

DAIHATSU F300

Service manual

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WFE90-00002

DAIHATSU

F300

STARTING SYSTEM

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WFE80-ST001

STARTING SYSTEM

OUTLINE OF STARTING SYSTEM

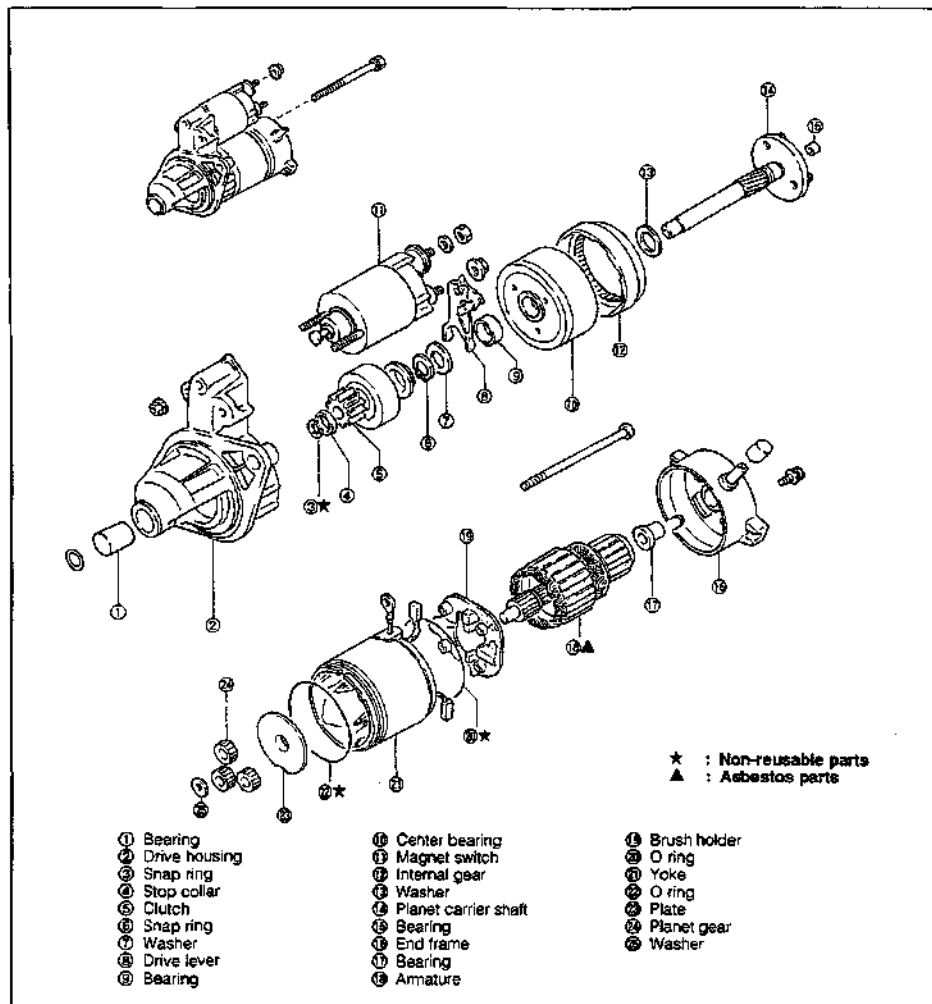
COMPONENTS

Planetary type starter motor

The starter motor consists of a solenoid switch and a motor.

The solenoid has electric contact points which supply power to the motor. The solenoid also has a shift fork (driver lever) which moves the motor pinion gear into mesh with the ring gear mounted on the engine flywheel.

The planetary type starter motor is a reduction type starter which employs a planetary gear set. Compared with the conventional starter motors, this reduction type starter motor features a smaller size and lighter weight.

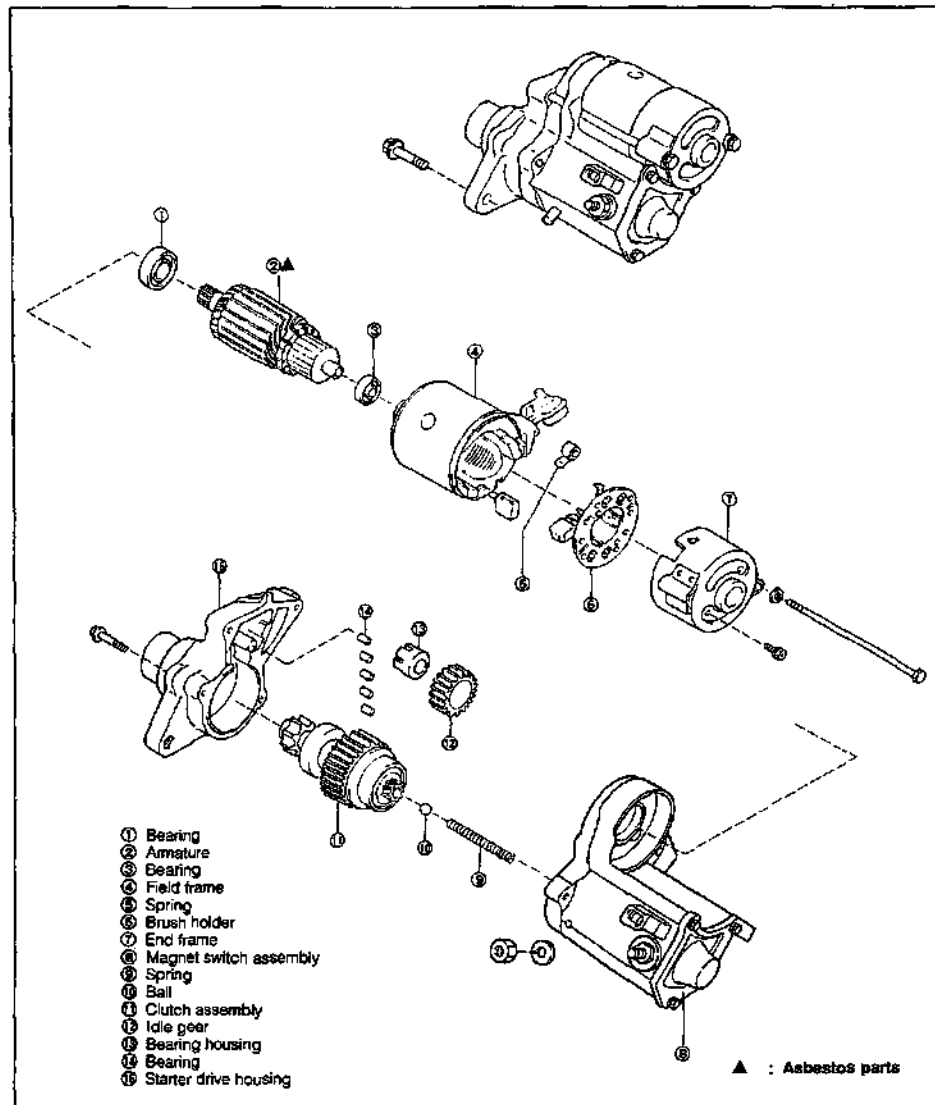


WFE90 ST002

STARTING SYSTEM

Reduction type starter motor

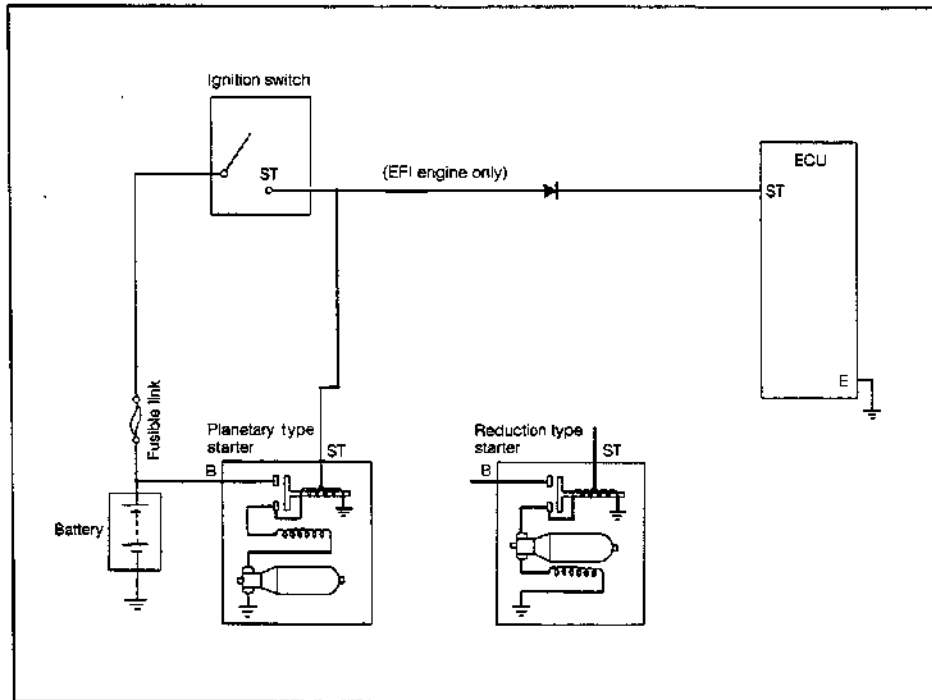
The starter consists of a solenoid switch and a motor. The power generated at the motor is transmitted to the clutch assembly through the idle gear. The rotation speed is reduced in accordance with the gear ratio between the drive gear provided at the motor and the clutch gear. On the other hand, the torque of the rotation increases.



WPB50-ST003

STARTING SYSTEM

STARTING SYSTEM CIRCUIT



WFE90-ST004

TROUBLE SHOOTING

Problem	Possible cause	Remedies
Engine will not crank.	Battery not fully charged. Battery cables loose, corroded or worn. Fusible link blown. Starter faulty. Ignition switch faulty.	Check specific gravity of battery electrolyte. Charge or replace battery. Repair or replace cables. Replace fusible link. Repair starter. Replace Ignition switch.
Engine cranks slowly.	Battery not fully charged. Battery cables loose, corroded or worn. Starter faulty.	Check specific gravity of battery electrolyte. Charge or replace battery. Repair or replace cables. Repair starter.
Starter keeps running.	Starter faulty. Ignition switch faulty. Short in wiring.	Repair starter. Replace Ignition switch. Repair or replace wiring.
Starter spins. - Engine will not crank.	Pinion gear teeth broken or faulty starter. Flywheel teeth broken.	Repair starter. Replace flywheel.

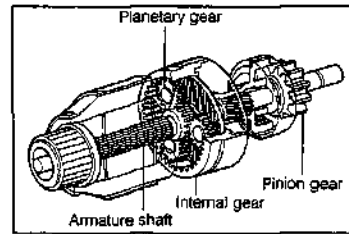
WFE90-ST005

STARTING SYSTEM

DESCRIPTION

PLANETARY TYPE STARTER MOTOR

The planetary starter motor consists of a motor and a solenoid switch in the same way as with the conventional starter motors. However, the starter motor of this type differs from the conventional type starter motors in that the revolution speed generated by the motor is reduced in the power train system.



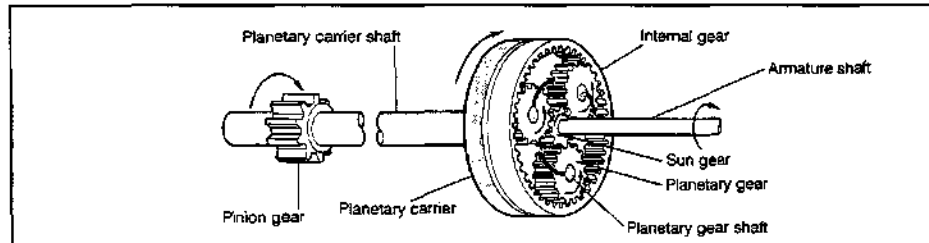
WFE90-ST006

The following shows how the torque is transmitted in the power train system.

(Here, it should be noted that the planetary carrier shaft, planetary carrier and planetary gear shaft is integral.)

- ① The torque generated at the armature is transmitted to the sun gear.
- ② When the sun gear is turned, the planetary gear turns on its own planetary gear shaft.
- ③ However, normally the internal gear is locked. As a result, the planetary gear starts to walk around the sun gear, while the planetary gear itself is turning on its own shaft.
- ④ In as much as the planetary carrier is integral with the planetary gear shaft, the torque is transmitted. Consequently, the pinion gear starts to turn.

Furthermore, the starter motor of this type is equipped with a buffer device. When an excessive torque is applied, it drives the internal gear, thereby relieving the excessive torque.

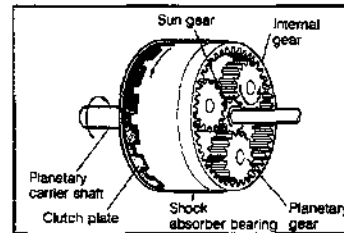


WFE90-ST007

The following is the description of the buffer function.

The internal gear is meshed with the clutch plate provided inside the shock absorber bearing.

Since the clutch plate is held in such a way that it turns when a torque in excess of a certain value is applied. Therefore, the internal gear turns together with the clutch plate, thereby reducing the torque excessively applied.



WFE90-ST008

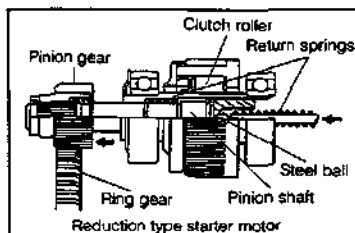
STARTING SYSTEM

PRINCIPLES OF OPERATION & STARTING SYSTEM CIRCUIT

The starter motor operations can be divided into two operations. When the ignition switch is set to the START (ST) position, current from the battery flows to the motor through the solenoid. The motor starts to rotate. Simultaneously, the pinion gear meshes with the ring gear by the magnetic force.

WP690-ST009

When the pinion gear has shifted into a complete mesh with the ring gear, the solenoid contact points are closed. The current from the battery now directly goes to the motor, thus supplying high power enough for cranking the engine. In this way, the starter motor begins cranking the engine.



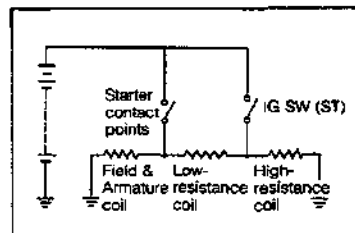
WP690-ST010

The solenoid is composed of two coils. One is a low-resistance coil which moves the shift fork (which corresponds to the pinion shaft in the case of the reduction type starter motor). The other is a high-resistance coil which retains the solenoid at the "start" position.

The low-resistance coil is connected to the battery ground through the motor brush (and armature coil) and field coil. The high-resistance coil is directly grounded to the solenoid case.

WP690-ST011

During the engine cranking, the solenoid is energized at the high-resistance coil alone. Since the low-resistance coil has the same potential at its both ends, no current flows. Consequently, the solenoid is retained at the "start" position by means of the high-resistance coil only. The right figure shows an equivalent circuit of the system.



WP690-ST012

STARTING SYSTEM

During the starting period, the low-resistance coil provides the solenoid with a large amount of current to move the shift fork or the pinion shaft. Afterward, however, it is no longer necessary to use a large amount of current to hold the solenoid. Therefore, the above-described circuit is employed in the starting system so as to prevent burning.

The plunger of the solenoid has two functions: One is to move the shift fork or the pinion shaft. The other is to close the electric contact points, which takes place simultaneously with the first function. For positive contact, the contact points are connected to the plunger through a spring.

When the ignition switch is set to the start (ST) position, current from the battery goes to the low-resistance coil, field coil and armature coils. As a result, the motor starts rotating. Simultaneously, the high-resistance coil is also energized. These two coils exert a drawing force on the plunger, thus making the plunger overcome the force of a spring (a spring which is provided to return the plunger and differs from the aforesaid spring provided at the contact points). The plunger then moves the shift fork or the pinion shaft strongly, thereby making the pinion gear mesh with the ring gear. Simultaneously, the starter contact points close and current is directly drawn from the battery. At this stage, the low-resistance coil has an equal potential at its both ends, as previously described. Hence, no current flows to the motor through the low-resistance coil.

After the engine has started, when the ignition switch is returned to the IG position, current to the solenoid is cut off. (See the NOTE.) The spring built in the solenoid returns the plunger, thereby opening the contact points and cutting the current to the motor. At the same time, the shift fork or the pinion shaft which has been pushing the pinion gear returns to the original position by means of the aforesaid spring force. Consequently, the pinion gear is disengaged and separated from the ring gear.

This pinion gear's separation from the ring gear can not be performed positively and assuredly by the spring at the pinion shaft alone. To achieve positive separation, a screw-shaped spline is provided at the pinion shaft gear. After start of the engine, the rotation speed of the ring gear continues to increase. Consequently, it becomes possible for the ring gear to drive the pinion gear.

At this point, owing to the screw-shaped spline, the pinion gear is moved in such a direction that it tends to disengage from the ring gear. On the other hand, this screw-shaped spline helps the pinion gear to be pushed and moved into mesh with the ring gear during the starting period.

NOTE:

- In fact, at this moment, the current to the solenoid goes to the starter contact points and passes in series through the low-resistance coil and the high-resistance coil. Consequently, electromagnet function continues and drawing forces are generated. However, the electromagnetic forces generated at the low-resistance and high-resistance coils counteract, for the winding direction of the coil is opposite to each other. As a result, no drawing force is produced.
- On the other hand, when the ignition switch is set to the ON (ST/ON) position, a parallel circuit is formed. The electromagnetic forces generated at both coils are in the same direction, resulting in an increased drawing force.
- Namely, the direction of the current at the low-resistance coil changes reversely when the ignition switch is switched between the ON and OFF states. (This explanation applies only to the instance when the ignition switch is changed from the ST position to the IG position.)

WFE30-ST015

STARTING SYSTEM

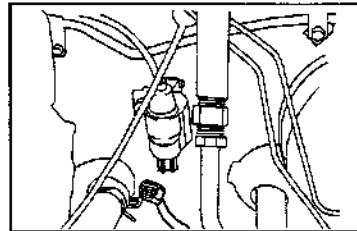
SERVICING INSTRUCTIONS OF STARTER

- (1) When connecting the starter terminal or battery terminal, perform positive tightening so as to avoid poor connection.
If poor connection should exist, it presents the hazard of serious danger that a large amount of current flowing during starter operation can overheat the poor connection.
- (2) When removing the starter, first disconnect the negative \ominus terminal of the battery. Then, disconnect the terminals (+B, ST) at the starter side. Since the battery voltage is always applied to the starter +B terminal, failure to observe this removing sequence may lead to battery short, which is extremely dangerous.
- (3) When installing the starter, install the starter in the clutch housing positively and be sure to tighten the attaching bolts to the specified torque. Improper installation can cause premature wear of the teeth of the pinion gear or ring gear and also can cause breakage of the clutch housing.

WPB90-ST014

IN-VEHICLE INSPECTION

- (1) Place the shift lever to the neutral position. Apply the parking brake lever.
- (2) Disconnect the ignition coil coupler so that the engine will not start.

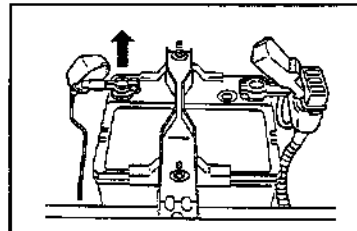


WPB90-ST015

- (3) Set the ignition switch to the ST position. Check to see if the engine cranks.
- (4) If the engine will not crank, perform the following checks.
 - Inspect the battery for damage. Charge the battery.
 - Perform harness continuity test.
- (5) If the starter motor still will not rotate even after the checks above have been performed, remove the starter motor and perform the unit check.

REMOVAL

- (1) Disconnect the ground cable terminal from the negative (-) terminal of the battery.

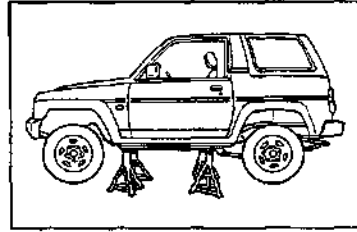


WPB90-ST016

WPB90-ST017

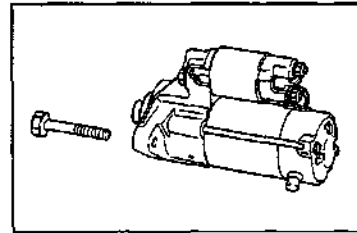
STARTING SYSTEM

- (2) Jack up the vehicle and support it with safety stands.



WFEBC-ST014

- (3) Disconnect the starter terminals ST and B from the starter.
(4) Remove the starter motor from the clutch housing.



WFEBC-ST015

STARTING SYSTEM

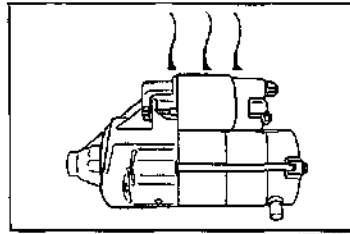
PLANETARY TYPE STARTER MOTOR UNIT CHECK OF PLANETARY TYPE STARTER MOTOR

CAUTION:

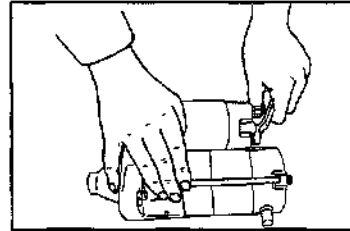
- Each of the following tests must be performed within three to five seconds. If you fail to observe this caution and the starter should be energized for more than this duration, the coil may be burnt out.

(1) Pull-in test

- ① Disconnect the lead wire from the magnetic switch terminal.

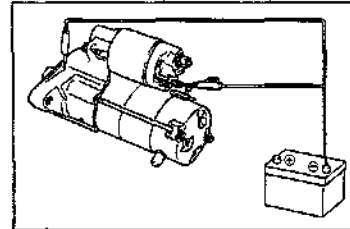


WPB30-ST022



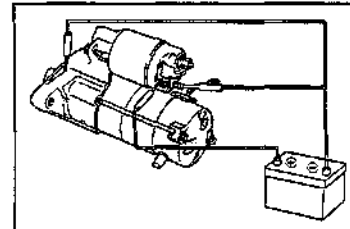
WPB30-ST021

- ② Connect the negative (-) terminal of the battery to the starter body and magnetic switch terminal.



WPB30-ST022

- ③ Connect the positive (+) terminal to the terminal ST. Ensure that the pinion is pushed outward. If the drive pinion fails to move out, replace the magnetic switch.

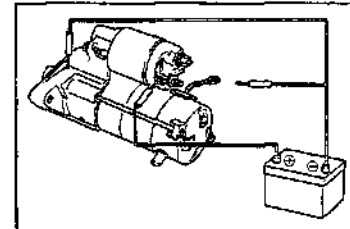


WPB30-ST023

(2) Hold-in test

After the check has been performed following the same procedure as with the pull-in test, disconnect the negative terminal of the magnetic switch terminal.

Ensure that the drive pinion is held in a pushed-out state. If the drive pinion fails to be held, replace the magnetic switch.



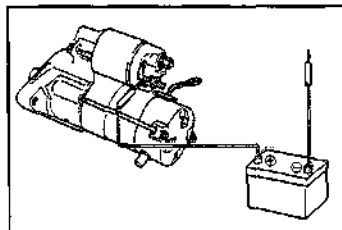
WPB30-ST024

STARTING SYSTEM

(3) Inspection of plunger return

After the check has been performed following the same procedure as with the hold-in test, disconnect the ground terminal of the starter body. Ensure that the drive pinion is drawn into the drive housing.

If the drive pinion fails to be drawn, replace the magnetic switch.



WP590-ST025

(4) No-load performance test

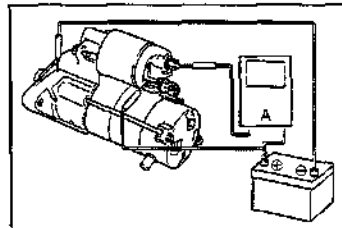
Connect the battery and an ammeter to the starter as shown in the right figure. Ensure that the starter rotates smoothly with the pinion moving out.

Measure the current the starter is drawing.

Specified Current: Less than 90A at 11.5V

NOTE:

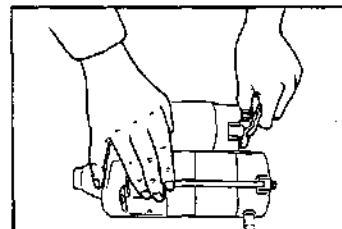
- Prior to the test, be sure to connect the lead wire to the magnetic switch.



WP590-ST026

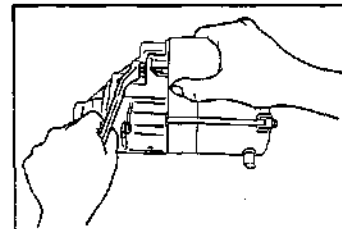
DISASSEMBLY OF PLANETARY TYPE STARTER MOTOR

(1) Disconnect the lead wire from the magnetic switch.



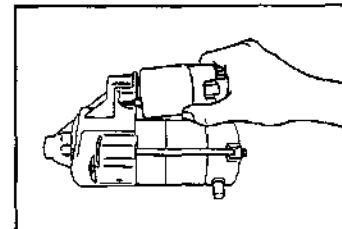
WP590-ST027

(2) Remove the attaching nut of the magnetic switch from the drive housing.



WP590-ST028

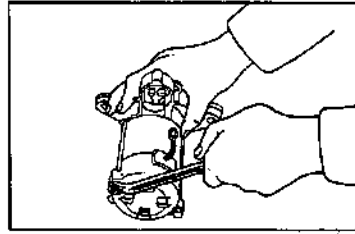
(3) Remove the magnetic switch from the drive housing.



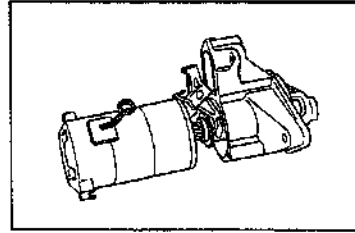
WP590-ST029

STARTING SYSTEM

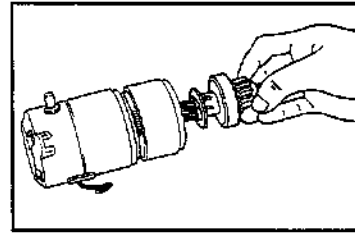
- (4) Remove the two through bolts from the commutator end frame.



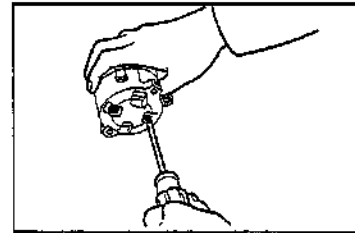
- (5) Remove the yoke with armature and the drive lever from the drive housing.



- (6) Separate the yoke with armature from the clutch with center bearing.
(7) Remove the "O" ring.



- (8) Remove the end frame cover by removing the two screws.

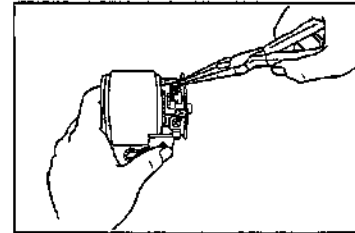


- (9) Remove the brushes from the brush holder by lifting the brush springs by means of nose pliers or the like.

NOTE:

- Care must be exercised not to damage the brushes during the removal.

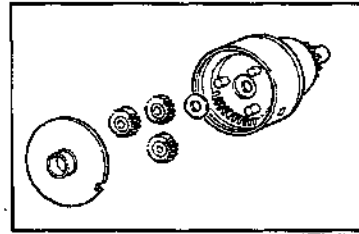
- (10) Then, remove the armature from the yoke.



STARTING SYSTEM

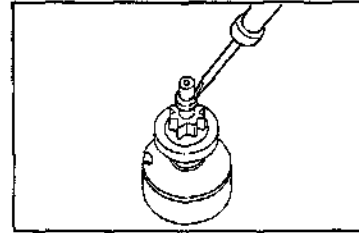
(11) Removal of planetary gear

- ① Remove the plate for starter armature.
- ② Remove the three planetary gears.
- ③ Remove the plate washer.



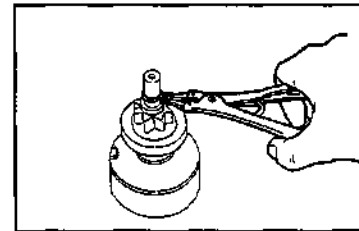
WPB90-ST035

(12) Remove the stop collar from the snap ring by tapping the collar with a screwdriver or the like placed on it.



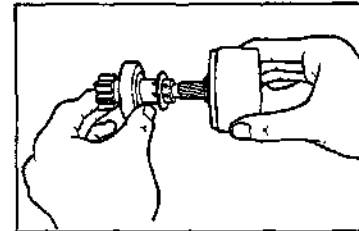
WPB90-ST036

(13) Detach the snap ring by prying it off with snap ring pliers. Then, remove the collar.



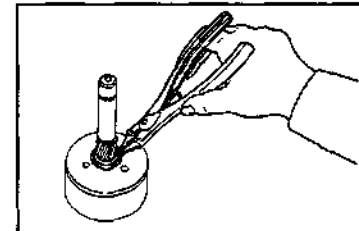
WPB90-ST037

(14) Remove the clutch.



WPB90-ST038

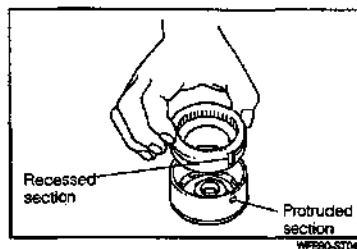
(15) Detach the snap ring. Separate the center bearing from the planetary carrier shaft.



WPB90-ST039

STARTING SYSTEM

- (16) Remove the internal gear by aligning the recessed section provided at the outer periphery of the internal gear with the protruded section provided at the inner periphery of the center bearing.

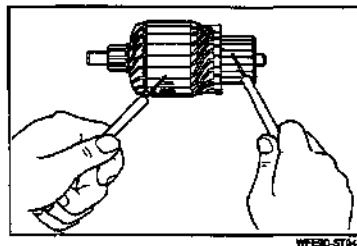


INSPECTION OF PLANETARY TYPE STARTER MOTOR

Check of armature

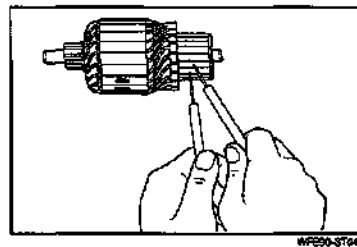
- (1) Check of armature insulation

Ensure that no continuity exists between the commutator and the armature coil, using an ohmmeter. If continuity exists, replace the armature.



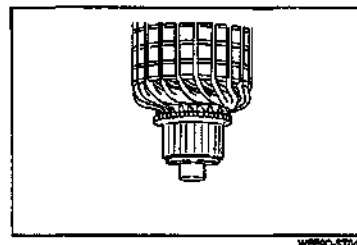
- (2) Check of commutator continuity

Check continuity between each adjacent segment of the commutator, using an ohmmeter. If no continuity exists between any adjacent segments, replace the armature.



Check of commutator

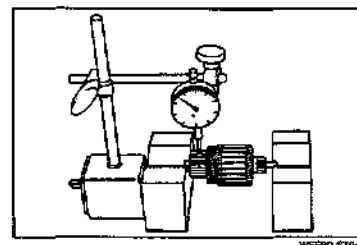
- (1) Check each contact surface of the commutator segments with the brushes for burning. If the surfaces are dirty or burnt, correct the commutator surfaces, using abrasive paper (No. 400) or a lathe.



- (2) Check of commutator for circle runout

Support the armature at its both ends on a Vee block. Check the commutator for circle runout, using a dial gauge. Circle Runout Limit: 0.05 mm

If the circle runout exceeds the allowable limit, turn down the commutator on a lathe. At this point, care must be exercised to ensure that the commutator diameter is not less than the minimum requirement diameter of 27 mm.



STARTING SYSTEM

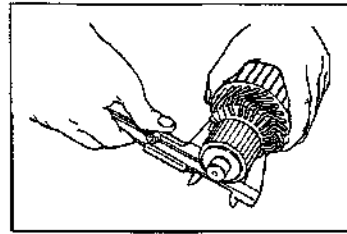
(3) Measurement of commutator diameter

Measure the commutator diameter by means of a micrometer or vernier calipers.

Standard Diameter: 28 mm

Minimum Diameter: 27 mm

If the commutator diameter is less than the minimum diameter, replace the armature.



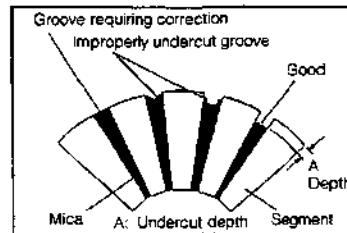
WP520-ST045

(4) Check of commutator undercut

Measure the insulator groove depth between commutator segments.

Minimum Depth: 0.2 mm

If the insulator groove depth becomes less than the limit value, replace the commutator.



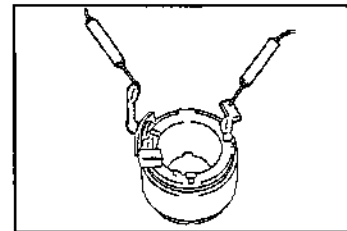
WP520-ST046

Check of field coil

(1) Field coil continuity test

Perform field coil continuity test at a point between the lead wire and the brush, using an ohmmeter.

If no continuity exists, replace the yoke.

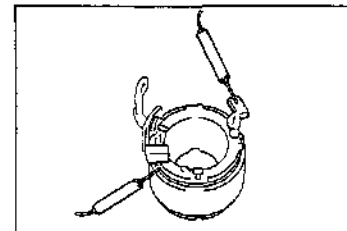


WP520-ST047

(2) Field coil short test

Perform field coil short test at a point between the brush and the yoke proper, using an ohmmeter.

If no continuity exists, replace the yoke.



WP520-ST048

Check of brushes

(1) Measurement of brush length

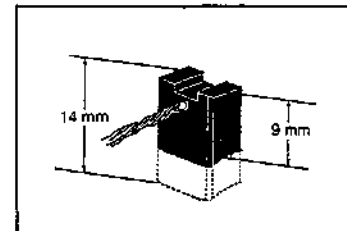
Measure the brush length, using vernier calipers.

Standard Length: 14 mm

Minimum Length: 9 mm

(2) Replacement of brush.

If the length is less than the minimum requirement, replace the brush holder or the yoke, as required.



WP520-ST049

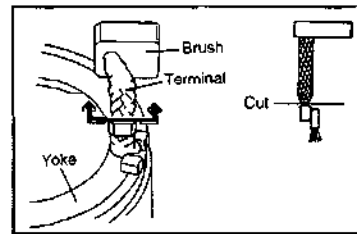
STARTING SYSTEM

(3) Procedure for brush replacement

- ① Cut the brush lead wire at the terminal side.

NOTE:

- Replacement can be made only for the two brushes at the yoke side (positive (+) side). The brush at the negative (-) side should be replaced together with the brush holder.



WPB90-ST050

- ② Remove welding traces with a file or the like to correct the brush terminal to the specified dimensions.

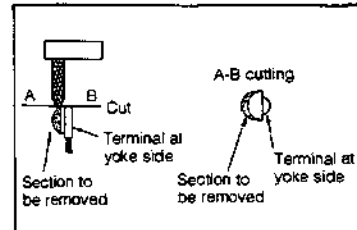
Specified Dimensions:

Thickness: 1.5 mm - 1.7 mm

Width: 5 mm

NOTE:

- Be sure to remove the section of the brush terminal as indicated in the right figure. Since the section to be removed is narrow, be very careful not to damage the field coil.

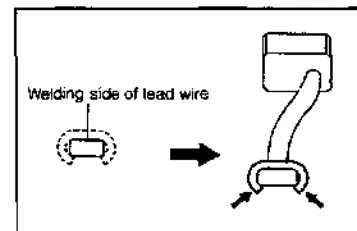


WPB90-ST051

- ③ Stack the plate section of a replacement brush onto the welding side of the lead wire. Make pressure connection over the overlaid section by pinching it with pliers.

NOTE:

- Be sure to take out the brush lead wire in the correct direction.

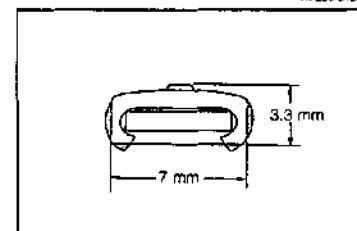


WPB90-ST052

- ④ Solder the pressure connection section. Correct the section, using a file or the like, so that the section conforms to the dimensions, as indicated in the right figure.

NOTE:

1. When performing the soldering, heat the section to be soldered thoroughly. Be very careful not to allow any solder to flow into the positive side lead wire.
2. Be sure to allow solder in a sufficient amount to flow into the inside of the plate.
3. Ensure that no solder oozes to the field side.



WPB90-ST053

Check of brush holder

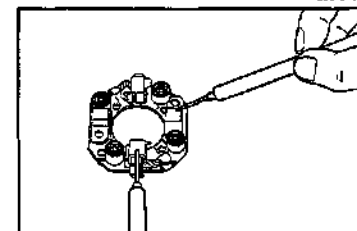
- (1) Check of brush holder for insulation

Measure the insulation between the positive and negative terminals of the brush holder, using an ohmmeter.

Insulation Resistance: 0.1 MΩ or more

- (2) Replacement of brush holder.

If the insulation resistance is less than the specification, replace the brush holder.

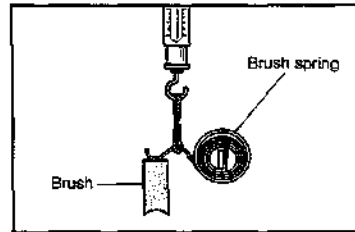


WPB90-ST054

STARTING SYSTEM

Check of brush spring

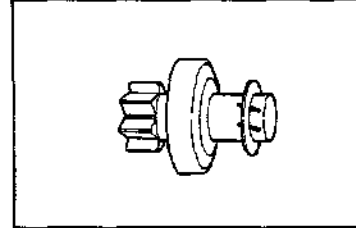
Measure the brush spring tension, using a spring scale.
Standard Tension: 15.7 N (1.6 kgf)



WPB30-ST055

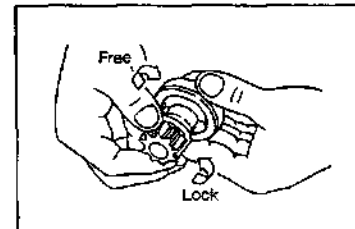
Check of clutch

- (1) Inspection of pinion gear and spline teeth
Check the teeth of the pinion gear and spline for wear or damage.
If the teeth exhibit any damage, replace the clutch. Also, inspect the flywheel ring gear for wear or damage.



WPB30-ST056

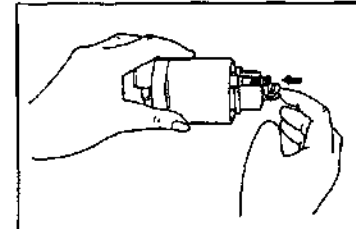
- (2) Check of starter clutch
While holding the clutch, turn the pinion clockwise. Ensure that the pinion turns smoothly.
Turn the pinion counterclockwise. Ensure that the pinion is locked.
If the check results are unsatisfactory, replace the starter clutch.



WPB30-ST057

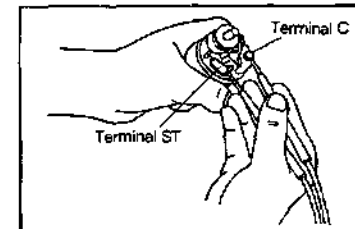
Check of magnetic switch

- (1) Plunger check
Push in the plunger with your fingers and release your fingers. Ensure that the plunger returns quickly to the original position. If the plunger exhibits poor returning or fails to return, replace the magnetic switch.



WPB30-ST058

- (2) Pull-in coil open circuit test
Using an ohmmeter, ensure that continuity exists between the terminal ST and terminal C.
If no continuity exists, replace the magnetic switch.



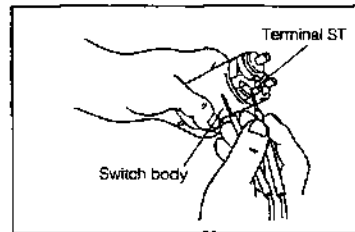
WPB30-ST059

STARTING SYSTEM

(3) Hold-in coil open circuit test

Ensure that continuity exists between the terminal ST and the switch body.

If no continuity exists, replace the magnetic switch.



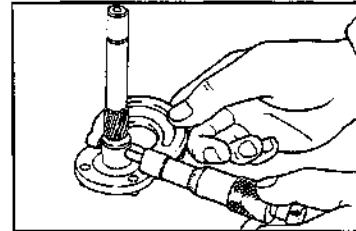
WPB30-ST000

Check of bearing

Center bearing

- (1) Measure the outer diameter of the center bearing sliding section of the planetary carrier shaft.

Specified Value: 15 mm



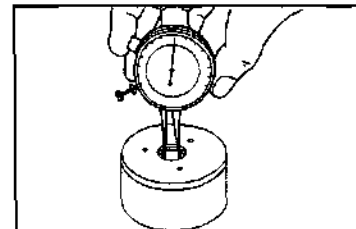
WPB30-ST001

- (2) Measure the inner diameter of the center bearing so as to determine the clearance.

Specified Value: 0.04 mm

Allowable Limit: 0.15 mm

If the clearance exceeds the allowable limit, replace the oilless bearing or the planetary carrier shaft.



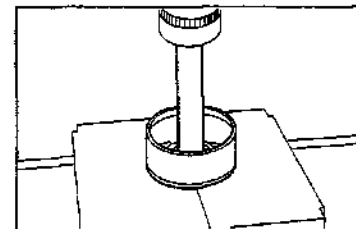
WPB30-ST002

(3) Bearing replacement

- ① Remove the bearing, using a suitable tool in combination with a press or the like.

NOTE:

- When pulling out the bearing, be sure to remove it from the inside.

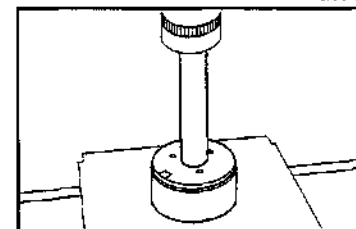


WPB30-ST003

- ② Install the bearing, using a suitable tool in combination with a press or the like.

NOTE:

- When installing the bearing, be sure to install it from the outside.

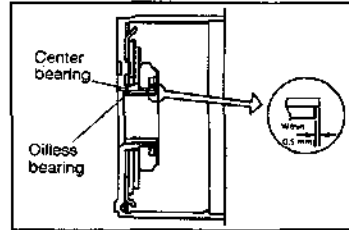


WPB30-ST004

STARTING SYSTEM

NOTE:

- The bearing should be driven into position in such a way that the bearing is recessed within 0.5 mm from the edge of the center bearing.

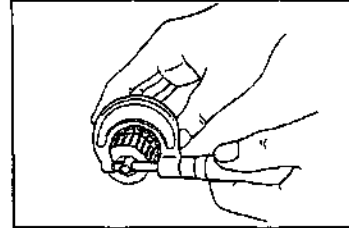


WF830-ST066

End frame bearing

- Measure the outer diameter of the end frame sliding section of the armature shaft.

Specified Value: 7 mm



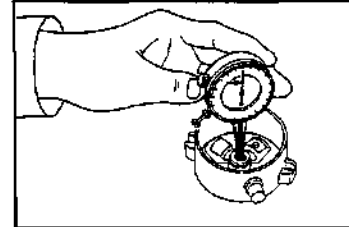
WF830-ST065

- Measure the inner diameter of the end frame bearing so as to determine the clearance.

Specified Value: 0.04 mm

Allowable Limit: 0.15 mm

If the clearance exceeds the allowable limit, replace the oilless bearing or the armature.



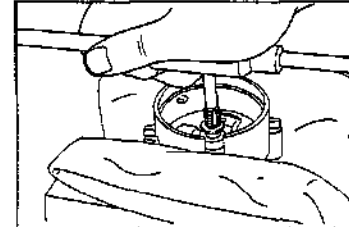
WF830-ST067

- Bearing replacement

- Remove the bearing, using a tap having an outer diameter of 8 mm.

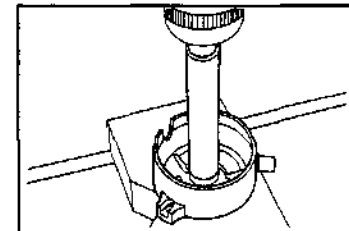
NOTE:

- Be certain to clamp the end frame in a vise with a cloth interposed so that no scratch may be made on the end frame.



WF830-ST068

- Install a new bearing, using a suitable tool in combination with a press or the like.



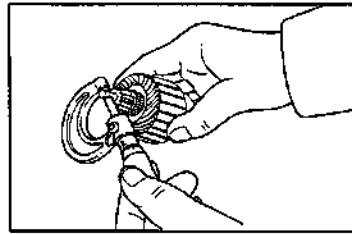
WF830-ST069

STARTING SYSTEM

Planetary carrier shaft bearing

- (1) Measure the outer diameter of the front sliding section of the armature shaft.

Specified Value: 7 mm



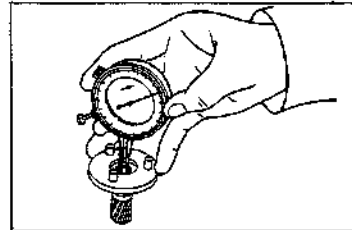
WPES0-ST070

- (2) Measure the inner diameter of the planetary carrier shaft bearing so as to determine the clearance.

Specified Value: 0.04 mm

Allowable Limit: 0.15 mm

If the clearance exceeds the allowable limit, replace the oilless bearing or the armature.



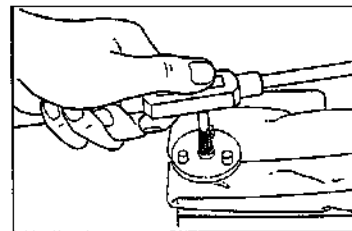
WPES0-ST071

- (3) Bearing replacement

- ① Remove the bearing, using a tap having an outer diameter of 8 mm.

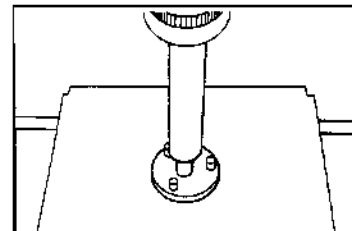
NOTE:

- Be certain to clamp the planetary carrier shaft in a vice with a cloth interposed so that no scratch be made on the planetary carrier shaft.



WPES0-ST072

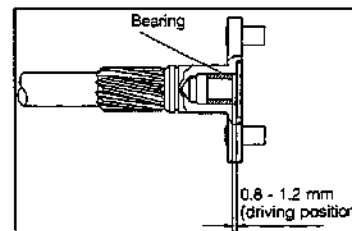
- ② Install a new bearing, using a suitable tool in combination with a press or the like.



WPES0-ST073

NOTE:

- The bearing should be driven into the position, as indicated in the right figure.



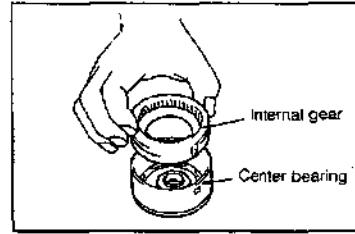
WPES0-ST074

ASSEMBLY OF PLANETARY TYPE STARTER MOTOR

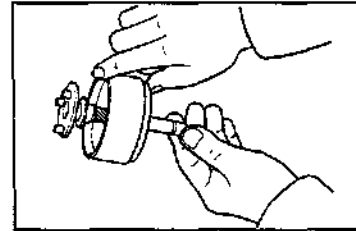
NOTE:

- Use high-temperature grease to lubricate the bearings and sliding parts when assembling the starter motor.

- (1) Install the internal gear by aligning the recessed section provided at the outer periphery of the internal gear with the protruded section provided at the inner periphery of the center bearing.
- (2) Put the plate washer onto the planetary carrier shaft. Then, install the center bearing to the planetary carrier shaft.

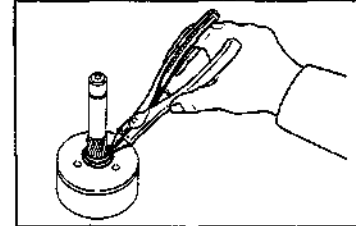


WP290-ST080



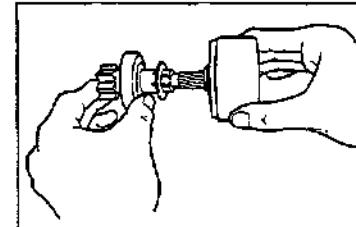
WP290-ST081

- (3) Install the plate washer in place. Install the snap ring.



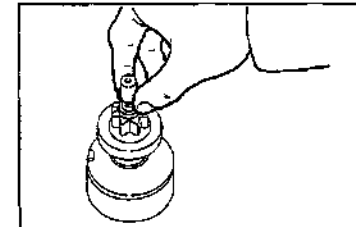
WP290-ST082

- (4) Install the clutch.



WP290-ST083

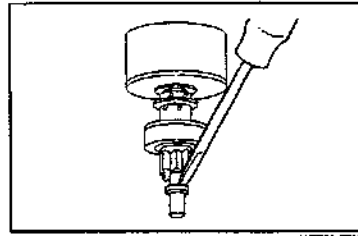
- (5) Install the stop collar and a new snap ring. Compress the snap ring, using a vise or the like.



WP290-ST084

STARTING SYSTEM

- (6) Tap the collar so that it may come onto the snap ring, using a screwdriver.

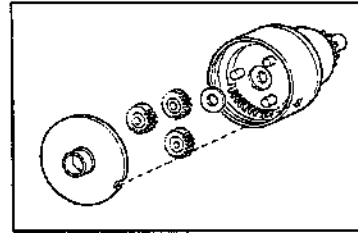


- (7) Installation of planetary gear

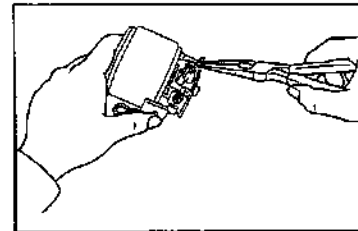
- ① Install the plate washer.
- ② Install the three planetary gears.
- ③ Install the plate for starter armature.

NOTE:

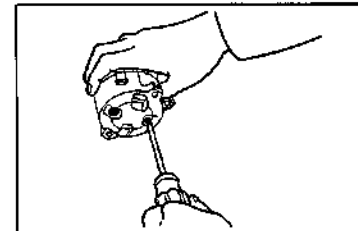
- Be certain to install the plate, aligning with the mate mark on the center bearing.



- (8) Install the yoke to the armature. Install the brushes to the brush holder while lifting the brushes by means of nose pliers or the like.



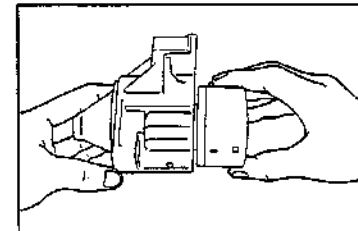
- (9) Install the commutator end frame, together with a new "O" ring, to the yoke by means of the two screws.



- (10) Install the drive lever and the clutch with center bearing to the drive housing.

NOTE:

- Apply high-temperature grease to the sliding section of the drive lever.
- Make sure to align the mate mark of the drive housing with that of the yoke during the assembly.

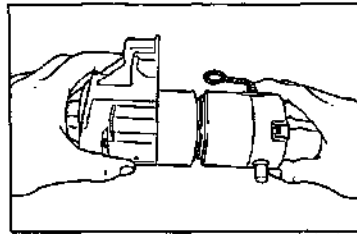


STARTING SYSTEM

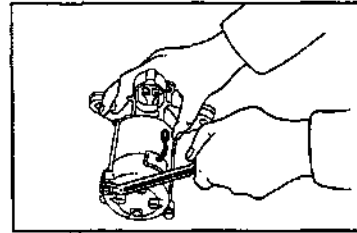
- (11) Install the armature with yoke and a new "O" ring to the drive housing.

NOTE:

- Make sure to align the mate mark of the center bearing with that of the yoke during the assembly.



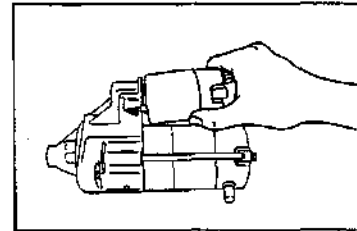
- (12) Install the two through-bolts.



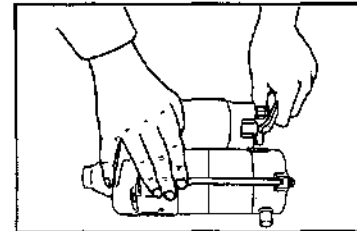
- (13) While hooking the magnetic switch over the drive lever, install the magnetic switch onto the drive housing. Secure the magnetic switch with the two nuts.

NOTE:

- Be sure to install the rubber boot in the spring section securely.



- (14) Connect the lead wire to the magnetic switch.



STARTING SYSTEM

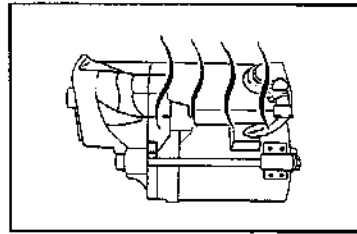
REDUCTION TYPE STARTER MOTOR UNIT CHECK OF REDUCTION TYPE STARTER MOTOR

CAUTION:

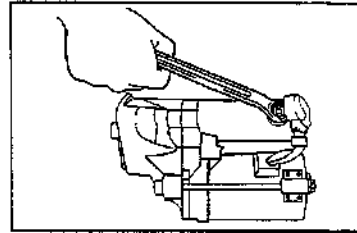
- Each of the following tests must be performed within three to five seconds. If you fail to observe this caution and the starter is energized for more than this duration, the coil may be burnt out.

(1) Pull-in Test

- ① Disconnect the lead wire from the magnetic switch terminal.

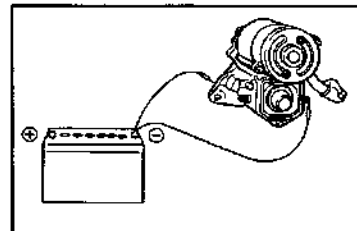


WPB30-ST004



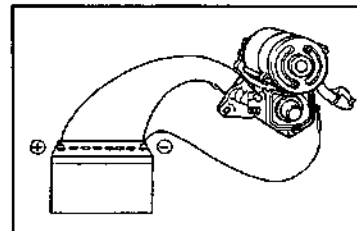
WPB30-ST005

- ② Connect the negative (-) terminal of the battery to the starter body and magnetic switch terminal.



WPB30-ST006

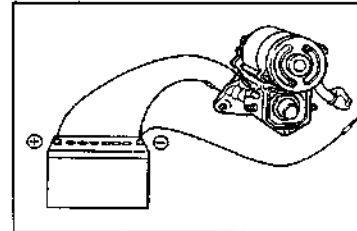
- ③ Connect the positive (+) terminal to the terminal ST. Ensure that the pinion is pushed outward. If the drive pinion fails to move out, replace the magnetic switch.



WPB30-ST007

(2) Hold-in Test

After the check has been performed following the same procedure as with the pull-in test, disconnect the negative terminal of the magnetic switch terminal. Ensure that the drive pinion is held in a pushed-out state. If the drive pinion fails to be held, replace the magnetic switch.



WPB30-ST008

STARTING SYSTEM

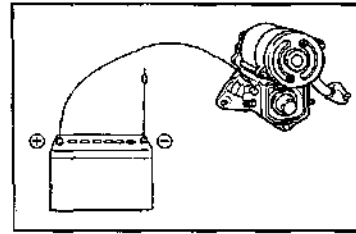
(3) Inspection of Plunger Return

After the check has been performed following the same procedure as with the hold-in test, disconnect the ground terminal of the starter body. Ensure that the drive pinion is drawn into the drive housing.

If the drive pinion fails to be drawn into the drive housing, replace the clutch assembly and return spring.

NOTE:

- Connect the lead wire to the magnetic switch terminal after inspection is carried out.



WP820-ST099

(4) No-load Performance Test

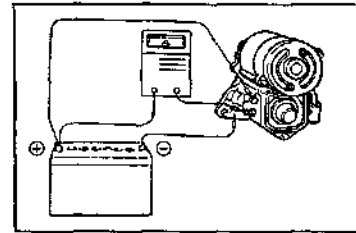
Connect the battery and an ammeter to the starter as shown in the right figure. Ensure that the starter rotates smoothly with the pinion moving out.

Measure the current the starter is drawing:

Specified Current: Less Than 90A at 11.5V

NOTE:

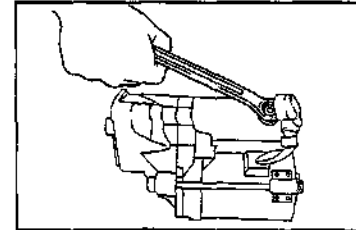
- Prior to the test, be sure to connect the lead wire to the magnetic switch.



WP820-ST100

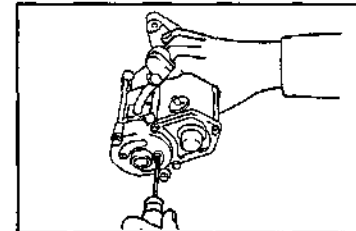
DISASSEMBLY OF REDUCTION TYPE STARTER MOTOR

(1) Disconnect the lead wire from the magnetic switch.



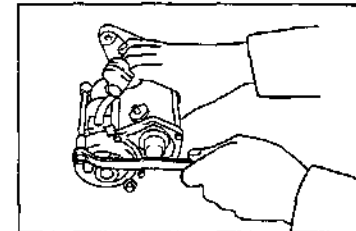
WP820-ST101

(2) Remove the brush holder retaining screws from the commutator end frame.



WP820-ST102

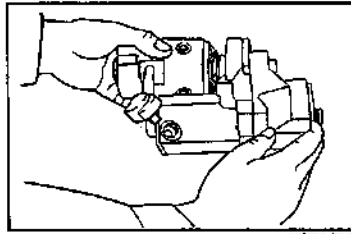
(3) Remove the two through bolts from the commutator end frame.



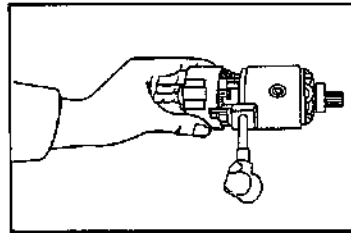
WP820-ST103

STARTING SYSTEM

- (4) Remove the yoke together with the armature from the drive housing.



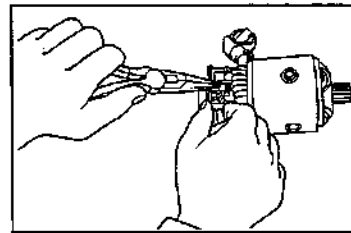
- (5) Remove the commutator end frame.



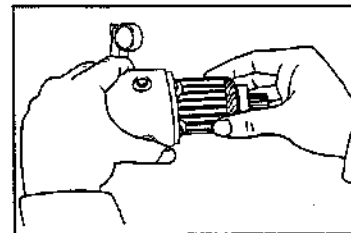
- (6) Remove the brushes from the brush holder by means of nose pliers or the like.

NOTE:

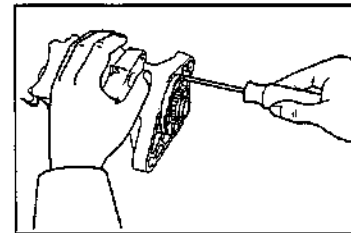
- Care must be exercised not to damage the brushes during the removal.



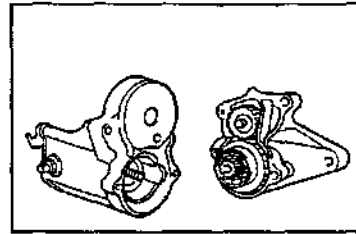
- (7) Remove the armature from the yoke, being very careful not to damage the brushes.



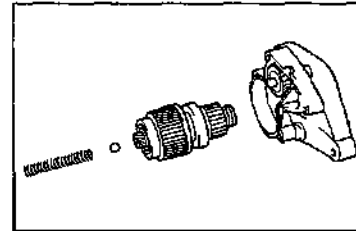
- (8) Remove the starter switch assembly from the drive housing by removing the two screws.



- (9) Remove the clutch assembly from the drive housing.
- (10) Remove the seal ball from the clutch assembly.
- (11) Remove the return spring from the magnet switch assembly.



WP50-ST109

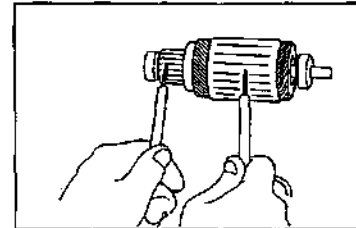


WP50-ST110

INSPECTION

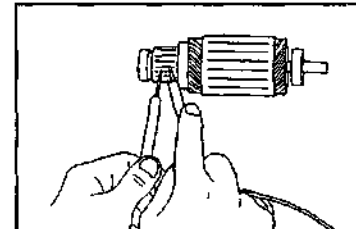
Check of armature

- (1) Check of armature insulation
Ensure that no continuity exists between the commutator and the armature coil, using an ohmmeter.
If continuity exists, replace the armature.



WP50-ST111

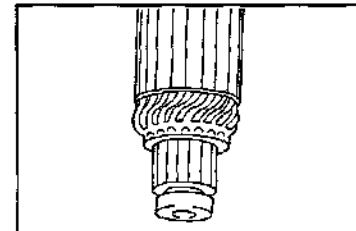
- (2) Check of commutator continuity
Check continuity between each adjacent segment of the commutator, using an ohmmeter.
If no continuity exists between any adjacent segments, replace the armature.



WP50-ST112

Check of commutator

- (1) Check each contact surface of the commutator segments with the brushes for burning.
If the surfaces are dirty or burnt, correct the commutator surfaces, using abrasive paper (No. 400) or a lathe.

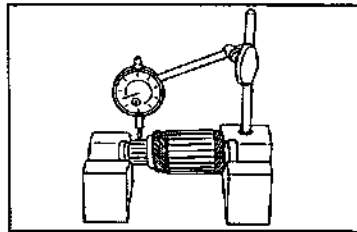


WP50-ST113

STARTING SYSTEM

- (2) Check of commutator for circle runout
Support the armature at its both ends on a Vee block.
Check the commutator for circle runout, using a dial gauge.
Circle Runout Limit: 0.05 mm (0.002 inch)

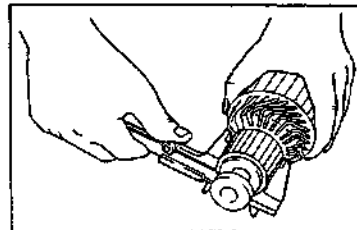
If the circle runout exceeds the allowable limit, turn down the commutator on a lathe.



WPBQ-ST114

- (3) Measurement of commutator diameter
Measure the commutator diameter by means of a micrometer or vernier calipers.
Standard Diameter: 30.0 mm
Minimum Diameter: 29.0 mm

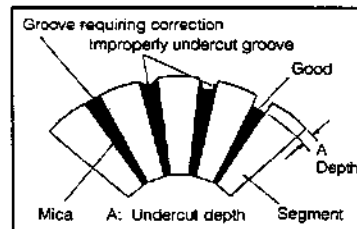
If the commutator diameter is less than the minimum diameter, replace the armature.



WPBQ-ST115

- (4) Check of commutator undercut
Measure the insulator groove depth between the commutator segments.
Minimum Depth: 0.2 mm

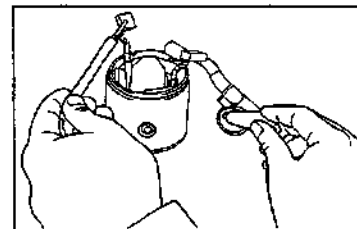
If the insulator groove depth becomes less than the limit value, replace the commutator.



WPBQ-ST116

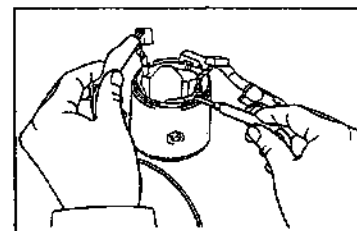
Check of field coil

- (1) Field coil continuity test
Perform field coil continuity test at a point between the lead wire and the brush, using an ohmmeter.
If no continuity exists, replace the yoke.



WPBQ-ST117

- (2) Field coil short test
Perform field coil short test at a point between the brush and the yoke proper, using an ohmmeter.
If continuity exists, replace the yoke.



WPBQ-ST118

Check of brushes

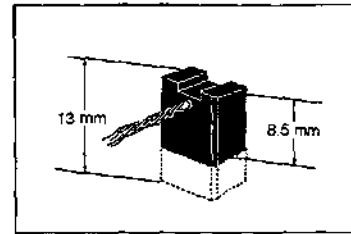
Measurement of brush length

Measure the brush length, using vernier calipers.

Standard Length: 13.0 mm

Minimum Length: 8.5 mm

If the length is less than the minimum requirement, replace the brush holder or the yoke, as required.



WPB30-ST11

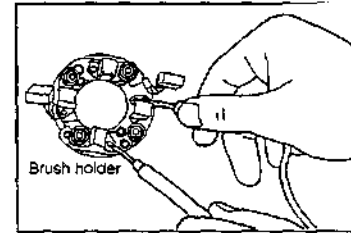
Check of brush holder

Check of brush holder for insulation

Measure the insulation between the positive and negative terminals of the brush holder, using an ohmmeter.

Insulation Resistance: 10 MΩ or more

If the insulation resistance is less than the specification, replace the brush holder.



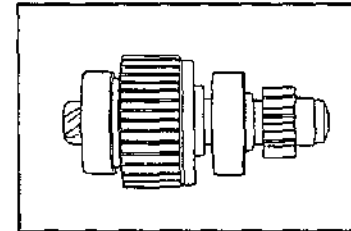
WPB30-ST120

Inspection of clutch

(1) Inspection of pinion gear and spline teeth

Check the teeth of the pinion gear and spline for wear or damage.

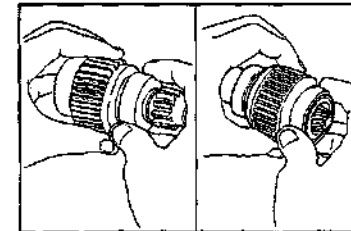
If the teeth exhibit any damage, replace the clutch. Also, inspect the flywheel ring gear for wear or damage.



WPB30-ST121

(2) Check of bearing

Lightly turn the bearing hand. Ensure that the bearing turns smoothly.



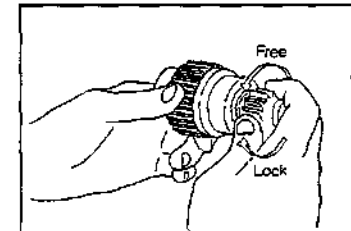
WPB30-ST122

(3) Check of starter clutch

While holding the clutch, turn the pinion clockwise. Ensure that the pinion turns smoothly.

Turn the pinion counterclockwise. Ensure that the pinion is locked.

If the check results are unsatisfactory, replace the starter clutch.



WPB30-ST123

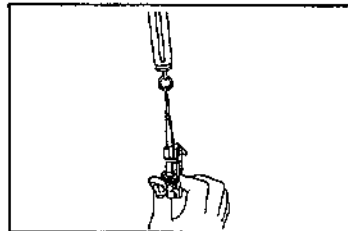
STARTING SYSTEM

Check of brush spring

Measure the brush spring tension, using a spring scale.

Tension with Spring Installed: 17.51 - 23.69 N
(1.785 - 2.415 kgf)

If the spring tension is less than the specification, replace the spring.

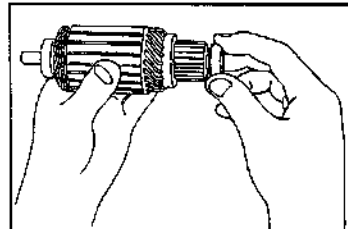


WFE90-ST0124

Inspection of bearings

(1) Inspection of bearings

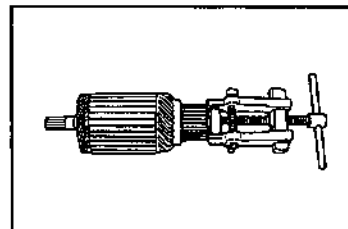
Turn the bearing while applying force to it by your hand. Ensure that the bearing turns smoothly. If the bearing fails to turn smoothly, replace the bearing.



WFE90-ST125

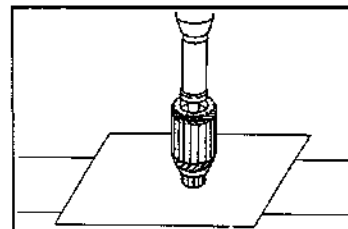
(2) Replacement of bearings (Only when bearing is faulty.)

① Remove the bearing, using an armature bearing puller.



WFE90-ST126

② Press the bearing into the armature shaft, using a press in conjunction with the suitable tool.

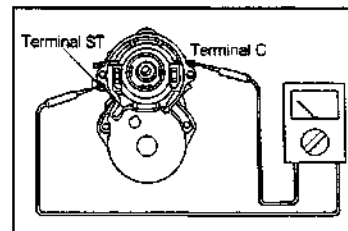


WFE90-ST127

Check of magnetic switch

(1) Pull-in coil test

Using an ohmmeter, ensure that continuity exists between the terminal ST of the starter and the terminal C. If no continuity exists, replace the magnetic switch.

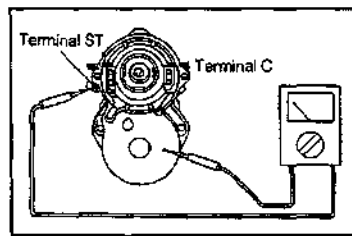


WFE90-ST128

STARTING SYSTEM

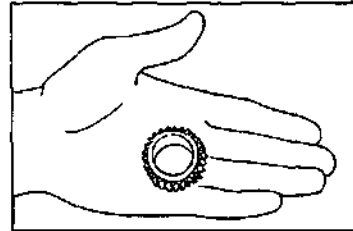
(2) Hold-in coil test

Ensure that continuity exists between the terminal ST of the magnetic switch and the switch body.
If no continuity exists, replace the magnetic switch.

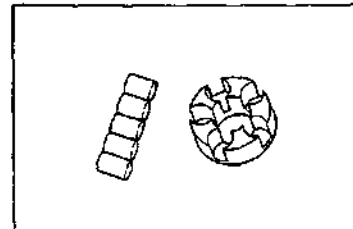


Inspection of gears

- (1) Inspect the starter idle gear for damage or wear.
Replace the gear which exhibits damage or wear.



- (2) Inspect the starter idle gear bearing and bearing housing for damage or wear.
Replace the clutch or retainer, as required.

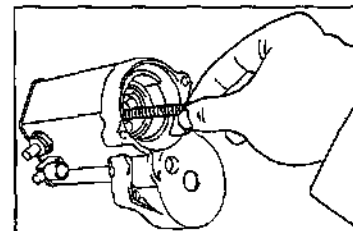


ASSEMBLY OF REDUCTION TYPE STARTER MOTOR

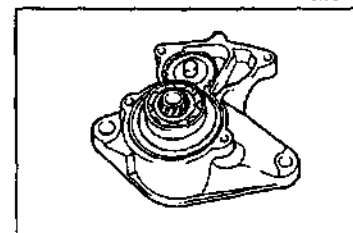
NOTE:

- Use high-temperature grease to lubricate the bearings and gears when assembling the starter.

- (1) Install the return spring in the starter switch assembly.

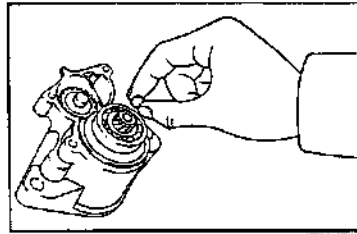


- (2) Assemble the clutch housing, idle gear and the clutch in the starter drive housing.



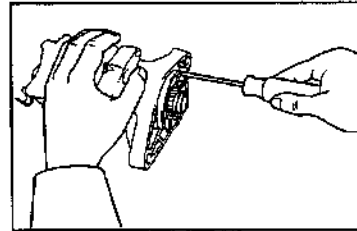
STARTING SYSTEM

(3) Fit the steel ball in the starter clutch assembly.



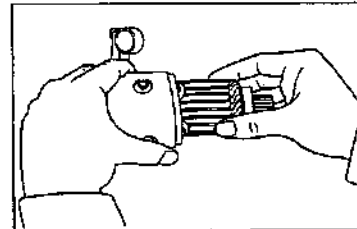
WPBX-ST134

(4) Install the starter magnetic switch assembly in the starter drive housing. Secure the switch assembly with the two screws.



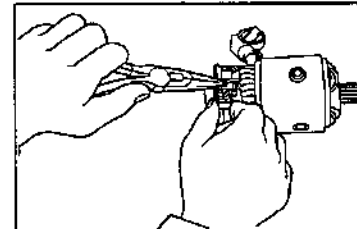
WPBX-ST135

(5) Insert the armature into the yoke.



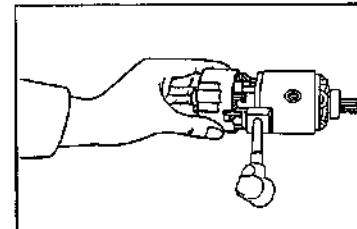
WPBX-ST136

(6) While the brush holder is held in a raised state by means of a screwdriver or nose pliers, insert the brushes.



WPBX-ST137

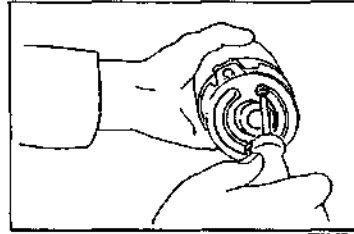
(7) Install the commutator end frame to the yoke.



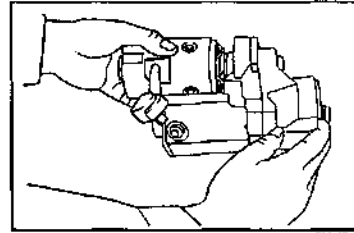
WPBX-ST138

STARTING SYSTEM

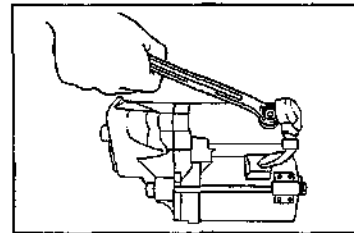
- (8) Install the brush holder on the end frame, using the two screws.



- (9) Install the yoke on the drive housing. Make sure that the cut-out marks are aligned with each other. Secure the yoke with the two through bolts.



- (10) Connect the lead wire to the magnetic switch terminal.

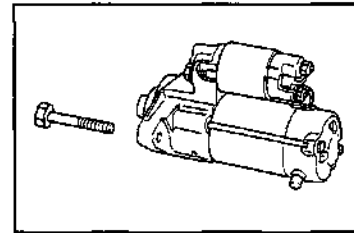


INSTALLATION

- (1) Install the starter motor to the clutch housing.
(2) Tighten the attaching bolts of the starter motor to the specified torque.

Tightening Torque: 5.0 - 7.0 kg-m
(36.2 - 50.6 ft-lb, 49.0 - 68.6 N-m)

- (3) Connect the starter terminals B and ST of the alternator wire to the starter.
(4) Install the engine undercover.
(5) Jack up the vehicle. Remove the safety stands from the vehicle. Then, remove the jack.
(6) Connect the ground cable terminal to the negative (-) terminal of the battery.



DAIHATSU

F300

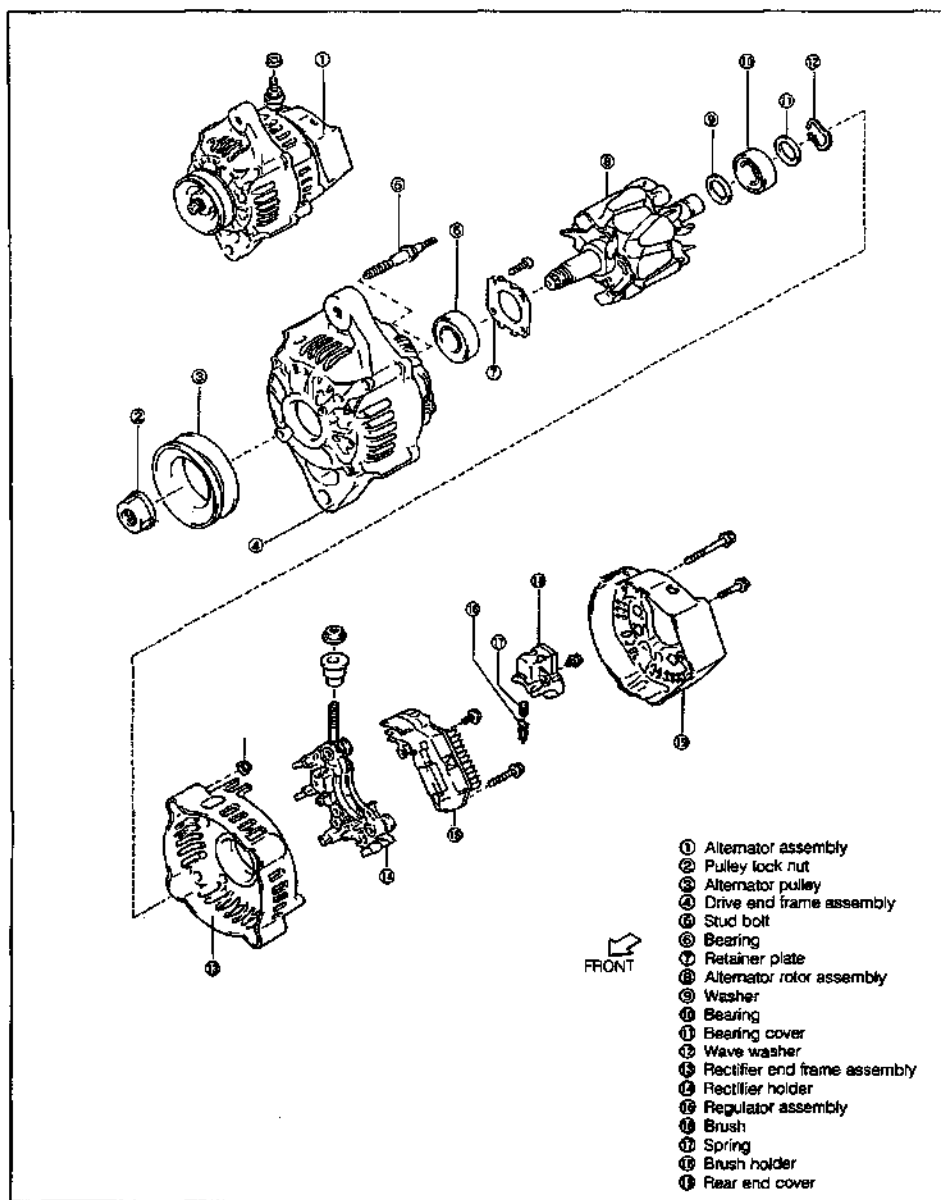
CHARGING SYSTEM

1. COMPONENTS	CH- 2
2. CHARGING SYSTEM CIRCUIT	CH- 3
3. TROUBLE SHOOTING	CH- 3
4. DESCRIPTION	CH- 4
5. IN-VEHICLE INSPECTION	CH- 7
6. REMOVAL	CH- 8
7. DISASSEMBLY	CH- 9
8. INSPECTION	CH-11
9. ASSEMBLY	CH-17
10. INSTALLATION	CH-20

WPE30-CH201

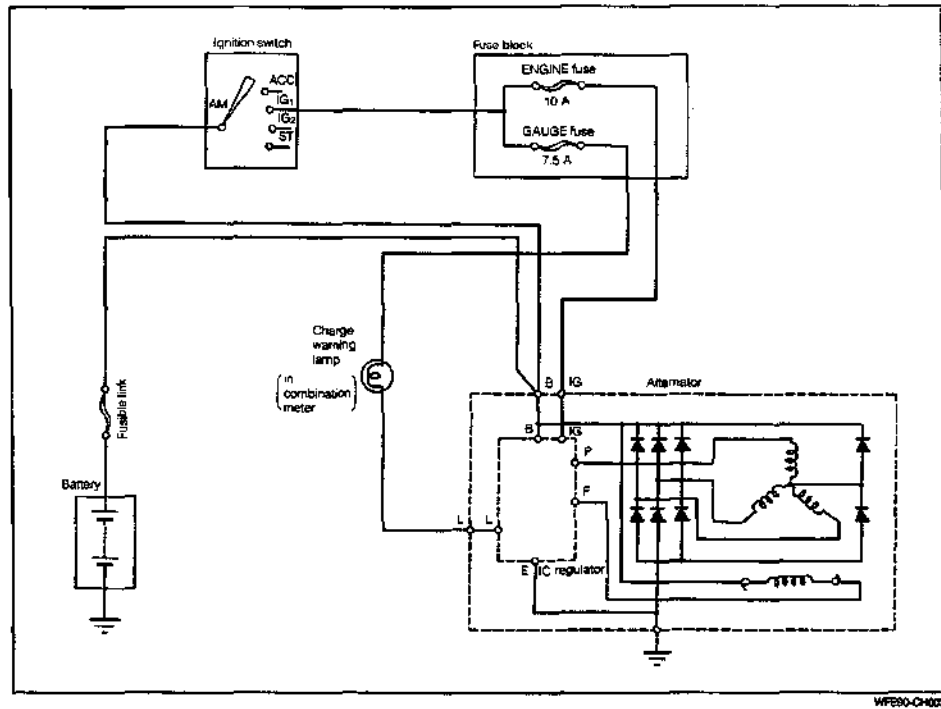
CHARGING SYSTEM

1. COMPONENTS



WP530-CH202

2. CHARGING SYSTEM CIRCUIT



3. TROUBLE SHOOTING

Problem	Possible causes	Remedies
Charge warning lamp will not glow even if ignition switch is turned ON.	Fuse blown Lamp bulb burnt Poor connection of wiring Open wire IC regulator faulty	Check gauge fuse. Replace bulb. Repair poor connection of wiring. Repair or replace. Replace regulator assembly.
Charge warning lamp will not go out even if engine has started.	Drive belt loose or worn Battery cables loose, corroded or worn Fuse blown Fusible link blown IC regulator or alternator faulty Wiring faulty	Adjust or replace. Repair or replace cables. Check gauge fuse. Replace fusible link. Check charging system. Repair or replace.

WFE20-CH204

CHARGING SYSTEM

4. DESCRIPTION

The charging device consists of an alternator and a regulator. The alternator produces alternating current (AC), which is converted to direct current (DC) by a rectifier. The battery supplies power for operating the starter as well as power required while the engine is stopped. The alternator recharges the battery so as to maintain it in an operational state at all times. The alternator also furnishes power for the electric equipment.

Electricity is produced when a magnet is moved in the vicinity of a coil. When the magnet is getting close to the coil, voltage is produced in one direction. However, when the magnet is leaving the coil, the direction of the voltage changes. This type of current is generally called alternating current, for the direction of the current is alternating.

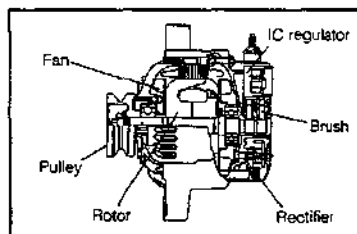
The main purpose of a generator for motor vehicles is to charge the battery. Hence, a generator which produces alternating current is not suited for this purpose. It is, therefore, necessary to convert alternating current to direct current. As semiconductor technology has advanced, today it has become possible to convert alternating current to direct current at a low cost. Consequently, alternators (AC generators) have been commonly used. The following are advantages of alternators compared with DC generators.

- (1) Compact design, light weight and remarkable vibration-resistant characteristics
- (2) Capable of withstanding high-speed rotation, quick acceleration and deceleration.
- (3) Being endurable under severe environment prevailing with dirt, dust and moisture, etc.
- (4) Having a fewer number of consuming parts and being easy to repair

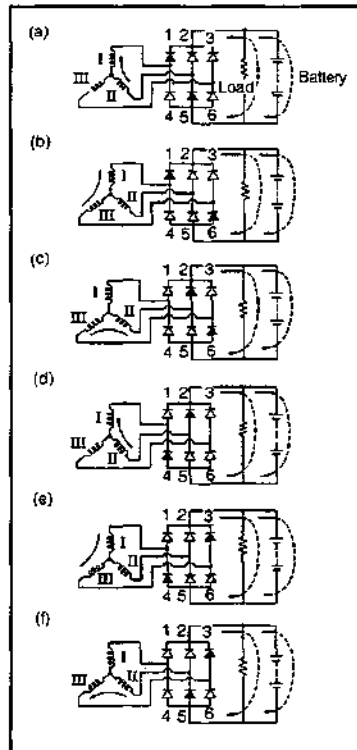
The alternator has three pairs of stator coils and rotor (coil) and produces three-phase current. The alternator employs six rectifiers, which performs three-phase full-wave rectification. The generated voltage (electromotive force) is in proportion to the strength of the magnetic field (magnet). This means that the voltage is proportional to the current of the rotor coil and to the rotation speed, i.e. the moving speed of the magnet.

The generated voltage varies as the engine revolution speed of the vehicle changes. It is, therefore, necessary to regulate the voltage so that the battery can be charged. For this purpose, the current of the rotor coil is regulated, thereby producing a regulated generator voltage. To achieve this operation, a regulator has been employed.

The regulator is of an IC (integrated circuit) type and it is built inside the alternator itself.



WFES0-CH005



WFES0-CH006

CHARGING SYSTEM

The electromotive force generated in a coil is generally expressed by the following formula.

$$e = -N \frac{d\phi}{dt}$$

where,

e : Induced electromotive force in coil (V)

N : Number of turns of wire in coil

$\frac{d\phi}{dt}$: Rate of change in magnetic flux (ϕ) per unit time

- : This means voltage is generated in such a direction that the change in magnetic flux is prevented.

The magnetic flux increases in proportion to the current of the rotor coil. However, as the magnetic flux is reaching a saturation point, the increase of the magnetic flux is no longer proportional to the current.

The output of the alternator increases as the rotation ($\frac{d\phi}{dt}$) increases, eventually reaching a saturation point.

This saturation is believed to be caused by the decline of the rate of change ($\frac{d\phi}{dt}$) i.e. the rate of change in magnetic flux (ϕ)

per unit time when the magnetic flux of the rotor is applied to the stator coil.

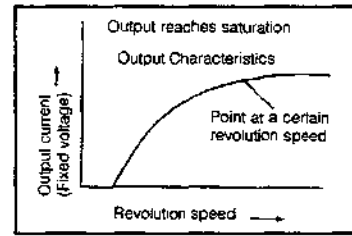
Besides the controlling by the magnetic flux and rotation speed described above, the output is restricted by the electric resistance of the stator coil. This resistance, mainly attributable to the induction reactance of ac current, increases as the frequency (rotation speed) rises.

The alternator is so designed that its electromotive force is generated at the stator coil. Therefore, the alternator features easy cooling and virtually trouble-free operation.

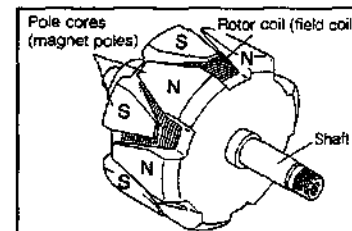
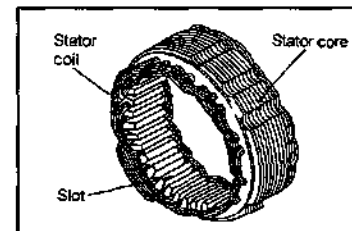
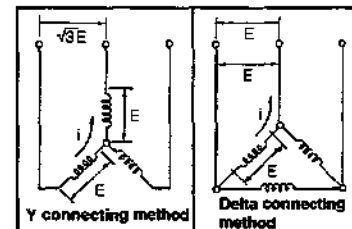
To connect the three pairs of stator coils, a "Y" connecting method is employed. Although this Y connecting method is inferior to a Delta-type connecting method in the maximum output current, the Y connecting method has a greater electromotive force at lower speeds. Moreover, the Y connecting method has an advantage of use of the neutral point. For these reasons, the Y connecting method has been widely used on small capacities less than 1 kW.

The stator assembly is made up of a laminated iron frame. This construction has been adopted so as to hold the stator coil and allow the magnetic flux from the rotor to pass through the coil easily (improvement of permeability).

The installation of an iron core in the coil increases the self inductance. This causes an increase of the inductive reactance in the case of AC current, resulting in reduced electromotive force. However, in the case of comparatively-low frequencies, the installation of iron core has more favorable effects in increasing the electromotive force which is attained by improved permeability, even counteracting the aforesaid disadvantage. For this reason, the iron core is generally employed. The purpose of slots provided at the core is to retain the wound stator coil. These slots also serve as magnetic flux passages which have been so designed that the rotor magnetic flux intersects the stator coil effectively.



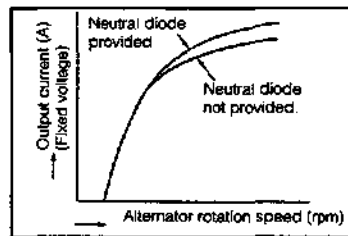
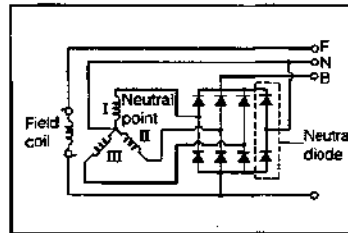
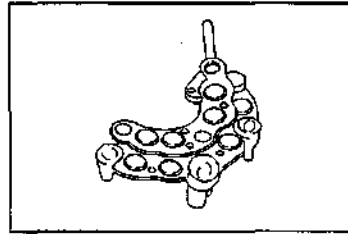
WF550-C1007



WF550-C1008

CHARGING SYSTEM

Theoretically speaking, six pieces of diodes are sufficient for full-wave rectification. However, the latest alternators have employed two more diodes for the purpose of utilizing the electromotive force at the neutral point. As a result, the latest alternator can produce a greater output current than the conventional alternators.



5. IN-VEHICLE INSPECTION

- (1) Prior to the in-vehicle inspection, be sure to perform the following checks.
- ① Specific gravity of battery electrolyte
 - ② Installation of battery terminals
 - ③ Tension of V-belt
 - ④ Fuse
 - ⑤ Wiring harness
 - ⑥ Abnormal noise emitted from alternator while engine is rotating

(2) Output test under unloaded state

- ① Ensure that all switches are turned OFF so that no unnecessary electric load may be applied.
 - Headlamps
 - Heater blower
 - Radio
 - Rear defogger
 - Room lamp, etc.

- ② Raise the engine revolution speed gradually to 2000 rpm. Measure the current and voltage at 2000 rpm.
Specifications: Not to exceed to 10 A
14.2 - 14.8 V

NOTE:

Immediately after the engine starting, the current may jump to 10 A or more momentarily. This is not an abnormal phenomenon.

If the voltage reading is less than the standard voltage, ground the terminal F as indicated in the right figure. Proceed to start the engine.

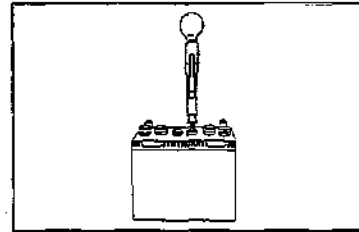
If the voltage reading becomes greater than the standard voltage under this setting, replace the IC regulator. If the voltage reading is still less than the standard voltage under this setting, check the alternator.

(3) Output test under loaded state

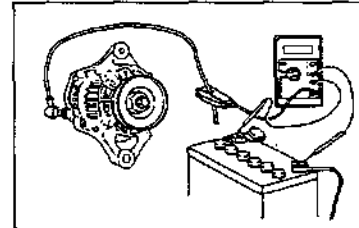
- ① To apply electric load, perform the following operation.
 - a. Set the headlamps to the upper-beam position.
 - b. Set the heater blower to the "High" position.
- ② Measure the output current of the alternator at the engine speed of 2000 rpm.
Specified Value: 30 A or more

NOTE:

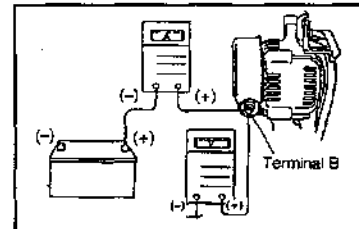
When the battery is fully charged, the measured current may be below the specified value. This is not an abnormal phenomenon. At this time, increase the electric load, for example, by turning ON the rear defogger. Then, check to see if the output current rises or not.



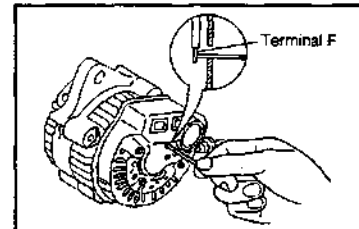
WF50-CH10



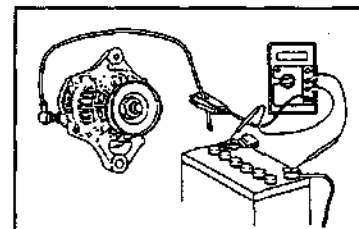
WF50-CH11



WF50-CH12



WF50-CH13

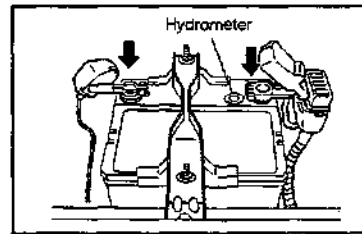


WF50-CH14

CHARGING SYSTEM

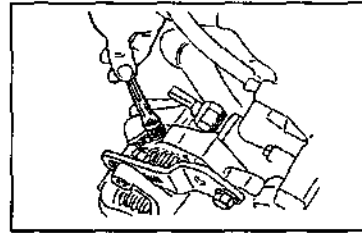
6. REMOVAL

- (1) Disconnect the ground cable terminal from the negative (-) terminal of the battery.



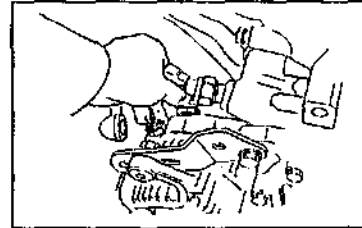
WFE90-CH015

- (2) Disconnection of wires from alternator
① Remove the nut and wire from the alternator.



WFE90-CH016

- ② Disconnect the connector from the alternator.



WFE90-CH017

- (3) Removal of alternator drive belt
Loosen the alternator attaching bolts. Remove the drive belt.

- (4) Removal of alternator
① Remove the alternator attaching bolts.
② Remove the alternator from the engine compartment.

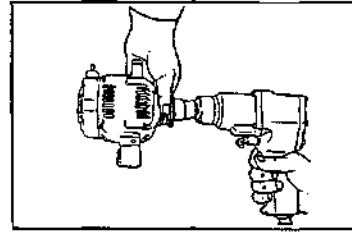
WFE90-CH018

7. DISASSEMBLY

- (1) Remove the alternator pulley lock nut by means of an impact wrench.

NOTE:

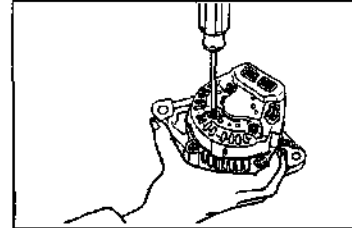
Be sure to use an impact wrench having a hexagonal hole.



WF590-CH-018

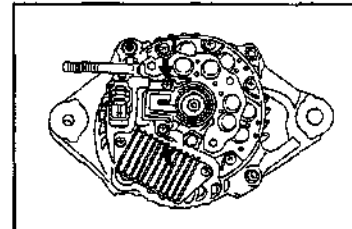
- (2) Removal of rear end cover

- ① Remove the nut and terminal insulator.
- ② Remove the three screws.
- ③ Remove the rear end cover.



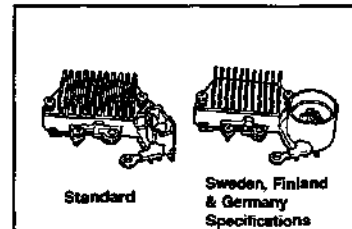
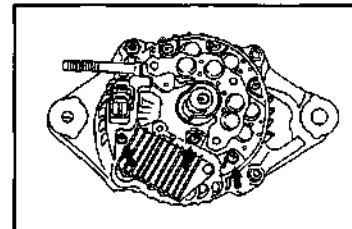
WF590-CH-022

- (3) Remove the brush holder.



WF590-CH-021

- (4) Remove the regulator assembly.

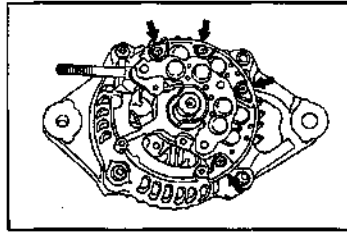


WF590-CH-022

CHARGING SYSTEM

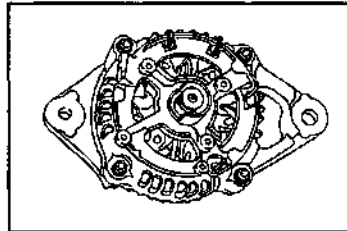
(5) Removal of rectifier holder

- ① Remove the attaching screws.



WP590-C-1022

- ② Straighten the stator wire.
- ③ Remove the rectifier holder.

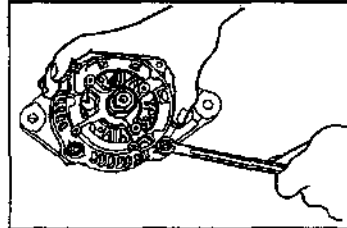


WP590-C-1024

(6) Remove the rectifier end frame from the drive end frame by removing the two nuts and bolts.

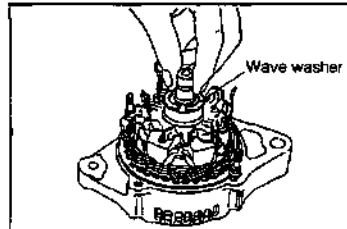
NOTE:

- Be very careful not to damage the stator wire.
- If any difficulty is encountered in the removal, lightly tap the shaft with a plastic hammer to facilitate the removal.



WP590-C-1025

(7) Remove the rotor from the drive end frame assembly.



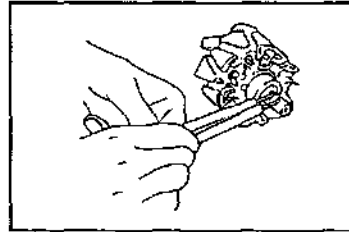
WP590-C-1026

8. INSPECTION

(1) Rotor

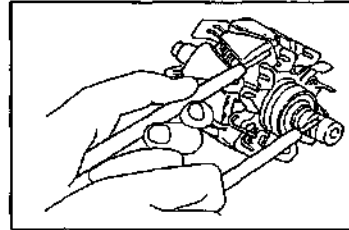
- ① Inspection of rotor for open circuit
Using an ohmmeter, check to see if specified resistance exists between the rotor slip rings.
Standard Resistance: $2.9 \pm 0.2 \Omega$

If no specified resistance exists, replace the rotor.



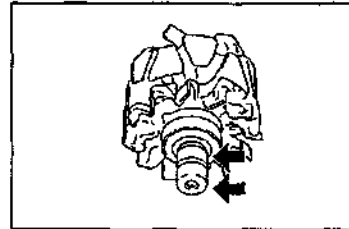
WPBIO-CH1027

- ② Inspection of rotor for ground
Ensure that no continuity exists between the rotor slip rings and the rotor core.
If continuity exists, replace the rotor.



WPBIO-CH1028

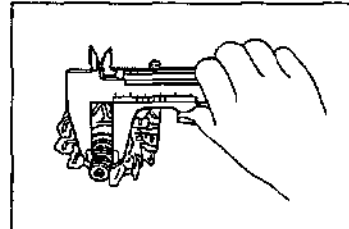
- ③ Inspection of slip rings
a. Check to see if the slip ring surface exhibits roughness, abnormal wear and/or burning.
Replace the rotor, if necessary.



WPBIO-CH1029

- b. Measure the outer diameter of the slip ring, using vernier calipers.
Standard diameter: 14.4 mm
Minimum diameter: 14 mm

If the slip ring diameter is less than the minimum diameter, replace the rotor assembly.

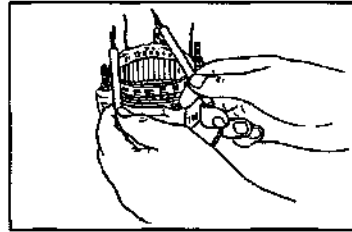


WPBIO-CH1030

CHARGING SYSTEM

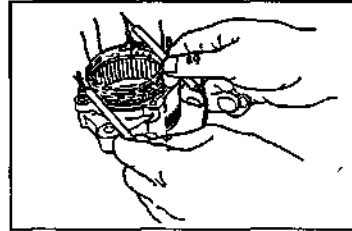
(2) Stator

- ① Inspection of stator for open circuit
Using an ohmmeter, check to see if any open circuit of the stator coil is present between the leads.
If no continuity exists, replace the end frame assembly.
Specified Resistance: About 0.2 Ω



WFES0-CH031

- ② Inspection of stator for short circuit
Using an ohmmeter, check to see if any short circuit of the stator coil is present between the coil lead and the drive end frame.
If continuity exists, replace the drive end frame assembly.

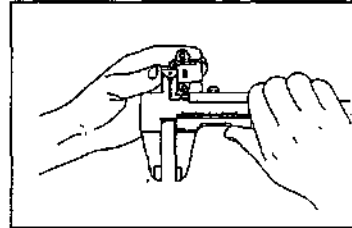


WFES0-CH032

(3) Brush and Brush Holder

- ① Measurement of exposed brush length
Measure the exposed brush length, using a scale.
Standard exposed length: 10.5 mm
Minimum exposed length: 1.5 mm

If the exposed length is less than the minimum requirement, replace the brushes.

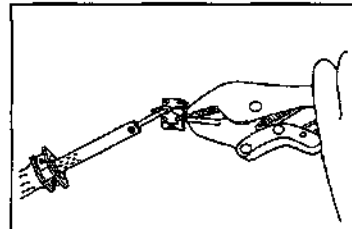


WFES0-CH033

- ② Replacement of brushes (If necessary)
a. Remove the brush and spring from the brush holder by melting the solder by means of a soldering iron.

NOTE:

- Prior to the operation, remove the painting film at the solder surface with a knife or the like.
- For this operation, it is advisable to use a soldering iron with a capacity of about 40 W.

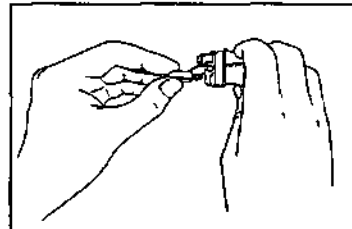


WFES0-CH034

- b. Install the brush cord in the brush holder with the spring fitted in place.

NOTE:

Using a knife, etc., remove the soldered section of the brush holder to form a flat surface until the bare metal is exposed.



WFES0-CH035

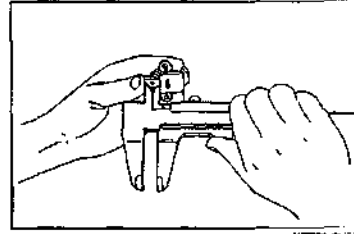
CHARGING SYSTEM

- c. Solder the brush cord in the brush holder in such a way that the exposed length of the brush meets the specification.

Standard exposed length: 10.5 mm

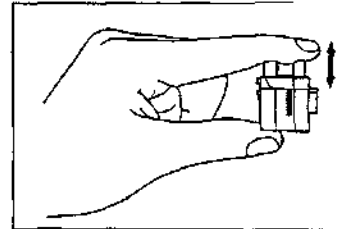
NOTE:

- Prior to the operation, let solder flow onto the forward end of the brush wire.
- To facilitate soldering:
Route the wire through the holder hole and adjust the exposed length of the brush to the specification. Bend the wire at its forward end on which solder has been applied in the preceding step. Then, solder the wire to the holder.



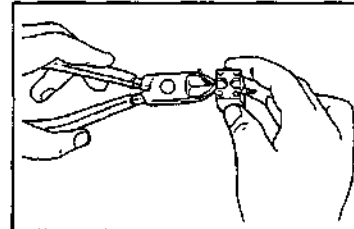
WPB30-CH137

- d. Ensure that the brush moves freely in the brush holder.



WPB30-CH137

- e. Cut off any excess remaining wire and apply an insulation paint.



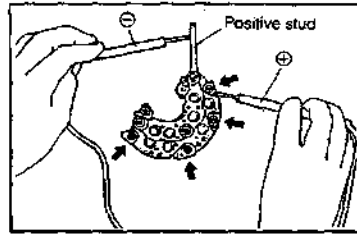
WPB30-CH138

CHARGING SYSTEM

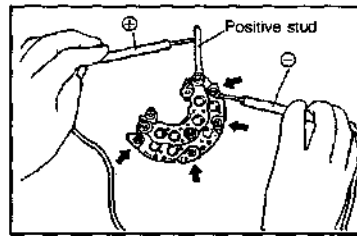
(4) Rectifier

① Inspection of rectifier at positive ⊕ side

- a. While using an ohmmeter, connect one tester probe to the positive stud. Also, connect the other probe to each of the rectifier terminals.

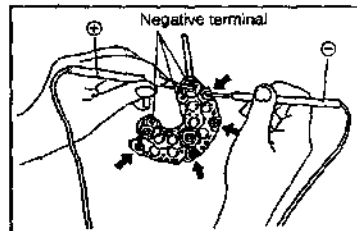


- b. Repeat the same steps described in a. above with the polarity of the tester probes reversed this time.
- c. Ensure that continuity exists either in the step a. or in the step b. and no continuity exists at the other test.
If not, replace the rectifier holder.

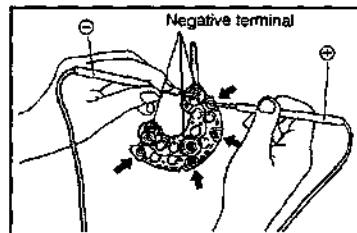


② Inspection of rectifier at negative ⊖ side

- a. While using an ohmmeter, connect one tester probe to each rectifier negative terminal. Also, connect the other probe to each rectifier terminal.

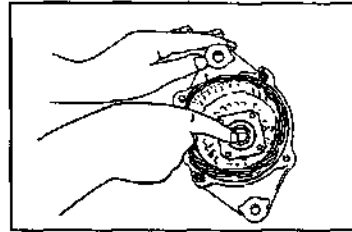


- b. Repeat the same steps described in a. above with the polarity of the tester probes reversed this time.
- c. Ensure that continuity exists either in the step a. or in the step b. and no continuity exists at the other test.
If not, replace the rectifier holder.



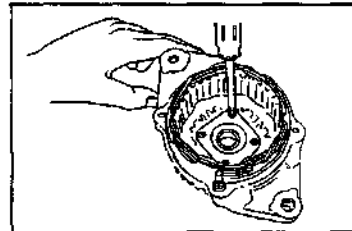
(5) Bearings

- ① Inspection of front bearing
Ensure that the bearing turns smoothly.
Replace the bearing, if necessary.



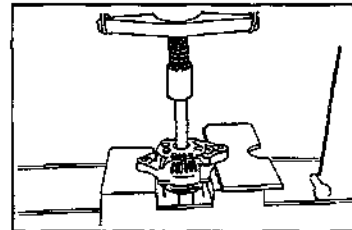
WP580-CHD43

- ② Replacement of front bearing (if necessary)
 - a. Remove the four screws and retainer plate.



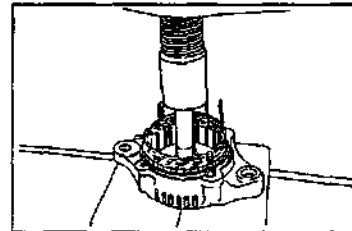
WP580-CHD44

- b. Remove the front bearing from the drive end frame, using a socket wrench in conjunction with a press.



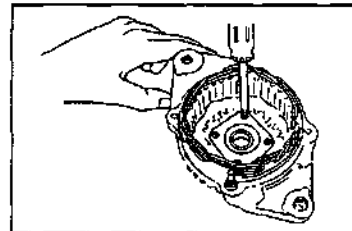
WP580-CHD45

- c. Press the new front bearing into the drive end frame, using suitable socket wrench.



WP580-CHD46

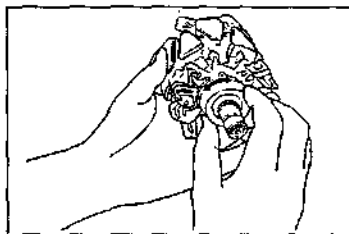
- d. Attach the retainer plate to the drive end frame with the four screws.



WP580-CHD47

CHARGING SYSTEM

- ③ Inspection of rear bearing
Ensure that the bearing turns smoothly.
Replace the bearing, if necessary.

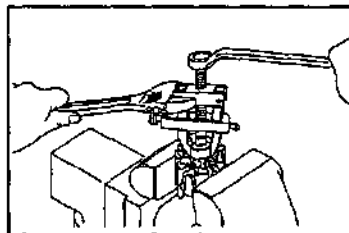


WP230-CH048

- ④ Replacement of rear bearing (if necessary)
a. Remove the rear bearing and bearing cover from the rotor, using the armature bearing puller.

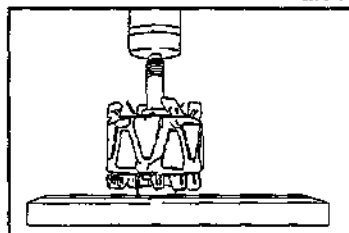
NOTE:

Be very careful not to damage the fan during the removal.



WP230-CH049

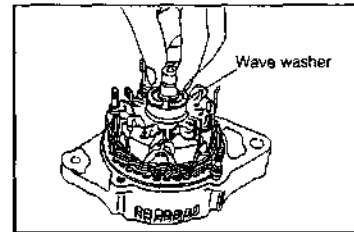
- b. Press a new rear bearing with spacer, using a hydraulic press.
c. Press a new bearing cover, using a suitable steel pipe.



WP230-CH050

9. ASSEMBLY

(1) Install the rotor into the drive end frame assembly.

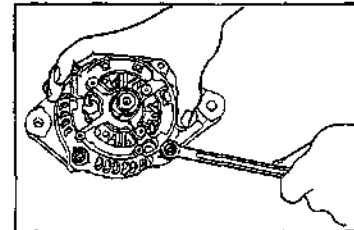


WF590-CH451

(2) Installation of rectifier end frame on drive end frame. Install the rectifier end frame on the drive end frame with the two bolts and two nuts.

NOTE:

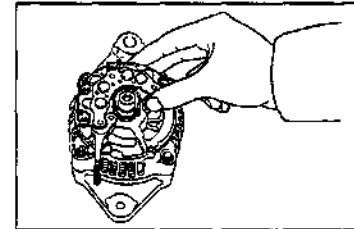
- Be very careful not to damage the stator wire during the installation.
- If some resistance is encountered during the insertion, lightly tap the frame with a plastic hammer.



WF590-CH452

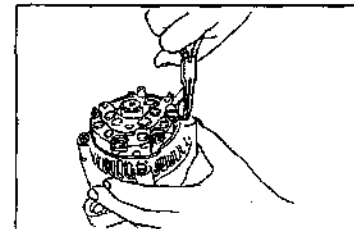
(3) Installation of rectifier holder, regulator assembly and brush holder.

- ① Attach the rectifier holder to the end frame with the stator wires passed through the aperture of the rectifier holder.



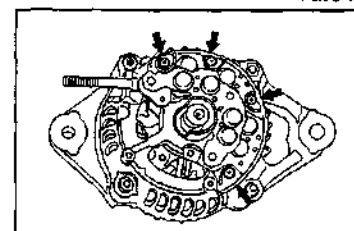
WF590-CH453

- ② Wind the stator wire around the installing section of the rectifier attaching screws.



WF590-CH454

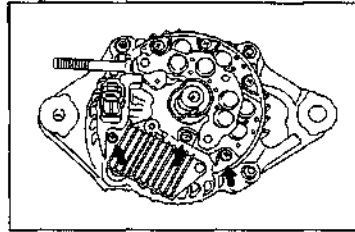
- ③ Secure the four attaching screws.



WF590-CH455

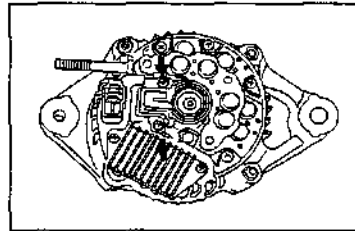
CHARGING SYSTEM

- (4) Install the regulator assembly with the three attaching screws.



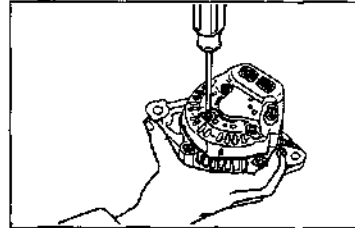
WPES0-CH056

- (5) Install the brush holder in such a way that a gap of at least 1 mm (0.04 inch) is provided between the brush holder and the regulator assembly. Secure the brush holder with the two screws.



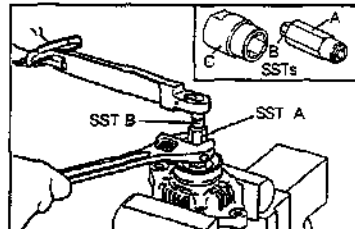
WPES0-CH057

- (6) Installation of rear cover
 ① Install the rear end cover with the three attaching screws.
 ② Install the terminal insulator and tighten it with the nut.



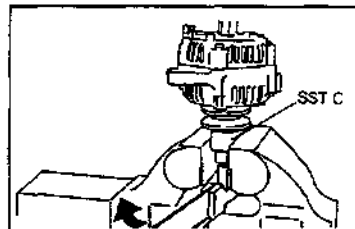
WPES0-CH058

- (7) Attach the pulley to the alternator shaft.
 (8) Tighten the SST B to the specified torque. Secure the the SST B to the alternator shaft.
 SSTs: 09820-87201-000
 Specified Torque: 39 N·m (4 kgf·m)



WPES0-CH059

- (9) Clamp the SST C in a vise. Tighten the nut by turning the SST B.
 Specified Torque: 110 N·m (11.25 kgf·m)

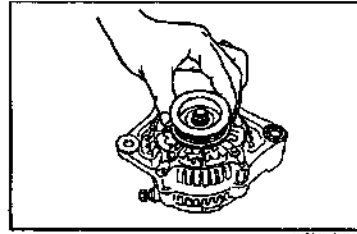


WPES0-CH060

- (10) Remove the SSTs A and B.

CHARGING SYSTEM

(11) Ensure that the rotor turns smoothly.

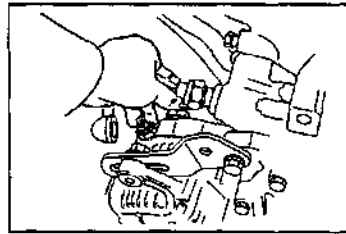


WP290-CH01

CHARGING SYSTEM

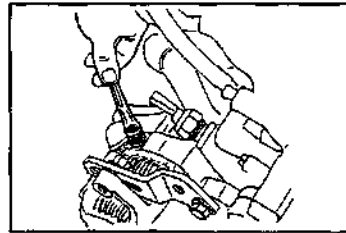
10. INSTALLATION

- (1) Temporarily install the alternator on the engine with the two attaching bolts.
- (2) Connection of wire to alternator
 - ① Connect the connectors to the alternator.



WP590-CH062

- ② Install the wire and nut to the alternator.

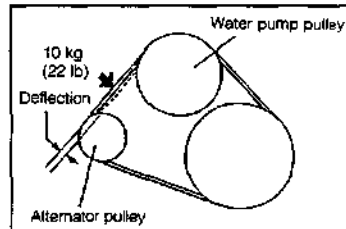


WP590-CH063

- (3) Installation of alternator drive belt
 - ① Install the alternator drive belt properly.

NOTE:

Make sure that the alternator drive belt is properly engaged in the grooves of each pulley.



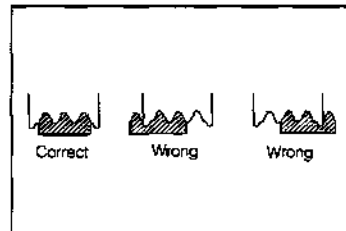
WP590-CH064

- ② Tension adjustment of drive belt

Adjust the belt tension in such a way that the deflection of the drive belt meets the specification when you push the midpoint of the drive belt between the alternator pulley and the water pump pulley by applying a force of 98 N (10 kgf).

Specified Belt Deflection

New belt: V belt: 5.0 - 7.0 mm
V-ribbed belt: 4.0 - 5.0 mm
Used belt: V belt: 6.0 - 8.0 mm
V-ribbed belt: 5.0 - 6.0 mm



WP590-CH065

NOTE:

- "New belt" refers to a belt which has been used less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine 5 minutes or more.
- If belt replaced with new one, run the engine for about 5 minutes and then recheck the tension.

CHARGING SYSTEM

- (4) Reconnect the ground cable terminal to the negative (-) terminal of the battery.

WFE90-C-1066

DAIHATSU

F300

CLUTCH

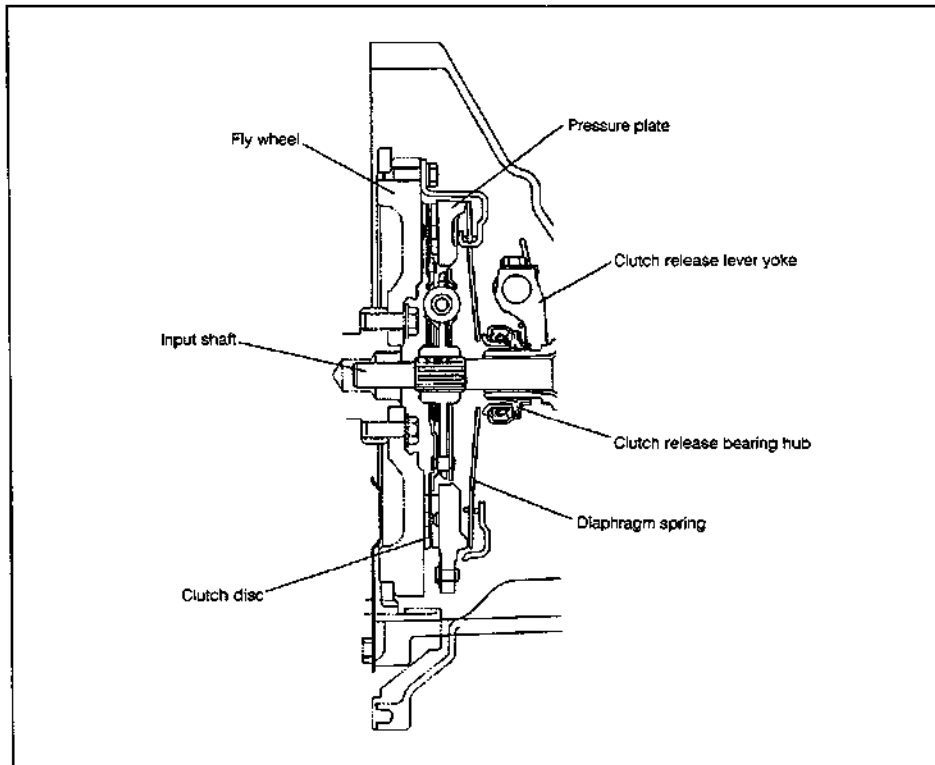
CLUTCH	CL- 2
CLUTCH RELEASE	CL- 3
CLUTCH PEDAL ADJUSTMENT	CL- 4
CLUTCH UNIT	CL- 5
COMPONENTS	CL- 5
TROUBLE SHOOTING	CL- 5
REMOVAL	CL- 6
INSPECTION	CL- 7
INSTALLATION	CL- 9
CLUTCH PEDAL (L.H.D)	CL-12
COMPONENTS	CL-12
REMOVAL	CL-13
INSPECTION (Clutch pedal & Release cable)	CL-15
INSTALLATION	CL-16
CLUTCH PEDAL (R.H.D)	CL-19
COMPONENTS	CL-19
REMOVAL	CL-20
INSPECTION	CL-22
INSTALLATION (Clutch pedal & Release cable)	CL-23
SSTs	CL-26
SERVICE SPECIFICATIONS	CL-26
TIGHTENING TORQUE	CL-26

WPB90-CL001

CLUTCH

CLUTCH

The clutch mechanism employs a dry, single-disc, diaphragm spring type. As for its operating method, it adopts a cable method which features positive operation and excellent serviceability.



WP290-CL.002

Clutch disc specifications

Clutch disc outer diameter		mm	200
Clutch disc inner diameter		mm	140
Thickness	Flywheel side	mm	3.5
	Pressure plate side	mm	3.5
Lining surface area		cm ²	160.14

Clutch cover specifications

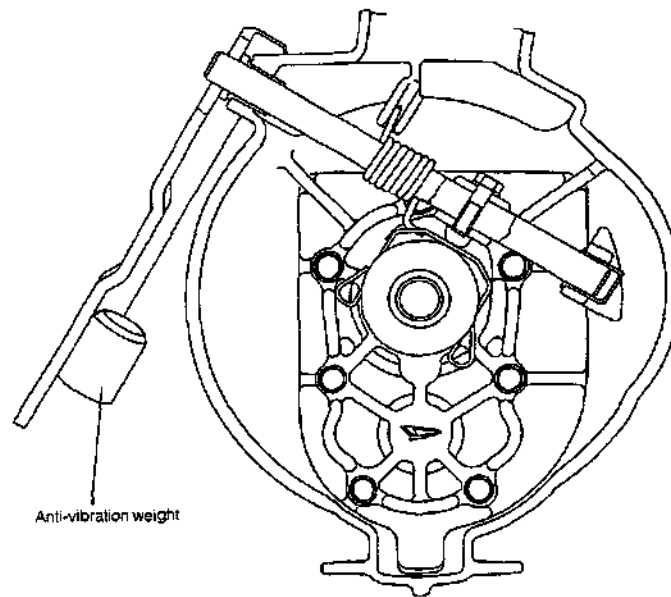
Clutch cover outer diameter	mm	253
Diaphragm spring load as assembled	kg	350

WP290-CL.003

CLUTCH

CLUTCH RELEASE

The clutch release lever yoke is attached to the clutch release lever by means of a bolt. Furthermore, an anti-vibration weight is provided at the outer lever section.



WFE90-CL004

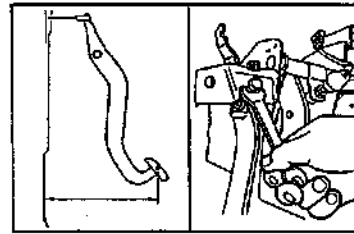
CLUTCH

CLUTCH PEDAL ADJUSTMENT

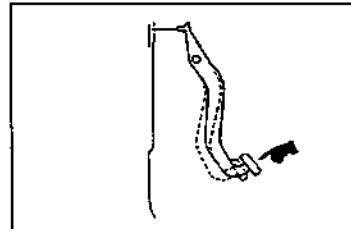
1. Check the clutch pedal for installation height.
Pedal installation height
(Distance between pedal pad upper surface's center and dash panel)
Clutch Pedal Installation Height:
L.H.D, R.H.D: 221 ± 5 mm

NOTE:

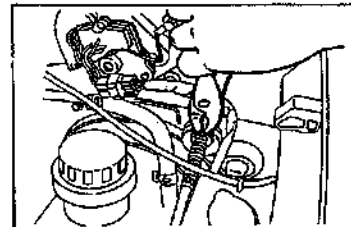
- Ensure that the clutch pedal installation height is 5.8 mm higher than the brake pedal surface. Adjust the clutch pedal installation height, as required. Then, adjust the clutch pedal installation height to the following specification.
- The figure above is the dimension from the body metal section to the pedal. It is, therefore, necessary to roll up the carpet and floor mat prior to the measurement.
Tightening Torque: 17.7 - 29.4 N-m (1.8 - 3.0 kgf-m)



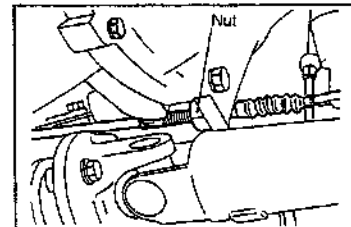
2. Adjust the pedal installation height, as required.
(1) Slacken the lock nut. Turn the stopper bolt until the installation height conforms to the specification.
(2) Tighten the lock nut.
3. Clutch pedal free travel
(1) Depress the clutch pedal gradually until you feel a resistance from the clutch. Measure the depressing distance up to this point.
Specified Clutch Pedal Free Travel: 18 - 27 mm



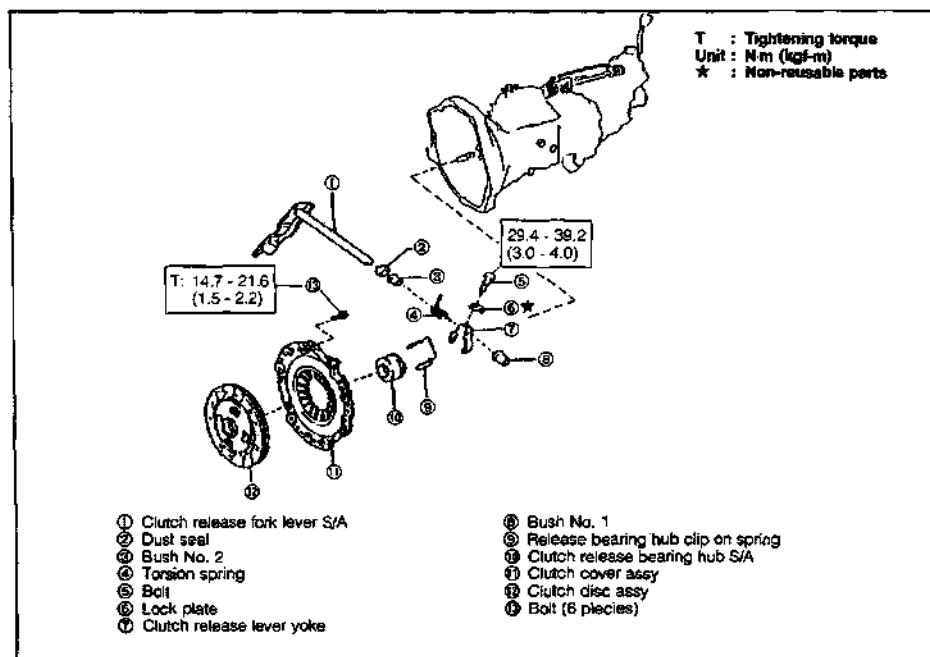
If the free travel of the clutch pedal fails to conform to the specification, adjust it to the specified value by changing the clip position of the clutch cable.



R.H.D vehicle only



CLUTCH UNIT COMPONENTS



WPB0-CL009

TROUBLE SHOOTING

Symptom	Possible causes	Remedies
Dragging clutch	<ul style="list-style-type: none"> Excessive free travel or clutch pedal travel improperly adjusted Deformed clutch disc Clutch disc spline malfunctioning 	<ul style="list-style-type: none"> Adjust free travel or clutch pedal travel. Check clutch disc. Check clutch disc.
Clutch judder	<ul style="list-style-type: none"> Abnormal surface of clutch disc Excessive runout of clutch disc Unevenness of clutch cover diaphragm spring heights Faulty clutch release bearing 	<ul style="list-style-type: none"> Check clutch disc. Check clutch disc runout. Check clutch cover. Check clutch release bearing.
Slipping clutch	<ul style="list-style-type: none"> Worn clutch disc Excessively worn clutch pressure plate Faulty clutch cover diaphragm springs 	<ul style="list-style-type: none"> Check clutch disc. Check pressure plate. Check clutch cover.

WPB0-CL010

CLUTCH

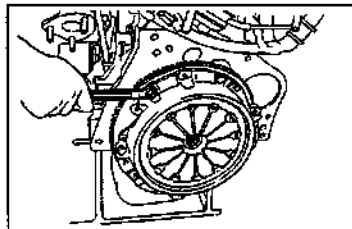
REMOVAL

1. Remove the transmission from the vehicle.

See page
MT-Section.

WPB90-CLD11

2. Remove the clutch disc by removing the clutch cover with the six bolts.

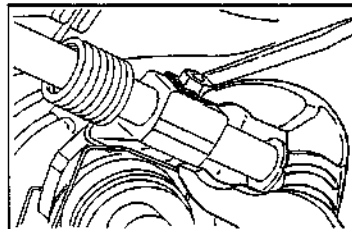


WPB90-CLD12

3. Raise the lock plate by means of a common tool of water pump pliers.

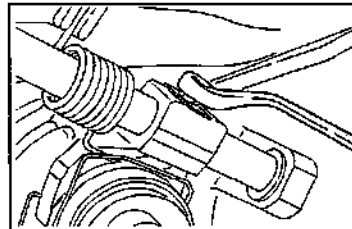
CAUTION:

- Never reuse the lock washer.



WPB90-CLD13

4. Remove the bolt tightened to the clutch release lever.

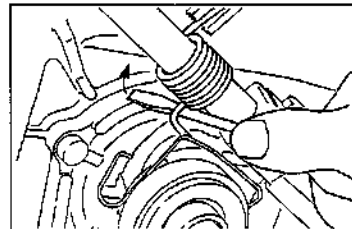


WPB90-CLD14

5. Remove the torsion spring from the release lever yoke, using a standard screwdriver.

NOTE:

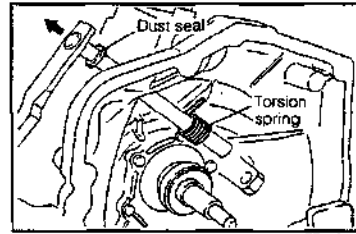
- Care must be exercised so that the torsion spring and standard screwdriver may not interfere with the release bearing hub clip when removing the torsion spring.



WPB90-CLD15

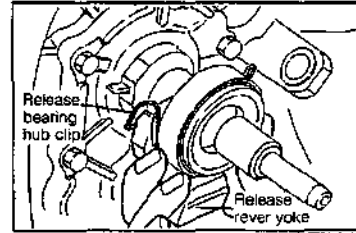
CLUTCH

6. While pulling out the clutch release lever subassembly, remove the torsion spring.
7. Remove the clutch release lever subassembly, with the dust seal attached, from the transmission case.



WP890-CL0016

8. Remove the release lever yoke, release bearing hub clip and clutch release bearing hub assembly as a set from the front bearing retainer.

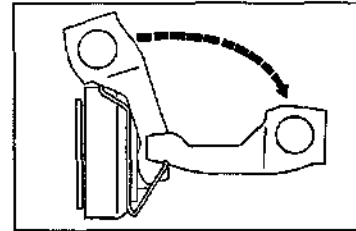


WP890-CL0017

9. Remove the release lever yoke from the release bearing hub clip by turning the release lever yoke clockwise.

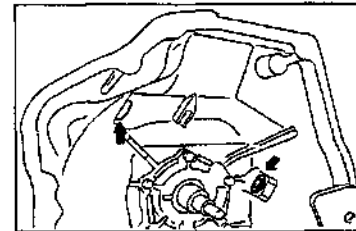
CAUTION:

- If the release bearing hub clip should be removed using a method other than the procedure above, it will cause the clip deformation.



WP890-CL0018

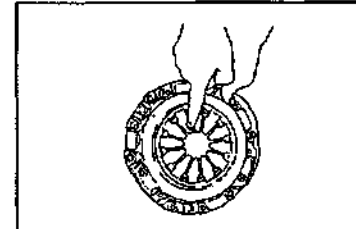
10. Remove the two bushes from the clutch housing.



WP890-CL0019

INSPECTION

1. Check the diaphragm spring for damage or wear.



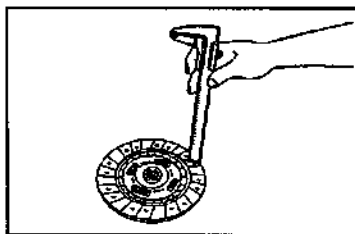
WP890-CL0020

CLUTCH

2. Check of clutch disc for wear

Measure the height of the clutch disc from each rivet. Compare the lowest height against the allowable use limit below.

Allowable Use Limit: 0.3 mm



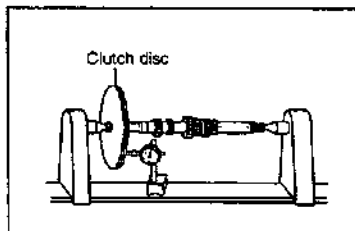
WP250-CL021

3. Check of clutch disc for runout

Allowable Runout Limit

(Longitudinal Runout): 1.0 mm

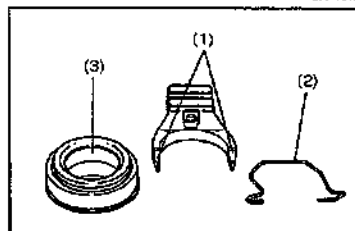
(Lateral Runout): 0.7 mm



WP250-CL022

4. Check the following parts.

- (1) Contact surface of release lever yoke with release bearing for wear
- (2) Release bearing hub clip for damage
- (3) Inner race of release bearing for wear

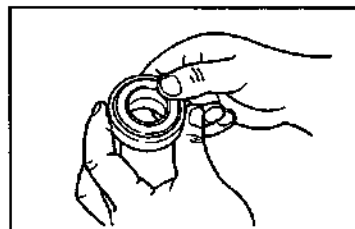


WP250-CL023

5. Rotate the release bearing with your fingers. Ensure that the release bearing rotates smoothly without any binding.

NOTE:

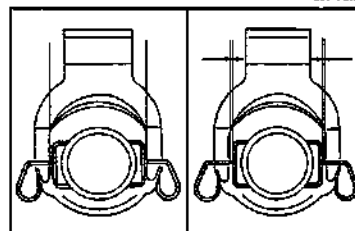
- Since the release bearing is packed with grease, never clean it, using oil.



WP250-CL024

6. Assemble the release lever yoke, release bearing hub clip and clutch release bearing hub assembly as a set. (See page CL-10.)

- Visually inspect whether the release bearing hub clip comes at the end section of the release lever yoke within the range indicated in the right figure.

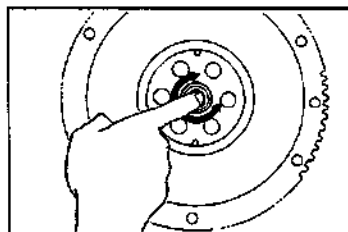


WP250-CL025

CLUTCH

7. Rotate the pilot bearing with your fingers. Prior to the installation of the clutch disc, ensure that the pilot bearing rotates smoothly without any binding.

* As for the installation and removal of the pilot bearing, refer to the EM section.



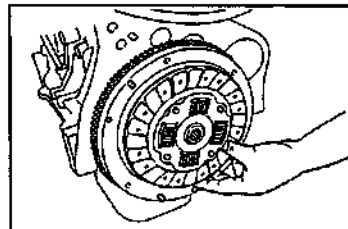
WP80-CL026

INSTALLATION

1. Install the clutch disc.

CAUTION:

- Do not allow oil grease to get on the rubbing face.



WP80-CL027

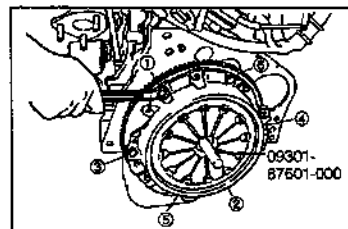
2. Install the clutch cover, using the following SST.

SST: 09301-87601-000

Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)

CAUTION:

- Be sure to tighten the bolts diagonally within the tightening torque range above so that the clutch cover may be tightened evenly.
(The right figure shows a typical example of tightening sequence.)

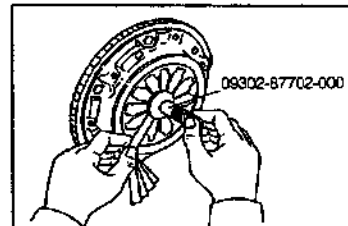


WP80-CL028

3. Check the diaphragm spring fingers for unevenness in height, using the following SST.

Allowable Limit of Unevenness in Height: 0.8 mm

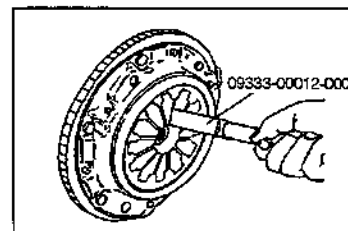
SST: 09302-87702-000



WP80-CL029

4. If the inspection results reveal that the unevenness in height exceeds the allowable limit, correct the unevenness, using the following SST.

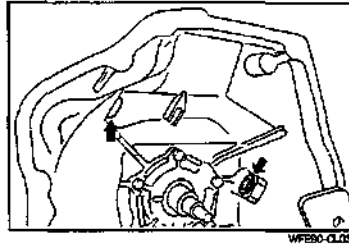
SST: 09333-00012-000



WP80-CL030

CLUTCH

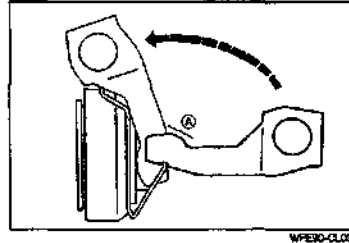
5. Apply Lithium base multi purpose grease to the entire periphery of the inner surface of the bush.
6. Insert the bush into the transmission case.



7. Place the cut-out section of the release lever yoke on the release bearing hub clip. Turn the release lever yoke counterclockwise so as to set the clutch release bearing hub assembly, release bearing hub clip and release lever yoke.

NOTE:

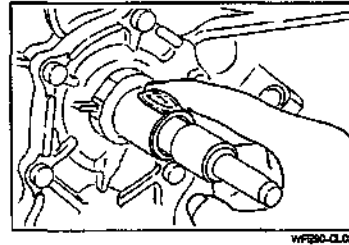
- Prior to the setting, apply a suitable amount of Lithium base multi purpose grease (A section) to the clutch release bearing hub or to the sliding surface with the release lever yoke.



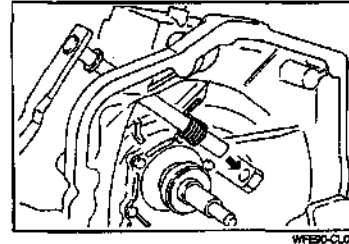
8. Apply molybdenum disulphide lithium base grease to the surface of the front retainer bearing sliding section.

CAUTION:

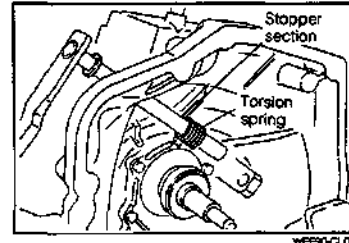
- Excessive application of grease may cause clutch slippage.



9. Attach the dust seal to the clutch release lever subassembly.
10. Insert the clutch release lever subassembly into the transmission case.

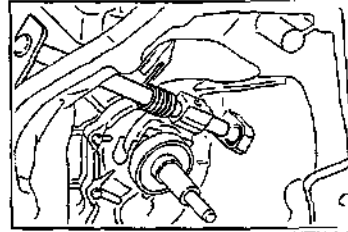


11. Align the torsion spring with the stopper of the transmission case.

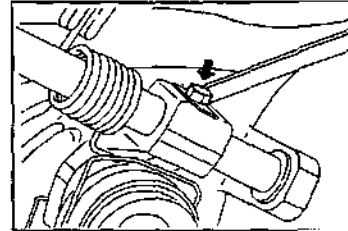


CLUTCH:

12. Pass the clutch release lever subassembly through the release lever yoke provided with the release bearing hub clip and clutch release bearing hub assembly.



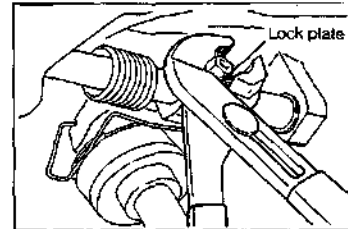
13. Tighten the bolt. (Use the new lock plate.)
Tightening Torque: 29.4 - 39.2 N·m (3.0 - 4.0 kgf-m)



14. After tightening the bolt, positively bend the lock plate along the side of the bolt, using a common tool of water pump pliers.

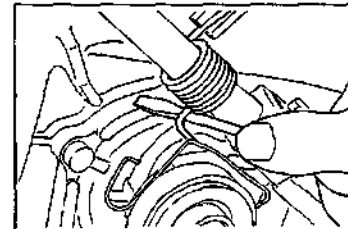
NOTE:

- Never use a chisel for this operation. If a chisel or the like should be used for bending the lock plate, the release bearing hub clip may be detached.



15. Apply the torsion spring to the release lever yoke by means of a standard screwdriver.

16. Move the clutch release lever subassembly in a fore-&-aft direction by hand. Thus, visually inspect the clutch release bearing hub assembly, release bearing hub clip, release lever yoke and spring torsion operate as a set. Also, ensure that they move smoothly.



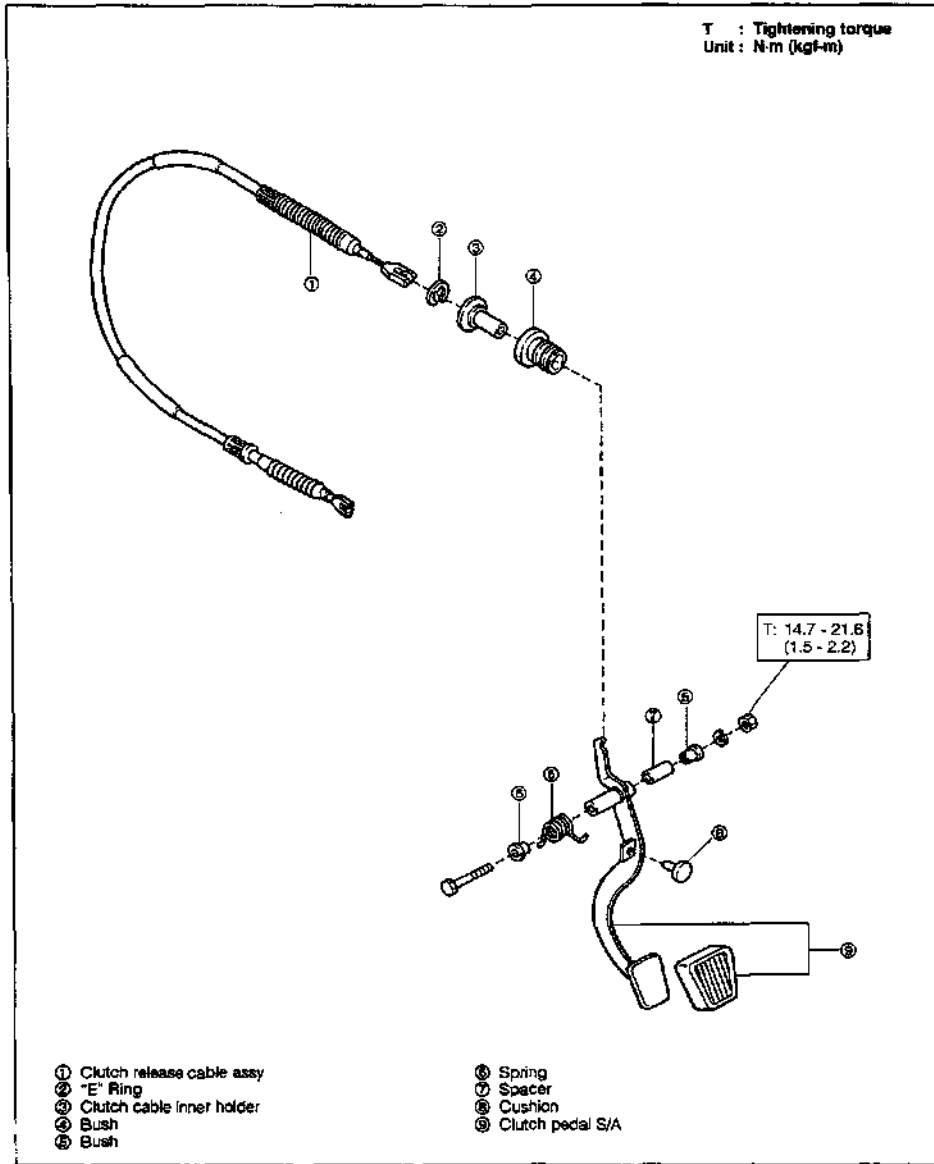
17. Install the transmission on the vehicle.



See page
MT-Section.

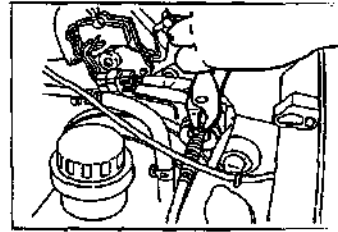
CLUTCH

CLUTCH PEDAL (L.H.D) COMPONENTS

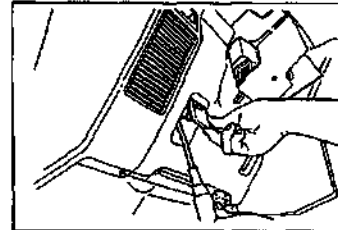


REMOVAL

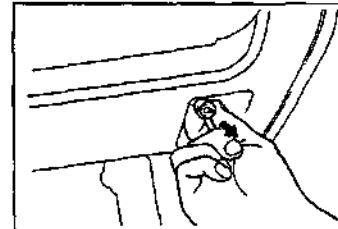
1. Remove the clutch cable and the clip of the clutch cable.



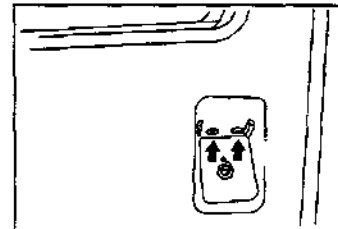
2. Remove the handle of the hood opener cable by removing the two screws.



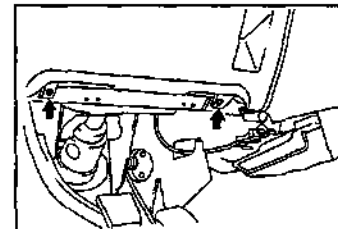
3. Pull out the instrument light control switch knob toward you.



4. Remove the two screws at the instrument panel light control switch.

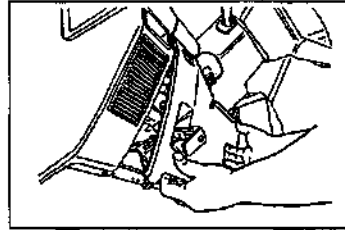


5. Remove the two screws located under the instrument panel finish lower panel.

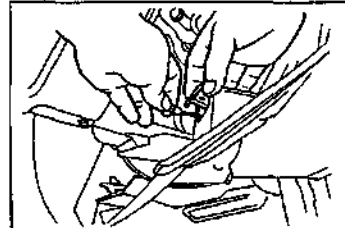


CLUTCH

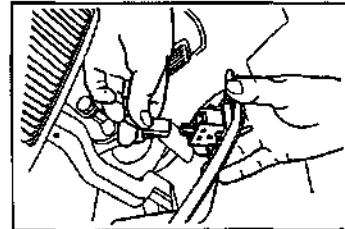
6. Push up the instrument panel finish lower panel. Then, pull out them lightly toward you.



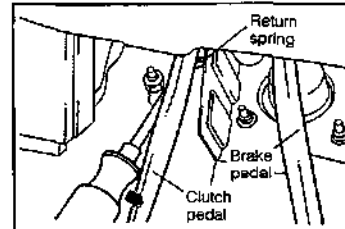
7. Remove the hood opener cable.



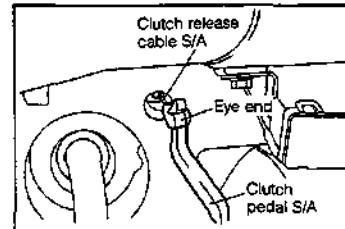
8. Disconnect the coupler of the instrument panel light control switch.



9. Insert a standard screwdriver into between the return spring and the clutch pedal. Release the return spring which hooks at the clutch pedal by lowering the standard screwdriver.



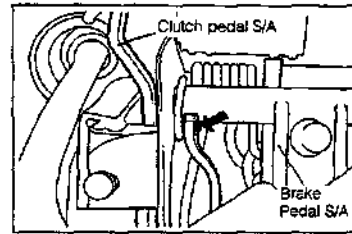
10. At the lower side of the back of the instrument panel assembly, disconnect the eye end section of the clutch release cable subassembly from the forward end of the clutch pedal subassembly.



CLUTCH

11. Removal of clutch pedal

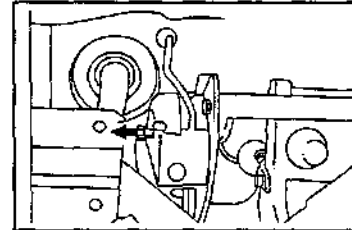
- (1) Remove the clutch pedal shaft bolt by removing a nut.



WP590-CL052

- (2) Remove the shaft bolt from the clutch pedal assembly.

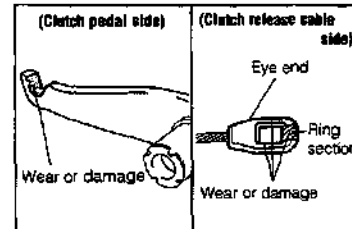
- (3) Remove the clutch pedal assembly with the return spring installed.



WP590-CL053

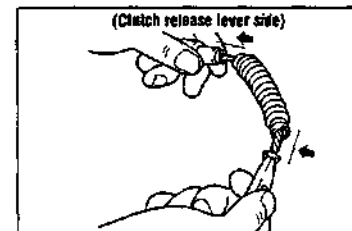
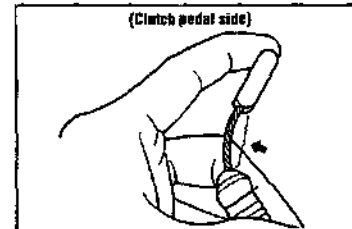
INSPECTION (Clutch pedal & Release cable)

1. Visually inspect the eye end's ring section of the clutch release cable assembly and clutch pedal assembly for wear or damage.



WP590-CL054

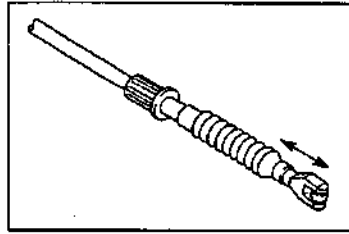
2. Visually inspect the inner cable at the clutch pedal and clutch release lever sides for damage, open wire and rust formation by bending the cable by hands.



WP590-CL055

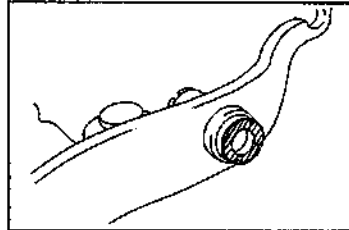
CLUTCH

3. Holding the eye end section of the inner cable by hands, move the inner cable in a fore-&-aft direction. Thus, check that the cable moves smoothly.



WFE80-CL056

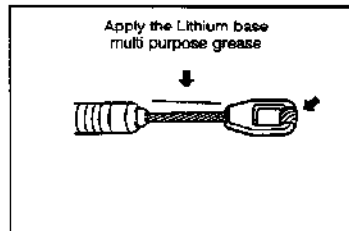
4. Visually inspect the bush for wear due to lack of grease.



WFE80-CL057

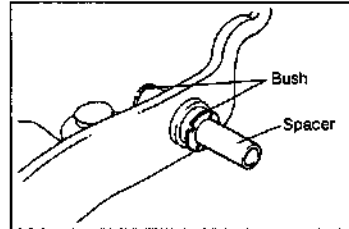
INSTALLATION

1. Apply Lithium base multi purpose grease to the eye end section of the clutch cable and inner cable.
2. Temporarily insert the clutch cable into the cable insertion hole.



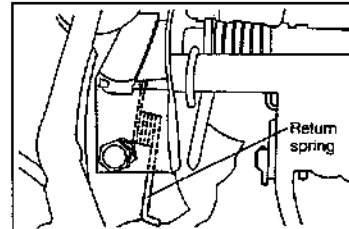
WFE80-CL058

3. After applying Lithium base multi purpose grease, install the two bushes and spacer to the clutch pedal subassembly.



WFE80-CL059

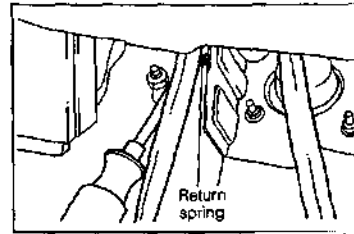
4. Hook the return spring to the hook position of the pedal bracket.



WFE80-CL060

CLUTCH

5. Install the clutch pedal subassembly to the return spring which has been hooked to the pedal bracket.

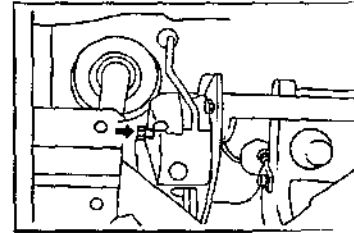


6. Insert the clutch pedal shaft bolt from the left side of the pedal bracket. Proceed to install and tighten the clutch pedal.

NOTE:

- Apply Lithium base multi purpose grease to the clutch pedal.

Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)

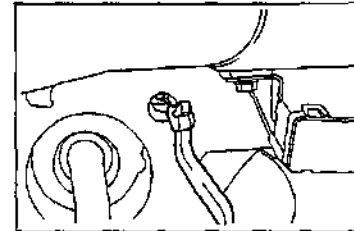


7. Connect the clutch release cable subassembly to the clutch pedal subassembly.

8. Attach the return spring to the clutch pedal and pedal bracket, using a common tool of a standard screwdriver.

NOTE:

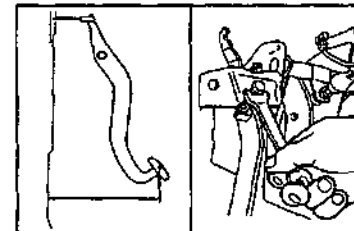
- Apply Lithium base multi purpose grease to the clutch cable and the installation section of the pedal.



9. Adjust the clutch pedal height by means of the set bolt.
Clutch Pedal Installation Height: 221 ± 5 mm

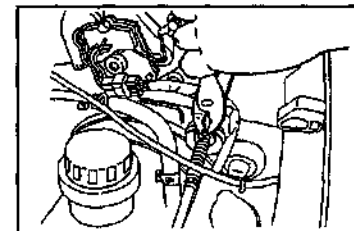
NOTE:

- The figure above is the dimension from the body metal section to the pedal. It is, therefore, necessary to roll up the carpet and floor mat prior to the measurement.



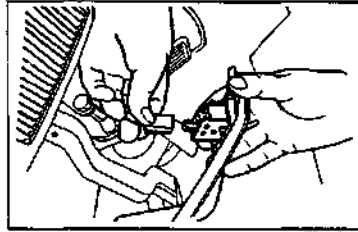
10. Adjust the clutch free travel by moving the clip of the clutch cable.

Specified Clutch Pedal Free Travel: 18 - 27 mm



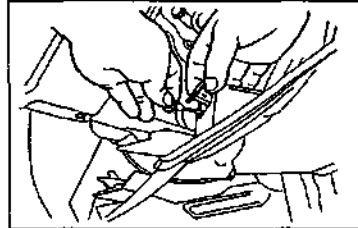
CLUTCH

11. Connect the coupler of the instrument panel light control switch.



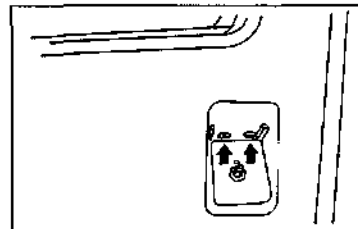
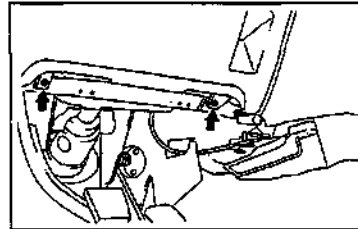
WPES0-CL066

12. Install the hood opener cable.



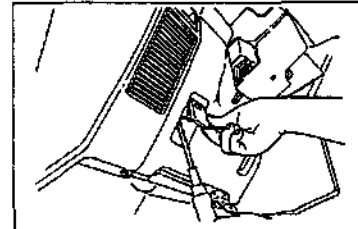
WPES0-CL067

13. Install the instrument panel finish lower panel with the four screws.



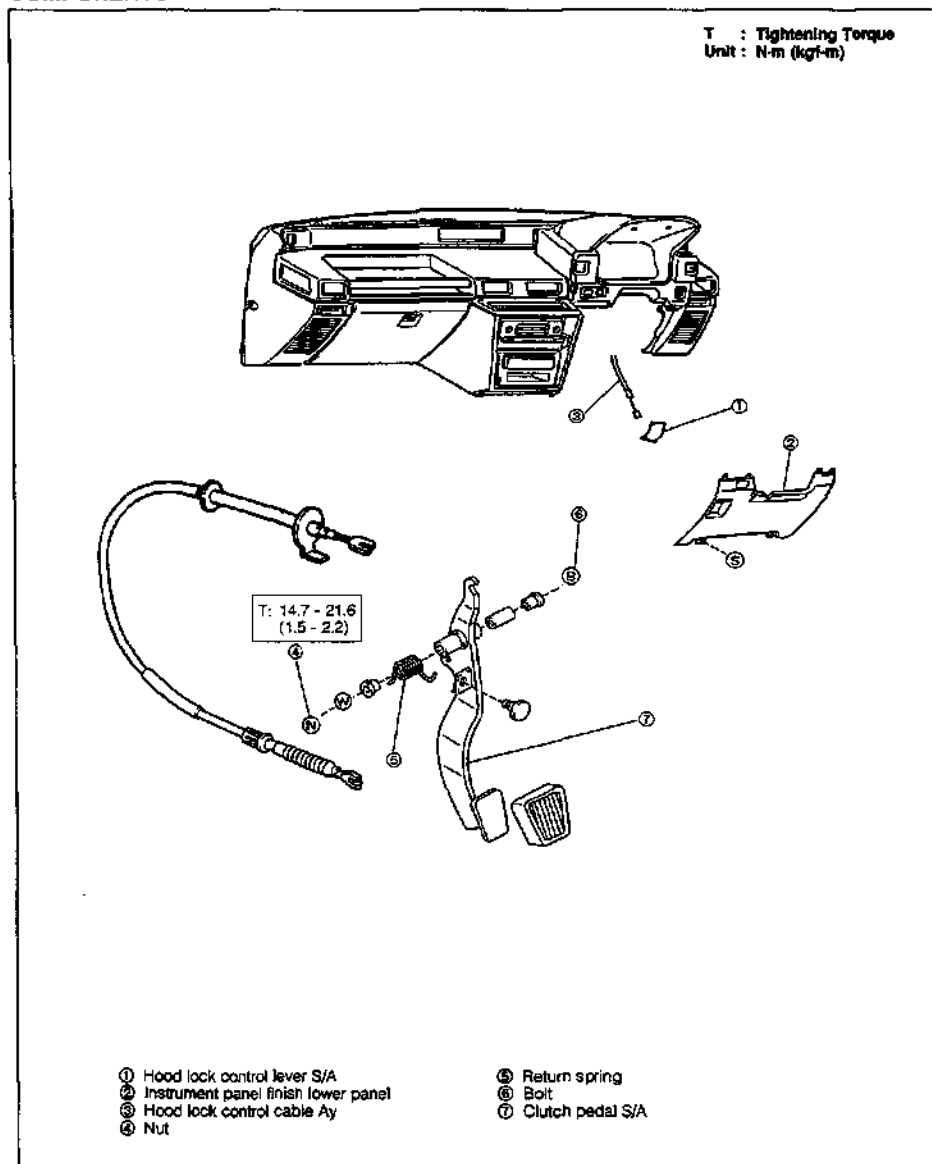
WPES0-CL068

14. Install the handle of the hood opener cable with the two screws.
15. Insert the instrument panel light control switch knob.



WPES0-CL069

CLUTCH PEDAL (R.H.D) COMPONENTS

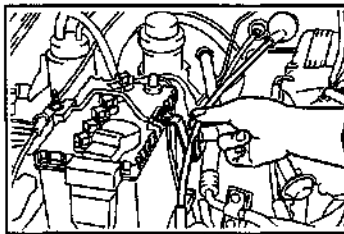


WP580-CL070

CLUTCH

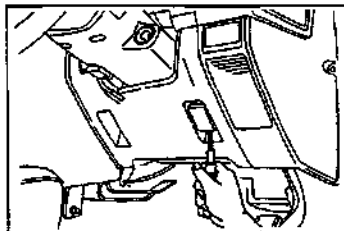
REMOVAL

1. Detach the clamp. Remove the clutch cable assembly and clutch cable inner holder from the engine compartment side.



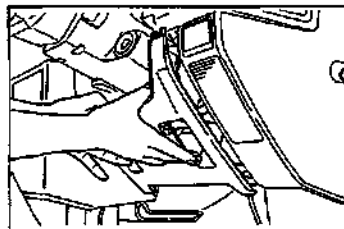
WPB90-CL071

2. Remove the hood opener cable handle.



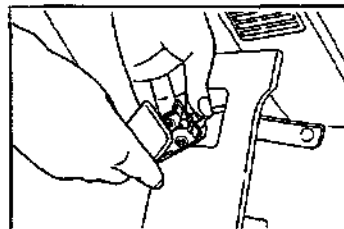
WPB90-CL072

3. Remove the instrument panel finish lower panel.



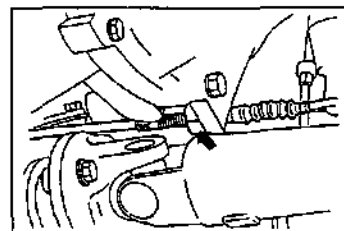
WPB90-CL073

4. Disconnect the hood opener cable.



WPB90-CL074

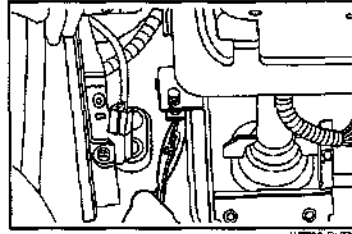
5. Loosen the nut.



WPB90-CL075

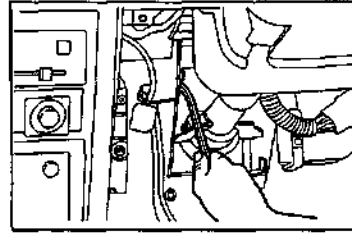
CLUTCH

6. Remove the return spring.



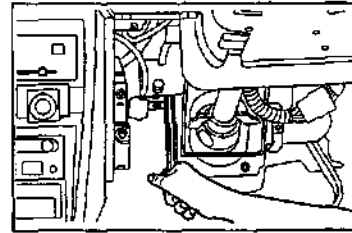
WPES0-CL076

7. Remove the clutch pedal shaft bolt.



WPES0-CL077

8. Remove the clutch pedal subassembly.

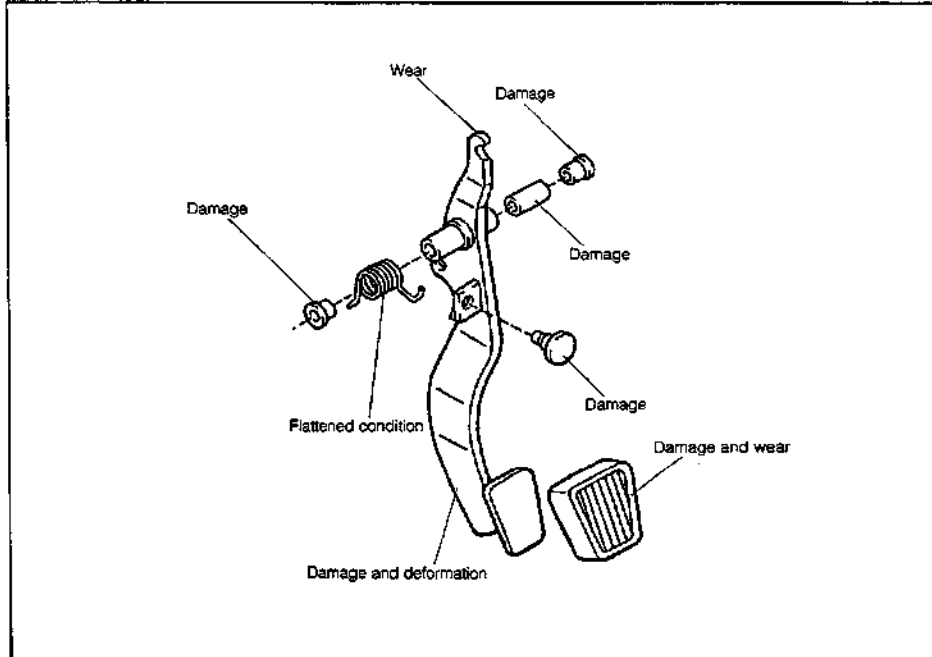


WPES0-CL078

CLUTCH

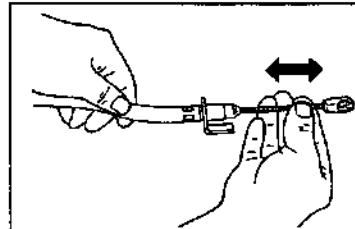
INSPECTION

1. Check each section given below. Replace any defective parts.

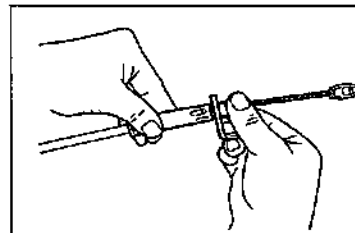


Check the items given below. Replace any defective parts.

2. Move the inner cable of the clutch release cable in a fore-&-aft direction. Ensure that no abnormal resistance or binding is present.

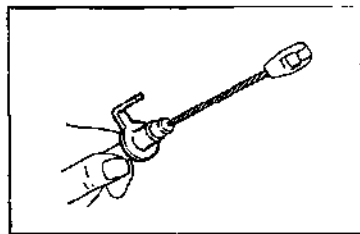


3. While holding the guide pipe section by hand, lightly turn the outer casing of the clutch release cable. Ensure that the outer casing will not turn.



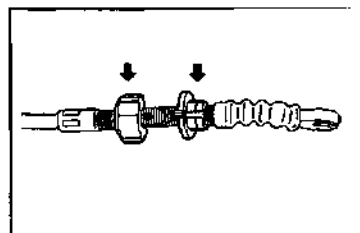
CLUTCH

4. Ensure that the clutch cable inner holder exhibits no deformation.



WP520-CL.082

5. Ensure that each of cushions and nuts exhibits no damage.



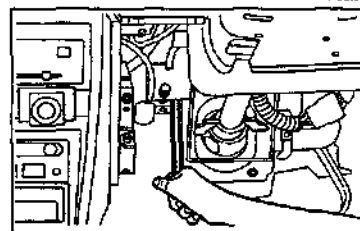
WP520-CL.083

INSTALLATION

1. Connect the clutch cable. Then, install the clutch pedal assembly.

NOTE:

- Apply Lithium base multi purpose grease to the clutch cable installation section of the clutch pedal.



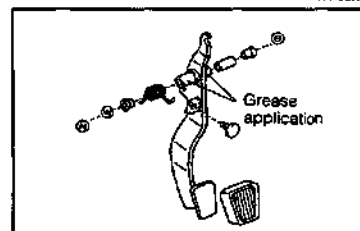
WP520-CL.084

2. Insert the clutch pedal shaft bolt from the left side of the pedal bracket. Tighten the bolt.

Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)

NOTE:

- Apply lithium base multi purpose grease to the parts of the clutch pedal indicated in the right figure.

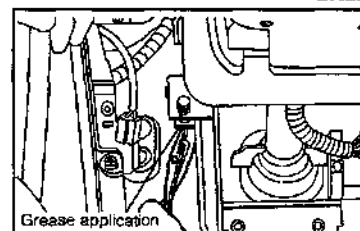


WP520-CL.085

3. Install the return spring.

NOTE:

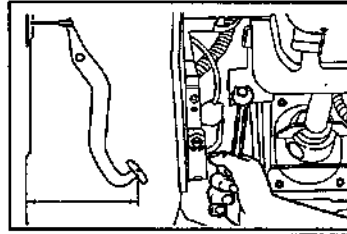
- Apply lithium base multi purpose grease to the return spring.



WP520-CL.086

CLUTCH

4. Adjust the clutch pedal height.
Clutch Pedal Installation Height: 221 ± 5 mm

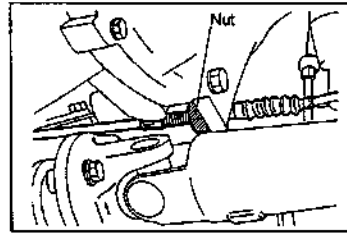


5. Connect the clutch cable to the clutch pedal. Adjust the nut so that the pedal free travel may conform to the specified value.

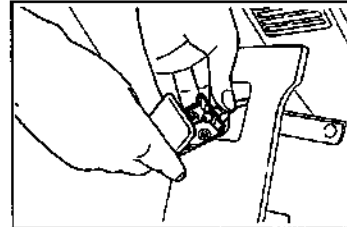
Pedal Free Travel: 18 - 27 mm

NOTE:

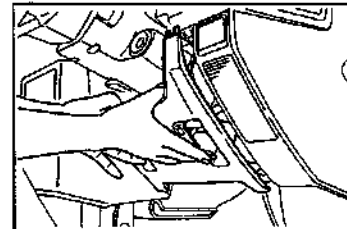
- ♦ Apply Lithium base multi purpose grease to the clutch pedal installation section of the clutch cable.



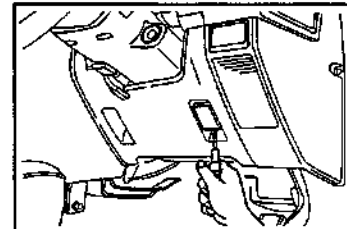
6. Connect the hood opener cable.



7. Install the instrument panel finish lower panel.

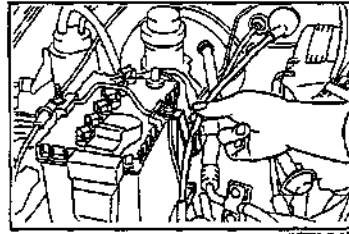


8. Install the hood opener cable handle.



CLUTCH

9. Detach the clamp. Remove the clutch cable assembly and clutch cable inner holder from the engine compartment side.

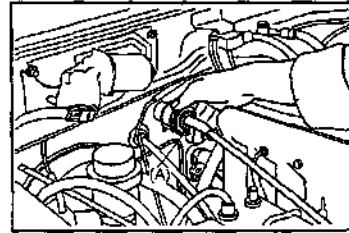


WPED-CL02

10. Install the clutch cable inner holder and clutch cable assembly. Then, install them to the clamp.

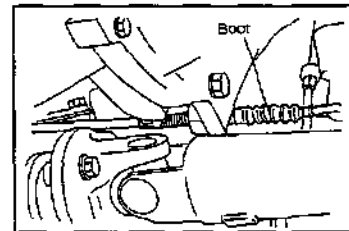
NOTE:

- Ensure that the clutch cable inner holder (A) should be inserted to the cut-off section of the dash panel.



WPED-CL03




11. Install the clutch cable at the clutch release lever side. Install the clutch cable assembly to the transmission case.
12. Install the clutch pedal. (Refer to page CL-23.)
13. Adjustment of clutch pedal (Refer to page CL-4.)
14. Ensure that the boot at the clutch cable side is not detached. Positively install the boot if it is detached.



WPED-CL04

CLUTCH

SSTs

Figure	Parts No.	Parts name
	09301-87601-000	Clutch guide tool
	09302-87702-000	Clutch diaphragm spring height No. 5 gauge
	09333-00012-000	Clutch diaphragm spring aligner

WFE90-CL095

SERVICE SPECIFICATIONS

Unit: mm

Item		Specified valve	Allowable limit	Remarks
Clutch disc	Rivet depth	—	0.3	Remaining lining
	Runout	—	1.0	Longitudinal
		—	0.7	Lateral
Clutch cover	Variation height of diaphragm spring	—	0.8	
	Height	221 ± 5	—	RHD LHD
	Free travel	18 - 27	—	

WFE90-CL096

TIGHTENING TORQUE

Tightening components	Tightening torque		
	N·m	kgf·m	ft·lb
Clutch cover A/y × Flywheel	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Clutch release fork lever S/A × clutch release lever yoke	29.4 - 39.2	3.0 - 4.0	21.7 - 28.9
Clutch height adjusting bolt × brake pedal bracket	17.7 - 29.4	1.8 - 3.0	13.0 - 21.7
Clutch pedal × shaft bolt	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9

WFE90-CL097

DAIHATSU F300

MANUAL TRANSMISSION

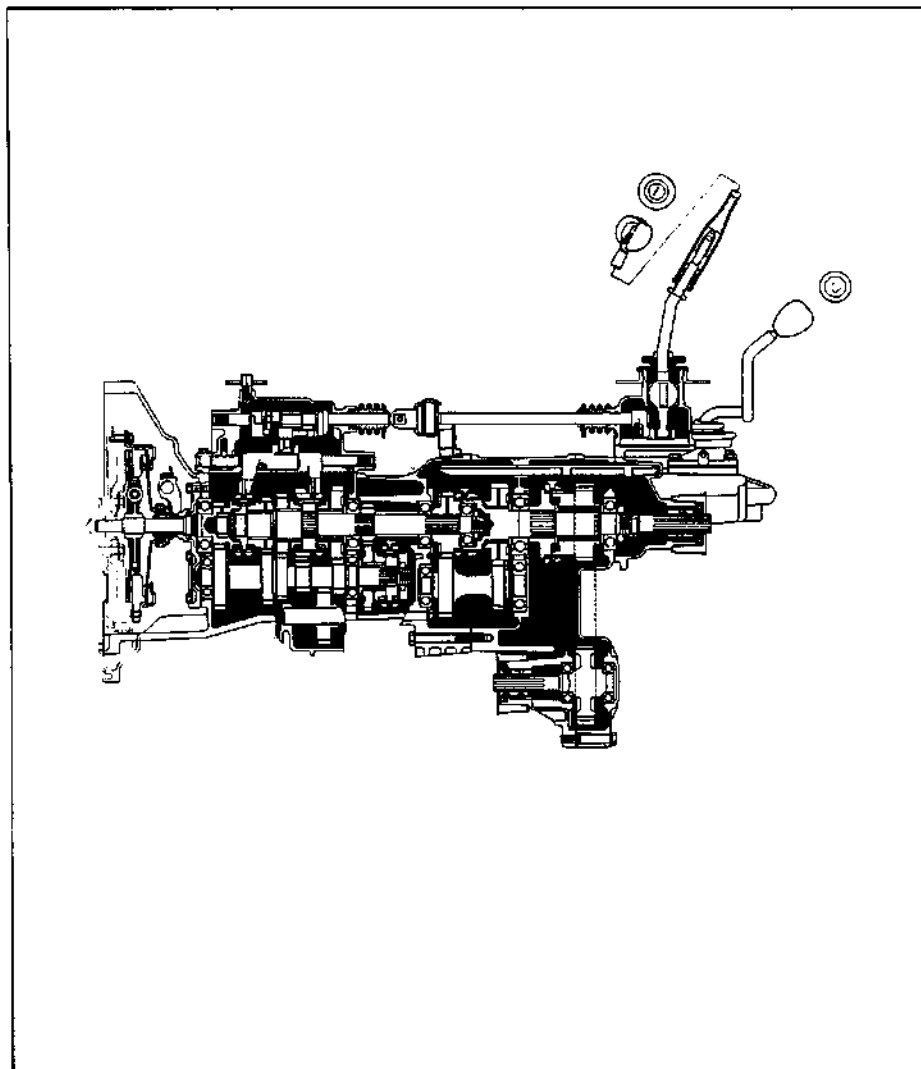
SECTIONAL VIEW	MT- 2	COUNTER GEAR- & REVERSE IDLER	
TRANSMISSION	MT- 4	GEAR-RELATED PARTS	MT- 36
TRANSMISSION SHIFT & SELECT		ASSEMBLY OF CLUTCH HUB	MT- 38
MECHANISM	MT- 4	TRANSMISSION CASE COVER	
INTERLOCK MECHANISM	MT- 4	(PART AND FULL TIME)	MT- 50
MIS-SHIFT PREVENTING		COMPONENTS	MT- 50
MECHANISM (5TH GEAR-TO-		REMOVAL	MT- 51
REVERSE GEAR SHIFT)	MT- 5	DISASSEMBLY	MT- 51
ONE-WAY MECHANISM	MT- 5	INSPECTION	MT- 57
TROUBLE SHOOTING	MT- 6	ASSEMBLY	MT- 59
TRANSMISSION & TRANSFER	MT- 7	TRANSMISSION (FULL TIME)	MT- 67
OIL SEAL REPLACEMENT		COMPONENTS	MT- 67
(IN-VEHICLE SERVICE)	MT- 8	INPUT SHAFT- OUTPUT SHAFT- &	
REMOVAL	MT- 8	TRANSFER INPUT HUB	MT- 69
INSTALLATION	MT- 9	COMPONENTS	MT- 69
SPEEDOMETER GEAR	MT- 11	DISASSEMBLY	MT- 71
REMOVAL	MT- 11	TRANSMISSION OUTPUT SHAFT	MT- 79
DISASSEMBLY	MT- 11	DISASSEMBLY	MT- 79
INSPECTION	MT- 11	INSPECTION	MT- 82
ASSEMBLY	MT- 11	ASSEMBLY	MT- 87
MANUAL TRANSMISSION & TRANSFER		ASSEMBLY OF TRANSFER OIL PUMP	
REMOVAL	MT- 12	BODY SUBASSEMBLY	MT- 87
REMOVAL	MT- 12	ASSEMBLY OF TRANSFER	
TRANSMISSION (PART TIME)	MT- 17	ADAPTER	MT- 88
COMPONENTS	MT- 17	ASSEMBLY OF OUTPUT SHAFT	MT- 89
INPUT SHAFT- OUTPUT SHAFT- &		TRANSMISSION ASSEMBLY	MT- 92
COUNTERSHAFT-RELATED	MT- 19	INSTALLATION	MT-101
COMPONENTS	MT- 19	SSTs	MT-106
TRANSMISSION DISASSEMBLY	MT- 21	SERVICE SPECIFICATIONS	MT-107
TRANSMISSION OUTPUT SHAFT	MT- 28	(PART TIME)	MT-107
TRANSFER ADAPTER	MT- 31	(Full Time)	MT-108
INPUT SHAFT	MT- 32	TRANSMISSION CASE COVER	
HUB SLEEVE, SYNCHRONIZER RING		(PART & FULL TIME)	MT-109
& GEARS	MT- 33	TRANSMISSION (PART & FULL TIME) ..	MT-109
OUTPUT SHAFT	MT- 36		

VF300-MT001

MANUAL TRANSMISSION

SECTIONAL VIEW

The manual transmission is connected directly to the engine and mounted longitudinally. A five-speed transmission is available on all models. A center-through type transfer is employed, in which the power train components from the input shaft to the output shaft are arranged straight in one row. The transmission controls employ a semi-direct method in which the transmission control section is connected with the shift lever section by means of a cross joint.



WP90-MT002

MT-2

MANUAL TRANSMISSION

Transmission and transfer gear ratio specifications

[]: General specification

Transmission	Gear ratio	1st gear	3.752
		2nd gear	2.182
		3rd gear	1.428 [1.529]
		4th gear	1.000
		5th gear	0.865
		Reverse gear	3.942
	Oil used	Kind	API GL-3 or GL-4 SAE 75W-85 or 75W-90
		Capacity	1.7 L
Transfer	Gear ratio	High gear	1.000
		Low gear	1.754 (part time only)
	Oil used	Kind	API GL-3 or GL-4 SAE 75W-85 or 75W-90
		Capacity	1.4 L

WPE80-MT003

Transmission and transfer teeth number

[]: General specification

Transmission	Input shaft gear		23
	Counter gear	Driven gear	34
		1st gear	13
		2nd gear	21
		3rd gear	30 [29]
		5th gear	41
		Reverse gear	12
	Output gear	1st gear	33
		2nd gear	31
		3rd gear	29 [30]
		5th gear	24
		Reverse gear	32
	Reverse idle gear		23
Transfer	Input shaft gear		33
	Counter gear	Driven gear	32
		Low gear	21
	Output shaft gear		38
	Sprocket	Driven gear	33
		Drive gear	33

WPE80-MT004

MANUAL TRANSMISSION

TRANSMISSION

TRANSMISSION SHIFT & SELECT MECHANISM

The transmission controls employ a semi-direct method, where the control section at the transmission side is connected to the shift lever section by means of a cross joint.

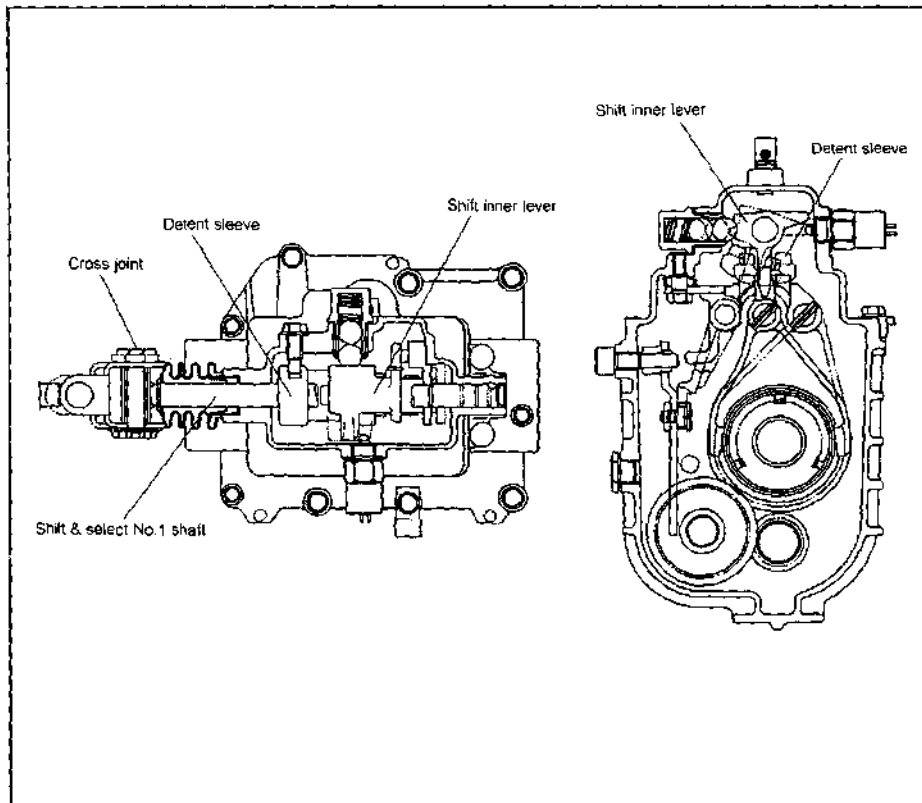
The shift & select mechanism incorporates such safe mechanisms as mis-shift preventing mechanism, interlock mechanism and one-way mechanism.

WF80-MT005

INTERLOCK MECHANISM

The transmission control shaft is connected to the shift & select No. 1 shaft by means of a cross joint. When the transmission control shaft is moved in the selecting direction, the shift inner lever attached to the shift & select No. 1 shaft swings in the selecting direction like a pendulum.

When the transmission control shaft is moved in the shifting direction, the shift inner lever moves the shift fork of each gear. This movement is restricted by a detent sleeve, thus preventing two gears from being engaged simultaneously.

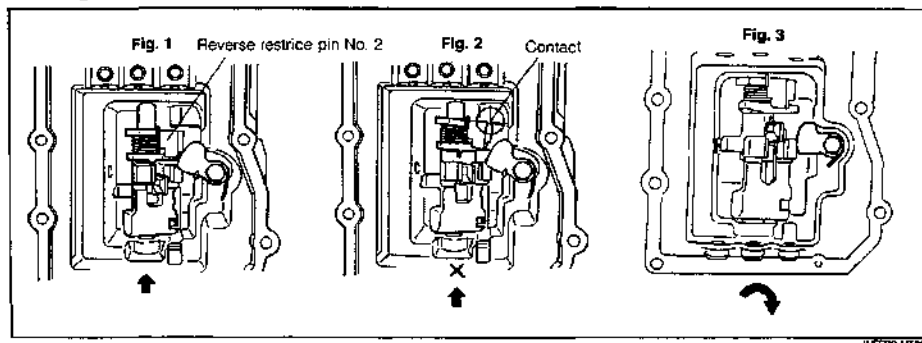


WF80-MT006

MIS-SHIFT PREVENTING MECHANISM (5TH GEAR-TO-REVERSE GEAR SHIFT)

When the transmission control shaft is shifted into the 5th gear position, the shift inner lever attached to the transmission control shaft is shifted into the 5th gear position, as shown in Fig. 1. Simultaneously, the same movement of the reverse restrict pin No. 2 also takes place. However, if an effort is made under this condition to shift the transmission control shaft from the 5th gear position directly into the reverse gear position, the reverse restrict pin No. 2 is brought into contact with the stopper surface of the transmission case cover, thus preventing the shifting of the control shaft into the reverse gear, as shown in Fig. 2.

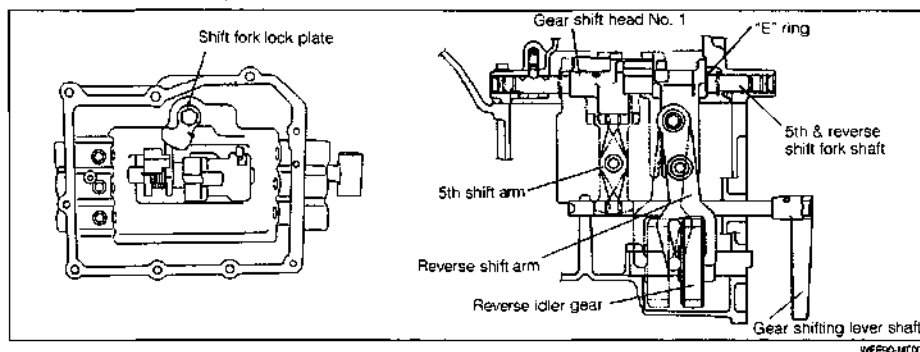
Once the transmission control shaft is returned to the neutral position, as shown in Fig. 3, the reverse restrict pin No. 2 returns to the original position, thus making it possible for the control shaft to be shifted into the reverse gear.



ONE-WAY MECHANISM

When the transmission control shaft is shifted into the 5th gear position, the gear shift head No. 1 attached to the 5th & reverse shift fork shaft moves backward (to the transfer side). In this way, the shift is made into the 5th gear from the 5th shift arm through the gear shifting lever shaft.

On the other hand, when the transmission control shaft is shifted into the reverse gear position, the "E" ring of the 5th & reverse shift fork shaft pushes the reverse shift fork forward (to the clutch side). Then, the reverse idler gear is shifted into the reverse gear position through the reverse shift arm. Moreover, when the transmission control shaft is returned to the neutral position, the returning force of the return spring of the shift fork lock plate returns the reverse shift fork to the original position. Consequently, the reverse idler gear is returned to the neutral position.



MANUAL TRANSMISSION

TROUBLE SHOOTING

Symptom	Possible causes	Checking points
Noise emitted from gear Slipping out of gear	Malfunctioning control-related components	Check control-related components.
Abnormal noise from bearing	Bearing seizure, Abnormal wear	Check bearing and gear for seizure.
Hard shifting	Malfunctioning control-related components	Check control-related components.
	Improper contact of synchronizer rings	Check synchronizer rings.

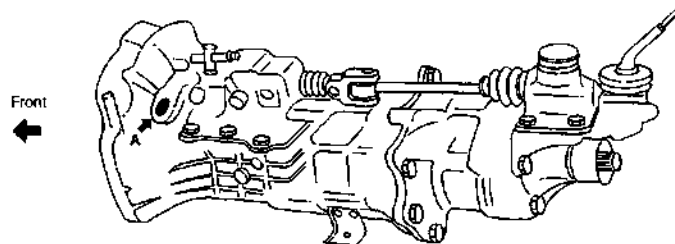
WP690-UT009

TRANSMISSION & TRANSFER

1. The Ferroza models are available with either a full-time transmission with transfer assembly or a part-time transmission with transfer assembly; the latter being used only in conventional models. The coating colors for identification between the full-time transmission with transfer assembly and the part-time transmission with transfer assembly are as follows:

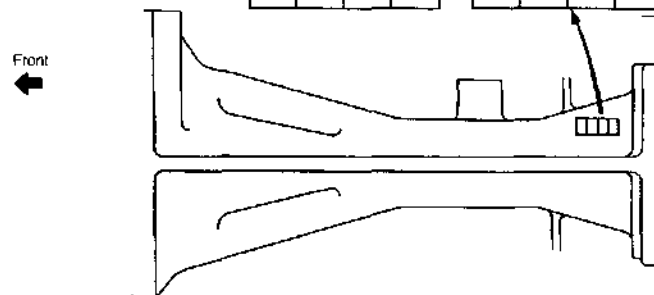
A: Identification marking position

A	European	Australian	General
Part time	Blue	←	Pink
Full time	White	←	←



B: Lot number inscription position

EX: 0 9 Y A or 1 0 S B



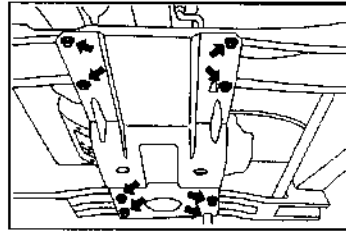
WFEB0-UT010

MANUAL TRANSMISSION

OIL SEAL REPLACEMENT (IN-VEHICLE SERVICE)

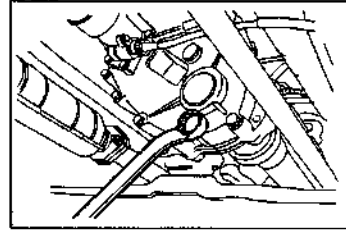
REMOVAL

1. Remove the transmission undercover by removing the eight bolts.



WPES0-MT011

2. Drain the oil of the transfer.

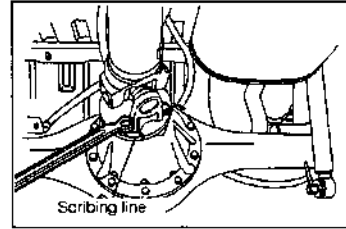


WPES0-MT012

3. Remove the rear propeller shaft.

CAUTION:

- Prior to the removal, be sure to put a scribing line. If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration.

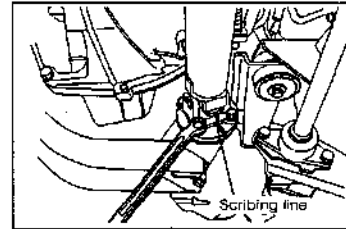


WPES0-MT013

4. Remove the front propeller shaft.

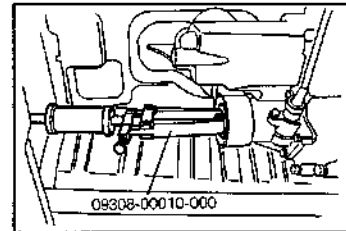
CAUTION:

- Prior to the removal, be sure to put a scribing line. If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration.



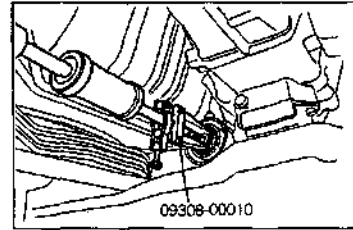
WPES0-MT014

5. Remove the rear oil seal, using the following SST.
SST: 09308-00010-000



WPES0-MT015

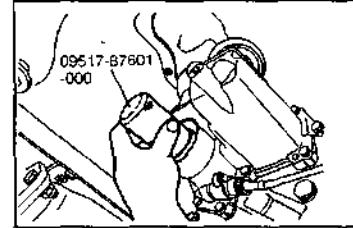
6. Remove the front oil seal, using the following SST.
SST: 09308-00010



WPES0-MT016

INSTALLATION

1. Press the rear oil seal, using the following SST.
SST: 09517-87601-000

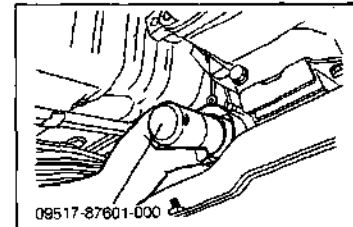


WPES0-MT017

NOTE:

- Apply lithium base multi purpose grease to the lip section of the oil seal.

2. Press the front oil seal, using the following SST.
SST: 09517-87601-000



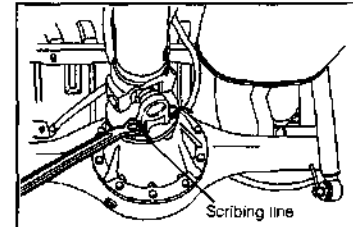
WPES0-MT018

NOTE:

- Apply lithium base multi purpose grease to the lip section of the oil seal.

3. Install the rear propeller shaft.

Tightening Torque:
58.8 - 78.5 N·m (6.0 - 8.0 kgf·m)



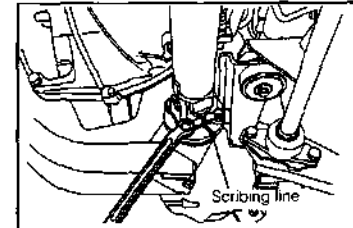
WPES0-MT019

CAUTION:

- Install the propeller shaft, while aligning the scribing lines which were put during the removal. If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration.

4. Install the front propeller shaft.

Tightening Torque:
58.8 - 78.5 N·m (6.0 - 8.0 kgf·m)



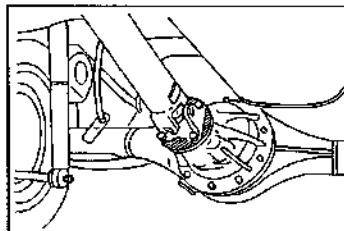
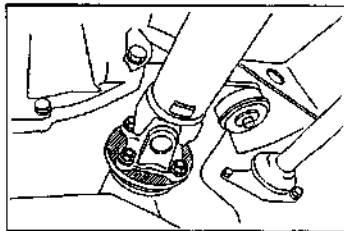
WPES0-MT020

CAUTION:

- Install the propeller shaft, while aligning the scribing lines which were put during the removal. If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration.

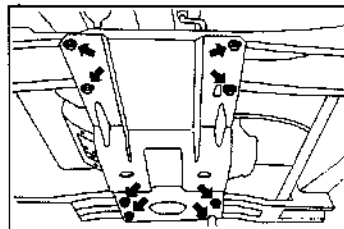
MANUAL TRANSMISSION

5. After installing the propeller shaft, apply black paint to the exposed machined surface of the differential (slant line section in the right figure) as a rust preventive measure.



WFE80-MT021

6. Install the transmission undercover with the eight bolts.
7. Fill the transfer with oil.
Transfer Oil Capacity: 1.4 L
Transfer Oil: API GL-3 or GL-4
SAE 75W-85 or 75W-90

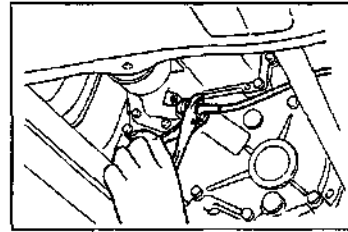


WFE80-MT022

SPEEDOMETER GEAR

REMOVAL

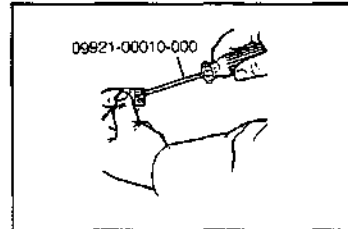
1. Disconnect the speedometer cable with oil seal from the transfer shift lever retainer, using the common tool of plier.



WFE90-MT022

DISASSEMBLY

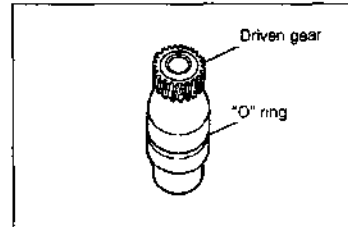
- Remove the oil seal, using the following SST.
- SST: 09921-00010-000



WFE90-MT024

INSPECTION

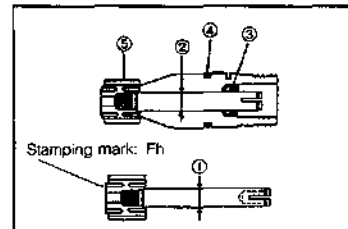
1. Check the oil seal, "O" ring and driven gear of the speedometer shaft sleeve for wear or damage.



WFE90-MT025

Unit: mm

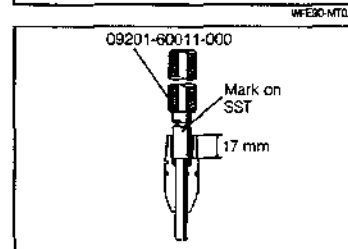
Part		Specified value	Limit
Driven gear shaft diameter	①	8 $\begin{smallmatrix} -0.03 \\ -0.08 \end{smallmatrix}$	7.95
Shaft sleeve bore	②	8 $\begin{smallmatrix} -0.05 \\ -0.02 \end{smallmatrix}$	8.10
Oil seal lip section	③	Visually inspect the section for excessive wear or damage.	
"O" ring	④		
Driven gear tooth surface	⑤		



WFE90-MT026

ASSEMBLY

- Assemble the oil seal for speedometer shaft sleeve, using the following SST.
- SST: 09201-60011-000



WFE90-MT027

INSTALLATION

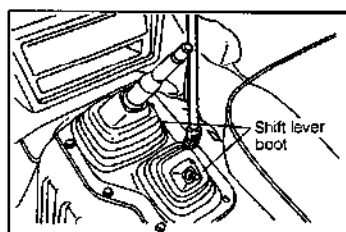
- Install the speedometer shaft sleeve to the transfer rear output shaft bearing retainer.

MANUAL TRANSMISSION

MANUAL TRANSMISSION & TRANSFER REMOVAL

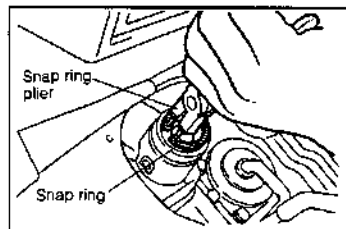
REMOVAL

1. Working from the vehicle interior
 - (1) Remove the Transmission and Transfer shift lever knob by turning the counterclockwise directions.
 - (2) Turn over the floor carpet.
 - (3) Remove the shift lever boot by removing the six bolts and then, pull up toward you.



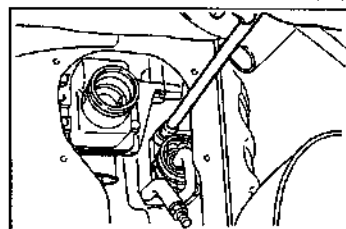
WPB90-MT026

- (4) Remove the transmission control lever by detaching the snap ring, using the common tool of snap ring plier.



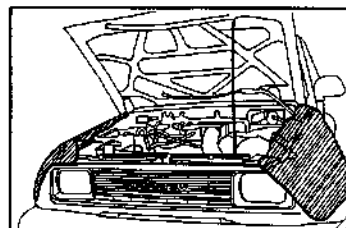
WPB90-MT029

- (5) Remove the transfer control lever by removing the four bolts attaching to the transfer rear case.



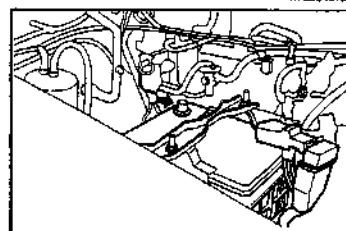
WPB90-MT030

2. Working from the engine compartment room
 - (1) Install the fender cover to the fenders so that no scratch may be made to the fenders.



WPB90-MT031

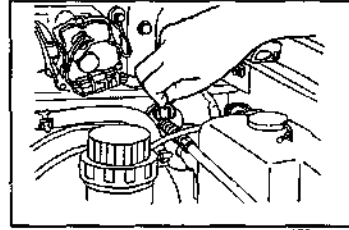
- (2) Disconnect the battery ground cable from the negative (-) terminal of the battery.



WPB90-MT032

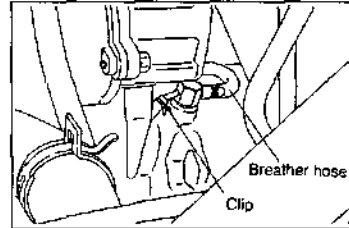
MANUAL TRANSMISSION

- (3) Remove the E-ring for the adjusting play.



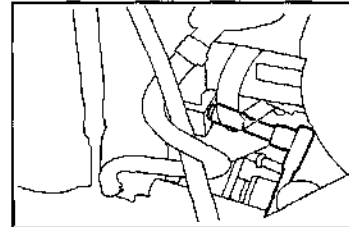
WFE90-MT003

- (4) Detach a clip on the transmission breather hose from the union.



WFE90-MT004

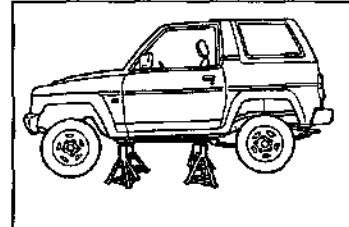
- (5) Remove the direct connecting one-both under the starter motor.



WFE90-MT005

3. Working from the vehicle outside

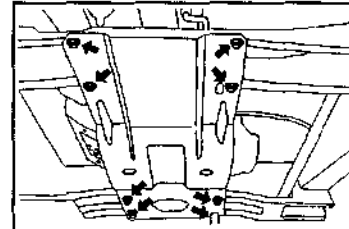
- (1) Jack or lift up the vehicle and support the vehicle body with safety stands securely. (As for the jack or lift up points, refer with the GI-section.)



WFE90-MT006

4. Working from the under vehicle

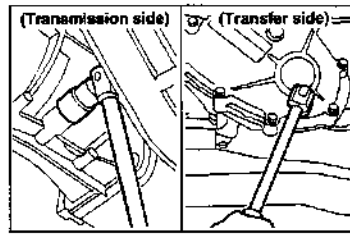
- (1) Remove the transmission under cover by removing the eight bolts.



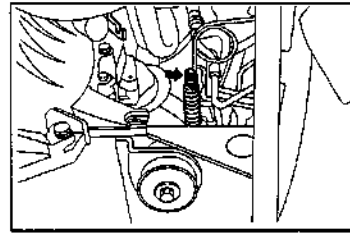
WFE90-MT007

MANUAL TRANSMISSION

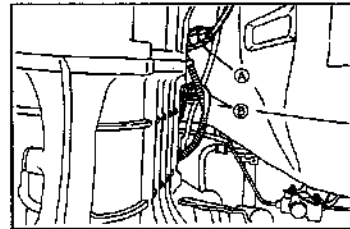
- (2) Drain the oil from the transmission and transfer by removing the drain plugs.



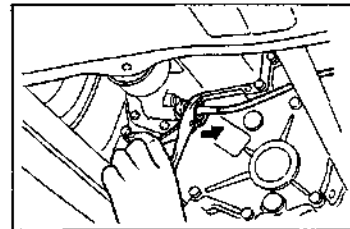
- (3) Disconnect the clutch release cable subassembly at the clutch housing side.



- (4) Disconnect the coupler of back up lamp ④ and transmission position detect switch ③.



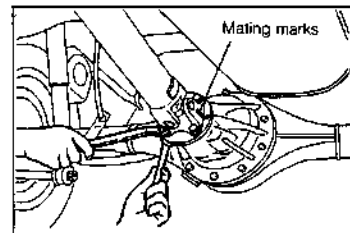
- (5) Disconnect the speedometer cable with oil seal from the transmission case, using the common tool of plier.



- (6) Remove the front propeller shaft and rear propeller shaft by removing the four bolts and four nuts.

CAUTION:

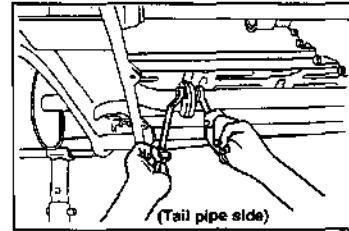
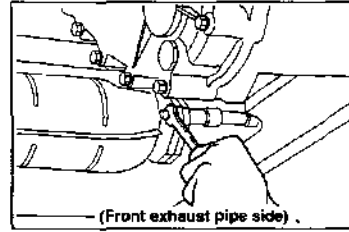
- When installing these parts, align the mating marks with each other which were put on the connecting section during the removal as guide during the installation. If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration.



- (7) Separate by catalyst converter assembly by removing the two nuts.

WARNING:

Be sure to put on a pair of gloves because the exhaust pipe may be still hot for a little while after the engine has stopped.

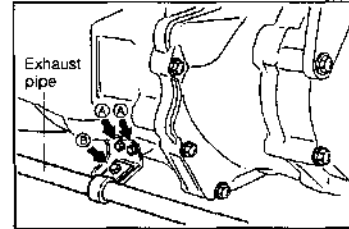


WFE90-VTD43

- (8) Remove the exhaust pipe support bracket by removing the three bolts.

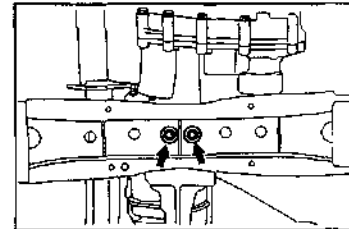
WARNING:

Be very careful not to touch the exhaust pipe because the exhaust pipe may be still hot for a little while after the engine has stopped.



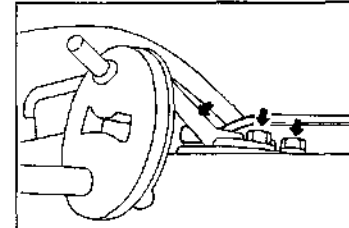
WFE90-MTC44

- (9) Remove the two attaching nuts at the crossmember No. 2.



WFE90-MTC45

- (10) Remove the exhaust pipe bracket attaching to the crossmember No. 3 by removing the three bolts.



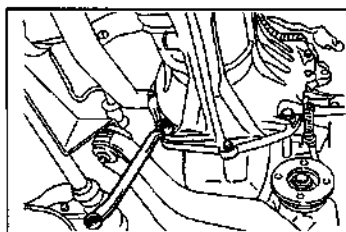
WFE90-MTC46

MANUAL TRANSMISSION

- (11) Remove the starter motor by removing the two bolts.
- (12) Remove the transmission direct-connecting six bolts and leave them in inserted condition.

WARNING:

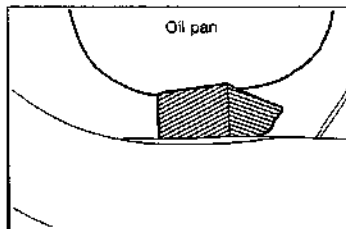
Be very careful not to touch the exhaust pipe, engine and transmission because they may be still hot for a little while after engine has stopped.



WFE90-MT047

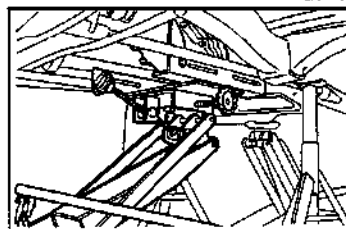
NOTE:

- As directed in the relevant section on remounting, insert a wooden piece(s) between the oil pan and the differential carrier support front bracket to prevent downward movement of the engine assembly to the transmission side (and to prevent contact between the fan and the fan shroud).



WFE90-MT048

- (13) Support the transmission with a transmission jack.

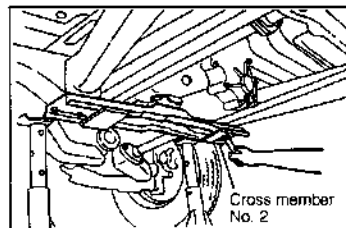


WFE90-MT049

- (14) Remove the crossmember No. 2 by removing the four bolts on both left and right sides.
- (15) While supporting the transmission with a transmission jack, remove the transmission direct-connecting bolts. Then, take out the transmission from the engine with installed the crossmember No. 2.

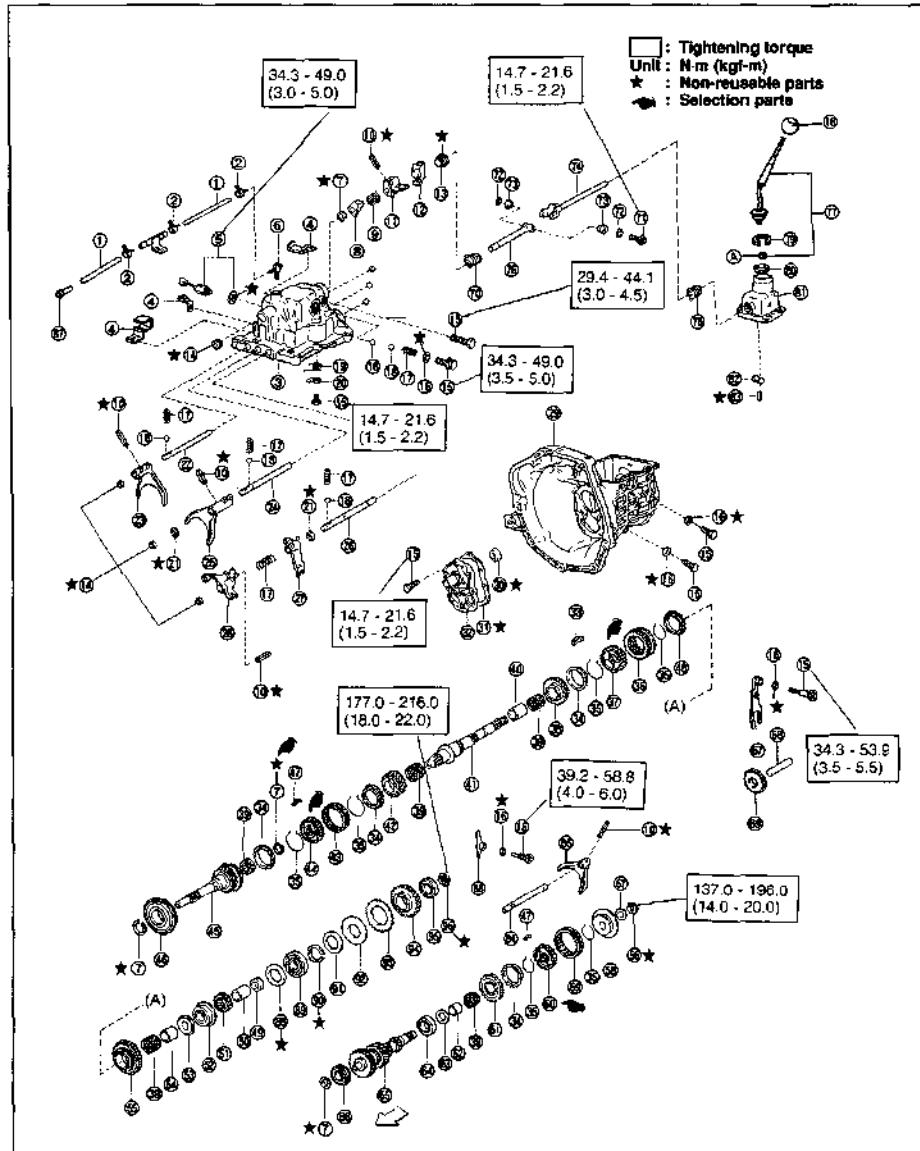
NOTE:

- The transmission direct-connecting bolts should be removed, while raising the rear section of the transfer with a transmission jack. Then, pull out the transmission input shaft from the clutch. Thus, remove the transmission and transfer by sliding them toward the rear.



WFE90-MT050

TRANSMISSION (PART TIME) COMPONENTS



WPB30-MT051

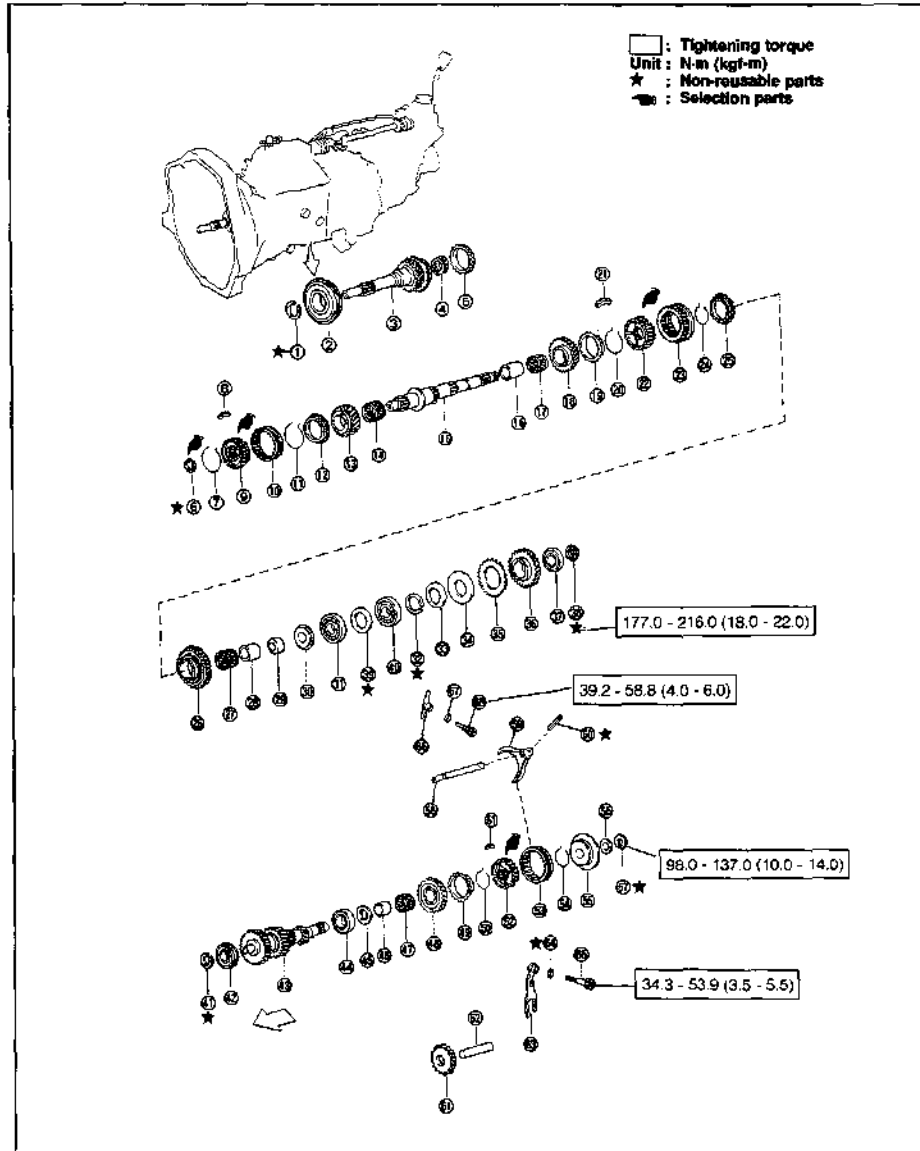
MANUAL TRANSMISSION

- | | |
|---------------------------------------|------------------------------------|
| ① Breather hose | ⑤⑥ Synchronizer ring No. 2 |
| ② Clip | ⑤⑦ Output shaft gear spacer No. 2 |
| ③ T/M case cover | ⑤⑧ Output shaft gear spacer No. 1 |
| ④ Clamp | ⑤⑨ 5th gear |
| ⑤ Backup lamp switch | ⑤⑩ Radial ball bearing |
| ⑥ Union | ⑤⑪ 1st gear thrust washer |
| ⑦ Snap ring | ⑤⑫ 1st gear bearing inner race |
| ⑧ Reverse restrict pin No. 2 | ⑤⑬ 1st gear |
| ⑨ Torsion spring | ⑤⑭ Lock nut |
| ⑩ Slotted pin | ⑤⑮ Conical washer spring |
| ⑪ Shift inner lever | ⑤⑯ Shifting key retainer |
| ⑫ Detent sleeve | ⑤⑰ T/M hub sleeve |
| ⑬ Oil seal | ⑤⑱ Synchronizer hub No. 1 |
| ⑭ Tight plug | ⑤⑲ Counter shaft 5th gear |
| ⑮ Bolt | ⑤⑳ 5th gear bearing inner race |
| ⑯ Gasket | ⑤㉑ 5th gear thrust washer |
| ⑰ Spring | ⑤㉒ Radial ball bearing |
| ⑱ Ball | ⑤㉓ Counter gear |
| ⑲ Torsion spring | ⑤㉔ Radial ball bearing |
| ⑳ Shift fork lock plate | ⑤㉕ Reverse shift arm |
| ㉑ "E" ring | ⑤㉖ Reverse idle gear shaft |
| ㉒ 1st & 2nd shift fork shaft | ⑤㉗ Reverse idle gear S/A |
| ㉓ 1st & 2nd shift fork | ⑤㉘ Shift & select shaft No. 1 boot |
| ㉔ 3rd & 4th shift fork shaft | ⑤㉙ Bolt |
| ㉕ 3rd & 4th shift fork | ⑤㉚ "O" ring |
| ㉖ 5th & reverse shift fork shaft | ⑤㉛ Bush |
| ㉗ Reverse shift fork | ⑤㉜ Control shaft |
| ㉘ Gear shift head No. 1 | ⑤㉝ Shift & select shaft No. 1 |
| ㉙ T/M case assy | ⑤㉞ Control shaft boot |
| ㉚ Oil seal | ⑤㉟ T/M shift lever assy (⑤: Bush) |
| ㉛ Gasket | ⑤㊱ T/M control shift knob |
| ㉜ Bearing front retainer | ⑤㊲ Snap ring |
| ㉝ Synchronesh shifting key (3 pieces) | ⑤㊳ T/M shift lever ball seat |
| ㉞ Synchronizer ring No. 3 | ⑤㊴ Shift lever retainer S/A |
| ㉟ Synchronesh shifting key spring | ⑤㊵ Shift lever outer |
| ㊱ Reverse gear | ⑤㊶ Slotted spring pin |
| ㊲ T/M clutch hub No. 1 | ⑤㊷ Gear shifting lever shaft |
| ㊳ 2nd gear | ⑤㊸ 5th shift fork |
| ㊴ Needle roller bearing | ⑤㊹ 5th shift arm |
| ㊵ 1st gear bearing inner race | ⑤㊺ 2way |
| ㊶ Output shaft | ⑤㊻ Oil seal |
| ㊷ 3rd gear | ⑤㊼ Radial ball bearing |
| ㊸ Hub sleeve No. 1 | ⑤㊽ Snap ring |
| ㊹ T/M clutch hub No. 2 | ⑤㊾ Conical spring washer |
| ㊺ Input shaft | ⑤㊿ Washer plate |
| ㊻ Radial ball bearing | ⑥ Sub gear No. 1 |
| ㊼ Synchronesh shifting key No. 2 | ⑥ Transfer low speed input gear |
| | ⑥ Bearing |
| | ⑥ Lock nut |

WPE90-NT052

MT-18

INPUT SHAFT-, OUTPUT SHAFT- & COUNTERSHAFT-RELATED COMPONENTS



WP80-MT03

MANUAL TRANSMISSION

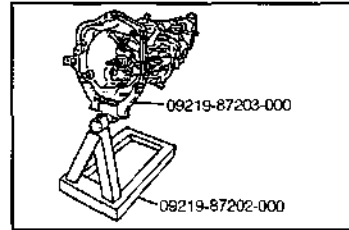
- | | |
|--|--|
| ① Snap ring | ⑤ Transfer low speed input gear |
| ② Radial ball bearing | ⑥ Bearing |
| ③ Input shaft | ⑦ Lock nut |
| ④ Needle roller bearing | ⑧ Oil seal |
| ⑤ Synchronizer ring No. 3 | ⑨ Bearing |
| ⑥ Snap ring | ⑩ Snap ring |
| ⑦ Synchronmesh shifting key spring | ⑪ Radial ball bearing |
| ⑧ Synchronmesh shifting key No. 2 (3 pieces) | ⑫ Counter gear |
| ⑨ Transmission clutch hub No. 2 | ⑬ Radial ball bearing |
| ⑩ Transmission hub sleeve No. 1 | ⑭ 5th gear thrust washer |
| ⑪ Synchronmesh shifting key spring | ⑮ 5th gear bearing inner race |
| ⑫ Synchronizer ring No. 3 | ⑯ Needle roller bearing |
| ⑬ 3rd gear | ⑰ Counter shaft 5th gear |
| ⑭ Needle roller bearing | ⑱ Synchronizer ring No. 3 |
| ⑮ Output shaft | ⑲ Synchronmesh shifting key spring |
| ⑯ 1st gear bearing inner race | ⑳ Synchronmesh shifting key No. 2 (3 pieces) |
| ⑰ Needle roller bearing | ㉑ Synchronizer No. 1 hub |
| ⑱ 2nd gear | ㉒ Transmission hub sleeve No. 2 |
| ⑲ Synchronizer ring No. 3 | ㉓ Synchronmesh shifting key spring |
| ㉑ Synchronmesh shifting key spring | ㉔ 5th Shifting key retainer |
| ㉒ Synchronmesh shifting key No. 1 (3 pieces) | ㉕ Conical spring washer |
| ㉓ Transmission clutch hub No. 1 | ㉖ Lock nut |
| ㉔ Reverse gear | ㉗ Gear shifting lever shaft |
| ㉕ Synchronmesh shifting key spring | ㉘ 5th shift fork |
| ㉖ Synchronizer ring No. 2 | ㉙ Slotted pin |
| ㉗ 1st gear | ㉚ Reverse idle gear S/A |
| ㉘ Needle roller bearing | ㉛ Reverse idle gear shaft |
| ㉙ 1st gear bearing inner race | ㉜ Reverse shift arm |
| ㉚ 1st gear bearing inner race No. 2 | ㉝ Gasket |
| ㉛ 1st gear thrust washer | ㉞ Bolt |
| ㉜ Radial ball bearing | ㉟ 5th shift arm |
| ㉝ Snap ring | ㊱ Gasket |
| ㉞ Conical spring washer | ㊲ Bolt |
| ㉟ Washer plate | |
| ㊱ Sub gear No. 1 | |

WPESQ-MT05+

TRANSMISSION DISASSEMBLY

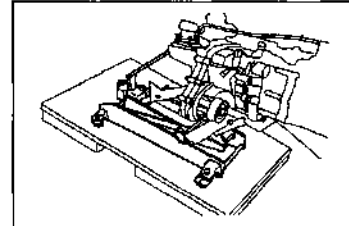
1. Install the transmission assembly with transfer on the over-haul stand using the following SSTs.
SST: 09219-87202-000
09219-87203-000

As for the removal of transmission assembly with transfer, see page MT-12 to MT-16.



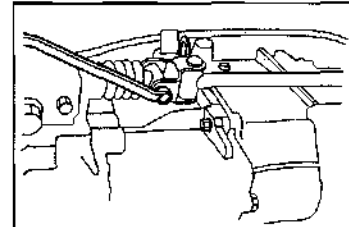
WPB0-MT055

2. Place wooden plates or any other suitable materials on the overhauling stand, as shown in the diagram at right.
3. Support the transfer front and transfer rear case with a transmission jack.



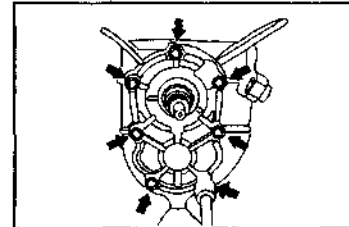
WPB0-MT056

4. Remove the control shaft with installed the shift lever retainer subassembly by removing the hexagon bolt.



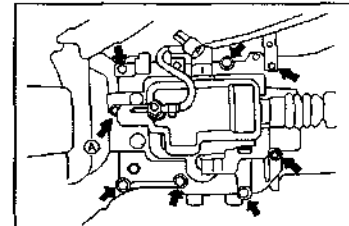
WPB0-MT057

5. Remove the clutch release bearing and related parts. (Refer CL-section.)
6. Remove the front bearing retainer by removing the seven bolts.



WPB0-MT058

7. Remove the transmission case cover subassembly by removing the seven bolts and a reamer bolt (A).

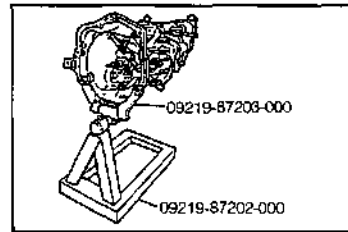


WPB0-MT059

TRANSMISSION DISASSEMBLY

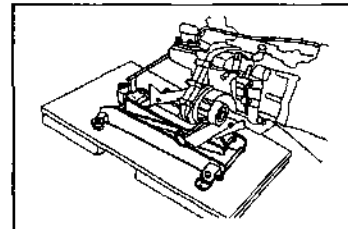
1. Install the transmission assembly with transfer on the over-haul stand using the following SSTs.
SST: 09219-87202-000
09219-87203-000

As for the removal of transmission assembly with transfer, see page MT-12 to MT-16.



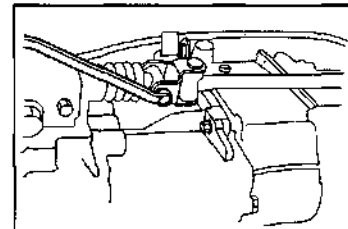
WPB0-MT055

2. Place wooden plates or any other suitable materials on the overhauling stand, as shown in the diagram at right.
3. Support the transfer front and transfer rear case with a transmission jack.



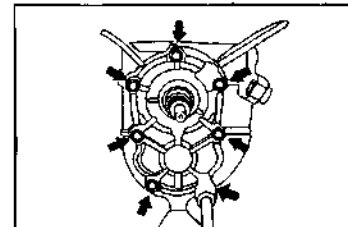
WPB0-MT056

4. Remove the control shaft with installed the shift lever retainer subassembly by removing the hexagon bolt.



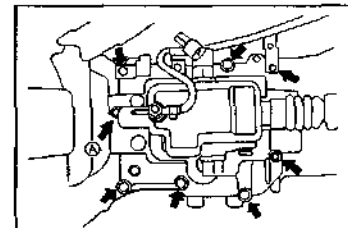
WPB0-MT057

5. Remove the clutch release bearing and related parts. (Refer CL-section.)
6. Remove the front bearing retainer by removing the seven bolts.



WPB0-MT058

7. Remove the transmission case cover subassembly by removing the seven bolts and a reamer bolt (A).



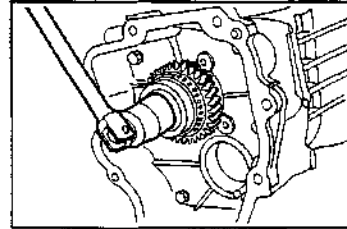
WPB0-MT059

MANUAL TRANSMISSION

13. Raise the lock section of the lock nut of the transfer lower speed input gear. Remove the lock nut.

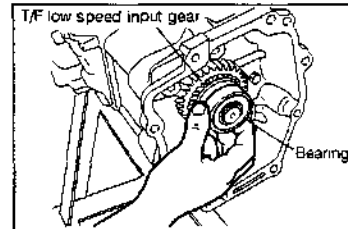
NOTE:

- Never use the impact wrench.
- The radial ball bearing seat face may be avoided from the damage.
- Never reuse the removed lock nut.



WPB0-4MT06

14. Remove the bearing and transfer lower speed input gear. (As for the inspection for the removed parts. See page MT-31.)

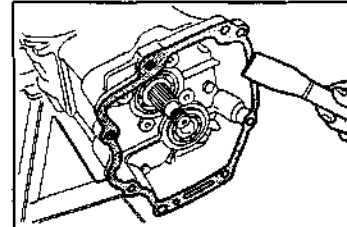


WPB0-4MT06

15. Remove the gasket on the transfer adapter with a gasket scraper.

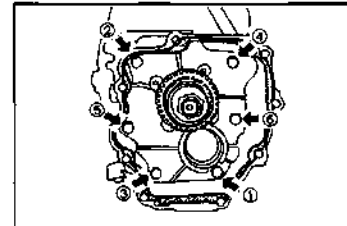
NOTE:

- Remove the gasket on the transmission case attaching surface of the transfer adapter, using a gasket scraper. Be very careful not to scratch the attaching surface.



WPB0-4MT06

16. Remove the transfer adapter by removing the six bolts with installed the radial ball bearing and oil seal.

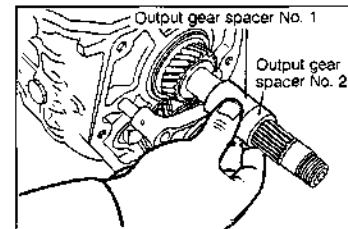


WPB0-4MT06

17. Remove the output gear spacer No. 1 and output gear spacer No. 2.

NOTE:

- Measure the backlash and thrust clearance of the 5th gear.



WPB0-4MT06

Unit: mm

Backlash	0.05 - 0.13
Thrust clearance	0.11 - 0.30

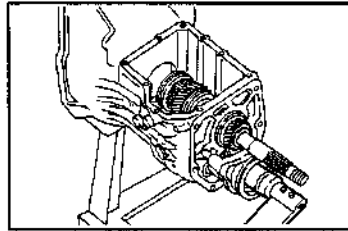
MANUAL TRANSMISSION

18. Raise the lock section of the lock nut of the countershaft 5th gear.

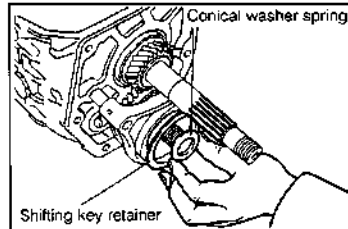
19. Remove the lock nut of the countershaft 5th gear.

NOTE:

- Never reuse the removed lock nut.



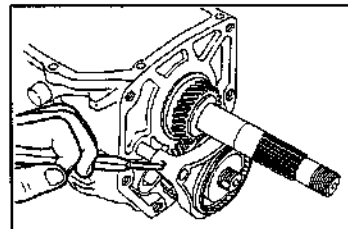
20. Remove the conical washer spring and shifting key retainer.



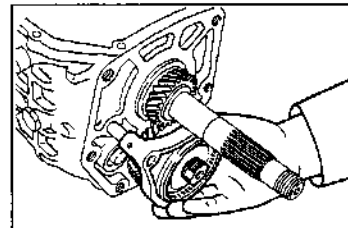
21. Drive off the slotted pin of the 5th shift fork.

NOTE:

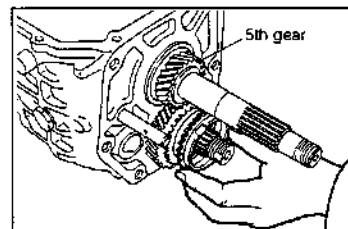
- Never reuse the removed slotted pin.



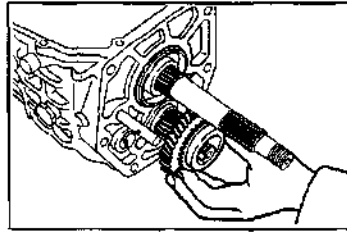
22. Remove the 5th shift fork together with synchronizer hub sleeve in a set.



23. Remove the synchronizer ring and 5th gear.

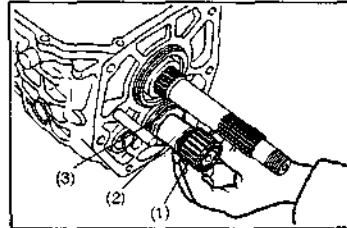


24. Remove the countershaft 5th gear.



WPB0-MT074

25. Remove the following parts from the countershaft.
 (1) Needle roller bearing
 (2) 5th gear bearing inner race
 (3) 5th gear thrust washer

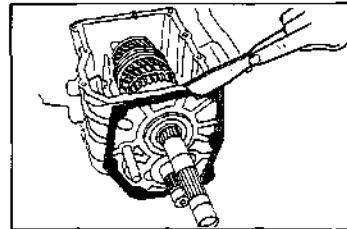


WPB0-MT075

26. Remove the liquid gasket from the transmission case, using a gasket scraper.

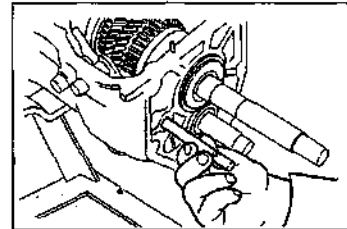
NOTE:

- Be very careful not to scratch the transmission case during the removal.



WPB0-MT076

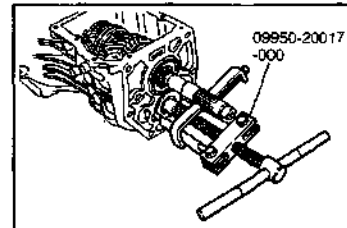
27. Remove the gear shifting lever shaft.



WPB0-MT077

28. Remove the countershaft rear bearing, using the following SST.

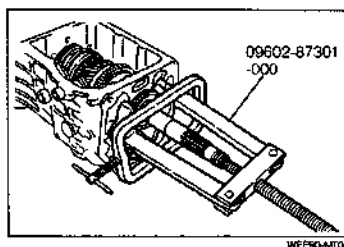
SST: 09950-20017-000



WPB0-MT078

MANUAL TRANSMISSION

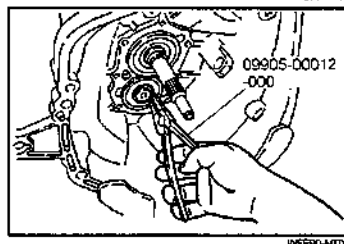
29. Detach the stop ring of the output shaft bearing. Remove the output shaft bearing, using the following SST.
- SST: 09602-87301-000



30. Detach the snap ring of the countershaft, using the following SST.
- SST: 09905-00012-000

NOTE:

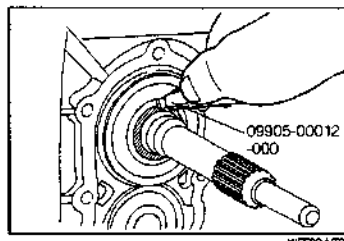
- Never reuse the removed snap ring.



31. Detach the snap ring of the input shaft, using the following SST.
- SST: 09905-00012-000

NOTE:

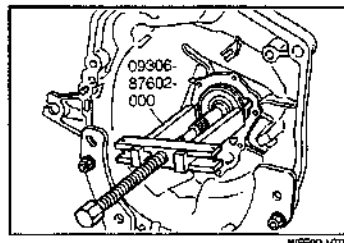
- Never reuse the removed snap ring.



32. Remove the input shaft bearing, using the following SST.
- SST: 09306-87602-000

NOTE:

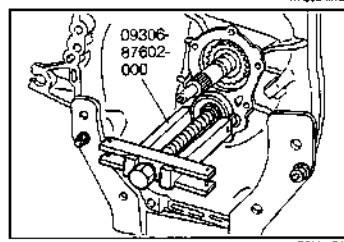
- Detach the stop ring, prior to remove the bearing.



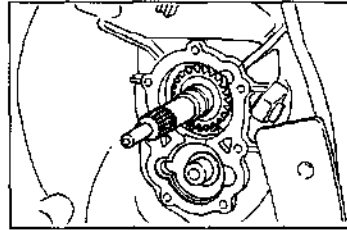
33. Remove the bearing of the countershaft at the clutch side, using the following SST.
- SST: 09306-87602-000

NOTE:

- Push out the bearing by tapping the countershaft at the output shaft side, using a plastic hammer.
- Detach the stop ring, prior to remove the bearing.

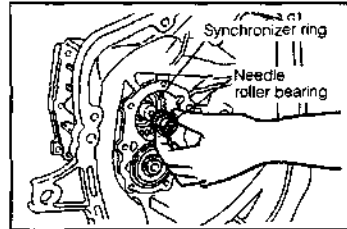


34. Remove the input shaft.
(As for the inspection procedures for each section, see page MT-32.)



WPB90-MT004

35. Remove the needle roller bearing and synchronizer ring.
(As for the inspection on the removed parts, see page MT-32.)

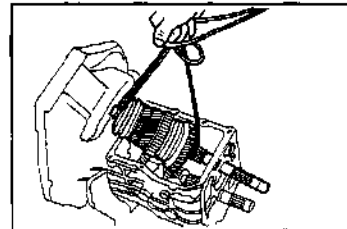


WPB90-MT005

36. Remove the output shaft assembly.
(As for the disassembly, inspection and assembly for the removed parts, see page MT-28.)

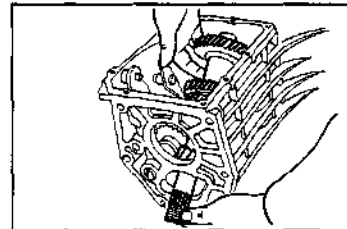
NOTE:

- It is recommended that as shown in the diagram at right, an operation rope (about 3 mm in outside diameter) be used to remove the output shaft assembly from the transmission case assembly.



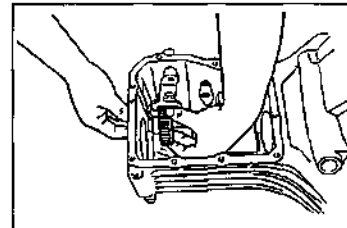
WPB90-MT006

37. Remove the countershaft from the transmission case.



WPB90-MT007

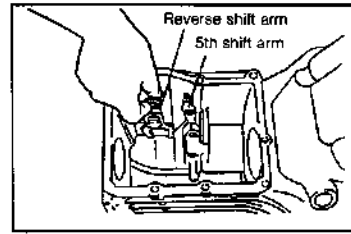
38. Remove the reverse idler gear and reverse idler gear shaft.



WPB90-MT008

MANUAL TRANSMISSION

39. Remove the reverse shift arm and 5th shift arm.

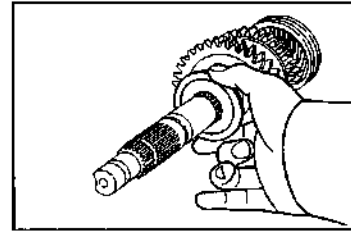


WPB90-MT089

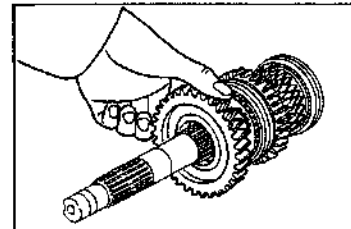
TRANSMISSION OUTPUT SHAFT

DISASSEMBLY

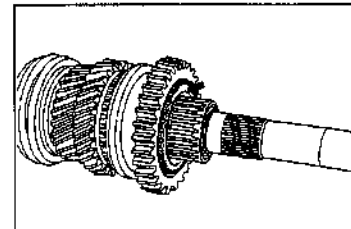
1. Remove the 1st gear thrust washer.



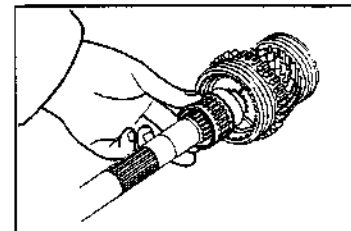
2. Remove the 1st gear.



3. Remove the synchronizer ring No. 2.

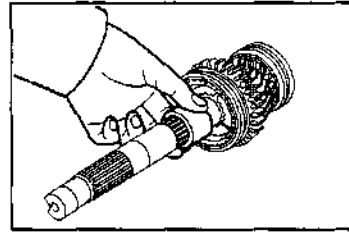


4. Remove the needle roller bearing.

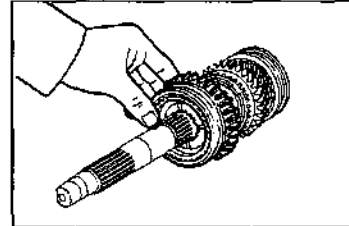


MANUAL TRANSMISSION

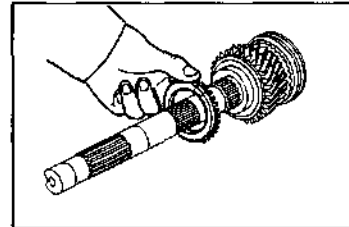
5. Remove the 1st gear bearing inner race.



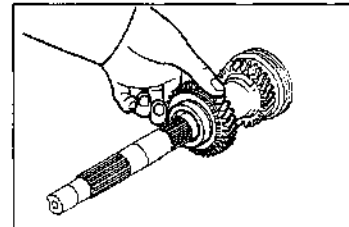
6. Remove the reverse gear with installed the following parts in a set.
- (1) Transmission clutch hub No. 1
 - (2) Synchromesh shifting key spring
 - (3) Synchromesh shifting key



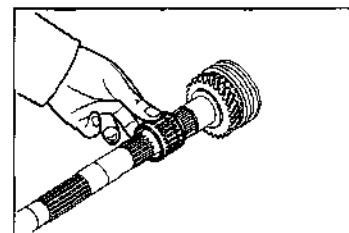
7. Remove the synchronizer ring.



8. Remove the 2nd gear.



9. Remove the needle roller bearing.



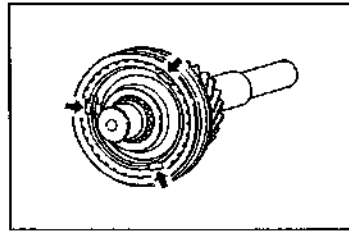
MANUAL TRANSMISSION

10. Remove the following parts.

- (1) Transmission hub sleeve No. 1
- (2) Synchromesh shifting key spring (1 piece)
- (3) Synchromesh shifting key (3 pieces)

NOTE:

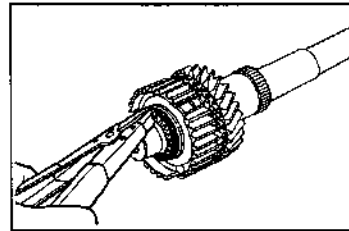
- Make sure that an axial clearance of transmission clutch hub No. 2 should be measured, prior to assembly the above parts (See page MT-39).



11. Detach the snap ring.

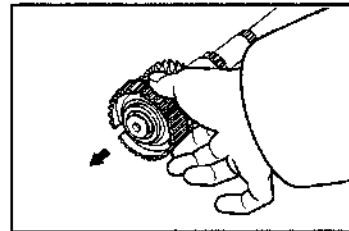
NOTE:

- Never reuse the removed snap ring.

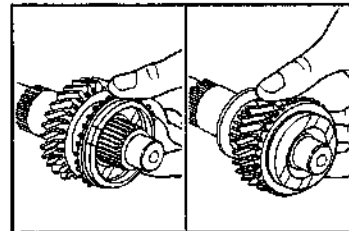


12. Remove the following parts in a set

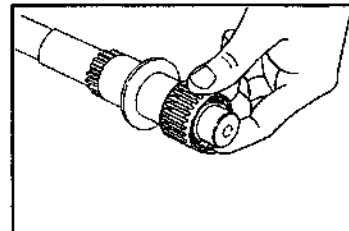
- (1) Transmission clutch hub No. 2.
- (2) Synchromesh shifting key spring (1 piece)



13. Remove the synchronizer ring No. 3 and 3rd gear.

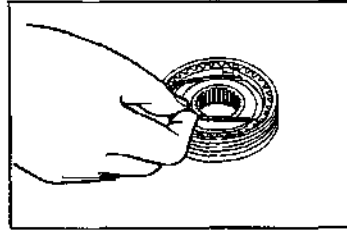


14. Remove the needle roller bearing.



MANUAL TRANSMISSION

15. Remove the synchromesh shifting key spring and synchromesh shifting key from the following transmission clutch hub sleeve No. 1, No. 2 and hub sleeve.



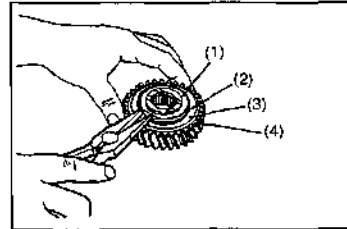
WPB30-MT104

TRANSFER ADAPTER

DISASSEMBLY

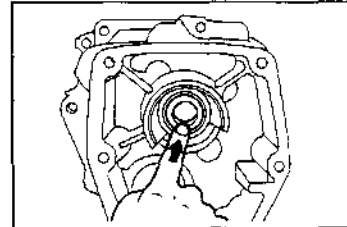
1. Remove the following parts of the transfer low speed input gear in this sequence.

- (1) Snap ring
- (2) Conical spring
- (3) Washer plate
- (4) Sub gear No. 1



WPB30-MT105

2. Remove the bearing of the transmission output shaft of the transfer adapter by pushing the output gear spacer No. 2 to the transfer front case side.



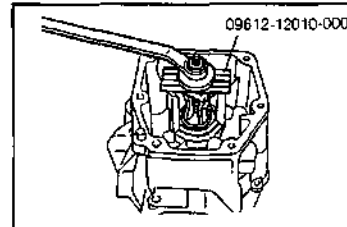
WPB30-MT106

3. Remove the oil seal of the transmission output shaft, using the following SSTs.

SST: 09612-12010-000

NOTE:

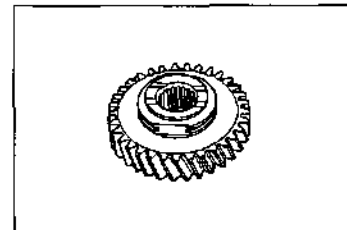
- Never reuse the removed oil seal.



WPB30-MT107

INSPECTION

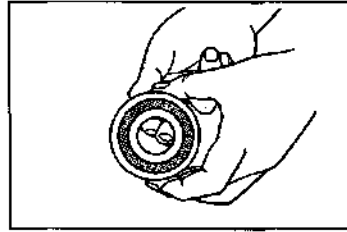
1. Check the transfer low speed input gear for wear or damage.



WPB30-MT108

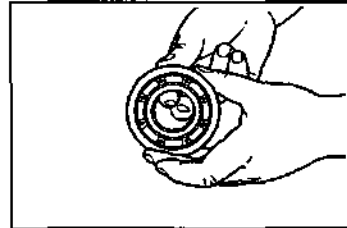
MANUAL TRANSMISSION

2. Rotate the bearing inner race of the following parts by applying a force with your finger. Check to see if the bearing inner race rotates smoothly without any binding.
 - (1) Transmission input shaft and out put shaft rear
 - (2) Transmission counter front



WPB0-MT108

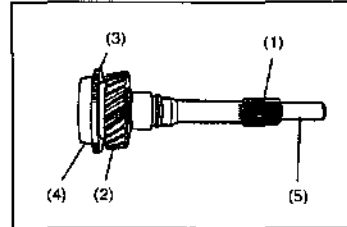
3. Rotate the bearing inner race of the following parts by applying a force with your finger. Check to see if the bearing inner race rotates smoothly without any binding.
 - (1) Transfer counter gear of the transfer adapter.
 - (2) Transmission output shaft of the transfer adapter.



WPB0-MT110

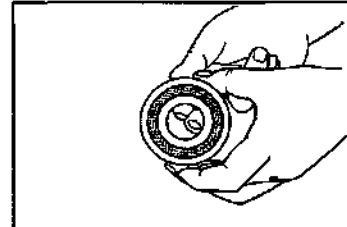
INPUT SHAFT

1. Check the input shaft for the following items.
 - (1) Spline section for damage
 - (2) Gear for damage and wear
 - (3) Engaging section of hub sleeve for damage
 - (4) Tapered section for wear or damage
 - (5) Race section of roller bearing for wear or damage



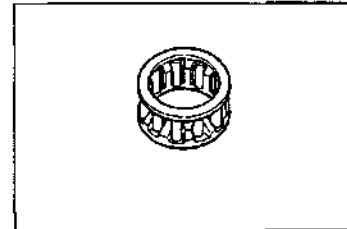
WPB0-MT111

2. Rotate the bearing inner race by applying a force with your finger. Check to see if the bearing inner race rotates smoothly without any sticking.



WPB0-MT112

3. Check the needle roller bearing for wear or damage.



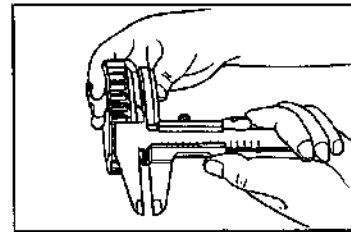
WPB0-MT113

HUB SLEEVE, SYNCHRONIZER RING & GEARS

1. Measure the contact width of the reverse gear with the shift fork, using vernier calipers.

Unit: mm

Item	Specified value	Allowable limit
Part name		
Reverse gear	7.05 - 7.12	7.3

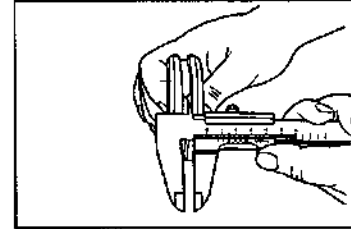


WFEG-MT114

2. Measure the contact width of the transmission hub sleeve with the shift fork, using vernier calipers.

Unit: mm

Item	Specified value	Allowable limit
Part name		
Transmission hub sleeve	7.05 - 7.12	7.3

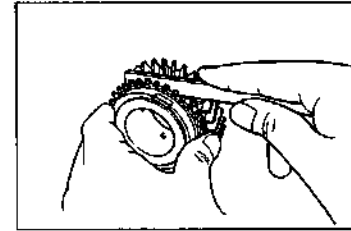


WFEG-MT115

3. Measure the clearance between each gear and the synchronizer ring, using a thickness gauge.

Unit: mm

Item	Specified value	Allowable limit
Measuring point		
1st gear	0.85 - 1.45	0.5
2nd gear		
3rd gear		
4th gear		
5th gear		



WFEG-MT116

NOTE:

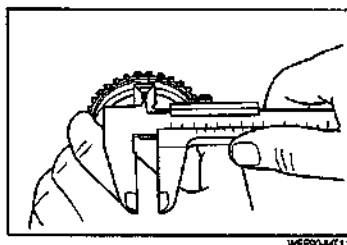
- The measurement should be performed at several points for each gear. The minimum value is regarded as the clearance for the said gear.

MANUAL TRANSMISSION

4. Measure the contact width of each synchronizer ring with the synchromesh shifting key, using vernier calipers. Replace the synchronizer ring which does not conform to the specifications with a new one.

Unit: mm

Measuring point \ Item	Specified value
1st gear	9.9 - 10.1
2nd gear 3rd gear 4th gear 5th gear	11.3 - 11.5



WP200-MT117

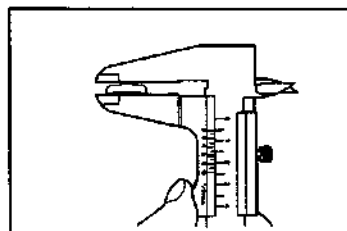
NOTE:

- The measurement should be performed at three points for each synchronizer ring. The maximum value is regarded as the contact width for the said ring.

5. Measure the height of each synchromesh shifting key, using vernier calipers.

Unit: mm

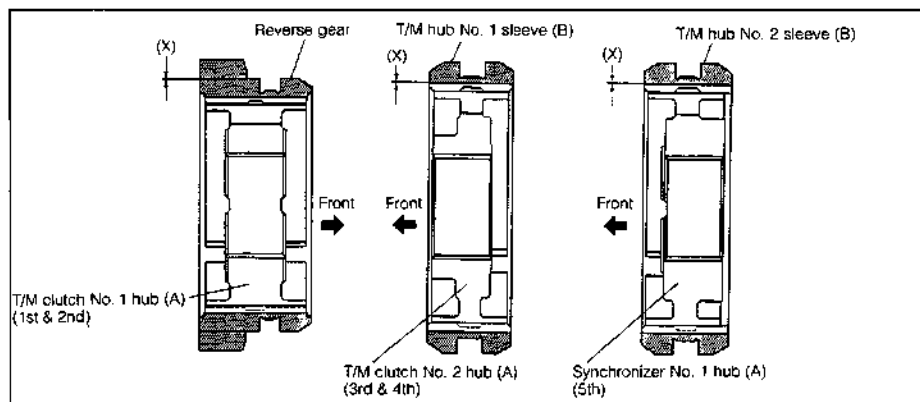
Measuring point \ Item	Specified value	Allowable limit
1st & 2nd gears 3rd & 4th gears 5th gear	5.0 - 5.2	4.7



WP200-MT118

6. Measure the dimension (A) and (B) of the followings parts. Make sure that the clearance (X) between this hubs and sleeves may confirm to the specification.

Specified Value: 0.03 - 0.19 mm



WP200-MT119

MANUAL TRANSMISSION

7. The outer diameter dimension of the (A) above parts has been machined in accordance with the bore dimension of the (B) parts. If either part exceeds the specified value above, be certain to replace them as a set.

CAUTION:

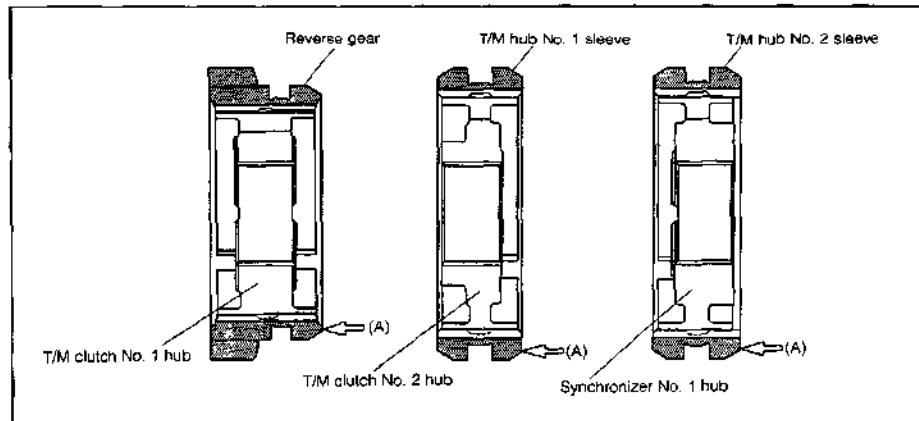
- If either part which has been exceed the the specified value should be used against this caution, it would cause slipping-out of gear and or emanation of abnormal noise.

Unit: mm

	Outer dimension	Classification No.		Bore dimension
T/M clutch No. 1 hub	69.78 - 69.84	2	Reverse gear	69.871 - 69.97
T/M clutch No. 2 hub	69.68 - 69.74	1	T/M hub No. 1 sleeve	69.971 - 69.87
Synchronizer No. 1 hub	69.58 - 69.64	3	T/M hub No. 2 sleeve	69.87 - 69.77

WPB30-MT120

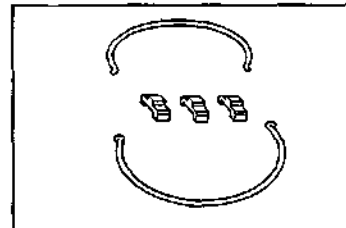
8. With the sleeves assembled to the hubs, measure the tilt width at the section (A) of the sleeves.
Specified Value: Not to exceed 0.5 mm



NOTE:

- If the tilt width of the sleeves exceeds the above specified value, be certain to replace those parts as a set.

9. Check the synchromesh shifting key and synchromesh shifting key spring for evidence of wear or damage.

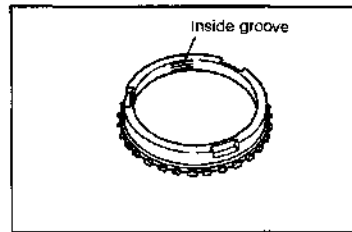


WPB30-MT121

WPB30-MT122

MANUAL TRANSMISSION

10. Check the inside groove of the synchronizer ring for wear or damage.

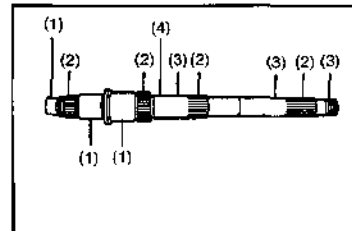


WFE90-MT123

OUTPUT SHAFT

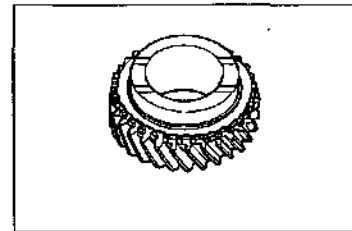
1. Check the output shaft for the following items.
 - (1) Needle roller bearing race section for wear or damage
 - (2) Spline section for damage
 - (3) Fitting section of bearing inner race for wear
 - (4) Measure the runout of the output shaft, using a dial gauge and V-block.

Allowable Runout Limit: 0.05 mm



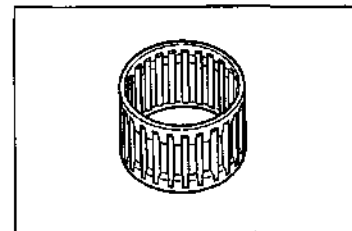
WFE90-MT124

2. Check the gear section of each gear for damage or abnormal wear.



WFE90-MT125

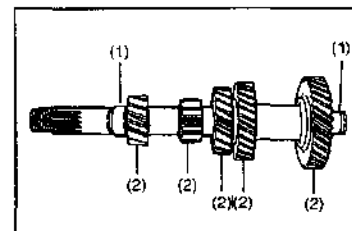
3. Check each needle roller bearing for damage.



WFE90-MT126

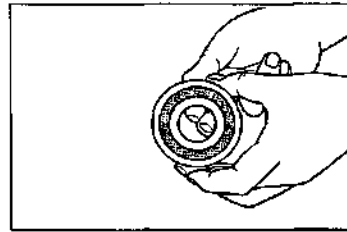
COUNTER GEAR- & REVERSE IDLER GEAR-RELATED PARTS

1. Check the transmission countershaft for the following items.
 - (1) Bearing fitting section for wear or damage
 - (2) Gear engaging section for damage or abnormal wear



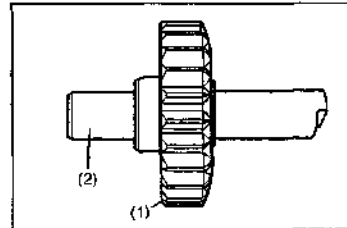
WFE90-MT127

2. Rotate the bearing inner race by applying a force with your finger. Check to see if the bearing inner race rotates smoothly without any sticking.



WFE90-MT125

3. Check the reverse idler gear and reverse idler gear shaft for the following items.
 - (1) Reverse gear engaging section for damage or abnormal wear
 - (2) Reverse gear sliding section for damage or wear



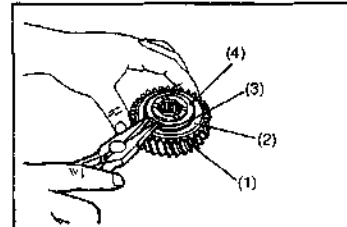
WFE90-MT129

ASSEMBLY (TRANSFER ADAPTER)

1. Install the following parts to the transfer low speed input gear in this sequence.
 - (1) Sub gear No. 1
 - (2) Plate washer
 - (3) Conical spring washer
 - (4) Snap ring

NOTE:

- Never reuse the removed snap ring.
- Install the conical spring washer with its expanded side facing toward the sub gear No. 1.



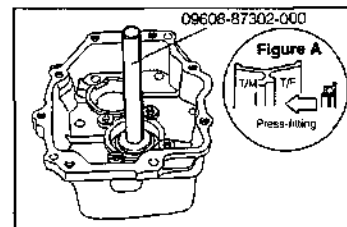
WFE90-MT130

2. Press a new oil seal from the bearing side of the transmission output shaft, using the following SST.

SST: 09608-87302-000

NOTE:

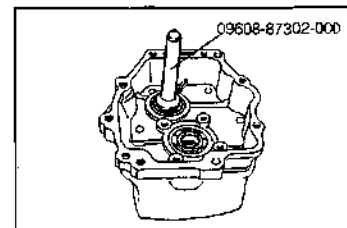
- Be sure to install the oil seal in the correct direction, as indicated in the right figure A.
- Make sure that the oil seal exhibits no tilt and the garter spring of the oil seal is not disengaged.
- Apply gear oil to the oil seal lip section, prior to press.



WFE90-MT131

3. Press the bearing of the transfer counter gear of the transfer adapter, using the following SST.

SST: 09608-87302-000



WFE90-MT132

MANUAL TRANSMISSION

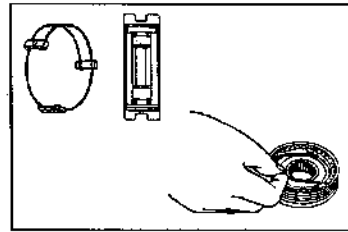
ASSEMBLY OF CLUTCH HUB

1. Assemble the selected transmission clutch hub to the following parts, using the synchromesh shifting key and synchromesh shifting key spring.

- (1) Reverse gear
- (2) Transmission hub sleeve (3rd ↔ 4th)
- (3) Transmission hub sleeve (5th)

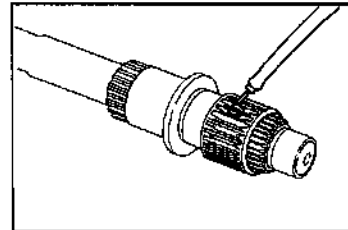
NOTE:

- As for the synchromesh shifting key spring, the bent sections at the front and rear should not come at the same direction, as shown in the right figure.

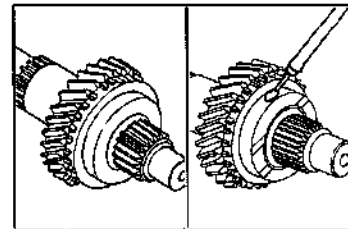


TRANSMISSION OUTPUT SHAFT ASSEMBLY

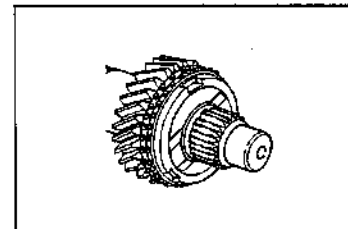
1. Apply the gear oil to the needle roller bearing and then, install to the output shaft.



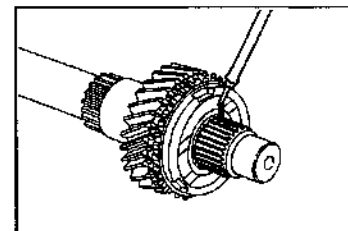
2. Install the 3rd gear to the output shaft.
3. Apply the gear oil to the tapered section of the 3rd gear.



4. Install the synchronizer ring No. 3.



5. Apply the gear oil to the spline section of the output shaft.



6. Attach the new snap ring. Ensure that the clearance (A) in the right figure conforms to the specification. If it does not conform to the specification, select a suitable snap ring.

NOTE:

- Never reuse the removed snap ring.

Specification:

Not to exceed 0.1 mm

Snap Ring Availability

Unit: mm

Snap ring thickness:	2.0
	2.1
	2.2

7. Install the transmission clutch hub No. 2 with installed the two pieces of the synchromesh shifting key spring to the output shaft.

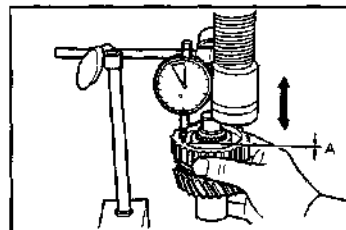
8. Install the synchromesh shifting key (three pieces) to the transmission clutch hub No. 2 and then, install the transmission clutch hub No. 2 and then, install the transmission hub sleeve No. 1.

NOTE:

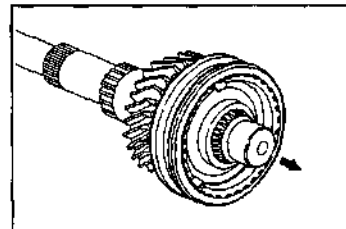
- Ensure that the groove section of the transmission hub sleeve No. 1 faces toward the input shaft.

9. Apply the gear oil to the needle roller bearing and then, install to the output shaft.

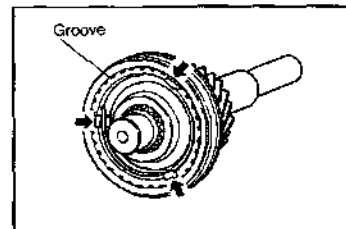
10. Apply the gear oil to the tapered section of the 2nd gear and then, install to the output shaft.



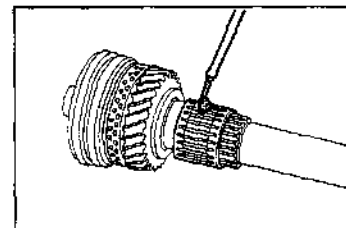
WPES0-MT138



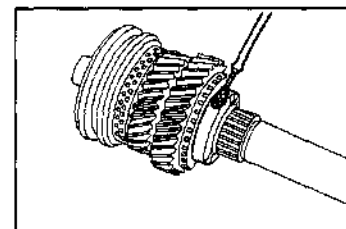
WPES0-MT139



WPES0-MT140



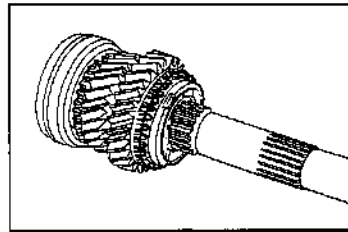
WPES0-MT141



WPES0-MT142

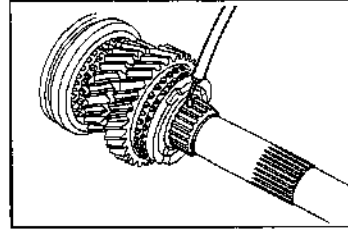
MANUAL TRANSMISSION

11. Install the synchronizer ring No. 3.



WPED0-MT143

12. Apply the gear oil to the spline section of the output shaft.

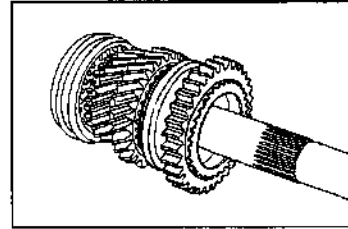


WPED0-MT144

13. Install the reverse gear to the output shaft in a set.
(1) Synchromesh shifting key (Three pieces)
(2) Synchromesh shifting key spring (Two pieces)
(3) Transmission clutch hub sleeve No. 1

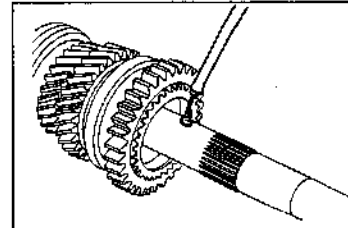
NOTE:

- Make sure that the sleeve section of the reverse gear faces toward the input shaft.



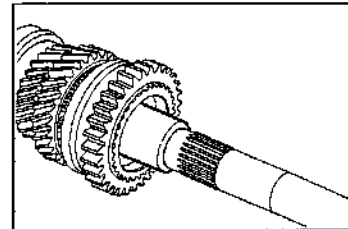
WPED0-MT145

14. Apply the gear oil to the outer periphery of the output shaft.



WPED0-MT146

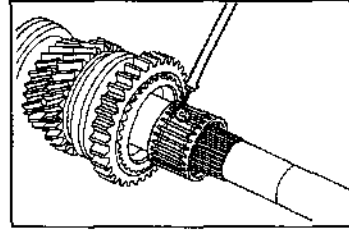
15. Install the 1st gear inner race to the output shaft.



WPED0-MT147

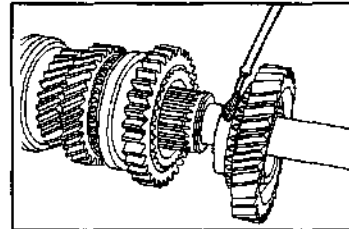
MANUAL TRANSMISSION

16. Apply the gear oil to the needle roller bearing and then, install to the outer periphery of the 1st gear inner race.



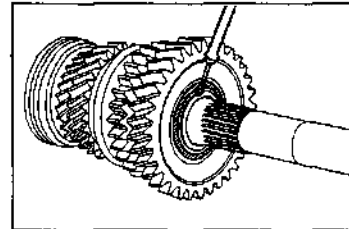
WPB90-MT146

17. Apply the gear oil to the tapered section of the 1st gear and then, install to the output shaft.



WPB90-MT148

18. Apply the gear oil to the end section of the 1st gear as shown in the right figure illustration and then, install the 1st gear thrust washer.



WPB90-MT150

TRANSMISSION ASSEMBLY

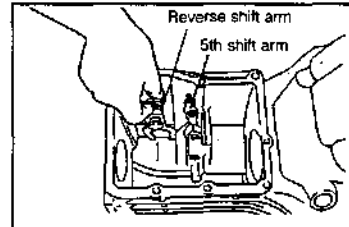
NOTE:

- Prior to assembling the transmission case, clean the transmission case by removing any dirt, gasket materials or the like.

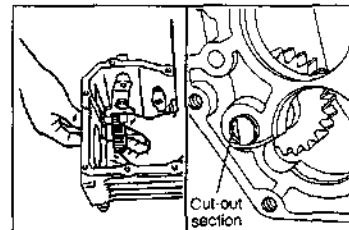
1. Install the reverse shift arm and 5th shift arm.
2. Install the reverse idler gear shaft and reverse idler gear.

NOTE:

- Be sure to install the reverse idler gear shaft in such a way that the cut-out section of the shaft faces toward the opposite side of the countershaft.
- If this operation should fail to be observed correctly, there may be a case where the transfer adaptor can not be installed.
- Before remounting the reverse idler gear, make sure that the gear chambering section faces toward the front side. If the reverse idler gear is remounted with the gear chambering section facing toward the rear, it may become difficult to put the gear in reverse or noise may result during shifting to reverse.



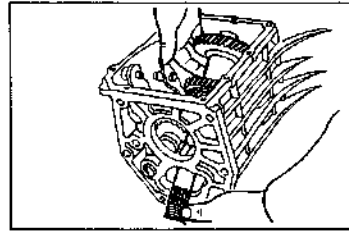
WPB90-MT151



WPB90-MT152

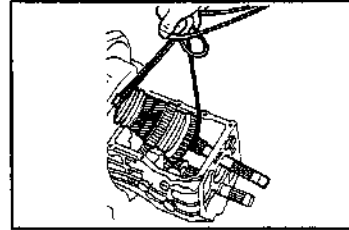
MANUAL TRANSMISSION

3. Insert the transmission countershaft into the transmission case.



WPB90-MT153

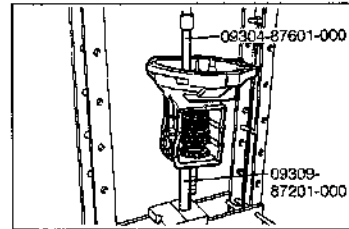
4. Place the output shaft in the transmission case.



WPB90-MT154

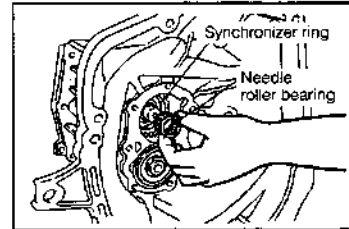
5. Press the bearings provided at the front and rear of the transmission countershaft, using the following SSTs at the same time.

SSTs: 09304-87601-000
09309-87201-000



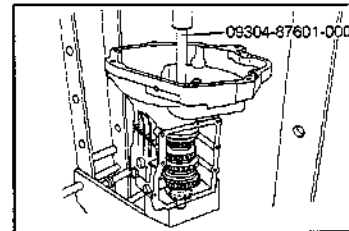
WPB90-MT155

6. Apply the gear oil to the needle roller bearing and then, install to the output shaft.
7. Install the synchronizer ring No. 3.



WPB90-MT156

8. Press the input shaft bearing into position, using the following SST at the same time.
SST: 09304-87601-000



WPB90-MT157

NOTE:

- Prior to install the above bearing, remove the stop ring.

9. Install new snap ring to the countershaft, using the following SST:

SST: 09306-87601-000

NOTE:

- Make sure that the snap ring should be installed to the groove section of the countershaft securely.

10. Install the stop ring to the countershaft front bearing.

NOTE:

- Push out the bearing by tapping the countershaft at the output shaft side, using a plastic hammer.

11. Install the new snap ring to the input shaft, using the following SST:

SST: 09304-87601-000

12. Install the stop ring to the input shaft bearing.

13. With a new gasket used, install the front bearing retainer.

NOTE:

- (1) Apply gear oil to the oil seal lip section.
- (2) Apply molybdenum disulphide lithium base grease to the clutch hub sliding section of the front bearing retainer.

Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)

- (3) Be sure to tighten the bolts alternately and diagonally. (Right figure illustration indicates a typical example of the tightening sequence.)

14. Install the clutch related parts (Refer CL-section).

15. Install the transmission case on the overhaul stand.

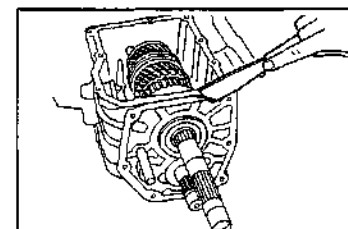
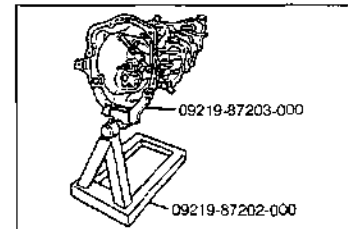
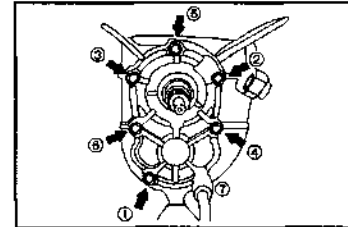
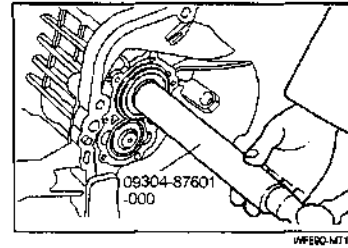
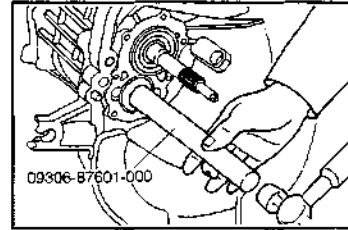
NOTE:

- After the transmission case has been remounted on the overhauling stand, cover the transmission case temporarily with a cloth or any other suitable materials to prevent foreign matter, dust, etc. from entering the transmission case.

16. Remove any remaining gasket material from the transmission, using a gasket scraper.

NOTE:

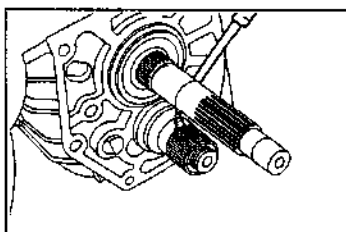
- Be very careful not to scratch the attaching surface.



MANUAL TRANSMISSION

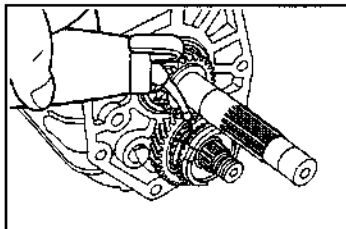
17. Apply the gear oil to the following parts and then, install then in this sequence to the countershaft.

- (1) 5th gear thrust washer
- (2) 5th gear bearing inner race
- (3) Needle roller bearing



18. Apply the gear oil to the following parts in this sequence.

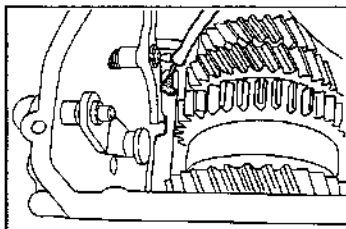
- (1) 5th gear
- (2) Countershaft 5th gear (Tapered section)
- (3) Synchronizer ring.



19. Apply the gear oil to the gear shifting lever shaft and then, insert to the transmission case.

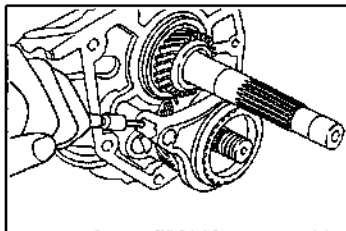
NOTE:

- Make sure that cut out section of the gear shifting lever faces toward the outside of transmission case.



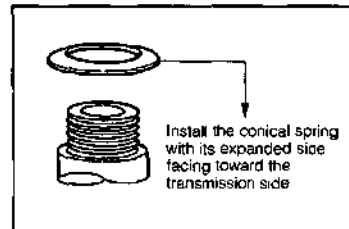
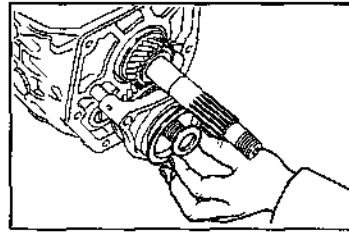
20. Install the following parts to the counter shaft in a set (use new slotted pin securely).

- (1) Transmission hub sleeve No. 2
- (2) Synchronizer hub assy No. 1
- (3) Synchromesh shifting key spring (Three pieces)
- (4) Synchromesh shifting key (Two pieces)
- (5) Synchronizer ring



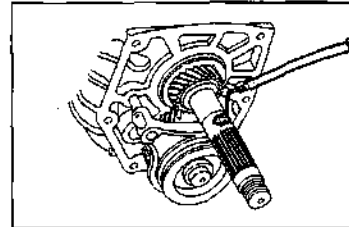
MANUAL TRANSMISSION

21. Install the following parts in this sequence.
 (1) Shifting key retainer
 (2) Conical washer spring



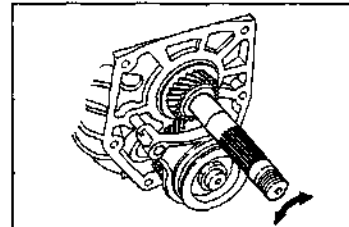
WFE30-MT167

22. Apply the gear oil onto the outer periphery of the output shaft.



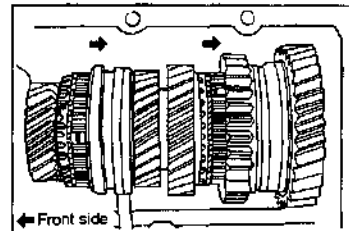
WFE30-MT168

23. Perform checks for smooth gear shifting by manual operation of the transmission, using the following procedure:
 (1) Fully hand-tighten the lock nut on the fifth gear of the countershaft.
 (2) Engage each gear in order of the manual transmission shift position.
 (3) Visually check that both the input shaft and the output shaft rotate clockwise during engagement of each gear (for the reverse gear, however, the output shaft rotates counterclockwise).



WFE30-MT169

24. Interlock the first and third gears.



WFE30-MT170

MANUAL TRANSMISSION

25. Tighten the countershaft 5th gear with the lock nut. Stake the lock nut with a chisel or the like.

Tightening Torque: 197.0 - 196.0 N·m
(14.0 - 20.0 kgf·m)

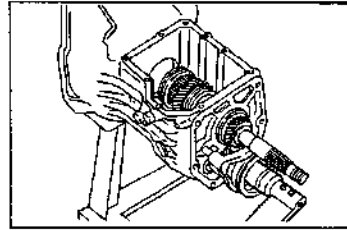
NOTE:

- Measure the following sections, prior to stake the lock nut.

Specified Value:

Unit: mm

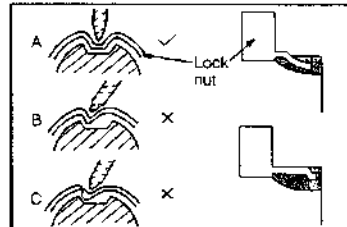
	1st	2nd	3rd	4th	5th
Backlash	0.05 - 0.18	0.05 - 0.16	0.05 - 0.14	0.05 - 0.13	0.05 - 0.13
Thrust clearance	0.17 - 0.30	0.10 - 0.37	0.10 - 0.33		0.11 - 0.30



WPES0-MT171

NOTE:

- When staking the lock nut, point a suitable staking tool toward the transmission counter shaft axis center and stake to lock nut securely as shown in the right figure A.
- Poor staking may cause abnormal noise as shown in the right figure illustration B and C.



WPES0-MT172

26. Install the output gear spacer No. 1 and No. 2 to the output shaft.

27. Apply gear oil to the outer periphery of the output gear spacer No. 2.

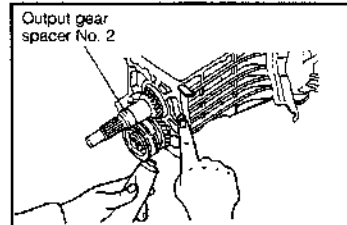
28. Apply the following bond to the transfer adapter attaching surface of the transmission case.

Bond: Three bond 1216 (Three bond made)

29. Apply the following bond to the threaded section of the bolts. Install the transfer adaptor and bearing.

Tightening Torque: 29.4 - 44.1 N·m (3.0 - 4.5 kgf·m)

Bond: Three bond 1324 (Three bond made)

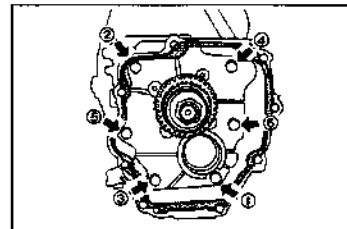


WPES0-MT173

NOTE:

- If the transmission adaptor can not be installed properly (i.e. a gap occurs between the transmission case and the transmission adaptor), probably it is caused by the reverse idle gear shaft that has not been installed correctly.

(As for the installing procedure of the reverse idle gear shaft, see page MT-41.)



WPES0-MT174

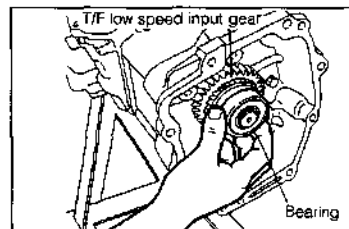
NOTE:

- Be sure to tighten the bolts alternately and diagonally (The right figure illustration indicates a the typical example of the tightening sequence).
- Apply the gear oil to the lip section of the oil seal so that the lip may be avoided from the turned over.

WF830-MT176

30. Install the following parts in this sequence.

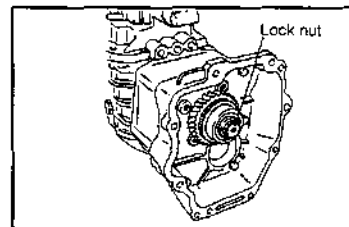
- (1) Transfer low speed input gear
- (2) Bearing



WF830-MT176

31. Tighten the transfer low speed input gear by means of the lock nut. Stake the lock nut, using a chisel as below illustration securely.

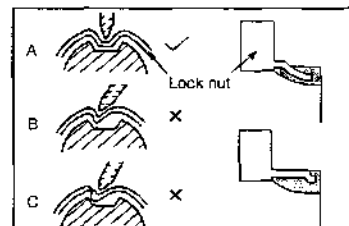
Tightening Torque: 177.0 - 216.0 N·m
(18.0 - 22.0 kgf·m)



WF830-MT177

NOTE:

- When staking the lock nut, point a suitable staking tool toward the transmission output rear shaft axis center and stake to lock nut securely as shown in the right figure A.
- Poor staking may cause abnormal noise as shown in the right figure illustration B and C.

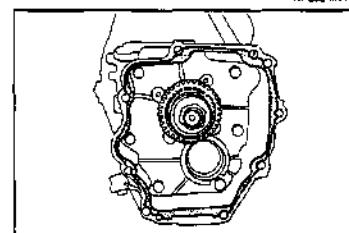


WF830-MT178

32. Apply the following bond to the mating surface between the transfer adapter and the transfer front case subassembly:
Bond: THREE BOND 1216 (made by THREE BOND)

NOTE:

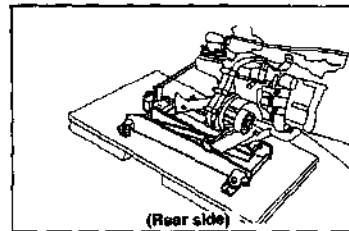
- Apply the bond to the inside of the bolt hole.
- Overlap the bond joints.



WF830-MT179

MANUAL TRANSMISSION

- i. Support the transfer front case subassembly and transfer rear case subassembly with a transmission jack.

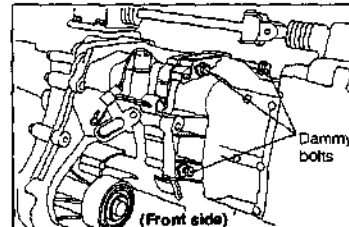


WF830-MT180

4. Press and hold down the transfer front case subassembly against the transfer adapter, and temporarily connect them using three to four dummy bolts.

CAUTION:

- The case of the transfer front case subassembly and that of the transfer adapter must be matched by slowly rotating the rear output shaft by hand until both sides have come into firm contact. Failure to observe the caution may bend the subgears, thus causing gear noise from the transmission.



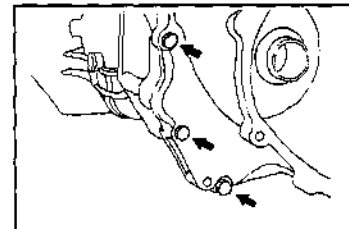
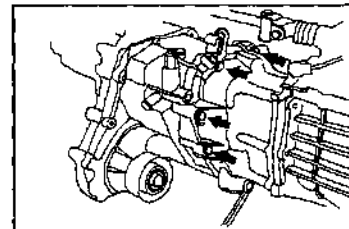
WF830-MT181

35. Tighten the transfer front case subassembly with the eight bolts.

Tightening Torque: 29.4 - 44.1 N·m (3.0 - 4.5 kgf·m)

NOTE:

- Apply the THREE BOND 1324 (made by THREE BOND) to the threaded sections of the bolts before tightening the transfer front case subassembly.

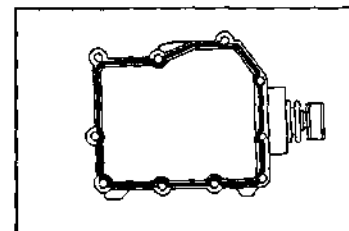


WF830-MT182

36. Apply Three bond 1104 (Three bond made) to the transmission case cover attaching surface of the transmission case. Proceed to install the transmission case cover subassembly.

NOTE:

- Apply the bond to the inside of each bolt as shown in the diagram at right.



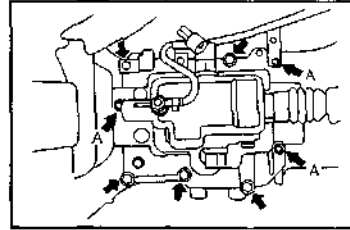
WF830-MT183

MANUAL TRANSMISSION

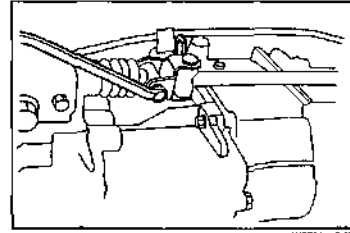
37. Install the transmission case cover subassembly, and tighten the bolts.

NOTE:

- Apply the **THREE BOND 1324** (made by **THREE BOND**) to the threaded section of each bolt.
Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)
A-section 6.9 - 9.8 N·m (0.7 - 1.0 kgf·m)



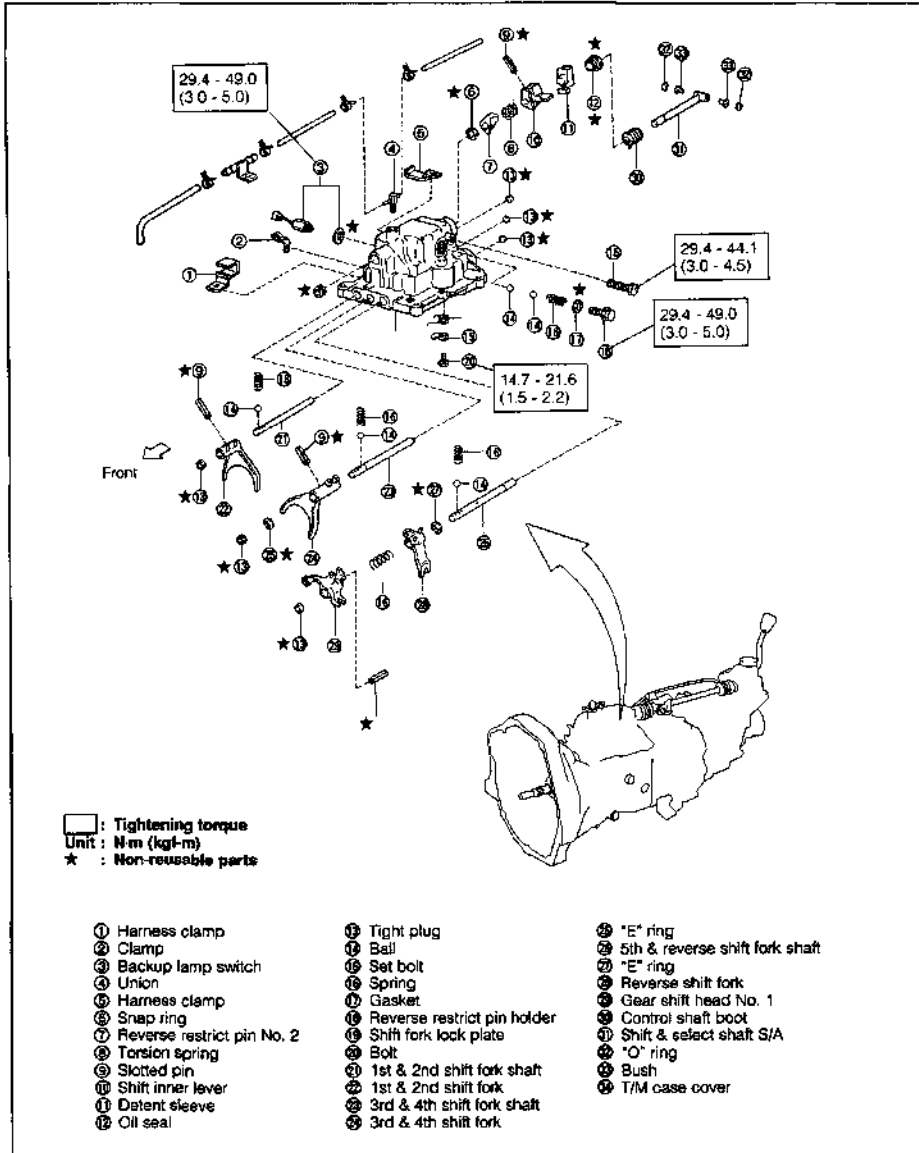
38. Install the shift lever retainer subassembly and the control shaft with a hexagon bolt (Use new hexagon bolt).
Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)



39. Install the transmission assy with transfer to the vehicle (As for the installation procedures, see page MT-101 to MT-105).

MANUAL TRANSMISSION

TRANSMISSION CASE COVER (PART AND FULL TIME) COMPONENTS



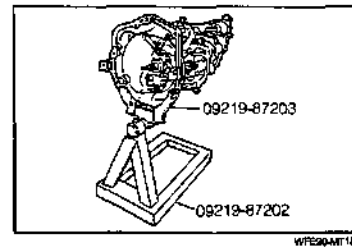
WFE90-MT106

MT-50

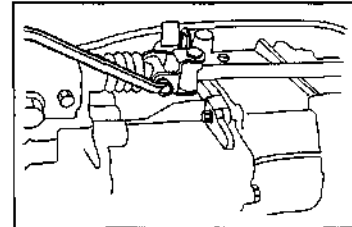
MANUAL TRANSMISSION

REMOVAL

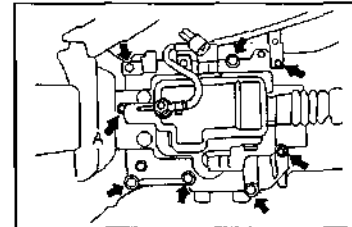
1. Remove the transmission assembly with transfer from the vehicle. (See page MT-12 to MT-16.)
2. Install the transmission assembly with transfer on the over-haul stand, using the following SSTs.
SST: 09219-87202-000
SST: 09219-87203-000



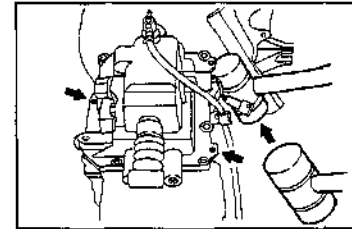
3. Remove the shift lever retainer subassembly and the control shaft by removing the hexagon bolt.



4. Remove the transmission case cover subassembly by removing the seven bolts and a reamer bolt.

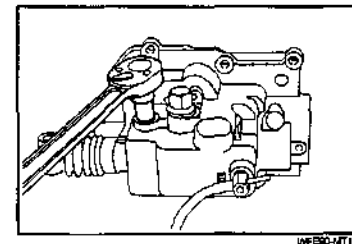


5. Remove the transmission case cover subassembly by lightly tapping each of the ribs evenly toward the upper side of the transmission case.



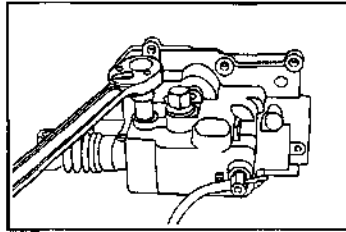
DISASSEMBLY

1. Set the transmission case cover subassembly in a vice.

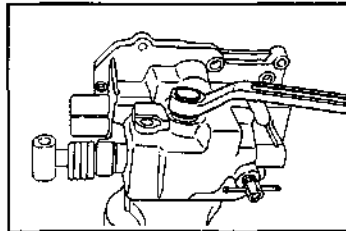


MANUAL TRANSMISSION

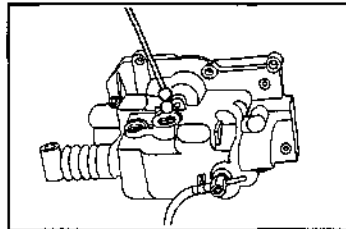
2. Remove the set bolt and the spring lock washer.



3. Remove the reverse restrict pin holder, gasket and compression spring.



4. Remove the two balls from the transmission case subassembly using a standard tool or magnet hand.

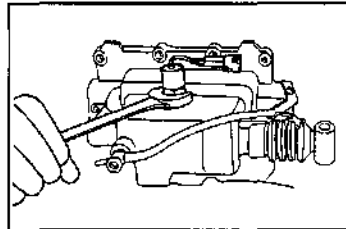


5. Turn the transmission case cover subassembly through 180 degrees.

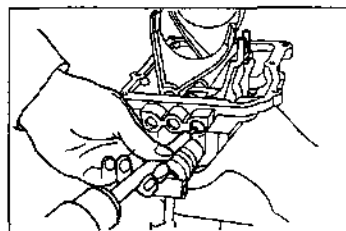
6. Remove the backup lamp switch assembly and the gasket.

NOTE:

- Never reuse the removed gasket.



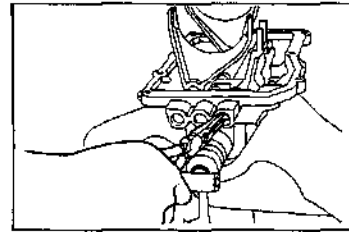
7. Remove the tight plugs in this sequence.
 - (1) Set a sharp-edged rod to the end of each tight plug, and lightly tap the rod with a hammer.



- (2) Rotate each tight plug through about 90 degrees, and pull them toward you with nose pliers or any other suitable tools.

NOTE:

- Never reuse the removed tight plugs.



WPED0-MT197

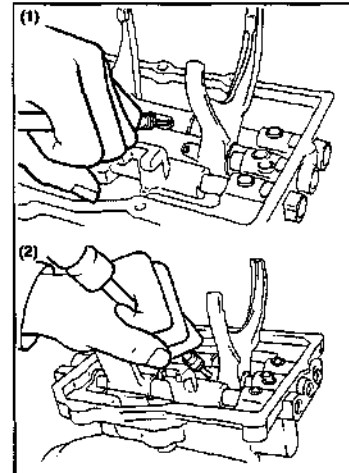
8. Drive off the slotted pin of the following parts, using the pin punch.

(1) 1st & 2nd shift fork

(2) 3rd & 4th shift fork

NOTE:

- Never reuse the removed slotted pin.

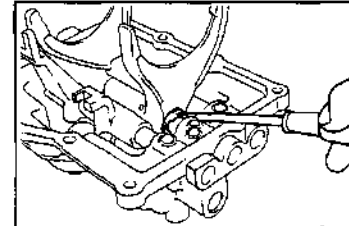


WPED0-MT198

9. Remove the "E" ring of the 3rd & 4th shift fork, using the standard tool of flat driver.

NOTE:

- Never reuse the removed "E"-ring.



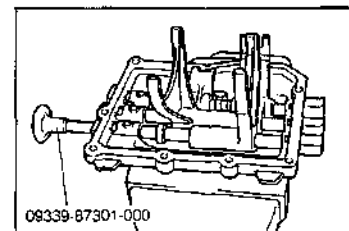
WPED0-MT199

10. Remove the 1st & 2nd shift fork shaft by inserting the following SST into the 1st & 2nd shift fork shaft hole of the transmission case cover subassembly and pushing those SST to the front side.

SST: 09339-87301-000

NOTE:

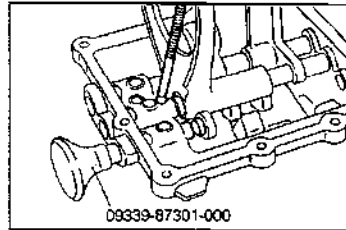
- (1) Remove the shaft on both 3rd & 4th shift fork shaft and the 5th & reverse shift fork shaft in the same manner.



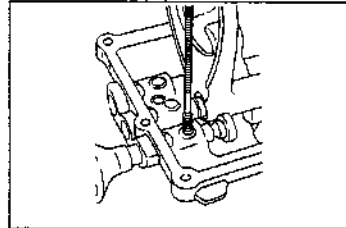
WPED0-MT200

MANUAL TRANSMISSION

- (2) Remove the 1st & 2nd shift fork.
- (3) Compress the ball and compression spring by inserting a small size SST to the shift fork shaft hole in the transmission case cover subassembly.
- (4) Remove the shift fork shaft.
- (5) Depress the small SST by inserting the large SST, remove the ball and compression spring, using the standard tool of magnet hand by rotating the SST either clockwise or counterclockwise.



WFE90-MT201



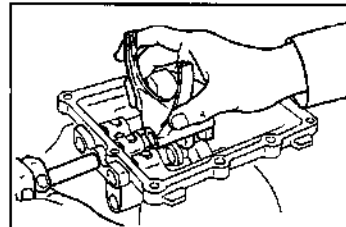
WFE90-MT202

11. Remove the 3rd & 4th shift fork shaft, using the following SST:

SST: 09339-87301-000

NOTE:

- Removal of shift fork shaft is same manner with the 1st & 2nd shift fork shaft.

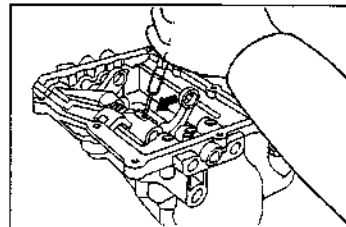


WFE90-MT203

12. Drive off the slotted pin using the pin punch, while the gear shift No. 1 head is being tilted.
13. Remove the gear shift No. 1 head with the slotted pin installed from the 5th & reverse shift fork shaft.

NOTE:

- Never reuse the removed slotted pin.

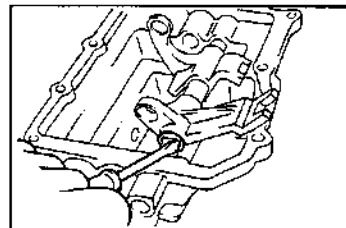


WFE90-MT204

14. Remove the E-ring of the 5th & reverse shift fork shaft, using the standard tool of minus driver.

NOTE:

- Never reuse the removed E-ring.



WFE90-MT205

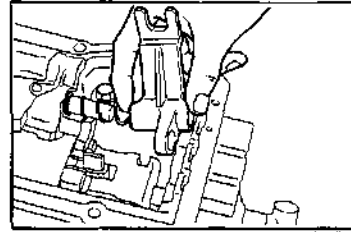
MANUAL TRANSMISSION

15. Remove the 5th & reverse shift fork shaft, using the following SST.

SST: 09339-87301-000

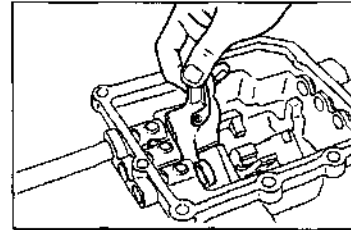
NOTE:

- Removal of shift fork shaft is same manner with the 1st & 2nd shift fork shaft.



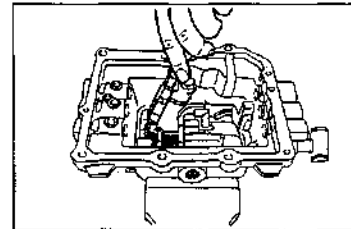
WP590-MT206

16. Remove the gear shift No. 1 head and the compression spring, while pulling out the 5th & reverse shift fork shaft to ward you.
17. With the same manner to that of the above operation, remove the reverse shift fork.



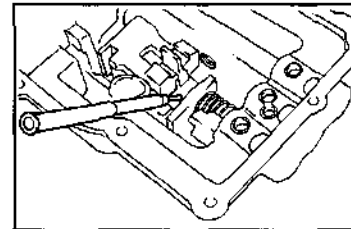
WP590-MT207

18. Detach the snap ring of the shift & select shaft No. 1 and slightly move to toward the end of transmission case cover subassembly.



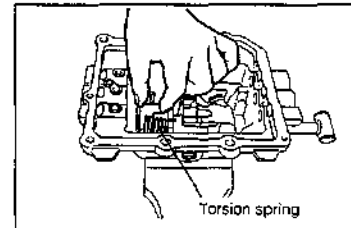
WP590-MT208

19. Drive off the slotted pin of the shift inner lever. When driving off the slotted pin, tilt the shift inner lever as large angle as possible, while enabling the knock pin to be used. If the slotted pin is driven off vertically, the movement of the gear shift head NO.1 may be prevented due to contact of the slotted pin with the transmission case cover.



WP590-MT209

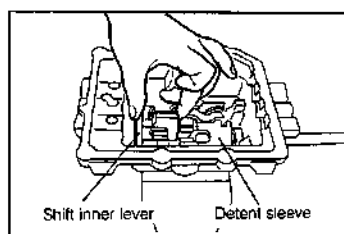
20. Remove the reverse restrict pin and torsion spring.



WP590-MT210

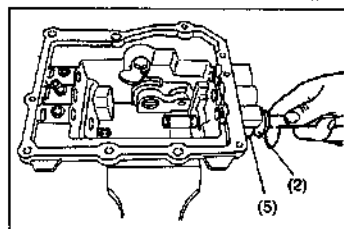
MANUAL TRANSMISSION

21. Remove the shift inner lever and detent sleeve.



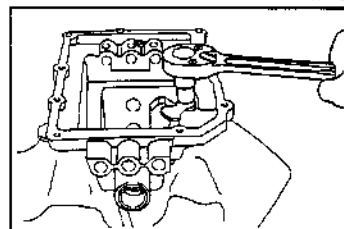
WPB90-MT211

22. Remove the shift & select shaft No. 1 with control shaft boot installed.



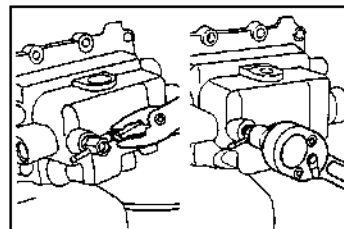
WPB90-MT212

23. Remove the shift fork lock plate and torsion spring by removing the hexagon bolt.



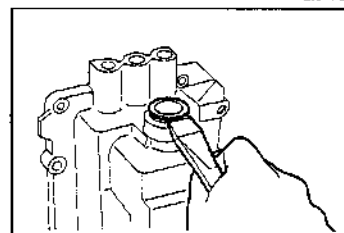
WPB90-MT213

24. Disconnect clamp of the breather hose.
25. Remove the union.



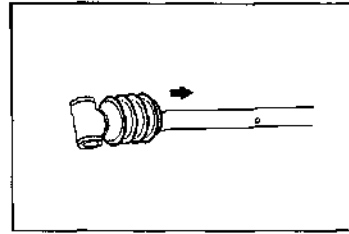
WPB90-MT214

26. Remove the oil seal, using the chisel or the like.
NOTE:
• Never reuse the removed oil seal.



WPB90-MT215

27. Remove the control shaft No. 2 boots from the shift & select shaft subassembly.



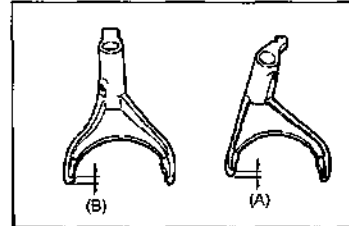
WF590-MT215

INSPECTION

1. Measure the contact width of each shift fork with the hub sleeve, using vernier calipers.

Unit: mm

Item	Specified value	Allowable limit
Part name		
1st & 2nd shift fork Dimension (A) in right figure	6.80 - 7.00	6.3
3rd & 4th shift fork dimension (B) in right figure	6.80 - 7.00	

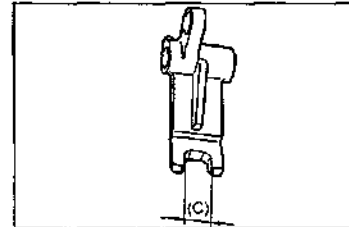


WF590-MT217

2. Measure the contact width of the reverse shift fork with the reverse shift arm, using vernier calipers.

Unit: mm

Item	Specified value	Allowable limit
Part name		
Reverse shift fork Dimension (C) in right figure	15.000 - 15.043	15.1

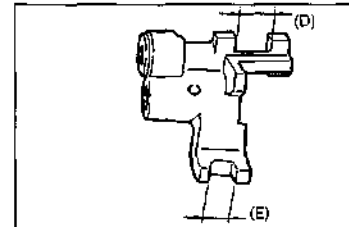


WF590-MT218

3. Measure the contact width of the gear shift head No. 1 with 5th shift arm, using vernier calipers.

Unit: mm

Item	Specified value	Allowable limit
Part name		
Gear shift head No. 1 Dimension (D) in right figure	16.1 - 16.2	16.7
Gear shift head No. 1 Dimension (E) in right figure	12.1 - 12.2	12.7

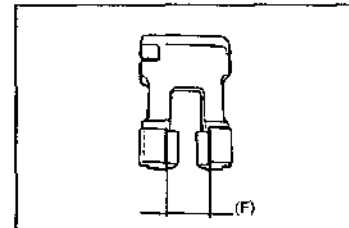


WF590-MT219

4. Measure the dimension (F) of the detent sleeve shown in the right figure, using vernier calipers.

Unit: mm

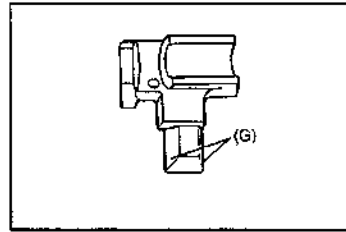
Item	Specified value	Allowable limit
Part name		
Detent sleeve Dimension (F) in right figure	18.8 - 19.2	19.5



WF590-MT220

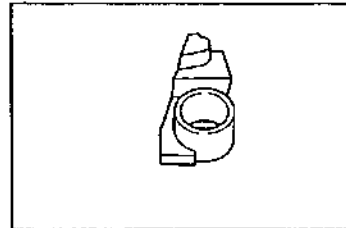
MANUAL TRANSMISSION

5. Visually inspect the shift inner lever (G) for wear or damage.



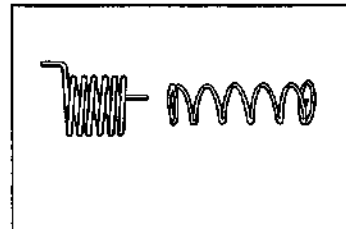
WPFB0-MT221

6. Visually inspect the reverse restrict pin No. 2 for wear or damage.



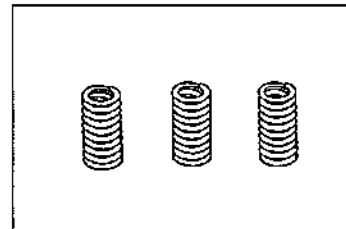
WPFB0-MT222

7. Check the spring for damage.



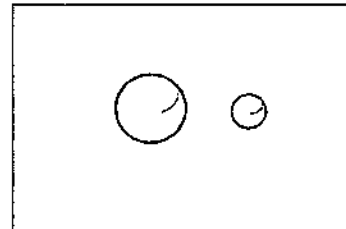
WPFB0-MT223

8. Check the spring of the shift fork shaft for damage.



WPFB0-MT224

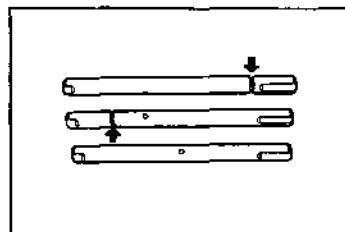
9. Check the balls of the reverse restrict pin holder and shift fork shaft for wear or damage.



WPFB0-MT225

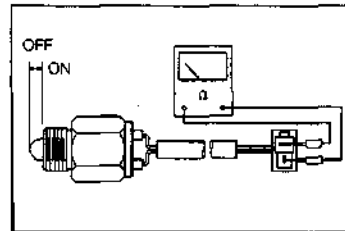
MANUAL TRANSMISSION

10. Visually inspect the outer periphery of the shift fork shaft for wear, or damage.



WPB90-MT226

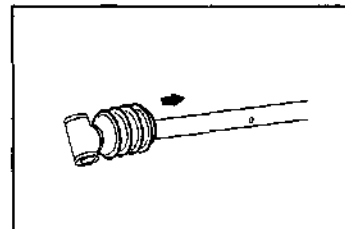
11. Turn ON and OFF the switch section of the backup lamp switch assembly. Ensure that continuity exists when the switch is turned ON. Also, ensure that no continuity exists when the switch is turned OFF.



WPB90-MT227

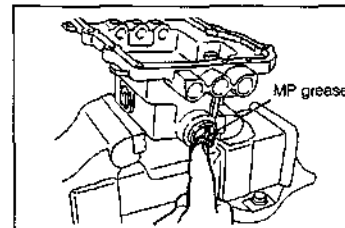
ASSEMBLY

1. Insert the control shaft No. 2 boots to the shift & select shaft subassembly.



WPB90-MT228

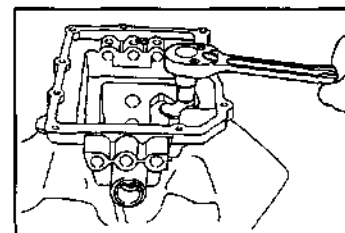
2. Apply Lithium base multi purpose grease to the lip section of the oil seal and then, drive the oil seal into the transmission case cover, using a hammer in combination with a wooden block interposed.



WPB90-MT229

3. Apply the Three bond 1324 to the threaded section of the hexagon bolt.
4. Install the torsion spring and shift fork lock plate and then, tighten the hexagon bolt.

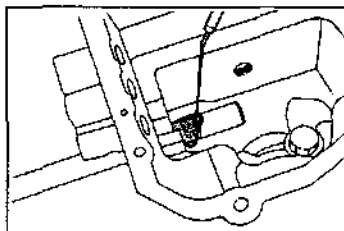
Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)



WPB90-MT230

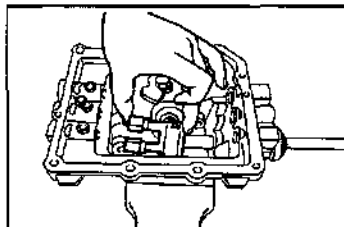
MANUAL TRANSMISSION

5. Apply the gear oil to the outer periphery of the shift & select shaft No. 1.



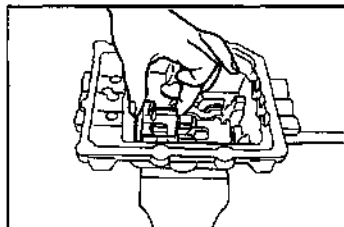
WFE90-MT231

6. Install the detent sleeve to the shift & select shaft No. 1.



WFE90-MT232

7. Install the shift inner lever to the shift & select shaft No. 1.

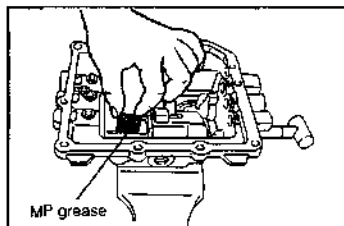


WFE90-MT233

8. Install the torsion spring to the shift & select shaft No. 1.

NOTE:

- Apply Lithium base multi purpose grease to the torsion spring installation section of the shift & select shaft No. 1.



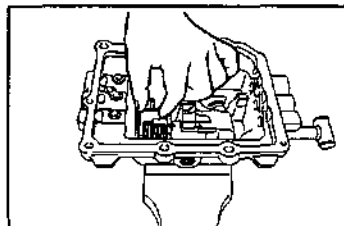
MP grease

WFE90-MT234

9. Install the reverse restrict pin to the shift & select shaft No. 1. Temporarily attach the new snap ring.

NOTE:

- Never reuse the removed snap ring.



WFE90-MT235

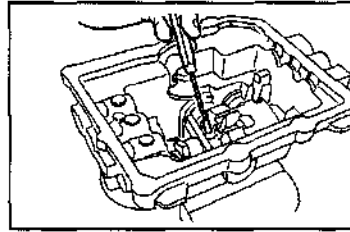
MT-60

MANUAL TRANSMISSION

10. Secure the shift inner lever by driving the new slotted pin into position.

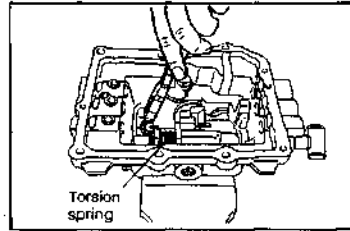
NOTE:

- Never reuse the removed slotted pin.



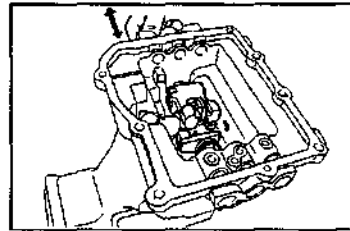
WPB30-MT236

11. Attach the snap ring into the groove section of the shift & select shaft No. 1 securely, while the torsion spring is being compressed with your fingers.



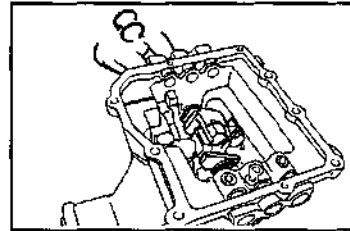
WPB30-MT237

12. Inspection of operation
 - (1) Move the shift & select shaft No. 1 in the shifting direction. Ensure that it operates smoothly.



WPB30-MT238

- (2) Move the shift & select shaft No. 1 in the selecting direction. Ensure that it operates smoothly.



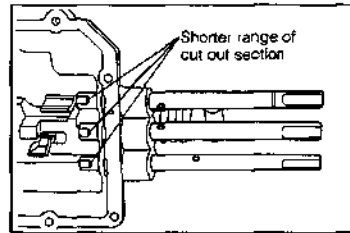
WPB30-MT239

13. Install the following shift fork shaft.

- (1) 1st & 2nd shift fork shaft
- (2) 3rd & 4th shift fork shaft
- (3) 5th & reverse shift fork shaft

NOTE:

- Make sure that the shorter range of cut out section faces toward the front side as shown in the right figure illustration.

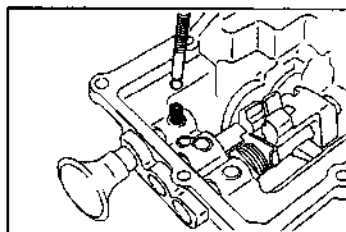


WPB30-MT240

MANUAL TRANSMISSION

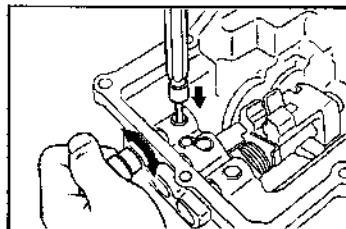
14.

- (1) Insert the large-sized SST into the shift fork shaft of the transmission case cover.
- (2) Install the compression spring and ball in this sequence.



WPED0-MT241

- (3) Turn the SST 90 degrees while pushing down the ball by means of a pin punch or the like.

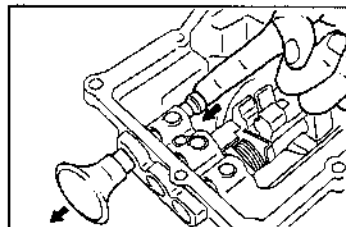


WPED0-MT242

- (4) Insert the small-sized SST into position from the transmission case cover.
- (5) Remove the large-sized SST by pushing the small-sized SST with your fingers.
- (6) Install the 5th & reverse shift fork shaft by pushing the small-sized SST.

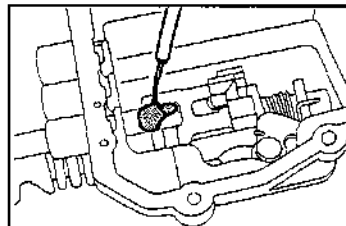
NOTE:

- At this stage, install the compression springs and balls for the 1st & 2nd and 3rd & 4th shift fork shafts in the transmission case cover subassembly, following the aforesaid procedure.



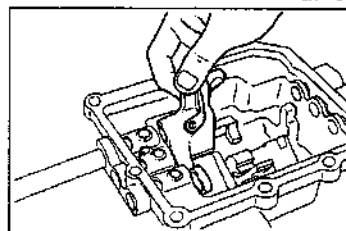
WPED0-MT243

15. Apply the gear oil to the 5th & reverse shift fork shaft and then, insert them into the position.



WPED0-MT244

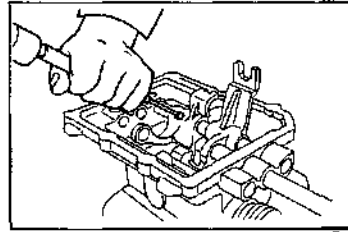
16. Install the reverse shift fork to the 5th & reverse shift fork shaft.
17. Install the gear shift No. 1 head in the 5th & reverse shift fork shaft.



WPED0-MT245

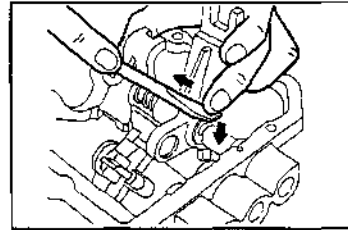
MANUAL TRANSMISSION

18. Drive the new slotted pin into the gear shift No. 1 head securely.



WFE90-MT246

19. Attach the new "E" ring, while the reverse shift fork is being compressed with your fingers.

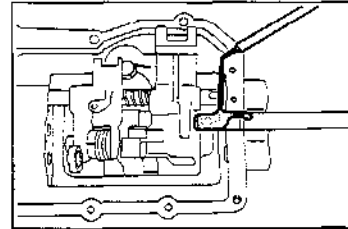


WFE90-MT247

20. Install the 3rd & 4th shift fork shaft to the transmission case cover subassembly.

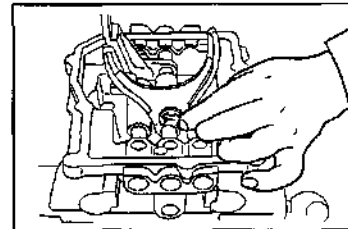
NOTE:

- Apply the gear oil to the outer periphery of the 3rd & 4th shift fork shaft, prior to install.



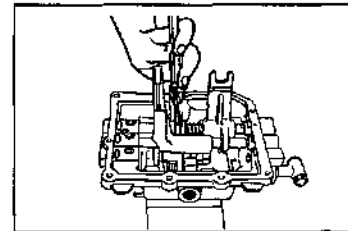
WFE90-MT248

21. Attach the new "E" ring to the 3rd & 4th shift fork.



WFE90-MT249

22. Secure the 3rd & 4th shift fork shaft and 3rd & 4th shift fork by driving the new slotted pins.



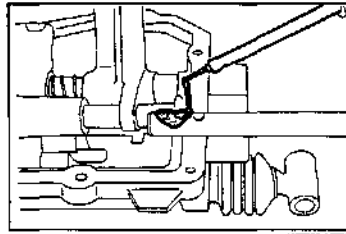
WFE90-MT250

MANUAL TRANSMISSION

23. Install the 1st & 2nd shift fork shaft to the transmission case cover subassembly.

NOTE:

- Apply the gear oil to the outer periphery of the 1st & 2nd shift fork shaft prior to install.

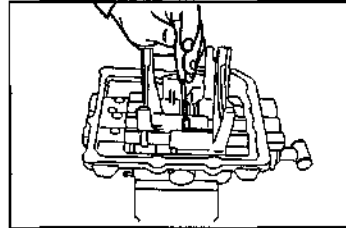


WP690-MT251

24. Secure the 1st & 2nd shift fork shaft and 1st & 2nd shift fork by driving the new slotted pins.

NOTE:

- Never reuse the removed slotted pin.

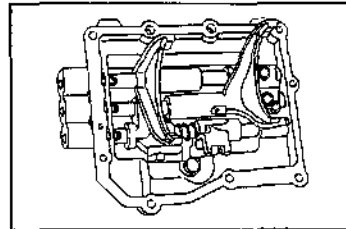


WP690-MT252

25. Move the shift fork shafts to put the gear into the neutral position.

NOTE:

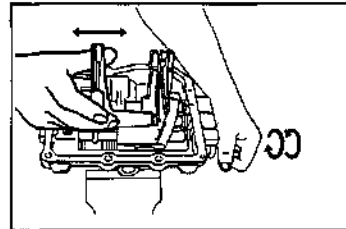
- Make sure that the long notch sections of the shift fork shafts are arranged uniformly.



WP690-MT253

26. Inspection of operation

Select the shift & select shaft No. 1 to each control shaft. Move the shift & select shaft No. 1 in the shifting direction. Ensure that the shift & select shaft No. 1 operates smoothly without any binding.



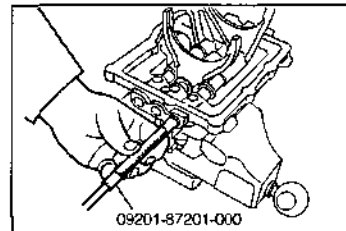
WP690-MT254

27. Apply the Three bond 1104 (Three bond made) to the new tight plug. Press all tight plugs into position, using the following SST.

SST: 09201-87201-000

NOTE:

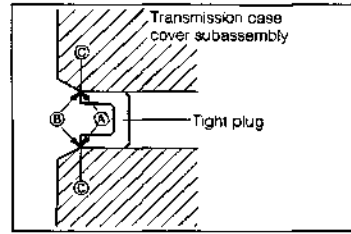
- Never reuse the removed tight plug.



WP690-MT256

MANUAL TRANSMISSION

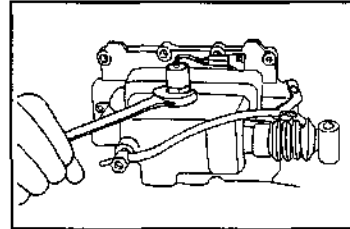
- Visually inspect that the both edge in the tight plugs ④ and chamber in the transmission case cover ③ should be well matched with the vertical line ⑤ as shown in the right figure illustration.



WFE90-MT256

28. Turn the transmission case cover subassembly upside down, and then tighten the backup lamp switch assembly (use a new gasket).

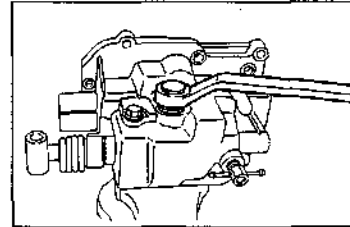
Tightening Torque: 29.4 - 49.0 N·m (3.0 - 5.0 kgf·m)



WFE90-MT257

29. Tighten the reverse restrict pin with the two balls and compression spring (use new gasket).

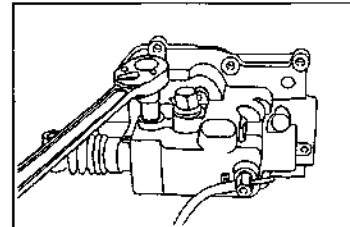
Tightening Torque: 29.4 - 49.0 N·m (3.0 - 5.0 kgf·m)



WFE90-MT258

30. Tighten the set bolt with a spring washer.

Tightening Torque: 29.4 - 44.1 N·m (3.0 - 4.5 kgf·m)



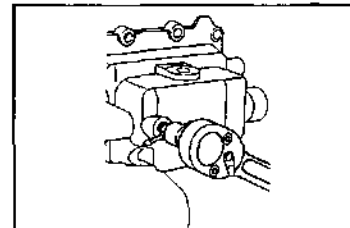
WFE90-MT259

31. Apply the THREE BOND 1214 (made by THREE BOND) to the threaded sections of the union, and tighten the union.

Tightening Torque: 12.7 - 15.7 N·m (1.3 - 1.6 kgf·m)

NOTE:

- The unions must be parallel in their longitudinal directions.



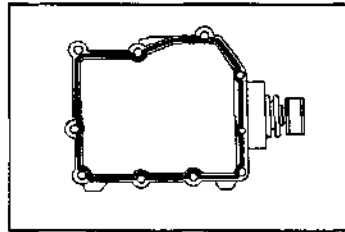
WFE90-MT260

MANUAL TRANSMISSION

32. Connect the breather hose to the union with a clamp.
33. Apply the Three bond 1216 (Three bond made) to the transmission case cover attaching surface of the transmission case.

NOTE:

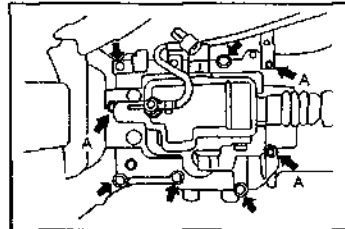
- Apply the bond to the inside of the bolt hole, as shown in the right figure illustration.



WFE90-MT261

34. Install the transmission case cover subassembly, and tighten the mounting bolts.

Tightening Torque: 14.7 - 21.6 N-m (1.5 - 2.2 kgf-m)
A-section 6.9 - 9.8 N-m (0.7 - 1.0 kgf-m)

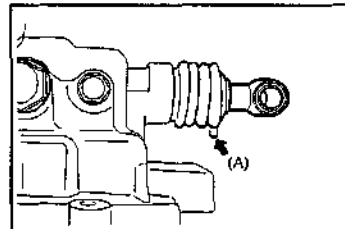


WFE90-MT262

35. Install fit the control shaft No. 2 boot to the oil seal groove section securely.

NOTE:

- Air breeding holl (A) in the control shaft No. 2 faces toward with the transmission A/y.



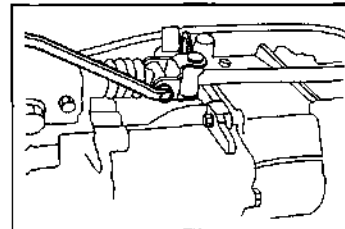
WFE90-MT263

36. Bolt down and tighten the shift lever retainer assembly and the control shaft.

Tightening Torque: 14.7 - 21.6 N-m (1.5 - 2.2 kgf-m)

NOTE:

- Apply the THREE BOND 1324 (made by THREE BOND) to the threaded sections of the bolts.

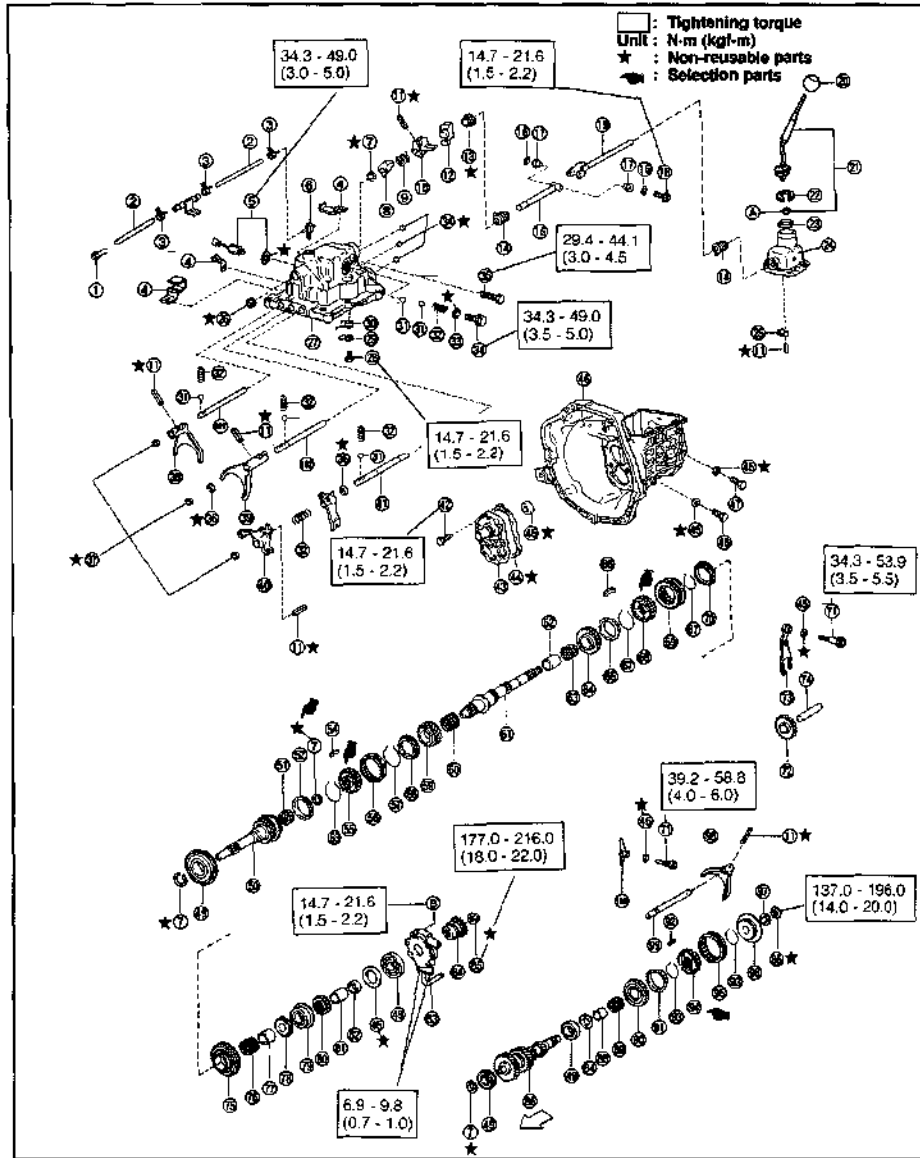


WFE90-MT264

37. Install the transmission assembly with transfer to the vehicle (As for the installation procedure, see page MT-101 to MT-105).

WFE90-MT265

TRANSMISSION (FULL TIME) COMPONENTS



WP20-MT296

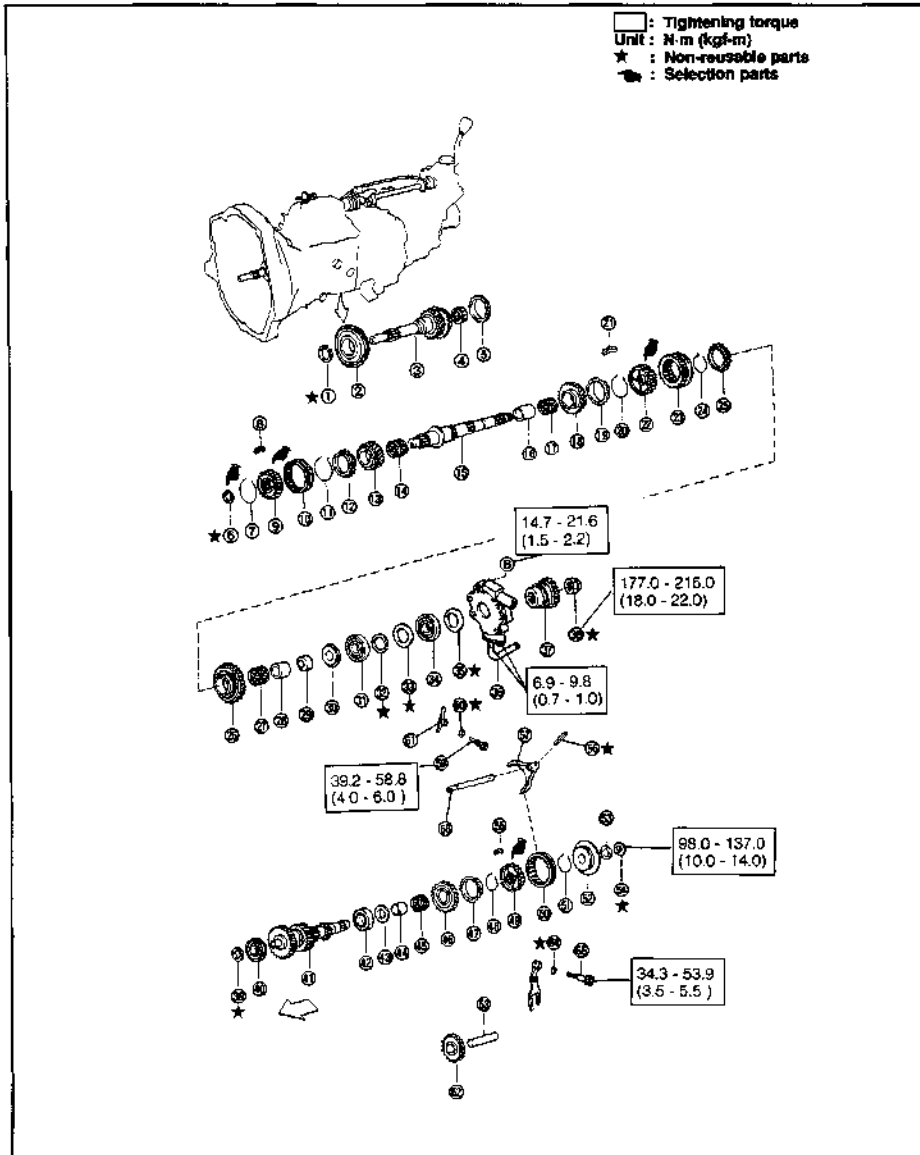
MT-67

MANUAL TRANSMISSION

- | | |
|-----------------------------------|-----------------------------------|
| ① 2 way | ② Synchronizer ring No. 3 |
| ② Breather hose | ③ Synchronesh shifting key spring |
| ③ Clip | ④ Synchronesh shifting key No. 2 |
| ④ Clamp | ⑤ T/M clutch hub No. 2 |
| ⑤ Back up lamp switch | ⑥ Hub sleeve No. 1 |
| ⑥ Union | ⑦ Synchronesh shifting key spring |
| ⑦ Snap ring | ⑧ Synchronizer ring No. 3 |
| ⑧ Reverse restrict pin No. 2 | ⑨ 3rd gear |
| ⑨ Torsion spring | ⑩ Needle roller bearing |
| ⑩ Shift inner lever | ⑪ Output shaft |
| ⑪ Slotted pin | ⑫ 1st gear bearing inner race |
| ⑫ Detent sleeve | ⑬ Needle roller bearing |
| ⑬ Oil seal | ⑭ 2nd gear |
| ⑭ Shift & select shaft No. 1 boot | ⑮ Synchronizer ring No. 3 |
| ⑮ Shift & select shaft | ⑯ Synchronesh shifting key |
| ⑯ "O" ring | ⑰ Synchronesh shifting key spring |
| ⑰ Bush | ⑱ T/M clutch hub No. 1 |
| ⑱ Bolt | ⑲ Reverse gear |
| ⑲ Control shaft | ⑳ Synchronizer ring No. 2 |
| ⑳ T/M control shift knob | ㉑ Bolt |
| ㉑ T/M shift lever assy (A: Bush) | ㉒ Reverse idle gear S/A |
| ㉒ Snap ring | ㉓ Reverse shift arm |
| ㉓ T/M shift lever ball seat | ㉔ Reverse idle gear shaft |
| ㉔ Shift lever retainer S/A | ㉕ 1st gear |
| ㉕ Shift lever outer | ㉖ Needle roller bearing |
| ㉖ Tight plug | ㉗ 1st gear bearing inner race |
| ㉗ T/M case cover | ㉘ 1st gear thrust washer |
| ㉘ Bolt | ㉙ Radial ball bearing |
| ㉙ Shift lock plate | ㉚ 5th gear |
| ㉚ Torsion spring | ㉛ Output shaft gear spacer No. 1 |
| ㉛ Ball | ㉜ Output shaft gear spacer No. 2 |
| ㉜ Spring | ㉝ Transfer oil pump body S/A |
| ㉝ Gasket | ㉞ Transfer input hub |
| ㉞ Bolt | ㉟ Lock nut |
| ㉟ Bolt | ㊱ Counter gear |
| ㊱ "E" ring | ㊲ 5th gear thrust washer |
| ㊲ Tight plug | ㊳ 5th gear bearing inner race |
| ㊳ 1st & 2nd shift fork | ㊴ Needle roller bearing |
| ㊴ 3rd & 4th shift fork | ㊵ Counter shaft 5th gear |
| ㊵ Gear shift head No. 1 | ㊶ Synchronizer ring No. 3 |
| ㊶ 5th & reverse shift fork shaft | ㊷ Synchronesh shifting key No. 2 |
| ㊷ Bolt | ㊸ Synchronesh shifting key spring |
| ㊸ Bearing front retainer | ㊹ Synchronizer hub No. 1 |
| ㊹ Gasket | ㊺ T/M hub sleeve |
| ㊺ Oil seal | ㊻ Shifting key retainer |
| ㊻ T/M case assy | ㊼ Conical washer spring |
| ㊼ Bolt | ㊽ 5th shift fork |
| ㊽ Bolt | ㊾ Gear shifting lever shaft |
| ㊾ Radial ball bearing | ㊿ 5th shift arm |
| ㊿ Input shaft | 1st & 2nd shift fork shaft |
| Needle roller bearing | 3rd & 4th shift fork shaft |

WPES0-MT267

INPUT SHAFT-, OUTPUT SHAFT- & TRANSFER INPUT HUB COMPONENTS



VULF90-MT265

MANUAL TRANSMISSION

- | | |
|---|------------------------------------|
| ① Snap ring | ②③ Oil seal |
| ② Radial ball bearing | ②④ Bearing |
| ③ Input shaft | ②⑤ O ring |
| ④ Needle roller bearing | ②⑥ Transfer oil pump body S/A |
| ⑤ Synchronizer ring No. 3 | ②⑦ Transfer input hub |
| ⑥ Snap ring | ②⑧ Lock nut |
| ⑦ Synchronesh shifting key spring | ②⑨ Snap ring |
| ⑧ Synchronesh shifting key No. 2 (3 pieces) | ②⑩ Radial ball bearing |
| ⑨ Transmission clutch hub No. 2 | ②⑪ Counter gear |
| ⑩ Transmission hub sleeve No. 1 | ②⑫ Radial ball bearing |
| ⑪ Synchronesh shifting key spring | ②⑬ 5th gear thrust washer |
| ⑫ Synchronizer ring No. 3 | ②⑭ 5th gear bearing inner race |
| ⑬ 3rd gear | ②⑮ Needle roller bearing |
| ⑭ Needle roller bearing | ②⑯ Counter shaft 5th gear |
| ⑮ Output shaft | ②⑰ Synchronizer ring No. 3 |
| ⑯ 1st gear bearing inner race | ②⑱ Synchronesh shifting key spring |
| ⑰ Needle roller bearing | ②⑲ Synchronizer No. 1 hub |
| ⑱ 2nd gear | ②⑳ Transmission hub sleeve No. 2 |
| ⑲ Synchronizer ring No. 3 | ②㉑ Synchronesh shifting key spring |
| ⑳ Synchronesh shifting key spring | ②㉒ 5th shifting key retainer |
| ㉑ Synchronesh shifting key No. 1 (3 pieces) | ②㉓ Conical spring washer |
| ㉒ Transmission clutch hub No. 1 | ②㉔ Lock nut |
| ㉓ Reverse gear | ②㉕ Synchronesh shifting key No. 2 |
| ㉔ Synchronesh shifting key spring | ②㉖ Slotted pin |
| ㉕ Synchronizer ring No. 2 | ②㉗ 5th shift fork |
| ㉖ 1st gear | ②㉘ Gear shifting lever shaft |
| ㉗ Needle roller bearing | ②㉙ Bolt |
| ㉘ 1st gear bearing inner race | ②㉚ Gasket |
| ㉙ 1st gear bearing inner race No. 2 | ②㉛ 5th shift arm |
| ㉚ 1st gear thrust washer | ②㉜ Reverse idle gear S/A |
| ㉛ Radial ball bearing | ②㉝ Reverse idle gear shaft |
| ㉜ O ring | |

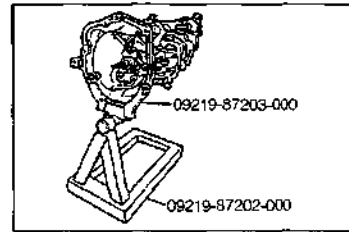
WP80-MT265

MT-70

DISASSEMBLY

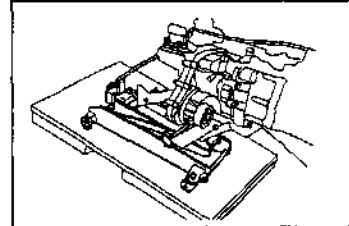
1. Install the transmission assembly with transfer on the over-haul stand, using the following SST:
SST: 09219-87202-000
09219-87203-000

(As for the removal of transmission assembly with transfer, see page MT-12 to MT-16.)



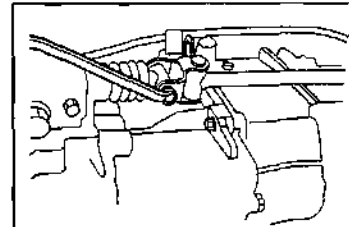
WPES0-MT270

2. Place a wooden plate(s) or any other suitable materials on the overhauling stand, as shown in the diagram at right.
3. Support the transfer front and transfer rear case with a transmission jack.



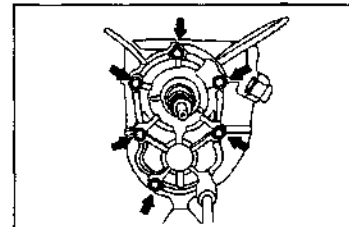
WPES0-MT271

4. Remove the control shaft with installed the shift lever retainer subassembly by removing the hexagon bolt.



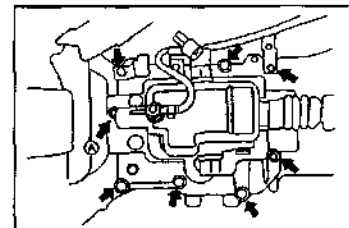
WPES0-MT272

5. Remove the clutch release bearing and related parts (see page CL-sections).
6. Remove the front bearing retainer by removing the seven bolts.



WPES0-MT273

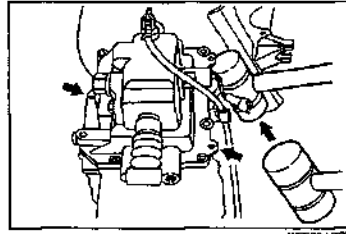
7. Remove the transmission case cover subassembly by removing the seven bolts and a reamer bolt ①.



WPES0-MT274

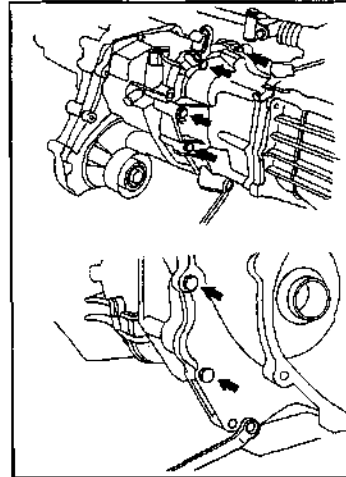
MANUAL TRANSMISSION

8. Disconnect the breather hose by detaching a clip.
9. Remove the transmission case cover subassembly by lightly tapping each of the ribs evenly toward the upper side of the transmission case.



WPB0-MT275

10. Remove the transfer front case by removing the eight bolts from the transfer adapter and pull them toward you carefully.



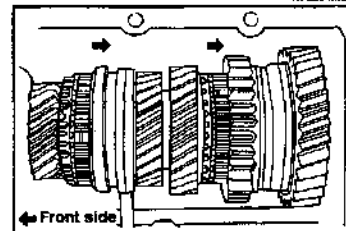
WPB0-MT276

11. Interlock the 1st gear and the 3rd gear.
NOTE:
• Measure the following sections, prior to an interlock.

Specified Value:

Unit: mm

	1st	2nd	3rd	4th
Gear backlash	0.05 - 0.18	0.05 - 0.16	0.05 - 0.14	0.05 - 0.13
Thrust clearance	0.17 - 0.30	0.10 - 0.37	0.10 - 0.33	



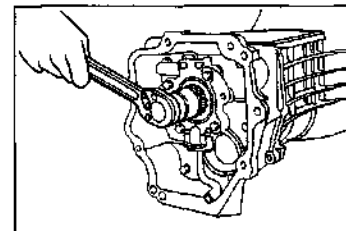
WPB0-MT277

12. Raise the lock section of the lock nut, using the chisel or the like.

CAUTION:

- Never reuse the removed lock nut.

13. Remove the lock nut, using the 32 mm socket wrench box.

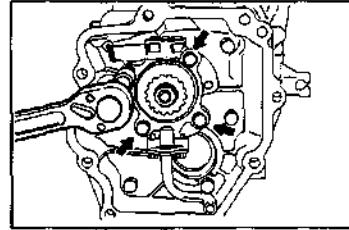


WPB0-MT278

MT-72

MANUAL TRANSMISSION

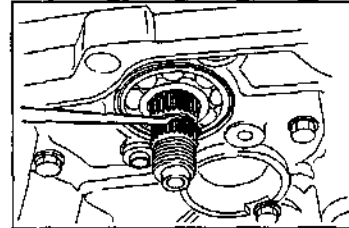
14. Remove the transfer oil pump body subassembly with the transfer oil strainer tube and transfer input hub installed by removing the four bolts.



WPED0-MT279

15. Remove the "O" ring from the transmission output shaft.
CAUTION:

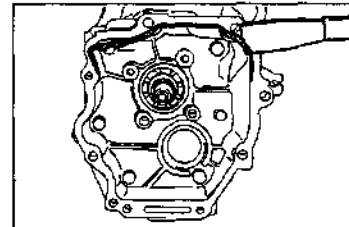
- Never reuse the removed "O" ring.



WPED0-MT280

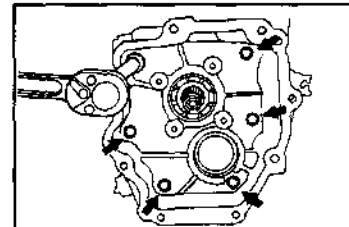
16. Remove the liquid gasket in the attaching surface of the transfer adapter, using the standard tool of gasket scraper.
NOTE:

- Be careful not to damage the mating surface.



WPED0-MT281

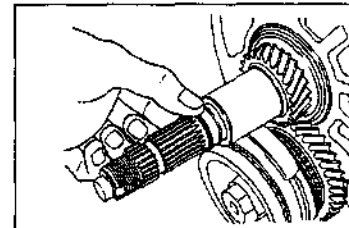
17. Remove the transfer adapter with installed the bearing and output gear spacer No. 2 by removing the six bolts.



WPED0-MT282

18. Remove the "O" ring from the transmission output shaft.
CAUTION:

- Never reuse the removed "O" ring.



WPED0-MT283

MANUAL TRANSMISSION

19. Remove the output gear spacer No. 1 from the transmission output shaft.

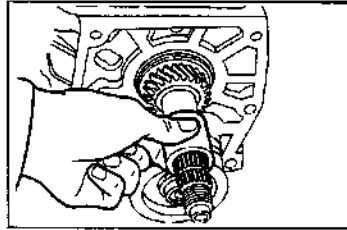
NOTE:

- Measure the backlash and the thrust clearance of the 5th gear.

Specified Value:

Unit: mm

Backlash	0.05 - 0.13
Thrust clearance	0.11 - 0.30

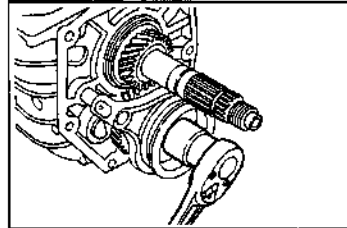


WPFBQ-MT264

20. Raise the lock section of the lock nut, using the chisel or the like.

CAUTION:

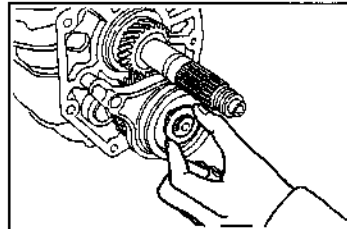
- Never reuse the removed lock nut.



WPFBQ-MT265

21. Remove the lock nut of the counter shaft 5th gear.

22. Remove the conical spring washer and shifting key retainer.

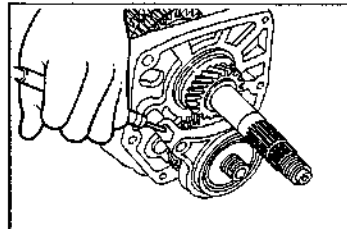


WPFBQ-MT266

23. Drive off the slotted pin of the 5th shift fork.

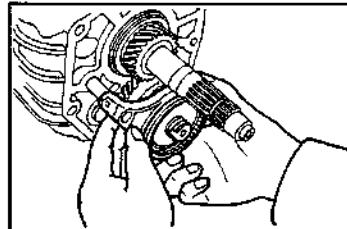
CAUTION:

- Never reuse the removed slotted pin.



WPFBQ-MT267

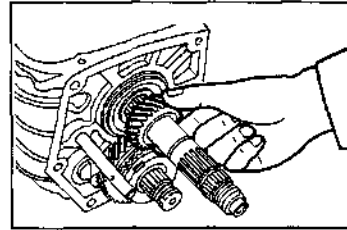
24. Remove the 5th shift fork together with synchronizer hub sleeve in a set.



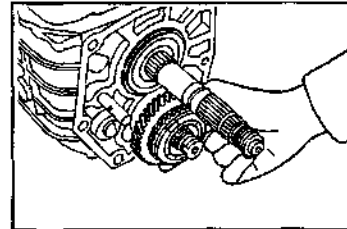
WPFBQ-MT268

MANUAL TRANSMISSION

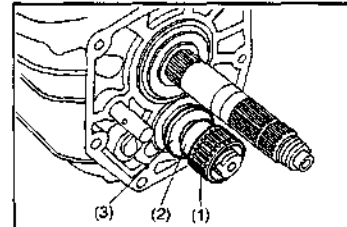
25. Remove the 5th gear of the transmission output shaft.



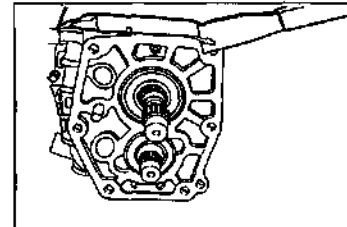
26. Remove the synchronizer ring No. 3 and 5th gear of the countershaft.



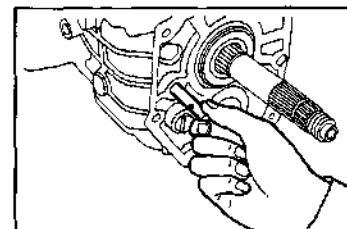
27. Remove the following parts from the countershaft.
(1) Needle roller bearing
(2) 5th gear bearing inner race
(3) 5th gear thrust washer



28. Remove the liquid gasket from the transmission case, using the standard tool of gasket scraper.
CAUTION:
• Be very careful not to scratch the transmission case.



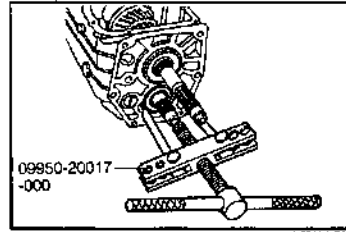
29. Remove the gear shifting lever shaft.



MANUAL TRANMISSION

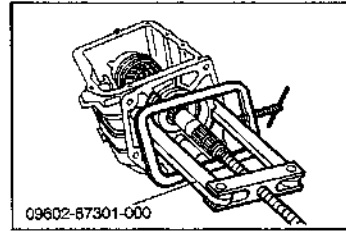
30. Remove the countershaft rear bearing, using the following SST.

SST: 09950-20017-000



31. Detach the snap ring of the output shaft bearing. Remove the output shaft bearing, using the following SST.

SST: 09602-87301-000

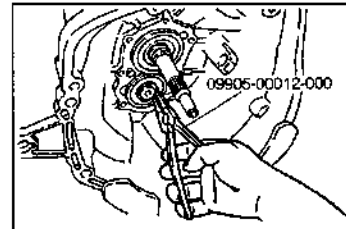


32. Detach the snap ring of the countershaft, using the following SST.

SST: 09905-00012-000

NOTE:

- Never reuse the snap ring.

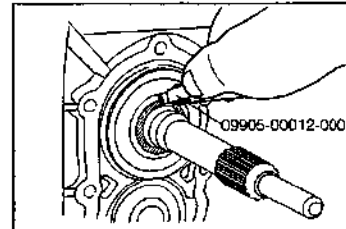


33. Detach the snap ring of the input shaft, using the following SST.

SST: 09905-00012-000

NOTE:

- Never reuse the removed snap ring.

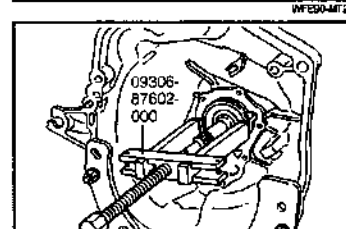


34. Remove the input shaft bearing, using the following SST.

SST: 09306-87602-000

NOTE:

- Detach the stop ring, prior to remove the bearing.



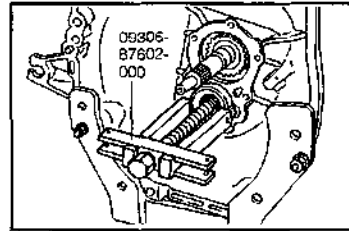
MANUAL TRANSMISSION

35. Remove the bearing of the countershaft at the clutch side, using the following SST.

SST: 09306-87602-000

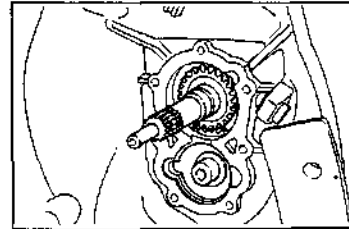
NOTE:

- Push out the bearing by tapping the countershaft at the output shaft side, using a plastic hammer.
- Detach the stop ring, prior to remove the bearing.



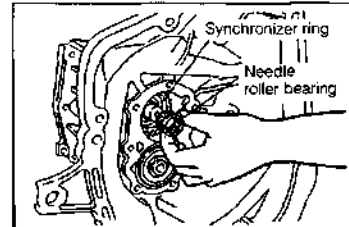
WP80-MT200

36. Remove the input shaft.



WP80-MT300

37. Remove the needle roller bearing and synchronizer ring No. 3.

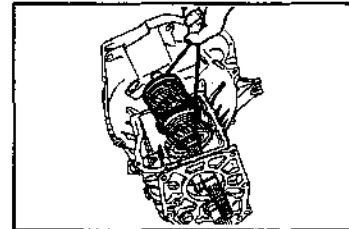


WP80-MT301

38. Remove the output shaft assembly.
(As for the disassembly, inspection and assembly for the removed parts, see page MT-79.)

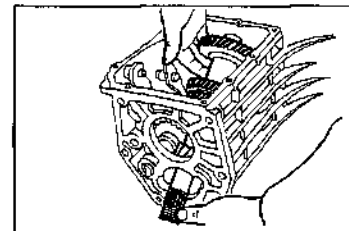
NOTE:

- It is recommended that as shown in the diagram at right, an operation rope (about 3 mm in outside diameter) be used to remove the output shaft assembly from the transmission case.



WP80-MT302

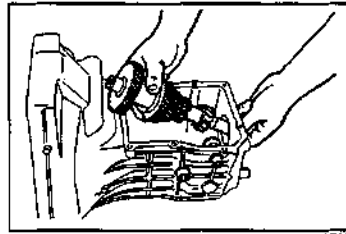
39. Remove the countershaft from the transmission case.



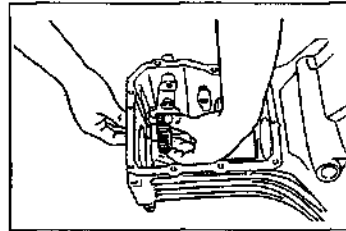
WP80-MT303

MANUAL TRANSMISSION

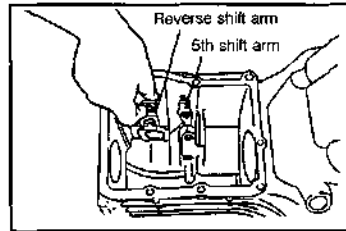
40. Remove the countershaft from the transmission case.



41. Remove the reverse idler gear and reverse idler gear shaft.



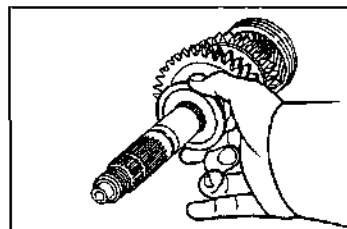
42. Remove the reverse shift arm and 5th shift arm.



TRANSMISSION OUTPUT SHAFT

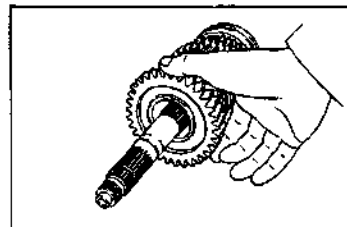
DISASSEMBLY

1. Remove the 1st gear thrust washer.



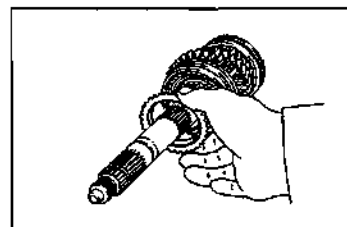
WFE90-MT307

2. Remove the 1st gear.



WFE90-MT308

3. Remove the synchronizer ring No. 2



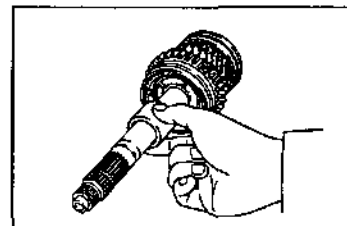
WFE90-MT309

4. Remove the needle roller bearing



WFE90-MT310

5. Remove the 1st gear bearing inner race.

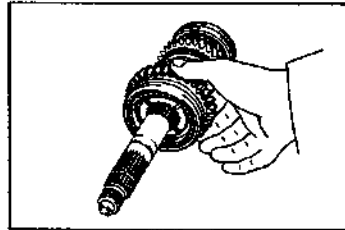


WFE90-MT311

MANUAL TRANSMISSION

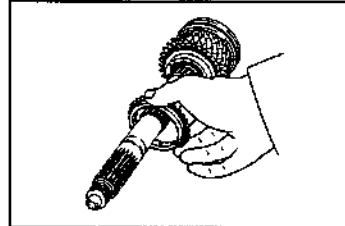
6. Remove the reverse gear with installed the following parts in a set.

- (1) Transmission clutch hub No. 1
- (2) Synchromesh shifting key spring (1 piece)
- (3) Synchromesh shifting key (3 pieces)



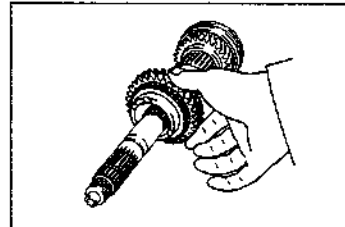
WPB90-MT312

7. Remove the synchronizer ring No. 2.



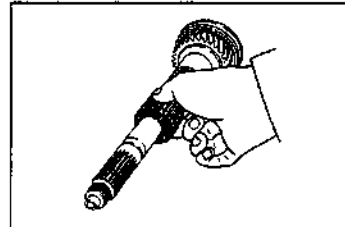
WPB90-MT313

8. Remove the 2nd gear.



WPB90-MT314

9. Remove the needle roller bearing.



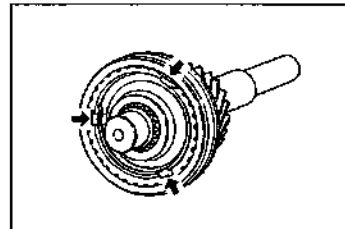
WPB90-MT315

10. Remove the following parts.

- (1) Transmission hub sleeve No. 1
- (2) Synchromesh shifting key spring (1 piece)
- (3) Synchromesh shifting key (3 pieces)

NOTE:

- Measurement of the clearance (in the direction of the output shaft) of transmission clutch hub No. 2 must be performed with the above-listed parts removed. See page MT-90 for the measurement procedure.



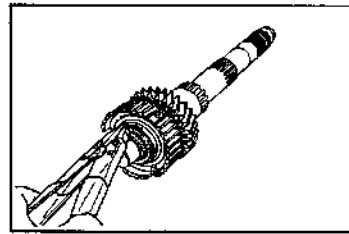
WPB90-MT316

MANUAL TRANSMISSION

11. Detach the snap ring.

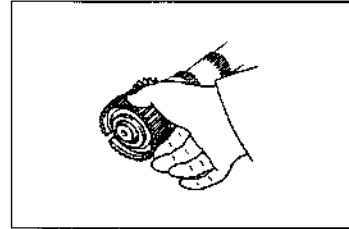
NOTE:

- Never reuse the removed snap ring.



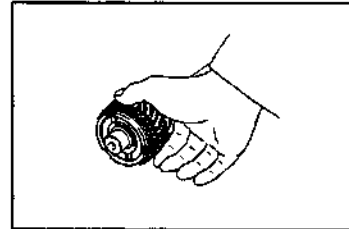
WFE90-MT317

12. Remove the following parts in a set.
(1) Transmission clutch hub No. 2
(2) Synchromesh shifting key spring (1 piece)



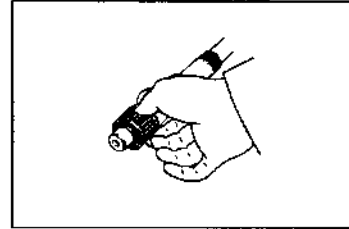
WFE90-MT318

13. Remove the 3rd gear together with synchronizer ring No. 3.



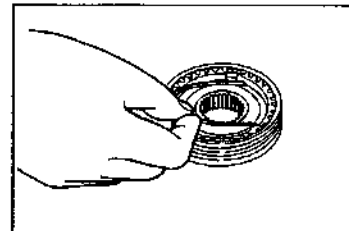
WFE90-MT319

14. Remove the needle roller bearing.



WFE90-MT320

15. Remove the synchromesh shifting key spring. Remove the transmission hub sleeve and synchromesh shifting key of the reverse gear and transmission hub sleeve No. 2.

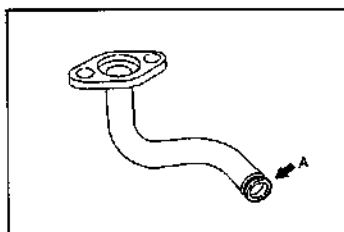


WFE90-MT321

MANUAL TRANSMISSION

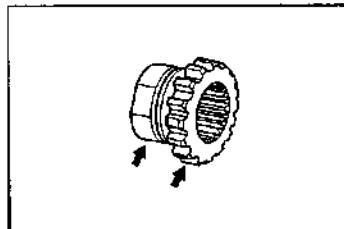
INSPECTION

1. Touch the end (section A) of the transfer oil strainer suction tube to check for burrs or other defects.



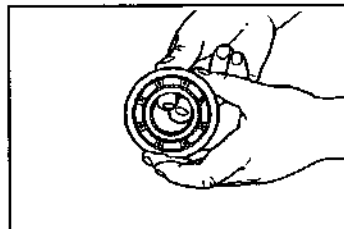
WPB90-MT322

2. Visually check the gear and spline sections of the transfer input hub for damage, or wear.



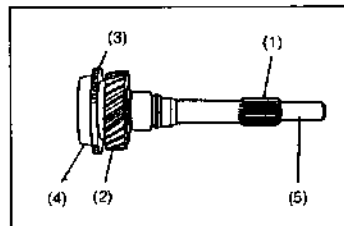
WPB90-MT323

3. Rotate the bearing inner race by applying a force with your finger. Check to see if the bearing inner race rotates smoothly without any binding and sticking.



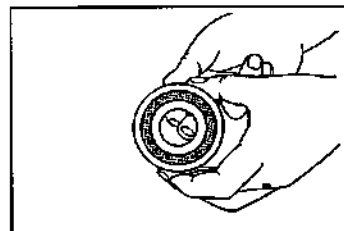
WPB90-MT324

4. Input shaft
Check the input shaft for the following items.
 - (1) Spline section for damage
 - (2) Gear for damage and wear
 - (3) Engaging section of hub sleeve for damage
 - (4) Tapered section for wear or damage
 - (5) Race section of roller bearing for wear or damage



WPB90-MT325

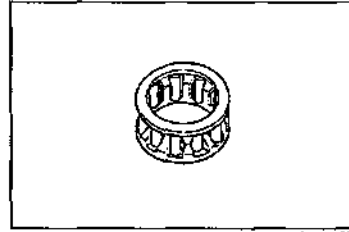
5. Rotate the bearing inner race by applying a force with your finger. Check to see if the bearing inner race rotates smoothly without any sticking.



WPB90-MT326

MANUAL TRANSMISSION

6. Check the needle roller bearing for wear or damage.



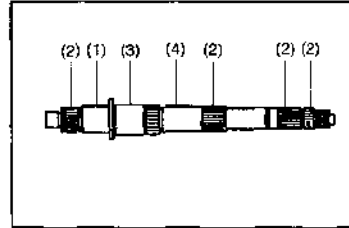
WPB30-MT327

7. Output shaft

Check the output shaft for the following items.

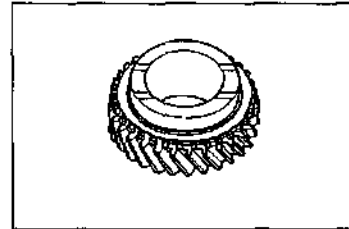
- (1) Needle roller bearing race section for wear or damage
- (2) Spline section for damage
- (3) Fitting section of bearing inner race for wear
- (4) Measure the runout of the output shaft, using a dial gauge and V-block.

Allowable Runout Limit: 0.05 mm



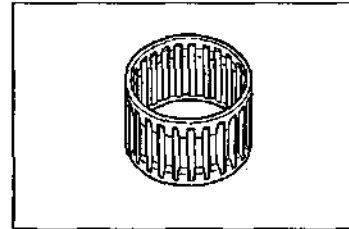
WPB30-MT328

8. Check the gear section of each gear for damage or abnormal wear.



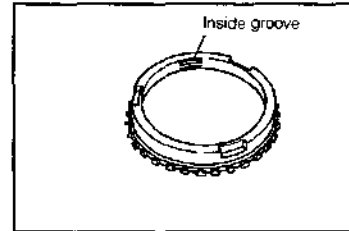
WPB30-MT329

9. Check each needle roller bearing for damage.



WPB30-MT330

10. Check the inside groove of the synchronizer ring for wear or damage.



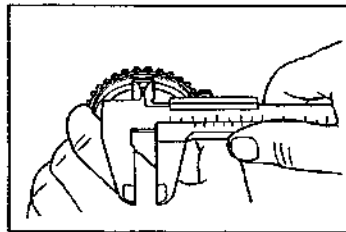
WPB30-MT331

MANUAL TRANSMISSION

11. Measure the contact width of each synchronizer ring with the synchromesh shifting key, using vernier calipers. Replace the synchronizer ring which does not conform to the specifications with a new one.

Unit: mm

Measuring point \ Item	Specified value
1st gear	9.9 - 10.1
2nd gear 3rd gear 4th gear 5th gear	11.3 - 11.5



WP690-MT332

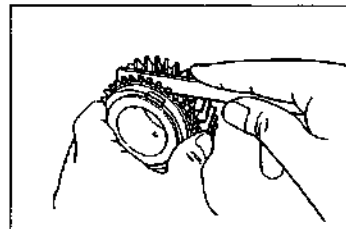
NOTE:

- The measurement should be performed at three points for each synchronizer ring. The maximum value is regarded as the contact width for the said ring.

12. Measure the clearance between each gear and the synchronizer ring, using a thickness gauge.

Unit: mm

Measuring point \ Item	Specified value	Allowable limit
1st gear 2nd gear 3rd gear 4th gear 5th gear	0.85 - 1.45	0.5



WP690-MT333

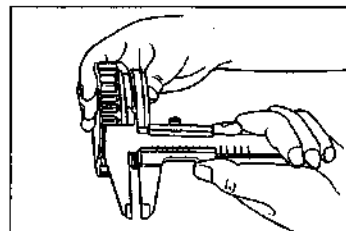
NOTE:

- The measurement should be performed at several points for each gear. The minimum value is regarded as the clearance for the said gear.

13. Measure the contact width of the reverse gear with the shift fork.

Unit: mm

Part name \ Item	Specified value	Allowable limit
Reverse gear	7.05 - 7.12	7.3



WP690-MT334

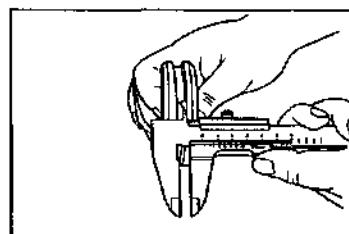
MT-84

MANUAL TRANSMISSION

14. Measure the contact width of the transmission hub sleeve with the shift fork.

Unit: mm

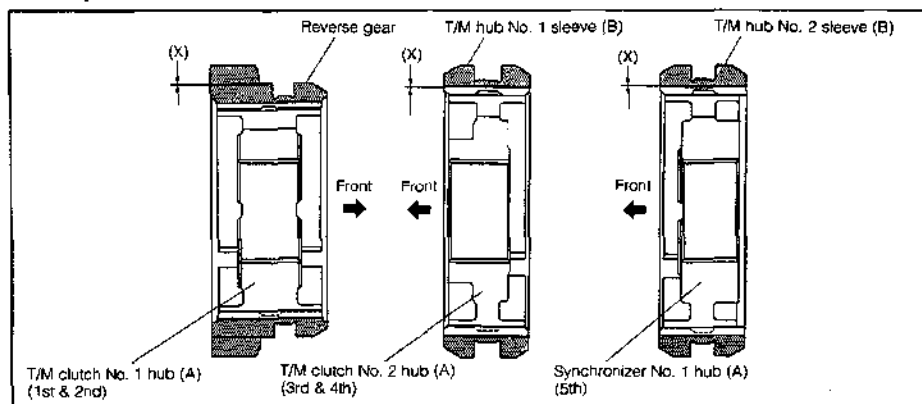
Part name	Item	Specified value	Allowable limit
Transmission hub sleeve		7.05 - 7.12	7.3



WFE80MT335

15. Measure the dimension (A) and (B) of the followings parts. Make sure that the clearance (X) between this hubs and sleeves may confirm to the specification.

Specified Value: 0.03 - 0.19 mm



WFE80MT336

16. The outer diameter dimension of the (A) above parts has been machined in accordance with the bore dimension of the (B) parts. If either part exceeds the specified value above, be certain to replace them as a set.

CAUTION:

- If either part which has been exceed the the specified value should be used against this caution, it would cause slipping-out of gear and or emanation of abnormal noise.

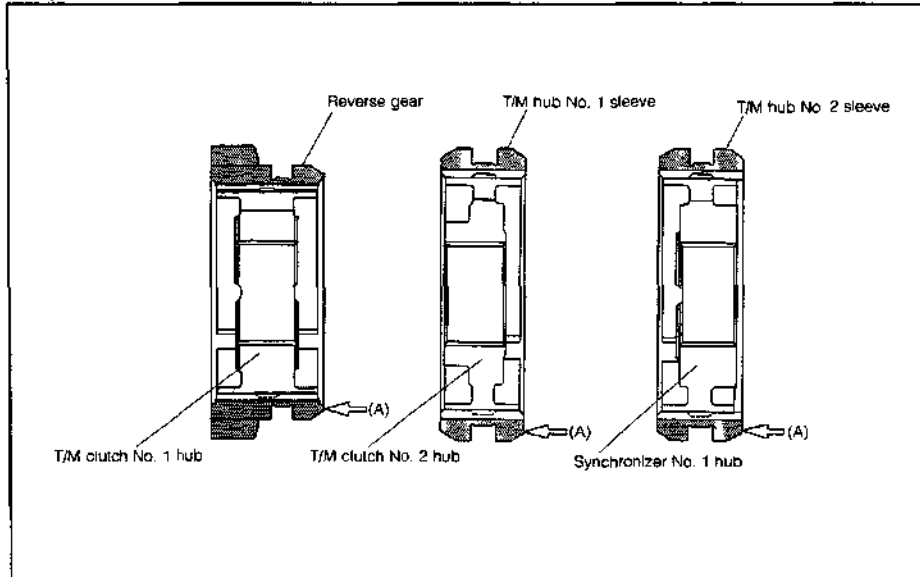
Unit: mm

	Outer dimension	Classification No.		Bore dimension
T/M clutch No. 1 hub	69.78 - 69.84	2	Reverse gear	69.871 - 69.97
T/M clutch No. 2 hub	69.68 - 69.74	1	T/M hub No. 1 sleeve	69.971 - 69.87
Synchronizer No. 1 hub	69.58 - 69.64	3	T/M hub No. 2 sleeve	69.67 - 69.77

WFE80-MT337

MANUAL TRANSMISSION

17. With the sleeves assembled to the hubs, measure the tilt width at the section (A) of the sleeves.
Specified Value: Not to exceed 0.5 mm



NOTE:

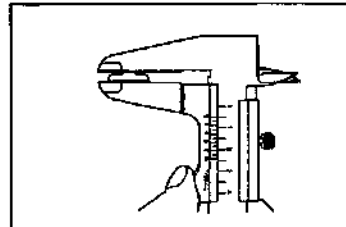
- If the tilt width of the sleeves exceeds the above specified value, be certain to replace those parts as a set.

WP590-MT338

18. Measure the height of each synchromesh shifting key, using vernier calipers.

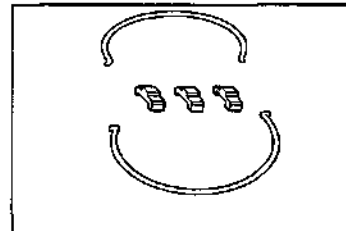
Unit: mm

Measuring point	Item	Specified value	Allowable limit
1st & 2nd gears		5.0 - 5.2	4.7
3rd & 4th gears			
5th gear			



WP590-MT339

19. Check the synchromesh shifting key and synchromesh shifting key spring for evidence of wear or damage.



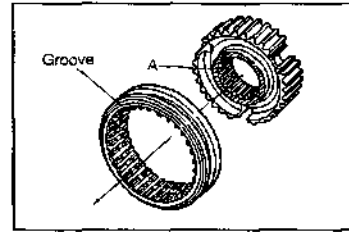
WP590-MT340

ASSEMBLY

1. The front ends of transmission clutch hub No. 2 and transmission hub sleeve No. 1, which is the sleeve for 3rd-4th speed selection, are as shown in the diagram at right.

NOTES:

- (1) The outer groove in hub sleeve No. 1 is present at the front end.
- (2) Clutch hub sleeve No. 2 (section A) is present at the front end.

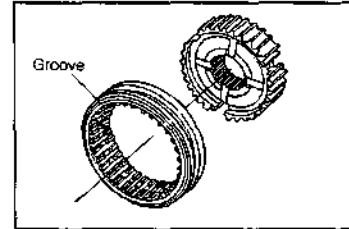


WFE80-MT341

2. The front ends of transmission synchronizer hub assembly No. 1 and transmission hub sleeve No. 2 (5th speed selection) are as shown in the diagram at right.

NOTES:

- (1) The outer groove in hub sleeve No. 2 is present at the front end.
- (2) The notch in the crisscross direction of synchronizer hub assembly No. 1 is present at the front end.



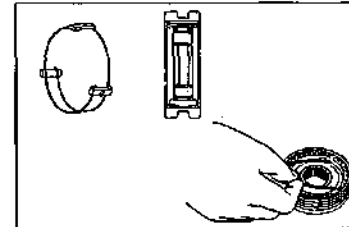
WFE80-MT342

3. Assemble the selected transmission clutch hub to the following parts, using the synchromesh shifting key and synchromesh shifting key spring.

- (1) Reverse gear
- (2) Transmission hub sleeve (5th)

NOTE:

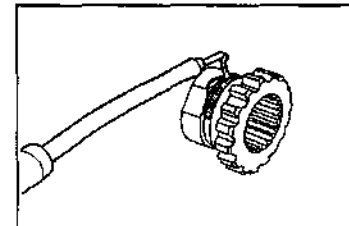
- As for the synchromesh shifting key spring, the bent sections at the front and rear should not come at the same direction, as shown in the right figure.



WFE80-MT343

ASSEMBLY OF TRANSFER OIL PUMP BODY SUBASSEMBLY

1. Apply gear oil to the outer periphery of the transfer input hub.

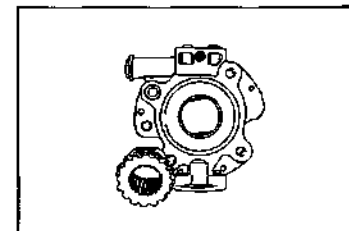


WFE80-MT344

2. Insert the transfer input hub into the transfer oil pump body subassembly lightly pushing with your finger.

NOTE:

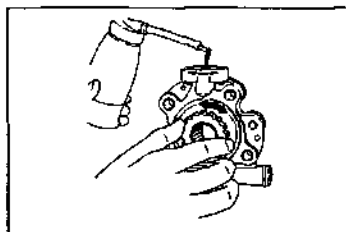
- Apply the gear oil to the outer periphery of the transfer input hub, prior to install.



WFE80-MT345

MANUAL TRANSMISSION

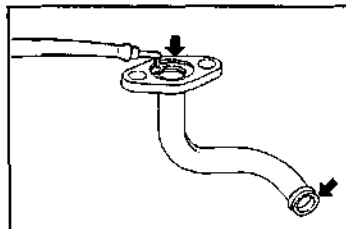
3. Turn the transfer oil pump body subassembly upside down, and then rotating the transfer input hub by hand, apply gear oil into the transfer oil pump body subassembly.



4. Install the two new O-rings to the transfer oil strainer suction tube and apply the gear oil to the O-rings.

NOTE:

- Be careful not to damage the O-rings while installing on the transfer oil strainer suction tube.

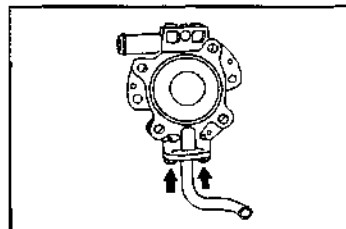


5. Connect the transfer oil strainer suction tube to the transfer oil pump body subassembly using two bolts, and tighten the bolts.

Tightening Torque: 6.9 - 9.8 N·m (0.7 - 1.0 kgf·m)

CAUTION:

- The bend section in the transfer oil strainer tube faces toward right side.



ASSEMBLY OF TRANSFER ADAPTER

1. Press a new oil seal from the bearing side of the transmission output shaft, using the following SST.

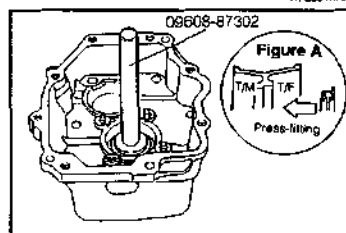
SST: 09608-87302-000

CAUTION:

- Be sure to install the oil seal in the correct direction, as indicated in the right figure A.

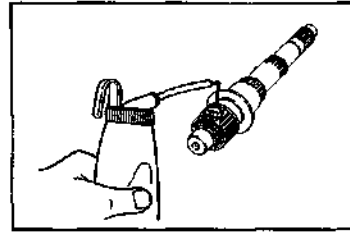
NOTE:

- Make sure that the oil seal exhibits no tilt and the garter spring of the oil seal is not disengaged.



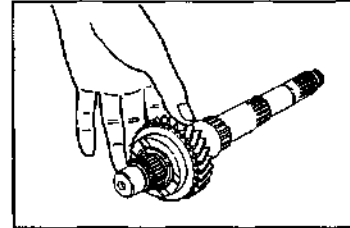
ASSEMBLY OF OUTPUT SHAFT

1. Apply gear oil to the needle roller bearing.



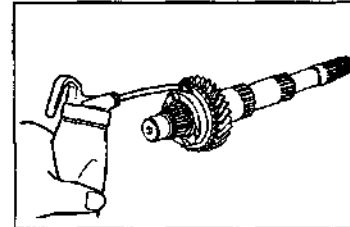
WPED0-AMT250

2. Install the 3rd gear to the output shaft.



WPED0-AMT361

3. Apply gear oil to the tapered section of the 3rd gear.

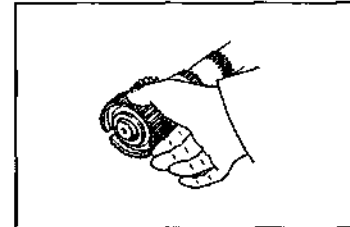


WPED0-AMT362

4. Install the transmission clutch hub No. 2 to the output shaft with the synchromesh shifting key (1 piece) and synchronizer ring No. 3 installed.

NOTE:

- For easier installation of the synchromesh shifting key spring, put mark in the surface of clutch hub No. 2 so that the bent sections at the front and rear should not come at the same direction.



WPED0-AMT363

MANUAL TRANSMISSION

5. Attach the new snap ring. Ensure that the clearance (A) in the right figure conforms to the specification. If it does not conform to the specification, select a suitable snap ring.

NOTE:

- Never reuse the snap ring.

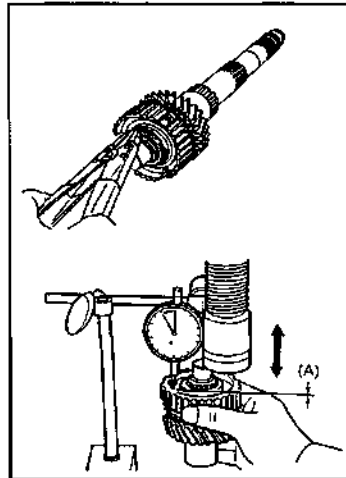
Specification:

Not to exceed 0.1 mm

Snap Ring Availability

Unit: mm

Snap ring thickness:	2.0
	2.1
	2.2



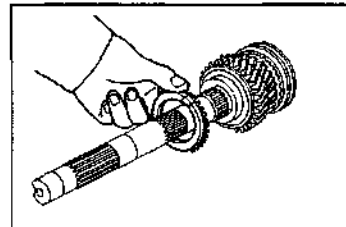
WPB90-4/T364

6. Install the following parts to the clutch hub No. 2, and then, install them to the output shaft.

- (1) Synchromesh shifting key (3 pieces)
- (2) Transmission hub sleeve No. 1
- (3) Synchromesh shifting key spring (1 piece)

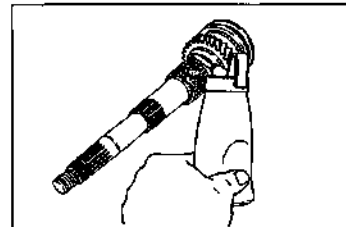
NOTE:

- Ensure that the bent sections at the front and rear of the synchromesh shifting key spring, should not come at the same direction.



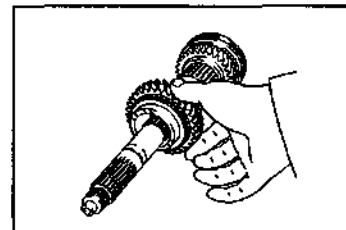
WPB90-MT355

7. Apply gear oil to the needle roller bearing and install to the output shaft.



WPB90-MT356

8. Install the 2nd gear.

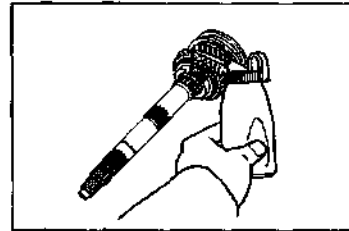


WPB90-MT357

MT-90

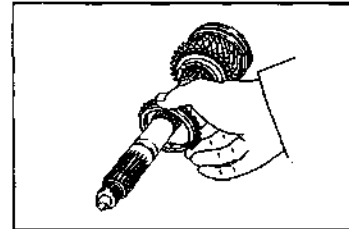
MANUAL TRANSMISSION

9. Apply gear oil to the tapered section of the 2nd gear.



WPES0-MT368

10. Install the synchronizer ring No. 2.

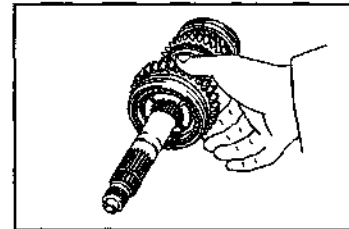


WPES0-MT369

11. Install the reverse gear with the following parts installed.
(1) Synchronesh shifting key spring (2 pieces)
(2) Synchronesh shifting key (3 pieces)
(3) Transmission clutch hub No. 1

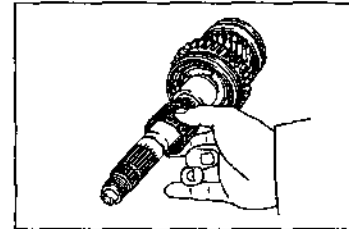
NOTE:

- Ensure that the bent sections at the front and rear of the synchronesh shifting key spring should not come at the same direction.



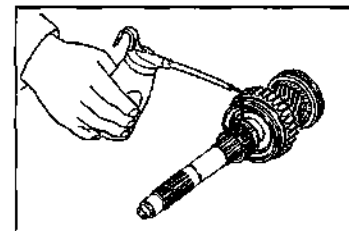
WPES0-MT380

12. Install the 1st gear inner race.



WPES0-MT381

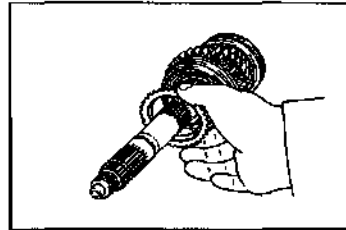
13. Apply gear oil to the outer periphery of the 1st gear inner race and the needle roller bearing.



WPES0-MT382

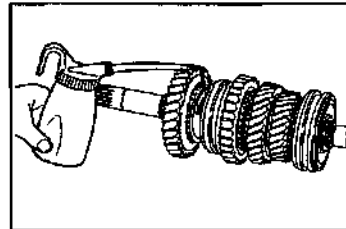
MANUAL TRANSMISSION

14. Install the synchronizer ring No. 2.



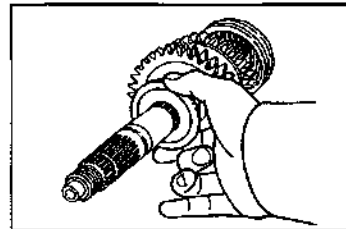
WPB20-MT363

15. Apply gear oil to the tapered section of the 1st gear, and install it.



WPB20-MT364

16. Install the 1st gear thrust washer.

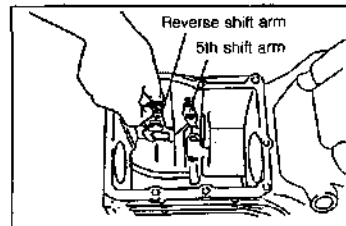


WPB20-MT365

TRANSMISSION ASSEMBLY

PRIOR TO ASSEMBLING THE TRANSMISSION CASE, CLEAN THE TRANSMISSION CASE BY REMOVING ANY DIRT, GASKET MATERIALS OR THE LIKE.

1. Install the reverse shift arm and 5th shift arm.

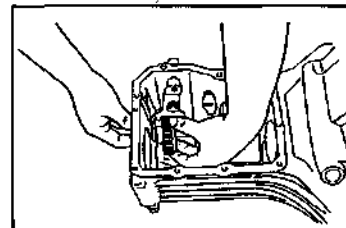


WPB20-MT366

2. Install the reverse idler gear shaft and reverse idler gear.

NOTE:

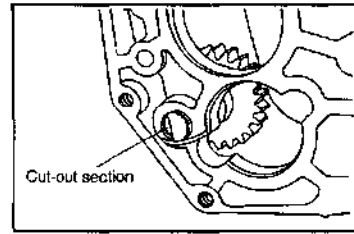
- Be sure to install the reverse idler gear shaft in such a way that the cut-out section of the shaft faces toward the opposite side of the countershaft. If this operation should fail to be observed correctly, there may be a case where the transfer adaptor can not be installed.



WPB20-MT367

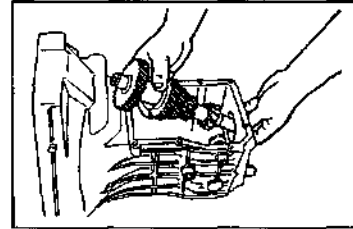
MANUAL TRANSMISSION

3. Insert the transmission countershaft into the transmission case.



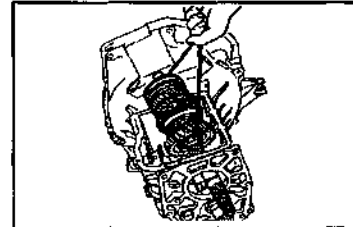
WPB0-MT328

4. Place the output shaft in the transmission case.



WPB0-MT369

5. Apply the gear oil to the needle roller bearing and then, install to the output shaft.
6. Install the synchronizer ring No. 3.



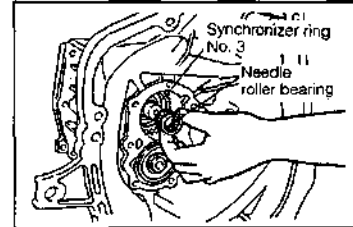
WPB0-MT370

7. Press the input shaft bearing into position, using the following SSTs.

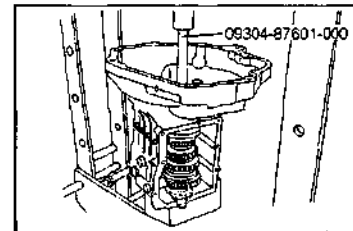
SST: 09304-87601-000

NOTE:

- Prior to install the above bearing, remove the stop ring.



WPB0-MT371

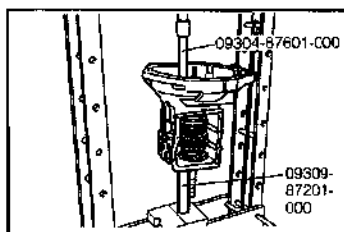


WPB0-MT372

MANUAL TRANSMISSION

8. Press the bearings provided at the front and rear of the transmission countershaft, using the following SSTs at the same time.

SSTs: 09304-87601-000
09309-87201-000



9. Install a new snap ring to the countershaft, using the following SST:

SST: 09306-87601-000

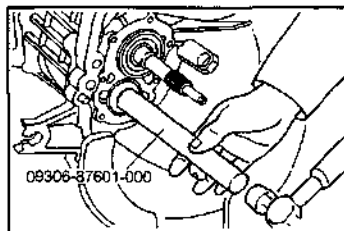
NOTE:

- Make sure that the snap ring is securely installed into the groove section of the countershaft.

10. Install the stop ring of the countershaft front bearing.

NOTE:

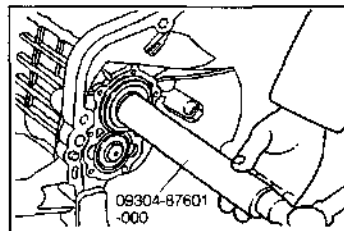
- Lightly tapping the countershaft from the rear side of transmission case with the plastic hammer or the like so that the bearing comes toward front side, prior to install the stop ring.



11. Install a new snap ring to the input shaft, using the following SST:

SST: 09304-87601-000

12. Install the stop ring to the input shaft.

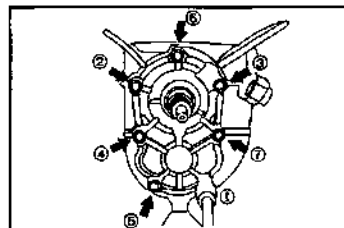


13. With a new gasket used, install the front bearing retainer.

NOTE:

- Apply gear oil to the oil seal lip section.
 - Molybdenum disulphide lithium base grease to the clutch hub sliding section of the front bearing retainer.
- Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf-m)

- Be sure to tighten the bolts alternately and diagonally (the right figure illustration indicates a typical example of the tightening sequence.)

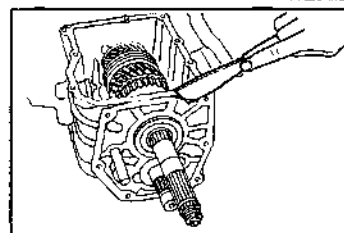


14. Install the clutch related parts (see page CL-sections).

15. Remove any remaining gasket material from the transmission, using a gasket scraper.

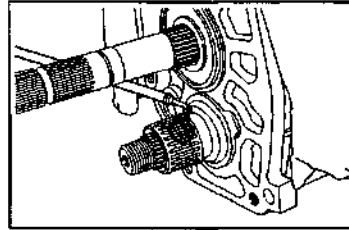
NOTE:

- Be very careful not to scratch the attaching surface.

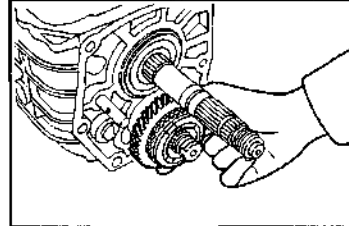


MANUAL TRANSMISSION

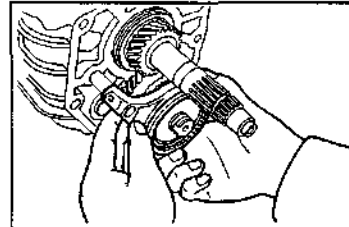
16. Install the 5th gear thrust washer.
17. Install the 5th gear inner race and needle roller bearing to the output shaft and then apply the gear oil to the outer periphery of these parts.



18. Apply gear oil to the tapered section of the 5th gear, and install the 5th gear and the synchronizer ring No. 3 to the counter shaft.



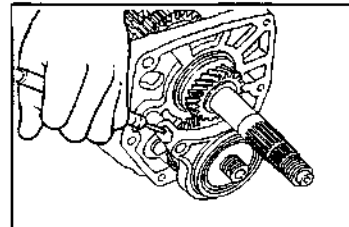
19. Install the 5th gear shift fork and the synchronizer hub sleeve together.



20. Drive the new slotted pin of the 5th shift fork.

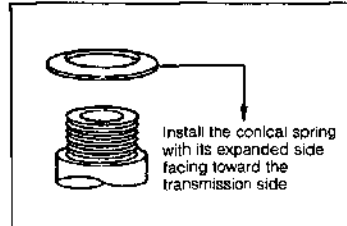
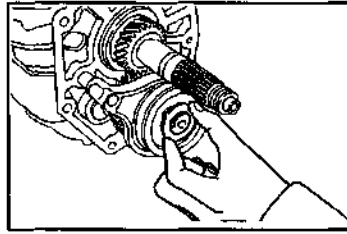
NOTE:

- Never reuse the removed slotted pin.



MANUAL TRANSMISSION

21. Install the shifting key retainer and conical spring washer in this sequence.

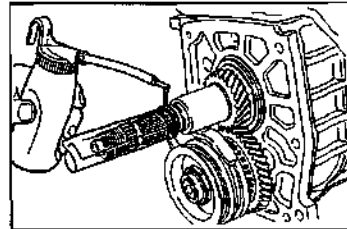


WFEB0-MT302

22. Interlock the 1st gear and the 3rd gear.
 23. Install the output gear spacer No. 1 to the output shaft.
 24. Protect the spline section of the output shaft with the suitable vinyl sheets or the like.
 25. Install the O-ring in a place and apply the gear oil to the O-ring.

NOTE:

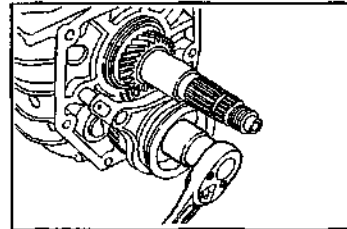
- Be very careful not to damage the new O-ring during installation.



WFEB0-MT303

26. Install the new lock nut of the 5th gear countershaft and then, tighten them.

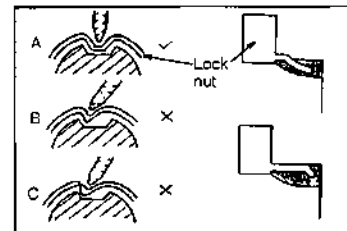
Tightening Torque: 177.0 - 216.0 N·m
 (18.0 - 22.0 kgf·m)



22WFEB0-MT304

NOTE:

- When staking the lock nut, point a suitable staking tool toward the counter shaft axis center and stake to lock nut securely as shown in the right figure A.
- Poor staking may cause abnormal noise as shown in the right figure B and C.



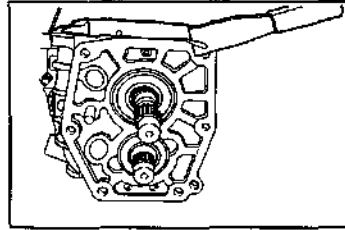
WFEB0-MT305

MANUAL TRANSMISSION

27. Remove any remaining gasket material from the transmission, using a gasket scraper.

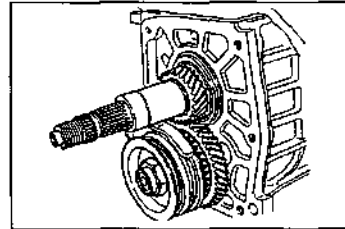
CAUTION:

- Be very careful not to scratch the attaching surface.



WFE90-MT366

28. Place output gear spacer No. 2 on the transmission output shaft.

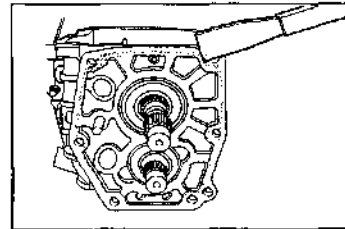


WFE90-MT367

29. Apply the THREE BOND 1216 (made by THREE BOND) to the mating surface between the transfer case and the transmission case.

NOTE:

- Apply the bond to the inside of the bolt hole, as shown in the diagram at right.

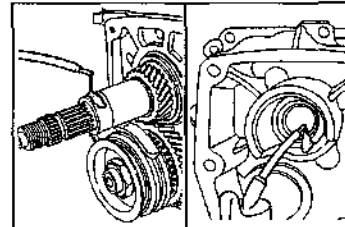


WFE90-MT368

30. Apply gear oil to the outer periphery of the output gear spacer No. 2 and to the lip section of the oil seal, and push the transfer adapter until it has come into firm contact with the transmission case.

NOTE:

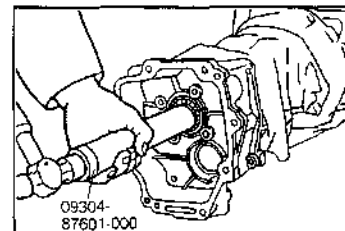
- Be very careful not to turned over the lip section of the oil seal during installation.



WFE90-MT369

31. Install the bearing of the transmission output shaft using the following SST:

SST: 09304-87601-000



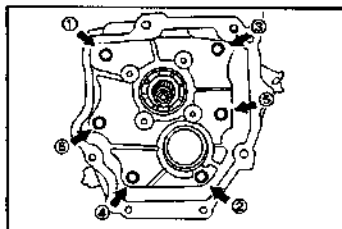
WFE90-MT390

MANUAL TRANSMISSION

32. Apply the THREE BOND 1216 (made by THREE BOND) to the thread sections of the bolts, and tighten those bolts.
Tightening Torque: 29.4 - 44.1 N·m (3.0 - 4.5 kgf·m)

NOTE:

- Be sure to tighten the bolts alternately and diagonally (the right figure illustration indicates a typical example of tightening sequence)

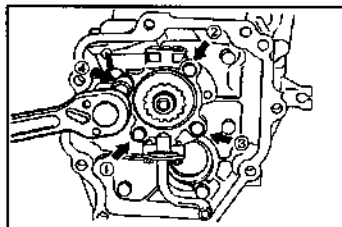


WFE90-MT321

33. Install the transfer oil pump body subassembly to the transfer adapter and then tighten the adapter with four bolts.
Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)

NOTE:

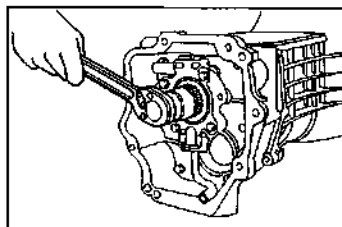
- Be sure to tighten the bolts alternately and diagonally (the right figure illustration is a typical example of tightening sequence)



WFE90-MT322

34. Install the new lock nut of the transmission output shaft and then, tighten it.

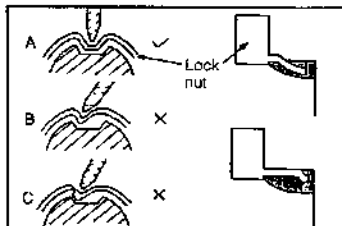
Tightening Torque: 177.0 - 216.0 N·m
(18.0 - 22.0 kgf·m)



WFE90-MT323

NOTE:

- When staking the lock nut, point a suitable staking tool toward the transfer output rear shaft axis center and stake to lock nut securely, as shown in the right figure A.
- Poor staking may cause abnormal noise as shown in the right figure B and C.

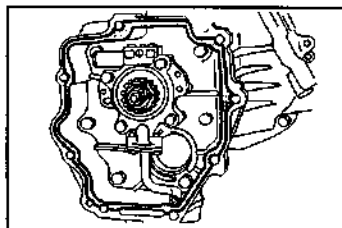


WFE90-MT324

35. Apply the liquid-gasket-use THREE BOND 1216 (made by THREE BOND) to the mating surface between the transfer adapter and the transfer front case.

NOTE:

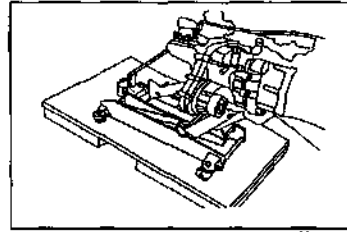
- Apply the bond to the attaching surface of the inside bolt hole.



WFE90-MT325

MANUAL TRANSMISSION

36. Support the transfer front and rear cases with transmission jacks or the like.

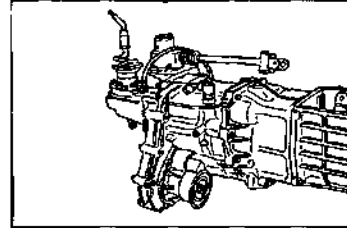


WPES0-MT586

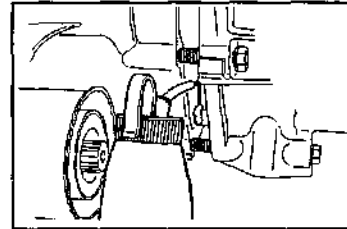
37. Temporarily install the transfer front case to the transfer adapter, using the eight dummy bolts.

NOTE:

- Apply the gear oil to the O-ring section of the transfer oil strainer tube.



WPES0-MT397



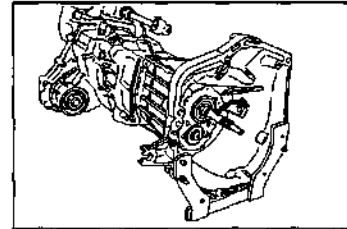
WPES0-MT586

38. Shift the 1st gear into position.

39. Tighten the transfer front case with the eight dummy bolts with rotating the input shaft clockwise.

CAUTION:

- Be careful to tighten the dummy bolts alternately, evenly and diagonally.
- If this operation should fail to be performed, failure to observe this caution may disengagement of gear.



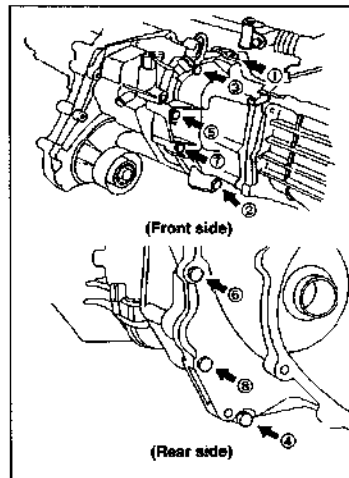
WPES0-MT369

MANUAL TRANSMISSION

40. Remove the eight dummy bolts.
41. Apply the THREE BOND 1216 (made by THREE BOND) to the thread section of the bolts, and tighten them.
Tightening Torque: 29.4 - 44.1 N·m (3.0 - 4.5 kgf·m)

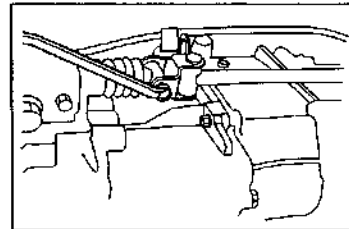
NOTE:

- Be sure to tighten the bolts alternately and diagonally.
(The illustration at the right figure indicates a typical example of tightening sequence.)



WPB90-MT400

42. Install the shift lever retainer subassembly and the control shaft with a hexagon bolt (Use new hexagon bolt).
Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)



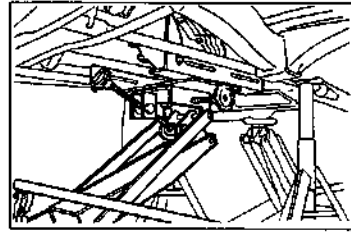
WPB90-MT401

43. Install the transmission case cover subassembly (see page MT-84).
44. Install the transmission and transfer assembly to the vehicle (see pages MT-101 to MT-105).

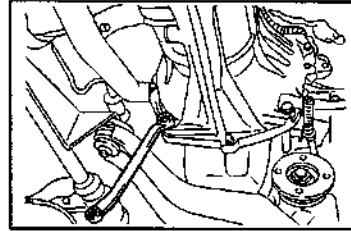
WPB90-MT402

INSTALLATION

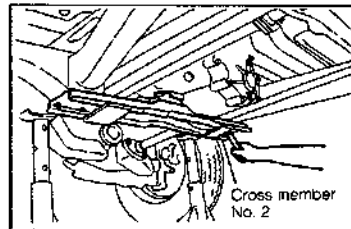
1. Working from the under vehicle
 - (1) Support the transmission with a transmission jack.



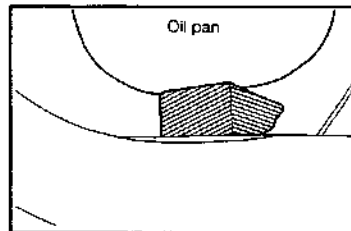
- (2) While supporting the transmission assembly with a transmission jack, push in the transmission assembly into the engine.
Tightening Torque: 49.0 - 68.6 N·m (5.0 - 7.0 kgf·m)



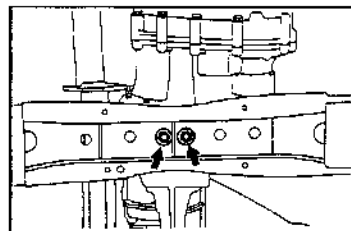
- (3) Tighten the cross member No. 2 with the four bolts on both left and right sides bolts.
Tightening Torque: 39.2 - 53.9 N·m (4.0 - 5.5 kgf·m)



- (4) Remove the wooden pieces between oil pan and differential carrier support front bracket.



- (5) Install the transmission mounting to the crossmember No. 2 with the two nuts and tighten them.
Tightening Torque: 58.8 - 78.5 N·m (6.0 - 8.0 kgf·m)

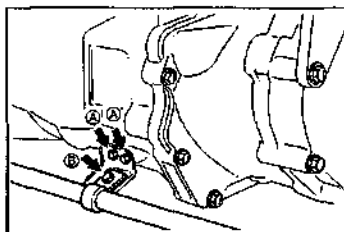


MANUAL TRANSMISSION

- (6) Tighten the exhaust pipe support bracket with the three bolts.

Tightening Torque:

- Ⓐ 14.7 - 21.6 N·m (1.5 - 2.2 kgf-m)
Bracket × Transmission
- Ⓑ 29.4 - 44.1 N·m (3.0 - 4.5 kgf-m)
Bracket × Exhaust pipe



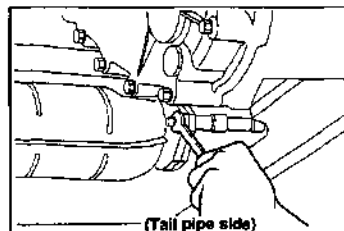
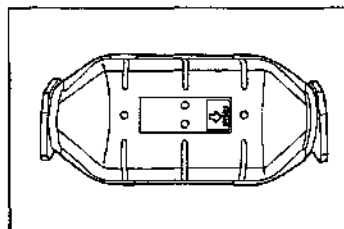
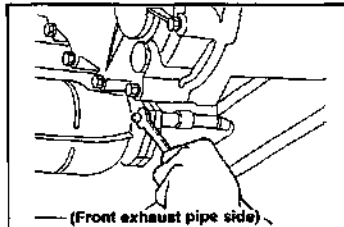
WFEG-MT408

- (7) Tighten the catalyst converter assembly with the two nuts on both front and rear side, using the new gaskets.

Tightening Torque: 36.3 - 51.0 N·m (3.7 - 5.2 kgf-m)

NOTE:

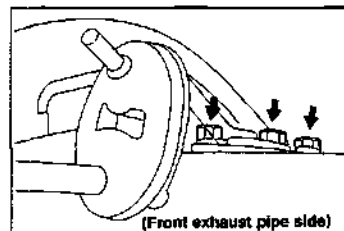
- Install the converter in such a way that.
- Arrow marking facing with ground.
- Toward the front exhaust pipe.



WFEG-MT409

- (8) Tighten the bracket to the crossmember No. 3 with the three bolts.

Tightening Torque: 29.4 - 44.1 N·m (3.0 - 4.5 kgf-m)



WFEG-MT410

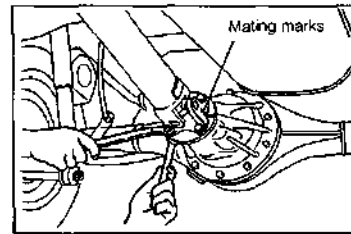
MANUAL TRANSMISSION

- (9) Install the front propeller shaft and rear propeller shaft and tighten with the bolts, spring washer and nuts.

CAUTION:

- Align the mating marks put during the removal with each others. If this operation should fail to be performed correctly, the propeller shaft may emit abnormal noise or vibration during the running.

Tightening Torque: 58.8 - 78.5 N·m (6.0 - 8.0 kgf·m)

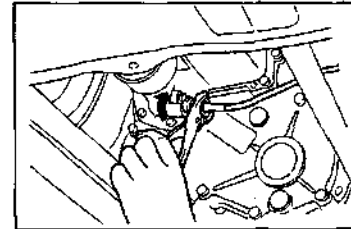


WPB0-MT411

- (10) Connect the speedometer cable with oil seal to the transmission case, using the common tool of plier.

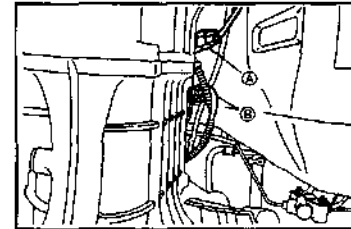
NOTE:

- Make sure that the forward end of the speedometer cable has positively entered into the sleeve.



WPB0-MT412

- (11) Connect the coupler of back up lamp and transmission position detect switch.

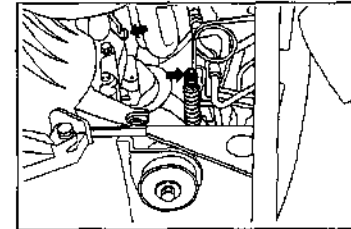


WPB0-MT413

- (12) Connect the clutch release cable subassembly to the release fork.

NOTE:

- Apply the Lithium base multi purpose grease to the connecting sections.



WPB0-MT414

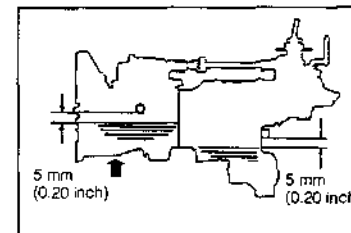
- (13) Fill in the transmission and transfer oil through the oil filler plug holes.

TRANSFER

Oil: API GL-3 or GL-4
SAE 75W-85 or 75W-90
Oil Capacity: 1.4 L

TRANSMISSION

Oil: API GL-3 or GL-4
SAE 75W-85 or 75W-90
Oil Capacity: 1.7 L

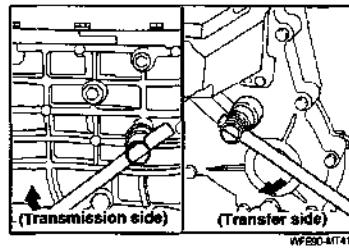


WPB0-MT415

- (14) Check of transmission and transfer checking of oil level and leakage oil should be up to the filler plug hole. Add oil if low and inspect for oil leakage.

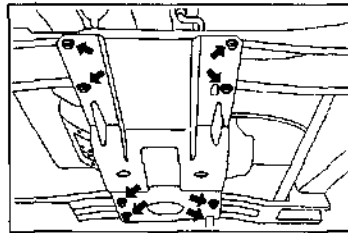
MANUAL TRANSMISSION

- (15) Tighten the filler plugs with new gasket.
Tightening Torque: 29.4 - 49.0 N·m (3.0 - 5.0 kgf·m)



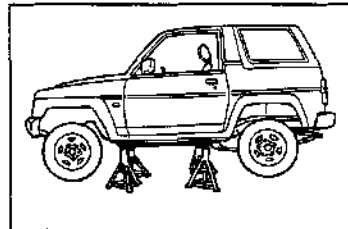
WF890-MT416

- (16) Tighten the transmission under cover with the eight bolts.
Tightening Torque: 39.2 - 58.8 N·m (4.0 - 6.0 kgf·m)



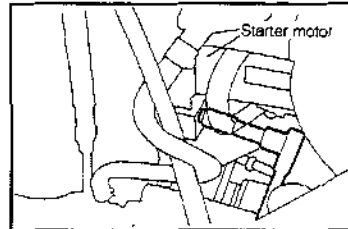
WF890-MT417

2. Working from the vehicle outside
(1) Jack down the vehicle.



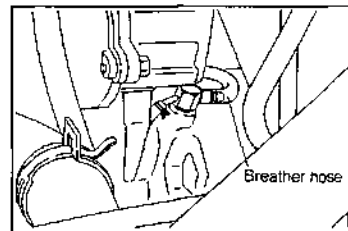
WF890-MT418

3. Working from the engine compartment room
(1) Install the direct-connecting a bolt and tighten it.
Tightening Torque:
49.0 - 68.6 N·m (5.0 - 7.0 kgf·m)



WF890-MT419

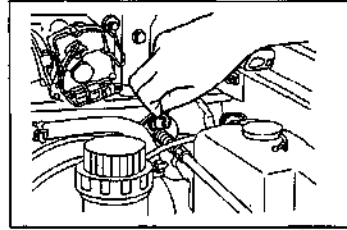
- (2) Install the transmission breather hose with a clip.



WF890-MT420

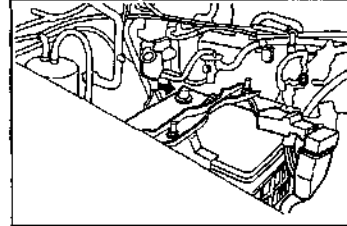
MANUAL TRANSMISSION

- (3) Install the clutch cable to the clutch release fork. Adjust the free travel by means of the E-ring.
Free Travel of Clutch Pedal: 18 - 27 mm



WPED0-MT421

- (4) Connect the battery ground cable to the negative (-) terminal of the battery.

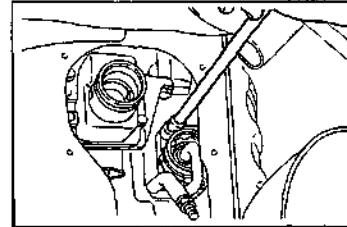


WPED0-MT422

4. Working from the vehicle interior
(1) Install the transfer control lever with the four bolts, using the new gasket.
Tightening Torque: 314.7 - 21.6 N-m (1.5 - 2.2 kgf-m)

NOTE:

- Apply the Lithium base multi purpose grease to the forward end of the transfer control lever.



WPED0-MT423

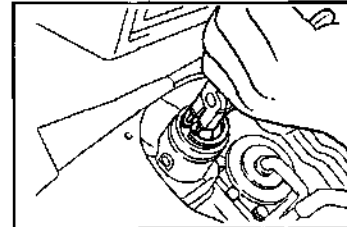
- (2) Install the transmission control lever with a snap ring, using the common tool of snap ring plier.

CAUTION:

- Ensure that the snap ring must be inserted in the groove section of control shift lever retainer.

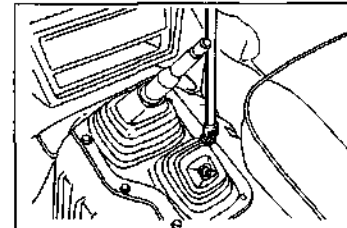
NOTE:

- Apply the Lithium base multi purpose grease to the forward end of the transfer control lever.



WPED0-MT424

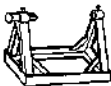

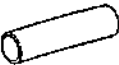
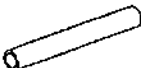


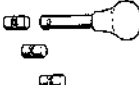




- (3) Install the shift lever boot with the six bolts.
(4) Install the floor carpet in a place.
(5) Install the transmission and transfer shift lever knobs.



WPED0-MT425

MANUAL TRANSMISSION

SSTs

Shape	Parts No.	Parts Name
	09219-87202-000	Engine overhaul stand
	09219-87203-000	Engine overhaul attachment (Commercially-available)
	09304-87601-000	Replacer input shaft bearing
	09306-87601-000	Replacer counter shaft bearing
	09306-87602-000	Puller counter gear front bearing
	09309-87201-000	Transmission bearing replacer
	09339-87301-000	Shift fork shaft guide
	09517-87601-000	Replacer oil seal
	09602-87301-000	Counter gear bearing puller
	09606-87302-000	Axle hub & drive pinion bearing tool set
	09950-20017-000	Universal puller

WPB90 MT1426

MANUAL TRANSMISSION

SERVICE SPECIFICATIONS (PART TIME)

Unit: mm

Item			Specified value	Allowable limit	Remarks
Speedometer driver gear shaft diameter			8.003 8.002	7.96	
Speedometer shaft bore diameter			8.006 8.005	8.10	
Backlash of each gear	1st gear		0.05 - 0.18	—	
	2nd gear		0.05 - 0.16	—	
	3rd gear		0.05 - 0.14	—	
	Input gear		0.05 - 0.13	—	
	5th gear		0.05 - 0.13	—	
Thrust clearance of each gear	1st gear		0.17 - 0.30	—	
	2nd gear		0.10 - 0.37	—	
	3rd gear		0.10 - 0.33	—	
	5th gear		0.11 - 0.30	—	
Shift fork groove width	Reverse gear		7.05 - 7.12	7.3	
	T/M Hub Sleeve		7.05 - 7.12	7.3	
Synchronizer ring to gear clearance	1st gear		0.85 - 1.45	0.5	
	2th gear				
	3rd gear				
	4th gear				
	5th gear				
T/M clutch No. 1, No. 2 hubs & Synchronizer No.1 hub	Class	2	69.78 - 69.84		Outer diameter
		1	69.68 - 69.74		
		3	69.58 - 69.64		
T/M hub No. 1, No. 2 hubs Sleeves & Reverse gear	Class	2	69.871 - 69.97		Bore diameter
		1	69.971 - 69.87		
		3	69.67 - 69.77		
Each hubs x hub sleeves and reverse gear clearance			0.03 - 0.19	—	
Each hub sleeves and reverse gear tilt width (Assembled to the each hubs)			—	Not to exceed 0.5	
Synchronmesh shifting key groove width	1st gear		9.9 - 10.1		
	Except 1st gear		11.3 - 11.5		
Synchronmesh shifting key height			5.0 - 5.2	4.7	
Output shaft runout			—	0.05	
Thrust clearance of T/M clutch hub No. 2			—	Not to exceed 0.1	Selected with the snap rings

MANUAL TRANSMISSION

Item		Specified value	Allowable limit	Remarks
Contact width	1st & 2nd shift fork	6.80 - 7.00	6.3	
	3rd & 4th shift fork	6.80 - 7.00		
	Reverse shift fork	15.000 - 15.043	15.1	
	Gear shift head No.1	16.1 - 16.2	16.7	
	Detent sleeve	12.1 - 12.2	12.7	
		18.8 - 19.2	19.5	

WPE90-MT427

(Full Time)

Unit: mm

Item		Specified valve	Allowable limit	Remarks
Backlash of each gear	1st gear	0.05 - 0.18	—	
	2nd gear	0.05 - 0.16	—	
	3rd gear	0.05 - 0.14	—	
	4th gear	0.05 - 0.13	—	
	5th gear	0.05 - 0.13	—	
Thrust clearance of each gear	1st gear	0.17 - 0.30	—	
	2nd gear	0.10 - 0.37	—	
	3rd gear	0.10 - 0.33	—	
	5th gear	0.11 - 0.30	—	
Output shaft runout		—	0.05	
Synchronizer ring to shifting key groove width	1st gear	9.9 - 10.1		
	Except gear	11.3 - 11.5		
Synchronizer ring to gear clearance	1st gear	0.65 - 1.45	0.5	
	2nd gear			
	3rd gear			
	4th gear			
	5th gear			
Synchronizer shifting key height		5.0 - 5.2	4.7	
Thrust clearance of T/M clutch hub No. 2		—	Not to exceed 0.1	Selected with the Snap rings
T/M clutch No. 1, No. 2 hubs & Synchronizer No. 1 hub	Class	2	69.78 - 69.84	
		1	69.68 - 69.74	
		3	69.58 - 69.64	
T/M hub No.1, No. 2 hub sleeves & Reverse gear	Class	2	69.871 - 69.97	
		1	69.971 - 69.87	
		3	69.67 - 69.77	
Each hubs x hub sleeves & reverse gear clearance		0.03 - 0.19		
Each hub sleeves and reverse gear tilt width		—	Not to exceed 0.5	

WPE90-MT428

MT-108

MANUAL TRANSMISSION

TRANSMISSION CASE COVER (PART & FULL TIME)

Tightening component	Tightening torque		
	kgf-m	ft-lb	N-m
T/M case cover x Transmission case	1.5 - 2.0 0.7 - 1.0 (only three bolts)	10.8 - 14.5 5.1 - 7.2	14.7 - 19.6 6.9 - 9.8
Reverse restrict pin holder x T/M case cover	3.0 - 5.0	21.7 - 36.2	29.4 - 49.0
Back up lamp switch x T/M case cover	3.0 - 5.0	21.7 - 36.2	29.4 - 49.0
Set bolt x T/M case cover	3.0 - 4.5	21.7 - 32.5	29.4 - 44.1
Shift lock plate x T/M case cover	1.5 - 2.2	10.8 - 15.9	14.7 - 21.6
Union x T/M case cover	1.3 - 1.6	9.4 - 11.6	12.7 - 15.7

WFE90-MT420

TRANSMISSION (PART & FULL TIME)

Tightening component	Tightening torque		
	kgf-m	ft-lb	N-m
Cylinder block x T/M case	5.0 - 7.0	36.2 - 50.6	49.0 - 68.6
Exhaust pipe support bracket x T/M case	1.5 - 2.2	10.8 - 15.9	14.7 - 21.6
Bolt for 5th shift arm x T/M case	4.0 - 6.0	28.9 - 43.4	39.2 - 58.8
Bolt for reverse shift arm x T/M case	3.5 - 5.5	25.3 - 39.8	34.3 - 53.9
Front bearing retainer x T/M case	1.5 - 2.2	10.8 - 15.9	14.7 - 21.6
Counter shaft 5th gear x Lock nut	10.0 - 14.0	72.0 - 101.0	98.0 - 137.0

WFE90-MT430

DAIHATSU F300

TRANSMISSION & TRANSFER

TRANSFER POWER TRANSMITTING	
MECHANISM (PART TIME)	TR- 2
TRANSFER SHIFT & MECHANISM	TR- 3
TRANSFER (FULL TIME)	TR- 7
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INSTALLATION	TR-80
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W/F80-TR001

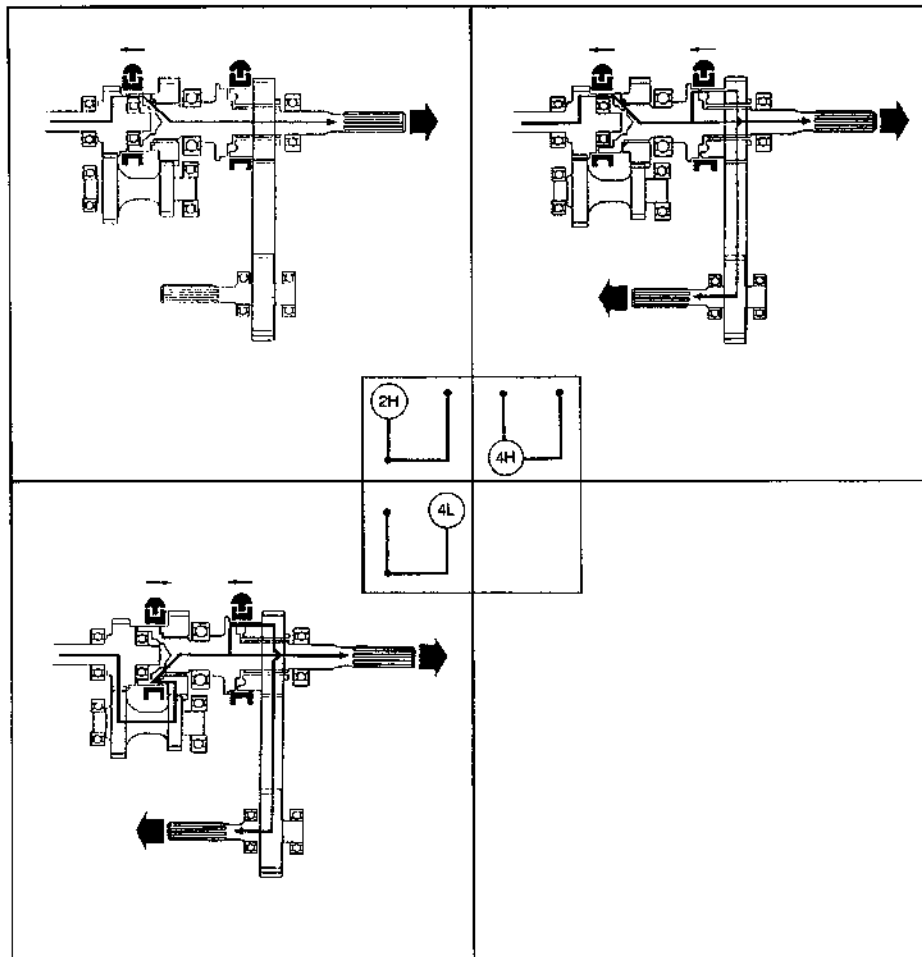
TRANSMISSION & TRANSFER

TRANSFER (PART TIME)

TRANSFER POWER TRANSMITTING MECHANISM

When the transfer shift lever is shifted into the 2H position, the power from the transmission output shaft is transmitted to the rear wheels through the transfer output rear shaft. Furthermore, when the transfer shift lever is shifted into the 4H position, the shift is made into the transfer front drive gear. Then, the power is transmitted to the transfer output front shaft through the transfer front drive chain, finally driving the front and rear wheels.

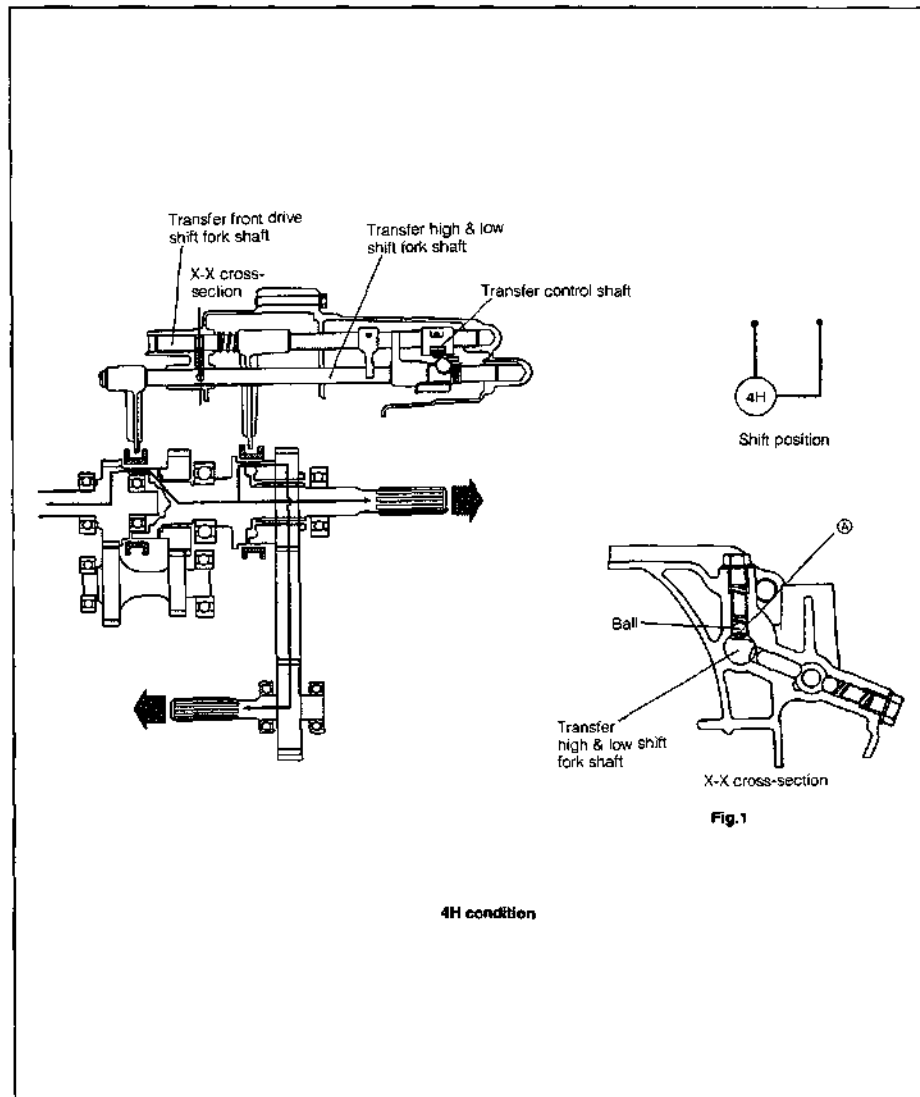
When the transfer shift lever is placed in the 4L position, the shift is made into the transfer low speed input gear. Then, the power is transmitted in the following sequence; the transfer countergear, transfer output rear shaft, transfer front drive chain and transfer output front shaft. Finally, the power drives the front and rear wheels.



WFE9C-TR002

TRANSFER SHIFT & SELECT MECHANISM**4H→2H**

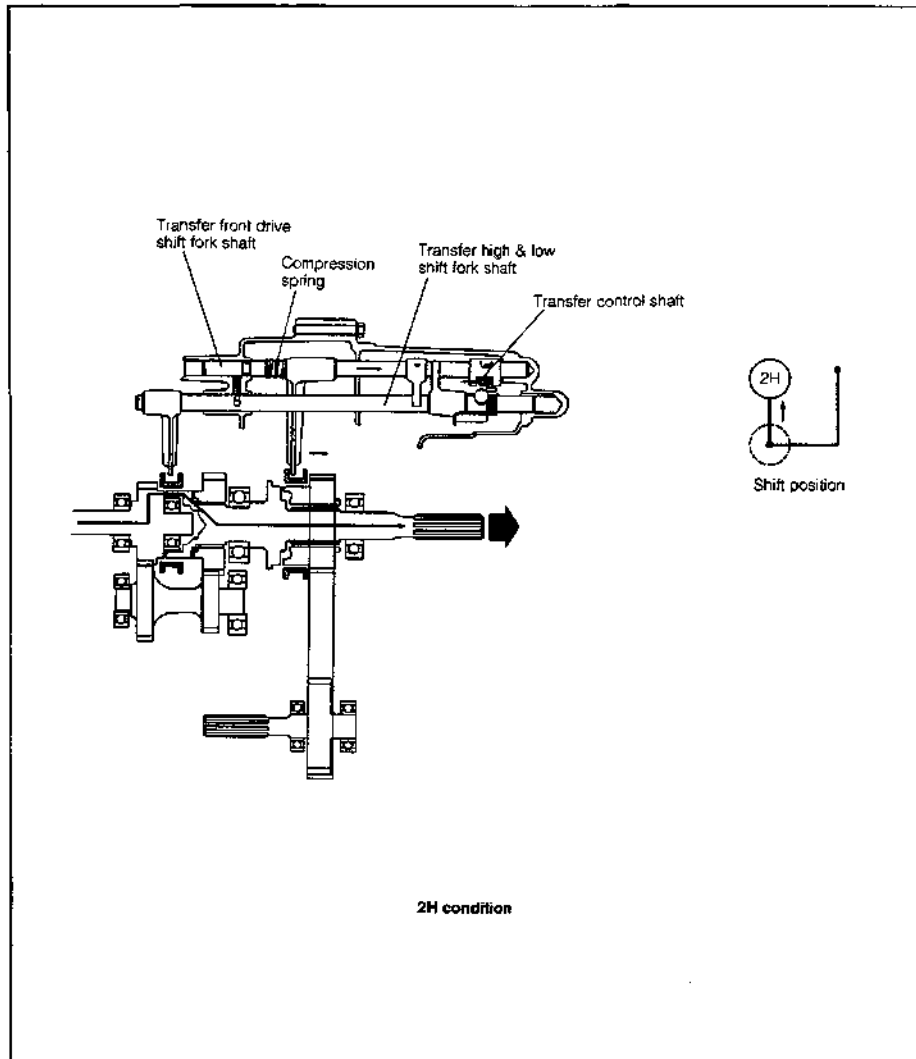
1. The transfer high & low shift fork shaft is pressed by a ball indicated in Fig. 1. Since this ball engagement is so deep that the center of the ball nearly reaches the outer contour of the transfer high & low shift fork shaft as shown by ④ in the figure below, the transfer high & low shift fork shaft is in a locked state.



WFE90-77003

TRANSMISSION & TRANSFER

2. When the transfer control shaft is shifted from the 4H position to the 2H position, the transfer front drive shift fork shaft alone moves to the right, for the transfer high & low shift fork shaft is locked by the ball. If there is any difference in rotating torque between the front wheel and the rear wheel at this time, a wait mechanism (ie: Compression spring) functions owing to the resistance by a twisting torque between the front drive clutch hub and the front drive gear. As a result, the front drive shift fork is kept in the 4H condition. When the difference in rotating torque diminishes, the front drive shift fork is returned to the right by a spring tension, thus switching to the 2H condition.

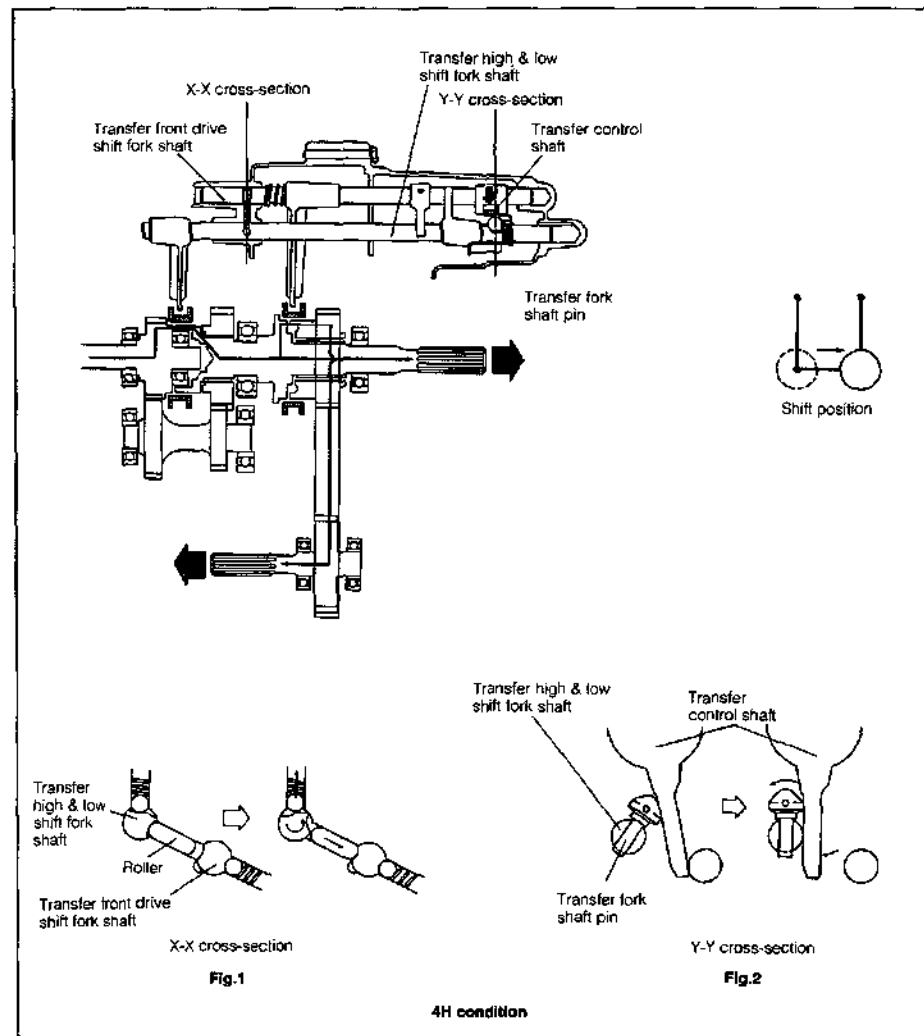


WPERSO-TRO04

TRANSMISSION & TRANSFER

4H→4L

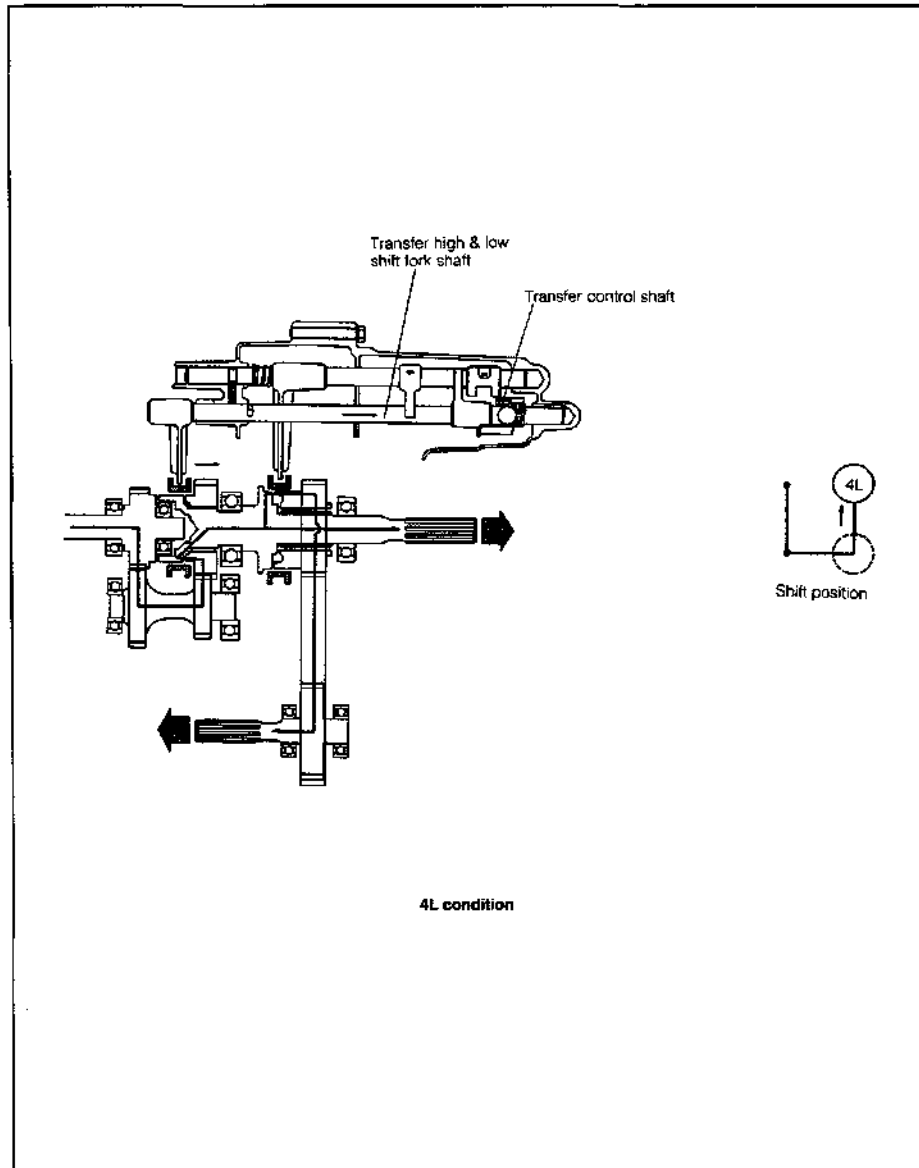
1. When the transfer control shaft is switched from the 4H direction to the 4L direction, the transfer shift lever moves downward. Thus, the transfer fork shaft pin is erected almost vertically as shown in Fig. 2 below. Inasmuch as the transfer fork shaft pin is secured to the transfer high & low shift fork shaft, the transfer fork shaft pin is erected almost vertically. Consequently, the transfer high & low shift fork shaft turns to the left, as shown in Fig. 1 below. Simultaneously the roller moves and fits into the groove of the transfer front drive fork shaft. As a result, the transfer front drive shift fork shaft is brought into a locked state.



WE80-TR006

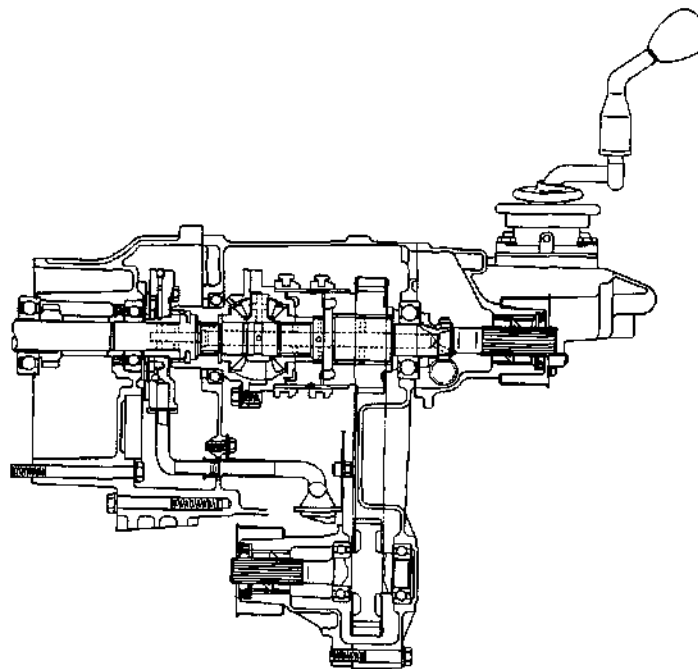
TRANSMISSION & TRANSFER

2. When the transfer control shaft is shifted to the 4L direction, the transfer high & low shift fork shaft alone moves to the right, thereby attaining the 4L condition.



TRANSFER (Full-time)**GENERAL**

A full-time 4WD vehicle has been introduced in which a differential (center differential) is provided on the transfer rear output shaft in the transfer. This center differential absorbs any difference in rotation between the front wheels and the rear wheels which may occur while turning under the 4WD mode or which may be generated due to the difference in friction between the front tires and the rear tires.



Full-time 4WD

WFEKO-TR007

TRANSMISSION & TRANSFER

TRANSFER (For full-time 4WD vehicle)

1. Gear specifications

Unit Nomenclature	Gear Nomenclature		Gear type	Number of teeth
Transfer (Full-time 4WD)	Differential side gear		Straight bevel gear	16
	Differential pinion		Straight bevel gear	10
	Sprocket	Drive gear	Spur gear	33
		Driven gear	Spur gear	33

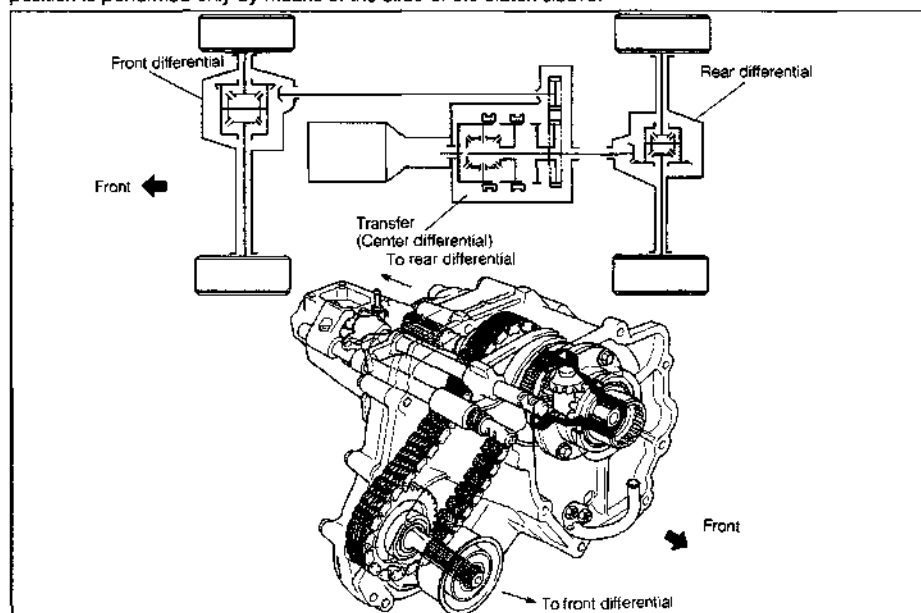
2. Speedometer gear specifications

Item		Type of engine
Speedometer	Number of drive gear teeth (Identification)	6
	Number of driven gear teeth (Identification)	24

WPE80-TR006

Power train system

The switching between the free position and the center differential lock position is performed by means of the clutch sleeve which is slid in a fore-&-aft direction by the shift fork. Moreover, the clutch section employs a dog type. Consequently, the switching between the center differential lock position and the free position is performed only by means of the slide of the clutch sleeve.

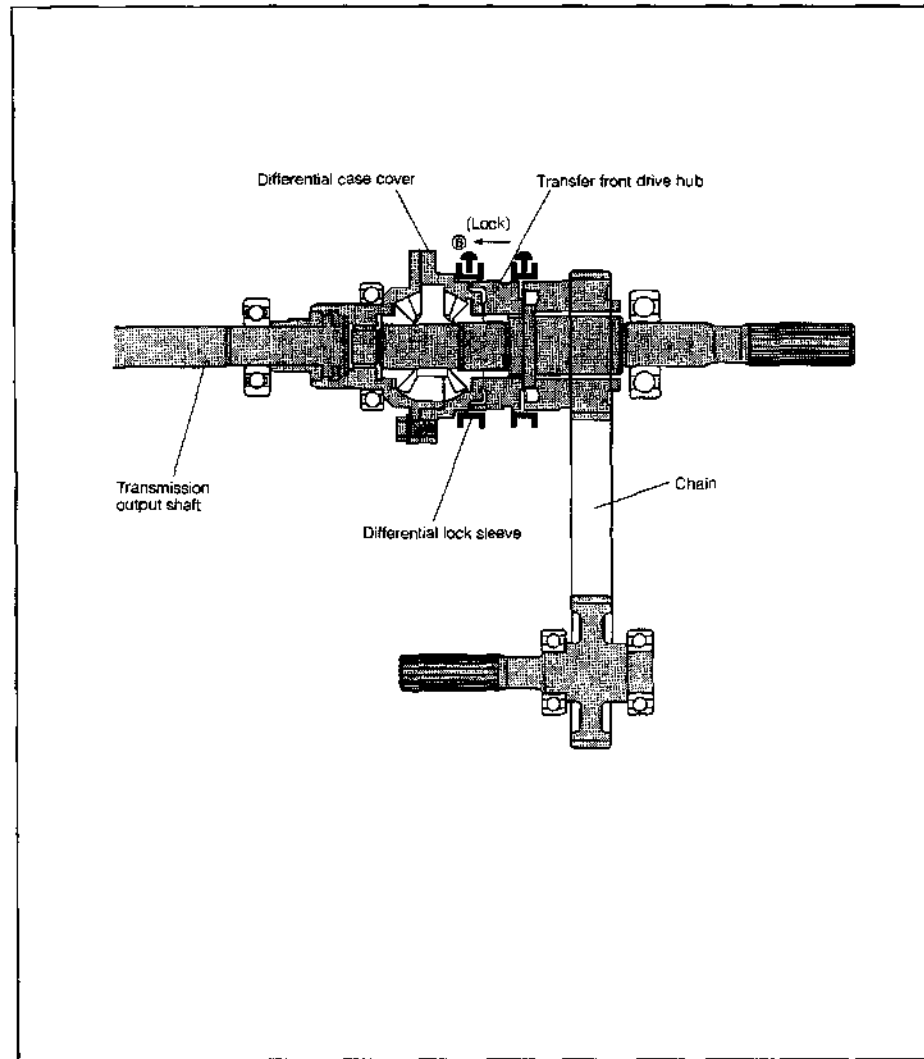


WPE80-TR006

Power transmitting route

1. When center differential is locked:

When the transfer shift lever is shifted into the "CENTER DIFF LOCK" position, the differential lock sleeve moves to the lock position ⑧. Consequently, the differential case cover is combined with the transfer front drive hub, thereby eliminating the differential function of the center differential. As a result, the power from the transmission output shaft is distributed evenly to the front and rear wheels under any condition. (This condition is the same as the 4WD running period of the part-time 4WD vehicle.)



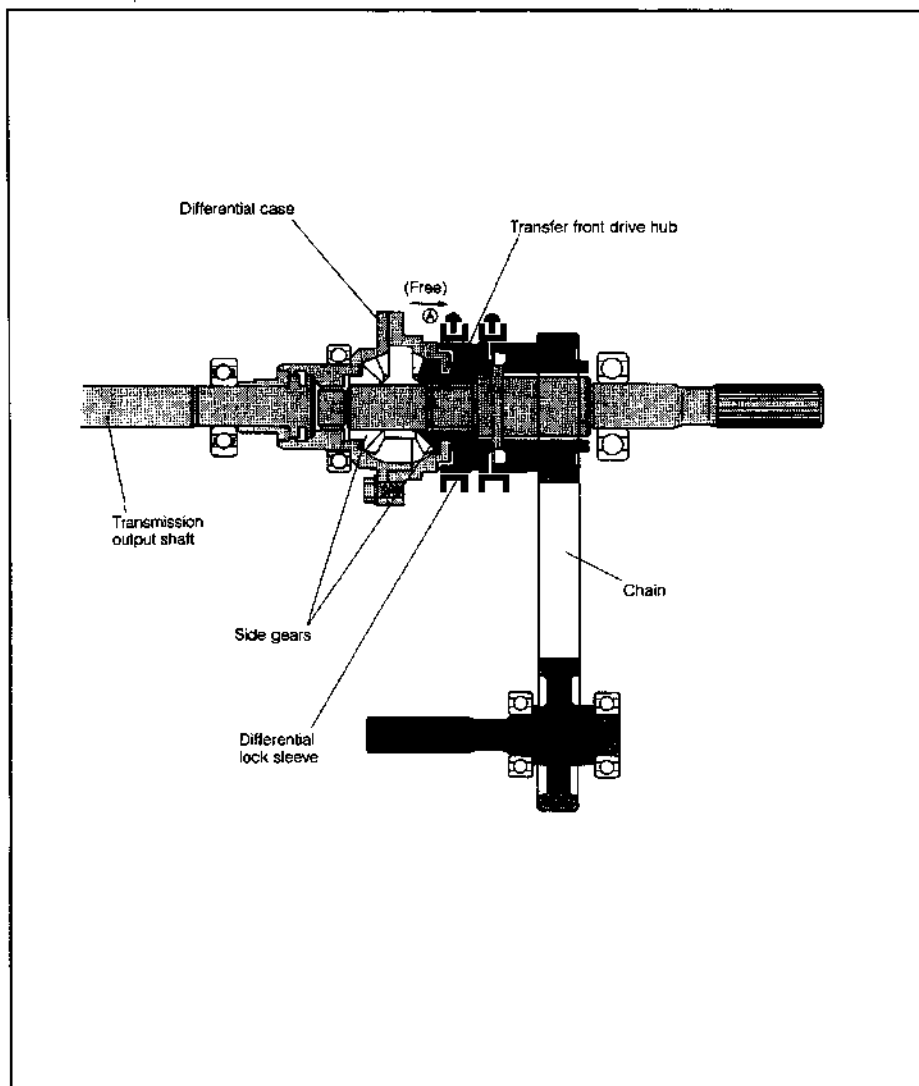
WFE90-TR010

TRANSMISSION & TRANSFER

2. When center differential is free:

When the transfer shift lever is shifted into the "FULLTIME" position, the power from the transmission output shaft is transmitted to the rear wheels in the same way as the center differential locked state.

However, since the differential lock sleeve moves to the free position (A), the differential case is disengaged from the transfer front drive hub. As a result, the differential function of the center differential becomes operative.



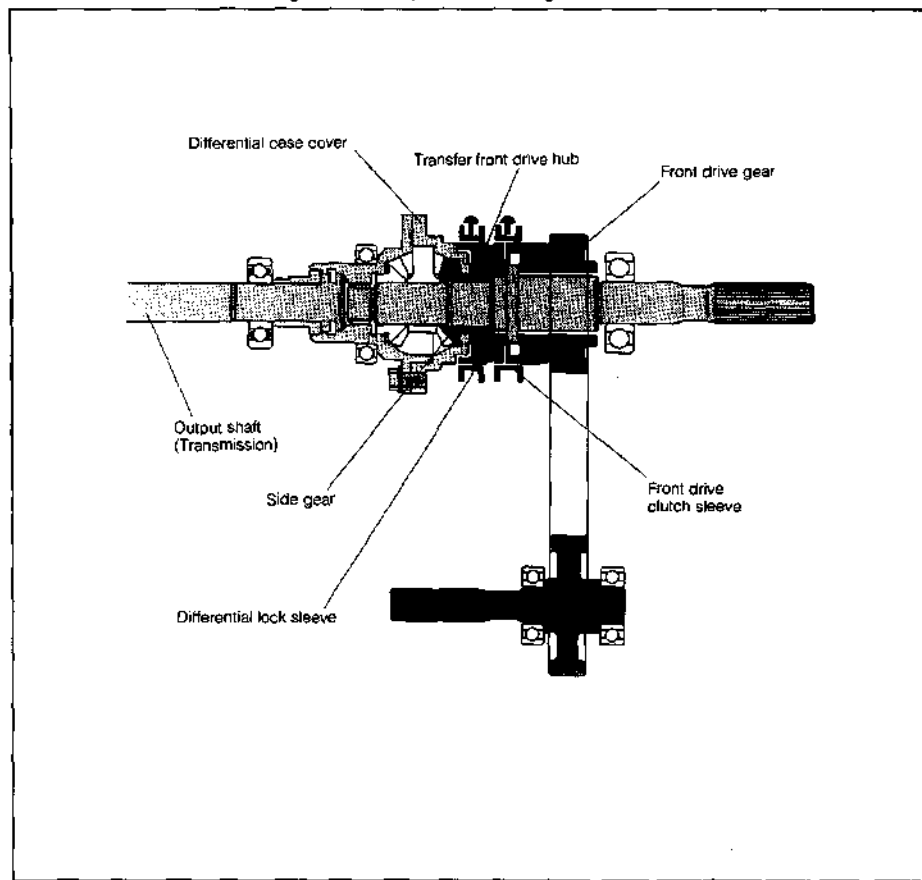
WPB90-TR011

CONSTRUCTION**1. Center differential**

The construction is the same as that of the hitherto- employed differential. The center differential is spline-connected to the output shaft of the transmission through the transfer input hub. These components transmit the driving power of the transmission output shaft to the center differential. Moreover, the transfer output shaft is spline- connected to the side gear in the center differential indicated at the left side of the figure below. Therefore, the driving power is transmitted to the rear wheels. The side gear indicated at the right side of the figure below is spline-connected to the transfer front drive hub. The driving power from the side gear is transmitted to the front drive gear by the front drive clutch sleeve. Consequently, the driving power is transmitted to the front wheels.

(1) Function of center differential

When the center differential operates in the free state as indicated in the figure below, the center differential section absorbs any difference in rotation between the front wheels and the rear wheels while the vehicle is turning. As a result, smooth running is assured.

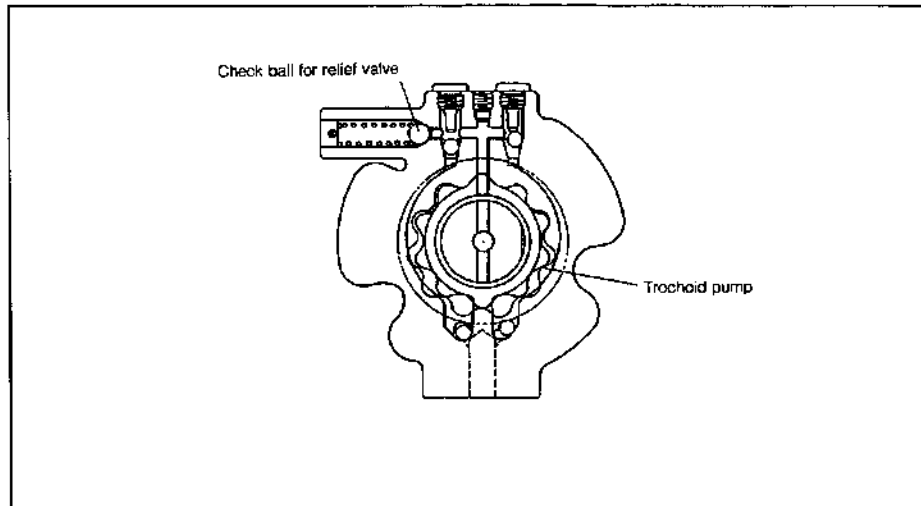


WFE90-TR012

TRANSMISSION & TRANSFER

2. Transfer oil pump body subassembly

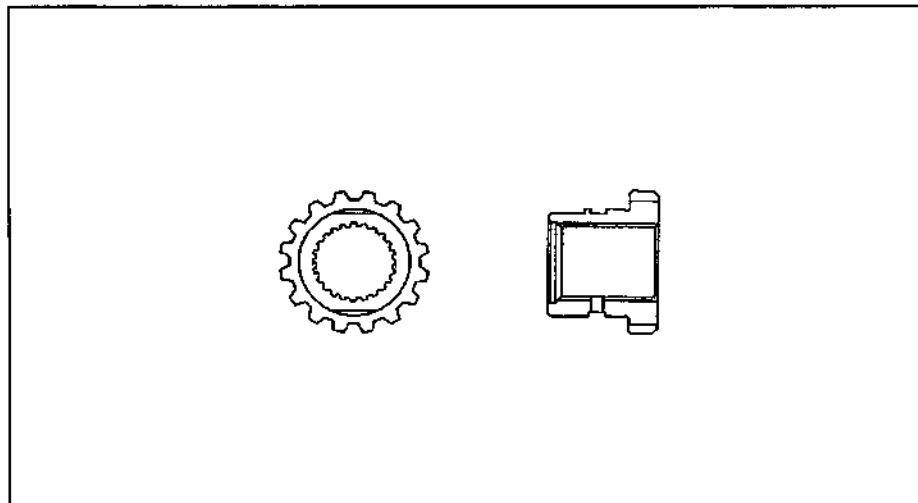
The transfer oil pump body subassembly is installed to the transmission output rear shaft. The transfer oil pump body subassembly forcibly lubricates each of the differential gear section, needle roller bearing and rear output bush.



WPES0-TR013

3. Transfer input hub

The transfer input hub is provided to transmit the driving power from the transmission output rear shaft to the center differential. The transfer input hub is spline-connected to the transmission output rear shaft and differential case.

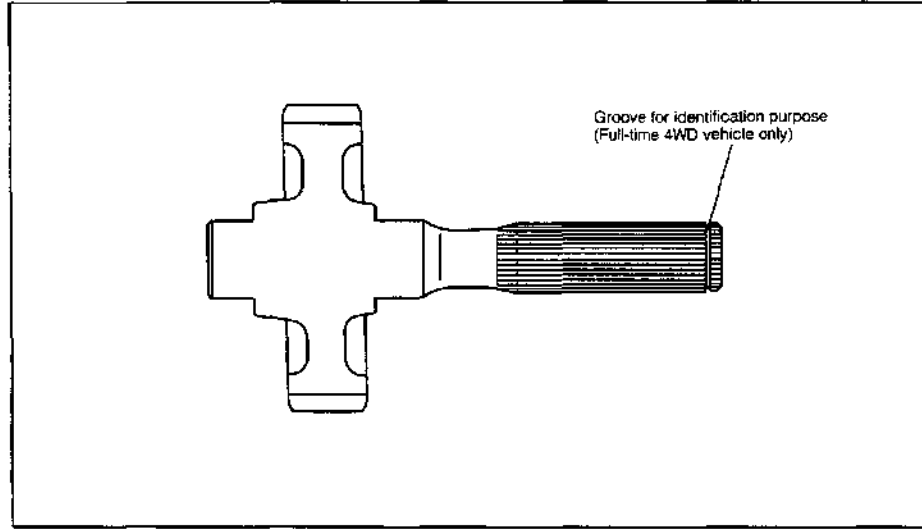


WPES0-TR014

TRANSMISSION & TRANSFER

4. Transfer output front shaft

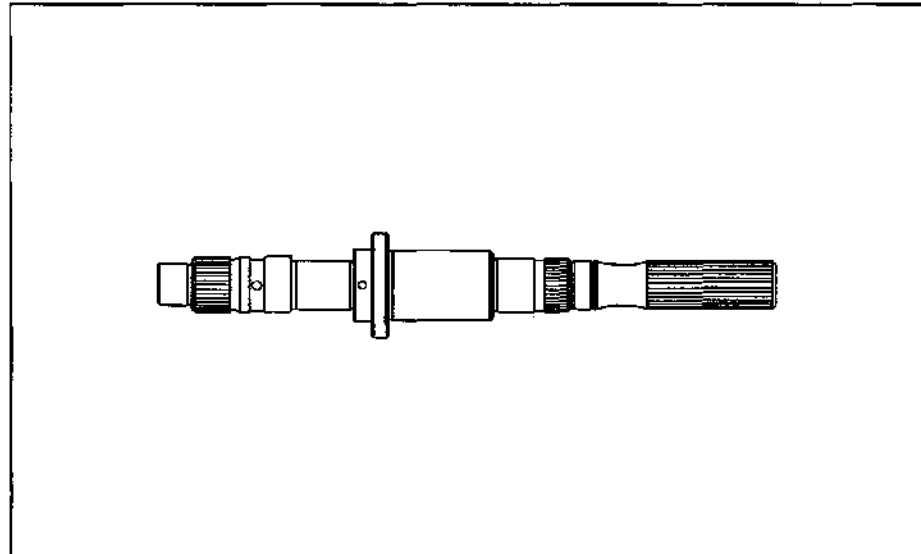
The shape of the tooth is different from that for the part-time 4WD vehicle. A groove is provided at the shaft section for the purpose of distinguishing this part from that for the part-time 4WD vehicle.



WPB90-TR015

5. Transfer output rear shaft

The shape is different from that for the part-time 4WD vehicle.



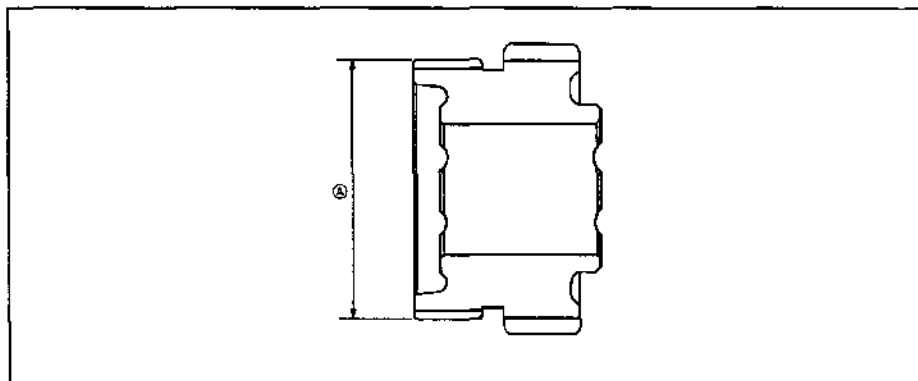
WPB90-TR016

TRANSMISSION & TRANSFER

6. Transfer front drive gear

The shape of the tooth is different from that for the part-time 4WD vehicle.

As for the tooth profile, the transfer front drive gear employs a spur gear. The transfer front drive gear comes in three kinds because of installation requirements.



WFE80-TR017

Transfer front drive gear specifications

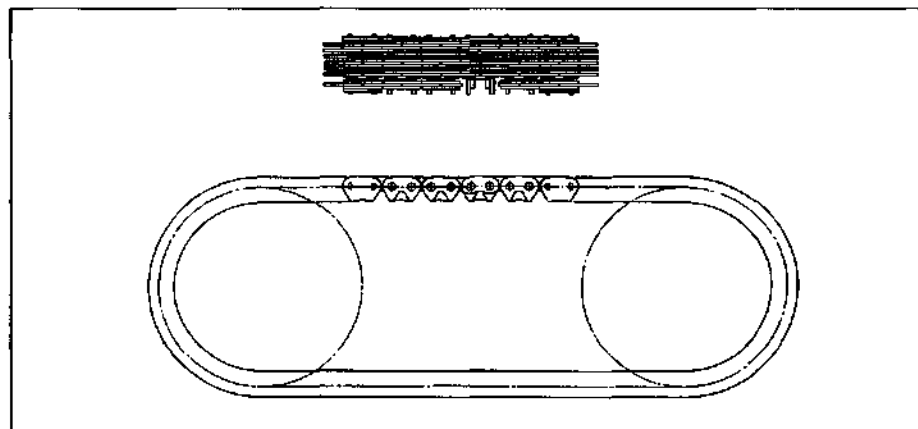
Unit: mm

Dimension ①	Classification
87.28 - 87.34	2
87.18 - 87.24	1
87.08 - 87.14	3

WFE80-TR018

7. Transfer front drive chain

The transfer front drive chain adopts a random chain for the full-time 4WD vehicle.

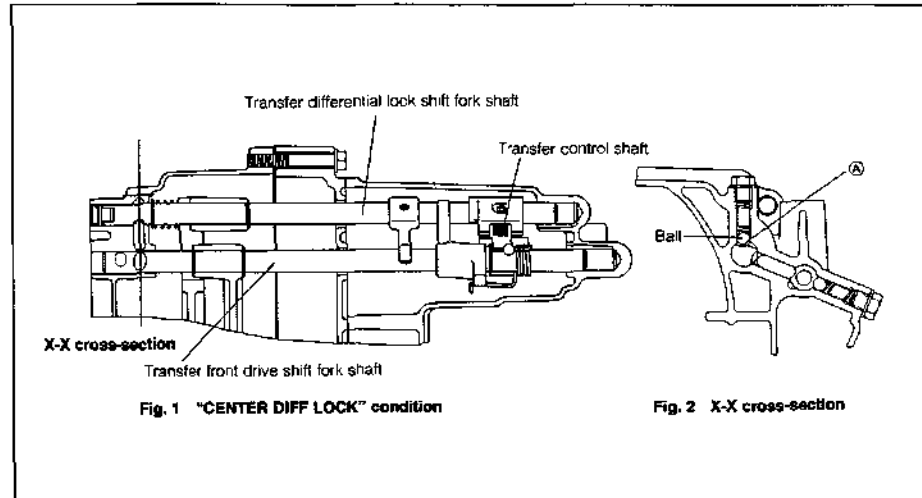


WFE80-TR019

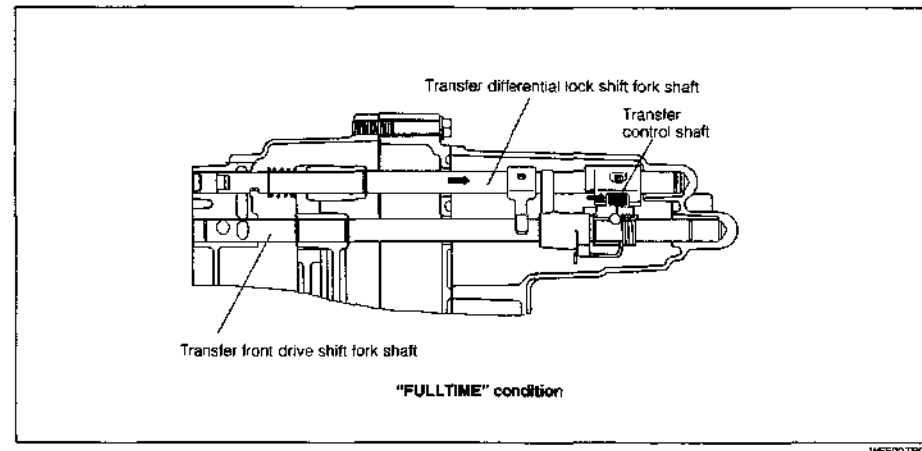
SHIFT & SELECT MECHANISM

1. When shifting from "CENTER DIFF LOCK" to "FULLTIME":

The ball in Fig. 2 is pressed by the spring and it is held down to the groove (j) in the figure below) of the transfer front drive shift fork shaft. Consequently, the transfer front drive shift fork shaft is locked.



When the transfer control shaft is shifted from the "CENTER DIFF LOCK" position to the "FULLTIME" position, the transfer front drive shift fork shaft is locked by the ball. Thus, the differential lock shift fork shaft alone moves to the right. At this time, if there is any difference in rotating torque between the front wheels and the rear wheels, the wait mechanism functions between the transfer front drive hub and the differential case owing to the twisting torque resistance. As a result, the transfer differential lock shift fork is held in the "CENTER DIFF LOCK" state. When the difference in rotating torque diminishes, the transfer differential lock shift fork returns to the right by a spring tension, thus switching to the "FULLTIME" condition.



TRANSMISSION & TRANSFER

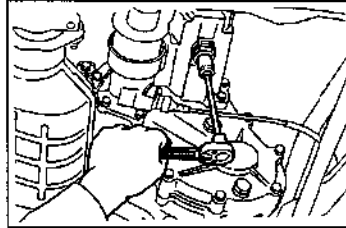
Switching transfer from 4WD to 2WD during towing

It becomes necessary to switch the full-time 4WD vehicle to the 2WD condition when the vehicle is towed or it is placed on the rollers of a speedometer tester during speedometer check or the like.

On the full-time 4WD Rocky, it is possible to switch it to the 2WD condition, following the procedure given below. (However, this procedure is described for the switching at the time of towing or vehicle inspections. Therefore, never drive the vehicle always under the 2WD mode.)

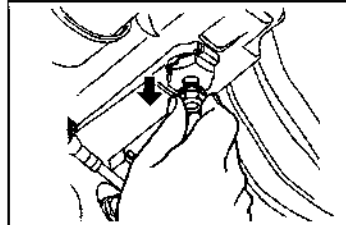
WFE90-TR022

1. Procedure for switching from 4WD to 2WD
 - (1) Jack up the vehicle.
 - (2) Loosen the bolt located at the lower section of the retainer in the right figure.



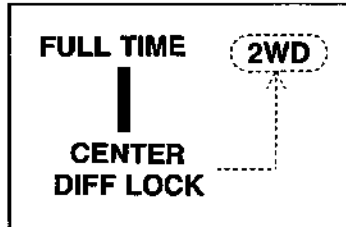
WFE90-TR023

- (3) Pull down the bolt which was loosened in the step (2) as far as it will go, as indicated in the right figure.



WFE90-TR024

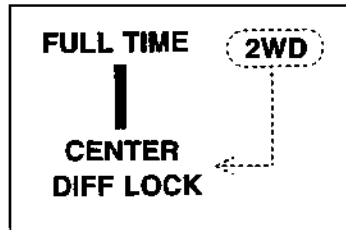
- (4) Operate the transfer control lever as indicated in the right figure so as to switch to the 2WD condition.



WFE90-TR025

2. Procedure for switching from 2WD to 4WD
 - Switch the transfer control lever to the "DIFF LOCK" position. Tighten the bolt.

Tightening Torque: 29.4 - 44.1 N·m (3.0 - 4.5 kgf·m)

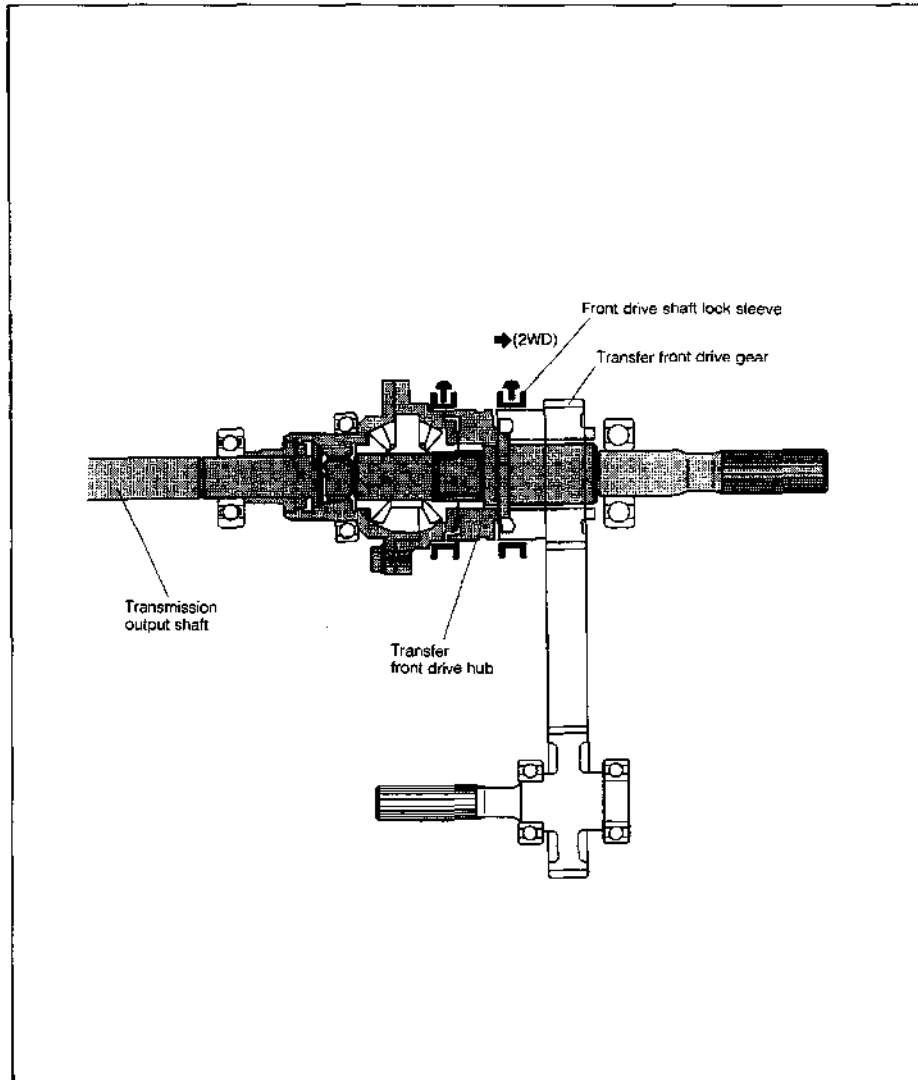


WFE90-TR026

TRANSMISSION & TRANSFER

Power transmitting route during 2WD

When the transfer shift lever is shifted to the 2WD position for the purpose of towing or speedometer check on the rollers of a speedometer tester, the front drive shaft lock sleeve moves to the right. Consequently, the transfer front drive hub is disengaged from the transfer front drive gear. Namely, the power from the manual transmission output shaft is not transmitted to the front wheels, thus switching to the 2WD condition where only the rear wheels are driven.

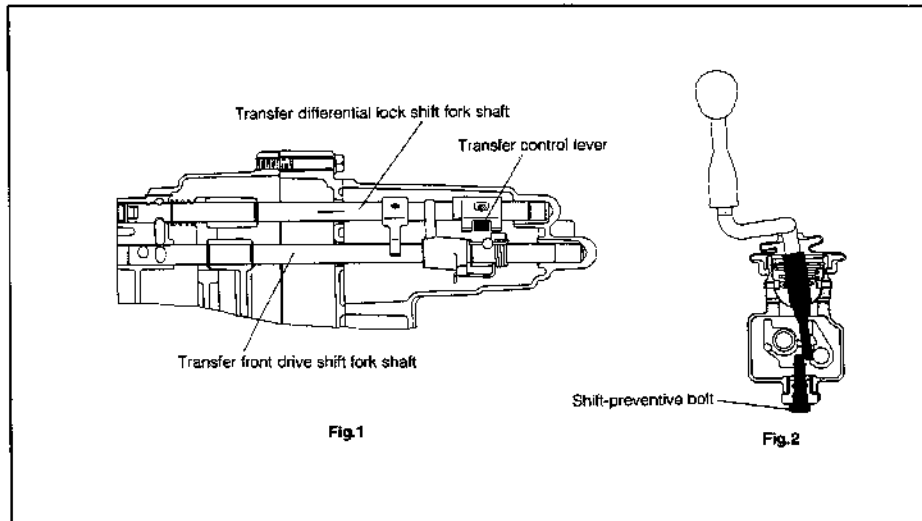


WPBKO-TR027

TRANSMISSION & TRANSFER

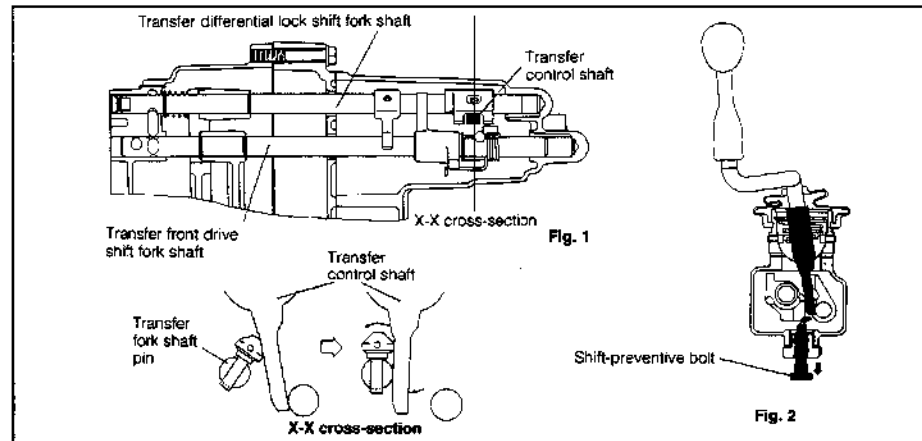
SHIFT & SELECT MECHANISM (during 2WD operation)

Normally, the right-&-left movement of the transfer shift lever is restricted by the shift-preventive bolt as indicated in Fig. 2. Therefore, the transfer shift lever operates the differential lock shift fork shaft only.



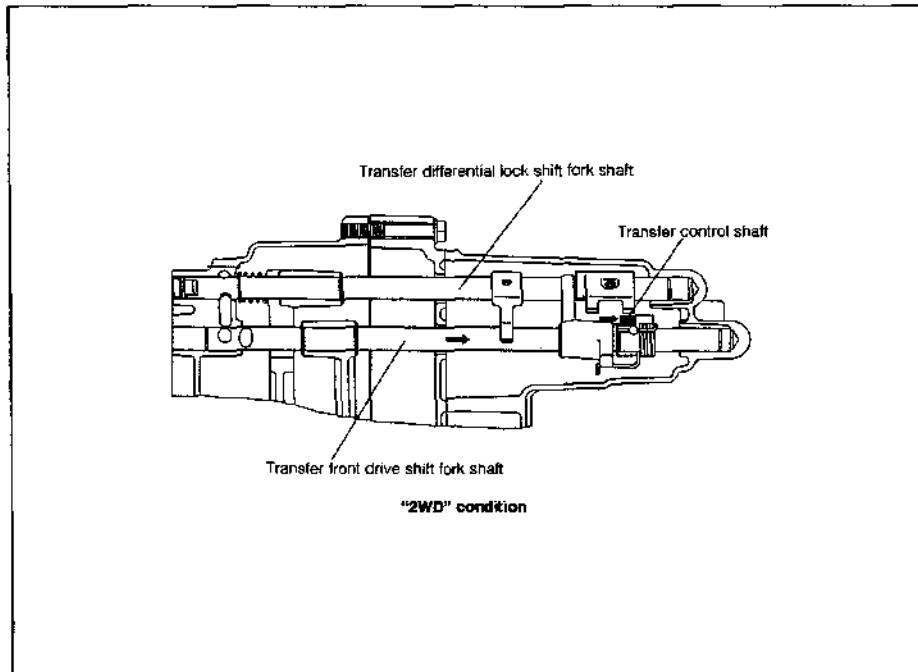
Here, when the shift-preventive bolt is loosened and pulled down as far as it will go, the shift lever can move in a right-&-left direction as indicated in Fig. 2 below.

Moreover, when the transfer shift lever is shifted as indicated in the figure below, the transfer fork shaft pin secured to the transfer front drive shift fork shaft erects almost vertically. Consequently, the transfer control shaft turns to the left, as indicated in Fig. 1 below. Simultaneously, the roller moves and fits into the groove of the differential lock shift fork shaft. As a result, the differential lock shift fork shaft is brought into a locked state.



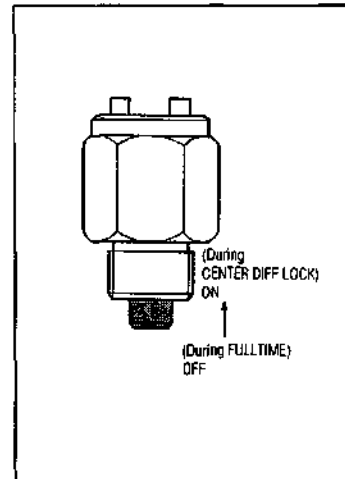
TRANSMISSION & TRANSFER

When the transfer control shaft is shifted as indicated in the figure below, the transfer front drive shift fork shaft alone moves to the right, thus switching to the 2WD condition.



Position Switch

The switch is turned "ON" when the differential lock shift fork shaft is moved from the "FULLTIME" side to the "CENTER DIFF LOCK" side.

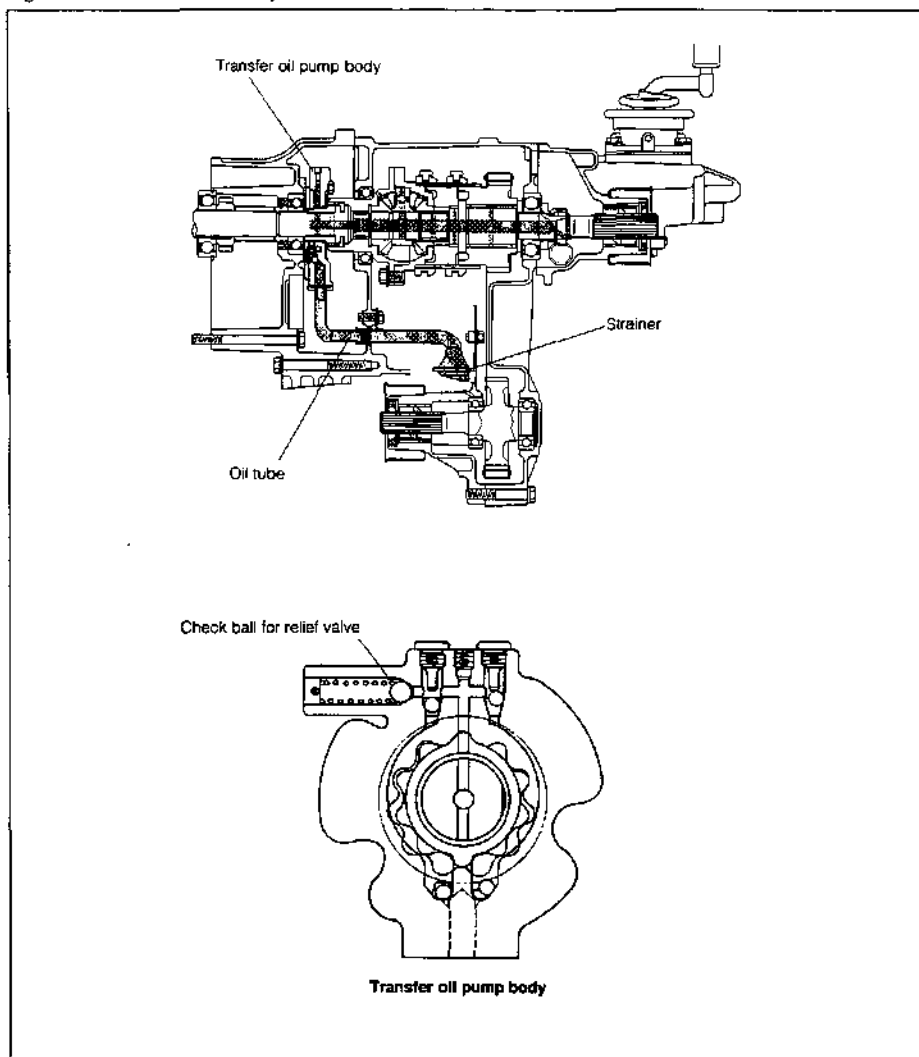


TRANSMISSION & TRANSFER

LUBRICATING MECHANISM

The trochoid type oil pump driven by the transmission output shaft forcibly lubricates the bearing, center differential, rear output bush and so forth of the transfer equipped with the center differential (for the full-time 4WD vehicle).

The lubrication of the oil pump is performed as follows: The oil is filtered by a strainer and sucked through the oil tube by the pump. Then, the oil is distributed to lubricate each section after its pressure has been regulated to a constant level by a relief valve.



WPE80-TR002

FILLING PORT OF TRANSFER OIL

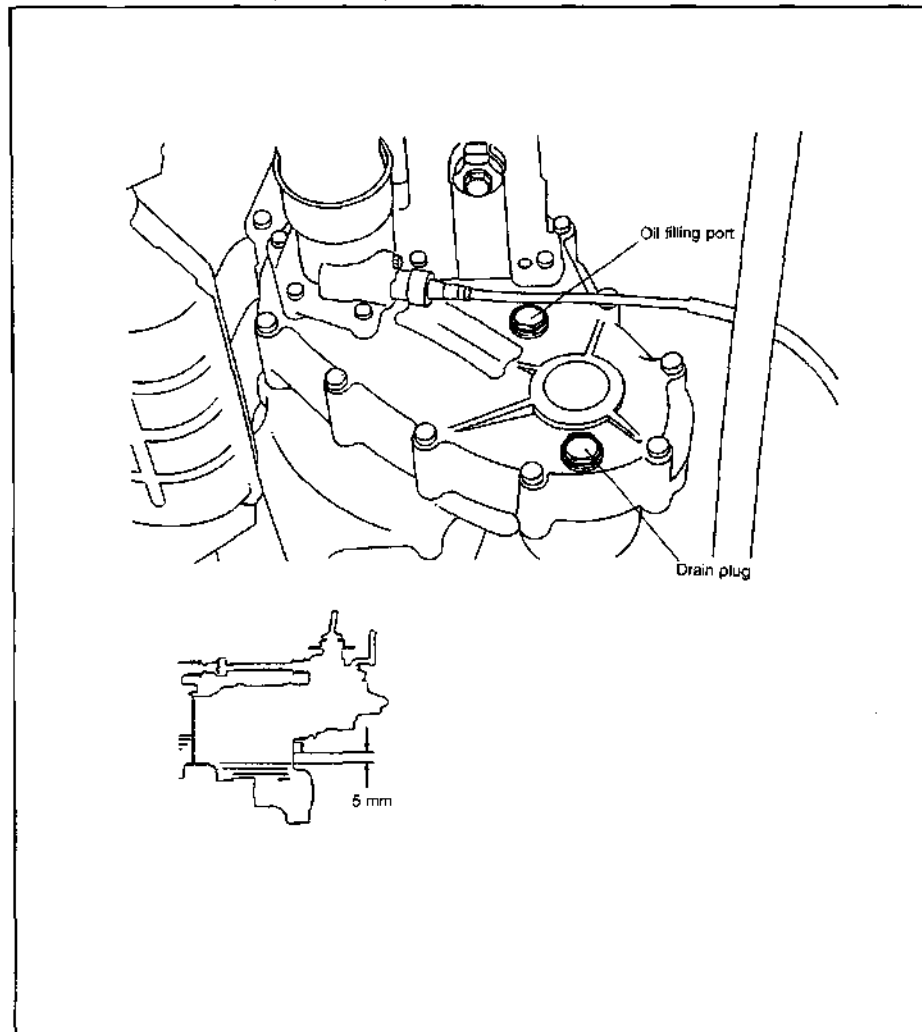
The oil filling port is provided at the lower side of the rear output retainer.

When changing the oil, drain the oil from the drain plug located at the lower/back side of the transfer. Fill oil from the oil filling port up to the following level.

Transfer oil to be used

Anmix super transmission gear oil multi SAE75W-85
(equivalent to API classification GL-3)

Oil amount: 1.7 L (total amount)



WFE90-TRG33

TRANSMISSION & TRANSFER

Transmission and transfer gear ratio specifications

[]: General specification

Transmission	Gear ratio	1st gear	3.752
		2nd gear	2.182
		3rd gear	1.426 [1.529]
		4th gear	1.000
		5th gear	0.865
		Reverse gear	3.942
Transfer	Oil used	Kind	API GL-3 or GL-4 SAE 75W-85 or 75W-90
		Capacity	1.7L
	Gear ratio	High gear	1.000
		Low gear	1.754 (part time only)
	Oil used	Kind	API GL-3 or GL-4 SAE 75W-85 or 75W-90
		Capacity	1.4L

WP600-TR004

Transmission and transfer teeth number

[]: General specification

Transmission	Input shaft gear		23
	Counter gear	Driven gear	34
		1st gear	13
		2nd gear	21
		3rd gear	30 [29]
		5th gear	41
		Reverse gear	12
	Output gear	1st gear	33
		2nd gear	31
		3rd gear	29 [30]
		5th gear	24
		Reverse gear	32
	Reverse idle gear		23
Transfer	Input shaft gear		33
	Counter gear	Driven gear	32
		Low gear	21
	Output shaft gear		38
	Sprocket	Driven gear	33
		Drive gear	33

WP600-TR005

TROUBLE SHOOTING

Symptom	Possible causes	Checking points
Noise emitted from gear Slipping out of gear	Malfunctioning control-related components	Check control-related components.
Abnormal noise from bearing	Bearing seizure, Abnormal wear	Check bearing and gear for seizure.
Hard shifting	Malfunctioning control-related components	Check control-related components.
	Improper contact of synchronizer rings	Check synchronizer rings.

VF690-TR098

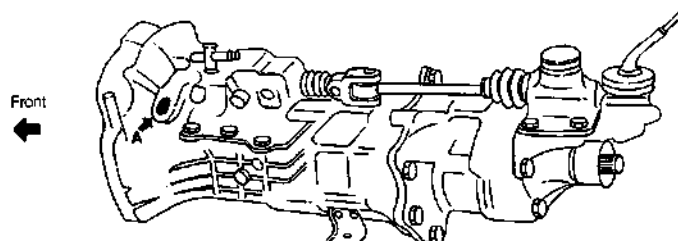
TRANSMISSION & TRANSFER

TRANSMISSION & TRANSFER

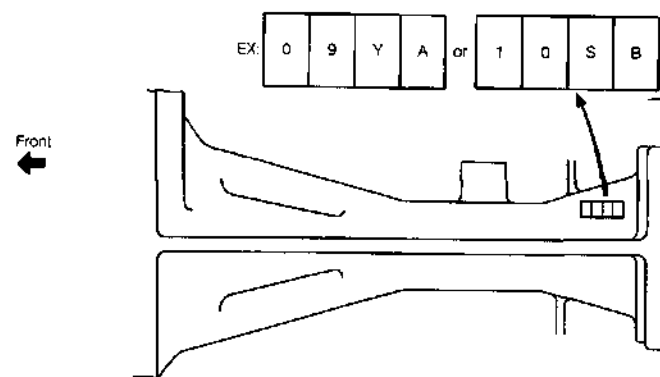
1. The Ferroza models are available with either a full-time transmission with transfer assembly or a part-time transmission with transfer assembly; the latter being used only in conventional models. The coating colors for identification between the full-time transmission with transfer assembly and the part-time transmission with transfer assembly are as follows:

A: Identification marking position

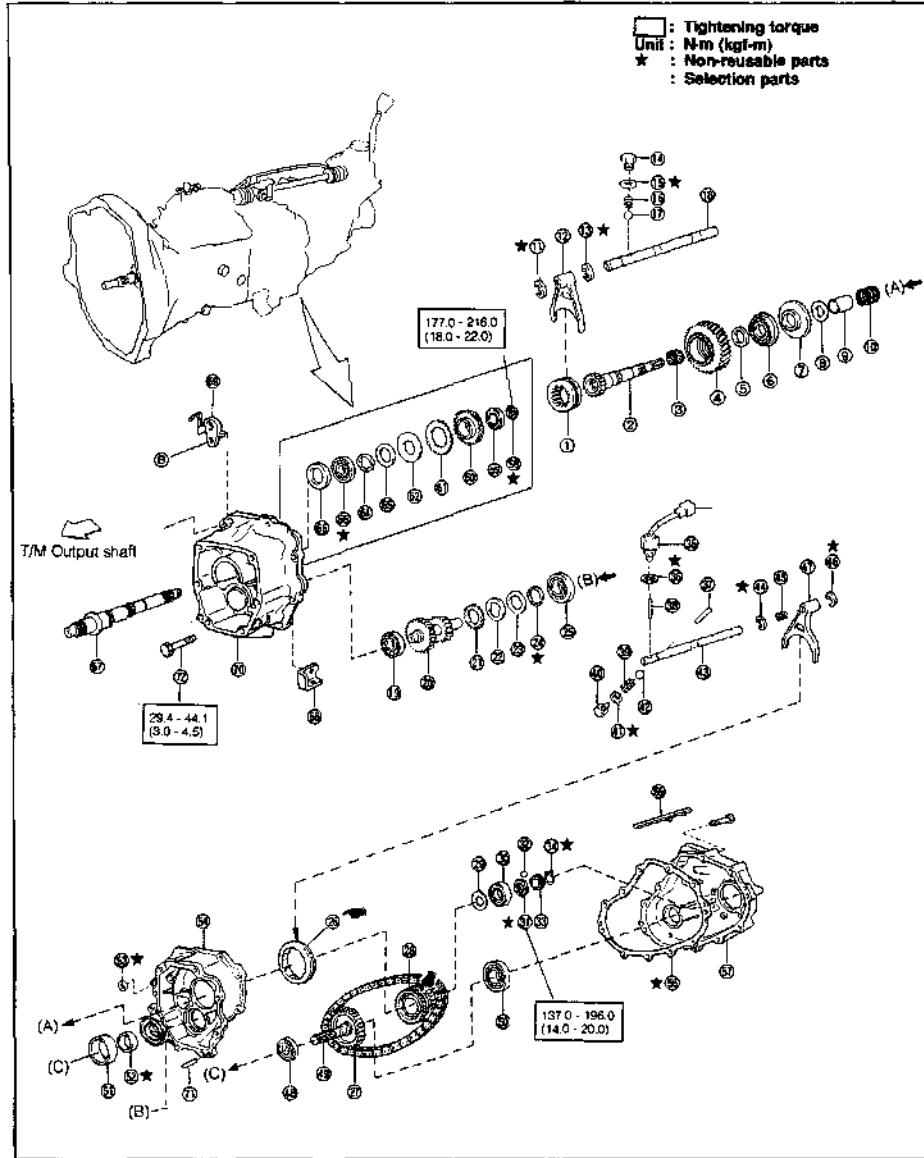
A	European	Australian	General
Part time	Blue	←	Pink
Full time	White	←	←



B: Lot number inscription position



**TRANSFER (PART TIME)
COMPONENTS**



WPE90-TR058

TRANSMISSION & TRANSFER

- | | |
|--|---|
| ① Transfer high & low clutch sleeve | ②③ Roller |
| ② Transfer output rear shaft | ④ Spring |
| ③ Needle roller bearing | ⑤ Bolt |
| ④ Transfer low speed output gear | ⑥ Gasket |
| ⑤ Transfer output gear thrust washer | ⑦ Ball |
| ⑥ Radial ball bearing | ⑧ Transfer front drive shift fork shaft |
| ⑦ Front drive clutch hub | ⑨ "E" ring |
| ⑧ Transfer output shaft spacer No. 2 | ⑩ Spring |
| ⑨ Transfer front drive gear bearing inner race | ⑪ "E" ring |
| ⑩ Needle roller bearing | ⑫ Transfer front drive shift fork |
| ⑪ "E" ring | ⑬ Radial ball bearing |
| ⑫ Transfer high & low shift fork | ⑭ Transfer output front shaft |
| ⑬ "E" ring | ⑮ Radial ball bearing |
| ⑭ Bolt | ⑯ Extension housing dust deflector |
| ⑮ Gasket | ⑰ Oil seal |
| ⑯ Spring | ⑱ Tight plug |
| ⑰ Ball | ⑲ Transfer front case subassembly |
| ⑱ Transfer high & low shift fork shaft | ⑳ Transfer oil supply pipe |
| ⑲ Radial ball bearing | ㉑ Transfer case gasket |
| ⑳ Transfer counter gear | ㉒ Transfer rear case |
| ㉑ Sub-gear No. 2 | ㉓ Lock nut |
| ㉒ Washer plate | ㉔ Bearing |
| ㉓ Conical spring washer | ㉕ Transfer low speed input gear |
| ㉔ Snap ring | ㉖ Sub-gear No. 1 |
| ㉕ Radial ball bearing | ㉗ Washer plate |
| ㉖ Transfer front drive gear sleeve | ㉘ Conical spring washer |
| ㉗ Transfer front drive chain | ㉙ Snap ring |
| ㉘ Transfer front drive gear | ㉚ Radial ball bearing |
| ㉙ Transfer output gear thrust washer | ㉛ Oil seal |
| ㉚ Radial ball bearing | ㉜ Transmission output shaft |
| ㉛ Lock nut | ㉝ Exhaust pipe support bracket |
| ㉜ Ball | ㉞ Engine hanger |
| ㉝ Speedometer drive gear | ㉟ Transfer adapter subassembly |
| ㉞ Snap ring | ㊱ Straight pin |
| ㉟ Transmission position detecting switch | ㊲ Hexagon bolt |
| ㊱ Gasket | |

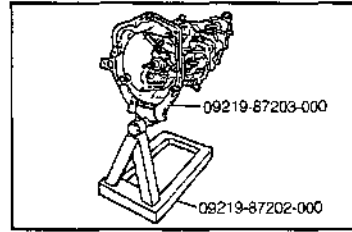
WPED0-TRC39

TRANSMISSION & TRANSFER

TRANSFER REMOVAL

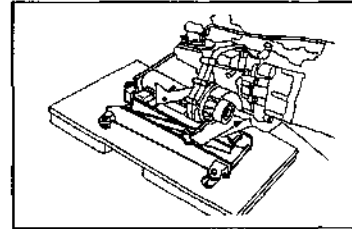
1. Install the transmission with transfer on the overhaul stand, using the following SSTs.

SST: 09219-87202-000
09219-87203-000



WFES0-TR040

2. Place a wooden plate(s) or any other suitable materials on the overhauling stand, as shown in the diagram at right.
3. Support the transfer front case and transfer rear case with a transmission jack.

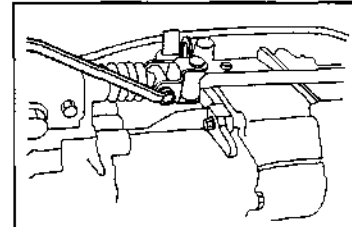


WFES0-TR041

4. Remove the control shaft with installed the shift lever retainer subassembly by removing the hexagon bolt.

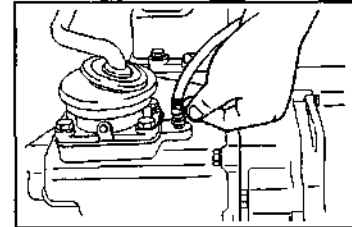
NOTE:

- ◆ When disconnecting the control shaft from the shift & select No. 1 shaft, care must be exercised as to the "O" ring which may be detached during the removal.



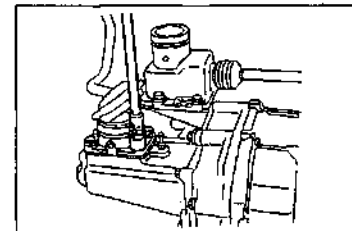
WFES0-TR042

5. Remove the breather hose by detaching a clip.



WFES0-TR043

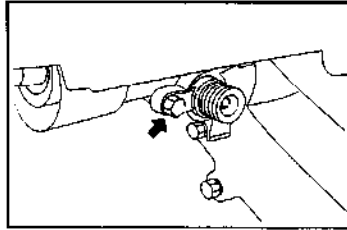
6. Remove the transfer shift lever retainer and gasket by removing the four bolts.
(As for the disassembly/assembly and inspection for the removed parts, see page TR-59.)



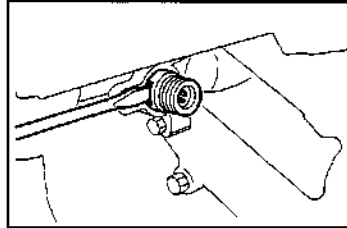
WFES0-TR044

TRANSMISSION & TRANSFER

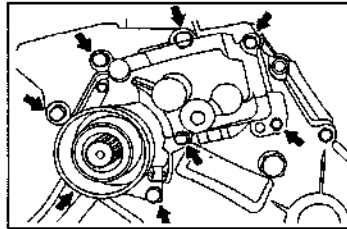
7. Remove the speedometer sleeve lock plate by removing the bolt.



8. Remove the speedometer sleeve, using the standard tool of flat driver arrow to remove the speedometer sleeve.



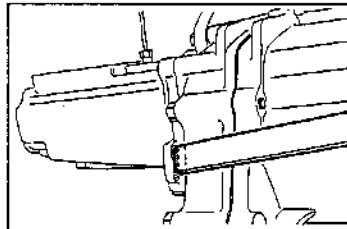
9. Removal of transfer output shaft bearing retainer
(1) Remove the eight bolts.



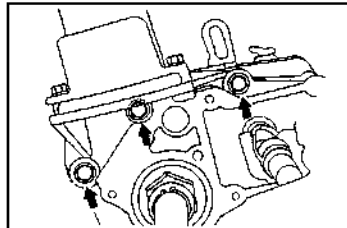
- (2) Remove the transfer output shaft bearing retainer by tapping the both right and left ribs section, using the wooden bar with plastic hammer lightly.
(3) Remove the gasket.

NOTE:

- Never reuse the removed gasket.



10. Remove the control shaft lower No. 1 bracket with installed the shift & select shaft and control shaft by removing the two hexagon bolts and the bolt.

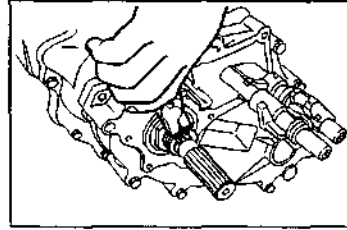


TRANSMISSION & TRANSFER

11. Detach the snap ring. Remove the speedometer driven gear and ball.

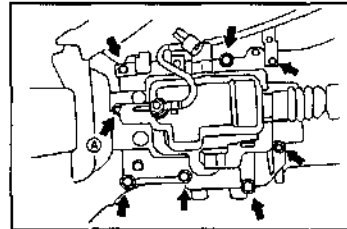
NOTE:

- Never reuse the removed snap ring.



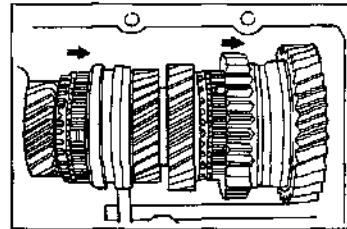
WPB90-TR060

12. Remove the transmission case cover subassembly by removing the seven bolts and the reamer bolt (A).



WPB90-TR061

13. Interlock the 1st gear and the 3rd gear.



WPB90-TR062

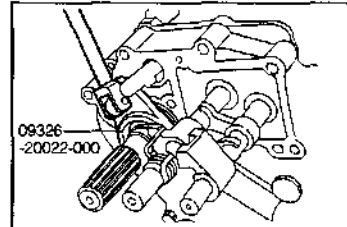
14. Raise the lock section of the lock nut.

15. Remove the lock nut from the transfer output rear shaft, using the following SST.

SST: 09326-20022-000

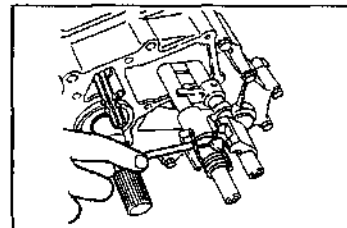
NOTE

- Never reuse the removed lock nut.



WPB90-TR063

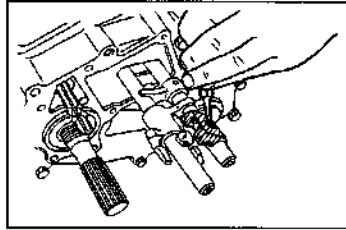
16. Remove the torsion bar spring, using the standard tool of flat driver.



WPB90-TR064

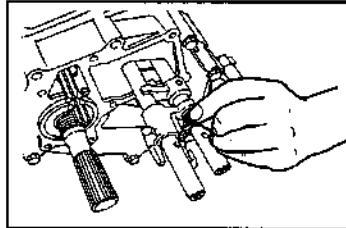
TRANSMISSION & TRANSFER

17. Drive out the slotted pin of the transfer front drive shift head.
Remove the transfer front drive shift head.



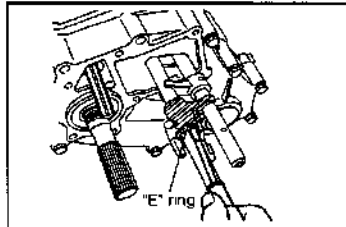
WPERS-TR055

18. Remove the transfer fork shaft pin.



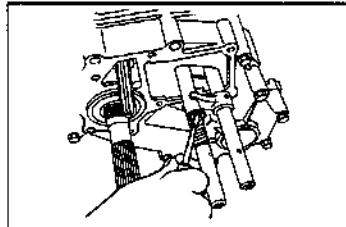
WPERS-TR056

19. Remove the "E" ring. Remove the transfer high & low shift head.



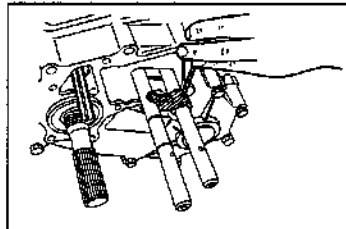
WPERS-TR057

20. Remove the "E" ring.



WPERS-TR058

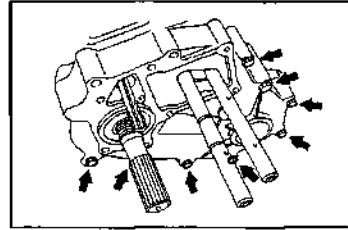
21. Drive out the slotted pin of the transfer front drive shift head No. 2. Remove the transfer front drive shift head No. 2.



WPERS-TR059

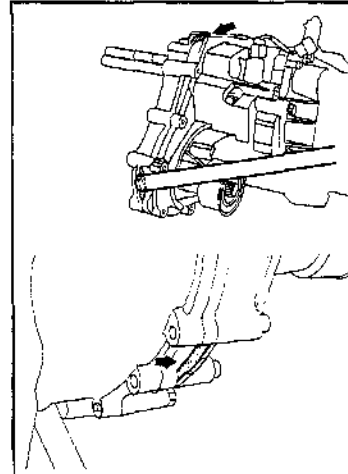
TRANSMISSION & TRANSFER

22. Remove the transfer rear case by removing the eight bolts.



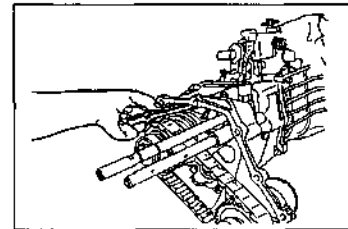
WPERSO-TR060

23. Remove the transfer rear case by lightly tapping the ribs section using the wooden bar with plastic hammer.



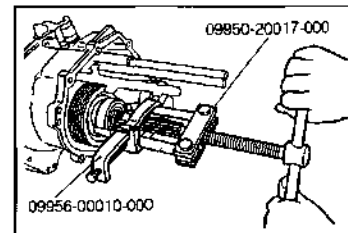
WPERSO-TR061

24. Remove the gasket and transfer oil supply pipe.



WPERSO-TR062

25. Remove the bearing, using the following SSTs.
SST: 09950-20017-000
SST: 09956-00010-000



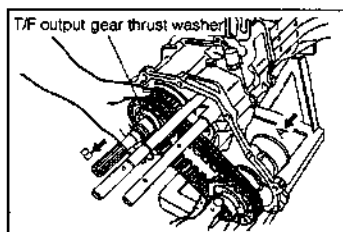
WPERSO-TR063

TRANSMISSION & TRANSFER

26. Remove the transfer output gear thrust washer.
27. Remove the transfer front drive chain and transfer output gear together with the transfer output front shaft.

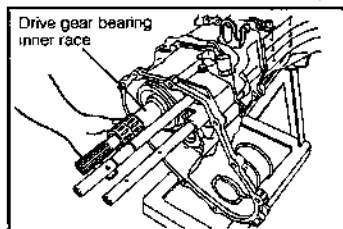
NOTE:

- Lightly tapping the transfer front shaft A with a plastic hammer.
- Pull out the transfer output rear shaft and transfer front shaft with installed the transfer front drive chain toward you B.



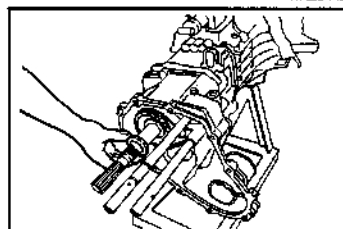
WP800-TR064

28. Remove the needle roller bearing and transfer front drive gear bearing inner race.



WP800-TR065

29. Remove the transfer output gear thrust washer.

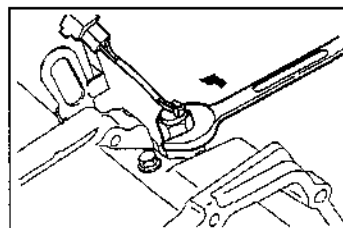


WP800-TR066

30. Remove the transmission position detect switch and gasket.

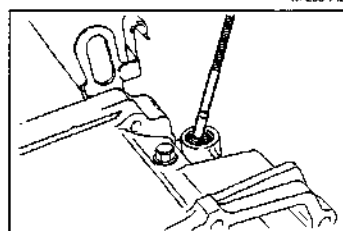
NOTE:

- Never reuse the removed gasket.



WP800-TR067

31. Remove the roller, using the standard tool of magnet hand.



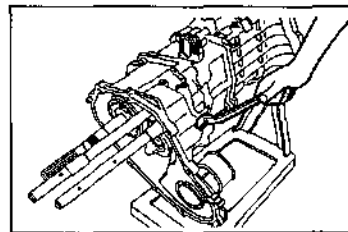
WP800-TR068

TRANSMISSION & TRANSFER

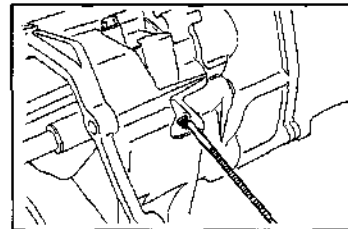
32. Remove the lock bolt of the transfer front drive shift fork shaft and gasket.

NOTE:

- Never reuse the removed gasket.



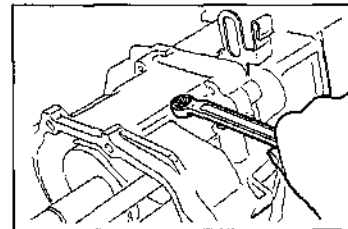
33. Remove the compression spring and ball, using the standard tool of magnet hand.



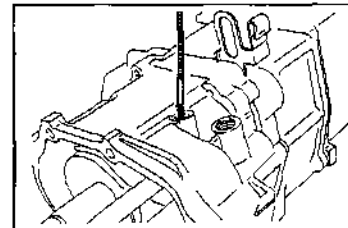
34. Remove the lock bolt of the transfer high & low shift fork shaft and gasket.

NOTE:

- Never reuse the removed gasket.

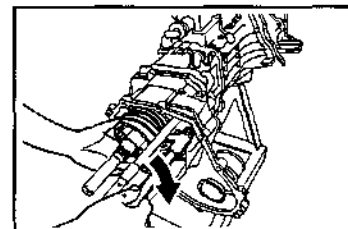


35. Remove the compression spring and ball, using the standard tool of magnet hand.



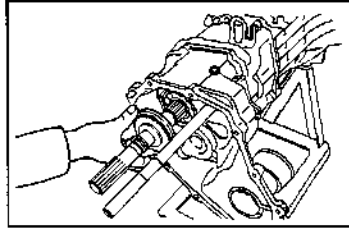
36. Turn the transfer front drive shift fork shaft 180 degree and then, remove the following parts in a set.

- Transfer front drive gear sleeve
- Transfer front drive shift fork
- Transfer front drive shift fork shaft
- Needle roller bearing
- Transfer front drive gear bearing inner race



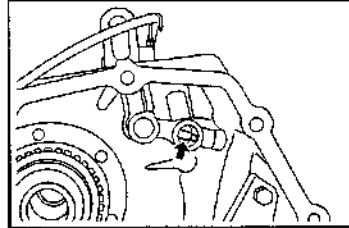
TRANSMISSION & TRANSFER

37. Remove the transfer front drive clutch hub and transfer output shaft spacer.
(As for the inspection for the removed parts, see page TR-41.)



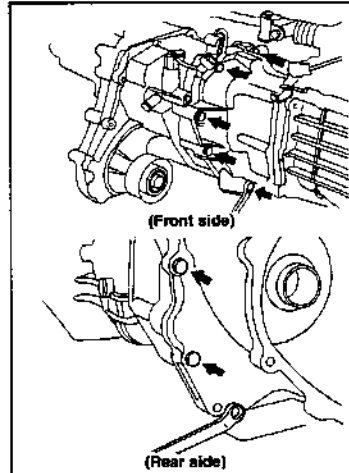
WF80-TR074

38. Remove the roller, using the common tool of magnet hand.



WF80-TR075

39. Remove the transfer front case by removing the seven bolts.

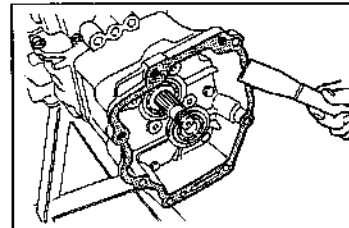


WF80-TR076

40. Remove the gasket on the transfer adapter, using the gasket scraper.

NOTE:

- Be very careful not to scratch the attaching surface.



WF80-TR077

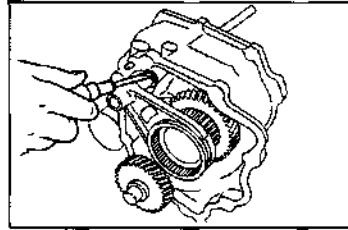
TRANSMISSION & TRANSFER

41. Remove the two "E" rings at the front and rear that retain the transfer high & low shift fork in the thrust direction.

NOTE:

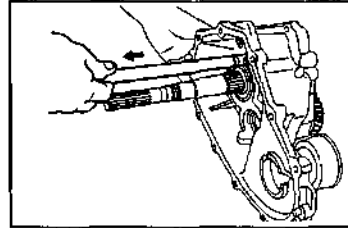
- Never reuse the removed "E" rings.

42. Remove the transfer high & low shift fork.



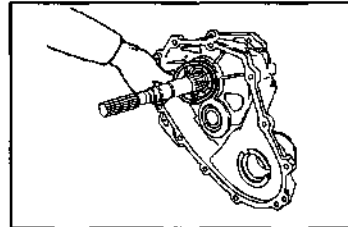
WF590-TR078

43. Pull out the transfer high & low shift fork shaft toward you.



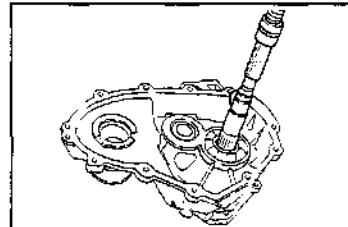
WF590-TR079

44. Detach the stop ring of the transfer output rear shaft bearing.



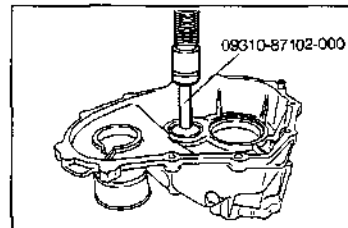
WF590-TR080

45. Remove the transfer output rear shaft, using a press.



WF590-TR081

46. Press the transfer counter shaft, using the following SST.
SST: 09310-87102-000



WF590-TR082

TRANSMISSION & TRANSFER

47. Set the disc-shaped plate (C) on the oil seal, using the following SST. Remove the dust deflector.

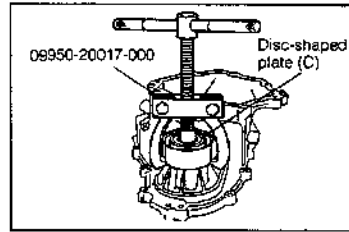
SST: 09950-20017-000

(Disc-shaped plate (C) that is a part of 09950-20017-000)

48. Remove the oil seal with a screwdriver.

CAUTION:

- Never reuse the removed oil seal.



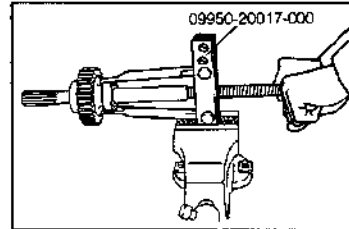
WPB30-TR063

DISASSEMBLY OF TRANSFER OUTPUT FRONT SHAFT

1. Set the following SST in a vice with transfer output front shaft installed.

Remove the bearing at the rear side of the transfer output front shaft, using the following SST.

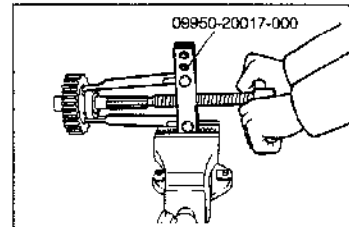
SST: 09950-20017-000



WPB30-TR064

Remove the bearing at the front side of the transfer output front shaft.

SST: 09950-20017-000



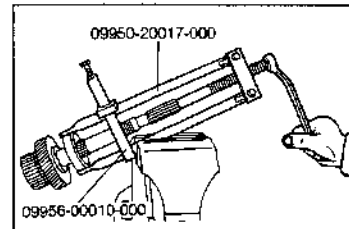
WPB30-TR065

DISASSEMBLY OF TRANSFER OUTPUT REAR SHAFT

1. Remove the bearing from the transfer output rear shaft, using the following SSTs.

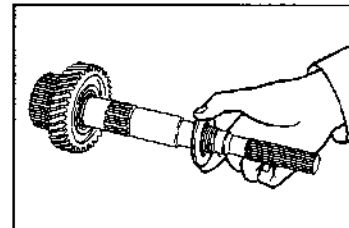
SST: 09950-20017-000

09956-00010-000



WPB30-TR066

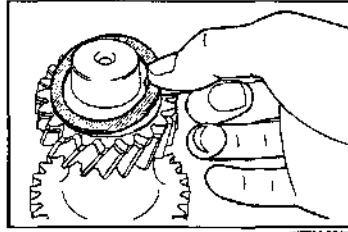
2. Remove the transfer output gear thrust washer from the transfer output rear shaft.



WPB30-TR067

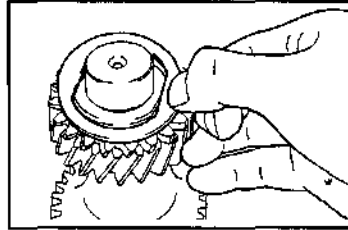
TRANSMISSION & TRANSFER

3. Remove the conical spring washer.



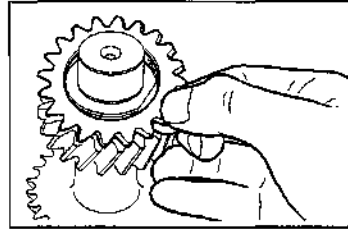
WPES0-TR032

4. Remove the washer plate.



WPES0-TR033

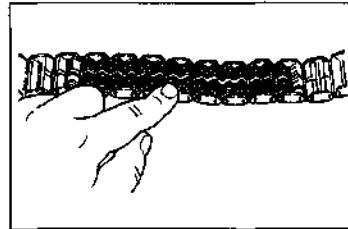
5. Remove the sub gear No. 2.



WPES0-TR034

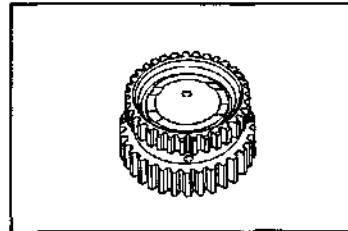
INSPECTION (FRONT DRIVE CHAIN)

1. Check the contacting surface of the transfer front drive chain with each gear for damage.



WPES0-TR035

2. Transfer front drive gear
 - (1) Check the contacting surface of the transfer front drive gear with the transfer front drive chain for damage.



WPES0-TR036

TRANSMISSION & TRANSFER

3. Measure the dimension of the transfer front drive gear and the differential lock sleeve shown in the right figure. Make sure that the clearance (A) between this gear and the differential lock sleeve may conform to the specification.

Specified Value: 0.03 - 0.19 mm

- (1) The outer diameter dimension of the transfer front drive gear has been machined in accordance with the bore dimension of the differential lock sleeve. If either part exceeds the specified value above, be certain to replace them as a set.

CAUTION:

- If either part which has exceeded the specified value should be used against this caution, it would cause slipping-out-of-gear and or emanation of abnormal noise.

- (2) With the differential lock sleeve assembled to the transfer front drive gear, measure the tilt width at the section (B) of the differential lock sleeve.

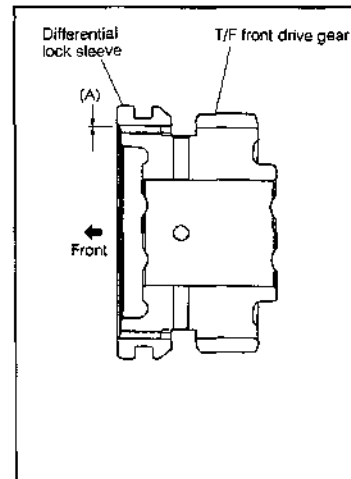
Specified Value: Not to exceed 0.5 mm

NOTE:

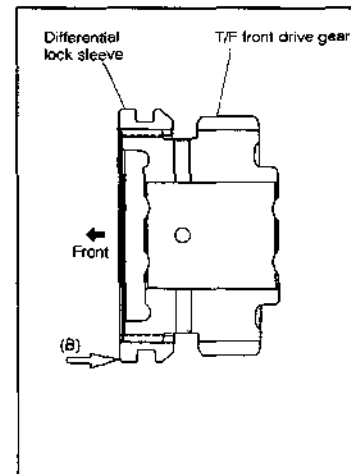
- If the tilt width of the differential lock sleeve exceeds the above specified value, be certain to replace those parts of the transfer front drive gear and differential lock sleeve as a set.

Unit: mm

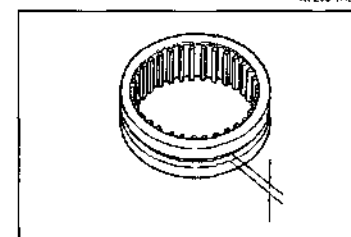
Classification /No.	Bore dimension	Outer dimension
	Differential lock sleeve	T/F front drive gear
2	87.371 - 87.47	87.28 - 87.34
1	87.271 - 87.37	87.18 - 87.24
3	87.17 - 87.27	87.08 - 87.14



WP690-TK087



WP690-TK088



WP690-TR036

INSPECTION

(TRANSFER HIGH & LOW CLUTCH SLEEVE)

1. Using vernier calipers, measure the installation width of the transfer high & low clutch sleeve with the transfer high & low shift fork.

Unit: mm

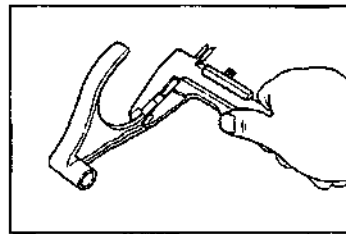
Part name	Item	Specified value	Allowable limit
Transfer high & low clutch sleeve		7.05 - 7.12	7.3

TRANSMISSION & TRANSFER

2. Transfer high & low shift fork

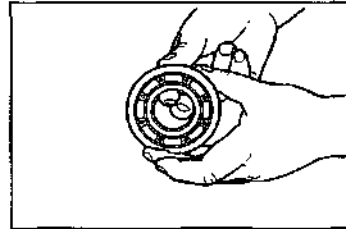
Using vernier calipers, measure the contact width of the transfer high & low shift fork with the transfer high & low sleeve.

Unit: mm		
Part name	Specified value	Allowable limit
Transfer high & low shift fork	6.80 - 7.00	6.3



WPES0-TR100

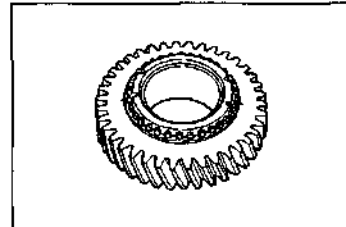
3. Rotate the bearing inner race by applying a force with your finger. Check to see if the bearing inner race rotates smoothly without any binding.



WPES0-TR101

4. Transfer low speed output gear

Check transfer low speed output gear for wear or damage.

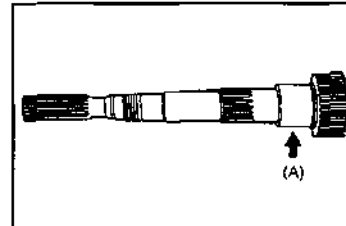


WPES0-TR102

5. Transfer output rear shaft

Measure the (A) section, transfer output rear shaft, using the micrometer.

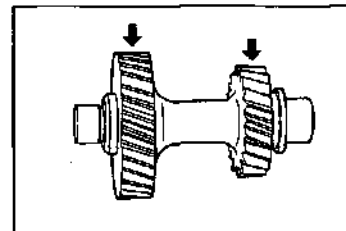
Unit: mm		
Measuring point	Specified value	Allowable limit
Section (A) in right figure	41.975 - 41.991	41.960



WPES0-TR103

6. Transfer counter gear

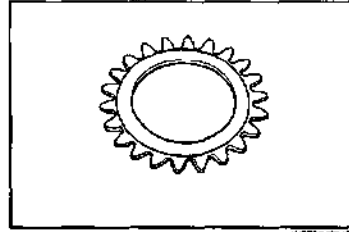
Check transfer counter gear for wear or damage.



WPES0-TR104

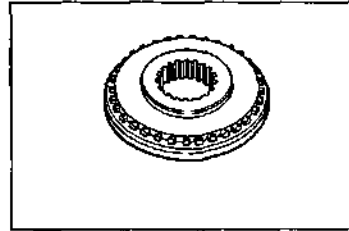
TRANSMISSION & TRANSFER

7. Sub gear No. 2
Check sub gear No. 2 for wear or damage and deformation.



WFBD-TR105

8. Transfer front drive clutch hub
Check transfer front drive clutch hub for damage.

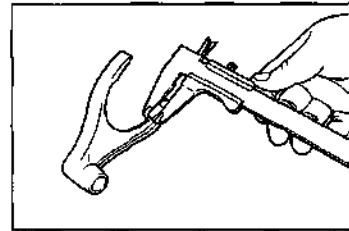


WFBD-TR106

9. Transfer front drive shift fork
Check the contact width transfer front drive shift fork with the transfer front drive gear sleeve.

Unit: mm

Item	Specified value	Allowable limit
Dimension of transfer front drive shift fork, as shown in right figure	6.8 - 6.9	6.3



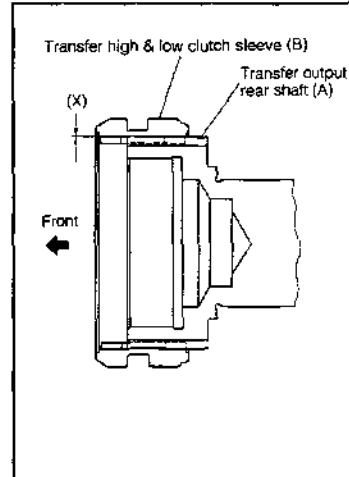
WFBD-TR107

10. Measure the dimension (A) of the transfer output and (B) of the transfer high & low clutch sleeve as shown in the right figure. Make sure that the clearance (X) between this shaft and the sleeve may confirm to the specification.
Specified Value: 0.03 - 0.19 mm

- (1) The outer diameter dimension of the transfer output rear shaft has been machined in accordance with the bore dimension of the transfer high & low clutch sleeve. If either part exceeds the specified value above, be certain to replace them as a set.

CAUTION:

- If either part which has exceed the specified value should be used against this caution, it would cause slipping-out of gear and or emanation of abnormal noise.



WFBD-TR108

TRANSMISSION & TRANSFER

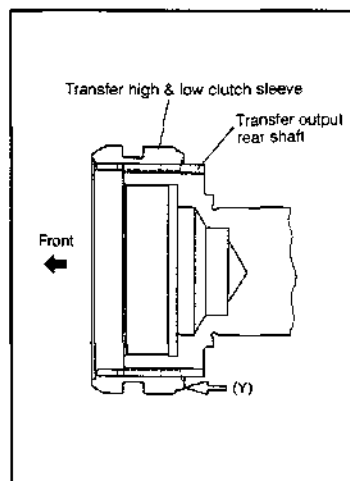
- (2) With the transfer high & low clutch sleeve assembled to the transfer output rear shaft, measure the tilt width at the section (Y) of the transfer high & low clutch sleeve.
Specified Value: Not to exceed 0.5 mm

NOTE:

- If the tilt width of the transfer high & low clutch sleeve exceeds the above specified value, be certain to replace those parts of the transfer output rear shaft and transfer high & low clutch sleeve as a set.

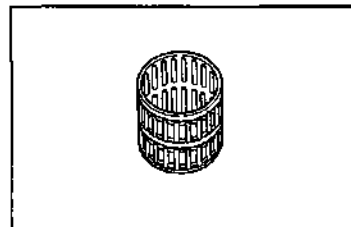
Unit: mm

Classification /No.	Bore dimension	Outer dimension
	T/F high & low clutch sleeve	T/F output rear shaft
2	69.871 - 69.97	69.78 - 69.84
1	69.771 - 69.87	69.68 - 69.74
3	69.67 - 69.77	69.58 - 69.64



WPES0-TR109

11. Needle roller bearing
Check to see if any foreign matter is caught needle roller bearing and that the bearing exhibits any damage.



WPES0-TR110

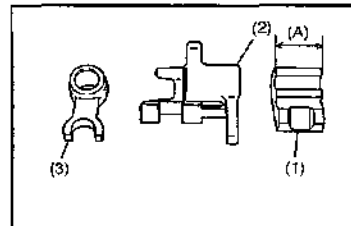
12. Inspection (Transfer shift head-related parts)

(1) Check the following parts for damage.

- (1) Transfer front drive shift head No. 2
- (2) Transfer high & low shift head
- (3) Transfer front drive shift head

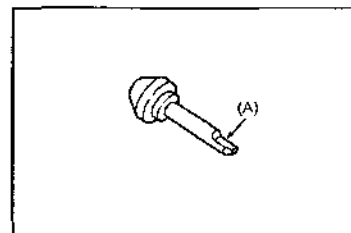
NOTE:

- Do not install the front drive shift head No. 2 for full time, as the (A) section for part time is shorter than full time.



WPES0-TR111

- (2) Check the section (A) of the transfer fork shaft pin shown in the right figure for wear.



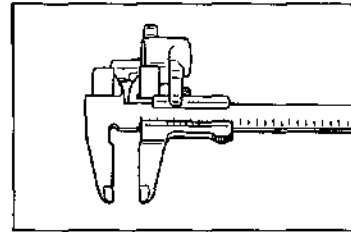
WPES0-TR112

TRANSMISSION & TRANSFER

- (3) Measure the contact width of the transfer high & low shift head with the transfer control shaft, using vernier calipers.

Unit: mm

Part name	Item	Specified value	Allowable limit
Transfer high & low shift head		16.000 - 16.070	16.2

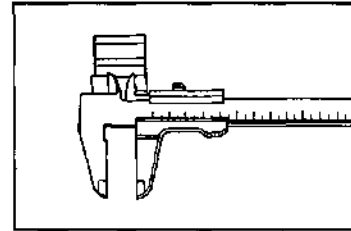


WF80-TR113

- (4) Measure the contact width of the transfer front drive shift head with the transfer control shaft, using vernier caliper.

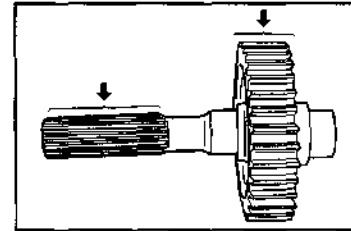
Unit: mm

Part name	Item	Specified value	Allowable limit
Transfer front drive shift head		16.000 - 16.070	16.2



WF80-TR114

13. Transfer output front shaft
Check for wear or damage.

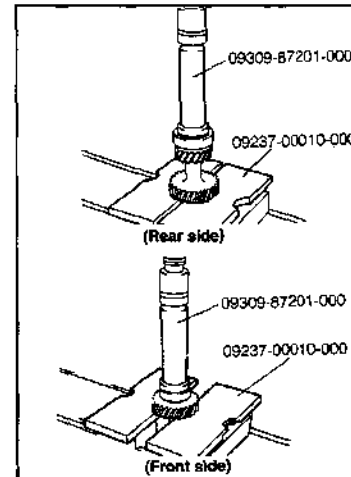


WF80-TR115

ASSEMBLY (TRANSFER OUTPUT FRONT SHAFT BEARING)

1. Press the radial bearing into the transfer output front shaft, using the following SSTs.

SST: 09309-87201-000
09237-00010-000

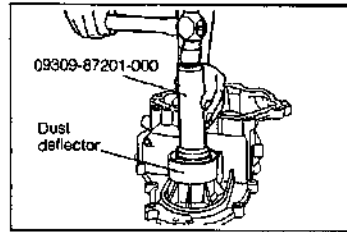


WF80-TR116

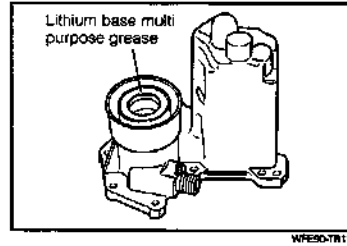
TRANSMISSION & TRANSFER

ASSEMBLY

1. Drive a new dust deflector into position, using a hammer.
For this installation, place a wooden block on the dust deflector so that the deflector may not be deformed.
2. Press a new oil seal, using the following SST.
SST: 09309-87201-000

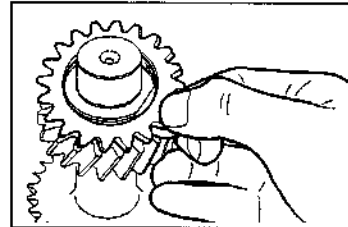


3. Apply lithium base multi purpose grease to the lip section of the oil seal.

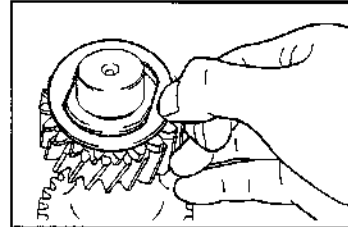


ASSEMBLY OF TRANSFER COUNTER GEAR

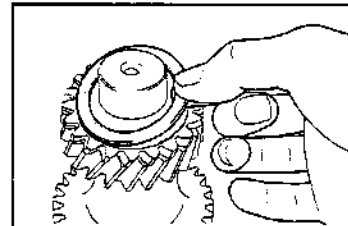
1. Install the sub gear No. 2.



2. Install the washer plate.



3. Install the conical spring washer.
CAUTION:
 - Ensure that the conical spring washer must be installed with its expanded side facing toward the sub gear No. 2.

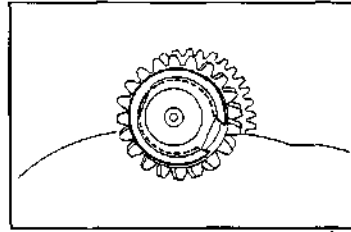


TRANSMISSION & TRANSFER

4. Install the new snap ring, using the standard tool of snap ring plier.

NOTE:

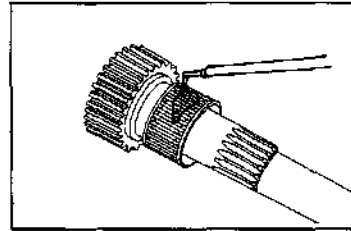
- Ensure that the snap ring should be installed to the groove section of the transfer counter gear securely.



WFE90-TR122

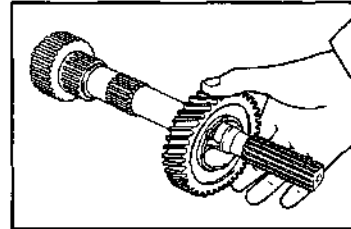
ASSEMBLY OF TRANSFER OUTPUT REAR SHAFT

1. Apply the gear oil to the needle roller bearing and then, install to the transfer output rear shaft.



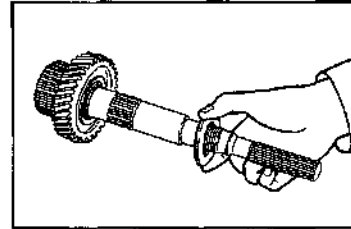
WFE90-TR123

2. Install the transfer low speed output gear as shown in the right figure illustration.



WFE90-TR124

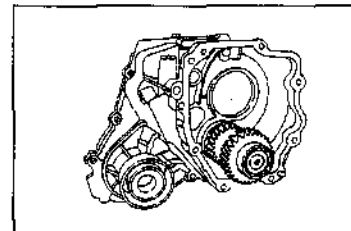
3. Install the transfer output gear thrust washer to the transfer output rear shaft.



WFE90-TR125

TRANSFER INSTALLATION

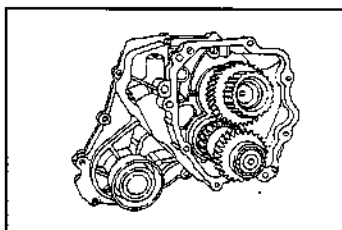
1. Temporarily install the transfer counter gear to the transfer front case.



WFE90-TR126

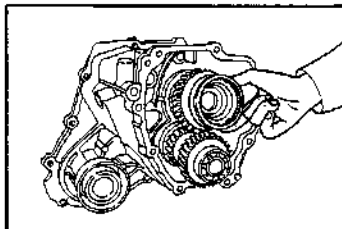
TRANSMISSION & TRANSFER

2. Install the transfer output rear shaft to the transfer front case.



WP80-TR127

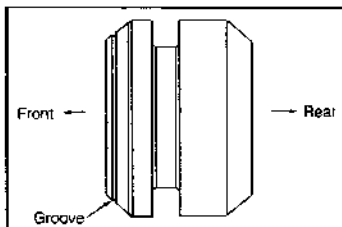
3. Install the transfer high & low clutch sleeve to the transfer output rear shaft.



WP80-TR128

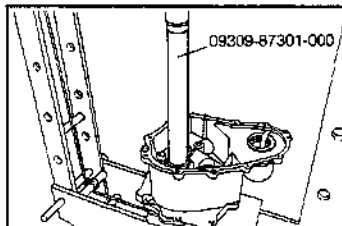
NOTE:

- Be sure to install the sleeve in such a direction that the grooved section, as indicated in the right figure, comes at the front side (transfer low speed output gear side).



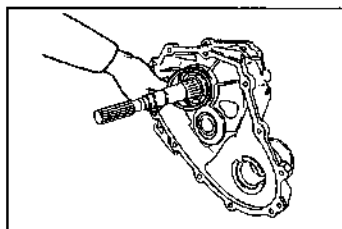
WP80-TR129

4. Rotate the transfer front case through 180 degrees.
5. Temporarily press the transfer output rear shaft bearing into position using the following SST:
SST: 09309-87301-000



WP80-TR130

6. Attach the stop ring of the transfer output rear shaft bearing.



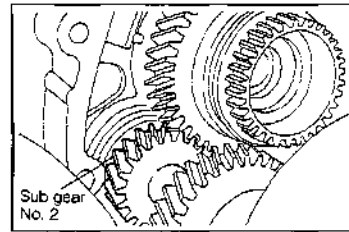
WP80-TR131

TRANSMISSION & TRANSFER

7. Turn over the transfer front case.

CAUTION:

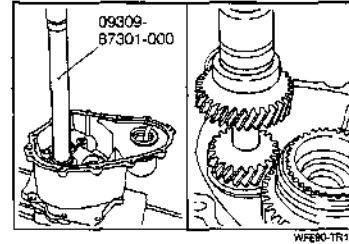
- Ensure that the gear must be engaged between subgear No. 2 of the transfer counter shaft and transfer low speed output gear.
- If the above operation should fail to be performed, failure to observe this caution may cause deformation of the transfer counter shaft subgear No. 2.



8. Press the transfer output shaft rear bearings into position using the following SST:

SST: 09309-87301-000

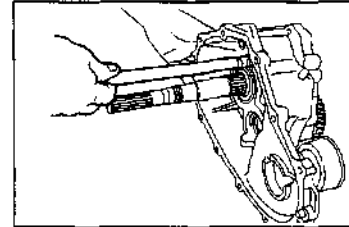
9. Press the transfer counter gear.



10. Insert the transfer high & low shift fork shaft into the transfer front case.

CAUTION:

- Ensure that the transfer high & low shift fork shaft is longer than the transfer front drive shift fork shaft, prior to install the shaft.

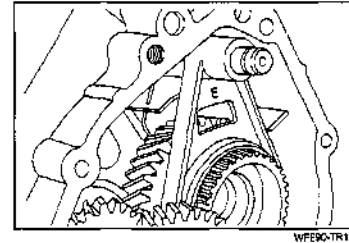


11. Installation of the transfer high & low shift fork

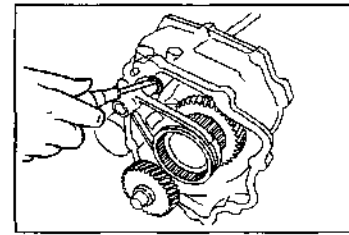
- (1) Insert the transfer high & low shift fork shaft into the hole of the transfer high & low shift fork.

CAUTION:

- Ensure that the E-marking on the transfer high & low shift fork faces toward the front side.

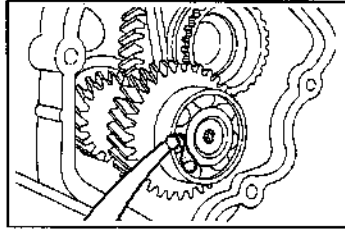


- (2) Install the new two "E" rings on both rear and front of the transfer high & low shift fork.



TRANSMISSION & TRANSFER

12. Apply the gear oil to the radial ball bearing of the transfer counter shaft.



WPERO-TR137

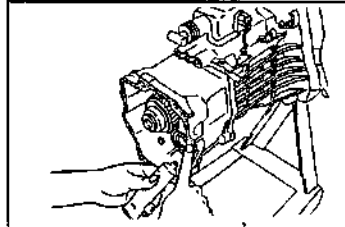
13. Remove the remaining gasket on the transfer adapter with gasket scraper.

NOTE:

- Be very careful not to scratch the attaching surface.

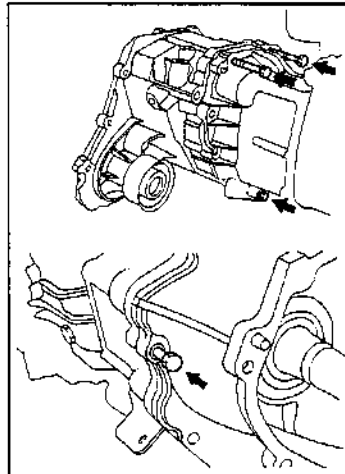
Apply the following bond to the transfer front case attaching surface of the transfer adapter and the threaded portion of the attaching screw.

Bond: Three Bond 1216 (Three Bond made)



WPERO-TR138

14. Installation of the transfer front case
(1) With using the two to four dummy bolts, temporarily install the transfer front case to the transfer adapter.

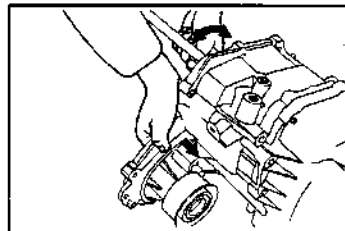


WPERO-TR139

- (2) Brought the transfer front case into carefully/slowly contact with the transfer adapter, while rotating the transfer rear output shaft with clockwise or counterclockwise directions.

CAUTION:

- Be carefully to proceed this job.
- If this operation should fail to be performed, failure to observe this caution may cause deformation of subgear No. 1.



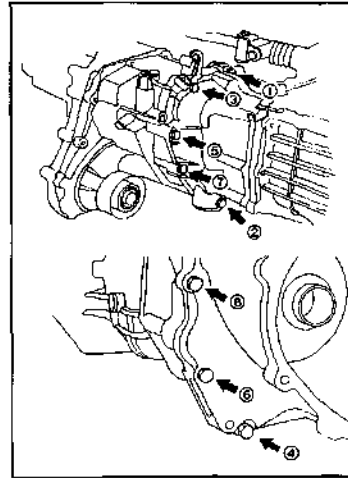
WPERO-TR140

TRANSMISSION & TRANSFER

- (3) Remove the dummy bolts.
Apply the following bond to the threaded section of the attaching bolts and then tighten the transfer front case subassembly with the eight bolts.
Bond: Three Bond 1216 (Three Bond made)
Tightening Torque: 29.4 - 44.1 N·m (3.0 - 4.5 kgf-m)

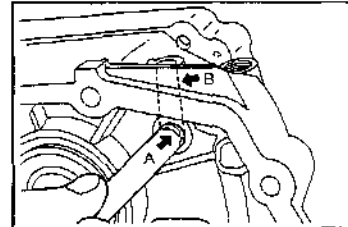
NOTE:

- Be sure to tighten the bolts alternately and diagonally.
(The illustration at the right figure indicates a typical example of the tightening sequence.)



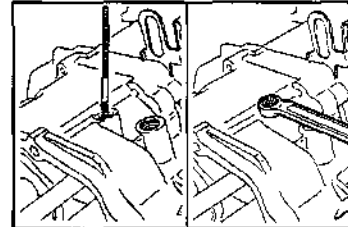
WPB30-TR141

15. Pull the transfer high & low shift fork shaft until the cut-out section A meet with swelling section of the transfer front case B.



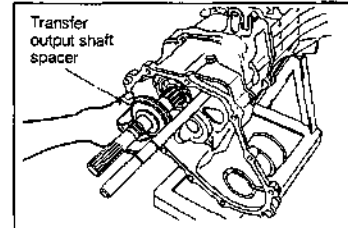
WPB30-TR142

16. Insert the transfer high & low shift fork shaft with the present condition to the transfer front case.
17. Install the ball and compression spring in this sequence.
18. Tighten the bolts, using a new gasket.
Tightening Torque: 18.6 - 30.4 N·m (1.9 - 3.1 kgf-m)
19. Insert the roller, using the standard tool of magnet hand.



WPB30-TR143

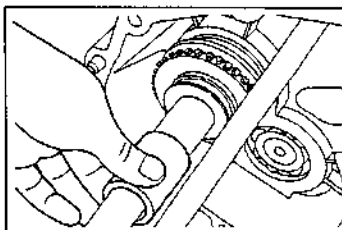
20. Install the transfer front drive clutch hub and transfer output shaft spacer.



WPB30-TR144

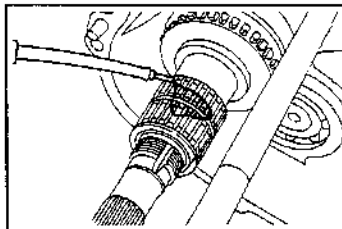
TRANSMISSION & TRANSFER

21. Install the transfer output shaft space No. 2 (A) and transfer front drive gear bearing inner race (B) to the transfer output rear shaft.



WFE90-TR145

22. Apply the gear oil to the outer periphery of the transfer front drive gear bearing inner race and needle roller bearing.
23. Install the needle roller bearing to the transfer output rear shaft.

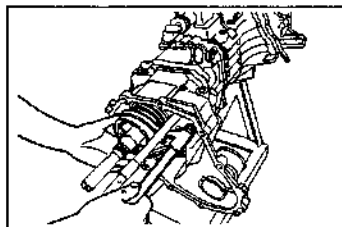


WFE90-TR146

24. Install the transfer front drive gear sleeve, transfer front drive shift fork and transfer front drive shift fork shaft in a set.

CAUTION:

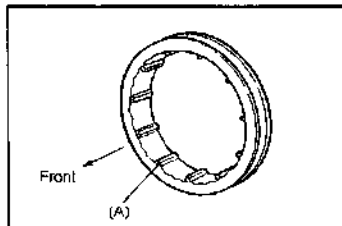
- Use the new two "E" rings.



WFE90-TR147

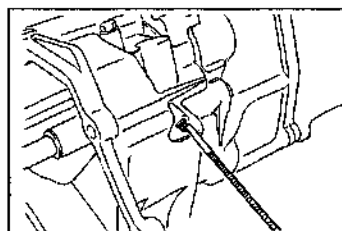
NOTE:

- The transfer front drive gear sleeve should be installed in the correct direction as indicated in the right figure.
- Be sure to install the sleeve in such a direction that the gear chamfered section (A) as indicated in the right figure, comes at the front side (transmission case side).



WFE90-TR148

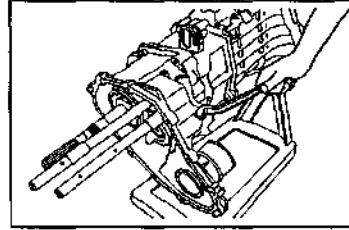
25. Install the ball and compression spring to the transfer front case in this sequence.



WFE90-TR149

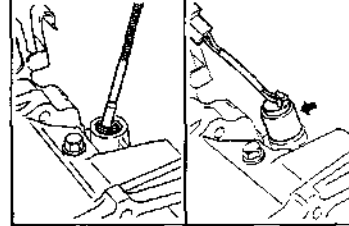
TRANSMISSION & TRANSFER

26. Tighten the bolt with a new gasket.
Tightening Torque: 18.6 - 30.4 N·m (1.9 - 3.1 kgf·m)



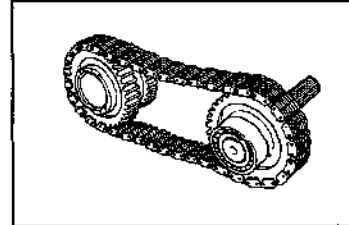
WFEB0-TR150

27. Install the roller.
28. Tighten the transmission position detect switch with a new gasket.
Tightening Torque: 29.4 - 49.0 N·m (3.0 - 5.0 kgf·m)



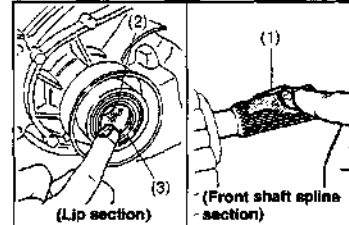
WFEB0-TR151

29. Install the front drive chain to the following parts.
(1) Transfer output gear
(2) Transfer output front shaft



WFEB0-TR152

30. Apply the lithium based multi purpose grease to the following sections.
(1) Outer periphery of the spline section in the transfer output shaft
(2) Inner periphery of the bush
(3) Lip section of the oil seal



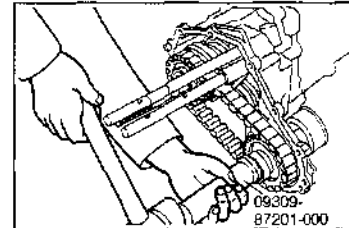
WFEB0-TR153

31. Install the front drive chain with the related parts to the transfer front case, using following SST with a plastic hammer.

SST: 09309-87201-000

NOTE:

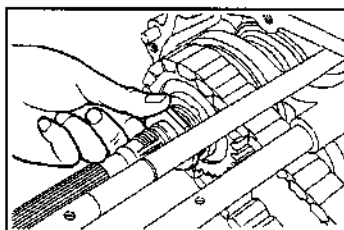
- Be very careful to not damage the lip section of the oil seal during the installation.



WFEB0-TR154

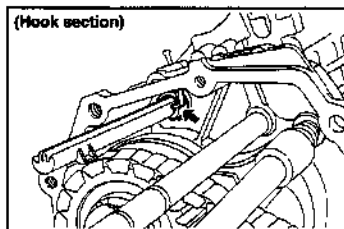
TRANSMISSION & TRANSFER

32. Apply the gear oil to the attaching surface of the transfer front drive gear.
33. Install the transfer output gear thrust washer.



WP690-TR165

34. Install the oil supply pipe to the transfer front case.
CAUTION:
 - Be sure to securely insert the transfer oil supply pipe as far as it will go. Failure to observe this caution may cause seizure of the transfer.

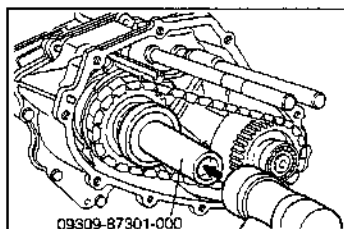


WP690-TR166

35. Install the bearing to the transfer output shaft and rear shaft with a plastic hammer alternately, using the following SST.
SST: 09309-87301-000

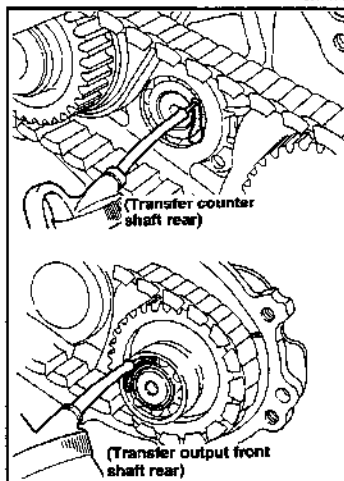
CAUTION:

- Ensure that the seal surface of the bearing comes in the transfer rear case. Failure to observe this caution may cause seizure of the bearing.



WP690-TR167

36. Apply the gear oil to the following bearings at the rear side.
 - Transfer counter gear
 - Transfer output front shaft

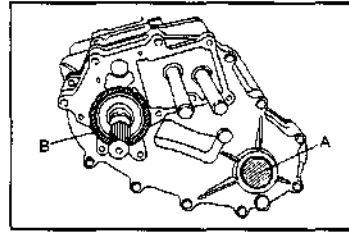


WP690-TR168

TRANSMISSION & TRANSFER

37. Install the transfer rear case with a new gasket interposed.
NOTE:

- Be sure to securely install the transfer rear case alternately and evenly in the A and B sections with a plastic hammer.

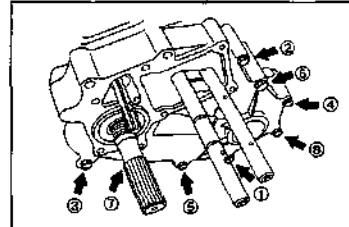


WP590-TR156

38. Tighten the transfer rear case with the eight bolts.
Tightening Torque: 29.4 - 44.1 N·m (3.0 - 4.5 kgf·m)

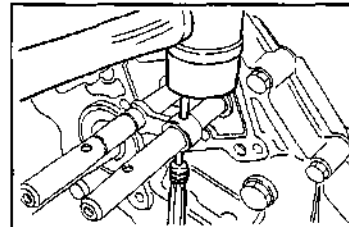
NOTE:

- Be sure to tighten the bolts alternately and diagonally (the right figure illustration indicates a typical example of tightening sequence)



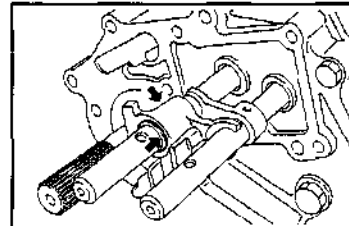
WP590-TR160

39. Lightly drive a new slotted pin into transfer front drive shift head No. 2 in advance.
40. Insert transfer front drive shift head No. 2 into the transfer front drive shift fork shaft, then insert a pin punch, as a guide, and install the slotted pin lightly tapping it with a hammer.



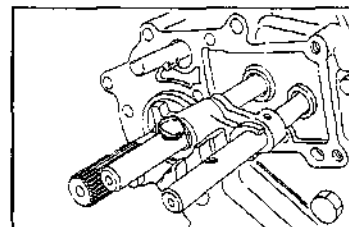
WP590-TR161

41. Attach the new E-ring to the transfer high & low shift fork shaft.
42. Install the transfer high & low shift head to the shaft.



WP590-TR162

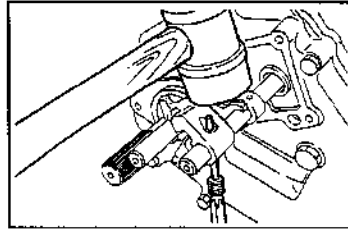
43. Attach the new E-ring on the transfer high & low shift fork shaft.
44. Insert the transfer fork shaft pin into the transfer high & low shift fork shaft.



WP590-TR163

TRANSMISSION & TRANSFER

45. Lightly drive the new slotted pin into the front drive shift head in advance slotted pin.
46. Insert the transfer front drive shift head into the transfer front drive shift fork shaft, then insert a pin punch, as a guide, and install the slotted pin lightly tapping it from above with a plastic hammer.

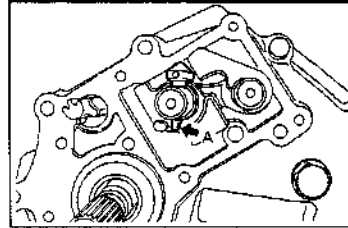


WPED0-TR164

47. Install the transfer fork shift pin.

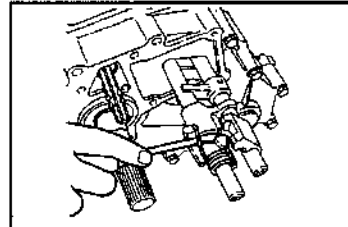
CAUTION:

- The cut section (A) of the transfer fork shaft pin should be faced toward the transfer front drive shift head during the installation, as shown in the right figure.
- Failure to observe this caution may cause trouble in the transfer operation.



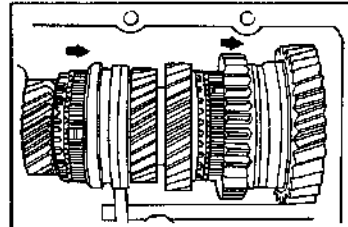
WPED0-TR165

48. Install the torsion spring.



WPED0-TR166

49. Interlock the 1st and 3rd gears.

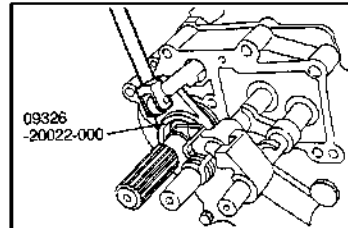


WPED0-TR167

50. Tighten the transfer output rear shaft by means of the lock nut. Proceed to stake the lock nut with a chisel or the like, using the following SST.

SST: 09326-20022-000

Tightening Torque: 137.0 - 196.0 N·m
(14.0 - 20.0 kgf·m)

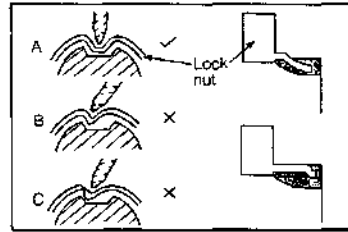


WPED0-TR168

TRANSMISSION & TRANSFER

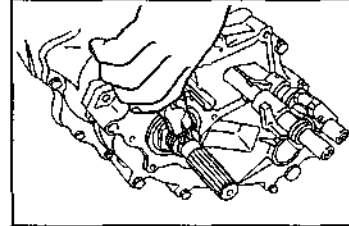
NOTE:

- When staking the lock nut, point a suitable staking tool toward the transfer output rear shaft axis center and stake to lock nut securely, as shown in the right figure A.
- Poor staking may cause abnormal noise or gear disengagement as shown in the right figure B and C.



WFE80-TR165

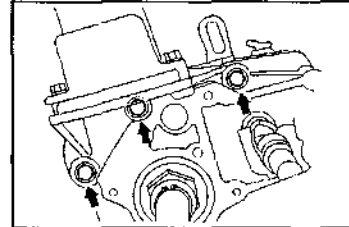
51. Install the ball and speedometer drive gear onto the transfer output rear shaft. Secure them with the new snap ring.



WFE80-TR170

52. Install control shaft lower No. 1 bracket with installed the shift & select shaft and control shaft with the two hexagon bolts and the bolt.

Tightening Torque: 29.4 - 44.1 N·m (3.0 - 4.5 kgf·m)



WFE80-TR171

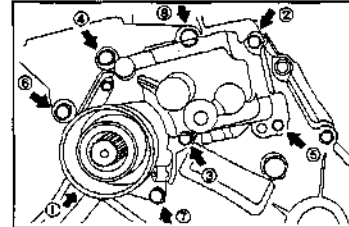
53. Install the transfer rear output bearing retainer with the new gasket interposed. Tighten the eight bolts.

Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)

NOTE:

- Apply gear oil to the contact sections of the transfer rear output shaft bearing retainer with the transfer high & low shift fork shaft and the transfer front drive shift fork shaft.
- Be sure to tighten the bolts alternately and diagonally (The illustration at the right figure indicates a typical example of the tightening sequence).
- Apply the following bond to the threaded section of the bolts.

Three band 1324 (three bond made)

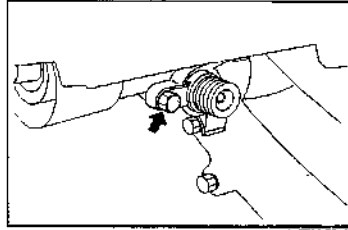


WFE80-TR172

TRANSMISSION & TRANSFER

54. Apply the gear oil to the outer periphery of the O-ring and the speedometer sleeve, prior to install.
55. Install the speedometer sleeve with the speedometer sleeve lock plate and a bolt.

Tightening Torque: 6.9 - 9.8 N·m (0.7 - 1.0 kgf·m)



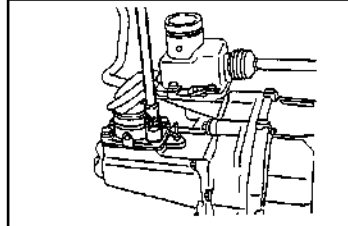
WPB30-TR173

56. With a new gasket used, install the transfer shift lever retainer with the four bolts and, tighten them.

Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)

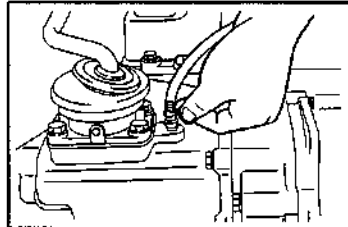
NOTE:

- Apply the 1324 bond (three bond made) to the thread sections of the bolt, prior to install.



WPB30-TR174

57. Install the breather hose by attaching a clip.

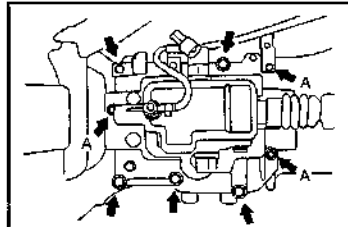


WPB30-TR175

58. Install the transmission case cover subassembly and tighten them.

Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)

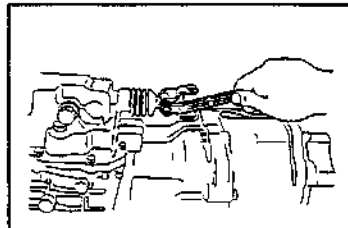
A-section 6.9 - 9.8 N·m (0.7 - 1.0 kgf·m)



WPB30-TR176

59. Apply lithium base multi purpose grease to the shift & select No. 1 shaft installing hole of the control shaft. Install the control shaft and the shift & select No. 1 shaft with the new hexagon bolt.

Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)



WPB30-TR177

TRANSMISSION & TRANSFER

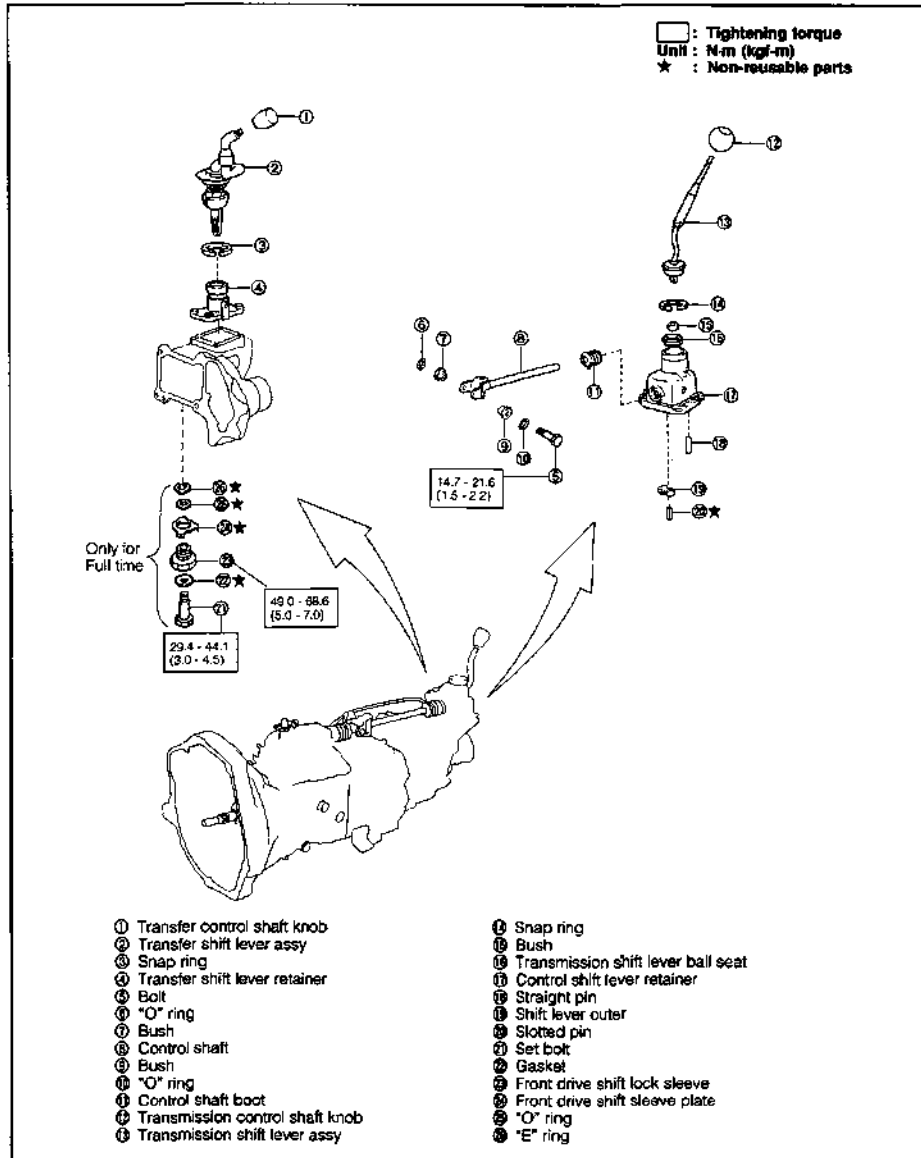
60. Remove the transmission assy with transfer from the over-haul stand and then, install them to the vehicle (see page MT-121 to MT-125).
61. Fill in the transmission and transfer oil through the oil filler plugs, when the transmission assy with transfer installed completely.

Oil: API GL-3 or GL-4
SAE75W-85 or 75W-90
Oil Capacity: 1.4 L

WPE20-TR178

TRANSMISSION & TRANSFER

CONTROL LEVER-RELATED (PART AND FULL TIME) COMPONENTS

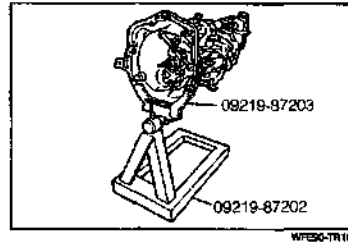


WFE80-TR178

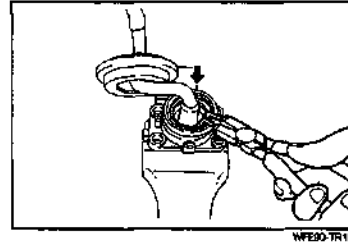
TRANSMISSION & TRANSFER

REMOVAL

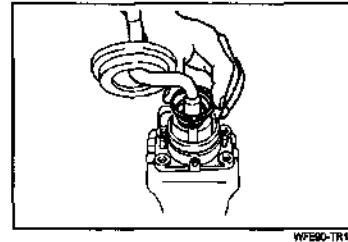
1. Remove the transmission assembly with transfer from the vehicle (see page MT-32 to MT-36).
2. Install the transmission with transfer on the overhaul stand, using the following.
SST: 09219-87202-000
09219-87203-000



3. Detach the hole snap ring, while the transfer shift lever is being lowered.

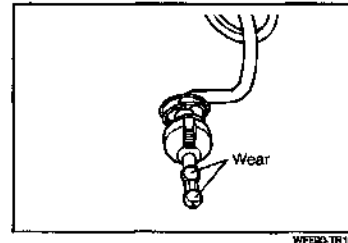


4. Remove the transfer shift lever with the conical spring installed.



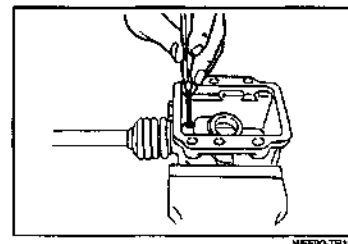
INSPECTION

1. Check the forward end of the transfer shift lever for wear.



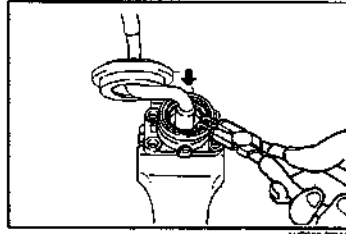
INSTALLATION

1. Apply lithium base multi purpose grease of the transfer shift lever.



TRANSMISSION & TRANSFER

2. Install the transfer shift lever with the hole snap ring to the transfer shift lever retainer subassembly, while the conical spring is being lowered.
3. Visually check that the hole snap ring must be installed securely into the groove section of the transfer shift lever retainer subassembly.

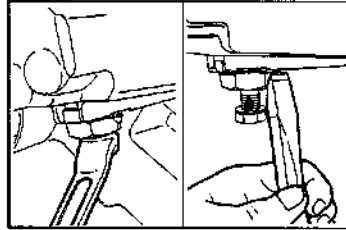


REMOVAL OF SET BOLT (ONLY FOR FULL TIME)

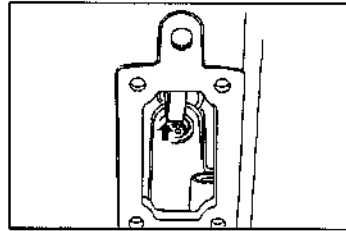
1. Remove the shift lever retainer subassembly (see page TR-27).
2. Loosen the set bolt and pull it out downward.
3. Raise the front drive shift sleeve plate using a chisel or any other suitable tool.

NOTE:

- Never reuse the removed front drive shift sleeve plate.



4. Remove the speedometer sleeve. (see page TR-28).
5. Remove the transfer rear output bearing retainer (see page TR-28).
6. Remove the "E" ring, using the standard tool of plier.



7. Set the transfer rear output shaft bearing retainer in a vice.
8. Remove the front drive shift lock sleeve and front drive shift sleeve plate.

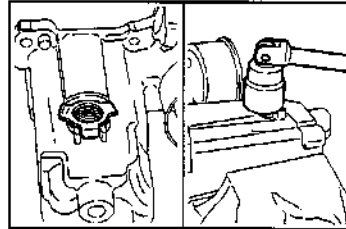
NOTE:

- Never reuse the removed front drive shift sleeve plate.

9. Remove the "O" ring from the drive shift lock sleeve.

CAUTION:

- Never reuse the "O" ring.



INSTALLATION OF SET BOLT

1. Apply gear oil to a new O-ring, and install to the groove section of the front drive shift lock sleeve.

NOTE:

- Be careful not to damage the O-ring.

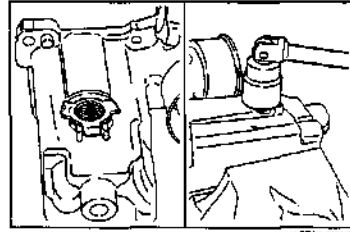
2. Apply the THREE BOND 1324 (made by THREE BOND) to threaded section of the front drive shift lock sleeve.

WFEB0-TR189

TRANSMISSION & TRANSFER

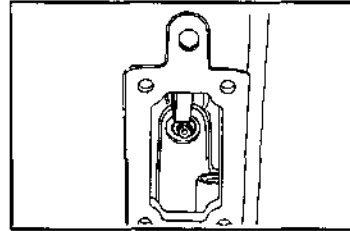
3. Place the new front drive shift sleeve plate to the transfer rear output shaft bearing retainer.
4. With the new gasket used, tighten the front drive shift lock sleeve.

Tightening Torque: 49.0 - 68.6 N·m (5.0 - 7.0 kgf·m)



WP690-TR190

5. Install the new E-ring using pliers or any other suitable tools.
6. Securely bend the front drive shift sleeve plate along the bolt surface of the front drive shift lock sleeve.

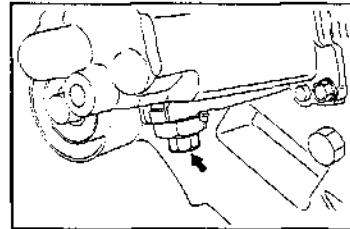


WP690-TR191

7. Install the transfer rear output bearing retainer with the new gasket interposed (see page TR-55).
8. Install the speedometer sleeve (see page TR-56).
9. Install the shift lever retainer subassembly (see page TR-56).

10. Tighten the set bolt.

Tightening Torque: 29.4 - 44.1 N·m (3.0 - 4.5 kgf·m)



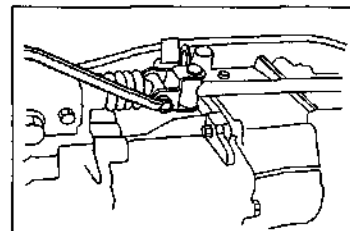
WP690-TR192

DISASSEMBLY OF SHIFT & SELECT SHAFT No. 1

1. Remove the control shaft with installed the shift lever retainer subassembly by removing the hexagon bolt.

NOTE:

- When disconnecting the control shaft from the shift & select No.1 shaft, care must be exercised as to the "O" ring which may be detached during the removal.

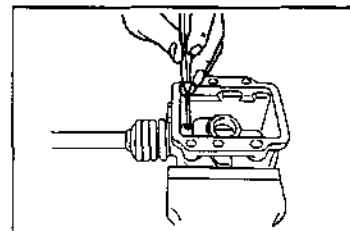


WP690-TR193

2. Drive off the slotted pin of the shift outer lever.

CAUTION:

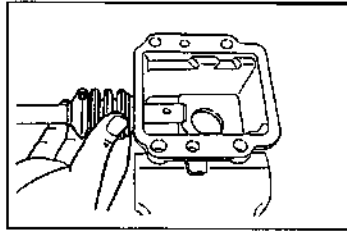
- Never reuse the removed slotted pin.



WP690-TR194

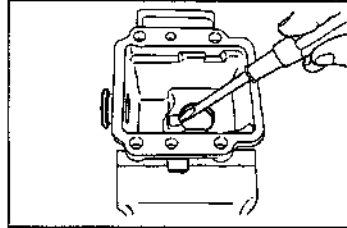
TRANSMISSION & TRANSFER

3. Remove the control shaft and control shaft boot.



WFEB0-TR106

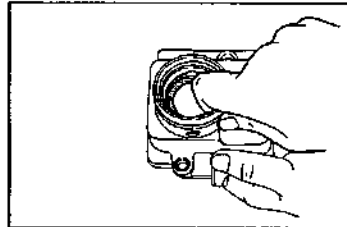
4. Remove the T/M shift lever ball seat.



WFEB0-TR106

ASSEMBLY OF SHIFT & SELECT SHAFT No. 1

1. Install the T/M shift lever ball seat with your fingers.
2. Apply lithium-based multi-purpose grease to the inner surface of the seat.

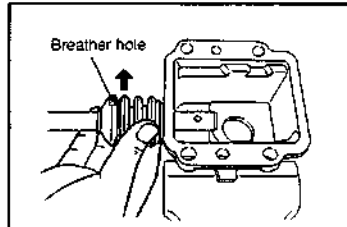


WFEB0-TR107

3. Install the control shaft and control shaft boot.

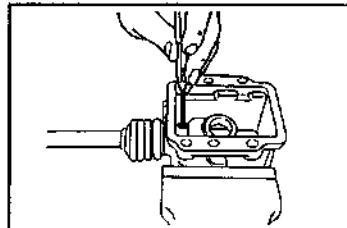
NOTE:

- Install the control shaft boot in such a way that the breather hole of the control shaft boot may face toward the transmission case side (lower side).



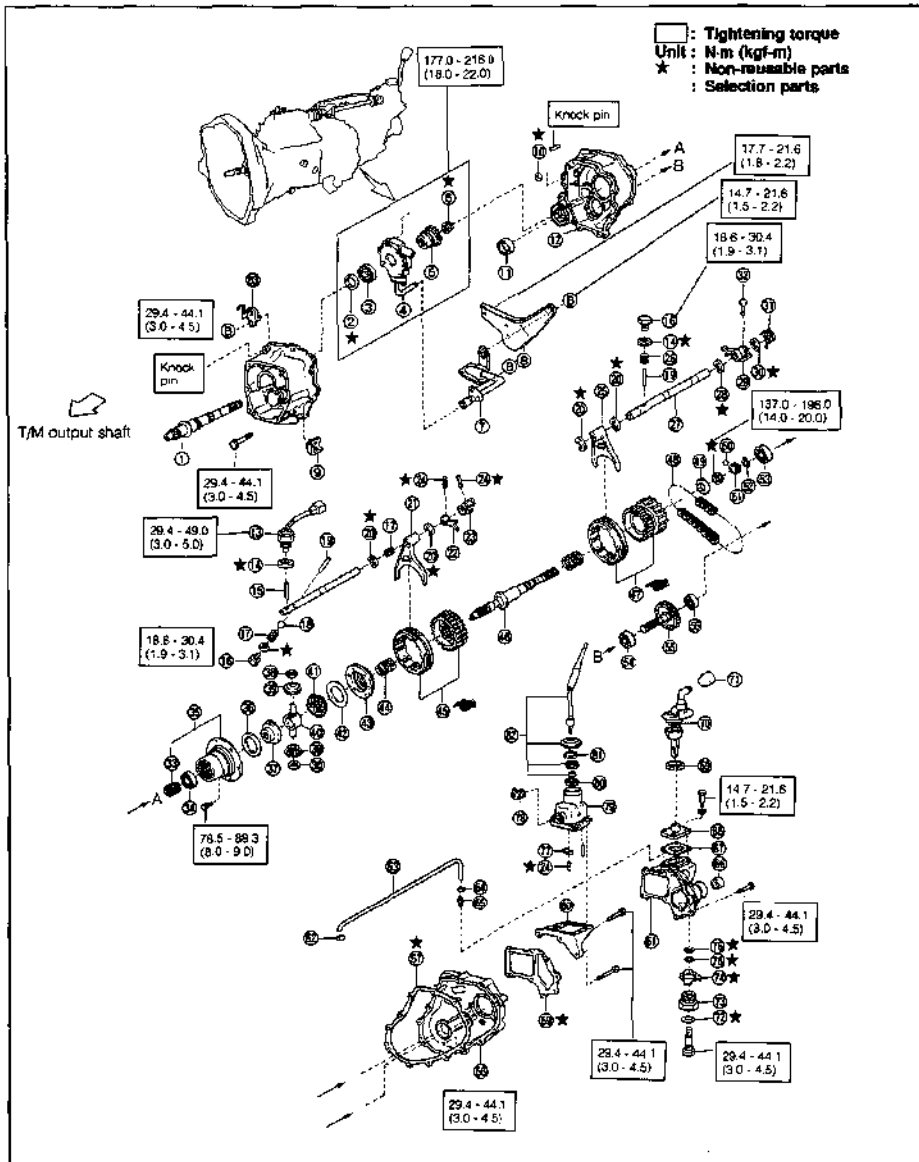
WFEB0-TR108

4. Drive the new slotted pin of the shift outer lever into position.
5. Connect the shift a select No. 1 shaft and control shaft.



WFEB0-TR109

TRANSFER (FULL TIME) COMPONENTS



WF-EPD-IR300

TRANSMISSION & TRANSFER

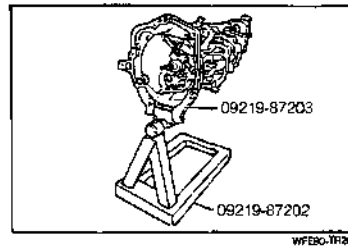
- | | |
|---|--|
| ① Transmission output shaft | ④① Differential case cover |
| ② Oil seal | ④② Needle roller bearing |
| ③ Radial ball bearing | ④③ Transfer front drive hub A/y |
| ④ Transfer oil pump body A/y | ④④ Transfer output rear shaft |
| ⑤ Transfer input hub | ④⑤ Transfer front drive gear A/y |
| ⑥ Lock nut | ④⑥ Transfer front drive chain |
| ⑦ Transfer oil strainer | ④⑦ Transfer output gear thrust washer |
| ⑧ Transfer oil pump cover | ④⑧ Ball |
| ⑨ Exhaust pipe support bracket | ④⑨ Speedometer drive gear |
| ⑩ Tight plug | ④⑩ Snap ring |
| ⑪ "T" type oil seal | ④⑪ Radial ball bearing |
| ⑫ Transfer front case | ④⑫ Radial ball bearing |
| ⑬ Transmission position detect switch | ④⑬ Transfer output front shaft |
| ⑭ Gasket | ④⑭ Bearing |
| ⑮ Roller | ④⑮ Transfer case gasket |
| ⑯ Bolt | ④⑯ Transfer rear case |
| ⑰ Compression spring | ④⑰ Output shaft bearing rear retainer gasket |
| ⑱ Ball | ④⑱ Control shaft lower bracket |
| ⑲ Roller | ④⑲ Output shaft bearing rear retainer |
| ⑳ E ring | ④㉑ Clip |
| ㉑ Transfer diff lock shift fork | ④㉒ No. 1 hose |
| ㉒ Transfer high & low shift head | ④㉓ Clip |
| ㉓ Transfer diff lock shift No. 1 head | ④㉔ Union |
| ㉔ Slatted pin | ④㉕ T type oil seal |
| ㉕ Transfer front drive shift fork | ④㉖ Transfer shift lever retainer gasket |
| ㉖ Compression No. 1 spring | ④㉗ Transfer shift lever retainer |
| ㉗ Transfer front drive shift fork shaft | ④㉘ Hole snap ring |
| ㉘ E ring | ④㉙ Transfer shift lever A/y |
| ㉙ Transfer high & lower shift head | ④㉚ Shift lever knob S/A |
| ㉚ E ring | ④㉛ Gasket |
| ㉛ Torsion spring | ④㉜ Front drive shift lock sleeve |
| ㉜ Pin for shift fork shaft | ④㉝ Front drive shift lock sleeve plate |
| ㉝ Needle roller bearing | ④㉞ O ring |
| ㉞ Bearing | ④㉟ E ring |
| ㊱ Differential case S/A | ④㊱ Shift outer lever |
| ㊲ Differential side gear thrust washer | ④㊲ Control shaft No. 2 boot |
| ㊳ Differential side gear | ④㊳ Shift lever retainer S/A |
| ㊴ Differential pinion thrust washer | ④㊴ Shift lever ball seat |
| ㊵ Differential pinion | ④㊵ Hole snap ring |
| ㊶ Differential pinion shaft | ④㊶ Shift lever A/y |
| ㊷ Differential side gear | ④㊷ Engine hanger |
| ㊸ Differential side gear thrust washer | |

WFE80-TR001

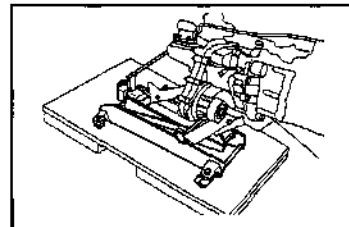
TRANSMISSION & TRANSFER

TRANSFER REMOVAL

1. Remove the transmission and transfer assembly from the vehicle (see pages MT-32 to MT-36).
2. Mount the transmission and transfer assembly on an overhauling stand, using the following SST:



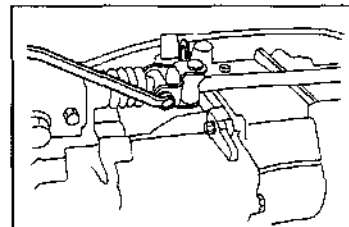
3. Support the transmission and transfer assembly with a transmission jack or any other suitable tools.



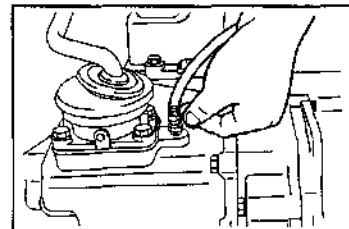
4. Remove the control shaft with installed the shift lever retainer subassembly by removing the hexagon bolt.

CAUTION:

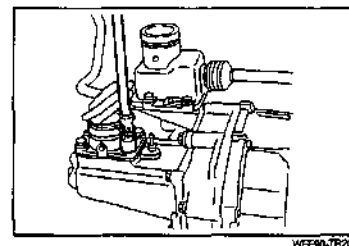
- When disconnecting the control shaft from the shift & select No. 1 shaft, care must be exercised as to the "O" ring which may be detached during the removal.



5. Disconnect the breather hose by detaching a clip.

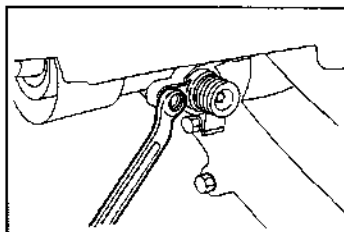


6. Remove the transfer shift lever retainer and gasket by removing the four bolts.

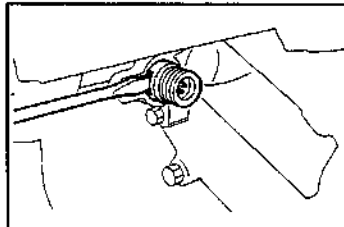


TRANSMISSION & TRANSFER

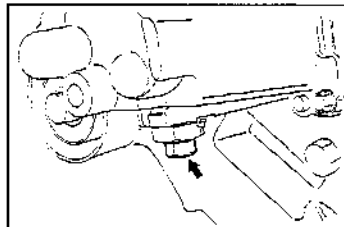
7. Remove the speedometer sleeve lock plate by removing a bolt.



8. Lift up the speedometer sleeve, using the flat drive.



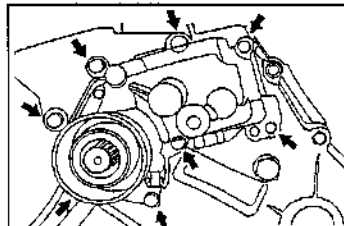
9. Removal of transfer output shaft bearing retainer
(1) Loosen the set bolt and pull it out downward with your fingers.



- (2) Remove the eight bolts and gasket.

NOTE:

- Never reuse the removed gasket.

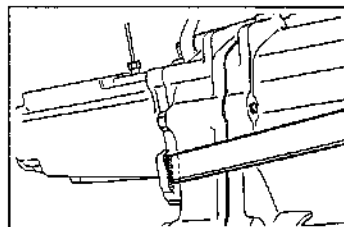


- (3) Lightly tapping the rib sections alternately, using the plastic hammer or the like.

- (4) Remove the gasket.

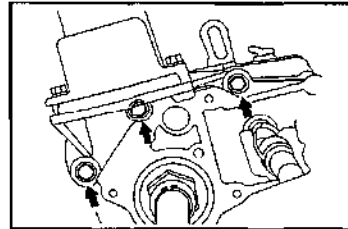
CAUTION:

- Never reuse the removed gasket.



TRANSMISSION & TRANSFER

10. Remove the control shaft lower bracket No. 1 with installed the shift lever retainer and control shaft by removing the two hexagon bolt and the bolt.

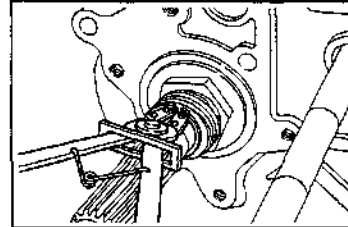


WPFB0-TR212

11. Detach the snap ring. Remove the speedometer driven gear and ball.

CAUTION:

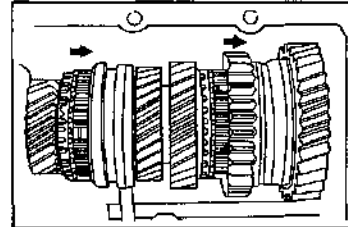
- Never reuse the removed snap ring.



WPFB0-TR213

12. Remove the transmission case cover subassembly by removing the seven bolts and the reamer bolt (see page TR-60).

13. Interlock the 1st gear and the 3rd gear.



WPFB0-TR214

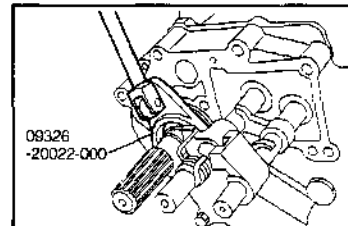
14. Raise the lock section of the lock nut.

CAUTION:

- Never reuse the removed lock nut.

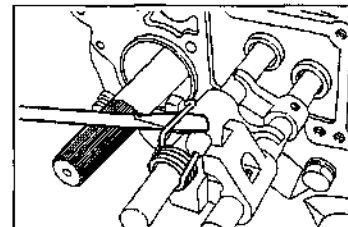
15. Remove the lock nut from the transfer output rear shaft, using the following SST.

SST: 09326-20022-000



WPFB0-TR215

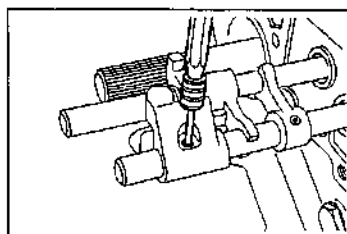
16. Remove the torsion bar spring, using the standard tool of minus driver.



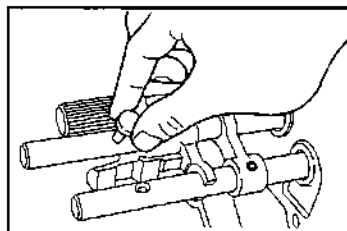
WPFB0-TR216

TRANSMISSION & TRANSFER

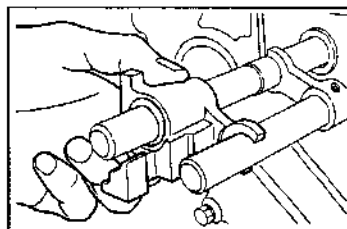
17. Drive out the slotted pin of the transfer front drive shift head. Remove the transfer front drive shift head.
CAUTION:
- Never reuse the removed slotted pin.



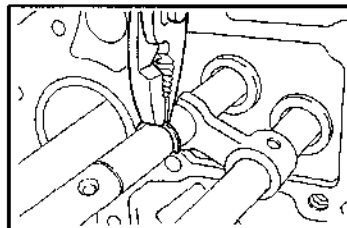
18. Remove the transfer fork shaft pin.



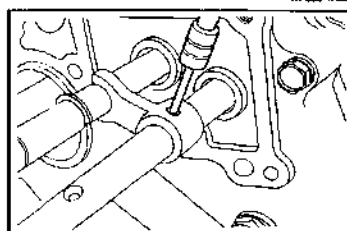
19. Remove the "E" ring, using the standard tool of driver. Remove the transfer high & low shift head.
CAUTION:
- Never reuse the removed "E" ring.



20. Remove the "E" ring, using the standard tool of driver or plier.
CAUTION:
- Never reuse the "E" ring.

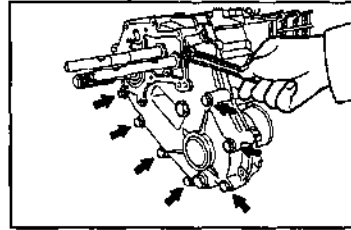


21. Drive out the slotted pin of the transfer front drive shift head No. 2. Remove the transfer front drive shift head No. 2.
CAUTION:
- Never reuse the removed slotted pin.



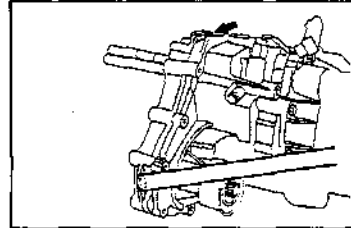
TRANSMISSION & TRANSFER

22. Remove the transfer rear case by removing the eight bolts.



WP690-TR222

23. Lightly tapping the ribs section, using the plastic hammer or the like.



WP690-TR223

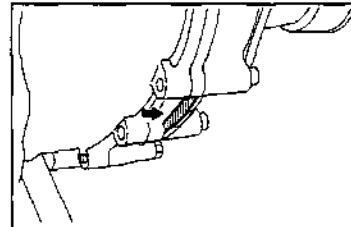
24. Remove the gasket of the transfer rear case.

CAUTION:

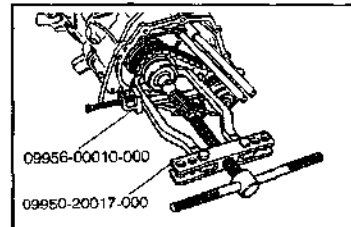
- Never reuse the removed gasket.

25. Remove the bearing of the transfer rear output shaft, using the following SSTs.

SST: 09950-20017-000
09956-00010-000



WP690-TR224

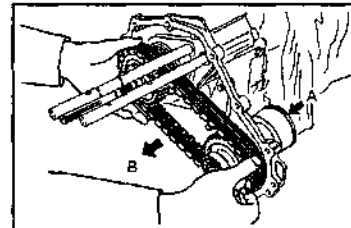


WP690-TR225

26. Remove the transfer output gear thrust washer.
27. Remove the transfer front drive chain and transfer output front drive gear together with the transfer output front shaft.

NOTE:

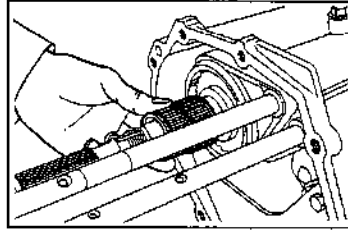
- Lightly tapping the transfer rear output shaft with a plastic hammer (A), pull out the output shaft toward you, with the transfer front drive chain (B).



WP690-TR226

TRANSMISSION & TRANSFER

28. Remove the needle roller bearing from the transfer output rear shaft.

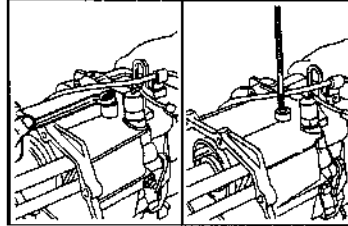


29. Remove the bolt and gasket.

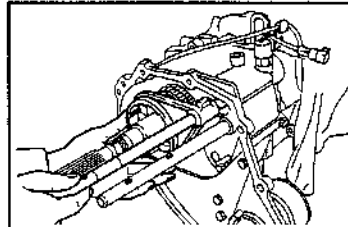
CAUTION:

- Never reuse the removed gasket.

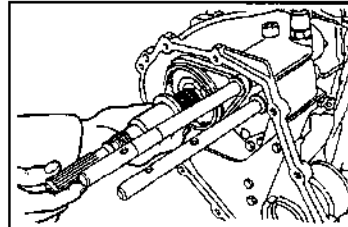
Remove the compression spring and roller (small size), using the standard tool of magnet hand.



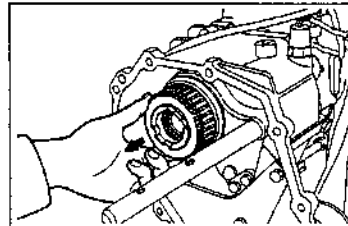
30. Remove the following parts in a set.
- (1) "E" ring (2 pieces)
 - (2) Transfer front drive shift fork
 - (3) Transfer front drive shift fork shaft
 - (4) Differential lock sleeve
 - (5) Transfer front drive hub



31. Remove the transfer rear output shaft with the tow-split needle roller bearing installed.



32. Remove the transfer front drive hub.



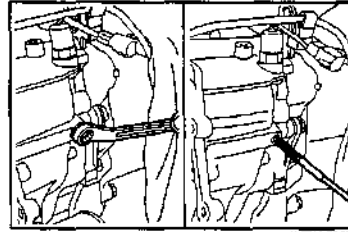
TRANSMISSION & TRANSFER

33. Remove the bolt and gasket.

CAUTION:

- Never reuse the removed gasket.

34. Remove the compression spring and ball, using the standard tool of magnet hand.



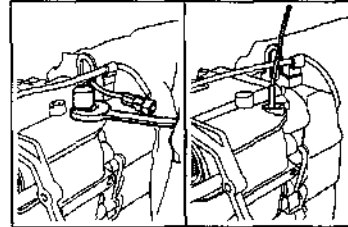
WFE90-TR232

35. Remove the transmission position detect switch assembly and gasket.

CAUTION:

- Never reuse the removed gasket.

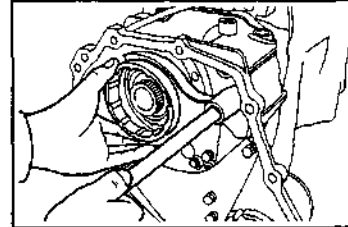
36. Remove the roller (large size), using the standard tool of magnet hand.



WFE90-TR233

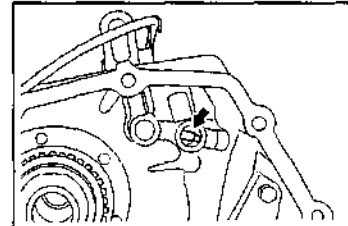
37. Remove the following parts in a set.

- (1) Differential lock shift fork shaft
- (2) "E" ring (2 pieces)
- (3) Compression spring
- (4) Differential lock sleeve
- (5) Transfer high & low shift fork



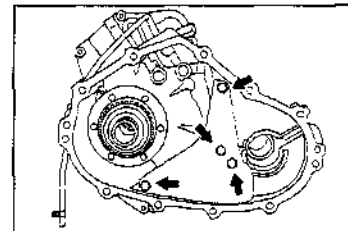
WFE90-TR234

38. Using a magnet band, remove the small-sized roller from the fitting hole provided between the differential lock shift fork shaft of the transfer front case and the transfer front drive shift fork shaft.



WFE90-TR235

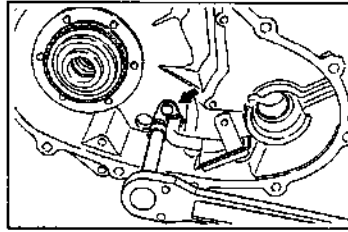
39. Remove the transfer oil pump cover by removing the four bolts.



WFE90-TR236

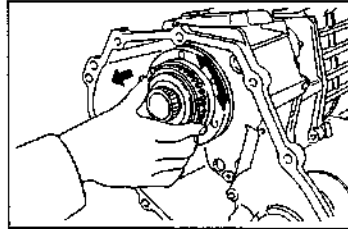
TRANSMISSION & TRANSFER

40. Remove the transfer oil strainer by removing the two bolts.



WPES0-TR237

41. Remove the differential assy toward you.

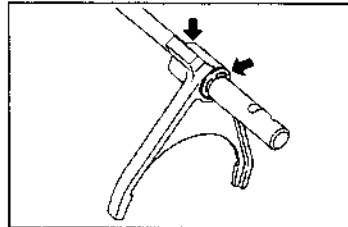


WPES0-TR238

42. Remove the transfer front drive shift fork by detaching the two "E" rings.

NOTE:

- Never reuse the removed "E" rings.

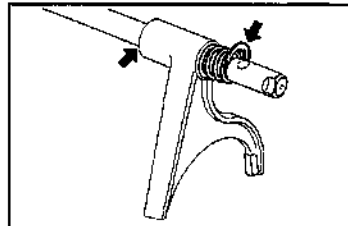


WPES0-TR239

43. Remove the transfer high & low shift fork by detaching the two "E" rings and compression spring.

NOTE:

- Never reuse the removed "E" rings.



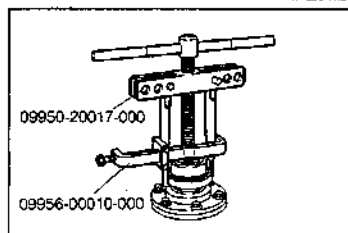
WPES0-TR240

DISASSEMBLY OF DIFFERENTIAL ASSY

1. Set the differential assembly in a vice.
2. Remove the radial ball bearing in combination with the following SSTs.

SST: 09950-20017-000

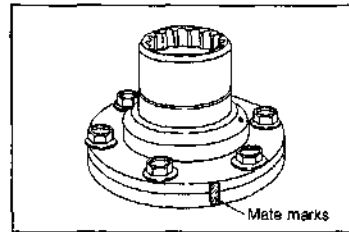
09956-00010-000



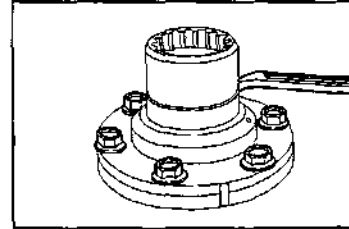
WPES0-TR241

TRANSMISSION & TRANSFER

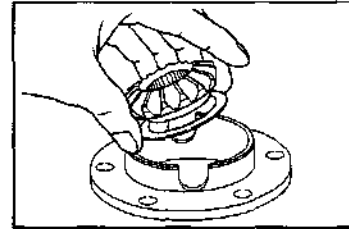
3. Put mate marks between differential case and differential case cover, as guide during installation.



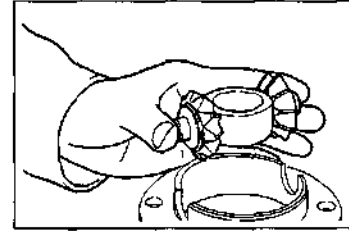
4. Remove the differential case subassembly by removing the six bolts.



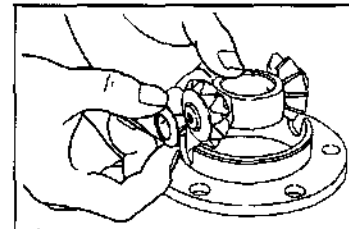
5. Remove the differential side gear and differential side gear thrust washer.



6. Remove the differential pinion shaft with install the differential pinion and differential pinion thrust washer in a set.



7. Remove the differential pinion and differential pinion thrust washer.



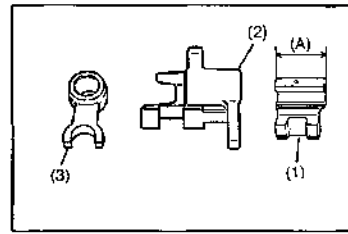
TRANSMISSION & TRANSFER

INSPECTION

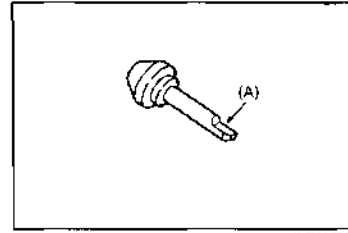
1. Check the following parts for damage.
 - (1) Transfer front drive shift head No. 2
 - (2) Transfer high & low shift head
 - (3) Transfer front drive shift head

NOTE:

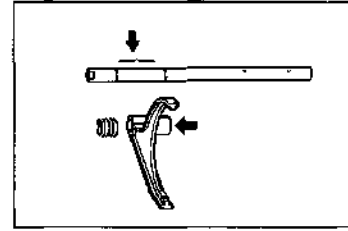
- Do not install the front drive shift head No. 2 for part time, as the (A) section for full time is longer than part time.



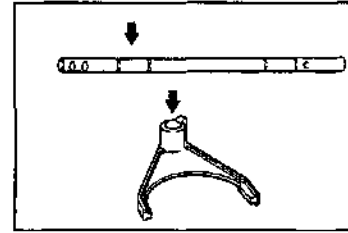
2. Check the section (A) of the transfer fork shaft pin shown in the right figure for wear.



3. Visually check the differential lock shift fork shaft, the transfer high & low shift fork, and the compression spring, for damage, inner/outer surface scratches, etc.



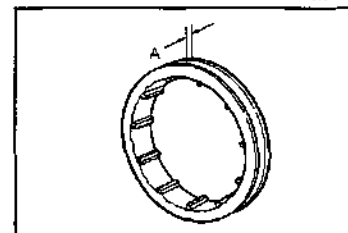
4. Visually check the mating surface between the outer surface of the transfer front drive shift fork shaft and the transfer front drive shift fork for any damage such as scratches.



5. Measure the contact wider (A) of the differential sleeve lock with the transfer front drive shift fork, using vernier caliper.

Unit: mm

	Specified value	Allowable limit
Differential sleeve lock	7.000 - 7.058	7.3

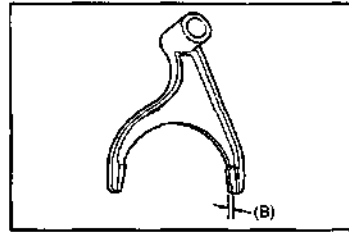


TRANSMISSION & TRANSFER

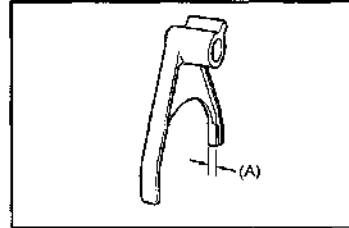
6. Measure the contact width of the transfer front drive shift fork (A) and transfer differential lock shift (B).

Unit: mm

	Specified value	Allowable limit
(A) Transfer front drive shift fork	6.8 - 6.9	6.3
(B) Transfer differential lock shift	6.8 - 6.9	6.3

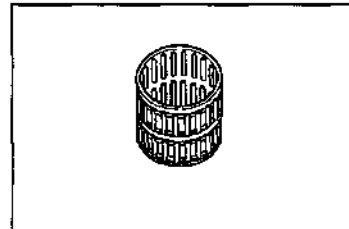


WP530-TR252



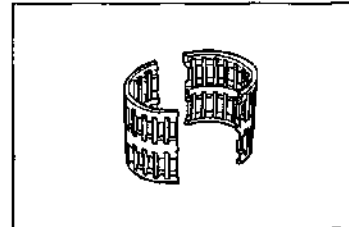
WP530-TR253

7. Check to see if any foreign matter is caught in the needle roller bearing and that the bearing exhibits any damage.



WP530-TR254

8. Check to see if any foreign matter is caught in the needle roller bearing and that the bearing exhibits any damage.

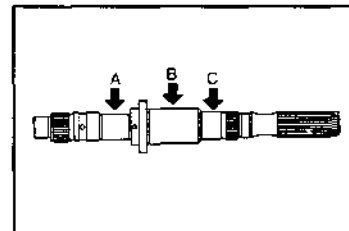


WP530-TR255

9. Measure the following parts of the transfer output rear shaft.

Unit: mm

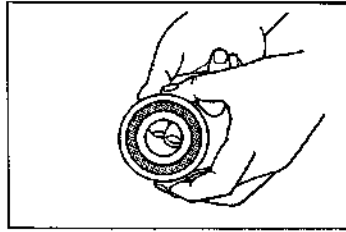
Measuring point	Item	Specified value	Allowable limit
Section (A) in right figure		25.991 - 26.000	25.941 - 25.950
Section (B) in right figure		37.975 - 37.991	37.925 - 37.941
Section (C) in right figure		27.955 - 28.0045	27.905 - 27.9545



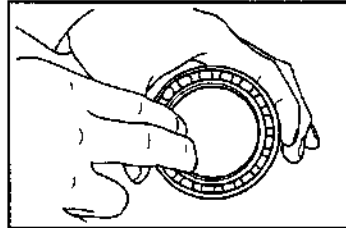
WP530-TR256

TRANSMISSION & TRANSFER

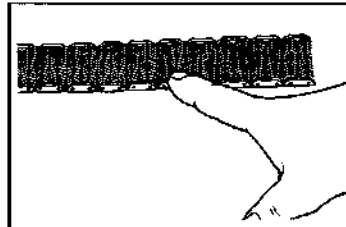
10. Rotate the bearing inner race by applying a force with your finger. Check to see if the bearing inner race rotates smoothly without any binding.



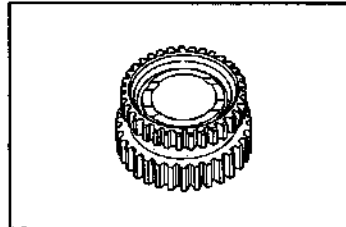
11. Rotate the bearing inner race by applying a force with your finger. Check to see if the bearing inner race rotates smoothly without any binding.



12. Check the contacting surface of the transfer front drive chain with each gear for damage.



13. (1) Check the contacting surface of the transfer front drive gear with the transfer front drive chain for damage.



14. Measure the dimension of the transfer front drive hub and the differential lock sleeve shown in the right figure. Make sure that the clearance (A) between this gear and the differential lock sleeve may conform to the specification.

Specified Value: 0.03 - 0.19 mm

T/F Front Drive hub:

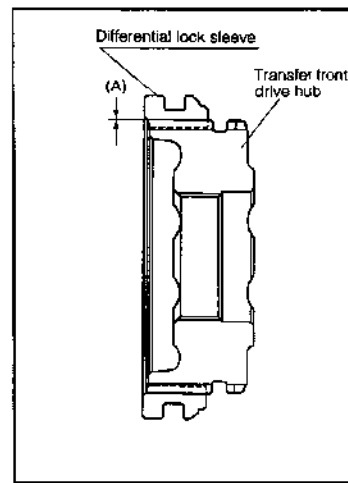
Unit: mm

Classification/No.	Outer dimension
2	87.28 - 87.34
1	87.18 - 87.24
3	87.08 - 87.14

Differential lock sleeve

Unit: mm

Classification/No.	Bore dimension
2	87.371 - 87.470
1	87.271 - 87.370
3	87.170 - 87.270



WFB90-TR261

- (1) The outer diameter dimension of the transfer front drive hub has been machined in accordance with the bore dimension of the differential lock sleeve. If either part exceeds the specified value above, be certain to replace them as a set.

CAUTION:

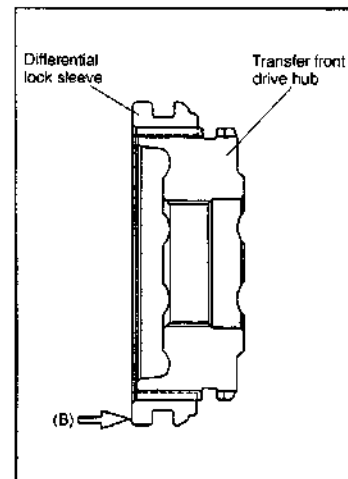
- If either part which has exceeded the specified value should be used against this caution, it would cause slipping-out-of-gear and or emanation of abnormal noise.

- (2) With the differential lock sleeve assembled to the transfer front drive hub, measure the tilt width at the section (B) of the differential lock sleeve.

Specified value: Not to exceed 0.5 mm

NOTE:

- If the tilt width of the differential lock sleeve exceeds the above specified value, be certain to replace those parts of the transfer front drive hub and differential lock sleeve as a set.



WFB90-TR262

TRANSMISSION & TRANSFER

15. Measure the dimension of the transfer front drive gear and the differential lock sleeve shown in the right figure. Make sure that the clearance (A) between this gear and the differential lock sleeve may conform to the specification.

Specified Value: 0.03 - 0.19 mm

- (1) The outer diameter dimension of the transfer front drive gear has been machined in accordance with the bore dimension of the differential lock sleeve. If either part exceeds the specified value above, be certain to replace them as a set.

CAUTION:

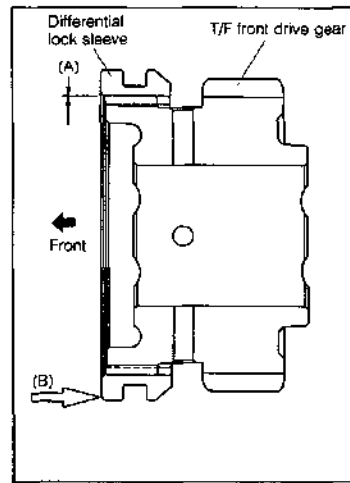
- If either part which has exceeded the specified value should be used against this caution, it would cause slipping-out-of-gear and or emanation of abnormal noise.

- (2) With the differential lock sleeve assembled to the transfer front drive gear, measure the tilt width at the section (B) of the differential lock sleeve.

Specified Value: Not to exceed 0.5 mm

NOTE:

- If the tilt width of the differential lock sleeve exceeds the above specified value, be certain to replace those parts of the transfer front drive gear and differential lock sleeve as a set.

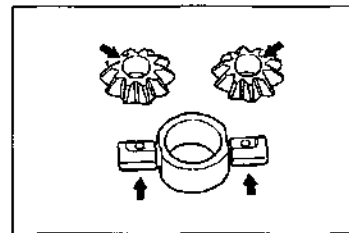


WPB90-TR264

Unit: mm

Classification /No.	Bore dimension	Outer dimension
	Differential lock sleeve	T/F front drive gear
2	87.371 - 87.47	87.28 - 87.34
1	82.71 - 87.37	87.18 - 87.24
3	87.17 - 87.27	87.08 - 87.14

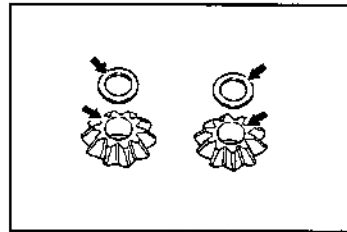
16. Visually check the differential pinion shaft and the differential pinion to scan for damage, or wear, etc.



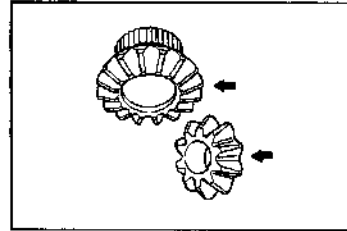
WPB90-TR265

TRANSMISSION & TRANSFER

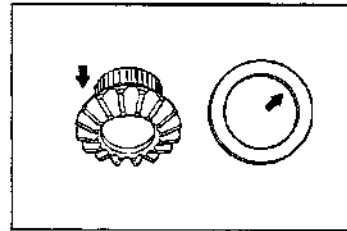
17. Visually check the differential pinion gear and the differential pinion thrust washer for damage, unusual wear, etc.



18. Visually check the contact surface between the differential sidegear and the differential pinion gear for damage, unusual wear, etc.

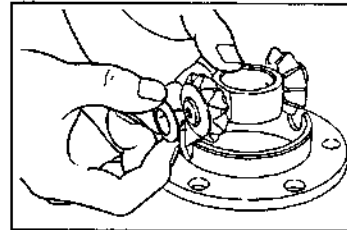


19. Visually check the differential sidegear and the differential sidegear thrust washer for damage, unusual wear, etc.

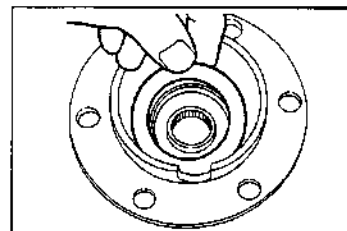


ASSEMBLY OF DIFFERENTIAL ASSY

1. Install the differential pinion thrust washer and differential pinion to the differential pinion shaft.

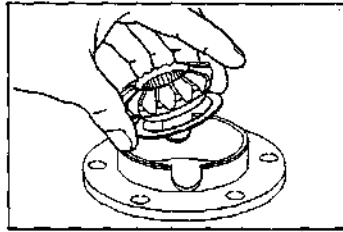


2. Install the differential side gear thrust washer to the differential case cover and differential case.



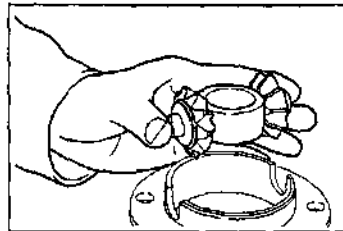
TRANSMISSION & TRANSFER

3. Install the differential side gear to the differential case cover and differential case.



WP590-TR271

4. Install the following parts to the differential case cover in a set.
 - (1) Differential pinion shaft
 - (2) Differential pinion
 - (3) Differential pinion thrust washer



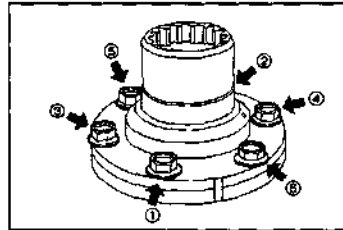
WP590-TR272

5. Install the differential case to the differential case cover and tighten them with six bolts.

Tightening Torque: 78.5 - 88.3 N·m (8.0 - 9.0 kgf·m)

CAUTION:

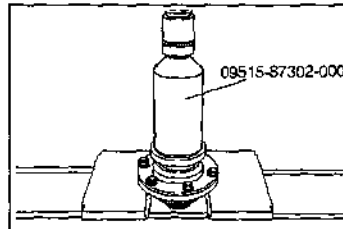
- Be sure to tighten the bolts alternately and diagonally.
- Match the pair marks put during the disassembly of differential prior to install the differential case cover to the differential.



WP590-TR273

6. Press the radial ball bearing to the differential assembly, using the following SST.

SST: 09515-87302-000

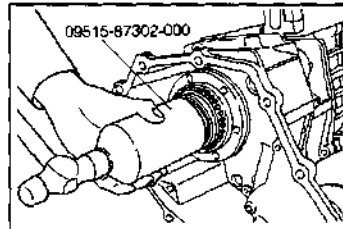


WP590-TR274

INSTALLATION

1. Installation of differential assembly.
 - (1) Lightly tap the differential assembly so as to drive it into the transfer front case, using a plastic hammer in conjunction with the following SST.

SST: 09515-87302-000



WP590-TR275

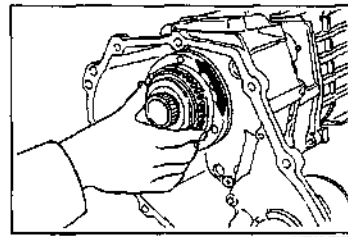
- (2) Stop the aforesaid operation. Then, while turning the differential either clockwise or counterclockwise, align the spline fitting section of the differential assembly and transfer input hub, using the feeling of your fingers.
- (3) Install the differential assembly in the transfer front case, while repeating the operations described in the steps (1) and (2) above.

NOTE:

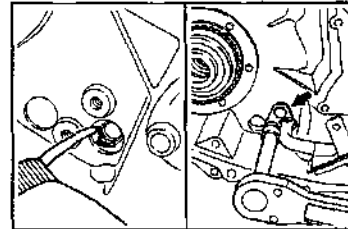
- If the operation described above should be performed improperly, it would cause damage to the spline of the differential assembly and transfer input hub.

2. Apply the gear oil to the oil seal section of the transfer oil strainer and then, tighten them with the two bolts.

Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)



WFEB0-TR276



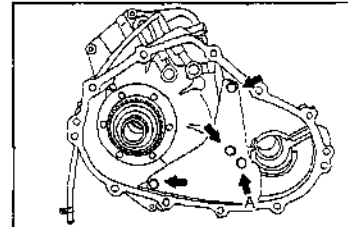
WFEB0-TR277

3. Install the transfer oil pump cover and then, tighten them with the four bolts.

Tightening Torque:

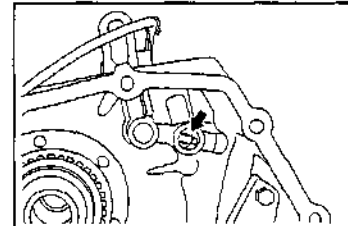
17.7 - 21.6 N·m (1.8 - 2.2 kgf·m)

A ... 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)



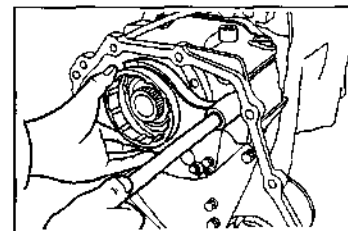
WFEB0-TR278

4. Using a magnet hand, reinsert the small-sized roller into the fitting hole provided between the differential lock shift fork shaft of the transfer front case and the transfer front drive shift fork shaft.



WFEB0-TR279

5. Install the following parts in a set.
 - (1) Transfer differential lock shift fork
 - (2) Differential lock sleeve
 - (3) Compression spring
 - (4) New "E" ring (2 pieces)
 - (5) Differential lock shift fork shaft.

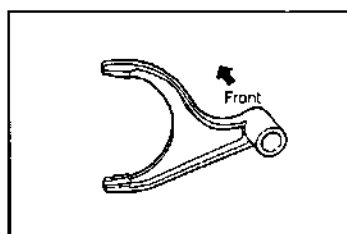


WFEB0-TR280

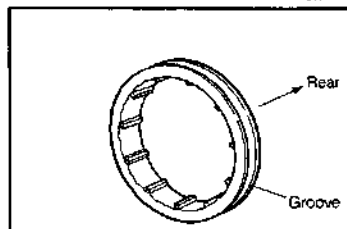
TRANSMISSION & TRANSFER

NOTE:

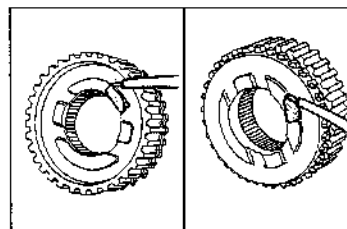
- The shape of R section of the transfer differential lock shift fork faces toward the upside as shown in the right figure illustration.
 - Ensure that the groove section of the differential lock sleeve comes at the transfer rear case.
6. Apply gear oil on both end sections of the transfer front drive hub as shown in the right figure illustration.
7. Install the transfer front drive hub.
8. Turn the differential lock shift fork shaft 180 degrees, using the pin punch or the like.



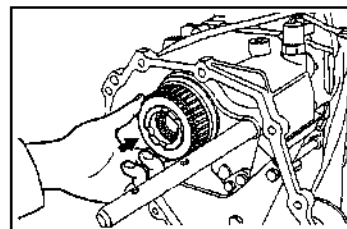
WPES0-TR251



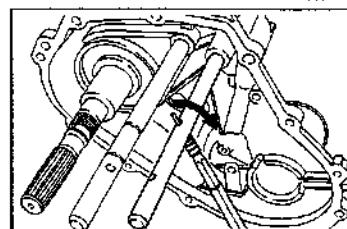
WPES0-TR252



WPES0-TR253



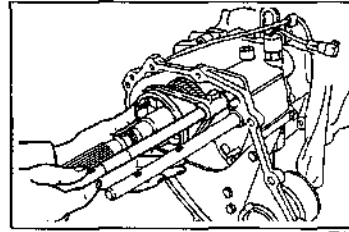
WPES0-TR254



WPES0-TR255

TRANSMISSION & TRANSFER

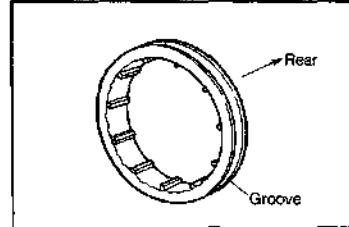
9. Install the following parts in a set.
 - (1) Differential lock sleeve
 - (2) Transfer front drive shift fork shaft
 - (3) Transfer front drive shift fork
 - (4) New "E" rings (2 pieces)



WP590-TR266

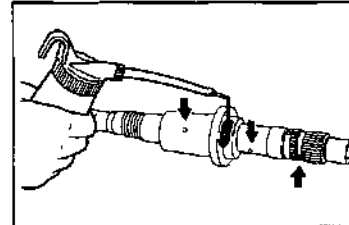
NOTE:

- Ensure that the groove section of the differential lock sleeve comes at the transfer rear case.



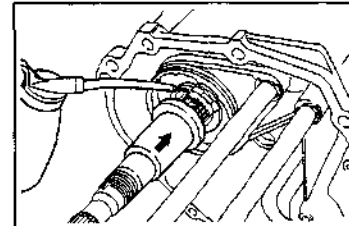
WP590-TR267

10. Fully apply gear oil to the oil hole in the transfer rear output shaft.



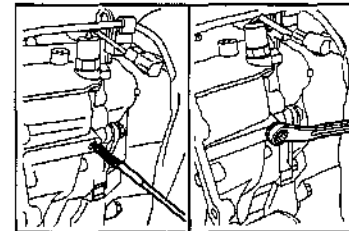
WP590-TR268

11. Apply gear oil to the outer periphery of the two-split needle roller bearing, and insert it together with the transfer rear output shaft into the differential assembly.



WP590-TR269

12. Turn the differential lock shift fork shaft 180 degree.
 13. Install the roller and compression spring.
 14. With the new gasket used, install the bolt and tighten it.
- Tightening Torque: 18.6 - 30.4 N·m (1.9 - 3.1 kgf·m)

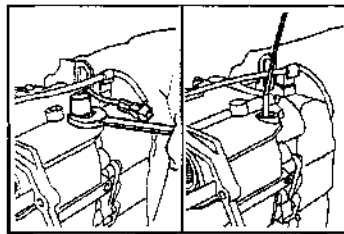


WP590-TR290

TRANSMISSION & TRANSFER

15. Install the roller (long size).
16. With the new gasket used, install the transmission position detect switch assembly and tighten it.

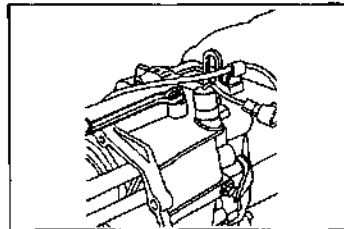
Tightening Torque: 29.4 - 49.0 N·m (3.0 - 5.0 kgf·m)



WF50-TR201

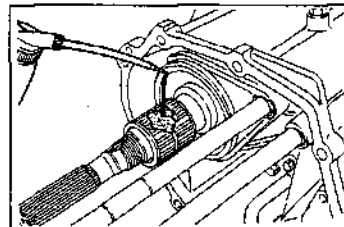
17. Install the ball and compression spring.
18. With the new gasket used, install the bolt and tighten it.

Tightening Torque: 18.6 - 30.4 N·m (1.9 - 3.1 kgf·m)



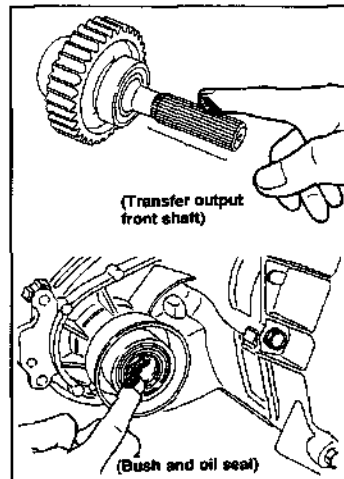
WF50-TR202

19. Apply gear oil to the outer surface of the needle roller bearing, and mount it on the transfer rear output shaft.



WF50-TR203

20. Apply lithium-based multi-purpose grease to the following parts.
 - (A) Spline section of the transfer output front shaft
 - (B) Lip section of the oil seal
 - (C) Inner surface of the bush



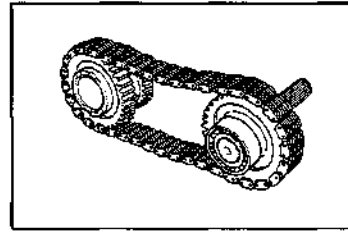
WF50-TR204

TRANSMISSION & TRANSFER

21. Install the transfer front drive chain and transfer front drive gear together with the transfer output front shaft.

NOTE:

- The front drive chain can be installed in any direction.
- Be careful not to damage the lip section of the oil seal during the installation.



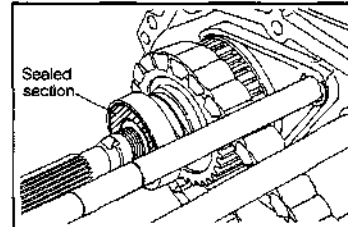
WP590-TR296

22. Install the transfer output gear thrust washer to the transfer output rear shaft.

23. Temporarily install the bearing to the transfer output rear shaft.

CAUTION:

- Sealed section of the bearing faces toward the transfer rear case.
- If the above installation should fail to be performed, failure to observe this caution may cause seizure or gear noise.



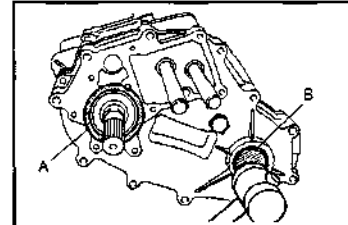
WP590-TR296

24. Apply gear oil to each of the bearings.

25. Install the transfer rear case with the new gasket interposed.

NOTE:

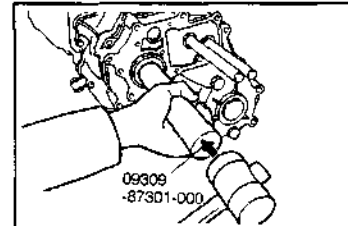
- Lightly tapping the transfer rear case A, B sections evenly and alternately, using the plastic hammer.



WP590-TR297

26. Install the bearing, using the following SST:

SST: 09309-87301-000

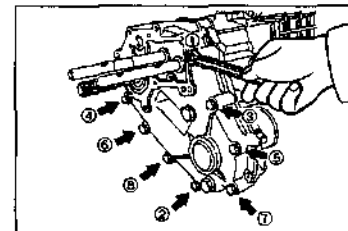


WP590-TR298

27. Tighten the transfer rear case with the eight bolts.
Tightening Torque: 29.4 - 44.1 N·m (3.0 - 4.5 kgf·m)

NOTE:

- Be sure to tighten the bolts alternately and diagonally. (The illustration at the right figure indicates a typical example of the tightening sequence.)



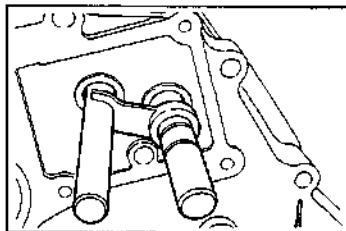
WP590-TR299

TRANSMISSION & TRANSFER

28. Install the transfer front drive shift head No. 2.

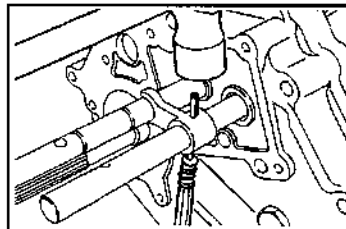
NOTE:

- Apply the gear oil to the outer periphery of the differential lock shift fork shaft and transfer front drive shift fork shaft, prior to install the transfer front drive shift head No.2.



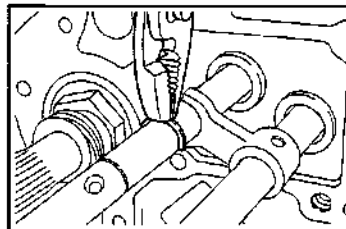
WPES0-TR300

29. Drive the new slotted pin into the position, using the pin punch as shown in the right figure illustration.



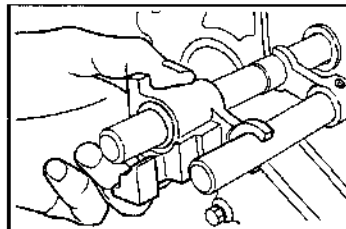
WPES0-TR301

30. Install the new E-ring to the transfer front drive shift fork shaft.



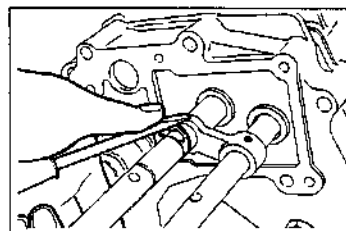
WPES0-TR302

31. Install the transfer high & low shift head.



WPES0-TR303

32. Install the new E-ring on the transfer front drive shift.



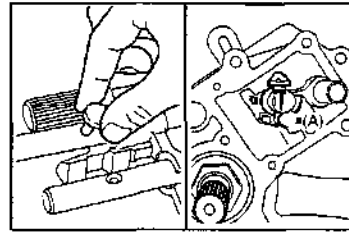
WPES0-TR304

TRANSMISSION & TRANSFER

33. Insert the transfer fork shaft pin into the transfer front drive shift fork shaft.

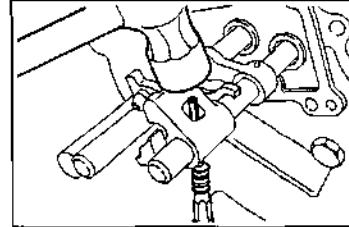
NOTE:

- Make sure that the cut-out section (A) of transfer fork shaft pin comes toward the transfer front drive shift head No. 2.



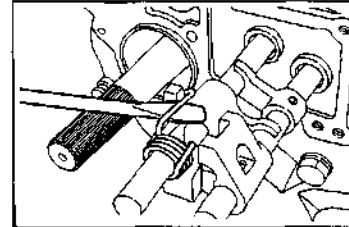
WPFB0-TR305

34. Drive the new slotted pin into the position, using the pin punch as shown in the right figure illustration.



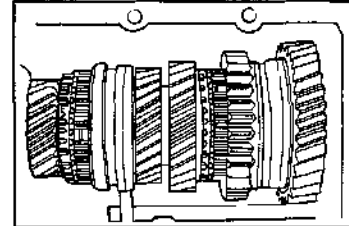
WPFB0-TR306

35. Install the torsion bar spring, using the standard tool of flat drive.



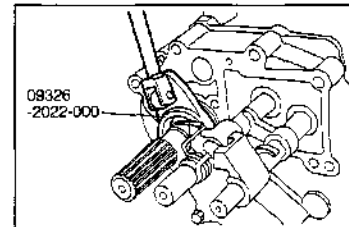
WPFB0-TR307

36. Interlock the 1st gear and the 3rd gear.



WPFB0-TR308

37. Tighten the lock nut using the following SST:
SST: 09326-20022-000
Tightening Torque: 137.0 - 196.0 N·m
(14.0 - 20.0 kgf·m)

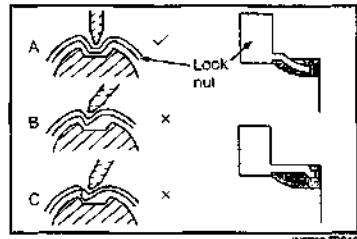


WPFB0-TR309

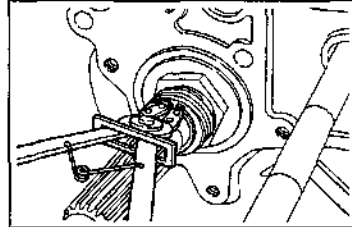
TRANSMISSION & TRANSFER

NOTE:

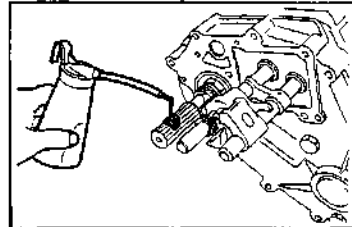
- When staking the lock nut, point a suitable staking tool toward the transmission output shaft rear axis center and stake to lock nut securely as shown in the right figure A.
- Poor staking may cause abnormal noise as shown in the right figure illustration B and C.



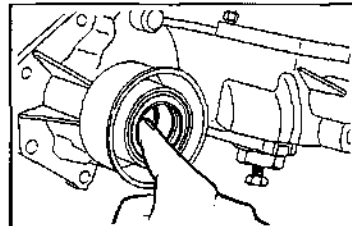
38. Install the speedometer driven gear and ball into the position.
39. Install the new snap ring.



40. Apply lithium-based multi-purpose grease to the spline section of the transfer rear output shaft.



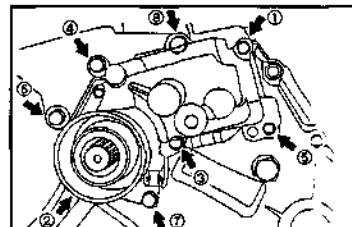
41. Apply the THREE BOND 1324 (made by THREE BOND) to the threads of the bolts.
42. Apply lithium-based multi-purpose grease to the lip section of the oil seal and an inner surface of the bush.



43. Install the transfer rear output bearing retainer with the new gasket interposed, and tighten the retainer with eight bolts.
- Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)

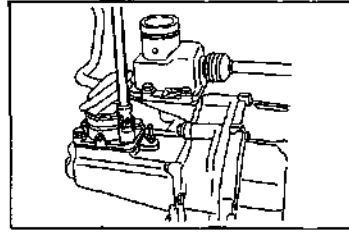
NOTE:

- Be sure to tighten the bolts alternately and diagonally. (The illustration at the right figure indicates a typical example of tightening sequence.)

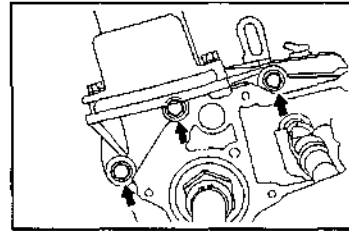


TRANSMISSION & TRANSFER

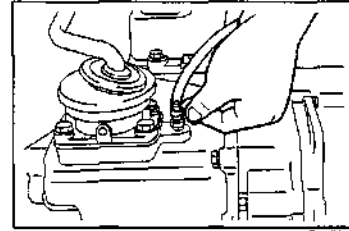
44. Apply the THREE BOND 1324 (made by THREE BOND) to the section of the bolts.
45. Mount the transfer shift lever retainer subassembly with the new gasket interposed, and tighten the subassembly with four bolts.
- Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)



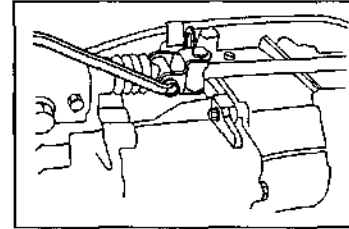
46. Install the control shaft lower bracket No. 1 with installed the control shift lever retainer subassembly with the two hexagon bolt and the bolt and tighten them.
- Tightening Torque: 29.4 - 44.1 N·m (3.0 - 4.5 kgf·m)



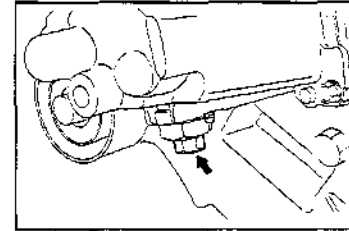
47. Connect the breather hose with a clip.



48. Apply the THREE BOND 1324 (made by THREE BOND) to the threads of the bolts.
49. Install down the shift lever retainer subassembly with the hexagon bolt.
- Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)



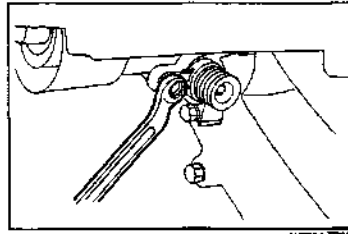
50. Tighten the set bolt.
- Tightening Torque: 29.4 - 44.1 N·m (3.0 - 4.5 kgf·m)



TRANSMISSION & TRANSFER

51. Install the speedometer sleeve on the transfer rear output bearing retainer, and tighten the sleeve using the speedometer sleeve lock plate and bolts.

Tightening Torque: 6.9 - 9.8 N·m (0.7 - 1.0 kgf-m)










52. Remove the transmission assembly with transfer from the overhauling stand, and install to the vehicle (see pages MT-121 to MT-125 for the remounting procedure).

WFEB0-TR321

TRANSMISSION & TRANSFER

SSTs

Shape	Part No.	Part Name
	09219-87202-000	Engine overhaul stand
	09219-87203-000	Valve guide bush remover & replacer
	09309-87201-000	Transmission bearing replacer
	09309-87301-000	Output shaft bearing replacer
	09310-87102-000	Counter shaft rear bearing replacer
	09950-20017-000	Universal puller
	09956-00010-000	Tightening piece

WP000-TR022

TRANSMISSION & TRANSFER

SERVICE SPECIFICATIONS

TRANSFER (PART TIME)

Unit: mm

Item			Specified value	Allowable limit	Remarks
Transfer high & low clutch sleeve installation width with the transfer high & low shift fork			7.05 - 7.12	7.3	
Transfer high & low shift fork			6.80 - 7.00	6.3	
Transfer front drive gear	Class	2	87.28 - 87.34	—	Outer diameter
		1	87.18 - 87.24	—	
		3	87.08 - 87.14	—	
Differential lock sleeve	Class	2	87.371 - 87.47	—	Bore diameter
		1	87.271 - 87.37	—	
		3	87.17 - 87.27	—	
Transfer front drive gear × Differential lock sleeve clearance			0.03 - 0.19	—	
Differential lock sleeve tilt width (Assembled to the transfer front drive gear)			—	Not to exceed 0.5	
Transfer output rear shaft			41.975 - 41.991	41.960	
Front drive gear sleeve contact width of front drive shift fork			6.8 - 6.9	6.3	
Transfer output rear shaft	Class	2	69.78 - 69.84	—	Outer diameter
		1	69.68 - 69.74	—	
		3	69.58 - 69.64	—	
Transfer high & low clutch sleeve	Class	2	69.871 - 69.97	—	Bore diameter
		1	69.771 - 69.87	—	
		3	69.67 - 69.77	—	
Transfer output rear shaft × Transfer high & low clutch sleeve clearance			0.03 - 0.19	—	
Transfer high & low clutch sleeve tilt width (Assembled to the transfer output rear shaft)			—	Not to exceed 0.5	—
Contact width of transfer high & low shift head			16.000 - 16.070	16.200	—
Contact width of transfer front drive shift head			16.000 - 16.070	16.200	—

WPB90-TR323

TRANSFER (FULL TIME)

Contact width of differential lock sleeve	7.000 - 7.068	7.300	—
Contact width of transfer front drive shift fork	6.8 - 6.9	6.3	
Contact width of differential lock shift	6.8 - 6.9	6.3	

WFE90-TR324

TRANSMISSION & TRANSFER

TRANSFER (FULL TIME)

Unit: mm

Transfer output rear shaft	Section (A)		25.991 - 26.000	25.941 - 25.950	
	Section (B)		37.975 - 37.991	37.925 - 37.941	
	Section (C)		27.955 - 28.0045	27.905 - 27.9545	
Transfer front drive hub	Class	2	87.28 - 87.34		
		1	87.18 - 87.24		
		3	87.08 - 87.14		
Differential lock sleeve	Class	2	87.371 - 87.470		
		1	87.271 - 87.370		
		3	87.170 - 87.270		
Transfer front drive hub x Differential lock sleeve clearance			0.03 - 0.19	—	—
Differential lock sleeve tilt width (Assembled to the transfer front drive hub)			—	Not to exceed 0.5	—
Transfer front drive gear	Class	2	87.28 - 87.34	—	Outer diameter
		1	87.18 - 87.24	—	
		3	87.08 - 87.14	—	
Differential lock sleeve	Class	2	87.371 - 87.47		Bore diameter
		1	87.271 - 87.37		
		3	87.17 - 87.27		
Transfer front drive gear x Differential lock sleeve clearance			0.03 - 0.19	—	
Differential lock sleeve tilt width (Assembled to the transfer front drive gear)			—	Not to exceed 0.5	

WFE90-TR93S

TRANSMISSION & TRANSFER

TIGHTENING TORQUE

TRANSFER (PART TIME)

Tightening component	Tightening torque		
	kgf-m	ft-lb	N-m
T/F adapter case x T/M case	3.0 - 4.5	21.7 - 32.5	29.4 - 44.1
T/F low speed input gear x Lock nut	18.0 - 22.0	130.0 - 159.0	177.0 - 216.0
T/F front case x T/F adapter case	3.0 - 4.5	21.7 - 32.5	29.4 - 44.1
Bolt for transfer high & low shift fork shaft x T/F front case	1.9 - 3.1	13.7 - 22.4	18.6 - 30.4
Bolt for T/F front drive shift fork shaft x T/F front case	1.9 - 3.1	13.7 - 22.4	18.6 - 30.4
Transposition detect switch x T/F front case	3.0 - 5.0	21.7 - 36.2	29.4 - 49.0
T/F rear case x T/F front case	3.0 - 4.5	21.7 - 32.5	29.4 - 44.1
T/F rear output shaft x Lock nut	14.0 - 20.0	101.0 - 145.0	137.0 - 196.0
Output shaft bearing retainer x T/F rear case	1.5 - 2.2	10.8 - 15.9	14.7 - 21.6
Speedometer sleeve lock plate x Output shaft bearing retainer	0.7 - 1.0	5.1 - 7.2	6.9 - 9.8
Control shaft lower No. 1 bracket x T/F rear case	3.0 - 4.5	21.7 - 32.5	29.4 - 44.1
T/F shift lever retainer x Output shaft bearing retainer	1.5 - 2.2	10.8 - 15.9	14.7 - 21.6
Control shift lever retainer x Control shaft lower No. 1 bracket	1.5 - 2.2	10.8 - 15.9	14.7 - 21.6
Control shaft x Shift & select shaft No. 1	3.0 - 4.5	21.7 - 32.5	29.4 - 44.1

WPED-TR325

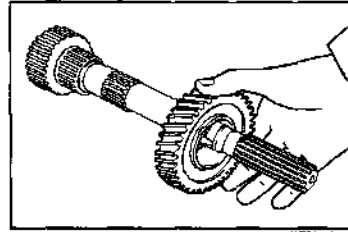
TRANSFER (FULL TIME)

Tightening component	Tightening torque		
	kgf-m	ft-lb	N-m
T/F oil pump body x T/F adapter case	1.5 - 2.2	10.8 - 15.9	14.7 - 21.6
T/F oil strainer tube x T/F oil pump body	0.7 - 1.0	5.1 - 7.2	6.9 - 9.8
T/F oil pump body x Lock nut	18.0 - 22.0	130.0 - 159.0	177.0 - 216.0
T/F oil strainer x T/F adapter case	1.5 - 2.2	10.8 - 15.9	14.7 - 21.6
T/F oil pump cover x T/F adapter case	1.5 - 2.2	10.8 - 15.9	14.7 - 21.6
Bolt for differential lock shift fork shaft x T/F front case	1.9 - 3.1	13.7 - 22.4	18.6 - 30.4
Bolt for transfer front drive shift fork shaft x T/F front case	1.9 - 3.1	13.7 - 22.4	18.6 - 30.4
T/F output rear shaft x Lock nut	14.0 - 20.0	101.0 - 145.0	137.0 - 196.0
T/F front drive shift lock sleeve x Output shaft bearing retainer	5.0 - 7.0	36.2 - 50.6	49.0 - 68.6
Bolt for shift preventive x T/F front drive shift lock sleeve	3.0 - 4.5	21.7 - 32.5	29.4 - 44.1

WPED-TR327

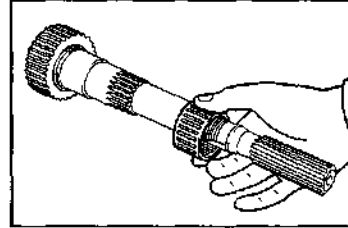
TRANSMISSION & TRANSFER

3. Remove the transfer low speed output gear from the transfer output rear shaft.



WP230-TR028

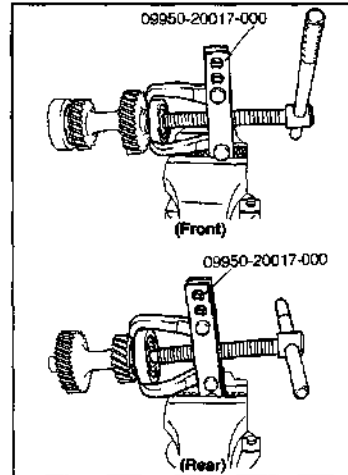
4. Remove the needle roller bearing from the transfer output rear shaft.



WP230-TR029

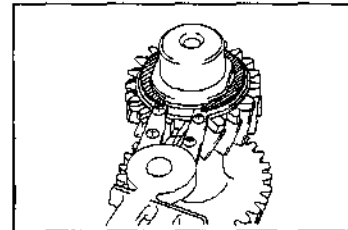
DISASSEMBLY OF TRANSFER COUNTER GEAR

1. Set the SST in a vice with the transfer counter gear installed. Remove the front and rear bearings.
SST: 09950-20017-000



WP230-TR030

2. Remove the snap ring, using the standard tool of snap ring plier.
NOTE:
 - Never reuse the removed snap ring.



WP230-TR031

DAIHATSU F300

PROPELLER SHAFTS

FRONT PROPELLER SHAFT	PR- 2
SECTIONAL VIEW	PR- 2
TROUBLE SHOOTING	PR- 2
PROPELLER SHAFT (FRONT & REAR) ...	PR- 3
COMPONENTS	PR- 3
REPLACEMENT OF PROPELLER SHAFT	
WITH NEW ONE (FRONT)	PR- 4
Case where propeller shaft is reused ...	PR- 5
REPLACEMENT OF UNIVERSAL JOINT	
SPIDER (FRONT)	PR- 6
REAR PROPELLER SHAFT	PR-13
SECTIONAL VIEW	PR-13
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REPLACEMENT OF PROPELLER SHAFT	
WITH NEW ONE (REAR)	PR-14
Case where propeller shaft is reused ...	PR-15
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WPE90-PR001

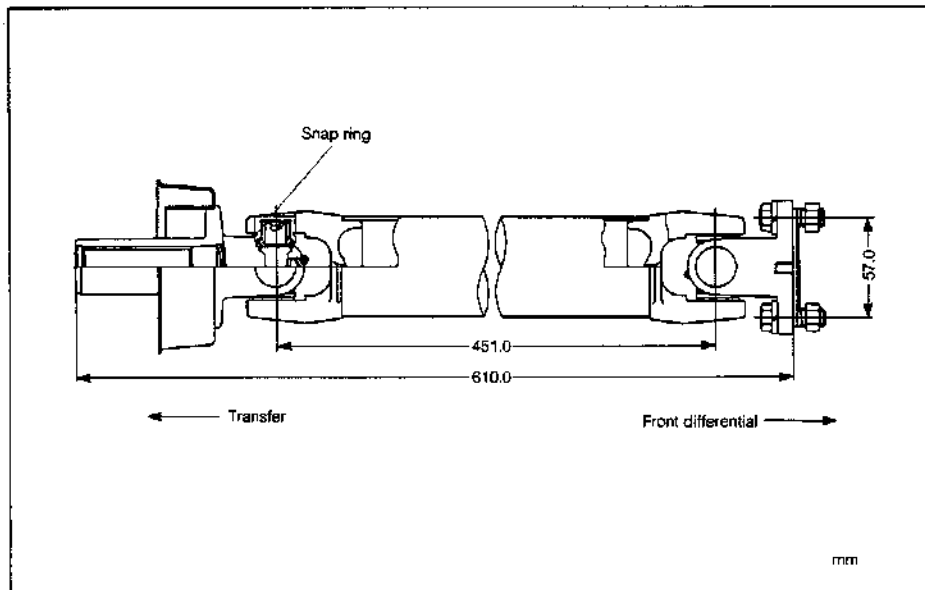
PROPELLER SHAFTS

FRONT PROPELLER SHAFT

The front propeller shaft employs a two-joint type.

Furthermore, the universal joint spiders adopt an inner snap ring as its securing method.

SECTIONAL VIEW



WPBQ-PROB4

Propeller shaft specification

mm

Kind	Item	Dimensions of propeller shaft (Length × outer dia.)
Front propeller shaft		610.0 × 57.0

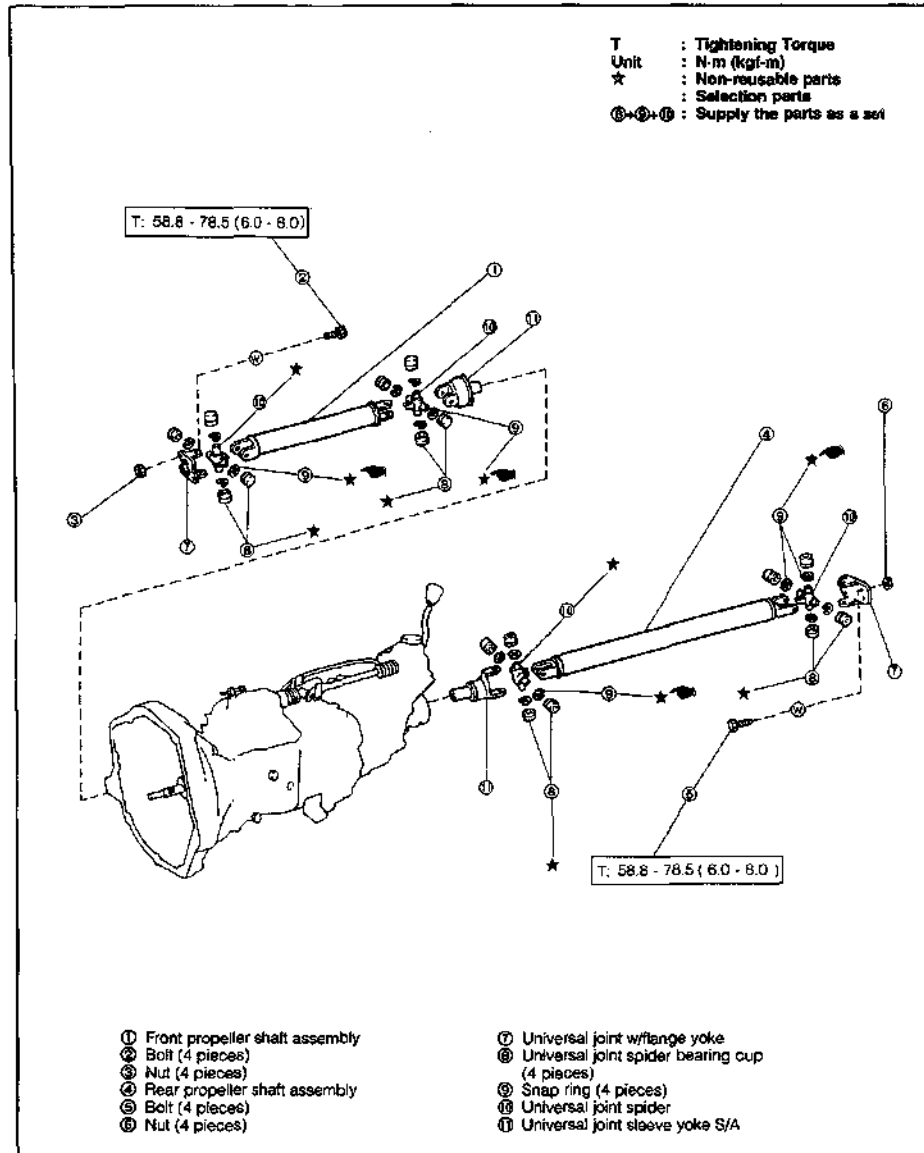
WPE90-PROB5

TROUBLE SHOOTING

Symptom	Possible causes	Checking points
Abnormal noise Vibration	<ul style="list-style-type: none"> • Universal joint improperly lubricated • Universal joint spider section damaged • Runout or damage of propeller shaft 	<ul style="list-style-type: none"> • Lubrication to grease nipple • Check universal joint. • Check propeller shaft for runout.

WPE90-PROB6

PROPELLER SHAFT (FRONT & REAR) COMPONENTS



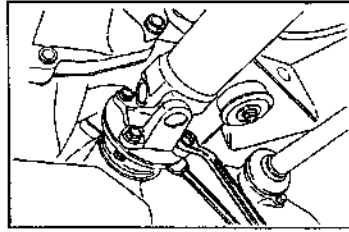
WPES04R0002

PROPELLER SHAFTS

REPLACEMENT OF PROPELLER SHAFT WITH NEW ONE (FRONT)

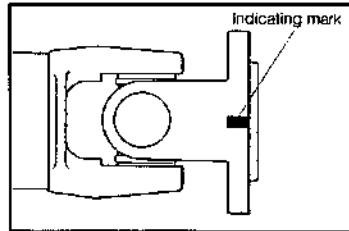
REMOVAL

1. Remove the front propeller shaft assembly by removing the four bolts.

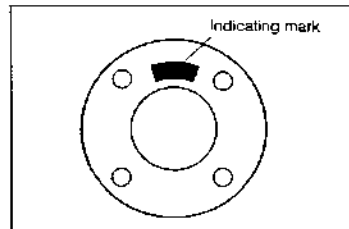


INSTALLATION

1. Confirm the installation indicating mark on the front differential attaching surface of the front propeller shaft.



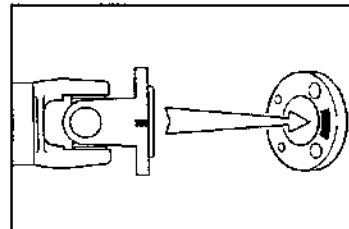
2. Confirm the installation indicating mark on (painted with pink) the front propeller shaft attaching surface of the front differential companion flange.



3. Install the propeller shaft in such a way that the installation indicating mark of the front propeller shaft may be lined up with the installation indicating mark of the front differential companion flange.

CAUTION:

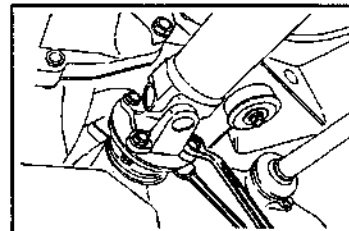
- If this operation should fail to be performed correctly, the propeller shaft may emit abnormal noise or vibration.



4. Install the front propeller shaft assembly with the four bolts, four spring washers, four nuts and then, tighten the nuts.

Tightening Torque:

58.8 - 78.5 N·m (6.0 - 8.0 kgf·m)



PROPELLER SHAFTS

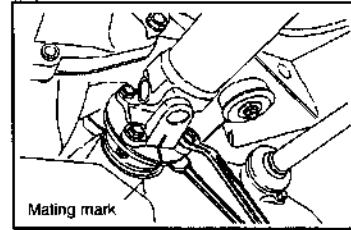
Case where propeller shaft is reused

REMOVAL

1. Remove the front propeller shaft by removing the four bolts.

CAUTION:

- Prior to the removal, mating marks should be put on each of the flange yoke and companion flange of the front differential.
- If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration during the running.

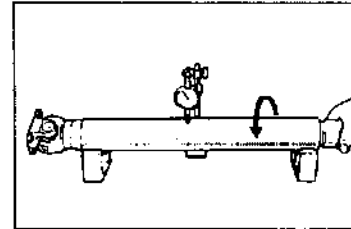


INSPECTION

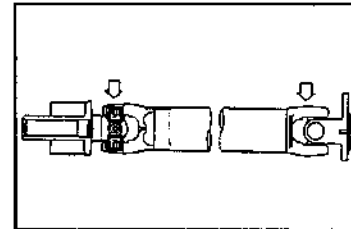
1. With a dial gauge placed at the center of the propeller shaft, measure the runout.

Allowable Runout Limit: 0.5 mm

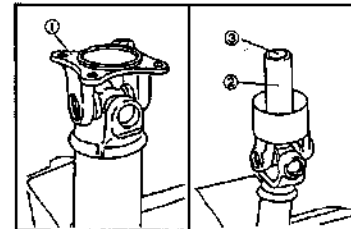
Replace to the new front propeller shaft, if the runout is exceed than 0.5 mm



2. Check to see if any damage is present at the seal of the spider section of the universal joint.

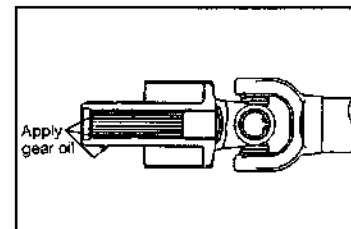


3. Check the flange yoke and sleeve yoke.
 - (1) Inspect to see if any damage is present at the differential drive pinion companion flange-contact section ①.
 - (2) Check the oil seal sliding section ② for damage or wear.
 - (3) Check the spline ③ for damage or wear.
 - (4) Fit the sleeve yoke onto the sliding spline of the transmission output shaft. Ensure that the spline exhibits no looseness in the rotation direction and the sleeve can slide freely in the axial direction on the spline.



INSTALLATION

1. Apply gear oil to both the inner and outer sides of the propeller shaft sleeve.



PROPELLER SHAFTS

2. Install the propeller shaft with the mating marks that were put during the removal of the propeller shaft aligned with each other.

Tightening Torque:

58.8 - 78.5 N·m (6.0 - 8.0 kgf-m)

CAUTION:

- Make sure to line up those mating marks that were put during the removal of the front propeller shaft. If this caution should fail to be observed, the propeller shaft may emit abnormal noise or vibration.

REPLACEMENT OF UNIVERSAL JOINT SPIDER SUBASSEMBLY (FRONT)

1. Move the center of the propeller shaft in up-&-down and right-&-left directions so as to check the universal joint spider for excessive play by hand feeling.

NOTE:

- The removal procedure for the universal joint spider subassembly is the same both at the sleeve yoke side and at the flange yoke side. Therefore, the procedure for the sleeve yoke (at the differential side) only is described here.

2. Remove the front propeller shaft by removing the four bolts.

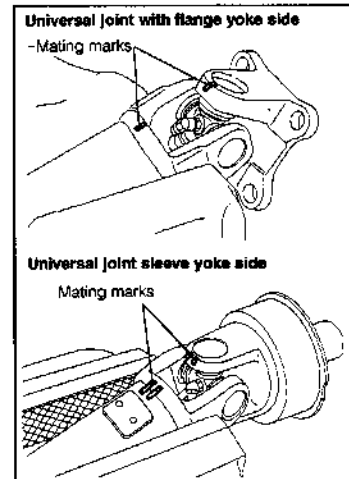
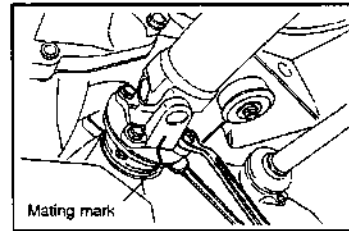
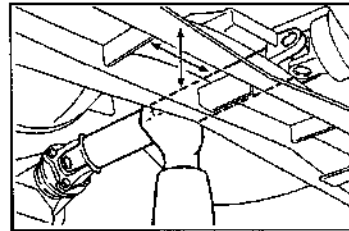
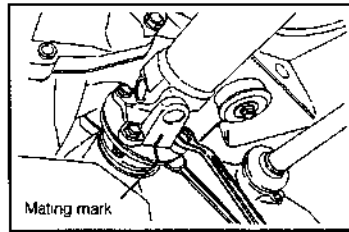
CAUTION:

- Prior to the removal, mating marks should be put on each of the flange yoke and companion flange of the front differential.
- If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration during the running.

3. Put different paint mating marks on the propeller shaft and each of the yoke side sections (universal joint sleeve yoke subassembly and universal joint with flange yoke). (The illustration in the right figure indicates an example of mating marks.)

CAUTION:

- If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration during the running.

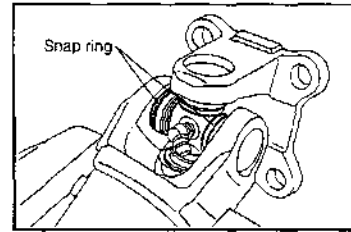


PROPELLER SHAFTS

4. Set the propeller shaft on a vise. Remove the snap ring, using a hammer and a standard screwdriver. (Arrow-headed section in the right figure)

CAUTION:

- Never clamp the balancer weight section of the propeller shaft in a vise.
- Never reuse the snap ring.

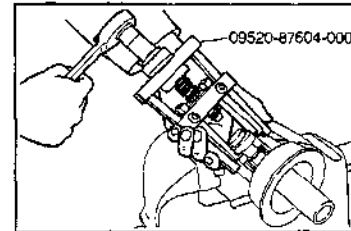


WPES0-PR014

5. Push down the right and left universal joint spider bearing cups, using the following SST.
SST: 09520-87604-000

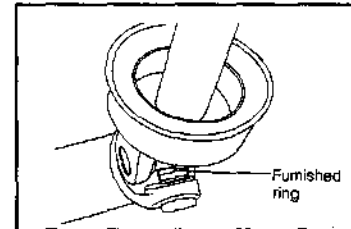
NOTE:

- At this stage, the universal joint spider bearing cups can not be removed completely.



WPES0-PR015

6. Lift the sleeve yoke. Install a furnished ring to the shaft section of the universal joint spider.

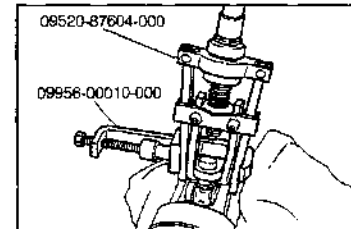


WPES0-PR016

7. Remove the universal joint spider bearing cup at one side, using the suitable socket wrench and the following SSTs.
SST: 09520-87604-000
09956-00010-000

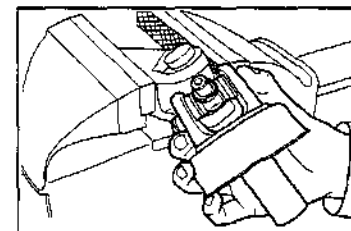
CAUTION:

- Never reuse the removed universal joint spider bearing cup.



WPES0-PR017

8. Remove the universal joint sleeve yoke from the propeller shaft.



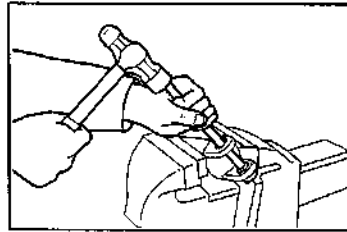
WPES0-PR018

PROPELLER SHAFTS

9. Remove the universal joint spider bearing cup by lightly tapping it, using a hammer in combination with a suitable metal rod.

CAUTION:

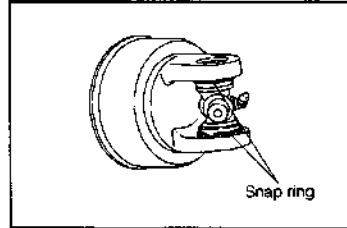
- Never reuse the removed universal joint spider bearing cup.



10. Remove the snap ring of the universal joint sleeve yoke.

CAUTION:

- Never reuse the removed snap ring.

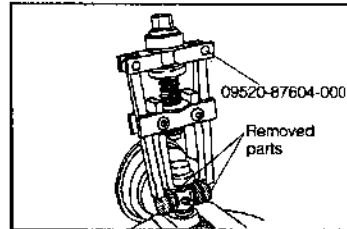


11. Install the two removed universal joint spider bearing cups to the universal joint spider. Then, push down the universal joint spider, using the following SST.

SST: 09520-87604-000

NOTE:

- At this stage, the universal joint spider bearing cups can not be removed completely.

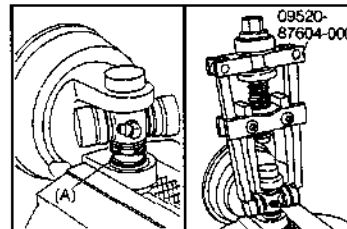


12. Install a furnished ring (A) to the shaft section of the universal joint spider. Then, remove the universal joint spider bearing cup at one side, using the following SST.

SST: 09520-87604-000

CAUTION:

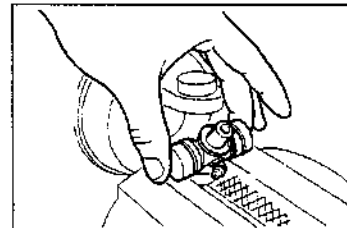
- Never reuse the removed universal joint spider bearing cup.



13. Remove the universal joint spider.

CAUTION:

- Never reuse the removed universal joint spider.

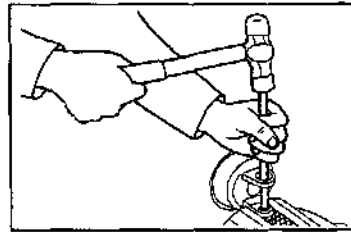


PROPELLER SHAFTS

14. Remove the universal joint spider bearing cup by lightly tapping it, using a hammer in combination with a suitable metal rod.

CAUTION:

- Never reuse the removed universal joint spider bearing cup.



WF890-PP026

INSPECTION

1. Conduct measurement at the two sections of A and B (cross direction) indicated in the right figure, using an inner dial gauge.

Specified Value:

Propeller Shaft

22.50 \pm 0.206 mm

22.50 \pm 0.201 mm

Sleeve and Flange Yoke

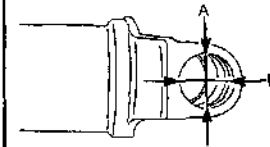
22.50 \pm 0.206 mm

22.50 \pm 0.201 mm

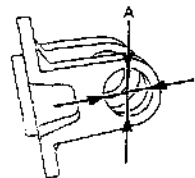
CAUTION:

- If the inner diameters of the sections A and B exceed the specified value above, replace the propeller shaft assembly with a new one.

Propeller shaft side



Sleeve and flange yoke side



WF890-PP026

INSTALLATION

1. The following parts are supplied in one set in the replacement parts for the universal joint spider subassembly.

(1) Universal joint spider 1 piece

(2) Universal joint spider bearing cup 4 pcs.

(3) Four kinds of snap ring

T = 1.20 mm

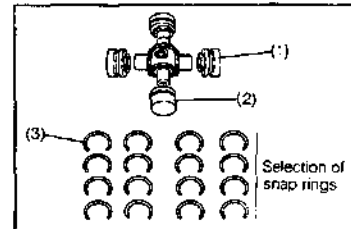
T = 1.25 mm

T = 1.30 mm

T = 1.35 mm

NOTE:

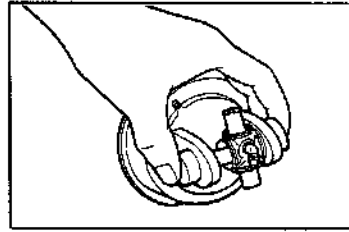
- Prior to using snap rings, be sure to measure the thickness of the snap rings by means of vernier calipers. Arrange the snap rings in order according to their thickness.



WF890-PP026

PROPELLER SHAFTS

2. Set a new universal joint spider to the universal joint sleeve yoke.
3. Temporarily install new universal joint spider bearing cups (two pcs.) to the universal joint with flange yoke, by pushing them with fingers.

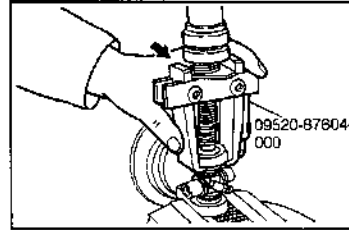


4. Install the right and left universal joint spider bearing cups, using the following SST.

SST: 09520-87604-000

NOTE:

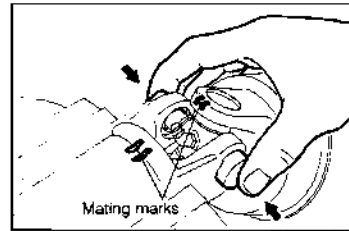
- Be sure to evenly press the right and left cups, until you can see the snap ring attaching groove provided on the outer periphery surface of the universal joint spider bearing cup.



5. Temporarily install the universal joint sleeve yoke subassembly to the propeller shaft.

CAUTION:

- Be sure to align the paint marks (at the propeller shaft and sleeve yoke sides) which were put before the removal with each other.
If the mating marks described above are not aligned with each other, it may cause abnormal vibration or abnormal noise of the propeller shaft.
- Make sure that the grease nipple faces toward the propeller shaft side.



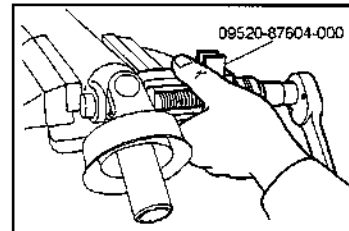
6. Temporarily install new universal joint spider bearing cups (right and left) to the propeller shaft by pushing them with finger.

7. Install the right and left universal joint spider bearing cups, using the following SST.

SST: 09520-87604-000

NOTE:

- Be sure to evenly press the right and left cups, until you can see the snap ring attaching groove provided on the outer periphery surface of the universal joint spider bearing cup.

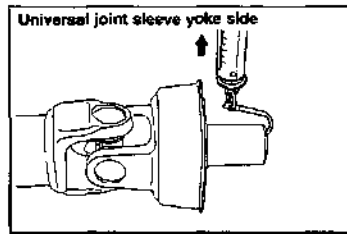


PROPELLER SHAFTS

8. Measurement of universal joint starting torque

- (1) Using a spring scale, install the selected snap ring so that the starting torque may fall within the specified range given below.

Specified Value: 0.029 - 1.47 N (0.003 - 0.15 kgf)

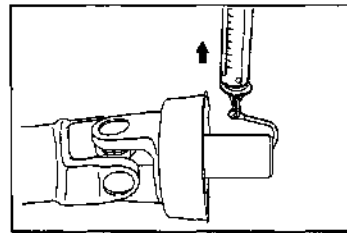


WPERO-PR031

- (2) Turn the propeller shaft 90 degrees. Measure the starting torque.

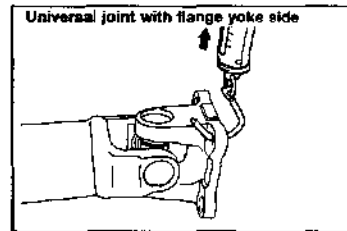
CAUTION:

- As regards the snap rings positioned symmetrically relative to the universal joint spider, in principle, it is required to use the snap rings having the same thickness.
- However, if the starting torque does not reach or exceeds the specified range despite the fact that the snap rings having the same thickness have been used, use a snap ring having one class higher or lower thickness.



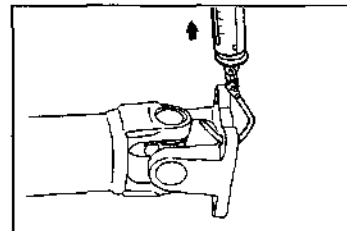
WPERO-PR032

- (3) Measure the starting torque, following the same procedure described above.



WPERO-PR033

- (4) Turn the propeller shaft 90 degrees. Measure the starting torque.

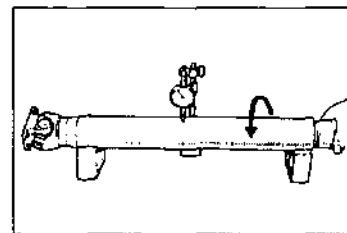


WPERO-PR034

9. With a dial gauge placed at the center of the propeller shaft, measure the runout.

Allowable Runout Limit: 0.5 mm

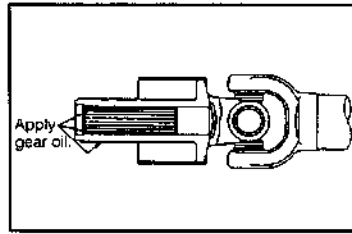
Replace to the new front propeller shaft, if the runout is exceed than 0.5 mm



WPERO-PR035

PROPELLER SHAFTS

10. Apply gear oil to both the inner and outer sides of the propeller shaft.



WP250-PR100

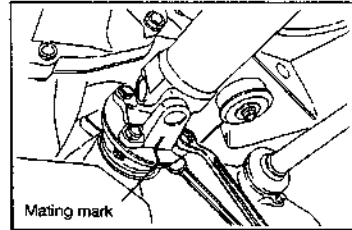
11. Install the propeller shaft with the mating marks that were put during the removal of the propeller shaft aligned with each other.

Tightening Torque:

58.8 - 78.5 N-m (6.0 - 8.0 kgf-m)

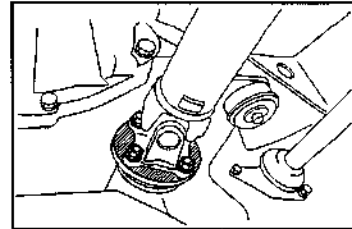
CAUTION:

- Make sure to line up those mating marks that were put during the removal of the front propeller shaft. If this caution should fail to be observed, the propeller shaft may emit abnormal noise or vibration.



WP250-PR037

12. After installing the propeller shaft, apply black paint to the exposed machined surface of the differential (slant line section in the right figure) as a rust preventive measure.
13. Apply lithium base multi-purpose grease to the grease nipples.



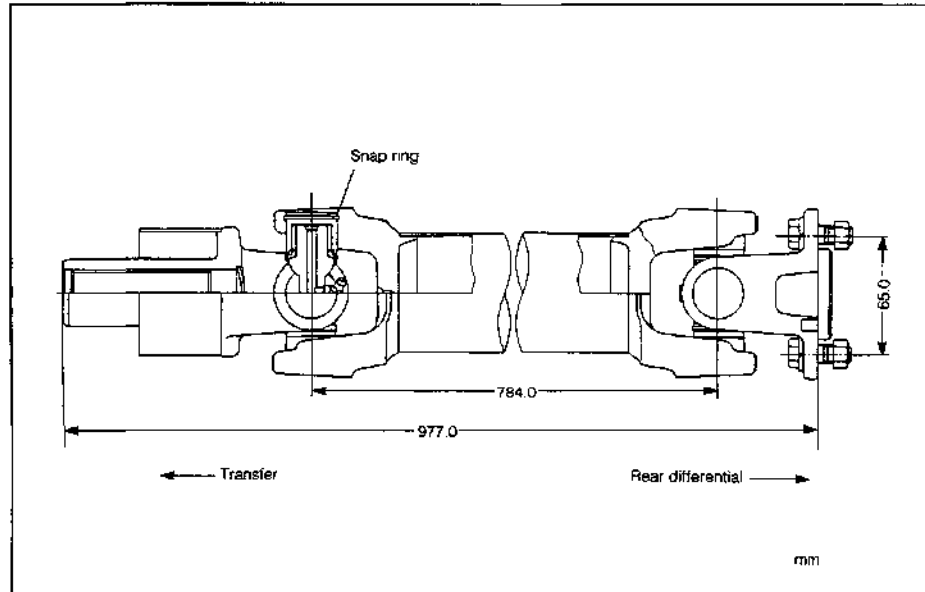
PROPELLER SHAFTS

REAR PROPELLER SHAFT

The rear propeller shaft employs a two-joint type. Furthermore, the universal joint spiders adopt an outer snap ring as its securing method.

WFE90-PR039

SECTIONAL VIEW



WFE90-PR040

Propeller shaft specifications

mm

Kind	Item	Dimensions of propeller shaft (Length x outer dia.)
Rear propeller shaft		977.0 x 65.0

WFE90-PR041

TROUBLE SHOOTING

Symptom	Possible causes	Checking points
Abnormal noise Vibration	<ul style="list-style-type: none"> Universal joint improperly lubricated Damage of universal joint spider section Runout or damage of propeller shaft Imbalance of propeller shaft 	<ul style="list-style-type: none"> Lubrication to grease nipples Check universal joints. Check propeller shaft for runout. Check mating marks that were put during installation or removal.

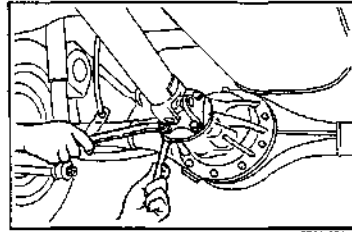
WFE90-PR042

PROPELLER SHAFTS

REPLACEMENT OF PROPELLER SHAFT WITH NEW ONE (REAR)

REMOVAL

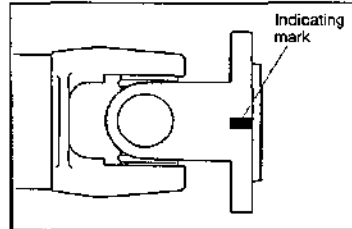
1. Remove the rear propeller shaft assembly by removing the four bolts.



WFEB0-PR043

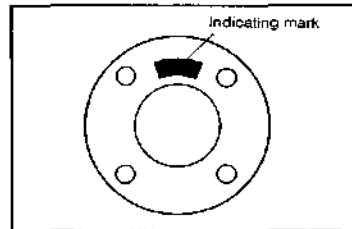
INSTALLATION

1. Confirm the installation indicating mark on the front differential attaching surface of the front propeller shaft.



WFEB0-PR044

2. Confirm the installation indicating mark on the front propeller shaft attaching surface of the front differential companion flange.

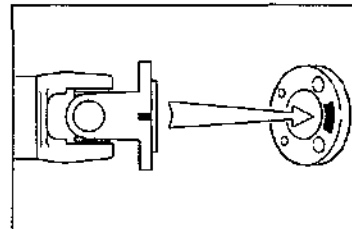


WFEB0-PR045

3. Install the propeller shaft in such a way that the installation indicating mark of the front propeller shaft may be lined up with the installation indicating mark of the front differential companion flange.

CAUTION:

- Prior to the removal, mating marks should be put on each of the flange yoke and companion flange of the rear differential.
- If this operation should fail to be performed correctly, the propeller shaft may emit abnormal noise or vibration.

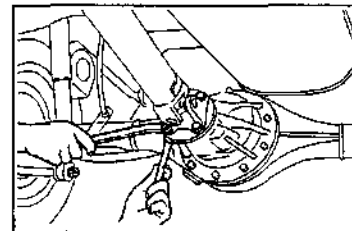


WFEB0-PR046

4. Install the rear propeller shaft assembly with the four bolts, four spring washers, four nuts and then, tighten the bolts.

Tightening Torque:

58.8 - 78.5 N·m (6.0 - 8.0 kgf·m)



WFEB0-PR047

PROPELLER SHAFTS

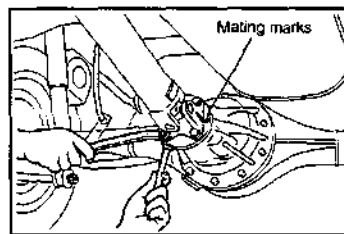
Case where propeller shaft is reused

REMOVAL

1. Remove the rear propeller shaft assembly by removing the four bolts.

CAUTION:

- Prior to the removal, mating marks should be put on each of the flange yoke and companion flange of the rear differential.
- If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration during the running.

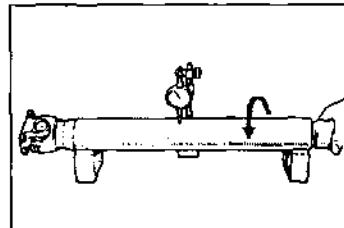


INSPECTION

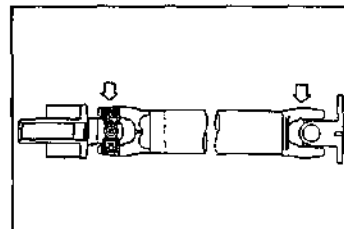
1. Measure the runout with a dial gauge set to the center of the propeller shaft.

Allowable Runout: 0.5 mm

Replace to the new propeller shaft, if the runout is exceed than 0.5 mm



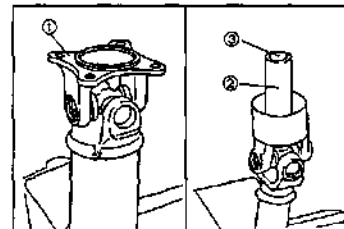
2. Check the oil seal of the universal joint spider section for damage.



3. Check the flange yoke and sleeve yoke.

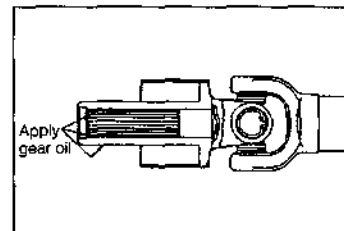
- (1) Inspect to see if any damage is present at the differential drive pinion companion flange-contact section ①.
- (2) Check the oil seal sliding section ② for damage or wear.
- (3) Check the spline ③ for damage or wear.
- (4) Fit the sleeve yoke onto the sliding spline of the transmission output shaft.

Ensure that the spline exhibits no looseness in the rotation direction and the sleeve can slide freely in the axial direction on the spline.



INSTALLATION

1. Apply gear oil to both the inner and outer sides of the propeller shaft.



PROPELLER SHAFTS

2. Install the rear propeller shaft assembly with the four bolts, four spring washers, four nuts then, tighten the nuts.

Tightening Torque:

58.8 - 78.5 N·m (6.0 - 8.0 kgf-m)

CAUTION:

- Make sure to line up those scribing lines that were put during the removal of the rear propeller shaft. If this caution should fail to be observed, the propeller shaft may emit abnormal noise or vibration.

REPLACEMENT OF UNIVERSAL JOINT SPIDER SUBASSEMBLY (REAR)

1. Move the center of the propeller shaft in up-&-down and right-&-left directions so as to check the universal joint spider for excessive play by hand feeling.

NOTE:

- The removal procedure for the universal joint spider subassembly is the same both at the sleeve yoke side and at the flange yoke side. Therefore, the procedure for the flange yoke (at the differential side) only is described here.

2. Remove the rear propeller shaft assembly by removing the four bolts.

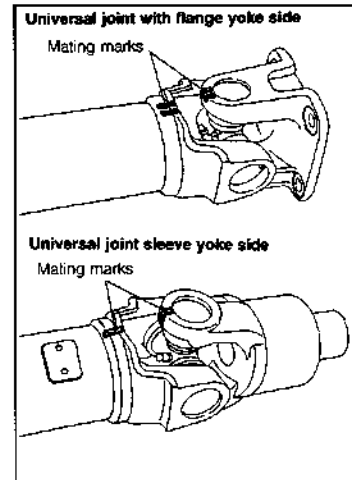
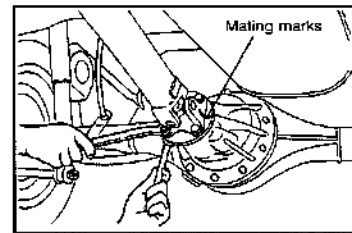
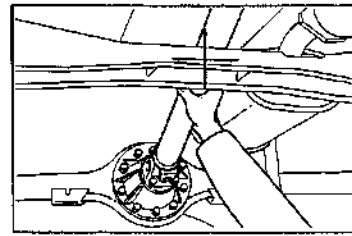
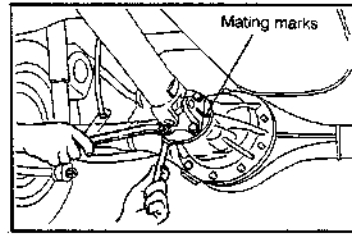
CAUTION:

- Prior to the removal, mating marks should be put on each of the flange yoke and companion flange of the rear differential.
- If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration during the running.

3. Put different paint mating marks on the propeller shaft and each of the yoke side sections (universal joint sleeve yoke subassembly and universal joint with flange yoke). (The illustration in the right figure indicates an example of mating marks.)

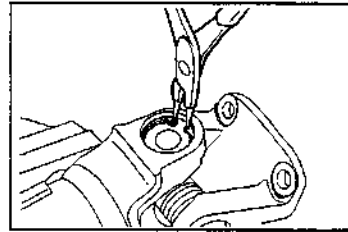
CAUTION:

- If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration during the running.



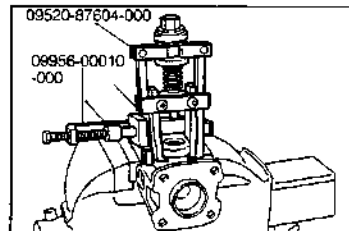
PROPELLER SHAFTS

4. Clamp the cut-out section of the propeller shaft in a vise.
 5. Remove the right and left snap rings with snap ring pliers.
- CAUTION:**
- Never reuse the removed snap rings.



WPB0-PR057

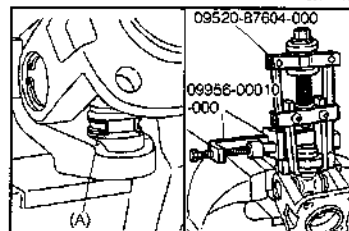
6. Push down the right and left universal joint spider bearing cups, using the suitable wrench box and the following SSTs.
- SST: 09520-87604-000
09956-00010-000



WPB0-PR058

- NOTE:**
- At this stage, the universal joint spider bearing cups can not be removed completely.

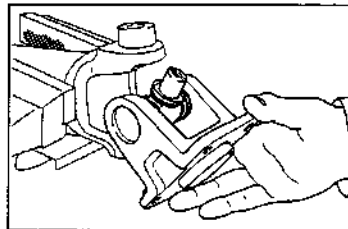
7. Install a furnished ring (A) to the shaft section of the universal joint spider. Remove the universal joint spider bearing cup at one side, using the following SST.
- SST: 09520-87604-000
09956-00010-000



WPB0-PR059

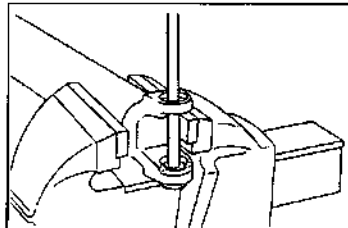
- CAUTION:**
- Never reuse the removed universal joint spider bearing cups.

8. Remove the universal joint with flange yoke from the propeller shaft.



WPB0-PR060

9. Remove the universal joint spider bearing cup by lightly tapping it, using a hammer in combination with a suitable metal rod.
- CAUTION:**
- Never reuse the removed universal joint spider bearing cup.



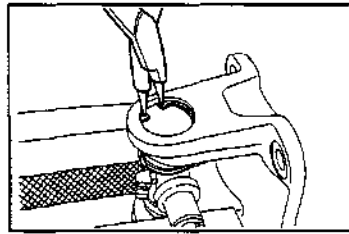
WPB0-PR061

PROPELLER SHAFTS

10. Remove the right and left snap rings with snap ring pliers.

CAUTION:

- Never reuse the removed snap rings.



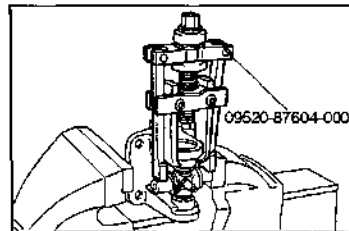
WPES0-PR028

11. Push the universal joint spider bearing cup, using the following SST.

SST: 09520-87604-000

NOTE:

- At this stage, the universal joint spider bearing cups can not be removed completely.



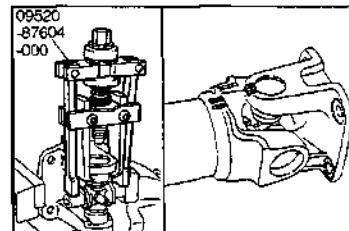
WPES0-PR024

12. Install a furnished ring to the shaft section of the universal joint spider. Then, remove the universal joint spider bearing cup at one side, using the following SST.

SST: 09520-87604-000

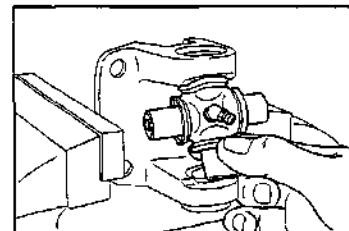
CAUTION:

- Never reuse the removed universal joint spider bearing cup.



WPES0-PR025

13. Remove the universal joint spider.

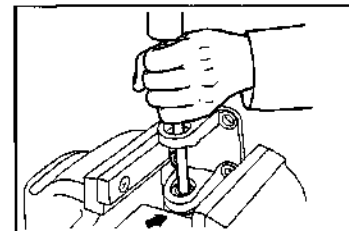


WPES0-PR026

14. Remove the universal joint spider bearing cup by lightly tapping it, using a hammer in combination with a suitable metal rod.

CAUTION:

- Never reuse the removed universal joint spider bearing cup.



WPES0-PR027

PROPELLER SHAFTS

INSPECTION

1. Conduct measurement at the two points of A and B (cross direction) indicated in the right figure, using an inner dial gauge.

Specified Value:

Propeller Shaft

28.0 \pm 0.15 mm

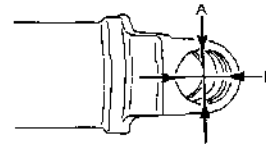
Sleeve and Flange Yoke

28.0 \pm 0.15 mm

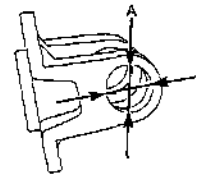
CAUTION:

- If the inner diameters of A and B (cross sections) exceed the specified value above, replace the parts with a new one.

Propeller shaft



Sleeve and flange yoke



WP590-PRO68

INSTALLATION

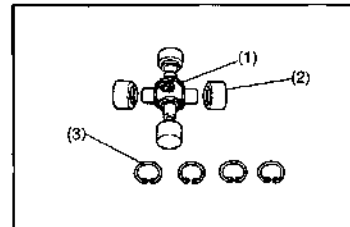
1. The following parts (1), (2), (3) are supplied in one set in the replacement parts for the universal joint spider subassembly.

(1) Universal joint spider 1 piece

(2) Universal joint spider bearing cup 4 pcs.

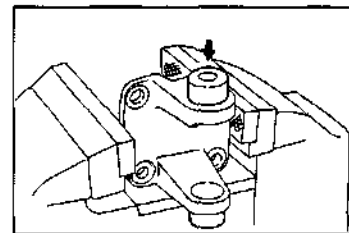
(3) Snap ring 4 pcs.

Parts availability	Identification
T = 1.45 mm	None
T = 1.50 mm	Yellow paint applied on ring outer periphery
T = 1.55 mm	White paint applied on ring outer periphery



WP590-PRO70

2. Temporarily install new universal joint spider bearing cups (two pcs.) to the universal joint with flange yoke by pushing them with finger.



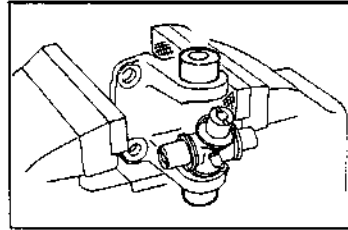
WP590-PRO70

PROPELLER SHAFTS

3. Temporarily install a new universal joint spider to the universal joint with flange yoke.

NOTE:

- Make sure that the grease nipple faces toward the propeller shaft side.



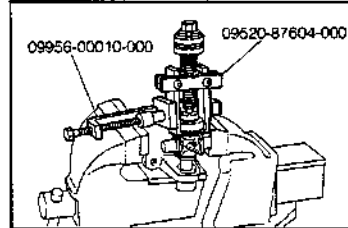
WPES0-PR071

4. Install the right and left universal joint spider bearing cups, using the suitable wrench box with the following SSTs.

SST: 09520-87604-000
09956-00010-000

NOTE:

- Be sure to evenly press the right and left universal joint spider bearing cups, until you can see the snap ring attaching groove provided on the inner periphery surface of the universal joint with flange yoke.

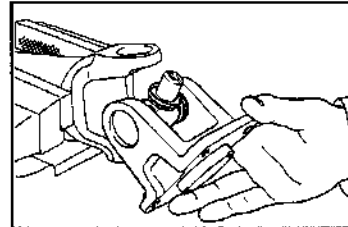


WPES0-PR072

5. Temporarily install the universal joint with flange yoke to the propeller shaft.

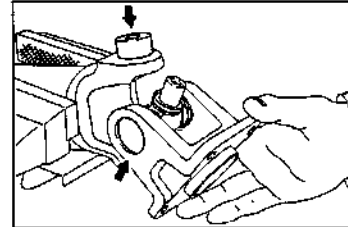
CAUTION:

- Be sure to align the paint marks (at the propeller shaft and flange yoke sides) which were put before the removal with each other.
If the mating marks described above are not aligned with each other, it may cause abnormal vibration or abnormal noise of the propeller shaft.
- Make sure that the grease nipple faces toward the propeller shaft side.



WPES0-PR073

6. Temporarily install new universal joint spider bearing cups (two pcs.) to the propeller shaft by pushing them with finger.



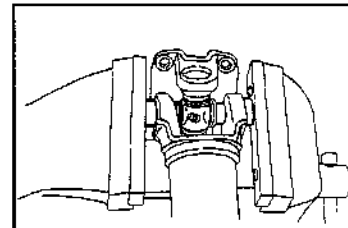
WPES0-PR074

7. While applying suitable box wrenches to both edge surfaces of the universal joint spider bearing cup, set the bearing cup in a vise.

8. After tightening the vise, press the right and left universal joint spider bearing cups.

NOTE:

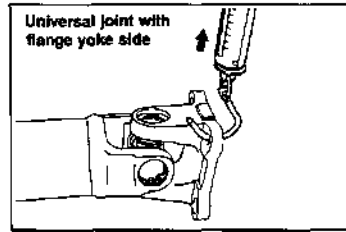
- Be sure to evenly press the right and left cups, until you can see the snap ring attaching groove provided on the inner periphery surface of the universal joint with flange yoke.



WPES0-PR075

PROPELLER SHAFTS

9. Measurement of universal joint starting torque
- (1) Using a spring scale, install the selected snap ring so that the starting torque may fall within the specified range given below.
- Specified Value: 0.049 - 1.47 N (0.005 - 0.15 kgf)

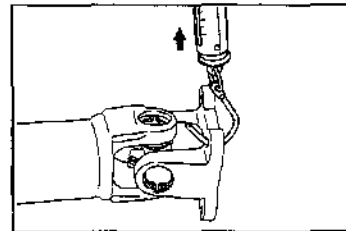


WPB90-PR076

- (2) Turn the propeller shaft 90 degrees. Measure the starting torque.

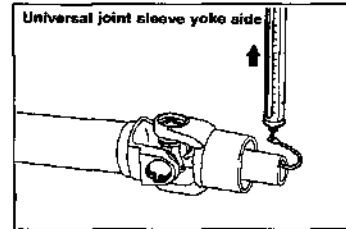
CAUTION:

- As regards the snap rings positioned symmetrically relative to the universal joint spider, in principle, it is required to use the snap rings having the same thickness.
- However, if the starting torque does not reach or exceeds the specified range despite the fact that the snap rings having the same thickness have been used, use a snap ring having one class higher or lower thickness.



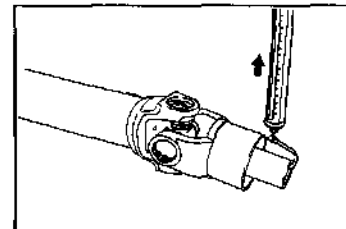
WPB90-PR077

- (3) Measure the starting torque, following the same procedure described above.



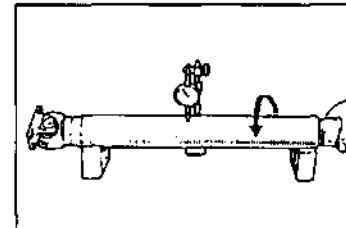
WPB90-PR078

- (4) Turn the propeller shaft 90 degrees. Measure the starting torque.



WPB90-PR079

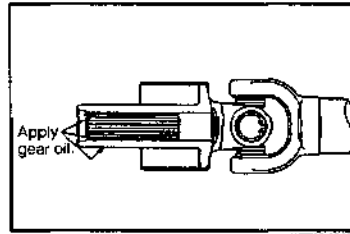
10. With a dial gauge set to the center of the propeller shaft.
- Allowable Runout: 0.5 mm
- Replace to the new propeller shaft, if the runout is exceed than 0.5 mm



WPB90-PR080

PROPELLER SHAFTS

11. Apply gear oil to both the inner and outer sides of the propeller shaft sleeve.



WPED-PR081

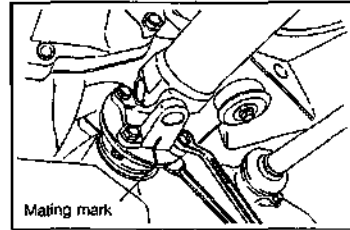
12. Install the propeller shaft with the mating marks that were put during the removal of the propeller shaft aligned with each other.

Tightening Torque:

58.8 - 78.5 N-m (6.0 - 8.0 kgf-m)

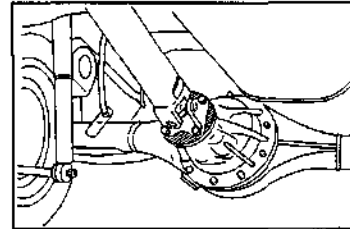
CAUTION:

- Make sure to line up those mating marks that were put during the removal of the front propeller shaft. If this caution should fail to be observed, the propeller shaft may emit abnormal noise or vibration.



WPED-PR082



13. After installing the propeller shaft, apply black paint to the exposed machined surface of the differential companion flange (Slant line section in the right figure) as a rust preventive measure.
14. Apply some amount of the lithium base multi-purpose grease to the grease nipples.



WPED-PR083

PROPELLER SHAFTS

SSTs

Shape	Parts No.	Parts name
	09520-87604-000	Puller universal joint
	09956-00010-000	Tightening piece

WP290-PRI10

SERVICE SPECIFICATIONS

Item			Specified value	Allowable limit	Remarks
Runout			—	0.5 mm	Front, Rear
Inner diameter	Propeller shaft	Front	22.50 $^{+0.008}_{-0.007}$	—	
		Rear	28.0 $^{+0.015}_{-0.005}$	—	
	Sleeve and flange yoke	Front	22.50 $^{+0}_{-0.002}$	—	
		Rear	28.0 $^{+0.05}_{-0.15}$	—	
Starting torque		Front	0.029 - 1.47 N (0.003 - 0.15 kg)	—	Selected with four kinds of snap ring
		Rear	0.049 - 1.47 N (0.005 - 0.15 kg)	—	Selected with three kinds of snap ring

WP290-PRI11

TIGHTENING TORQUE

Tightening components	Tightening torque		
	N·m	kgf·m	ft·lb
Front differential companion flange x Propeller shaft	58.8 - 78.5	6.0 - 8.0	43.4 - 57.9
Rear differential companion flange x Propeller shaft	58.8 - 78.5	6.0 - 8.0	43.4 - 57.9

WP290-PRI12

DAIHATSU F300

FRONT/REAR DIFFERENTIAL

GENERAL DESCRIPTION	DF -2	PRE-INSPECTION	DF-34
IN-VEHICLE REPLACEMENT PROCEDURES		DISASSEMBLY	DF-35
FOR OIL SEAL (FRONT)	DF -3	INSPECTION	DF-38
TROUBLE SHOOTING	DF -6	ASSEMBLY	DF-39
FRONT DIFFERENTIAL		INSTALLATION	DF-48
COMPONENTS	DF -7	L.S.D. (Limited Slip Differential)	
REMOVAL	DF -8	COMPONENTS	DF-50
PRE-INSPECTION	DF-10	REMOVAL	DF-51
DISASSEMBLY	DF-12	DISASSEMBLY	DF-51
INSPECTION	DF-15	INSPECTION	DF-54
ASSEMBLY	DF-16	ASSEMBLY	DF-54
INSTALLATION	DF-26	INSTALLATION	DF-59
IN-VEHICLE REPLACEMENT PROCEDURES		SSTs	DF-60
FOR OIL SEAL (REAR)	DF-29	SERVICE SPECIFICATIONS	DF-61
REAR DIFFERENTIAL COMPONENTS	DF-32	TIGHTENING TORQUE	DF-62
REMOVAL	DF-33		

WFE90-DF001

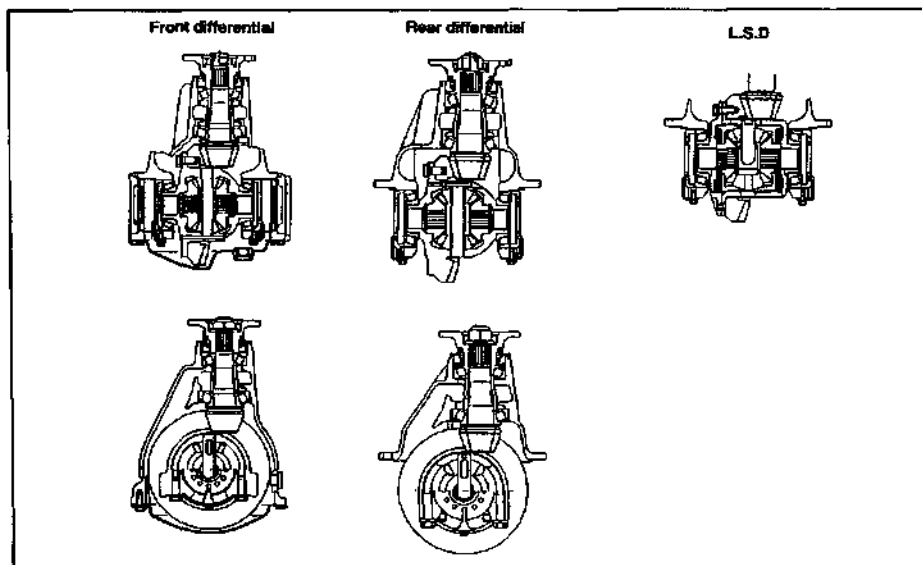
FRONT/REAR DIFFERENTIAL

GENERAL DESCRIPTION

DIFFERENTIALS

The differential at both the front and rear employs a hypoid gear type.

In the case of ordinary differentials, there will be cases where the traction is lost when the wheel at one side is rotating idly on muddy roads or during a rapid cornering. To solve those problems, an L.S.D. (Limited Slip Differential) is available as optional equipment on the rear differential.



WPB90-DF002

Differential specifications

Item		Kind	Front	Rear	Rear (LSD)
Final reduction gear ration			5.285	5.285	5.285
Differential ring gear	Number of teeth		37	37	37
	Outer diameter	mm	170	180	180
	Gear type		Hypoid gear	Hypoid gear	Hypoid gear
Final reduction gear	Number of teeth		7	7	7
	Outer diameter	mm	55	57	57
	Gear type		Hypoid pinion	Hypoid pinion	Hypoid pinion
Differential side gear	Number of teeth		18	14	14
	Number of inner spline teeth		25	27	27
Number of differential pinion teeth			10	10	10
Pinion shaft outer diameter			mm $\phi 16$	$\phi 18$	$\phi 18$

WPB90-DF003

FRONT/REAR DIFFERENTIAL

IN-VEHICLE REPLACEMENT PROCEDURES FOR OIL SEAL FRONT FRONT DIFFERENTIAL (Drive Shaft Oil Seal) REMOVAL

1. Remove the drive shaft from the front differential. (Refer front axle and suspension).
2. Remove the oil seal at the drive shaft installation section, in conjunction with the following SSTs.
SST: 09517-87602-000
09308-10010-000

NOTE:

- Never reuse the removed oil seal.

INSTALLATION

1. Drive the oil seal at the drive shaft installation section into position, using the following SST.
SST: 09517-87601-000

NOTE:

- Apply the lithium base multi purpose grease to the oil seal lip section, prior to install.
2. Install the drive shaft to the front differential.
(Refer front axle and suspension section).

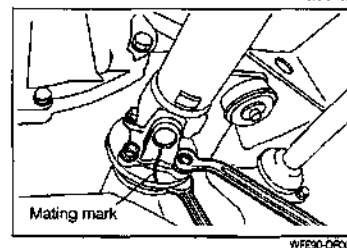
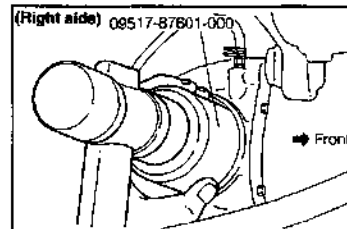
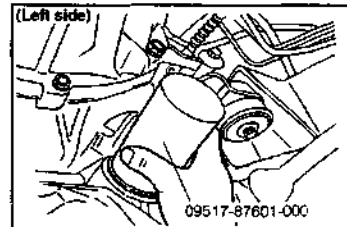
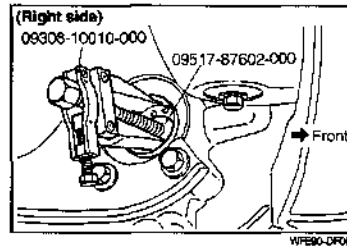
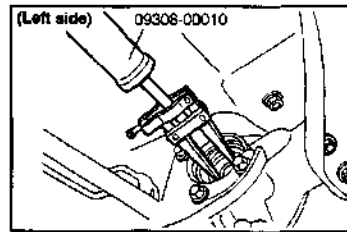
FRONT DIFFERENTIAL (Drive Pinion Oil Seal)

REMOVAL

1. Remove the propeller shaft.

CAUTION:

- Prior to the removal, be sure to put a mating mark. If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration during the running.

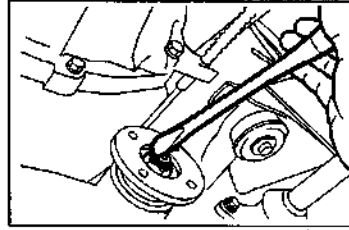


FRONT/REAR DIFFERENTIAL

2. Release the staking of the lock nut of the drive pinion.

NOTE:

- Insufficient releasing of the staking of the lock nut may cause the threaded portion of the drive pinion to be damaged.



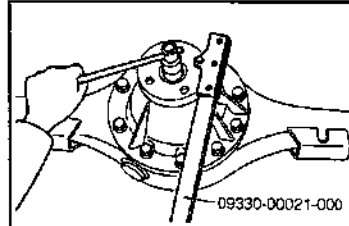
WFE90-DF007

3. Remove the lock nut and plate washer using the following SST.

SST: 09330-00021-000

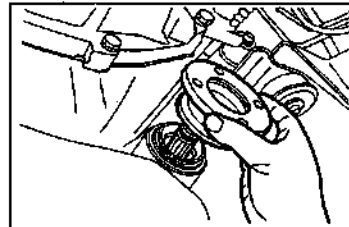
NOTE:

- Never reuse the removed lock nut.



WFE90-DF008

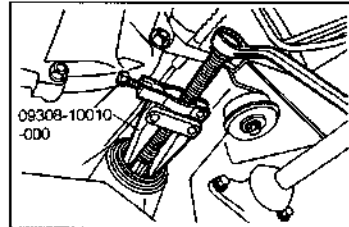
4. Remove the companion flange.



WFE90-DF009

5. Remove the oil seal, using the following SST.

SST: 09517-87602-000



WFE90-DF010

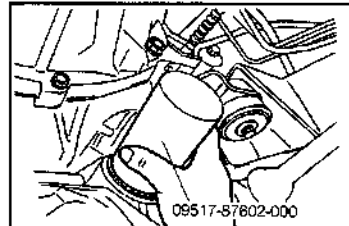
INSTALLATION

1. Drive the oil seal into position, using the following SST.

SST: 09517-87602-000

NOTE:

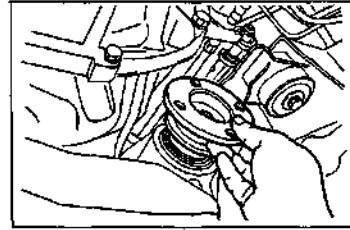
- Apply the lithium base multi purpose grease to the oil seal lip section, prior to install.



WFE90-DF011

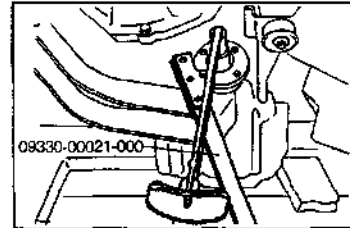
FRONT/REAR DIFFERENTIAL

2. Install the companion flange.



WF830-DF012

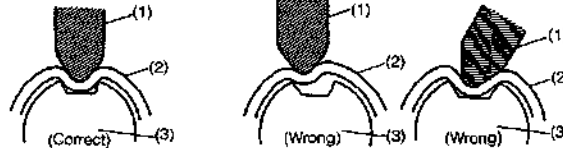
3. Install the plate washer and a new lock nut. Tighten the nut, using the following SST.
SST: 09330-00021-000
Tightening Torque:
157.0 - 196.0 N·m (16.0 - 20.0 kgf-m)



NOTE:

- When staking the lock nut, point a suitable staking tool toward the drive pinion axis center and stake the lock nut securely, as shown in the figure below. (Poor staking may cause abnormal noise.)

- (1) Suitable staking tool
(2) New nut
(3) Drive pinion

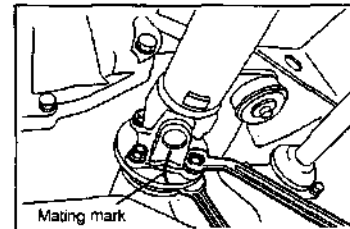


WF830-DF013

4. Install the propeller shaft.

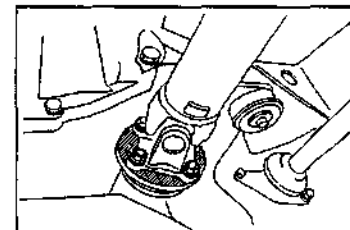
CAUTION:

- While installing the propeller shaft, align the mating marks put during the removal with each other. If this operation should fail to be performed correctly, the propeller shaft may emit abnormal noise or vibration during the running.
Tightening Torque: 58.8 - 78.5 N·m (6.0 - 8.0 kgf-m)



WF830-DF014

5. After the propeller shaft has been installed, apply black paint to the exposed machined surface (slant line section in the right figure).



WF830-DF014

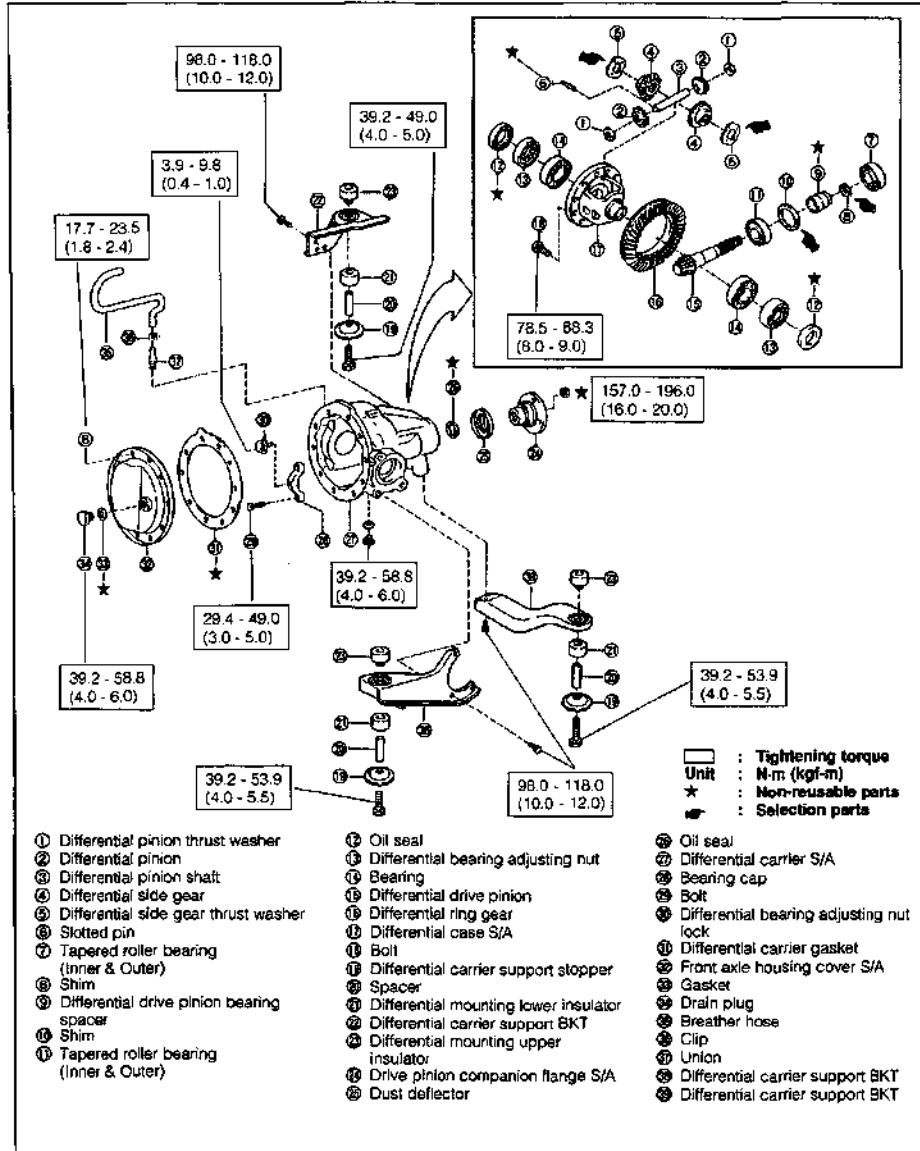
FRONT/REAR DIFFERENTIAL

TROUBLE SHOOTING

Symptoms		Possible causes	Checking points
Abnormal noise	Differential tapping noise	Improper backlash of hypoid gear	Check backlash between drive pinion and ring gear.
	Differential clunk noise	The same above	The same above
	Differential clonking noise	Drive pinion improperly adjusted	Check preload. Check backlash.
	Differential chuckle noise	Abnormal wear in side gear and differential case	Check side gear. Check differential case.
	Differential noise	Improper tooth contact at hypoid gear	Check tooth contact between drive pinion and ring gear.
Oil leakage		Faulty oil seal	Check each oil seal.
		Oil leakage at differential carrier installation section	Check installation surface with rear axle housing.

WFE80-DF015

FRONT DIFFERENTIAL COMPONENTS

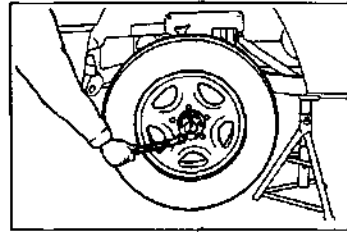


WF80-07016

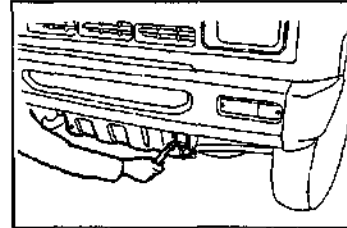
FRONT/REAR DIFFERENTIAL

REMOVAL

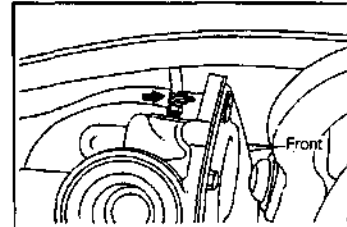
1. Jack up the vehicle and support it with safety stands. (As for the jacking-up points and support points for safety stands, refer GI-section.)
2. Remove the front wheel.
3. Drain the oil from the differential.



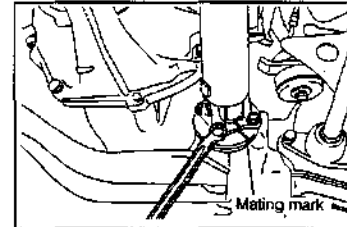
4. Remove the engine undercover by removing the four bolts.
5. Remove the front drive shafts and stabilizer. (Refer Front Axle & Suspension section.)



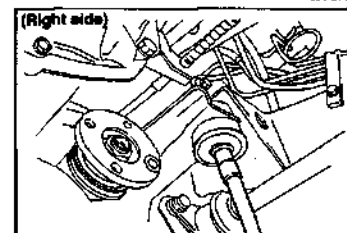
6. Disconnect the breather hose by removing the clamp.



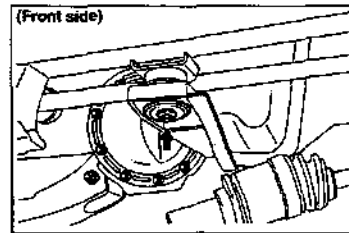
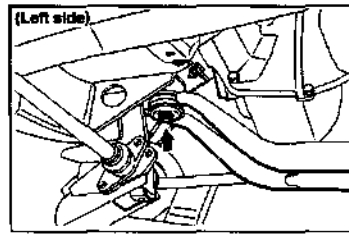
7. Remove the propeller shaft.
NOTE:
 - Before the propeller shaft is removed, be sure to put a mating mark as a guide during the installation.
8. Hold the propeller shaft in a suspended state.



9. Remove the differential mounting.
Temporarily loosen the three bolts of the differential mounting brackets.



FRONT/REAR DIFFERENTIAL

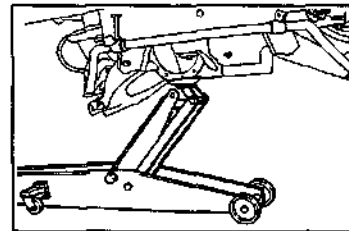


WF890-DF022

10. Support the differential with a transmission jack or the like.
11. Remove the differential from the chassis frame by removing the three bolts of the differential mounting brackets.
12. Remove the differential from the vehicle, while supporting the differential with a jack.

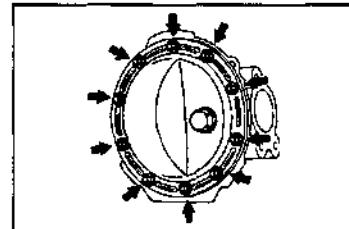
WARNING:

Be sure to slowly lower the differential, while holding it by your hands, for the differential is in an unstable state.



WF890-DF023

13. Remove the ten bolts of the front axle housing cover sub-assembly.

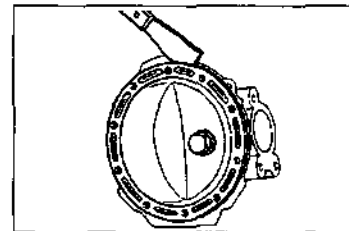


WF890-DF024

14. Remove the front axle housing cover subassembly, using the standard tool of the scraper.

NOTE:

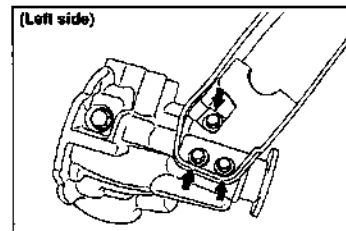
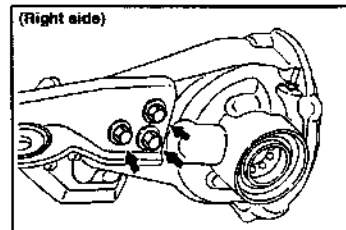
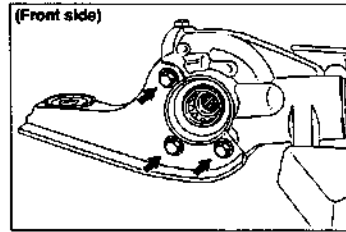
- Never reuse the removed gasket.



WF890-DF025

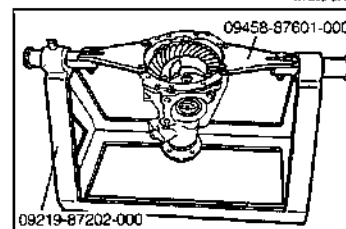
FRONT/REAR DIFFERENTIAL

15. Remove the three differential carrier support brackets from the differential by removing the three bolts.



16. Install the differential assembly removed from the vehicle on the following SSTs.

SSTs: 09219-87202-000
09458-87601-000



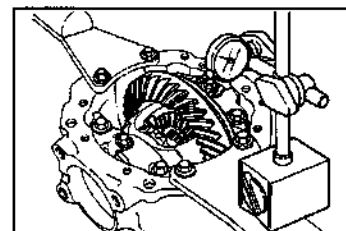
PRE-INSPECTION

NOTE:

- Prior to the disassembling of the differential, be sure to check the following items and record the values. (These values are used as reference which assures the correct assembling.)

1. Ring gear runout check
Measure the runout at the back surface of the ring gear, using a dial gauge.
Allowable Limit: 0.1 mm

If the runout exceeds the allowable limit, replace the final gear as a set.

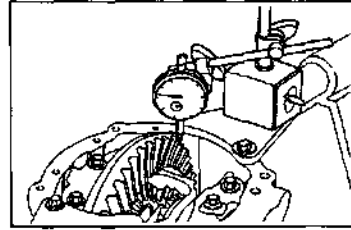


FRONT/REAR DIFFERENTIAL

2. Ring gear backlash check

Secure the drive pinion in such a way that a dial gauge may make contact with the forward end of the tooth surface of the ring gear at right angles. Measure the backlash by moving the ring gear.

Specified Value: 0.07 - 0.17 mm

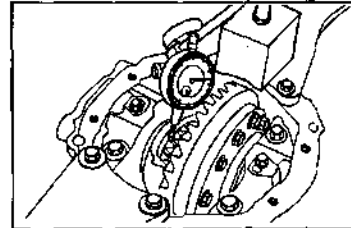


WF60-DF029

3. Side gear backlash check

Measure the backlash with the pinion gear pushed against the differential case side.

Specified Value: 0.03 - 0.15 mm

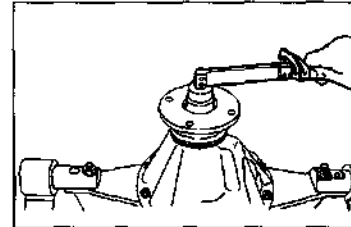


WF60-DF030

4. Total preload measurement

Measure the starting torque with the drive pinion brought into contact with the tooth surface of the ring gear, using a torque gauge.

Specified Value: 0.58 - 3.0 N (0.06 - 0.31 kgf)



WF60-DF031

5. Check of tooth contact between ring gear and drive pinion

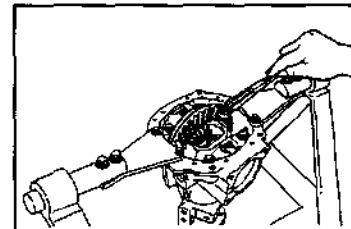
Apply a thin film of blue lead or the like evenly to both sides of five or six teeth of the ring gear.

NOTE:

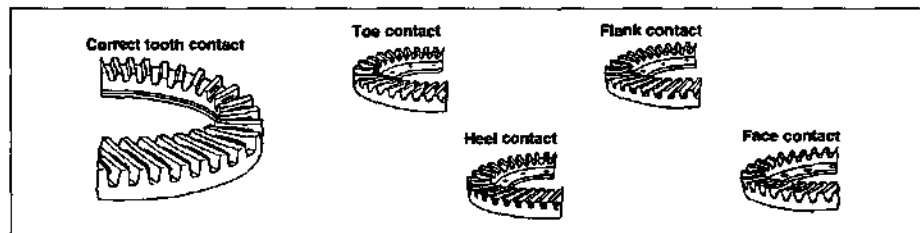
- Perform the tooth contact check at four points of the ring gear.

Apply braking to the drive pinion and turn the ring gear several times. Check the tooth contact between the ring gear and the drive pinion.

Ensure that correct tooth contact has been attained, as shown in the figure below.



WF60-DF032



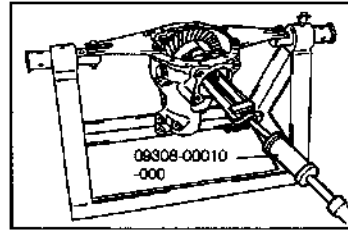
WF60-DF033

FRONT/REAR DIFFERENTIAL

DISASSEMBLY

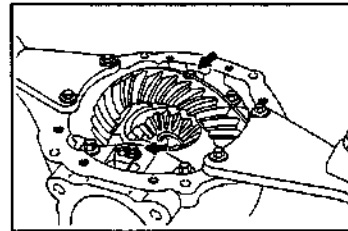
1. Remove the oil seal at the drive shaft side, using the following SST.

SST: 09308-00010-000



WF690-DF034

2. Remove the adjusting lock nut.

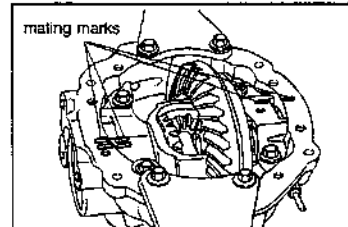


WF690-DF035

3. Put mating marks (Painted with white or the like) on the bearing cap and differential carrier.

NOTE:

- Since the bearing cap has been manufactured integrally with the differential carrier, never disturb the combination of these components.

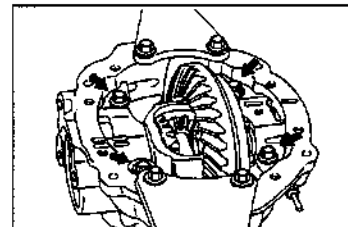


WF690-DF036

4. Remove the bearing cap by removing the two bolts on both left and right sides.

NOTE:

- Arrange the removed bearing caps in order, separating the right cap from the left cap.

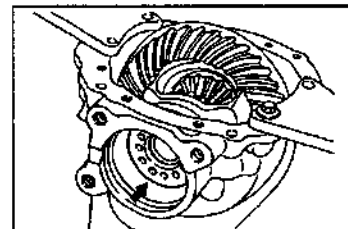


WF690-DF037

5. Remove the differential bearing adjusting nut on both left and right sides.

NOTE:

- Arrange the removed bearing caps in order, separating the right cap from the left cap.



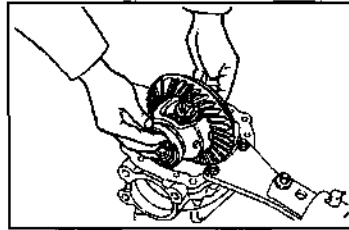
WF690-DF038

FRONT/REAR DIFFERENTIAL

6. Remove the differential case from the carrier.

NOTE:

- The drive pinion preload should be measured after the differential case has been removed.
- After completion of measurement, perform disassembly, following the removal procedures given below.



WPES0-DF035

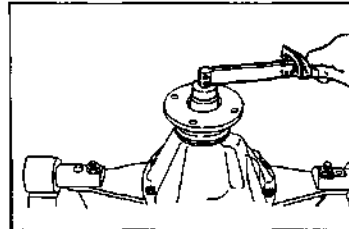
7. Drive pinion preload measurement

Measure the starting torque within the range of the backlash between the drive pinion and the ring gear, using torque gauge.

Specified Value: 0.39 - 2.45 N (0.04 - 0.25 kgf)

NOTE:

- This step should be performed after the differential case has been removed from the carrier.

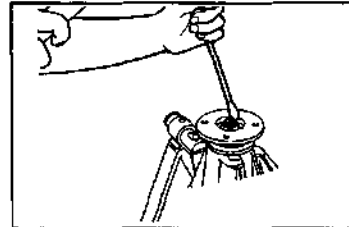


WPES0-DF040

8. Release the staking of the lock nut, using a chisel and a hammer.

NOTE:

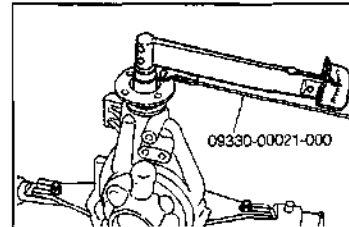
- Never reuse the removed lock nut.



WPES0-DF041

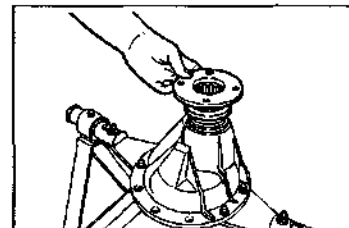
9. Secure the companion flange, using the following SST. Proceed to the remove the lock nut.

SST: 09330-00021-000



WPES0-DF042

10. Remove the companion flange.



WPES0-DF043

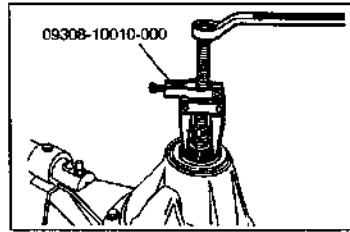
FRONT/REAR DIFFERENTIAL

11. Remove the oil seal of the drive pinion, using the following SST.

SST: 09308-10010-000

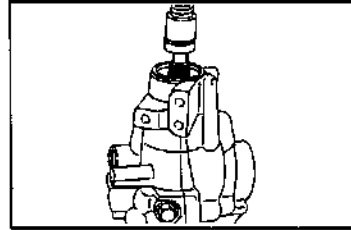
NOTE:

- Never reuse the removed oil seal.



WPB0-0F044

12. Remove the drive pinion by pressing the press.



WPB0-0F045

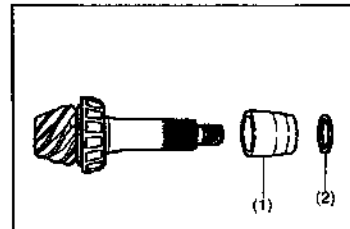
13. Remove the following parts from the drive pinion.

(1) Spacer

(2) Shim for drive pinion preload

NOTE:

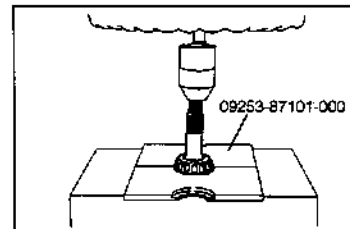
- Never reuse the removed spacer as it's crash type



WPB0-0F046

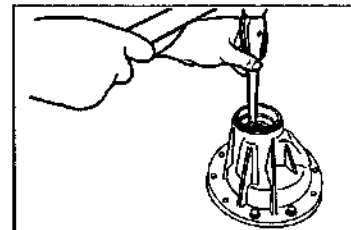
14. Remove the rear bearing and the drive pinion mounting distance adjusting shim from the drive pinion, in conjunction with a press and the following SST.

SST: 09253-87101-000



WPB0-0F047

15. Remove the front and rear bearing outer races, using a brass bar.



WPB0-0F048

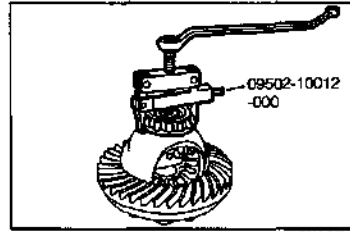
FRONT/REAR DIFFERENTIAL

16. Set the differential case into the vice.
17. Remove the side bearings from the differential case, using the following SST.

SST: 09502-10012-000

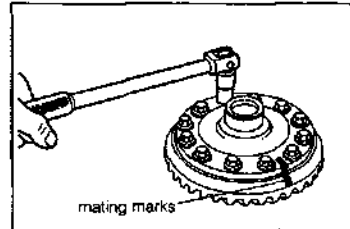
NOTE:

- Insert the pawl of the SST into the groove of the differential carrier.



WP80-DF043

18. Stamp mating marks (painted with white or the like) on the differential case and ring gear. Proceed to remove the ring gear.

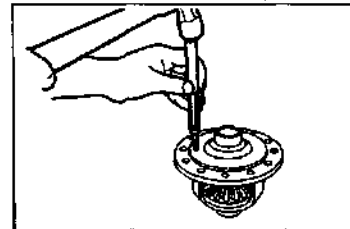


WP80-DF050

19. Pull out the slotted spring pins of the pinion gear. Remove the following parts from the differential case.
 - (1) Differential side gear
 - (2) Differential side gear thrust washer
 - (3) Differential pinion shaft
 - (4) Differential pinion
 - (5) Differential pinion thrust washer

NOTE:

- Never reuse the removed slotted spring pin.

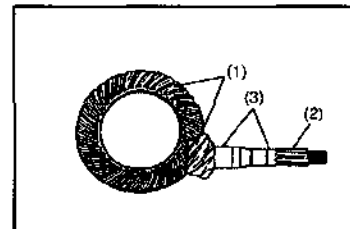


WP80-DF061

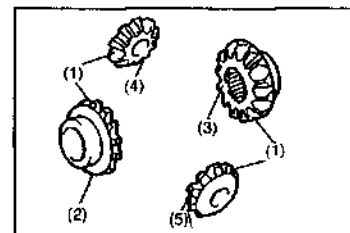
INSPECTION

Inspect each section of the following parts for any sign of damage, wear or excessive looseness. Replace any parts which exhibit defects.

1. Drive pinion & ring gear
 - (1) Gear teeth (1)
 - (2) Spline portion (2) of drive pinion
 - (3) Bearing fitting section (3)
2. Side gear & pinion
 - (1) Gear teeth (1)
 - (2) Side gear boss section (2)
 - (3) Side gear serrated section (3)
 - (4) Pinion shaft fitting hole (4)
 - (5) Differential case contact section (5)



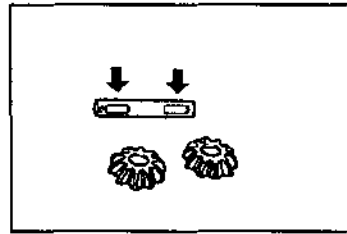
WP80-DF062



WP80-DF063

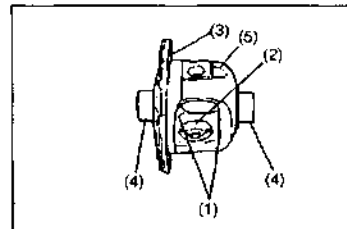
FRONT/REAR DIFFERENTIAL

3. Visually inspect the rotational sliding section between the differential pinion and the differential pinion shaft for damage and wear.



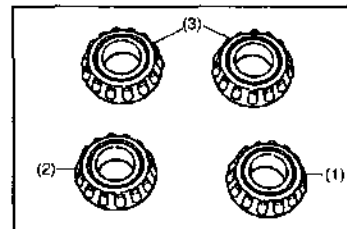
WP690-DR54

4. Inspection of differential case for wear or damage
 - (1) Side gear boss contact sections (1)
 - (2) Pinion contact section (2)
 - (3) Ring gear attaching section (3)
 - (4) Side bearing press-fitting section (4)
 - (5) The differential case proper (5)



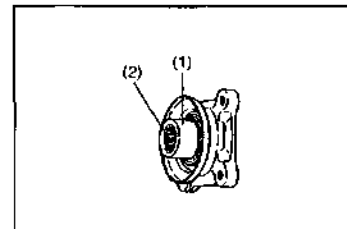
WP690-DR55

5. Bearings
 - (1) Front bearing (1)
 - (2) Rear bearing (2)
 - (3) Side bearings (3)
 - Turn the bearings lightly. Ensure that they rotate smoothly without any binding or abnormal noise.
 - While tracing the outer peripheral section of the taper roller with your nails, check to see if any binding exists there.



WP690-DR56

6. Companion flange
 - (1) Oil seal contact section (1)
 - (2) Spline section (2)

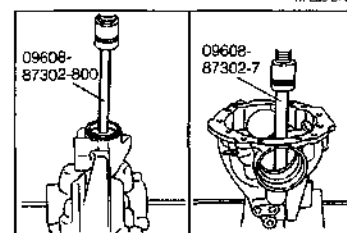


WP690-DR57

ASSEMBLY

1. Press the front and rear outer races into the differential carriers, using the following SSTs.
 - SSTs: (1) Front...09608-87302-800
 - (2) Rear...09608-87302-7

Both above SSTs are included in the 09608-87302-000.



WP690-DR58

FRONT/REAR DIFFERENTIAL

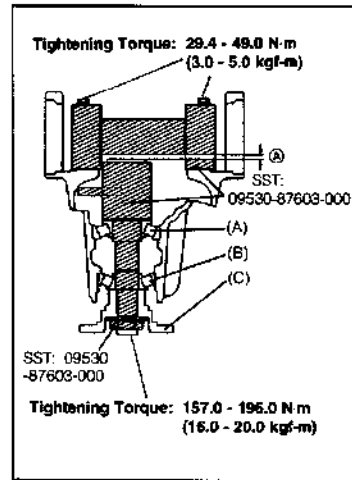
2. Selecting procedures for drive pinion mounting distance adjusting shims

- (1) Assemble the SST and following parts on the front differential. Tighten the bolt to the tightening torque shown in the figure right.
SST: 09530-87603-000

(A)...Rear bearing
(B)...Front bearing
(C)...Companion flange

NOTE:

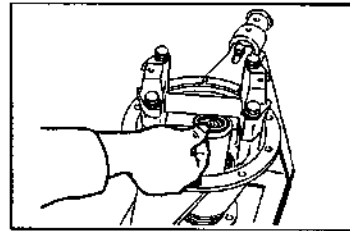
- Do not install the oil seal at this stage.



WPB90-DF059

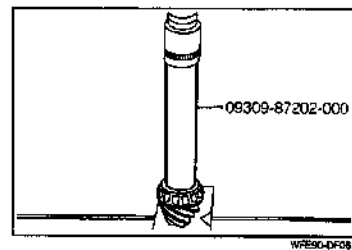
- (2) Measure the dimension ① shown in the figure above. Select a suitable shim from the table below.

Adjusting Shim Availability	Unit: mm
3.60	
3.65	
3.70	
3.75	
3.80	
3.85	
0.30	



WPB90-DF060

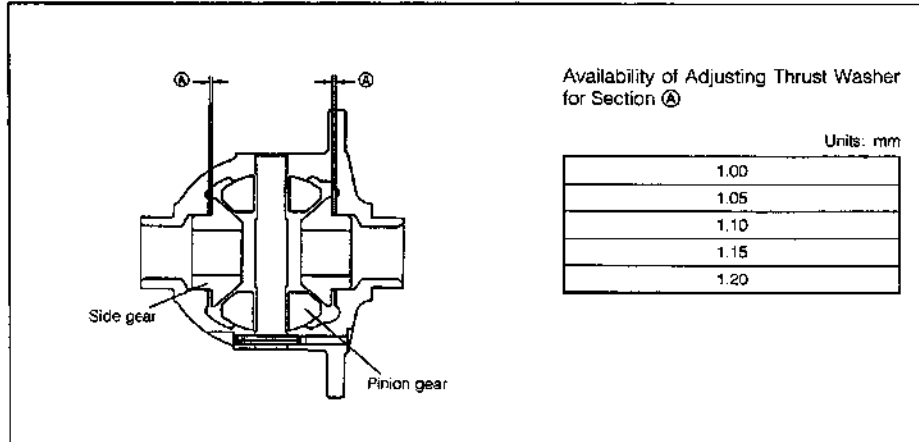
- (3) Place the drive pinion mounting distance adjusting shim that was selected in the previous step in the drive pinion. Press the rear bearing, using the following SST.
SST: 09309-87202-000



WPB90-DF061

FRONT/REAR DIFFERENTIAL

3. Selecting procedures for side gear backlash thrust washer



- (1) Prior to assembling, apply the gear oil to the following rotating sections.

- Outer periphery (side and pinion gear)
- Inner periphery of side and pinion gear in differential case

- (2) Assemble the following parts in the differential case.

- (1) Differential side gear
- (2) Differential side gear thrust washer
- (3) Differential pinion shaft
- (4) Differential pinion
- (5) Differential pinion thrust washer

- (3) Measure the backlash with the pinion gear pushed against the differential case side. Select a thrust washer in such a way that the backlash between the differential pinion and the differential side gear may conform to the specified value given below. Here, the backlash is the mean value of measurements over four teeth. Place the selected thrust washer.

Specified Value: 0.03 - 0.15 mm

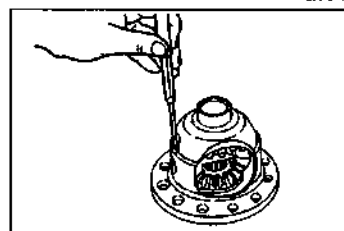
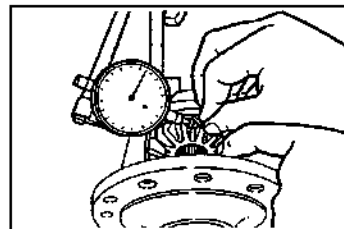
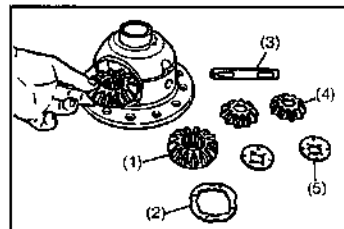
NOTE:

- The same size of the thrust washer should be installed at both the right and left sides.

4. Drive the new slotted spring pin into position, after completion of the backlash measurement.

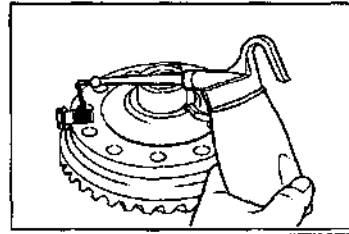
NOTE:

- Stake the differential case with a chisel or the like so as to secure the slotted spring pin.



FRONT/REAR DIFFERENTIAL

5. Align the mating marks put during the disassembly with each other.
6. Apply gear oil to the threaded portions of the tightening bolts and the ring gear.



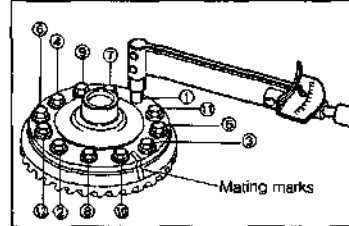
WP890-DF066

7. Install the ring gear in the differential case and tighten the bolts.

Tightening Torque: 78.5 - 88.3 N-m (8.0 - 9.0 kgf-m)

NOTE:

- Be sure to tighten the bolts alternately and diagonally. (The illustration at the right figure indicates a typical example of the tightening sequence.)



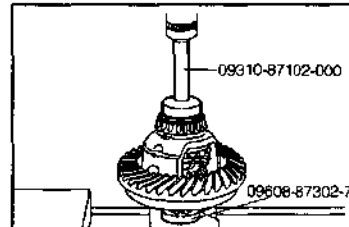
WP890-DF067

8. Press the side bearing into the differential case, using the following SSTs.

SST: 09310-87102-000

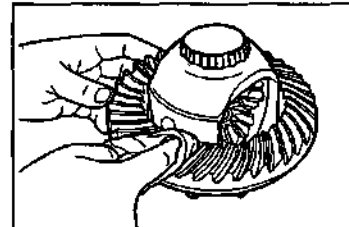
09608-87302-7

that is a part of 09608-87302-000 set



WP890-DF068

9. Clean the ring gear tooth surfaces.

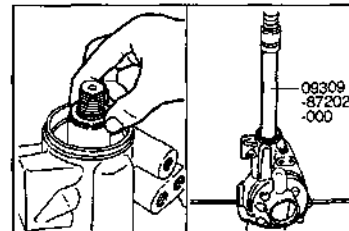


WP890-DF069

10. Install the drive pinion, new drive pinion bearing spacer and shim (one that was measured at time of selection) to the differential carrier.

11. Press the rear bearing, using the following SST.

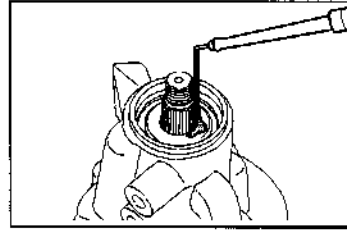
SST: 09309-87202-000



WP890-DF070

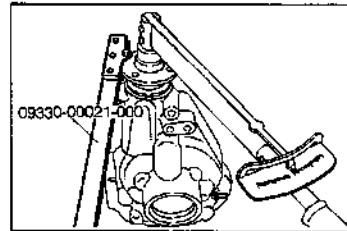
FRONT/REAR DIFFERENTIAL

12. Apply the gear oil to the rear bearing tapered roller sections.



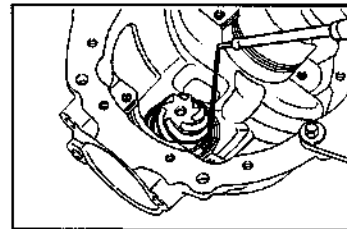
WPFB0-CF071

13. Install the companion flange.
 14. Tighten the nut (use for 09530-87603-000), using the following SST.
 SST: 09330-00021-000
 Tightening Torque:
 157.0 - 196.0 N·m (16.0 - 20.0 kgf-m)



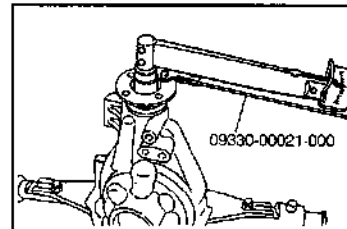
WPFB0-CF072

15. Apply the gear oil to the front bearing tapered roller sections.



WPFB0-CF073

16. Rotate the companion flange for several times in clock and counter clockwise.
 17. Measure the preload of the drive pinion, using a torque gauge.
 Specified Value:
 New Bearing:
 0.39 - 2.45 N (0.04 - 0.25 kgf)
 Bearing Reused:
 0.39 - 1.27 N (0.04 - 0.13 kgf)

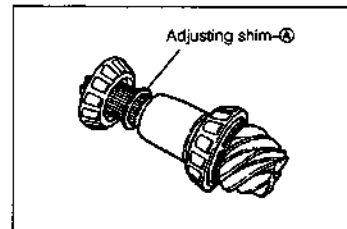


WPFB0-CF074

18. When the preload is greater than the specified value, increase the adjusting shim thickness. Conversely, when the preload is less than the specified value, decrease the adjusting shim thickness.

NOTE:

- Refer the table for availability of adjusting shim ④ on the item of 19.



WPFB0-CF075

FRONT/REAR DIFFERENTIAL

19. Availability of adjusting shim for section (A)

Units: mm

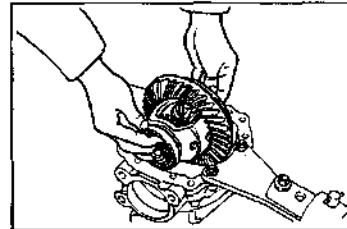
1.600	1.850	2.100
1.625	1.875	2.125
1.650	1.900	2.150
1.675	1.925	2.175
1.700	1.950	2.200
1.725	1.975	2.225
1.750	2.000	2.250
1.775	2.025	2.275
1.800	2.050	2.300
1.825	2.075	2.325

WP80-DF076

20. Install the differential case on the differential carrier.

NOTE:

- Make sure that the outer races of the side bearings are assembled correctly in the respective original positions.

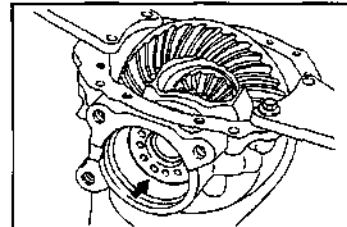


WP80-DF077

21. Install the adjusting nut in such a way that it is aligned with the threaded portion of the differential carrier.

NOTE:

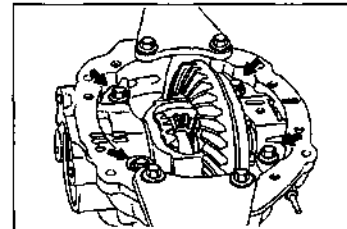
- Apply gear oil to the bearing and adjusting nut.



WP80-DF078

22. Temporarily tighten the bearing cap to the following specified torque.

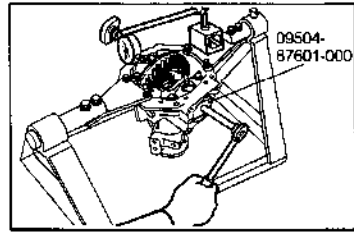
Tightening Torque: 19.6 N·m (2.0 kgf·m)



WP80-DF079

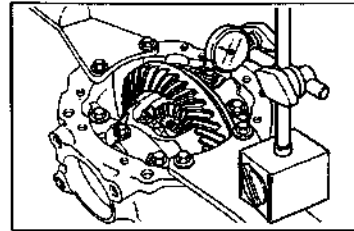
FRONT/REAR DIFFERENTIAL

23. Lightly tighten the right and left adjusting nuts, using the SST, until the backlash between the drive pinion and the ring gear becomes about 0.2 mm
SST: 09504-87601-000



WP890-DF082

24. Ring gear preload adjusting procedure
(1) Install a dial gauge normally to the back surface of the ring gear.

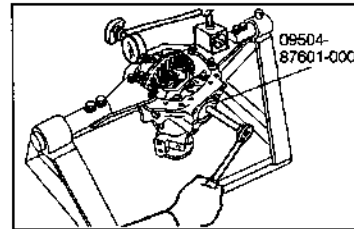


WP890-DF081

- (2) Using the SST, tighten the adjusting nut at the tooth surface side of the ring gear, until the dial gauge registers no fluctuation in the reading.

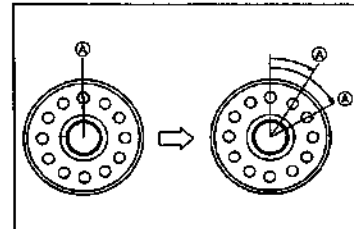
NOTE:

- The side bearing preload becomes zero when the dial gauge no longer registers fluctuation.



WP890-DF082

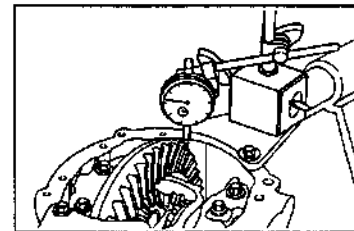
- (3) Tighten further the adjusting nut at the ring gear tooth surface side to the specified preload.
Specified Side Bearing Preload: 1 - 2 notches



WP890-DF083

25. Adjusting procedure for backlash between ring gear and drive pinion

- (1) Install a dial gauge at right angles with the ring gear tooth surface. Measure the backlash.
Specified Value: 0.07 - 0.17 mm



WP890-DF084

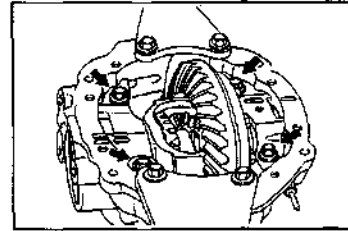
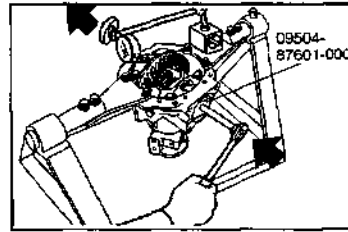
FRONT/REAR DIFFERENTIAL

- (2) If the backlash does not conform to the specification, adjust the backlash by moving the bearing by means of the right and left adjusting nuts, using the following SST:
SST: 09504-87601-000

NOTE:

- The right and left bearings should be moved in the same direction and by the same amount. For example, if the left bearing is loosen one notch, the right bearing should be tightened one notch.

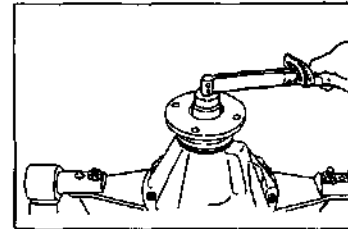
26. Tighten the bearing cap to the specified torque.
Tightening Torque: 29.4 - 49.0 N·m (3.0 - 5.0 kgf·m)



27. Total preload:
With the drive pinion brought in contact with the ring gear, measure the total preload, using a torque gauge.
New Bearing: 0.58 - 3.0 N (0.06 - 0.31 kgf)
Bearing Reused: 0.58 - 1.8 N (0.06 - 0.19 kgf)

NOTE:

- If the total preload does not conform to the specification, adjust the total preload by means of the adjusting nut at the ring gear tooth surface side.

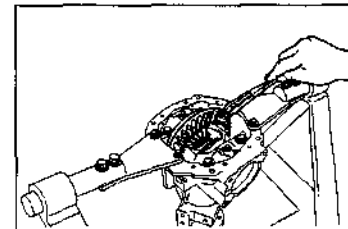


28. Checking procedure for tooth contact between ring gear and drive pinion

- Apply a thin film of blue lead or the like evenly to both sides of five or six teeth of the ring gear.
- Turn the ring gear several times by applying a load to the drive pinion by one hand.

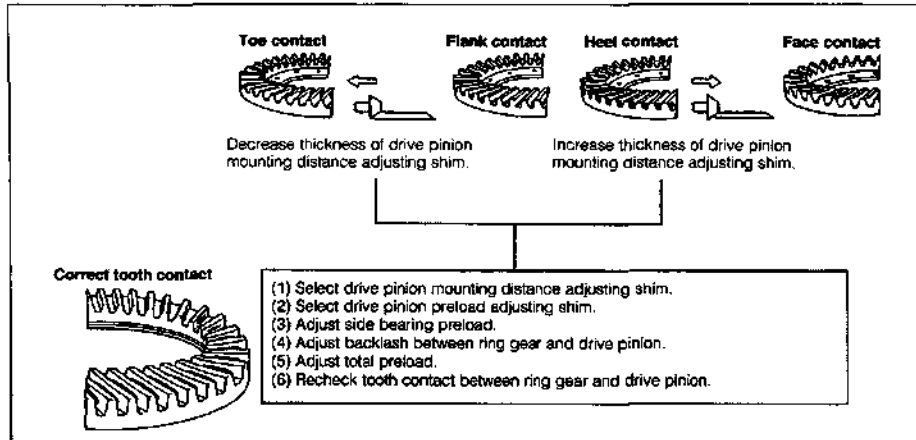
NOTE:

- Perform the tooth contact check at four points of the ring gear.



FRONT/REAR DIFFERENTIAL

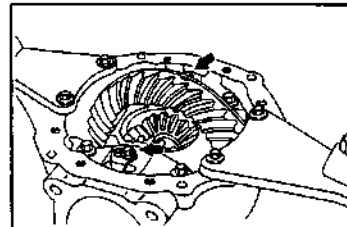
(3) Ensure that the correct tooth contact has been attained, as shown in the figure below.



WF890-DF089

29. Install the adjusting nut lock to the bearing cap and tighten the bolts.

Tightening Torque: 3.9 - 9.8 N·m (0.4 - 1.0 kgf·m)



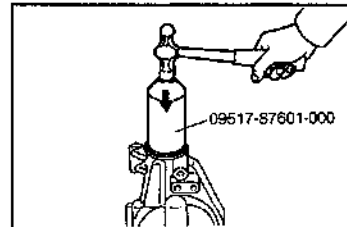
WF890-DF090

30. Remove the companion flange by removing the nut for 09530-87603-000.
31. Drive a new oil seal up to the edge surface of the differential carrier, using the following SST.

SST: 09517-87601-000

NOTE:

- Apply gear oil to the oil seal lip section.



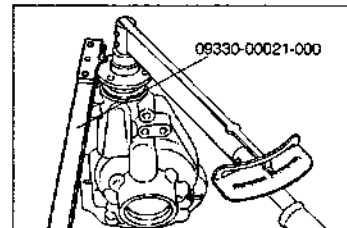
WF890-DF091

32. Install the companion flange, plate washer and new lock nut and tighten the companion flange by means of a new lock nut, using the following SST.

SST: 09330-00021-000

Tightening Torque:

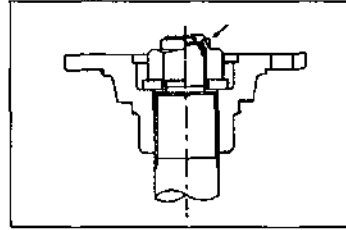
157.0 - 196.0 N·m (16.0 - 20.0 kgf·m)



WF890-DF092

FRONT/REAR DIFFERENTIAL

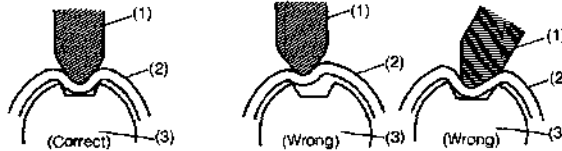
33. Stake the lock section of nut securely, using a chisel or the like.



NOTE:

- When staking the lock nut, point a suitable staking tool toward the drive pinion axis center and stake the lock nut securely, as shown in the figure below. (Poor staking may cause abnormal noise.)

- (1) Suitable staking tool
(2) New nut
(3) Drive pinion

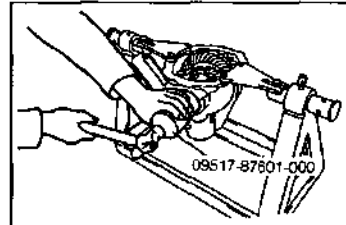


WF830-CF083

34. Drive a new oil seal into the drive shaft side up to the edge surface, using the following SST.

NOTE:

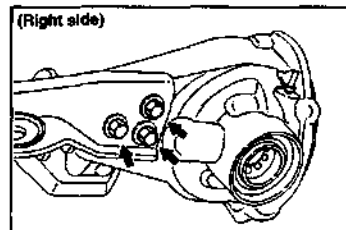
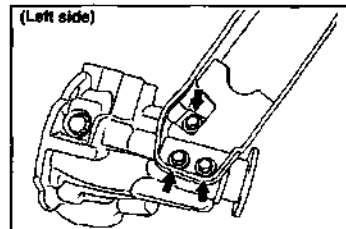
- Apply gear oil to the oil seal lip section.
SST: 09517-87601-000



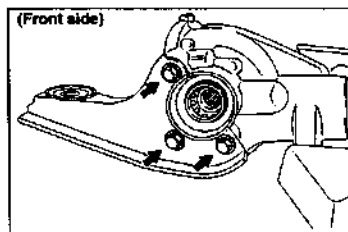
WF830-CF084

35. Remove the differential assembly from the overhaul stand.
36. Tighten the three differential carrier support brackets by means of the bolts.

Tightening Torque:
98.0 - 118.0 N·m (10.0 - 12.0 kgf-m)



FRONT/REAR DIFFERENTIAL



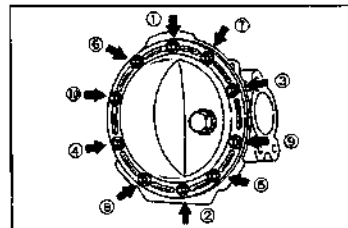
WPB90-DF066

37. With a new gasket interposed, tighten the front axle housing cover subassembly by means of the bolts.

Tightening Torque: 17.7 - 23.5 N·m (1.8 - 2.4 kgf·m)

NOTE:

- Be sure to tighten the bolts alternately and diagonally. (The illustration at the right indicates a typical example of the tightening sequence.)



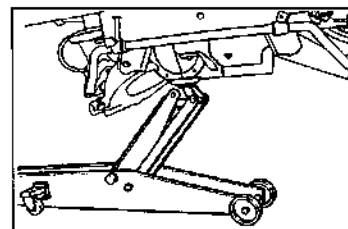
WPB90-DF069

INSTALLATION

1. Install the differential assembly, while supporting with a transmission jack or the like.

WARNING:

Be sure to slowly install the differential, while holding it by your hands, for the differential is in an unstable state.

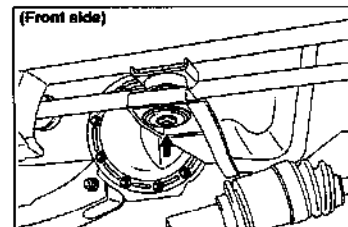


WPB90-DF067

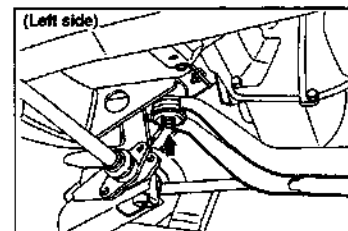
2. Temporarily tighten the three bolts of the differential mounting brackets to the chassis frame.
3. Proceed to tighten the bolts.

Tightening Torque:

39.2 - 53.9 N·m (4.0 - 5.5 kgf·m)



WPB90-DF068

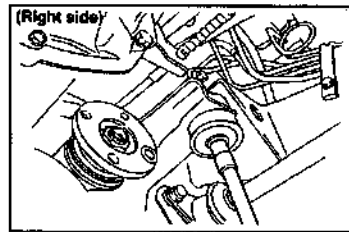


WPB90-DF069

FRONT/REAR DIFFERENTIAL

Tightening Torque:
39.2 - 49.0 N·m (4.0 - 5.0 kgf-m)

4. Remove the jack from the vehicle.



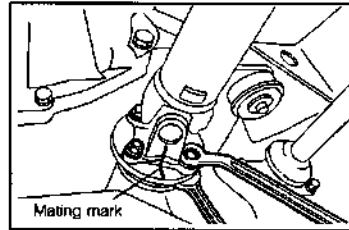
WF830-DF101

5. Install the propeller shaft.

CAUTION:

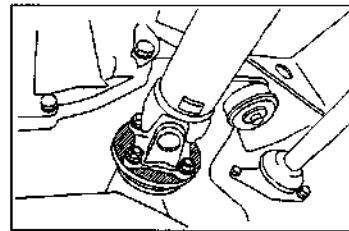
- While installing the propeller shaft, align the mating marks put during the removal with each other. If this operation should fail to be performed correctly, the propeller shaft may emit abnormal noise or vibration during the running.

Tightening Torque: 58.8 - 78.5 N·m (6.0 - 8.0 kgf-m)



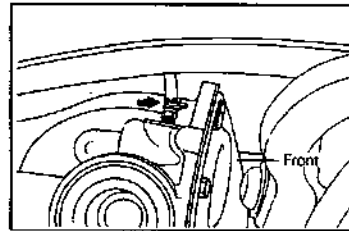
WF830-DF101

6. After the propeller shaft has been installed, apply black paint to the exposed machined surface (slant line section in the right figure) of the differential companion flange.



WF830-DF102

7. Connect the breather hose with the clamp.



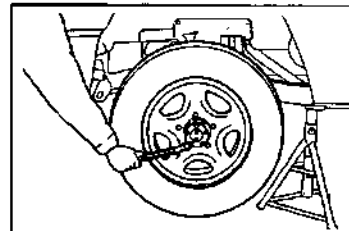
WF830-DF103

8. Install the front drive shaft (Refer front axle and suspension).
9. Tighten the front wheel by means of a hub nuts.

Tightening Torque:
88.3 - 118.0 N·m (9.0 - 12.0 kgf-m)

NOTE:

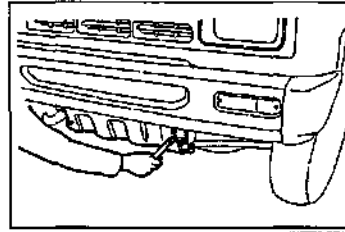
- Be sure to tighten the hub nut alternately and diagonally.



WF830-DF104

FRONT/REAR DIFFERENTIAL

10. Jack down the vehicle.
11. Install the front stabilizer (Refer front axle and suspension section).
12. Fill the differential oil.
Oil to be Used: API GL-5, SAE 90 or 80W-90
Oil Capacity: 0.9 L
13. Install the engine undercover with the four bolts.



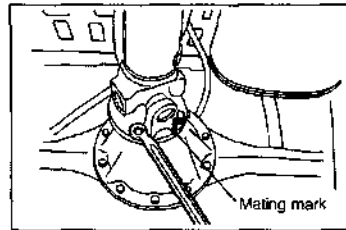
IN-VEHICLE REPLACEMENT PROCEDURES FOR OIL SEAL (REAR)

REMOVAL

1. Remove the drive shaft.

CAUTION:

- Prior to the removal, be sure to put a mating mark. If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration during the running.

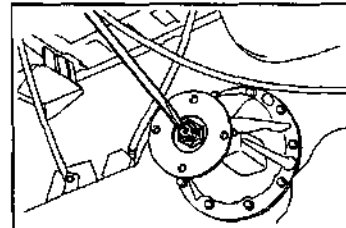


WPBQ-DP107

2. Release staking of the lock nut of the drive pinion.

NOTE:

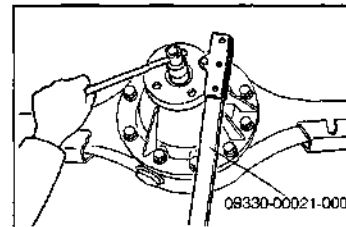
- Insufficient releasing of the staking of the lock nut may cause the threaded portion of the drive pinion to be damaged.



WPBQ-DP108

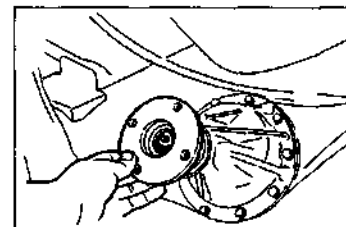
3. Remove the lock nut and plate washer, using the following SST.

SST: 09330-00021-000



WPBQ-DP109

4. Remove the companion flange.



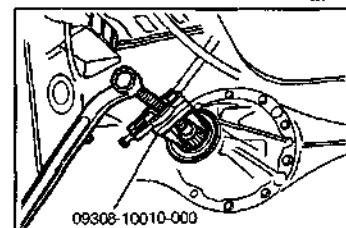
WPBQ-DP110

5. Remove the oil seal, using the following SST.

SST: 09308-10010-000

NOTE:

- Never reuse the removed oil seal.



WPBQ-DP111

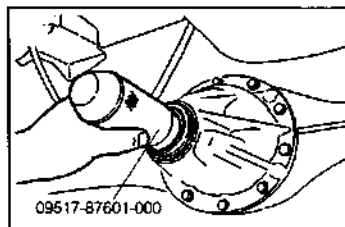
FRONT/REAR DIFFERENTIAL

INSTALLATION

1. Drive a new oil seal into position, using the following SST.
SST: 09517-87601-000

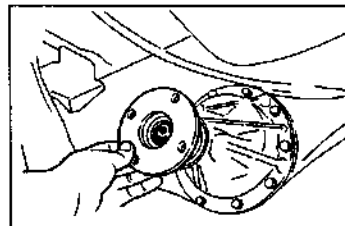
NOTE:

- Apply the gear oil to the oil seal lip section, prior to install.



WP690-DF112

2. Install the companion flange.



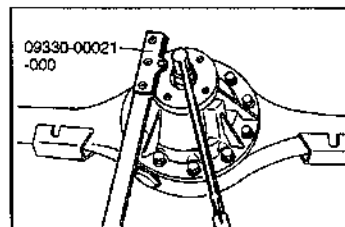
WP690-DF113

3. Install the plate washer and new lock nut, using the following SST.

SST: 09330-00021-000

Tightening Torque:

186.0 - 226.0 N·m (19.0 - 23.0 kgf·m)

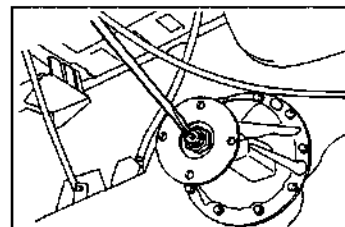


WP690-DF114

4. Stake the lock nut of the drive pinion.

NOTE:

- Never reuse the removed lock nut.



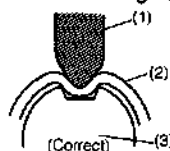
NOTE:

- When staking the lock nut, point a suitable staking tool toward the drive pinion axis center and stake the lock nut securely, as shown in the figure below. (Poor staking may cause abnormal noise.)

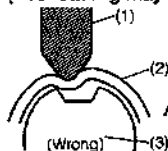
(1) Suitable staking tool

(2) New nut

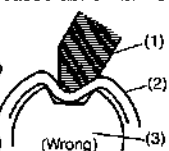
(3) Drive pinion



(Correct)



(Wrong)



(Wrong)

WP690-DF115

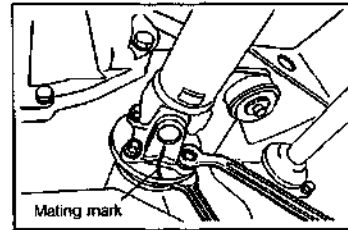
FRONT/REAR DIFFERENTIAL

5. Install the propeller shaft.

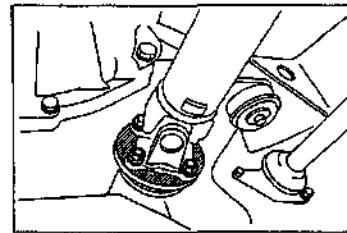
CAUTION:

- While installing the propeller shaft, align the mating marks put during the removal with each other. If this operation should fail to be performed correctly, the propeller shaft may emit abnormal noise or vibration during the running.

Tightening Torque: 58.8 - 78.5 N·m (6.0 - 8.0 kgf·m)

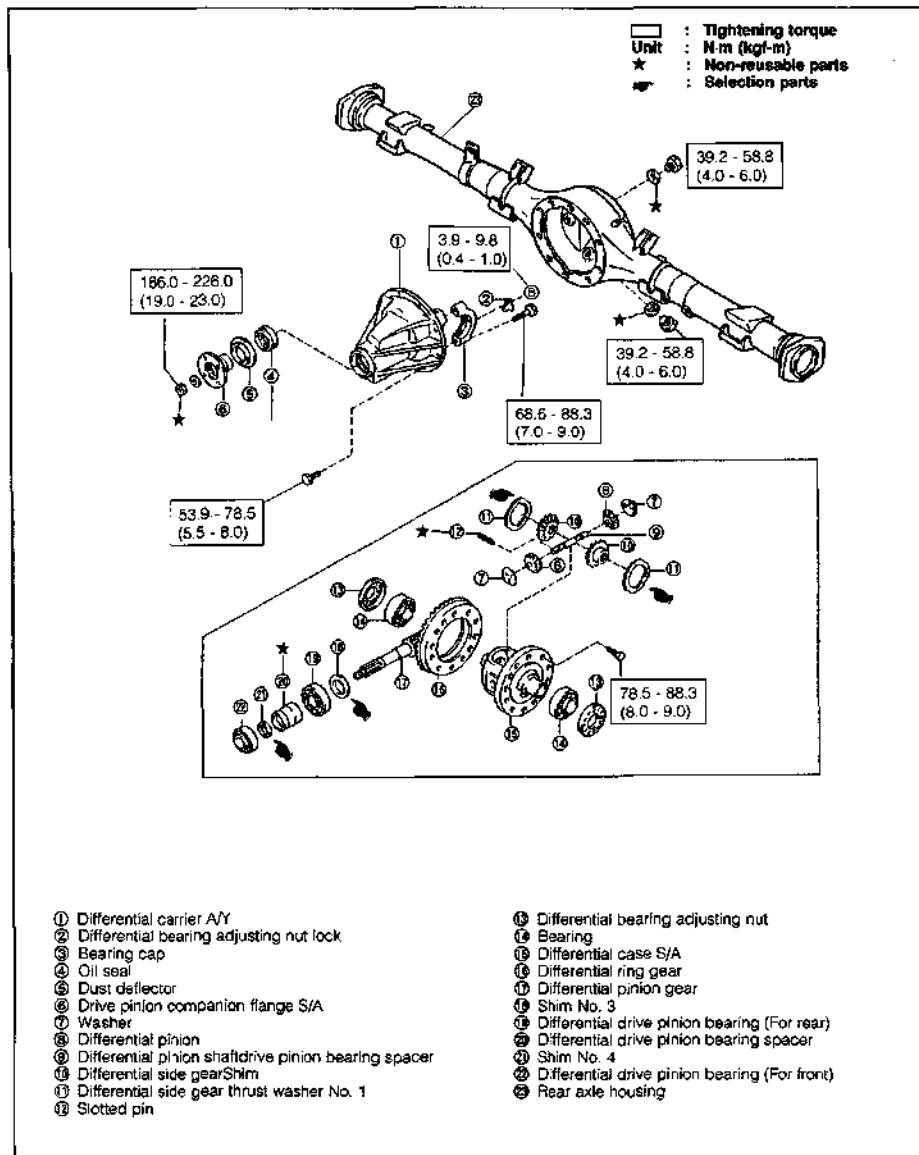


6. After the propeller shaft has been installed, apply black paint to the exposed machined surface (slant line section in the right figure) of the differential companion flange.



FRONT/REAR DIFFERENTIAL

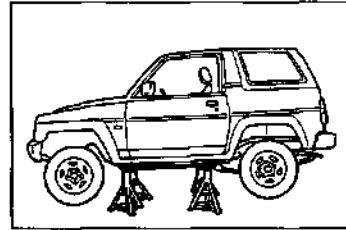
REAR DIFFERENTIAL COMPONENTS



WP560-DF118

REMOVAL

1. Jack up the vehicle and support it with safety stands (As for the jacking-up points and support points for safety stands, refer GI-section).

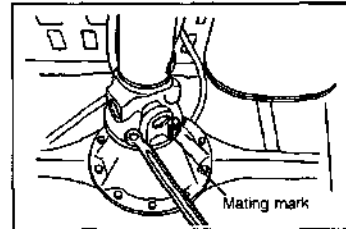


WP890-DF119

2. Remove the propeller shaft.

CAUTION:

- Prior to the removal, be sure to put a mating mark. If this operation should fail to be performed, the propeller shaft may emit abnormal noise or vibration during the running.



WP890-DF120

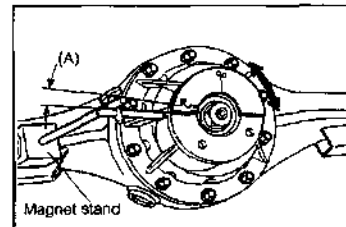
3. Rock the rear wheel by pulling up the parking brake lever.
4. Drain the oil from the differential.

5. Remove the speed sensor only for rear A.B.S equipped vehicle (Refer BR-section).

6. Measurement of total backlash of rear axle assembly

- (1) Install a protractor and a magnet stand equipped with a pointer on the differential companion flange surface.
- (2) Move the differential companion flange to the right or to the left by the backlash (A).

Specified Value: Less than 5.5°

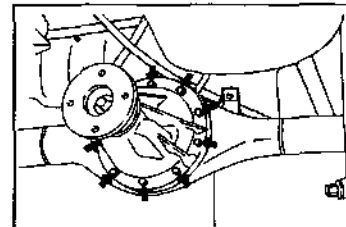


WP890-DF121

NOTE:

- if the total backlash exceeds the specified value, adjust the ring gear-to-drive pinion backlash and side gear-to-pinion gear backlash to the minimum value, respectively.

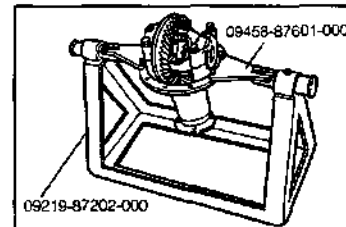
7. Remove the differential carrier assembly by removing the ten bolts.



WP890-DF122

8. Install the differential assembly removed from the vehicle on the following SSTs.

SSTs: 09219-87202-000
09458-87601-000



WP890-DF123

FRONT/REAR DIFFERENTIAL

PRE-INSPECTION

NOTE:

- Prior to the disassembling of the differential, be sure to check the following items and record the values. (These values are used as reference which assures the correct assembling.)

1. Ring gear runout check

Measure the runout on the several points at the back surface of the ring gear, using a dial gauge.

Allowable Limit: 0.1 mm

If the runout exceeds the allowable limit, replace the final gear as a set.

2. Ring gear backlash check

Secure the drive pinion in such a way that a dial gauge may make contact with the forward end of the tooth surface of the ring gear at right angles. Measure the backlash by moving the ring gear.

Specified Value: 0.07 - 0.17 mm

3. Side gear backlash check (Except for L.S.D.)

Measure the backlash with the pinion gear pushed against the differential case side.

Specified Value: 0.03 - 0.15 mm

4. Total preload measurement

Measure the starting torque with the drive pinion brought into contact with the tooth surface of the ring gear, using a torque gauge.

Specified Value: 0.58 - 3.2 N (0.06 - 0.33 kgf)

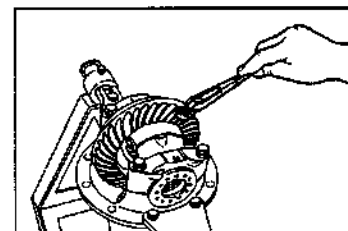
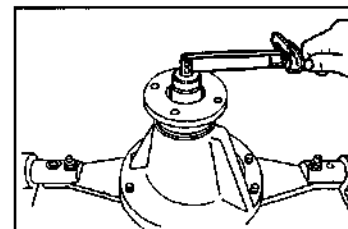
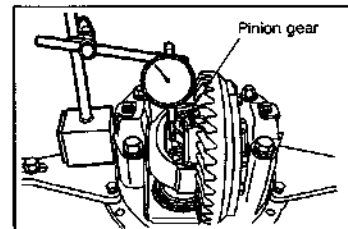
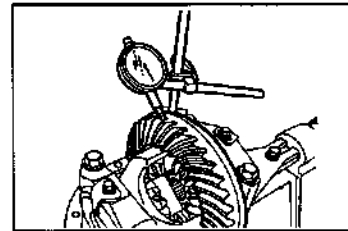
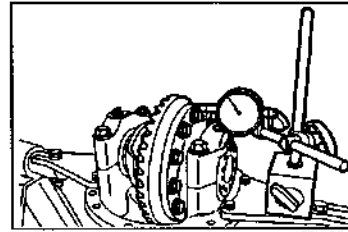
5. Check of tooth contact between ring gear and drive pinion

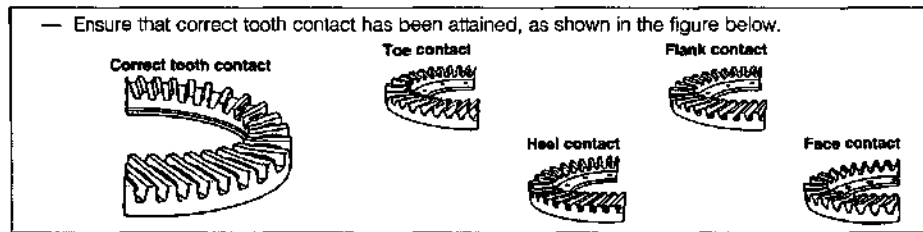
- Apply a thin film of blue lead or the like evenly to both sides of five or six teeth of the ring gear.

NOTE:

- Perform the tooth contact check at four points of the ring gear.

- Apply braking to the drive pinion and turn the ring gear several times. Check the tooth contact between the ring gear and the drive pinion.

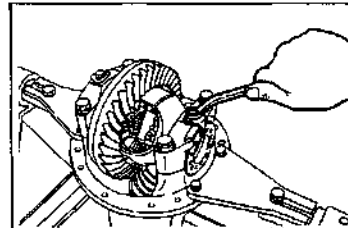




WP290-DF125

DISASSEMBLY

1. Remove the adjusting lock nut.

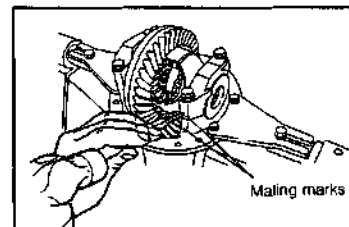


WP290-DF130

2. Put mating marks on the bearing cap and differential carrier.

NOTE:

- Since the bearing cap has been manufactured integrally with the differential carrier, never disturb the combination of these components.



Mating marks

WP290-DF131

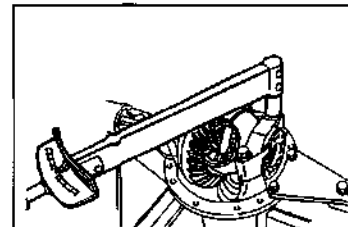
3. Remove the bearing cap.

NOTE:

- Arrange the removed bearing caps in order, separating the right cap from the left cap.

NOTE:

- The drive pinion preload should be measured after the differential case has been removed.
- After completion of measurement, perform disassembly, following the removal procedures given below.

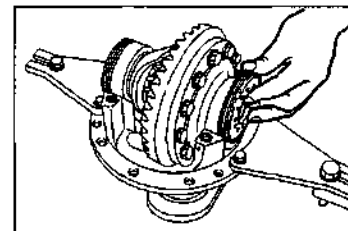


WP290-DF132

4. Remove the adjusting nut.

NOTE:

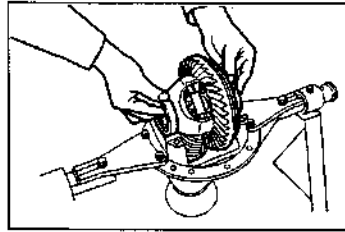
- Arrange the removed adjusting nut in order, separating the right nut from the left nut.



WP290-DF133

FRONT/REAR DIFFERENTIAL

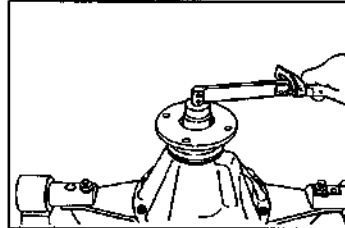
5. Remove the differential case from the carrier.



6. Drive pinion preload measurement
Measure the starting torque using a torque gauge.
Specified Value: 0.49 - 2.9 N (0.05 - 0.3 kgf)

NOTE:

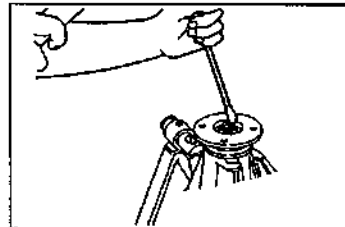
- This step should be performed after the differential case has been removed from the carrier.



7. Release the staking of the lock nut, using a chisel and a hammer.

NOTE:

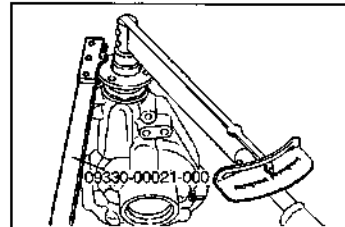
- Never reuse the removed lock nut.



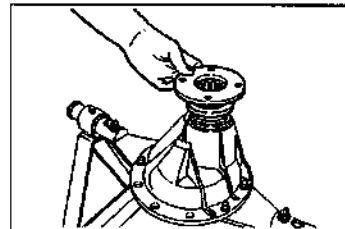
8. Secure the companion flange, using the following SST.
Proceed to the remove the lock nut.
SST: 09330-00021-000

NOTE:

- Never reuse the removed lock nut.



9. Remove the companion flange and plate washer



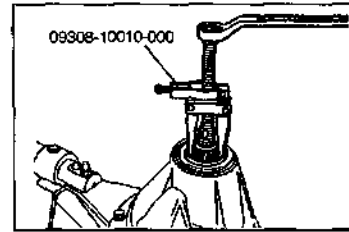
FRONT/REAR DIFFERENTIAL

10. Remove the oil seal of the drive pinion, using the following SST.

SST: 09308-10010-000

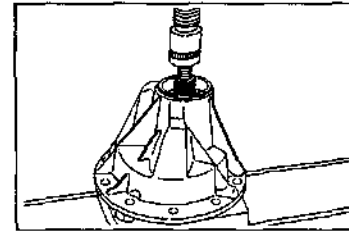
NOTE:

- Never reuse the removed oil seal



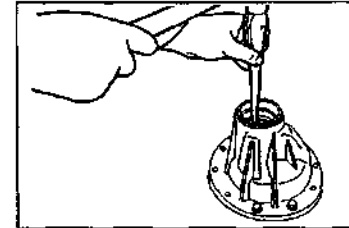
WP690-DF138

11. Remove the drive pinion, using a press.



WP690-DF139

12. Remove the front and rear bearing outer races, using a brass bar.



WP690-DF140

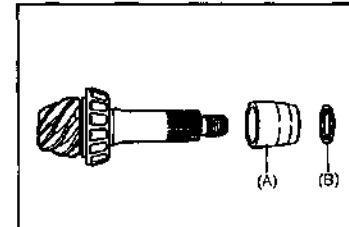
13. Remove the following parts from the drive pinion.

(A) Spacer

(B) Shim for drive pinion preload

NOTE:

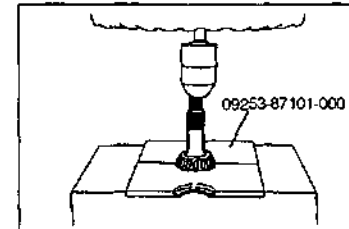
- Never reuse the spacer as it's crush type



WP690-DF141

14. Remove the rear bearing and the drive pinion mounting distance adjusting shim from the drive pinion, using the following SST.

SST: 09253-87101-000



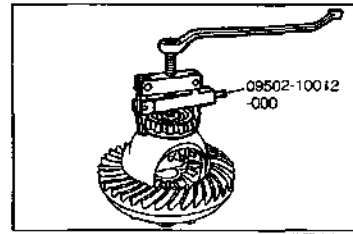
WP690-DF142

FRONT/REAR DIFFERENTIAL

15. Set the differential case in a vice.
16. Remove the side bearing from the differential case, using the following SST.

NOTE:

- Insert the pawl of the SST into the groove of the differential carrier.
- SST: 09502-10012-000

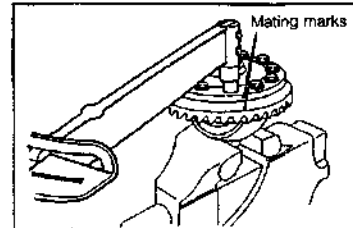


WF890-DF143

17. Stamp mating marks on the differential case and ring gear. Proceed to remove the ring gear.

NOTE:

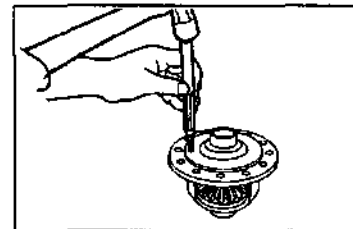
- For easier removal, lightly tap the ring gear at its back surface, using a plastic hammer.



WF890-DF144

18. Pull out the slotted spring pins of the pinion gear. Remove the following parts from the differential case.

- (1) Differential side gear
- (2) Differential side gear thrust washer
- (3) Differential pinion shaft
- (4) Differential pinion
- (5) Differential pinion thrust washer

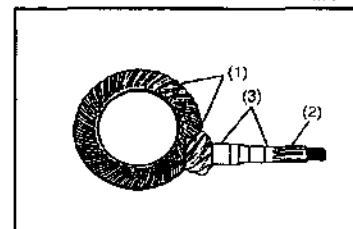


WF890-DF145

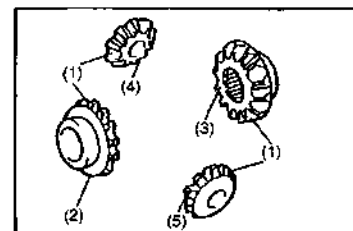
INSPECTION

Inspect each section of the following parts for any sign of damage, wear or excessive looseness. Replace any parts which exhibit defects.

1. Drive pinion & ring gear
 - (1) Gear teeth (1)
 - (2) Spline portion (2) of drive pinion
 - (3) Bearing fitting section (3)
2. Side gear & pinion
 - (1) Gear teeth (1)
 - (2) Side gear boss section (2)
 - (3) Side gear serrated section (3)
 - (4) Pinion shaft fitting hole (4)
 - (5) Differential case contact section (5)



WF890-DF146



WF890-DF147

FRONT/REAR DIFFERENTIAL

2. Selecting procedures for drive pinion mounting distance adjusting shims

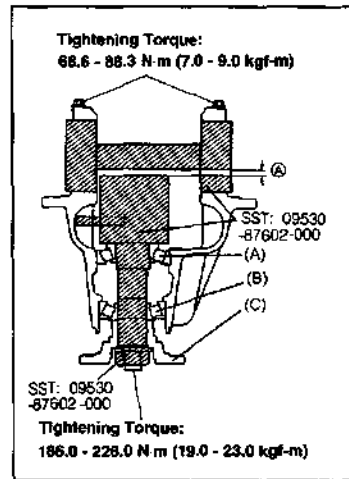
- (1) Assemble the SST and following parts on the front differential. Tighten the bolt to the tightening torque shown in the figure above.

SST: 09530-87602-000

- (A)...Rear bearing
(B)...Front bearing
(C)...Companion flange

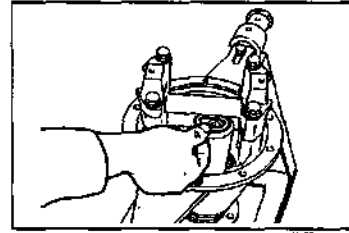
NOTE:

- Do not install the oil seal at this stage.



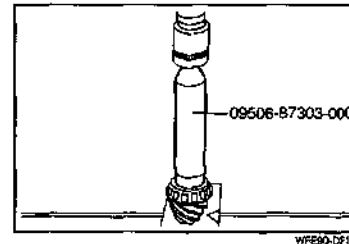
- (2) Measure the dimension (A) shown in the figure above. Select a suitable shim from the table below.

Adjusting Shim Availability	Unit: mm
2.10	
2.15	
2.20	
2.25	
2.30	
2.35	
0.30	



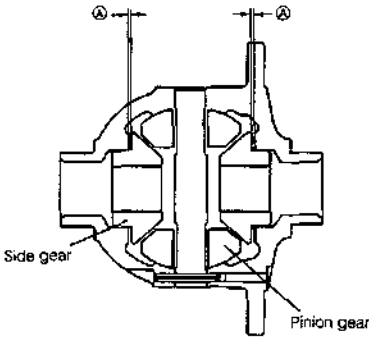
3. Place the drive pinion mounting distance adjusting shim that was selected in the previous step in the drive pinion. Press the rear bearing, using the following SST.

SST: 09506-87303-000



FRONT/REAR DIFFERENTIAL

4. Selecting procedures for side gear backlash thrust washer



Availability of Adjusting Thrust Washer for Section (A)

Units: mm

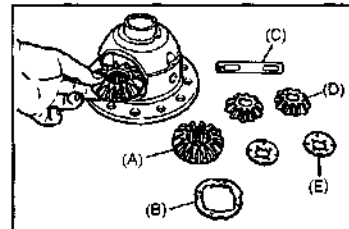
1.00
1.05
1.10
1.15
1.20

- (1) Prior to assembling, apply the gear oil to the following rotating sections.

- Outer periphery (side and pinion gear)
- Inner periphery of side and pinion gear in differential case

- (2) Assemble the following parts in the differential case.

- (A) Differential side gear
- (B) Differential side gear thrust washer
- (C) Differential pinion shaft
- (D) Differential pinion
- (E) Differential pinion thrust washer



- (3) Measure the backlash with the pinion gear pushed against the differential case side. Select the thrust washer in such a way that the backlash between the differential pinion and the differential side gear may conform to the specified value given below. Here, the backlash is the mean value of measurements over four teeth. Place the selected thrust washer.

Specified Value: 0.03 - 0.15 mm

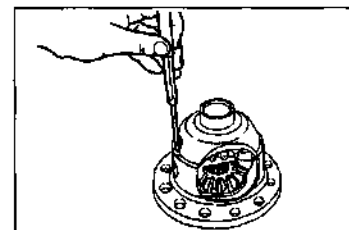
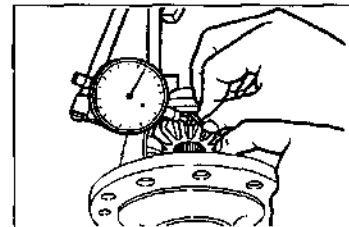
NOTE:

- The same size of the thrust washer should be installed at both the right and left sides.

- (4) Drive the slotted spring pin into position after completion of the backlash measurement.

NOTE:

- Stake the differential case so as to secure the slotted spring pin.



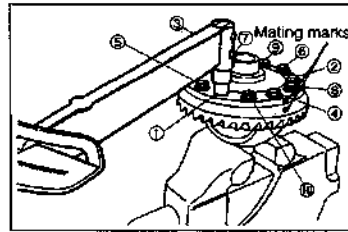
FRONT/REAR DIFFERENTIAL

5. Apply the gear oil to the threaded portions of the tightening bolts and ring gear.
6. Align the matching marks put during the disassembly with each other.
7. Install the ring gear in the differential case and tighten the bolts.

Tightening Torque: 78.5 - 88.3 N·m (8.0 - 9.0 kgf·m)

NOTE:

- Be sure to tighten the bolts alternately and diagonally.
- The illustration at the right indicates a typical example of the tightening sequence.

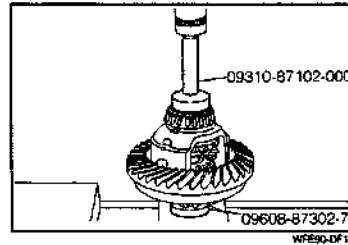


8. Press the side bearing into the differential case, using the following SSTs.

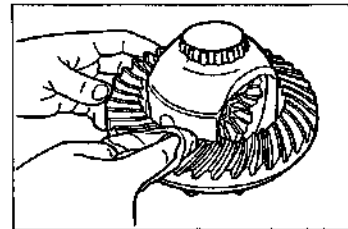
SST: 09310-87102-000

09608-87302-7

that is a part of 09608-87302-000



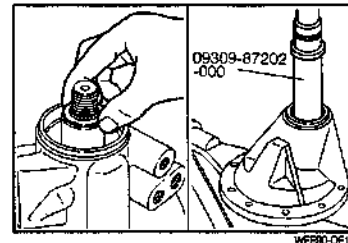
9. Clean the ring gear tooth surfaces.



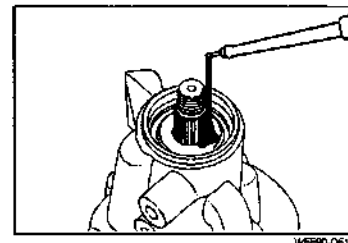
10. Install the drive pinion, new drive pinion bearing spacer and shim (one that was measured at time of selection) to the differential carrier.

11. Press the rear bearing, using the following SST.

SST: 09309-87202-000

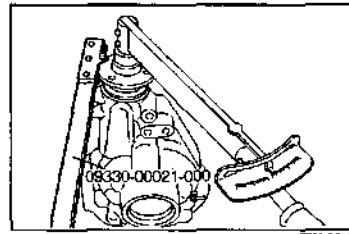


12. Apply the gear oil to the rear bearing tapered roller sections.

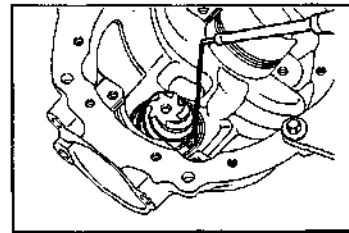


FRONT/REAR DIFFERENTIAL

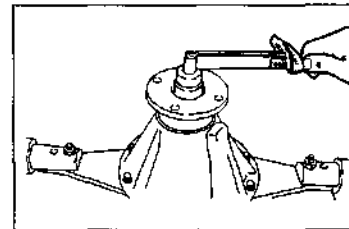
13. Install the companion flange.
14. Tighten the nut (use for 09530-87603-000), using the following SST:
 SST: 09330-00021-000
 Tightening Torque:
 186.0 - 226.0 N·m (19.0 - 23.0 kgf·m)



15. Apply the gear oil to the front bearing tapered roller sections.



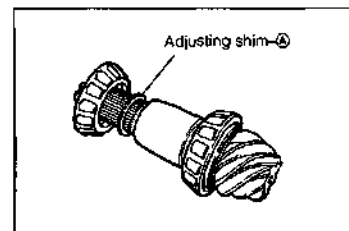
16. Rotates the companion flange for several times in clock and counter clockwise.
17. Measure the preload of the drive pinion, using a torque gauge.
 Specified Value:
 New Bearing:
 0.49 - 2.9 N (0.05 - 0.3 kgf)
 Bearing Reused:
 0.49 - 1.7 N (0.05 - 0.17 kgf)



18. When the preload is greater than the specified value, increase the adjusting shim thickness. Conversely, when the preload is less than the specified value, decrease the adjusting shim thickness.

NOTE:

- Refer the table for availability of adjusting shim ④ on the item of 19.



FRONT/REAR DIFFERENTIAL

19. Availability of adjusting shim for section ㉑

Units: mm

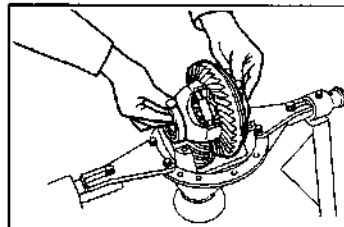
1.600	1.850	2.100
1.625	1.875	2.125
1.650	1.900	2.150
1.675	1.925	2.175
1.700	1.950	2.200
1.725	1.975	2.225
1.750	2.000	2.250
1.775	2.025	2.275
1.800	2.050	2.300
1.825	2.075	2.325

WFE90-DF169

20. Install the differential case on the differential carrier.

NOTE:

- Make sure that the outer races of the side bearings are assembled correctly in the respective original positions.

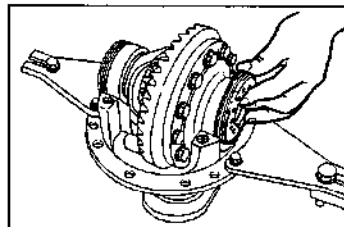


WFE90-DF170

21. Install the adjusting nut in such a way that it is aligned with the threaded portion of the differential carrier.

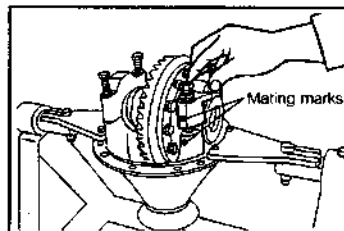
NOTE:

- Apply gear oil to the bearing and adjusting nut.



WFE90-DF171

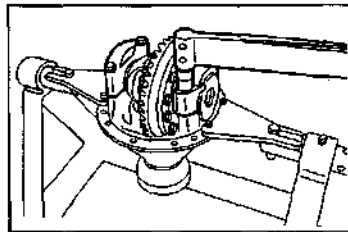
22. Install the bearing cap to the differential carrier, while aligning the mating marks put during the disassembly with each other.



WFE90-DF172

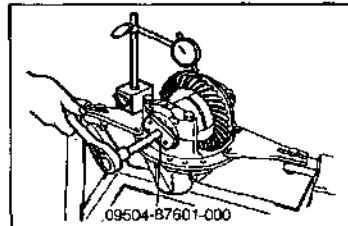
FRONT/REAR DIFFERENTIAL

23. Temporarily tighten the bearing cap to the following specified torque. Then, loosen the bearing cap to such an extent that the adjusting nut can be turned with the SST.
Tightening Torque: 19.6 N-m (2.0 kgf-m)



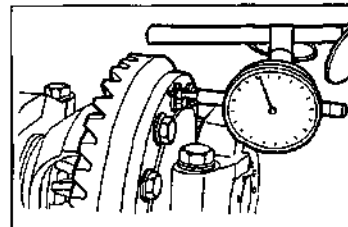
WP530-DF173

24. Lightly tighten the right and left adjusting nuts, using the SST, until the backlash between the drive pinion and the ring gear becomes about 0.2 mm
SST: 09504-87601-000



WP530-DF174

25. Ring gear preload adjusting procedure
(1) Install a dial gauge normally to the back surface of the ring gear.

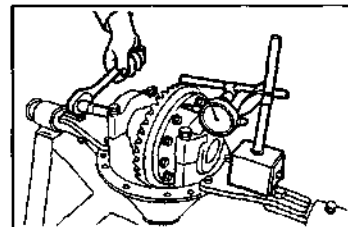


WP530-DF175

- (2) Using the SST, tighten the adjusting nut at the tooth surface side of the ring gear, until the dial gauge registers no fluctuation in the reading.

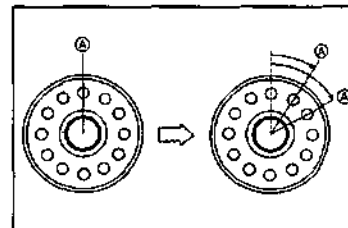
NOTE:

- The side bearing preload becomes zero when the dial gauge no longer registers fluctuation.



WP530-DF176

- (3) Tighten further the adjusting nut at the ring gear tooth surface side to the specified preload.
Specified Side Bearing Preload: 1 - 2 notches

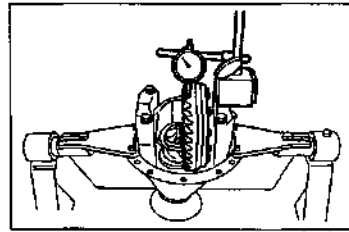


WP530-DF177

FRONT/REAR DIFFERENTIAL

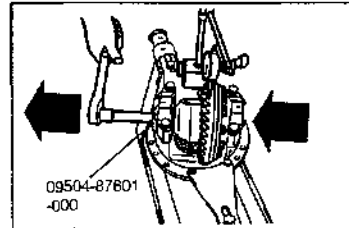
26. Adjusting procedure for backlash between ring gear and drive pinion

(1) Install a dial gauge at right angles with the ring gear tooth surface. Measure the backlash.
Specified Value: 0.07 - 0.17 mm



WF830-DF178

(2) If the backlash does not conform to the specification, adjust the backlash by moving the bearing by means of the right and left adjusting nuts, using the following SST.
SST: 09504-87601-000



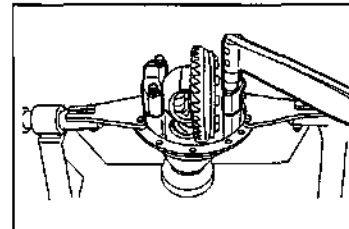
WF830-DF179

NOTE:

- The right and left bearings should be moved in the same direction and by the same amount. For example, if the left bearing is loosen one notch, the right bearing should be tightened one notch.

27. Tighten the bearing cap to the specified torque.

Tightening Torque: 68.6 - 88.3 N·m (7.0 - 9.0 kgf·m)



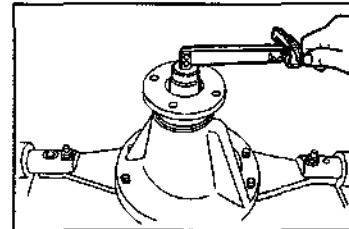
WF830-DF180

28. Total Preload

With the drive pinion brought in contact with the ring gear, measure the total preload, using a torque gauge.

New Bearing: 0.58 - 3.2 N (0.06 - 0.33 kgf)

Bearing Reused: 0.58 - 1.9 N (0.06 - 0.2 kgf)



WF830-DF181

NOTE:

- If the total preload does not conform to the specification, adjust the total preload by means of the adjusting nut at the ring gear tooth surface side.

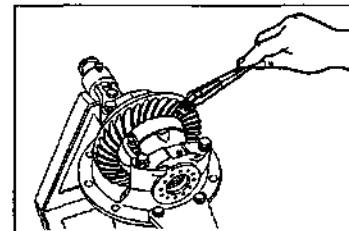
29. Checking procedure for tooth contact between ring gear and drive pinion

(1) Apply a thin film of blue lead or the like evenly to both sides of five or six teeth of the ring gear.

(2) Turn the ring gear several times by applying a load to the drive pinion by one hand.

NOTE:

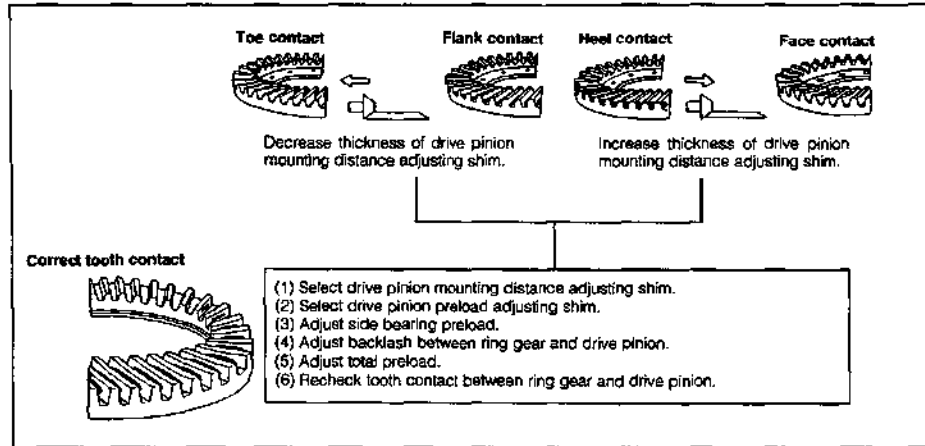
- Perform the tooth contact check at four points of the ring gear.



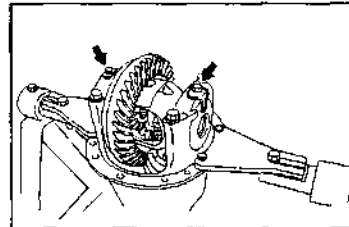
WF830-DF182

FRONT/REAR DIFFERENTIAL

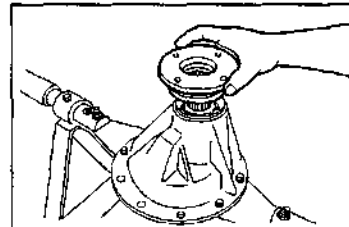
(3) Ensure that the correct tooth contact has been attained, as shown in the figure below.



30. Install the adjusting nut lock to the bearing cap.
Tightening Torque: 3.9 - 9.8 N·m (0.4 - 1.0 kgf-m)



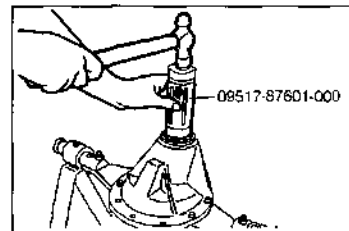
31. Remove the companion flange by removing the lock nut for 09530-87602-000.



32. Drive a new oil seal up to the edge surface of the differential carrier, using the following SST.
SST: 09517-87601-000

NOTE:

- Apply gear oil to the oil seal lip section.



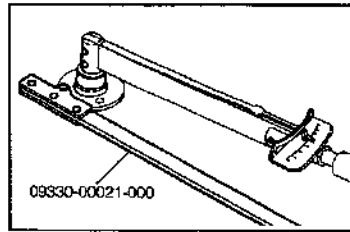
FRONT/REAR DIFFERENTIAL

33. Tighten the companion flange by means of a new lock nut, using the following SST.

SST: 09330-00021-000

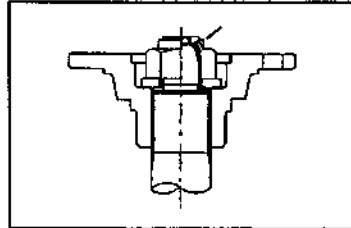
Tightening Torque:

186.0 - 226.0 N·m (19.0 - 23.0 kgf·m)



WFE90-CF187

34. Stake lock section of the nut securely, using a chisel or the like.

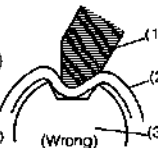
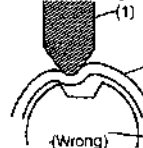
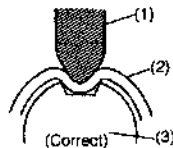


WFE90-CF188

NOTE:

- When staking the lock nut, point a suitable staking tool toward the drive pinion axis center and stake the lock nut securely, as shown in the figure below. (Poor staking may cause abnormal noise.)

- (1) Suitable staking tool
(2) New nut
(3) Drive pinion

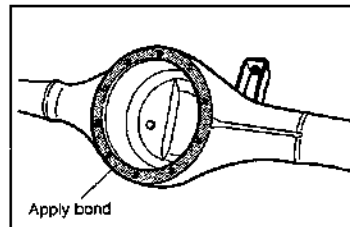


WFE90-CF189

INSTALLATION

1. Apply the following bond to the differential installation surface of the rear axle housing.

Bond to Be Used: Three bond 1104
(Three bond made)



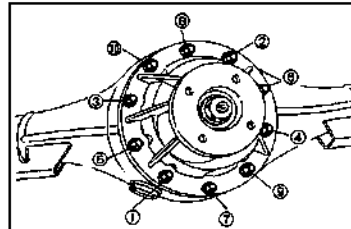
WFE90-CF190

2. Remove the differential carrier from the SSTs.
3. Tighten the differential carrier by means of the bolts.

Tightening Torque: 53.9 - 78.5 N·m (5.5 - 8.0 kgf·m)

NOTE:

- Be sure to tighten the bolts alternately and diagonally. (The illustration at the right figure indicates a typical example of the tightening sequence.)



WFE90-CF191

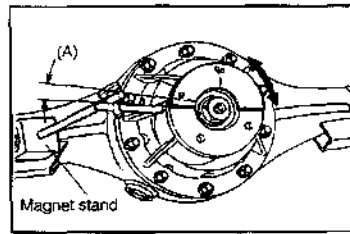
FRONT/REAR DIFFERENTIAL

4. Install the rear axle shaft (Refer RS-section)
5. Measurement of total backlash of rear axle assembly
 - (1) Install a protractor and a magnet stand equipped with a pointer on the differential companion flange surface.
 - (2) Move the differential companion flange to the right or to the left by the backlash.

Specified Value: Less than 5.5°

NOTE:

- If the total backlash exceeds the specified value, adjust the ring gear-to-drive pinion backlash and side gear-to-pinion gear backlash to the minimum value, respectively.
- If the total backlash exceeds the specified value even if the respective backlashes (ring gear-to-drive pinion backlash and side gear-to-pinion gear backlash) are set to the minimum values, replace the rear axle shaft and side gear with new ones.



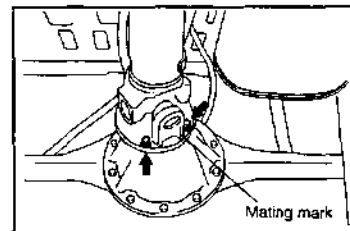
WFE90-DF192

6. Install the propeller shaft.

CAUTION:

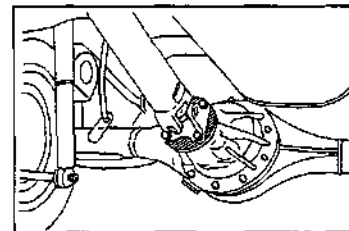
- Align the mating marks put during the removal with each other.
- If this operation should fail to be performed correctly, the propeller shaft may emit abnormal noise or vibration during the running.

Tightening Torque: 58.8 - 78.5 N·m (6.0 - 8.0 kgf·m)



WFE90-DF193

7. On the rear ABS-equipped vehicle only, install the speed sensor. (Refer to RS section.)
8. Apply black paint to the exposed machined surface (slant line section in the right figure) of the differential companion flange.



WFE90-DF194

9. Fill the differential oil.

Oil to Be Used:

Standard	API GL-5, SAE 90 or 80W-90
L.S.D.	API GL-5 (Oil exclusively used for L.S.D. SAE 90 or 80W-90)

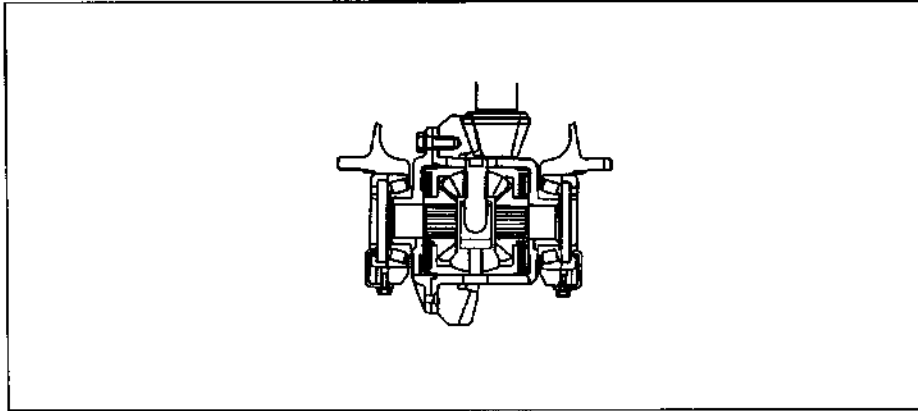
Oil Capacity: 1.95 L

10. Jack down the vehicle.

WFE90-DF195

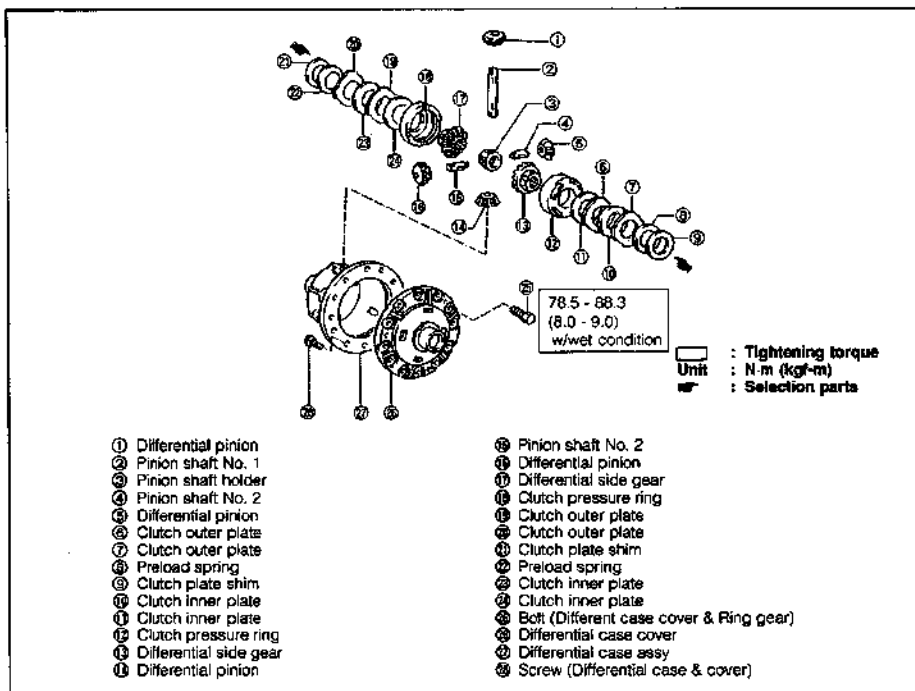
FRONT/REAR DIFFERENTIAL

L.S.D. (Limited Slip Differential) SECTIONAL VIEW



WFE90-OF 196

COMPONENTS



WFE90-OF 197

DF-50

FRONT/REAR DIFFERENTIAL

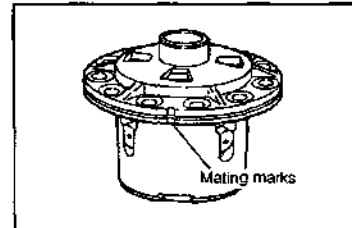
REMOVAL

1. Remove the rear differential carrier assembly.
(See pages DF-32 through DF-34.)
2. Remove the differential case assembly from the differential carrier.
(See pages DF-34 through DF-37.)

WPB90-DF108

DISASSEMBLY

1. Ensure that the mating marks on the differential case sub-assembly and the differential case cover are aligned with each other.

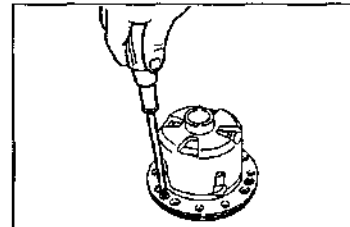


WPB90-DF109

2. Separate the differential case subassembly from the differential case cover by removing the screws.

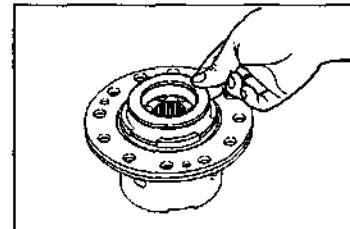
NOTE:

- When removing the three screws, loosen them evenly over several stages.



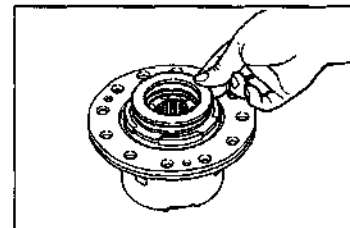
WPB90-DF200

3. Remove the clutch plate shim.



WPB90-DF201

4. Remove the preload spring.

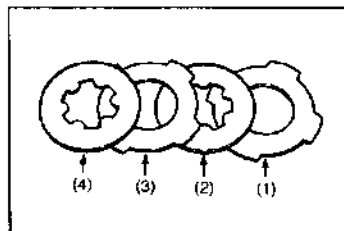


WPB90-DF202

FRONT/REAR DIFFERENTIAL

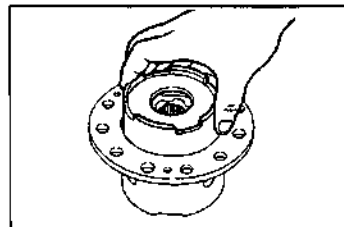
5. Remove the following parts in this sequence from the differential case.

- (1) Clutch outer plate
- (2) Clutch inner plate
- (3) Clutch outer plate
- (4) Clutch inner plate



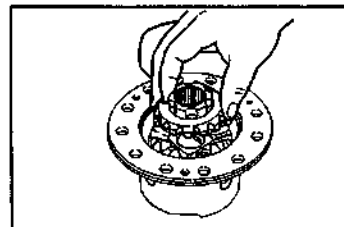
WFEB0-DF269

6. Remove the clutch pressure ring.



WFEB0-DF204

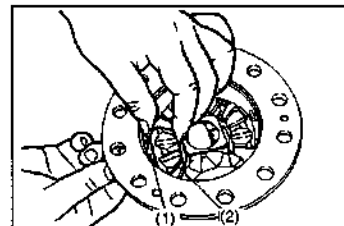
7. Remove the side gear.



WFEB0-DF206

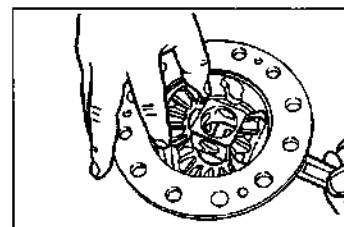
8. Remove the following parts, while floating the pinion shaft No. 1.

- (1) Pinion shaft No. 2 (2 pcs.)
- (2) Differential pinion (2 pcs.)



WFEB0-DF208

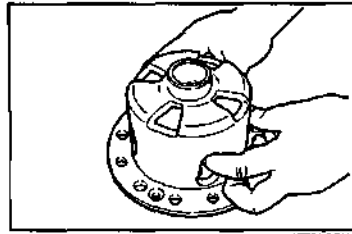
9. Remove the pinion No. 1 and two differential pinions.



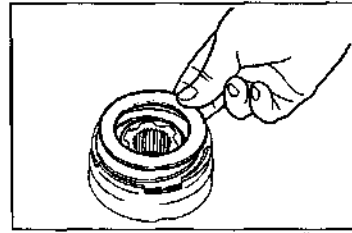
WFEB0-DF207

FRONT/REAR DIFFERENTIAL

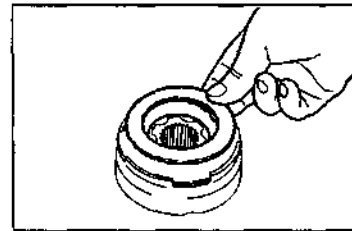
10. Remove each inner part from the differential case.



11. Remove the clutch plate shim.

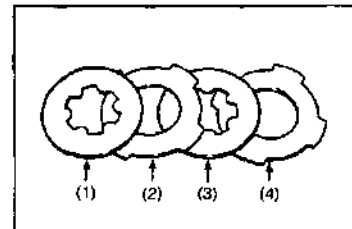


12. Remove the preload spring.

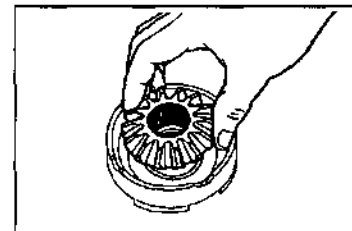


13. Remove the following parts in this sequence from the differential side gear.

- (1) Clutch inner plate
- (2) Clutch outer plate
- (3) Clutch inner plate
- (4) Clutch outer plate



14. Remove the differential side gear.



FRONT/REAR DIFFERENTIAL

INSPECTION

NOTE:

- (1) Clean each of the disassembled parts. Check each part for cracks, wear at fitting sections, damage, deformation or seizure. Replace any faulty part.
- (2) When the side gear and clutch inner plate are to be replaced, also replace the clutch outer plate and preload spring that are in contact with the replaced parts.

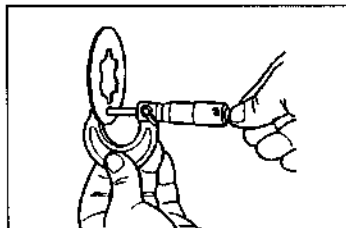
WF890-DF213

1. Check of clutch inner plate

- (1) Ensure that the clutch inner plate exhibits no excessive uneven wear.
- (2) Measure the clutch inner plate thickness.
Specified Value: 1.6 mm
Allowable Limit: 1.4 mm

NOTE:

- The allowable wear limit for the clutch inner plate at one side is 0.1 mm.



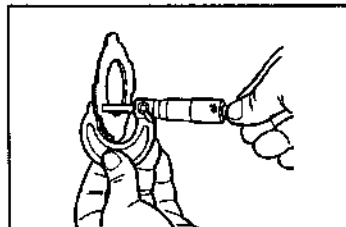
WF890-DF214

2. Check of clutch outer plate

- (1) Ensure that the clutch outer plate exhibits no excessive uneven wear.
- (2) Measure the clutch outer plate thickness.
Specified Value: 1.6 mm
Allowable Limit: 1.4 mm

NOTE:

- The allowable wear limit for the clutch outer plate at one side is 0.1 mm.



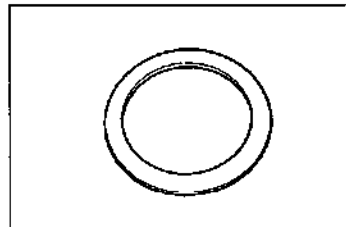
WF890-DF215

3. Preload spring check

- (1) Ensure that the preload spring exhibits no excessive wear.

REFERENCE:

- The spring load should be 480 - 580 kgf as assembled.



WF890-DF216

ASSEMBLY

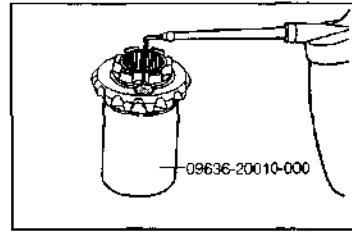
NOTE:

- (1) When assembling each part, make sure that no dust nor chip gets to the part.
- (2) Liberally apply the designated oil to each of the sliding and rotating sections.
Designated Oil: SAE 90 L.S.D. Oil

WF890-DF217

FRONT/REAR DIFFERENTIAL

1. Install the clutch pressure ring to the differential gear, using the following SST or a cylindrical base.
SST: 09636-20010-000



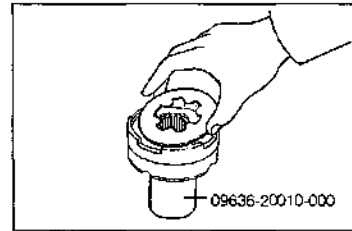
WP80-DF218

2. Apply the L.S.D. oil, as shown in the right figure.

3. Install the clutch inner plate.

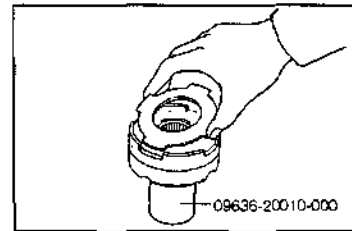
NOTE:

There is no specific installation direction for the clutch inner plate.



WP80-DF219

4. Apply the L.S.D. oil to the upper periphery of the clutch inner plate.



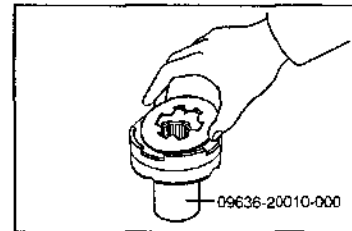
WP80-DF220

5. Install the clutch outer plate.

NOTE:

• There is no specific installation direction for the clutch outer plate.

6. Apply the L.S.D. oil to the upper periphery of the clutch outer plate.



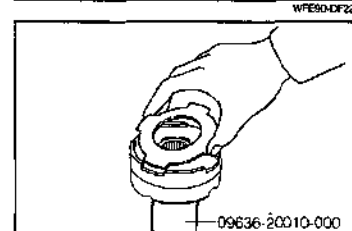
WP80-DF221

7. Install the clutch inner plate.

NOTE:

• There is no specific installation direction for the clutch inner plate.

8. Apply the L.S.D. oil to the upper periphery of the clutch inner plate.



WP80-DF222

9. Install the clutch outer plate.

NOTE:

• There is no specific installation direction for the clutch outer plate.

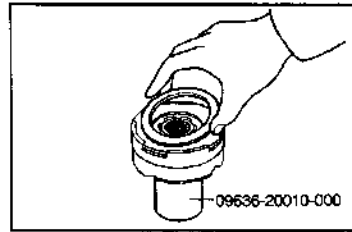
10. Apply the L.S.D. oil to the upper periphery of the clutch outer plate.

FRONT/REAR DIFFERENTIAL

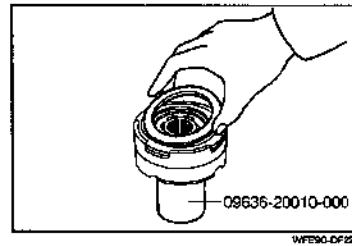
11. Install the preload spring.

NOTE:

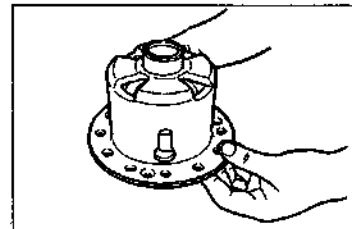
- The preload spring should be installed in such a direction that the enlarged section of the preload spring may come at the clutch plate side.



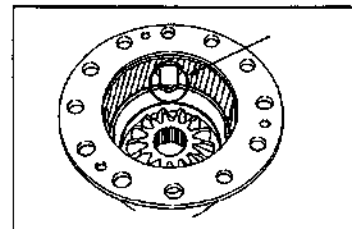
12. Install the 0.5 mm thick plate shim.



13. Install the differential case subassembly.

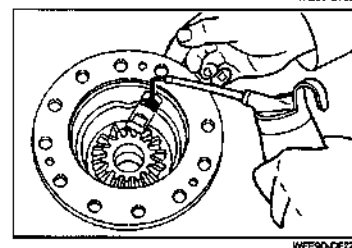


14. Align the groove of the clutch pressure ring with that of the differential case.



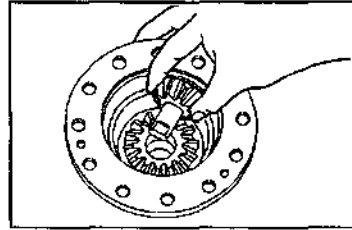
15. Apply the L.S.D. oil to the outer periphery of the differential pinion shaft.

16. Insert the differential pinion shaft to the differential case.



FRONT/REAR DIFFERENTIAL

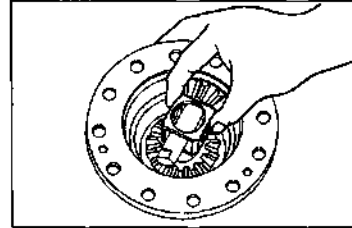
17. Install the pinion gear in the differential pinion shaft.



WPB0-DF228

18. Install the differential pinion shaft No. 1 in the differential pinion shaft.

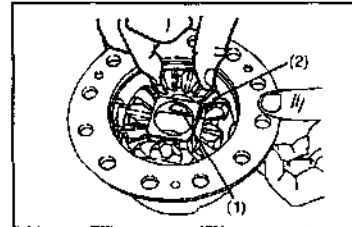
19. Install the pinion gear in the differential pinion shaft.



WPB0-DF229

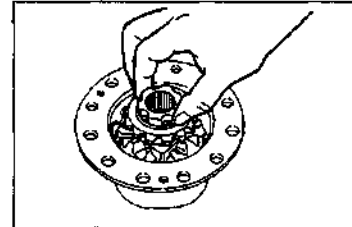
20. Apply the L.S.D. oil to the outer periphery of the pinion shaft No. 2 and then, install the following parts in differential case, while floating the pinion shaft No. 1.

- (1) Pinion shaft No. 2 (2 pcs.)
(2) Differential pinion (2 pcs.)



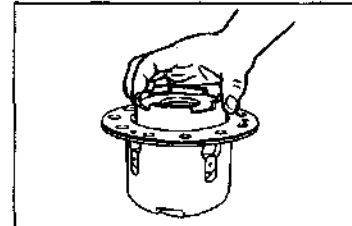
WPB0-DF230

21. Assemble the differential side gear in the clutch pressure ring.



WPB0-DF231

22. Assemble the clutch pressure ring in the differential case.

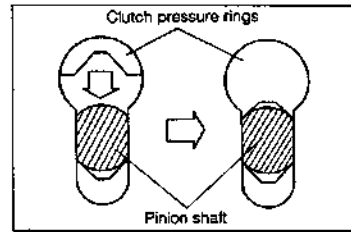


WPB0-DF232

FRONT/REAR DIFFERENTIAL

NOTE:

- The pinion shaft should be aligned with the groove section of the clutch pressure ring during the assembly, as shown in the right figure.

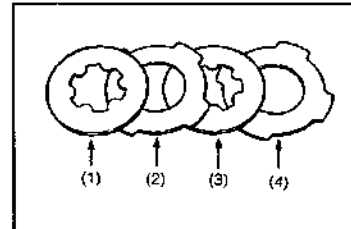


23. Assemble the following parts in this sequence in the clutch pressure ring.

- (1) Clutch inner plate
- (2) Clutch outer plate
- (3) Clutch inner plate
- (4) Clutch outer plate

NOTE:

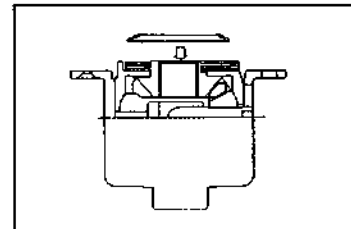
- Each clutch plate should be aligned with the grooves of the clutch pressure ring and side gear during the assembly.



24. Assemble the preload spring in the differential case.

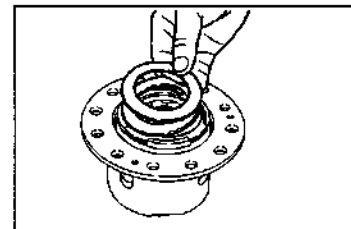
NOTE:

- The preload spring should be installed in such a direction that the enlarged section of the preload spring may come at the clutch plate side.



25. Selecting procedure for clutch plate shim

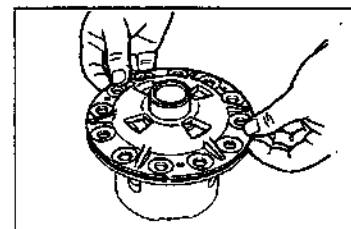
- (1) Install the two 0.5 mm thick clutch plate shims in the differential case.



- (2) Install the differential case cover on the differential case subassembly.

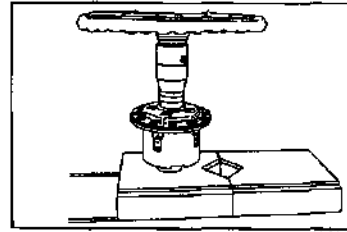
NOTE:

- Do not install the screws at this stage.



FRONT/REAR DIFFERENTIAL

- (3) Apply the following specified load to the differential case cover, using a press.
Specified Load: 1000 kgf

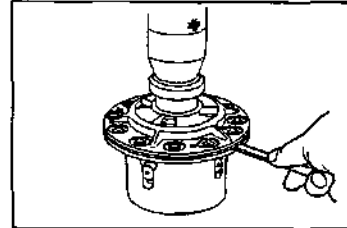


WPB90-DF236

- (4) Measure the clearance between the differential case subassembly and the differential cover, using a thickness gauge.

NOTE:

- Perform this clearance check at three points.
Specified Load: 0.05 - 0.2 mm



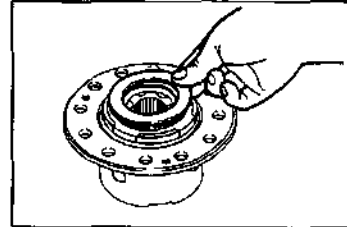
WPB90-DF238

If the clearance exceeds the specified value, decrease the thickness of the clutch plate shim. Conversely, if the clearance is less than the specified value, increase the shim thickness.

Select a suitable clutch plate shim from the table below.

Clutch Plate Shim Availability: mm

0.2
0.3
0.5



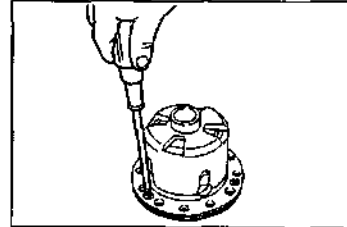
WPB90-DF240

26. Install the differential case cover, while aligning it with the mating mark of the differential case subassembly.

NOTE:

- Tighten the screws evenly.

27. Assemble the differential case assembly.
(See page DF-41 through DF-47.)



WPB90-DF241




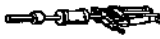












INSTALLATION

1. Install the differential carrier to the rear axle housing (See page DF-48 through DF-49.)

WPB90-DF243

FRONT/REAR DIFFERENTIAL

SSTs

Figure	Parts No.	Parts Name
	09219-87202-000	Engine overhaul stand
	09253-87101-000	Water pump bearing anvil
	09308-10010-000	Oil seal puller
	09308-00010-000	Oil seal puller
	09309-87202-000	Transmission bearing replacer
	09330-00021-000	Companion flange holding tool
	09458-87601-000	Attachment differential overhaul
	09502-10012-000	Differential side bearing puller
	09504-87601-000	Differential side bearing adjust nut wrench
	09517-87601-000	Replacer oil seal
	09517-87602-000	Attachment oil seal puller
	09530-87602-000	Rear differential drive pinion adjust gauge set
	09530-87603-000	Front differential drive pinion adjust gauge set
	09506-87303-000	Differential drive pinion bearing cone front replacer
	09608-87302-000	Axle hub & drive pinion bearing tool set
	09636-20010-000	Upper ball joint dust cover replacer

WFE9D-DF244

FRONT/REAR DIFFERENTIAL

SERVICE SPECIFICATIONS

FRONT

Unit: mm

Item		Specified value	Allowable limit	Remarks
Ring gear runout		—	0.1	
Backlash	Ring gear	0.07 - 0.17	—	
	Pinion gear x Side gear	0.03 - 0.15	—	
Preload	Total	New bearing	0.58 - 3.0 N (0.06 - 0.31 kgf)	—
		Bearing reused	0.58 - 1.8 N (0.06 - 0.19 kgf)	—
	Drive pinion	New bearing	0.39 - 2.45 N (0.04 - 0.25 kgf)	—
		Bearing reused	0.39 - 1.27 N (0.04 - 0.13 kgf)	—

WFE30-CF245

REAR

Unit: mm

Item			Specified value	Allowable limit	Remarks
Total backlash of rear axle A/Y			—	Not to exceed 5.5°	
Ring gear runout			—	0.1	
Backlash		Ring gear	0.07 - 0.17	—	
		Side gear	0.03 - 0.17	—	
Preload	Total	New bearing	0.58 - 3.2 N (0.06 - 0.33 kgf)	—	
		Bearing reused	0.58 - 1.9 N (0.06 - 0.21 kgf)	—	
	Drive pinion	New bearing	0.49 - 2.9 N (0.05 - 0.31 kgf)	—	
		Bearing reused	0.49 - 1.7 N (0.05 - 0.17kgf)	—	
Clutch inner & outer plate thickness (L.S.D only)			1.6	1.4	Allowable wear limit at one side is 0.1
Clearance (differential case S/A x differential cover) (L.S.D only)			0.05 - 0.2		Differential case cover shined be 1000 kgf

WFE30-CF246

FRONT/REAR DIFFERENTIAL

TIGHTENING TORQUE

FRONT

Tightening Components	Tightening Torque		
	N·m	kgf·m	ft·lb
Differential carrier support BKT (only right side) × Chassis frame	39.2 - 49.0	4.0 - 5.0	28.9 - 36.2
Differential carrier support BKT × Chassis frame	39.2 - 53.9	4.0 - 5.5	28.9 - 39.8
Front axle housing S/A × Filler plug	39.2 - 58.8	4.0 - 6.0	28.9 - 43.4
Differential carrier S/A × Drain plug	39.2 - 58.8	4.0 - 6.0	28.9 - 43.4
Front axle housing S/A × Differential carrier S/A	17.7 - 23.5	1.8 - 2.4	13.0 - 17.4
Differential adjusting nut lock × Bearing cap	3.9 - 8.8	0.4 - 1.0	2.9 - 7.2
Bearing cap × Differential carrier S/A	29.4 - 49.0	3.0 - 5.0	21.7 - 36.9
Differential case cover × Differential case S/A	78.5 - 88.3	8.0 - 9.0	57.9 - 65.1
Drive pinion × Lock nut	157.0 - 196.0	16.0 - 20.0	116.0 - 146.0
Differential carrier support BKT × Differential carrier S/A	98.0 - 118.0	10.0 - 12.0	72.0 - 87.0

WFES0-DF247

REAR

Tightening Components	Tightening Torque		
	N·m	kgf·m	ft·lb
Rear axle housing × plugs (filler, drain)	39.2 - 58.8	4.0 - 6.0	28.9 - 43.4
Rear axle housing × Differential carrier A/Y	53.9 - 78.5	5.5 - 8.0	39.8 - 57.9
Differential bearing adjusting lock nut × Bearing cap	3.9 - 9.8	0.4 - 1.0	2.9 - 7.2
Bearing cap × Differential carrier A/Y	68.6 - 88.3	7.0 - 9.0	50.6 - 65.1
Differential case S/A × Differential case cover	78.5 - 88.3	8.0 - 9.0	57.9 - 65.1
Drive pinion × Lock nut	186.0 - 226.0	19.0 - 23.0	137.0 - 166.0

WFES0-DF248

DAIHATSU

F300

FRONT AXLE & SUSPENSION

OUTLINE OF FRONT AXLE &	
SUSPENSION	FS- 2
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WFE00-FS001

FRONT AXLE & SUSPENSION

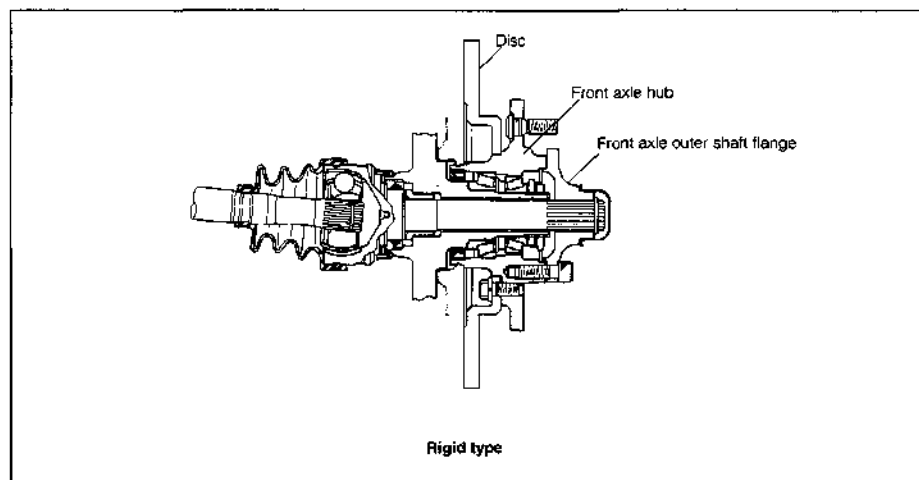
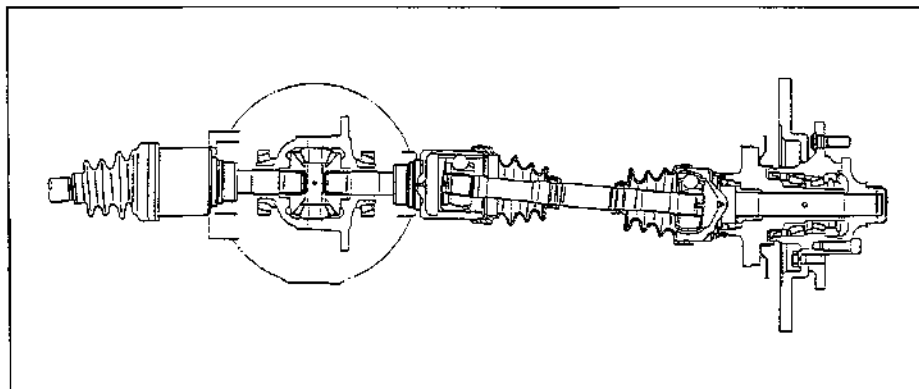
OUTLINE OF FRONT AXLE & SUSPENSION

FRONT AXLE

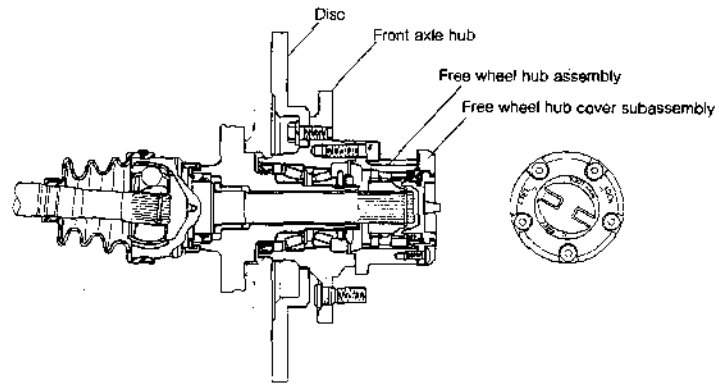
- The driving force from the engine is transmitted to the drive shafts at the right and left sides via the transmission, transfer, front propeller shaft and front differential, finally reaching the front hub meshed with the spline provided at the forward end of each drive shaft. Consequently, the tires are driven.
- The drive shaft employs a full floating type in which the vehicle weight is sustained by means of two tapered roller bearings located between the front axle hub and the steering knuckle. Hence, no vehicle weight is applied to the drive shaft.
- The forward section of the front axle hub adopts two types, depending upon the vehicle type: the rigid type and the locking hub type.

Furthermore, the locking hub comes in two kinds: the manual locking hub mechanism and the automatic locking hub mechanism.

This mechanism makes it possible to reduce a mechanical loss which will be generated when the power from the front wheel drives the front differential and transfer during the 2WD operation.

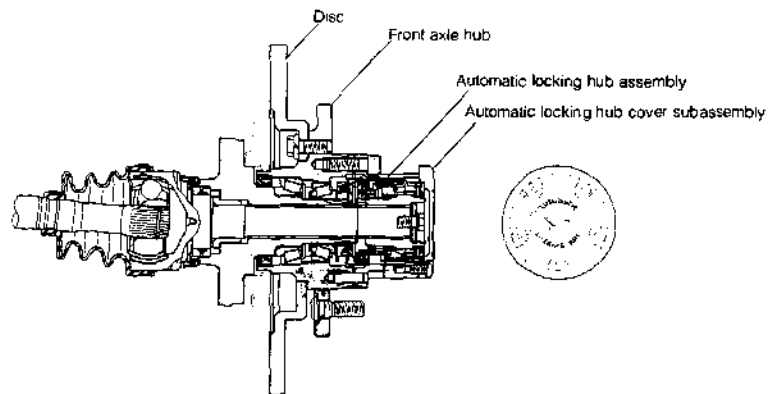


FRONT AXLE & SUSPENSION



Manual locking hub-equipped vehicle

WFE90-FS004



Automatic locking hub-equipped vehicle

WFE90-FS005

FRONT AXLE & SUSPENSION

1. MANUAL LOCKING HUB

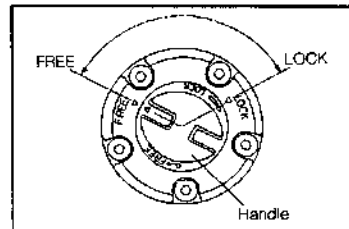
The manual locking hub is a mechanism whereby the switching of power flow is made so that the driving force from the front drive shaft can be transmitted to the front wheel or the torque from the front wheel can not be transmitted to the front drive shaft, etc. and this switching is performed through the operation of the handle provided at the front wheel hub.

How to operate

- When the transfer shift lever is shifted to the [2H] position, set the locking hub handle to the [FREE] position at both the right and left wheels.
- When the transfer shift lever is shifted to the [4H] or [4L] position, set the locking hub handle to the [LOCK] position at both the right and left wheels.

CAUTION

1. Do not move the vehicle if the handle (Δ mark) is not aligned exactly with the Δ mark at the "Free" or "Lock" position on the cover.
2. Do not operate the vehicle in the 4L or 4H position when the hub handle is set to the "Free" position.
3. Make sure to set the handle (Δ mark) on both the right and left wheels at the same position.

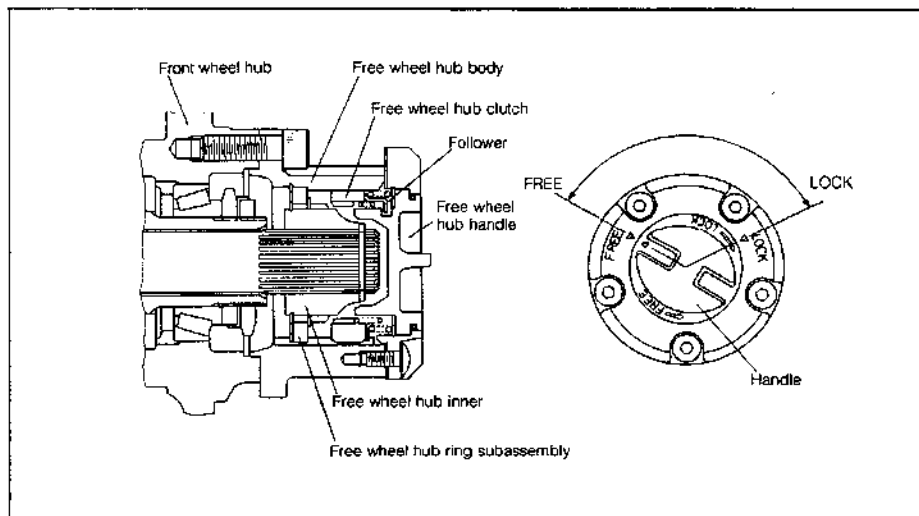


WPFB0-FS006

WPFB0-FS007

Construction

- The manual locking hub (manual free wheel hub assembly) consists of the free wheel hub body, free wheel hub inner, free wheel hub ring sub assembly, free wheel hub clutch, free wheel hub handle, follower and so forth.
- The free wheel hub inner is spline-connected to the drive shaft. On the other hand, the free wheel hub body is mounted on the front wheel hub. Furthermore, its inside is spline-connected to the free wheel hub clutch.
- The free wheel hub clutch is attached to the free wheel hub handle by means of the follower and two springs.



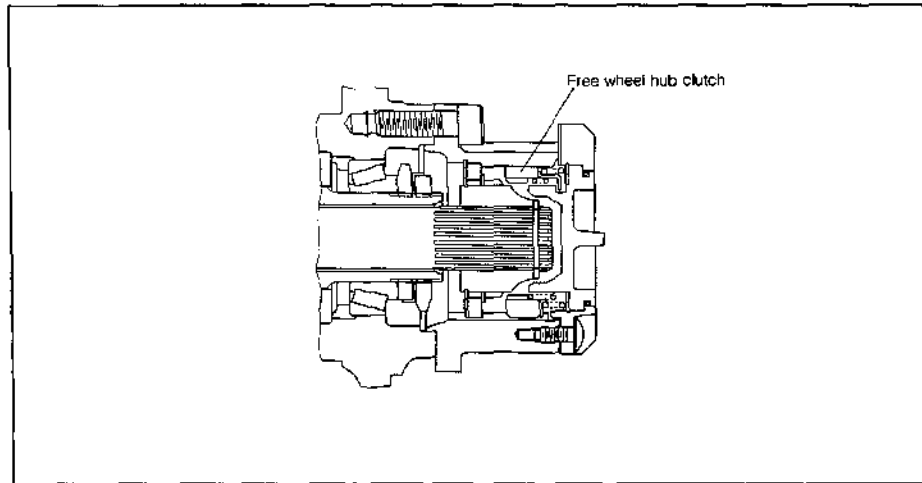
WPFB0-FS008

FRONT AXLE & SUSPENSION

Operation

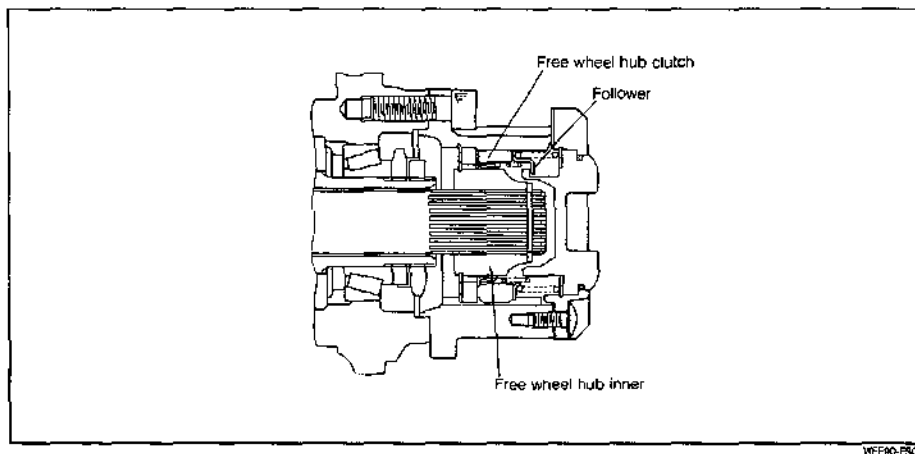
- LOCKING HUB HANDLE (FREE WHEEL HUB HANDLE) WHEN SET TO [FREE] POSITION

When the free wheel hub handle is set to the [FREE] position, the free wheel hub clutch comes at the outermost position on the spline of the free wheel hub body (at the extremely right position in the figure below), where no driving force from the drive shaft is transmitted to the front wheel hub.



- LOCKING HUB HANDLE (FREE WHEEL HUB HANDLE) WHEN SET TO [LOCK] POSITION

When the free wheel hub handle is turned from the [FREE] position to the [LOCK] position, the follower moves toward the inside (toward the left side in this figure) along the diagonal groove provided inside the free wheel hub handle. As a result, the free wheel hub clutch which is attached to the follower by means of springs will move toward the inside along the spline of the free wheel hub body. This operation causes the free wheel hub clutch to mesh with the spline of the free wheel hub inner. Consequently, the driving force from the drive shaft is transmitted to the front wheel hub.



FRONT AXLE & SUSPENSION

2. AUTOMATIC LOCKING HUB

The automatic locking hub is a mechanism whereby the switching of power flow is made automatically so that the driving force from the front drive shaft can be transmitted to the front wheel or no driving force can not be transmitted to the front wheel when the transfer lever is shifted from the [2H] position to the [4H] position or the [4L] position and the vehicle is run.

WFE90-F5011

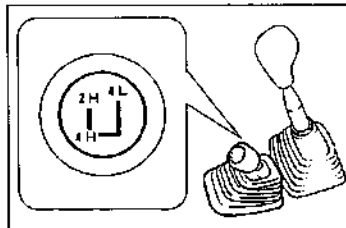
How to operate

1. [FREE] STATE TO [LOCK] STATE

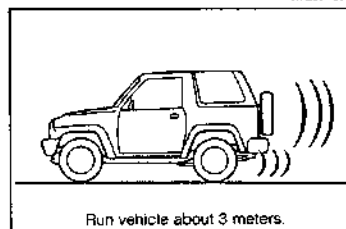
- (1) With the vehicle in a stationary state, shift the transfer shift lever from the [2H] position to the [4H] position or the [4L] position.
- (2) With the steering wheel set to a straight-ahead position, slowly move off the vehicle and run it approximately more than 3 meters. Then, the vehicle is put automatically under the [LOCK] condition.

NOTE:

- When the vehicle runs in a direction opposite to the former direction before stopping (forward movement ↔ backward movement) after the vehicle has been run with the transfer shift lever placed in the [4H] or [4L] position and with the automatic locking hub set to the [LOCK] state and the vehicle has been stopped, the automatic locking hub will be switched from the [LOCK] state to the [FREE] state and will become the [LOCK] state again.



WFE90-F5012



Run vehicle about 3 meters.

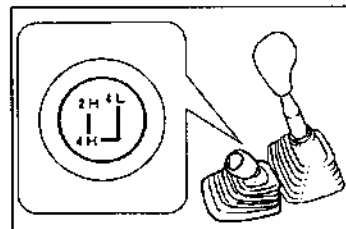
WFE90-F5013

2. [LOCK] STATE TO [FREE] STATE

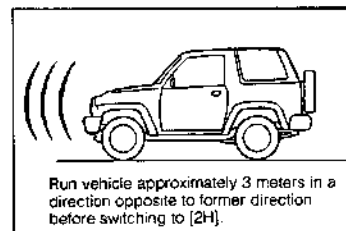
- (1) With the vehicle in a stationary state, shift the transfer shift lever from the [4H] or [4L] position to the [2H] position.
- (2) With the steering wheel set to a straight-ahead position, slowly move off the vehicle in a direction opposite to the former direction before the switching to [2H] position and run the vehicle approximately more than 3 meters. Then, the vehicle is put automatically under the [FREE] condition.

NOTE:

- If the vehicle is moved off in the same direction as the former direction before the switching to the [2H] position in the operation described in Step (2) above, the vehicle will run under the [LOCK] lock state continually.



WFE90-F5014



Run vehicle approximately 3 meters in a direction opposite to former direction before switching to [2H].

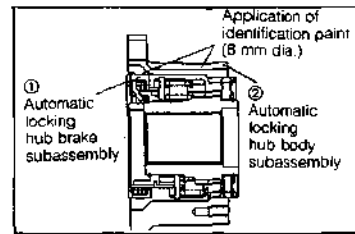
WFE90-F5015

Handling Instructions on Automatic Locking Hub

• Avoidance of Ratcheting Phenomenon

The ratcheting phenomenon means a gear clashing noise which occurs when the automatic locking hub clutch meshes with the automatic locking hub body if there exists a difference in revolutional speed between these two components.

When such phenomenon occurs, first stop the vehicle. Again place the transfer in the 4WD position. Slowly move off the vehicle straight. Then, proceed to drive the vehicle normally.



WP690-FS016

1. Prohibition of shifting operation of transfer during running
If the transfer should be shifted from the 2WD to the 4WD during the running, the aforesaid ratcheting phenomenon would occur. Hence, do not shift the transfer during the running.
2. Observance of driving straight immediately after transfer shifting
When the automatic locking hub is shifted from the Free position to the Lock position, first stop the vehicle. Then, be certain to move off the vehicle with the steering wheel held in a straight-ahead state and run the vehicle at least 3 meters under this state.
If the steering wheel should be turned before the vehicle has been run at least 3 meters, one hub of the automatic locking hubs at the right and left sides may be locked and the other hub may become free, thereby causing the ratcheting phenomenon to occur.
3. Avoidance of sudden moving off
If the vehicle should be moved off suddenly after the transfer has been shifted from the 2WD to the 4WD, the ratcheting phenomenon might occur. Hence, make sure to avoid moving the vehicle suddenly.
4. Shifting of transfer during running on muddy terrain
If you want to get the vehicle out from a muddy terrain or on snowy roads or the like by shifting the transfer from the 2WD to the 4WD while the rear wheels are slipping on these roads, perform the locking slowly, using the half clutch so as to prevent the occurrence of ratcheting phenomenon.
5. Observance of driving vehicle under 4WD mode during extremely cold climate (below -15°C)
If the vehicle should be run under the 2WD mode with the automatic locking hub in the free state, the vehicle may assume the 4WD mode owing to high viscosity of the transfer oil. Consequently, the ratcheting phenomenon may occur. Therefore, during extremely cold climate, drive the vehicle under the 4WD mode until the warming-up is completed.
6. Handling during extremely cold climate (below -15°C)
There are many instances where the automatic locking hub fails to become free when the automatic locking hub is in the locked state and you try to unlock it by shifting the transfer shift lever to the 2WD position and by driving the vehicle reversely. This is because the viscosity of the transfer oil is too high. Hence, be certain to drive the vehicle under the 4WD mode until the warming-up is completed. In this case, after completion of the warming-up operation, shift the transfer from the 4WD to the 2WD.
7. Do not soil or wipe off the grease that has been applied to the automatic locking hub brake subassembly. Failure to observe this caution makes it impossible to reuse the brake subassembly.

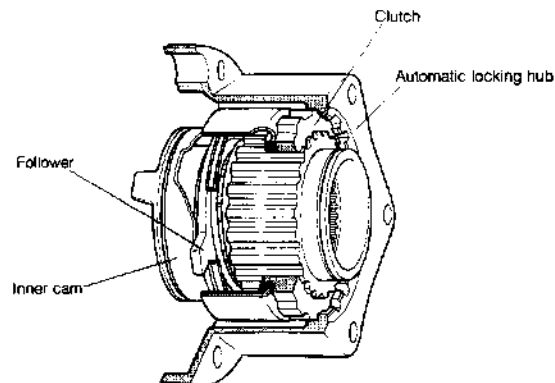
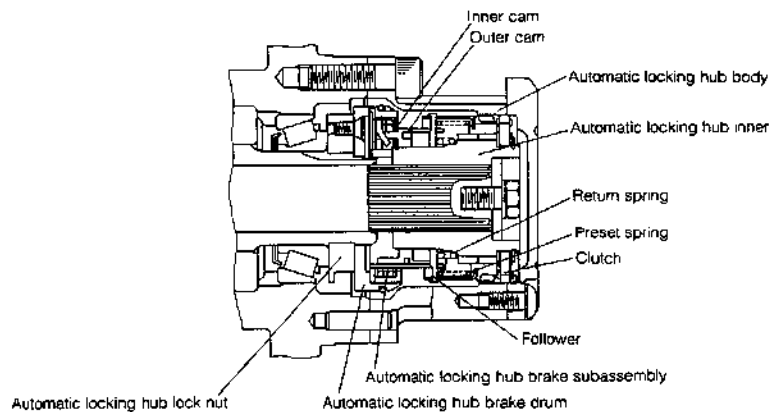
WP690-FS017

WP690-FS018

FRONT AXLE & SUSPENSION

Construction

- The automatic locking hub assembly consists of the automatic locking hub lock nut, automatic locking hub brake drum, automatic locking hub brake subassembly, outer cam, inner cam, automatic locking hub body, clutch and so forth.
- The inside of the automatic locking hub inner is spline- connected to the front drive shaft. On its outside are mounted the clutch and so forth. On the other hand, the automatic locking hub body is mounted on the front wheel hub. Furthermore, the inside of the automatic locking hub body is provided with spline so that it may be connected with the clutch.
- On the clutch are attached the follower, two springs, inner cam and outer cam.
- The automatic locking hub brake drum is attached to the hub lock nut with screws.



WPB90-48019

Operation

• AUTOMATIC LOCKING HUB (FREE) STATE TO [LOCK] STATE

When the drive shaft turns after the transfer shift lever has been shifted to the [4H] or [4L] position and the vehicle has been moved off, the automatic locking hub inner and follower which are connected with each other through spline will turn as an integral unit. (The follower is connected by means of the outer spline of the automatic locking hub inner.)

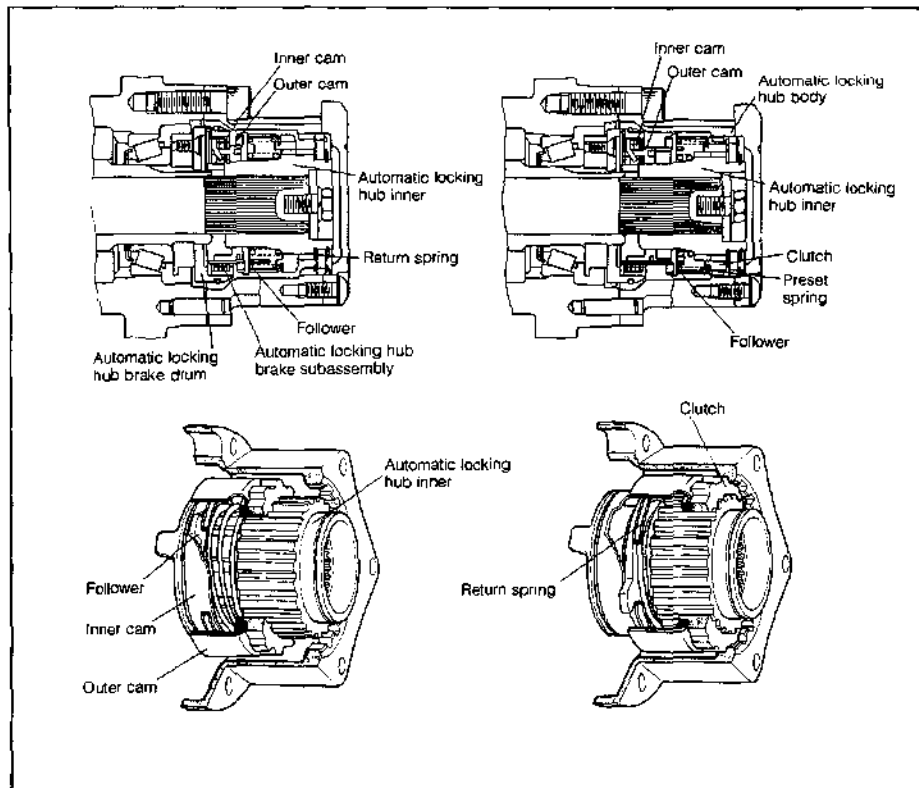
On the other hand, the inner and outer cams tend to remain in their position because of the operation of the automatic locking hub brake subassembly. As a result, the follower moves toward the outside while turning along with the diagonal surface of the inner cam. (The follower moves toward the right side in the figure below.) Refer to Reference 1 in the following pages.

When the follower moves toward the outside, the clutch, too, which is pushed by the spring tension, will move toward the outside. Thus, the clutch meshes with the inner spline of the automatic locking hub body, thereby transmitting the driving force from the drive shaft to the front tire via the front wheel hub.

Moreover, the point where the automatic locking hub is locked corresponds to the point where the rotation of the follower is prevented by means of the outer cam (i.e. a point where the movement toward the outside is completed). Refer to Reference 2 in the following pages.

[Reference]

When the locking of the automatic locking hub is completed, the outer cam rotates in the automatic locking hub brake drum, while sliding together with the automatic locking hub brake subassembly.

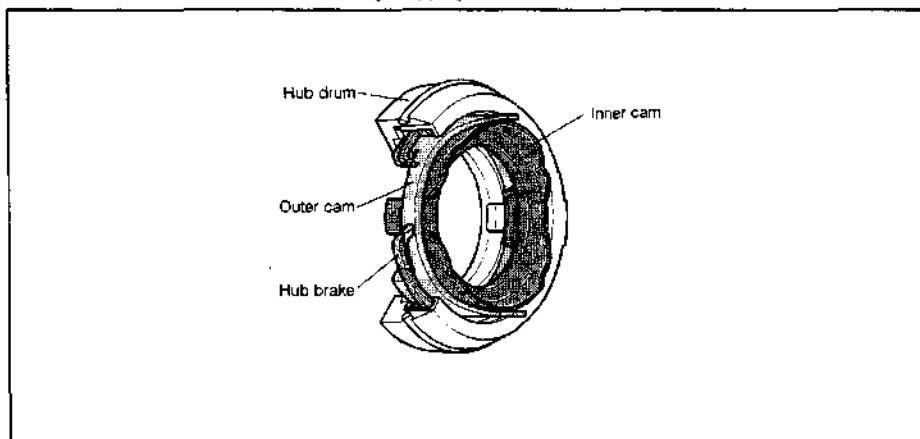


WFE9G-FS000

FRONT AXLE & SUSPENSION

[Reference 1]

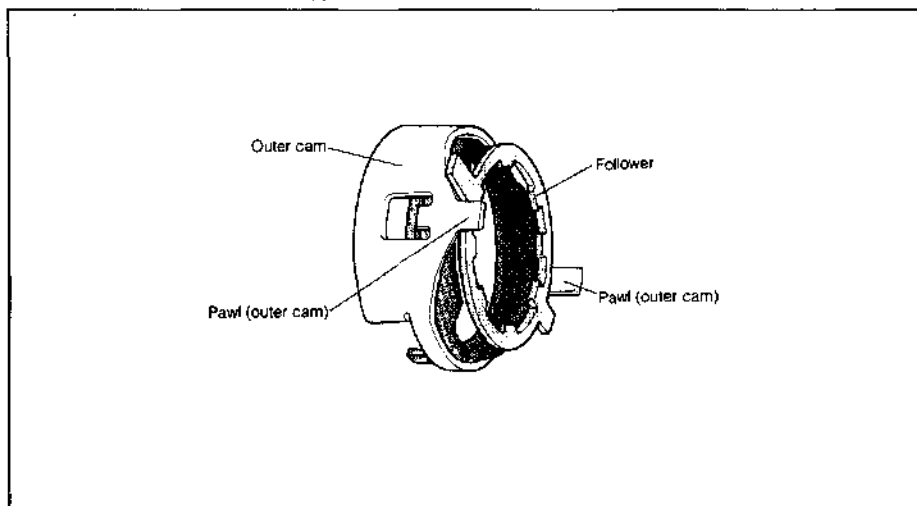
- ① The inner and outer cams have a pawl, respectively. Also, the automatic locking hub brake has an involute-shaped pawl.
- ② In the beginning of the [LOCK] phase, both the inner and outer cams are turning. Thus, their respective pawls are contacting with the pawl of the automatic locking hub brake. At this stage, the hub brake expands because of its involute shape. Consequently, the friction relative to the automatic locking hub brake drum is on the increase, finally stopping the rotation of the inner and outer cams.



WRE30-FS021

[Reference 2]

The outer cam has two pawls; One pawl which functions relative to the automatic locking hub brake and the other pawl which is located at the opposite side. When the follower makes contact with the latter pawl, the rotation of the follower is stopped.



WRE30-FS022

FRONT AXLE & SUSPENSION

• AUTOMATIC LOCKING HUB [LOCK] STATE TO [FREE] STATE

When the transfer shift lever is shifted to the [2H] position and the vehicle is run approximately 3 meters in a direction opposite to former direction before switching to [2H], the automatic locking hub body and the automatic locking hub inner as well as the follower start to rotate as a unit, for power is transmitted from the tires. (The drive shaft and clutch, too, rotate as a unit, until the lock is released.)

Since the follower is connected by means of the outer spline of the automatic locking hub inner and it is pushed against the diagonal surface of the inner cam by the spring tension, the follower rotates as an integral unit as the automatic locking hub inner. As a result, the follower moves toward the inside while turning along with the diagonal surface of the inner cam. (The follower moves toward the left side in the figure below.)

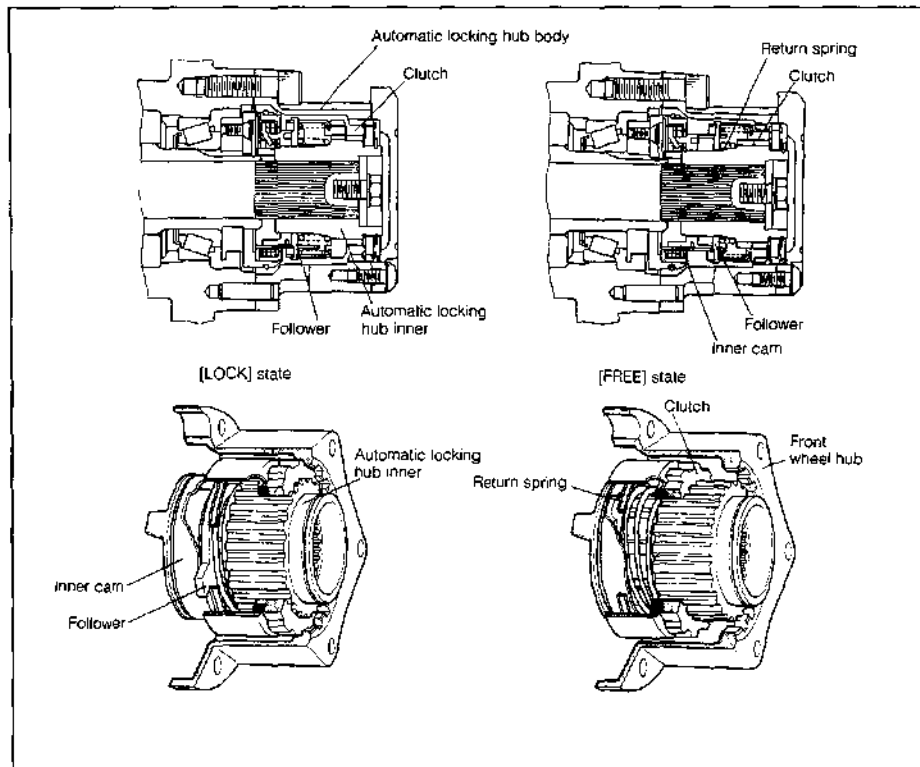
At this stage, the inner and outer cams tend to remain at their position, for their rotation is restricted by the automatic locking brake subassembly.

When the follower moves toward the inside, the clutch, too, will move because of the spring tension. Therefore, the meshing of the clutch with the inner spline of the front wheel hub will be disengaged.

Consequently, the driving force from the tire side will no longer be transmitted. Moreover, the point where the automatic locking hub is freed corresponds to the point where the rotation of the follower is prevented by means of the outer cam (i.e. a point where the movement toward the inside is completed).

[Reference]

To change the mode from the [LOCK] state to the [FREE] state, refer to the "How to Operate" under Section "Automatic Locking Hub," 2.

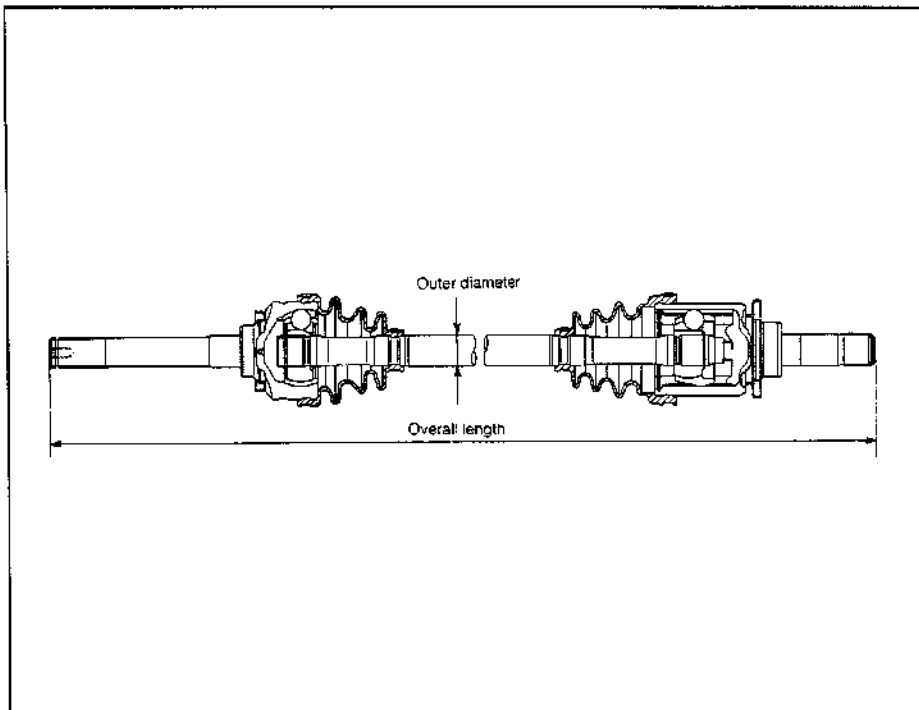


WFE90-FS023

FRONT AXLE & SUSPENSION

DRIVE SHAFTS

The drive shaft employing a Birfield constant-velocity joint is used for driving the front wheels. The outboard joint at the tire side compensates for the angle change of the steering tire, whereas the inboard joint at the differential side compensates for the wheel movement in the up-and-down as well as in the axial directions. Thus, the power from the engine can be transmitted smoothly under various running conditions.



WFES90-FS024

Drive Shaft Specifications

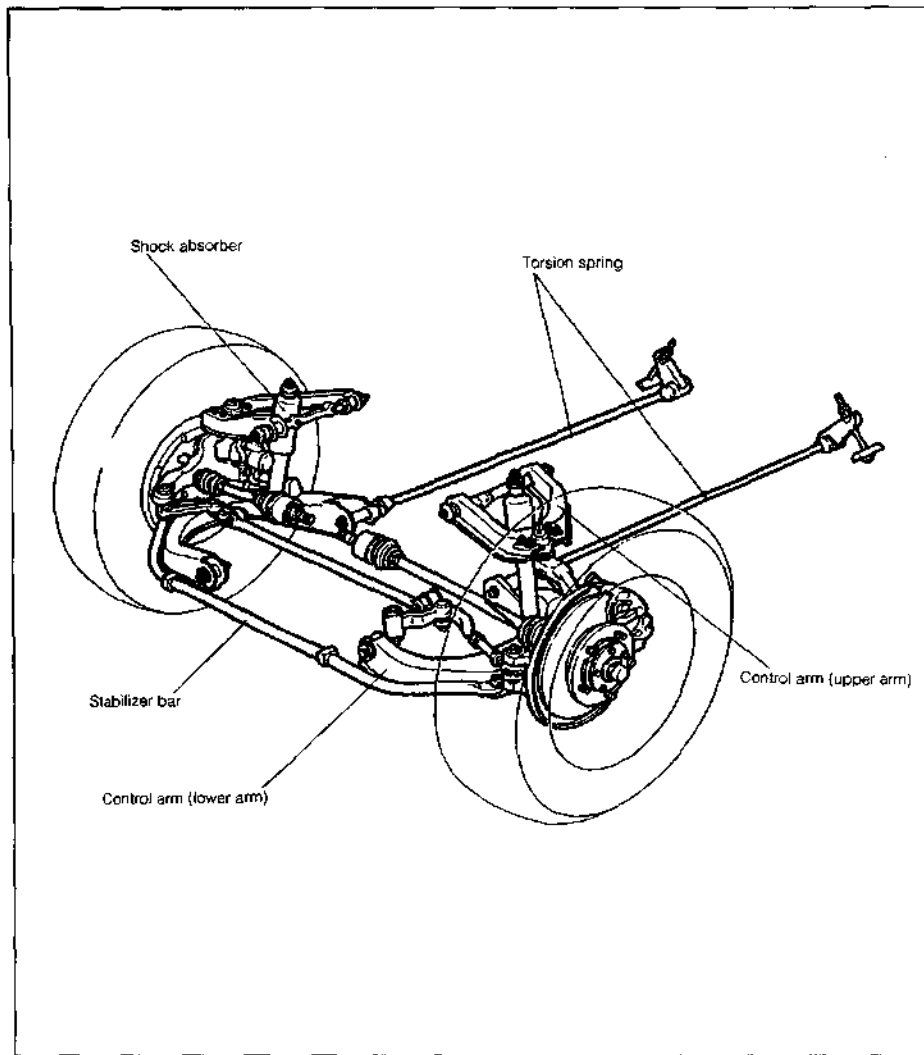
Overall length	mm	Right	599.7
		Left	684.3
Drive shaft outer diameter	mm	Right	25.5
		Left	25.5
Joint type	Wheel side	Birfield type	
	Differential side	Double offset type	
Grease to be used	Wheel side	Moriex S No. 2	
	Amount to be applied	g	90 ± 10
	Differential side	Moriex S No. 2	
	Amount to be applied	g	170 ± 10

WFES90-FS025

FRONT AXLE & SUSPENSION

FRONT SUSPENSION

- The front suspension employs a double wishbone type where the vehicle body weight is sustained by two control arms.
- The springs adopt a torsion bar spring featuring light weight and a comparatively great energy absorption rate per unit weight.
- The shock absorbers employ a nitrogen-sealed type shock absorber.
- For improved running stability, a stabilizer bar is provided.



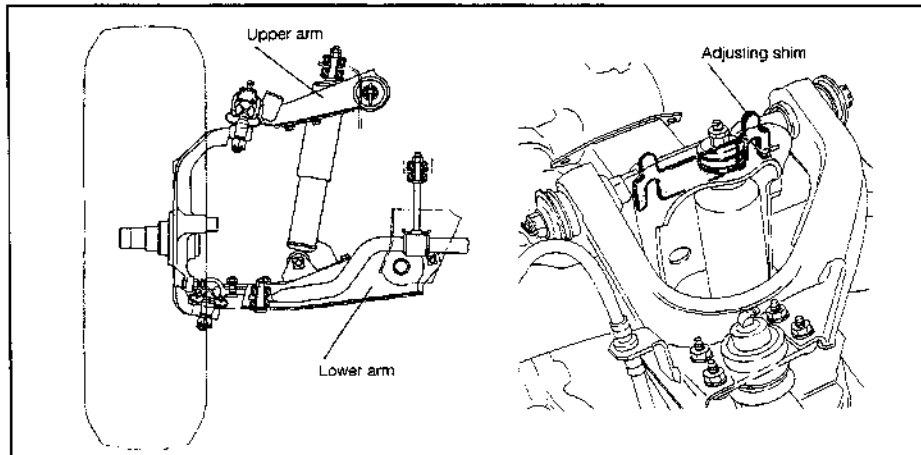
WFE90-PS026

FRONT AXLE & SUSPENSION

Upper arms & lower arms

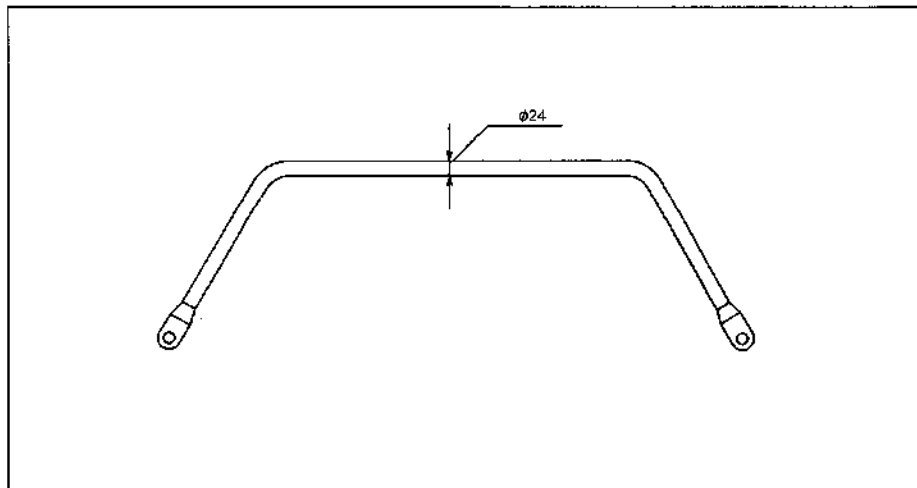
The front suspension employs a double wishbone type. In the suspension of this type, the driving, braking, lateral forces and so forth of the front wheels are supported by means of the upper and lower control arms. The camber and caster angles can be altered by changing the thickness of the adjusting shims for the upper arm.

The camber angle decreases when the thickness of adjusting shims for the upper arm is increased. Furthermore, the caster angle can be altered by changing the thickness of adjusting shims for the upper arm at the forward side or the backward side.



Stabilizer bar

For improved running stability, the stabilizer bar is standard equipment on all vehicle models. It is provided between the lower arms at the right and left sides.

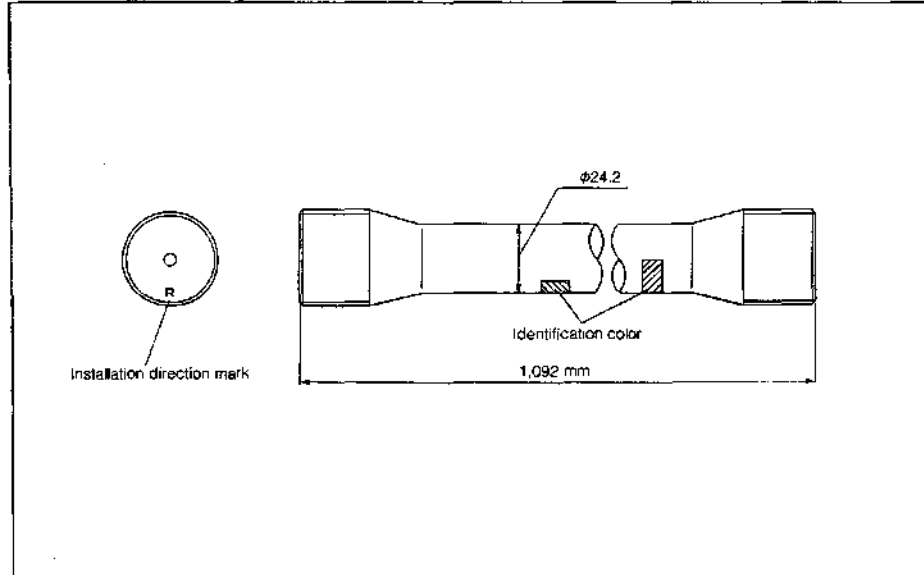


FRONT AXLE & SUSPENSION

Front springs

The front springs adopt a torsion bar spring that features light weight and a comparatively great energy absorption rate per unit weight.

The torsion bar springs come in two kinds: One for the right side and the other for the left side. Hence, make sure that the respective springs are installed at the correct side. If the springs should be installed at a wrong side, the durability will drop.



WFE90-FS029

Identification

Right	White (*Pink mark)
Left	Yellow (*Light green mark)

* For the United Kingdom

WFE90-FS030

Torsion Spring Specifications

Overall length	1092 mm
Outer diameter	24.2 (*25.1) mm
Spring constant	4.31 (*4.99) kgf-m/degree
Hardness	455 - 528 HV
Treatment	Shot peening

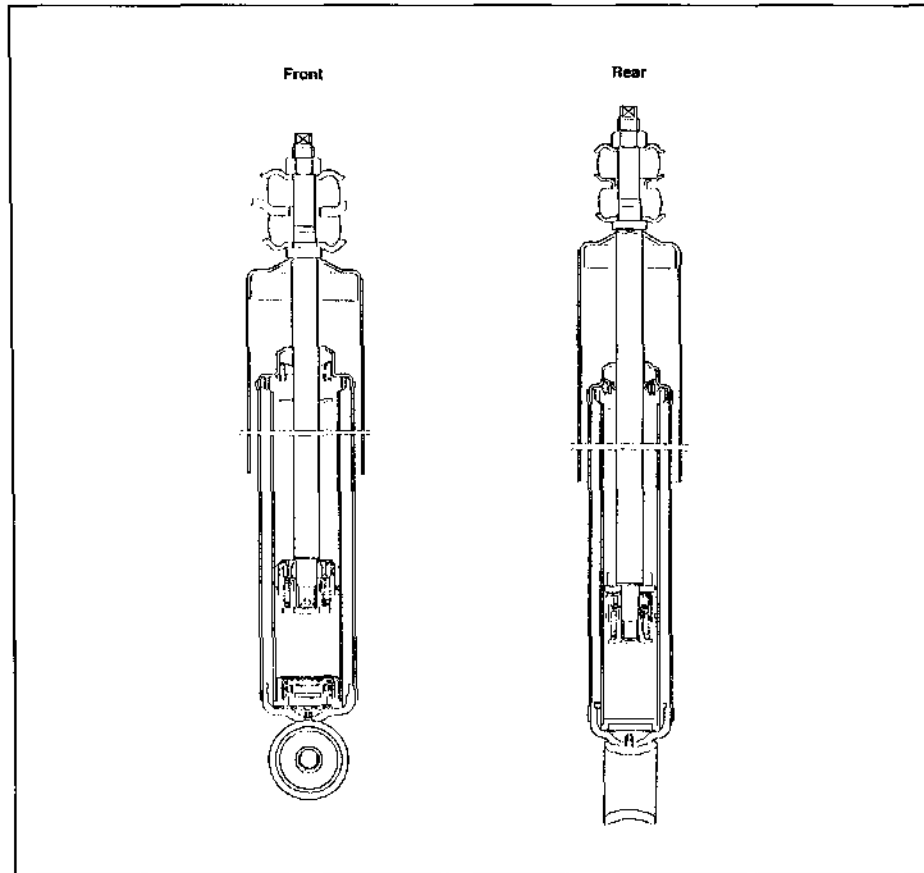
* For the United Kingdom

WFE90-FS031

FRONT AXLE & SUSPENSION

SHOCK ABSORBERS

The front and rear shock absorbers employ a nitrogen gas sealed type shock absorber.



WFE90-FS002

Shock Absorber Specifications

Item		Kind	FRONT	REAR
Maximum length		mm	365	453
Minimum length		mm	230	276
Stroke		mm	135	177
Damping force (at a piston speed of 0.3 m/sec)	Rebound stroke	kg	320 (*345)	205 (*162)
	Compression stroke	kg	50 (*55)	21 (*27)

* For the United Kingdom

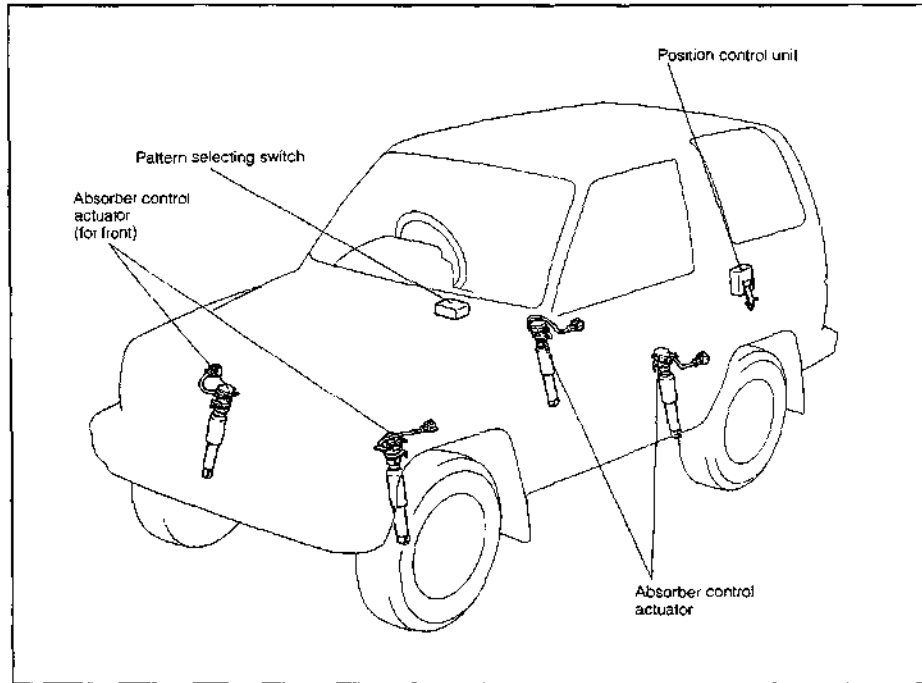
WFE90-FS003

FRONT AXLE & SUSPENSION

THREE-STAGE DAMPERS

(Three-Stage Adjustable Shock Absorbers)

A three-stage damper is available as optional equipment for some models. This shock absorber is so designed that its damping force can be altered in accordance with the road and running conditions. The setting is performed through a switch arranged at the instrument panel.



WFE90-FS034

Three-Stage Dampers Specifications

Item			Kind	FRONT	REAR
Maximum length			mm	360	446 (*440)
Minimum length			mm	245	281 (*276)
Stroke			mm	115	165 (*162)
Damping force (at a piston speed of 0.3 m/sec)	Rebound stroke	kg	HARD	360	222 (*211)
			MEDIUM	320	265 (*192)
			SOFT	290	153 (*142)
	Compression stroke	kg	HARD	60 (*63)	25 (*32)
			MEDIUM	48 (*57)	21 (*28)
			SOFT	40	13 (*20)

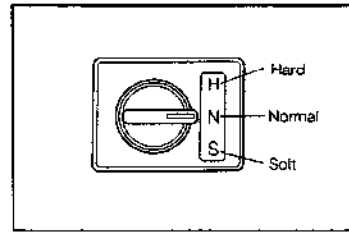
* For the United Kingdom

WFE90-FS035

FRONT AXLE & SUSPENSION

PATTERN SELECTION SWITCH ASSEMBLY

The pattern selection switch assembly is a switch which switches the shock absorber damping force to three stages. It is installed at the lower section of the combination meter of the instrument panel.



WFE80-FS036

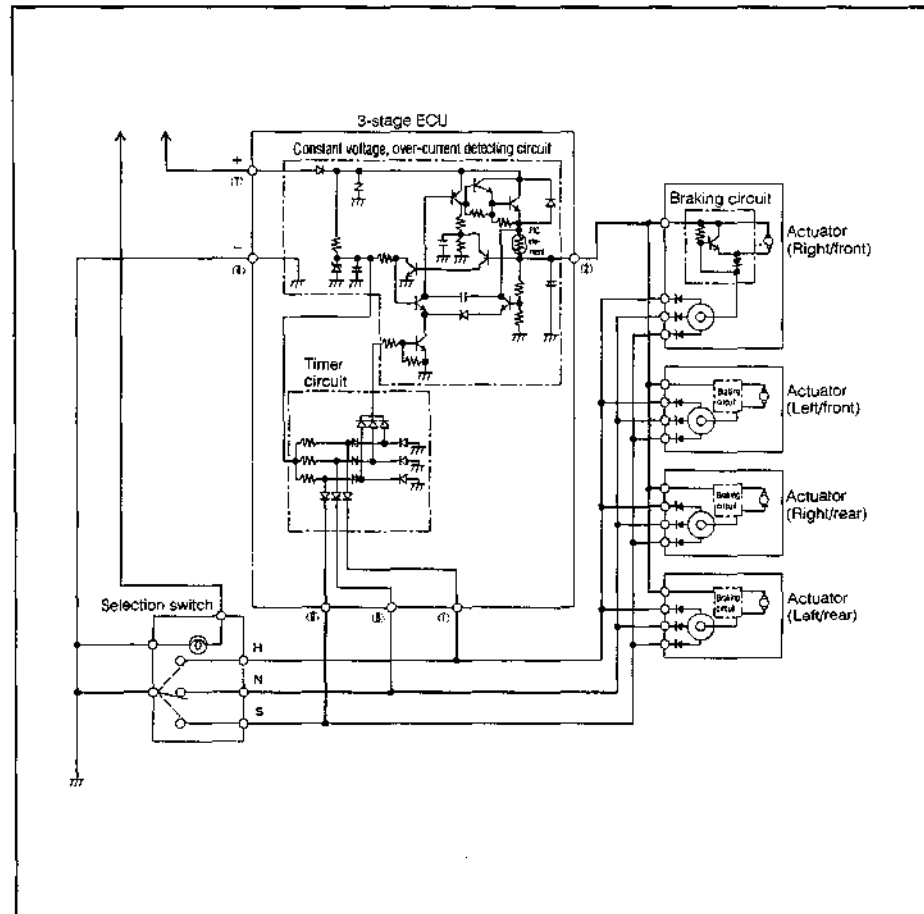
POSITION CONTROL UNIT

Braking operation

1. When the three-stage selection switch is operated, the actuator motor is energized. Then, the rotor interlocking with the motor begins to rotate.
2. When the rotor rotates to the specified position, the switch provided inside the actuator is turned OFF. (This switch is made of contact points consisting of patterns on the printed circuit board and a brush.) Then, the braking circuit is actuated, thereby stopping the rotation.
3. The rotor turns the control rod located inside the shock absorber proper, thus switching the damping force.

If the actuator should be encountered with malfunction or continuous rotation, the actuator energizing time is restricted to four to seven seconds so as to protect the motor.

Circuit Diagram

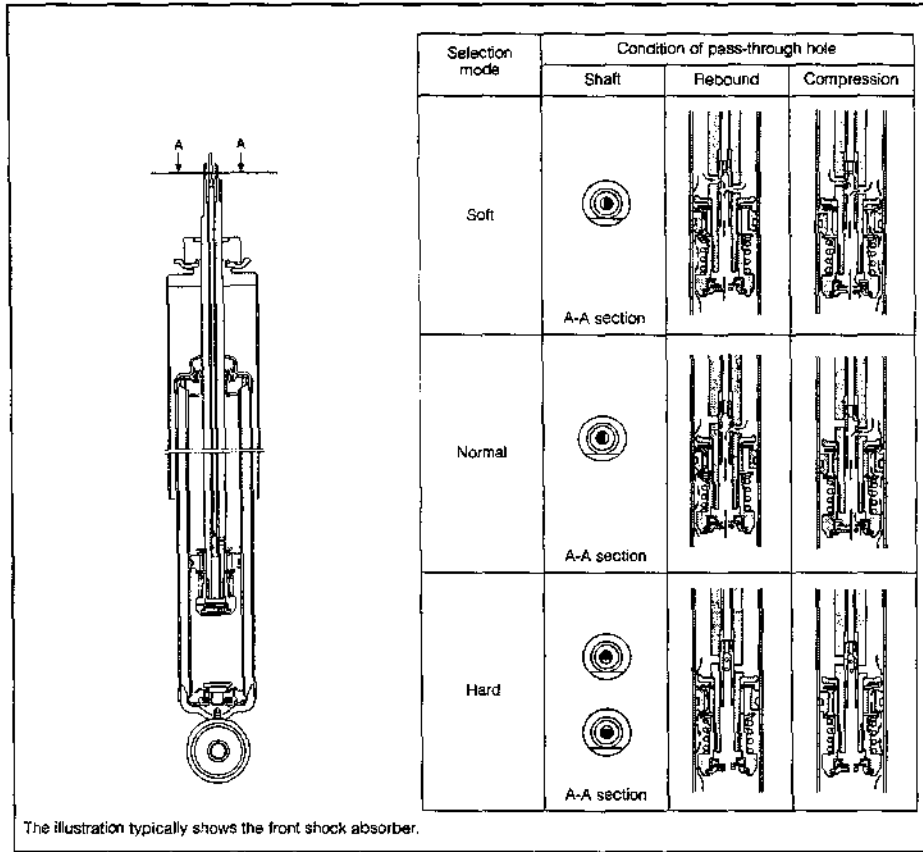


WFS0-FS037

FRONT AXLE & SUSPENSION

THREE-STAGE DAMPER (SHOCK ABSORBER)

Construction



WFE90-P5038

Operation

In accordance with the rotating position of the control rod, the rate of the oil passing through the pass-through holes provided at the control rod and shaft varies. As a result, the damping force is switched.

1. Soft

The pass-through holes of the control rod and shaft are aligned at both two positions. Consequently, a large amount of oil passes through the holes, thus softening the damping force.

2. Normal

The pass-through holes are aligned at one position, providing a slightly increased damping force.

3. Hard

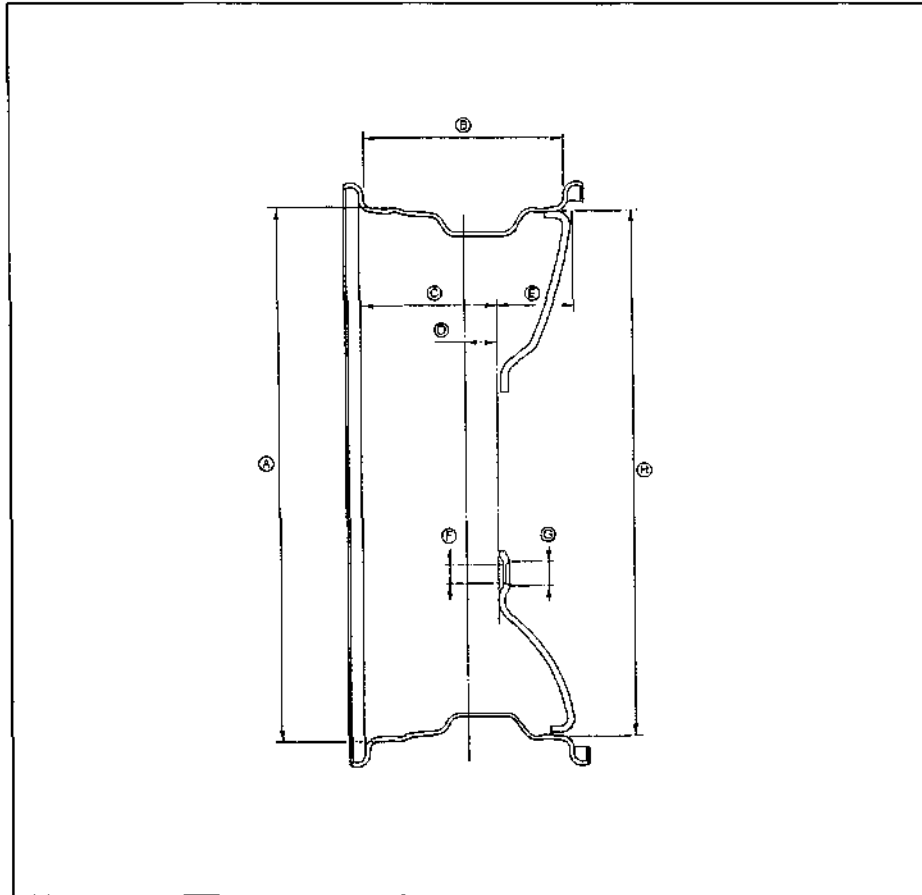
All pass-through holes are shut, thereby enhancing the damping force further.

The damping force is generated at the pass-through hole and piston valve section.

WFE90-FS039

FRONT AXLE & SUSPENSION

Disc Wheel Specifications



WFE90-FS045

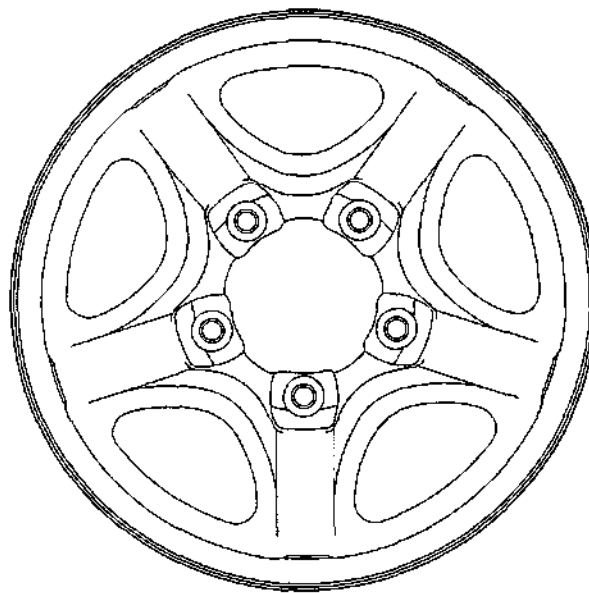
mm	
Dimension A	380.2
Dimension B	152.5
Dimension C	99.05
Dimension D	19.0
Dimension E	84.0
Dimension F	14.0
Dimension G	17.5
Dimension H	374.0

WFE90-FS046

DISC WHEELS

The disc wheel employs a 15 × 6JJ size.

The exterior color of the standard disc wheel is silver metallic. Chrome-plated disc wheel and aluminum disc wheel are available as option.



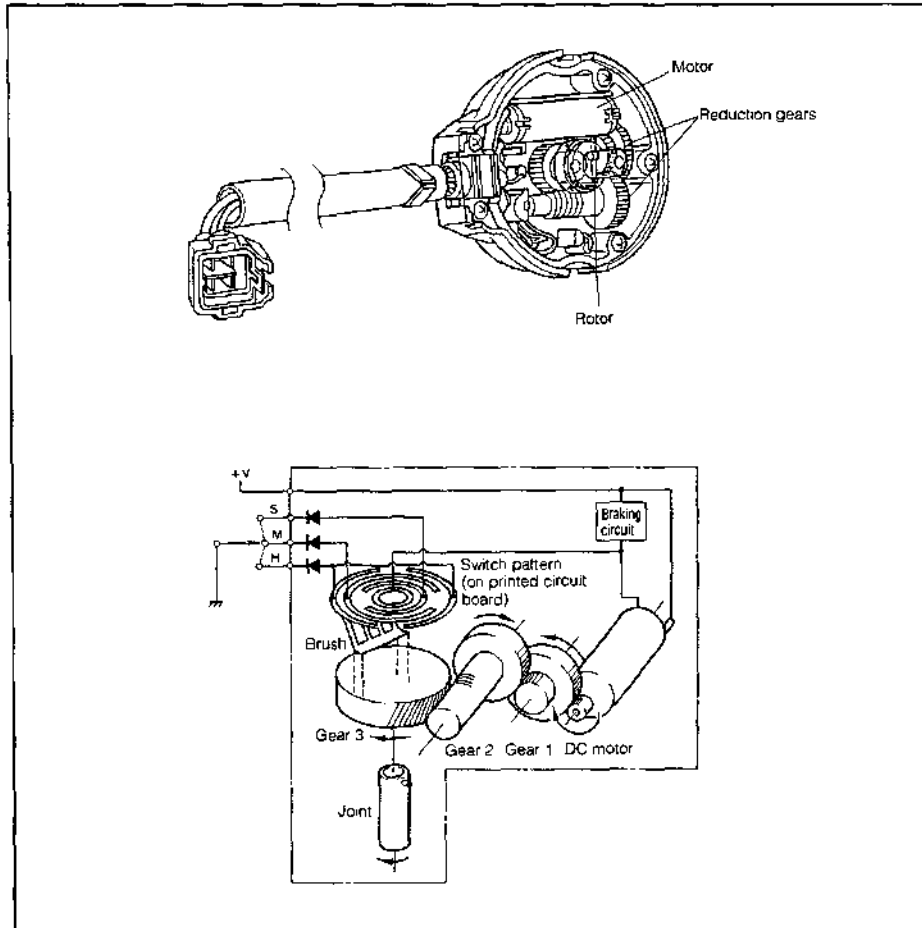
Steel disc wheels

VPE30-F3044

ABSORBER CONTROL ACTUATOR

Construction

As for the internal construction, the actuator is composed of the following sections: the rotation driving section consisting of a DC motor and a 3-stage gear (final gear: worm gear), the position detecting section consisting of a brush which rotates integrally with the output shaft and switch patterns which are secured to the case, and the braking circuit which brakes the DC motor electrically to assure the positioning accuracy.



Operation

Energized by the motor driving current sent from the controller, the rotor rotates to the specified position.

1. The motor driving current from the controller drives the actuator in the following sequence: motor → reduction gear → rotor.
2. The control current stops the motor at the specified position, simultaneously locking the rotor.

FRONT AXLE & SUSPENSION

TIRES

Radial tires are mounted on all vehicle models. These tires come either in tubeless or with/tube, depending upon destinations.

Tire \ Destination	ECE & EEC	General	Australian	G.C.C.
195 R15 94S (Tubeless)	○	○	○	—
195 R15 94S (W/Tube)	—	—	—	—
195/80 R15 94S (W/Tube)	—	—	—	○
225/70 R15 100S (Tubeless)	○	○	○	—
225/70 R15 100S (W/Tube)	—	—	—	○

WFEBC-PS042

Tire Size and Tire Pressure

Destination			ECE & EEC	General	Australian	G.C.C.
Tire						
195 R15 94S (Tubeless)	Unloaded	Front	1.6 kgf/cm ²	1.6 kgf/cm ²	160 kpa	—
		Rear	2.1 kgf/cm ²	2.1 kgf/cm ²	210 kpa	—
	Loaded	Front	1.6 kgf/cm ²	1.6 kgf/cm ²	160 kpa	—
		Rear	2.3 kgf/cm ²	2.3 kgf/cm ²	230 kpa	—
195 R15 94S (W/Tube)	Unloaded	Front	—	1.6 kgf/cm ²	—	—
		Rear	—	2.1 kgf/cm ²	—	—
	Loaded	Front	—	1.6 kgf/cm ²	—	—
		Rear	—	2.3 kgf/cm ²	—	—
195/80 R15 94S (W/Tube)	Unloaded	Front	—	—	—	1.6 kgf/cm ²
		Rear	—	—	—	2.1 kgf/cm ²
	Loaded	Front	—	—	—	1.6 kgf/cm ²
		Rear	—	—	—	2.3 kgf/cm ²
225/70 R15	Unloaded	Front	1.6 kgf/cm ²	1.6 kgf/cm ²	160 kpa	1.6 kgf/cm ²
		Rear	2.1 kgf/cm ²	2.1 kgf/cm ²	210 kpa	2.1 kgf/cm ²
	Loaded	Front	1.6 kgf/cm ²	1.6 kgf/cm ²	160 kpa	1.6 kgf/cm ²
		Rear	2.3 kgf/cm ²	2.3 kgf/cm ²	230 kpa	2.3 kgf/cm ²
Tire air inflation pressure caution label affixing position			Lower part of front door striker at driver's seat side		Inside glove compartment	Lower part of front door striker at driver's seat side

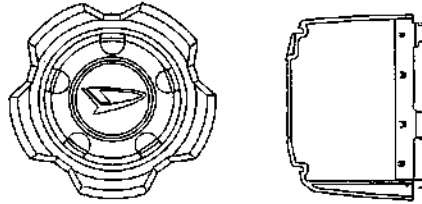
WFEBC-PS043

FRONT AXLE & SUSPENSION

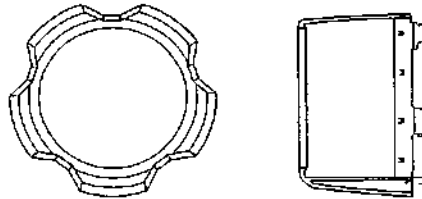
WHEEL CAPS

Wheel caps are installed on EL and EL-II grades. The wheel cap for the front wheel comes in two kinds; a standard wheel cap and a wheel cap for the front wheel with free wheel hub. On the rear wheels, the same wheel caps are installed on EL and EL-II grades. A steel wheel cap is provided for the aluminum wheel.

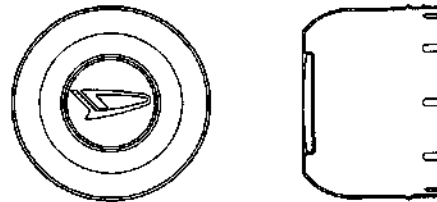
Wheel cap for rear wheels and standard front wheels



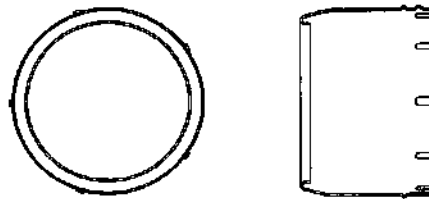
Wheel cap for front wheels with free wheel hub



Wheel cap for rear wheels and standard front wheels on aluminum wheel

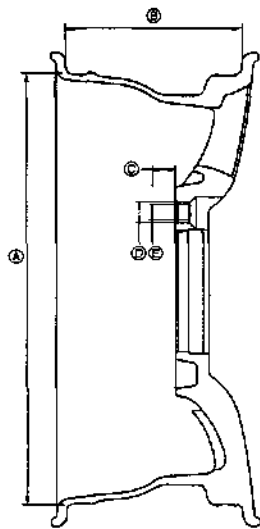
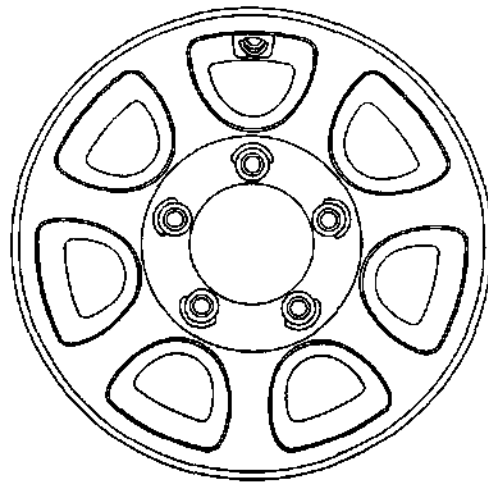


Wheel cap for front wheels with free wheel hub on aluminum wheel



WPEBO-FS047

FRONT AXLE & SUSPENSION



(mm)

Dimension A	380.2
Dimension B	151.0
Dimension C	19.0
Dimension D	φ19.0
Dimension E	φ14.0

Aluminum disc wheel

WP250-FS429

WHEELS & TIRES

NOTE:

- The tires should exhibit no damage, such as excessive wear, uneven wear and scratches.
- Any foreign matter, such as grit caught in the groove of the tire, should be removed in advance.
- The tires should not be so worn that slip signs appear on their tread surfaces.

WPFB0-FS048

1. Check of tire size

Confirm the following points.

- (1) Ensure that the tires having the designated tire size are mounted.

Designated Tire Size:

195 R15
195/80 R15
225/70 R15

- (2) Ensure that the four tires have the same size and they are ones made by the same manufacturer.
- (3) There is no significant difference in wear between the right and left tires.

WPFB0-FS049

2. Tire inflation pressure

Ensure that the tires are inflated to the specified air pressure.

Specified Value

kgf/cm²

	Front		Rear	
	Unloaded	Loaded	Unloaded	Loaded
195 R15 94S	1.6	1.6	2.1	2.3
225/70 R15 100S	1.6	1.6	2.1	2.3
195/80 R15 94S	1.6	1.6	2.1	2.3

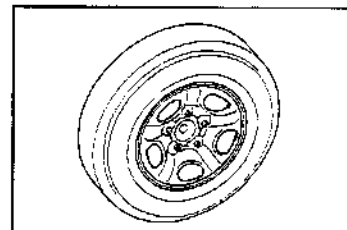
NOTE:

- The tire inflation pressure should be adjusted when the tire temperature is at the ambient temperature (prior to the running).
- The tire inflation pressure should be adjusted under the unloaded state.

WPFB0-FS050

3. Check of disc wheel and tire

- (1) Ensure that the disc wheel exhibits no damage, such as deformation and cracks.
If any damage is present, replace the disc wheel.
- (2) Jack up the vehicle and support it with safety stands.
(See the GI section.)



WPFB0-FS051

FRONT AXLE & SUSPENSION

- (3) Check the wheel and tire for runout, using a dial gauge. Ensure that the runout is within the allowable limit.

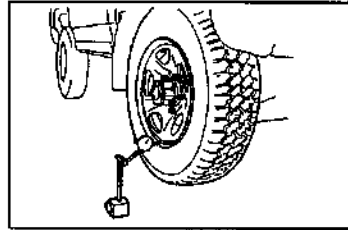
Wheel Maximum Runout:

Mean value of runouts at front and rear sides not to exceed 1.0 mm (0.04 inch)

Tire Maximum Runout:

Vertical Runout: Not to Exceed 1.4 mm
(Not to Exceed 0.0551 inch)

Lateral Runout: Not to Exceed 2.0 mm
(Not to Exceed 0.0787 inch)



WFE80-F5062

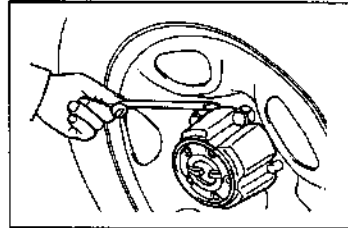
- (4) Jack down the vehicle.

4. Removal and installation of tire

- (1) Pry off the center cap by inserting an L type handle into between the wheel and the center cap.

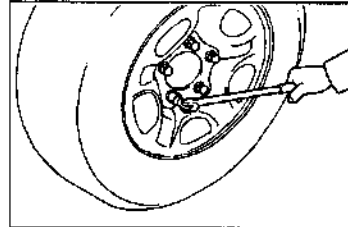
NOTE:

- Be very careful not to damage the wheel.



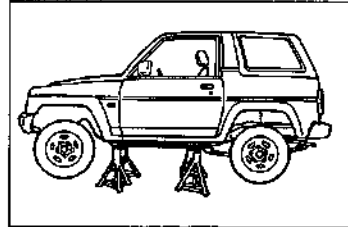
WFE80-F5063

- (2) Slightly loosen the wheel hub nuts in the sequence indicated in the right figure.



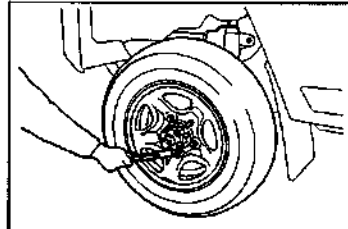
WFE80-F5064

- (3) Jack up the vehicle and support it with safety stands. (See GI section.)



WFE80-F5065

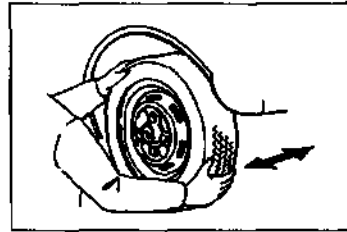
- (4) Remove the wheel hub nuts. Remove the wheel from the vehicle.



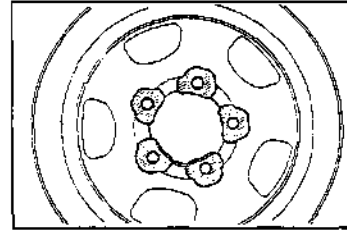
WFE80-F5066

FRONT AXLE & SUSPENSION

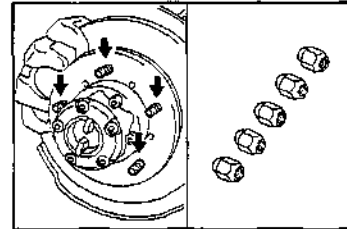
- (5) Ensure that no foreign matter, such as dirt, gets to the wheel attaching surface at the vehicle side.



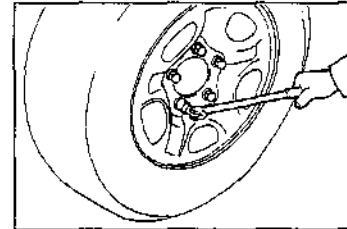
- (6) Ensure that no foreign matter gets to the wheel attaching surface.



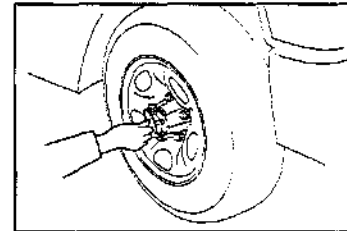
- (7) Ensure that the hub bolts and hub nuts exhibit no damage.
If any hub bolt or hub nut exhibits damage, replace the damaged hub bolt and/or hub nut.
- (8) Attach the wheel to the vehicle. Temporarily tighten the hub nut, until the wheel can be secured.



- (9) Jack down the vehicle.
- (10) Evenly tighten the wheel hub nuts to the specified torque over two or three stages in the sequence indicated in the right figure.
- Tightening Torque: 89.2 - 118 N·m
(9.0 - 12.0 kgf-m, 65.1 - 87.0 ft-lb)

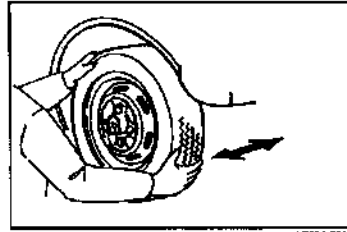


- (11) Attach the vehicle tool indicated in the right figure to the wheel cap. Press the wheel cap to the wheel.



FRONT AXLE & SUSPENSION

5. Check of each related part for excessive play
- (1) Front wheel bearing for excessive play
 - (2) Suspension ball joint for excessive play
 - (3) Steering linkage for excessive play and deformation
 - (4) Suspension-related parts for excessive play and deformation
- Check the items above by rocking the tire in a fore-&-aft direction as well as in a right-&-left direction.



WFE90-FS062

FRONT WHEEL ALIGNMENT TROUBLE SHOOTING

Symptom	Possible causes	Checking points
Tire unevenly worn at inner side	Toe-in amount too small Camber amount too small	Check toe-in. Check camber.
Tire unevenly worn at outer side	Toe-in amount too large or camber amount too large	Check toe-in. Check camber.
Turning effort is too great when steering wheel is turned with vehicle in stationary state.	Caster angle too large Tire air inflation pressure too low	Check caster. Check tire air inflation pressure.
Vehicle pulls to one side continuously while straight-ahead driving.	Caster angle too small Excessive difference in camber angle between right and left sides	Check caster. Check camber.
Vehicle pulls to one side during braking.	Kingpin angle improperly set	Check upper arm bush. Check upper arm for damage or deformation. Check upper arm ball joint for excessive play. Check lower arm bush. Check lower arm for damage or deformation. Check lower arm ball joint for excessive play. Knuckle deformed Check frame dimensions at installation side of suspension upper arm and lower arm.

WFE90-FS063

PRELIMINARY CHECK ITEMS

1. Check of tire size and tire wear
Ensure that the tires having the designated size are mounted and that there is no significant difference in wear between the right and left tires.

Designated Tire Size:

195 R15
195/80 R15
225/70 R15

WFE90-FS064

2. Check of tire inflation pressure
Set the tire inflation pressure to the specified value in accordance with the designated tires mounted.

Specified Value

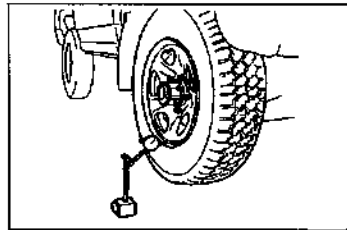
kgf/cm²

	Front		Rear	
	Unloaded	Loaded	Unloaded	Loaded
195 R15 94S	1.6	1.6	2.1	2.3
225/70 R15 100S	1.6	1.8	2.1	2.3
195/80 R15 94S	1.6	1.6	2.1	2.3

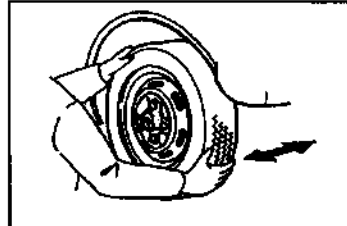
WFE90-FS065

FRONT AXLE & SUSPENSION

3. Check of disc wheel and tire for runout
 - (1) Check the disc wheel for runout, using a dial gauge.
Allowable Limit: Mean value of runouts at front and rear sides not to exceed 1.0 mm.
 - (2) Check the tire for runout, using a dial gauge.
Radial Runout: Not to Exceed 1.4 mm.
Lateral Runout: Not to Exceed 2.0 mm.
4. Check the suspension-related sections for bolt and nut tightness.
5. Check that the front shock absorber operates correctly while rocking the vehicle body.



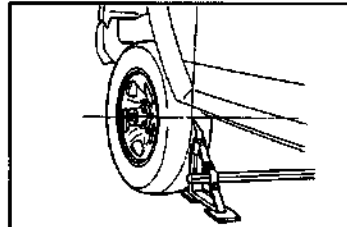
WPB30-FS066



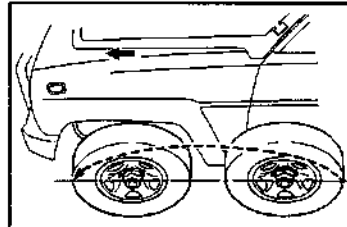
WPB30-FS067

Toe-in check

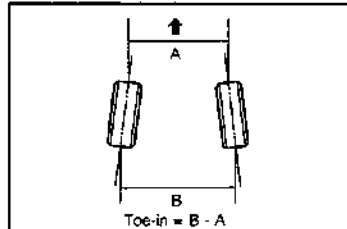
1. Move the vehicle forward so that the front wheels becomes straight.
2. Apply a toe-in gauge to the center point of the height at the rear side of each front wheel of the vehicle.
3. Mark the tread center at the rear side of each front tire. Measure the distance between the marks.
4. Move the vehicle slowly until the front wheels turn 180 degrees.
5. Measure the distance between the marks at the front side of each front wheel. Determine the toe-in amount by calculating the difference.
Specified Value: 4 ± 3 mm



WPB30-FS068



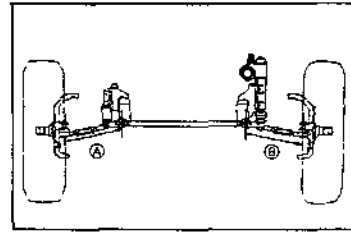
WPB30-FS069



WPB30-FS070

FRONT AXLE & SUSPENSION

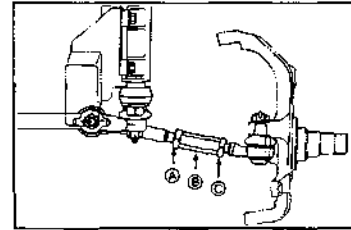
If the toe-in amount fails to conform to the specification, adjust the tie rod length by turning the tie rod adjusting tube the same amount at the right and left sides, until the difference in length between the right and left tie rods (A) and (B) shown in the right figure becomes within 3 mm.



<Tie Rod Tightening Procedure>

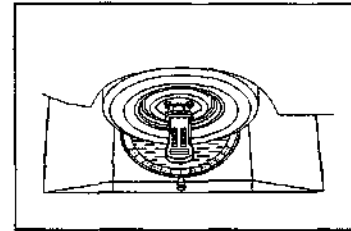
1. Tighten the tie rod by turning the nut (A), with a wrench applied to the section (B) shown in the right figure.
2. Tighten the tie rod by turning the nut (C), with a wrench applied to the section (B) shown in the right figure.

Tightening Torque: 118 - 167 N·m
(12 - 17 kgf·m, 87.0 - 123 ft·lb)



Camber check and caster check

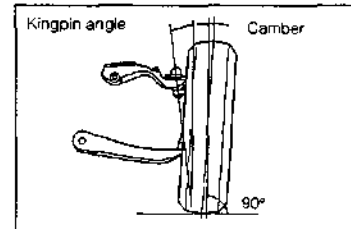
1. Place the wheel on a turning radius gauge.
2. Remove the free wheel hub cover.
3. Align the forward end of the center rod of the camber, caster and kingpin gauge with the center of the drive shaft section. Proceed to make the forward end of the center rod closely contact with the hub body.



4. Camber measurement
Specified Camber Amount: $1^{\circ} \pm 1'$

NOTE:

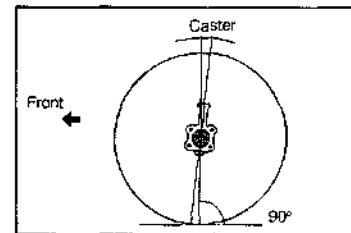
- The measurement should be performed in the same way at the right and left wheels.



5. Caster measurement
Specified Caster Amount: $2^{\circ} \pm 30'$
Specified Kingpin Angle: $9^{\circ}30'$

NOTE:

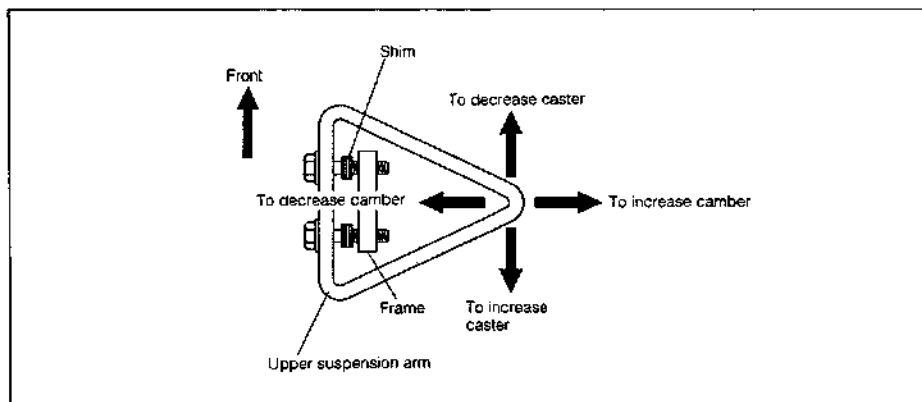
- For the alignment checks, turn the steering wheel until the reading of the turning radius gauge becomes 20 degrees at the right wheel or the left wheel, respectively.



FRONT AXLE & SUSPENSION

Adjusting procedure for camber and caster

The camber and caster vary by increasing/decreasing the number of the adjusting shims provided at the frame installation surface of the upper arm shaft.



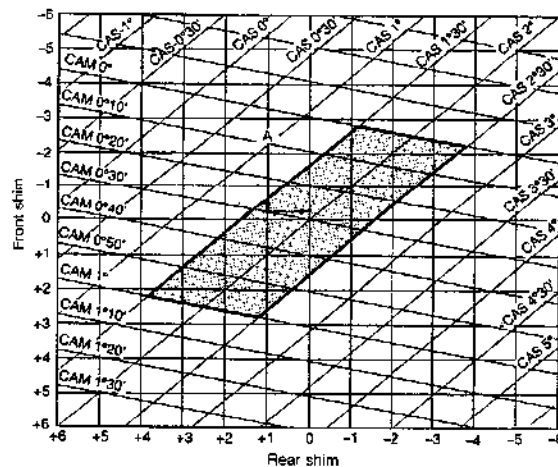
WFE90-F3076

Selecting method of adjusting shim

1. Select a suitable adjusting shim, using the diagram below.

<How to Read Diagram>

- (1) Suppose that the measurement on a vehicle reveals the following results:
Caster: 1° Camber: $0^{\circ}10'$
- (2) Plot the intersection of the caster line with camber line in the diagram below. The intersection is designated as the point A.
- (3) Decrease the front shim thickness by 2 mm and increase the rear shim thickness by 1 mm. Thus, the point A enters into the specified range.



NOTE:
The area enclosed by heavy lines (/) in the left diagram denotes the permissible range for camber and caster angle.

WFE90-F3077

FRONT AXLE & SUSPENSION

- Both the front and rear shim thickness should not exceed 8 mm. The difference in thickness between the front shim and the rear shim should not exceed 4 mm.
- After the adjusting shims have been installed, finally ensure that the front alignment conforms to the specifications.

WP590-FS078

Check of steering wheel turning angle

- Place the wheel on the turning radius gauge. Check the wheel turning angle.

Specified Value:

Mounted tire	Inner turning (A)	Outer turning (B)
195/80 R15 195 R15	31°05' \pm 3'	27°15'
225/70 R15	27°05' \pm 3'	23°55'

- If the measured turning angle fails to conform to the specifications, adjust the wheel turning angle by means of the knuckle stopper bolt.

Stopper Bolt Lock Nut Tightening Torque:

78.5 - 98.0 N·m (8.0 - 10.0 kg-m, 57.9 - 72.0 ft-lb).

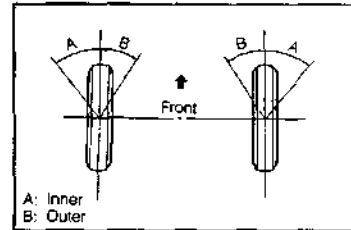
NOTE:

- After completion of the adjustment, be sure to install the cap to the stopper bolt.

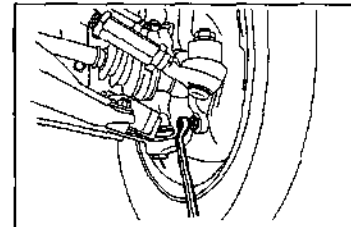
Sideslip check

- Check the sideslip, using a sideslip tester.

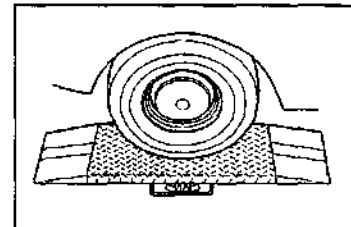
Specified Value: Within 3 mm per one meter



WP590-FS079



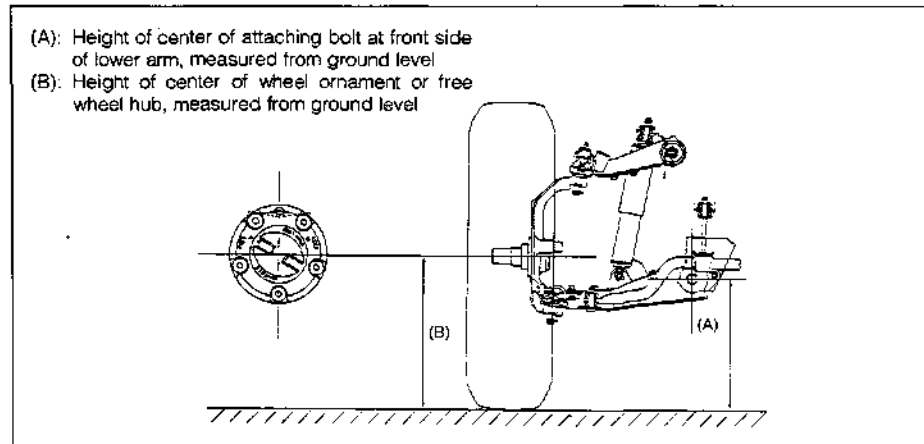
WP590-FS080



WP590-FS081

FRONT AXLE & SUSPENSION

<Checking and Adjusting Procedures for Vehicle Height>



Care must be exercised as to the following points before the vehicle height check is carried out.

- (1) The designated tires are installed.
- (2) The tires are inflated to the specified value.
- (3) The vehicle is under no-loaded state.

NOTE:

- The measurement should be conducted with the vehicle under no-loaded state.

- (4) Rock the vehicle several times so as to settle the suspensions.
- (5) Move the vehicle about three meters twice in a fore-and-aft direction.

WPB0-FS022

Adjusting procedure

1. Adjust the anchor bolt so that the following specified value may be obtained.

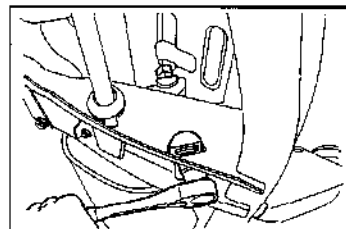
Specified Value: $(B) - (A) = 41 \pm 10 \text{ mm}$

NOTE:

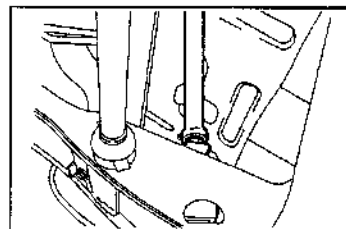
1. As regards the vehicle height, the adjustment should be carried out so that any variation in the specified value between the right and left sides may become within 10 mm.
 2. With regard to the protrusion height of the anchor bolt, the adjustment should be carried out so that any variation between the right and left sides may become within 10 mm.
2. Secure the anchor bolt by means of the lock nut.
Tightening Torque: 68.6 - 88.3 N·m
(7.0 - 9.0 kg-m, 50.6 - 65.1 ft-lb)

NOTE:

- Secure the anchor bolt by tightening the upper nut while preventing the lower nut from turning by means of a spanner.



WPB0-FS023



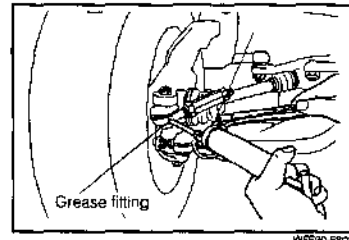
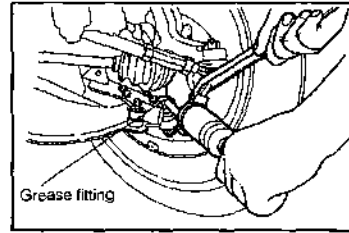
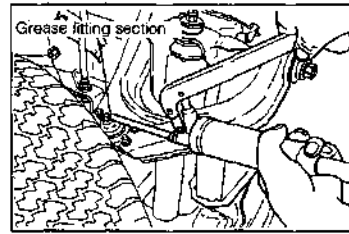
WPB0-FS024

GREASE LUBRICATION

1. Upper arm ball joint
 - (1) Clean the grease fitting of the upper arm ball joint.
 - (2) Ensure that the grease fitting of the upper arm ball joint exhibits no damage.
If any damage is present, replace the damaged grease fitting.
 - (3) Fill grease from the grease fitting, using a grease gun.
Specified Grease: Lithium-based MP grease
Filling Amount: 27 grams
(In cases where a new part is installed)

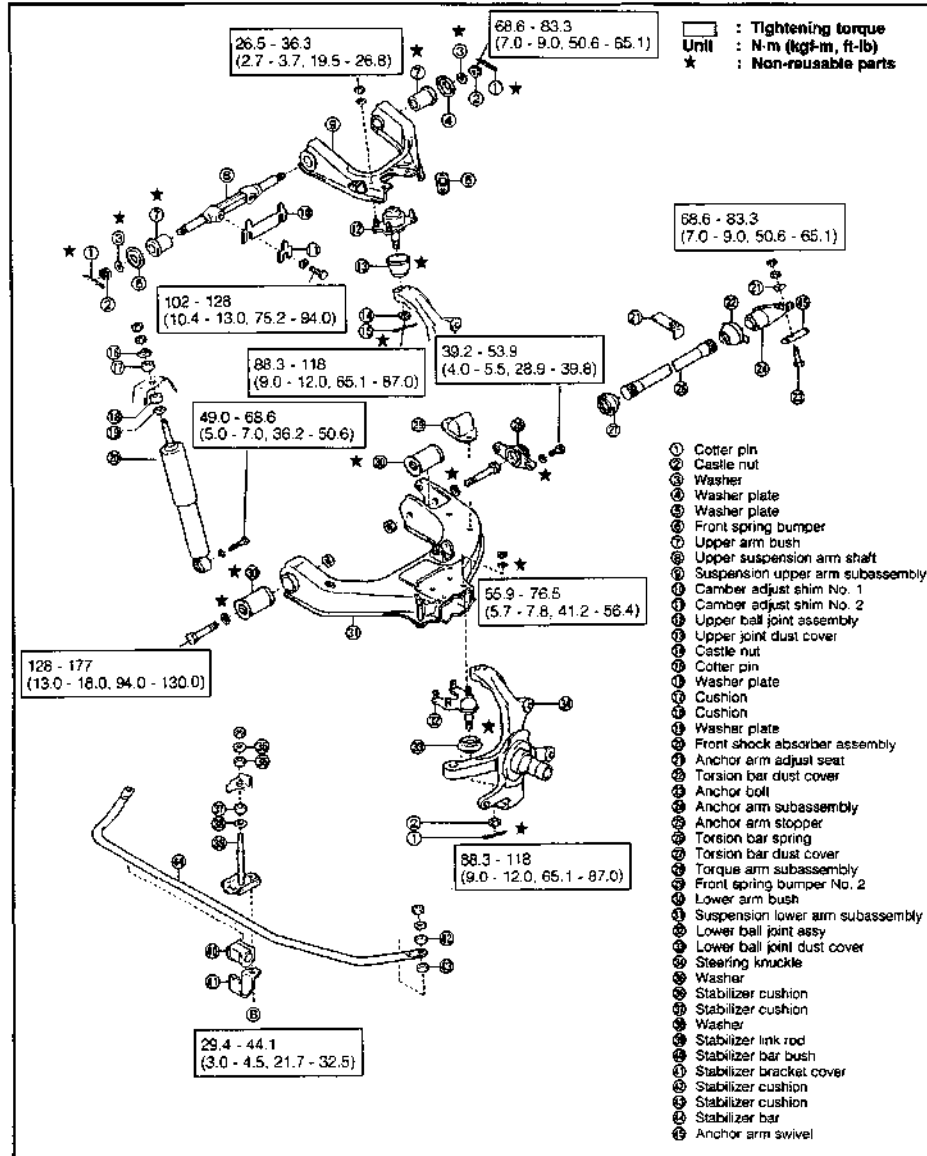
2. Lower arm ball joint
 - (1) Clean the grease fitting of the lower arm ball joint.
 - (2) Ensure that the grease fitting of the upper arm ball joint exhibits no damage.
If any damage is present, replace the damaged grease fitting.
 - (3) Fill grease from the grease fitting, using a grease gun.
Specified Grease: Lithium-based MP grease
Filling Amount: 10 grams
Filling Amount: (In cases where a new part is installed)

3. Tie rod end ball joint
(See the Steering section.)



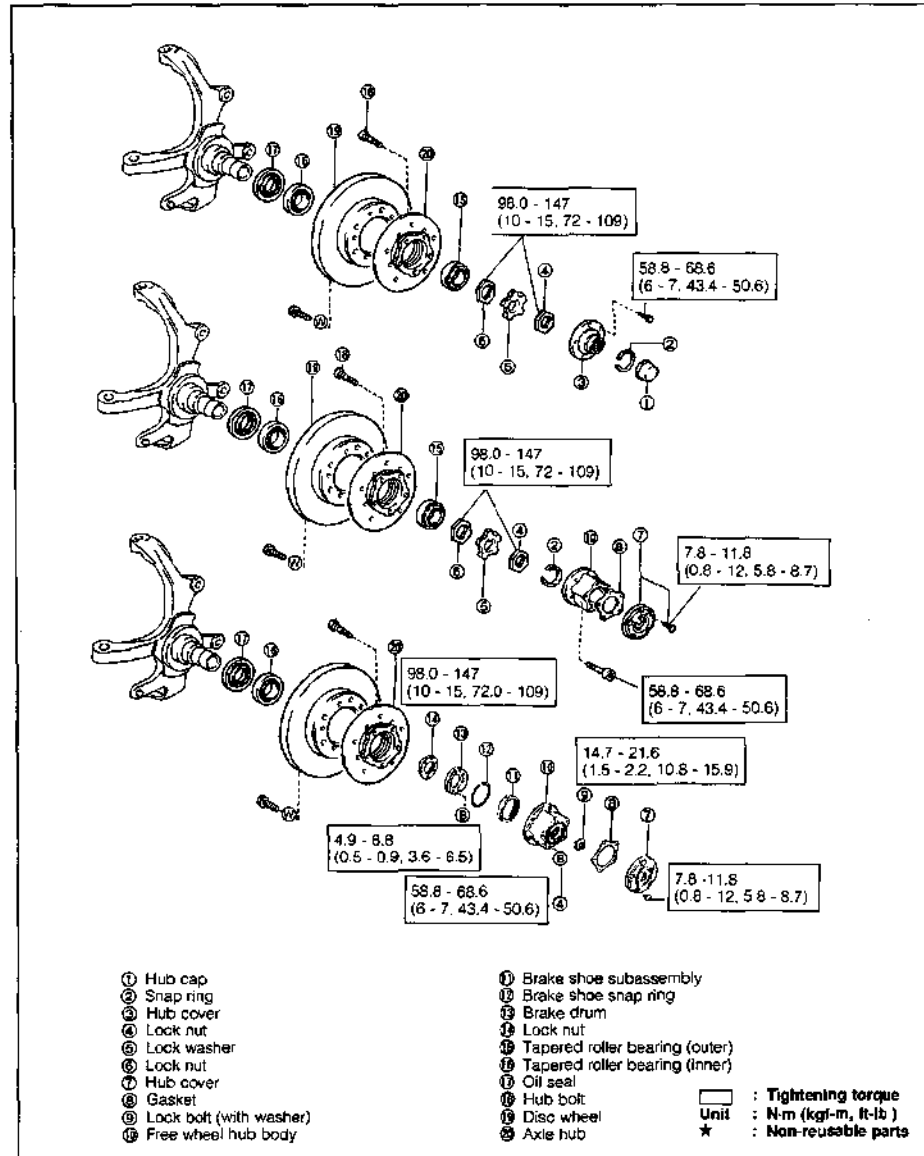
FRONT AXLE & SUSPENSION

FRONT SUSPENSION COMPONENTS



WPE90-FS/086

FRONT AXLE HUB COMPONENTS

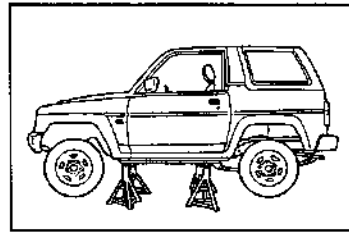


WFE90-FS089

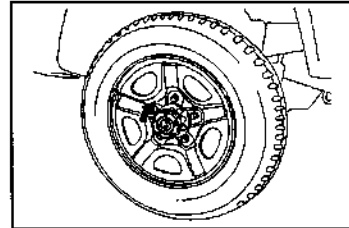
FRONT AXLE & SUSPENSION

CHECK OF FREE WHEEL HUB OPERATION

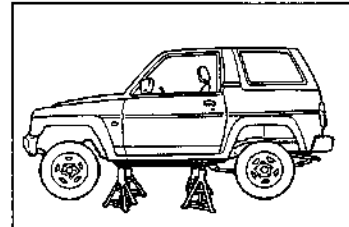
1. Check of manual free wheel hub
 - (1) Jack up the vehicle and support it with safety stands.
(See GI section.)
 - (2) Set the handle of the free wheel hub to the "LOCK" position.
 - (3) Turn the tire several times. At this time, ensure that the front drive shaft turns together.
If not, replace the free wheel hub.
 - (4) Set the handle of the free wheel hub to the "FREE" position.
 - (5) Turn the tire several times. At this time, ensure that the front drive shaft will not turn together.
 - (6) Jack down the vehicle.
2. Check of automatic free wheel hub
 - (1) Jack up the vehicle and support it with safety stands.
(See GI section.)
 - (2) Shift the shift lever to the 4H position.
 - (3) Start the engine. When the driving force is applied to the wheel, ensure that the front wheels turn.
If not, replace the free wheel hub.
 - (4) Shift the shift lever to the 2H position.
 - (5) While slightly applying the brake, apply the driving force to the wheel in a direction opposite to the former direction in the step (3). In this way, turn the wheel more than three times.



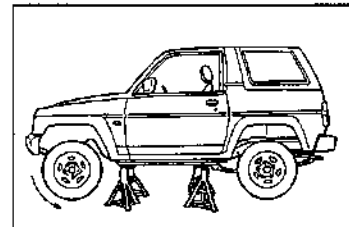
WFE90-F5090



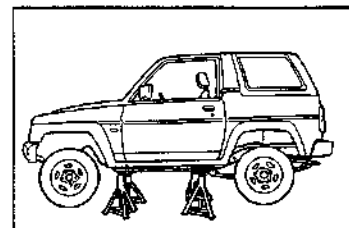
WFE90-F5091



WFE90-F5092



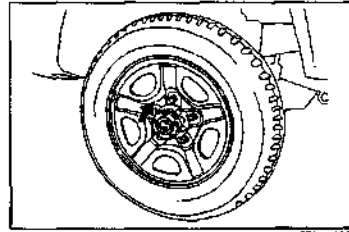
WFE90-F5093



WFE90-F5094

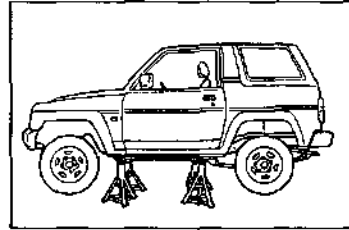
FRONT AXLE & SUSPENSION

- (6) Stop the engine.
- (7) When turning the wheel by hands, ensure that the drive shaft will not turn together.
If not, replace the free wheel hub.

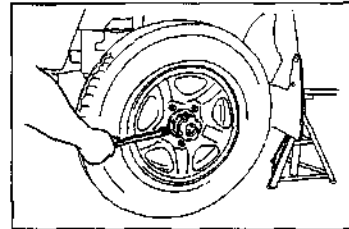


REMOVAL/DISASSEMBLY OF FRONT AXLE HUB

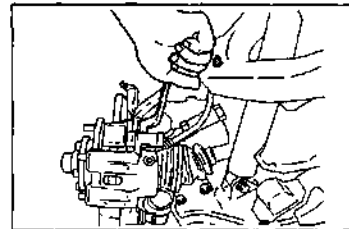
1. Jack up the vehicle and support it with safety stands.
(See GI section.)



2. Remove the front wheel.
(See page FS-28.)



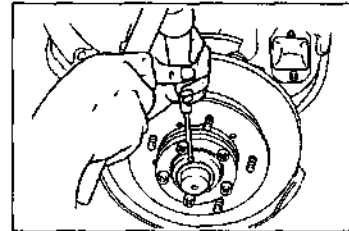
3. Remove the brake mounting support attaching bolts. Remove the brake mounting support together with calipers. Suspend the brake mounting support from the upper frame in such a way that no undue force is applied to the brake hose.



4. Removal of hub cap (rigid type only)
(1) Remove the hub cap by lightly and evenly driving a chisel or the like into between the hub cap and the cover.

NOTE:

- Do not reuse the hub cap.
- Be very careful not to damage the hub cap during the removal.

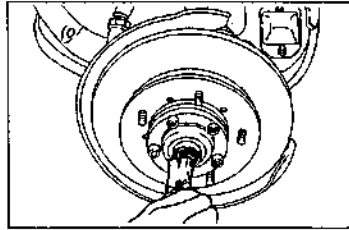


FRONT AXLE & SUSPENSION

- (2) Remove the snap ring from the drive shaft, using a snap ring expander.

NOTE:

- Do not reuse the snap ring.



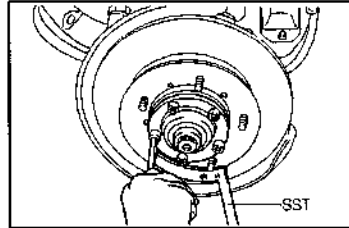
WPFB0-FS100

- (3) Remove the hub cover attaching bolts by means of a hexagonal box wrench (8 mm).

NOTE:

- Be sure to prevent the hub from turning, using the following SST.

SST: 09511-87202-000

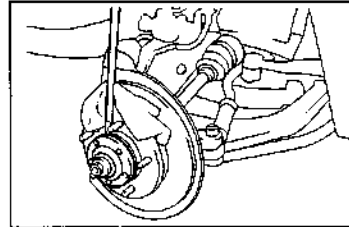


WPFB0-FS101

- (4) Detach the hub cover by prying it off evenly by means of a tire lever or the like.

NOTE:

- Be sure to interpose an adequate cloth between the tire lever and the front axle hub so as not to damage the tire attaching surface of the front axle hub as well as the disc rotor.
- After the hub cover has been removed, completely remove any bond remaining trace from between the hub cover and the hub.

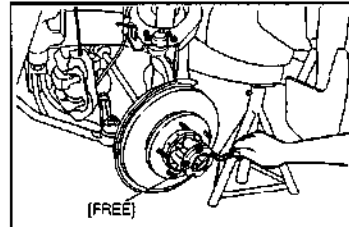


WPFB0-FS102

5. Removal of free wheel hub

As for the manual locking hub, see page FS-52 to FS-55.

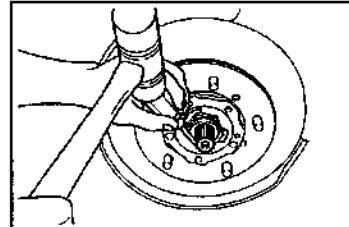
As for the automatic locking hub, see page FS-58 to FS-60.



WPFB0-FS103

6. Removal of lock nut (except automatic locking hub-equipped vehicle)

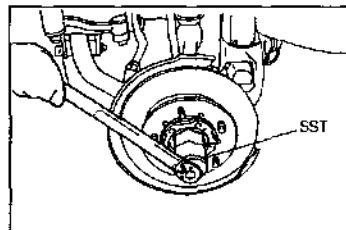
- (1) Raise the pawl of the lock washer by means of a chisel or the like.



WPFB0-FS104

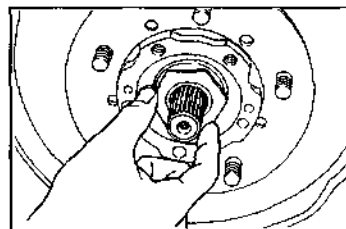
FRONT AXLE & SUSPENSION

- (2) Remove the lock nut, using the following SSTs.
SST: 09607-87602-000



WFES0-PS105

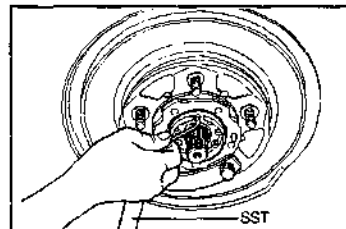
- (3) Remove the lock washer.
(4) Remove the lock nut, using the same SSTs as the step (2).



WFES0-PS106

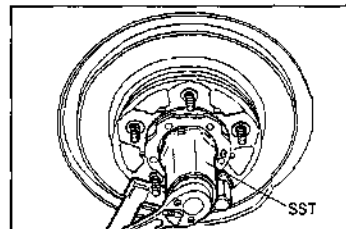
7. Removal of lock nut (Automatic locking hub-equipped vehicle only)

- (1) While preventing the brake drum from turning, remove the brake drum by means of a torque wrench. For this operation, use the following SST.
SST: 09511-87202-000



WFES0-PS107

- (2) Remove the lock nut, using the following SSTs.
SST: 09607-87603-000

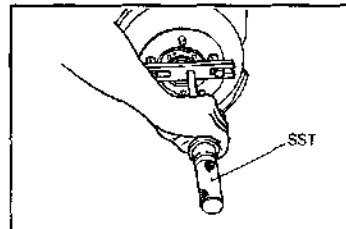


WFES0-PS108

8. Remove the front axle hub, using the following SST.

NOTE:

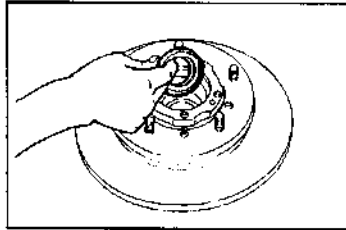
- Be very careful not to drop the outer bearing and hub during the removal.
- SST: 09520-00031-000



WFES0-PS109

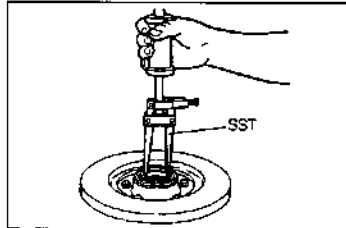
FRONT AXLE & SUSPENSION

9. Remove the tapered roller outer bearing (outer side) from the hub.



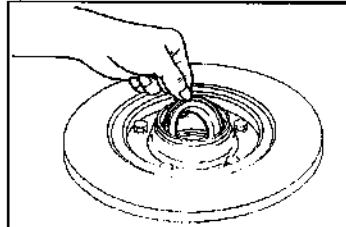
WPFB0-FS110

10. Remove the type T oil seal, using the following SST.
SST: 09308-00010-000



WPFB0-FS111

11. Remove the tapered roller bearing (inner side).

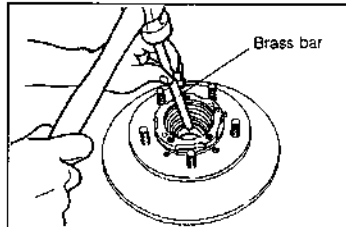


WPFB0-FS112

12. Pull out the inner race (inner side) of the tapered roller bearing by evenly tapping it by means of a brass bar or the like.

NOTE:

- This operation is required only when the bearing is replaced.

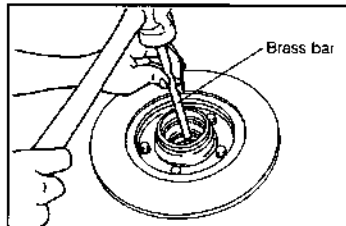


WPFB0-FS113

13. Pull out the inner race (outer side) of the tapered roller bearing by evenly tapping a brass bar or the like.

NOTE:

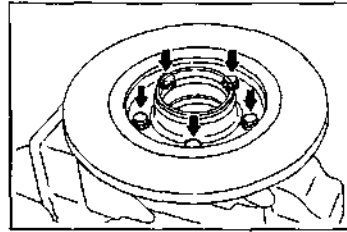
- This operation is required only when the bearing is replaced.



WPFB0-FS114

FRONT AXLE & SUSPENSION

14. Remove the brake disc by removing the brake disc attaching bolts from the front axle hub.

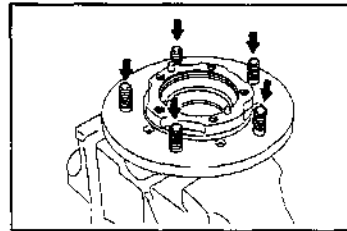


WPES0-FS115

15. Drive out the hub bolt from the front axle hub by means of a plastic hammer or the like.

NOTE:

- Attach the nut in place so that the threaded portion may not be damaged.



WPES0-FS116

INSPECTION

Wash the disassembled parts and dry them with compressed air, except for the free wheel hub.

As for the brake discs, degrease them with cleaning solvent, such as alcohol.

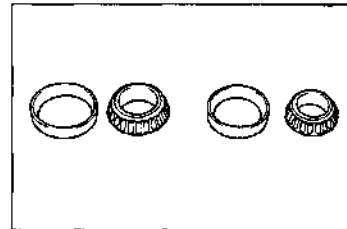
WPES0-FS117

1. Ensure that the inner and outer tapered roller bearings exhibit no damage, such as wear and scratches.

If they exhibit damage, replace the defective bearings.

NOTE:

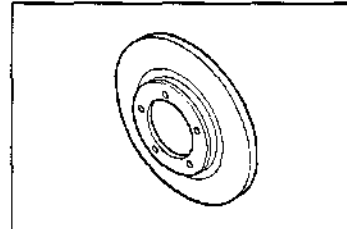
- The inner race and outer race should be handled as a set.



WPES0-FS118

2. Ensure that the brake disc exhibits no damage, such as wear, cracks and scratches.

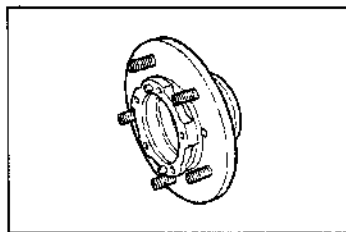
If any damage is present, replace the brake disc.



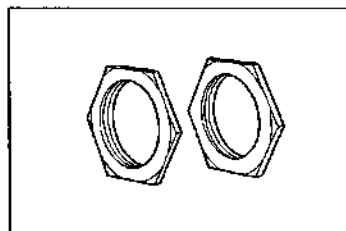
WPES0-FS119

FRONT AXLE & SUSPENSION

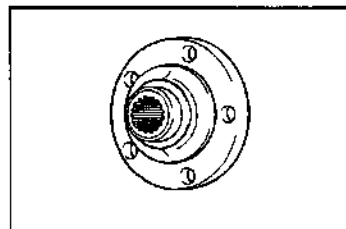
3. Ensure that the front axle hub exhibits no damage, such as wear, cracks and scratches.
If any damage is present, replace the front axle hub.



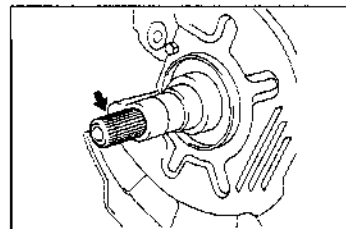
4. Ensure that lock nut exhibits no damage.
If any damage is present, replace the lock nut.



5. Ensure that the hub cover exhibits no damage, such as wear and cracks.
If any damage is present, replace the hub cover.
If the spline section exhibits damage, check the spline at the drive shaft side.



6. Ensure that the drive shaft spline section exhibits no damage, such as wear and cracks.
If any damage is present, replace the drive shaft.
(See page FS-102.)



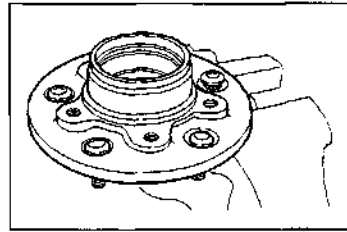
7. Check of free wheel hub
- As for the manual locking hub, see page FS-39.
 - As for the automatic locking hub, see page FS-39.

ASSEMBLY OF FRONT AXLE HUB

1. Drive the hub bolt into the front axle hub by means of a plastic hammer.

NOTE:

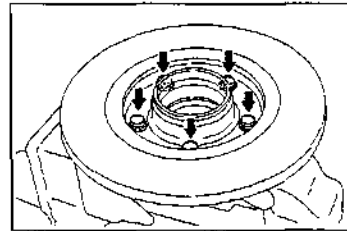
- Be sure to align the cut-out section of the hub bolt with the hub.



WPE90-FS124

2. Install the brake disc to the front axle hub. Evenly tighten the attaching bolts to the specified torque over two or three stages.

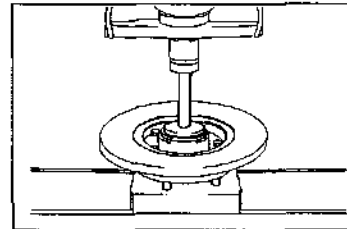
Tightening Torque: 53.9 - 73.5 N·m
(5.5 - 7.5 kgf-m, 39.8 - 54.2 ft-lb)



WPE90-FS125

3. Install the outer race (inner side) of the tapered roller bearing, using the following SST.

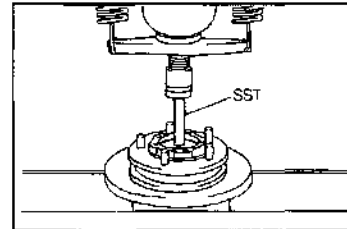
SST: 09608-87604-000
09611-87506-000



WPE90-FS126

4. Install the outer race (outer side) of the tapered roller bearing, using the following SST.

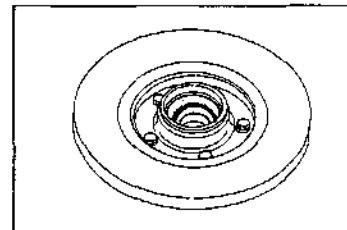
SST: 09608-87603-000
09611-87506-000



WPE90-FS127

5. Fill the specified amount of lithium-based MP grease to a space between the outer races of the inner and outer bearings.

Filling Amount: 35 - 40 grams



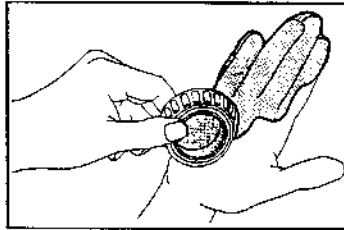
WPE90-FS128

FRONT AXLE & SUSPENSION

6. Fill lithium-based MP grease to the inner and outer bearings.

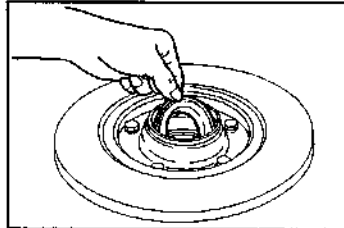
NOTE:

- Fill grease to a space between the inner race and the bearing guide, until the grease oozes from the inside of the bearing guide. Then, apply grease to the surface.



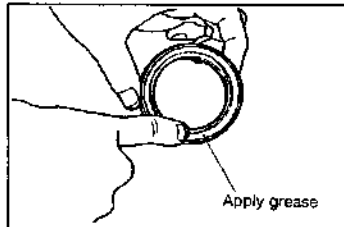
WFE90-FS128

7. Install the inner bearing to the hub.



WFE90-FS130

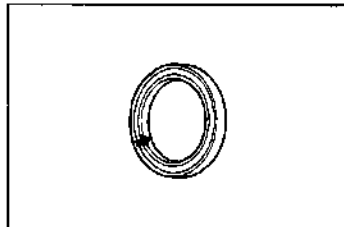
8. Fill the specified amount of lithium-based MP grease to the back side of the oil seal lip section.



Apply grease

WFE90-FS131

9. Apply lithium-based MP grease to the lip section of the oil seal.



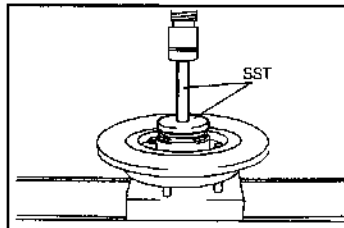
WFE90-FS132

10. Press the oil seal to the hub edge surface, using the following SST.

SST: 09608-87602-000
09611-87506-000

NOTE:

- Care must be exercised to ensure that the oil seal will not tilt during the press operation.

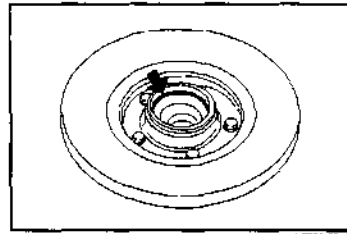


WFE90-FS133

FRONT AXLE & SUSPENSION

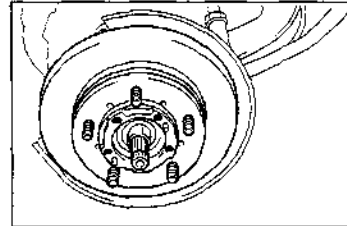
11. Fill lithium-based MP grease between the oil seal and the bearing.

Filling Amount: 25 - 30 grams



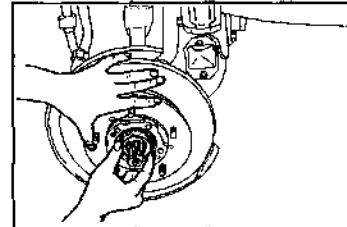
WP690-FS134

12. Install the front axle hub to the steering knuckle.



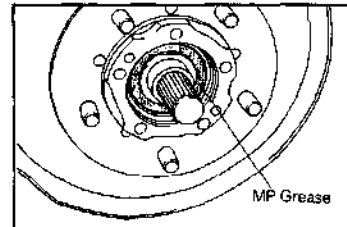
WP690-FS135

13. Insert the outer bearing into the front axle hub.



WP690-FS136

14. Fill lithium-based MP grease to the outer bearing.



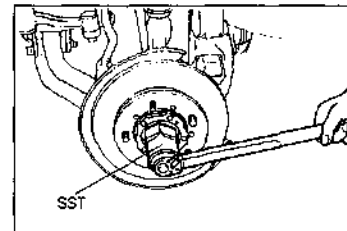
WP690-FS137

15. Tighten the lock nut to the specified torque, using the following SST. Then, back off the lock nut one sixth turn.

SST: Manual locking hub-equipped vehicle and full-time 4WD vehicle: 09607-87602-000

Automatic locking hub-equipped vehicle:
09607-87603-000

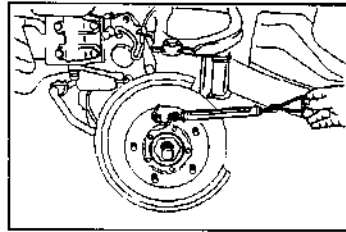
Tightening Torque: 98.0 - 147 N·m
(10 - 15 kgf-m, 72.0 - 109 ft-lb)



WP690-FS138

FRONT AXLE & SUSPENSION

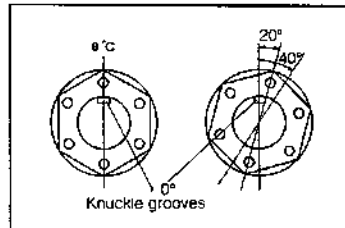
16. Rotate the axle hub two or three turns so that the axle hub may be bedded in.
17. Adjust the lock nut so that the starting torque may conform to the specified value.
 Starting Load: 1.4 - 3.6 kgf
 [Reference]
 Starting Torque:
 0.98 - 2.45 N·m
 (10 - 25 kgf-cm, 8.7 - 21.7 inch-lb)



WPB90-PS129

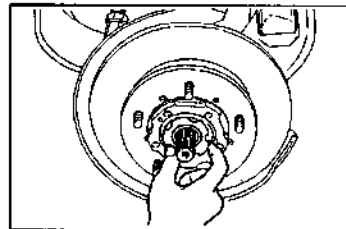
NOTE:

- Adjust the automatic locking hub nut in such a way that the hub nut position comes at the position indicated in the right figure after completion of the adjustment.



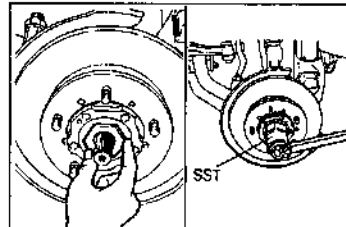
WPB90-PS140

18. Installation of lock washer and lock nut (except automatic locking hub-equipped vehicle)
 (1) Install the lock washer.

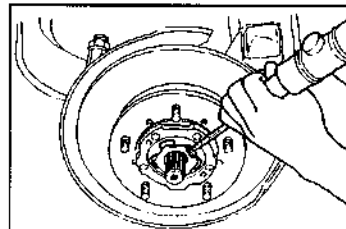


WPB90-PS141

- (2) Tighten the lock nut to the specified torque, using the following SST.
 SST: 09607-87602-000
 Tightening Torque: 98.0 - 147 N·m
 (10 - 15 kgf-m, 72.0 - 109 ft-lb)
- (3) Ensure that the starting torque is within the specifications.
 (See the step 17.)
 If not, adjust the lock nut back-off amount described at the step 15. Perform the operations from the step 15 onward again.
- (4) Bend the tang of the lock washer toward the lock nut edge surface at the inner and outer sides.



WPB90-PS142

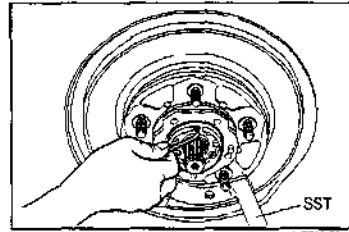


WPB90-PS143

FRONT AXLE & SUSPENSION

19. Install the brake drum and tighten the attaching screws (torque screws) to the specified torque. (Automatic free wheel hub-equipped vehicle only)

Tightening Torque: 4.9 - 8.8 N·m
(0.5 - 0.9 kgf·m, 3.6 - 6.5 ft·lb)



WP690-FS144

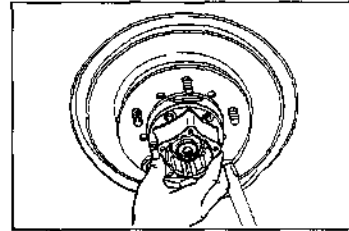
20. Installation of free wheel hub
(Free wheel hub-equipped vehicle only)

Manual locking hub

See page FS-55 to FS-58.

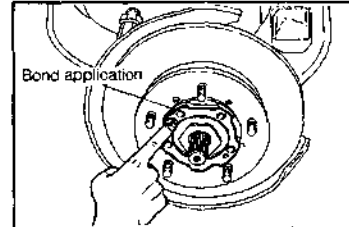
Automatic locking hub

See page FS-61 to FS-64.



WP690-FS145

21. Installation of hub cover (Full-time 4WD vehicle only)
Thinly and evenly apply the Daihatsu Bond No.4 to the edge surface of the hub.



WP690-FS146

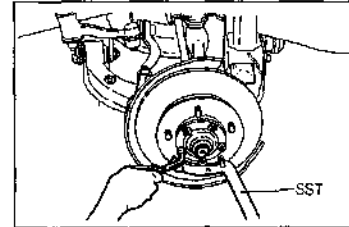
22. Install the hub cover. Tighten the attaching bolts evenly to the specified torque over two or three stages.
(Full-time 4WD vehicle only)

Tightening Torque: 58.8 - 68.6 N·m
(6.0 - 7.0 kgf·m, 43.4 - 50.6 ft·lb)

NOTE:

- Use a hexagonal box wrench for the bolt tightening.
- Wipe off any oozed bond.
- Prevent the hub from turning, using the following SST.

SST: 09511-87202-000

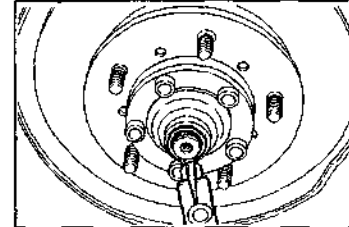


WP690-FS147

23. Install a new snap ring to the groove section of the drive shaft.

NOTE:

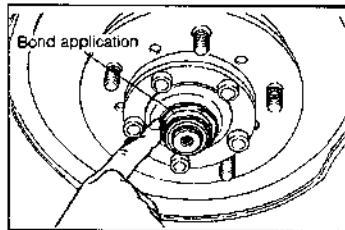
- Do not reuse the snap ring.



WP690-FS148

FRONT AXLE & SUSPENSION

24. Apply the Daihatsu Bond No.4 to the hub cap attaching surface of the hub cover.



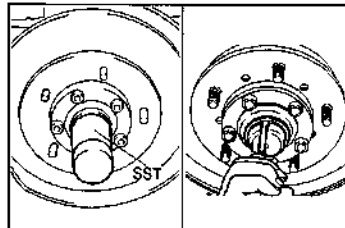
WFE90-FS149

25. Press the hub cap, using the following SST or a screwdriver or the like.

SST: 09608-87613-000

NOTE:

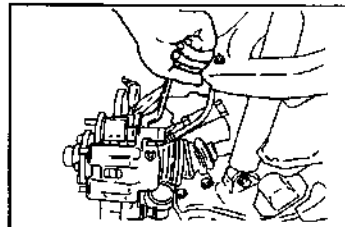
- Do not reuse the hub cap.
- Wipe off any bond that has oozed out.



WFE90-FS150

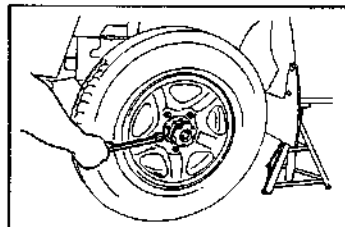
26. Install the brake mounting support together with calipers to the steering knuckle.

Tightening Torque: 68.6 - 88.3 N·m
(7.0 - 9.0 kgf-m, 50.6 - 65.1 ft-lb)



WFE90-FS151

27. Install the front wheel.
(See page FS-28)

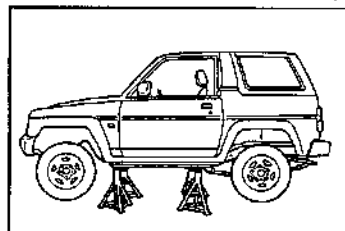


WFE90-FS152

MANUAL FREE WHEEL HUB

Disassembly

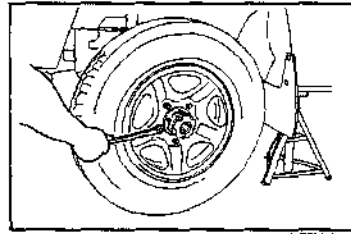
1. Jack up the vehicle and support it with safety stands.
(See GI section.)



WFE90-FS153

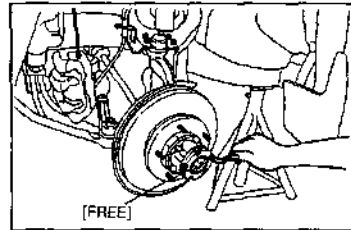
FRONT AXLE & SUSPENSION

2. Remove the front wheel.
(See page FS-28.)



WFE00-FS154

3. Removal of free wheel hub cover
 - (1) Set the handle of the free wheel hub cover to the "FREE" position.



[FREE]

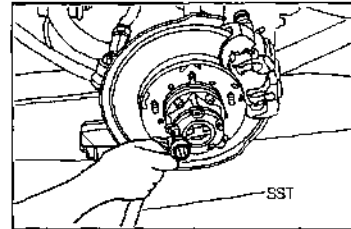
WFE00-FS155

- (2) Evenly loosen the free wheel cover attaching bolts and remove them.

NOTE:

- Prevent the hub bolt from turning, using the following SST.

SST: 09511-87202-000



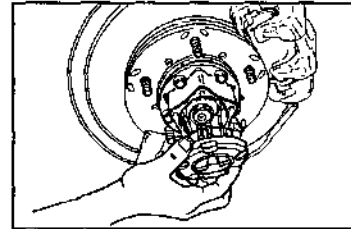
SST

WFE00-FS156

- (3) Remove the hub cover from the hub body in a state that the hub cover is assembled to the clutch and spring.

NOTE:

- The handle of the free wheel cover should be at the "FREE" position.

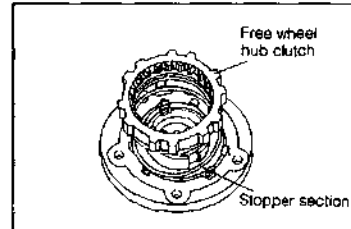


WFE00-FS157

4. Removal of clutch subassembly
 - (1) With the handle of the hub cover set to the "FREE" position, turn the clutch subassembly, until the clutch stops, while pushing the clutch subassembly against the cover side.

NOTE:

- Be very careful not to damage the compression spring and follower by applying excessive force during this operation.



Free wheel
hub clutch

Stopper section

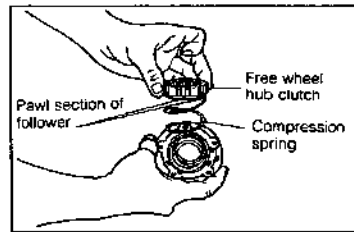
WFE00-FS158

FRONT AXLE & SUSPENSION

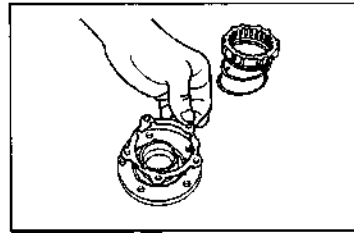
- (2) Push the clutch toward the cover side further. Remove the pawl section of the follower from the stopper section of the hub cover handle. Then, remove the clutch sub-assembly from the cover.

NOTE:

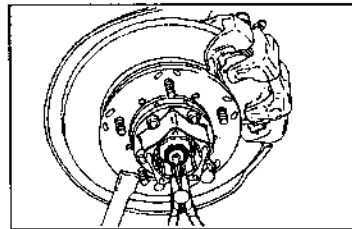
- Do not remove the compression spring from the follower.



- (3) Remove the gasket.

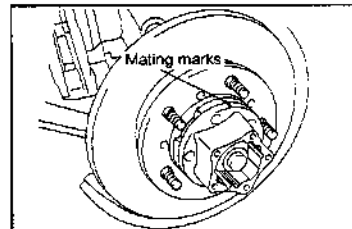


5. Remove the snap ring from the drive shaft.

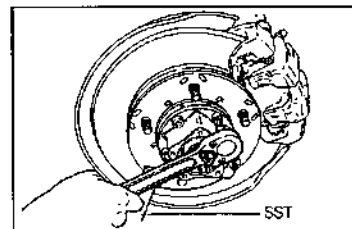


6. Removal of hub body

- (1) Put mating marks at a point between the hub body and the hub by means of a marker pen or the like.



- (2) Evenly loosen the hub body attaching bolts and remove them.

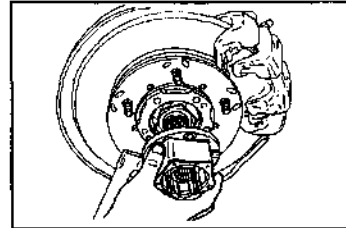
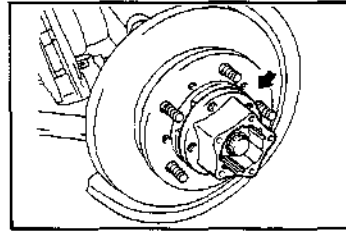


FRONT AXLE & SUSPENSION

- (3) Remove the hub body by lightly tapping it by means of a plastic hammer or the like.

NOTE:

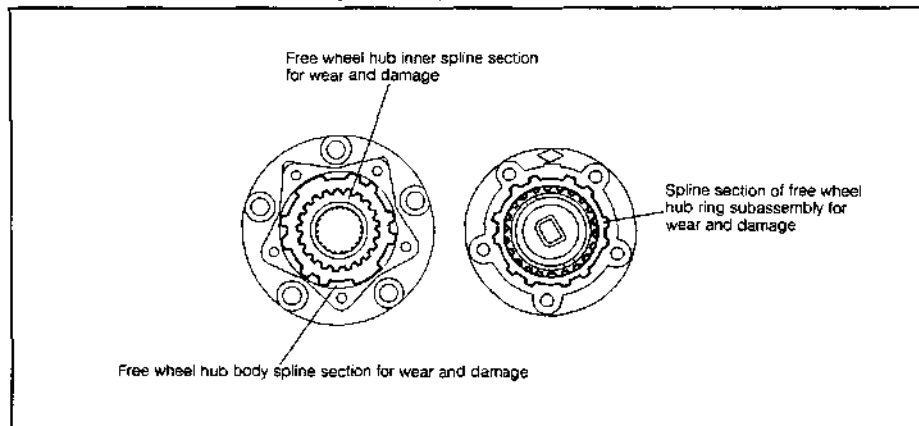
- Be very careful not to drop the hub body.
- Care must be exercised so as not to apply strong impacts to the hub body.



WP890-FS164

Inspection

Check the following parts. Replace any defective parts.

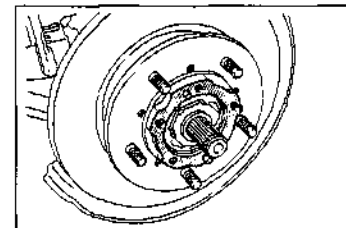


WP890-FS165

Assembly

1. Installation of hub body

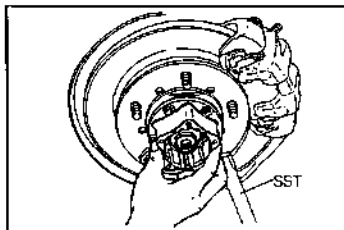
- (1) Clean the mating surfaces of the hub body and axle hub. Then, thinly and evenly apply the Daihatsu Bond No. 4.



WP890-FS166

FRONT AXLE & SUSPENSION

- (2) While aligning the knock pin hole of the hub body with the knock pin of the hub, install the hub body to the hub.



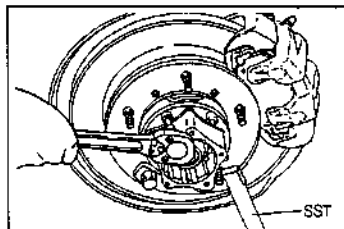
WPB90-FS167

- (3) Tighten the hub body attaching bolts to the specified torque over two or three stages evenly.
Tightening Torque: 58.8 - 68.6 N·m
(6.0 - 7.0 kgf-m, 43.4 - 50.6 ft-lb)

NOTE:

- Prevent the axle hub from turning, using the following SST.

SST: 09511-87202-000

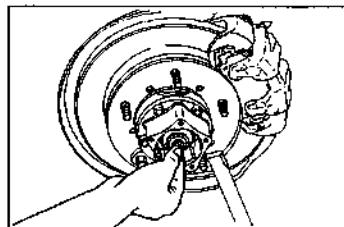


WPB90-FS168

2. Assemble a new snap ring to the drive shaft.

NOTE:

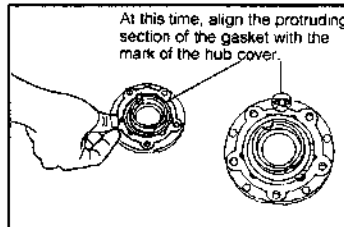
- Never reuse the snap ring.
- Fit the snap ring positively to the groove of the drive shaft.



WPB90-FS169

3. Assembly of hub cover

- (1) Install a new gasket to the hub cover.

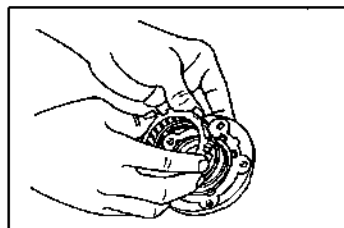


WPB90-FS170

- (2) Move the handle of the hub cover to the "FREE" position. Align the pawl of the clutch subassembly with the cut-out section of the handle.

NOTE:

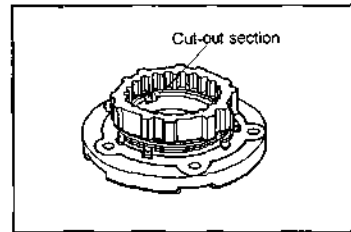
- Make sure that the compression spring is positively placed in the follower.



WPB90-FS171

FRONT AXLE & SUSPENSION

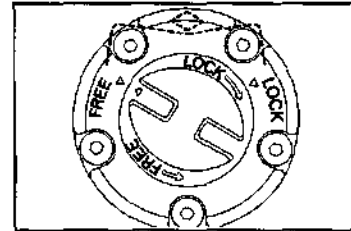
- (3) Turn the clutch subassembly, until the clutch stops, while pushing the clutch subassembly against the cover side.
- (4) Move the handle of the hub cover several times from the "FREE" position to the "LOCK" position; from the "LOCK" position to the "FREE" position. At this time, ensure that the clutch operates smoothly.



WPB90-FS172

4. Installation of hub cover

- (1) Set the handle of the hub cover to the "FREE" position.
- (2) Install the hub cover to the hub body, while aligning the mark at the reverse side of the hub cover with the protruding section at the hub body side.



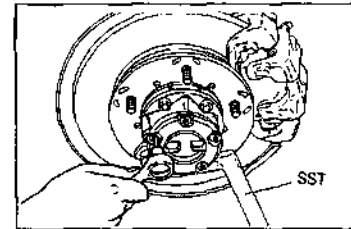
WPB90-FS173

NOTE:

- Be very careful not to displace the gasket position during this operation.

- (3) Tighten the hub cover attaching bolts to the specified torque.

Tightening Torque: 7.8 - 11.8 N·m
(0.8 - 1.2 kgf-m, 5.8 - 8.7 ft-lb)



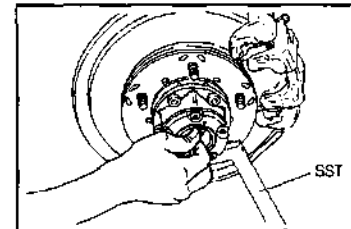
WPB90-FS174

NOTE:

- Prevent the axle hub from turning, using the following SST.

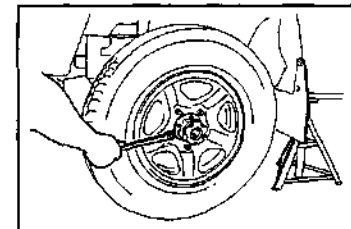
SST: 09511-87202-000

5. Move the handle of the hub cover several times from the "FREE" position to the "LOCK" position; from the "LOCK" position to the "FREE" position. At this time, ensure that the handle operates smoothly.



WPB90-FS175

6. Install the front wheel temporarily.



WPB90-FS176

FRONT AXLE & SUSPENSION

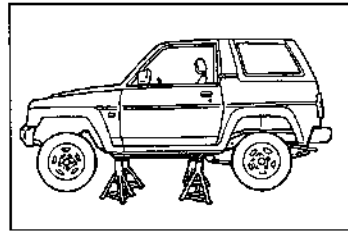
7. Perform the operation check.
(See page FS-40.)
8. Jack up the vehicle and remove the safety stands.
9. Tighten the front wheel attaching bolts to the specified torque.
(See page FS-29.)

WFEB0-FS177

AUTOMATIC LOCKING HUB

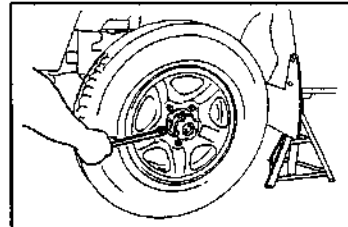
Removal

1. Jack up the vehicle and support it with safety stands.
(See GI section.)



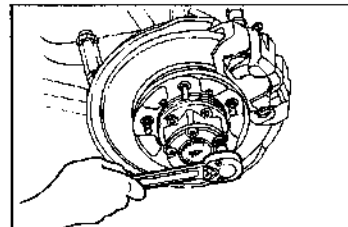
WFEB0-FS178

2. Remove the front wheel.
(See page FS-28.)



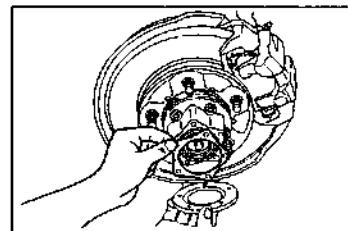
WFEB0-FS179

3. Remove the hub cover.



WFEB0-FS180

4. Remove the gasket from the hub body.



WFEB0-FS181

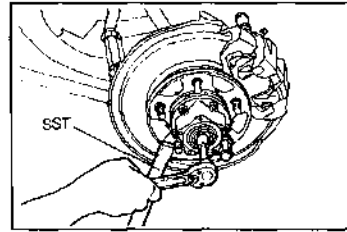
FRONT AXLE & SUSPENSION

5. Remove the lock washer attaching bolt.

NOTE:

- Prevent the axle hub from turning, using the following SST.

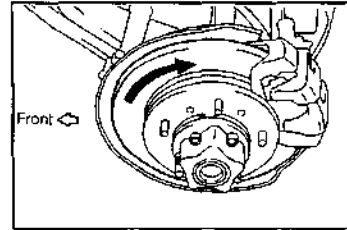
SST: 09511-87202-000



WPB90-FS182

6. Turn the hub. Ensure that the hub is set to the free wheel state.

If the hub is not set to the free condition, turn the hub (three turns or more) reversely relative to the forward direction so that the hub may be set to the free condition.



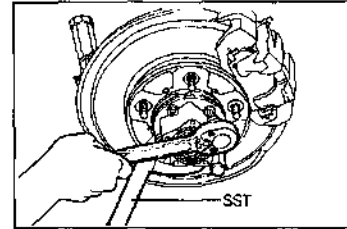
WPB90-FS183

7. Evenly loosen the hub body attaching bolts and remove them.

NOTE:

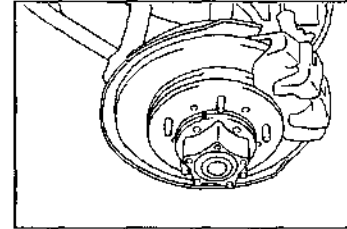
- Prevent the axle hub from turning, using the following SST.

SST: 09511-87202-000



WPB90-FS184

8. Put mating marks at a point between the hub body and the axle hub by means of a marker pen or the like.

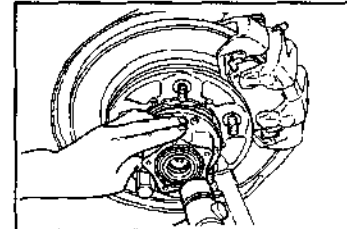


WPB90-FS185

9. Remove the hub body from the axle hub by lightly tapping the hub body by means of a plastic hammer or the like.

NOTE:

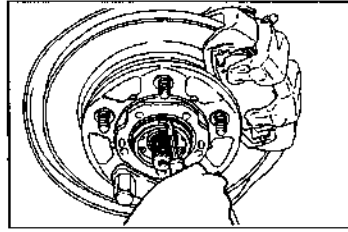
- Be very careful not to drop the hub body.
- Care must be exercised not to apply strong impact to hub body.



WPB90-FS186

FRONT AXLE & SUSPENSION

10. Remove the brake shoe snap ring.

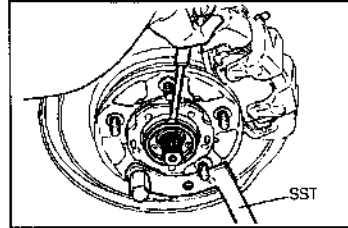


WFES0-F3187

11. Remove the brake shoe by lightly prying off the brake shoe by means of a screwdriver or the like.

NOTE:

- Since the brake shoe is provided with inserting sections at its upper and lower sides, be sure to pry off the brake shoe at upper and lower sides evenly and alternately.
- Be very careful not to scratch the brake drum and/or brake shoe.
- Do not remove the grease that has been applied to the removed brake shoe. Leave the grease as it is.
- Do not soil the removed brake shoe and grease.
- Do not allow the grease of the removed brake shoe to get to other sliding parts.
- Do not allow the grease of the removed brake shoe to get into other grease.



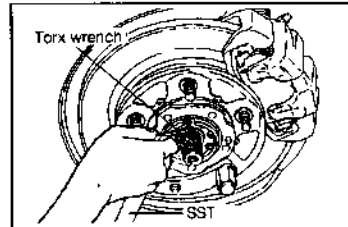
WFES0-F5188

12. Remove the brake drum from the lock nut, using a torx wrench.

NOTE:

- Prevent the axle hub from turning, using the following SST.

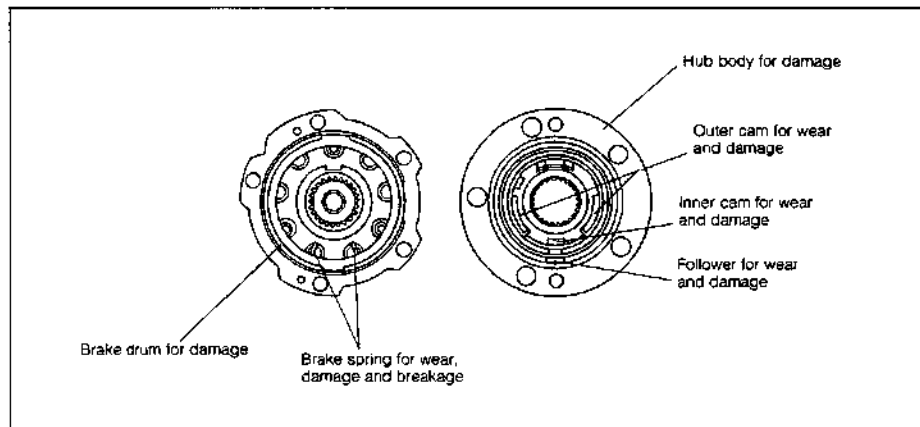
SST: 09511-87202-000



WFES0-F5189

Inspection

Check the following parts. Replace any defective parts.



WFES0-F5190

ASSEMBLY

NOTE:

• Identification of Automatic Locking Hub

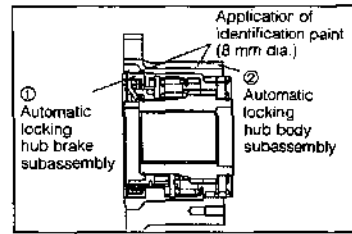
When the hub body assembly and/or the hub brake subassembly is replaced, it is necessary to consider the combination of the hub body assembly and the hub brake subassembly. Before these parts are assembled, be certain to confirm their identification, using the table below.

Identification colors

Hub body assembly	Identification color	Brake subassembly	
		Yellow	blue
	Yellow	○	○
	Blue	x	○

The ○-marked combination only is acceptable.

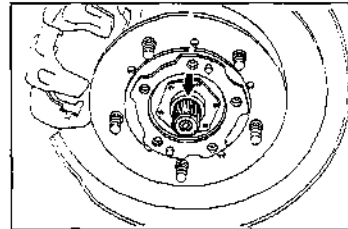
However, when replacing the hub brake subassembly, if it is impossible to confirm the identification color of the hub body assembly, be certain to employ a blue brake subassembly.



WFE90-FS153

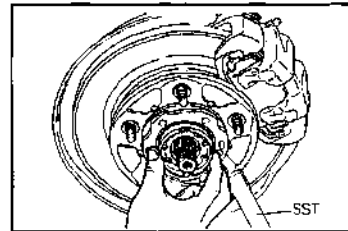
WFE90-FS154

1. Clean the serration section of the drive shaft so as to remove grease or the like.



WFE90-FS155

2. While aligning the brake drum with the groove of the knuckle, assemble them.



WFE90-FS156

FRONT AXLE & SUSPENSION

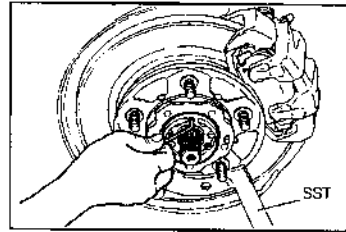
3. Tighten the brake drum attaching screws (torx) to the specified torque.

Tightening Torque: 4.9 - 8.8 N·m
(0.5 - 0.9 kgf-m, 3.6 - 6.5 ft-lb)

NOTE:

- Prevent the axle hub from turning, using the following SST.

SST: 09511-87202-000

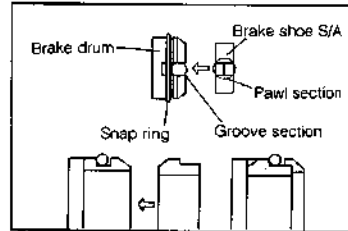


WPES0-FS192

4. Install the brake shoe to the brake drum.

NOTE:

- Since the width of the pawl of the brake shoe differs between the upper section and the lower section, be certain to confirm the width of the pawl before the installation.
- Make sure that the brake shoe is installed in the correct direction.
- Do not remove the grease that has been applied to the brake shoe.
- Do not soil the brake shoe and grease.
- Do not allow the grease applied to the brake shoe to get to other sliding parts.
- Do not allow the grease that has been applied to the brake shoe to get into other grease.



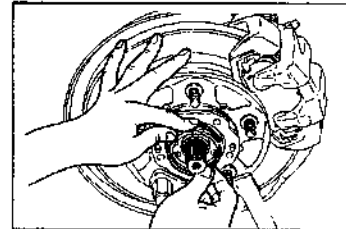
WPES0-FS193

If the grease applied to the brake shoe should be soiled and/or removed, be sure to replace the brake shoe with a new one. The new brake shoe will be supplied with grease applied.

5. Install the brake shoe snap ring so as to secure the brake shoe.

NOTE:

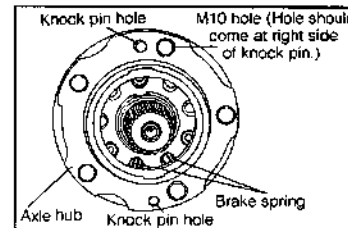
- Be sure to set the opening of the snap ring within a range of $90^\circ \pm 20$ relative to the cut-out section provided at the pawl section of the brake shoe of the brake drum.



WPES0-FS197

6. Installation of hub body

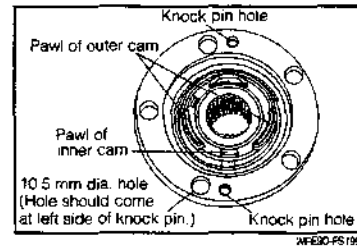
- (1) Turn the axle hub so as to set it, as indicated in the right figure.
- (2) Turn the spring so that the end section of the brake spring may come at the position as indicated in the right figure.



WPES0-FS196

FRONT AXLE & SUSPENSION

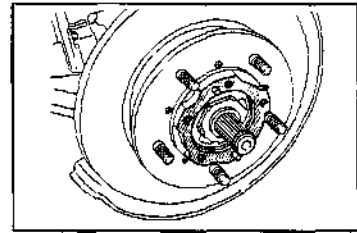
- (3) Turn the cam so that the pawls of the inner cam and outer cam of the hub body may come at the position as indicated in the right figure.



- (4) Clean the attaching surfaces of the axle hub and hub body. Thinly and evenly apply the Daihatsu Bond No.4 to the axle hub side.

NOTE:

- At this time, make sure that no grease is stuck to the serration section of the drive shaft.

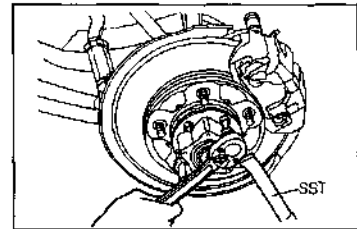


- (5) Install the hub body to the axle hub. Tighten the attaching bolts to the specified torque evenly over two or three stages.

Tightening Torque: 58.8 - 68.6 N·m
(6.0 - 7.0 kgf-m, 43.4 - 50.6 ft-lb)

NOTE:

- Prevent the axle hub from turning, using the following SST.
SST: 09511-87202-000
- Wipe off any oozed bond.
- Be very careful not to get lithium-based MP grease to the brake shoe subassembly.

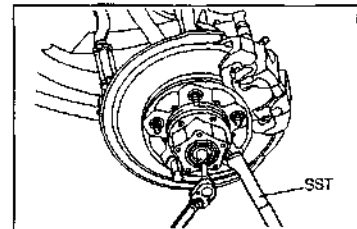


- (6) Install the plate washer with the attaching bolt.

Tightening Torque: 14.7 - 21.6 N·m
(1.5 - 2.2 kgf-m, 10.8 - 15.9 ft-lb)

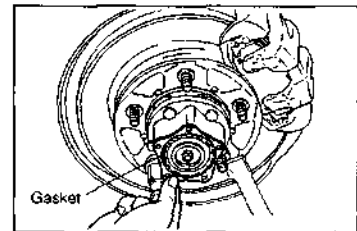
NOTE:

- Prevent the axle hub from turning, using the following SST.
SST: 09511-87202-000



7. Installation of hub cover

- (1) Install a new gasket to the hub body.



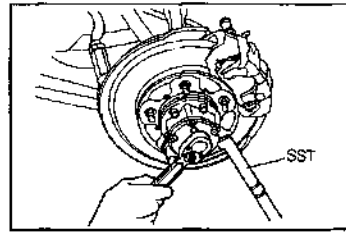
FRONT AXLE & SUSPENSION

- (2) Install the hub cover with the bolt.
Tightening Torque: 7.9 - 11.8 N·m
(0.8 - 1.2 kgf-m, 5.8 - 8.7 ft-lb)

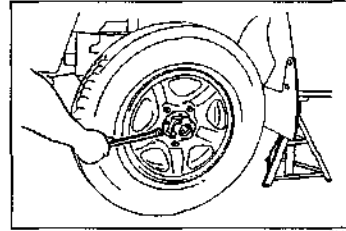
NOTE:

- Prevent the axle hub from turning, using the following SST.

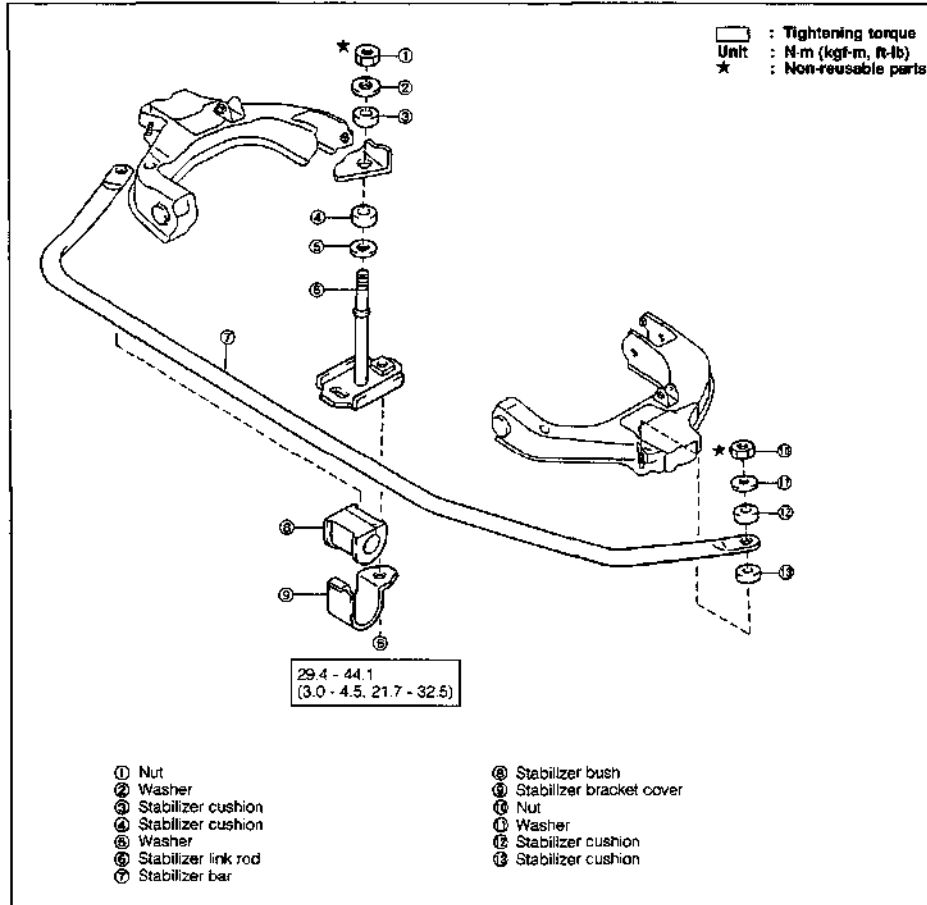
SST: 09511-87202-000



8. Install the front wheel.
(See page FS-28.)
9. Perform the operation check.
(See page FS-40.)
10. Jack up the vehicle and remove the safety stands. Then,
jack down the vehicle.



STABILIZER BAR COMPONENTS



TROUBLE SHOOTING

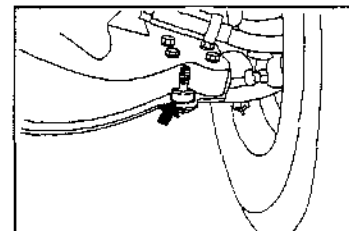
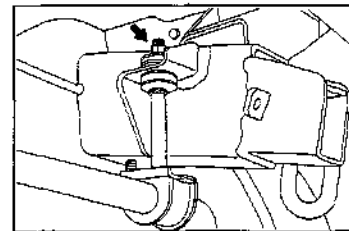
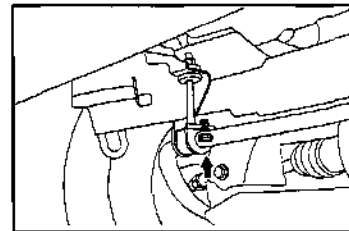
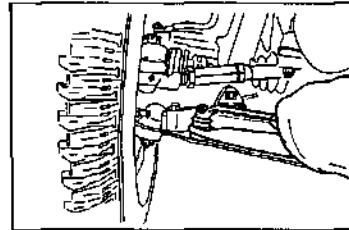
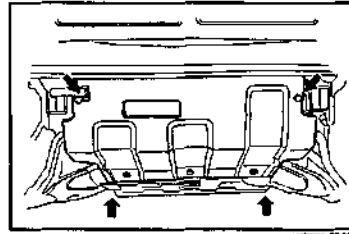
Symptom	Possible causes	Checking points
Excessive rolling of vehicle body during running	Stabilizer damaged	Check stabilizer.
	Stabilizer installing section damaged	Check stabilizer installing section.

WP590-FS207

FRONT AXLE & SUSPENSION

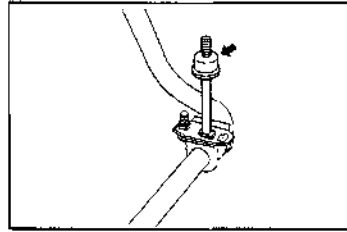
REMOVAL

1. Place the vehicle in an unloaded state.
2. Remove the engine undercover at the front side.
3. Remove the bolts attaching the stabilizer bar to the lower arm at the right and left sides. Remove the washer and cushion.
4. Loosen the attaching bolts of the stabilizer bracket covers.
5. Remove the stabilizer link rod attaching nut. Remove the washer and cushion.
6. Remove the stabilizer bar from the lower arm. Remove the cushion.



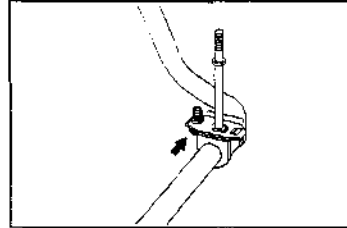
FRONT AXLE & SUSPENSION

7. Remove the cushion and washer from the stabilizer link rod.



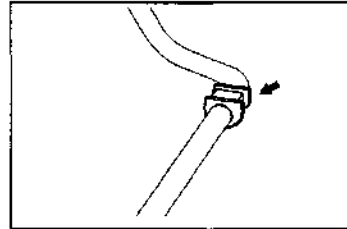
WPE90-FS213

8. Remove the stabilizer bracket cover.



WPE90-FS214

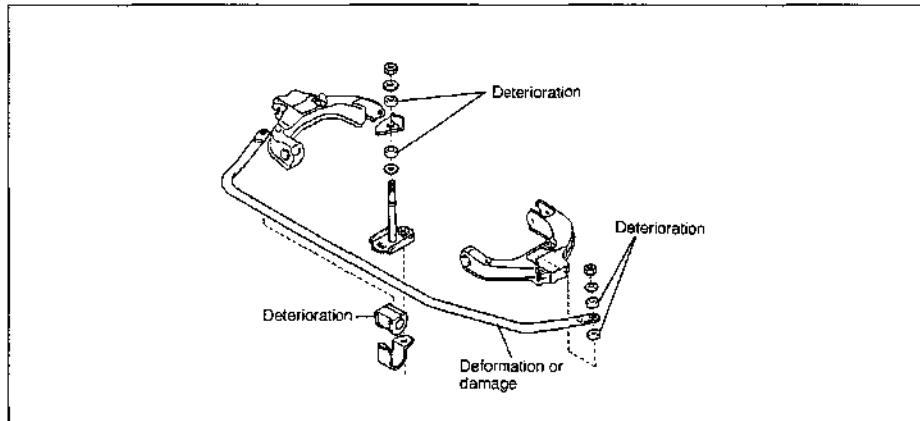
9. Remove the stabilizer bush.



WPE90-FS215

INSPECTION

Check the following parts. Replace any defective parts.



WPE90-FS216

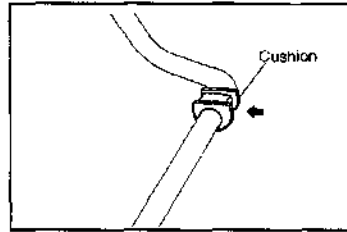
FRONT AXLE & SUSPENSION

INSTALLATION

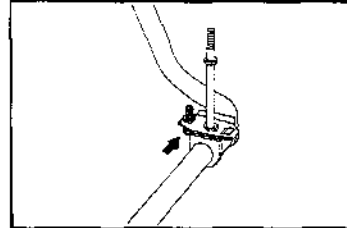
1. Install the bush to the stabilizer bar.
2. Install the stabilizer link rod to the cushion. Temporarily install the stabilizer bracket cover.
3. Install the washer and cushion to the stabilizer link rod.
4. Install the cushion to the lower arm.
5. Connect the stabilizer to the lower arm attaching bolt. Install the stabilizer link to the frame. Tighten the nut with the cushion and washer interposed.

NOTE:

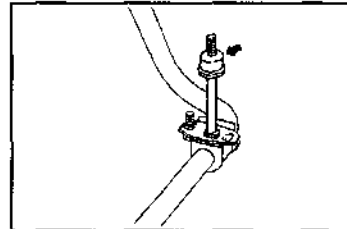
- Tighten the nut so that the threaded portion of the stabilizer link protrudes 2 to 6 mm from the nut end surface.



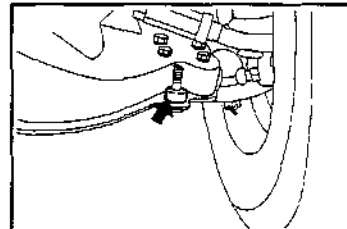
WPB90-FS217



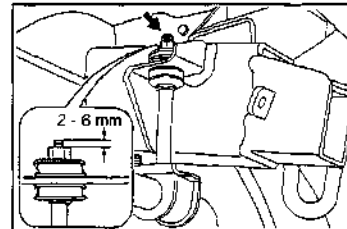
WPB90-FS218



WPB90-FS219



WPB90-FS220



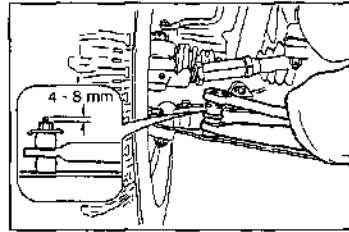
WPB90-FS221

FRONT AXLE & SUSPENSION

6. Install the cushion and washer to the lower arm. Tighten the attaching nut.

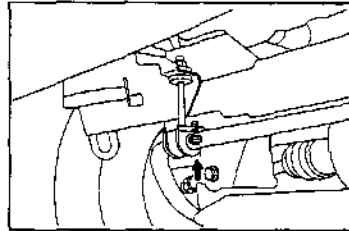
NOTE:

- Tighten the nut so that the threaded portion of the lower arm protrudes 4 to 8 mm from the nut end surface.



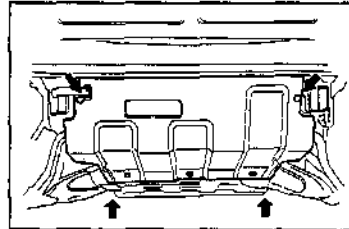
VPF80-PS222

7. Tighten the stabilizer bracket cover attaching bolt.
Tightening Torque: 29.4 - 44.1 N·m
(3.0 - 4.5 kgf-m, 21.7 - 32.5 ft-lb)



VPF80-PS223

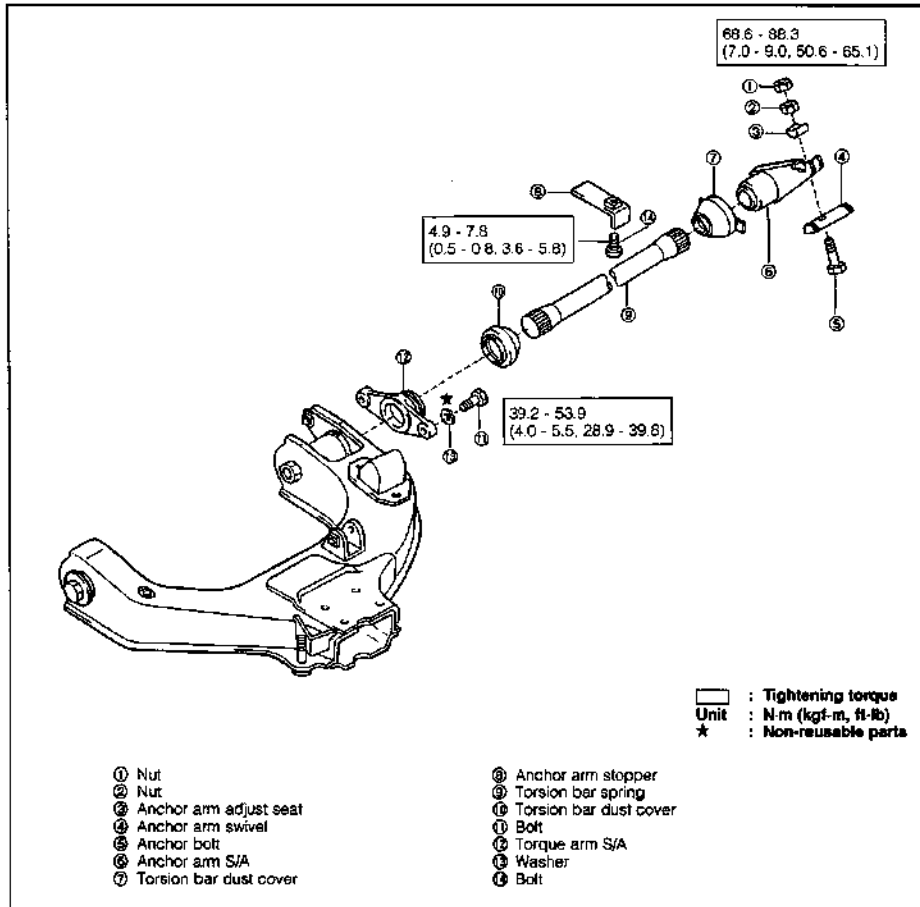
8. Install the engine front undercover.



VPF80-PS224

FRONT AXLE & SUSPENSION

TORSION BAR SPRINGS COMPONENTS



WFE90-FS225

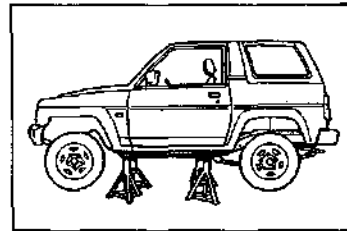
TROUBLE SHOOTING

Symptom	Possible causes	Checking points
Vehicle body tilted	Torsion bar improperly adjusted	Adjust vehicle height

WFE90-FS226

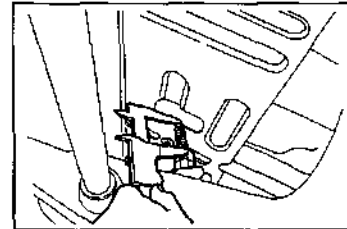
REMOVAL

1. Jack up the vehicle and support it with safety stands.
(See GI section.)



WP690-FS227

2. Measure the protruding dimension of the anchor bolt.
Record the measured value.

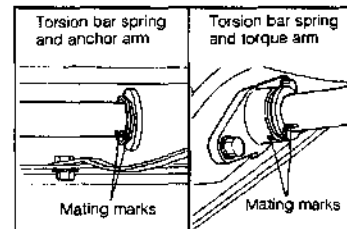


WP690-FS228

3. Remove the rubber boot. Put mating marks at a point between the torsion bar spring and the anchor arm and also at a point between the torsion bar spring and the torque arm. For this identification marks, use white paint or the like.

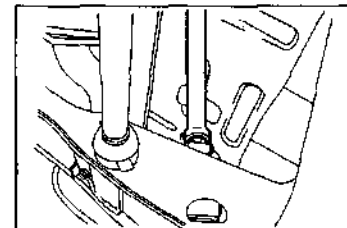
NOTE:

- Since the shape of the torsion bar spring differs between the right side and the left side, be sure to put mating marks, so that the torsion bar springs may be installed correctly in their original positions.



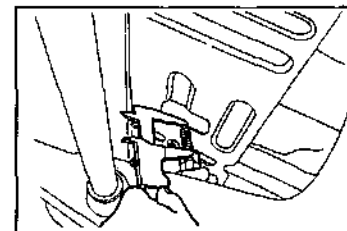
WP690-FS229

4. Loosen the lock nut of the anchor bolt, until the reaction force of the torsion bar spring is just eliminated.



WP690-FS230

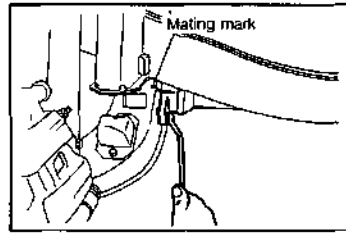
5. Measure the protruding dimension of the anchor bolt.
Record the measured value.



WP690-FS231

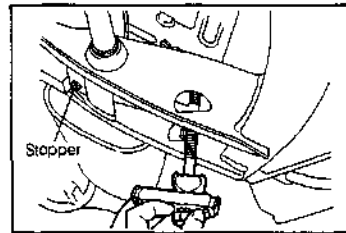
FRONT AXLE & SUSPENSION

6. Remove the torque arm from the lower arm by removing the torque arm attaching bolt.



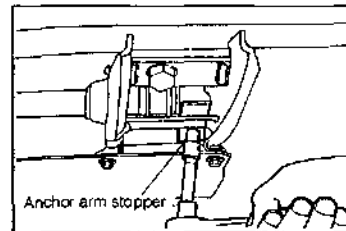
WPB90-FS232

7. Remove the adjusting seat from the anchor arm. Then, remove the anchor arm swivel together with the anchor bolts, nuts and anchor arm adjusting seat from the frame.



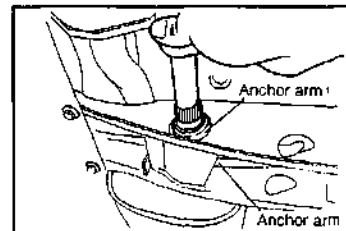
WPB90-FS233

8. Remove the anchor arm stopper from the frame.



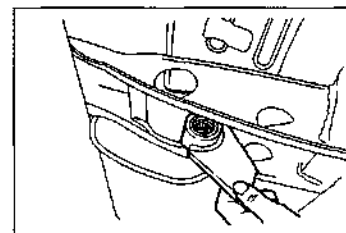
WPB90-FS234

9. Pull out the torsion bar spring from the anchor arm.



WPB90-FS235

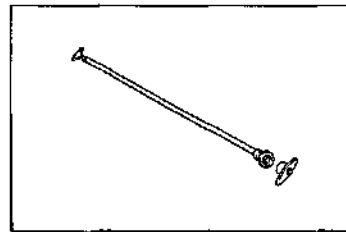
10. Remove the anchor arm from the frame.



WPB90-FS236

FRONT AXLE & SUSPENSION

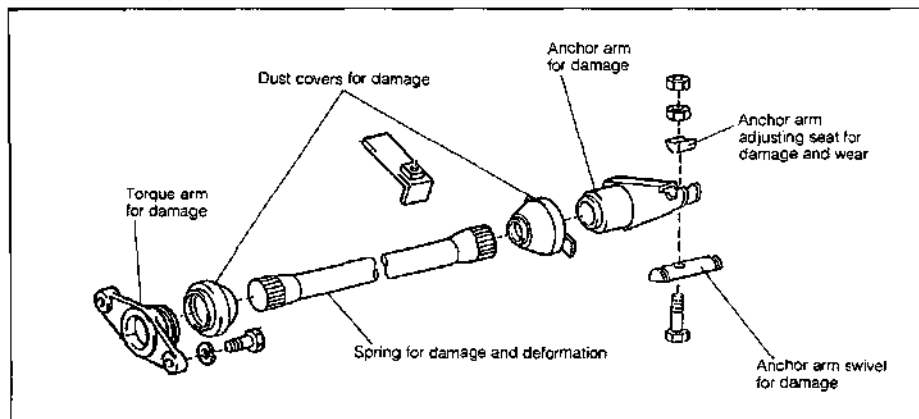
11. Remove the torque arm and dust covers from the torsion bar spring.



WPE90-FS237

INSPECTION

Check the following parts. Replace any defective parts.



NOTE:

- Torsion bar springs for the right and for the left are the designated parts exclusively for each side. Care must be exercised as to the following identification marks.

WPE90-FS238

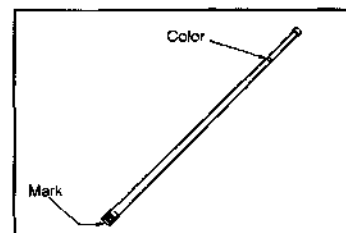
<Identification Marks>

	Left side	Right side
Color	Yellow (*Light green)	White (*pink)
Mark		

* For the United Kingdom

CAUTION:

- As respects the torsion bar springs, be sure to observe the combination above.
- If this caution should fail to be observed, the running performance may drop significantly.



WPE90-FS239

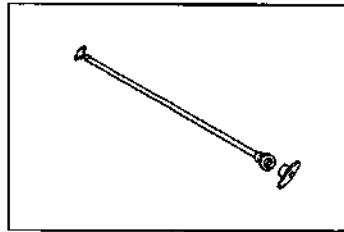
FRONT AXLE & SUSPENSION

INSTALLATION

1. Install the dust covers and torque arm to the torsion bar.

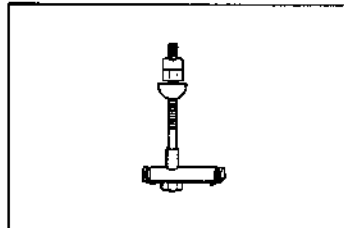
NOTE:

- Make sure that the front and rear dust covers are installed correctly in their respective positions.



WFBD0-FS240

2. Install the anchor arm swivel, anchor arm stopper and lock nut to the anchor bolt.



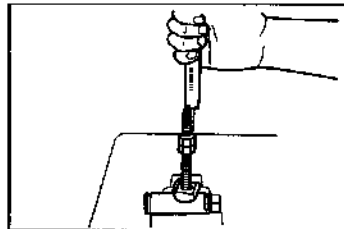
WFBD0-FS241

3. Adjust the length from the anchor bolt end to the lock nut upper surface to the specified value.

Specified Value: 30 mm

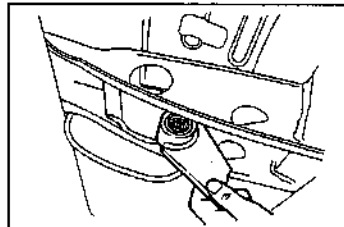
NOTE:

- In cases where the torsion bar, anchor arm and torque arm are reused, set their positions to the original heights measured during the disassembly.



WFBD0-FS242

4. Insert the anchor arm into the frame.

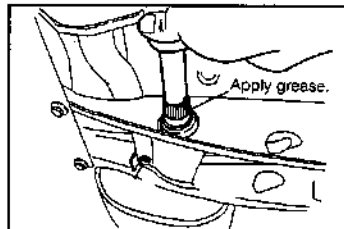


WFBD0-FS243

5. Apply MP grease to the torsion bar spline section. Connect the torsion bar to the anchor arm.

NOTE:

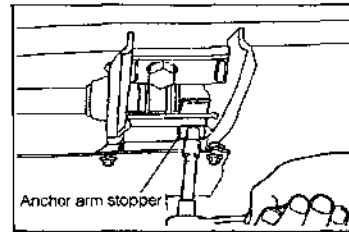
- In cases where the torsion bar, torque arm and anchor arm are reused, align the mating marks put during the removal.



WFBD0-FS244

FRONT AXLE & SUSPENSION

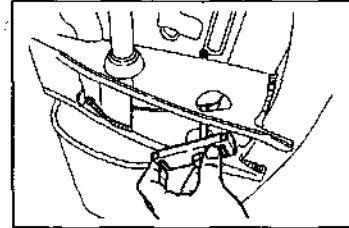
6. Install the anchor arm stopper.
Tightening Torque: 4.9 - 7.8 N·m
(0.5 - 0.8 kgf-m, 3.6 - 5.8 ft-lb)



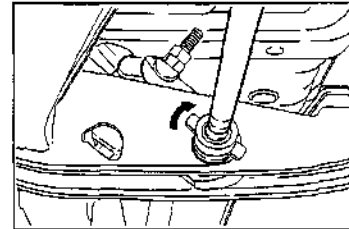
7. Install the anchor arm stopper to the anchor. Install the anchor swivel to the frame.

NOTE:

- Make sure that the anchor arm swivel is inserted into the frame positively.

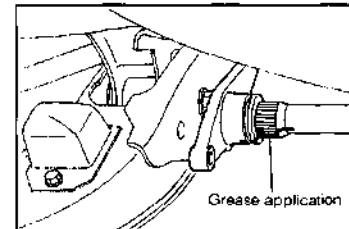


8. Turn the torque arm. Ensure that the anchor arm stopper and anchor swivel come at their correct positions.



9. Under the condition described in the step 8, apply lithium-based MP grease to the spline section of the torsion bar spring. Install the torque arm to the lower arm.

Tightening Torque: 39.2 - 53.9 N·m
(4.0 - 5.5 kgf-m, 28.9 - 39.8 ft-lb)



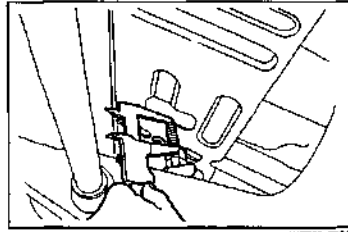
NOTE:

- In cases where the torque arm, torsion bar spring and anchor arm are reused, install the torque arm to the lower arm while aligning the mating marks put during the removal.
- At this time, make sure that the anchor arm stopper and anchor swivel are placed at their correct positional relationship and that no excessive play is present.

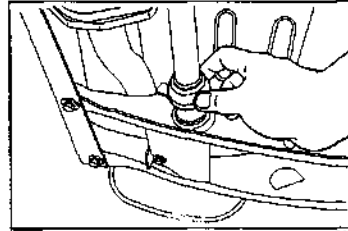
WFE90-FS249

FRONT AXLE & SUSPENSION

10. While preventing the lock nut at the frame side from turning, adjust the anchor bolt so that the protruding dimension of the anchor bolt may become the value measured before the disassembly.



11. Install the dust covers to the torque arm and anchor arm.



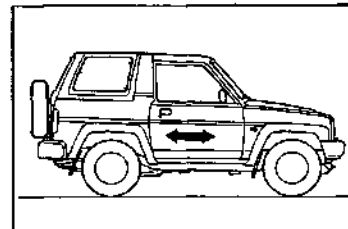
12. Remove the safety stands.

13. Check and adjustment of vehicle height

Confirmation items prior to check and adjustment

- Ensure that the designated tires are installed.
- Ensure that the tires are inflated to the specified air pressure. Also, ensure that the air inflation pressure is uniform on the four tires.
- Ensure that the vehicle is under no-loaded state.
- Ensure that the floor where the check and adjustment are carried out is level.

- (1) Rock the vehicle several times so as to stabilize the suspensions.

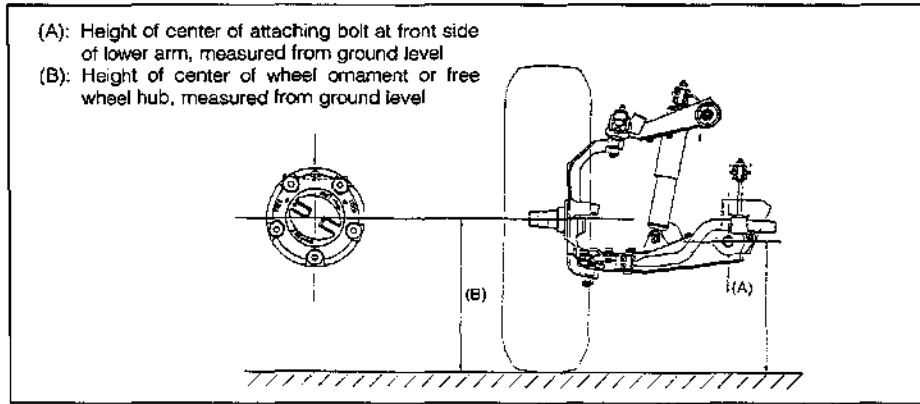


- (2) Move the vehicle about three meters twice in a fore-and-aft direction.



FRONT AXLE & SUSPENSION

- (3) Measure the distance from the center of the front ornament or the free wheel hub to the ground level. Also, measure the distance from the center of the attaching bolt of the lower arm at the front side to the ground level. Record the measured values.

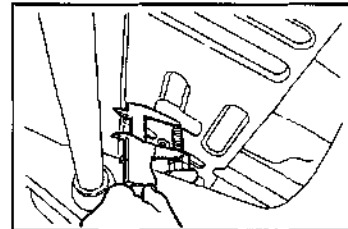


- (4) Calculate the measured value. Ensure that the difference conforms to the specified value. However, the variation in the specified value between the right and left sides should be within 10 mm.
 $B - A = \text{Specified value}$
 Specified Value: 31 - 51 mm

If the calculated results do not conform to the specified value or the variation in height between the right and left sides is 10 mm or more, adjust the vehicle height by means of the anchor bolt.

After the adjustment, repeat the operation from the step (1).

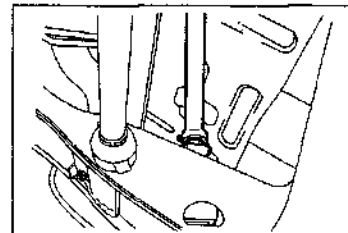
14. Measure the protruding dimension of the anchor bolt. Ensure that the variation between the right and left sides is within 10 mm. If not, replace the torsion bar spring. Prior to the replacement of the torsion bar, recheck to ensure that the spline exhibits no displacement under assembled condition.



15. Tighten the lock nut of the anchor bolt and lock it.
 Tightening Torque: 68.6 - 88.3 N·m
 (7.0 - 9.0 kgf·m, 50.6 - 65.1 ft·lb)

NOTE:

- As regards the tightening of the lock nut, be sure to prevent the lower nut from turning, using a spanner or the like. Then, tighten the upper nut.

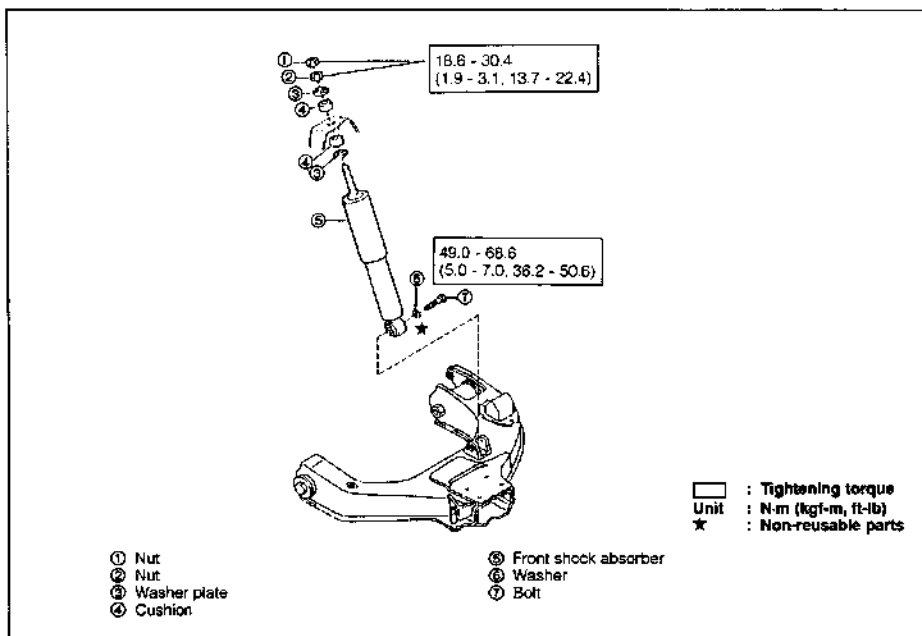


FRONT AXLE & SUSPENSION

FRONT SHOCK ABSORBERS

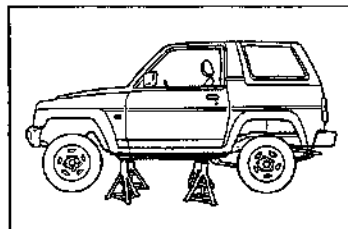
(STANDARD TYPE)

COMPONENTS

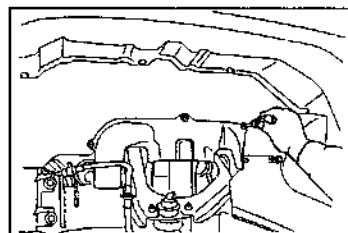


REMOVAL

1. Jack up the vehicle and support it with safety stands.
(See GI section.)

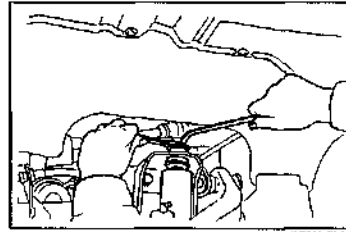


2. Remove the dust cover.



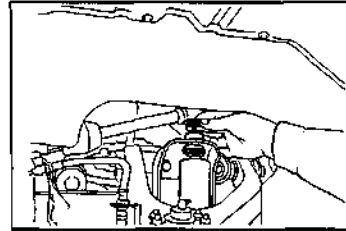
FRONT AXLE & SUSPENSION

3. Loosen the lock nut.
4. While preventing the lock nut and attaching nut from turning at the top of the shock absorber, remove them.



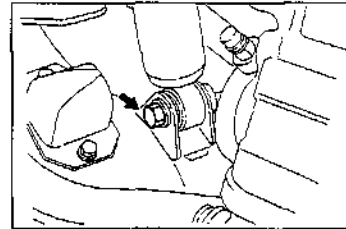
WP630-FS261

5. Remove the plate washer and cushion.



WP630-FS262

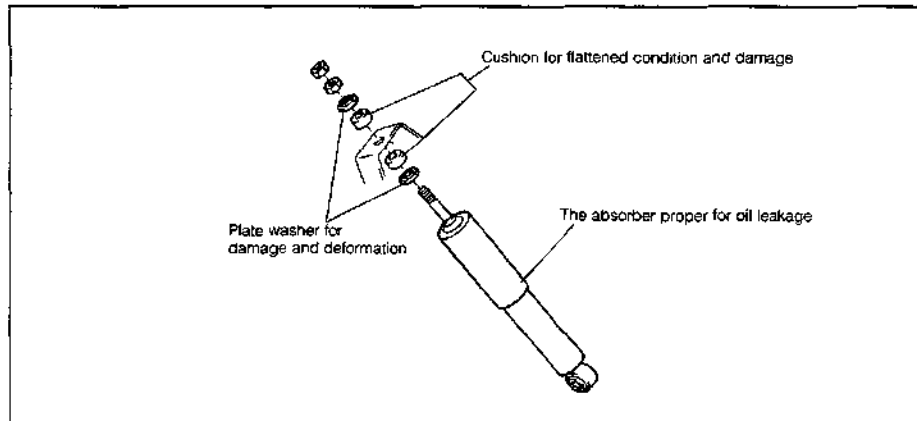
6. Remove the bolt connecting the shock absorber to the lower arm.
7. Remove the shock absorber from the vehicle by contracting it.
8. Remove the cushion and washer plate from the shock absorber.



WP630-FS263

INSPECTION

Check the following parts. Replace any defective parts.

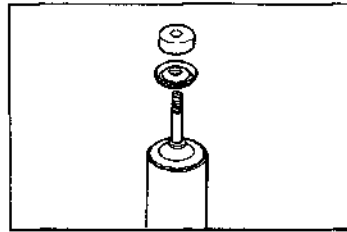


WP630-FS264

FRONT AXLE & SUSPENSION

INSTALLATION

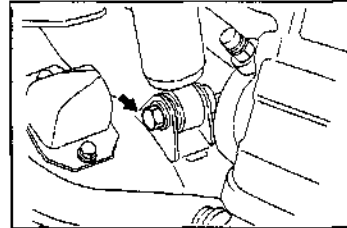
1. Install the washer plate and cushion to the shock absorber.



WPES0-FS265

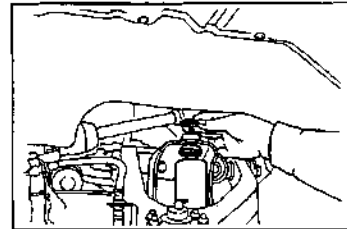
2. Insert the shock absorber into the attaching hole at the chassis side.
3. With the shock absorber contracted, connect the shock absorber to the lower arm attaching section. Tighten the attaching bolt.

Tightening Torque: 49.0 - 68.6 N·m
(5.0 - 7.0 kgf·m, 36.2 - 50.6 ft·lb)



WPES0-FS266

4. Install the cushion and washer plate.



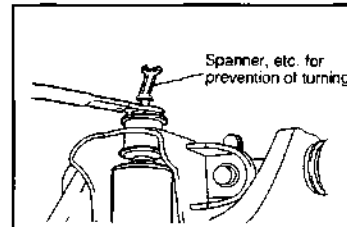
WPES0-FS267

5. Install the attaching nut to the top of the shock absorber. While preventing the attaching nut from turning, tighten the nut to the specified torque.

Tightening Torque: 18.6 - 30.4 N·m
(1.9 - 3.1 kgf·m, 13.7 - 22.4 ft·lb)

NOTE:

Nut thickness: 8 mm



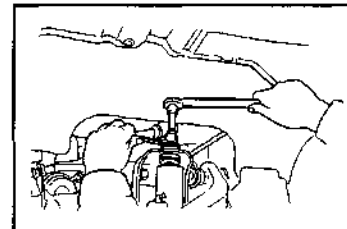
WPES0-FS268

6. Install the lock nut and tighten it to the specified torque.

Tightening Torque: 18.6 - 30.4 N·m
(1.9 - 3.1 kgf·m, 13.7 - 22.4 ft·lb)

NOTE:

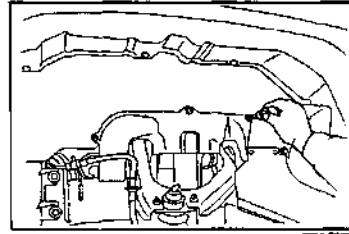
Nut thickness: 6 mm



WPES0-FS269

FRONT AXLE & SUSPENSION

7. Install the dust cover.



WP690-FS270

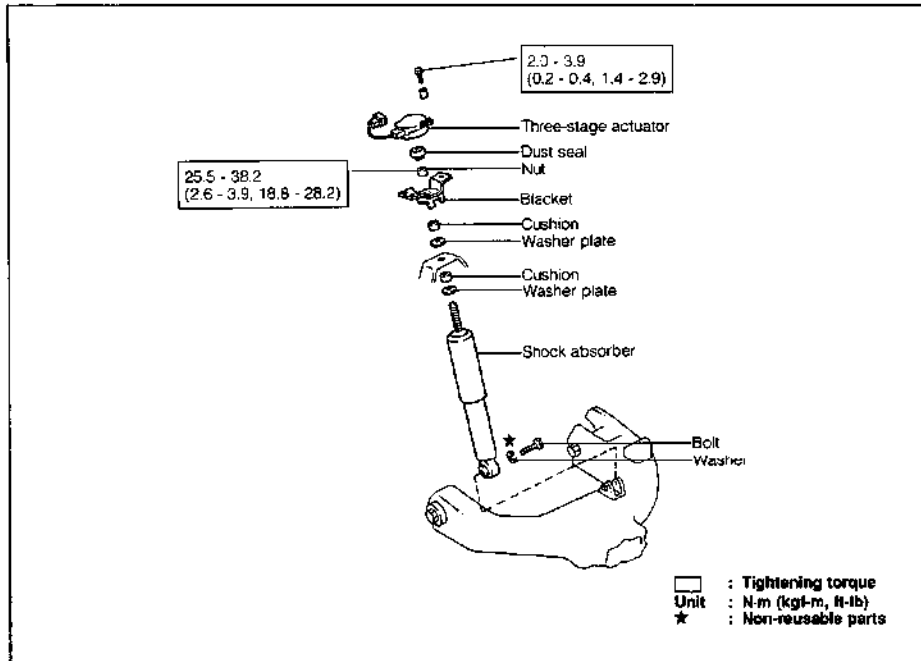
8. Jack up the vehicle and remove the safety stands. Then, jack down the vehicle.

WP690-FS271

FRONT AXLE & SUSPENSION

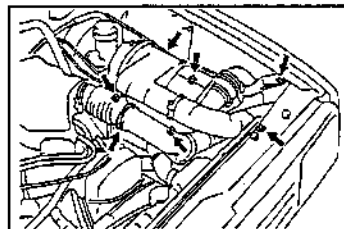
(THREE-STAGE DAMPERS)

COMPONENTS

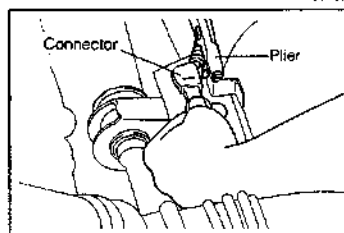


REMOVAL

1. Remove the air cleaner assembly with air duct. (Only cases where left actuator is to be removed) (See the engine section.)

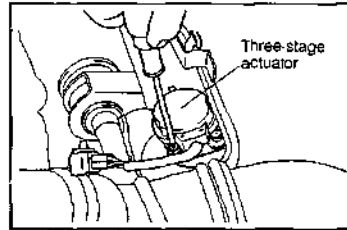


2. Remove the connector of the three-stage actuator from the bracket and disconnect the connector.

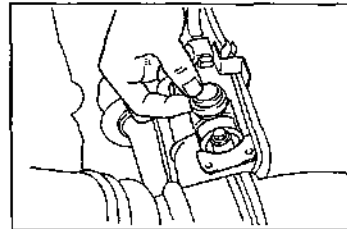


FRONT AXLE & SUSPENSION

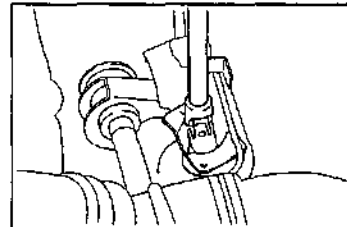
3. Remove the three-stage actuator by removing its attaching screws.



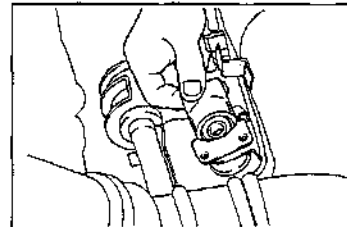
4. Remove the dust seal from the shock absorber control bracket.



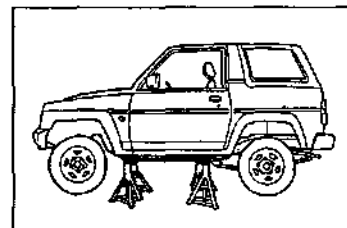
5. Remove the lock nut.



6. Remove the shock absorber control bracket.
7. Remove the cushion and washer plate.

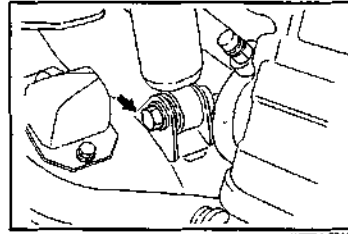


8. Jack up the vehicle and support it with safety stands. (See G1 section.)



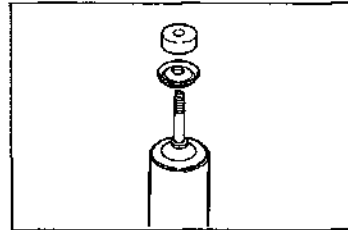
FRONT AXLE & SUSPENSION

9. Remove the connecting bolts at the lower arm side of the shock absorber.
10. Remove the shock absorber from the vehicle by contracting it.



WPE90-FS280

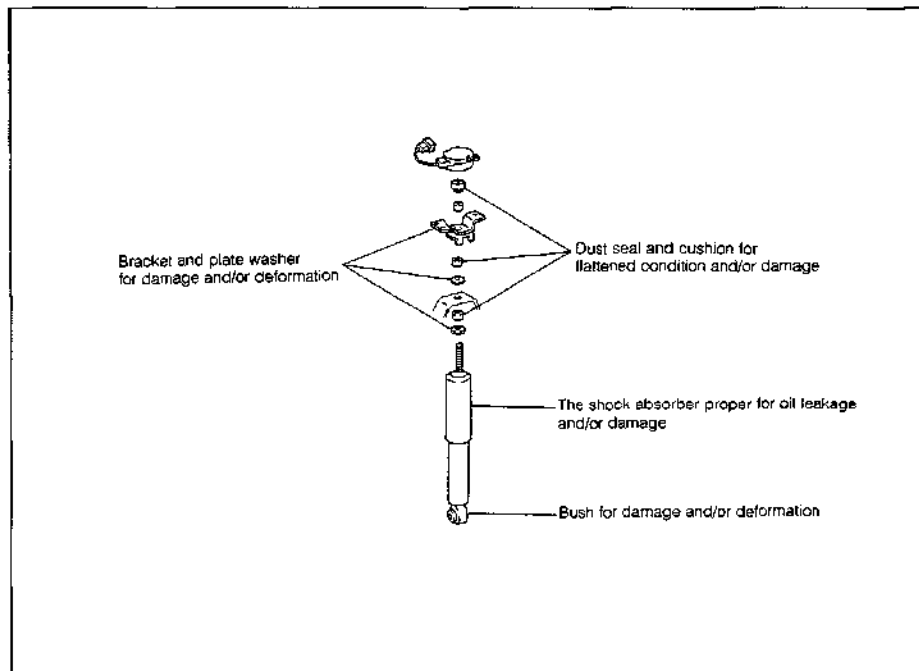
11. Remove the cushion and washer plate from the removed shock absorber.



WPE90-FS281

INSPECTION

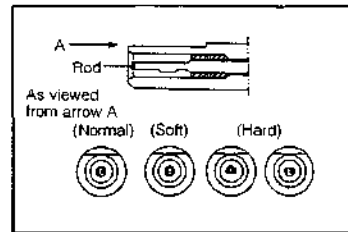
1. Inspect each section in the figure below. Replace any defective parts.



WPE90-FS282

FRONT AXLE & SUSPENSION

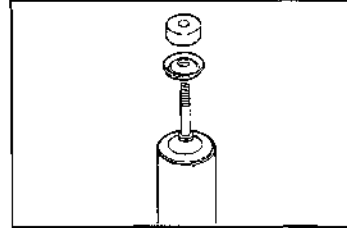
2. Ensure that the rod at the upper side of the three-stage damper can be turned easily by radio pliers or the like.
3. Set the rod as indicated in the figure. Ensure that the damping force varies according to the modes.



WP590-FS263

INSTALLATION

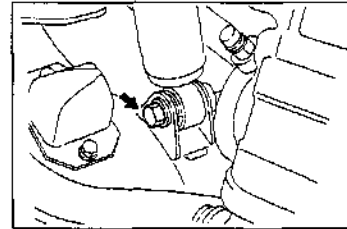
1. Install the washer plate and cushion to the shock absorber.



WP590-FS265

2. Insert the shock absorber into the attaching hole at the chassis side.
3. With the shock absorber contracted, connect the shock absorber to the lower arm attaching section, tighten the attaching bolt.

Tightening Torque: 49.0 - 68.6 N·m
(5.0 - 7.0 kgf-m, 36.2 - 50.6 ft-lb)



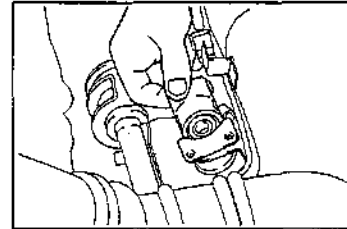
WP590-FS266

4. Install the washer plate.

NOTE:

- Be certain to install the washer plate in such a way that the protruding surface of the washer plate may be fitted to the shock absorber installation hole of the chassis.

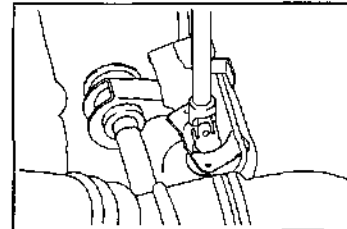
5. Install the cushion.
6. Install the shock absorber control bracket.



WP590-FS267

7. Install new attaching nuts of the shock absorber control bracket. Tighten them to the specified torque.

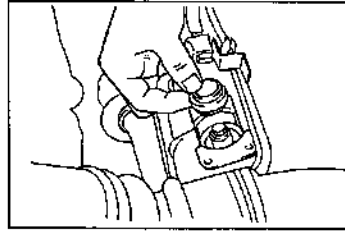
Tightening Torque: 25.5 - 38.2 N·m
(2.6 - 3.9 kgf-m, 18.8 - 28.2 ft-lb)



WP590-FS268

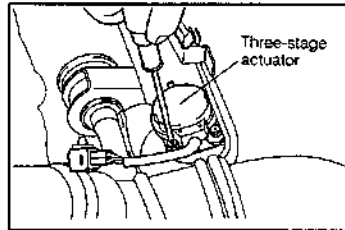
FRONT AXLE & SUSPENSION

8. Install the dust seal on the attaching nuts of the shock absorber control bracket.



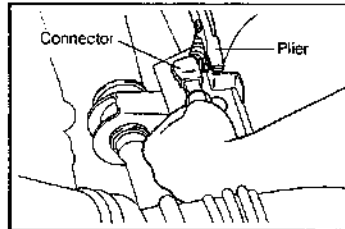
WPB90-FS289

9. Install the three-stage actuator to the shock absorber control bracket. Tighten the attaching screws.
Tightening Torque: 2.0 - 3.9 N·m
(0.2 - 0.4 kgf-m, 1.4 - 2.9 ft-lb)



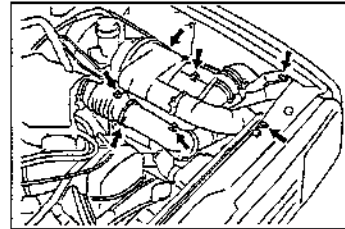
WPB90-FS290

10. Connect the connector of the three-stage actuator. Install it to the bracket.



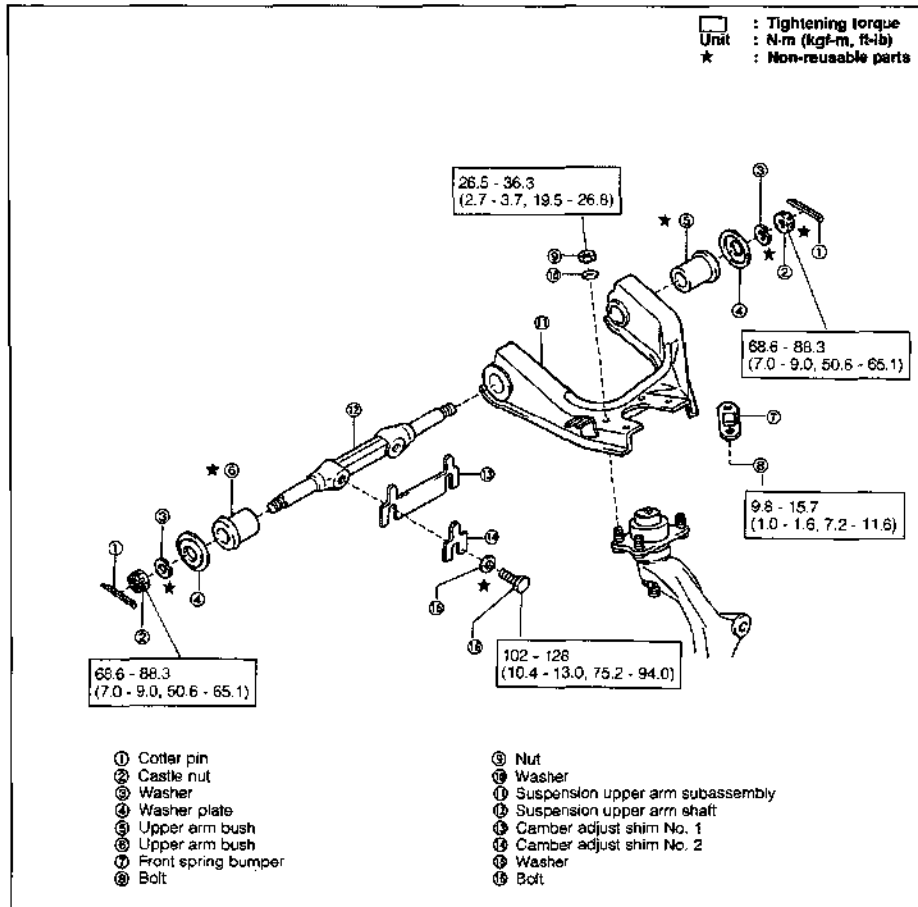
WPB90-FS291

11. Install the air cleaner assembly with air duct. (Only cases where left actuator is removed)
(See Engine section.)
12. Jack down the vehicle.



WPB90-FS292

UPPER ARMS COMPONENTS



WPER0-FS283

TROUBLE SHOOTING

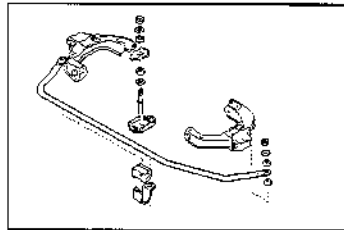
Symptom	Possible causes	Checking points
Improper front alignment (Improper camber and caster)	Bush worn or damaged Upper arm damaged or deformed	Check bush. Check upper arm.

WPER0-FS284

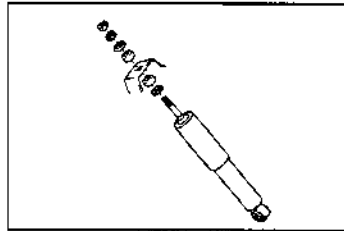
FRONT AXLE & SUSPENSION

REMOVAL

1. Remove the torsion bar.



2. Remove the front shock absorbers.
(See page FS-78.)

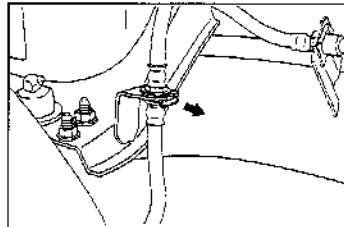


3. Pull out the clip.

NOTE:

- Do not reuse the clip.

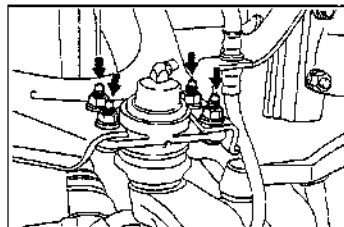
4. Disconnect the brake hose from the upper arm.



5. Remove the attaching nut at the upper arm ball joint side.

NOTE:

- Do not reuse the spring washer.

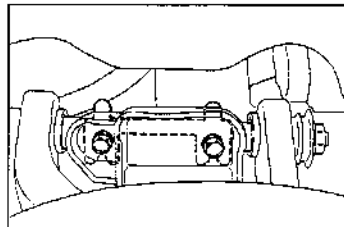


6. Remove the camber adjusting shim by loosening the upper arm attaching bolt.

NOTE:

- Record the number, kind and installation position of the removed shim.

7. Remove the upper arm by removing the upper arm attaching bolts.



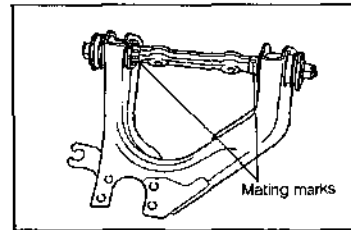
FRONT AXLE & SUSPENSION

DISASSEMBLY

1. Put mating marks at points between the upper arm and the upper shaft.

NOTE:

- Putting marks are required, only when either the upper arm or the upper shaft is reused.



WP690-FS300

2. Remove the cotter pin.

NOTE:

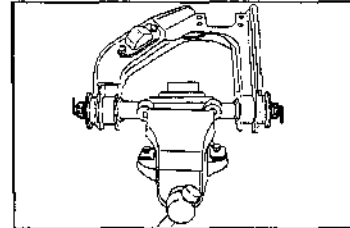
- Never reuse the cotter pin.

3. Remove the castle nuts.

4. Remove the washer and washer plate.

NOTE:

- Never reuse the washer.



WP690-FS301

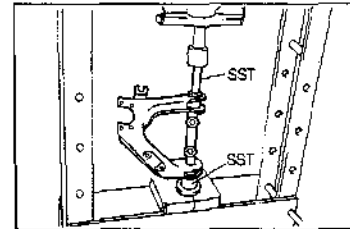
5. Removal of upper arm bush (at rear side)

Remove the upper arm shaft together with the upper arm bush, using a hydraulic press in combination with the following SST.

SST: 09608-87612-000
09608-87609-000

NOTE:

- Be very careful not to drop the upper arm shaft.

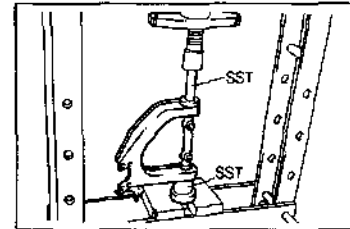


WP690-FS302

6. Removal of upper arm bush (at front side)

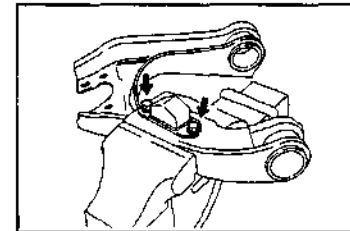
Remove the upper arm bush, using a hydraulic press in combination with the following SST.

SST: 09608-87612-000
09608-87609-000



WP690-FS303

7. Remove the front spring bumper from the upper arm.

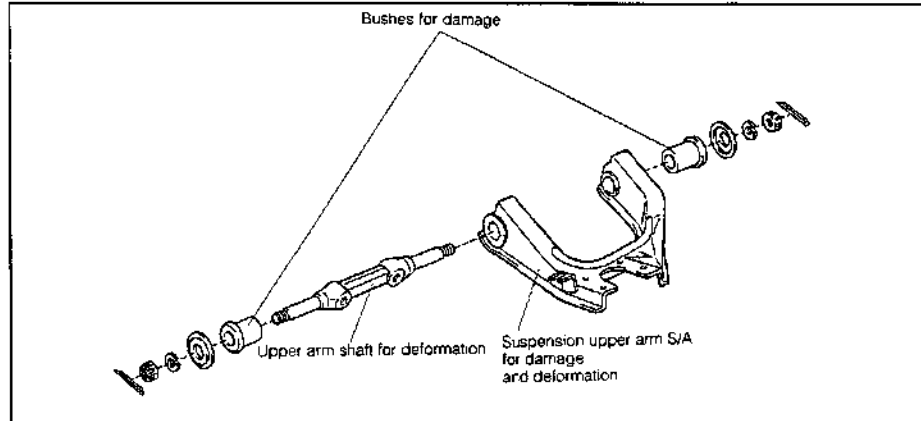


WP690-FS304

FRONT AXLE & SUSPENSION

INSPECTION

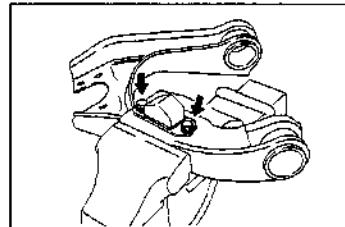
Check the following parts. Replace any defective parts.



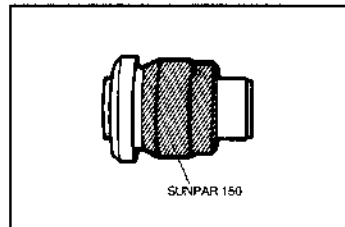
WP890-F5305

ASSEMBLY OF SUSPENSION ARM

1. Install the front spring bumper to the upper arm.
Tightening Torque: 9.8 - 15.7 N·m
(1.0 - 1.6 kgf-m, 7.2 - 11.8 ft-lb)
2. Installation of upper arm bush (at front side)
 - (1) Apply the SUNPAR 150® to the press-fitting section of a new bush.
 - (2) Press the bush into the upper arm, using a hydraulic press in combination with the following SST.

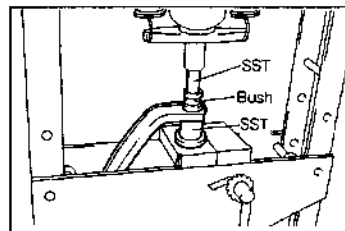


WP890-F5306



SUNPAR 150

WP890-F5307

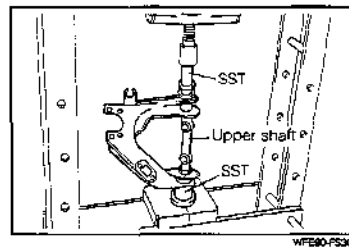


WP890-F5308

FRONT AXLE & SUSPENSION

3. Installation of upper arm bush (at rear side)
 - (1) Install the upper arm shaft to the upper arm.
 - (2) Press the upper arm bush, using a hydraulic press in combination with the following SST.

SST: 09608-87612-000
09608-87610-000



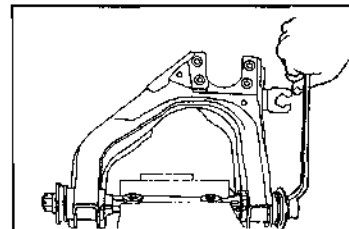
WP690-FS305

4. Install the plate washer and washer.
5. Tighten the castle nut while aligning the mating marks which have been put at the upper arm and upper arm shaft during the disassembly. (In cases where the upper arm and upper shaft are reused.)

Tightening Torque: 68.6 - 88.3 N·m
(7.0 - 9.0 kgf-m, 50.6 - 65.1 ft-lb)

NOTE:

- Align the cotter pin hole with the cotter pin groove during the tightening.



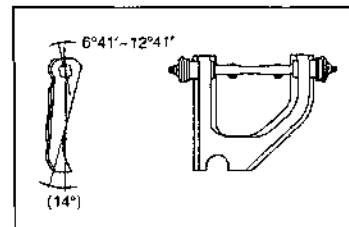
WP690-FS310

6. Set the upper arm and upper shaft in such a way that they are placed at their positional relationship as indicated in the right figure.

Tightening Torque: 68.6 - 88.3 N·m
(7.0 - 9.0 kgf-m, 50.6 - 65.1 ft-lb)

NOTE:

- Align the cotter pin hole with the cotter pin groove during the tightening.

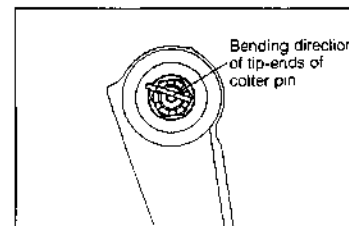


WP690-FS311

7. Install a new cotter pin and bend its tip-ends, as indicated in the right figure.

NOTE:

- Do not reuse the cotter pin.



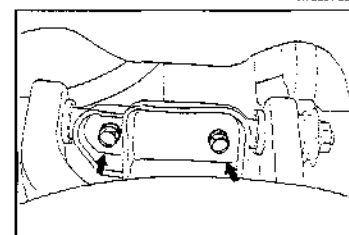
WP690-FS312

INSTALLATION

1. Temporarily install the upper arm shaft to the chassis with bolts and new washer interposed.

NOTE:

- Do not reuse the spring washer.



WP690-FS313

FRONT AXLE & SUSPENSION

2. Insert the camber adjusting shim into between the upper arm shaft and the chassis.

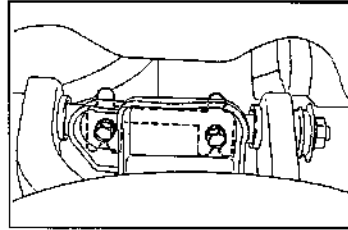
NOTE:

- Make sure that the correct number and kind of shims are installed in their respective installation positions.

3. Tighten the upper arm shaft attaching bolts.

Tightening Torque:

102 - 128 N·m (10.4 - 13.0 kgf-m, 75.2 - 94.0 ft-lb)

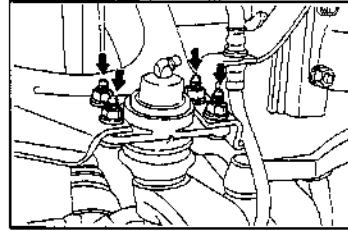


WFEB0-FS314

4. Connect the upper arm ball joint to the upper arm. Tighten the attaching nuts with a new washer interposed.

Tightening Torque: 26.5 - 36.3 N·m

(2.7 - 3.7 kgf-m, 19.5 - 26.8 ft-lb)



WFEB0-FS315

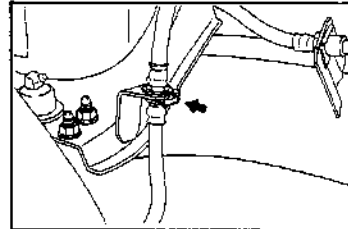
NOTE:

- Do not reuse the washer.

5. Connect the brake hose to the upper arm. Install a new clip.

NOTE:

- Do not reuse the clip.



WFEB0-FS316

6. Install the shock absorbers.

(See page FS-78.)

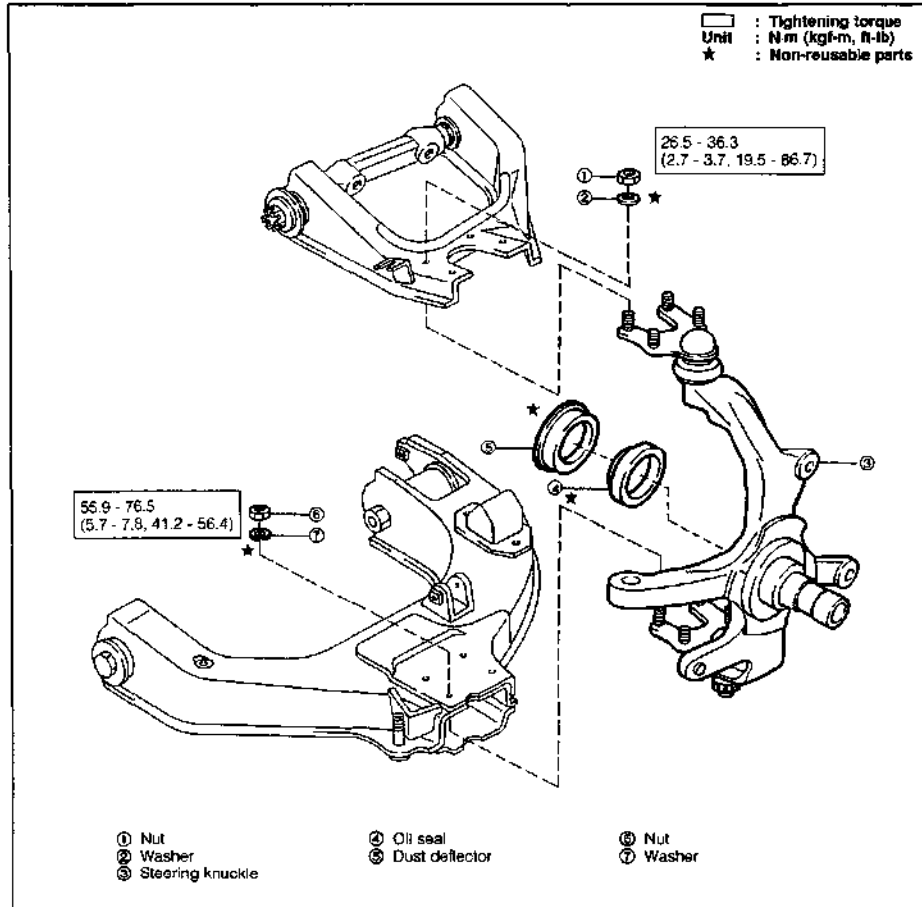
7. Install the torsion bar.

(See page FS-74.)

8. Check and adjust the front wheel alignment.

WFEB0-FS317

STEERING KNUCKLES COMPONENTS



WP290-FS318

TROUBLE SHOOTING

Symptom	Possible causes	Checking points
Oil leakage	Oil seal damaged Oil seal improperly installed	Installing condition of oil seal
Abnormal noise	Bush seized	Check inner bush.

WP290-FS319

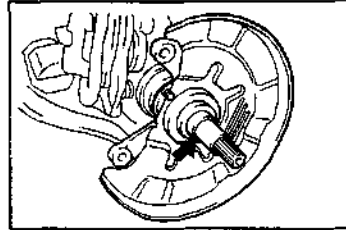
FRONT AXLE & SUSPENSION

REMOVAL

1. Remove the stabilizer bar.
(See page FS-66 to FS-67.)
2. Remove the torsion spring.
(See page FS-71 to FS-73.)
3. Remove the front axle hub.
(See page FS-41 to FS-45.)

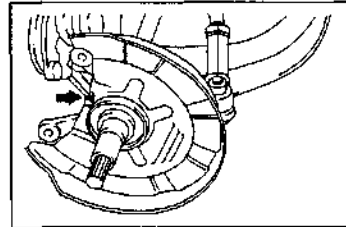
WP590-FS320

4. Check of steering knuckle
Ensure that each section of the steering knuckle exhibits no damage, such as cracks and wear.
If any damage is present, replace the steering knuckle.



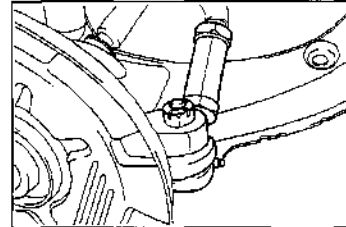
WP590-FS321

Only when the brake disc dust cover is replaced, remove the brake disc dust cover attaching bolts. Then, remove the brake disc dust cover by lightly tapping it with a plastic hammer or the like.



WP590-FS322

5. Removal of tie rod end
(1) Remove the cotter pin of the tie rod end attaching nut.
(2) Remove the attaching nut.

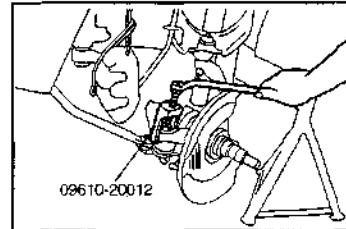


WP590-FS323

- (3) Remove the tie rod end from the steering knuckle, using the following SST.

SST: 09610-20012-000

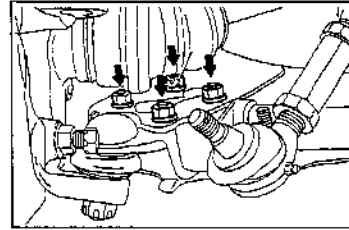
(See SR section.)



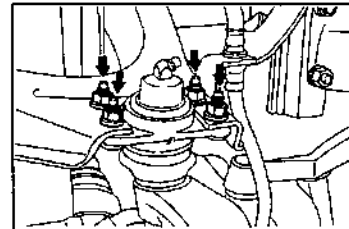
WP590-FS324

FRONT AXLE & SUSPENSION

6. Remove the lower arm ball joint attaching nut from the lower arm.



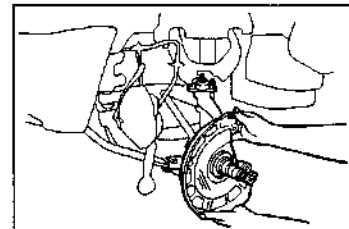
7. Remove the upper arm ball joint attaching nut from the upper arm.



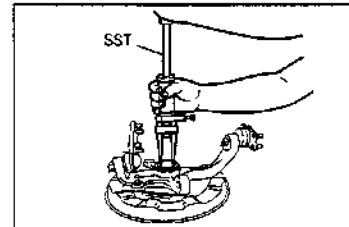
8. Remove the steering knuckle.

NOTE:

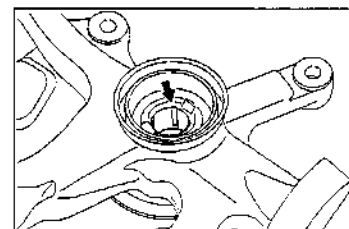
- Be very careful not to scratch the drive shaft during the removal.



9. Remove the oil seal, using the following SST.
SST: 09308-00010-000

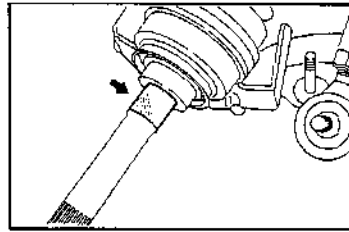


10. Check of steering knuckle bush
(1) Ensure that the steering knuckle bush exhibits no seizure and abnormal wear.
If any defect is present, replace the steering knuckle and drive shaft.

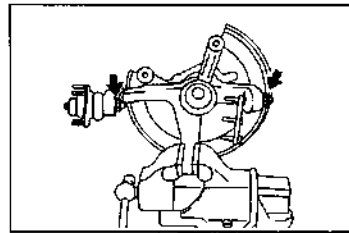


FRONT AXLE & SUSPENSION

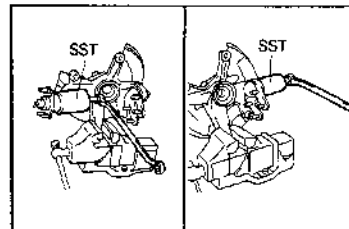
- (2) Ensure that the steering knuckle bush contact surface of the drive shaft exhibits no seizure and abnormal wear.
If any defect is present, replace the steering knuckle and drive shaft.



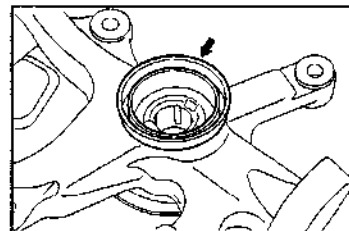
11. Removal of ball joints
(1) Remove the cotter pin.
(2) Loosen the castle nut.



- (3) Remove the ball joints from the steering knuckle, using the following SST.
SST: 09610-20012-000



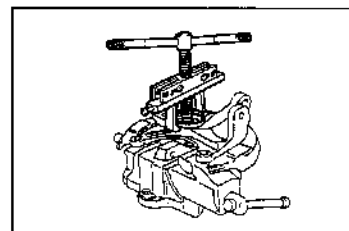
12. Check of dust deflector
Check the dust deflector for damage, such as deformation.
If any damage is present, replace the dust deflector.



13. Removal of dust deflector
(Only when the removal is required)
Remove the dust deflector, using the following SST.
SST: 09950-20017-000

NOTE:

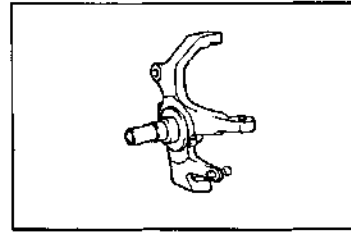
- Do not reuse the dust deflector.



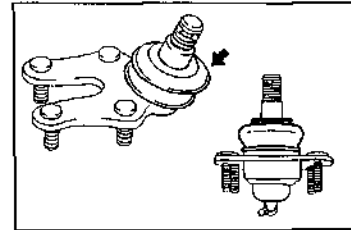
FRONT AXLE & SUSPENSION

INSPECTION

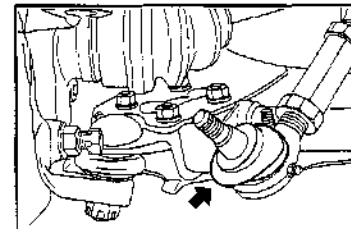
1. **Steering knuckle**
Ensure that the steering knuckle exhibits no damage, such as wear, seizure and cracks.
If any damage is present, replace the steering knuckle.
2. **Check of upper and lower ball joints**
Ensure that the boot sections of the upper and lower ball joints exhibit no damage.
If any damage is present, replace the boot.
(See page FS-118.)
3. **Check of tie rod end**
Ensure that the boot section of the tie rod end exhibits no damage.
If any damage is present, replace the boot.



WFE90-FS335



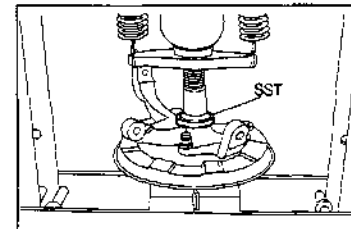
WFE90-FS336



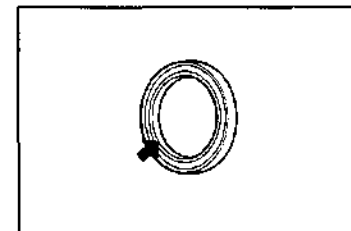
WFE90-FS337

INSTALLATION OF STEERING KNUCKLE

1. Press the oil deflector into the steering knuckle, using the following SST in combination with a hydraulic press.
SST: 09608-87605-000
2. Apply lithium-based MP grease to the oil seal lip section.



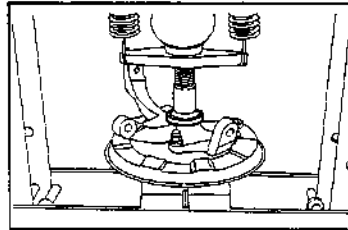
WFE90-FS338



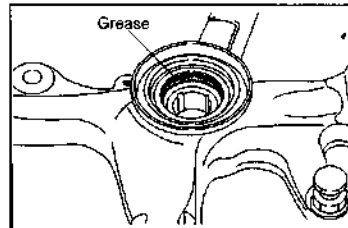
WFE90-FS339

FRONT AXLE & SUSPENSION

3. Press the oil seal into position, using the following SST.
SST: 09606-87605-000



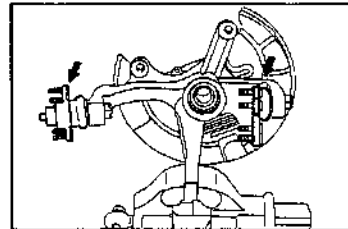
4. Fill lithium-based MP grease to a space between the oil seal and the bush.
Filling Amount of Grease: 25 - 30 grams



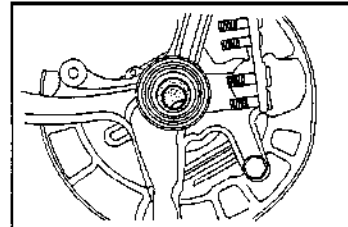
5. Install the upper and lower ball joints to the steering knuckle with castle nuts.

NOTE:

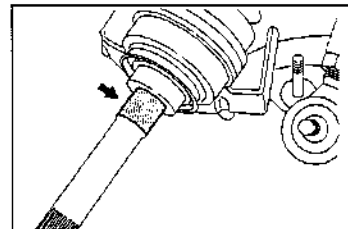
- Make sure that no grease and oil or the like is stuck on the tapered sections and threaded portions of the ball joints.



6. Apply the specified amount of lithium-based MP grease to the steering knuckle bush section.
Specified Amount: 25 - 30 grams

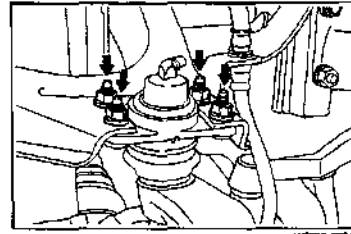


7. Clean the drive shaft. Apply lithium-based MP grease to the steering knuckle bush contact surface.



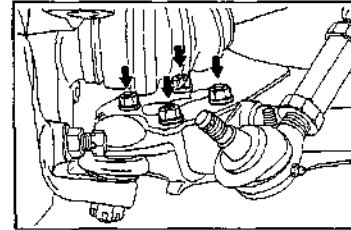
FRONT AXLE & SUSPENSION

8. Install the steering knuckle to the upper arm after passing the drive shaft through the steering knuckle.
Tightening Torque: 26.5 - 36.3 N·m
(2.7 - 3.7 kgf-m, 19.5 - 26.8 ft-lb)



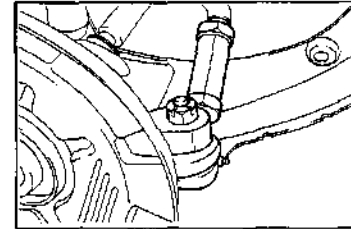
WPFB0-FS346

9. Install the steering knuckle to the lower arm. Tighten the attaching bolts.
Tightening Torque: 55.9 - 76.5 N·m
(5.7 - 7.8 kgf-m, 41.2 - 56.4 ft-lb)



WPFB0-FS346

10. Install the tie rod end to the steering knuckle. Tighten the castle nut.
Tightening Torque: 68.6 - 137 N·m
(7.0 - 14 kgf-m, 50.6 - 101 ft-lb)

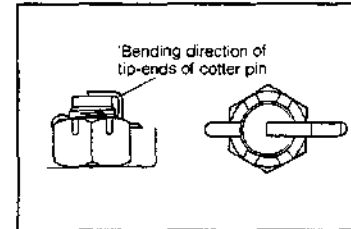


WPFB0-FS347

NOTE:

- Align the cotter pin hole of the ball joint with the cotter pin groove of the castle nut.

11. Install the cotter pin to the castle nut, as indicated in the right figure.

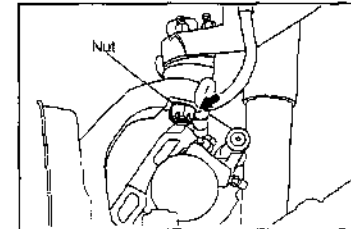


WPFB0-FS348

12. Tighten the upper ball joint attaching castle nut.
Tightening Torque: 88.3 - 118 N·m
(9.0 - 12 kgf-m, 65.1 - 87.0 ft-lb)

NOTE:

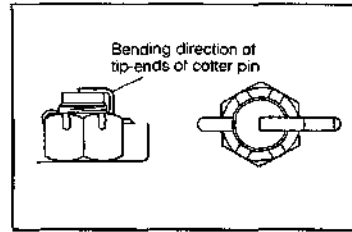
- Align the cotter pin hole of the ball joint with the cotter pin groove of the castle nut.



WPFB0-FS349

FRONT AXLE & SUSPENSION

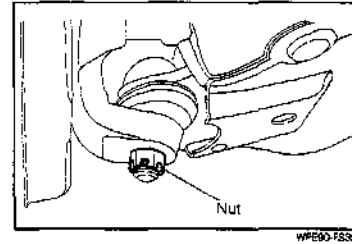
13. Install the cotter pin to the castle nut, as indicated in the right figure.



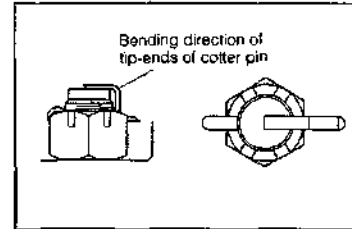
14. Tighten the lower ball joint attaching castle nut.
Tightening Torque: 88.3 - 118 N·m
(9 - 12 kgf-m, 65.1 - 87.0 ft-lb)

NOTE:

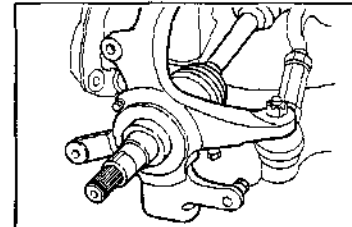
- Align the cotter pin hole of the ball joint with the cotter pin groove of the castle nut.



15. Install the cotter pin to the castle nut, as indicated in the right figure.



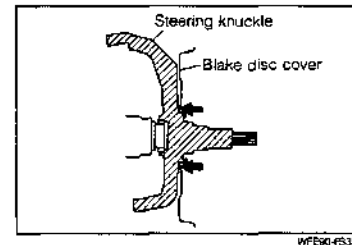
16. Installation of brake disc cover
(1) Slightly thread the brake disc cover attaching bolts into the steering knuckle.



- (2) Press a new brake cover into the steering knuckle with an appropriate rod applied to the point as indicated in the right figure.

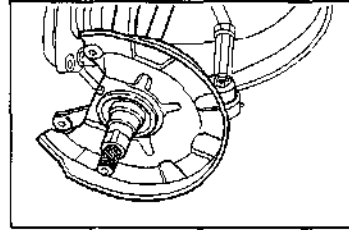
NOTE:

- Never reuse the brake disc cover.
- Care must be exercised to ensure that the arrowheaded sections are driven into position evenly.



FRONT AXLE & SUSPENSION

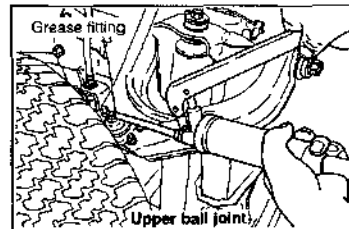
- (3) Tighten the attaching bolts.
Tightening Torque: 5.9 - 8.8 N·m
(0.6 - 0.9 kgf-m, 4.3 - 6.5 ft-lb)



17. Install the front axle hub.
(See page FS-47 to FS-52.)
18. Install the torsion spring.
(See page FS-74 to FS-77.)
19. Install the stabilizer bar.
(See page FS-68 to FS-69.)

WFE90-FS356

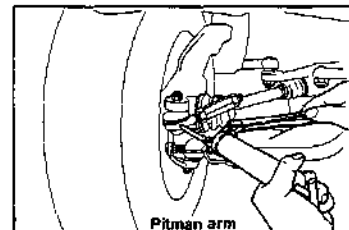
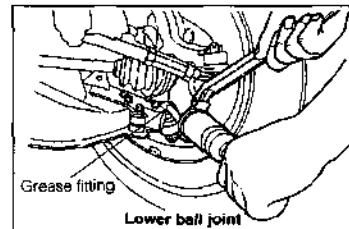
20. Fill MP grease to the upper joint, lower joint and tie rod end, using a grease gun.
Grease Filling Amount
Upper ball joint: 27 grams
Lower ball joint: 10 grams
Pitman arm: 15 grams



Grease to Be Used:
Lithium-based MP grease

NOTE:

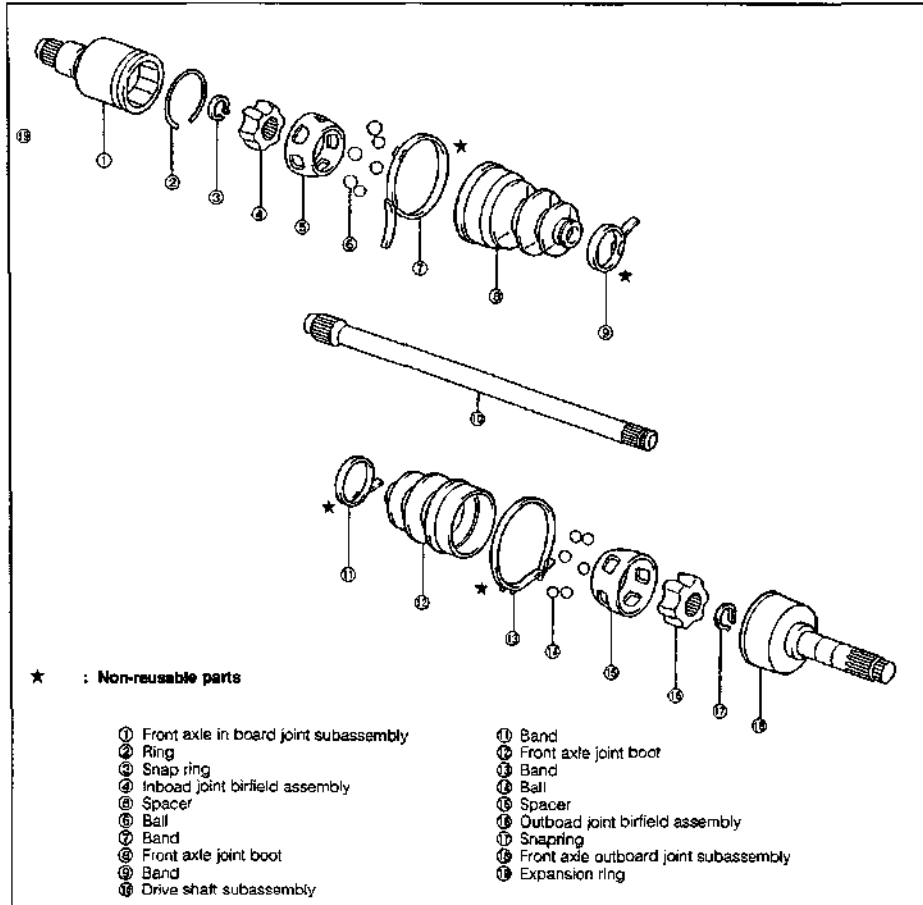
- The filling amount above is the specified amount for cases where new parts are assembled.



21. Check the front alignment.
(See page FS-31.)

FRONT AXLE & SUSPENSION

DRIVE SHAFTS COMPONENTS



WFE90-F5360

TROUBLE SHOOTING

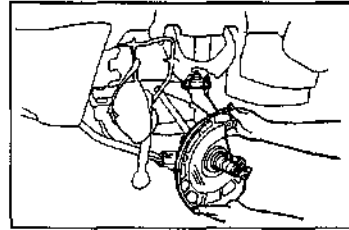
Symptom	Possible causes	Checking points
Abnormal noise	Drive shaft bent or damaged	Check drive shaft.
Abnormal vibration	Joint section damaged	Check joint.
Oil leakage	Boot damaged	Check boot.

WFE90-F5361

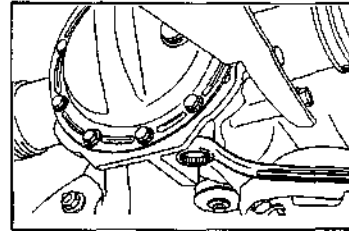
FRONT AXLE & SUSPENSION

REMOVAL

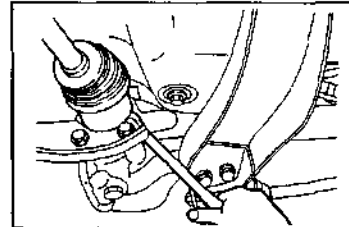
1. Remove the steering knuckle.
(See page FS-94 under section "Removal of Steering Knuckle.")



2. Drain the front differential oil.
(See Differential section.)

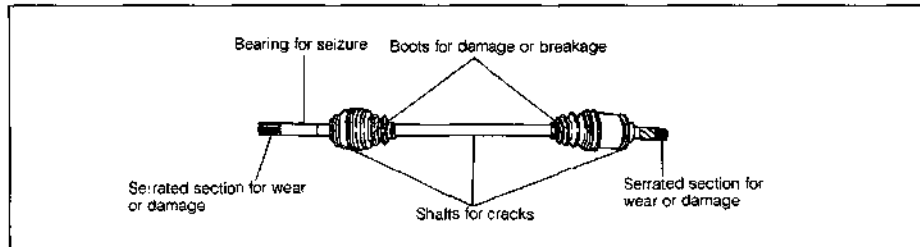


3. Pull out the drive shaft, using a tire lever or the like.
NOTE:
 - Be very careful not to damage the spline, oil seal, boot and so forth during the removal.



CHECK PRIOR TO DISASSEMBLY

Check the following points indicated in the figure below. Replace any defective parts.



NOTE:

1. The outboard bearing is a part not to be disassembled.
2. As for those parts to be reused, wash them using cleaning solvent and then dry them in advance.
3. If the bearing section is encountered with damage, such as seizure, check the bush section of the steering knuckle.
4. If the splined section at the outboard side is encountered with damage, check the splined section of the hub.
5. If the splined section at the inboard side is encountered with damage, check the side gears of the differential.

WF590-FS365

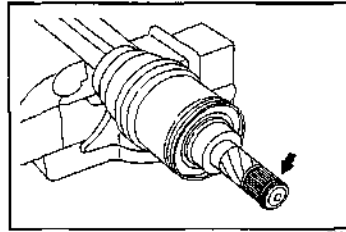
FRONT AXLE & SUSPENSION

DISASSEMBLY

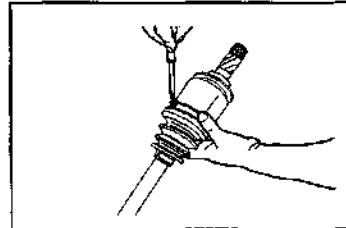
1. Remove the expansion ring from the inboard joint.

NOTE:

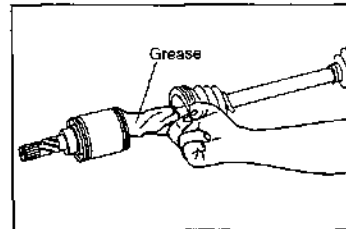
- Do not reuse the expansion ring.



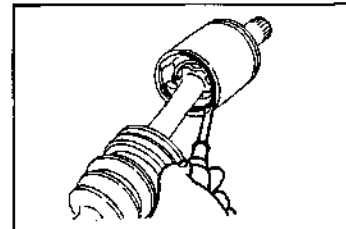
2. Raise the tang of each boot band of the inboard bearing by means of a screwdriver or the like so as to loosen the boot band.



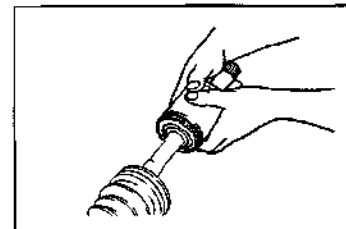
3. Displace the boot toward the inboard side and remove any grease from the inside of the boot.



4. Detach the hole snap ring from the inboard joint, using a minor screwdriver.



5. Remove the inboard joint from the drive shaft.

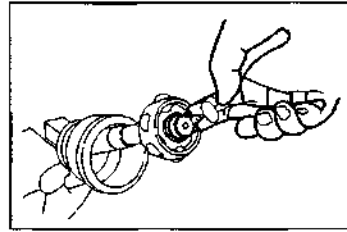


FRONT AXLE & SUSPENSION

6. Detach the snap ring from the drive shaft, using a snap ring expander.

NOTE:

- Do not reuse the removed snap ring.



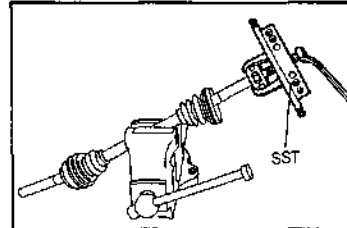
WP690-FS371

7. Remove the ball subassembly from the drive shaft. If any difficulty is encountered in removing the ball subassembly by hands, drive it out by tapping it by means of an appropriate rod, or remove it using the following SST.

SST: 09950-20017-000

NOTE:

- When removing the ball subassembly, be sure to hold the inner race so as to avoid the interference with the bearing guide.

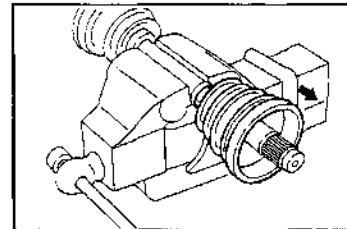


WP690-FS372

8. Detach the boot and boot band at the inner race from the drive shaft.

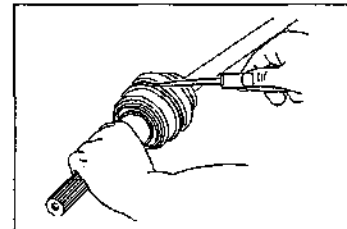
NOTE:

- Do not reuse the removed boot band.



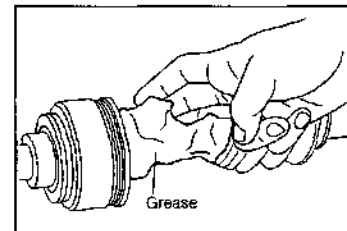
WP690-FS373

9. Raise the tang of each boot band by means of a screwdriver or the like so as to loosen the boot band.



WP690-FS374

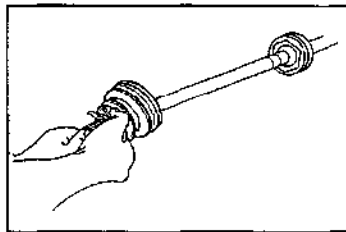
10. Displace the boot and remove any grease from the inside of the boot.



WP690-FS375

FRONT AXLE & SUSPENSION

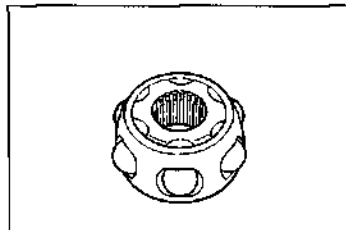
11. Detach the boot and boot band from the drive shaft.



WPES0-FS376

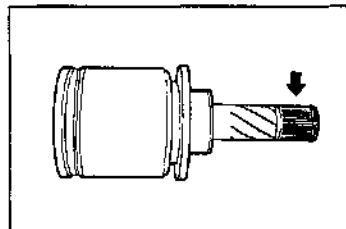
INSPECTION

1. Ensure that the ball subassembly exhibits no wear, cracks, scratches and so forth.
If any damage is present, replace the inboard assembly.



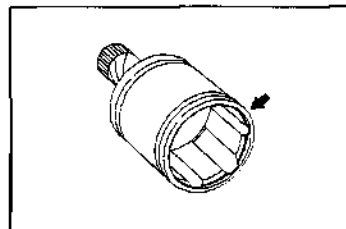
WPES0-FS377

2. Check of inboard joint
 - (1) Ensure that the spline section exhibits no damage, such as wear and cracks.
If any damage is present, replace the inboard assembly.



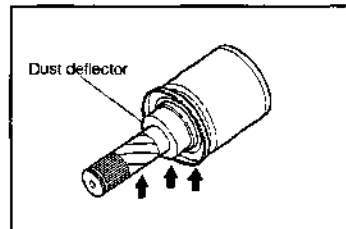
WPES0-FS378

- (2) Ensure that the ball joint groove section exhibits no damage, such as wear, cracks and scratches.
If any damage is present, replace the inboard assembly.



WPES0-FS379

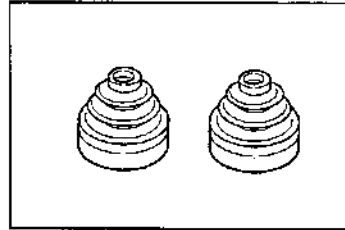
- (3) Ensure that the dust deflector exhibits no damage.
If any damage is present, replace the inboard subassembly.
 - (4) Ensure that the shaft section and oil seal contact surface exhibit no damage, such as wear, scratches and rust.
If any damage is present, replace the inboard assembly.



WPES0-FS380

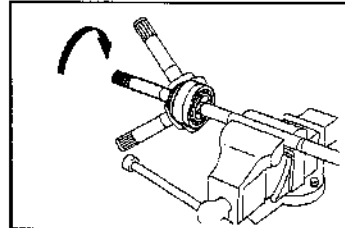
FRONT AXLE & SUSPENSION

3. Boot check
Ensure that the boot exhibits no damage, such as cracks.
If any damage is present, replace the boot.



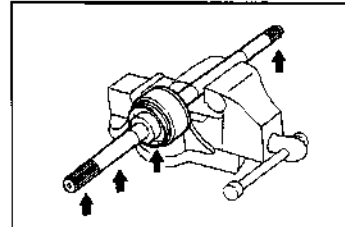
WP80-FS361

4. Check of inboard joint
 - (1) Ensure that the inboard joint exhibits no excessive play and/or sticking.
If any damage is present, replace the inboard assembly.



WP80-FS382

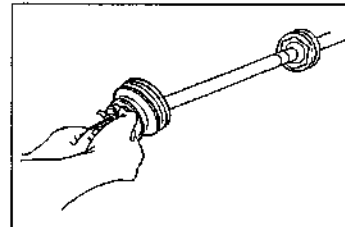
- (2) Ensure that the spline and shaft section exhibits no damage, such as wear, cracks and rust.
If any damage is present, replace the inboard assembly.
 - (3) Ensure that the dust deflector exhibits no damage.
If any damage is present, replace the inboard assembly.
 - (4) Ensure that the inboard ball subassembly attaching section exhibits no damage, such as wear and cracks.
If any damage is present, replace the inboard subassembly.



WP80-FS383

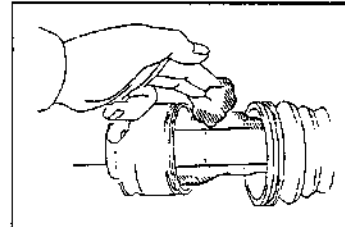
ASSEMBLY

1. Install the boot to the outboard joint.
NOTE:
 - Be very careful not to damage the boot.



WP80-FS384

2. Positively fill the specified amount of grease furnished in the boot band or the boot set to the outboard joint as well as the inside of the boot.
Grease to Be Used: **Moritex No. 2**
Amount to Be Used: **80 - 100 grams**



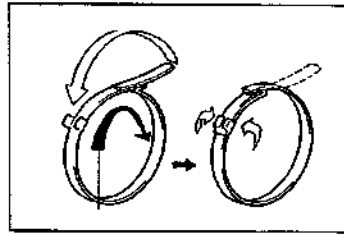
WP80-FS385

FRONT AXLE & SUSPENSION

3. Install the boot correctly. Attach the boot bands and bend them in the sequence as indicated in the right figure.

NOTE:

1. Be sure to install the boot band in such a way that the bending direction of the boot band becomes opposite to the rotating direction of the drive shaft.
2. Be sure to use a new boot band.
3. Care must be exercised to ensure that no air is trapped inside of the boot, resulting in a bulging boot.

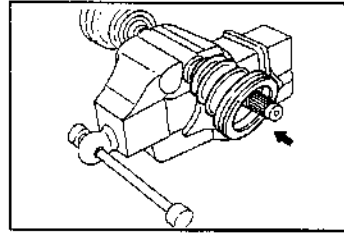


WFEBQ-FS386

4. Insert the boot and boot band at the inboard joint side into the drive shaft side.

NOTE:

- Make sure that the boot bands are bent in the correct direction.

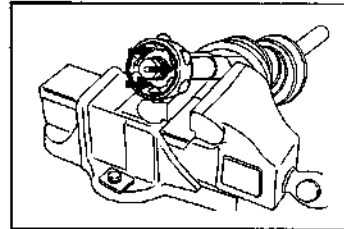


WFEBQ-FS387

5. Install the ball subassembly to the drive shaft by tapping the inner race of the ball subassembly by means of an appropriate rod.

NOTE:

- Be very careful not to damage the bearing guide section.
- Be sure to tap the inner race.

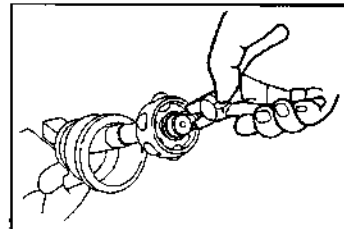


WFEBQ-FS388

6. Install the snap ring to the drive shaft, using a snap ring expander.

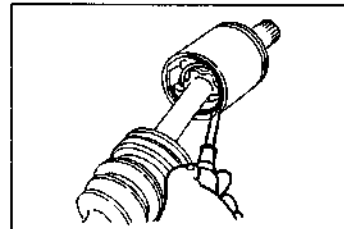
NOTE:

- Use a new snap ring.



WFEBQ-FS389

7. Connect the inboard joint to the ball subassembly. Install the hole snap ring to the inboard joint.



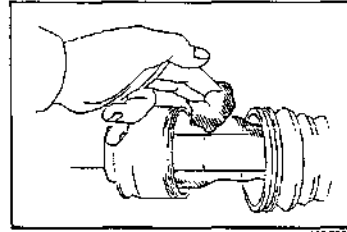
WFEBQ-FS390

FRONT AXLE & SUSPENSION

8. Positively fill the specified amount of grease furnished in the boot band or the boot set to the inboard joint as well as the inside of the boot.

Grease to Be Used: Morilex No. 2

Amount to Be Used: 160 - 180 grams

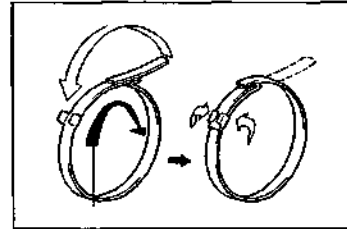


WPB90-FS301

9. Install the boot correctly. Attach the boot bands and bend them in the sequence as indicated in the right figure.

NOTE:

1. Be sure to install the boot band in such a way that the bending direction of the boot band becomes opposite to the rotating direction of the drive shaft.
2. Be sure to use a new boot band.
3. Care must be exercised to ensure that no air is trapped inside of the boot, resulting in a bulging boot.

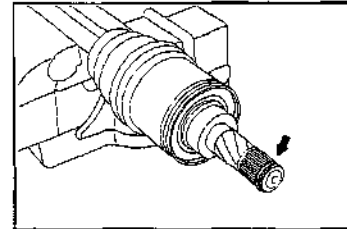


WPB90-FS302

10. Install the expansion ring to the inboard joint.

NOTE:

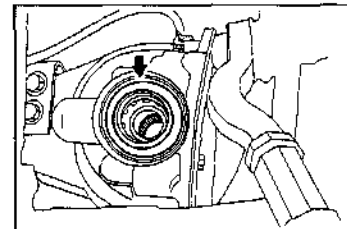
- Do not reuse the expansion ring.



WPB90-FS303

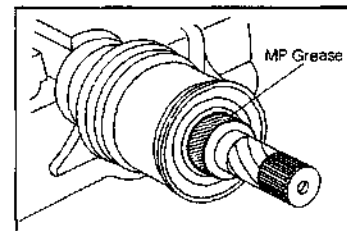
ASSEMBLY OF DRIVE SHAFT

1. Ensure that the oil seal at the front differential side exhibits no damage, such as scratches. If any damage is present, replace the oil seal. (See the Front Differential section.)
2. Apply lithium-based MP grease to the lip section of the front differential oil seal.



WPB90-FS304

3. Thinly apply lithium-based MP grease to the oil seal contact surface of the inboard.



WPB90-FS305

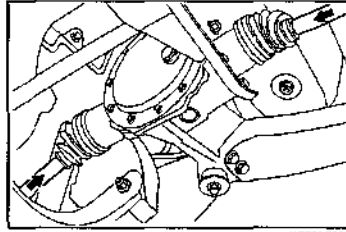
FRONT AXLE & SUSPENSION

4. Insert the inboard joint into the front differential.

NOTE:

- Be very carefull not to get damage to the oil seal.

5. After inserting the inboard joint into the front differential, ensure that the inboard joint can not be pulled out by hands. If the inboard joint can be pulled out by hands, replace the expansion ring at the forward end of the inboard joint with a new part. After completion of the replacement, install the inboard joint again.

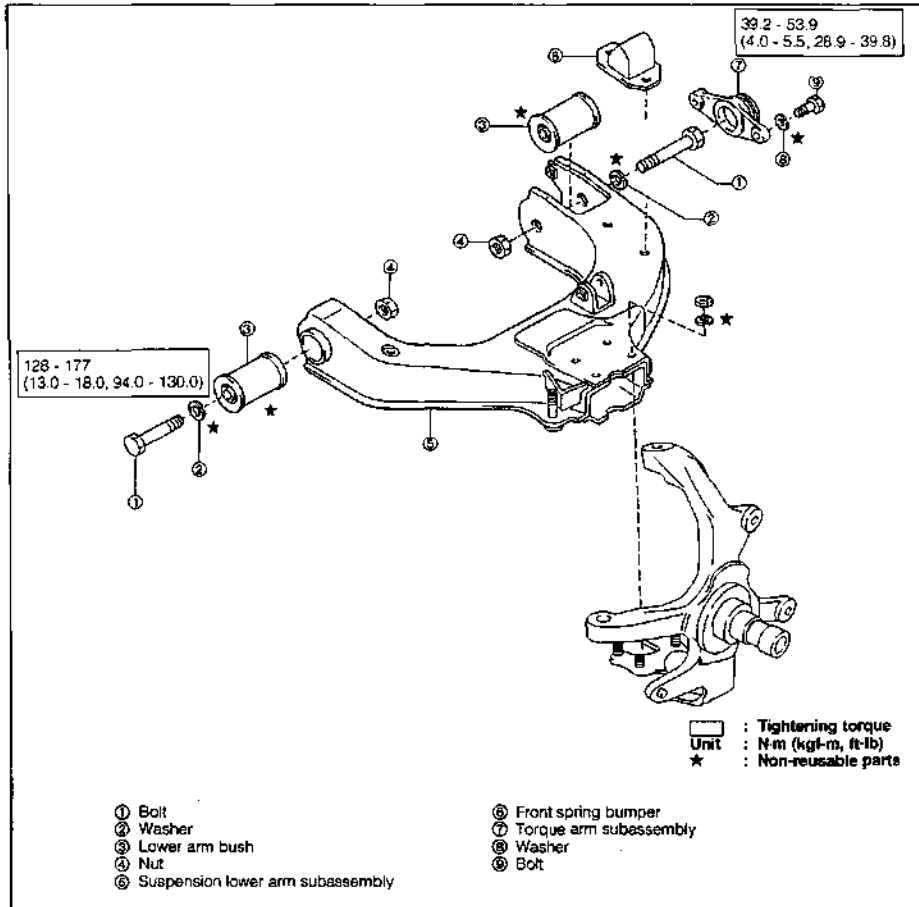


WFESG-FS396

6. Fill front differential oil.
(See the Front Differential section.)
7. Install the steering knuckle.
(See page FS-97.)

WFESG-FS397

LOWER ARMS COMPONENTS



WP590-FS3183

TROUBLE SHOOTING

Symptom	Possible causes	Checking points
Improper front alignment (Improper camber and caster)	Bush worn or damaged Lower arm damaged or deformed	Check bush. Check lower arm.
Abnormal noise		

WP590-FS3199

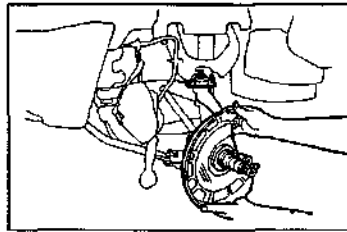
FRONT AXLE & SUSPENSION

REMOVAL

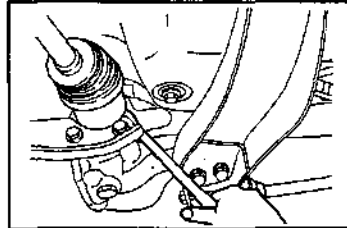
1. Remove the steering knuckle.
(See page FS-94 to FS-96.)
2. Remove the drive shaft (at the right side only).
(See page FS-103.)
3. Remove the shock absorber attaching bolts from the lower arm.
4. Remove the lower arm from the frame by removing the lower arm attaching bolts and nuts.
5. Removal of lower arm bush (at frame side)
Remove the lower arm bush, using the following SST.
SST: 09950-20017-000

NOTE:

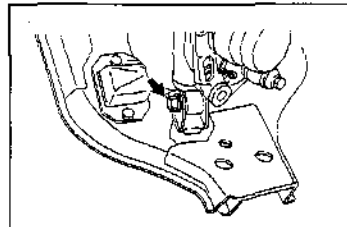
- Be sure to insert a suitable nut or the like to the bush contact surface of the SST so that the forward end of the SST may not be damaged.



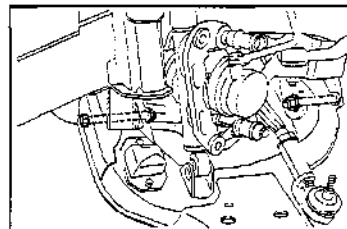
WPED0-FS400



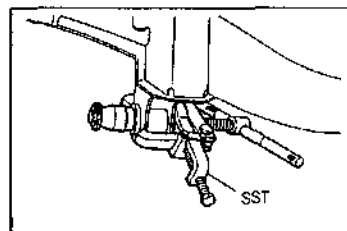
WPED0-FS401



WPED0-FS402



WPED0-FS403



WPED0-FS404

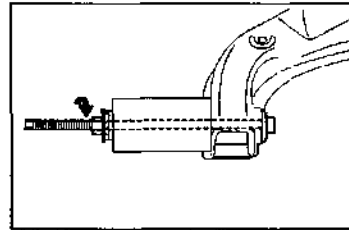
FRONT AXLE & SUSPENSION

6. Removal of lower arm bush (at lower arm side)
Remove the lower arm bush, using the following SST.
SST: 09608-87615-000

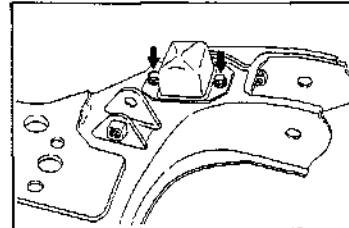
NOTE:

- Apply an adequate amount of MP grease to the threaded portion of the SST.
- If the bush rubber remains at the frame side, remove the rubber by attaching an appropriate plate waster to the SST.
- If the bolt turns when tightening the nut, prevent the bolt from turning, using the two flat sections provided at the forward end of the bolt. 5. Removal of lower arm bush (at lower arm side)

7. Remove the front spring bumper from the lower arm.



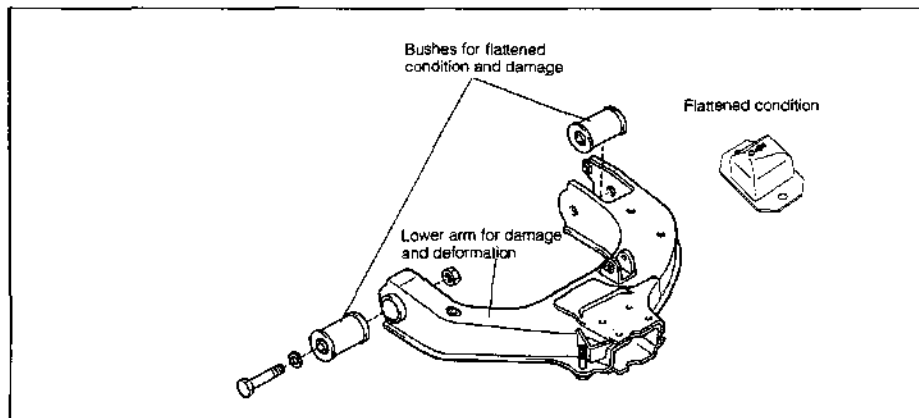
WPED0-FS405



WPED0-FS406

INSPECTION

Check the following parts. Replace any defective parts.



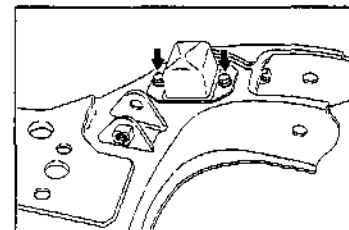
WPED0-FS407

INSTALLATION

1. Install the front spring bumper on the lower arm.

NOTE:

- Install the spring bumper in such a way that the arrow direction faces toward the forward direction of the vehicle.

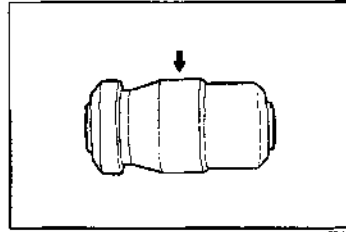


WPED0-FS408

FRONT AXLE & SUSPENSION

2. Installation of lower arm bush (at lower arm side)

- (1) Apply the SUNPAR 150° to the press-fitting section of the lower arm bush.



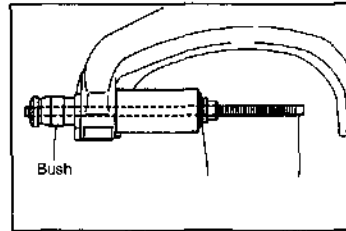
WPED0-FS409

- (2) Press the lower arm bush into the lower arm, using the following SST.

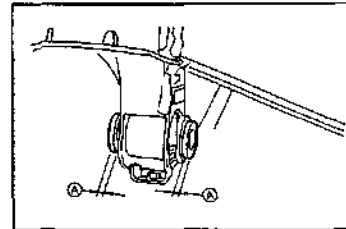
SST: 09608-87615-000

NOTE:

- If the bolt turns when tightening the nut, prevent the bolt from turning, using the two flat sections provided at the forward end of the bolt.
- After completion of the press-fitting, perform adjustment so that the relationship between the bush edge surface and the lower arm may become as indicated in the right figure.
Dimension A: 7 ± 1 mm



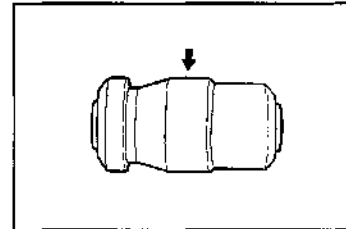
WPED0-FS410



WPED0-FS411

3. Installation of lower arm bush (at frame side)

- (1) Apply the SUNPAR 150° to the press-fitting section of the lower arm bush.



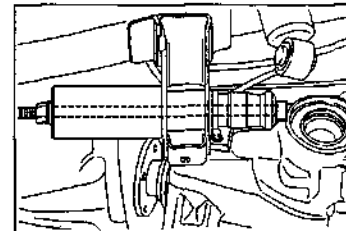
WPED0-FS412

- (2) Press the lower arm bush into the frame, using the following SST.

SST: 09608-87615-000

NOTE:

- If the bolt turns when tightening the nut, prevent the bolt from turning, using the two flat sections provided at the forward end of the bolt.

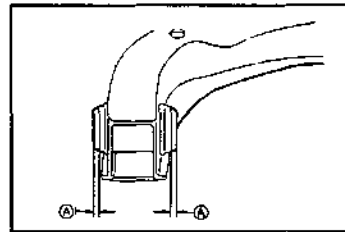


WPED0-FS413

FRONT AXLE & SUSPENSION

- After completion of the press-fitting, perform adjustment so that the relationship between the bush edge surface and the lower arm may become as indicated in the right figure.

Dimension A: 7 ± 1 mm

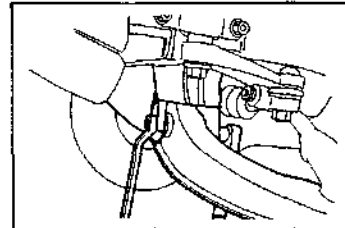


WPB90-FS414

- Install the lower arm to the frame. Temporarily tighten the attaching bolts and nuts.

NOTE:

- Never reuse the spring washer.



WPB90-FS415

- Set the lower arm so that it may become as indicated in the right figure. Tighten the lower arm attaching bolts.

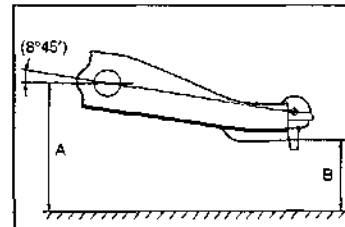
Installation Height: $A - B = C$

C: $87 (^{+}82) \pm 10$ mm

* For the United Kingdom

Tightening Torque:

128 - 177 N·m (13.0 - 18.0 kgf-m, 94.0 - 130 ft-lb)

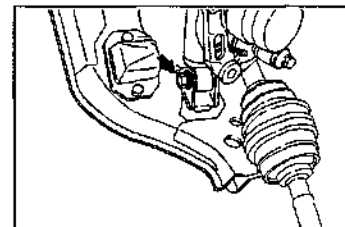


WPB90-FS416

- Install the shock absorber to the lower arm with bolts.

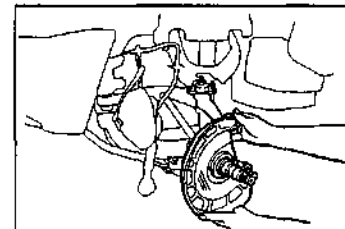
Tightening Torque: 49.0 - 68.6 N·m

(5.0 - 7.0 kgf-m, 36.2 - 50.6 ft-lb)



WPB90-FS417

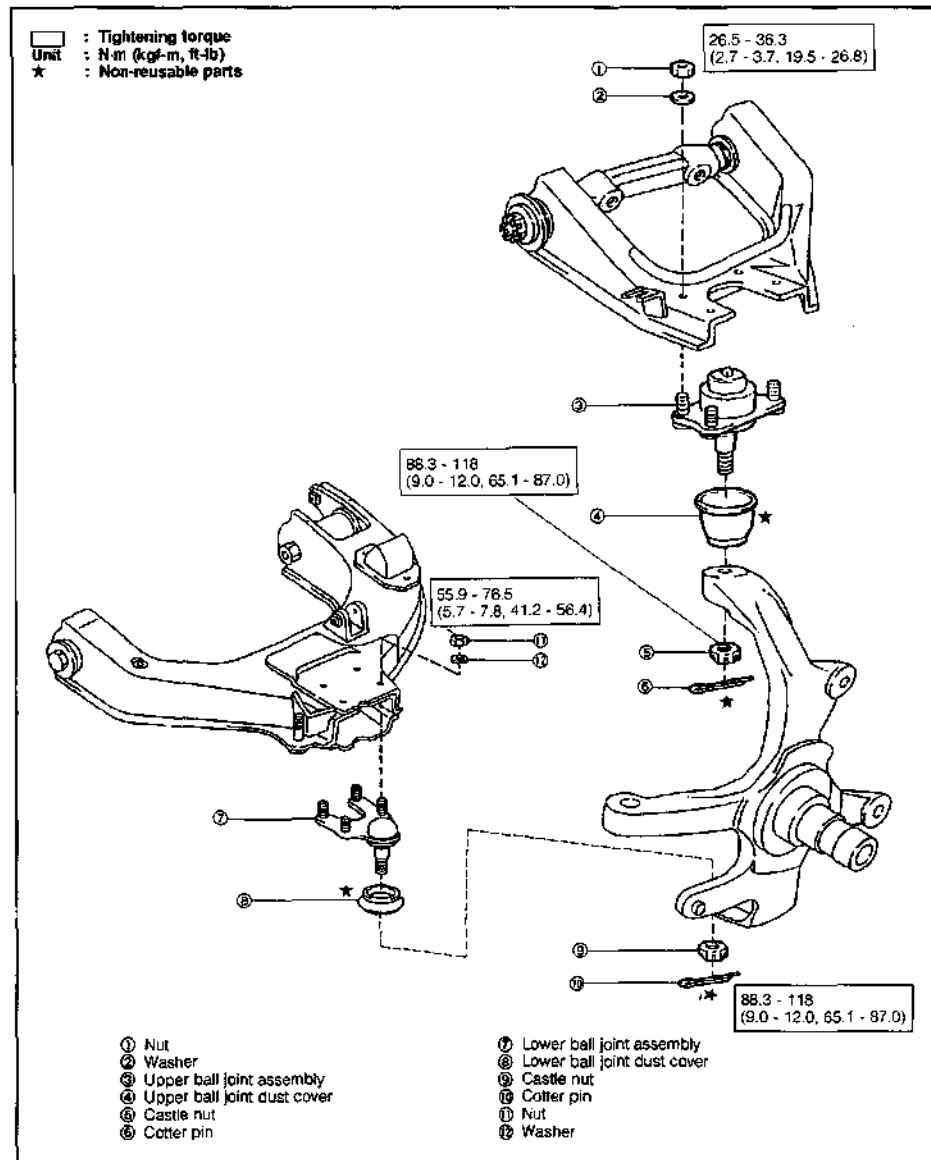
- Install the steering knuckle.
(See page FS-97 to FS-101.)



WPB90-FS418

FRONT AXLE & SUSPENSION

UPPER & LOWER BALL JOINTS COMPONENTS

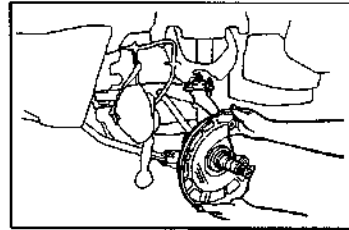


WFE80-PS419

FRONT AXLE & SUSPENSION

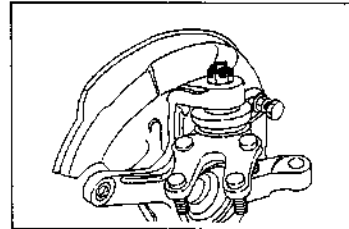
REMOVAL

1. Remove the steering knuckle arm.
(See page FS-94 to FS-96.)



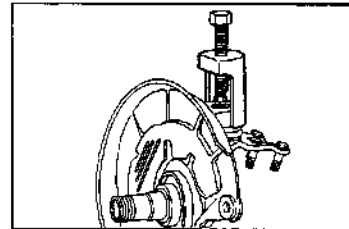
WPB30-FS420

2. Pull out the cotter pin.
3. Remove the castle nut.



WPB30-FS421

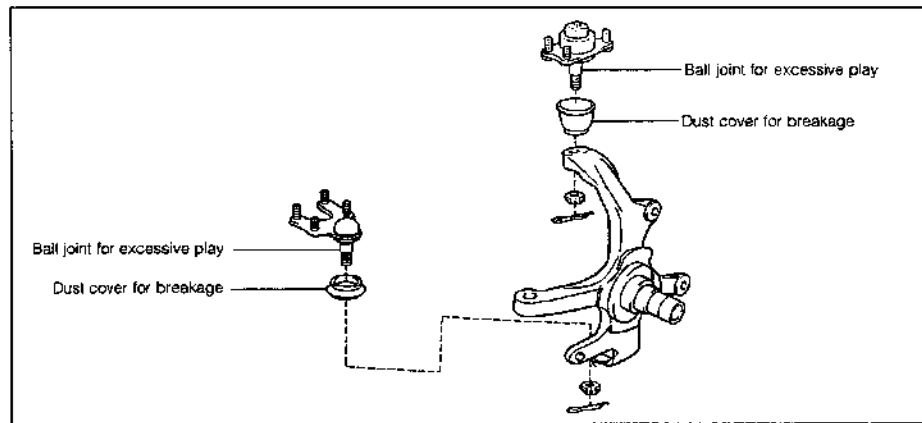
4. Remove the ball joint from the knuckle arm, using the following SST.
SST: 09610-20012-000



WPB30-FS422

INSPECTION

Check the following parts. Replace any defective parts.

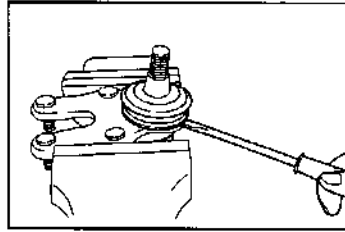


WPB30-FS425

FRONT AXLE & SUSPENSION

3. Replacement of rubber boot

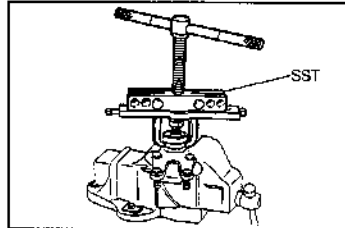
- (1) Detach the press-fitting section of the rubber boot from the ball joint by means of a screwdriver.



WPES0-FS424

- (2) Remove the rubber boot from the ball joint, using the following SST.

SST: 09950-20017-000

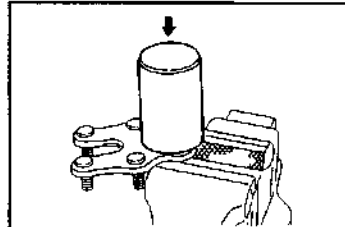


WPES0-FS425

- (3) Press a new rubber boot into position, using the following SST.

SST (lower ball joint): 09608-87611-000

(upper ball joint): 09608-87613-000



WPES0-FS426

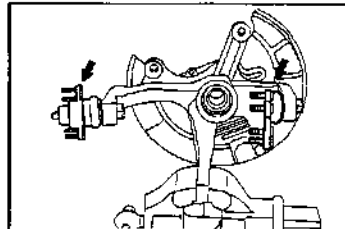
INSTALLATION

1. Connect the ball joint to the steering knuckle.

NOTE:

- Be very careful not to get any lubricant, such as grease, onto the tapered section.

2. Temporarily tighten the castle nut.



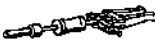
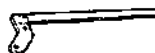












WPES0-FS427

3. Install the steering knuckle arm.
(See page FS-97 to FS-101.)





WPES0-FS428

FRONT AXLE & SUSPENSION

SSTs (Special Service Tools)

Shape	Parts No. and Name	Purpose	Remarks
	09308-00010-000 Oil seal puller	Removal of front axle hub oil seal	
	09511-87202-000 Brake drum stopper	Prevention of hub from turning	
	09520-00031-000 Rear axle shaft puller	Removal of front axle hub	
	09607-87602-000 Front axle bearing lock nut wrench	Removal/installation of front axle hub lock nut	
	09607-87603-000 Front axle hub nut wrench	Removal/installation of front axle hub lock nut	
	09608-87606-000 Front axle hub outer bearing outer race replacer	Installation of front axle hub outer bearing and outer race	
	09608-87604-000 Front axle hub inner bearing outer race replacer	Installation of front axle hub inner bearing and outer race	
	09608-87605-000 Steering knuckle oil seal & dust deflector replacer	Installation of steering knuckle oil seal and/or dust deflector	
	09608-87609-000 Upper arm bush remover	Pulling out of upper arm bush	
	09608-87610-000 Upper arm bush replacer	Press-fitting of upper arm bush	
	09608-87611-000 Lower arm dust cover & tie rod end dust cover replacer	Installation of dust cover	
	09608-87612-000 Upper arm bush remover & replacer holder	Pulling out and/or press-fitting of upper arm bush	
	09608-87613-000 Pitman arm tie rod end dust cover & hub cap replacer	Installation of dust cover and/or hub cap	Except for hub cap for free wheel hub
	09608-87615-000 Lower arm bush remover & replacer	Removal/installation of lower arm bush	

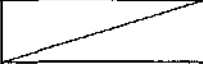
FRONT AXLE & SUSPENSION

Shape	Parts No. and Name	Purpose	Remarks
	09610-20012-000 Pitman arm puller	Disconnection of tie rod end	
	09611-87506-000 Handle	Used for press-fitting of inner race and other purposes	
	09950-20017-000 Universal puller	Removal of dust cover, etc. Removal of lower arm bush	
	06608-87602-000 Front axle hub oil seal replacer	Installation of oil seal	

WFE80-F8430

FRONT AXLE & SUSPENSION

SERVICE SPECIFICATION

Side slip	3 mm (0.118 inch)				
Toe-in	4 $\frac{3}{4}$ mm (0.157 $\frac{3}{16}$ inch)				
Camber	1° $\frac{1}{4}$				
Caster	2° \pm 30'				
King pin angle	9°30'				
Wheel turning angle	Tyre	Inner turning		Outer turning	
	195/80R15	31°05' $\frac{4}{5}$		27°15'	
	225/70R15	27°05' $\frac{4}{5}$		23°55'	
Tire inflation pressure		Front kgf/cm ²		Rear kgf/cm ²	
		Unloaded	Loaded	Unloaded	Loaded
	195 R15 94S	1.6	1.6	2.1	2.3
	225/70 R15 100S	1.6	1.6	2.1	2.3
	195/80 R15 94S	1.6	1.6	2.1	2.3
Wheel runout (maximum)	0.1 mm (0.04 inch)				
Tyre runout (maximum)	1.4 mm (0.0551 inch)				
Vertical runout	2.0 mm (0.0787 inch)				
Lateral runout					
Front vehicle height	41 \pm 10 mm (1.6 \pm 0.39 inches) (See page FS-75)				
Front axle bearing starting torque	1.4 - 3.6 kgf (3.1 - 7.9 lb)				

WFE90-FS431

FRONT AXLE & SUSPENSION

TIGHTENING TORQUE

Tightening component	Nm	kgf-m	ft-lb
Wheel hub nuts	89.2 - 118	9.0 - 12.0	65.1 - 87.0
Knuckle stopper bolt lock nut	78.5 - 98.0	8.0 - 10.0	57.9 - 72.0
Tie rod (Lock nut)	118 - 167	12 - 17	87 - 123
Torsion spring lock nut	68.6 - 88.3	7.0 - 9.0	50.6 - 65.1
Lock nut (Axle hub nut)	98.0 - 147	10 - 15	72 - 109
Steering knuckle x Brake mounting support	68.6 - 88.3	7.0 - 9.0	50.6 - 65.1
Lock nut (Axle hub nut) x brake drum (Automatic free wheel hub equipped vehicle only)	4.9 - 8.8	0.5 - 0.9	3.6 - 6.5
Axle hub x Hub cover (Free wheel hub body)	58.8 - 68.6	6.0 - 7.0	43.4 - 50.6
Free wheel hub body x Free wheel hub cover (Free wheel hub equipped vehicle only)	7.8 - 11.8	0.8 - 1.2	5.8 - 8.7
Axle hub x Brake disc	53.9 - 73.5	5.5 - 7.5	39.8 - 54.2
Drive shaft x Lock bolt with washer (Automatic locking hub equipped vehicle only)	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Stabilizer link x Stabilizer bracket cover	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5
Anchor arm stopper x Frame	4.9 - 7.8	0.5 - 0.8	3.6 - 5.8
Torque arm x Lower arm	39.2 - 53.9	4.0 - 5.5	28.9 - 39.8
Anchor bolt x Lock nut	68.6 - 88.3	7.0 - 9.0	50.6 - 65.1
Shock absorber x Frame	18.6 - 30.4	1.9 - 3.1	13.7 - 22.4
Shock absorber x Lower arm	49.0 - 68.6	5.0 - 7.0	36.2 - 50.6
Shock absorber x Shock absorber control bracket	25.5 - 38.2	2.6 - 3.9	18.8 - 28.2
Shock absorber control bracket x Three-stage actuator	2.0 - 3.9	0.2 - 0.4	1.4 - 2.9
Suspension upper arm shaft x Frame	102 - 128	10.4 - 13.0	75.2 - 94.0
Suspension upper arm shaft x Upper arm sub assembly	68.6 - 88.3	7.0 - 9.0	50.6 - 65.1
Upper arm x Front spring bumper	9.8 - 15.7	1.0 - 1.6	7.2 - 11.6
Upper arm x Upper ball joint	26.5 - 38.3	2.7 - 3.7	19.5 - 28.8
Lower arm x Lower ball joint	55.9 - 76.5	5.7 - 7.8	41.2 - 56.4
Steering knuckle x Tie rod end	68.6 - 137	7.0 - 14	50.6 - 101
Upper ball joint x Steering knuckle	88.3 - 118	9.0 - 12.0	65.1 - 87.0
Lower ball joint x Steering knuckle	88.3 - 118	9.0 - 12.0	65.1 - 87.0
Lower arm x Frame	128 - 177	13 - 18	94 - 130

WPEBO-PS432

DAIHATSU

F300

REAR AXLE & SUSPENSION

OUTLINE OF REAR AXLE &	
SUSPENSION	RS- 2
REAR AXLE &	
SUSPENSION COMPONENTS	RS- 6
REAR SPRINGS	RS- 7
REAR SHOCK ABSORBERS	RS-17
THREE-STAGE DAMPER	RS-22
REAR AXLE SHAFT	RS-28
SSTs (special service tools)	RS-37
TIGHTENING TORQUE	RS-38

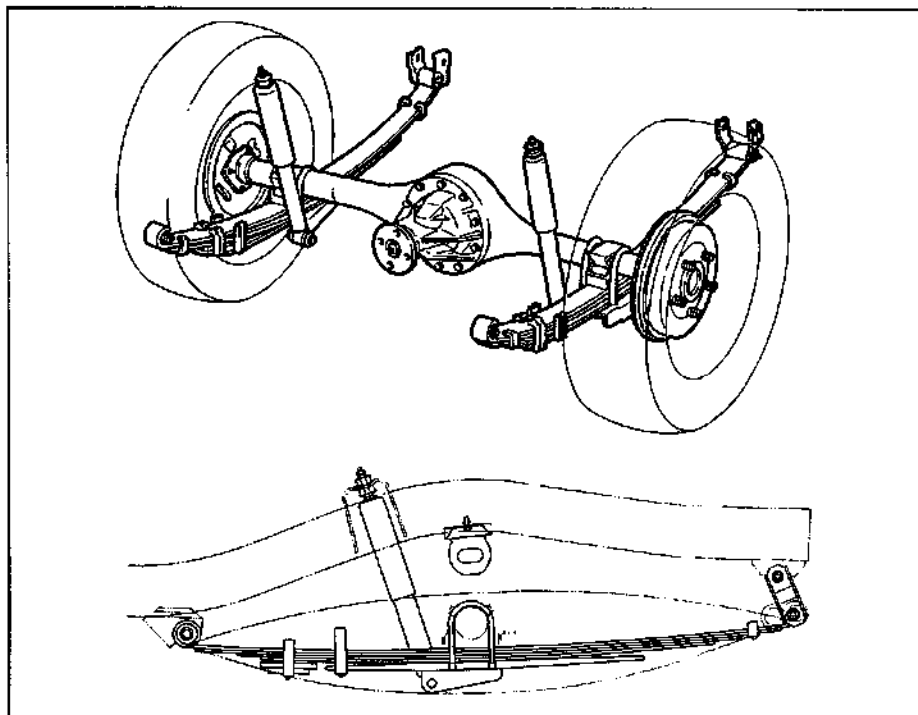
WF80-RS001

REAR AXLE & SUSPENSION

OUTLINE OF REAR AXLE & SUSPENSION

REAR SUSPENSION

The rear suspension is a rigid type and is composed of five leaf springs. For improved negotiability over rough terrains and steering response, shackles are installed at the back side.



WPB90-RS002

Rear suspension specifications

Vehicle model			All models (Except the United kingdom)	For the United kingdom
Item				
Leaf spring	Camber (under unloaded state) mm		185	165
	Main spring	Span (mm) x width (mm) x sheet thickness (mm) - Number of leaves (pcs.)	1,170 x 60 x 6 - 1, 1,125 x 60 x 5 - 1 870 x 60 x 6 - 1, 965 x 60 x 5 - 1	1,170 x 60 x 7 - 1, 985 x 60 x 7 - 1 740 x 60 x 8 - 1
	Auxiliary spring	Span (mm) x width (mm) x sheet thickness (mm) - Number of leaves (pcs.)	610 x 60 x 14 - 1	430 x 60 x 12 - 1
	Spring constant	Main spring kg/mm	1.95	1.95
		Combined kg/mm	4.61	4.61

NOTE:

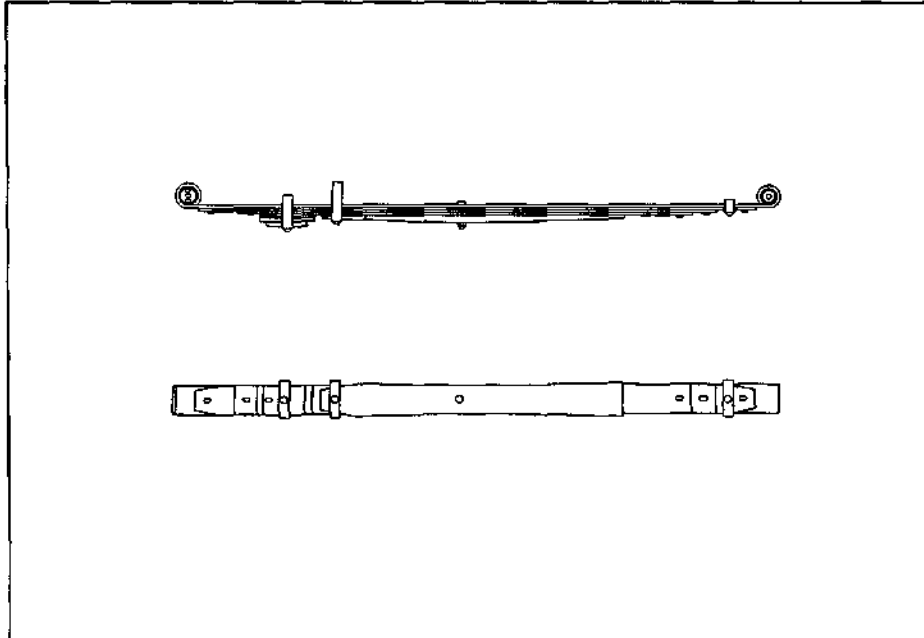
- As for the shock absorber, see the Front Axle & Suspension section.

WPB90-RS003

REAR AXLE & SUSPENSION

REAR SPRINGS

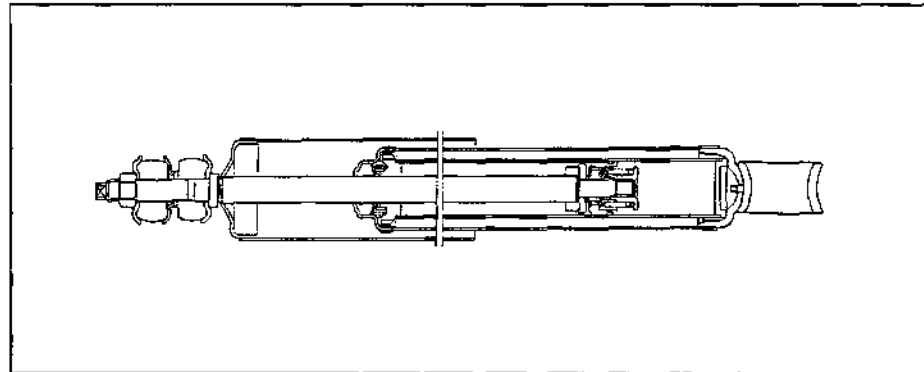
The rear spring adopts leaf springs which consist of five leaves, thus assuring excellent negotiability over rough terrains.



WFE90-RS004

REAR SHOCK ABSORBERS

The rear shock absorber is a nitrogen gas-sealed type shock absorber. The absorber comes in two kinds: standard type and three-stage damper type. (For details, see the section under "Front shock absorber.")



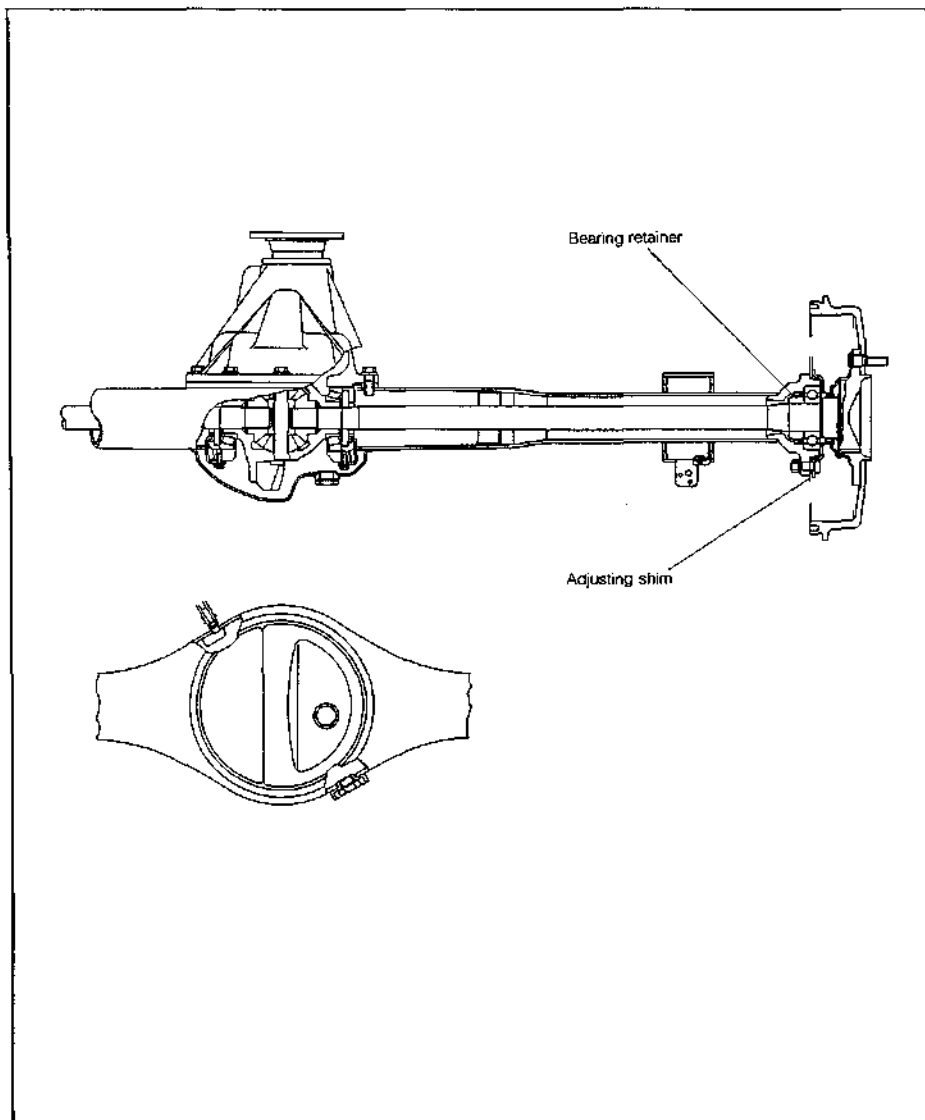
WFE90-RS005

RS-3

REAR AXLE & SUSPENSION

REAR AXLE

The rear axle housing employs a banjo type, whereas the axle adopts a semi-floating type. The bearing is secured through a shrink fit. The clearance between the bearing and the backing plate is adjusted by means of adjusting shims.

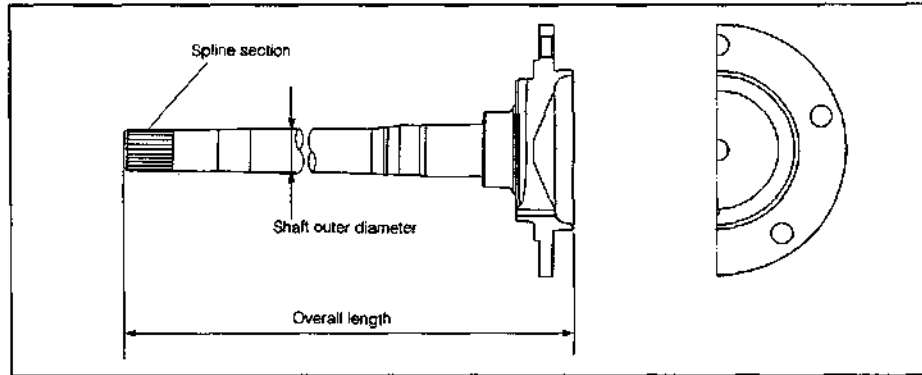


WFE20-RS006

REAR AXLE & SUSPENSION

REAR AXLE SHAFTS

The rear axle shaft employs a semi-floating type, in which the wheels are directly installed to the axle shaft and the vehicle weight is divided both by the axle shaft and by the axle tube.



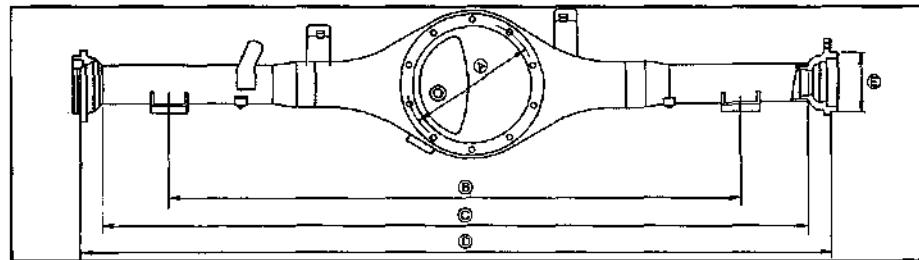
Rear axle shaft specifications

Overall length	Right	mm	704
	Left	mm	650
Shaft outer diameter	mm		30
Number of teeth of spline section			27

WFE90-RS008

REAR AXLE HOUSING

The rear axle housing employs a banjo type rear axle housing which features remarkable strength and rigidity of the axle tube and easy removal/installation of the rear differential carrier.



WFE90-RS009

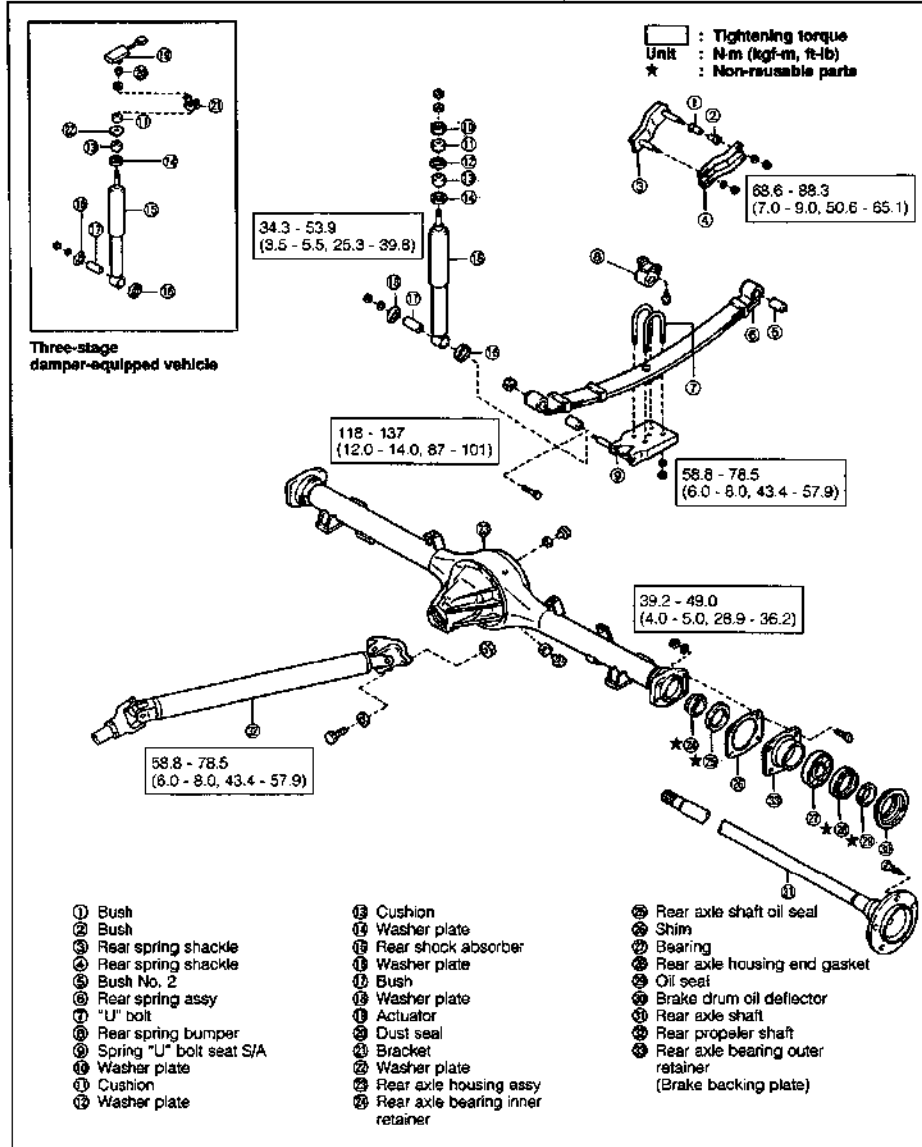
Rear axle housing specifications

Dimension A	211	mm
Dimension B	921	
Dimension C	1157	
Dimension D	1231	
Dimension E	98.5	

WFE90-RS010

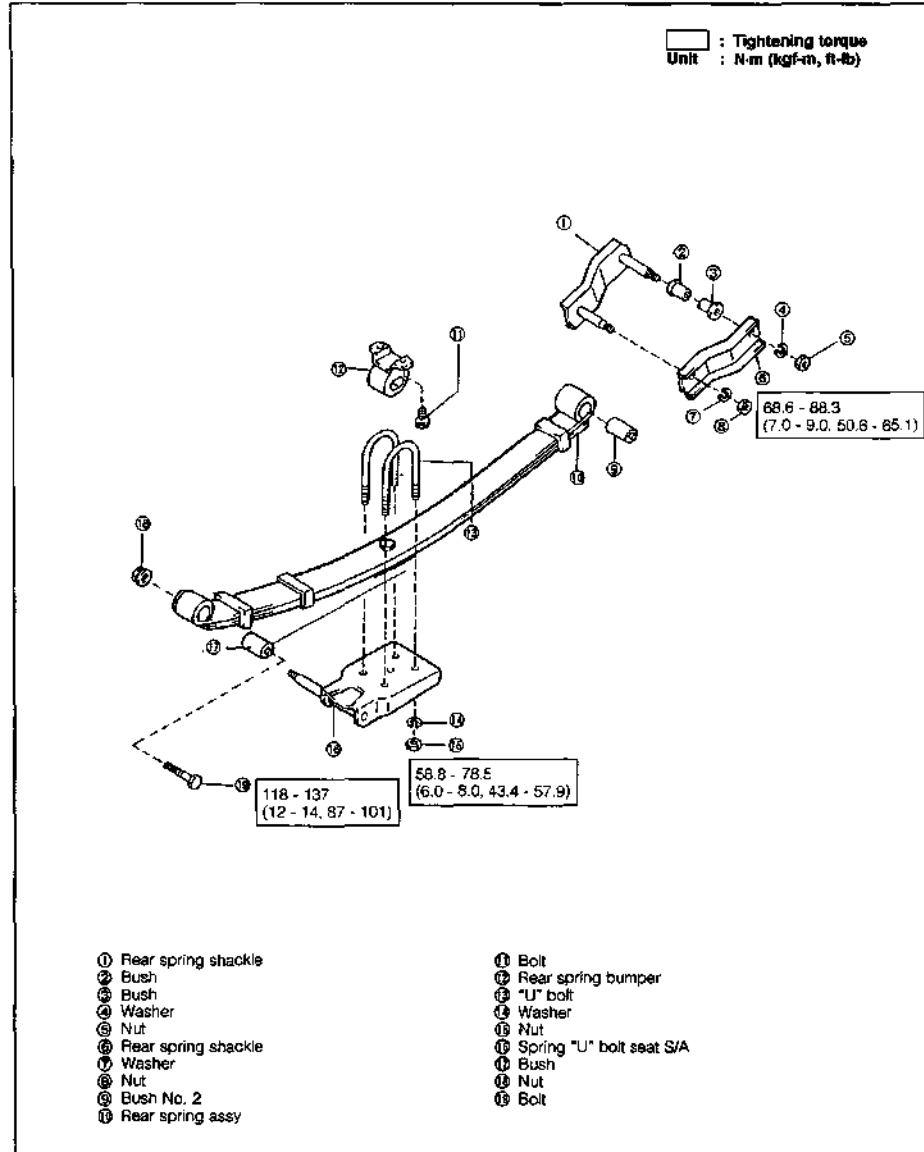
REAR AXLE & SUSPENSION

REAR AXLE & SUSPENSION COMPONENTS



WF600-RS011

REAR SPRINGS COMPONENTS



WFED0-RS012

REAR AXLE & SUSPENSION

TROUBLE SHOOTING

Symptom	Possible causes	Checking points
Abnormal noise	Spring bushes worn	Check spring and bush.
Vehicle body tilted	Spring damaged	

NOTE:

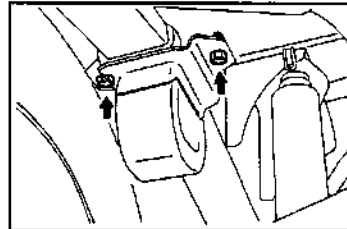
1. Care must be exercised so that the right and left leaf springs may not be exchanged with each other during the removal and installation of the leaf springs.
2. When replacing the leaf springs, assemble them according to the following combination of the marking codes (+, 0, -) which were put on the leaf springs. The right table indicates the priority order with the top priority attached to the (1).

	Right	Left
(1)	+	0
(2)	0	-
(3)	+	+
(4)	0	0
(5)	+	+
(6)	-	-

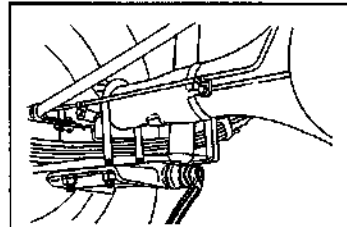
WFB20-RS013

REMOVAL

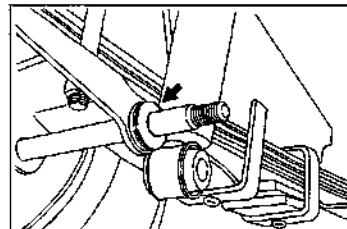
1. Remove the rear spring bumper by removing the attaching bolts.
2. Remove the attaching nut at the lower side of the rear shock absorber. Disconnect the rear shock absorber from the spring "U" bolt seat subassembly.
3. Remove the washer plate from the spring "U" bolt seat.



WFB20-RS014



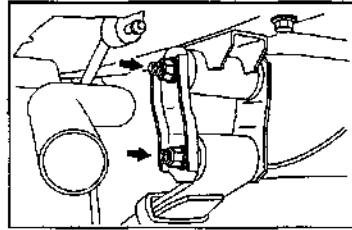
WFB20-RS015



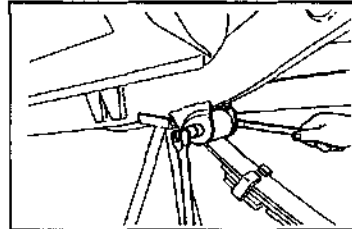
WFB20-RS016

REAR AXLE & SUSPENSION

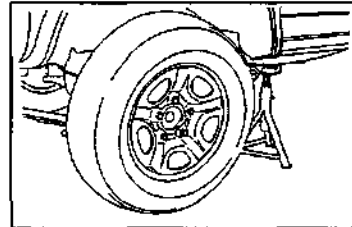
4. Loosen the rear spring shackle attaching nut.



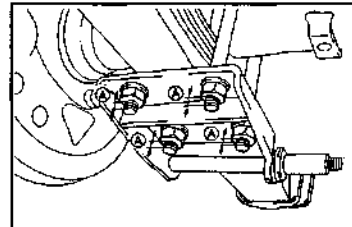
5. Loosen the rear spring attaching nut at the front side.



6. Jack up the vehicle until the rear tires are just cleared from the ground (with no load applied to the rear axle). Put safety stands underneath the frame so as to support the vehicle.



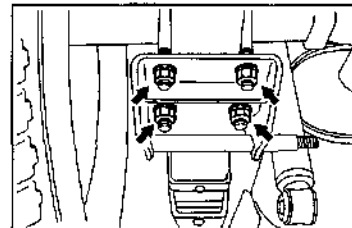
7. Removal of "U" bolts
(1) Measure and record the protruding dimension of the "U" bolt tightening nut.



- (2) Loosen the "U" bolt attaching nuts evenly over two or three stages.

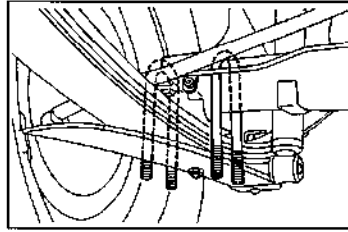
CAUTION:

- When loosening the nuts, make sure that the spring load is not sustained by the nuts.



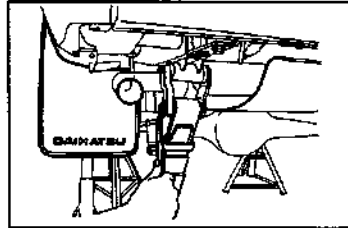
REAR AXLE & SUSPENSION

- (3) Remove the "U" bolt attaching nuts. Remove the "U" bolt seat and "U" bolt.



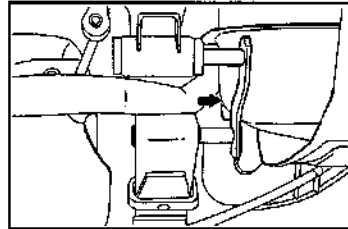
WP200-RS022

8. Removal of rear spring shackle pin
(1) Remove the rear spring shackle attaching nuts. Remove the shackle bracket.



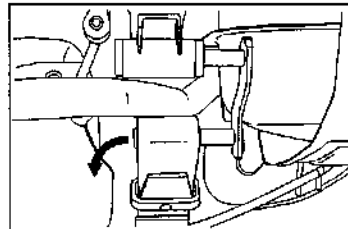
WP200-RS023

- (2) Pull out the shackle pin about halfway by lightly tapping the shackle pin at its plate section by means of a plastic hammer or the like.



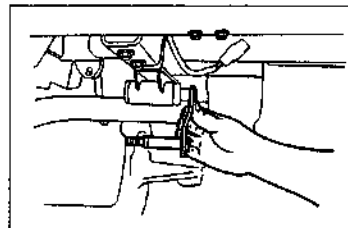
WP200-RS024

- (3) Remove the leaf spring from the shackle pin.



WP200-RS025

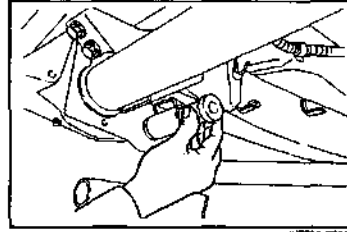
- (4) Remove the shackle pin from the frame.



WP200-RS026

REAR AXLE & SUSPENSION

9. Remove the shackle pin bush from the frame.

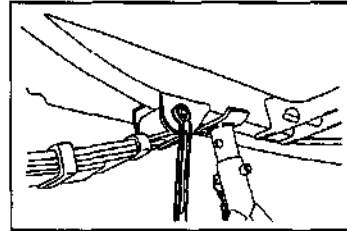


WFES0-RS027

10. Remove the leaf spring attaching bolt and nut at the front side. Remove the rear spring from the vehicle.

NOTE:

- When removing the bolt, be very careful not to drop the leaf spring.



WFES0-RS028

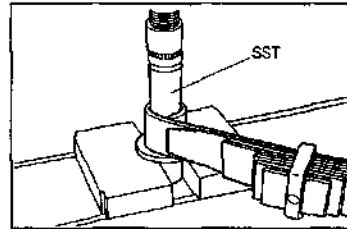
11. Removal of rear spring bushes No.1 and No.2

- (1) Pull out the rear spring bush No.1, using the following SST in combination with a hydraulic press.

SST: 09608-87607-000

NOTE:

- Provide an adequate receiving hole at the lower side of the leaf spring so that the bush may be pulled out by a press.



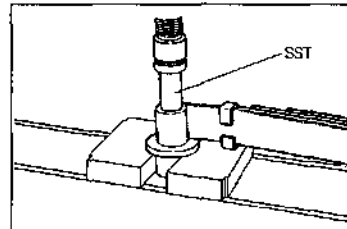
WFES0-RS029

- (2) Pull out the rear spring bush No.2, using the following SST in combination with a hydraulic press.

SST: 09608-87608-000

NOTE:

- Provide an adequate receiving hole at the lower side of the leaf spring so that the bush may be pulled out by a press.

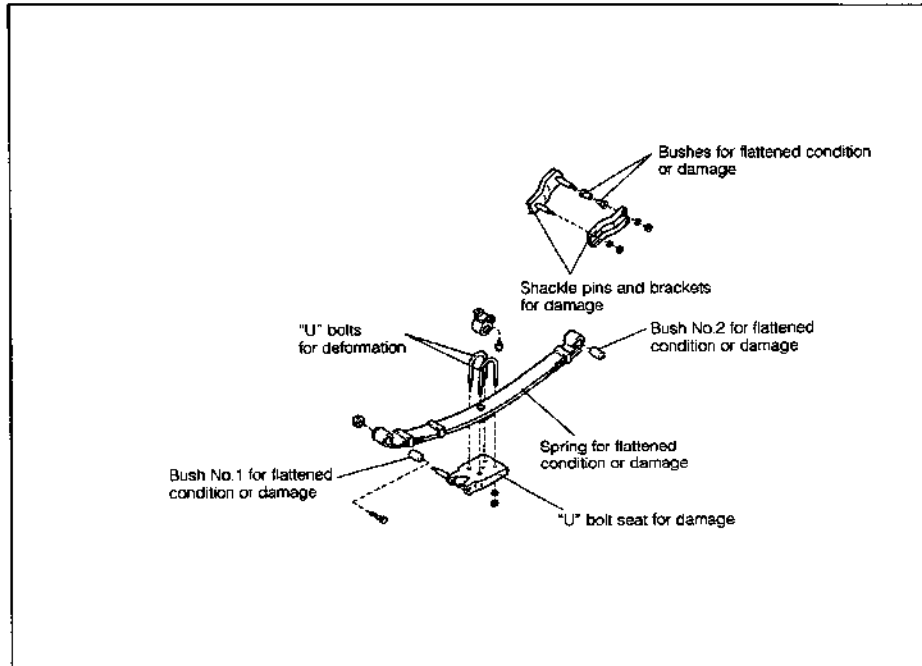


WFES0-RS030

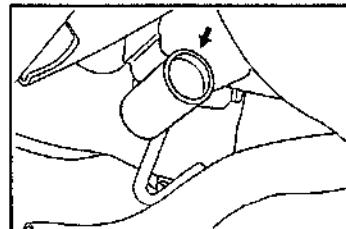
REAR AXLE & SUSPENSION

INSPECTION

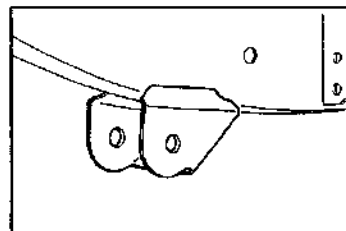
1. Inspect each section in the figure below. Replace any defective parts.



2. Ensure that the bush installing section of the chassis exhibits no damage.



3. Ensure that no damage is present at the leaf spring installation section at the chassis front side.



INSTALLATION

1. Installation of rear spring bushes No.1 and No.2
 - (1) Press the rear spring bush No.1 into the rear spring with the following SST in combination with a press.
SST: 09608-87607-000

NOTE:

- Be sure to press the bush up to the edge surface of the leaf spring.
- For this operation, use a press stand having a hole so that no interference with the inner bush may occur.

- (2) Press the rear spring bush No.2 into the rear spring with the following SST in combination with a press.
SST: 09608-87608-000

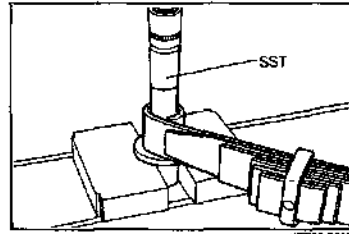
NOTE:

- Be sure to press the bush up to the edge surface of the leaf spring.
- For this operation, use a press stand having a hole so that no interference with the inner bush may occur.

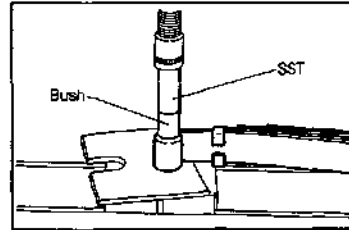
2. Connect the front installing section of the rear spring. Temporarily install the attaching bolt and nut.

3. Apply a thin film of SUNPAR 150_g to the rear shackle bush. Install the bush to the frame.

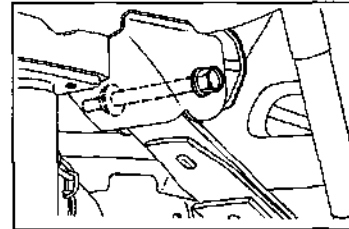
4. Insert the shackle pin into the frame about halfway.



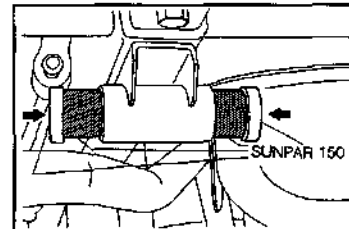
WP690-RS004



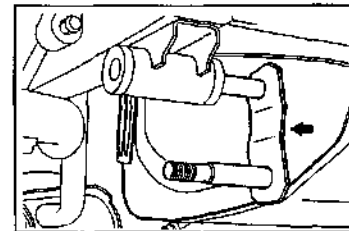
WP690-RS005



WP690-RS006



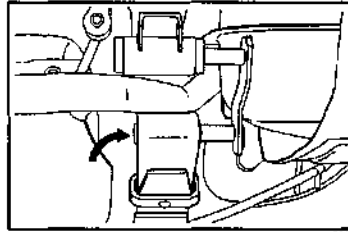
WP690-RS007



WP690-RS008

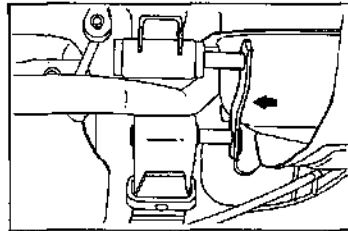
REAR AXLE & SUSPENSION

5. Connect the leaf spring to the shackle pin.



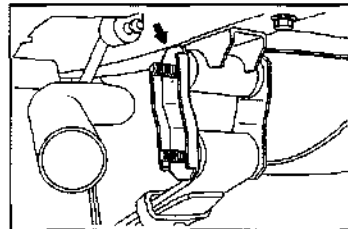
WFE90-RS330

6. Insert the shackle pin farther.



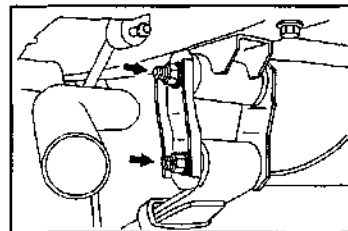
WFE90-RS340

7. Install the shackle pin bracket to the shackle pin.



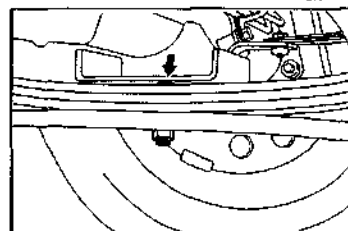
WFE90-RS341

8. Temporarily tighten the shackle pin bracket attaching nut with a new washer interposed.



WFE90-RS342

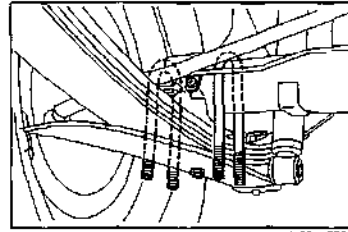
9. Attach the bolt head of the leaf spring into the hole at the rear axle housing side.



WFE90-RS343

REAR AXLE & SUSPENSION

10. Install the "U" bolts to the rear axle housing.



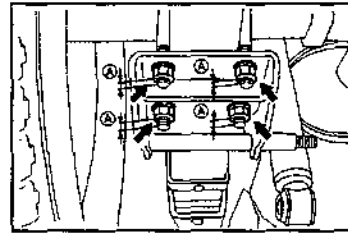
WPES0-RS044

11. Install the spring "U" bolt seat. Connect the "U" bolts.
12. Tighten the spring "U" bolt seat attaching nuts with new washers interposed. This tightening must be performed evenly over two or three stages to the specified torque in such a way that all the protruding amounts (dimension A) of the four bolts may become the same.

Tightening Torque: 58.8 - 78.5 N·m
(6.0 - 8.0 kgf-m, 43.4 - 57.9 ft-lb)

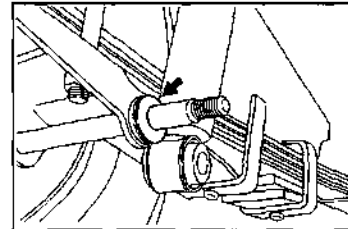
NOTE:

- When the "U" bolt is reused, make sure that the protruding amounts become virtually the same as those measured during the removal.



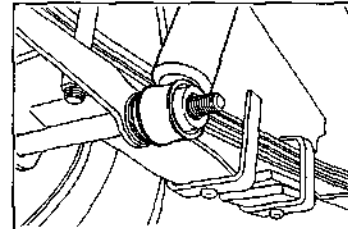
WPES0-RS045

13. Jack down the vehicle.
14. Connection of shock absorber
 - (1) Install the washer plate to the spring "U" bolt seat in such a way that the washer plate protruding surface may face toward the shock absorber.



WPES0-RS047

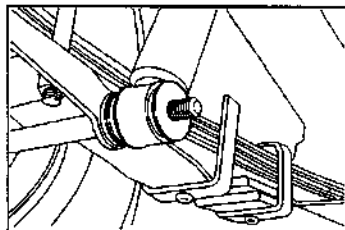
- (2) Connect the shock absorber to the spring "U" bolt seat.



WPES0-RS048

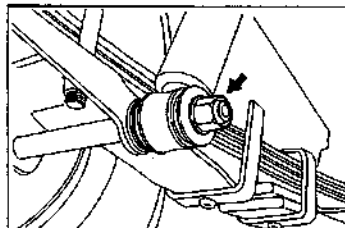
REAR AXLE & SUSPENSION

- (3) Install the washer plate to the spring "U" bolt seat in such a way that the washer plate protruding surface may face toward the shock absorber.



WPB90-RS049

- (4) Tighten the shock absorber attaching nut to the specified torque with a new spring washer interposed.
Tightening Torque: 34.3 - 53.9 N·m
(3.5 - 5.5 kgf-m, 25.3 - 39.8 ft-lb)



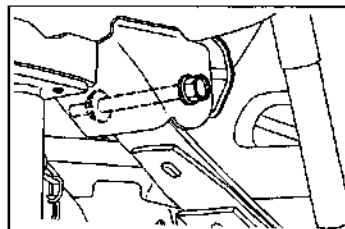
WPB90-RS050

15. Tighten the rear spring attaching bolt and nut at the front side to the specified torque.

Tightening Torque: 118 - 137 N·m
(12.0 - 14.0 kgf-m,
87.0 - 101.0 ft-lb)

NOTE:

- The vehicle should be in unloaded state during this operation.



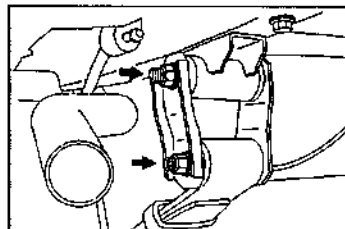
WPB90-RS051

16. Tighten the rear spring shackle attaching nuts to the specified torque.

Tightening Torque: 68.6 - 88.3 N·m
(7.0 - 9.0 kgf-m, 50.6 - 65.1 ft-lb)

NOTE:

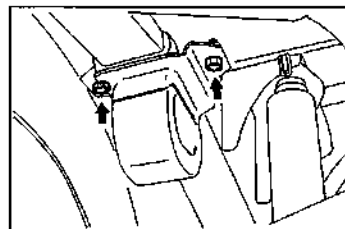
- The vehicle should be in unloaded state during this operation.



WPB90-RS052

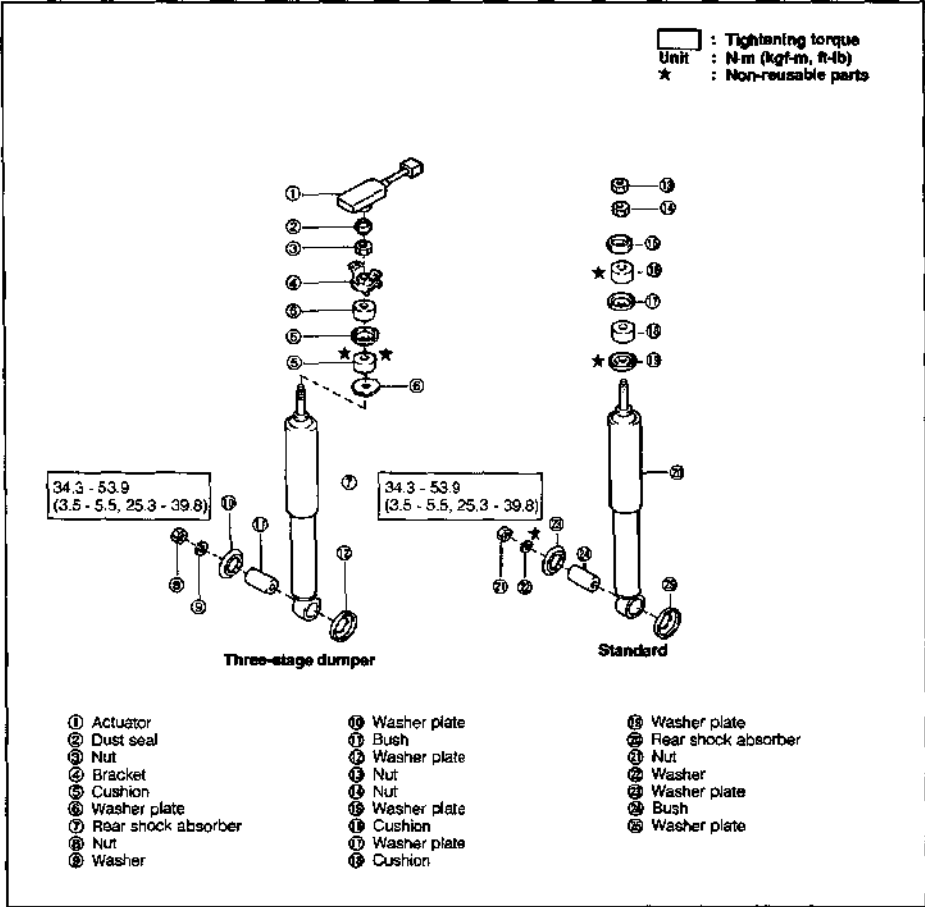
17. Install the rear spring bumper.

Tightening Torque: 14.7 - 21.6 N·m
(1.5 - 2.2 kgf-m, 10.8 - 15.9 ft-lb)



WPB90-RS053

REAR SHOCK ABSORBERS
COMPONENTS



TROUBLE SHOOTING

Symptom	Possible causes	Checking points
Abnormal noise	Oil leakage at shock absorber	Check shock absorber.
Oil leakage	Poor oil seal of shock absorber	

CAUTION:

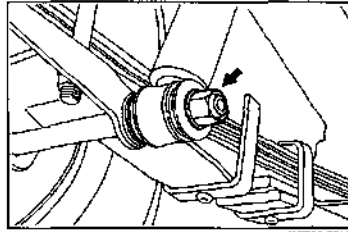
- When discarding the rear shock absorber, prior to disposal be sure to release the filled gas.

REAR AXLE & SUSPENSION

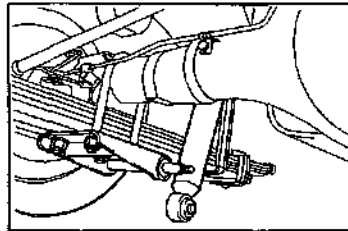
REMOVAL

Standard shock absorber

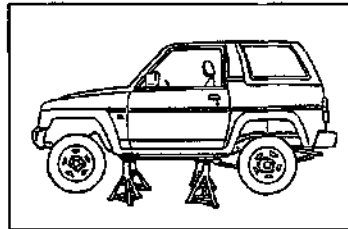
1. Remove the attaching nut at the spring "U" bolt seat side.



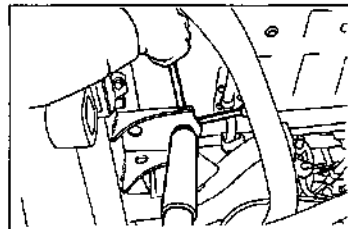
2. Remove the shock absorber from the spring "U" bolt seat.



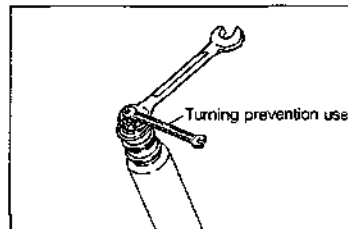
3. Jack up the vehicle and support it with safety stands.
(See GI section.)



4. Loosen the lock nut provided at the upper side of the upper connecting section of the rear shock absorber.

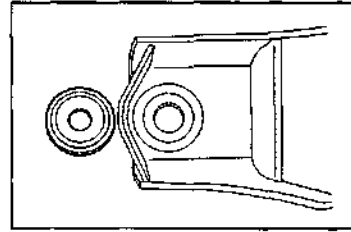


5. Remove the attaching nut while preventing the rear shock absorber from turning. For this operation, use the two-flat section provided at the top of the rear shock absorber. Remove the rear shock absorber, washer plate and cushion.



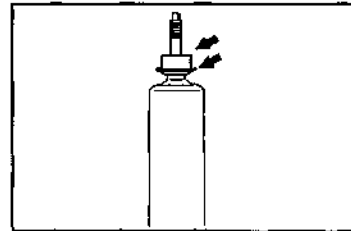
REAR AXLE & SUSPENSION

6. Remove the washer plate from the top of the rear shock absorber installation section of the frame.



WPB30-RS067

7. Remove the cushions and washer plates from the rear shock absorber.

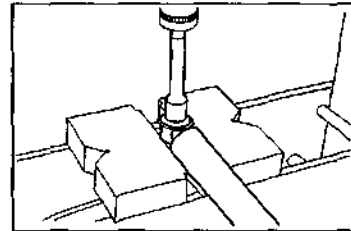


WPB30-RS068

8. Pull out the bush at the rear shock absorber lower section with a hydraulic press, while applying a suitable iron rod to the bush.

NOTE:

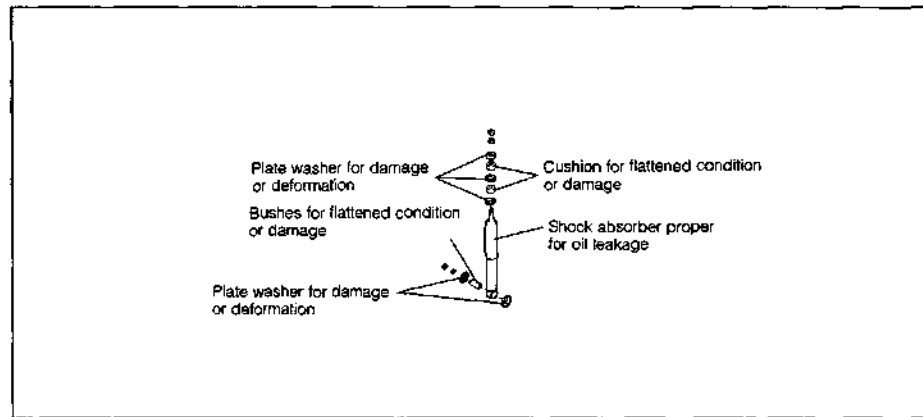
- This operation should be performed only when the inspection has been conducted and the removal proved to be necessary.



WPB30-RS069

INSPECTION

1. Inspect each section in the figure below. Replace any defective parts.

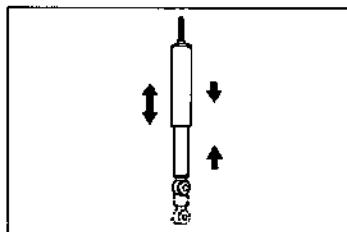


WPB30-RS064

REAR AXLE & SUSPENSION

2. Check of shock absorber

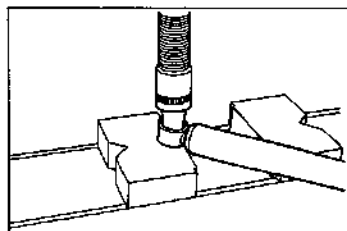
Ensure that the shock absorber can be contracted slowly when it is compressed. Also, ensure that the shock absorber can extend slowly and smoothly when it is extended.



WF830-RS065

INSTALLATION

1. Apply Sunpar 150® to the bush at the shock absorber lower section. Press the bush into the shock absorber.
2. Push the bush pressed into the shock absorber by hand to settle it.

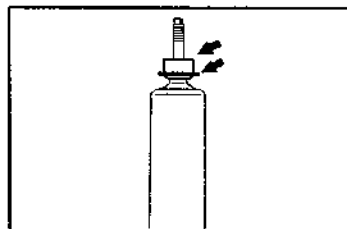


WF830-RS066

3. Install the cushion and washer plate to the shock absorber.

NOTE:

- Be certain to install the washer so that its recessed surface faces toward the cushion side.

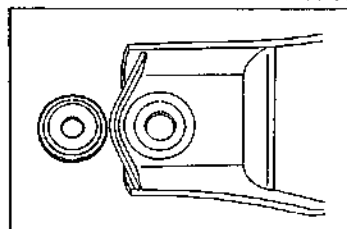


WF830-RS067

4. Install the washer plate on the top of the shock absorber installation section of the frame.

NOTE:

- Be certain to install the washer plate in such a way that the protruding surface of the washer plate may be fitted to the hole section of the shock absorber installation section of the frame.

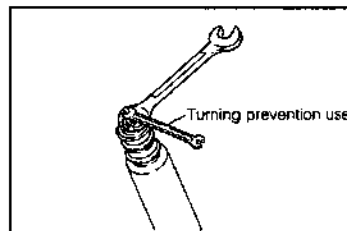


WF830-RS068

5. Insert the rear shock absorber into the frame installation section. Install the cushion, washer plate and nut.

NOTE:

- Be certain to install the washer so that its recessed surface faces toward the cushion side.



WF830-RS069

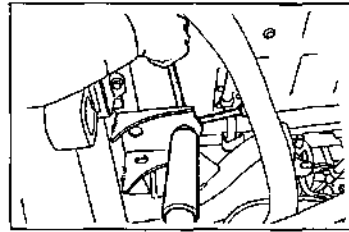
6. Tighten the attaching nut to the specified torque, while preventing the shock absorber from turning. For this operation, use the two-flat section at the top of the rear shock absorber.

Tightening Torque: 18.6 - 30.4 N·m
(1.9 - 3.1 kgf-m, 13.7 - 22.4 ft-lb)

REAR AXLE & SUSPENSION

7. Install and tighten the lock nut of the attaching nut at the upper section of the rear shock absorber.

Tightening Torque: 18.6 - 30.4 N·m
(1.9 - 3.1 kgf-m, 13.7 - 22.4 ft-lb)



WPED0-RS070

8. Jack down the vehicle.

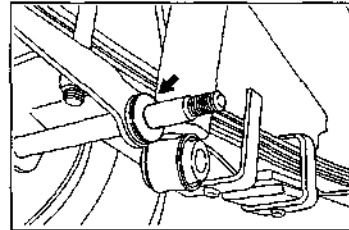
NOTE:

- Be very careful not to damage the shock absorber.

9. Install the washer plate to the shock absorber installation section of the spring "U" bolt seat.

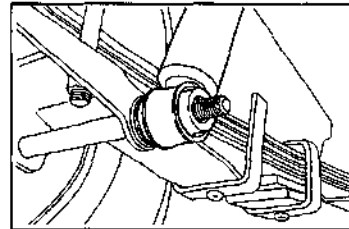
NOTE:

- Be certain to install the washer plate so that its protruding side faces toward the shock absorber side.



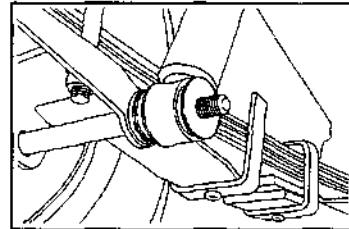
WPED0-RS071

10. Connect the shock absorber to the shock absorber installation section of the spring "U" bolt seat.



WPED0-RS072

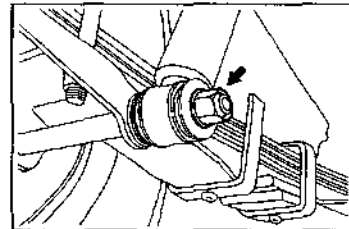
11. Install the washer plate so that its protruding side faces toward the shock absorber side.



WPED0-RS073

12. Tighten the shock absorber attaching nut to the specified torque.

Tightening Torque: 34.3 - 53.9 N·m
(3.5 - 5.5 kgf-m, 25.3 - 39.8 ft-lb)



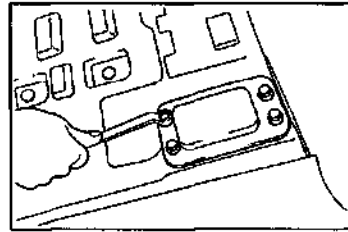
WPED0-RS074

REAR AXLE & SUSPENSION

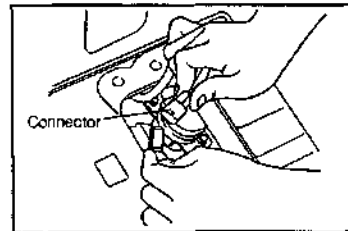
THREE-STAGE DAMPER

REMOVAL

1. Remove the rear seat and floor mat.
(See the Body section.)
2. Remove the service hole cover by removing the attaching bolts of the service hole cover.



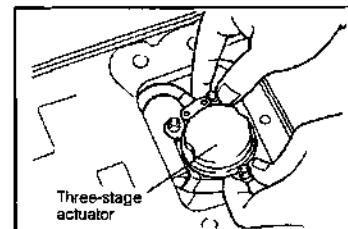
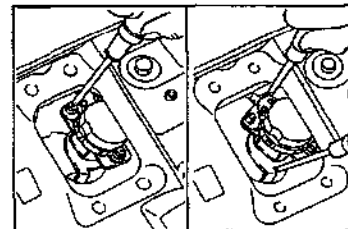
3. Pull out the three-stage actuator connector from below the floor and disconnect it.



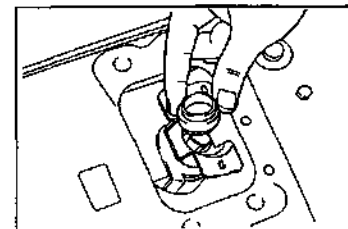
4. Remove the actuator by removing the three-stage actuator attaching screws.

NOTE:

1. When loosening the actuator bolts, while applying a standard screwdriver to the shock absorber control bracket and lightly prying the bracket, remove the bolts progressively.
Be very careful not to damage the bracket.
2. When removing the actuator, care must be exercised not to drop the collar.

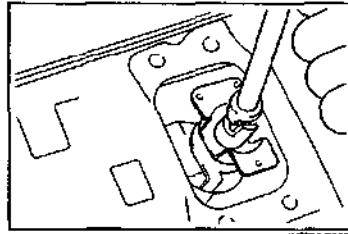


5. Remove the dust seal.



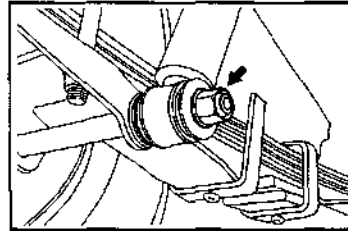
REAR AXLE & SUSPENSION

6. Remove the shock absorber control bracket by removing its attaching nuts.
7. Remove the cushion and washer plate.



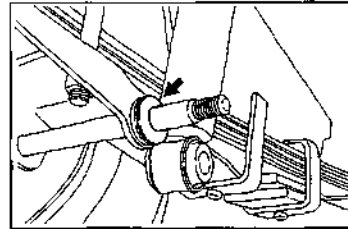
WP500-RS073

8. Remove the attaching nut at the shock absorber lower section.



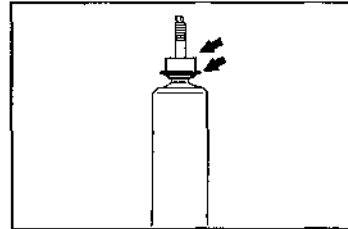
WP500-RS080

9. Remove the shock absorber from the spring "U" bolt seat.
10. Remove the washer plate from the spring "U" bolt seat.



WP500-RS081

11. Remove the cushion and washer plate from the shock absorber.

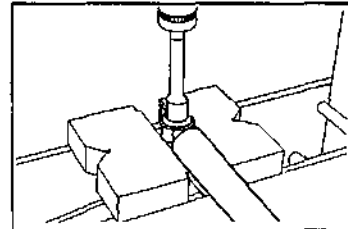


WP500-RS082

12. Pull out the bush at the rear shock absorber lower section with a hydraulic press, while applying a suitable iron rod to the bush.

NOTE:

- This operation should be performed only when the inspection results revealed that such removal is necessary. (See page RS-24.)

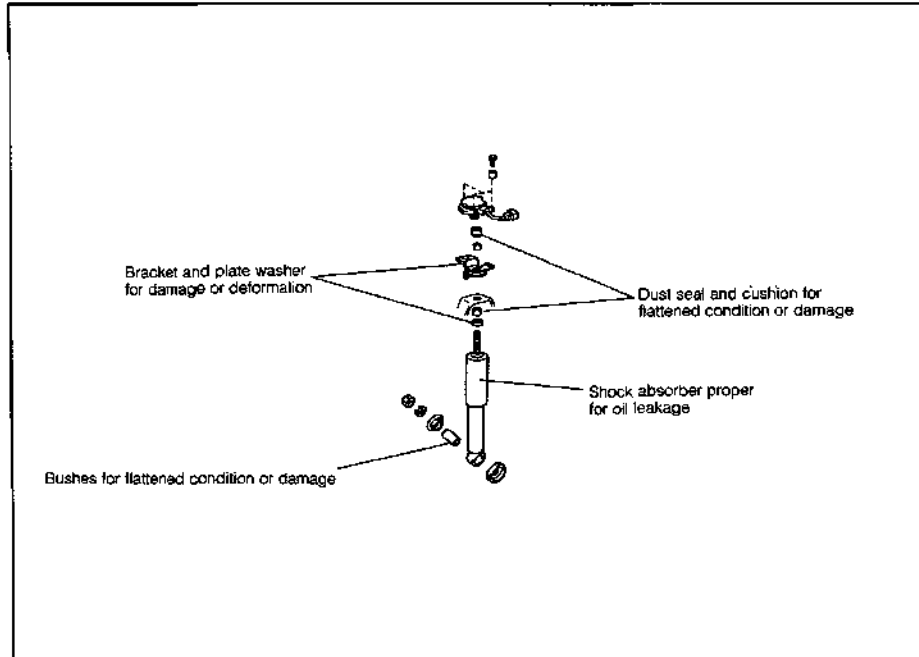


WP500-RS083

REAR AXLE & SUSPENSION

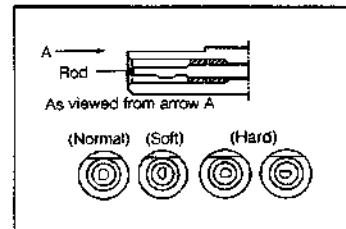
INSPECTION

1. Inspect each section in the figure below. Replace any defective parts.



WPB90-RS064

2. Ensure that the rod at the upper side of the three-stage damper can be turned easily by radio pliers or the like.
3. Set the rod as indicated in the figure. Ensure that the damping force varies according to the modes.



WPB90-RS005

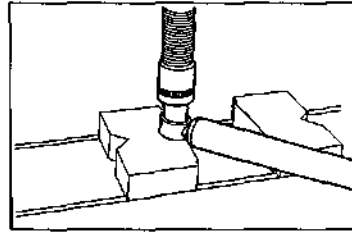
REFERENCE:

Selection mode			Soft	Normal	Hard
Damping force (at time of piston m/s speed of 0.3 m/s)	Rebound/compression	Front	290/40	320/48	360/60
		Rear	153/13	206/21	222/25

WPB90-RS006

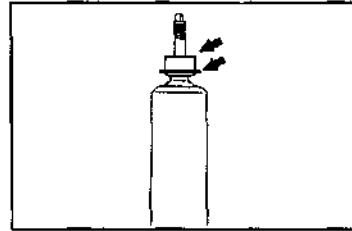
INSTALLATION

1. Apply Sunpar 150_g to the bush at the shock absorber lower section. Press the bush into the shock absorber.
2. Push the bush pressed into the shock absorber by hand to settle it.



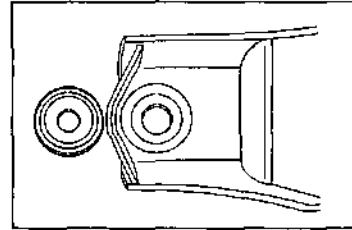
WPBX-RS067

3. Install the cushion and washer plate to the shock absorber.
NOTE:
 - Be certain to install the washer so that the its recessed surface faces toward the cushion side.



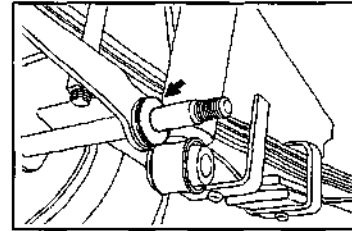
WPBX-RS068

4. Install the washer plate on the top of the shock absorber installation section of the frame.
NOTE:
 - Be certain to install the washer plate in such a way that the protruding surface of the washer plate may be fitted to the hole section of the shock absorber installation section of the frame.



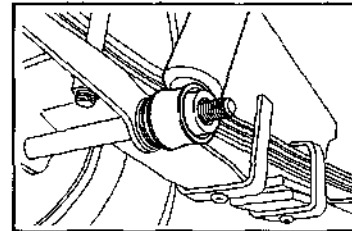
WPBX-RS069

5. Insert the washer plate into the shock absorber installation section of the spring "U" bolt seat.
NOTE:
 - Be certain to install the washer plate so that the its protruding surface faces toward the shock absorber side.



WPBX-RS070

6. While inserting the shock absorber into the upper installation hole, contract the shock absorber and install it to the installation section of the spring "U" bolt seat.



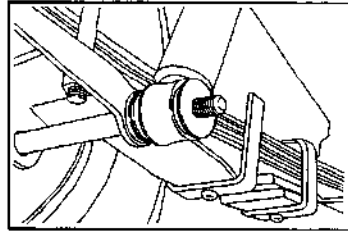
WPBX-RS071

REAR AXLE & SUSPENSION

7. Install the washer plate.

NOTE:

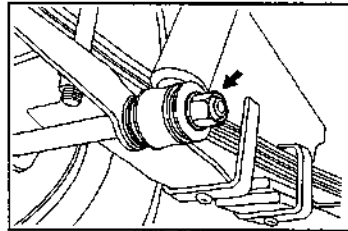
- Be certain to install the washer so that the its protruding side faces toward the shock absorber side.



WP260-R5002

8. Install the attaching nut at the shock absorber lower section with a new spring washer interposed. Tighten the attaching nut to the specified torque.

Tightening Torque: 34.3 - 53.9 N·m
(3.5 - 5.5 kgf-m, 25.3 - 39.8 ft-lb)

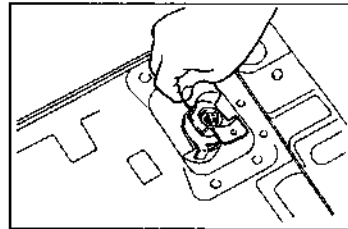


WP260-R5003

9. Install the cushion to the top of the shock absorber.
10. Install the shock absorber control bracket in such a way that it is aligned with the cut-out section of the shock absorber upper end.

NOTE:

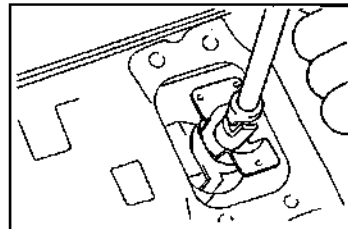
- Be sure to install the bracket in the correct direction.



WP260-R5004

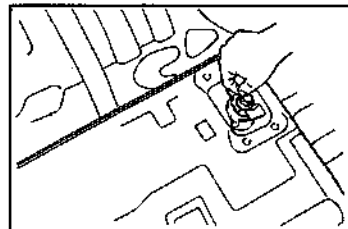
11. Install a new nut to the shock absorber top section and tighten it to the specified torque.

Tightening Torque: 25.5 - 38.2 N·m
(2.6 - 3.9 kgf-m, 18.8 - 28.2 ft-lb)



WP260-R5005

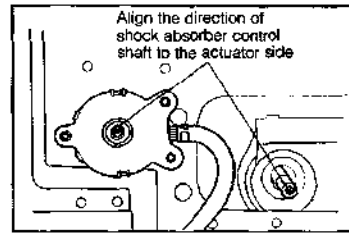
12. Install the dust seat to the shock absorber top section.



WP260-R5006

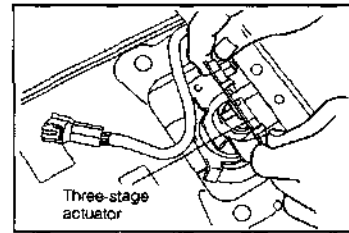
REAR AXLE & SUSPENSION

13. Align the direction of the control shaft of the shock absorber with that of the actuator side.



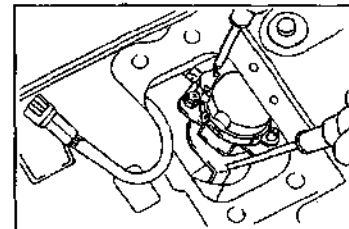
14. Install the actuator to the bracket. Tighten the attaching bolt to the specified torque.

Tightening Torque: 2.0 - 3.9 N·m
(0.2 - 0.4 kgf-m, 1.4 - 2.9 ft-lb)

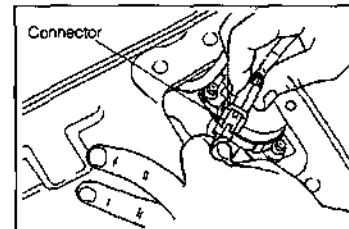


NOTE:

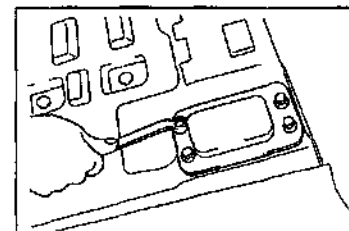
1. When installing the actuator, care must be exercised not to drop the collar.
2. When tightening the attaching bolts of the actuator, tighten the bolts progressively by turning the bracket. Be very careful not to damage the bracket.



15. Connect the connector of the three-stage actuator and route it under the floor. Secure it with clamps.

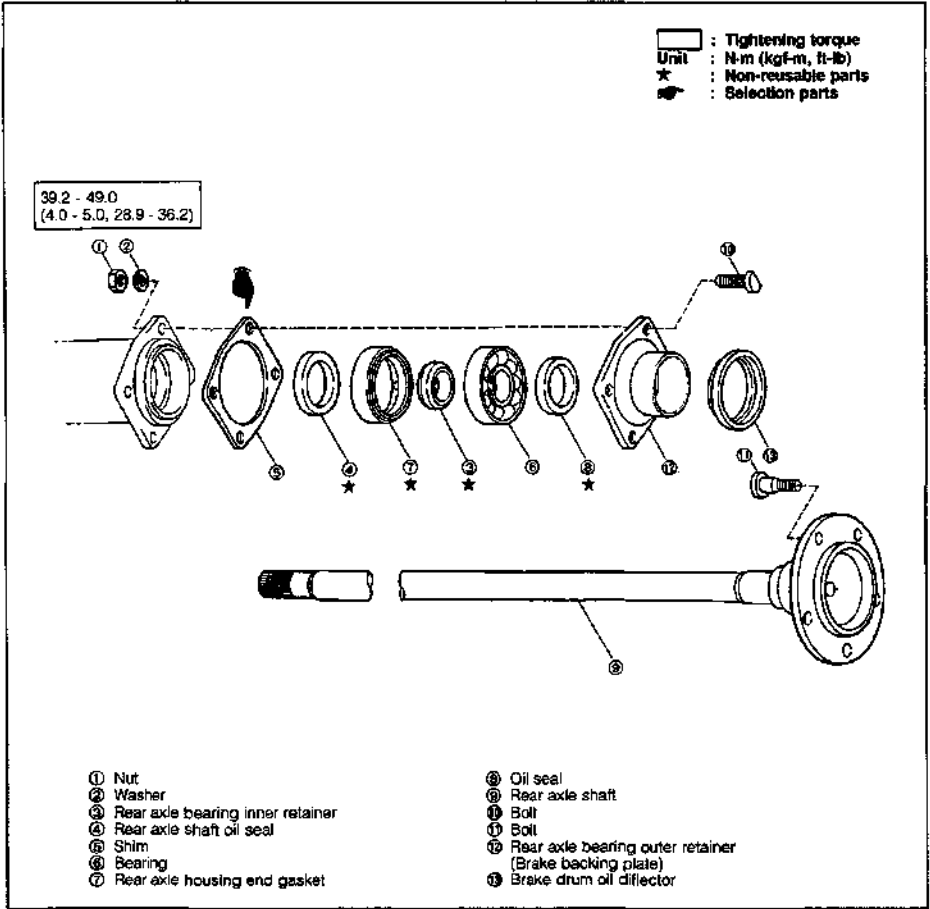


16. Install the service hole cover. Tighten the attaching bolts.
17. Install the rear seat and floor mat.
(See the Body section.)



REAR AXLE & SUSPENSION

**REAR AXLE SHAFT
COMPONENTS**



TROUBLE SHOOTING

Symptom	Possible causes	Checking points
Abnormal noise	Bearing damaged Bearing improperly lubricated	Check bearings.
Oil leakage	Oil seals damaged Oil seals improperly installed	Check oil seals.

WPE90-RS103

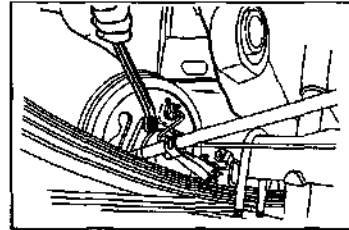
REAR AXLE & SUSPENSION

REMOVAL

1. Disassemble the rear brake.
(For details see the Brake section.)

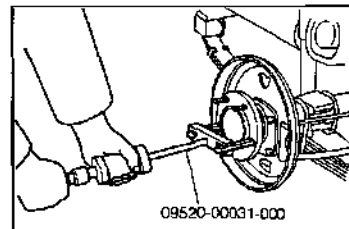
WP690-RS104

2. Remove the attaching nuts of the backing plate from the rear axle housing.



WP690-RS105

3. Remove the rear axle shaft, using the following SST.
SST: 09520-00031-000



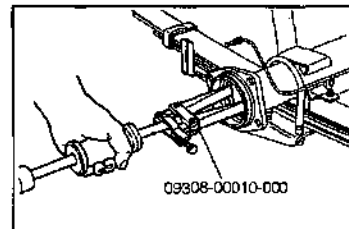
09520-00031-000

WP690-RS106

4. Remove the oil seal, using the following SST.
SST: 09520-00010-000

NOTE:

- Never reuse the oil seal.



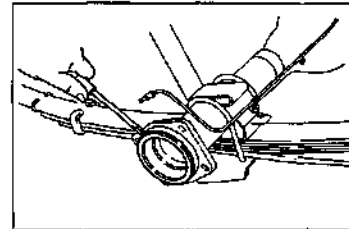
09520-00010-000

WP690-RS107

5. Remove the oil seal, using a screwdriver or the like.

NOTE:

- Never reuse the gasket.



WP690-RS108

REAR AXLE & SUSPENSION

DISASSEMBLY

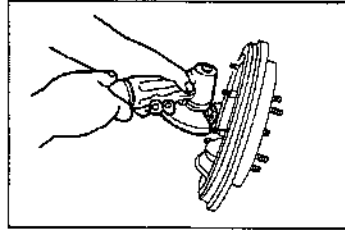
1. Grind off the retainer, using a hand grinder.

WARNING:

- Observe the operating instructions of the hand grinder. Also, be sure to wear goggles during the grinding.

NOTE:

- Do not grind the rear axle shaft.

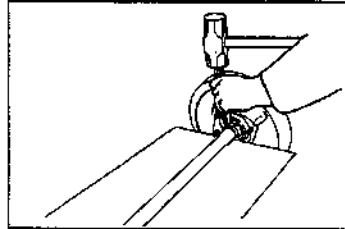


WF690-RS109

2. Split the retainer with a chisel.

WARNING:

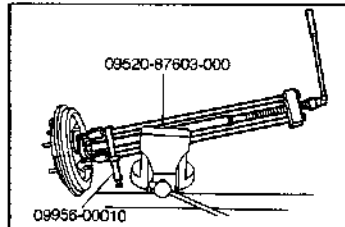
- Be sure to wear a pair of gloves and goggles during the operation.



WF690-RS110

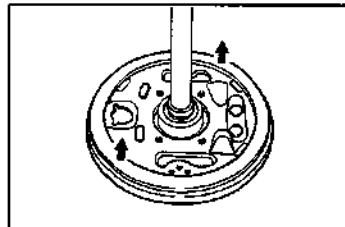
3. Remove the retainer and bearing, using the following SSTs in combination with a socket wrench.

SST: 09520-87603-000
09956-00010-000



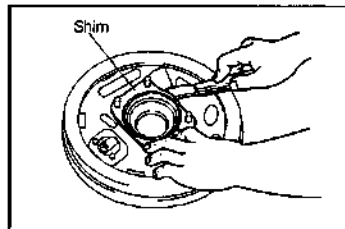
WF690-RS111

4. Remove the backing plate from the rear axle shaft.



WF690-RS112

5. Remove the shim from the backing plate.



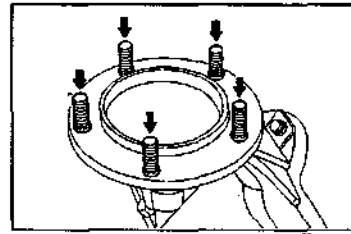
WF690-RS113

REAR AXLE & SUSPENSION

6. Drive off the hub bolt from the rear axle shaft with a plastic hammer or the like.

NOTE:

- Be very careful not to damage the screw section.



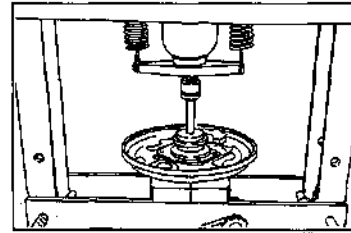
WP690-RS114

7. Remove the oil seal from the backing plate using the following SST in combination with a hydrolic press.

SST: 09608-87604-000

NOTE:

- Be sure to use the flat surface of the SST.



WP690-RS115

INSPECTION

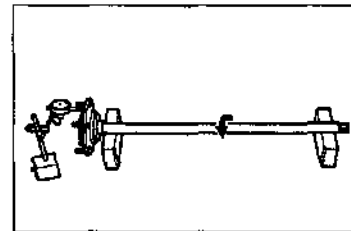
1. Rear axle shaft

- 1) Place the rear axle shaft on a "V" block. Ensure that the runout at the flange end surface is within the allowable limit.

Maximum Allowable Runout: 0.15 mm

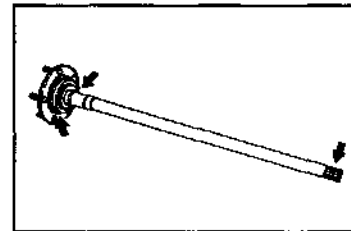
NOTE:

- This maximum allowable runout does not include the runout caused by roughness on the flange surface.
- If the flange surface exhibits roughness, finish the surface with abrasive paper or the like.



WP690-RS116

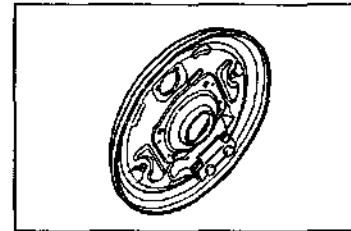
- 2) Ensure that the rear axle shaft spline section exhibits no damage, such as cracks and wear. If any damage exists, replace the rear axle shaft.
- 3) Ensure that the oil seal contact surface of the rear axle shaft exhibits no damage, such as cracks, scores and/or rust. If any damage exists, replace the rear axle shaft.
- 4) Ensure that the oil deflector exhibits no damage, such as deformation. If any damage exists, replace the rear axle shaft.



WP690-RS117

2. Backing plate

- Ensure that the backing plate exhibits no damage such as cracks, scores, rust and deformation. If any damage exists, replace the backing plate.



WP690-RS118

REAR AXLE & SUSPENSION

ASSEMBLY

1. Pack the back side of the lip section of the oil seal with specified amount of lithium-based MP grease.
Specified Amount: 5 grams
Specified Grease: Lithium-based MP grease
2. Apply a thin film of lithium-based MP grease to the lip surface of the oil seal.

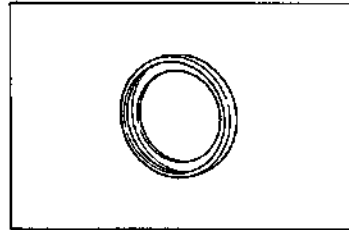
3. Drive the oil seal from the brake shoe attaching surface of the backing plate up to the wheel end surface of the backing plate, using the following SST.
SST: 09608-87606-000
09611-87506-000

NOTE:

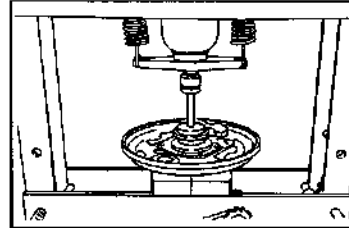
- At this time, the oil seal should be installed in such a direction that the brake shoe attaching surface comes at the inner side.
 - Be very careful not to allow the oil seal to tilt.
 - Install the oil seal so that its surface may come at the brake shoe side.
4. Drive the serration bolt into the backing plate with the cut-out section of the serration bolt aligned with the backing plate.

5. Drive the hub bolt into the rear axle shaft with the cut-out section of the hub bolt aligned to the rear axle shaft.

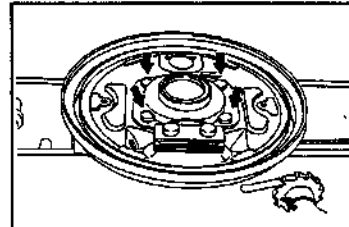
6. Selection of shim
 - 1) Measure the dimension A of the backing plate at four points which are diagonally opposite with each other.



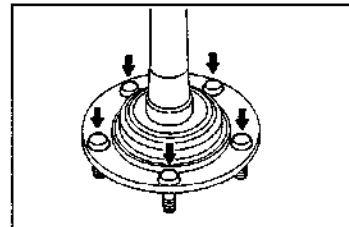
WFES0-RS119



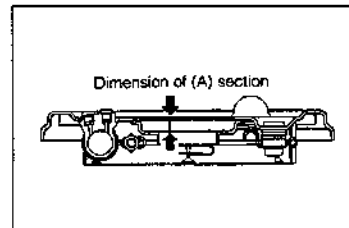
WFES0-RS120



WFES0-RS121



WFES0-RS122



WFES0-RS123

REAR AXLE & SUSPENSION

- 2) Calculate the mean value of the measured four dimensions. Select a shim which corresponds to the calculated value, referring to the table below.

Dimension A of backing plate mm	Suitable thickness of adjusting shim mm
14.4 - 14.65	0.50
14.66 - 14.90	0.25

7. Install the backing plate to the rear axle shaft.

NOTE:

- Be very careful not to damage the oil seal during the installation.

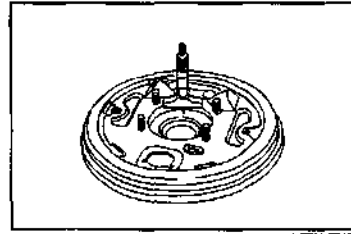
8. Pack the back surface of the oil seal with 5 grams of lithium-based MP grease.

9. Pack the rear axle bearing with lithium-based MP grease.

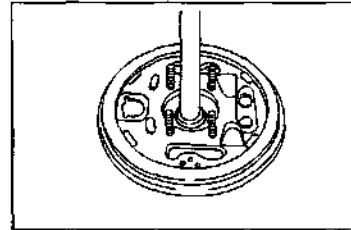
NOTE:

- Grease should not be applied only to the surface. After packing the bearing with grease, apply grease also to the surface.

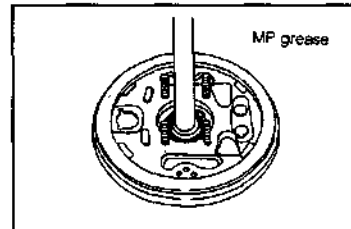
10. Install the rear axle bearing to the rear axle shaft.



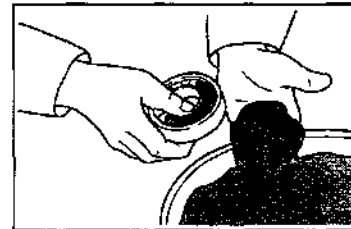
WFE00-RS124



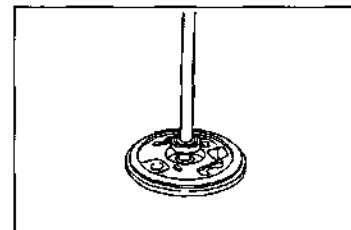
WFE00-RS125



WFE00-RS126



WFE00-RS127



WFE00-RS128

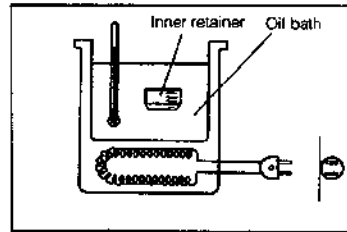
REAR AXLE & SUSPENSION

11. Installation of rear axle bearing retainer

NOTE:

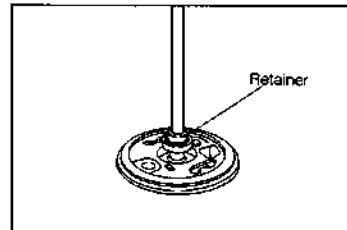
- Perform this operation promptly before the retainer temperature drops.

1) Heat the retainer to about $150 \pm 15^\circ\text{C}$



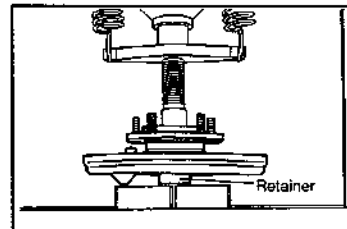
WPB30-RS129

2) Install the retainer to the rear axle shaft.



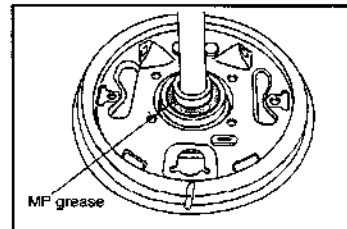
WPB30-RS130

3) Press the retainer into the rear axle shaft, using a hydraulic press.



WPB30-RS131

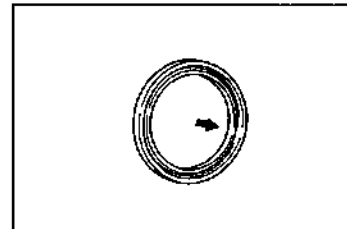
12. Apply 5 grams of lithium-based MP grease between the retainer and the bearing.



WPB30-RS132

INSTALLATION

1. Apply lithium-based MP grease to the lip section of the oil seal.



WPB30-RS133

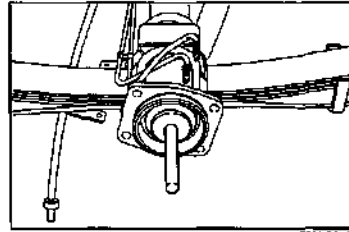
REAR AXLE & SUSPENSION

2. Press the oil seal into the rear axle housing, using the following SST.

SST: 09608-87607-000
09611-87506-000

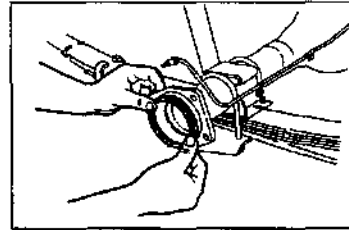
NOTE:

- Care must be exercised not to allow the oil seal to be tilted.
- The oil seal should be installed in such a way that the surface comes at the wheel side.



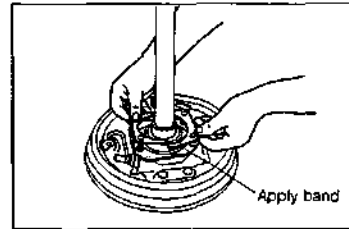
WP820-RS134

3. Install the gasket to the rear axle housing.



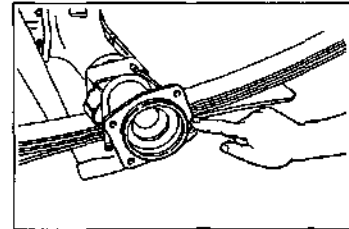
WP820-RS135

4. Apply a thin film of Three Bond 1104_e to the shim contact surface of the backing plate. Install the selected shim (at page RS-32) to the backing plate.



WP820-RS136

5. Apply a thin film of Three Bond 1104_e to the backing plate installing surface of the axle housing.

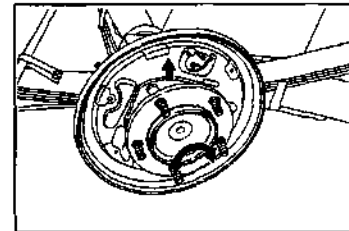


WP820-RS137

6. Insert the rear axle shaft into the rear axle housing. Install the backing plate to the rear axle in such a way that the attaching bolt of the backing plate is aligned with the attaching hole of the rear axle housing and that the wheel cylinder installing hole of the backing plate comes at the upper side.

NOTE:

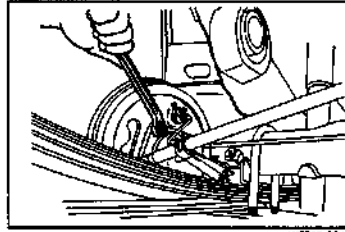
- 1) Turn the axle shaft so that the spline at the differential side may engage with the spline at the axle shaft side.
- 2) Be very careful not to damage the oil seals.



WP820-RS138

REAR AXLE & SUSPENSION

7. Attach the backing plate attaching nuts and tighten them to the specified torque evenly over two or three stages.
Tightening Torque: 39.2 - 49 N·m
(4.0 - 5.0 kgf-m, 28.9 - 36.2 ft-lb)












8. Assemble the rear brake.
(For details, see the Brake section.)

WFE90-RS140

REAR AXLE & SUSPENSION

SSTs (special service tools)

Shape	Parts No. and Name	Purpose	Remarks
	09308-00010-000 Oil seal puller	Removal of rear axle shaft oil seal	
	09520-00081-000 Rear axle shaft puller	Removal of rear axle shaft	
	09520-87603-000 Rear wheel bearing puller set	Removal of rear axle bearing	
	09608-87604-000 Front axle hub inner bearing outer race replacer	Removal of rear axle shaft oil seal	
	09608-87606-000 Rear axle shaft oil seal replacer	Installation of rear axle shaft oil seal	
	09608-87607-000 Leaf spring bush No.1 remover & replacer	Removal/installation of leaf spring bush No.1	
	09608-87608-000 Leaf spring bush No.2 remover & replacer	Removal/installation of leaf spring bush No.2	
	09611-87506-000 Handle	Used as a handle for rear axle shaft oil seal replacer	
	09956-00010-000 Tightening piece	Used in combination with rear wheel bearing puller set	

WPE80-RS141

REAR AXLE & SUSPENSION

TIGHTENING TORQUE

Tightening component	N·m	kgf·m	ft·lb
Rear spring shackle	68.6 - 88.3	7.0 - 9.0	50.6 - 65.1
Leaf spring x Frame	118 - 137	12 - 14	87 - 101
*U"bolt	58.8 - 78.5	6.0 - 8.0	43.4 - 57.9
Rear shock absorber x Frame	18.6 - 30.4	1.9 - 3.1	13.7 - 22.4
Rear shock absorber x "U" bolt seat	34.3 - 53.9	3.5 - 5.5	25.3 - 39.8
Rear shock absorber x shock absorber control bracket (Three stage damper only)	25.5 - 38.2	2.6 - 3.9	18.8 - 28.2
Rear axle housing x Backing plate	39.2 - 49.0	4.0 - 5.0	28.9 - 36.2
Rear spring bumper x Frame	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Rear shock absorber x Frame (Lock nut)	18.6 - 30.4	1.9 - 3.1	13.7 - 22.4
Shock absorber x Actuator (Three stage damper only)	2.0 - 3.9	0.2 - 0.4	1.4 - 2.9

WFE00-RS142

DAIHATSU

F300

BRAKE

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TROUBLE SHOOTING	BR-21
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SERVICE SPECIFICATIONS	BR-97
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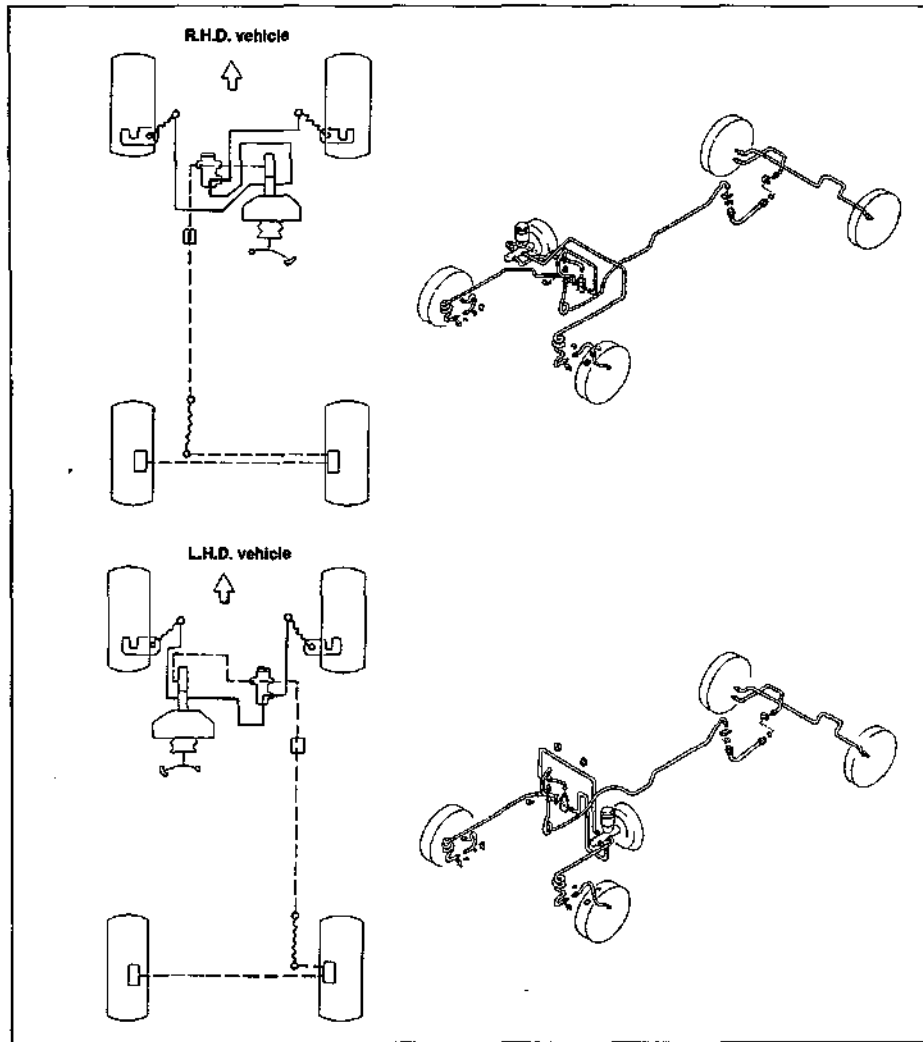
W7950-BR001

BRAKE

OUTLINE OF BRAKE SYSTEMS

BRAKE LINE

The brake line comes in two kinds; one for the R.H.D. vehicles and the other for the L.H.D. vehicles. On all models, the disc brake is provided at the front wheels, while the drum brake is installed at the rear wheels. The front and rear brake systems are operated through a proportioning valve. The brake pipe employs a two-winding copper tube, the inside of which is treated with Cu plating, while the outside is treated with Cu-Zn plating and resin coating as anticorrosion treatment.

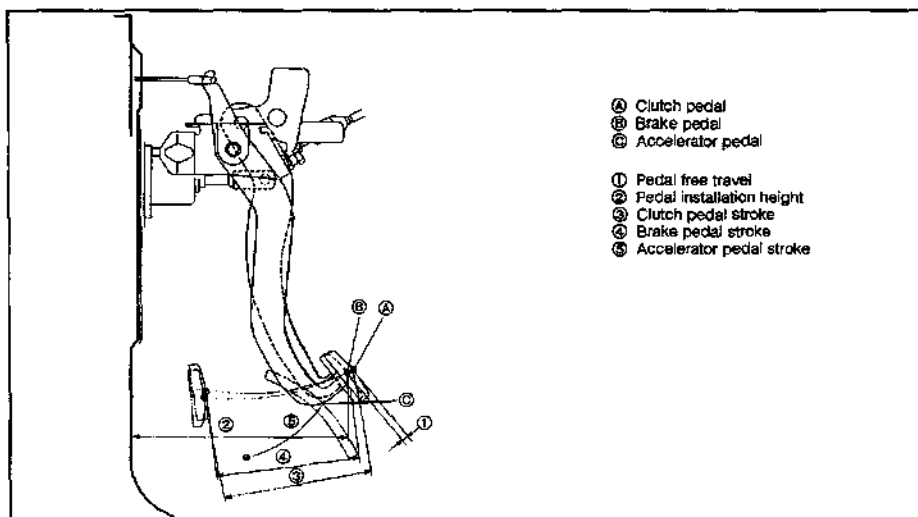


WF890-BP002

BRAKE

PEDALS

All the operating pedals, such as the clutch pedal, accelerator pedal and brake pedal, adopt a hanging type whose pedal fulcrum is provided at the pedal support located upward of each pedal.



WP590-3R003

Pedal-related specifications

Item \ Type		RHD	LHD	Remarks
Pedal installation height mm	Clutch	216 - 226	216 - 226	Measured with dash board vertical wall as reference.
	Brake	211 - 221	211 - 221	Measured from dash board steel sheet with silencer turned over.
Stroke mm	Clutch	150	150	<Accelerator pedal> Adjust in such a way that stopper bolt-to-pedal stopper clearance becomes 0 to 3 mm when throttle valve is opened fully.
	Brake	143	143	
	Accelerator	Carburetor-equipped vehicle	57	
		EFI-equipped vehicle	55	
Pedal free travel mm	Clutch	18 - 27	18 - 27	<Brake pedal> With engine stopped, depress brake pedal strongly several times so that vacuum no longer exists inside brake booster. Measure free travel by pushing pedal lightly with your finger.
	Brake	1 - 3	1 - 3	
	Accelerator	1 - 5	1 - 5	

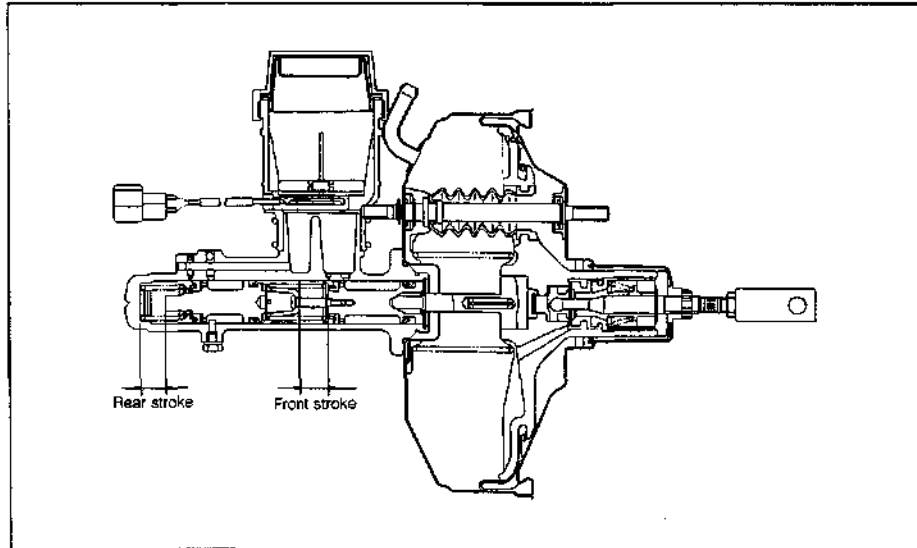
WP590-3R004

BRAKE

BRAKE BOOSTER & MASTER CYLINDER

The brake booster employs a direct acting brake booster having an 8-inch effective diameter in order that the pedal applying force may be reduced during the braking and the braking performance may be improved. The master cylinder is an aluminum alloy-made tandem master cylinder located inside the engine compartment.

The reservoir adopts a sealed type incorporating a diaphragm. In this reservoir, the brake fluid is shut from the atmosphere, thus preventing deterioration of the brake fluid and improving the reliability.



Brake booster

Diaphragm effective diameter	mm	203
Effective stroke	mm	31.5 or more
Servo ratio		3.5
Jumping amount	kgf	10 kgf

WFE90-BR006

Master cylinder

Stroke	Front	mm	18.5
	Rear	mm	11.5
Inner diameter		mm	22.22
Reserve tank capacity	Front	cc	16
	Rear	cc	12
	Portion shared in common	cc	114

WFE90-BR007

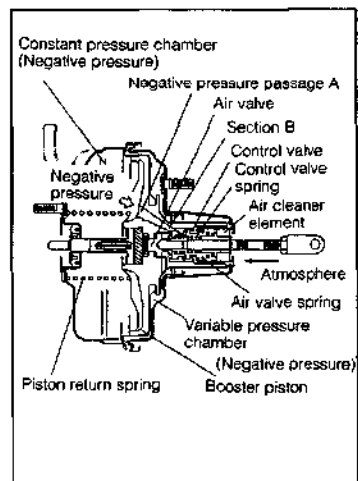
OPERATION OF BRAKE BOOSTER

Non-operating condition

The air valve is butted against the control valve by means of the control valve spring.

Therefore, the atmosphere that has passed through the air cleaner element is interrupted at the air valve and no air can enter into the variable pressure chamber.

Moreover, the air valve is pulled to the right by the air valve spring, until it contacts the valve stopper key. Also, the booster piston is apart from the control valve (because of the section B). As a result, the negative pressure of the constant pressure chamber is applied through the passage A also to the variable pressure chamber. Consequently, the booster piston is pushed to the right by the tension of the piston return spring.



VF80-BR006

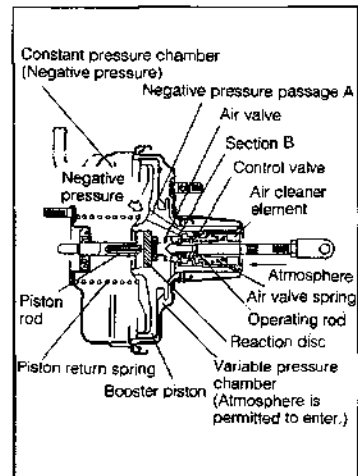
Jumping condition

When the brake pedal is depressed and the air valve spring tension is overtaken, the operating rod starts moving toward the left side. Finally, the control valve becomes butted against the booster piston (see the section B), thus closing the negative pressure passage A.

When the operating rod farther travels toward the left side, the control valve becomes apart from the air valve. Consequently, the atmosphere that has passed through the air cleaner element is permitted to enter into the variable pressure chamber. In this way, the booster piston begins moving toward the left side, thereby generating a booster output.

At this point, the reaction disc is compressed between the booster piston and the piston rod because of a gap which has been already provided between the air valve and the reaction disc. Then, the compressed reaction disc changes its shape in such a way that the gap between the air valve and the reaction disc may be filled with the reaction disc. As a result, no reaction force from the master cylinder is transmitted to the air valve, until the reaction disc contacts the air valve.

The booster output at this point is represented as the jumping amount.



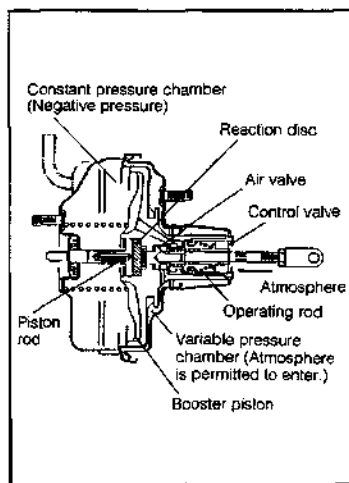
VF80-BR009

BRAKE

Operating condition

The deformation of the reaction disc that was being compressed between the booster piston and the piston rod further progresses and the reaction disc eventually makes contact with the air valve.

When the pedal applying force increases further from this condition and the operating rod travels farther toward the left, the air valve and control valve are held apart from each other, thus permitting the atmosphere to enter into the variable pressure chamber continually. Consequently, the power assist of the booster increases further and the hydraulic pressure of the master cylinder, too, continues to rise.



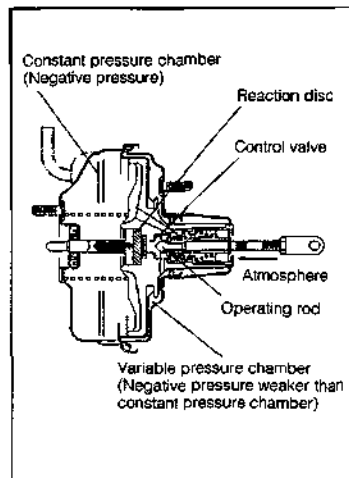
WPB30-69010

Holding condition

When the force being applied to the operating rod (the pedal applying force) is kept at a constant value, soon the control valve and air valve are closed, thereby stopping the atmosphere flow to the variable pressure chamber.

As a result, the power assist of the booster piston becomes stabilized.

When the pedal applying force and power assist become stabilized, the force being applied to the reaction disc also becomes a constant value. Furthermore, the hydraulic pressure of the master cylinder becomes equal to the force which is transmitted from the reaction disc. This condition of equilibrium continues until any change in the pedal applying force occurs.



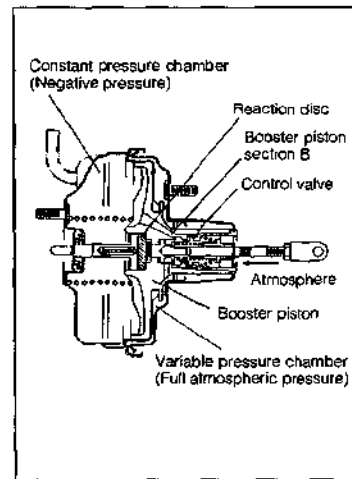
WPB30-69011

Maximum power assist condition

When the pedal applying force increases further, the variable pressure chamber eventually is filled with the atmosphere, thereby fully reaching to the atmospheric pressure.

At this point, the differential pressure that is applied to the booster piston reaches to the maximum value. In this way, the power assist of the booster also reaches its limit.

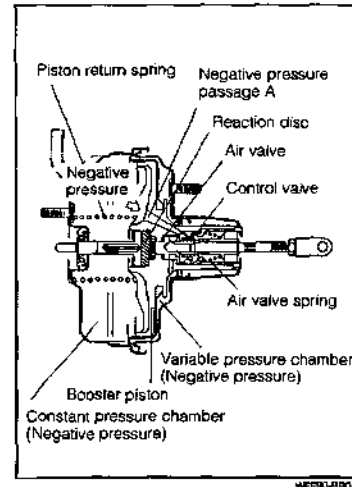
Simultaneously, the movement of the control valve also is restricted. Consequently, a condition where the control valve is held closely against the booster piston (section B) is retained. If the pedal applying force is increased further from this condition, this additional force is added to the reaction disc. As a result, the hydraulic pressure of the master cylinder also rises, corresponding to that additional portion of force.



Released condition

As the pedal applying force decreases, the force equilibrium condition between the reaction disc and the air valve is lost, thereby pushing back the air valve toward the right side. Then, the air valve makes contact with the control valve, thus interrupting the atmosphere circuit from the air cleaner to the variable pressure chamber. Simultaneously, the control valve also moves toward the right side by the function of the air valve spring.

Hence, the negative pressure of the constant pressure chamber is now applied to the variable pressure chamber through the passage A. When the difference in pressure between the constant pressure chamber and the variable pressure chamber no longer exists because of the negative pressure supplied from the constant pressure chamber, the booster piston completely returns to the original position owing to the tension of the piston return spring.

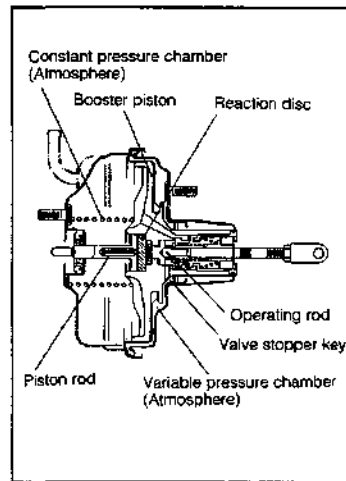


BRAKE

In case where no negative pressure is available:

In instances where no negative pressure is applied to the booster owing to some troubles, both the constant pressure chamber and variable pressure chamber remain under the atmospheric pressure condition, thereby offering no power assist. Nevertheless, when the brake pedal is depressed and the operating rod travels toward the left side, a force is applied to the piston rod from the air valve through the reaction disc.

At this time, the air valve also pushes the valve stopper key, which is inserted into the booster piston, to the left. Then, the force overcomes the tension of the piston return spring and moves the booster piston to the left. As a result, a hydraulic pressure is generated in the master cylinder. In this way, the braking performance of the vehicle is assured at all times.

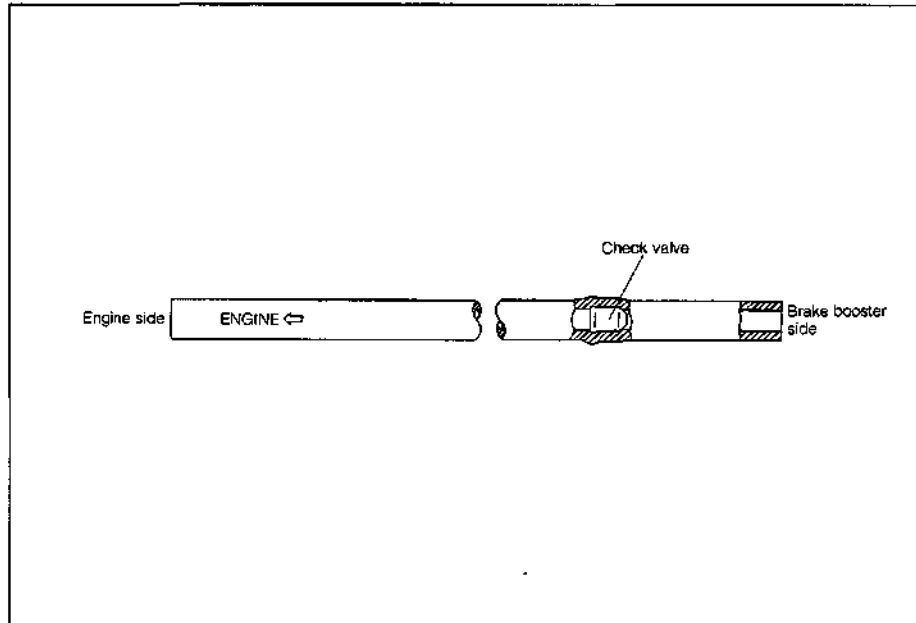


WPC80-BR014

VACUUM HOSE

The vacuum hose provided between the engine suction system and the brake booster incorporates a check valve.

The vacuum hose bears a letter "ENGINE ←" The arrowheaded direction must face toward the engine side.



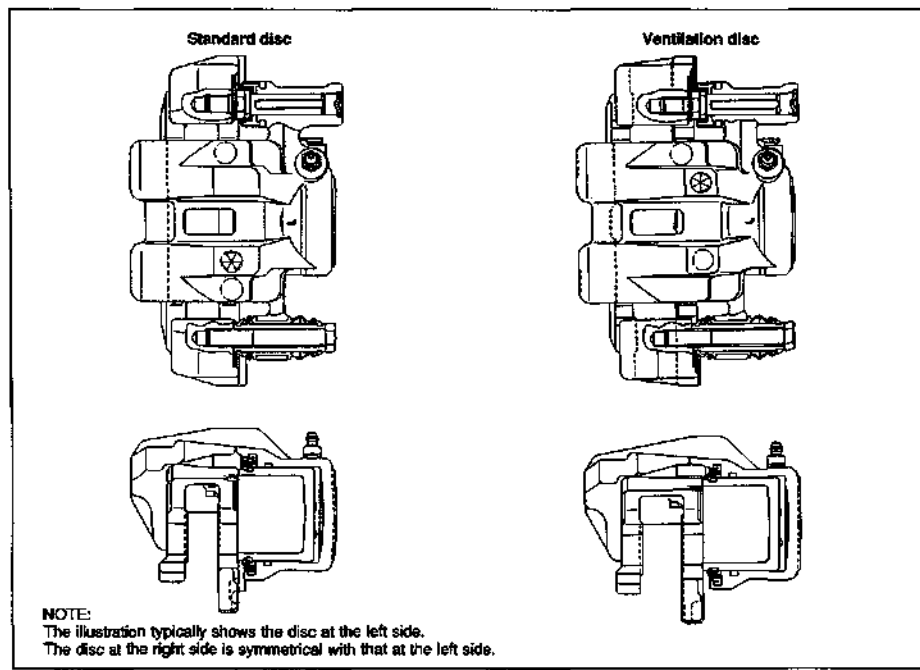
WVJ50-BR015

FRONT BRAKE

The front brake employs a disc brake. A ventilation disc is available as optional equipment. The ventilation disc features stable braking force during the braking at high speed running.

The disc brake caliper is also available both for the standard disc and for the ventilation disc.

The flexible hose joint adopts a gasket type. It is, therefore, necessary to use a new gasket at the time of re-assembling.



WPE90-BR015

Front brake specifications

Item		Type	Standard disc	Ventilation disc
Cylinder	Diameter	mm	53.97	53.97
	Area	cm ²	22.89	22.89
Brake effective radius		mm	R115	R115
Rotor	Outer diameter	mm	277	277
	Clearance between pads	mm	12.5	18.0
Pad	Thickness	mm	9	9
	Area	cm ²	48.6	48.6
	Materials		AK NS101 (Asbestos-free)	AK NS101 (Asbestos-free)

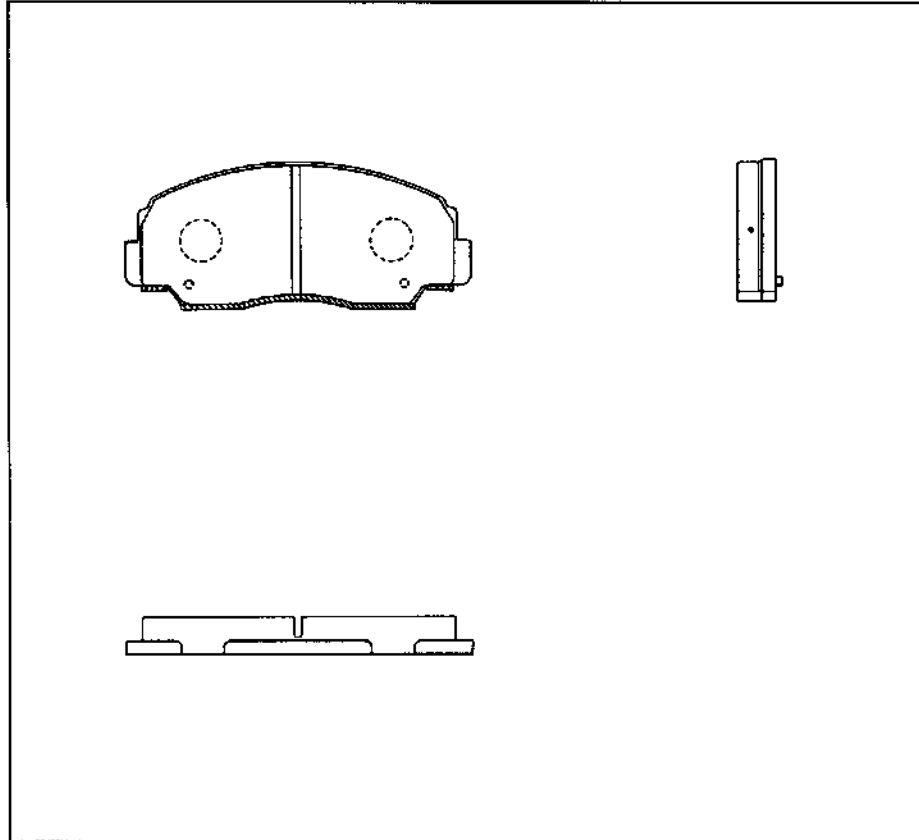
WPE90-BR016

BRAKE

DISC BRAKE PADS

The disc brake pad comes in two kinds according to materials: AK S405 (asbestos) and AK NS101 (Asbestos-free). The disc brake pad is used selectively depending upon its destination.

As regards the disc brake pads, both the standard disc and ventilated disc employ a brake pad having the same shape.



WFE90-BR017

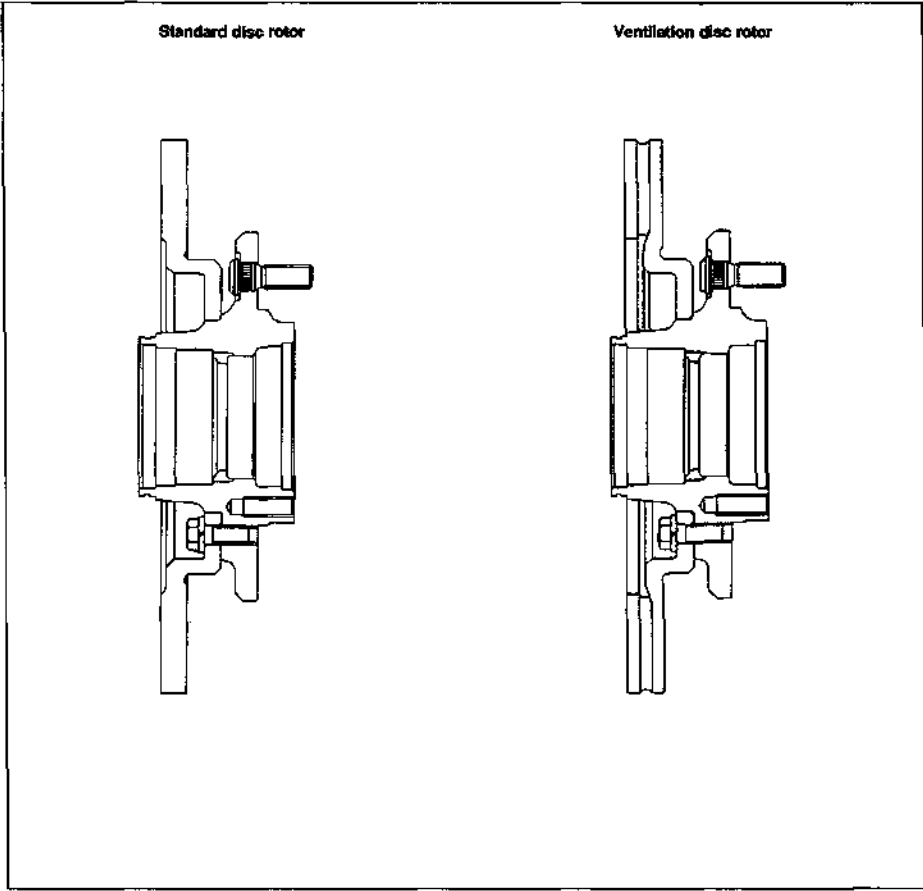
Disc brake pad specifications

Pad thickness	mm	9
Lining area	cm ²	48.6
Materials	AK NS101 (Asbestos-free)	

WFE90-BR018

DISC ROTORS

As for the disc rotor, a solid type disc rotor is standard, whereas a ventilated disc rotor having improved heat fade-resistance is optional equipment.



WFE93-BR019

Disc rotor specifications

Item	Type	Standard disc rotor	Ventilation disc rotor
Disc rotor outer diameter	mm	277	277
Disc rotor thickness	mm	12.5	18.0

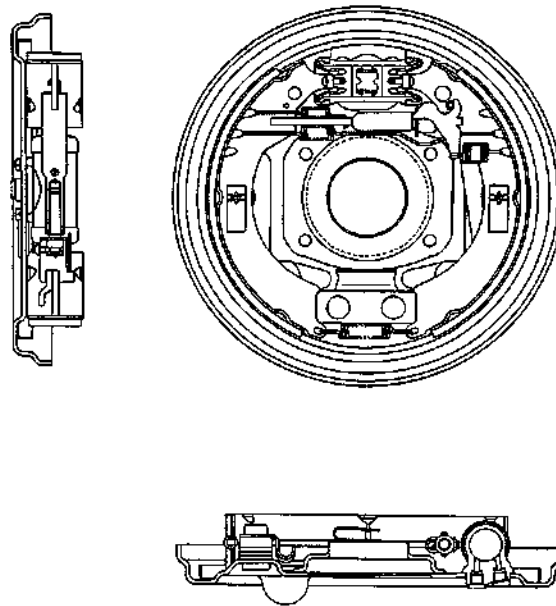
WFE93-BR020

BRAKE

REAR BRAKE

The rear brake is a leading and trailing type, in which the virtually same braking effectiveness can be attained both during the forward and reverse movement of the vehicle.

The parking brake is built inside the rear brake system, where the automatic adjuster of the rear brake shoe functions when the parking brake lever is actuated.



NOTE:

The illustration typically shows the brake at the right side.

The brake at the left side is symmetrical with that at the right side except for the wheel cylinder bleeder plug section.

WPB0-BP01

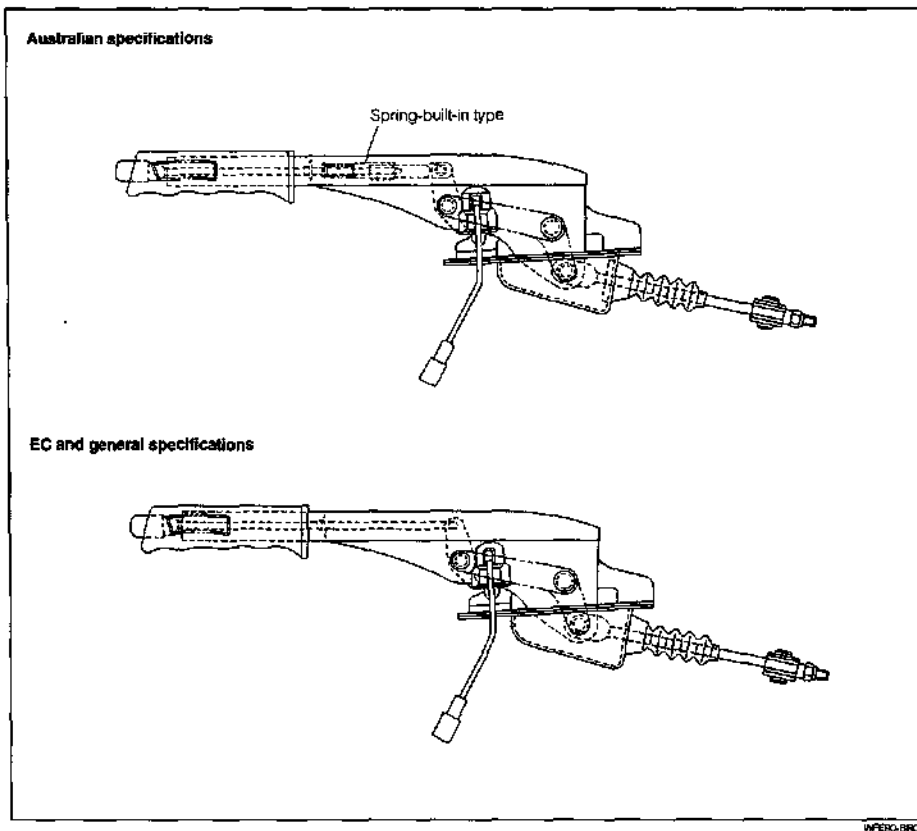
Rear brake specifications

Lining dimensions (Length x width x Thickness)	mm	266 x 44.0 x 5.0
Lining area	cm ²	117 x 2-piece x 2-wheel
Material		AK L610 (asbestos-free)
Brake drum inner diameter	mm	φ254
Wheel cylinder bore diameter	mm	φ22.22

WPB0-BP02

PARKING BRAKE

The parking brake is a mechanically-operated, rear wheel braking type. The parking brake lever is located at the center between the right and left front seats. The cable adjustment method employs a center lever type which can be adjusted from the passenger room exterior. The parking brake comes in two kinds; one for the EC and general specifications and the other for the Australian specifications.



WFE90-BR023

Parking brake specifications

Type	Mechanically-operated, wheel braking type		
Braked wheel	Two rear wheels		
Lining	Area	cm ²	117 x 2-piece x 2-wheel
	Material		AK L610 (asbestos-free)
	Dimensions	mm	265.9 x 44.0 x 5.0
Brake drum inner diameter		mm	φ254

WFE90-BR024

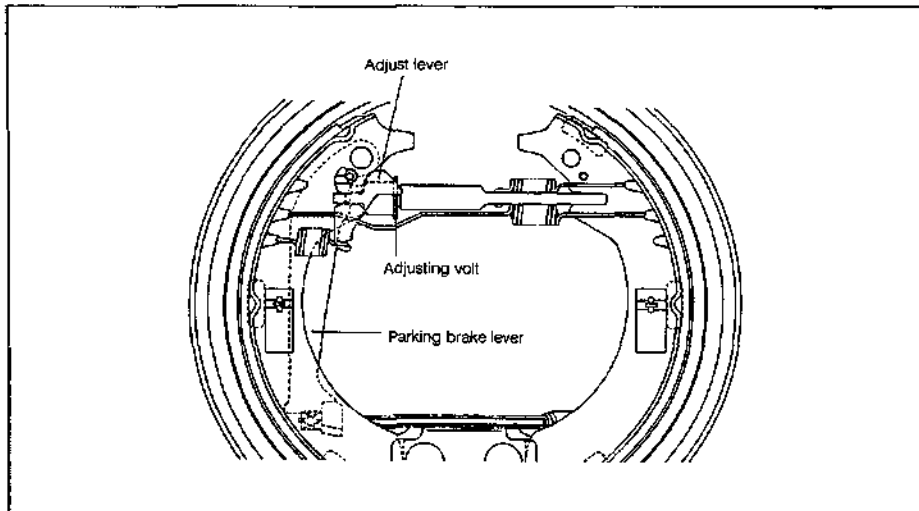
BRAKE

Operation of automatic adjuster

The automatic rear brake shoe clearance adjuster is activated when the parking brake is operated. As shown in the figure below, the adjuster adjust lever is fixed to the parking brake lever.

This adjust lever serves to hold the adjuster teeth, thus locking it in place. It acts in such a manner as causes the adjuster teeth to advance when the parking brake is applied. If the shoe clearance is normal, the amount of shift of the adjust lever is not big enough to move one tooth of the adjuster. But if the lining is worn and the shoe clearance is bigger, the lever operating angle is big, and as a result, the amount of shift of the adjust lever is big enough to cause the adjuster to advance by one tooth.

Thus normal shoe clearance is maintained.

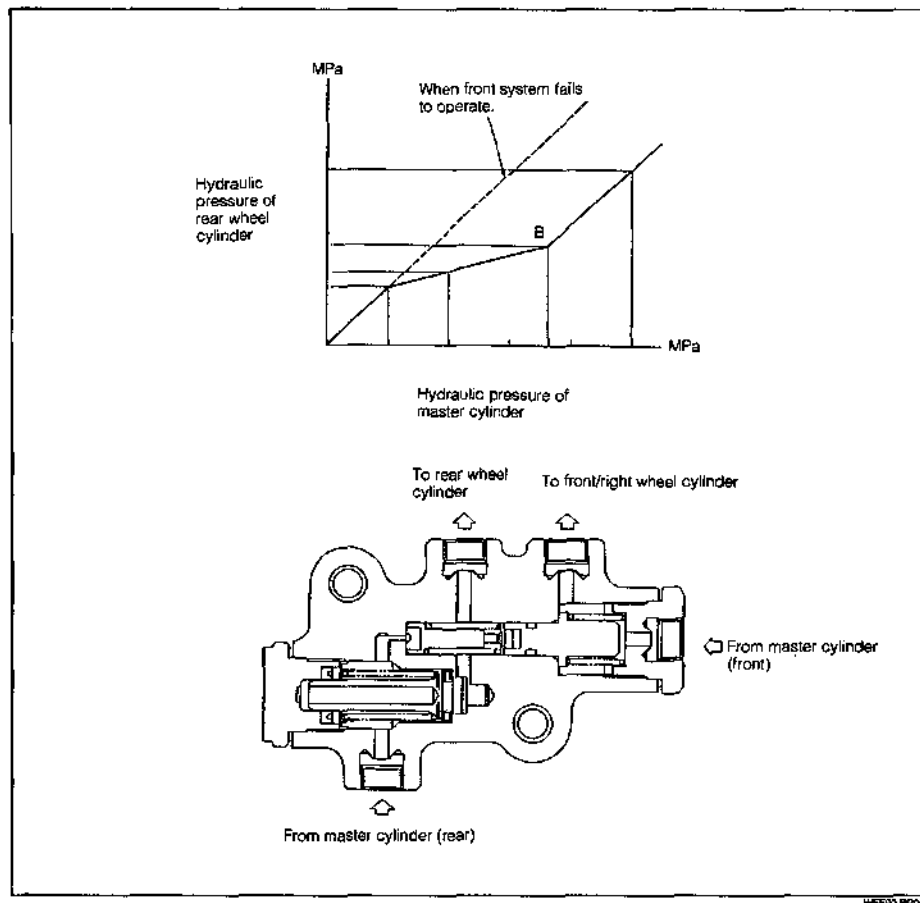


P & B VALVE (Proportioning & By-pass Valve)

A "P & B" valve is provided in the brake line between the front and rear wheel brake systems. The purpose of the P & B valve is to assure braking stability by distributing the braking forces of the front and rear wheels at an optimum ratio. The P & B valve is provided with a mechanism whereby the hydraulic pressure of the rear wheel cylinder bypasses the proportioning valve and is applied directly to the rear wheel cylinder in the event that the front brake system is encountered with a malfunction.

The proportioning valve employs a secondary turning point type.

In addition to the normal proportioning valve functions, the secondary turning point type proportioning valve has such characteristics that the hydraulic pressure ratio for the rear wheels is increased again at a middle point (point B in the figure below) in the hydraulic pressure characteristics diagram. This increase is necessary because the braking forces become insufficient for the rear wheels due to greater rear wheel load when the vehicle is loaded fully.

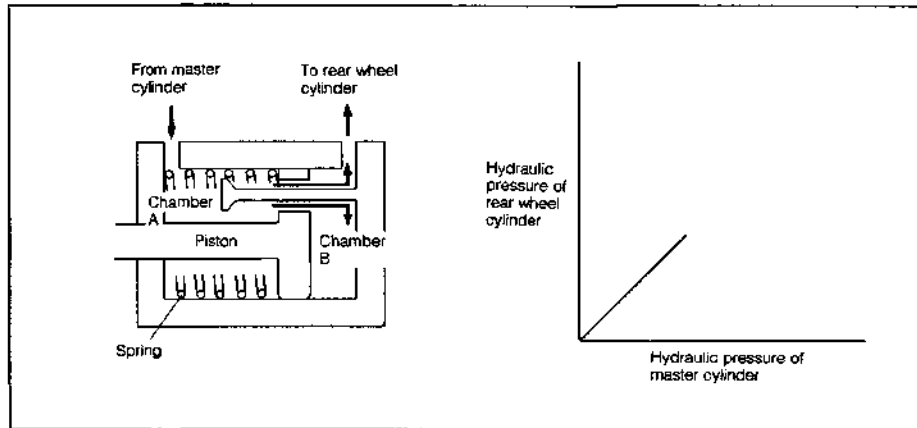


BRAKE

DESCRIPTION OF P & B VALVE OPERATION

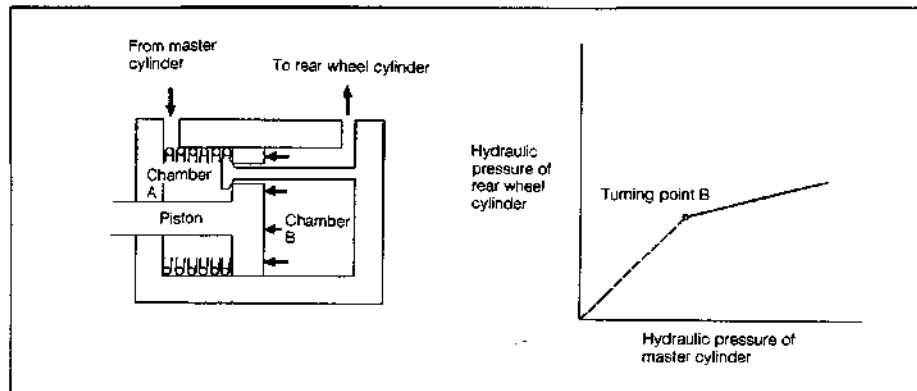
Operation principle of proportioning valve

1. The hydraulic pressure from the master cylinder is applied through the chamber A to the chamber B, as shown in the figure below. The same pressure is applied to both the chambers A and B. Since the hydraulic pressure-receiving area of the chamber A is smaller than that of the chamber B, the piston moves to the left. Hence, while the piston is moving, the hydraulic pressure of the master cylinder is equal to that of the rear wheel cylinder.



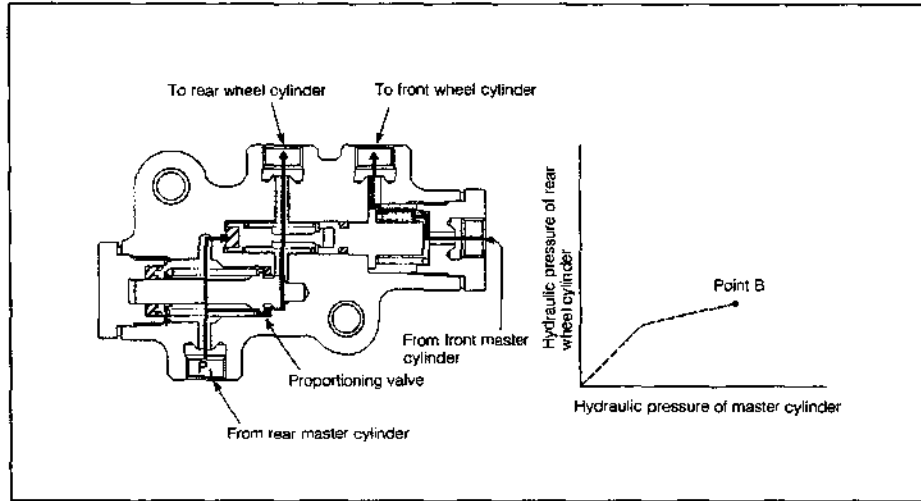
2. The piston further moves to the left, until the chamber A and the chamber B are shut off completely, thus attaining a balance in pressure. This state is accomplished at a turning point B in the figure below.

As the hydraulic pressure from the master cylinder continues to rise and the pressure in the chamber A also increases, the piston moves to the right and the valve becomes open. Then, the pressure in the chamber B increases, until the hydraulic pressure of the chamber A equals to that of the chamber B. At this point, the piston, in turn, moves to the left due to the difference in surface area between the chamber A and the chamber B. These operations are repeated, thus making it possible to produce a difference in pressure between the master cylinder and the rear wheel cylinder.

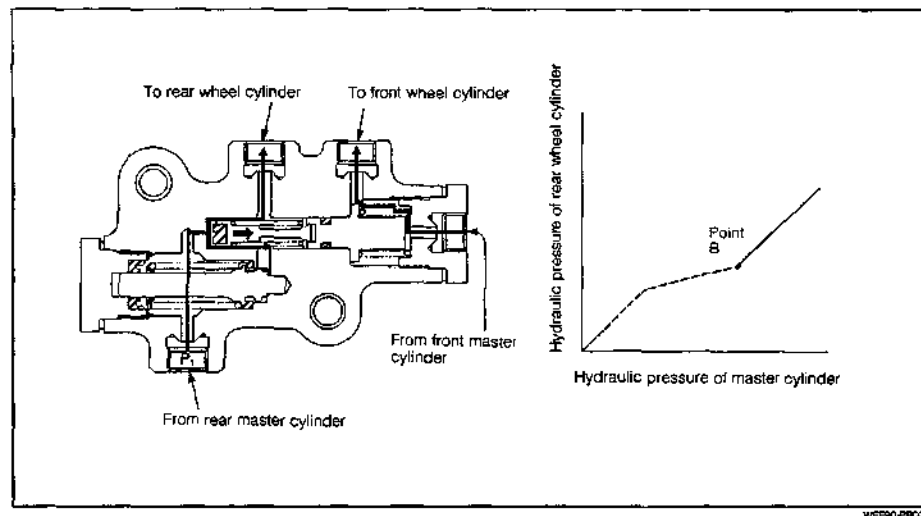


Operation principle of secondary turning point

1. The hydraulic pressure of the rear master cylinder is reduced by the proportioning valve and is applied to the rear wheel cylinder. As the pressure P_1 shown in the figure below rises gradually, the pressure overcomes the spring tension of the by-pass valve. This takes place at a point B in the figure below.



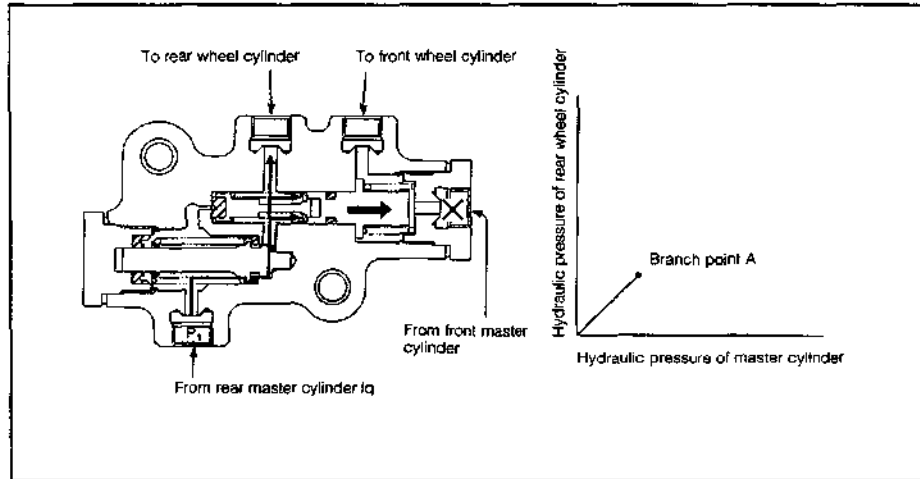
2. The hydraulic pressure of the rear master cylinder which has overcome the spring tension of the by-pass valve is applied to the rear wheel cylinders through the by-pass valve directly rather than through the proportioning valve. As a result, the hydraulic pressure again begins to increase, as shown in the figure below.



BRAKE

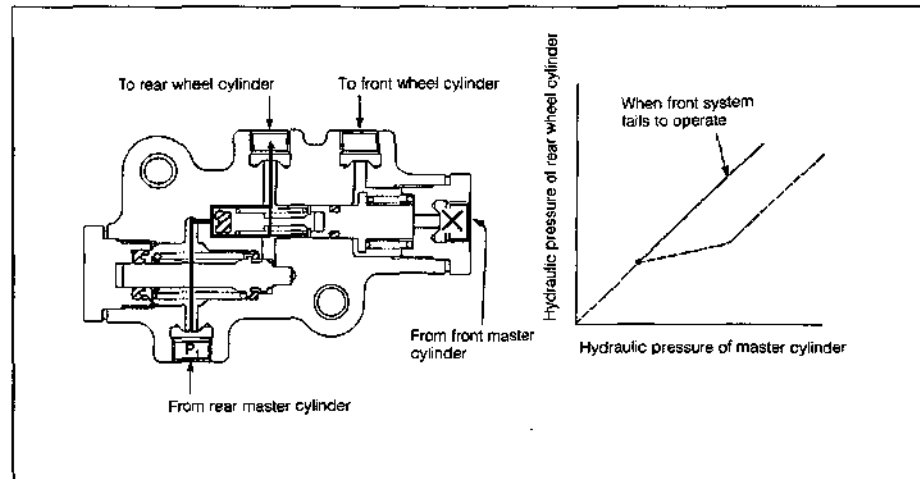
Operation principle of by-pass valve

1. If the front brake system should fail to operate due to some reasons, the hydraulic pressure applied to the front wheel cylinders drops. Then, the hydraulic pressure P_1 which has been applied to the rear wheel cylinder overcomes the spring tension of the by-pass valve, thus causing the by-pass valve to start moving to the right. This operation takes place at a branch point A in the figure below.



2. Inasmuch as the hydraulic pressure of the front wheel cylinder drops, the by-pass valve moves to the right.

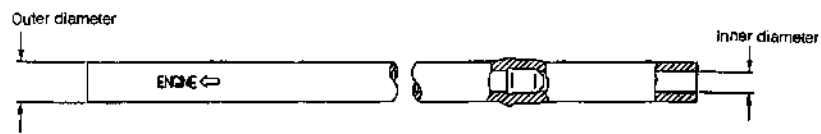
This by-pass valve's movement to the right forms a by-pass circuit for the hydraulic pressure of the rear wheel cylinders. Hence, the pressure is no longer reduced by the proportioning valve and is applied directly to the rear wheel cylinders. As a result, no turning point exists, as shown in the figure below.



VACUUM CHECK VALVE

The vacuum check valve is built inside the vacuum hose.

The vacuum hose bears a mark of "ENGINE ⇐", which indicates that the arrow headed direction must point toward the engine.



WFE90-6RC33

Vacuum hose specifications

Shape	EFI	RH LH	Straight tube hose Molded hose
	Carburetor	RH LH	Molded hose Molded hose
Outer diameter		mm	17.46
Inner diameter		mm	8.73

WFE90-6RC34

BRAKE

PRECAUTION

Brake piping-related items

1. Never assemble the brake tube by deforming it purposely.
2. When tightening the flare nut, torque it to the specified value, while retaining the way section or the hose union section by means of a spanner or the like.

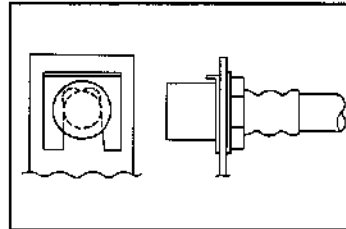
Tightening Torque: 12.7 - 17.7 N·m (1.3 - 1.8 kgf-m, 9.4 - 13.0 ft-lb)

3. Be sure to clamp bending clamps (winding clamps) in such a way that there is no displacement in relation with the brake tube.
4. Care must be exercised to ensure that clamps are installed without deforming the brake tube.
5. Be certain to install clamps in such a way that no gap is formed between the brake tube and the clamp.
6. Be very careful not to get brake fluid and/or mineral oil (e.g. grease and shock absorber oil) to the brake hoses and/or brake tubes.
If such fluid or lubricant, etc. should get to these parts, be sure to wipe it off immediately.
7. Make sure that the flexible hoses are not assembled in a twisted state.
However, if the hexagonal section of the flexible hose is not aligned with the groove of the bracket, it is permissible to twist the flexible hose within the allowable angle.

Allowable Angle: Not to Exceed 30 Degrees

WP530-BR025

8. As regards the installation of clips, positively insert the clip from the direction as indicated in the right figure, until the protruded section provided at the central part of the clip contacts the hose union, as indicated in the right figure.
9. Do not reuse the clips.
10. After completion of brake air bleeding, depress the brake pedal at a force of 25 kgf and hold the pedal in a depressed state. Make sure that the brake system exhibits no fluid leakage.
11. Be very careful not to scratch the brake hose and/or brake tube surfaces.



WP530-BR026

Parking brake-related items

1. Special caution must be paid so as not to scratch the cable.
2. Make sure not to deform the cable forcibly.
3. Be very careful not to damage the boot section.
4. Do not remove the boot.
5. Ensure that the boot is not detached.
6. As regards the parking brake switch, ensure that the switch functions positively at the first notch. Also, ensure that the switch makes correct contact with the parking brake lever attaching bolt when the parking brake lever is returned to the original position.
7. As for the section where the parking brake cables are crossed with each other, make sure that there exists a gap of at least 20 mm between the cables under the unloaded state of the vehicle.

WP530-BR027

BRAKE SYSTEM

TROUBLE SHOOTING

Symptom	Possible causes	Checking points
Brake juddering	Runout of front disc rotor Rear brake drum out-of round	Check disc rotor for runout. Check rear brake drum.
Improper height of brake pedal	Brake pedal improperly installed or adjusted	Check installation height of brake pedal.
Abnormal noise	Brake pedal emitting abnormal noise Disc pad improperly installed Brake shoe improperly installed Disc rotor bearing damaged or improperly lubricated Dust cover distortion	Check brake pedal for proper lubrication. Check disc pad. Check brake shoe. Check disc rotor bearing. Check dust cover.
Car pulls to one side on application of brakes.	Faulty disc pad or brake shoe Disc pad and brake shoe contaminated by lubricant, etc. Attachment curvature of parking brake cable too sharp	Check pad or shoe. Check pad or shoe. Check parking brake cable.
Low or spongy brake pedal	Air trapped in brake line	Perform air bleeding operation.
Brake will not work effectively.	Brake fluid leaky Brake vacuum line leaky	Check brake tube, etc. Check brake vacuum line.

WFE90-BRC03

CHECK OF BRAKE SYSTEM

1. Check of brake pedal height

Measure the distance between the center of the pedal applying surface and the dash panel surface which is in parallel to the brake pedal applying center surface. Ensure that the measured value complies with the specifications. Also, ensure that the center of the brake pedal surface is located higher than the center of the accelerator pedal surface by 40 ± 6 mm in the case of the R.H.D. vehicle; 47 ± 6 mm in the case of the L.H.D. vehicle.

Specified Brake Pedal Height: 216 ± 5 mm

If not, adjust the brake pedal height. (See page BR-26.)

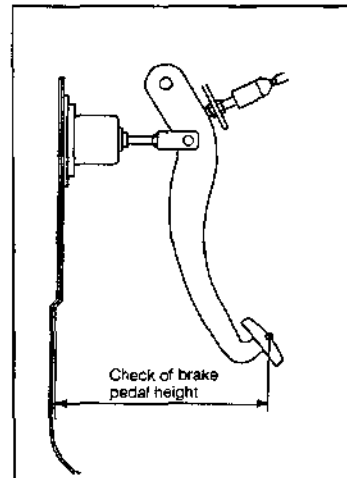
2. Check of brake pedal free travel

(1) After stopping the engine, depress the brake pedal firmly four or five times so that no vacuum may remain in the brake booster.

(2) Measure the brake pedal free travel by pushing the brake pedal lightly with fingers. Ensure that the free travel is with the specifications.

Specified Value: 1 - 3 mm

If not, adjust the brake pedal free travel.
(See page BR-26.)



WFE90-BRC09

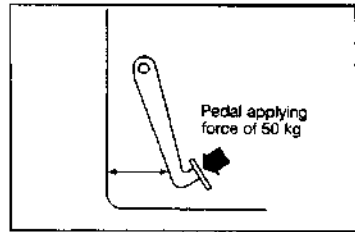
BRAKE

3. Check of brake pedal reserve travel

- (1) With the engine running at the idling speed and with the parking brake lever released, apply the specified load to the brake pedal. Measure the distance between the center of the brake pedal applying surface and the lower end of the dash panel. Ensure that the distance complies with the specifications.
Specified Load: 50 kgf
Specified Value: 80 mm or more

If the measured value is lower than the specified value, check the air bleeding condition and/or check and repair the brake automatic adjustment system.

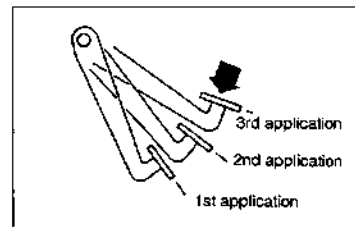
- (2) When the brake pedal is held under the specified load in (1), ensure that the height of the brake pedal applying surface remains unchanged.
If the brake pedal applying surface drops, check the brake fluid for leakage and/or repair the brake fluid leakage, as required. Moreover, perform the brake master cylinder overhauling, as required.



WPB90-BRD40

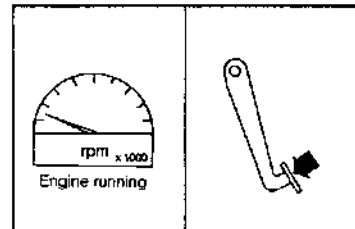
4. Check of brake booster

- (1) Check of brake booster air-tight performance
 - ① Start the engine. After allowing the brake booster to hold negative pressure, stop the engine.
 - ② Depress the brake pedal several times, applying force used during normal brake applications and allowing at least five seconds between each application. Ensure that the position of the brake pedal rises progressively at the second and third applications.



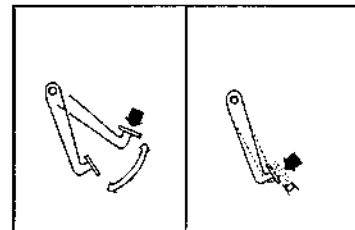
WPB90-BRD41

- (2) Check of brake booster air-tight performance under loaded condition
With the engine running, depress the brake pedal. While maintaining this condition, stop the engine. Ensure that no change in the pedal height occurs in about 30 seconds.



WPB90-BRD42

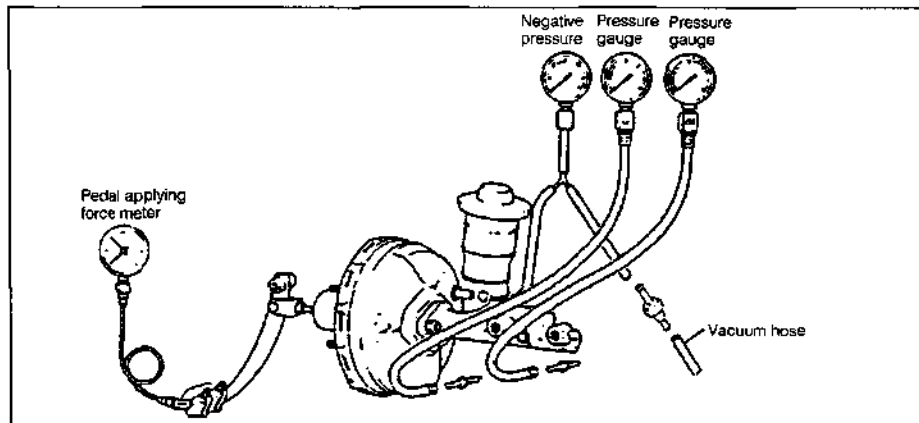
- (3) Check of booster operation
 - ① With the engine stopped, depress the brake pedal several times, until the brake pedal height will not vary at each application.
 - ② With the engine stopped, depress the brake pedal. While maintaining the same applying force, start the engine. If the brake pedal moves in slightly, it indicates that the booster operates satisfactory.



WPB90-BRD43

5. Check employing portable brake booster tester

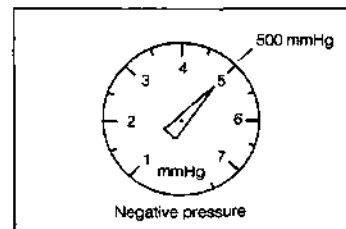
(1) Connect the portable brake booster tester, as indicated in the figure. Perform air bleeding.



WFE90-BR044

(2) Check of booster air-tight performance

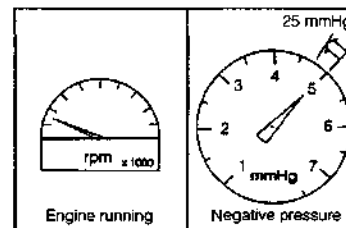
- ① Start the engine. Apply a negative pressure of 500 mmHg to the brake booster.
- ② Stop the engine. Ensure that no negative pressure drops for 15 seconds after the engine has stopped. If not, check the check valve and brake booster.



WFE90-BR045

(3) Check of booster air-tight performance under loaded condition

- ① Start the engine.
- ② Depress the brake pedal with a force of 20 kgf.
- ③ Apply a negative pressure of 500 mmHg to the booster.
- ④ Stop the engine.
- ⑤ Ensure that the negative pressure drop does not exceed 25 mmHg after the engine has stopped. If not, repair the brake booster.



WFE90-BR046

(4) Check of brake hydraulic pressure

- ① With the engine stopped, depress the brake pedal several times so that no negative pressure may not apply to the brake booster.
- ② Ensure that the hydraulic pressure is obtained in accordance with the pedal applying force, as indicated in the right table. If not, check the air bleeding condition.

Pedal applying force kgf	Hydraulic pressure kgf/cm ²
10	0 - 5
20	8 - 18
30	19 - 29

WFE90-BR047

BRAKE

(5) Check of booster operation

- ① Start the engine.
- ② Set the booster negative pressure to 500 mmHg. Ensure that the hydraulic pressure is obtained in accordance with the pedal applying force. If not, repair the brake booster.

Pedal applying force kgf	Hydraulic pressure kgf/cm ²
5	6 - 14
10	24 - 34
20	63 - 73
30	74 - 84

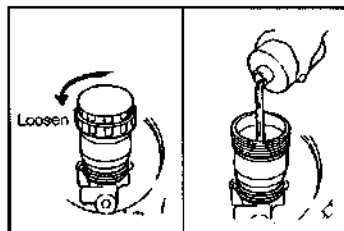
WFE20-BR048

Air bleeding of brake system

1. Filling brake fluid

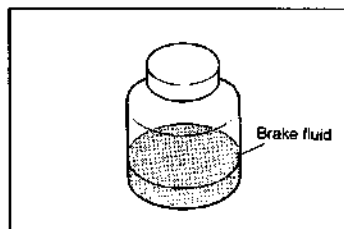
Fill the brake reservoir tank with the specified brake fluid to the full level. Maintain the full level at all times during the brake air bleeding.

Specified Brake Fluid: DOT 3 or SAEJ 1703



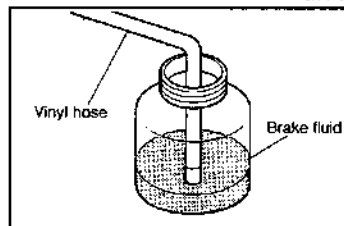
WFE20-BR049

2. Prepare an adequate container for the air bleeding. Fill a small amount of brake fluid in the container.



WFE20-BR050

3. Detach the air bleeder cap connect one end of a suitable vinyl hose to the air bleeder plug. Insert the other end of the vinyl hose into the prepared container in such a way that the vinyl hose may be submerged in the brake fluid in the container. Start this air bleeding operation at the brake which is located at the furthestmost point from the master cylinder.

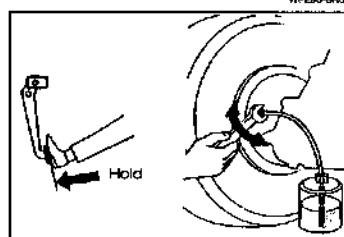


WFE20-BR051

4. Air bleeding

This operation should be performed by two persons.

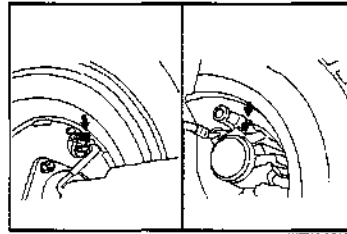
- (1) One person depresses the brake pedal several times and hold it in a depressed state.
- (2) The other person loosens the air bleeder plug 1/3 through 1/2 turn to bleed the air. Tighten the plug again.
- (3) Repeat the steps (1) and (2), until no air or bubble comes from the air bleeder plug.
- (4) Start the engine. Repeat the steps (1) and (2), until no air or bubble comes from the air bleeder plug. (Rear-ABS equipped vehicle only)



WFE20-BR052

BRAKE

5. Tighten the air bleeder plug to the specified torque.
Tightening Torque: 8.8 - 12.7 N·m
(0.9 - 1.3 kgf·m, 6.5 - 9.4 ft·lb)



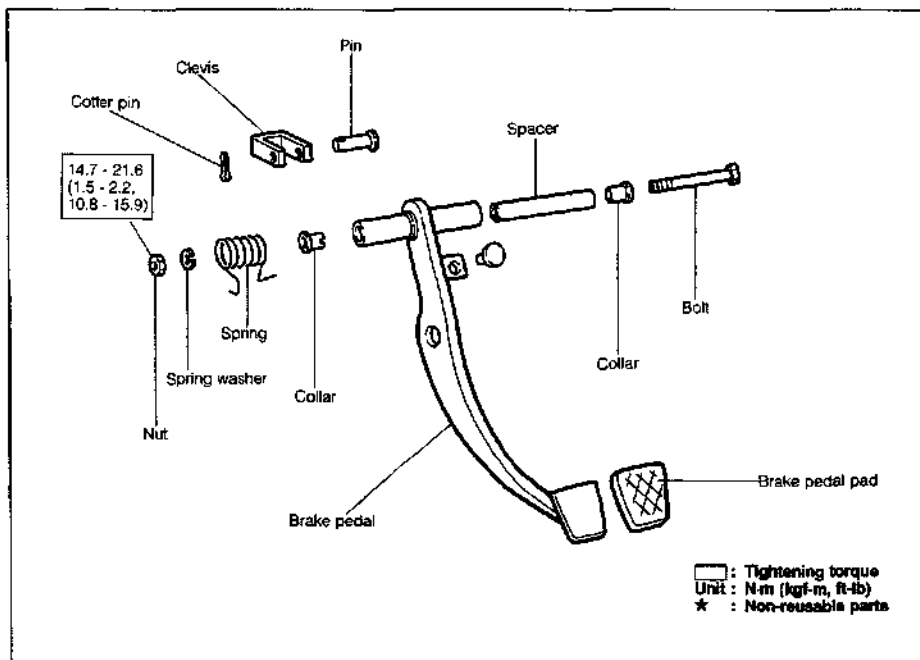
WP80-8R023

6. Install the bleeder plug cap to the bleeder plug.
7. Perform air bleeding for the other brakes in turn, starting from the step (3).
8. Perform the brake pedal reserve travel check.
(See page BR-22.)

WP80-8R024

BRAKE

BRAKE PEDAL COMPONENTS



ADJUSTMENT OF BRAKE PEDAL HEIGHT

1. Disconnect the connector of the stop lamp switch.
2. Loosen the lock nut (3) of the stop lamp switch.
3. Back off the stop lamp switch.

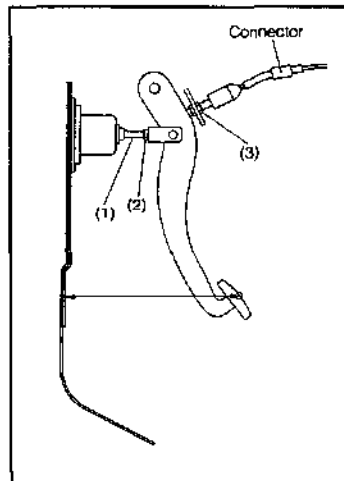
NOTE:

- Be very careful not to twist the cord by turning it together with the switch.

4. Loosen the lock nut of the clevis (2).
5. Turn the push rod (1) to adjust the pedal height to the specified height.

Specified Height: 216 ± 5 mm

The measurement should be made between the center of the brake pedal applying surface and the dash panel surface which is in parallel to the brake pedal applying center surface.

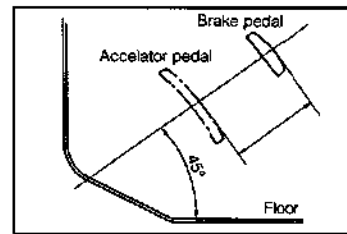


BRAKE

NOTE:

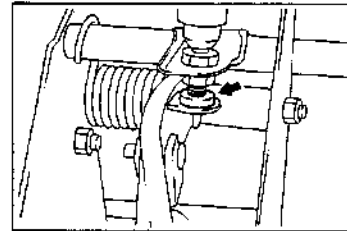
- Adjust the brake pedal height so that the difference in height between the accelerator pedal and the brake pedal may become.

Specified Value: RHD 40 ± 6 mm
LHD 47 ± 6 mm



WPB30-BR057

- Screw in the stop lamp switch, until the lower end of the threaded portion is brought into contact with the brake pedal cushion.
- Tighten the stop lamp switch lock nut.
Tightening Torque: $17.7 - 29.4$ N·m
($1.8 - 3.0$ kgf·m, $13.0 - 21.7$ ft·lb)



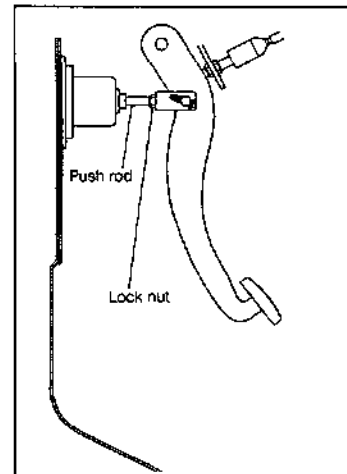
WPB30-BR058

- Turn the push rod, until the brake pedal free travel becomes the specified value.
Specified Value: $1 - 3$ mm

NOTE:

- The free travel represents a mechanical play observed before the brake pedal pushes the push rod of the brake booster.

- Tighten the clevis lock nut.
Tightening Torque: 12.7 ± 2.6 N·m
(1.3 ± 0.2 kgf·m, 9.4 ± 1.9 ft·lb)



WPB30-BR059

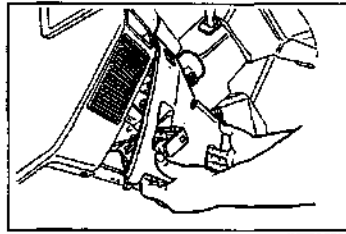
- Check the brake pedal height. (See the step 5.)
If the height fails to conform to the specifications, repeat the operation from the step 2 onward.
- Reconnect the stop lamp switch connector.
- Depress the brake pedal. Ensure that the stop lamp goes on.
If not, check and repair the brake lamp system.
(See the Body Electrical Section.)

WPB30-BR060

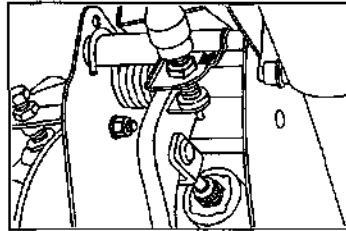
BRAKE

REMOVAL

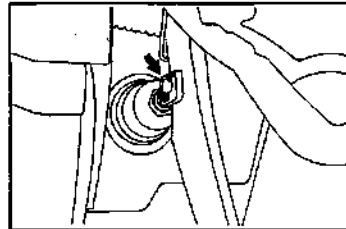
1. Remove the instrument finish lower panel.
(See the Body Section.)



2. Disconnect the connector of the stop lamp switch.
3. Remove the stop lamp switch by loosening its lock nut.



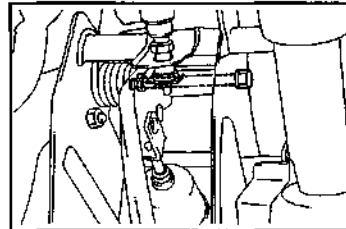
4. Pull out the clevis pin by removing its cotter pin.



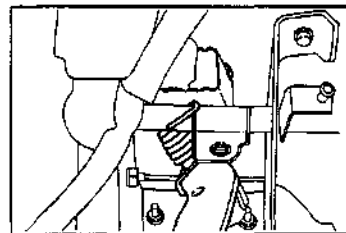
5. Remove the brake pedal set nut and pull out the set bolt.

NOTE:

- Before pulling out the set bolt, be sure to align the end surface across the two flat sections of the set bolt with the clutch pedal end surface so that they may not interfere with each other.

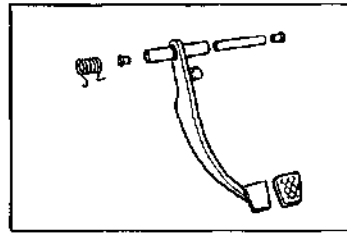


6. Remove the return spring from the pedal bracket while changing the brake pedal angle.



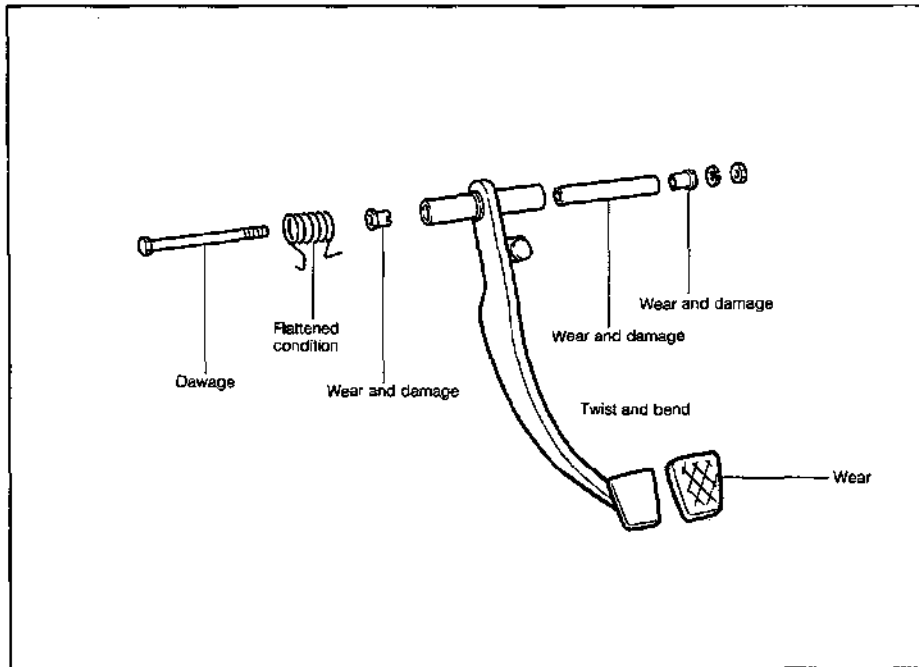
BRAKE

7. Remove the spring, bushes, spacer, cushion and pedal pad from the brake pedal.



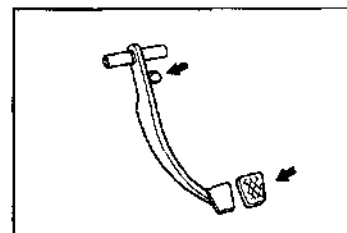
INSPECTION

Inspect the following parts and replace any defective part.



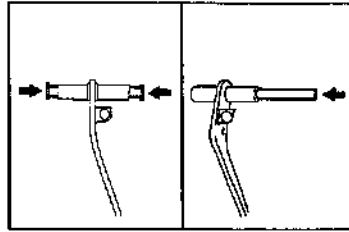
INSTALLATION

1. Install the pedal pad and cushion to the brake pedal.



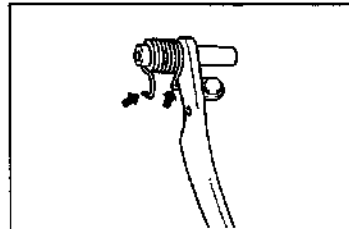
BRAKE

2. Insert the bushes into the brake pedal.
3. Apply a thin film of MP grease to the spacer. Insert the spacer into the bush.



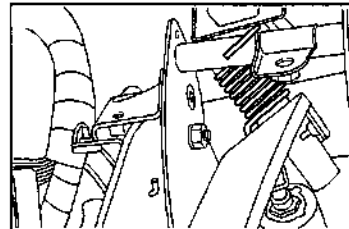
WPES0-BR068

4. Apply a thin film of MP grease to the supporting section of the return spring. Install the return spring to the brake pedal.



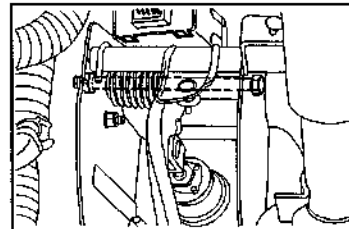
WPES0-BR070

5. Hook the return spring to the pedal bracket.



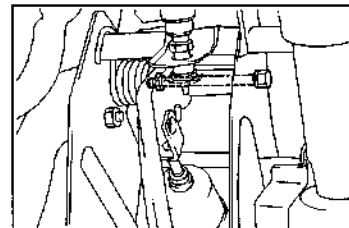
WPES0-BR071

6. With the brake pedal aligned with the attaching hole, insert the attaching bolt.



WPES0-BR072

7. Tighten the attaching nut to the installation specified torque.
Tightening Torque: 14.7 - 21.6 N·m
(1.5 - 2.2 kgf-m, 10.8 - 15.9 ft-lb)



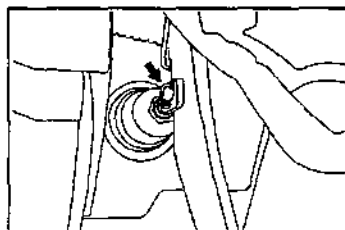
WPES0-BR073

BRAKE

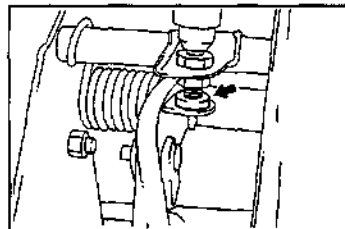
8. Connect the clevis to the brake pedal by means of the clevis pin. Install the cotter pin and bend its legs.

NOTE:

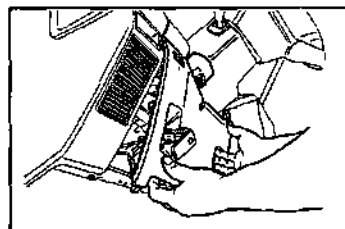
- Be sure to bend the cotter pin beyond 90 degrees.



9. Install the stop lamp switch. Adjust the brake pedal height. (See page BR-21.)
10. Operate the brake pedal and check to see if any trouble exists.

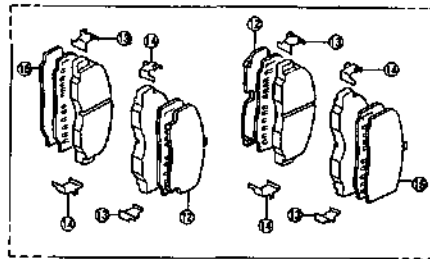
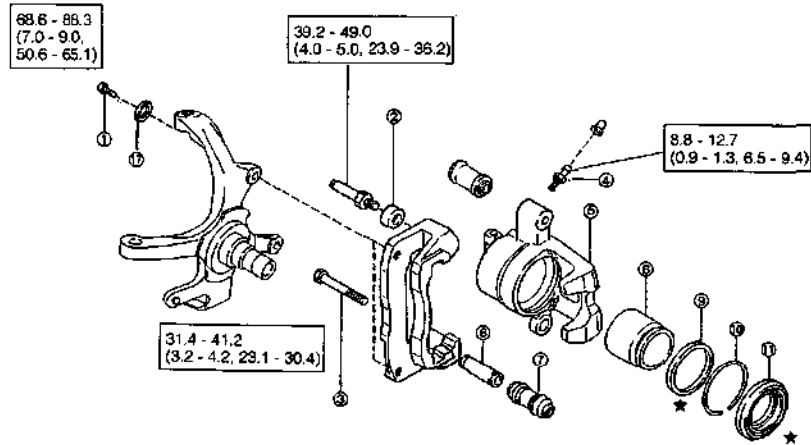


11. Install the instrument finish lower panel. (See the Body Section.)



BRAKE

FRONT BRAKE COMPONENTS



□ : Tightening torque
Unit : N·m (kgf·m, ft·lb)
★ : Non-reusable parts

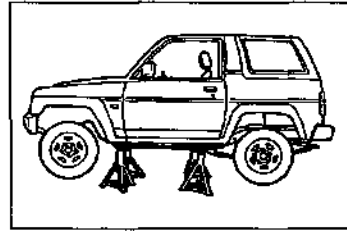
- ① Bolt
- ② Boot
- ③ Bolt
- ④ Bleeder plug
- ⑤ Body caliper
- ⑥ Cylinder slide bush
- ⑦ Bush dust boot
- ⑧ Front disc brake piston
- ⑨ Piston seal

- ⑩ Set ring
- ⑪ Cylinder boot
- ⑫ Antisqual shim
- ⑬ Disc brake pad guide plate
- ⑭ Disc brake pad guide plate No. 2
- ⑮ Antisqual shim
- ⑯ Mounting support
- ⑰ Washer

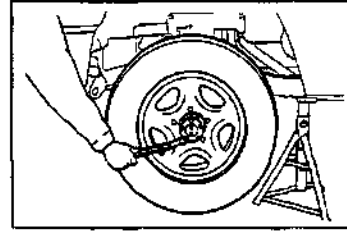
WP690-EP077

INSPECTION OF BRAKE PAD AND DISC

1. Jack up the vehicle and support it with rigid racks.
(As for the jack-up point and rigid rack supporting position, see G1 section.)



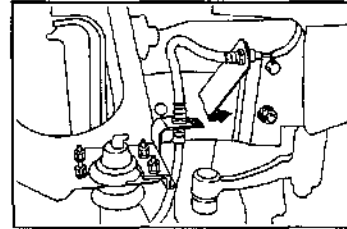
2. Remove the front wheel.



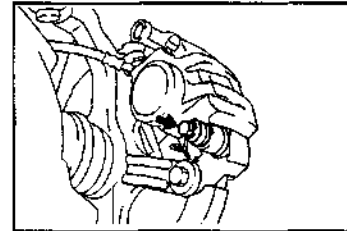
3. Detach the clamp from the brake hose clamp of the upper arm.

NOTE:

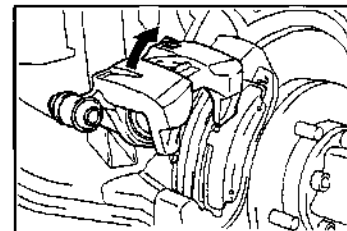
- Do not reuse the clip.



4. Remove the caliper body attaching bolt.



5. Lift the caliper body.

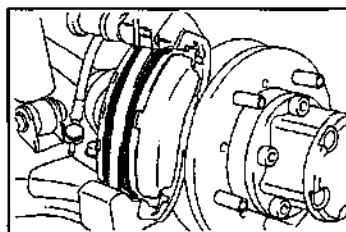


BRAKE

6. Measure the brake pad thickness.

New Part: 9 mm
Minimum Limit: 1.5 mm

If the measure value is lower than the minimum limit, replace the brake pad.



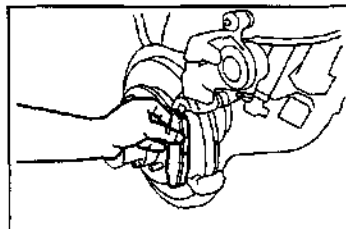
WPES0-BR063

7. Inspection of brake pad

(1) Remove the brake pad.

NOTE:

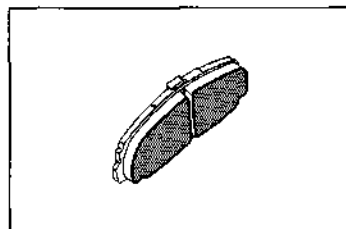
- Be very careful not to disengage the disc brake pad guide plate during this operation.



WPES0-BR064

(2) Inspect the brake pad surface for burning.

If the brake pad exhibits burning, replace the brake pad.



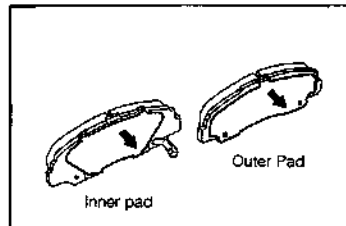
WPES0-BR065

8. Replacement of brake pad

NOTE:

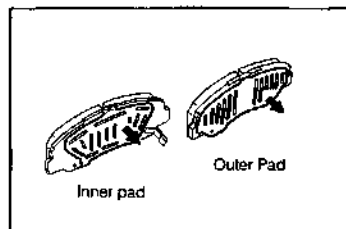
- When replacing the brake pad be sure to replace the pads inside and outside for both the right and left sides as a set. This replacement is required so as to prevent the vehicle from pulling to one side on application of the brakes.

(1) Remove the antisqueal shims No.3 and No.4 from the brake pad.



WPES0-BR066

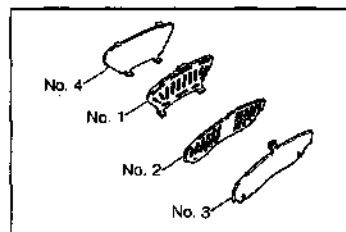
(2) Remove the antisqueal shims No.1 and No.2 from the brake pad.



WPES0-BR067

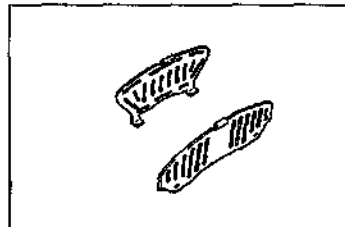
BRAKE

- (3) Clean the antisqueal shims No.1, No.2, No.3 and No.4. Inspect them for damage. Replace any shim which exhibits damage.



WFEB0-BF000

- (4) Apply anti-squeal grease to the both side of antisqueal shims No.1 and No.2.



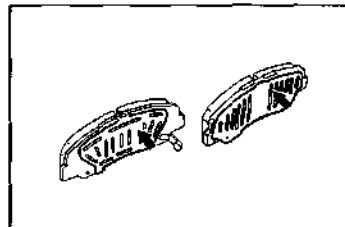
WFEB0-BF000

- (5) Install the antisqueal shims No.1 and No.2 to a new brake pad.

- (6) Apply anti-squeal grease into the slit of the antisqueal shim.

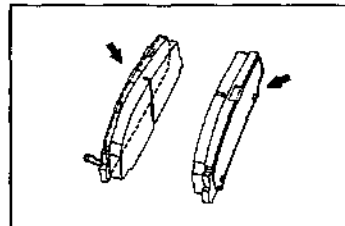
Filling Amount: Antisqaeal shim No. 1 0.8 - 1.3 grams

Filling Amount: Antisqaeal shim No. 2 0.6 - 1.1 grams



WFEB0-BF000

- (7) Install the antisqueal shims No.3 and No.4 to the brake pad.



WFEB0-BF001

9. Inspection of brake disc

NOTE:

- Never allow any oil to get to the disc and/or pad surface.

WFEB0-BF002

BRAKE

- (1) Ensure that the disc surface exhibits no damage, such as abnormal wear and cracks.
If any damage exists on the disc surface, replace the disc. (See the front axle & suspension system.)

- (2) Measure the disc thickness. Ensure that the measured value is above the minimum limit.

UNIT: mm

	Standard	Ventilation
New parts thickness	12.5	16.0
Minimum limit thickness	11.5	17.0

Difference in disc thickness
on the same circumference: Not to exceed 0.015 mm

If the measured value is less than the minimum limit,
replace the disc.
(See the front axle & suspension system.)

- (3) Ensure that the runout of the brake disc is within the allowable limit.
Allowable Runout Limit: 0.15 mm

NOTE:

- Measuring point should be point 10 mm inward from outer periphery of rotor.

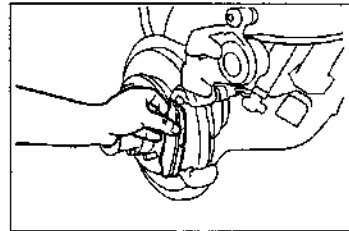
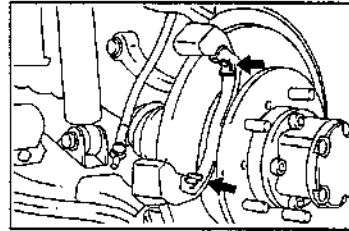
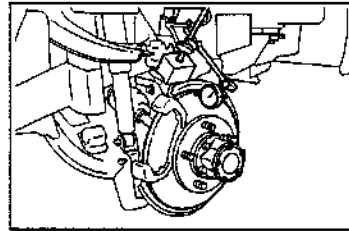
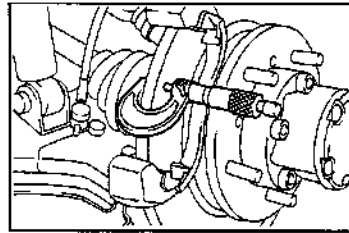
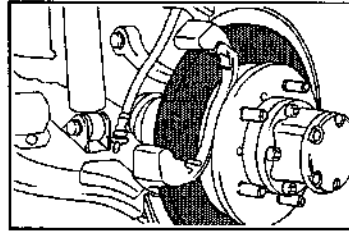
10. Inspection of disc brake pad guide

- (1) Ensure that no damage exists on the disc brake pad guide.
If any damage is present, replace the disc brake pad guides.

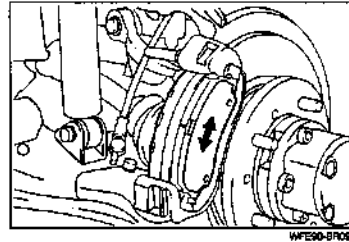
- (2) Install the pad to the mounting support.

NOTE:

- The pad equipped with the warner should come at the inside of the vehicle.
- Never allow any oil to get to the pad.



- (3) Turn the pad in the rotating direction to ensure that no excessive looseness exists.
If any excessive looseness exists, replace the disc brake pad guides.

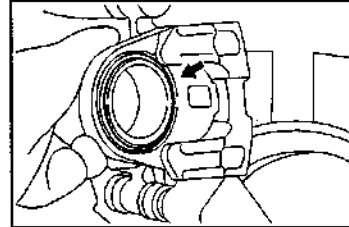


11. Installation of caliper

- (1) Inspect the caliper piston for brake fluid leakage.

NOTE:

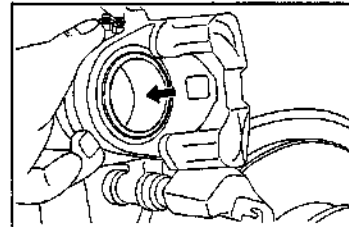
- If fluid leakage is present, repair the fluid leakage.



- (2) Push the caliper piston to the cylinder side.

NOTE:

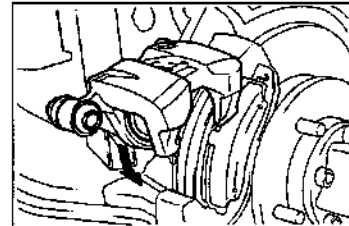
- Prior to this operation, drain the brake oil, as required, so that no brake oil overflows from the brake reservoir tank during this operation.



- (3) Install the caliper on the brake pad.

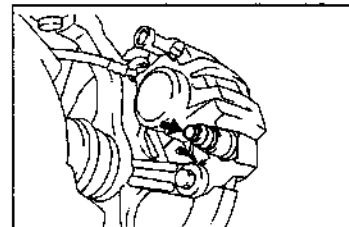
NOTE:

- Care must be exercised not to bring the caliper into contact with the antisqueal shims during this operation.



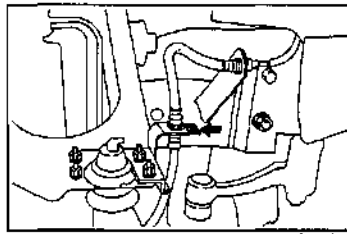
- (4) Install the caliper attaching bolt and tighten it to the specified torque.

Tightening Torque: 31.4 - 41.2 N·m
(3.2 - 4.2 kgf-m, 23.1 - 30.4 ft-lb)



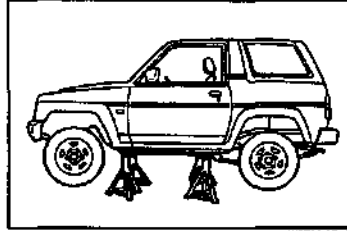
BRAKE

12. Connect the brake hose to the upper arm bracket. Install the new clip.
13. Perform brake tests on a brake tester.

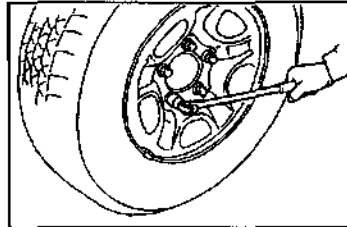


REMOVAL OF BRAKE CALIPER

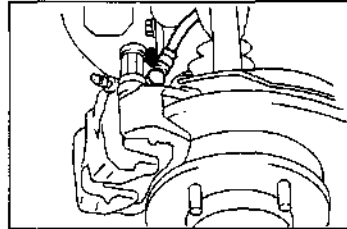
1. Jack up the vehicle and support it with safety stands.
(As for the jacking-up points and supporting points for the safety stands, see page GI section.)



2. Remove the front wheel.
(See page FS-27.)
3. Drain the brake fluid of the caliper from the air bleeder plug.



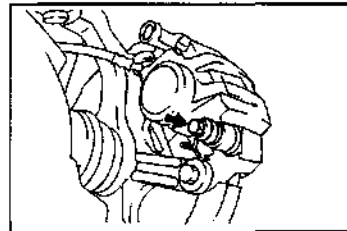
4. Disconnect the brake hose from the caliper.
NOTE:
 - Since the brake fluid flows out, receive the brake fluid with an adequate container.



CAUTION:

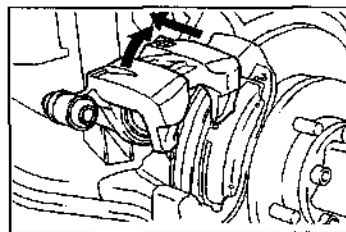
- Never reuse the removed gaskets.

5. Remove the brake caliper attaching bolts.



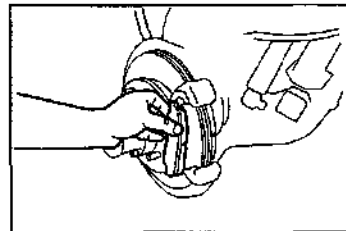
BRAKE

6. Remove the brake caliper from the mounting support.



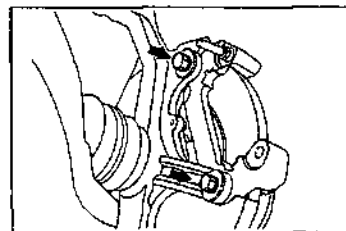
WFE90-BR108

7. Remove the brake pads.



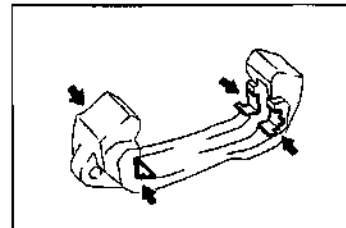
WFE90-BR109

8. Remove the brake mounting support.



WFE90-BR110

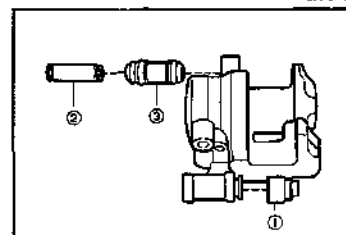
9. Remove the disc brake pad guide plates from the brake mounting support.



WFE90-BR111

DISASSEMBLY OF CALIPER

1. Remove the rubber boot from the caliper.
2. Pull out the cylinder slide bush.
3. Remove the bush dust boot.



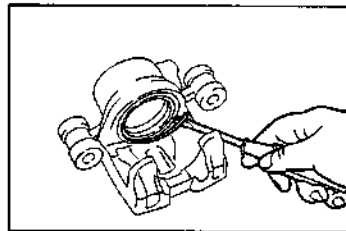
WFE90-BR112

BRAKE

4. Remove the boot set ring.

NOTE:

- Never reuse the removed set ring.

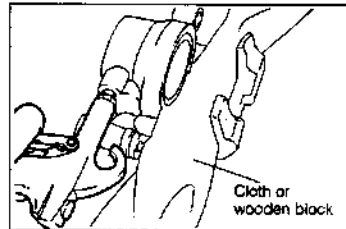


WPB20-BR113

5. Insert a suitable cloth or a wooden block in front of the piston. Then, pull out the piston by applying compressed air from the brake hose connecting section.

WARNING:

- Since the piston jumps out strongly when applying compressed air, care must be exercised so that your fingers or the like may not be caught in.
- Be sure to put on safety goggles when using compressed air.

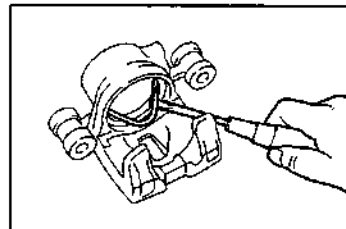


WPB20-BR114

6. Remove the piston seal from the cylinder section.

NOTE:

- Never reuse the removed piston seal.

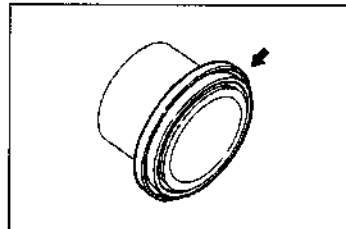


WPB20-BR115

7. Remove the rubber boot from the piston.

NOTE:

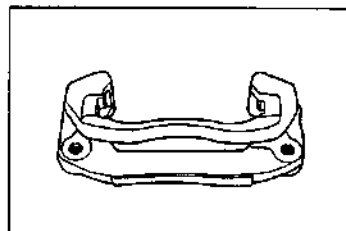
- Never reuse the removed boot.



WPB20-BR116

INSPECTION

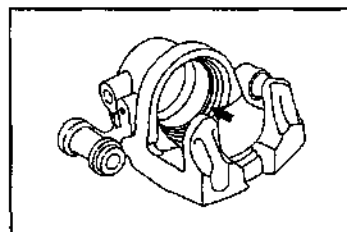
1. Ensure that the mounting support exhibits no damage, such as cracks and/or wear.



WPB20-BR117

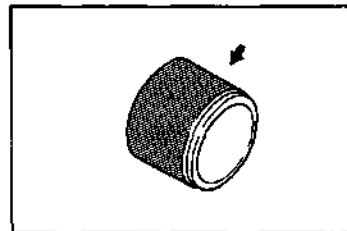
BRAKE

2. Ensure that the caliper exhibits no damage, such as cracks and wear.
3. Ensure that the caliper and inner surface of the piston exhibit no damage, such as rust and/or scratches.



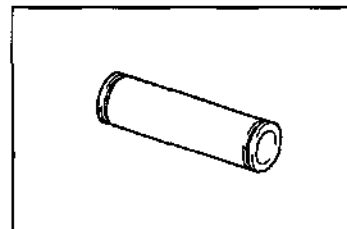
WFE30-BR118

4. Ensure that the piston exhibits no damage, such as rust and scratches.



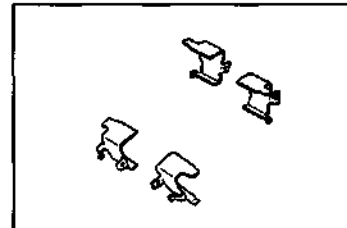
WFE30-BR119

5. Ensure that the cylinder slide bush, bush dust boot and rubber boot exhibit no damage, such as rust and scratches.



WFE30-BR120

6. Ensure that the pad guide plates exhibit no wear or damage.



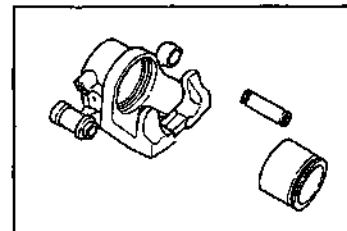
WFE30-BR121

ASSEMBLY OF CALIPER

1. Wash the reassembling parts and dry them with compressed air.

WARNING:

- Be sure to put on safety goggles when using compressed air.



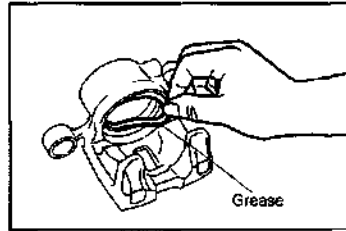
WFE30-BR122

BRAKE

2. Apply rubber grease to the piston seal. Install the piston seal to the cylinder.

CAUTION:

- Never reuse the piston seal.
- Be very careful not to scratch the edge of the piston seal.

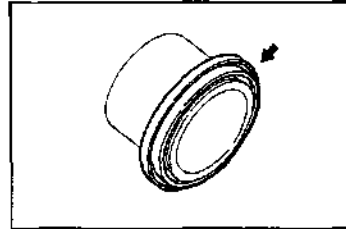


WPED0-BR123

3. Apply rubber grease to the new cylinder boot. Install the cylinder boot to the piston.

CAUTION:

- Never reuse the cylinder boot.

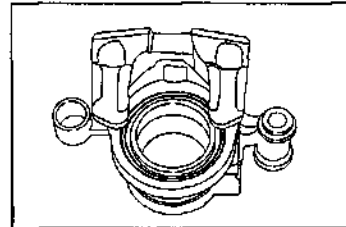


WPED0-BR124

4. Apply rubber grease to the piston sliding surface.
5. Insert the piston into the cylinder.
6. Fit the cylinder boot into the groove at the cylinder side. Fit the set ring into the groove of the cylinder boot.

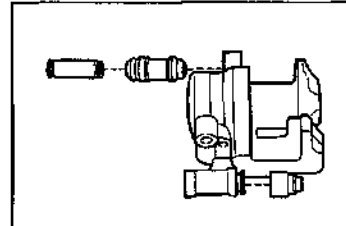
CAUTION:

- Never reuse the set rings.



WPED0-BR125

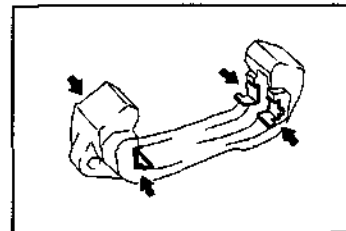
7. Insert the bush dust boot into the caliper.
8. Apply rubber grease to the cylinder slide bush. Insert the cylinder slide bush into the bush dust boot. Then, fit both edge sections of the bush dust boot into the groove sections of the cylinder slide bush.
9. Install the rubber boot to the caliper.



WPED0-BR126

INSTALLATION OF BRAKE CALIPER

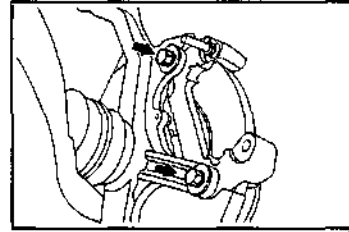
1. Install the disc brake pad guide plates to the brake mounting support.



WPED0-BR127

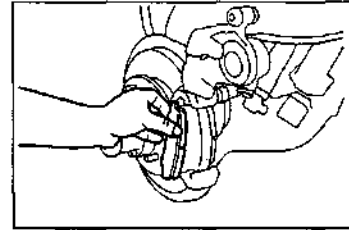
BRAKE

2. Install the brake mounting support to the steering knuckle by attaching bolts with new spring washers interposed.
Tightening Torque: 68.6 - 88.3 N·m
(7.0 - 9.0 kgf-m, 50.6 - 65.1 ft-lb)



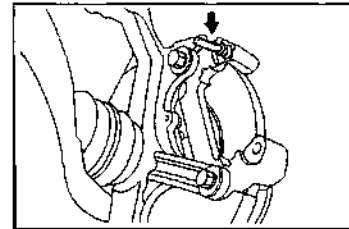
WFE90-BR128

3. Install the brake pad to the brake mounting support.



WFE90-BR129

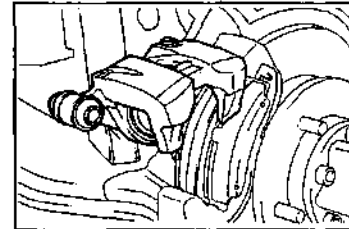
4. Apply rubber grease to the brake mounting support pin.



WFE90-BR130

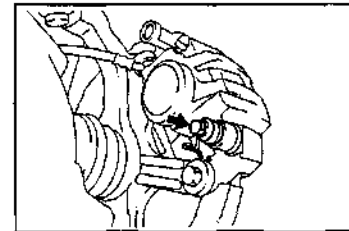
5. Install the brake caliper to the mounting support. Place the mounting support over the brake pad.
NOTE:

- Be very careful not to damage the antisqueal shim during this operation.



WFE90-BR131

6. Tighten the brake caliper attaching bolts.
Tightening Torque: 31.4 - 41.2 N·m
(3.2 - 4.2 kgf-m, 23.1 - 30.4 ft-lb)



WFE90-BR132

7. Ensure that each boot of the caliper exhibits no damage, such as cracks. Also, ensure that no turning-over is present at the fitting section of each boot.

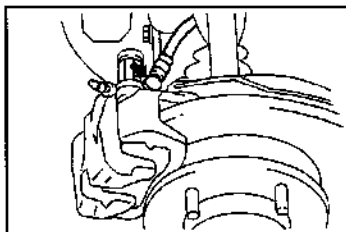
BRAKE

8. Connect the brake hose to the caliper with new gaskets interposed.

Tightening Torque: 20.6 - 26.5 N·m
(2.1 - 2.7 kgf-m, 15.2 - 19.5 ft-lb)

CAUTION:

- Never reuse the gaskets.

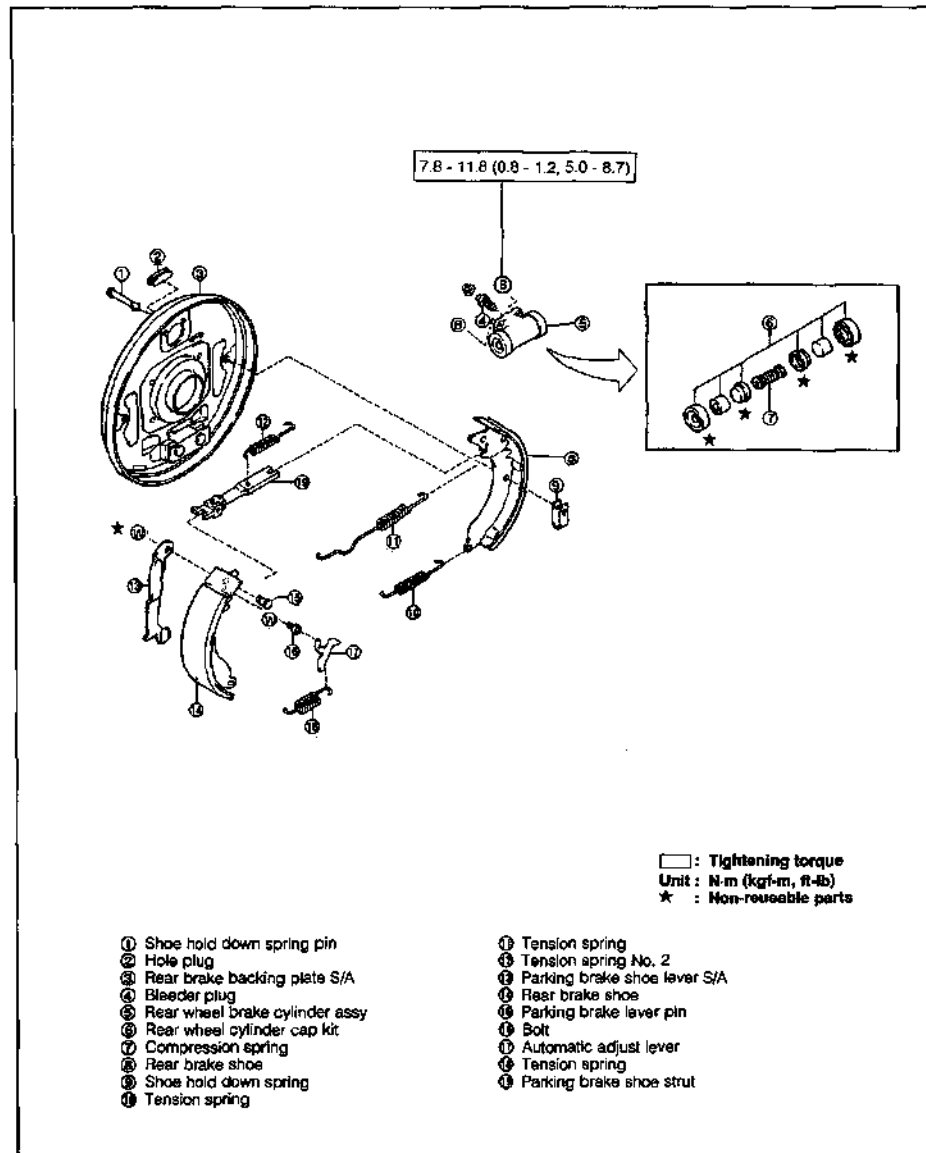


WPB30-BR133

9. Perform brake air bleeding.
(See page BR-24.)
10. Perform the brake test, using a brake tester.

WPB30-BR134

REAR BRAKE COMPONENTS



WFDX-BR165

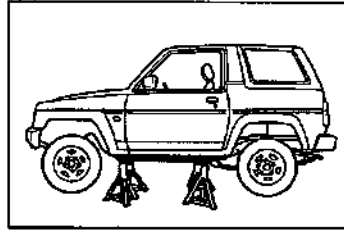
BRAKE

DISASSEMBLY

CAUTION:

- Make sure that no lubricant, such as grease, gets to the brake shoe and/or drum surfaces.

1. Jack up the vehicle and support it with safety stands. (As for the jacking-up points and supporting points for the safety stands, see page G1 section.)

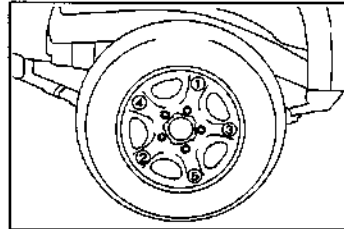


WPB90-BR135

2. Remove the rear wheel.

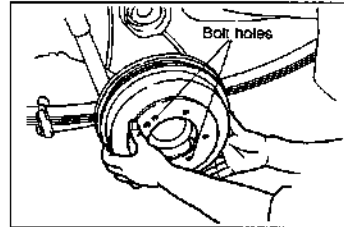
NOTE:

- Be sure to loosen the attaching bolts evenly over two or three stages in the sequence indicated in the right figure.



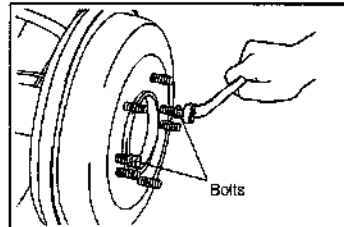
WPB90-BR137

3. Remove the brake drum. If any difficulty is encountered in removing the brake drum, install the bolts (M10 x 1.25) to each bolt hole, as indicated in the right figure.



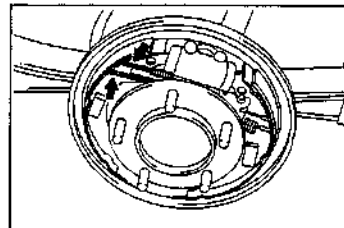
WPB90-BR138

The brake drum can be detached easily when the bolts are tightened alternately.



WPB90-BR139

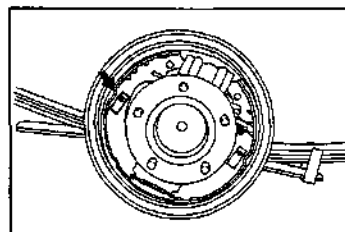
4. Detach the tension springs from the trailing side shoe, using the following SST and remove the tension springs.
SST: 09921-00010-000



WPB90-BR140

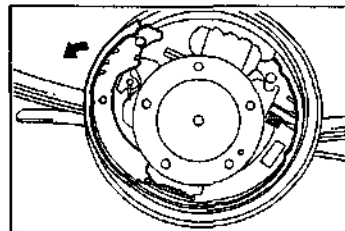
BRAKE

5. Detach the shoe hold down spring pin and hold down spring at the trailing side.



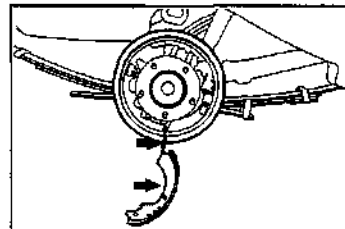
WFE90-BR1141

6. Remove the shoe at the trailing side from the backing plate.



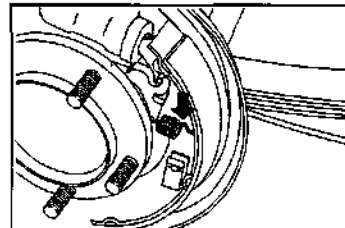
WFE90-BR1142

7. Remove the shoe at the trailing side from the tension spring.
8. Remove the tension spring from the shoe at the leading side.



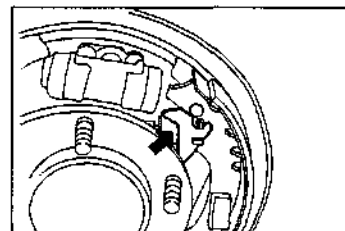
WFE90-BR1143

9. Remove the tension spring, using the following SST.
SST: 09921-00010-000



WFE90-BR1144

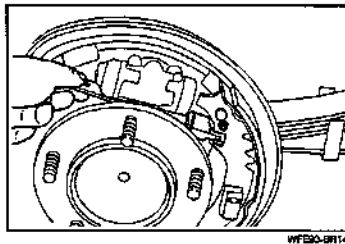
10. Remove the automatic adjusting lever.



WFE90-BR1145

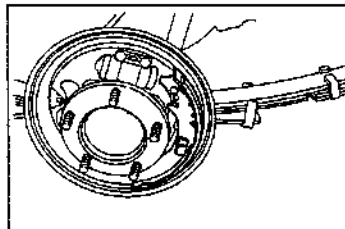
BRAKE

11. Remove the parking brake shoe strut.

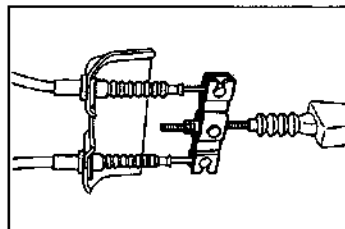


12. Remove the hold-down spring and pin of the leading side shoe.

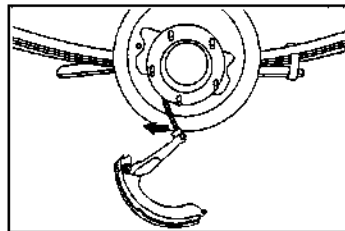
13. Remove the leading side shoe from the backing plate.



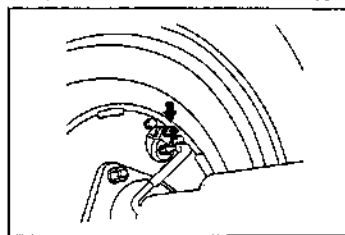
14. Loosen the lock nut of the parking brake lever adjusting screw. Fully loosen the adjusting screw.



15. Disconnect the parking brake cable from the parking brake shoe lever.

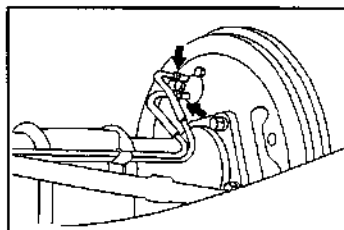


16. Drain the brake fluid by loosening the rear wheel cylinder air bleeder plug.



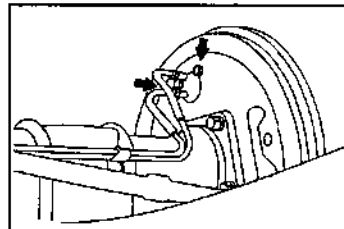
BRAKE

17. Disconnect the brake pipes from the rear wheel cylinder, using a brake pipe spanner.



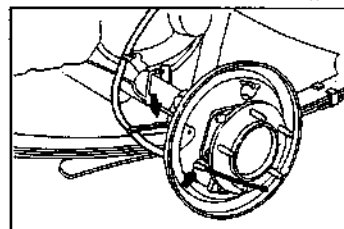
WP590-BR150

18. Remove the rear wheel cylinder from the backing plate.



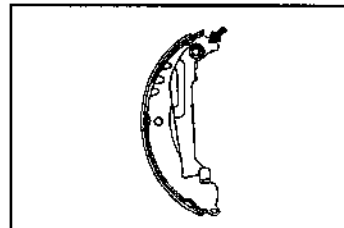
WP590-BR151

19. Removal of parking brake cable
 (1) Remove the parking brake cable clamp bolt.
 (2) Pull out the parking brake cable from the backing plate by retracting the pawl of the parking brake cable.



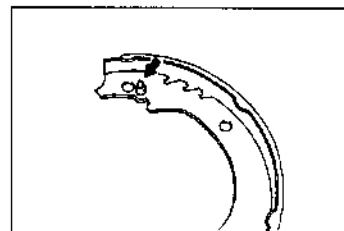
WP590-BR152

20. Disassembly of leading side shoe
 (1) Remove the "C" washer.
NOTE:
 • Never reuse the "C" washer.
 (2) Remove the parking brake shoe lever and parking brake lever pin.



WP590-BR153

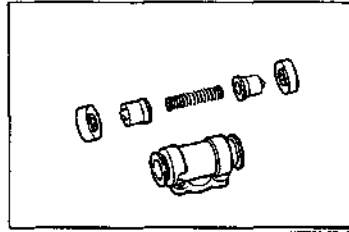
- (3) Remove the washer and automatic adjusting lever pin.



WP590-BR154

BRAKE

21. Disassembly of rear wheel cylinder
- (1) Remove the wheel cylinder boots.
 - (2) Remove the wheel cylinder pistons.
 - (3) Remove the piston cup.
 - (4) Remove the compression spring.



WPERS-BR155

22. Removal of brake backing plate
(See the Rear Axle section.)

WPERS-BR156

INSPECTION

NOTE:

- When replacing the brake shoe, be sure to replace the leading and trailing shoe for both the right and left side as a set. This replacement required so as to prevent the vehicle from pulling to one side on application of the brakes.

1. Check of brake drum

- (1) Ensure that the brake shoe contact surface exhibits no defect, such as severe roughness and abnormal wear. If any defect is present, replace the brake drum with a new one.

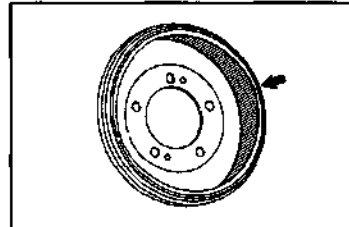
- (2) Measure the inner diameter of the brake drum. Ensure that the measured value is less than the maximum limit. If the measured value is greater than the maximum limit, replace the brake drum with a new one.

Standard: 254.00 mm

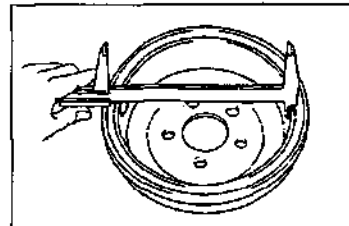
Maximum Limit: 256.00 mm

- (3) Ensure that the brake drum exhibits no damage, such as cracks.

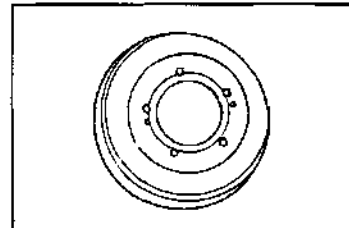
If any damage is present, replace the brake drum.



WPERS-BR157



WPERS-BR158

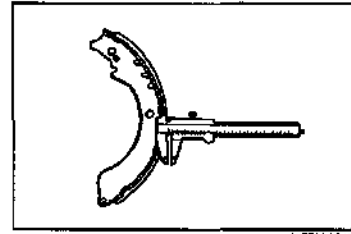


WPERS-BR159

BRAKE

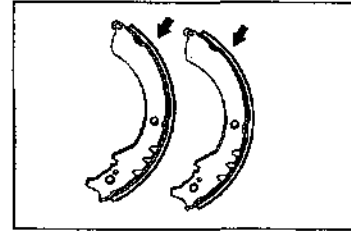
2. Check of brake shoe

- (1) Ensure that the remaining amount of the brake lining exceeds the minimum limit.
If the remaining amount is less than the minimum limit, replace the brake lining as a set.
Standard: 5 mm
Minimum Limit: 1 mm



WP800-BR160

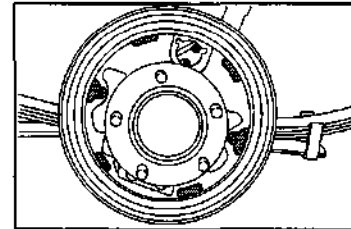
- (2) Ensure that each brake shoe contact surface exhibits no defect, such as abnormal wear and cracks.
If any defect is present, replace the brake shoe as a set.



WP800-BR161

3. Check of brake backing plate

- (1) Ensure that the brake shoe contact surface exhibits no abnormal wear.
- (2) Ensure that the backing plate exhibits no damage, such as bend.
If any defect is present, replace the backing plate.
(See the Rear Axle section.)



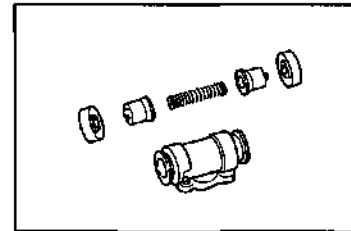
WP800-BR162

4. Check of wheel cylinder

CAUTION:

- Never reuse the cups and boots.

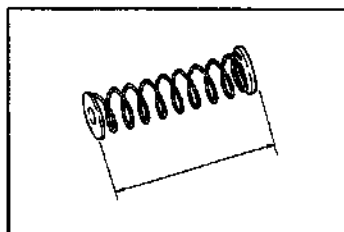
- (1) Ensure that the inner surface of the wheel cylinder exhibits no rust and scratches.
If any rust or scratch is present, replace the wheel cylinder.
- (2) Ensure that no rust or scratch is present at the piston-to-cylinder contact surface and cup-to-cylinder contact surface. Also, ensure that the brake shoe contact surface exhibits no abnormal wear.
If any rust or scratch is present, replace the piston.
- (3) Ensure that the compression spring exhibits no damage, such as flattened condition.
If any damage is present, replace the compression spring.



WP800-BR163

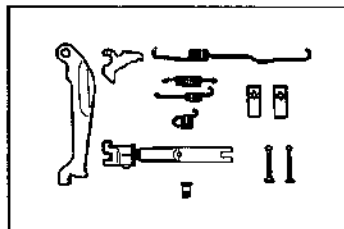
BRAKE

- (4) Ensure that the free length of the compression spring is more than the minimum limit.
Standard: 57 ± 1.5 mm



WP800-BR184

5. Check of related parts
- (1) Ensure that the tension springs exhibit no damage, such as wear and flattened condition.
 - (2) Ensure that the parking brake strut exhibits no wear and rust. Also, ensure that the screw turns smoothly.
 - (3) Ensure that each of the levers, pins and so forth exhibits no damage, such as wear.
- If any defect is present, replace the defective parts.



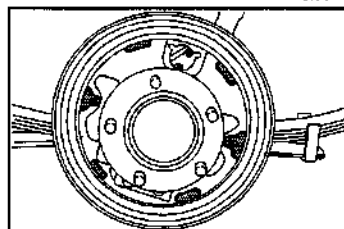
WP800-BR185

ASSEMBLY

CAUTION:

- Make sure that no lubricant, such as grease, gets to the brake shoe and/or drum surfaces.

1. Clean the backing plate.

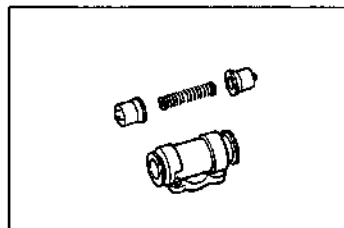


WP800-BR186

2. Installation of wheel cylinder
 - (1) Thinly apply rubber grease to the pistons and cup. Assemble the pistons and cup to the cylinder together with the compression spring.

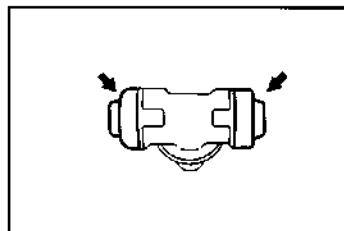
CAUTION:

- Make sure that the cup is installed in the correct direction. The cup should be assembled so that its protruding surface may face toward the piston.



WP800-BR187

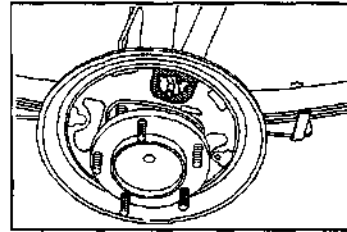
- (2) Install the boot to the cylinder. Assemble the boot to the piston.



WP800-BR188

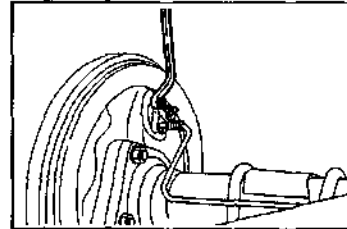
BRAKE

- (3) Apply the Three Bond 1105B to the wheel cylinder installation surface of the backing plate.



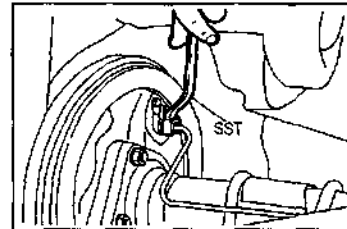
WF890-BR160

- (4) Install the wheel cylinder to the backing plate.
Tightening Torque: 7.8 - 11.8 N·m
(0.8 - 1.2 kgf-m, 5.8 - 8.7 ft-lb)



WF890-BR170

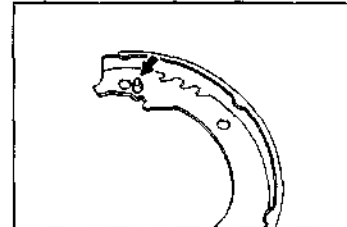
- (5) Connect the brake tube to the wheel cylinder.
Tightening Torque: 12.7 - 17.7 N·m
(1.3 - 1.8 kgf-m, 9.4 - 13.0 ft-lb)



WF890-BR171

3. Assembly of shoe at leading side

- (1) Install the washer and automatic adjusting lever pin.
Tightening Torque: 2.55 - 4.9 N·m
(0.26 - 0.5 kgf-m, 18.8 - 3.62 ft-lb)

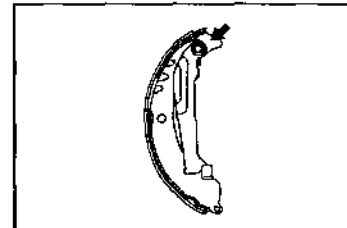


WF890-BR172

- (2) Thinly apply brake grease to the parking brake lever pin. Install the parking brake lever pin to the shoe.
(3) Install the parking brake lever to the pin.
(4) Install a new "C" washer to the parking brake lever pin. Bend the "C" washer by means of pliers, until both ends of the "C" washer come in contact with each other.

NOTE:

- NEVER reuse the "C" washer.

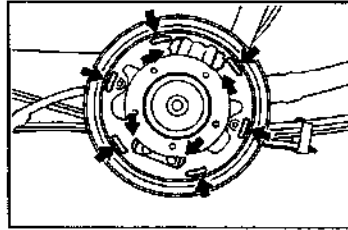


WF890-BR173

BRAKE

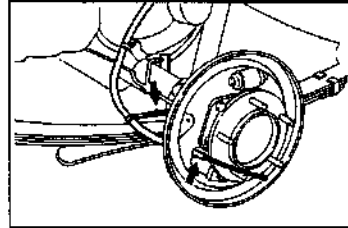
4. Assembly of brake shoe at leading side

- (1) Apply a thin film of brake grease to the shoe contact surface of the backing plate.
- (2) Apply a thin film of brake grease to the pawl section of the wheel cylinder piston.



WPESD-BR174

- (3) Connect the parking brake cable to the backing plate.
- (4) Install the cable clamp.

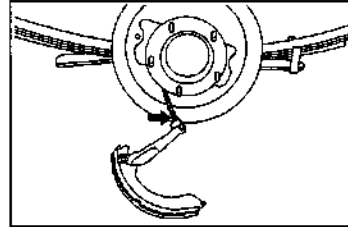


WPESD-BR175

- (5) Connect the parking brake cable to the parking brake lever.

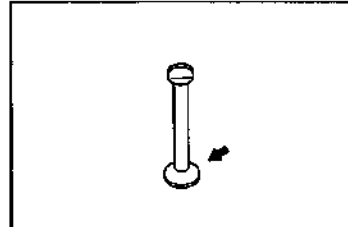
NOTE:

- Be very careful not to bend the parking brake cable by applying undue force to it.



WPESD-BR176

- (6) Apply the Three Bond 1105B₂ to the head section of the hold down spring pin.

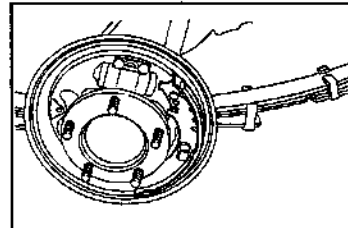


WPESD-BR177

- (7) While holding the shoe toward the backing plate, install the shoe to the backing plate by means of the shoe hold down spring pin and shoe hold down spring.

NOTE:

- Make sure that the head of the shoe hold down spring pin is positively fitted into the groove of the shoe hold down spring.

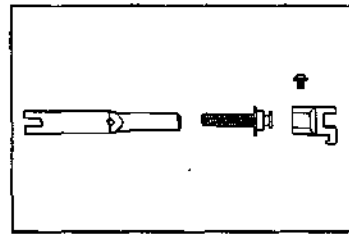


WPESD-BR178

BRAKE

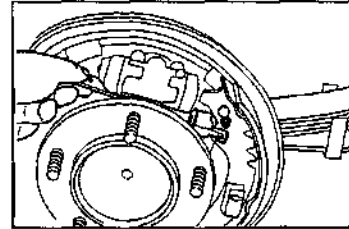
- (8) Disassemble the parking brake shoe strut. Apply a thin film of brake grease to each sliding section. Assemble the parking brake shoe strut.

Tightening Torque: 2.6 - 3.9 N·m
(0.26 - 0.4 kgf-m, 1.88 - 2.9 ft-lb)



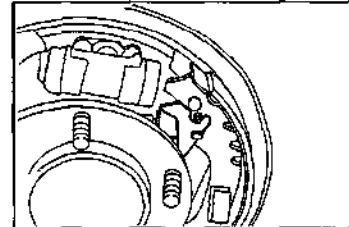
WP500-BR179

- (9) Connect the parking brake shoe strut to the shoe.



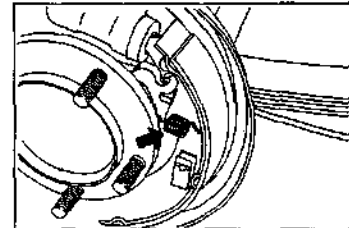
WP500-BR180

- (10) Apply brake grease to each contact surface of the automatic adjusting lever. Install the automatic adjusting lever to the shoe.



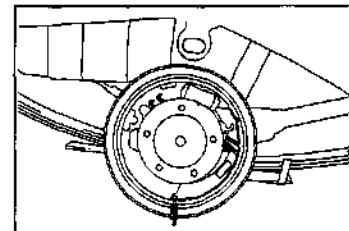
WP500-BR181

- (11) Install the tension spring, using the following SST or a suitable lever.
SST: 09921-0001-000



WP500-BR182

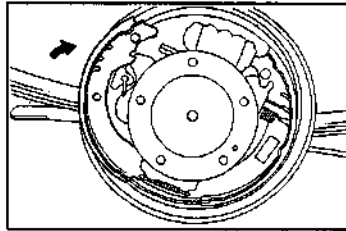
5. Installation of shoe at trailing side
(1) Install the tension spring to the shoe at the leading side.
(2) Install the shoe at the trailing side to the tension spring.



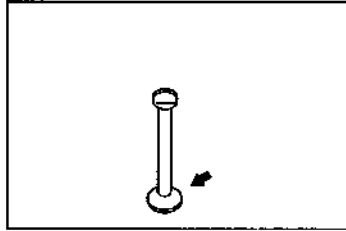
WP500-BR183

BRAKE

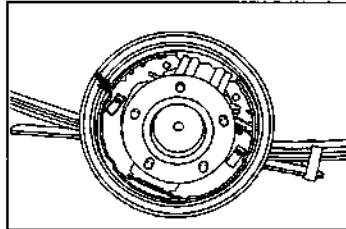
- (3) Lift the shoe at the trailing side over the backing plate.



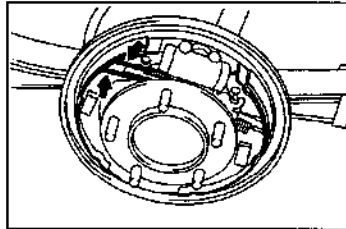
- (4) Apply the Three Bond 1105B to the head section of the shoe hold down spring pin.



- (5) While holding the shoe at the trailing side toward the backing plate, install the shoe to the backing plate by means of the shoe hold down spring pin and shoe hold down spring.



- (6) Install the tension springs.

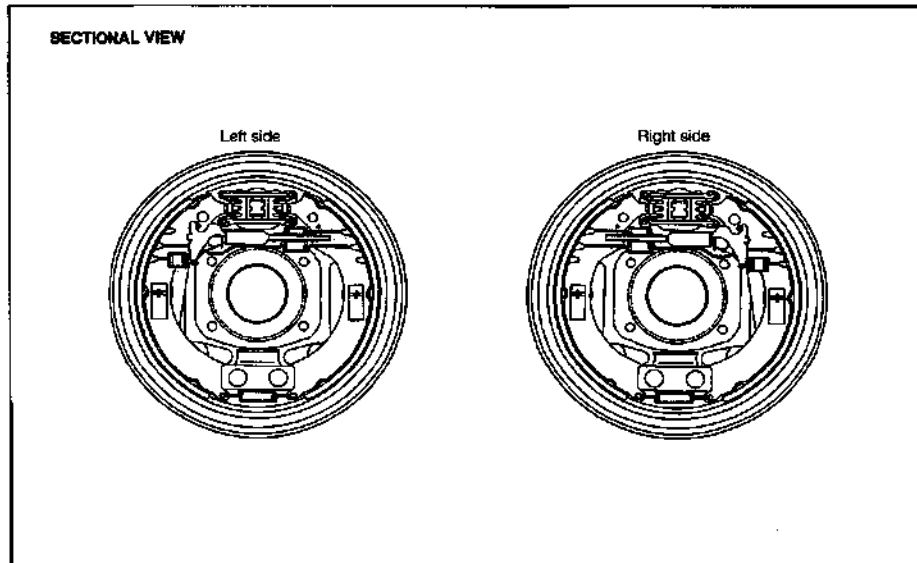


6. Inspection

Be sure to perform the following inspection to assure safe running.

(1) Ensure that the rear brake is mounted correctly as indicated in the figure below.

WARNING:
If the rear brake is not installed correctly, it may cause brake failure during the turning and parking brake failure.



(2) Inspect that lubricant, such as oil or grease, gets on the surface of the rear brake drum or brake lining. If any lubricant gets on the surface, remove the lubricant, using abrasive paper.

WARNING:
If any lubricant gets on the surface of the rear brake drum or the brake lining, it may cause inadequate braking.

(3) Check that the rear wheel cylinder and brake tube attaching sections are tightened to the specified torque. Inspect the attaching sections for brake fluid leakage.

WARNING:

- If the brake tubes are not installed correctly, it may cause brake failure.

WF230-BR169

BRAKE

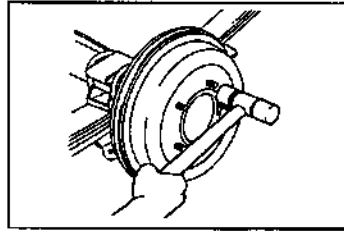
7. Install the brake drum.

Attach the brake drum to the axle shaft. Tap the brake drum lightly into the axle shaft, using a plastic hammer or the like.

WARNING:
If any contaminants (grease, oil, dirt) on the end surface of the brake drum, be sure to wipe it off. Failure to observe this warning may cause inadequate braking.

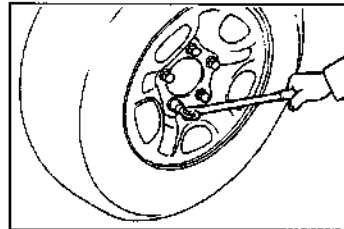
NOTE:

- When assembling the axle shaft, never apply impact strong enough to produce traces inside the bearing. Moreover, be very careful not to damage the oil seal provided at the housing end.
- If paint was removed during the installation, be sure to apply chassis black to such areas to prevent rust formation. However, no paint should be applied to the threaded portions.

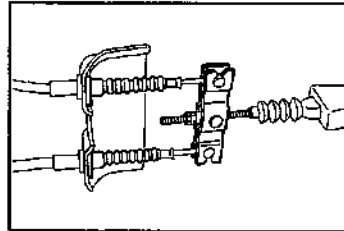


8. Install the wheel. Tighten the attaching bolts to the specified torque evenly over two or three stages in the sequence indicated in the right figure.

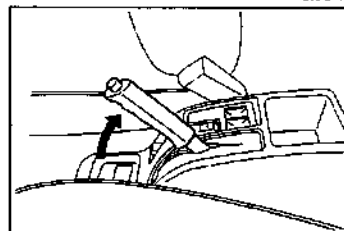
Tightening Torque: 88.3 - 118 N·m
(9.0 - 12 kgf-m, 65.1 - 87.0 ft-lb)



9. Screw in the parking brake lever adjusting screw lock nut about halfway.

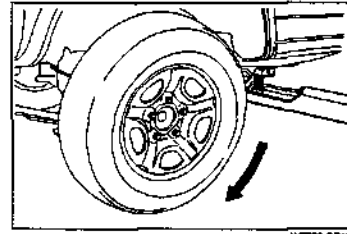


10. Repeat the pulling/returning operation of the parking brake lever, until no clicking noise is emitted from the brake drum.



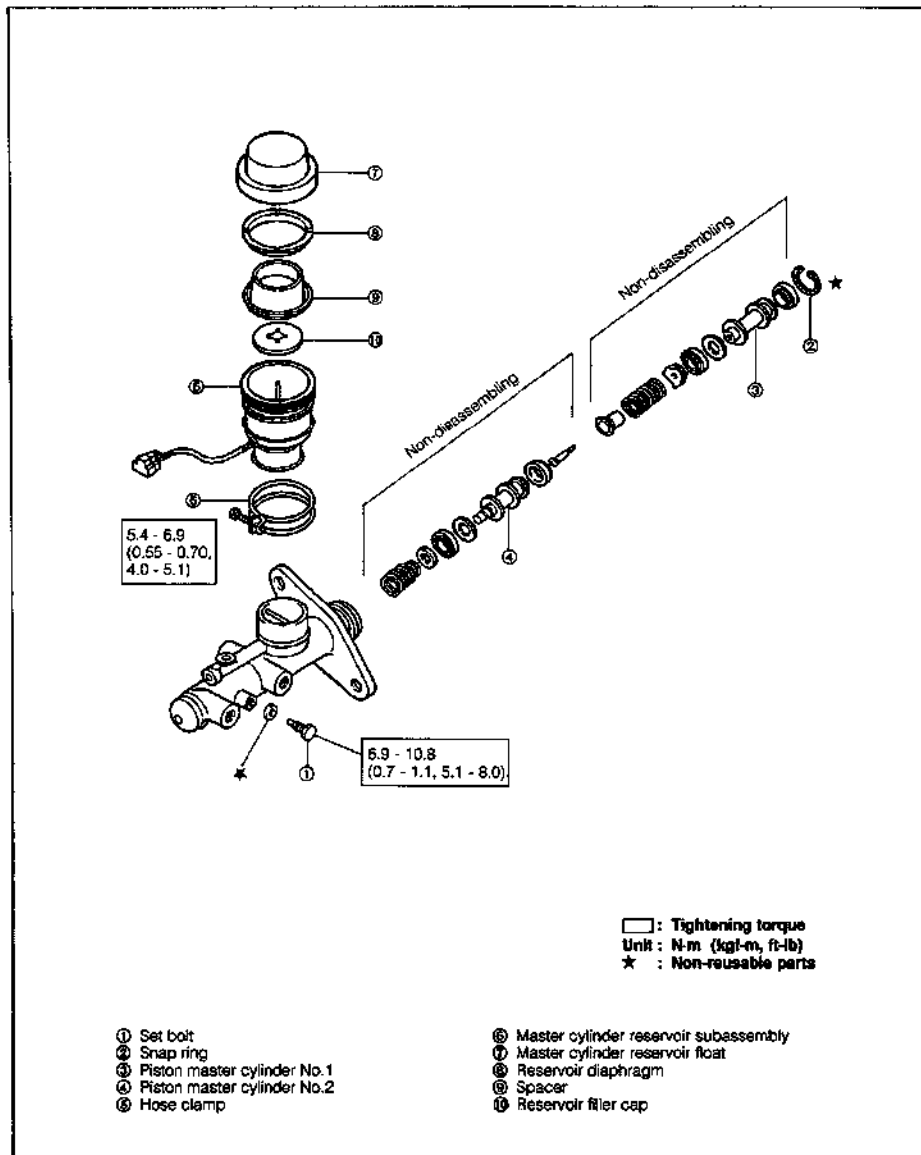
BRAKE

11. Turn the wheel. At this time, ensure that the brake is not dragging.
12. Perform brake air bleeding.
(See page BR-24.)
13. Perform the brake fluid leakage check.
(See page BR-22.)
14. Perform the brake test, using a brake tester.
15. Adjust the height of the parking brake lever.
(See page BR-93.)



BRAKE

BRAKE MASTER CYLINDER COMPONENTS



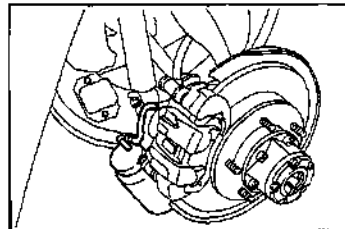
WF200-BR196

REMOVAL**CAUTION:**

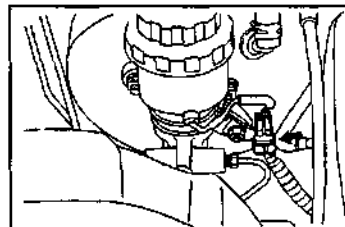
- If the brake fluid is spilled inadvertently over the paint-finish surface of the vehicle, quickly wipe off the brake fluid. In addition, wipe the affected area, using white gasoline or the like.

WP50-BR196

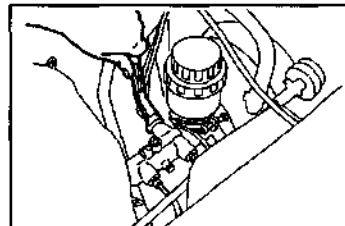
1. Drain the brake fluid from the rear and front wheel cylinder.



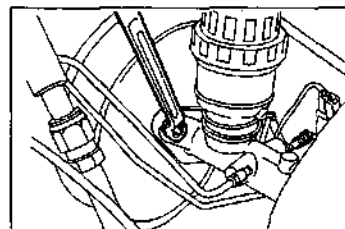
2. Disconnect the brake fluid level switch connector.



3. Disconnect the brake tubes from the master cylinder, using a flare nut wrench.



4. Remove the brake master cylinder from the brake booster by removing the brake master cylinder attaching nuts.

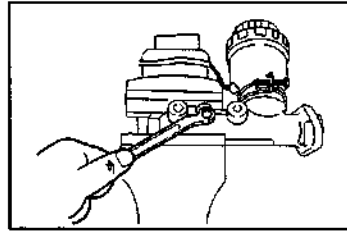


BRAKE

5. Remove the piston set bolt.

NOTE:

- Do not apply excessive force when installing the cylinder to a vise.

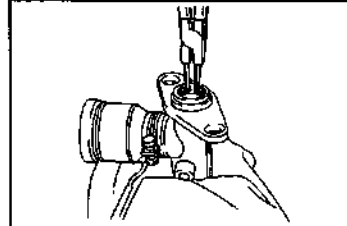


WFE90-BR201

6. While holding the piston by hand, remove the snap ring.

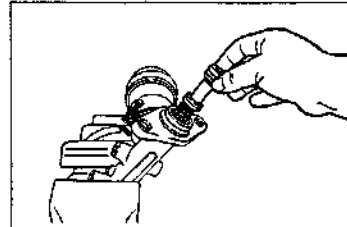
CAUTION:

- Do not scratch the cylinder bore surface.



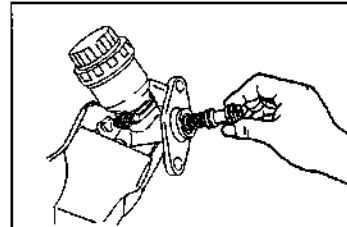
WFE90-BR202

7. Remove the brake master cylinder piston No.1.



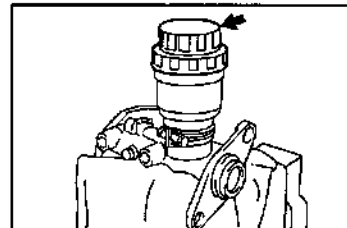
WFE90-BR203

8. Remove the brake master cylinder piston No.2 by blowing air from the brake pipe connecting hole.



WFE90-BR204

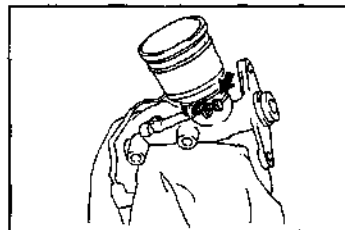
9. Remove the reservoir filler cap. Take out the float.



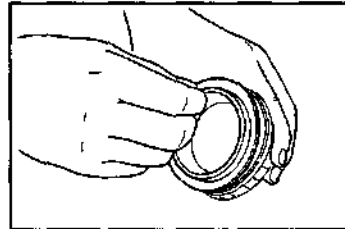
WFE90-BR205

BRAKE

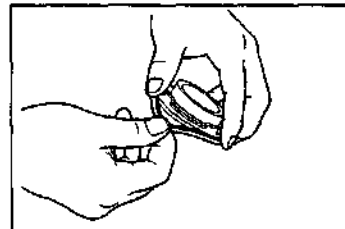
10. Remove the reservoir tank by loosening the reservoir tank hose clamp.



11. Remove the spacer together with the reservoir diaphragm from the reservoir filler cap.

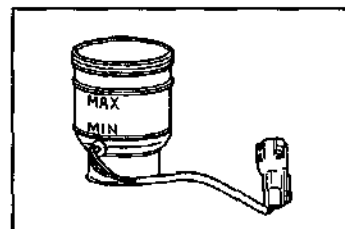
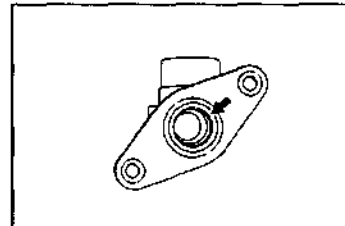


12. Remove the reservoir diaphragm from the spacer.



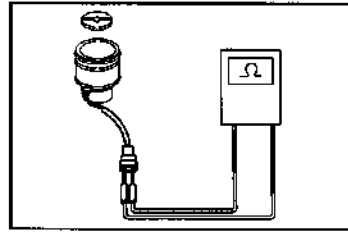
INSPECTION

1. Check of master cylinder
 - (1) Ensure that the inner surface of the master cylinder exhibits no scratches.
 - (2) Ensure that each part of the master cylinder exhibits no damage, such as deformation.
2. Check of reservoir tank
 - (1) Ensure that the reservoir tank exhibits no damage, such as cracks.



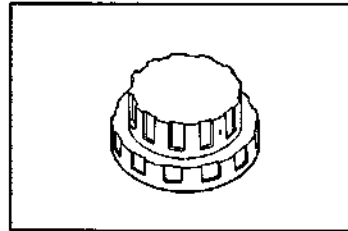
BRAKE

- (2) Ensure that continuity exists between the terminals of the connector when the float is put in the reservoir tank. Also, ensure that no continuity exists when the float is taken out from the reservoir tank. If not, replace the reservoir tank.



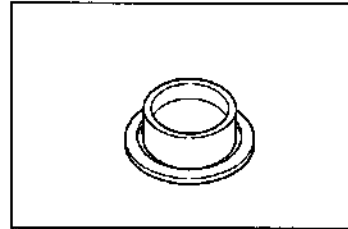
WPES0-BR211

3. Inspection of reservoir tank cap
 - (1) Ensure that the reservoir tank exhibits no damage, such as cracks.



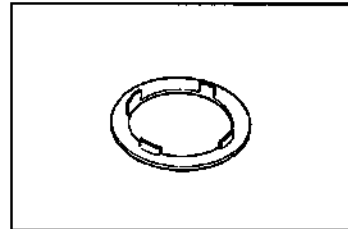
WPES0-BR212

- (2) Ensure that the reservoir diaphragm exhibits no damage, such as cracks and holes.



WPES0-BR213

- (3) Ensure that the spacer exhibits no damage, such as cracks.



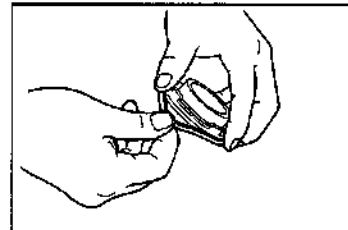
WPES0-BR214

ASSEMBLY

1. Install the reservoir diaphragm to the spacer.

NOTE:

 - Be sure to fit the reservoir diaphragm to the recessed section of the spacer.



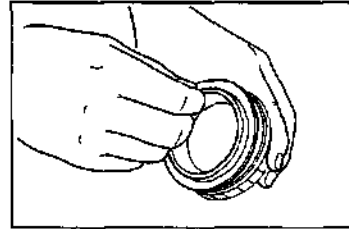
WPES0-BR215

BRAKE

2. Install the spacer together with the reservoir diaphragm to the reservoir tank cap.

NOTE:

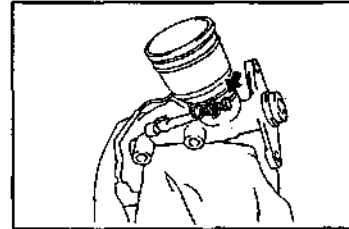
- Fit the pawl section of the spacer into the reservoir tank cap securely.



WFE90-BR216

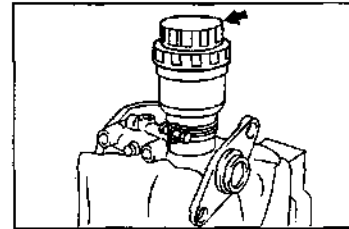
3. Install the reservoir tank to the master cylinder. Tighten the clamp.

Tightening Torque: 5.4 - 6.9 N·m
(0.55 - 0.70 kgf-m , 4.0 - 5.1 ft-lb)



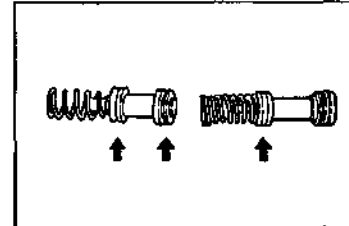
WFE90-BR217

4. Insert the float in the reservoir tank. Install the reservoir tank cap.



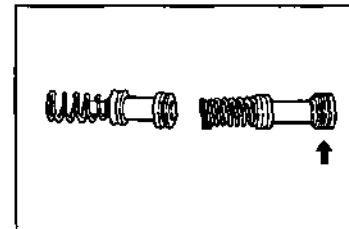
WFE90-BR218

5. Apply brake fluid to the piston cups indicated in the right figure.



WFE90-BR219

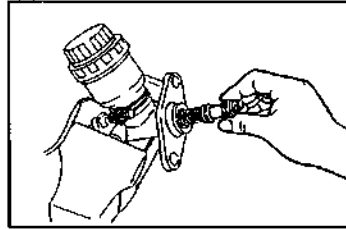
6. Apply rubber grease to the piston cups indicated in the right figure.



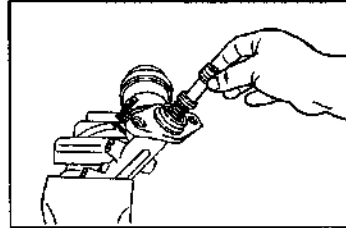
WFE90-BR220

BRAKE

7. Insert the piston No.2 into the master cylinder.



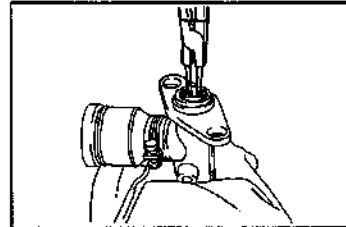
8. Insert the piston No.1 into the master cylinder.



9. While holding the piston No.1 by hand, install a new snap ring.

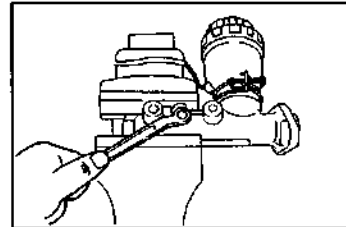
NOTE:

- Never reuse the snap ring.



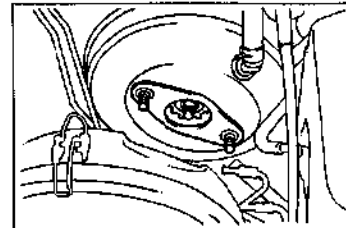
10. Install the set bolt to the master cylinder with a new gasket interposed.

Tightening Torque: 6.9 - 10.8 N·m
(0.7 - 1.1 kgf-m, 5.1 - 8.0 ft-lb)



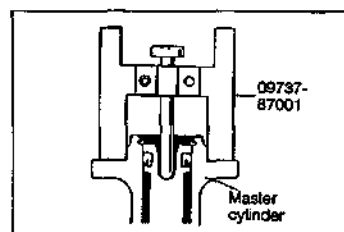
11. Ensure that the gasket at the brake booster side exhibits no damage.

If any damage is present, replace the gasket.



BRAKE

12. Adjust the clearance between the brake booster push rod and the master cylinder.
(See page BR-82.)



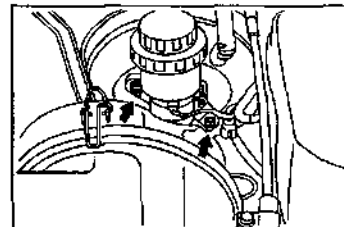
WFE00-BR225

13. Install the master cylinder to the brake booster. Tighten the attaching nuts evenly to the specified torque over two or three stages.

Tightening Torque: 10.2 - 15.3 N·m
(1.04 - 1.56 kgf-m, 7.52 - 11.3 ft-lb)

NOTE:

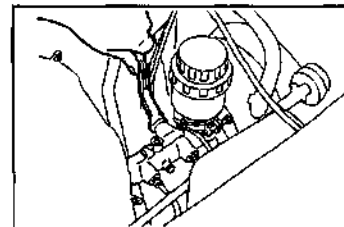
- The installation section at the vehicle exterior side should be tightened together with the connector bracket of the brake fluid level switch.



WFE00-BR227

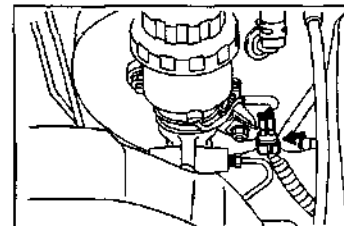
14. Connect the brake tubes to the master cylinder. Tighten the flare nut to the specified torque, using a flare nut wrench.

Tightening Torque: 12.7 - 17.7 N·m
(1.3 - 1.8 kgf-m, 9.4 - 13.0 ft-lb)



WFE00-BR228

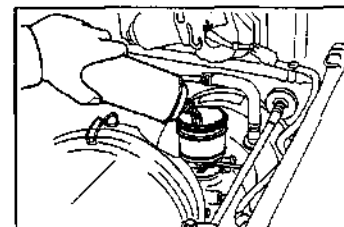
15. Reconnect the brake fluid level switch connector.



WFE00-BR229

16. Fill brake fluid to the reservoir tank.
Specified Brake Fluid: DOT 3 or SAEJ - 1703

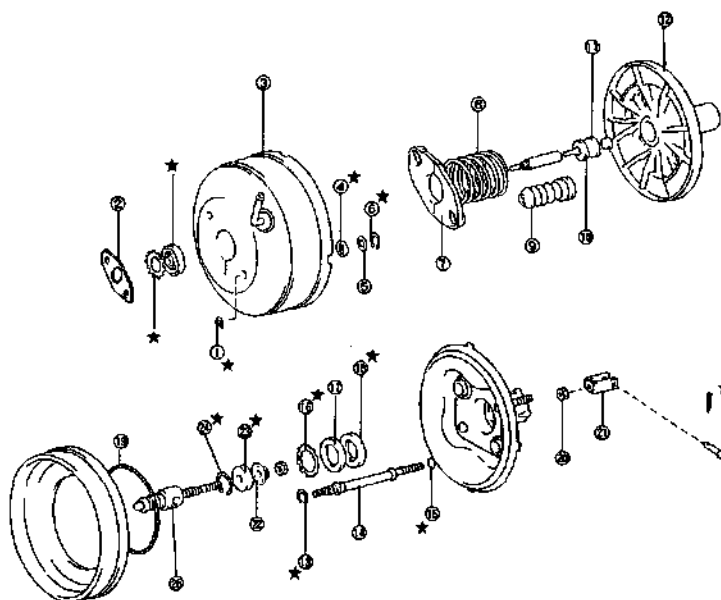
17. Perform air bleeding.
(See page BR-24.)
18. Ensure that no brake fluid leakage is present.
19. Check and adjust the brake pedal height.
(See page BR-21.)



WFE00-BR230

BRAKE

BRAKE BOOSTER COMPONENTS



★ : Non-reusable parts

- ① "E" ring
- ② Gasket
- ③ Booster body
- ④ Tie rod seal
- ⑤ Seal plate
- ⑥ Snap ring
- ⑦ Spring retainer
- ⑧ Booster spring
- ⑨ Tie rod boot
- ⑩ Reaction ring
- ⑪ Reaction rubber
- ⑫ Booster piston
- ⑬ Snap ring

- ⑭ Tie rod
- ⑮ "O" ring
- ⑯ Bush stopper
- ⑰ Bush
- ⑱ Piston seal
- ⑲ Diaphragm band
- ⑳ Nut
- ㉑ Clevis master cylinder push rod
- ㉒ Booster operating rod adjusting nut
- ㉓ Element
- ㉔ Booster piston stop ring
- ㉕ Poppet valve complete

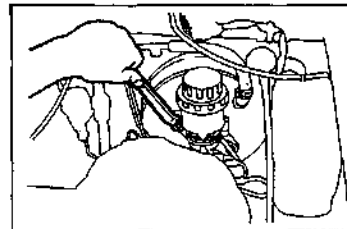
WFE80-6R231

REMOVAL**NOTE:**

- If any brake fluid gets on the painting surface, immediately wipe off the brake fluid and wash the painting surface with water.

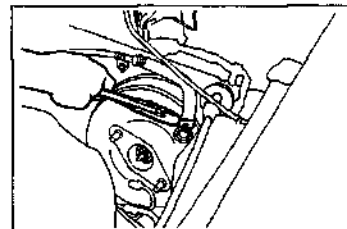
WFE90-BR232

1. Remove the master cylinder.
(See page BR-61.)



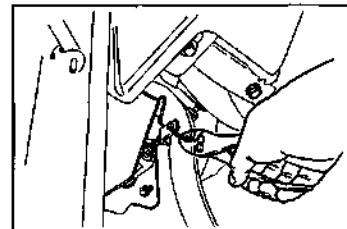
WFE90-BR233

2. Disconnect the brake booster hose from the brake booster.



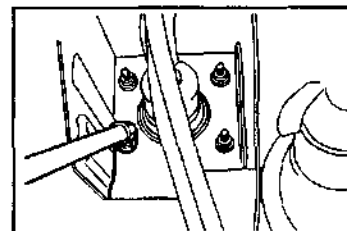
WFE90-BR234

3. Remove the cotter pin. Remove the clevis pin.



WFE90-BR235

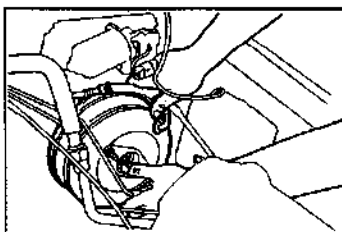
4. Remove the brake booster attaching nuts.



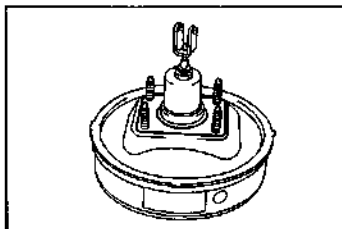
WFE90-BR236

BRAKE

5. Remove the brake booster from the dash panel.
CAUTION:
 - Be very careful not to damage the brake tubes.

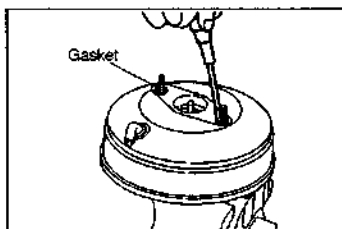


6. Remove the gasket from the brake booster.

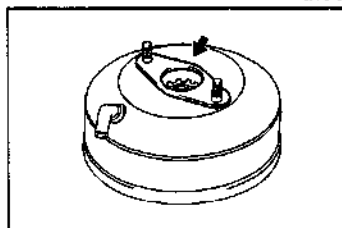


DISASSEMBLY

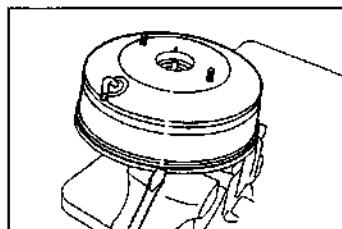
1. Remove the "E" ring.
NOTE:
 - Never reuse the "E" ring.



2. Remove the gasket.
NOTE:
 - Never reuse the gasket.



3. Remove the booster body from the booster housing, using a standard screwdriver or the like.
NOTE:
 - Be very careful not to deform the booster body and booster housing.



4. Remove the booster piston rod.

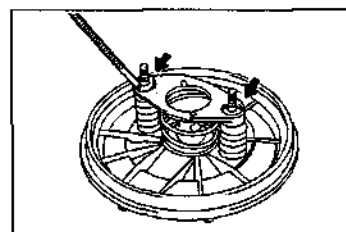
BRAKE

5. Remove the tie rod seal, using a minor screwdriver or the like.

NOTE:

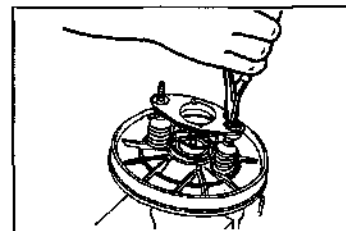
- Never reuse the tie rod seal.

6. Remove the tie rod seal plate, using a magnet finger or the like.



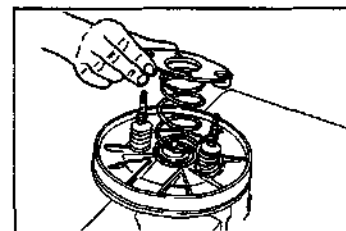
WFE30-BR242

7. While holding the spring retainer, remove the snap rings.



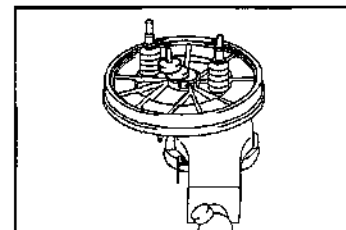
WFE30-BR243

8. Remove the spring retainer and booster spring from the booster piston.



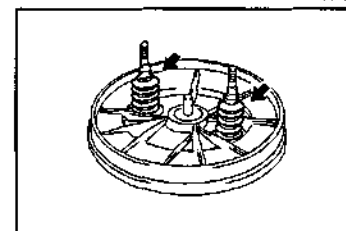
WFE30-BR244

9. Remove the reaction ring, rubber and reaction plate.



WFE30-BR245

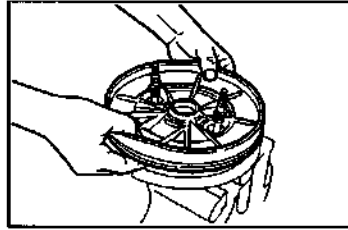
10. Remove the tie rod boot from the tie rod and piston.



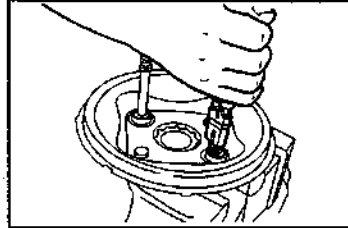
WFE30-BR246

BRAKE

11. Remove the booster piston from the booster housing.



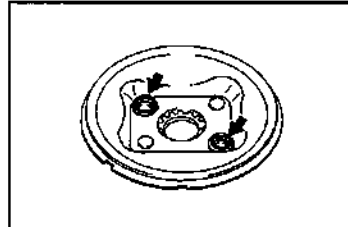
12. Remove the snap rings. Remove the tie rod from the booster housing.



13. Remove the "O" ring from the booster housing.

NOTE:

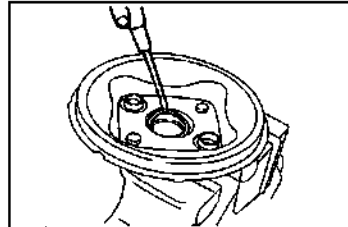
- Never reuse the "O" ring.



14. Remove the bush retainer.

NOTE:

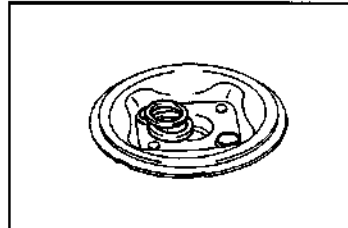
- Never reuse the bush retainer.



15. Remove the bush and piston seal from the booster housing.

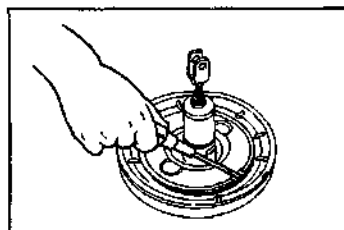
NOTE:

- Never reuse the piston seal.



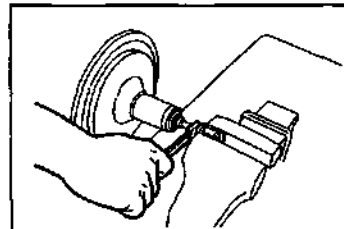
BRAKE

16. Remove the diaphragm band. Remove the diaphragm.



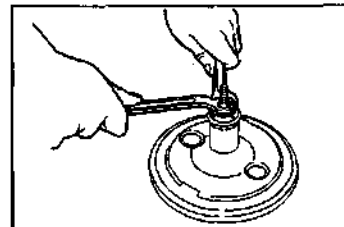
WFE90-BR252

17. Loosen the lock nut. Remove the clevis and lock nut.



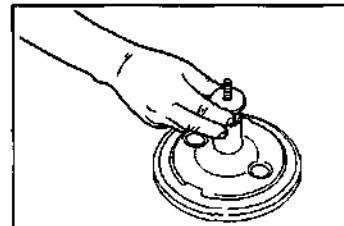
WFE90-BR253

18. Loosen the lock nut. Remove the lock nut and adjusting nut.



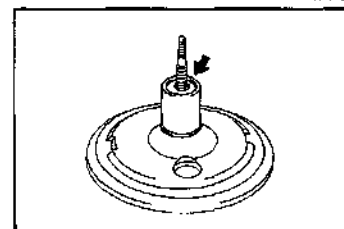
WFE90-BR254

19. Remove the element from the booster piston.



WFE90-BR255

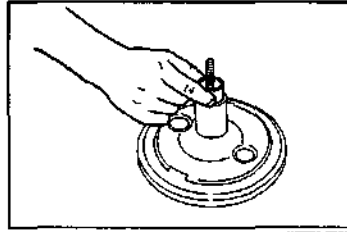
20. Remove the booster piston stop ring.



WFE90-BR256

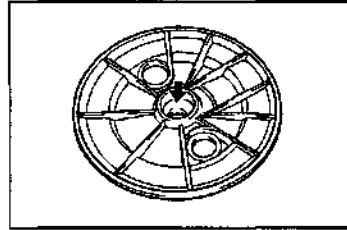
BRAKE

21. Remove the poppet valve assembly from the booster piston.



NOTE:

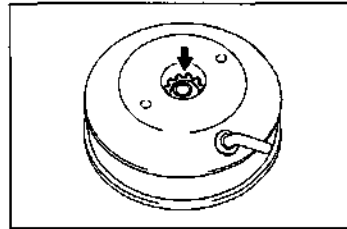
- If any difficulty is encountered in drawing out the poppet valve, lightly tap the poppet valve from the back side of the piston with a suitable rod interposed.



22. Remove the circular internal ring from the booster body.

NOTE:

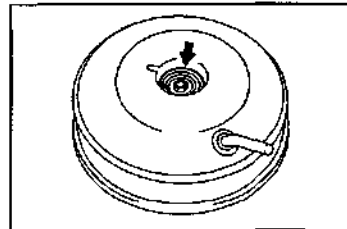
- Never reuse the circular internal ring.



23. Remove the booster plate and seal from the booster body.

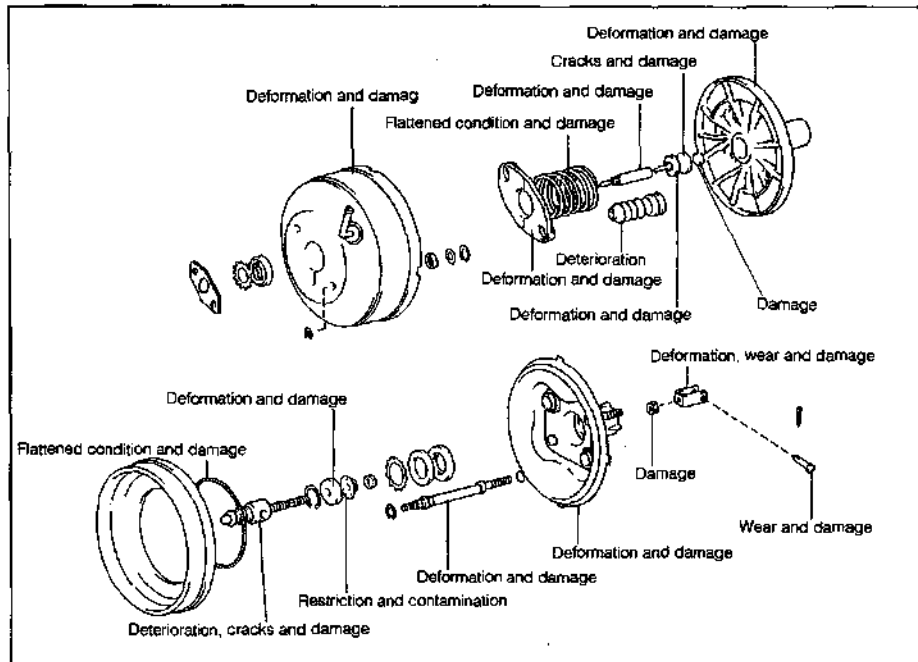
NOTE:

- Never reuse the booster plate and seal.



INSPECTION

Check the following parts. Replace any defective parts.



WF690-BR261

ASSEMBLY**NOTE:**

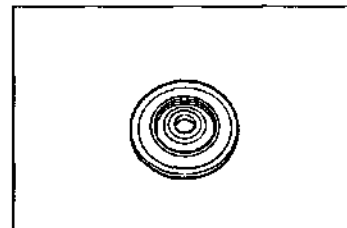
- Be sure to use the silicone grease furnished in the gasket kit.

1. Thinly apply silicone grease to the inner surfaces of the booster plate and seal.

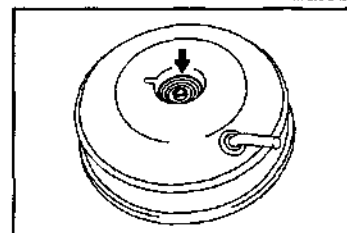
NOTE:

- Be sure to use a new booster plate and seal.
- If silicone grease has been already applied to those new parts, it is unnecessary to perform this step.

2. Install the booster plate and seal to the booster body.



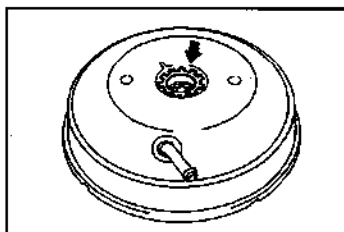
WF690-BR262



WF690-BR263

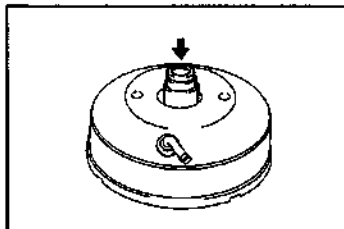
BRAKE

3. Place the circular internal ring on the booster body.



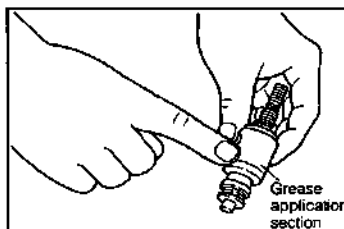
WPERS-BR254

4. While applying a box wrench having a suitable outer diameter on the circular internal ring, press the circular internal ring into the booster body.



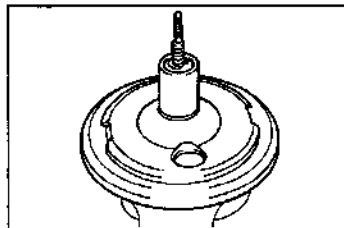
WPERS-BR265

5. Thinly apply silicone grease to the poppet valve at the section indicated in the right figure.



WPERS-BR266

6. Insert the poppet valve into the piston.

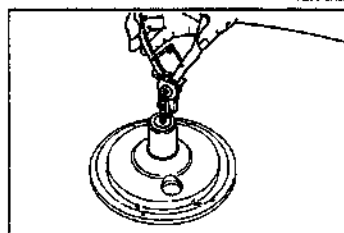


WPERS-BR267

7. While pushing the booster piston stop ring toward the poppet valve, install the booster piston stop ring to the piston.

NOTE:

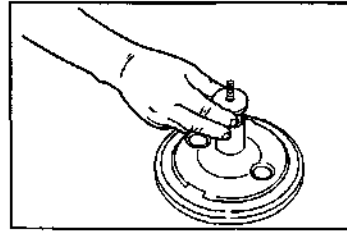
- Make sure that the stop ring is securely fitted into the groove of the piston inner surface.



WPERS-BR268

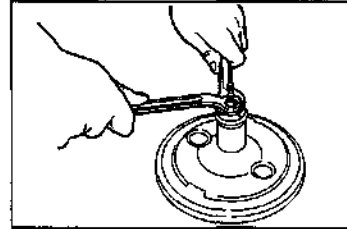
BRAKE

8. Install the element to the booster piston.



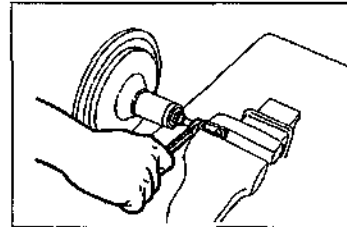
WFE90-9R269

9. Install and temporarily tighten the lock nut and adjusting nut.



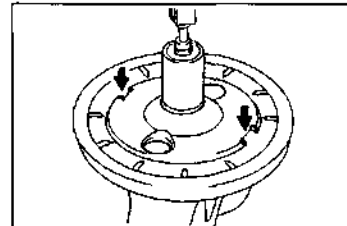
WFE90-9R270

10. Install and temporarily tighten the lock nut and clevis.



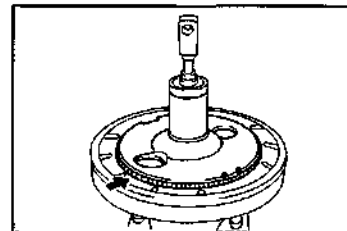
WFE90-9R271

11. Install the diaphragm to the piston while aligning the diaphragm with the cut-out section.



WFE90-9R272

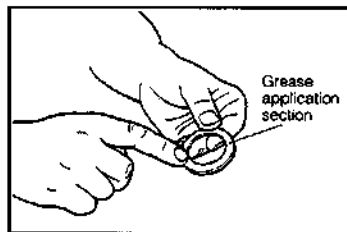
12. Install the diaphragm stopper to the diaphragm in such a way that its connection may not be aligned with the cut-out section.



WFE90-9R273

BRAKE

13. Thinly apply silicone grease to the piston seal.



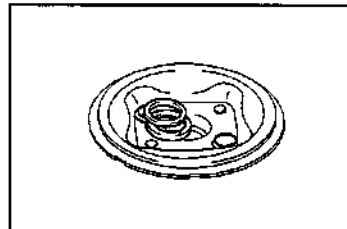
WP590-BR274

14. Install the piston seal to the booster housing.

NOTE:

- Be sure to use a new piston seal.

15. Install the bush to the booster housing.

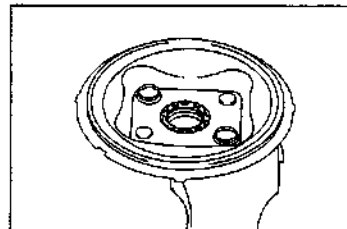


WP590-BR275

16. Lightly fit the bush retainer to the booster housing.

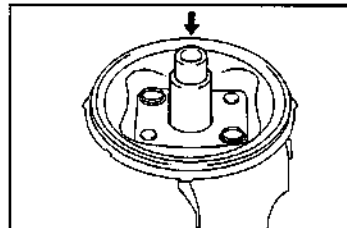
NOTE:

- Be sure to use the new bush retainer.



WP590-BR276

17. Press the retainer into the booster housing, using a box wrench having a suitable outer diameter or the like.

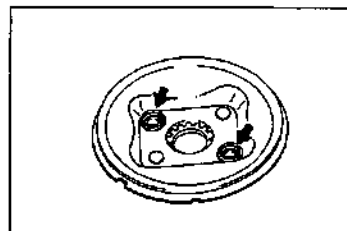


WP590-BR277

18. Install the "O" ring to the booster housing.

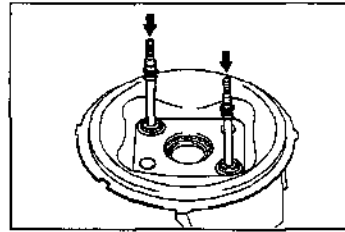
NOTE:

- Be sure to use the new "O" ring.



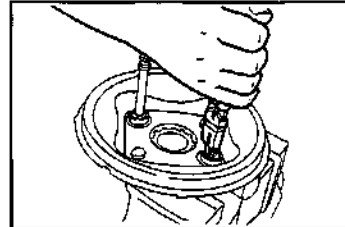
WP590-BR278

19. Install the tie rod to the booster housing.



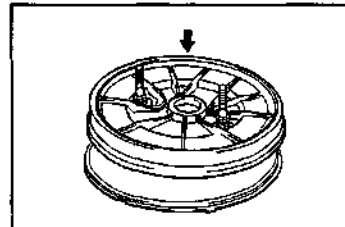
WFE90-BR279

20. Secure the tie rod to the booster housing with a snap ring.
NOTE:
- Be sure to use a new snap ring.
 - Make sure that the snap ring is securely fitted into the groove section of the booster housing.



WFE90-BR280

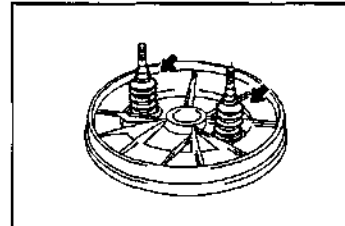
21. Install the booster piston to the booster housing while aligning the protruding section of the diaphragm with the cut-out section of the booster housing.



WFE90-BR281

22. Assemble the tie rod boot to the tie rod and piston.

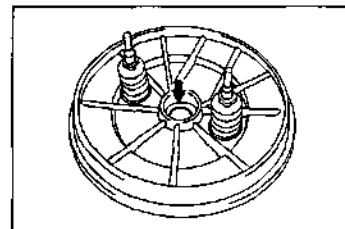
- NOTE:
- Be sure to use a new tie rod boots.
 - Be very careful not to damage the rod boot by the threaded portion of tie rod.



WFE90-BR282

23. Install the reaction plate to the booster piston.

- NOTE:
- The reaction plate should be assembled in such a way that the recessed side may come at the piston side.



WFE90-BR283

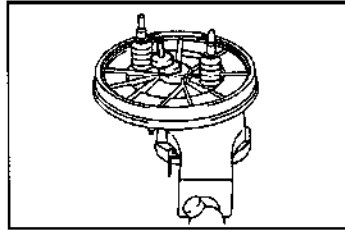
BRAKE

24. Thinly apply silicone grease to the rubber surface.

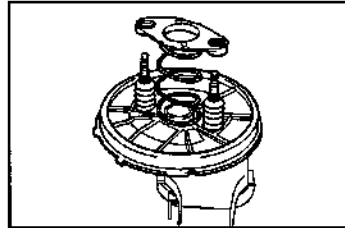
NOTE:

- Never reuse the rubber.

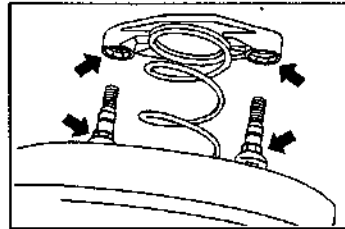
25. Install the rubber and reaction ring to the booster piston.



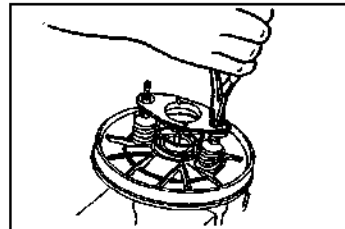
26. Place the booster spring and retainer on the piston.



27. Align the recessed section of the retainer with the direction of the tie rod connecting section.



28. While holding the retainer, install the snap ring.

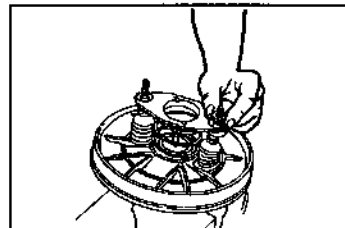


29. Install the tie rod seal plate to the tie rod section.

30. Thinly apply silicone grease to the tie rod seal. Install the tie rod seal to the tie rod section.

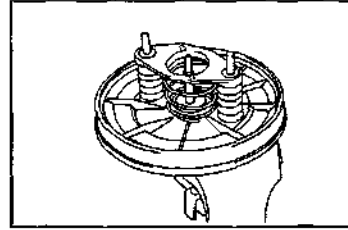
NOTE:

- Make sure that the lip surface of the oil seal faces upward.



BRAKE

31. Apply a small amount of silicone grease to the forward end of the reaction ring shaft.
32. Install the booster piston rod. Apply a small amount of silicone grease to the forward end of the booster piston rod.

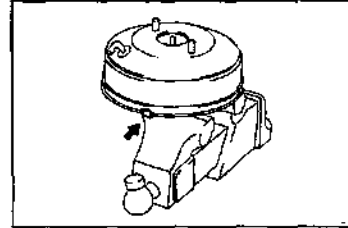


VFEB0-BF029

33. Install the booster body to the booster housing while aligning the cut-out section.

NOTE:

- Slowly and completely fit the booster body with the housing.



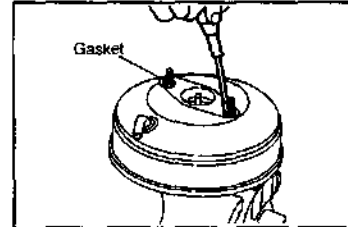
VFEB0-BR290

34. Install the gasket to the booster body.

35. Install the new "E" rings.

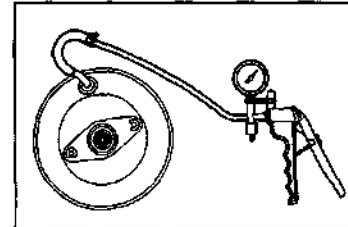
NOTE:

- Do not reuse the "E" rings.



VFEB0-BR291

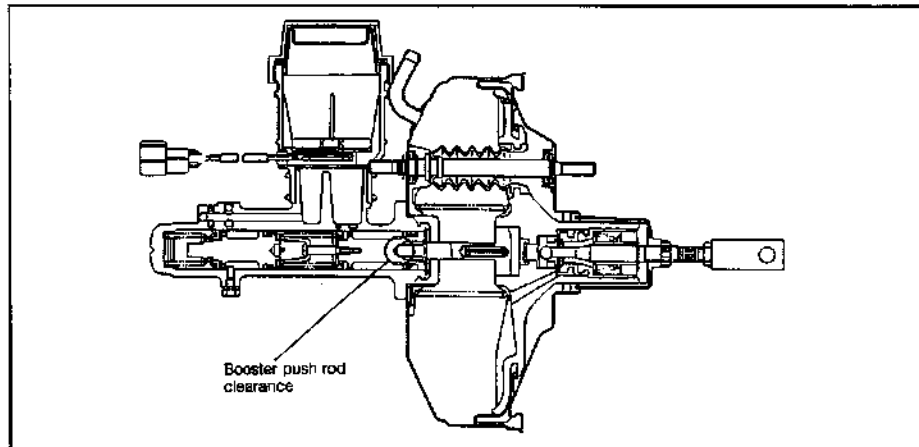
36. Apply negative pressure to the brake booster, using a Mity-Vac. At this time, ensure that no air leakage is present.



VFEB0-BR292

BRAKE

ADJUSTMENT OF PUSH ROD CLEARANCE

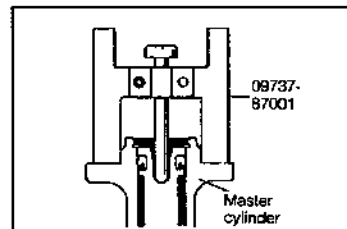


1. Place the following SST on the master cylinder. Adjust the central rod of the SST so that it may contact with the bottom of the piston.

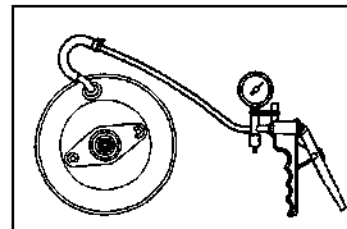
SST: 09737-87001-000

CAUTION:

- Be very careful not to allow the SST or rod to tilt. Failure to observe this caution may lead to brake malfunctioning.



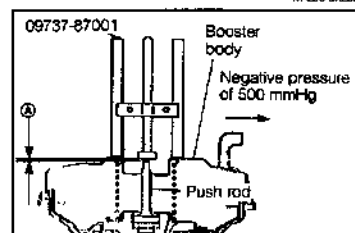
2. Apply a negative pressure of 500 mmHg to the brake booster, using a MityVac or the like.



3. Place the SST which was adjusted at the step 1 on the brake booster in a turned-over state, as shown in the right figure. Ensure that the clearance between the push rod and the SST is zero. If not, adjust the push rod height.

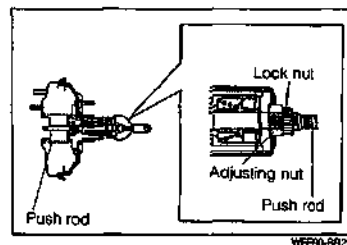
NOTE:

- This operation should be performed with the gasket installed.



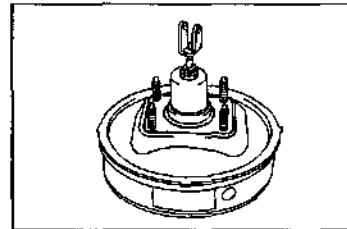
BRAKE

4. Adjustment of push rod height
Loosen the lock nut. While preventing the push rod from turning, turn the adjusting nut, until the push rod height becomes the same height as at the step 3.
5. Tighten the lock nut, while preventing the adjusting nut from turning.
Tightening Torque: 20.4 - 30.6 N·m
(2.08 - 3.12 kgf·m, 15.1 - 22.5 ft·lb)



INSTALLATION

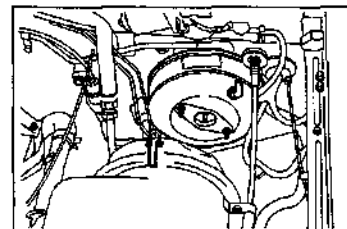
1. Install a new gasket to the dash panel installation surface of the brake booster.



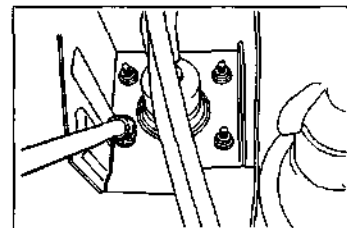
2. Install the brake booster to the dash panel in such a way that the brake booster hose connection may be positioned as indicated in the right figure and that the clevis may be incorporated into the brake pedal.

NOTE:

- Be very careful not to deform the brake pipe.



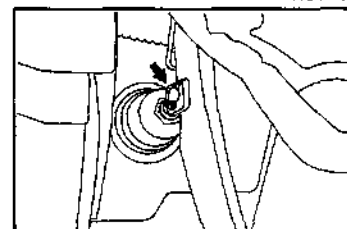
3. Tighten the brake booster attaching nuts.
Tightening Torque: 9.8 - 15.7 N·m
(1.0 - 1.6 kgf·m, 7.2 - 11.6 ft·lb)



4. Connect the clevis to the brake pedal by means of the pin. Install the cotter pin to prevent the pin from dropping.

NOTE:

- Be sure to bend the cotter pin beyond 90 degrees.
- Be sure to apply chassis grease to the pin.

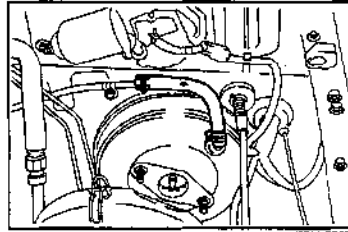


BRAKE

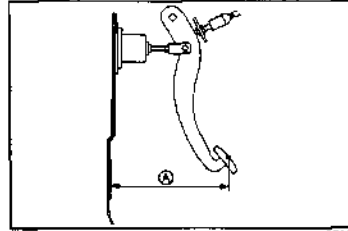
5. Connect the brake booster hose to the brake booster as indicated in the right figure. Install a new hose band.

CAUTION:

- The hose should be connected in such a way that the arrowheaded direction may face toward the engine side. Failure to observe this caution may lead to booster malfunctioning.
- Be sure to insert the hose up to the bottom of the spool at the inner side.
- Be sure to install the hose band between the spools.



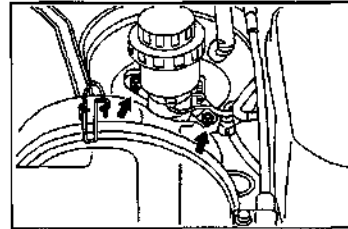
6. Adjust the brake pedal height.
(See page BR-26.)



7. Install the master cylinder.
(See page BR-66.)

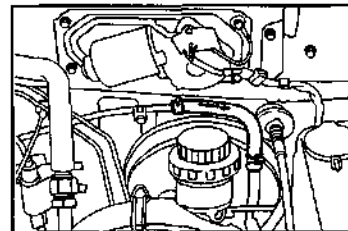
CAUTION:

- Prior to the installation of the master cylinder, be sure to adjust the brake booster push rod clearance.

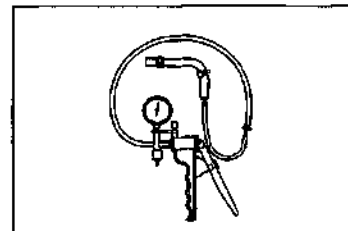


CHECK OF CHECK VALVE

1. Remove the booster vacuum hose bands. Remove the booster vacuum hose.



2. Connect a MityVac to the booster vacuum hose as indicated in the right figure. Apply negative pressure. Ensure that negative pressure is applied and the applied pressure is maintained.
If not, replace the booster vacuum hose.



BRAKE

3. Blow air into the booster vacuum hose from the booster side. Ensure that air continuity exists. If not, replace the booster vacuum hose.

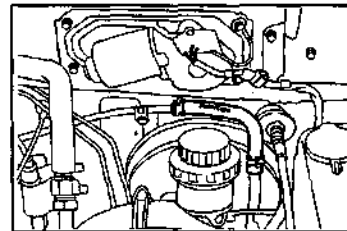


WP560-BR307

4. Connect the brake booster hose as indicated in the right figure. Install new hose bands.

CAUTION:

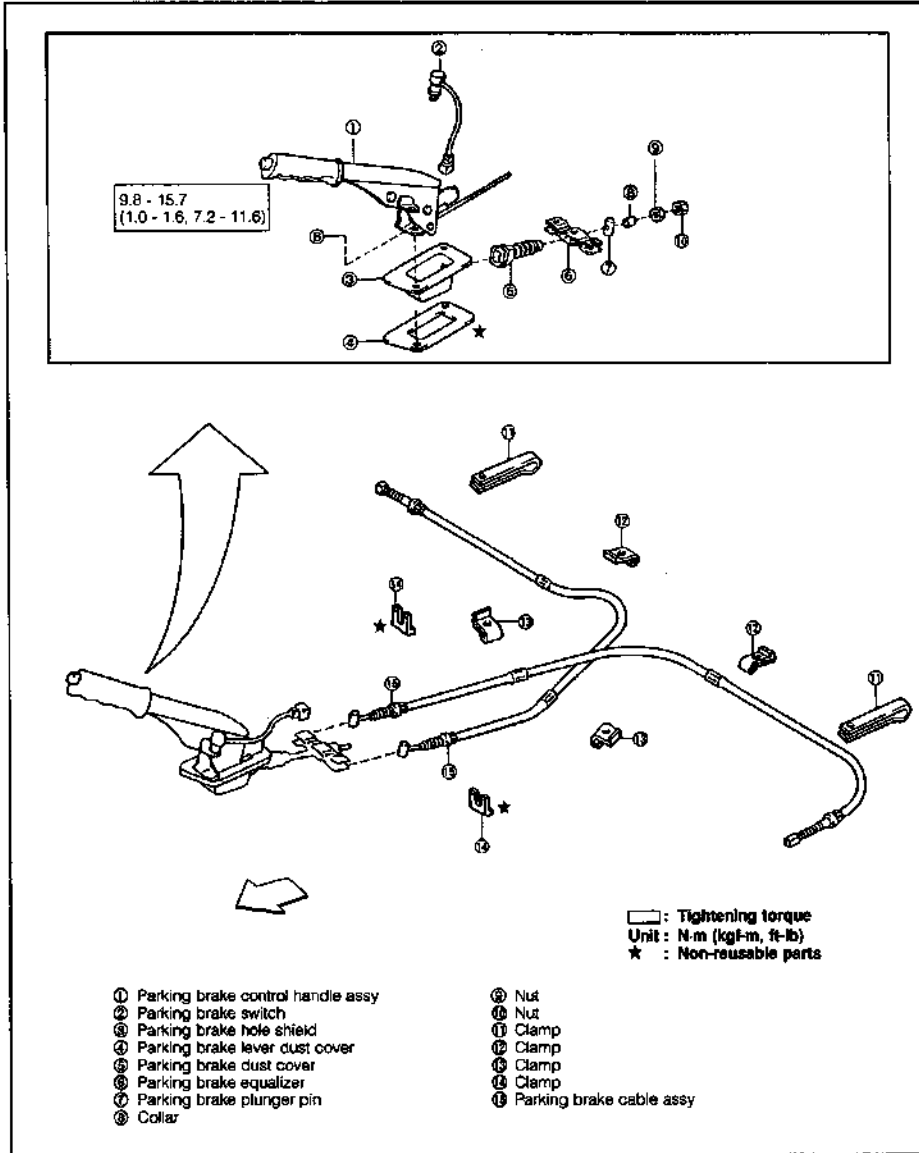
- The hose should be connected in such a way that the arrowheaded direction may face toward the engine side. Failure to observe this caution may lead to booster malfunctioning.
- Be sure to insert the hose up to the bottom of the spool at the inner side.
- Be sure to install the hose band between the spools.



WP560-BR308

BRAKE

PARKING BRAKE COMPONENTS

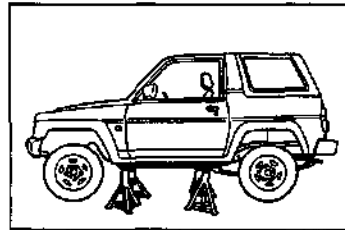


WFE90-BR200

REMOVAL**CAUTION:**

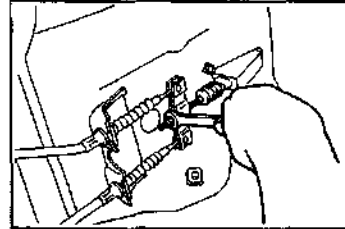
- Be very careful not to damage the cable.
- Be sure not to deform the cable by applying undue force to it.

1. Jack up the vehicle and support it with safety stands.
(See GI section.)



WPBIO-BR310

2. Loosen the lock nut of the parking brake lever adjusting nut.

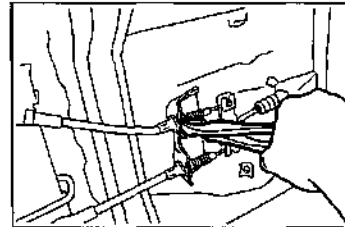


WPBIO-BR311

3. Remove the lock nut and adjusting nut.
4. Remove the collar.
5. Detach the cable clamp clip.

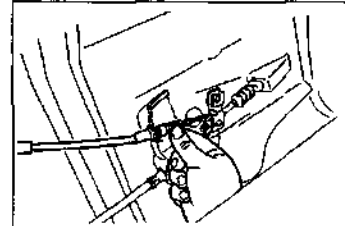
NOTE:

- Do not reuse the clip.



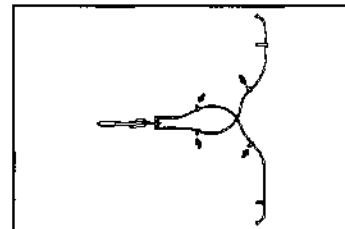
WPBIO-BR312

6. Disconnect the parking brake cable from the bracket and remove it from the equalizer.
7. Pull out the parking brake plunger from the equalizer.
Remove the parking brake plunger pin.



WPBIO-BR313

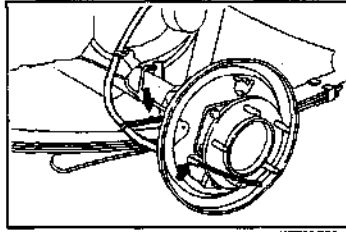
8. Remove the parking brake cable clamps and bolts.



WPBIO-BR314

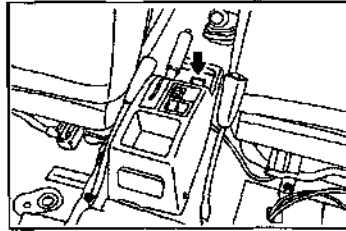
BRAKE

9. Disconnect the parking cable from the brake backing plate.
(See the Rear Brake section.)



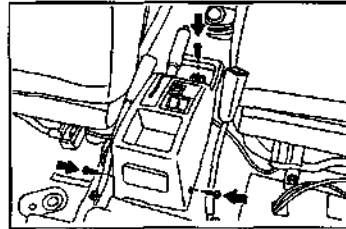
WP290-BR31g5

10. Removal of console box
(For details, see the Body section.)
(1) Remove the box hole cover, using a small-sized standard screwdriver or the like.



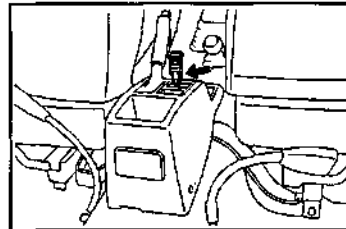
WP290-BR31b

- (2) Remove the console box attaching screws.



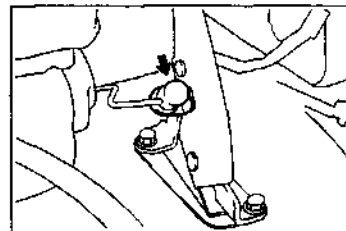
WP290-BR317

- (3) Lift the console box and disconnect the connectors of the door lock control switch and/or the power window.
(On vehicles so equipped)
(4) Remove the console box.



WP290-BR31b

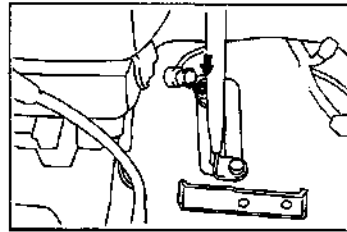
11. Remove the rubber cap of the parking brake lever switch from the switch.



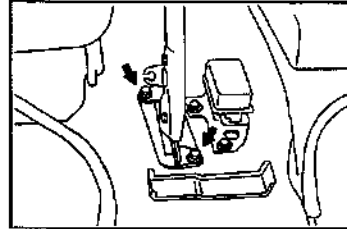
WP290-BR319

BRAKE

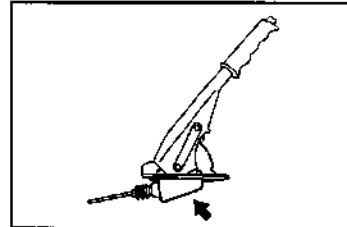
12. Push the parking brake lever switch to release the lock section. Then, remove the parking brake lever switch from the parking brake lever.



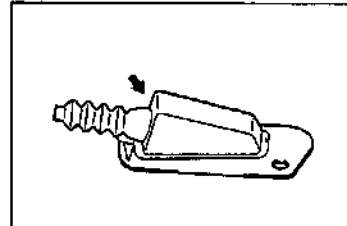
13. Remove the attaching bolts of the parking brake control handle. Then, remove the parking brake control handle from the vehicle.



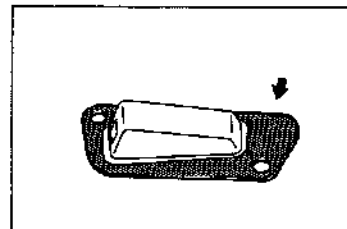
14. Remove the parking brake lever dust cover from the parking brake control handle.



15. Remove the parking brake dust cover from the parking brake lever dust cover.



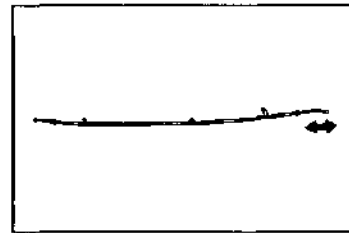
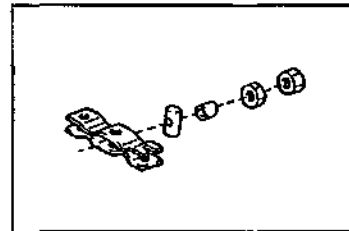
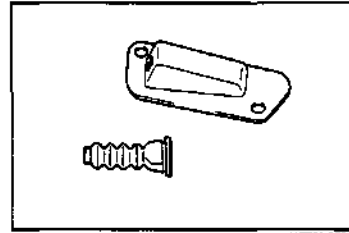
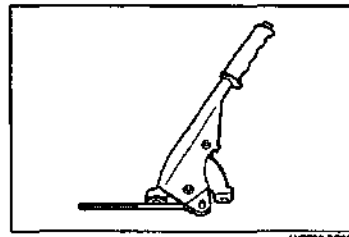
16. Remove the parking brake hole shield from the parking brake lever dust cover.



BRAKE

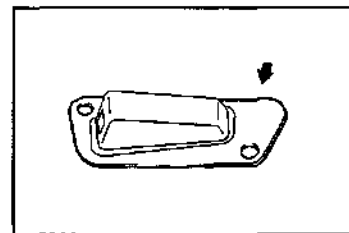
INSPECTION

1. Check of parking brake control lever
 - (1) Ensure that the rack and pawl sections exhibit no wear or deformation.
 - (2) Ensure that the pawl for the rack operates smoothly, interlocking with the release button.
 - (3) Ensure that the screw section exhibits no damage.
 - (4) Ensure that each staking section exhibits no excessive play.
 - (5) Ensure that the lever section exhibits no damage, such as deformation.
2. Inspection of parking brake lever dust cover
Ensure that the parking brake lever dust cover exhibits no damage, such as cracks.
3. Inspection of parking brake dust cover
Ensure that the parking brake dust cover exhibits no damage, such as wear and cracks.
4. Ensure that no damage, such as wear, is present at the parking brake equalizer, parking brake plunger pin, collar, adjusting nut and lock nut.
Replace any defective part.
5. Check of parking brake cable
Ensure that the parking brake cable and rubber boot exhibits no damage, such as wear, cut and deformation. Also, ensure that the inner cable operates smoothly.



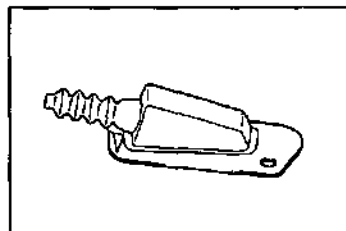
INSTALLATION

1. Install the parking brake hole shield to the parking brake lever dust cover.



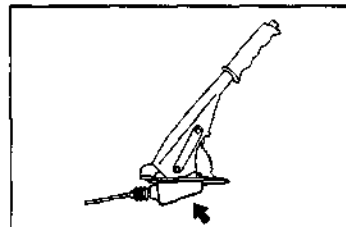
BRAKE

2. Assemble the parking brake dust cover to the parking brake lever dust cover.



WP50-BR300

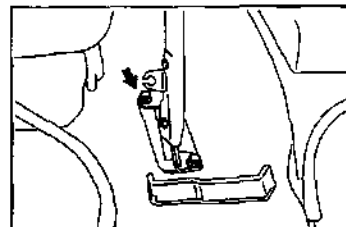
3. Insert the parking brake lever dust cover through the parking brake control handle.



WP50-BR301

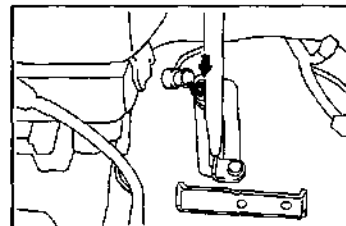
4. Install the parking brake control handle to the floor panel. Tighten the attaching bolts to the specified torque.

Tightening Torque: 9.8 - 15.7 N·m
(1.0 - 1.6 kgf·m, 7.2 - 11.6 ft·lb)



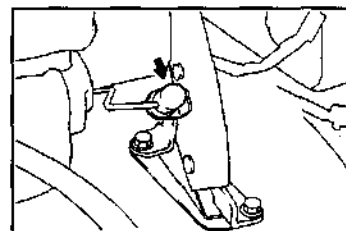
WP50-BR302

5. Insert the parking brake switch into the parking brake lever.



WP50-BR303

6. Put the rubber cap of the parking brake lever switch over the switch.



WP50-BR304

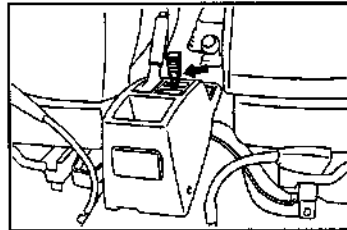
BRAKE

7. Installation of console box (See the Body section.)

- (1) Install the console box through the parking brake lever.

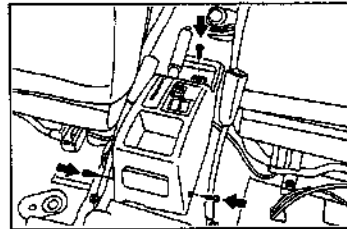
WPB30-BP335

- (2) Reconnect the connectors of the door lock control switch and/or power window control switch.
(On vehicles so equipped only)



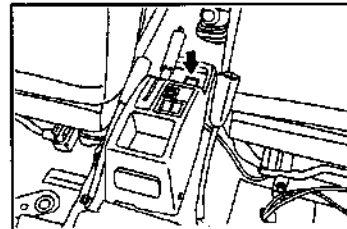
WPB30-BR336

- (3) Install the console box and tighten the attaching screws.



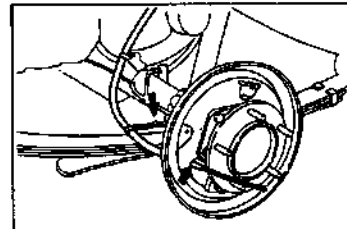
WPB30-BR337

- (4) Install the console box hole cover.



WPB30-BR338

8. Install the parking brake to the brake backing plate. (See the Rear Brake section.)



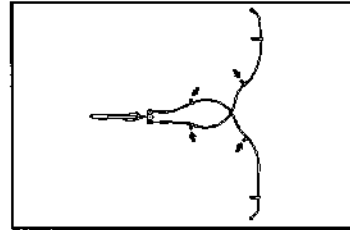
WPB30-BR339

BRAKE

9. Secure the parking brake cable clamps by installing the attaching bolt.

NOTE:

- The cable clamp should be installed in such a way that the gap between the parking brake cable and the fuel tank protector becomes at least 20 mm.

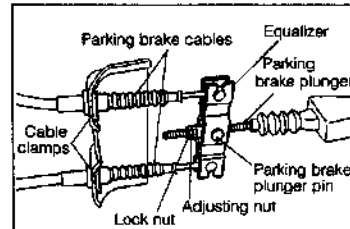


WFEB0-6R340

10. Connect the parking brake cable to the equalizer.
12. Install the parking brake plunger pin to the equalizer. Pass the parking brake plunger in place.
13. Install the adjusting nut and lock nut to the plunger.
14. Insert the parking brake cable to the bracket. Clamp the parking brake cable with new cable clamp clips.

NOTE:

- Never reuse the cable clamp clips.



WFEB0-6R341

15. Remove the slack of the parking brake cable by pulling the parking brake lever with a force of around 30 - 40 kgf.

16. Adjust the adjusting nut so that the working travel of the parking brake lever may become the specified value when the lever is pulled with a force of 25 kgf.

Specified Working Travel of Parking Lever:

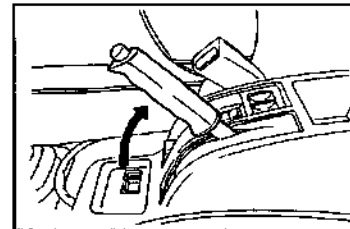
4 - 6 notches

(with an operating force of 25 kgf applied)

17. While preventing the adjusting nut from turning, tighten the lock nut to the specified torque.

Tightening Torque: 3.9 - 6.9 N·m

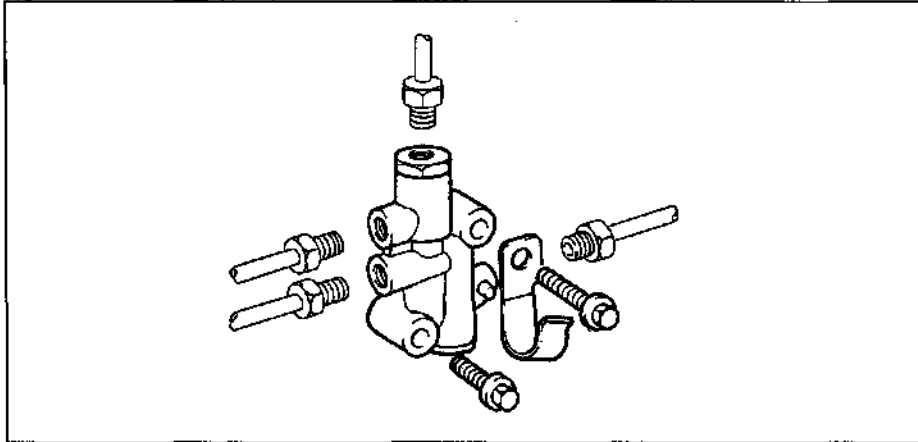
(0.4 - 0.7 kgf-m, 2.9 - 5.1 ft-lb)



WFEB0-6R342

BRAKE

P & B VALVE (PROPORTIONING AND BY-PASS VALVE)

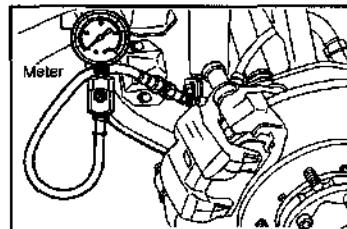


INSPECTION

1. Connect a suitable brake hydraulic pressure gauge to the front wheel brake. Perform air bleeding.

NOTE:

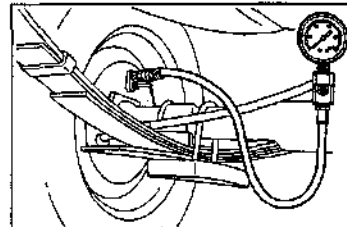
- Be sure to follow the manufacturer's instructions of the brake hydraulic pressure gauge during the connection.



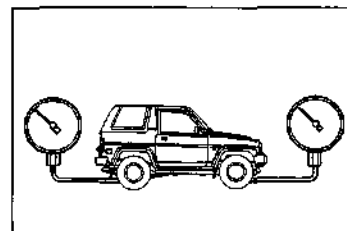
2. Connect a suitable brake hydraulic pressure gauge to the rear wheel brake. Perform air bleeding.

NOTE:

- Be sure to follow the manufacturer's instructions of the brake hydraulic pressure gauge during the connection.

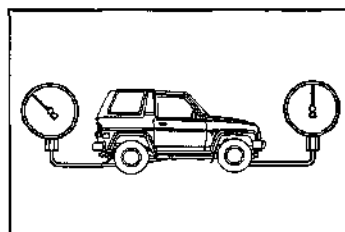


3. With the brake pedal depressed, set the reading of the hydraulic pressure gauge installed to the front wheel brake to 10 kgf/cm². Ensure that the hydraulic pressure gauge installed to the rear wheel brake registers almost the same hydraulic pressure as that applied to the front wheel. If not, replace the P & B valve.



BRAKE

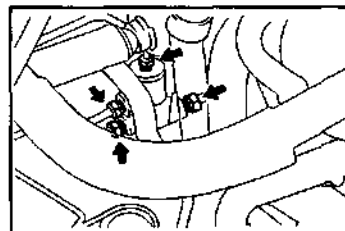
4. Apply a hydraulic pressure of 30 kg/cm² or more to the front wheel brake by depressing the brake pedal. Ensure that the hydraulic pressure applied to the rear wheel brake is lower than that applied to the front wheel. If not, replace the P & B valve.
5. Remove the brake hydraulic pressure gauge. Perform air bleeding. (See page BR-24.)



WFE90-BR347

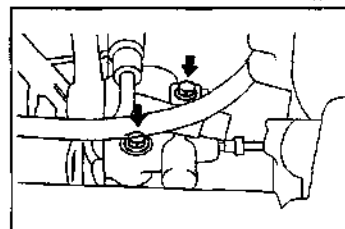
REMOVAL

1. Drain the brake fluid from the front and rear brake bleeder plugs.
2. Remove the brake pipe from the P & B valve.



WFE90-BR348

3. Remove the P & B valve by removing the P & B valve attaching bolts.



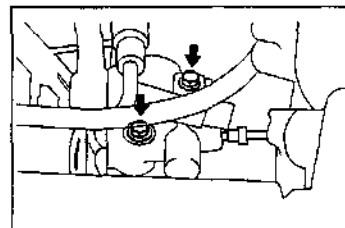
WFE90-BR349

INSTALLATION

1. Install the P & B valve and tighten the attaching bolts.
Tightening Torque: 5.9 - 9.8 N·m
(0.6 - 1.0 kgf-m, 4.3 - 7.2 ft-lb)

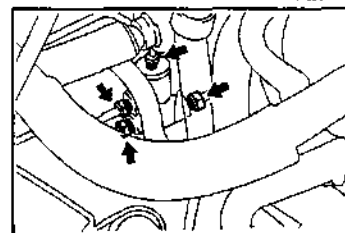
NOTE:

- On air conditioner-equipped vehicles, be sure to tighten the drain hose clamp together with the valve.



WFE90-BR350

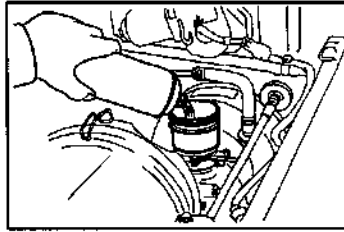
2. Connect the brake pipes to the P & B valve.
Tightening Torque: 12.7 - 17.7 N·m
(1.3 - 1.8 kgf-m, 9.4 - 13.0 ft-lb)



WFE90-BR351


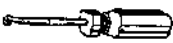
BRAKE

3. Fill brake fluid to the master cylinder. Perform air bleeding.
(See page BR-24.)
4. Perform the brake fluid leakage test.
5. Perform the in-vehicle inspection.
6. Perform the brake test on a brake tester.



BRAKE

SSTs (Special Service Tool)

Shape	Parts No. and Name	Purpose	Remarks
	09373-87001-000 Brake booster push rod gauge	Height adjustment of brake booster push rod	
	09921-0010-000 Spring tension tool	Removal/installation of tension spring	

WFE90-BR33

SERVICE SPECIFICATIONS

Brake pedal height		216 ± 5 mm (8.53 ± 0.2 inch)
Brake pedal free travel		1 - 3 mm (0.039 - 0.12 inch)
Brake pedal reserve travel		80 mm (3.15 inches) or more
Brake pad thickness	New Minimum limit	9 mm (0.35 inch) 1.5 mm (0.06 inch)
Brake disc thickness	Solid New Minimum limit Ventilation New Minimum limit	12.5 mm (0.49 inch) 11.5 mm (0.45 inch) 18.0 mm (0.71 inch) 17.00 mm (0.669 inch)
Brake disc runout limit		0.15 mm (0.006 inch)
Brake drum inner diameter	New Minimum limit	254 mm (10 inches) 256 mm (10.08 inches)
Brake shoe thickness	New Minimum limit	5 mm (0.2 inch) 1 mm (0.04 inch)
Compression spring free length		57 ± 1.5 mm (2.24 ± 0.06 inches)
Clearance between master cylinder and brake booster		0.3 ± 0.2 mm (0.012 ± 0.008 inch)

WFE90-BR34

BRAKE

TIGHTENING TORQUE

Tightening component	N·m	kgf·m	ft·lb
Brake tube (Flare nut)	12.7 - 17.7	1.3 - 1.8	9.4 - 13.0
Air bleeder plug	8.8 - 12.7	0.9 - 1.3	6.5 - 9.4
Brake pedal x Brake pedal bracket	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Stop lamp switch lock nut	17.7 - 29.4	1.8 - 3.0	13.0 - 21.7
Brake booster push rod x Clevis	12.7 ± 2.6	1.3 ± 0.2	9.4 ± 1.9
Brake mounting support x Steering knuckle	68.6 - 88.3	7.0 - 9.0	50.6 - 65.1
Brake mounting support x Stud bolt	39.2 - 49.0	4.0 - 5.0	28.9 - 36.2
Brake mounting support x Caliper body	31.4 - 41.2	3.2 - 4.2	23.1 - 30.4
Brake hose x Caliper body	20.6 - 26.5	2.1 - 2.7	15.2 - 19.5
Wheel cylinder x Brake tube	12.7 - 17.7	1.3 - 1.8	9.4 - 13.0
Backing plate x Wheel cylinder	7.8 - 11.8	0.8 - 1.2	5.8 - 8.7
Shoe x Automatic adjusting lever pin	2.55 - 4.9	0.26 - 0.5	1.88 - 3.62
Parking brake shoe strut (screw)	2.6 - 3.9	0.26 - 0.4	1.88 - 2.9
Wheel hub nut	88.3 - 11.8	9.0 - 12.0	65.1 - 87.0
Master cylinder piston set bolt	6.9 - 10.8	0.7 - 1.1	5.1 - 8.0
Master cylinder reservoir hose band	5.4 - 6.9	0.55 - 0.70	4.5 - 5.1
Master cylinder x Brake booster	10.2 - 15.3	1.04 - 1.56	7.52 - 11.3
Master cylinder x Brake tube	12.7 - 17.7	1.3 - 1.8	9.4 - 13.0
Brake booster lock nut x Adjust nut	20.4 - 30.6	2.08 - 3.12	15.1 - 22.5
Brake booster x Dash panel	9.8 - 15.7	1.0 - 1.6	7.2 - 11.6
Parking brake control handle x Floor panel	9.8 - 15.7	1.0 - 1.6	7.2 - 11.6
Parking brake control handle x Lock nut	3.9 - 6.9	0.4 - 0.7	2.9 - 5.1
P&B valve x Floor panel	5.9 - 9.8	0.6 - 1.0	4.3 - 7.2
P&B valve x Brake tube	12.7 - 17.7	1.3 - 1.8	9.4 - 13.0

WFE90-BR356

DAIHATSU

F300

GENERAL INFORMATION

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2. CHASSIS SERIAL NUMBER & MANUFACTURER'S PLATE	GI- 5
3. ENGINE NUMBER AND ENGINE TYPE	GI- 6
4. BODY COLOR INFORMATION	GI- 6
5. VEHICLE 4-PLANE DIAGRAMS	GI- 7
6. PERFORMANCE DIAGRAMS	GI-11
7. SPECIFICATIONS	GI-14
8. SUMMARY OF ENGINE CONSTRUCTION	GI-17
9. SUMMARY OF BODY AND OTHER CONSTRUCTIONS	GI-26
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12. SUMMARY OF BODY ELECTRICAL	GI-44

This Service Manual applies to those vehicles with the following chassis numbers onward and with the owner's manual F270-9008-E1, FG1, S1 or A1 furnished.

JDA00F30000026439

WFE90-G1001

GI-1

GENERAL INFORMATION

IMPORTANT SAFETY NOTICE

The vehicle is a machine comprising a great number of parts. Basically speaking, the vehicle is potentially hazard. However, one can handle it safely if he has the required knowledge.

Correct service methods and repair procedures are very vital for assuring not only the safety and reliability of a vehicle, but also the safety of service personnel concerned.

The methods and procedures contained in this manual describe in a general way the techniques which the manufacturer has recommended. Thus, they will contribute to ensuring the reliability of the products. The contents of the servicing operations come in a wide variety of ways. Moreover, techniques, tools and parts necessary for each operation are different widely from each other.

This manual does not cover all details of techniques, procedures, parts, tools and handling instructions which are necessary for these operations, for such coverage is impossible. Hence, any one who obtains this manual is expected first to make his responsible selection as to techniques, tools and parts which are necessary for servicing the vehicle concerned properly. Furthermore, he must assume responsibility for his actions in connection with his own safety.

Therefore, one should not perform any service if he is not capable of making responsible selection and/or if he can not understand the contents herein described, for this manual has been prepared for experienced service personnel.

WARNINGS, CAUTIONS AND NOTES

All these symbols have their specific purposes, respectively.

WARNING:

This symbol means that there is a possibility of personal injury of the operator himself or the nearby workers if the operator fails to follow the operating procedure prescribed in this manual.

CAUTION:

This symbol means that there is a possibility of damage to the component being repaired if the operator fails to follow the operating procedure prescribed in this manual.

NOTE:

To accomplish the operation in an efficient manner, additional instructions concerning the operation are given in this section.

The following list describes general WARNINGS:

- Always wear safety glasses for eye protection.
- Use safety stands whenever a procedure requires you to be under the vehicle.
- Be sure that the ignition switch is always in the OFF position, unless otherwise required by the procedure.
- Set the parking brake when working on the vehicle.
- Operate the engine only in a well-ventilated area to avoid the danger of carbon monoxide.
- Keep yourself and your clothing away moving parts, when the engine is running, especially from the fan and belts.
- To prevent serious burns, avoid contact with hot metal parts such as the radiator, exhaust manifold, tail pipe, catalytic converter and muffler.
- Do not smoke while working on a vehicle.
- To avoid injury, always remove rings, watches, loose hanging jewelry, and loose clothing before beginning to work on a vehicle.
- Keep hands and other objects clear of radiator fan blades! The electric cooling fan is mounted on the radiator and can start to operate at any time by an increase in underhood temperature. The electric cooling fan is also mounted on the condenser for air conditioner and start to operate in anytime during the air conditioner switch "ON". For this reason care should be taken to ensure that the electric cooling fan motor is completely disconnected when working under the hood.

WFE90-G1100

YOU SHOULD OBSERVE THE FOLLOWING WARNING WHEN WORKING ON THE VEHICLE AS LAID DOWN BY THE HEALTH AND SAFETY EXECUTIVE.**THE DANGER**

Some vehicle parts contain asbestos. Working with them can create dust. Breathing this dust is harmful. Cases of asbestos related cancer have been reported in garage workers.

The dangerous jobs are:

- cleaning brake assemblies
- cleaning clutch housings
- grinding brake linings
- drilling brake linings
- sweeping floors

Brake and clutch linings and disc pads may contain asbestos. If in doubt assume that they do.

WHO IS AT RISK?

Anyone in the garage could be at risk. There is no known safe level of asbestos dust. But the more dust you breath, the greater the chance of lung damage.

The problem is that the dust particles are too small to be seen by the naked eye. And the diseases caused can take years to develop.

Don't put the brakes on your life. Avoid breathing asbestos dust. Prevent dust getting into the air. Follow the WARNING.

WARNING

1. DON'T blow dust out of brake drums or clutch housings with an air line.
2. DO use properly designed drum cleaning equipment which prevents dust escaping
or
use clean wet rags to clean out drums or housings.
Put used rags in a plastic waste bag while still wet.
3. DON'T grind or drill linings unless the machine has exhaust ventilation or there is a ventilated booth to do the work in.
4. DON'T use brushes to sweep up dust.
5. DO use a special vacuum cleaner to remove dust.
6. DO wet dust *thoroughly* and scrape it up if you haven't got a vacuum.
7. DO wear the protective clothing, such as overalls, provided by your employer.
8. DON'T take the protective clothing home. It should be cleaned by your employer.
9. DON'T use equipment if it is not maintained and checked. Ask to see the examination reports for ventilation systems.

WF590-GI101

GENERAL INFORMATION

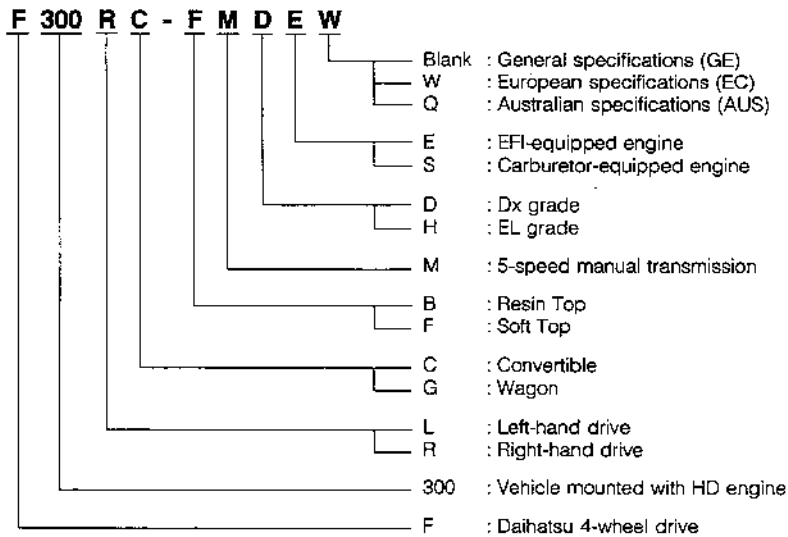
1. VEHICLE MODELS

Model code	Destination	Engine	Catalyzer	Fuel evap. canister	Fuel system
F300RC-FMDS	General	HD-C	N/A	N/A	Carburetor
F300RG-BMDS					
-BMHS					
F300LC-FMDS				Canister (Only G.C.C.)	
F300LG-BMDS	Europe	HD-C	N/A	N/A	Carburetor
-BMHS					
F300RC-FMDSW					
F300RG-BMDSW					
-BMHSW	Europe	HD-E	3-WAY	Canister	EFI ⁽¹⁾
F300LC-FMDSW					
F300LG-BMDSW					
-BMHSW					
F300RC-FMDEW	Europe	HD-E	3-WAY	Canister	EFI ⁽¹⁾
F300RG-BMDEW					
-BMHEW					
F300LC-FMDEW					
F300LG-BMDEW	Australia	HD-E	3-WAY	Canister	EFI ⁽¹⁾
-BMHEW					
F300RC-FMDEQ	Australia	HD-E	3-WAY	Canister	EFI ⁽¹⁾
F300RG-BMDEQ					
-BMHEQ					

Note: (1) Electronic Fuel Injection

WFE90-G002

EXPLANATION OF VEHICLE MODEL CODE



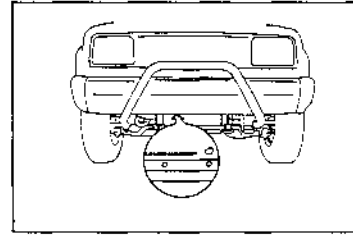
WFE90-G003

GENERAL INFORMATION

2. CHASSIS SERIAL NUMBER & MANUFACTURER'S PLATE

FIRST CHASSIS SERIAL NUMBER

F300LC-
F300LG-

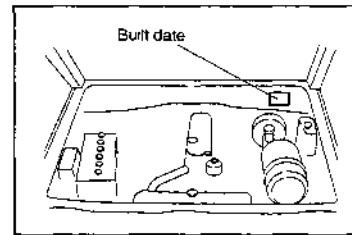


WFE90-61004

CHASSIS NUMBER & MANUFACTURER'S PLATE

1. Position

The chassis number is stamped on the crossmember at the front section of the vehicle.
Manufacturer's plate is attached on the cowl panel.



VF290-G1008

2. Contents of manufacturer's plate

(1) General & Australian Specification

① DAIHATSU MOTOR CO. LTD. JAPAN
② TYPE
③ CHASSIS NO
④ ENGINE
⑤ COLOR TRIM
BUILT DATE
ENGINE NO
ダイハツ工業株式会社

- ① Manufacturer's name, Country
- ② Vehicle model
- ③ Chassis No.
- ④ Engine type
- ⑤ Engine displacement
- ⑥ Body colors
- ⑦ Trim code
- ⑧ Engine number
- ⑨ Manufacturer's name in Japanese
- ⑩ Gross vehicle weight
- ⑪ Gross combination weight
- ⑫ Maximum permissible front axle weight
- ⑬ Maximum permissible rear axle weight
- ⑭ Production month-year. (Only for AUS spec.)

(2) European Specification

① — DAIHATSU MOTOR CO.,LTD

② — TYPE

③ —

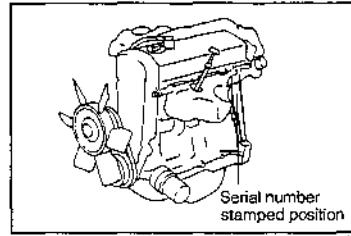
④ — ENGINE COLOR

WT90-G1007

GENERAL INFORMATION

3. ENGINE NUMBER AND ENGINE TYPE

The engine type and serial number is stamped on the place as shown in the illustration.



WFE90-GI006

4. BODY COLOR INFORMATION

Body color	Daihatsu color code	Stripe color		
		A	B	C
Red Gray M. San Remo green/Gray M.	3E7 168 NB1 (G09/168)	Dark Gray Metallic	Silver Metallic	Dark Blue
Green Dark blue M. Black M. Red mica/silver M. Dark blue M./silver M. Black M./silver M. White/silver M. White	G05 8G4 6A5 NA1 (3H1/148) NA2 (8G4/148) NA3 (6A5/148) NA4 (045/148) 045		Gray Metallic	Red

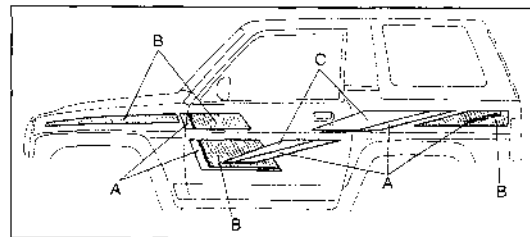
WFE90-GI007

COLOR CODE OF THE WORLD

COLOR		AXZO	DUPONT	I.C.I	SPIES HECKER	STANDOX
WHITE	045	DAH045	L8997	NW-80	16067	045
RED	3E7	DAH3E7	G8690	KK26	38299	3E7
GREEN	G05	DAHG05	G8691	KV77	68470	G05
GRAY, M	168	DAH168	N8832	B936B	97728	168
DARK BLUE, M	8G4	DAH8G4	K9131	C247B	97909	8G4
BLACK, M	6A5	DAH6A5	G8742	A403B	97806	6A5
TWO TONE	NA1	DAHNA1	G8730/N8221	PC86B/0985B	47840	NA1
TWO TONE	NA2	DAHNA2	K9131/N8221	C247B/0985B	48225	NA2
TWO TONE	NA3	DAHNA3	G8742/N8221	A403/0985B	48231	NA3
TWO TONE	NA4	DAHNA4	L8997/N8221	NW80/0985B	48232	NA4
TWO TONE	NB1	DAHNB1	N9305/N8832	XW13/B936B	48480	NB1

WFE90-GI100

BODY STRIPE INFORMATION

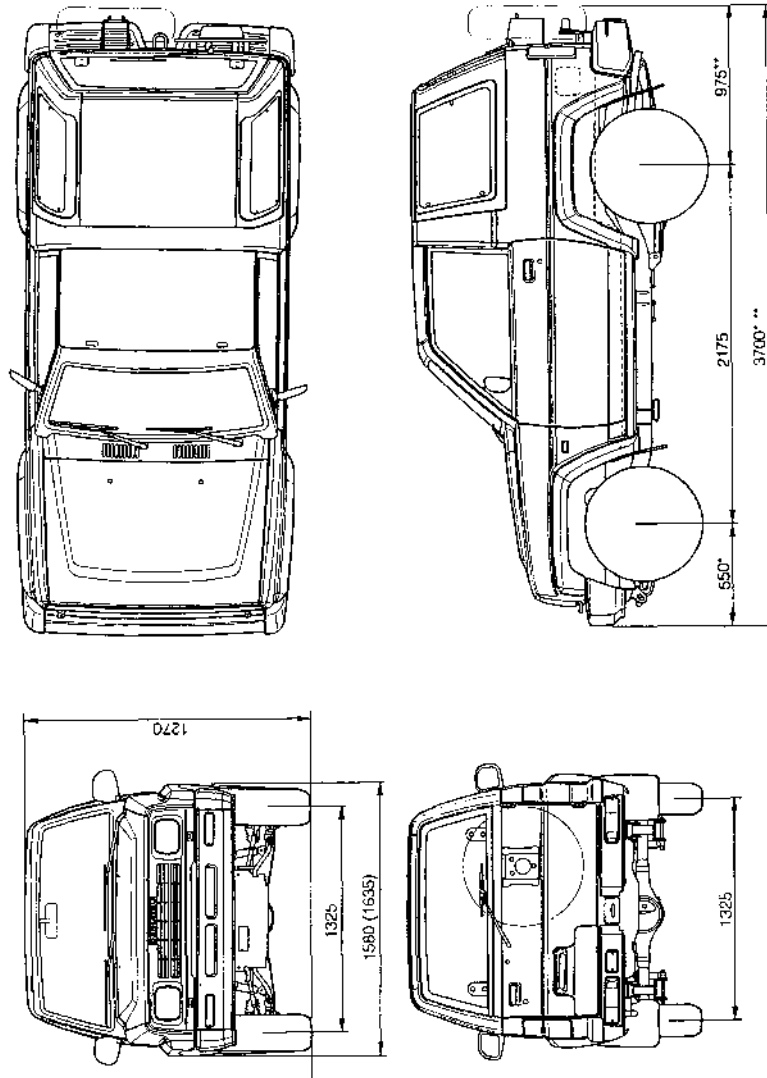


WFE90-GI101

GI-6

5. VEHICLE 4-PLANE DIAGRAMS

Version: A (Resin top)

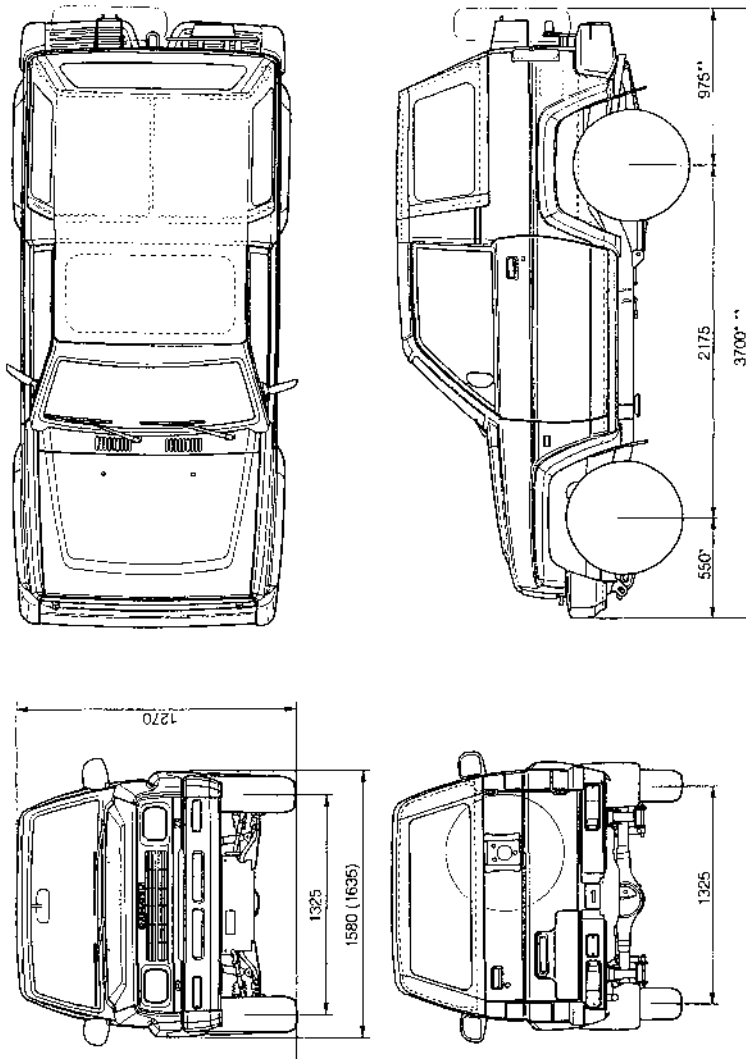


() : with over-landers
 * : +70 with front large bumper
 ** : +15 with 225/70R15 tyres

WFE00-G009

GENERAL INFORMATION

Version: B (Soft top)

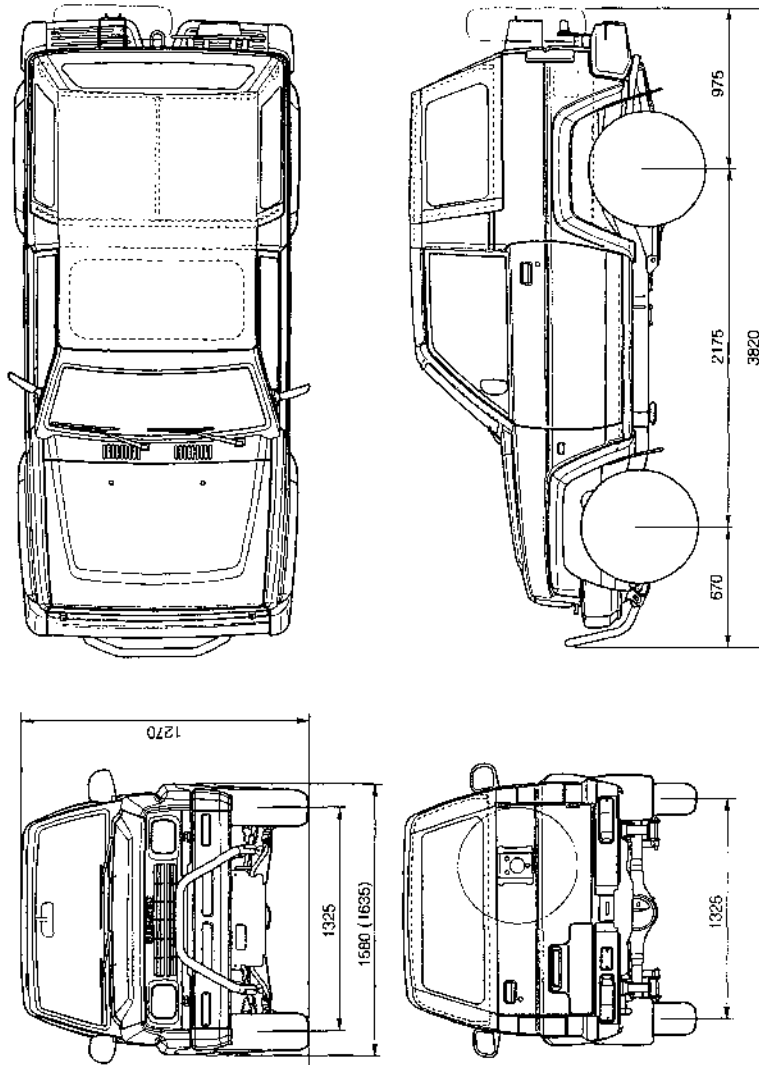


() : with over-fenders
 * : +70 with front large bumper
 ** : +15 with 225/70R15 tyres

WFE90-G201C

GENERAL INFORMATION

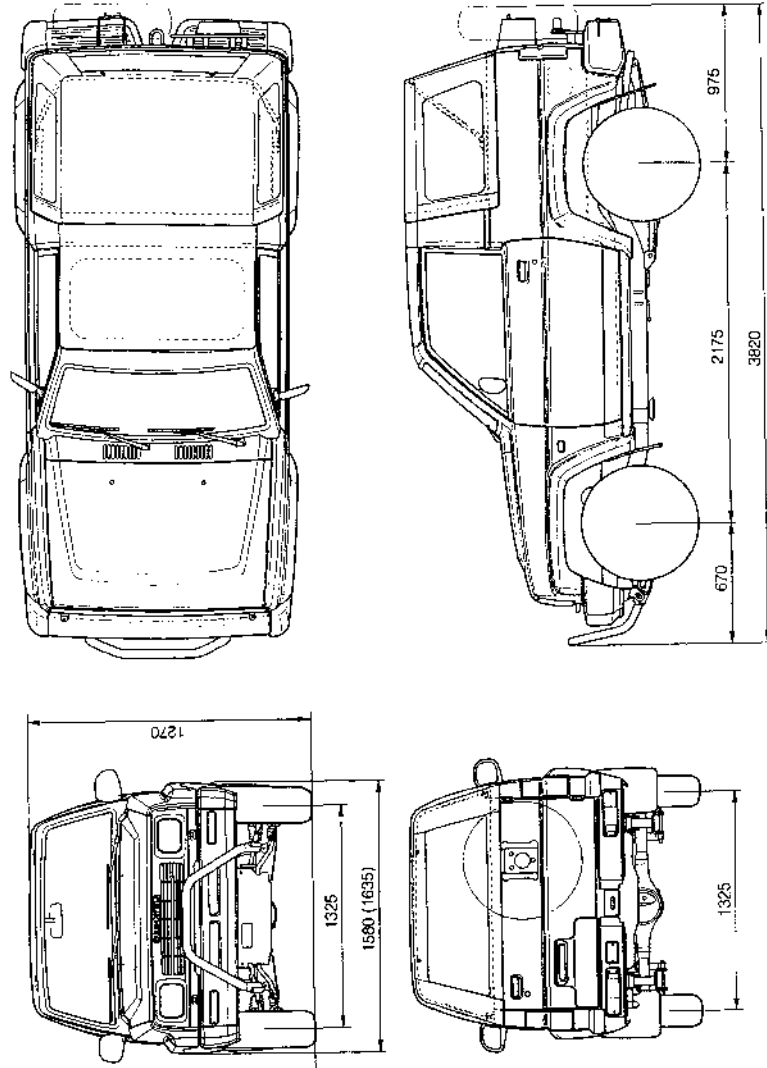
Version: C (Soft top)



WPES0-G1151

GENERAL INFORMATION

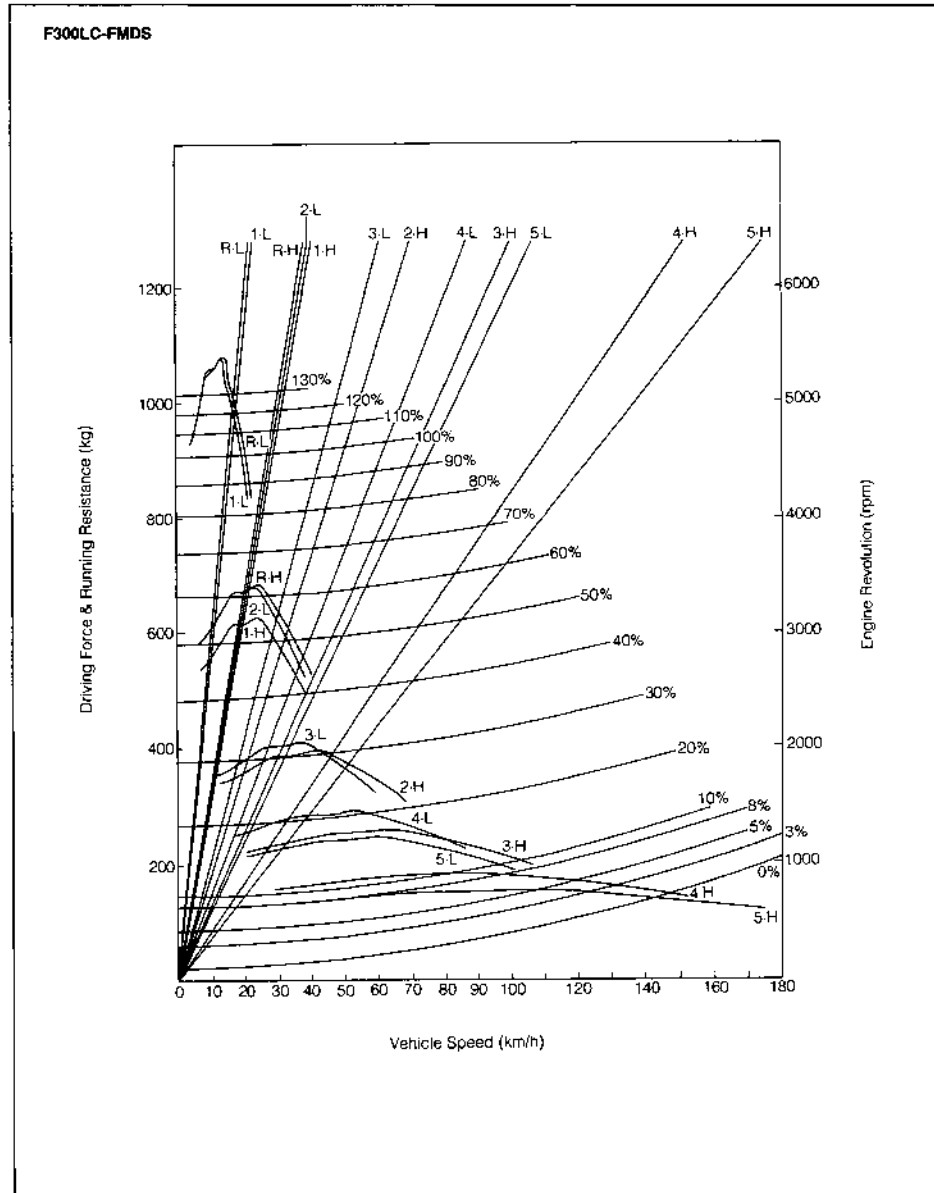
Version: D (Soft top)



WPE9C-GI102

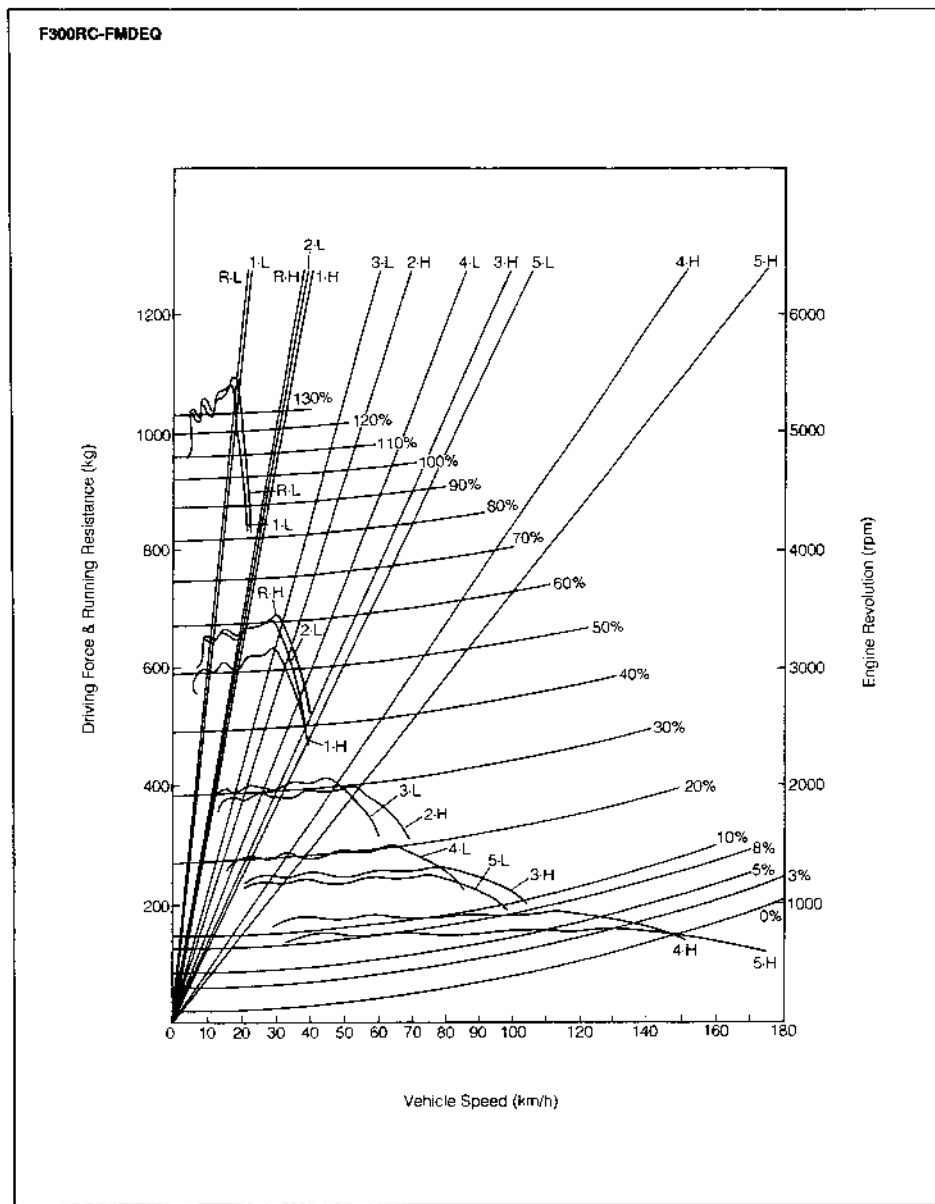
GI-10

6. PERFORMANCE DIAGRAMS



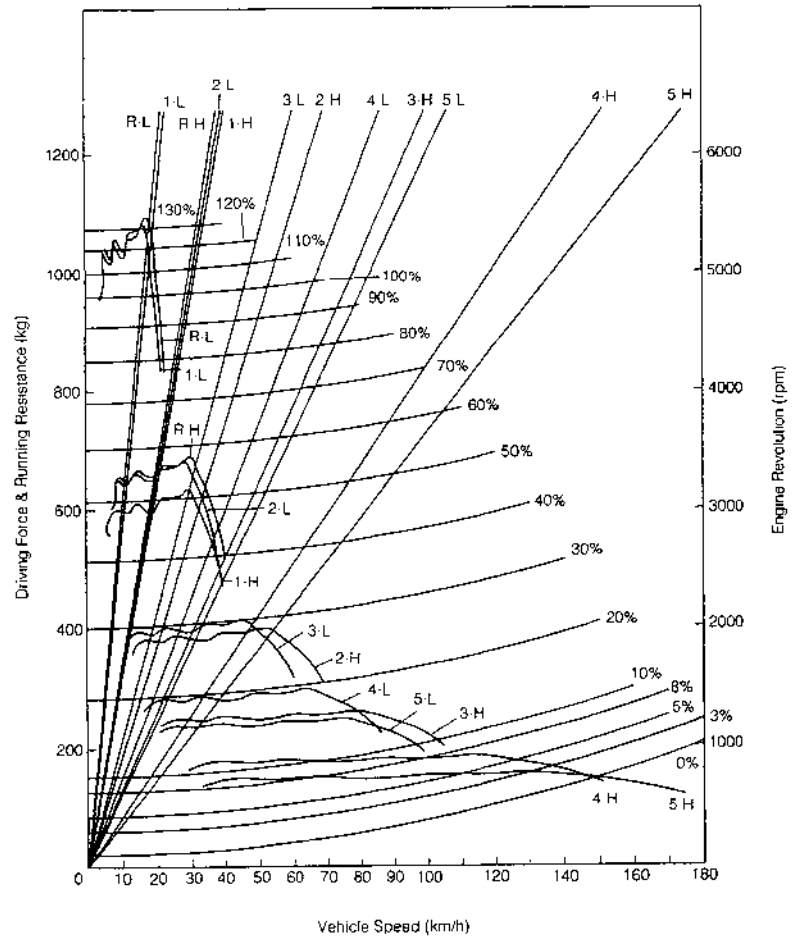
WFE90-G011

GENERAL INFORMATION



GENERAL INFORMATION

F300LG-BMHEW



WF690-G1013

GENERAL INFORMATION

7. SPECIFICATIONS

7-1. PRE-DELIVERY INSPECTION SPECIFICATIONS

Items		Specifications
Tire Inflation Pressure Front/Rear bar	195R15	STD: 1.6/2.1, Full load: 1.6/2.3
	225/70R15 bar	STD: 1.6/2.1, Full load: 1.6/2.3
	195/80R15	STD: 1.6/2.1, Full load: 1.6/2.3
Spare tire inflation pressure		2.3
Wheel nut tightening torque N·m (kgf·m)		88.2 - 117.6 (9 - 12)
Accelerator pedal free play mm		1 - 5
Engine idling speed rpm	HD-C	850 ± 50
	HD-E	850 ± 50
Engine oil	Capacity dm ³	3.8
	Grade	API SE or higher
Transmission oil	Capacity dm ³	1.7
	Grade	API GL-3 or GL-4
	Viscosity	SAE-75W-90
Transfer oil	Capacity dm ³	Part time: 1.4, Full time: 1.7
	Grade	API GL-3 or GL-4
	Viscosity	SAE-75W-90
Differential oil	Capacity dm ³	Front: 0.9
		Rear: 1.95
	Grade	API GL-5
	Viscosity	SAE 90 or 80W-90
Brake fluid	Grade	FMVSS116DOT3 or SAE J1703
Brake pedal (While engine is running)	Free travel mm	1 - 3
	Reserve travel mm	Not less than 80
Clutch pedal free travel mm		18 - 27
Parking brake working travel		Should "set" within 4-6 notches when apply 25 kgf by hand
Exhaust emission at tail pipe. (Manufacturer's standard)	Idle CO vol. %	HD-C: 1.5 ± 0.5, HD-E: 0.5 (Max.)
	Idle HC max. ppm	HD-C: 2200, HD-E: 200
	Idle CO ₂ min. %	HD-C: 12.1, HD-E: 14.0

WPE90-GI014

7-2. VEHICLE SPECIFICATIONS

Items			Specifications
ENGINE	Type	HD-C	Gasoline, Carburetor, 4 Cycle
		HD-E	Gasoline, EFI, 4 Cycle
	Displacement (Bore x Stroke) cm^3		1589 (76 x 87.6 mm)
	Compression ratio		9.5
	Firing order		1 - 3 - 4 - 2
	Ignition timing	HD-C	B.T.D.C. $3^\circ \pm 2^\circ/650 \pm 50 \text{ rpm}$
		HD-E	B.T.D.C. $3^\circ \pm 2^\circ/650 \pm 50 \text{ rpm}$
	Valve mechanism		Belt-driven, SOHC
	Valve clearance mm	Intake	0.25 (Hot condition)
		Exhaust	0.33 (Hot condition)
	Spark plug type (Spark gap) mm	CHAMPION	RC9YC4 (1.0 - 1.1)
		NIPPONDENSO	K20PR-U11 (1.0 - 1.1)
		NGK	BKR6E-11 (1.0 - 1.1)
	Coolant capacity dm^3		5.5 (Excluding 1.0 dm^3 in reserve tank)
	Max. output power kW/r.p.m.	HD-C	63/6000
		HD-E	70/5700
	Max. output torque N.m/r.p.m.	HD-C	126/3500
		HD-E	128/4800
	Recommendation fuel	HD-C	Leaded or Unleaded, Octane 90 or higher (Ron)
		HD-E	Unleaded, Octane 90 or higher (Ron)
	Fuel tank capacity dm^3		60
CLUTCH	Type		Dry single plate, diaphragm
	Operation		Mechanical
TRANSMISSION	Type		5-Speed, synchromesh
	Gear ratio (tooth number)	1st	3.752 (34/23 x 33/13)
		2nd	2.182 (34/23 x 31/21)
		3rd	1.528
		4th	1.000
		5th	0.865 (34/23 x 24/41)
		Reverse	3.942 (34/23 x 23/12 x 32/23)
TRANSFER	Gear ratio	High	1.000
		Low	1.754 (32/33 x 38/21)
DIFFERENTIAL	Gear ratio		5.285 (37/7)

GENERAL INFORMATION

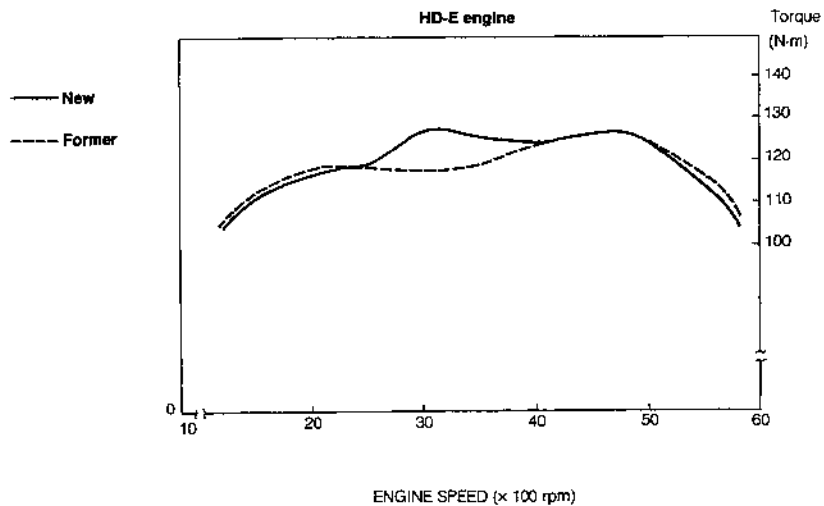
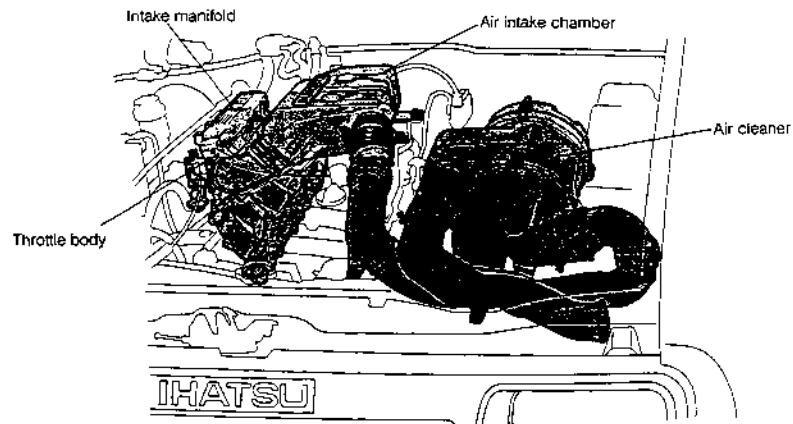
Items			Specifications		
SUSPENSION	Suspension Type	Front	Double wish bone	Toe-in	4 mm
				Camber	1°
				Caster	2°
		Rear	Rigid		
	Spring	Front	Torsion bar		
		Rear	Leaf spring		
	Shock absorber	Front	Double-acting telescopic type		
			Double-acting telescopic type		
STEERING	Type		Ball-nut type		
	Over all gear ratio		24.2, 18.4 (With power steering)		
BRAKES	Type	Front	Disc, (Option: Ventilated rotor)		
			Drum (Leading and Trailing)		
	Service brake system		Vacuum booster, Power-assisted		
	Emergency brake system		Front/Rear split, hydraulic circuits		
	Parking brake system		Mechanical hand operation which applies to rear wheels.		
WHEEL & RIM	Tire size		195R15, 225/70R15, 195/80R15		
	Inflation pressure bar		Front: 1.6. Rear: 2.3		
	Rim	Size	15 x 655		
		Off-set	19 mm		
BULB	Headlamp	W	Candescent	45/40	
			Halogen	60/55	
			Yellow	45/40	
	Front lamp	W	Clearance	5 (White)	
				21 (Amber)	
	Side turn signal lamp		W	5 (Amber)	
	Rear lamp	W	Stop/tail	21/5 (Red)	
			Turn Signal	23 (21: for European)	
				21 (White)	
	License plate lamp		W	5	
	Rear fog lamp		W	21	
	Interior lamp		W	10	
	Luggage room lamp		W	8	

WPESG-01015

8. SUMMARY OF ENGINE CONSTRUCTION

8-1. AIR INTAKE SYSTEM MODIFICATION (HD-E)

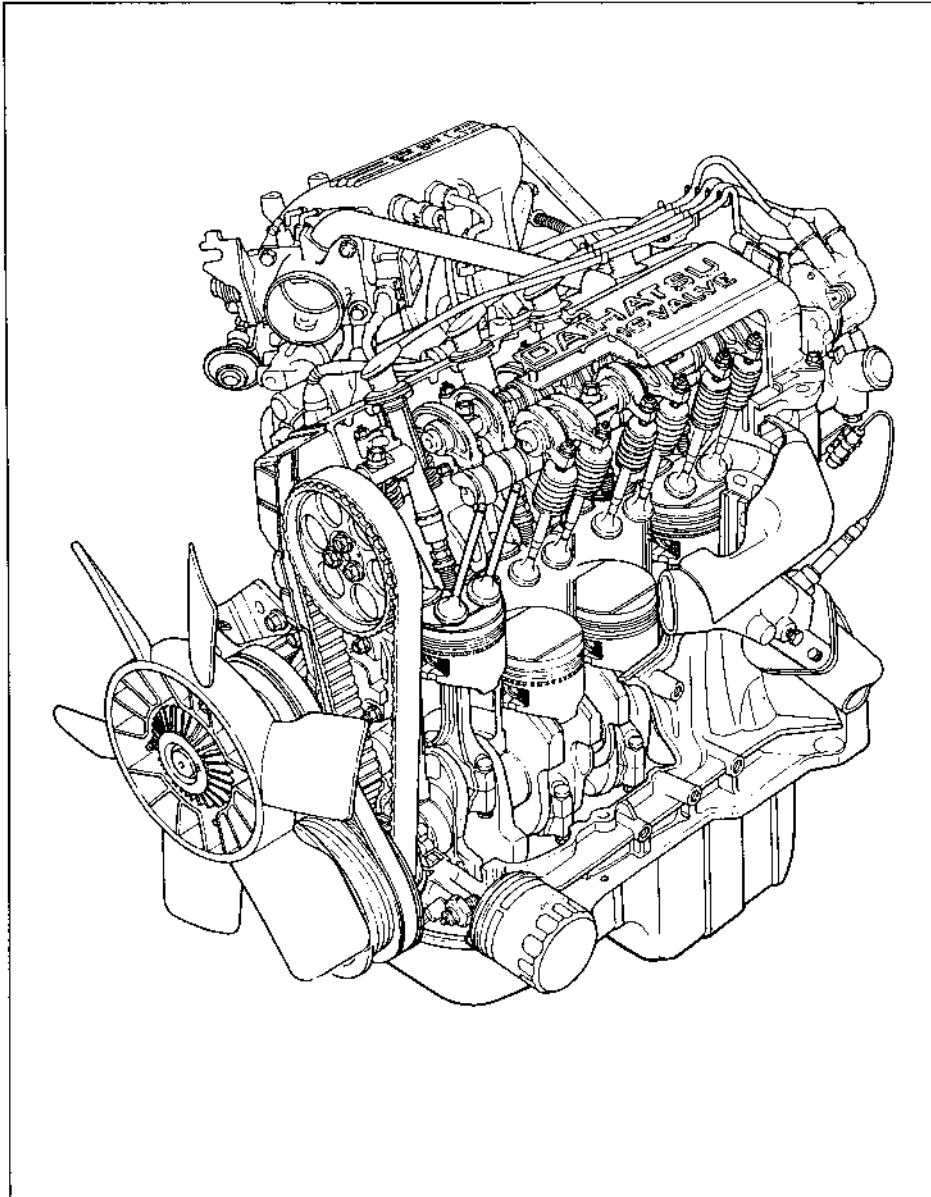
The air intake system consists of the air cleaner, air intake chamber, throttle body, intake manifold, ducts and hoses. It becomes possible to improve the torque around 3200 rpm by employing the air intake chamber.



WF230-GM16

GENERAL INFORMATION

8-2. STEREOSCOPIC VIEWS OF HD-E ENGINE

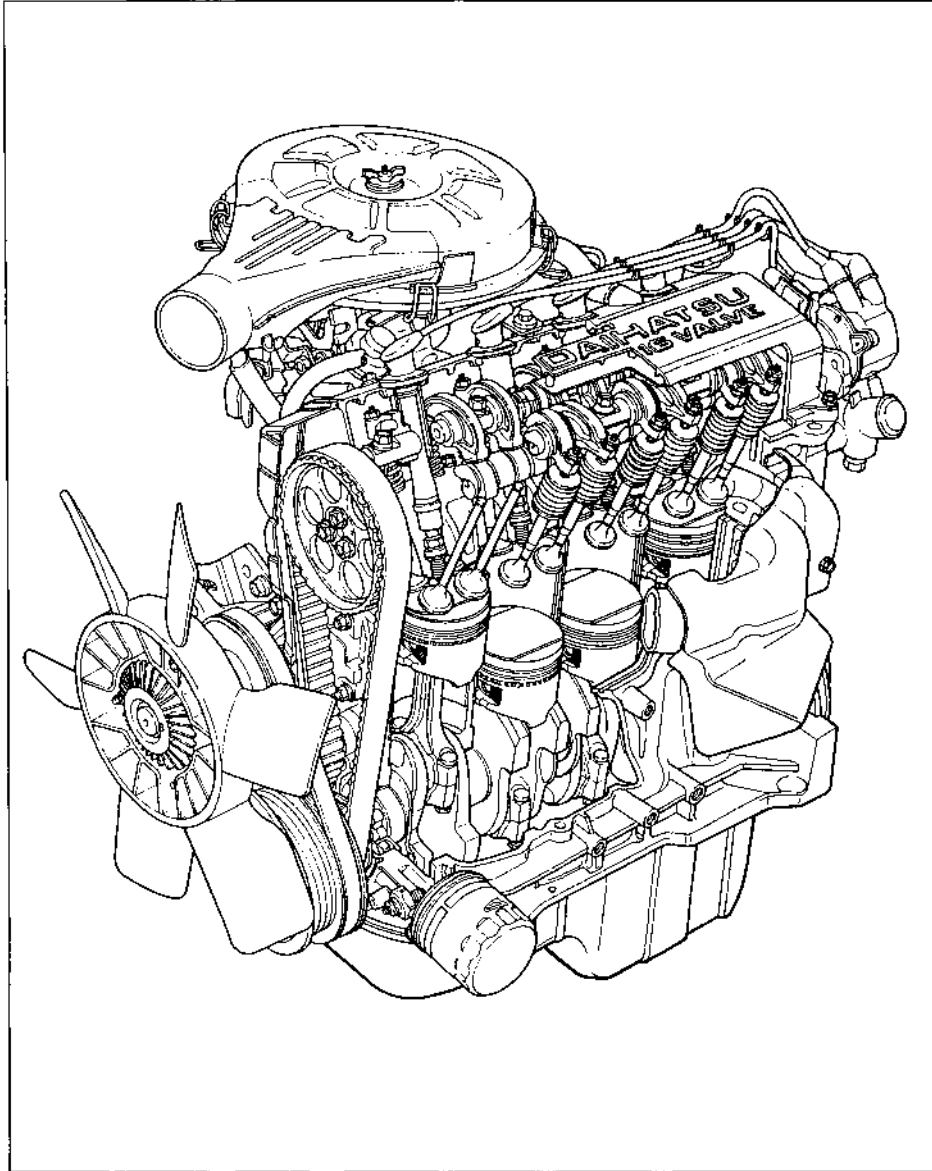


WFE90-G1017

GI-18

8-3. STEREOSCOPIC VIEWS OF HD-C ENGINE

No modification has been made on Type HD-C engine.



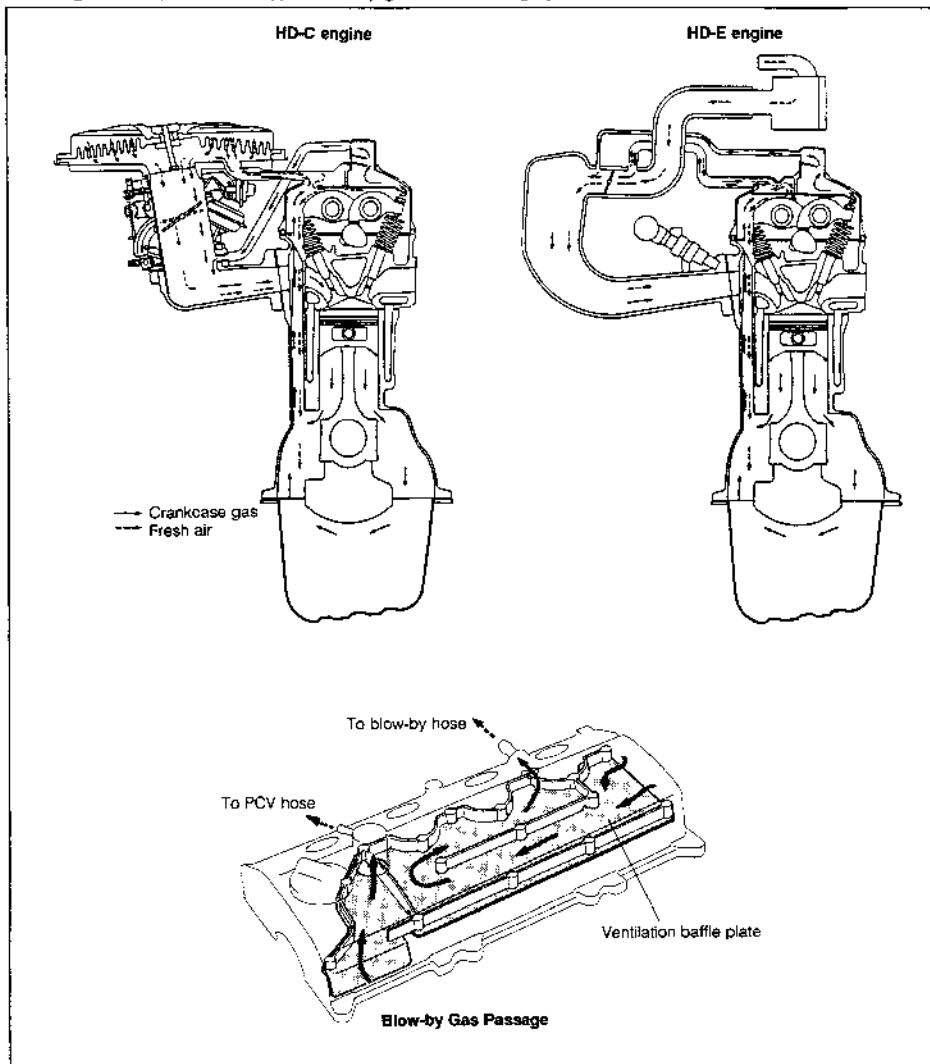
MF890-G1018

GENERAL INFORMATION

8-4. BLOW-BY GAS RECIRCULATING SYSTEM

Any blow-by gas in the crankcase flows into the cylinder head side after passing through the blow-by gas passage in the cylinder block. Then, the gas travels through an oil separator and will be sucked by the intake manifold negative pressure. Thus, the blow-by gas is reburnt in the combustion chamber.

Furthermore, this recirculation takes place also at the air cleaner in the case of the carburetor specification engine (HD-C); at the upper stream of the throttle body in the case of the EFI specification engine (HD-E). Both engines adopt a closed type blow-by gas recirculating system.

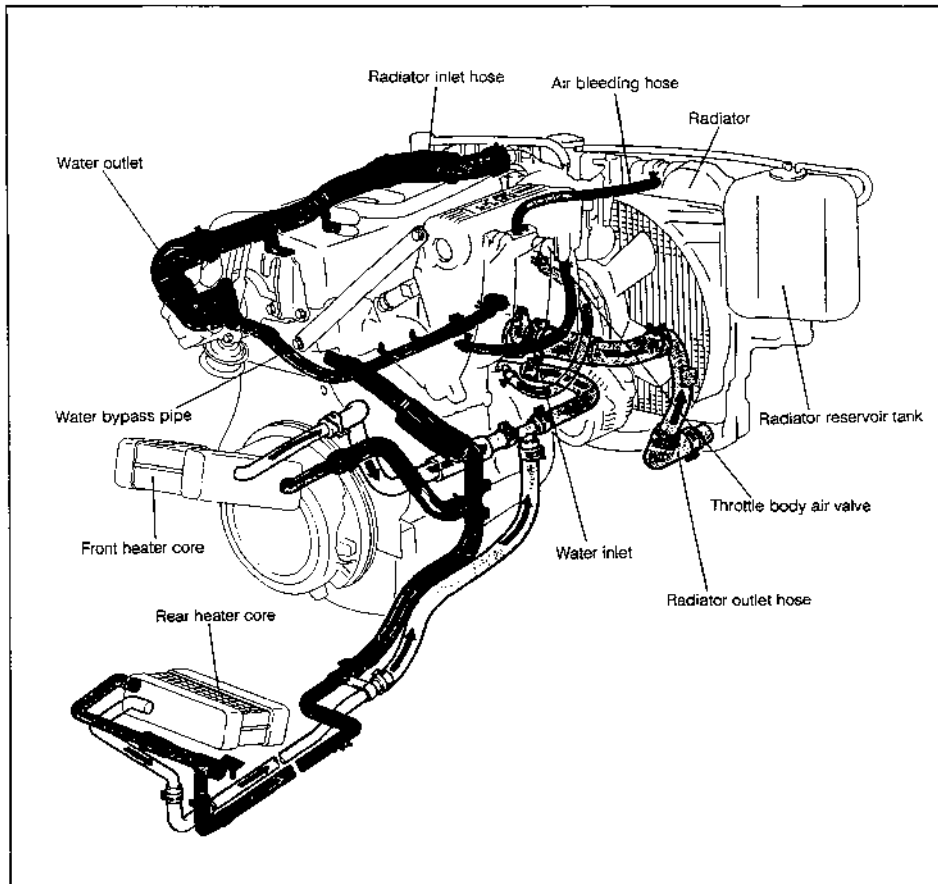


WFE90-GI019

GENERAL INFORMATION

8-5. COOLING SYSTEM

The cooling system is a water-cooled, forced-circulation type. This system employs an inlet water-temperature control bypass method in which a thermostat equipped with a bypass valve is arranged at the water inlet section. The fin pitch of the radiator has been changed.

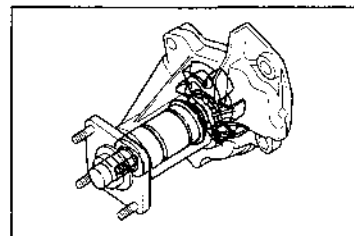


WFE90-G1020

The water pump is a centrifugal type. In order to install the fluid coupling and fan at the flange section, cast iron is used at the body so as to assure the rigidity.

NOTE:

This pump can not be disassembled. Therefore, when replacing the pump during repair works, it is necessary to replace it as the water pump assembly.



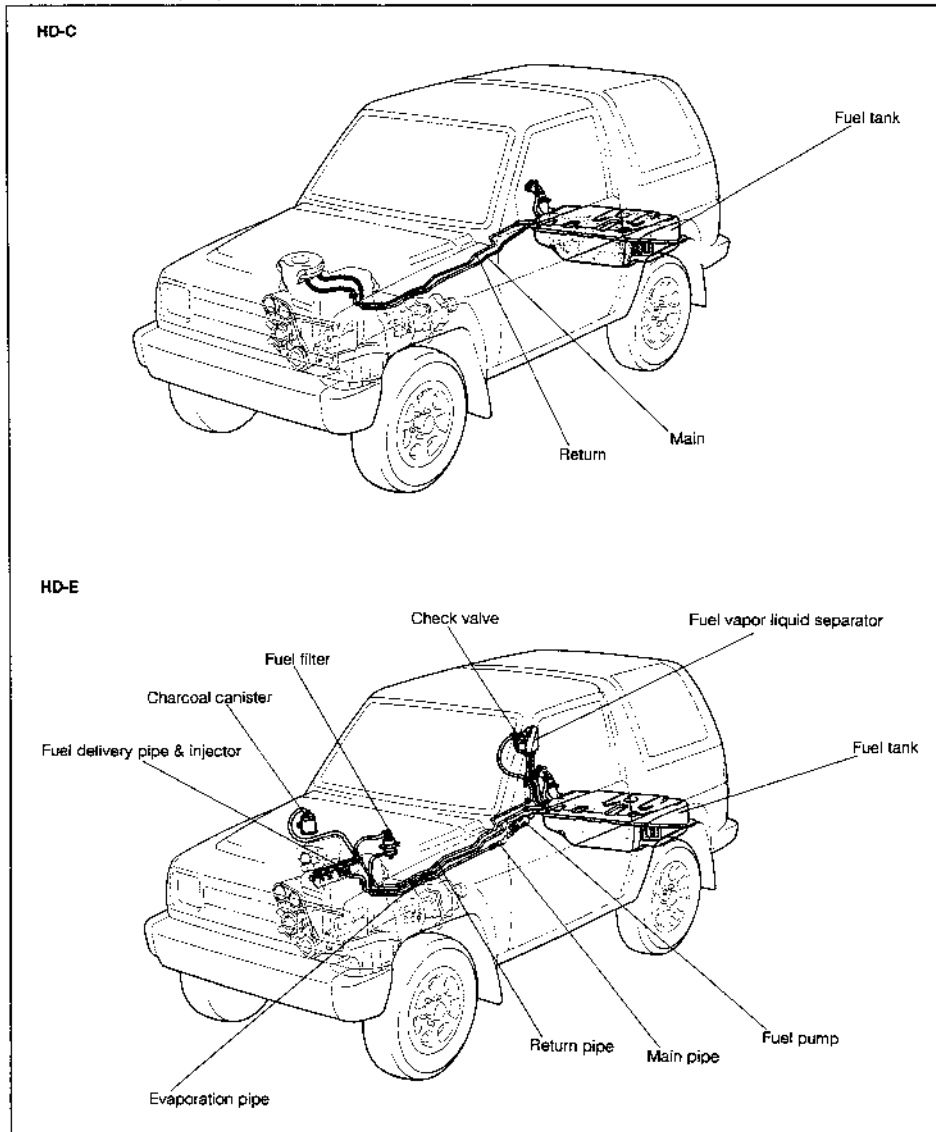
WFE90-G1021

GENERAL INFORMATION

8-6. FUEL SYSTEM

No modification has been made on the fuel system.

On Type HD-E engine, the installation method has been changed to a two-point support so as to reduce the vibration of the fuel pump bracket.

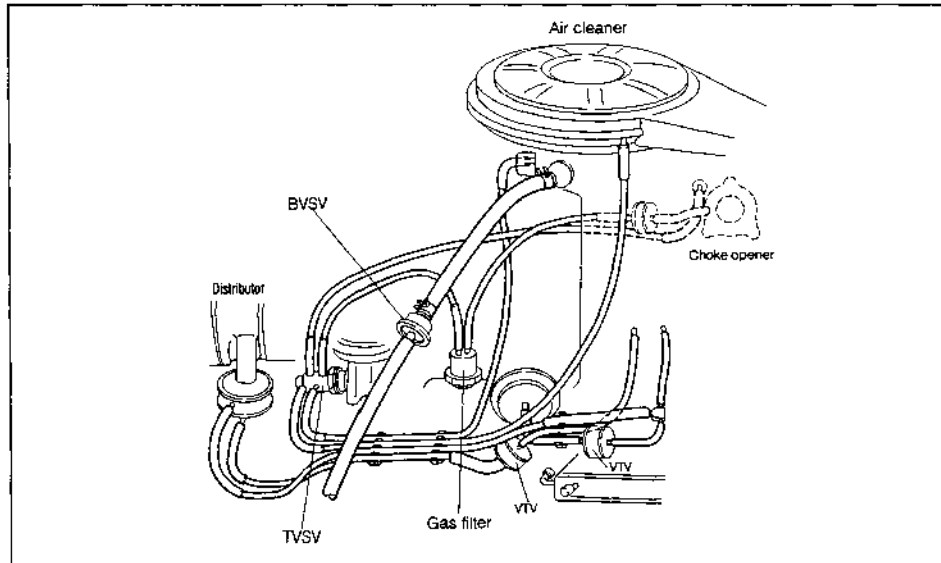


WF590-3/022

GENERAL INFORMATION

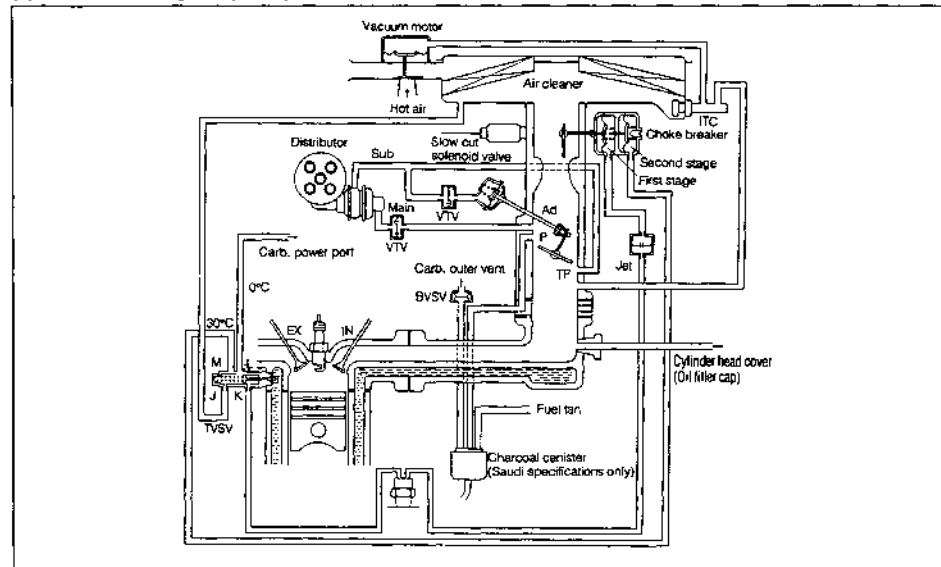
8-7. EMISSION CONTROL SYSTEM

(1) Rubber hose piping (HD-C)



WP390-G1023

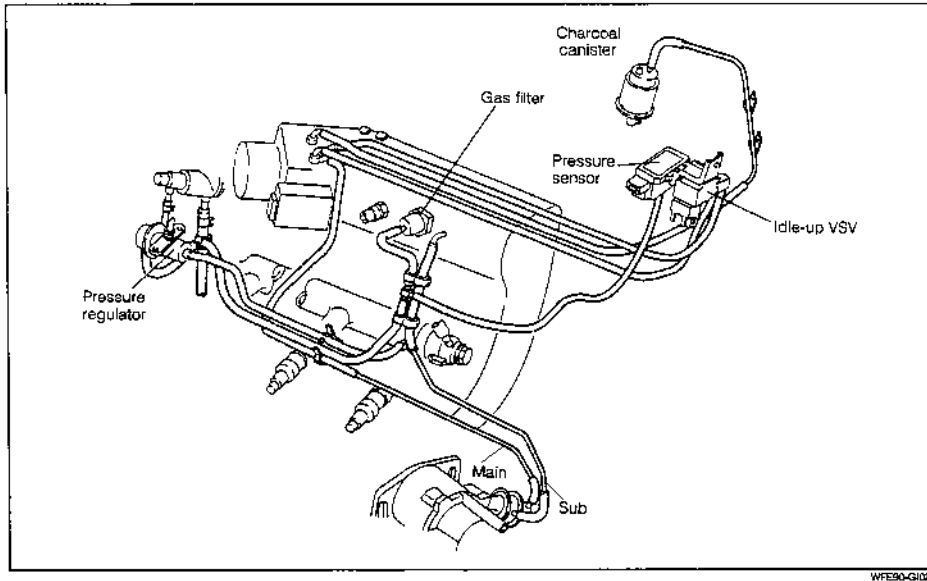
(2) Schematic diagram (HD-C)



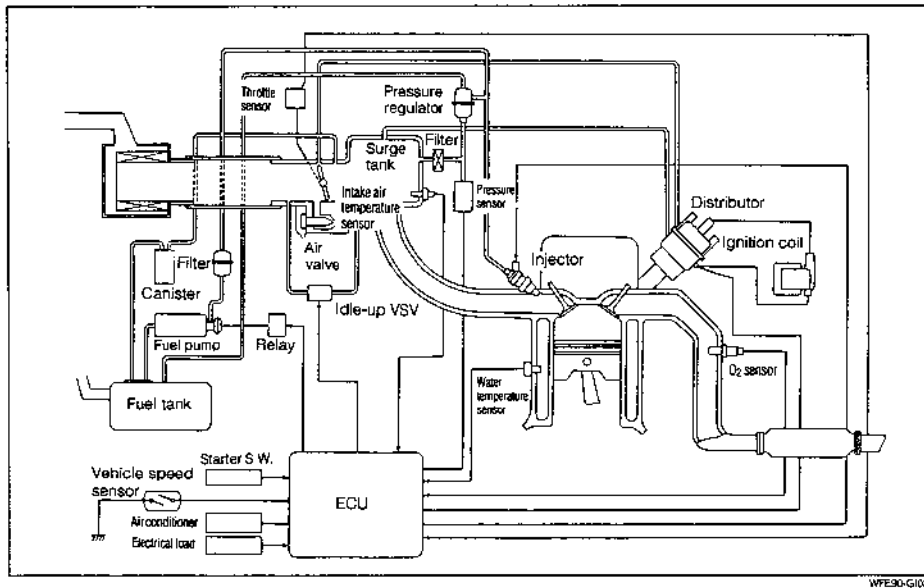
WP390-G1024

GENERAL INFORMATION

(3) Rubber hose piping (HD-E)

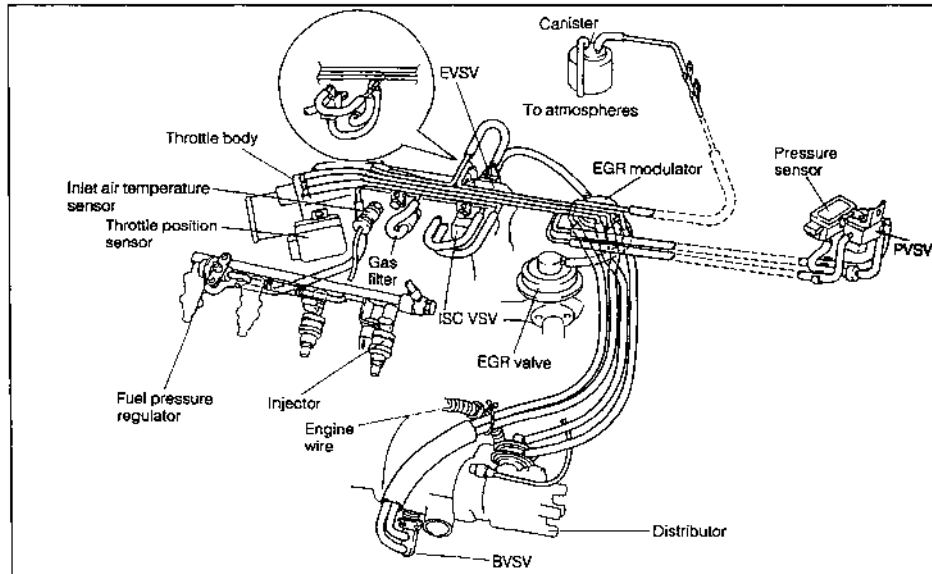


(4) Schematic diagram (HD-E)

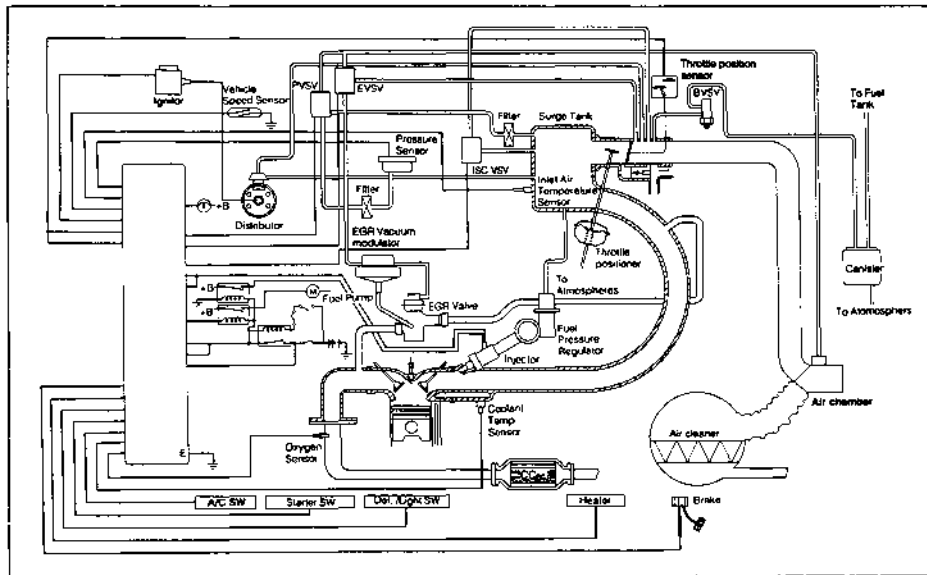


GENERAL INFORMATION

(5) Rubber hose piping (HD-E/US)



(6) Schematic diagram (HD-E/US)

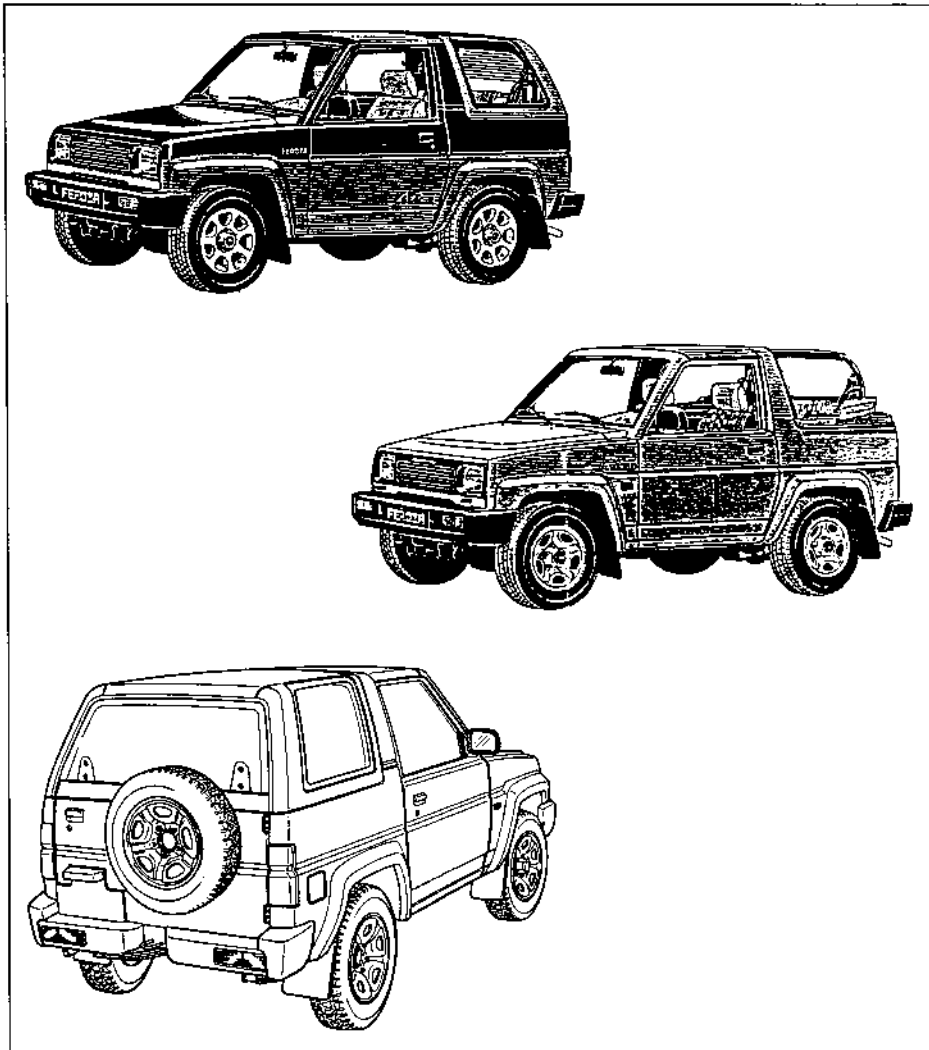


GENERAL INFORMATION

9. SUMMARY OF BODY AND OTHER CONSTRUCTIONS

9-1. BASIC DESIGN

- (1) The F300 was introduced in 1988 as a light 4WD vehicle.
Since its debut, the F300 has been widely praised as a futuristic 4WD offering excellent performance both on-road and off the road.
- (2) The new F300 has been refined to enhance the image as a casual, stylish 4WD city cruiser offering both ruggedness and beauty.



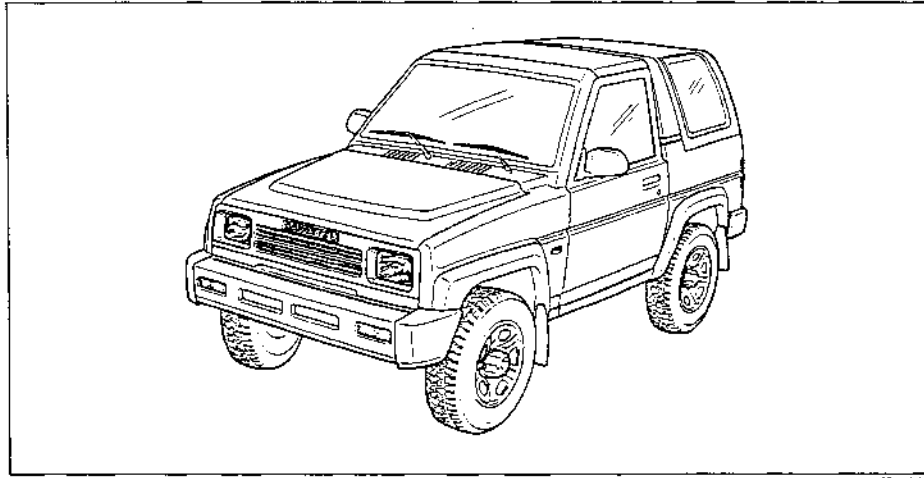
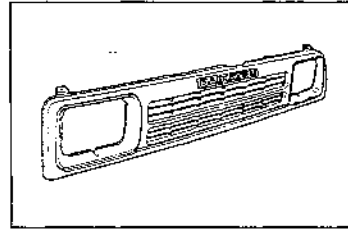
WTE30-G1027

GENERAL INFORMATION

9-2. EXTERIOR MODIFICATION

(1) Front grille

The grid-shaped radiator grille has been changed. On the new model, horizontal grille louvers create a rugged front mask. A grey radiator grille is standard. A chrome-plated grille is available as an option. The 16VALVE emblem has been discontinued.



WFE90-G028

(2) Extended wheel arch

To match the rugged 225/70R15 100S wide radial tyres, resin extended wheel arches have been added. (To save transport costs, these are packed together with the vehicles for installation at their destination.)

● : Option

Model	Resin top			Soft top	
	DX	EL	EL-II	DX	EL
Wheel arch colour					
Black	○	●	●	○	○
Body colour	○	○	○	○	○

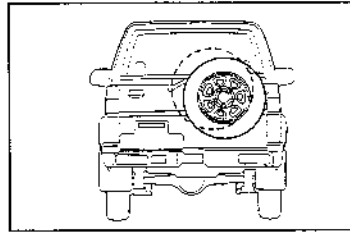
WFE90-G1029

GENERAL INFORMATION

(3) Improved rear visibility

(Only European and Australian markets)

To improve rear visibility, the spare tyre position has been lowered 65 mm, and moved 190 mm to the right. (For the Norwegian market, the spare tyre was only moved to the right so as not to block the license plate.)

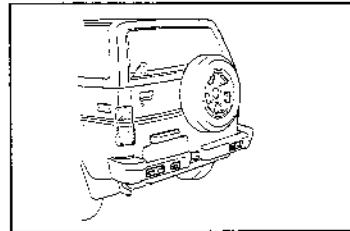


WFE90-G030

(4) Rear combination lamps

(Only European and Australian markets)

To improve the visibility of the rear lamps, the tail lamp, brake lamps and side turn signals have been incorporated into a combination lamp and built into the rear bumper. A maroon-coloured lens is provided in the current rear combination lamp position in which only the left-side back-up lamp lights.



WFE90-G031

(5) Improved loadability through the back door (Only European market)

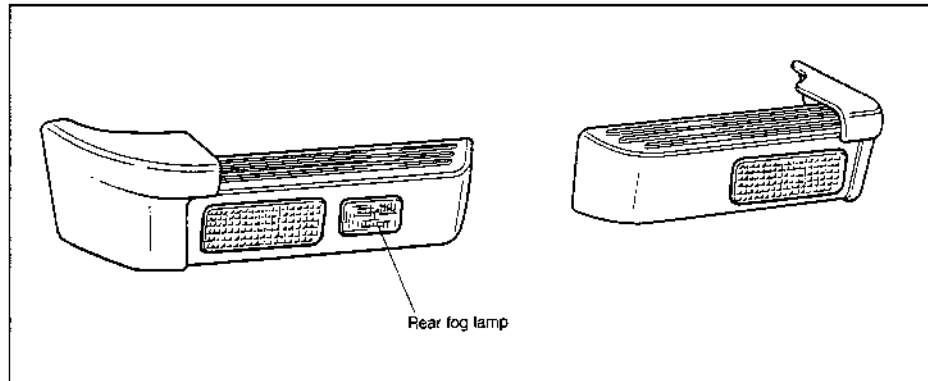
Improved visibility, achieved by building the rear combination lamps into the bumper, allowed adjustment of the back door to allow it to open a full 90°, improving loadability. (Only on models for UK, Denmark, Belgium, Netherlands, Iceland — due to elimination of the full-open stopper)

WFE90-G032

(6) New rear fog lamp built in to rear bumper (Only European market)

The rear fog lamp has also been changed to a built-in type for greater visibility.

The fog lamp is mounted on the driver's side on both RHD and LHD models. (Standard on RHD, optional for LHD)



WFE90-G033

GENERAL INFORMATION

9-3. INTERIOR MODIFICATION

The seat upholstery and upholstered door trim on the higher grades have been completely changed to enhance the image of the car and add style.
(Printed leatherette seat still offered.)

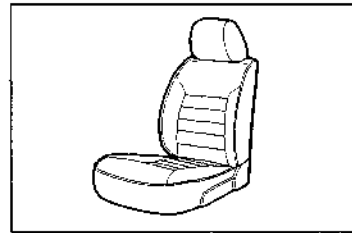
WFE90-GK034

(1) Front seat

Without altering the body-contouring and cushioning quality of the seats, the upholstery has been changed to offer a smarter image. (See colour chart.)

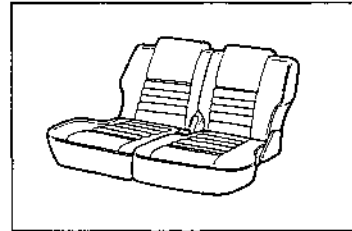
Modification of front head-restraint

The head-restraints of the EL and EL-II grades have been upgraded from the skeleton type to a large full-form type covered with the same upholstery as the seat.
The skeleton type formerly offered in the soft-top EL grade has been changed for the full-form-model (vinyl covered) offered in the DX grade.



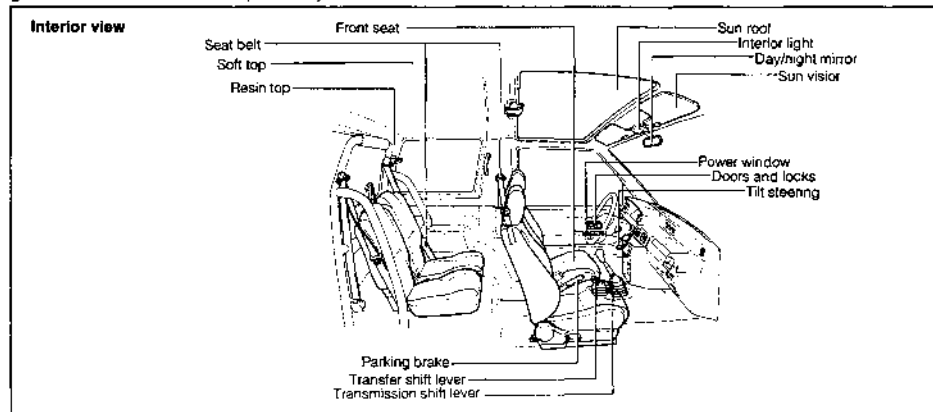
(2) Rear seat

The seat has been exchanged for a new split-type which folds in two stages for improved loadability. The split-type rear seat is optional on the EL and the EL-II.



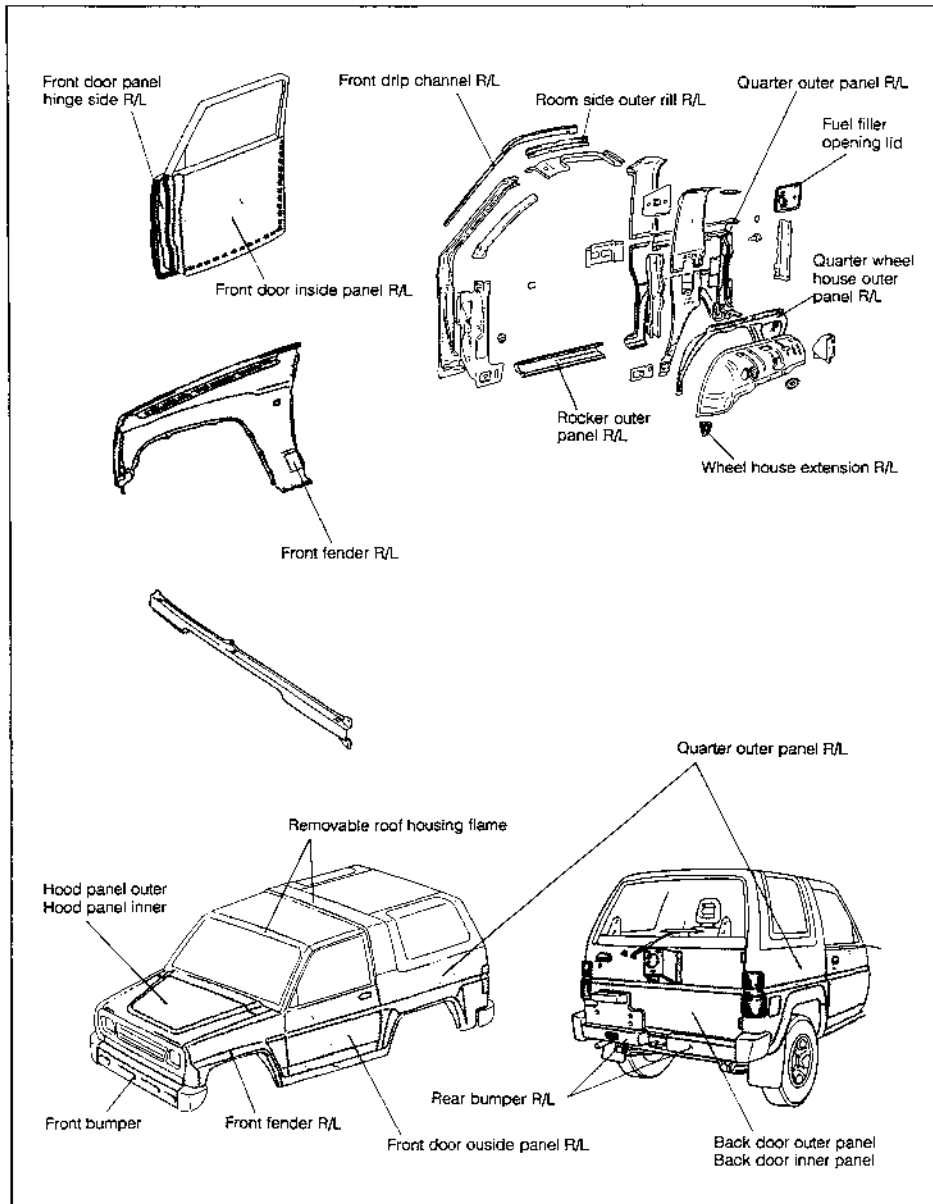
(3) Matching upholstered front door trim

The upholstery used for the ornamental front door trim has also been changed in the resin-top EL and EL-II grades to match the seat upholstery.



GENERAL INFORMATION

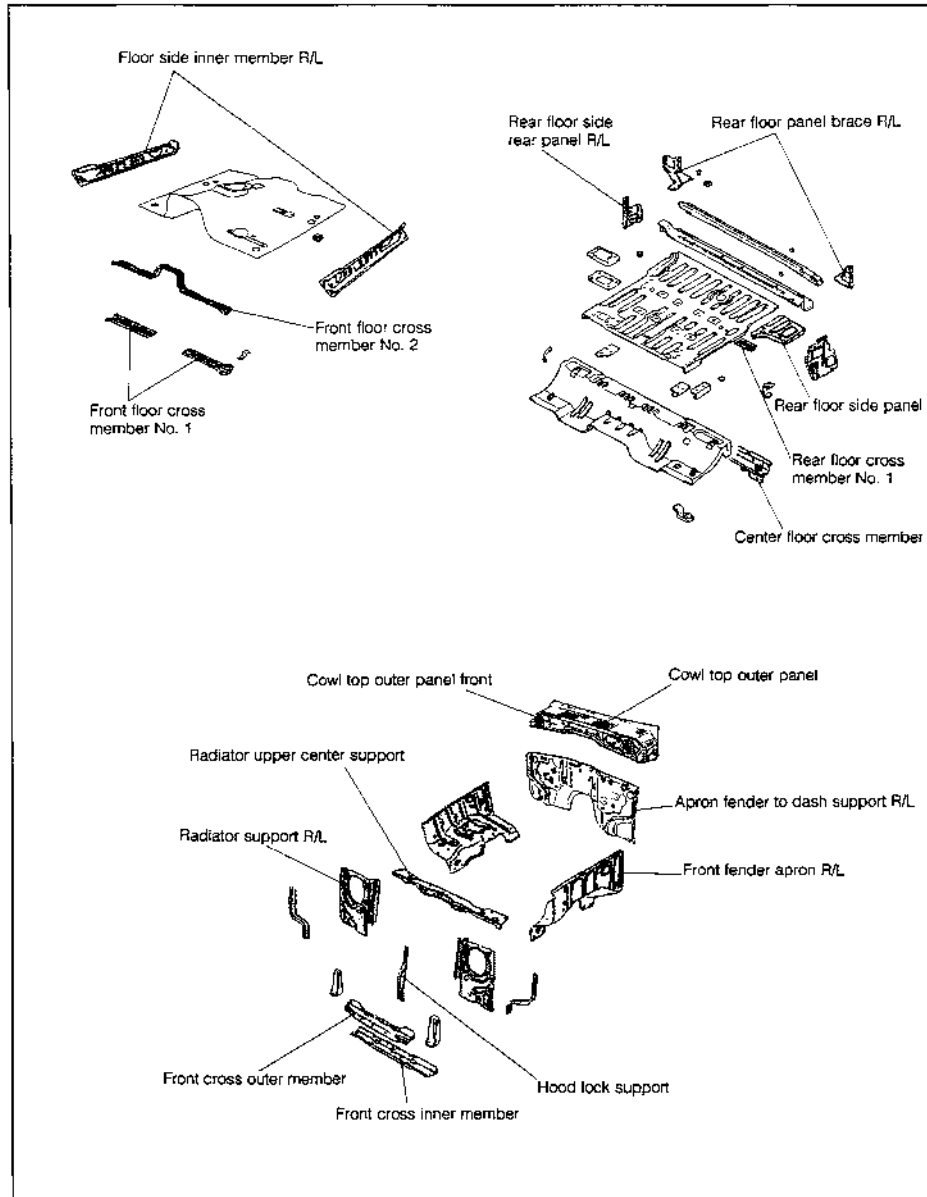
9-4. PARTS WHERE GALVANIZED STEEL SHEETS ARE USED



WPESG-G1038

GENERAL INFORMATION

(Continued)

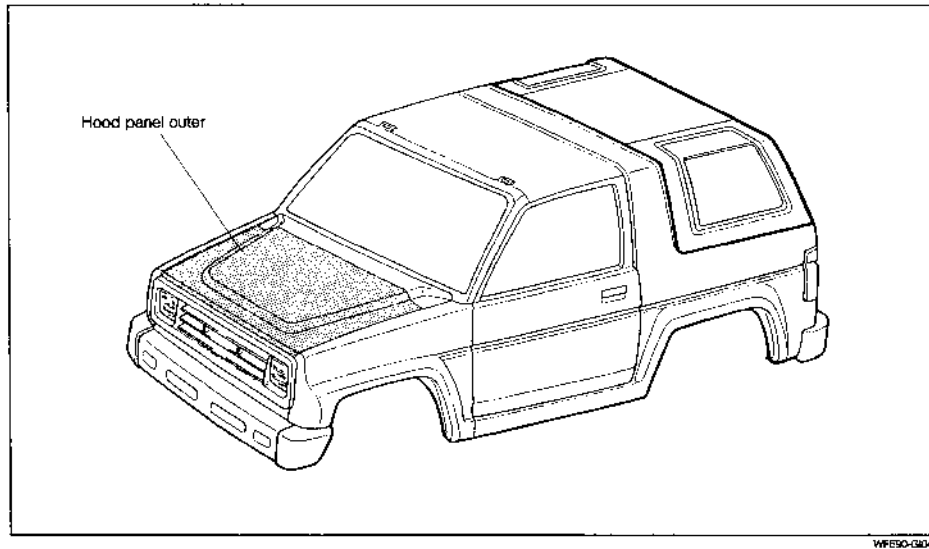


WP590 G1039

GI-31

GENERAL INFORMATION

9-5. PARTS WHERE HIGH-TENSILE STEEL SHEETS ARE USED



9-6. BODY MOUNTINGS

The mountings used for connecting the vehicle body to the frame have been further improved so that the transmission of noise from the suspensions and power train system to the vehicle body may be kept at a minimum level.

No.	1	2	3	4	5
Hardness (Hs)	46	Upper 50 Lower 44	60	Upper 50 Lower 44	60
Identification	Yellow	Black	White	Black	White
Shape					

Below the table is a diagram of a vehicle body section showing the location of the five mounting types. Lines connect the shapes in the table to their respective locations on the body. A circular component is shown with the label "Cad mounting cushion" and "Identification".

WFES0-G8041

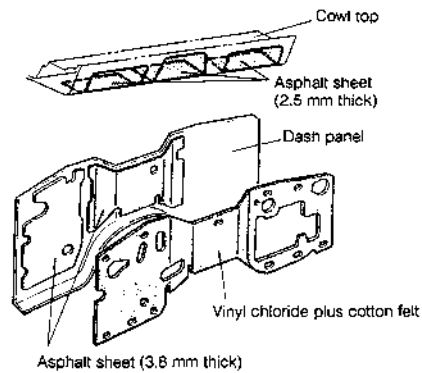
GENERAL INFORMATION

9-7. SILENCERS

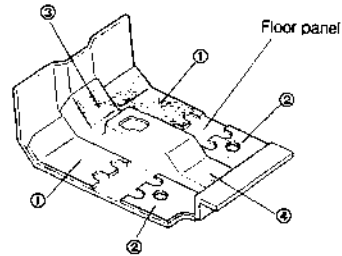
On all models, various silencers are provided at the dash panel and floor panel so as to prevent the noise at the vehicle exterior and engine from being transmitted into the vehicle interior.

Furthermore, on those vehicles with EFI specifications, as a noise control measure silencers (glass wool plus polyester base unwoven cloth) are mounted on the apron fender.

Dash silencer

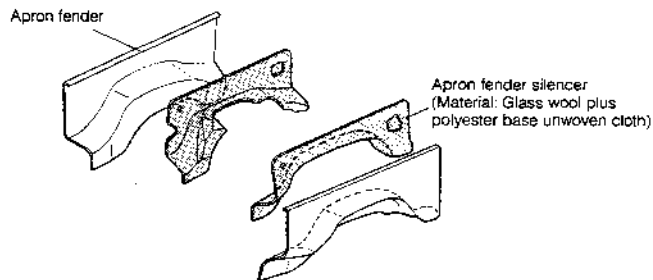


Floor silencer



No.	Nomenclature	Resin top vehicle	Soft top vehicle
		Material	Material
①	Front floor silencer pad	Asphalt sheet + Cotton felt	Asphalt sheet + Cotton felt
②	Center floor silencer pad	Asphalt sheet + Cotton felt	Asphalt sheet + Cotton felt
③	Front floor silencer pad	Asphalt sheet	Asphalt sheet
④	Center floor silencer rear center pad	Asphalt sheet	

Apron fender silencer (Only for EFI vehicle)



WFE90-G442

GENERAL INFORMATION

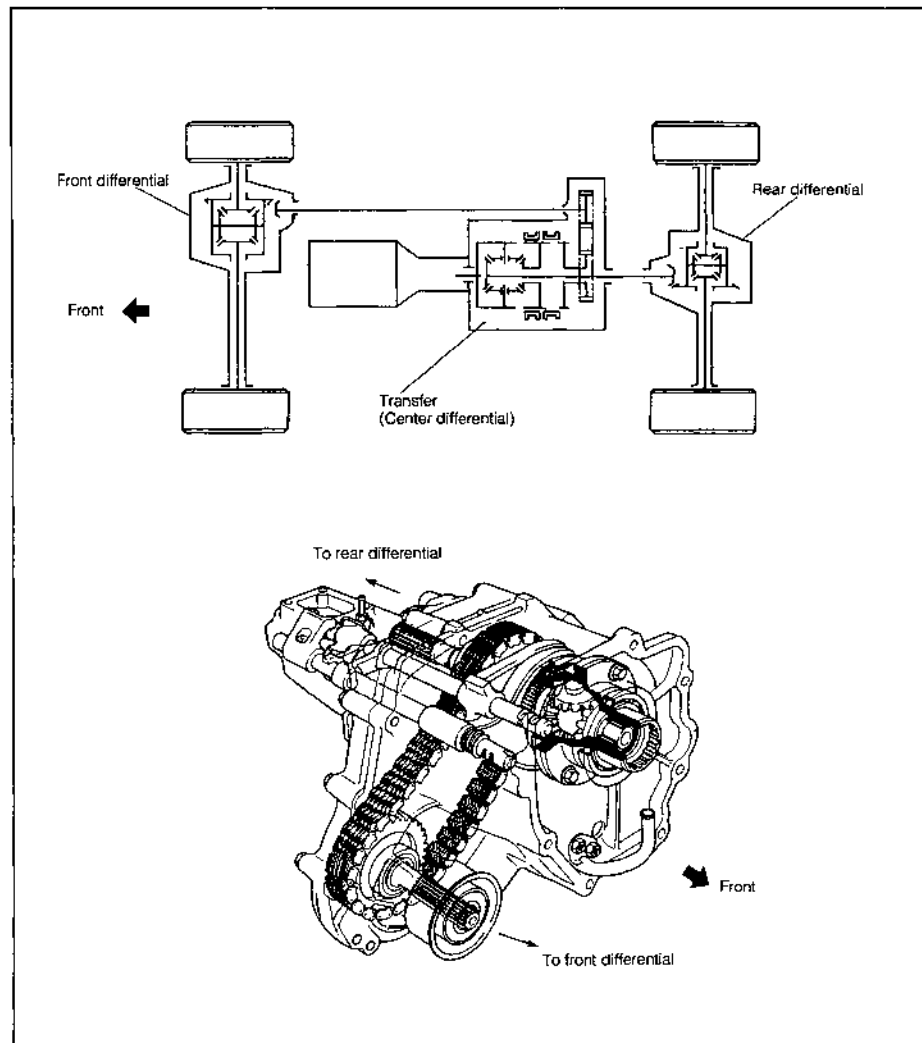
10. SUMMARY OF POWER TRAIN CONSTRUCTION

10-1. TRANSFER FOR FULL TIME 4WD

(Newly added for optional equipment)

A newly developed, centre-differential type full-time 4WD is available. The system uses a differential gear in the transfer case.

A centre differential lock system is also provided for an emergency state. The 2WD (rear wheel drive only) is available.



WF920-G104S

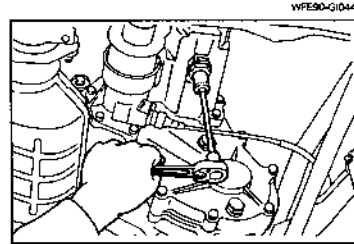
GENERAL INFORMATION

SWITCHING FROM FULL-TIME 4WD TO 2WD

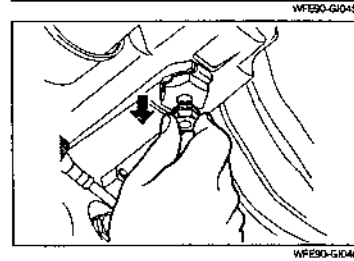
If it becomes necessary to switch from the full-time 4WD to 2WD, for example, in the case of towing a troubled vehicle or during the vehicle inspections (use of brake testers, etc.), the switching can be made, following the procedure given below. Under this state, power from the output shaft of the transmission is not transmitted to the front wheels. The vehicle is driven by the rear wheels only.

However, it must be avoided to always use the vehicle in the 2WD state.

- (1) Jack up the vehicle.
- (2) Loosen the set bolt at the lower section of the output shaft bearing retainer in the right figure.

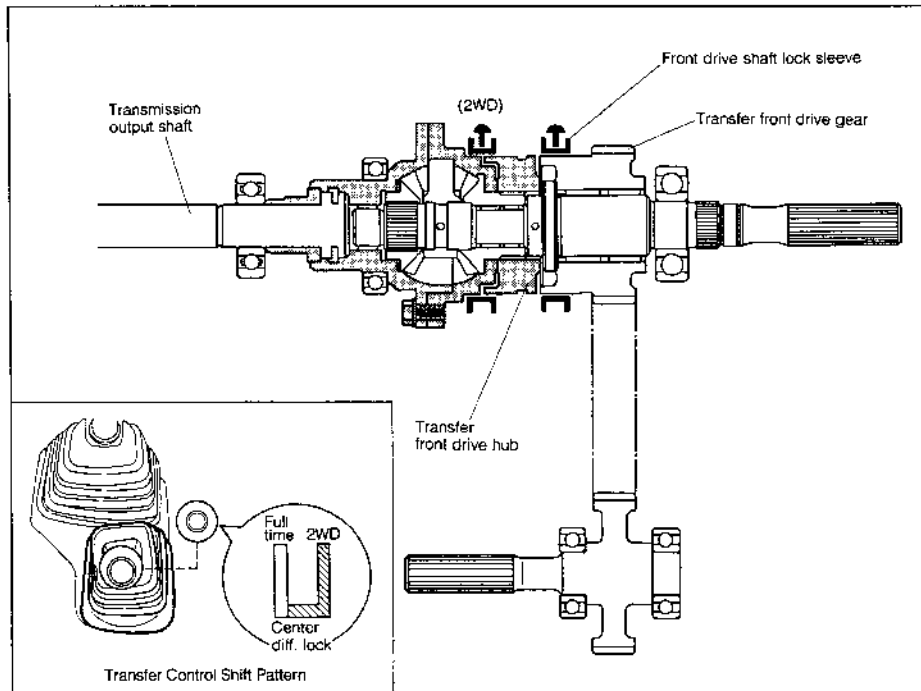


- (3) Pull out the set bolt loosened in the step (2) as far as it will stop, as indicated in the right figure.



GENERAL INFORMATION

(4) Shift the transfer control lever to the 2WD, as indicated in the figure below.



10-2. AUTOMATIC LOCKING HUB SYSTEM (ALH)

(1) Objective of setting

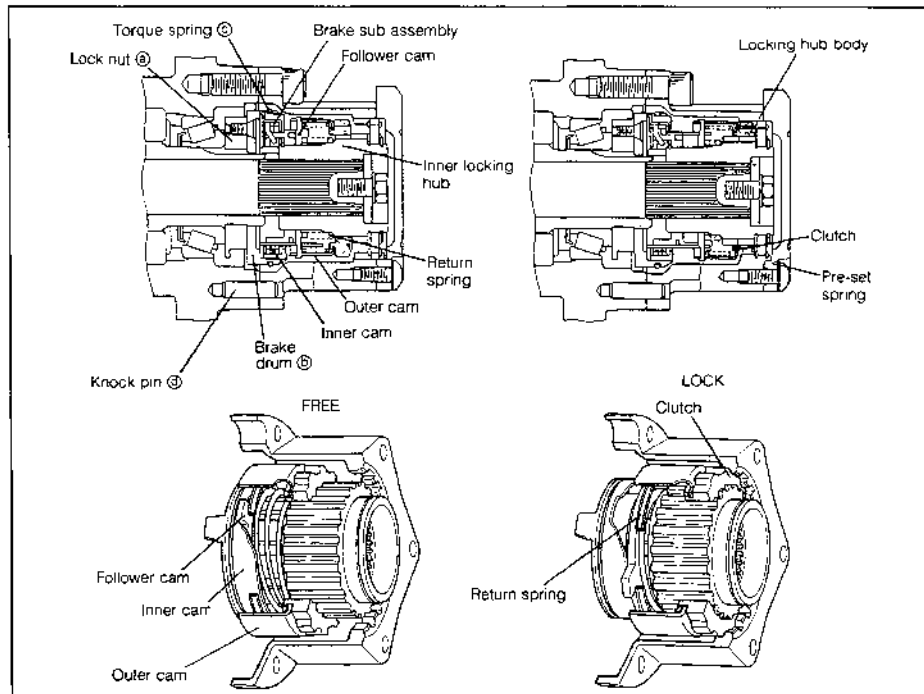
The ALH is set for improving the free ↔ lock switching operability from the conventional manual free wheel hub.

Namely, the ALH is capable of automatic switching by just starting the car while the free ↔ lock switching is to be done manually in the manual free wheel hub.

The ALH is mounted at the same position as the manual free wheel hub.

WFE90-G048

(2) Outline of structure



Major differences with manual free wheel hub (Assembly parts)

- (i) A bearing lock nut ② is provided. (The existing bearing nut is not required.)
- (ii) A brake drum ⑤ is provided to also replace the claw washer. (A claw washer is not required.)
- (iii) ② and ⑤ are tightened and fixed by the torque spring ③.
- (iv) A knock pin ④ is set instead of the axle hub and ALH socket joint.
All of ②, ③, ④ are ALH-dedicated parts.
- (V) Drive shaft is also required for automatic locking hub, when modification from manual to auto locking hub.

WFE90-G049

GENERAL INFORMATION

(3) Operation method

FREE → LOCK

- (1) Stop the car and change the T/F to 4WD.
- (2) Start the car slowly holding the steering wheel in a straight forward travelling condition. (Note 1)
- (3) Run about 3 m or more, and the system will lock automatically.

LOCK → FREE

- (1) Stop the car and change the T/F to 2WD.
- (2) Back up the car slowly holding the steering wheel in a straight forward travelling condition. (Note 2)
- (3) Run about 3 m or more, and the system become free automatically.

Notes

1. It doesn't matter whether forward or backward.
2. Strictly speaking, start the car in the opposite direction to the direction of travelling just before changing the T/F to 2WD.

WFE90-G1050

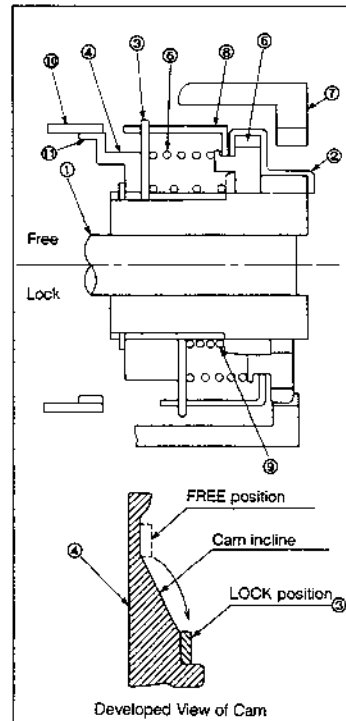
(4) Operating principle

FREE → LOCK

- (1) When the car is started after changing the T/F to 4WD, the drive shaft ① turns to turn the inner ② and the cam follower ③ as one.
- (2) The brake drum ⑩, which is fixed to another part (bearing lock nut), does not turn. The brake sub-assembly ⑪ is suppressed from turning by the frictional force with ⑩. ④, which is engaged with the claw of ⑪, is also suppressed from turning. (Note 1)
- (3) As a result, ③ climbs the cam incline of ④ while turning to move to the right-hand side of the diagram. (See the developed view of the cam.)
- (4) As ③ moves to the right-hand side, the clutch ⑤ attached to the preset spring ⑥ also moves to engage the hub body's ⑦ inner teeth to lock.

Note 1.

When locked, ⑪ starts turning to slide along the frictional face of ⑩.



WFE90-G1051

GENERAL INFORMATION

LOCK → FREE

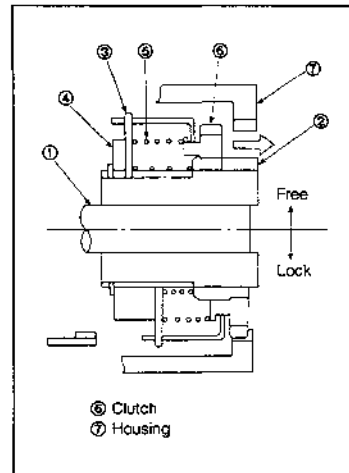
- (1) When the car is backed up after changing the T/F to 2WD, the system is driven backward from the wheel side to turn ⑦, ⑥ and the hub joint ③, ④ backward as one.
(② and ① also turn as one until unlocked.)
- (2) ③, which is pressed onto the cam incline of ④ by the return spring ⑤, goes down the cam incline of ④ to move to the left-hand side of the diagram.
- (3) As ③ moves to the left-hand side, ⑥ is pulled to the left-hand side by ⑤ to free the system.

WFES0-G052

Cautions on user handling

In the event of ratcheting, stop the car once, change the T/F to 4WD, and then start the car.

1. Avoidance of Ratcheting
The gear noise that occurs when the clutch and the housing are about to lock while there is a difference between the speeds of the two.
2. Prevention of T/F Operation during Travelling Ratcheting
occurs if the T/F is shifted 2WD → 4WD by mistake while travelling with the T/F at 2WD and the ALH free.
In that case, take the disposition of 1.
3. Observance of Straight Forward Starting at ALH Change
when changing the ALH free ↔ lock, hold the steering wheel in a straight forward travelling condition and run about 3 m or more. (If the steering wheel is turned before running a minimum of 3 m, one of the ALH's on both sides locks while the other becomes free to cause ratcheting.)



WFES0-G053

GENERAL INFORMATION

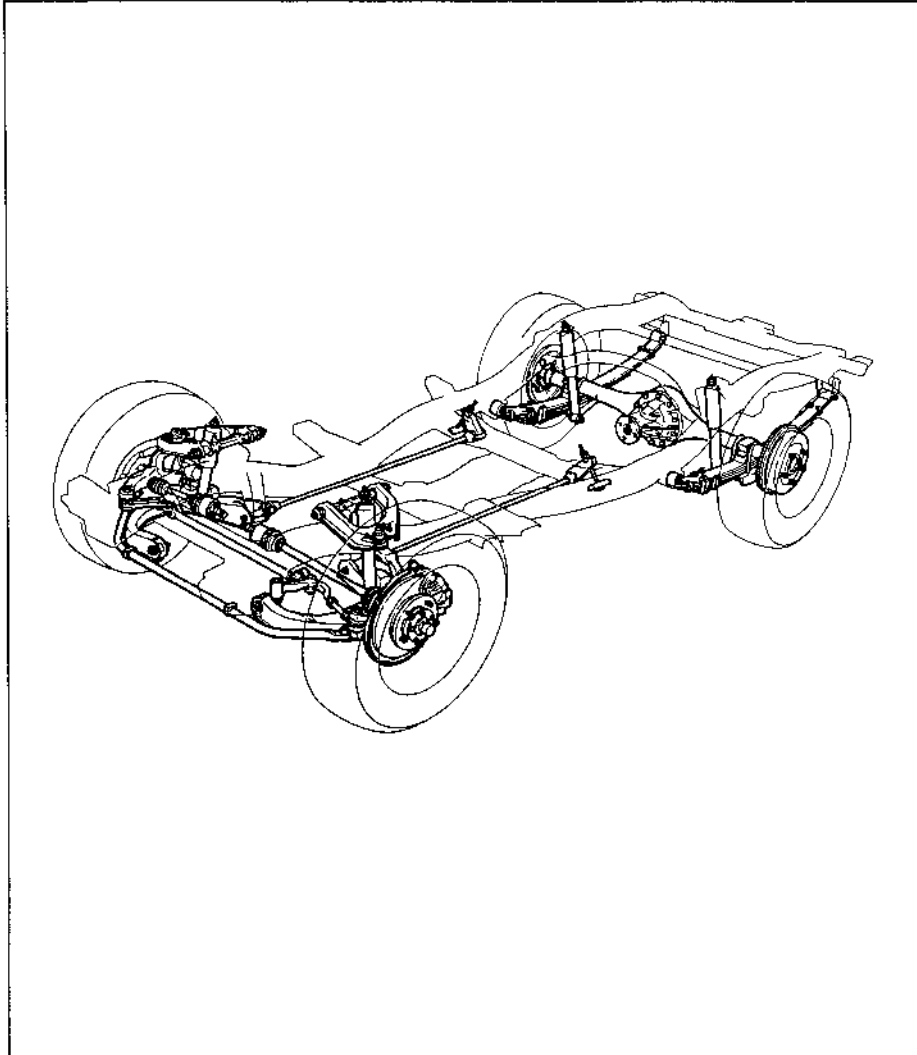
11. SUMMARY OF CHASSIS CONSTRUCTION

11-1. SUSPENSION

The front suspension employs the double wishbone type. The springs employ torsion bar springs.

The rear suspension is the rigid type. The spring employs leaf springs.

As regards the front and rear shock absorbers, a switch which changes the damping force of the shock absorbers to the H (hard), N (normal) or S (soft) mode is provided on the instrument panel. (Option)



WFEBG-G1054

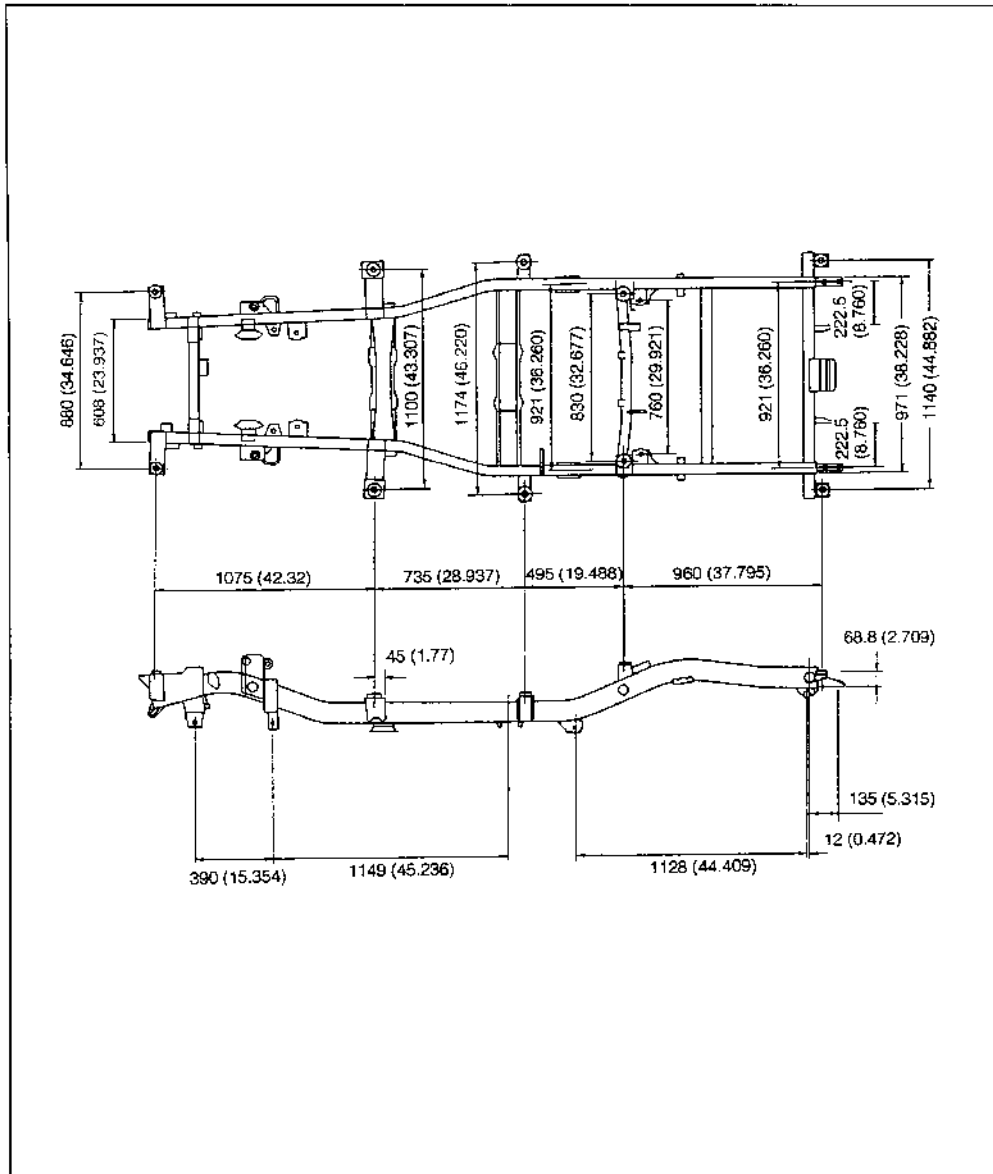
G1-40

GENERAL INFORMATION

11-2. FRAME

The frame employs a ladder type frame which retards the transmission of vibrations and noises from the road or engine to the body. Furthermore, the ladder type frame contributes to soft riding comfort and quieter vehicle interior.

The frame has a box shaped cross-section.



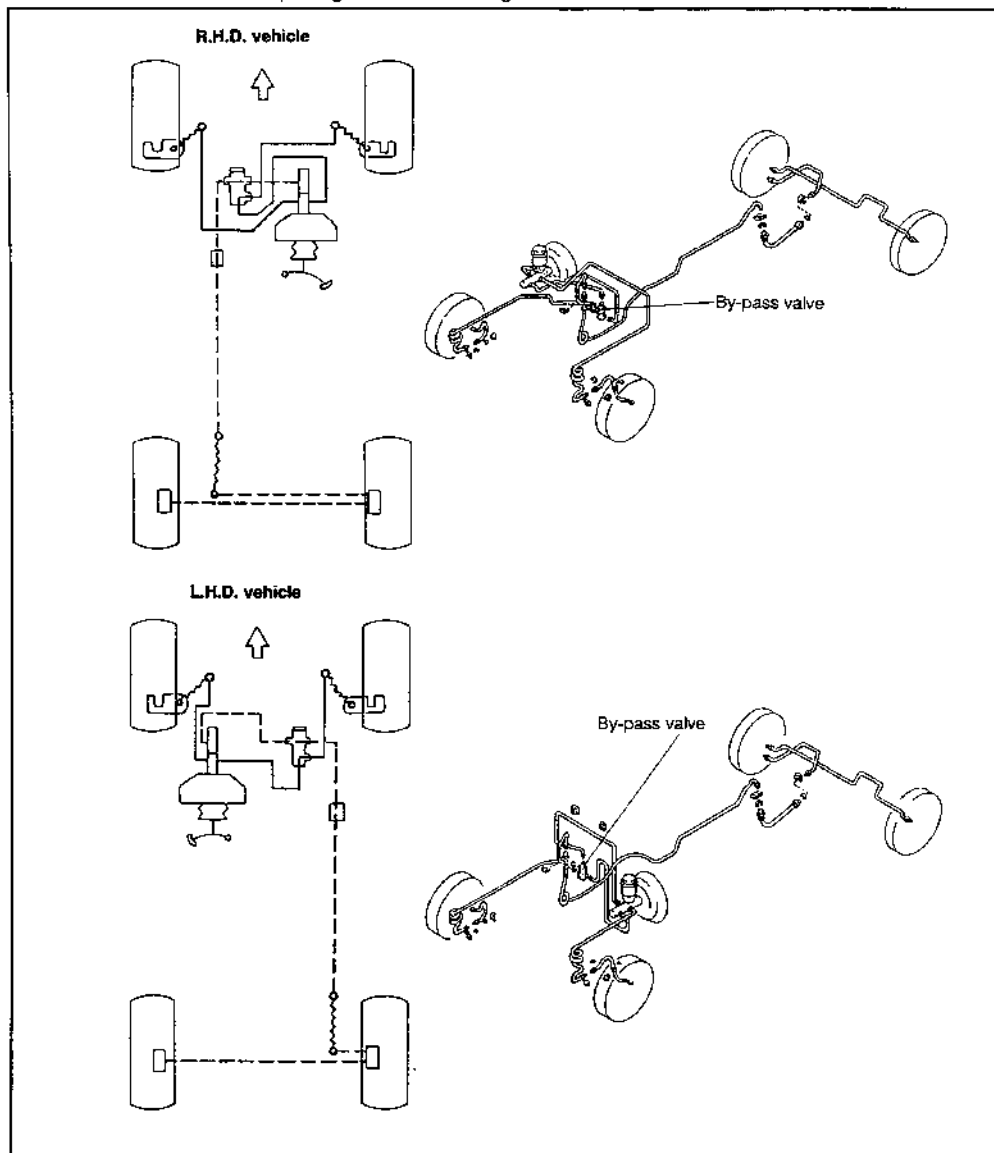
WFE90-G062

GI-41

GENERAL INFORMATION

11-3. BRAKE LINE

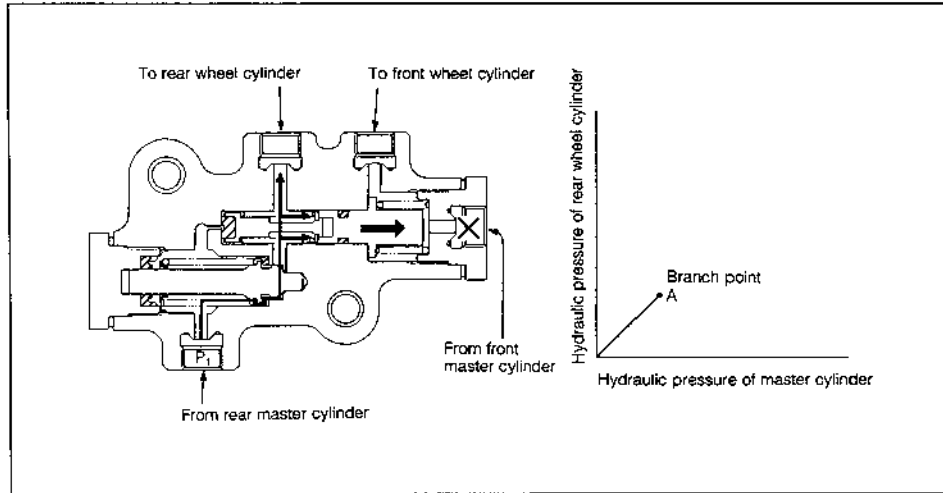
The brake line comes in two kinds; one for the R.H.D. vehicles and the other for the L.H.D. vehicles. On all models, the disc brake is provided at the front wheels, while the drum brake is installed at the rear wheels. The front and rear brake systems are operated through a proportioning valve. The brake pipe employs a two-winding copper tube, the inside of which is treated with Cu plating, while the outside is treated with Cu-Zn plating and resin coating as anticorrosion treatment.



GENERAL INFORMATION

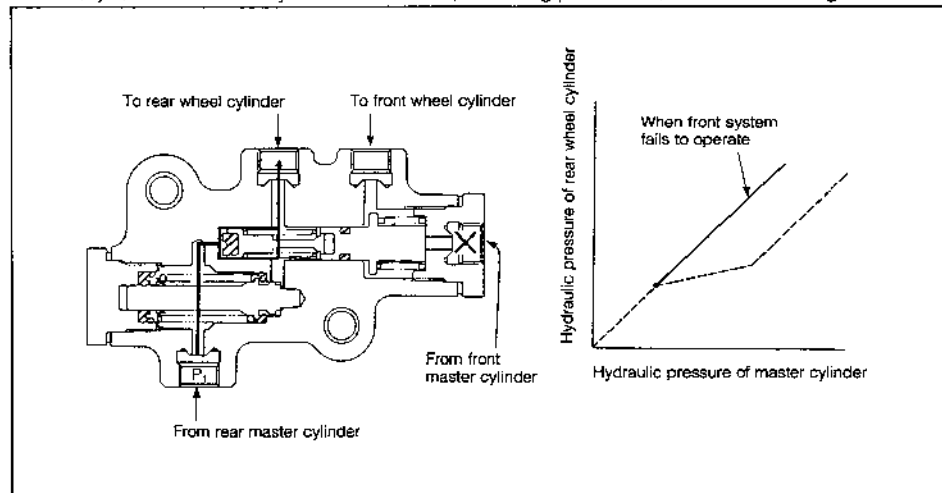
Operation principle of by-pass valve

- (1) If the front brake system should fail to operate due to some reasons, the hydraulic pressure applied to the front wheel cylinders drops. Then, the hydraulic pressure P_1 which has been applied to the rear wheel cylinder overcomes the spring tension of the by-pass valve, thus causing the by-pass valve to start moving to the right. This operation takes place at a branch point A in the figure below.



WFE90-GI064

- (2) In as much as the hydraulic pressure of the front wheel cylinder drops, the by-pass valve moves to the right. This by-pass valve's movement to the right forms a by-pass circuit for the hydraulic pressure of the rear wheel cylinders. Hence, the pressure is no longer reduced by the proportioning valve and is applied directly to the rear wheel cylinders. As a result, no turning point exists, as shown in the figure below.



WFE90-GI065

GENERAL INFORMATION

12. SUMMARY OF BODY ELECTRICAL

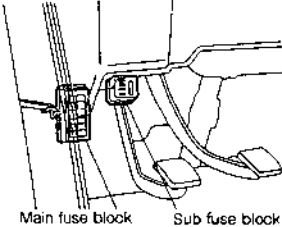
12-1. FUSE BLOCK

The fuse block is located at the cowl side of the driver's seat side.

Blade type fuses have been employed. A fuse is provided independently for each of the right and left headlamps in order that the load for each circuit may be reduced.

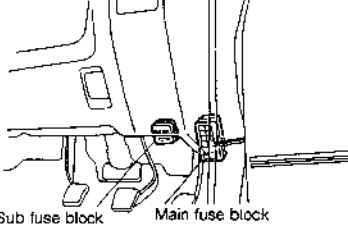
A sub-fuse block is installed below the instrument panel at the driver's seat side.

L.H.D.



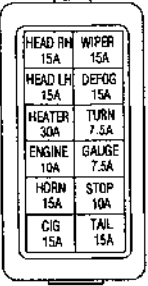
Main fuse block Sub fuse block

R.H.D.

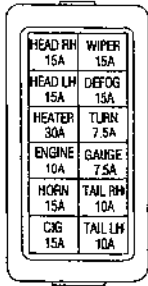


Sub fuse block Main fuse block

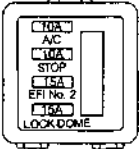
w/o Germany Specification



Germany Specification



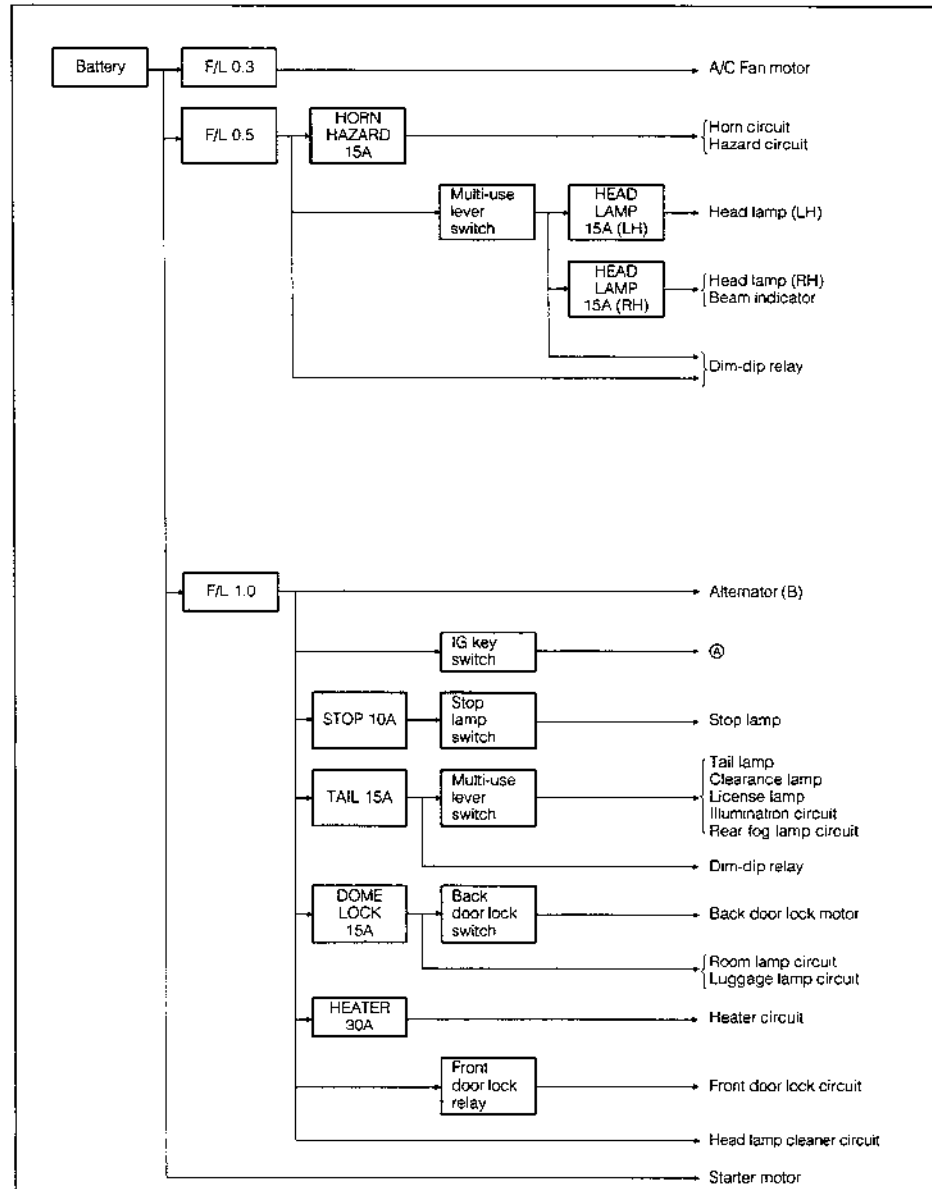
Sub fuse block



	LOCK DOME 15A	EFI No. 2 15A	STOP 10A	A/C 10A
R.H.D. EFI vehicle (With A/C)	○	○	—	○
R.H.D. carburetor vehicle (With A/C)	○	—	—	○
L.H.D. carburetor vehicle (With A/C)	○	—	—	—
L.H.D. carburetor vehicle (Without A/C)	○	—	—	—
L.H.D. carburetor vehicle (Without A/C)	○	—	—	—
L.H.D. EFI vehicle (With A/C)	○	○	○	○
L.H.D. EFI vehicle (Without A/C)	○	○	○	—
L.H.D. carburetor vehicle (Without A/C)	○	—	○	—

WFE90-G1066

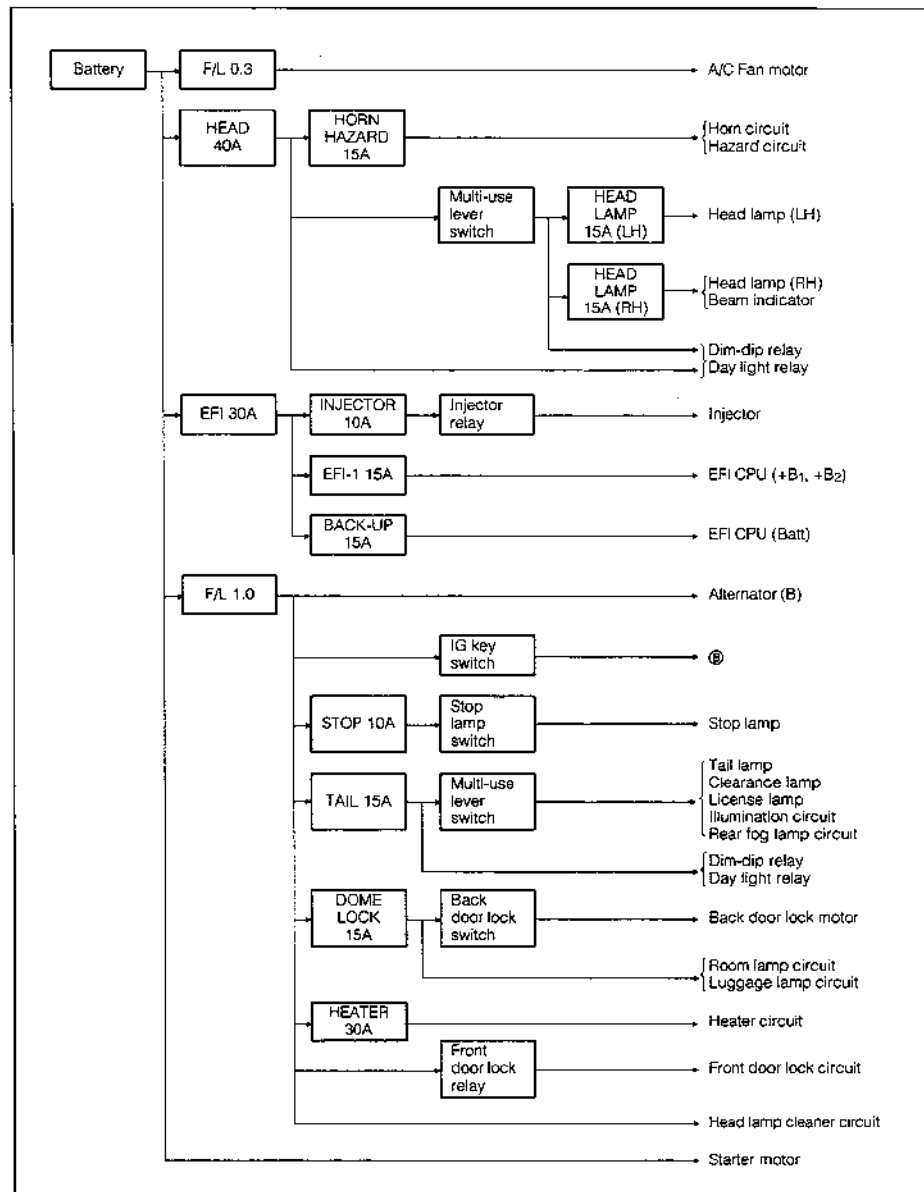
12-2. FUSE CIRCUIT (HD-C engine)



WPB30-G1105

GENERAL INFORMATION

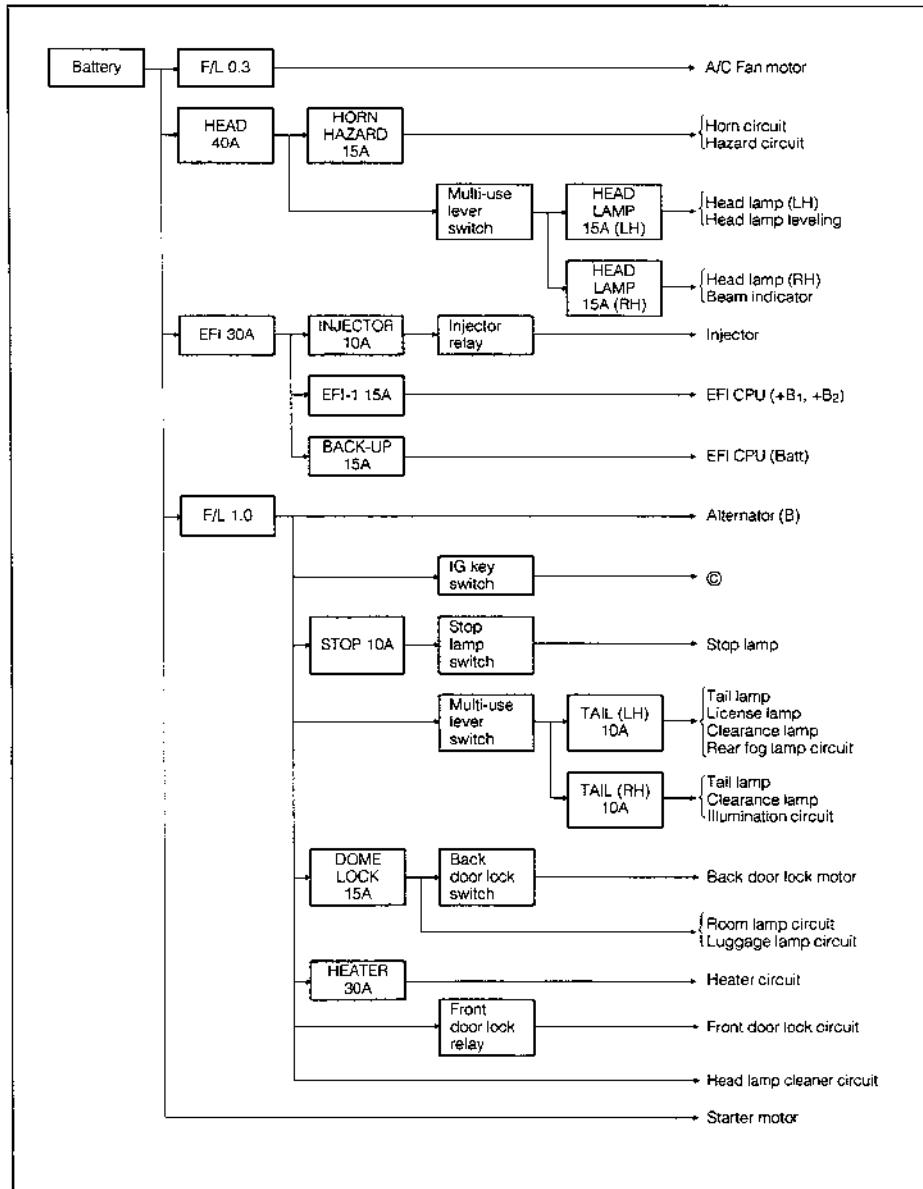
FUSE CIRCUIT (HD-E engine)



WFEBO-G105

GENERAL INFORMATION

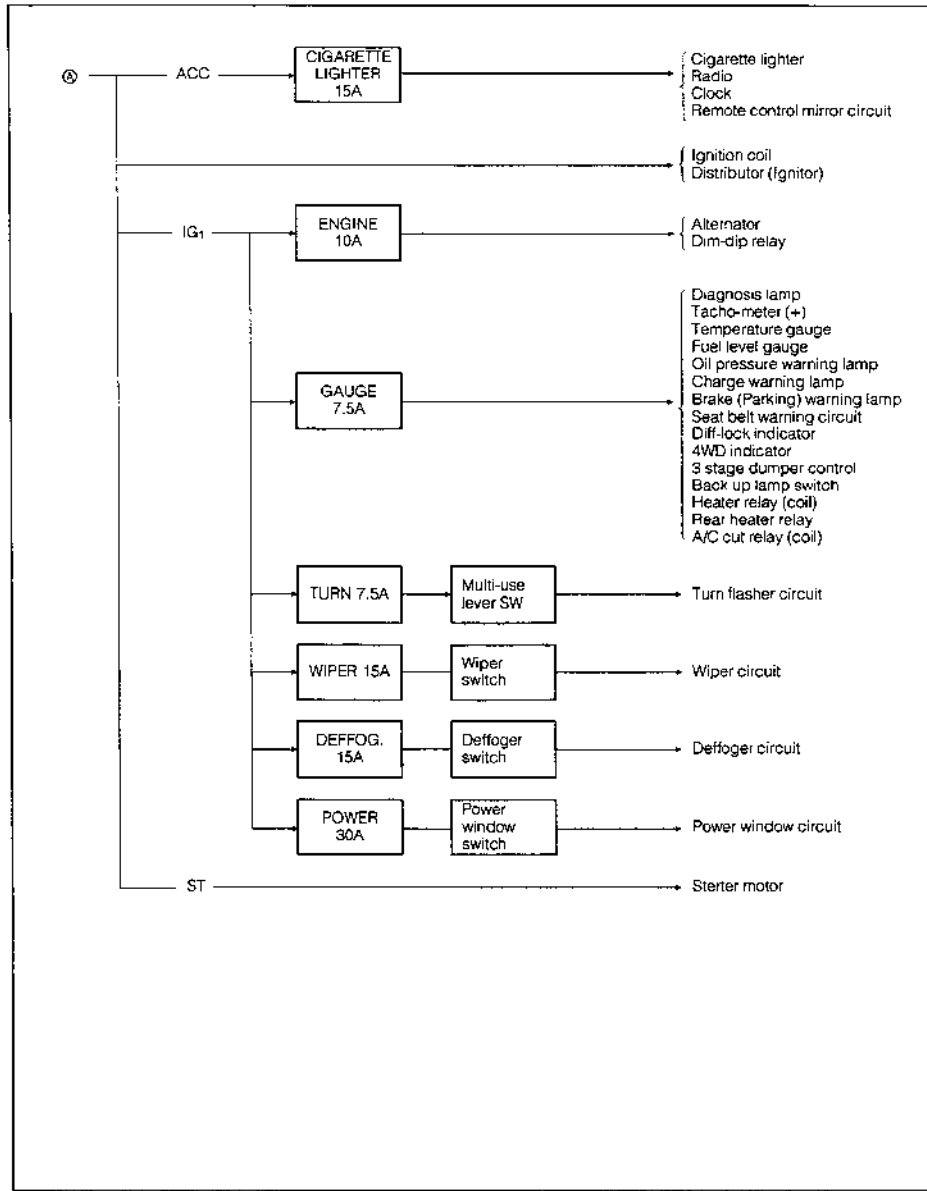
FUSE CIRCUIT (HD-E/German Specification)



WFE90-G1107

GENERAL INFORMATION

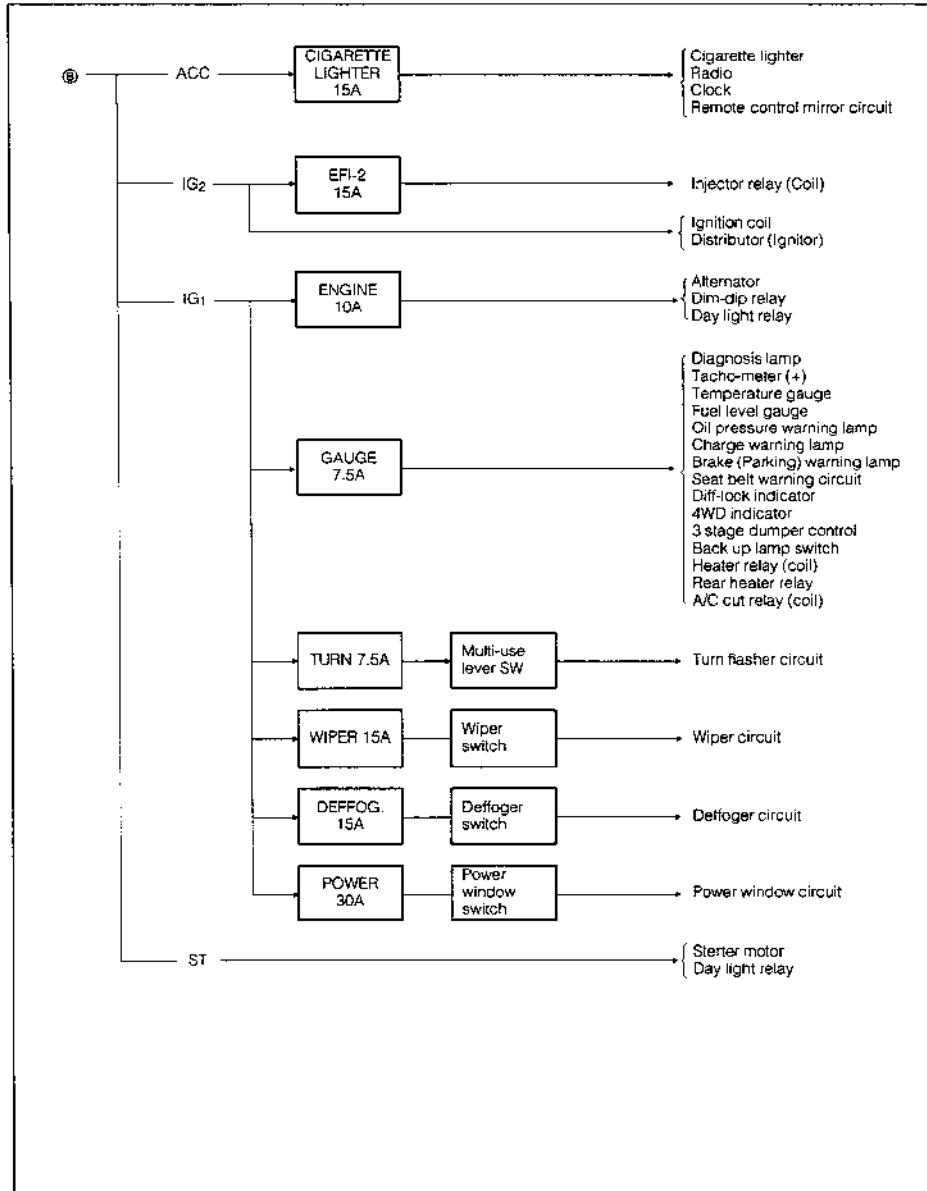
FUSE CIRCUIT (HD-C engine)



WF250-G106

GENERAL INFORMATION

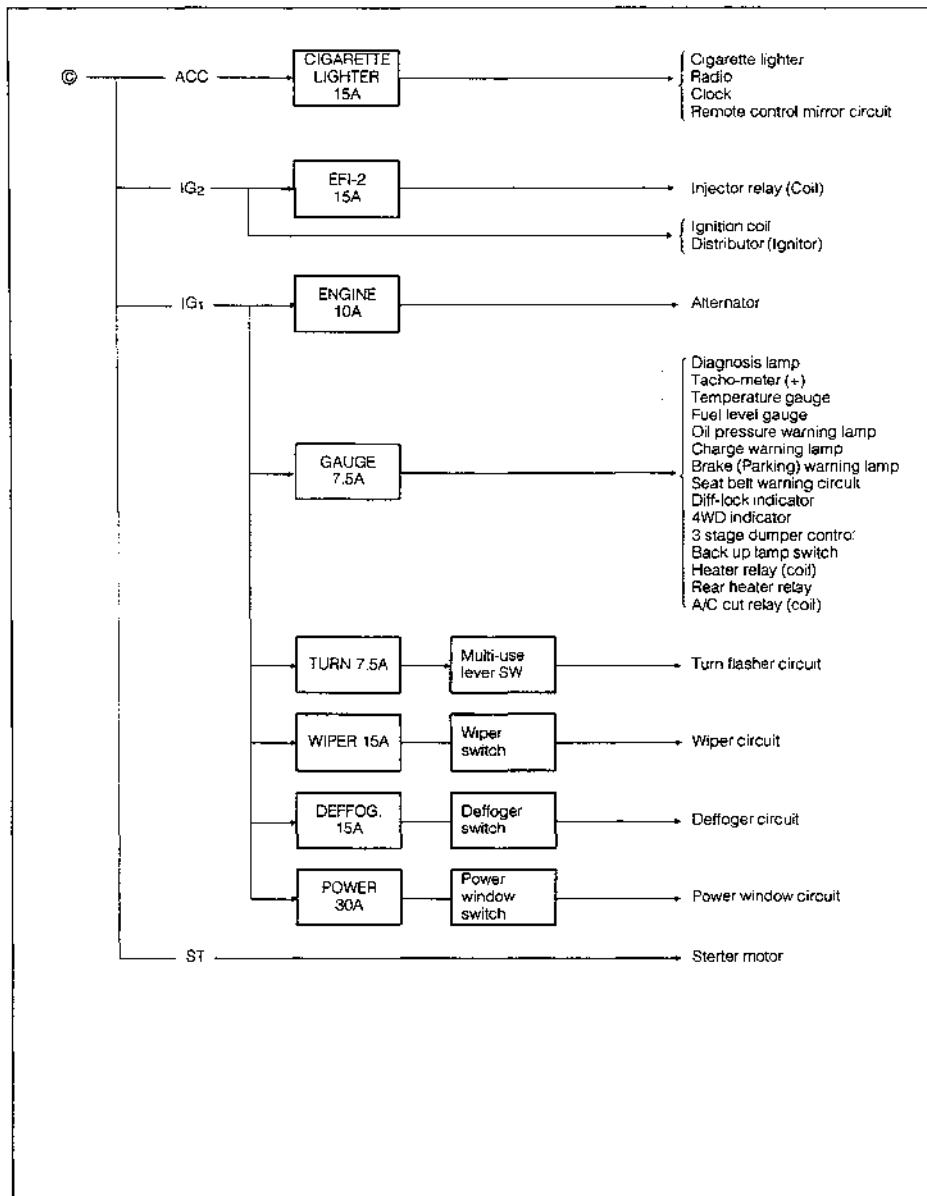
FUSE CIRCUIT (HD-E engine)



WFE30-G-109

GENERAL INFORMATION

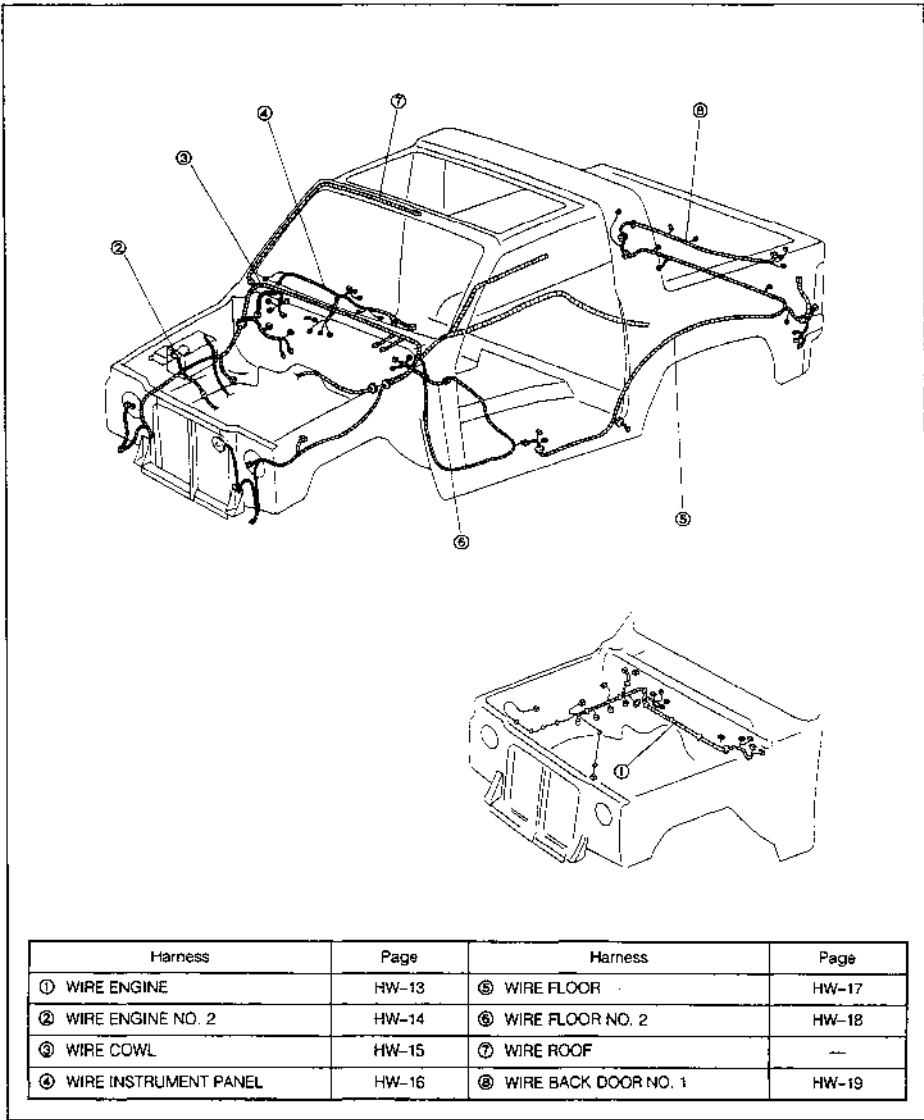
FUSE CIRCUIT (HD-E/German Specification)



WFE90-GII 10

12-3. WIRING HARNESS

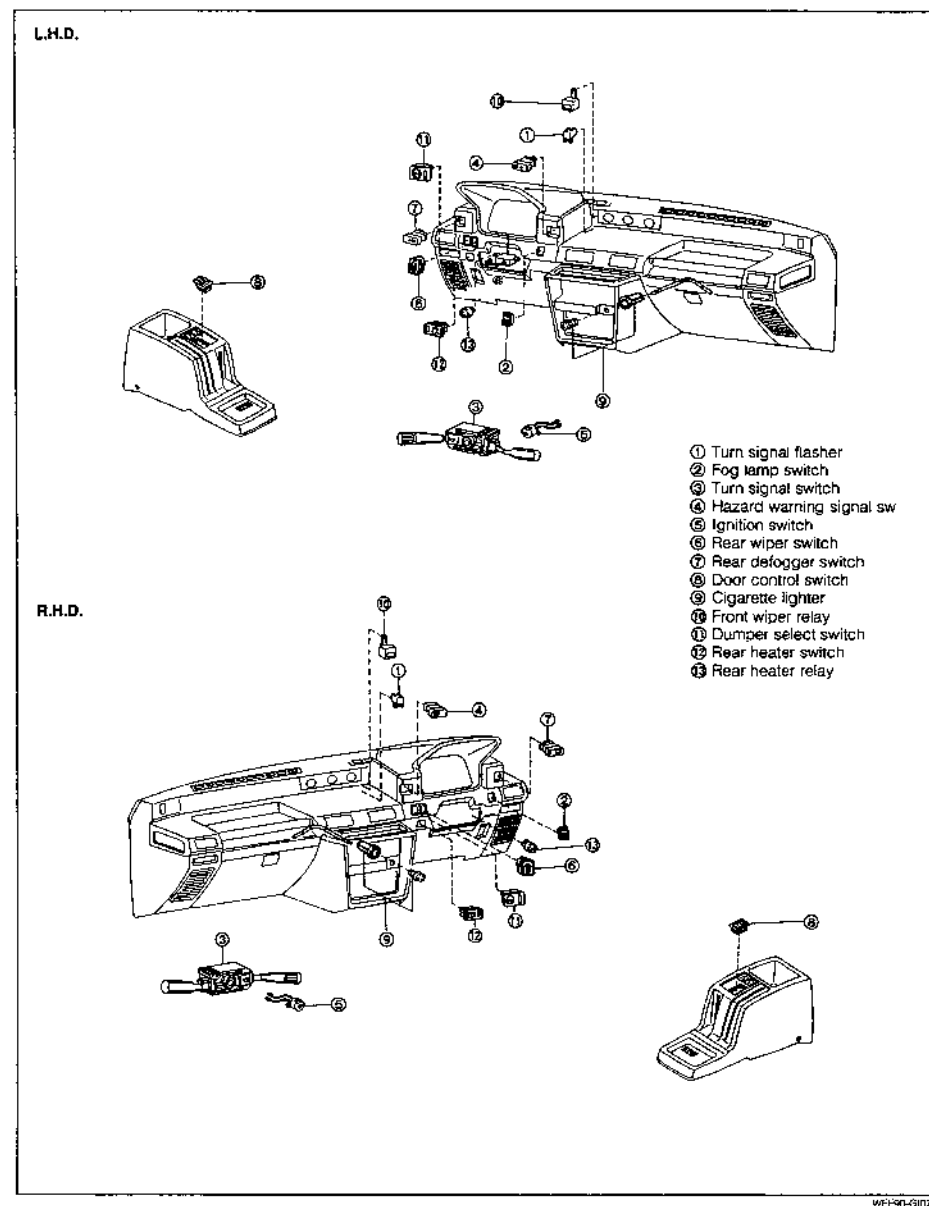
As for extra wirings for optional equipment, they are clamped at those points in close proximity of the installation position of respective pieces of equipment.
For improved reliability, protectors, clamps and so forth are provided at various points, as required.



WFE6G-G1072

GENERAL INFORMATION

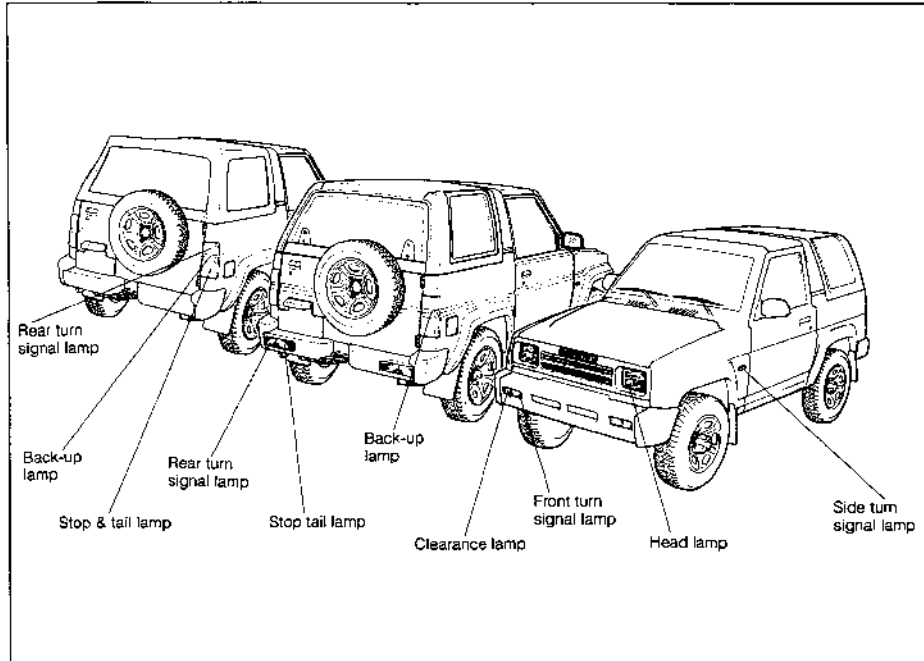
12-4. ARRANGEMENT OF SWITCHES AND RELAYS



GENERAL INFORMATION

12-5. LAMPS

The rear combination lamp has been built into the rear bumper for only European and Australian markets.



WPED-G1074

Lamp specifications

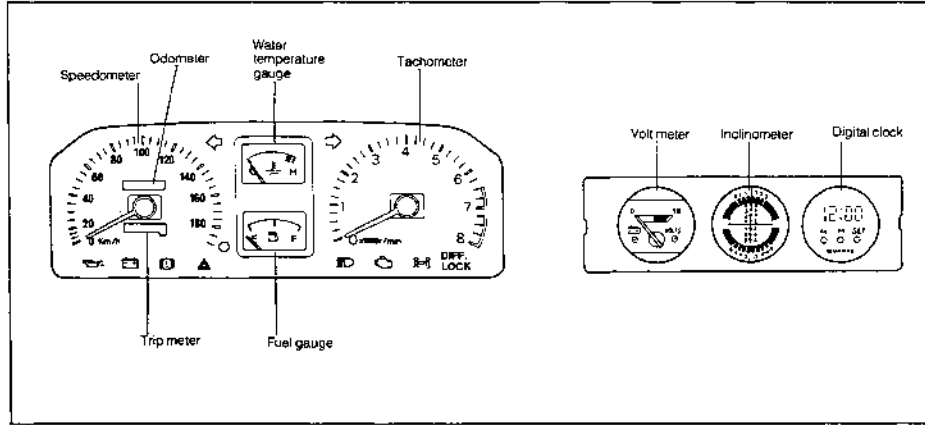
Lamp		Specifications	Wattage	Remarks
Headlamp	Bulb specifications	Candescent	45/40	
		Halogen	60/55	
		Yellow	45/40	
Front combination lamp		Clearance lamp	5	
		Turn signal lamp	21	
Side turn signal lamp			5	
Rear combination lamp		Stop/tail lamp	21/5	Figures in () denote European specifications
		Turn signal lamp	23 (21)	
		Back up lamp	21	
License plate lamp			5	
Room lamp			10	
Fog lamp		Front	35	• Option on Australian & General specifications
		Rear	21	• Standard on R.H.D. vehicles for European specifications • Option on L.H.D. vehicles for European specifications

WPED-G1075

GENERAL INFORMATION

12-6. COMBINATION METER

(1) Meter panel overview



WFE00-G1376

(2) Warning & indicator lamps

	Kind	Indication	Function
Warning lamp	Hazard warning		Flashes when hazard switch is turned ON. Indicating color: Red
	Brake warning		Glows when brake fluid becomes too low or empty, or when parking brake is applied. Indicating color: Red
	Oil pressure warning		Glows when engine oil pressure system is encountered with abnormality while engine is running. Indicating color: Red
	Charge warning		Glows when engine charging system is encountered with abnormality while engine is running. Indicating color: Red
	Seat belt warning		Glows for about six seconds when driver fails to buckle up seat belt at driver's seat after ignition switch has been turned ON or engine has started. Indicating color: Red
	Check engine warning		Glows when CPU detects malfunction of Electronic Fuel Injection system. Indicating color: Amber
Indicator lamp	High beam indicator		Glows when upper beams of headlamps are turned ON. Indicating color: Amber
	Turn signal indicator		Flashes when turn signal switch or hazard warning switch is turned ON. Indicating color: Green
	4WD indicator		Glows when the transfer shift lever is moved to the 4H or 4L position with the engine switch turned ON. Indicating color: Green
	Differential lock indicator	DIFF-LOCK	Glows when the transfer shift lever is shifted to CENTER DIFF-LOCK with the engine switch turned ON. Indicating color: Amber

WFE00-G1077

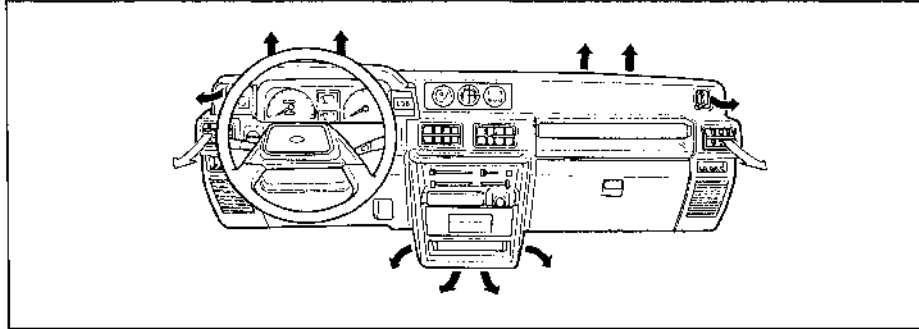
GENERAL INFORMATION

12-7. HEATER & VENTILATION

(1) FRONT HEATER

The heater employs a full air mixing type heater having remarkable air temperature regulating characteristics. Air outlets are provided at the center and both sides of the instrument panel as well as at the right and left sides on a feet level.

For improved visibility, side defrosters are employed so as to prevent door windows from misting.



WPB90-G1076

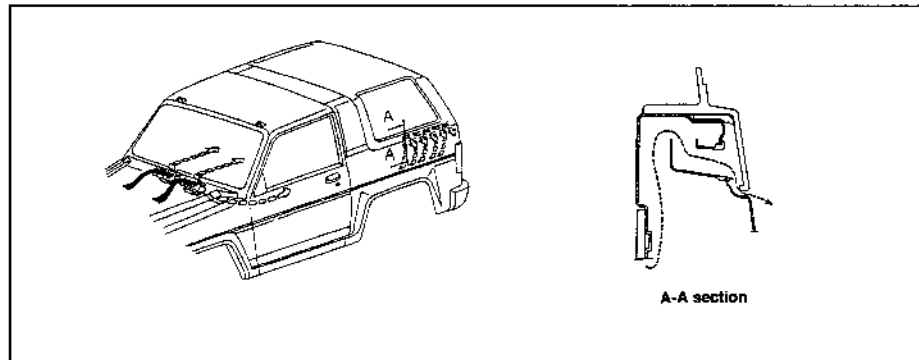
Heater specifications

Heat radiating rate	kCal/h	3,000
Air flow rate	m ³ /h (ft ³ /h)	245 (8625)
Power consumption	W	140
Fan diameter	mm (inch)	140 (5.51)

WPB90-G1079

(2) Ventilation (fresh air system)

Fresh air is introduced from the louvers provided on the cowl panels. After passing through the heater proper, the fresh air is discharged to the vehicle interior from the ventilators provided at the center as well as at either side of the instrument panel. Then, the air in the vehicle interior is released from the quarter panel ventilation louvers to the outside.

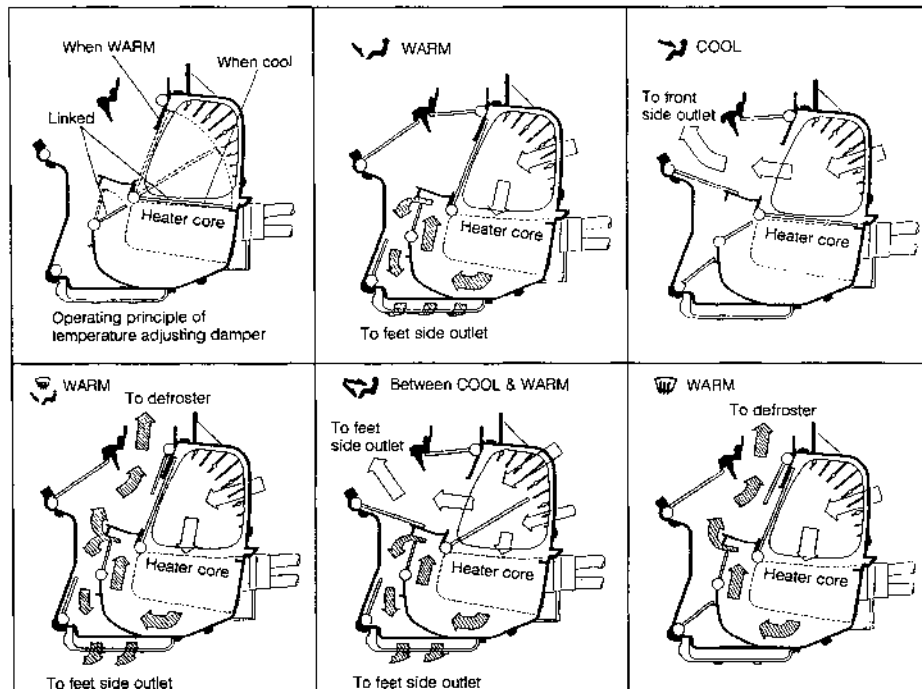


WPB90-G1080

GI-55

GENERAL INFORMATION

(3) Heater construction



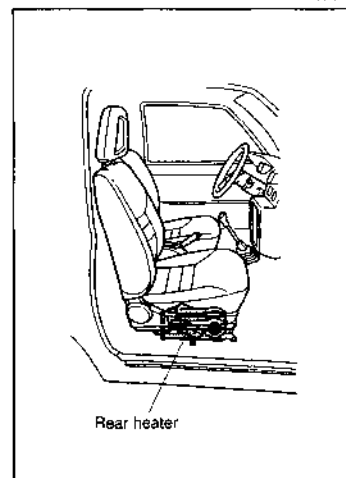
WP290-G1032

(4) Rear heater

Rear heater is available except for Australian specification.
Rear heater is located at the under position of the co-drivers seat.

Heater specifications

Heat radiating rate	kCal/h	1,600
Air flow rate	m ³ /h (ft ³ /h)	120 (4238)
Power consumption	W	30
Fan diameter	mm (inch)	80 (3.1)



WP290-G1032

DAIHATSU

F300

STEERING

OUTLINE OF STEERING SYSTEM	SR- 2
COMPONENTS	SR-16
TROUBLESHOOTING	SR-18
IN-VEHICLE INSPECTION	SR-19
STEERING WHEEL	SR-31
STEERING COLUMN	SR-34
STEERING LINKAGE	SR-57
STEERING GEAR HOUSING	SR-70
VANE PUMP	SR-85
SSTs (Special Service Tools)	SR-97
SERVICE SPECIFICATION	SR-97
TIGHTENING TORQUE	SR-98

WFB90-SR001

STEERING

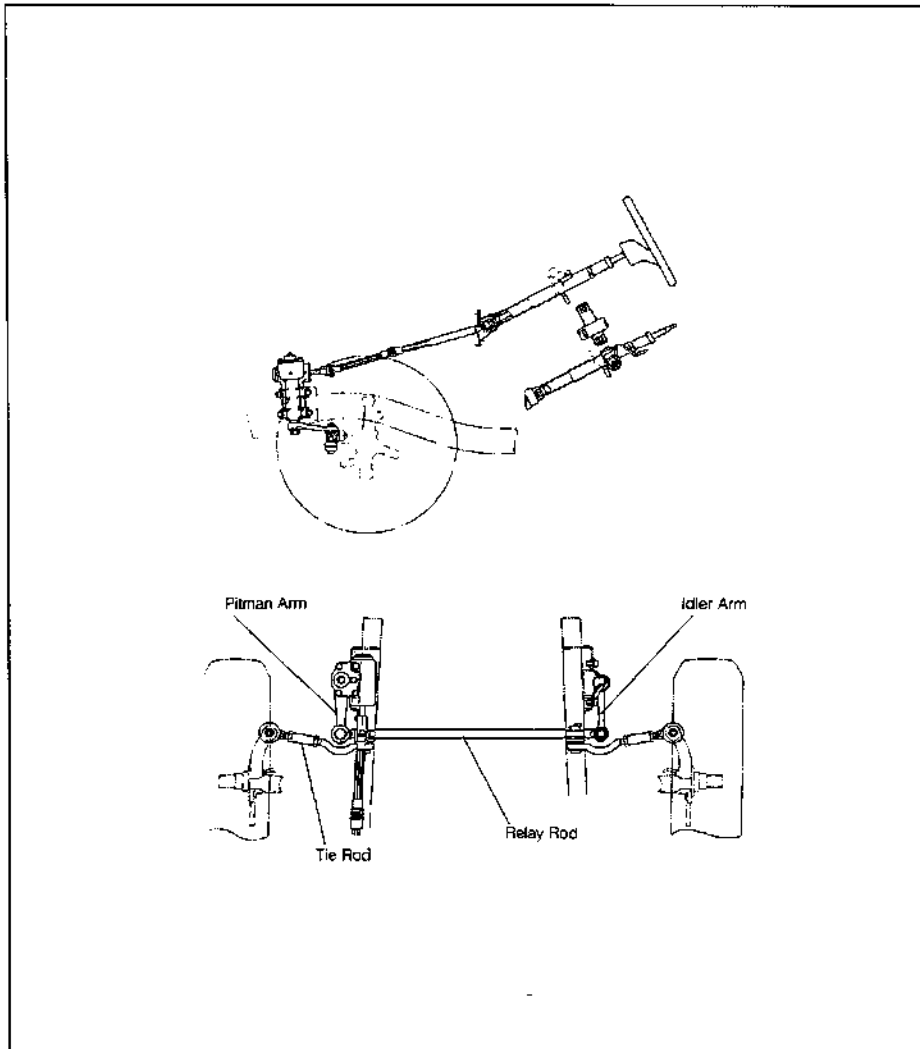
OUTLINE OF STEERING SYSTEM

The steering gear box employs a recirculating ball type. Furthermore, the power steering is available as optional equipment.

The steering column employs a rigid type for the general and Australian specifications and an impact absorption type for the ECE & EEC specifications.

The tilt steering is standard equipment on the EL grade, while it is optional equipment on the DX grade.

The steering linkage consists of a pitman arm, a relay rod, an idler arm and tie rods.



WP250-SH002

STEERING

Steering specifications

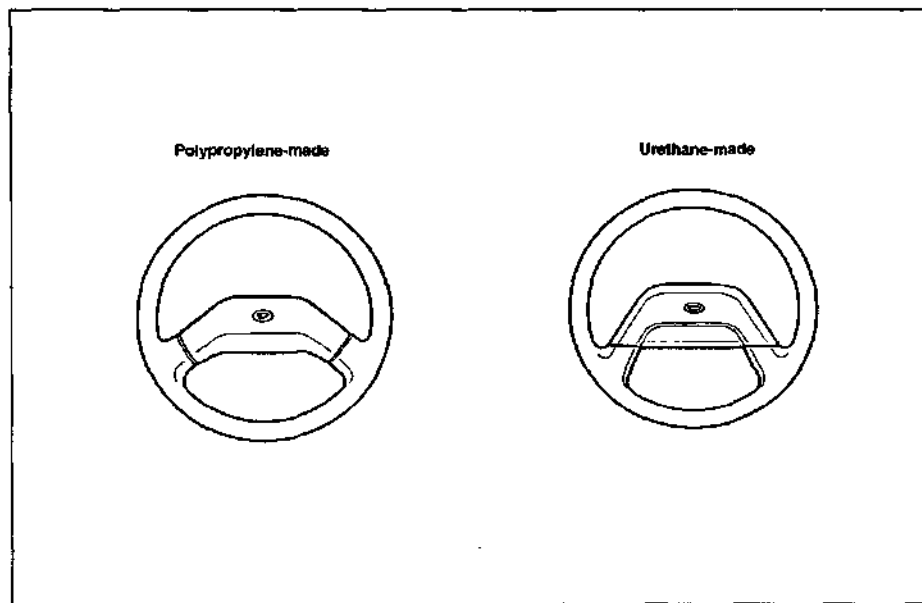
Item		Specifications	
		Tyre size	
		195R15	225/70R15
Turning angle degrees	Inner	31°	27°
	Outer	27°	24°
Minimum turning radius	Tire	5.1	5.7
	Body	5.4	6.0

WFE20-SR003

STEERING WHEEL

The steering wheel is available in two materials: urethane and polypropylene.

The urethane-made steering wheel is standard on the EL grade of the resin top vehicle; the EL package of the soft top vehicle. Also, it is optional equipment on the DX grade of the resin top vehicle. (On those vehicles equipped with the urethane made steering wheel, the transmission shift lever knob is also made of urethane.) Other vehicles uses the polypropylene-made steering wheel.

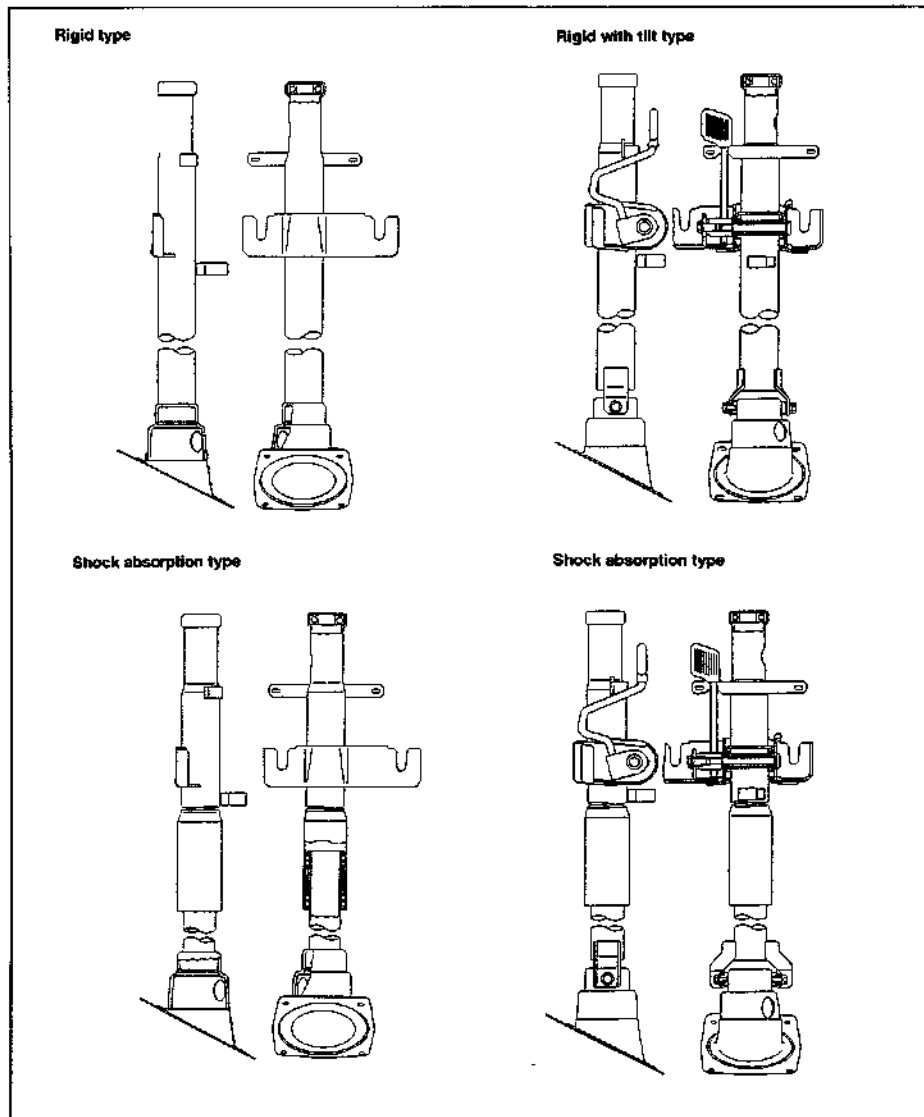


WFE20-SR004

STEERING

STEERING COLUMN

The steering column employs the rigid type for the general and Australian specifications and the shock absorption type for the ECE & EEC and GCC specifications. The tilt steering is provided as standard on the EL grade vehicle.

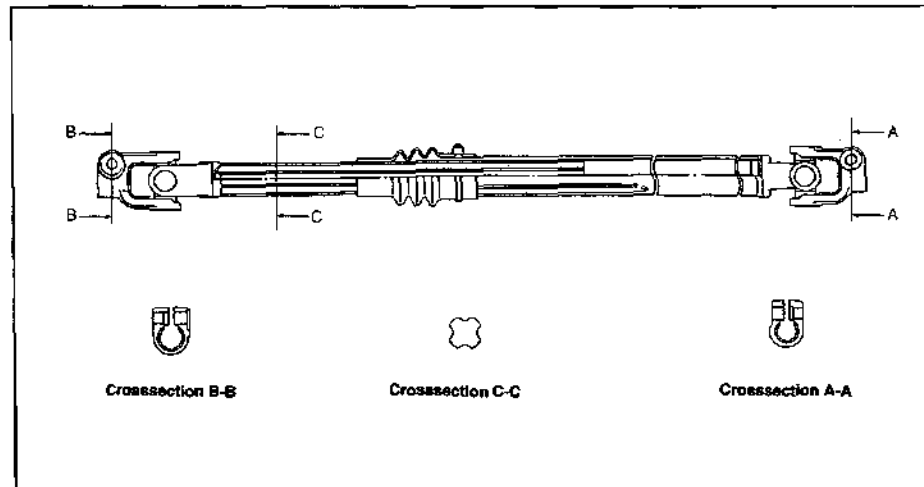


W/FERD-SR006

STEERING

INTERMEDIATE SHAFT

The intermediate shaft shown in the figure below is provided between the steering main shaft and the steering gear box.

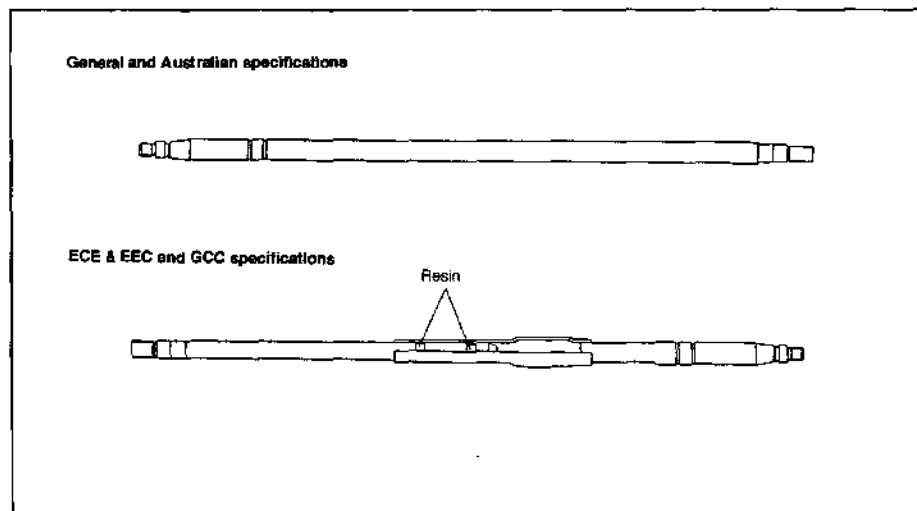


WFE90-SR008

STEERING MAIN SHAFT

The steering main shaft comes in two kinds: one for the general and Australian specifications and the other for the ECE & EEC specifications.

The steering main shaft for the ECE & EEC and GCC specifications employs an impact absorption type steering main shaft which uses resin.

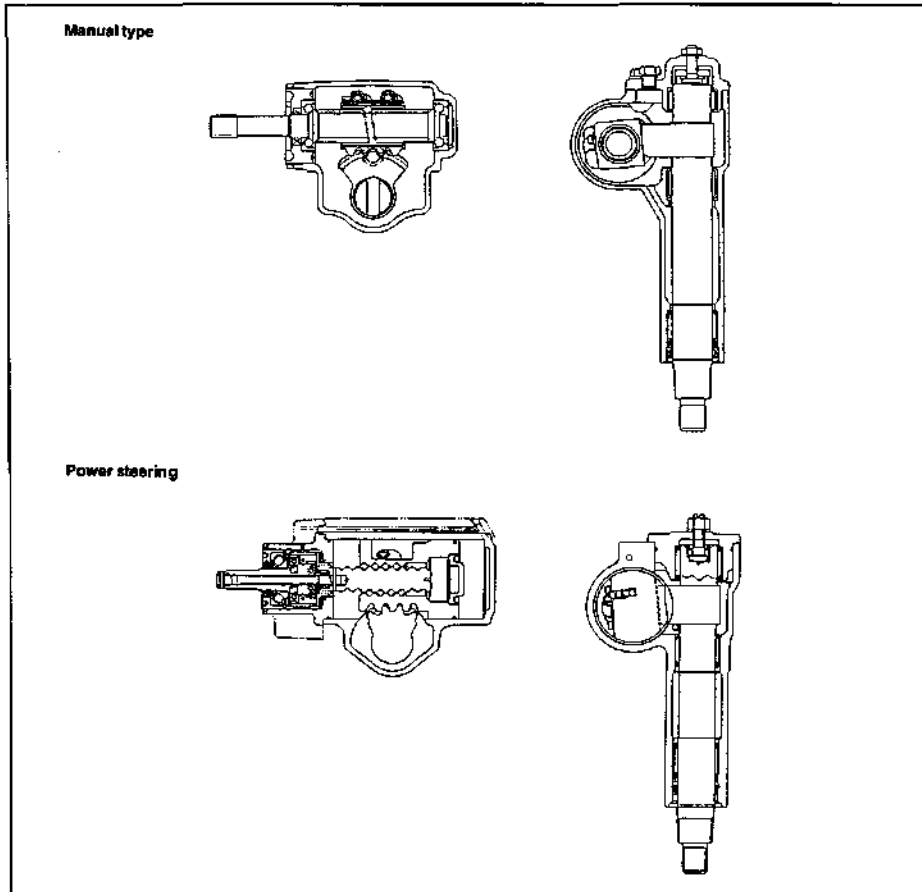


WFE90-SR007

STEERING

STEERING GEAR BOX

As regards the steering gear box, the manual steering (recirculating ball type) is standard, where as the power steering (integral type) is optional.



WFE90-SF005

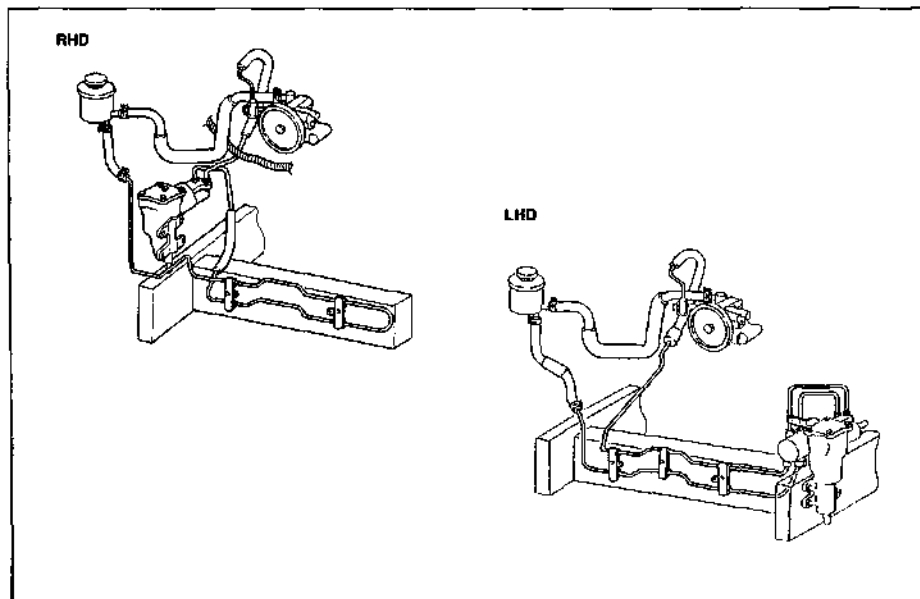
Steering gear box specifications

	Manual Type		Power steering
	Recirculating ball type		Integral type
Gear ratio	24 - 28		19.8
Oil capacity	Upper limit	480 cc	—
	Lower limit	460 cc	

WFE90-SF009

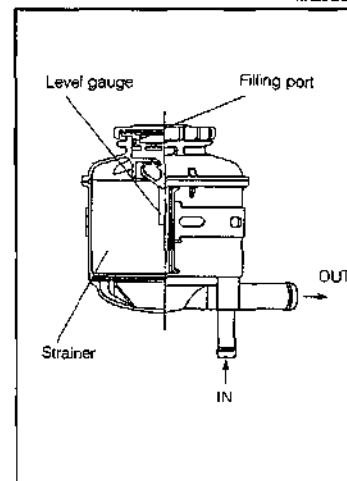
POWER STEERING

The power steering consists of the following components: a vane pump which generates a hydraulic pressure, an integral type gear box which detects a force being applied to the steering system, controls the hydraulic pressure and converts the hydraulic pressure to a mechanical power, an oil reservoir which stores hydraulic fluid, and those hoses, pipes, etc. linking these components.



OIL RESERVOIR

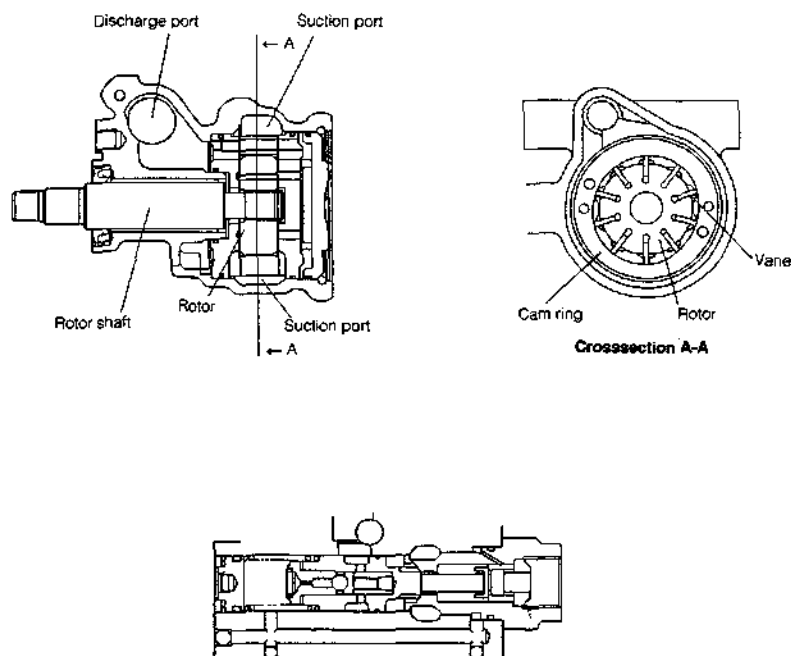
The oil reservoir is a tank which stores the hydraulic fluid sent to and returning from the steering gear box. The oil reservoir consists of a strainer which filtrates hydraulic fluid, a level gauge for checking the fluid level and so forth. This oil reservoir is located in the engine compartment.



STEERING

VANE PUMP

The vane pump consists of a cam ring, a pump rotor, vanes and so forth. A flow control valve which controls the fluid flow rate according to the revolution speed is incorporated at the rear section of the pump.



WFED-SR012

Vane pump specifications

Revolution speed used	rpm	500 - 7000
Control discharge rate	liter/min	7.0 (at 1000 rpm) [*5.5 (at 1000 rpm)]
Relief set pressure	kg/cm ²	60 - 70 [at 500 rpm]
Fluid		Power steering fluid (DEXRON® II)
Ambient temperature	°C	- 40 - 120

*For the United Kingdom

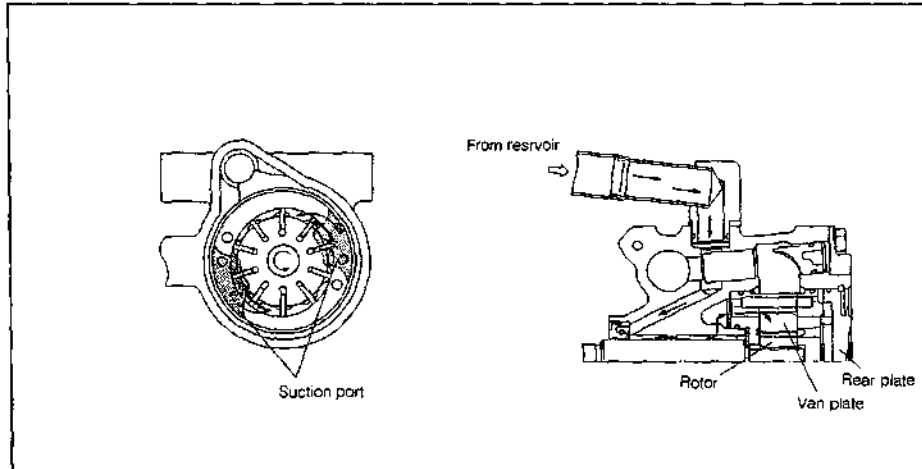
WFED-SR013

STEERING

Suction operation

The volume of a space between the cam ring and the rotor partitioned by a vane plate increases as the rotor rotates.

As the volume starts to increase, the fluid is sucked from the suction port of the rear plate.



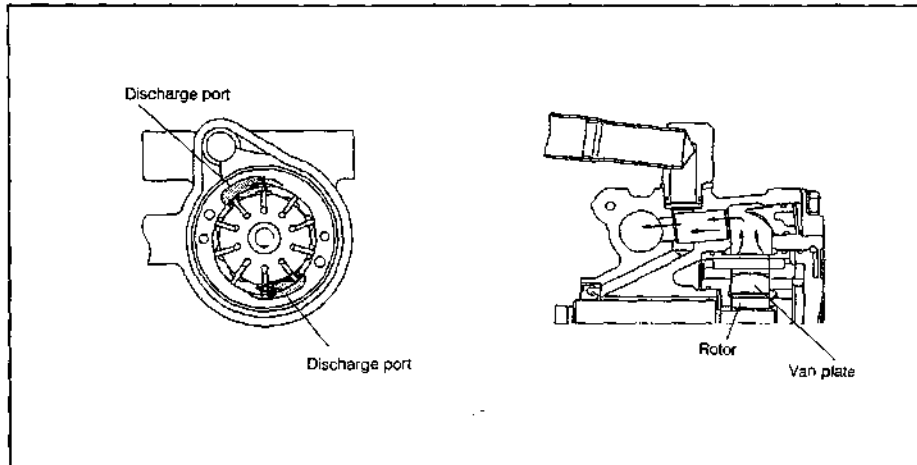
WFE90-SR014

Discharge operation

The volume of a space between the cam ring and the rotor partitioned by a vane plate decreases as the rotor further rotates.

The sucked fluid is, therefore, sent to the flow control valve from the discharge port of the rear plate through the oil passage in the housing. In this way, the fluid flow rate to the gear housing is controlled.

Furthermore, the vane plate is pushed against the cam ring owing to a centrifugal force applied to the vane plate and a hydraulic pressure applied to the back of the vane, thereby preventing leakage.

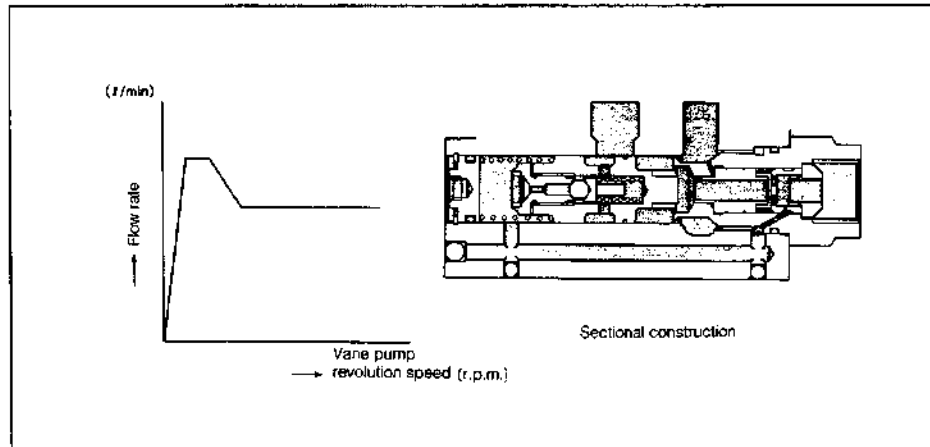


WFE90-SR015

STEERING

FLOW CONTROL VALVE

The flow control valve controls the flow rate of the fluid in accordance with the engine revolution speed (vane pump revolution speed). The flow control valve improves the steering feeling by providing a light steering turning effort during low-speed operations and a certain extent of the steering turning effort during high-speed operations.

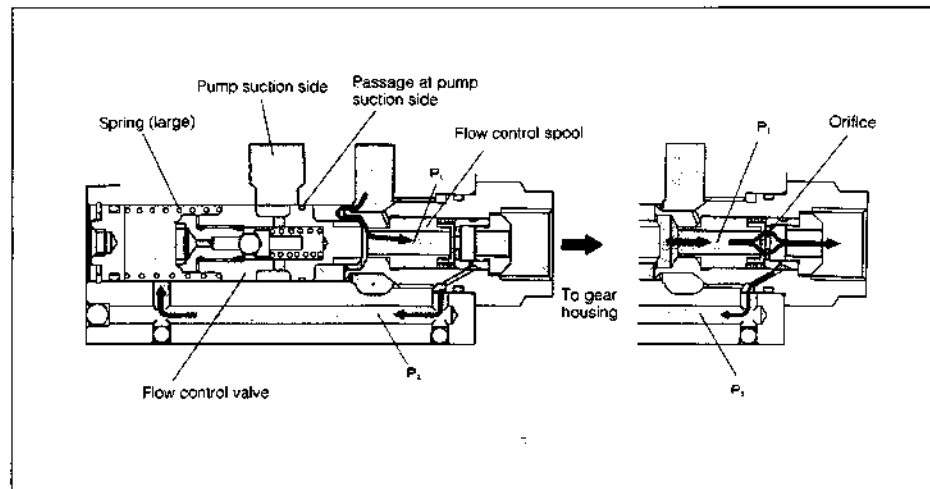


WPES0-SR016

OPERATION OF FLOW CONTROL VALVE

During low revolution speed period

The pump delivery pressure P_1 is applied to the right side of the flow control valve, while the pressure P_2 , i.e. pressure after the fluid has passed through the orifice, is applied to the left side. When the pump revolution speed is low, the passage at the pump suction side is closed. Therefore, the fluid which increases corresponding to the pump revolution speed is directly sent to the gear housing.



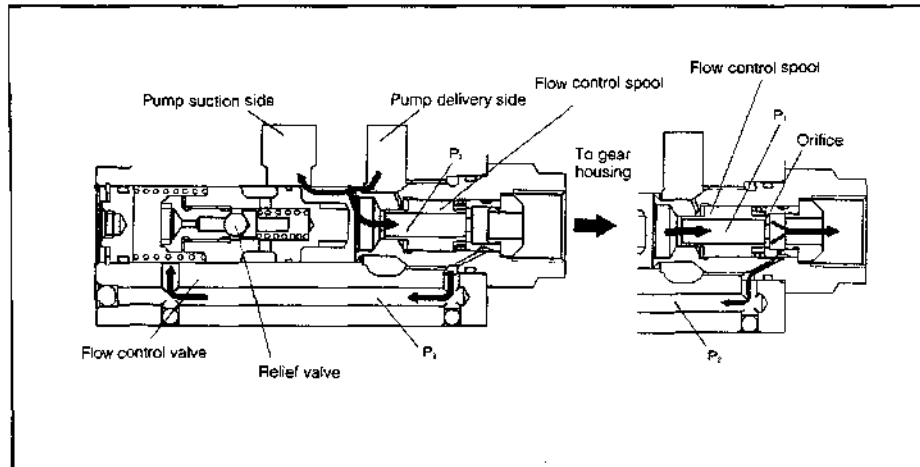
WPES0-SR017

STEERING

During middle and high revolution speed period

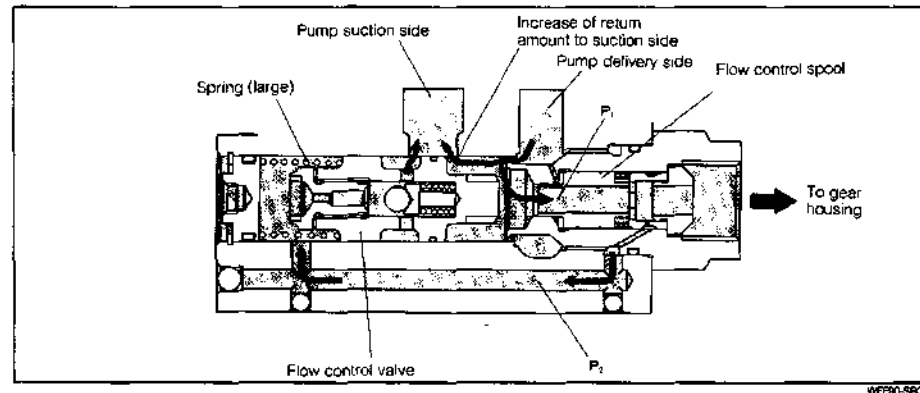
When the pump delivery pressure rises as the pump revolution speed increases, the flow control valve overcomes the spring (large one) tension, thereby moving toward the left side. Consequently, a part of the pump delivery side returns to the suction side, thus controlling the fluid flow rate to the gear housing. Also, the flow control spool moves toward the right side as a result of the rise of the pump delivery pressure P_1 .

When the flow control spool moves toward the right side, the orifice is restricted. This increases difference between the pump delivery pressure P_1 and the pressure P_2 , i.e. pressure after the fluid has passed through the orifice. Consequently, the flow control valve moves farther to the left. Hence, the return amount of the fluid from the pump delivery side to the pump suction side increases, thus reducing the fluid flow rate to the gear housing.



Operation of relief valve

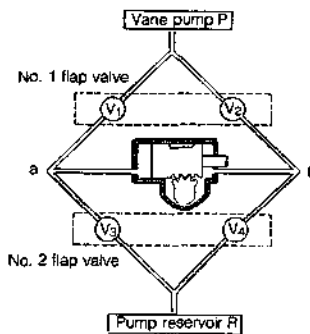
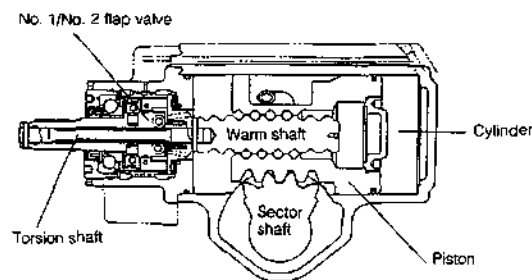
The relief valve is built inside the flow control valve. When the hydraulic pressure during revolution rises, the relief valve is opened. The fluid returns to the pump suction side via the arrowheaded passages. In this manner, the relief valve controls the maximum hydraulic pressure to from 65 to 70 kg/cm².



STEERING

OPERATION PRINCIPLE

1. The V_1 and V_2 of the No. 1 flap valve are direction controlling valves, which switch the oil passage to either P-a-R or R-b-P, according to the movement of the steering wheel.
The V_3 and V_4 of the No. 2 flap valve are pressure controlling valves, which determines pressures at the points "a" and "b" according to steering.
2. When the steering wheel is in the neutral position, all those valves of V_1 , V_2 , V_3 and V_4 are open and there is no difference in pressure between the points "a" and "b".
3. When the steering wheel is turned to the right, the V_1 closes, V_2 and V_3 open and V_4 almost closes. The hydraulic pressure at the point "b" (in the cylinder) increases. Then the piston is pushed to the left in the figure, thus assisting the driver's steering effort.
The greater the steering effort, the smaller the opening of the V_4 , thus increasing the pressure at the point "b".
4. When the steering wheel is turned to the left, the power steering operation is reverse to that of (3).

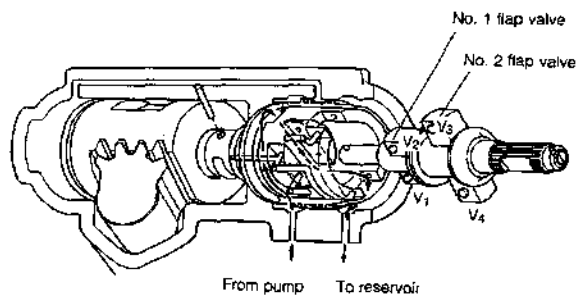
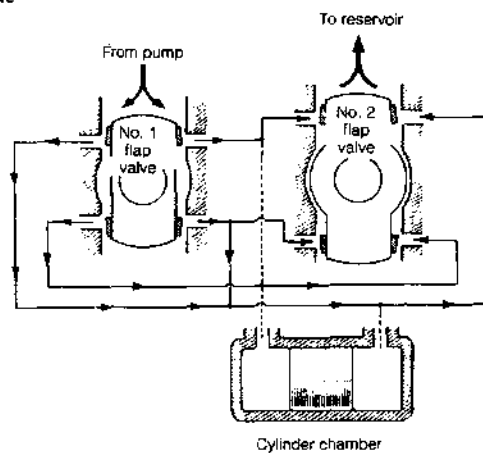


WF80-SR120

OIL PASSAGE

1. When steering wheel is in neutral position:

As both the No. 1 and the No. 2 flap valves are in their neutral positions, the oil passage of the valve body is open. Hence, the fluid coming from the pump is returned to the reservoir through all oil passages. As a result, the hydraulic pressure in the cylinder will not increase and no force will be applied to the power piston.

Oil passage**Operational procedure**

WFE90-SR021

STEERING

2. When steering wheel is turned to right:

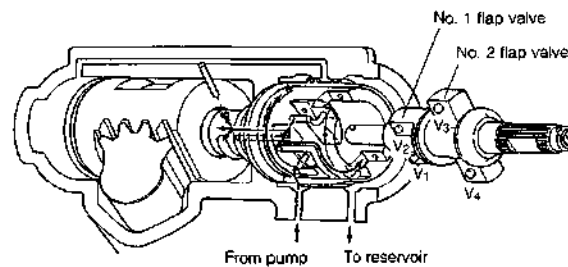
Because the V_2 of the No. 1 flap valve is opened and the V_4 is almost closed, the hydraulic pressure of the oil passage shown in the figure increases. The hydraulic pressure at the right side of the power piston in the figure increases, thus moving the piston to the left.

When the force applied to the worm shaft drops, the twisting angle of the torsion bar decreases. Hence, the clearance of the V_4 becomes large, thereby lowering the hydraulic pressure (a force which pushes the piston).

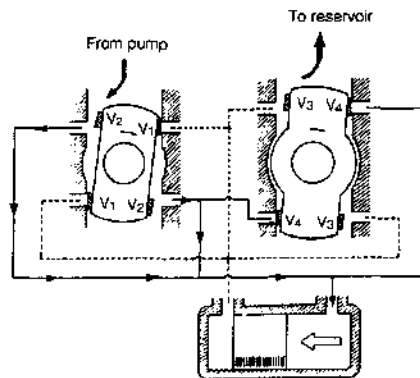
Conversely, when the force applied to the worm shaft becomes large, the V_4 fully closes, thus increasing the hydraulic pressure (a force which pushes the piston).

In this way, the No. 2 flap valve regulates the hydraulic pressure so that the servo force corresponding to the driver's turning effort may be produced.

Oil passage



Operational procedure



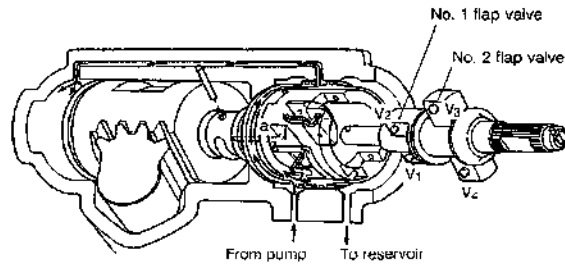
WFE90-SR022

STEERING

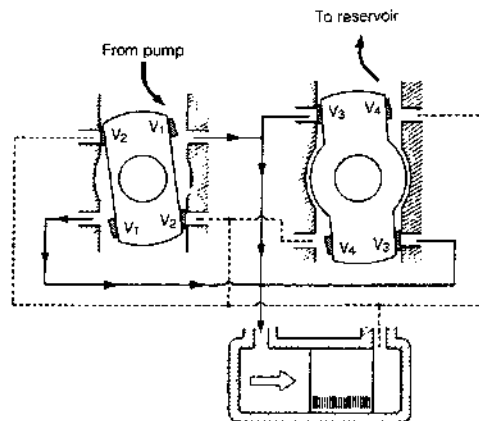
3. When steering wheel is turned to left:

Because the V_1 of the No. 1 flap valve opens and the V_3 almost closes, the fluid flows in the following order as shown in the figure: the oil groove of the periphery ring, the oil passage of the valve body housing, and the oil passage of the steering gear housing. Then, the fluid flows into the left side of the power piston, thereby moving the piston to the right.

Oil passage



Operational procedure

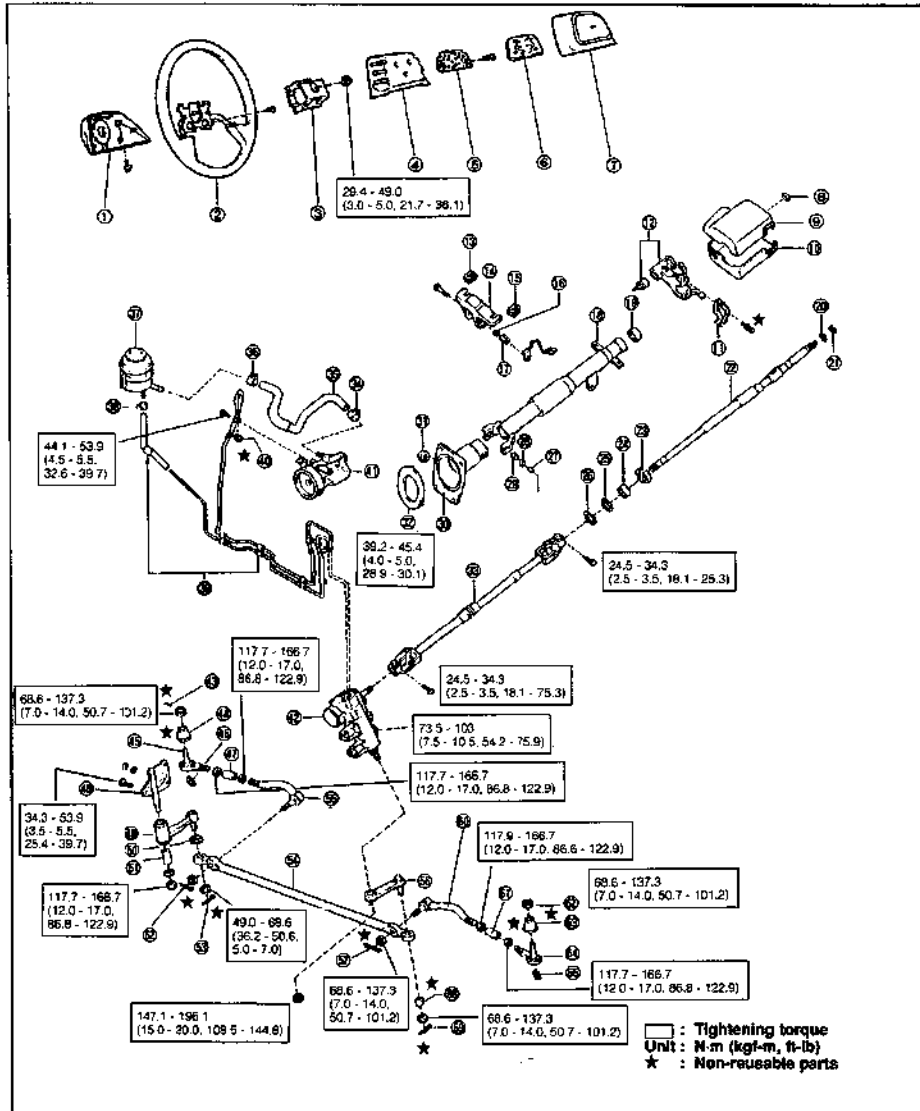


STEERING

COMPONENTS

NOTE:

- This illustration below typically indicates those components of power steering-equipped left hand model.



WFE90-SP02-1

- | | |
|--|-----------------------------------|
| ① Steering wheel cover | ②④ Clip |
| ② Steering wheel sub assembly | ②⑤ Oil reservoir-to-pump hose |
| ③ Energy absorbing pad | ②⑥ Clip |
| ④ Steering wheel lower cover | ②⑦ Oil reservoir assembly |
| ⑤ Horn bottom contact plate | ②⑧ Clip |
| ⑥ Horn bottom contact plate No.2 | ②⑨ Pressure feed tube assembly |
| ⑦ Horn pad sub assembly | ②⑩ Gasket |
| ⑧ Grommet | ②⑪ Vane pump assembly |
| ⑨ Steering column upper cover | ②⑫ Steering gear housing assembly |
| ⑩ Steering column lower cover | ②⑬ Cotter pin |
| ⑪ Steering column housing | ②⑭ Steering link joint dust seal |
| ⑫ Steering column upper w/switch bracket | ②⑮ Tie rod end sub assembly, R.H. |
| ⑬ Steering column upper attachment plate | ②⑯ Fitting grease |
| ⑭ Tilt steering support sub assembly | ②⑰ Tie rod adjusting tube |
| ⑮ Steering column upper attachment plate | ②⑱ Idler arm support pin |
| ⑯ Washer | ②⑲ Steering idler arm assembly |
| ⑰ Bolt | ②⑳ Dust seal |
| ⑱ Steering column tube sub assembly | ③① Collar |
| ⑲ Radial ball bearing | ③② Cotter pin |
| ⑳ Snap ring | ③③ Cotter pin |
| ㉑ Snap ring | ③④ Steering relay rod |
| ㉒ Steering main shaft sub assembly | ③⑤ Tie rod assembly, R.H. |
| ㉓ Steering shaft thrust stopper sub assembly | ③⑥ Pitman arm sub assembly |
| ㉔ Radial ball bearing | ③⑦ Cotter pin |
| ㉕ Washer | ③⑧ Steering link joint seal |
| ㉖ Snap ring | ③⑨ Cotter pin |
| ㉗ Collar | ③⑩ Tie rod assembly, L.H. |
| ㉘ Bush | ③⑪ Tie rod adjusting tube |
| ㉙ Bush | ③⑫ Cotter pin |
| ㉚ Steering column hole cover | ③⑬ Steering link joint dust seal |
| ㉛ Hole plug | ③⑭ Tie rod end sub assembly, L.H. |
| ㉜ Steering column hole cover shield | ③⑮ Grease fitting |
| ㉝ Steering intermediate shaft | |

STEERING

TROUBLESHOOTING

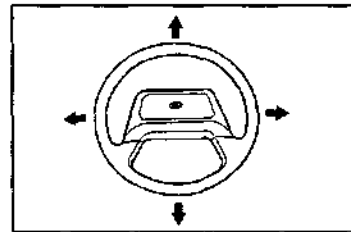
Symptom	Possible causes	Checking points
Hard steering Hard steering persists even after being jacked up.	<ul style="list-style-type: none">• Faulty steering gear• Preload improperly adjusted• Faulty ball joint	<ul style="list-style-type: none">• Check steering gear.• Check steering linkage.
Steering effort becomes lighter after being jacked up.	<ul style="list-style-type: none">• Tire size• Front wheels improperly aligned	<ul style="list-style-type: none">• Check front alignment and tire size.• Check tire air pressure.
Excessive play	<ul style="list-style-type: none">• Steering wheel improperly installed• Faulty steering linkage• Suspension improperly installed• Faulty steering gear• Bush worn	<ul style="list-style-type: none">• Check steering wheel.• Check steering linkage.• Check suspension.• Check steering gear.• Check steering linkage bush.
Abnormal noise	<ul style="list-style-type: none">• Faulty steering shaft• Faulty steering gear• Faulty steering linkage	<ul style="list-style-type: none">• Check steering shaft.• Check steering gear.• Check steering linkage.• Check ball joint rattle.

WFF3C-SR026

IN-VEHICLE INSPECTION**(Except power steering-equipped models)****1. Check of steering wheel**

Move the steering wheel in an axial direction and/or in a perpendicular direction so as to ensure no looseness and/or excessive play is present.

If any looseness and/or excessive play is present, check the steering wheel for improper installing condition. Repair any defective parts.



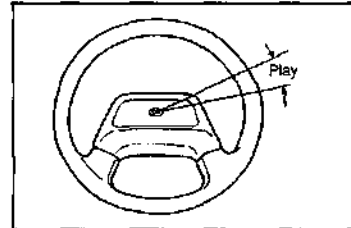
WP590-SR027

2. Check of steering wheel for free play

(1) Set the steering wheel to a straight-ahead state.

(2) Turn the steering wheel clockwise and counterclockwise. Measure the steering wheel movement at the circumference of the steering wheel which is registered before the steering tires start to be steered. Ensure that this steering wheel play is not more than the specified value.

Specified Value: 30 mm



WP590-SR028

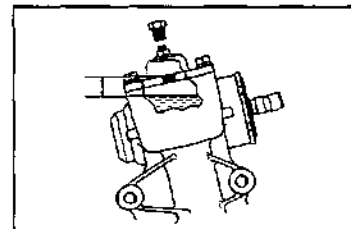
If not, check each joint section for excessive play. If the joints are satisfactory, replace the steering gear box. If the joint sections exhibit defects, such as excessive play, replace the defective parts.

3. Check of steering gear box fluid level

(1) Remove the fluid level check plug of the steering gear box.

(2) Check the fluid level by inserting a clean screwdriver, etc. from the check hole. Ensure that the height from the fluid level to the upper edge of the check hole conforms to the specified value.

Specified Level: 13 - 23 mm



WP590-SR029

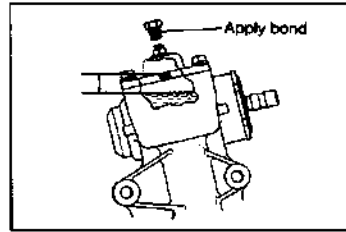
If not, ensure that the steering gear box exhibits no fluid leakage. Replenish the specified fluid to the upper level.

Specified Fluid: Gear oil API GL-3, SAE90

If any fluid leakage is present, replace the steering gear box.

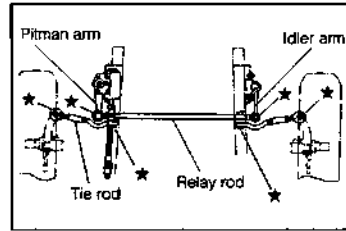
STEERING

- (3) Clean the plug and plug hole. Furthermore, apply Three Bond 1216 to the threaded portion of the plug. Tighten the plug to the specified torque.
Tightening Torque: 2.0 - 3.9 N·m
(0.2 - 0.4 kgf-m, 1.4 - 2.9 ft-lb)



WF590-SF030

4. Check of steering linkage and gear housing
 - (1) Ensure that the steering linkage exhibits no excessive play and/or looseness.
If any excessive play and/or looseness is present, check and/or repair the defective parts.
 - (2) Ensure that the dust seals exhibits no damage.
(Points bearing a "★" mark in the right figure.)
Replace any defective dust seal.
 - (3) Ensure that the steering gear housing exhibits no fluid leakage.
If any fluid leakage is present, replace the steering gear housing.

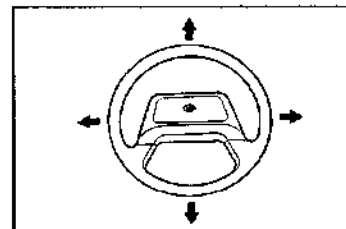


WF590-SR031

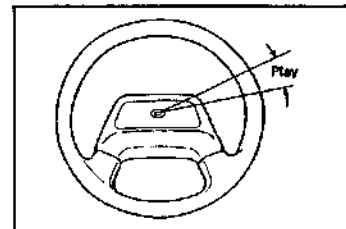
(Power steering-equipped models)

1. Check of steering wheel

Move the steering wheel in an axial direction and/or in a perpendicular direction so as to ensure that no looseness and/or excessive play is present.
If any looseness and/or excessive play is present, check the steering gear for improper installing condition. Repair any defective parts.
2. Check of steering wheel free play
 - (1) Set the steering wheel to a straight-ahead state.
 - (2) Turn the steering wheel clockwise and counterclockwise.
Measure the steering wheel movement at the circumference of the steering wheel which is registered before the steering tires start to be steered. Ensure that this steering wheel play is not more than the specified value.
Specified Value: 30 mm



WF590-SR032

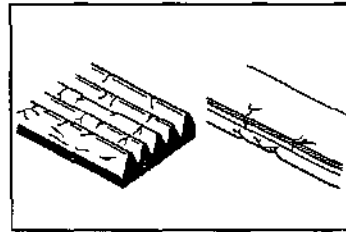


WF590-SR033

If not, check each joint section for excessive play. If the joints are satisfactory, replace the steering gear box.
If the joint sections exhibit defects, such as excessive play, replace the defective parts.

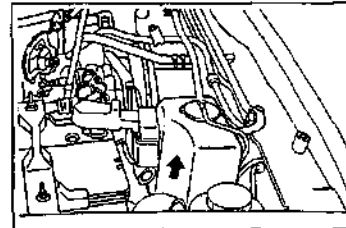
3. Check of power steering vane pump drive belt

- (1) Visually check the belt for separation of the adhesive rubber above and below the core, core separation of the rib from the belt side, severed core, separation of the adhesive rubber, cracks or separation of the ribs, torn or worn ribs or cracks in the inner ridges of the ribs. If necessary, replace the drive belt. (See page SR-87.)



WP80-SR004

- (2) Remove the radiator reserve tank by raising it. Put the reservoir tank on the radiator.



WP80-SR005

- (3) Check the amount of drive belt deflection when the midpoint of the drive belt between the vane pump pulley and the crankshaft pulley is pushed with a force of 10 kgf.

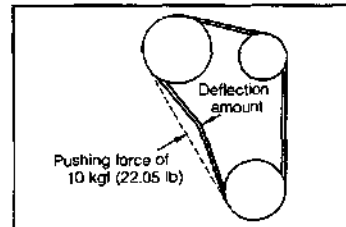
Specified Belt Deflection: 9 - 11 mm

[When a force of 10 kgf is applied.]

Reference:

Belt Tension: 50 - 75 kgf

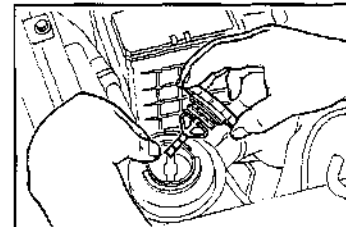
If the amount of belt deflection does not conform to the specified value, adjust the drive belt tension. (See page SR-96.)



WP80-SR006

4. Check of power steering fluid

- (1) Open the reservoir tank cap.
- (2) Ensure that the power steering fluid viscosity is not low abnormally. If the viscosity is low abnormally, change the power steering fluid.



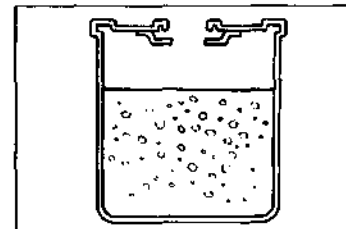
WP80-SR007

- (3) Ensure that no aeration, whitish cloudy state or discoloration is present in the fluid. If any aeration or whitish cloudy state is observed, check the power steering fluid level. If the fluid level is low, replenish the power steering fluid. Then, proceed to perform air bleeding.

Specified Power Steering Fluid: ATF DEXRON® II

If the level is within the specified range, change the power steering fluid.

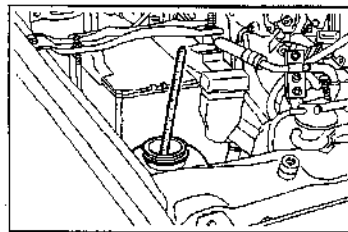
- (4) Close the reservoir tank cap.



WP80-SR008

STEERING

5. Check of power steering fluid level
- (1) Open the reservoir tank cap.
 - (2) Measure the power steering fluid temperature.



WFE90-SR038

- (3) When the power steering fluid temperature is within the range of 0 to 40°C or 40 - 80°C, check to see if the fluid level is within the specified range corresponding to the measured temperature condition.

NOTE:

- The term "cold" represents a range of 0 - 40°C.
- The term "hot" represents a range of 40 - 80°C.

If the fluid level is low, replenish the specified power steering fluid up to the upper level.

Specified Power Steering Fluid: ATF DEXRON® II

- (4) Close the reservoir tank cap.

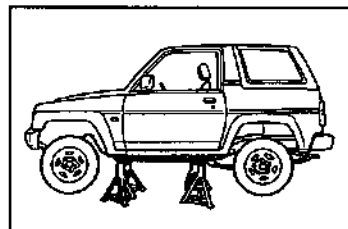
WFE90-SR040

6. Power steering fluid change procedure

CAUTION:

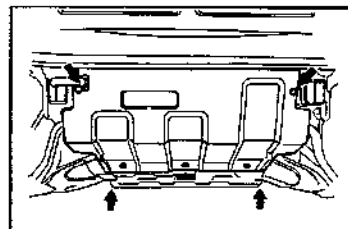
- Never start the engine while the power steering fluid is being drained.

- (1) Place the vehicle on a level floor. Jack up the vehicle and support it with safety stands. (See page G1 section.)



WFE90-SR041

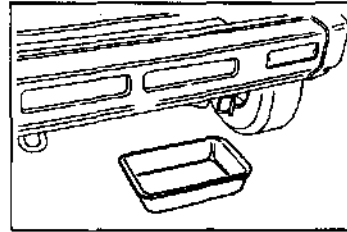
- (2) Detach the engine undercover by removing the engine undercover attaching bolts.



WFE90-SR042

STEERING

- (3) Place a suitable container below the return hose connecting section.



WFE90-SRD43

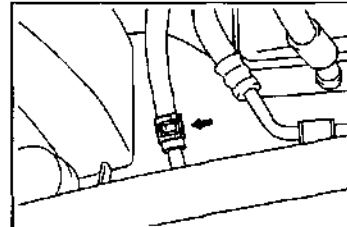
- (4) Detach the return hose clamp. Drain the fluid by disconnecting the return hose from the return pipe.

CAUTION:

- When disconnecting the return hose, special caution must be paid as to the flowing fluid.

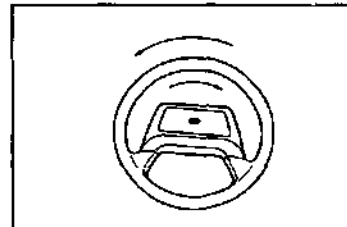
NOTE:

- Be very careful not to deform the return pipe.



WFE90-SRD44

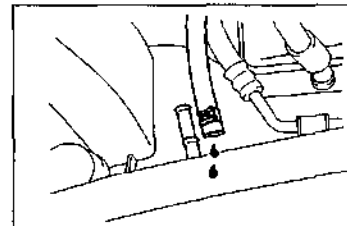
- (5) Turn the steering wheel fully clockwise or counterclockwise from the lock to the lock several times so as to drain the fluid inside the steering gear box.



WFE90-SRD45

NOTE:

- When the steering wheel is turned fully from the lock to the lock, be certain to hold the steering wheel for four to five seconds at the fully turned state.
- Make sure that the fluid no longer flows from the return hose.

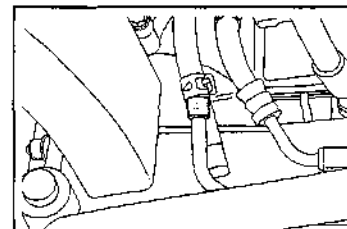


WFE90-SRD46

- (6) Pour the power steering fluid into the reservoir tank, until the fluid starts to flow from the return pipe. When the fluid starts flowing from the return pipe, install a blank plug to the return pipe.

NOTE:

- Make sure that the power steering fluid will not run out from the reservoir tank.
- When the fluid starts flowing from the return pipe, allow about 100 cc of fluid to flow out so that the old fluid may be drained completely.



WFE90-SRD47

Specified Power Steering Fluid: ATF DEXRON® II

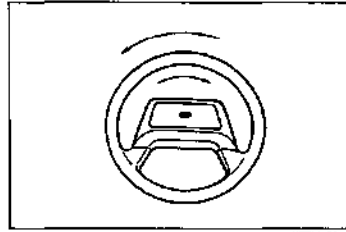
SR-23

STEERING

- (7) While replenishing the power steering fluid to the reservoir tank approximately up to the upper level in the COLD range, keep turning the steering wheel fully clockwise and counterclockwise from the lock to the lock.

NOTE:

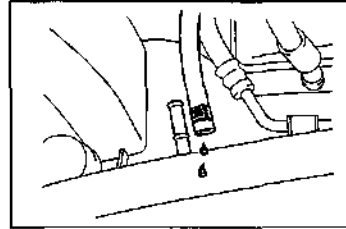
- Make sure that the power steering fluid will not run out from the reservoir tank.
- When the steering wheel is turned fully from the lock to the lock, be certain to hold the steering wheel for four to five seconds at the fully turned state.
- Turn the steering wheel as quickly as possible. Do not stop the steering wheel midway nor turn the steering wheel reversely.



- (8) Turn the steering wheel fully clockwise and counterclockwise from the lock to the lock, until about 100 cc of the power steering fluid flows from the return hose.

NOTE:

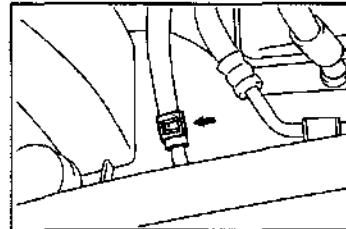
- Make sure that the power steering fluid will not run out from the reservoir tank.



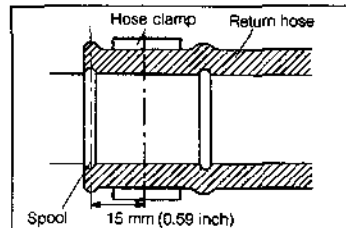
- (9) Remove the blank plug from the return pipe. Connect the return hose to the return pipe and install the hose clamp.

NOTE:

- Make sure that the power steering fluid will not run out from the reservoir tank.



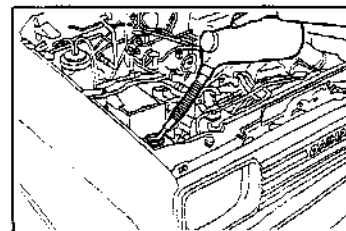
- Correctly clamp the return hose as shown in the right figure.
- Be sure to install the return hose so that the distance from the center of the hose clamp to the edge of the spool becomes 15 ± 2 mm.



- (10) Replenish the power steering fluid to the reservoir tank approximately up to the upper level in the COLD range. Specified Power Steering Fluid: ATF DEXRON® II

NOTE:

- If the oil temperature is above 40 °C, fill the power-steering fluid up to the upper level in the HOT level.



STEERING

- (11) Start the engine. Keep running the engine at the idle speed.
- (12) Turn the steering wheel fully either to the right or to the left. Hold the steering wheel for two to three seconds at the fully turned state. Then, turn the steering wheel in the opposite direction and hold it for two to three seconds.

NOTE:

- Make sure that the power steering fluid will not run out from the reservoir tank.

- (13) Repeat the operations described in the step (12) onward three or four times.

- (14) Ensure that no aeration or whitish cloudy state is present at the power steering fluid in the reservoir tank. If any aeration and/or whitish cloudy state is observed, stop the engine. Wait for about ten minutes. Again, repeat the operations described in (4) onward.

- (15) Ensure that the difference in fluid level between the time when the engine is stopped and the time when the engine is kept running at the idle speed will not exceeds the specified value.

Specified Value: 5 mm

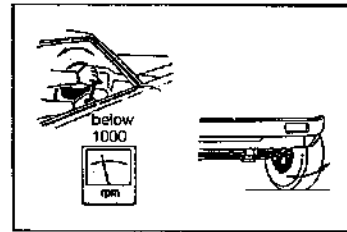
If the difference in fluid level exceeds the specified value, again perform air bleeding.

If the difference in fluid level fails to become within the specified value persistently, check the hydraulic pressure.

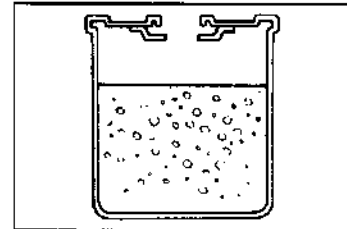
- (16) Check the fluid level.
(See page SR-20, step SR-21.)
- (17) Start the engine. Ensure that no fluid leakage is present.

- (18) Perform the following inspection.
 - ① Ensure that no whitish cloudy state is present in the power-steering fluid when the engine revolution speed is raised quickly.
 - ② Ensure that the steering wheel can be turned smoothly without emanating abnormal noise.
 - ③ Ensure that the oil level will not change more than 5 mm during the engine starting period or when the steering wheel is being turned.
 - ④ Ensure that no abnormal noise is emanated when turning the steering wheel (when the front wheels are being turned) during the running.

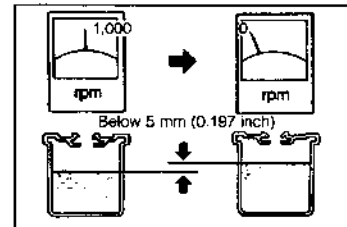
If any abnormality is present, perform air bleeding again.



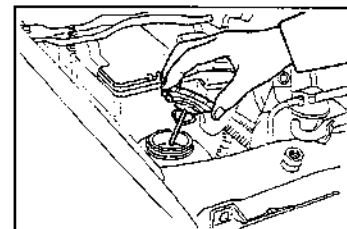
WP59C-SR023



WP59C-SR054



WP59C-SR055



WP59C-SR056

WP59C-SR067

STEERING

7. Check of power steering turning effort

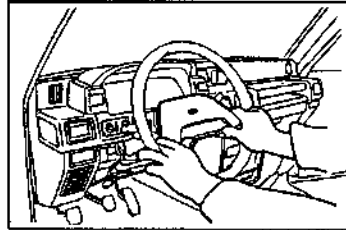
NOTE:

Before this power steering turning effort is checked, the following requirements must be satisfied in advance.

- The vehicle is mounted with the tires whose use has been approved.
- The tire size and tire manufacturer are the same on all four tires.
- All of the tires are inflated accurately to the specified pressure.

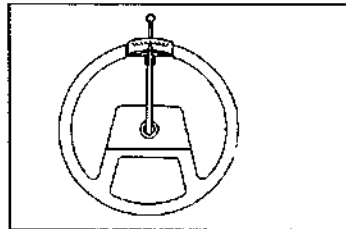
WFEDG-SR058

- (1) Remove the steering wheel cover assembly from the steering wheel.
(See page SR-32.)



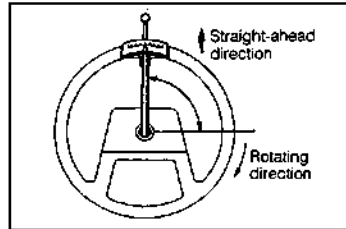
WFEDG-SR059

- (2) Start the engine. Keep running the engine at the idle speed.
(3) Set the steering wheel to a straight-ahead condition.
(4) Install a torque wrench to the steering wheel attaching nut.



WFEDG-SR060

- (5) Measure the maximum steering torque which is registered while the steering wheel is being turned one-fourth turn slowly in the clockwise direction by means of the torque wrench. Ensure that this maximum turning effort will not exceeds the specified value.
Specified Value: 7.8 N·m (80 kgf-cm, 5.8 ft-lb)



WFEDG-SR061

If not, perform the power steering hydraulic pressure check.

If the results of the hydraulic pressure check are satisfactory, check the following items given below:

Steering gear box preload, operating conditions of each steering linkage, steering shaft ball joints and/or operating conditions of universal joints.

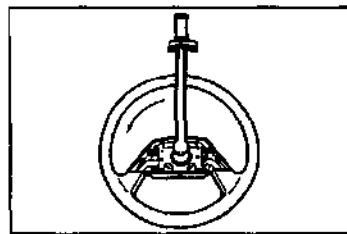
STEERING

- (6) Set the steering wheel to a straight-ahead condition.
- (7) Measure the maximum steering torque which is registered while the steering wheel is being turned one-fourth turn slowly in the counterclockwise direction by means of the torque wrench. Ensure that this maximum turning effort will not exceed the specified value.
Specified Value: 7.8 N·m (80 kgf-cm, 5.8 ft-lb)

If not, perform the power steering hydraulic pressure check.

If the results of the hydraulic pressure check are satisfactory, check the following items given below:

Steering gear box preload, operating conditions of each steering linkage, steering shaft ball joints and/or operating conditions of universal joints.



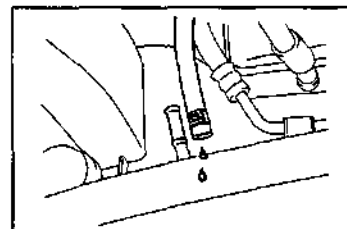
WP80-SP082

8. Check of power steering hydraulic pressure

(1) Installation of pressure gauge

- ① Drain the power steering fluid.

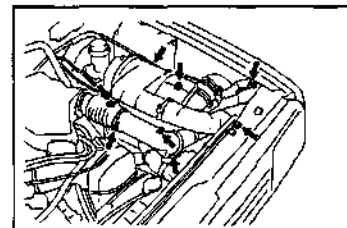
(See page SR-22, step (1) to step (5).)



WP80-SP083

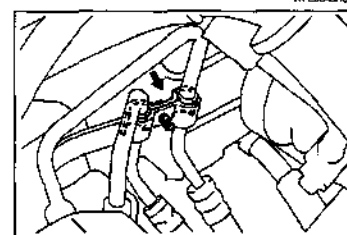
- ② Remove the attaching bolts for the air cleaner and air cleaner hose. Also, remove the clutch cable clamp bolts and hose bands. Remove the air cleaner and air hose as an assembly from the vehicle.

(For further details, see the Engine section.)



WP80-SP084

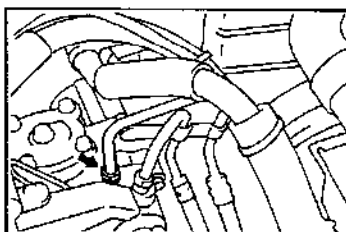
- ③ Detach the pressure tube clamp by removing the clamp screw.



WP80-SP085

STEERING

- ④ Disconnect the pressure side tube from the steering gear box.

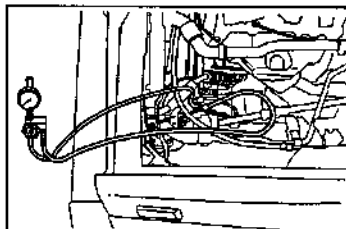


WPERO-SR066

- ⑤ Connect the pressure gauge midway between the disconnected tube and the steering gear box.

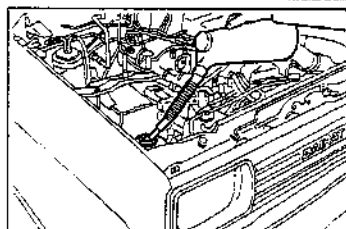
NOTE:

- Connect the pressure gauge in accordance with the pressure gauge manufacturer's instructions.



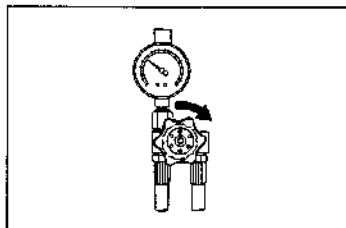
WPERO-SR067

- (2) Fill power steering fluid.
(See page SR-24.)



WPERO-SR068

- (3) Start the engine.
(4) With the valve of the pressure gauge closed and while maintaining the line pressure at 40 to 50 kg/cm², warm up the power steering fluid, until its temperature reaches 80°C.



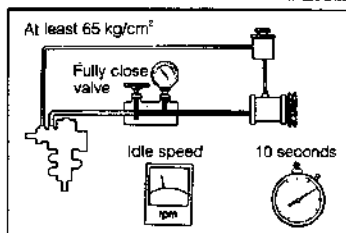
WPERO-SR069

- (5) Check of vane pump hydraulic pressure
Close the valve of the pressure gauge temporarily and fully. Ensure that the pressure exceeds the specified pressure.
Specified Pressure: 65 kg/cm² or more

CAUTION:

- The valve of the pressure gauge must not be kept closed for more than 10 seconds.

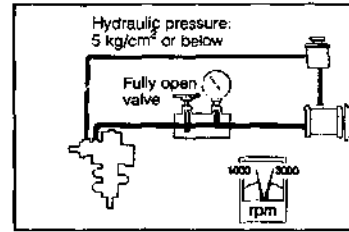
If the vane pump fails to deliver the specified pressure, replace the vane pump.



WPERO-SR070

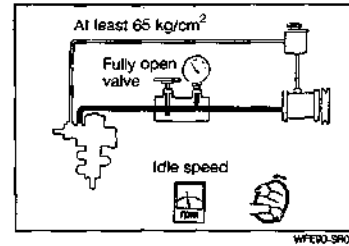
- (6) Check of hydraulic pressure under unloaded state
- ① Open the valve of the pressure gauge fully.
 - ② Set the steering wheel to a straight-ahead condition.
 - ③ Measure the hydraulic pressure at times when the engine speed is 1000 rpm and 3000 rpm, respectively. Ensure that the difference in these pressures will not exceed the specified value.
- Specified Value: 5 kg/cm²

If the difference in pressure exceeds the specified value, replace the vane pump.

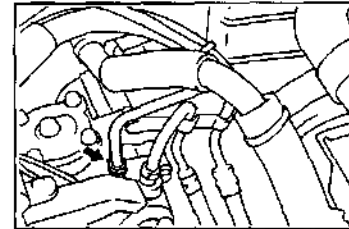


- (7) Check of steering gear housing hydraulic pressure
- ① Open the valve of the pressure gauge fully.
 - ② Turn the steering wheel fully either clockwise or counterclockwise and hold the steering wheel at the fully turned state. Ensure that the hydraulic pressure under this state exceeds the specified value.
- Specified Value: 65 kg/cm² or more

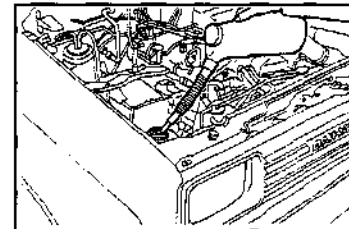
If the hydraulic pressure is below the specified value, replace the steering gear box.



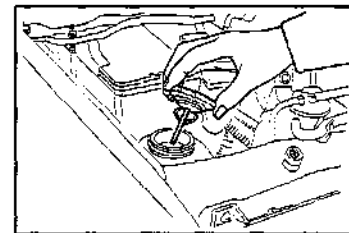
- (8) Remove the pressure gauge.
- (9) Connect the pressure side tube to the steering gear box.
- (See page SR-84.)
- Tightening Torque: 39.2 - 49.0 N·m
(4.0 - 5.0 kgf-m, 28.9 - 36.2 ft-lb)



- (10) Replenish the power steering fluid to the reservoir tank.
- Perform air bleeding.
- For the air bleeding procedure, refer to page SR-24 to SR-25.



- (11) Check the fluid level.
- (See page SR-22.)
- (12) Start the engine. Ensure that no fluid leakage is present.



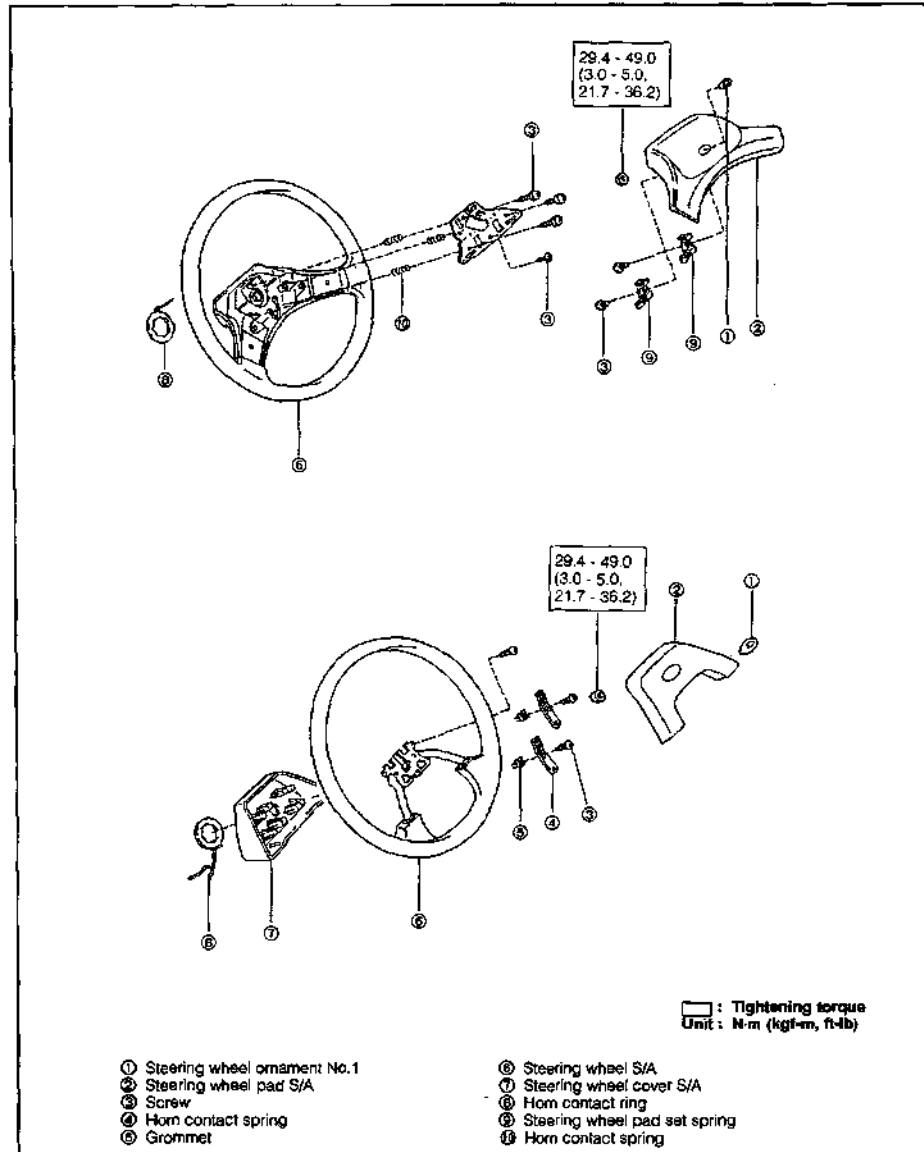
STEERING

Inspection of idle-up VSV

1. When turning the steering wheel, ensure that air continuity exists.
2. When the steering wheel is set to a straight-ahead position, ensure that no air continuity exists.
If not, replace the vane pump.

WFE90-SR076

STEERING WHEEL COMPONENTS

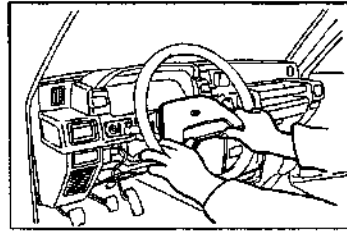


W/EXD-SR077

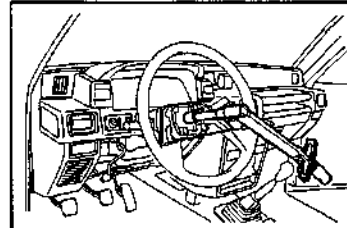
STEERING

REMOVAL

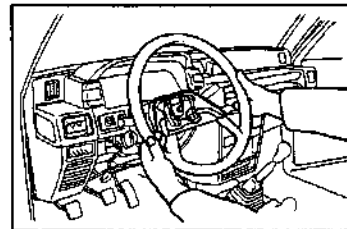
1. Remove the horn pad by pulling it horizontally together with the steering shaft.



2. Loosen the steering wheel attaching nut two or three turns.

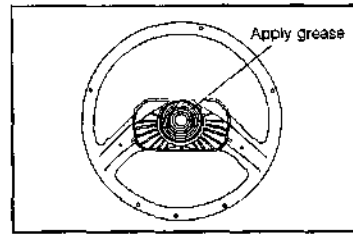


3. Disconnect the steering wheel by applying an impact to it with the palms of your hands.
4. Remove the steering wheel attaching nut.
5. Remove the steering wheel.

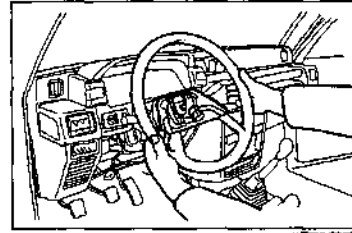


INSTALLATION

1. Apply about 2 grams of rubber grease to the horn contact plate.

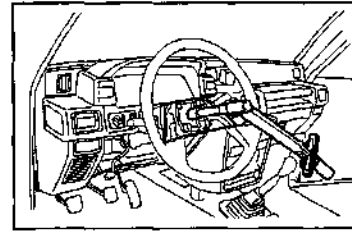


2. Align the hole of the steering wheel with the protruding section of the cancel cam. Install the steering wheel in such a way that it may be set to the straight-ahead position when the tires are in the straight-ahead position.

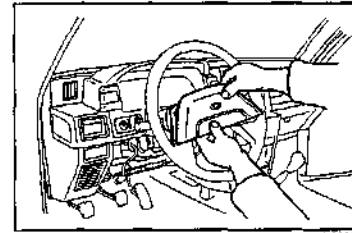


3. Install a new steering wheel attaching nut and tighten it to the specified torque.

Tightening Torque: 29.4 - 49.0 N·m
(3.0 - 5.0 kgf-m, 21.7 - 36.2 ft-lb)

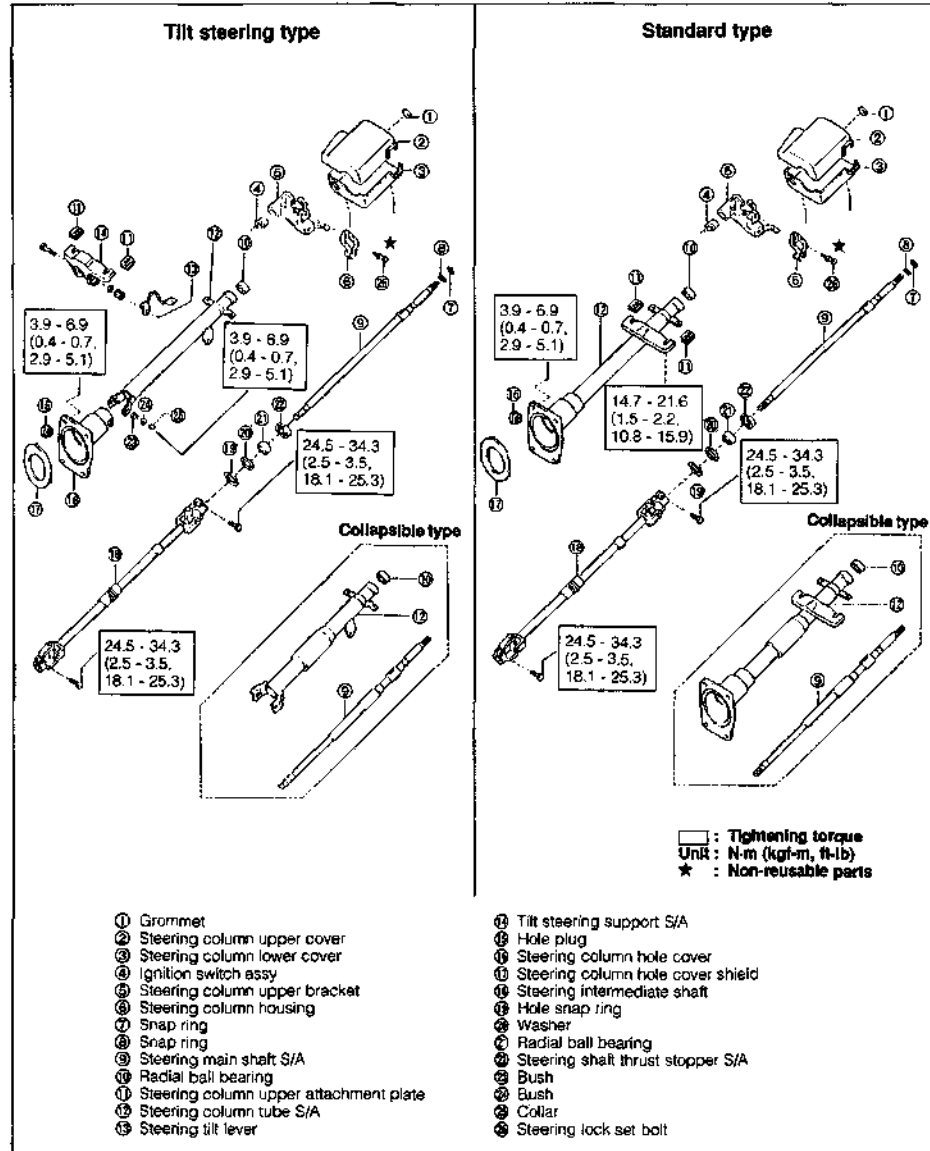


4. Install the horn pad while aligning it with the steering wheel attaching hole. Push the horn pad, until it is locked.



STEERING

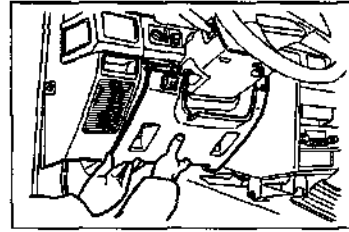
STEERING COLUMN COMPONENTS



WFE90-SP065

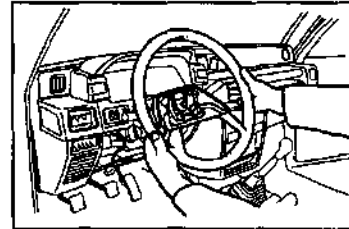
REMOVAL

1. Remove the instrument panel finish lower panel.
(For details, refer to the Body section.)



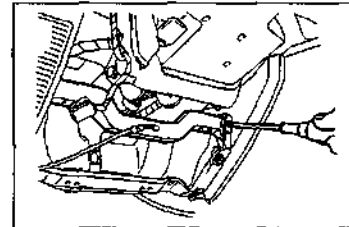
WP50-SR026

2. Remove the steering wheel
(See page SR-32.)



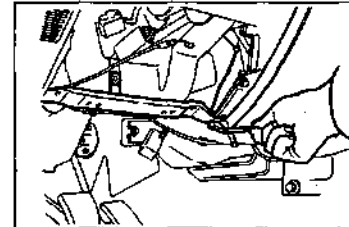
WP50-SR027

3. Remove the instrument panel finish panel 1.



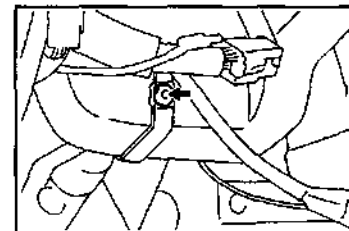
WP50-SR028

4. Remove the instrument panel reinforcement subassembly.



WP50-SR029

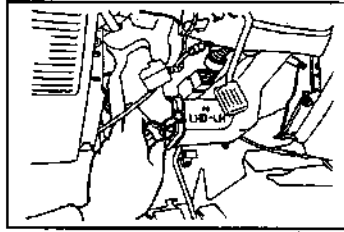
5. Removal of air duct assembly No. 1
(1) Push the center of the clip by the forward end of a Phillips screwdriver or the like.



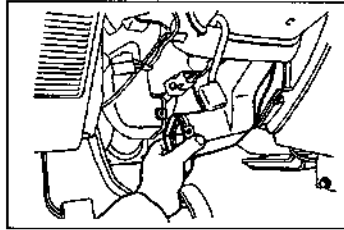
WP50-SR030

STEERING

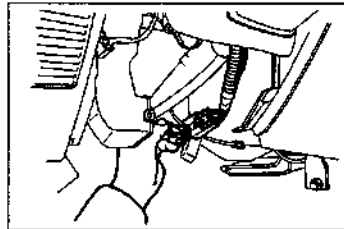
- (2) Detach the clip from the duct.



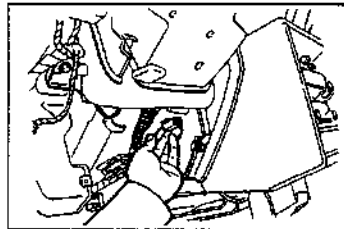
- (3) Remove the air duct assembly No. 1.



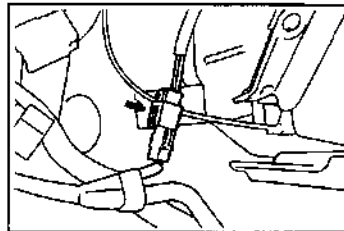
6. Disconnect the connector of the turn signal switch.



7. Disconnect the connector from the ignition switch.

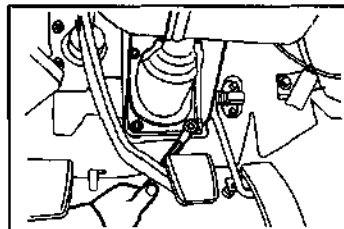


8. Disconnect the connector of the key reminder switch (if so equipped).



STEERING

9. Remove the attaching bolts at the steering column tube hole cover side.



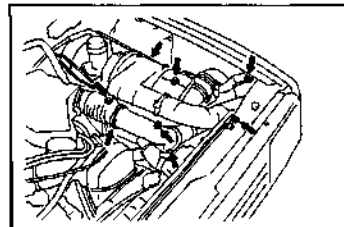
WFE90-SR006

10. Removal of air cleaner

NOTE:

- For details, refer to the Engine section.
- The air cleaner assembly has been removed so that the disconnection/reconnection of the intermediate shaft may be performed easily.

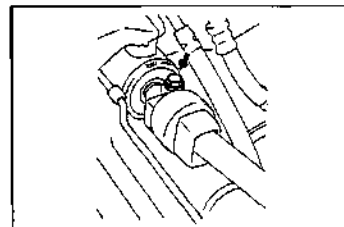
- (1) Remove the attaching bolts of the air cleaner and air hoses.
- (2) Loosen the hose band.
- (3) Remove the air cleaner and air hose as an assembly from the vehicle.



WFE90-SR007

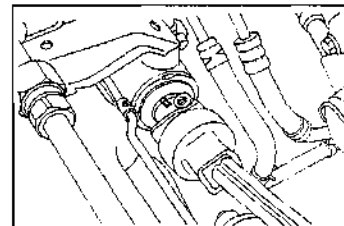
11. Disconnection of intermediate shaft from steering gear housing

- (1) Remove the connecting bolts at the universal joint of the intermediate shaft.



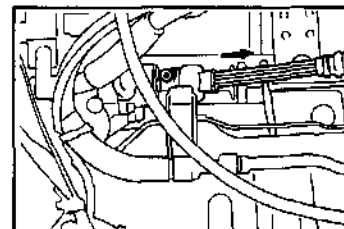
WFE90-SR008

- (2) Put mating marks on the universal joint of the intermediate shaft and the shaft at the steering gear housing side.



WFE90-SR009

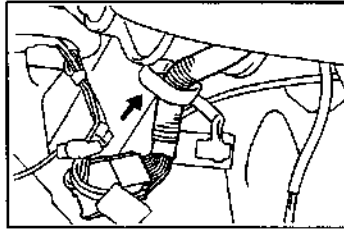
- (3) Disconnect the intermediate shaft from the steering gear housing by contracting the intermediate shaft.



WFE90-SR100

STEERING

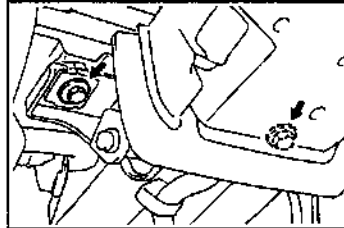
12. Detach the wiring harness which is clamped to the steering column.



13. Remove the steering column attaching bolts.

NOTE:

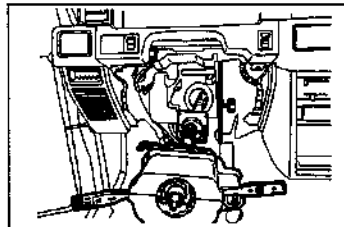
- Be very careful not to drop the steering column.
- Care must be exercised not to soil the seat.



14. Remove the steering column assembly together with the intermediate shaft from the vehicle.

NOTE:

- Care must be exercised so that the spline connecting section of the intermediate shaft may not be disconnected.

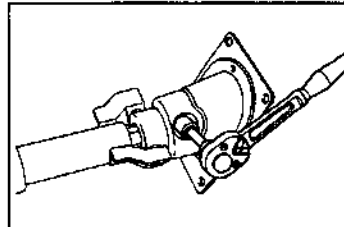


15. Remove the hole plug. Remove the bolts which connect the steering shaft to the intermediate shaft.

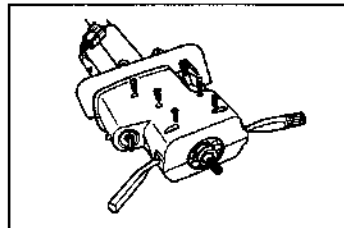
16. Pull out the intermediate shaft from the steering shaft.

NOTE:

- Be sure to put a mating mark on both the steering shaft and intermediate shaft so that the assembling position may be known readily.

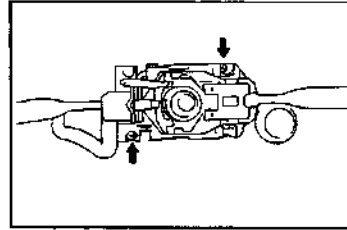


17. Remove the six attaching screws of the steering column cover. Remove the steering column cover from the steering column.



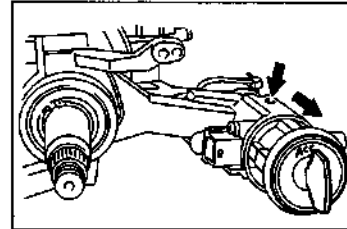
STEERING

18. Remove the attaching screws of the turn signal lamp switch assembly. Remove the turn signal lamp switch assembly from the steering column.



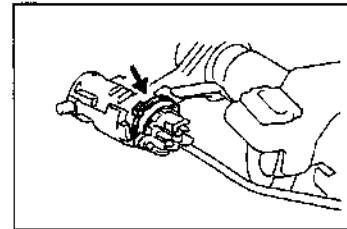
WFEB0-SR108

19. Removal of ignition key cylinder
 (1) Insert the ignition key and set it to the "ACC" position.
 (2) While retaining the cylinder lock section with a suitable rod through the cylinder upper hole, pull out the key cylinder from the steering column upper bracket.



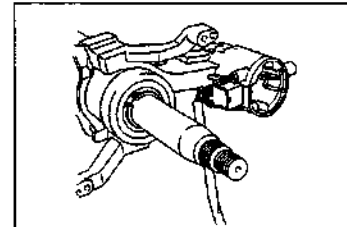
WFEB0-SR109

20. Detach the key reminder switch cord coat clamp.
 (Key reminder switch-equipped vehicle only)



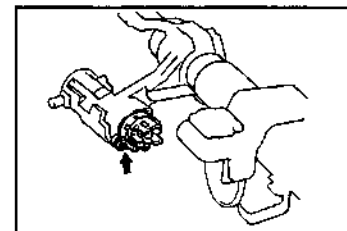
WFEB0-SR110

21. Remove the attaching screw of the key reminder switch. Remove the key reminder switch from the pawl section of the steering column upper bracket by turning the switch clockwise. In this way, remove the key reminder switch from the steering column upper bracket.
 (Key reminder switch-equipped vehicle only)



WFEB0-SR111

22. Remove the ignition key switch from the steering column upper bracket by removing the ignition key switch attaching screw.



WFEB0-SR112

STEERING

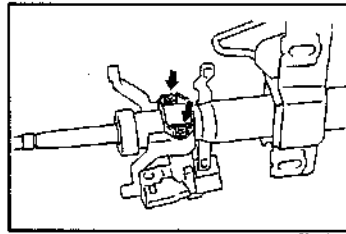
23. Removal of steering column upper bracket

- (1) Make a recessed mark at the center of the steering lock set bolt with a punch.
- (2) Remove the head of the set bolt by drilling the center of the set bolt with a drill of about 17 mm diameter.

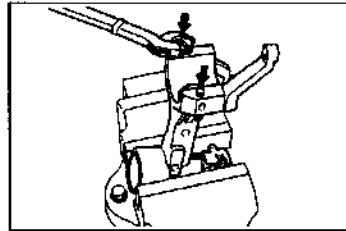
NOTE:

- Be very careful not to damage the steering column housing.
- Care must be exercised not to drop the steering column bracket.

- (3) Remove the bolt threaded portion which is remaining at the steering column upper bracket, using a pipe wrench or the like.



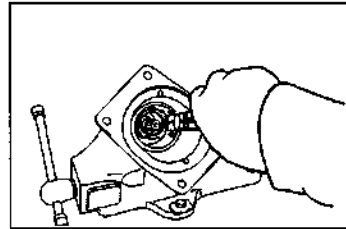
WFE90-SR113



WFE90-SR114

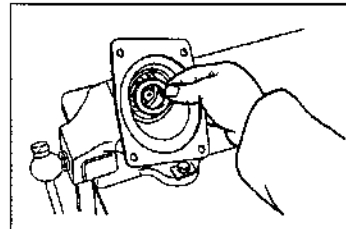
24. Disassembly of steering column

- (1) Detach the hole snap ring.



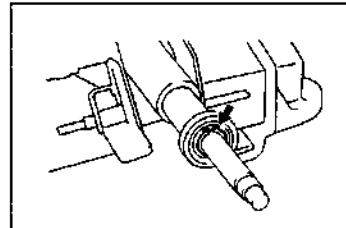
WFE90-SR115

- (2) Remove the washer plate.



WFE90-SR116

- (3) Detach the shaft snap ring.



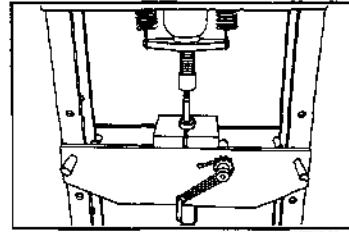
WFE90-SR117

STEERING

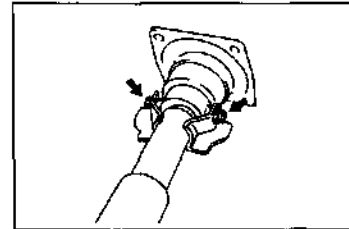
- (4) Remove the steering shaft from the steering column tube, using a press. (Standard type only)

NOTE:

- When applying load to the steering shaft with a press, apply the load gradually, making sure that no impact may be applied to the steering shaft. Failure to observe this caution will lead to breakage of the center connecting section of the steering shaft.
- Be very careful not to drop the steering shaft.



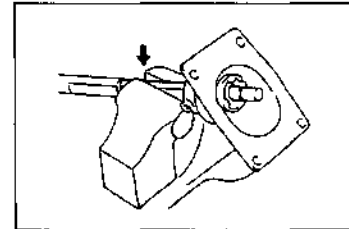
- (5) Remove the attaching bolts of the steering column hole cover. Remove the steering shaft together with the steering column hole cover. (Tilt steering type only)



- (6) Clamp the steering shaft lower shaft in a vice. (Tilt steering type only)

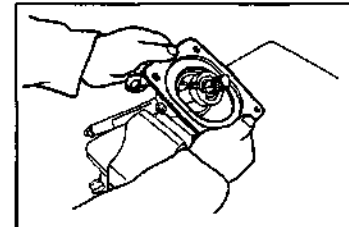
NOTE:

- Be sure to clamp the lower shaft only in a vice. Never clamp the upper shaft (hollow shaft) in a vice.

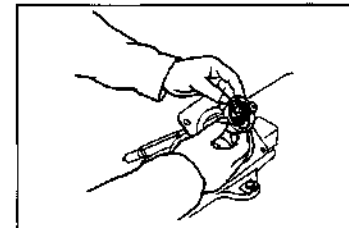


- (7) Remove the steering column hole cover from the steering shaft while prying and lowering the cover. (Tilt steering type only)

- (8) Remove the steering shaft from the vice. Remove the steering column hole cover. (Tilt steering type only)



25. Remove the steering shaft thrust stopper from the radial ball bearing.

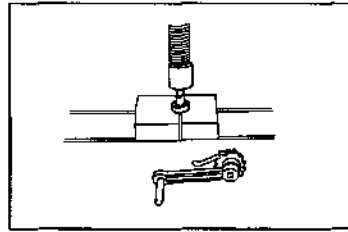


STEERING

26. Removal of radial ball bearing
(Only cases where such operation is required, see page SR-43)
Pull out the radial ball bearing from the steering shaft, using a hydraulic press.

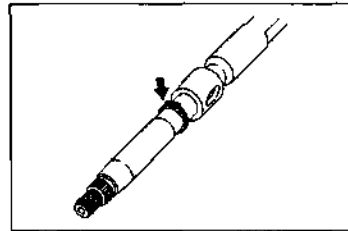
NOTE:

- Be very careful not to drop the steering shaft. If the shaft should be dropped, the connecting section of the steering shaft will be broken.
- Never reuse the removed bearing.



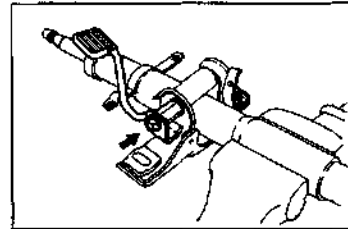
WFE90-SR123

27. Detach the snap ring from the steering shaft. (Only cases where such operation is required)



WFE90-SR124

28. Removal of tilt steering support
(1) Remove the steering tilt lever attaching nut, while applying a spanner to the long nut to prevent the nut from turning.
(2) Remove the steering tilt lever.

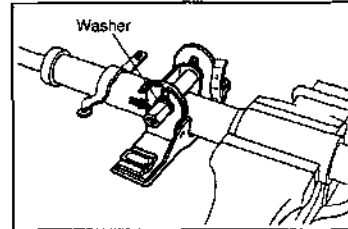


WFE90-SR125

- (3) Remove the long nut and washer. Pull out the attaching shaft. Remove the tilt steering support.

NOTE:

- The long nut is a left-hand threaded nut.



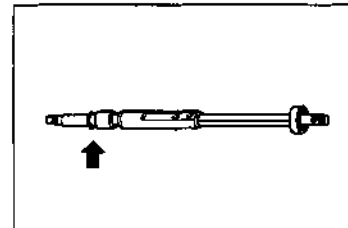
WFE90-SR126

INSPECTION

1. Inspection of steering shaft
(1) Ensure that each section of the steering shaft exhibits no damage, such as wear, cracks and deformation.

NOTE:

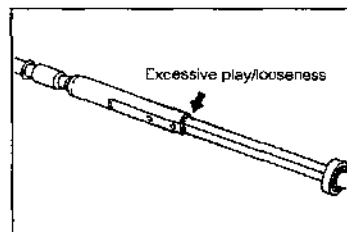
- If the snap ring is damaged, remove the snap ring.
(See step 27 above.)



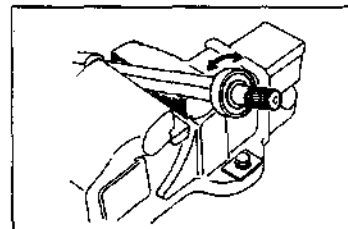
WFE90-SR127

STEERING

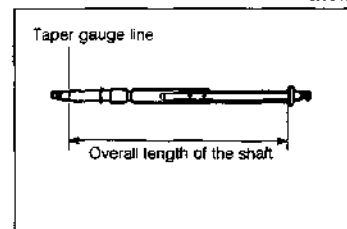
- (2) Ensure that no excessive play or looseness is present at the connecting section between the upper and lower sections of the steering shaft.
(Tilt steering-equipped vehicle only)



- (3) Ensure that the radial ball bearing of the steering shaft exhibits no defect, such as abnormal binding. If any defect is present, replace the radial ball bearing. (See page SR-42 and SR-47.)

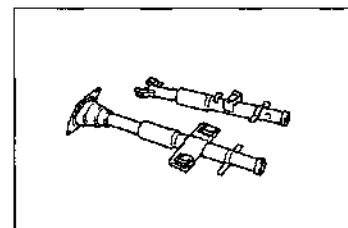


- (4) Ensure that the overall length of the steering shaft is within the specified value.
(Tilt steering-equipped vehicle only)
Specified Value: About 545.5 mm

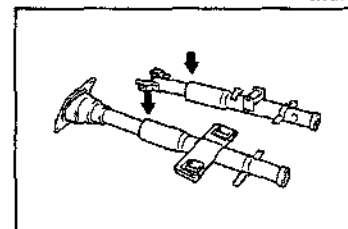


2. Steering column tube

- (1) Ensure that the steering column tube exhibits no damage, such as deformation, wear and cracks.



- (2) Ensure that no excessive play or looseness is present at the connecting section between the upper and lower sections of the steering column tube.
(Tilt steering-equipped vehicle only.)



STEERING

- (3) Ensure that the overall length of the steering column tube is within the specified value. (Tilt steering-equipped vehicle only)

Specified Value:

Standard Type: About 313 mm*¹

Tilt Steering Type: About 559 mm*²

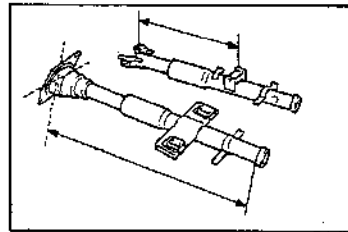
NOTE:

*¹ Dimension between centers of bolt holes

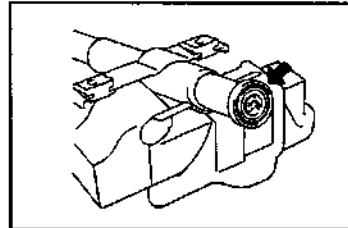
*² Dimension between the center of the hole at column hole cover and the bearing end section

- (4) Ensure that the radial ball bearing assembled in the steering column tube exhibits no defect, such as abnormal binding.

If any defect is present, replace the steering column tube.

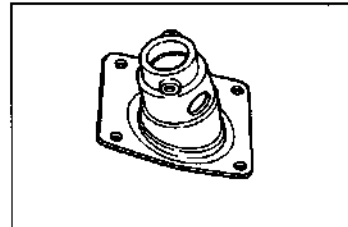


WFE00-SR133



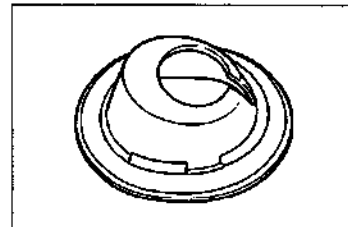
WFE00-SR134

3. Ensure that the steering column hole cover exhibits no damage, such as wear, cracks and deformation. (Tilt steering-equipped vehicle only)



WFE00-SR135

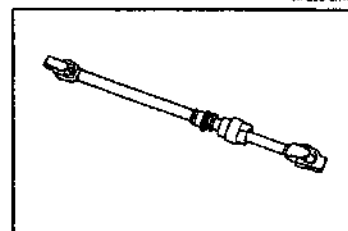
4. Ensure that the steering column hole cover shield exhibits no damage, such as cracks.



WFE00-SR136

5. Inspection of intermediate shaft

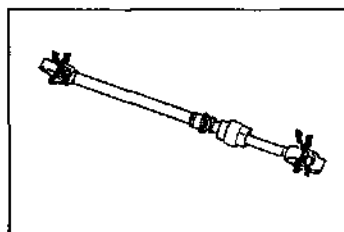
- (1) Ensure that the intermediate shaft exhibits no defect, such as excessive play at the spline section.



WFE00-SR137

STEERING

- (2) Ensure that the intermediate shaft exhibits no defect, such as excessive play at the joint section of the universal joint.

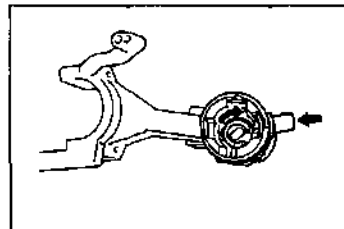


WPESD-SR138

6. Inspection of steering column upper bracket
- (1) While holding the pushbutton, turn the cam inside the steering column upper bracket, using a standard screwdriver, until the cam assumes the positional relationship as indicated in the right figure.

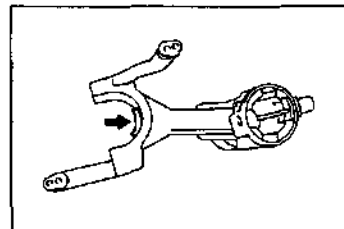
NOTE:

- Do not pull out the cam.



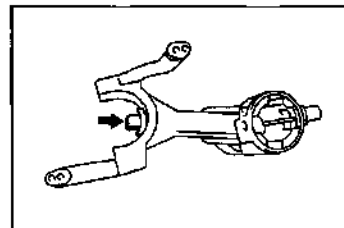
WPESD-SR139

- (2) Ensure that the pawl of the steering lock is not protruded under the condition (1).



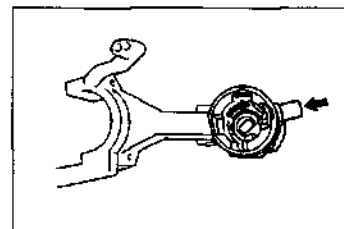
WPESD-SR140

- (3) Under the condition (1), push the pushbutton. Ensure that the pawl for steering shaft lock jumps out.



WPESD-SR141

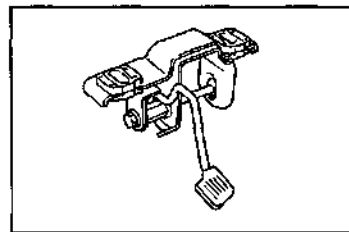
- (4) Return the steering column upper bracket to the condition (1).



WPESD-SR142

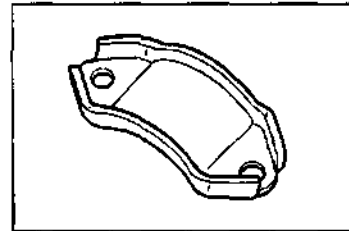
STEERING

7. Ensure that no damage is present at the tilt steering support, plain washer, lock nut and steering tilt lever. Replace any damaged part.



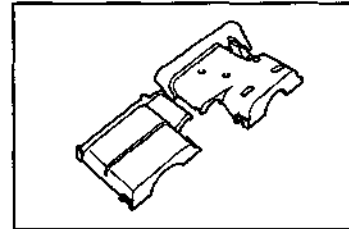
WPB0-SR143

8. Ensure that the steering column housing exhibits no damage, such as cracks and deformation.



WPB0-SR144

9. Inspection of steering column cover
Ensure that the steering column cover exhibits no damage, such as scratch, wear and/or deformation.



WPB0-SR145

10. Perform unit inspection for each switch.
(Refer to the Body Electrical System section.)

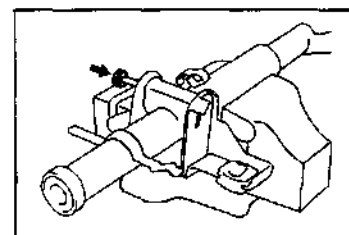
WPB0-SR146

INSTALLATION

1. Installation of tilt steering support
(Tilt steering-equipped vehicle only)
(1) Install the steering shaft support to the steering column tube through the attaching shaft.

NOTE:

- Be sure to align the shaft with the column tube groove during the assembling.



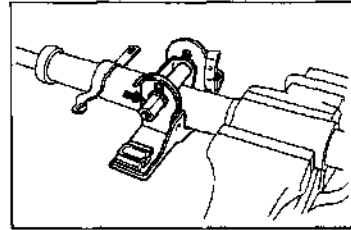
WPB0-SR147

STEERING

- (2) Install the long nut to the shaft with the washer interposed. Temporarily tighten the long nut.

NOTE:

- The long nut is a left-hand threaded nut.

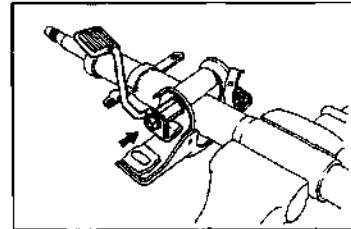


WPFR0-SR148

- (3) Install the steering tilt lever to the shaft. Temporarily tighten the attaching bolt with a new spring washer interposed.

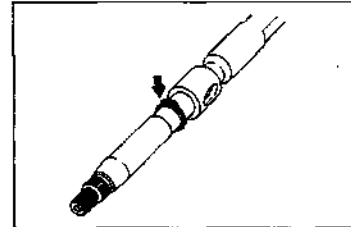
NOTE:

- Never reuse the spring washer.
- Be sure to insert the spring washer between the tilt lever and the long nut.



WPFR0-SR149

2. Install a new snap ring to the steering shaft (if it was removed.)



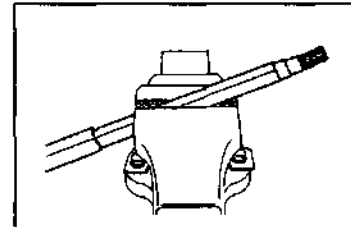
WPFR0-SR150

3. Assembling of radial ball bearing (Only when it was removed)

- (1) Clamp the steering shaft lower shaft in a vice or the like.

NOTE:

- Never clamp the steering shaft upper shaft.



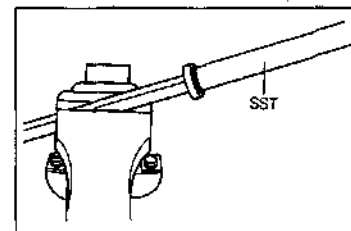
WPFR0-SR151

- (2) Press a new radial ball bearing into the steering shaft, using the handle section of the following SST.

SST: 09648-87201-000

NOTE:

- When pressing the radial ball bearing, be sure to drive the inner race. Never apply force to the outer race and bearing cover, etc.



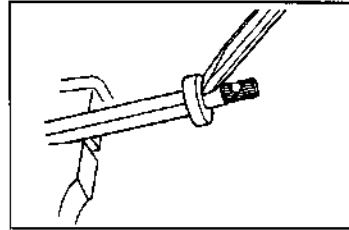
WPFR0-SR152

STEERING

- (3) To prevent the steering shaft radial ball bearing from dropping, lightly prevent the steering shaft from turning with a chisel. At this time, be careful not to deform the steering shaft.

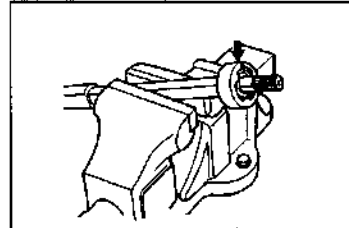
NOTE:

- Be very careful not to bend the steering shaft.



WFE90-SR183

4. Install the steering shaft thrust stopper to the radial ball bearing.
5. Apply a thin film of Sunper[®] 150 to the steering shaft thrust stopper surface.

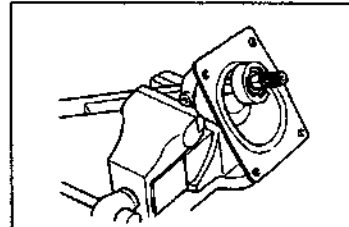


WFE90-SR154

6. Installation of steering column hole cover
(Tilt steering-equipped vehicle only)
(1) With the steering column hole cover passed through the steering shaft, clamp the steering shaft lower shaft in a vice.

NOTE:

- Never clamp the steering shaft upper shaft (hollow shaft) in a vice.

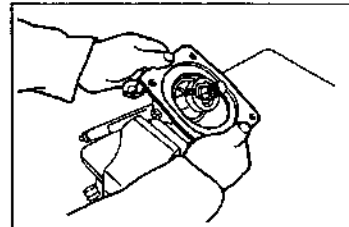


WFE90-SR155

- (2) Assemble the steering column hole cover to the steering shaft thrust stopper by pulling the cover.

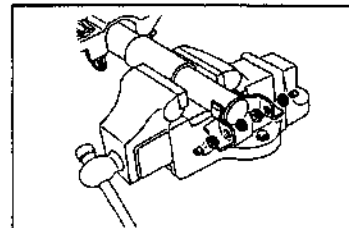
NOTE:

- Care must be exercised so that the steering shaft thrust stopper may not be detached.



WFE90-SR156

7. Installation of steering column tube
(Tilt steering-equipped vehicle only)
(1) Install the bushes and collars on the steering column hole cover installation section of the steering column tube.
(2) Insert the steering shaft into the steering column tube.



WFE90-SR157

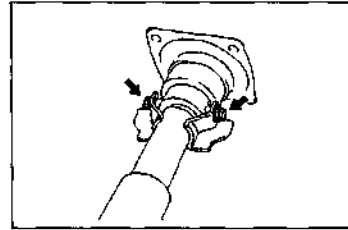
STEERING

- (3) Connect the steering column tube to the steering column hole cover with the bolts. Tighten the bolts to the specified torque.

Tightening Torque: 3.9 - 6.9 N·m
(0.4 - 0.7 kgf-m, 2.9 - 5.1 ft-lb)

NOTE:

- Be sure to install the steering hole cover in the correct direction.

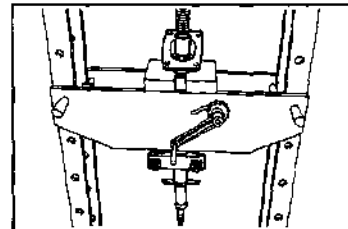


WPED0-SR156

8. Installation of steering column tube
(Standard type only)
Press the steering shaft into the steering column by means of a hydraulic press.

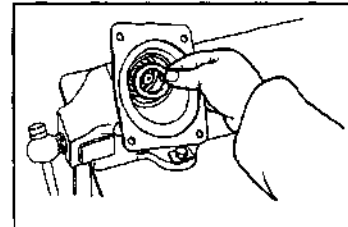
NOTE:

- Never apply excessive load to the steering shaft.
- Never hold the upper section of the steering column tube.
- The press-fitting should be performed only to such an extent that the washer and snap ring now can be installed. Do not press the steering shaft further beyond this.



WPED0-SR169

9. Insert the washer at the steering column hole side.

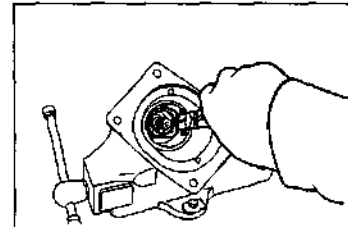


WPED0-SR160

10. Attach a new snap ring.

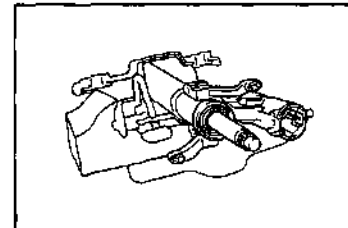
NOTE:

- Make sure that the snap ring is fitted in the snap ring groove of the steering column tube or steering column hole cover.



WPED0-SR161

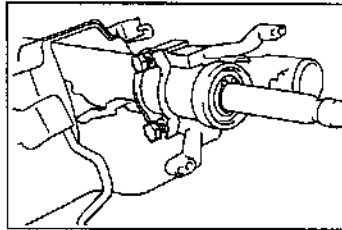
11. Install the new shaft snap ring
12. Install the steering column upper bracket to the steering column tube, while aligning it with the hole of the pawl for steering column tube locking use.



WPED0-SR162

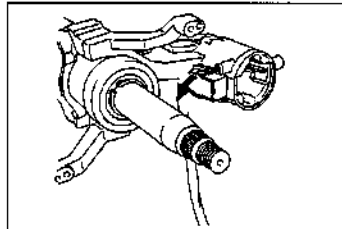
STEERING

13. Install the steering column housing. Connect the steering column upper bracket with the steering column by attaching a new bolt.
14. Tighten the attaching bolts evenly, until the hexagonal section of the bolts are broken.



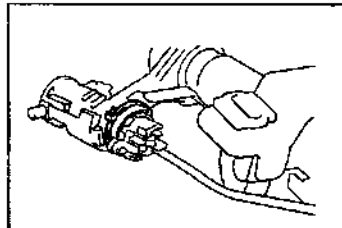
WFE90-SR163

15. Installation of key reminder switch
(Key reminder switch equipped vehicle only)
 - (1) Insert the key reminder switch into the installation section of the steering column upper bracket. Hook the key reminder switch to the pawl of the steering column upper bracket.
 - (2) Tighten the attaching screw.



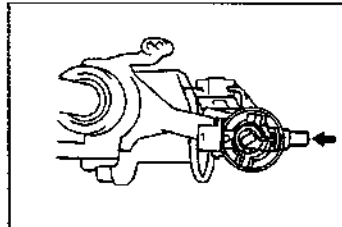
WFE90-SR164

- (3) Install the harness to the steering column upper bracket with a clamp band.



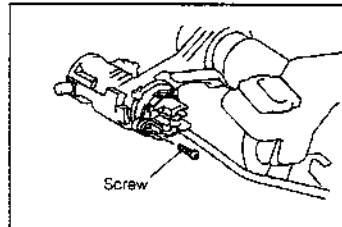
WFE90-SR165

16. Installation of ignition key switch
 - (1) With the pushbutton pushed, turn the shaft of the steering column upper bracket until the shaft assumes the position as indicated in the right figure.



WFE90-SR166

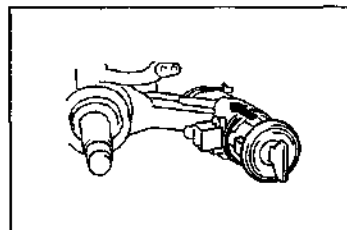
- (2) While aligning the recessed section of the ignition key switch with the pawl of the steering column upper bracket, insert the ignition key switch into the steering column upper bracket. Tighten the attaching screw.



WFE90-SR167

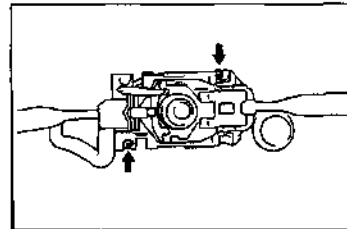
STEERING

17. Installation of ignition key cylinder
Set the key of the ignition key cylinder to the ACC position. Align the recessed section of the steering column upper bracket with the protruded section of the ignition key cylinder. Under this setting, insert the ignition key cylinder into the steering upper bracket.



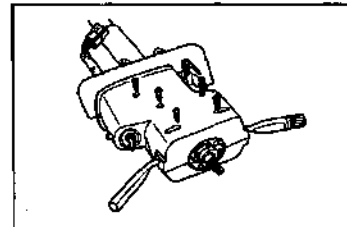
WFE90-SR166

18. Install the turn signal lamp switch assembly (combination switch) to the steering column. Tighten the attaching screws.



WFE90-SR169

19. Install the steering column cover to the steering column. Tighten the attaching screws.

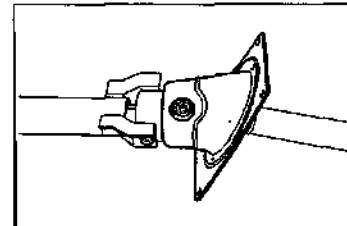


WFE90-SR170

20. Connection of intermediate shaft
(1) Connect the intermediate shaft to the steering shaft in such a way that the cut-out section of the steering shaft may be aligned with the bolt hole of the intermediate shaft.

NOTE:

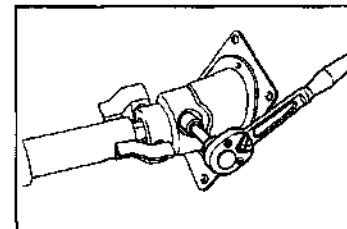
- Be sure to positively connect the universal joint to the serration section as far as it will go, until the serration section of the steering shaft becomes invisible from the universal joint edge surface of the intermediate shaft.
- If the steering shaft and intermediate shaft are reused, assemble them, while aligning the mating mark put during the disassembly.



WFE90-SR171

- (2) Insert the attaching bolts and tighten them to the specified torque.

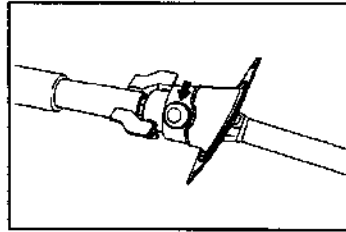
Tightening Torque: 24.5 - 34.3 N·m
(2.5 - 3.5 kgf·m, 18.1 - 25.3 ft·lb)



WFE90-SR172

STEERING

- (3) Install the hole plug.

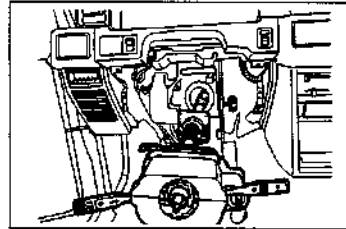


WFEB0-SR173

21. Insert the steering column assembly together with the intermediate shaft.

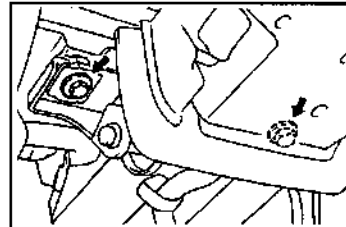
NOTE:

- Care must be exercised so that the intermediate shaft may not interfere with other parts.



WFEB0-SR175

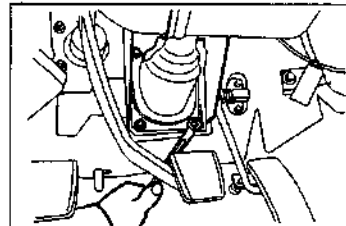
22. Install the steering column to the upper installation section. Temporarily tighten the attaching bolts.



WFEB0-SR176

23. Install the attaching bolts at the column cover side of the steering column. Tighten them to the specified torque.

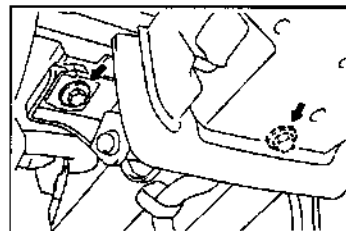
Tightening Torque: 3.9 - 6.9 N·m
(0.4 - 0.7 kgf-m, 2.9 - 5.1 ft-lb)



WFEB0-SR178

24. Tighten the upper attaching bolts of the steering column to the specified torque.

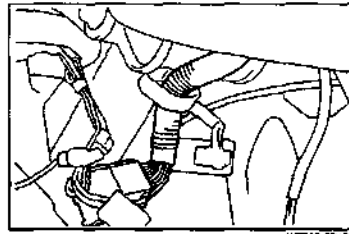
Tightening Torque: 14.7 - 21.6 N·m
(1.5 - 2.2 kgf-m, 10.8 - 15.9 ft-lb)



WFEB0-SR179

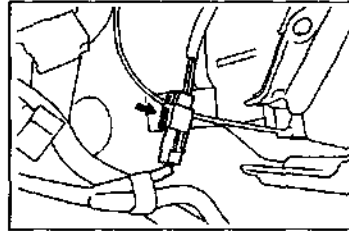
STEERING

25. Clamp the wire harness to the steering column.



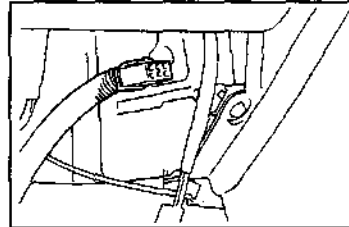
WFE90-SR150

26. Connect the key reminder switch connector (if so equipped).



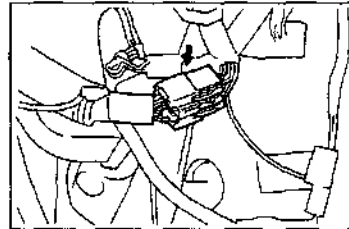
WFE90-SR151

27. Connect the connector to the ignition switch.



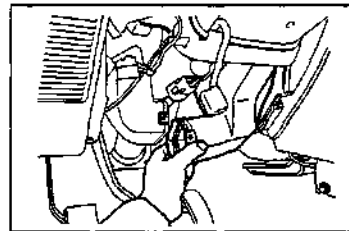
WFE90-SR152

28. Connect the connector of the turn signal switch.



WFE90-SR153

29. Install the air duct No. 1.

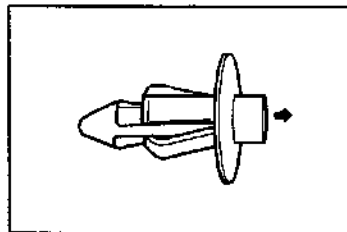


WFE90-SR154

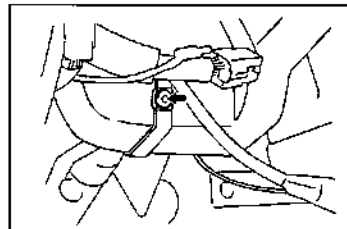
SR-53

STEERING

30. Pull out the center of the clip, as indicated in the right figure.



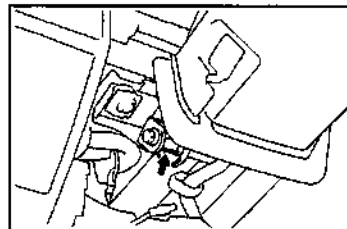
31. Install the clip to the air duct No. 1. Push down the shaft at the clip central section until it becomes flush with the clip surface. Then, lock the clip.



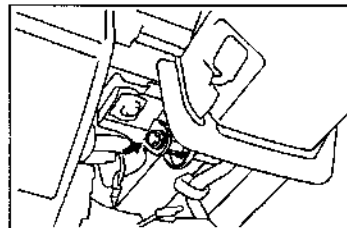
32. Tighten the long nut of the tilt steering support.
Tightening Torque: 12.7 N·m (1.3 kgf-m, 9.4 ft-lb)

NOTE:

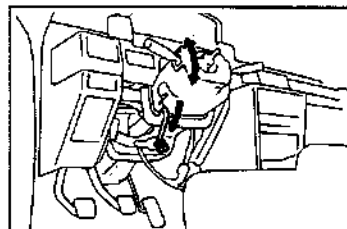
- The long nut is a left-threaded nut.



33. Set the tilt steering lever to the upper position. While preventing the lever from turning with the long nut, tighten the tilt steering lever attaching bolt to the specified torque.
Tightening Torque: 29.4 - 49.0 N·m
(3.0 - 4.5 kgf-m, 21.7 - 36.2 ft-lb)

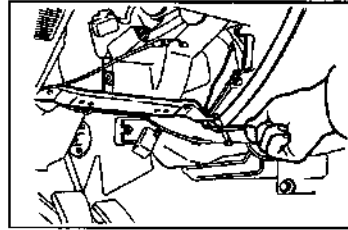


34. Ensure that the steering column is secured.
If not, adjust the tightening torque, as instructed in the step 34.
35. Lower the tilt steering lever. Ensure that the steering tilt function operates properly.
If not, loosen the tilt steering lever attaching bolt while preventing the long nut from turning. Adjust the tightening torque of the long nut and repeat the operations from the step 34.



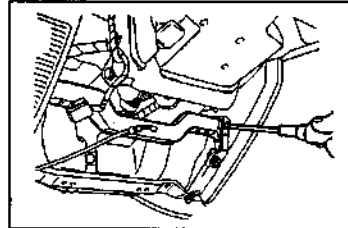
STEERING

36. Install the instrument panel reinforcement subassembly.
(For details, refer to the Body section.)



WP690-SR190

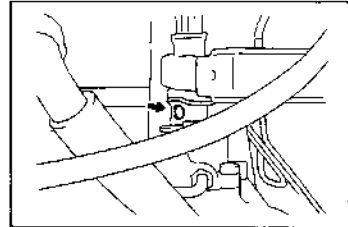
37. Install the instrument panel finish panel No. 1.
(For details, refer to the Body section.)



WP690-SR191

38. Connect the intermediate shaft to the steering gear housing, while aligning the cut-out section of the steering gear housing shaft with the bolt hole of the intermediate shaft.
NOTE:

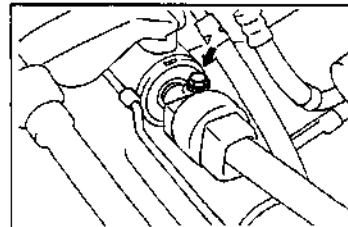
- Be sure to positively connect the universal joint to the serration section as far as it will go, until the serration section of the shaft at the steering gear box side becomes invisible from the universal joint edge surface of the intermediate shaft.
- If the steering shaft and intermediate shaft are reused, assemble them, while aligning the mating mark put during the disassembly.



WP690-SR192

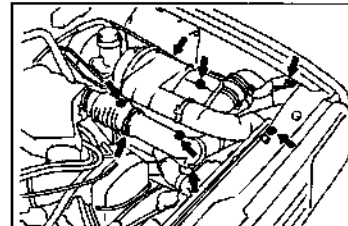
39. Tighten the bolts which connect the intermediate shaft to the steering gear housing to the specified torque.

Tightening Torque: 24.5 - 34.3 N·m
(2.5 - 3.5 kgf-m, 18.1 - 25.3 ft-lb)



WP690-SR193

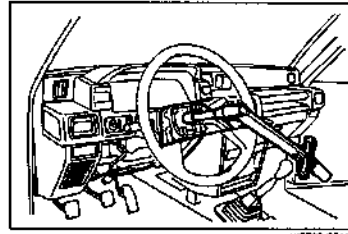
40. Installation of air cleaner and air hose
(For details, refer to the Engine section.)
- (1) Install the air cleaner and air hose as an assembly to the vehicle. Tighten the five attaching bolts.
 - (2) Tighten the hose band.
 - (3) Tighten the clutch cable clamp bolt.



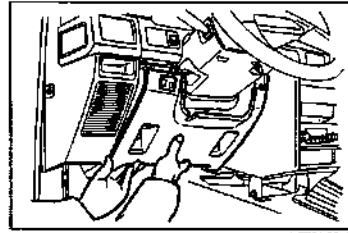
WP690-SR194

STEERING

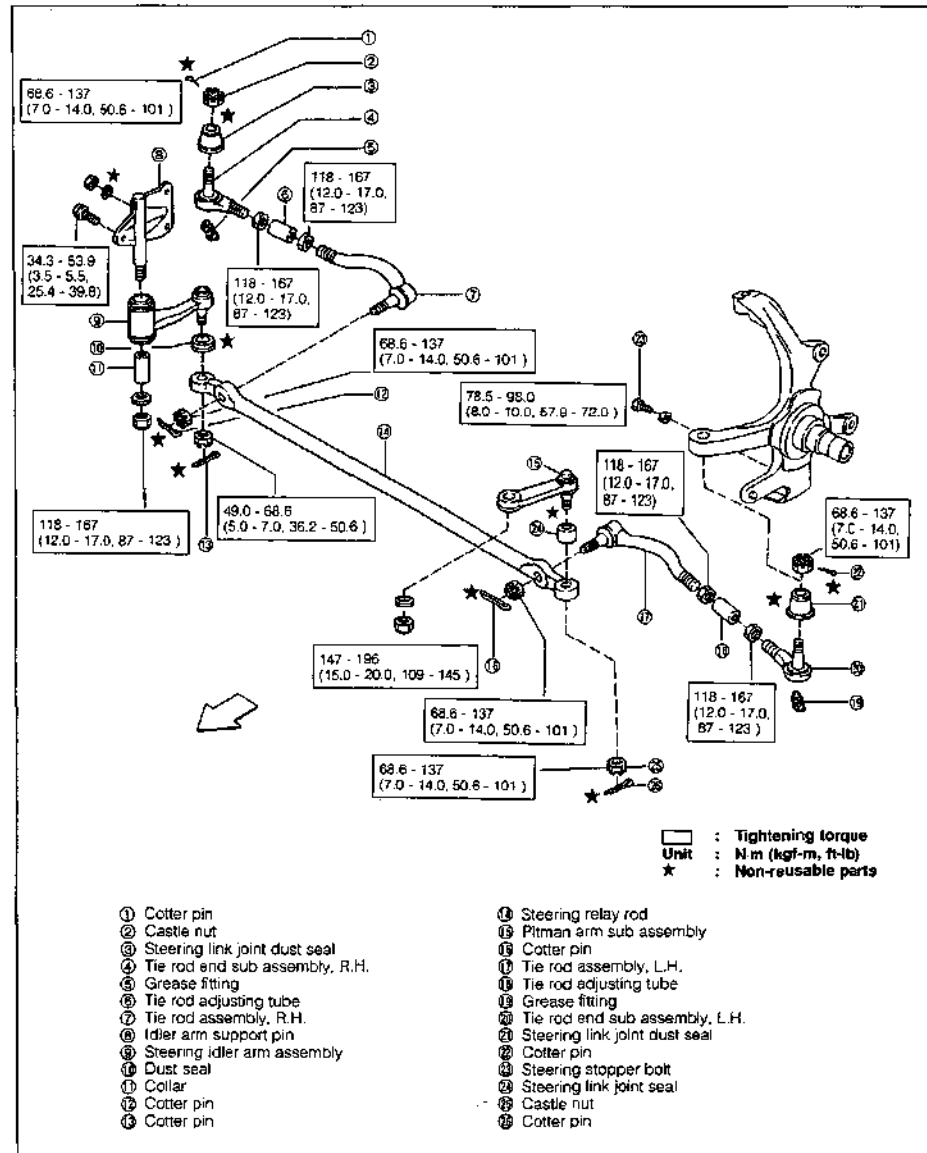
41. Installation of steering wheel
(See page SR-33.)



42. Install the instrument panel lower panel.
(For details, see the Body section.)



STEERING LINKAGE COMPONENTS

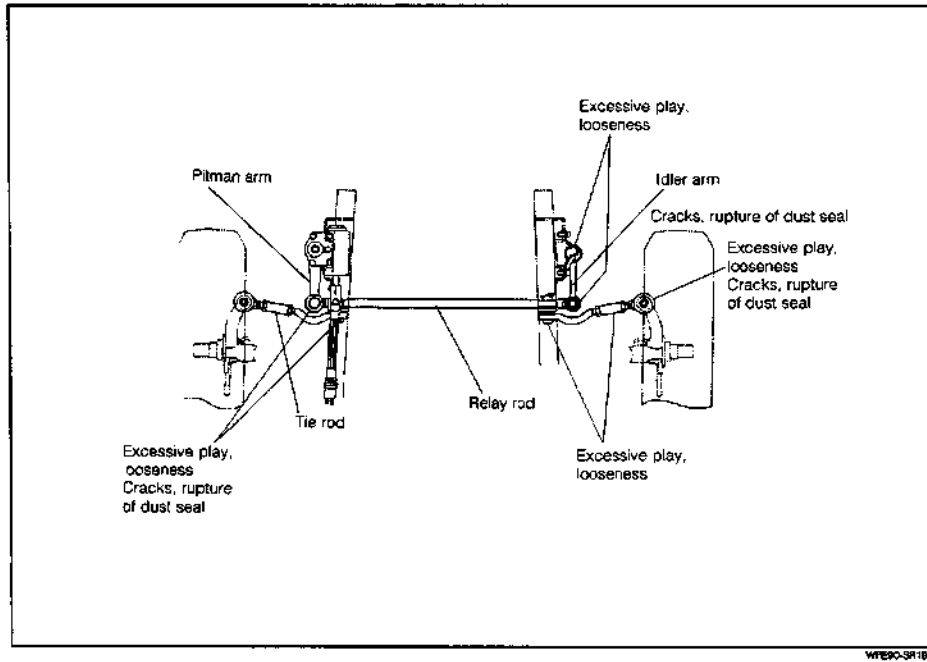


WF80-SR197

STEERING

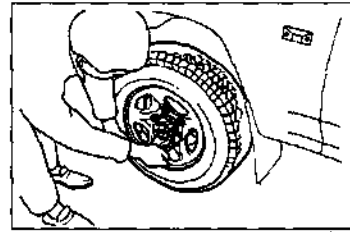
INSPECTION

Ensure that each section exhibits no defect, such as cracks, excessive play, looseness and deformation. Replace any defective part.



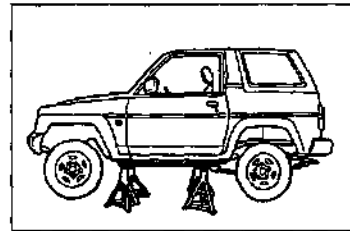
REMOVAL

1. Loosen the front wheel attaching bolts.



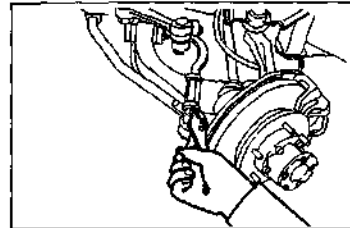
WFE90-SR199

2. Jack up the vehicle and support it with safety stands.



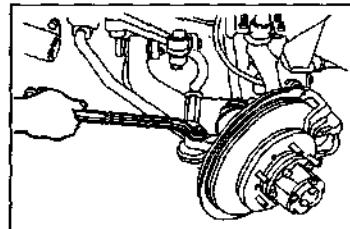
WFE90-SR200

3. Remove the front wheels. (Both right and left sides)
4. Remove the cotter pin at the connecting section of the tie rod end and the steering knuckle. (Both right and left sides)



WFE90-SR201

5. Loosen the castle nut two or three threads at the connecting section of the tie rod end and the steering knuckle. (Both right and left sides)

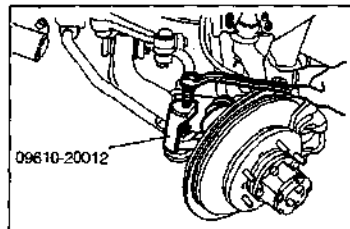


WFE90-SR202

6. Disconnect the connecting section of the tie rod end and the steering knuckle, using the following SST.
SST: 09610-20012-000

NOTE:

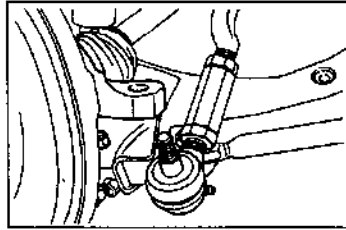
- If any difficulty is encountered during this disconnection, apply a suitable metal rod against the side of the tapered section of the steering knuckle and lightly tap the metal rod with a hammer or the like. This will facilitate the disconnection.



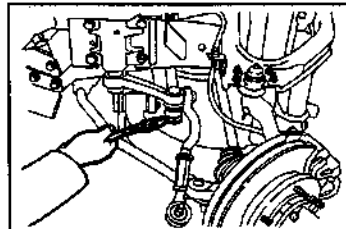
WFE90-SR203

STEERING

7. Remove the castle nut.
8. Separate the tie rod end from the steering knuckle.



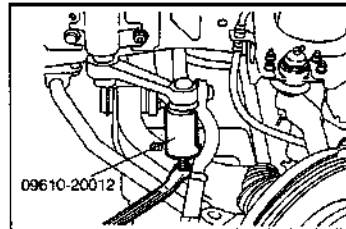
9. Remove the cotter pin at the connecting section of the pitman arm and the relay rod.
10. Loosen the castle nut four or five threads which connects the pitman arm with the relay rod.



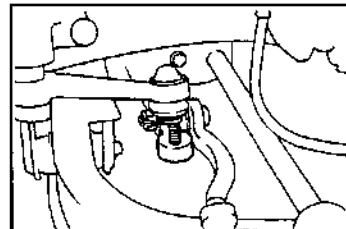
11. Disconnect the connecting section of the pitman arm and the relay rod, using the following SST.
SST: 09610-20012-000

NOTE:

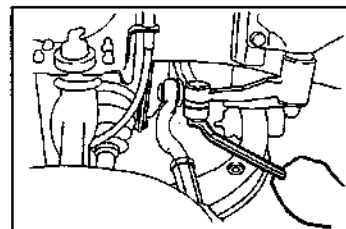
- If any difficulty is encountered during this disconnection, apply a suitable metal rod against the side of the tapered section of the relay rod and lightly tap the metal rod with a hammer or the like to give impact. This will facilitate the disconnection.



12. Remove the castle nut and separate the pitman arm.



13. Remove the cotter pin at the connecting section of the steering idler arm and the relay rod.
14. Loosen the castle nut four or five threads.



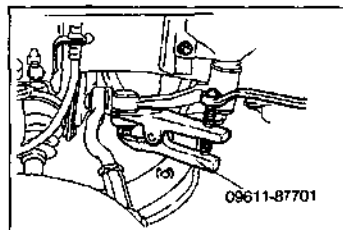
STEERING

15. Disconnect the connecting section of the steering idler arm and the relay rod, using the following SST.

SST: 09611-87701-000

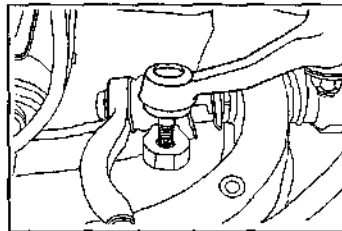
NOTE:

- If any difficulty is encountered during this disconnection, apply a suitable metal rod against the side of the tapered section of the steering relay rod and lightly tap the metal rod with a hammer or the like to give impact. This will facilitate the disconnection.



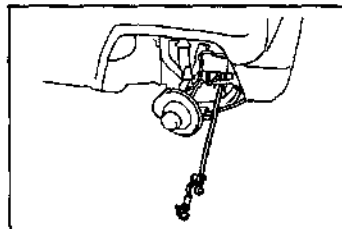
WPB90-SR209

16. Remove the castle nut. Disconnect the idler arm and relay rod.



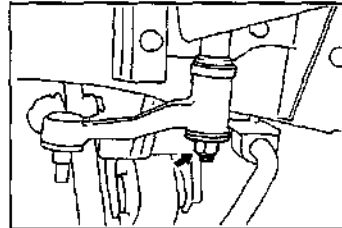
WPB90-SR210

17. Remove the relay rod together with the tie rod end from the vehicle.



WPB90-SR211

18. Remove the idler arm attaching nut. Remove the thrust washer and idler arm.

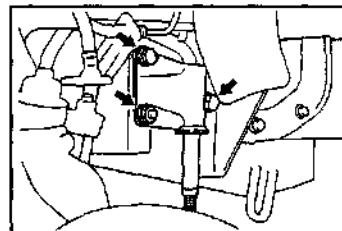


WPB90-SR212

19. Remove the idler arm support pin from the frame. (Never reuse the spring washer.)

NOTE:

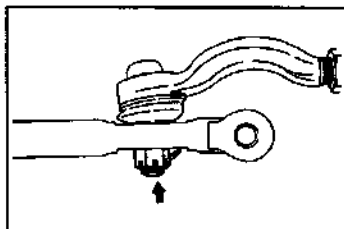
- Do not reuse the used spring washers.



WPB90-SR213

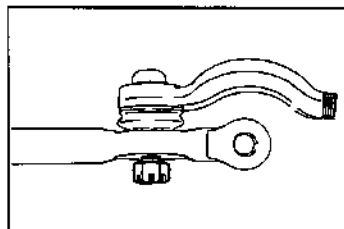
STEERING

20. Remove the cotter pin at the tie rod assembly attaching nut.



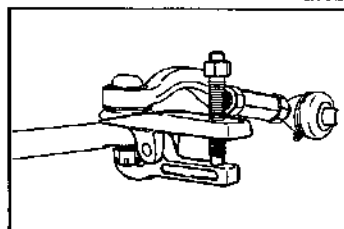
WP830-SR214

21. Loosen the tie rod assembly attaching nut two or three threads.



WP830-SR215

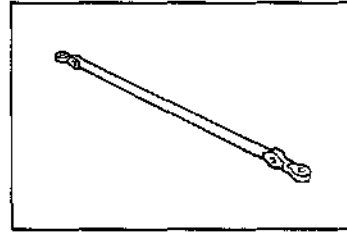
22. Remove the tie rod assembly from the steering rod, using the following SST.
SST: 09611-87701-000



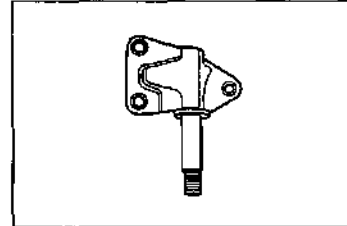
WP830-SR216

INSPECTION

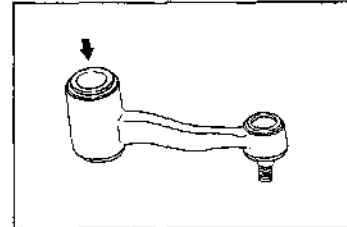
1. Inspection of steering relay rod
Ensure that the steering relay rod exhibits no defect, such as deformation, wear and cracks.
2. Inspection of idler arm support pin
Ensure that the idler arm support pin exhibits no defect, such as deformation, wear and cracks.
3. Inspection of steering idler arm
 - (1) Ensure that the steering idler arm exhibits no defect, such as deformation, wear and cracks.
 - (2) Ensure that the bush section of the steering idler arm exhibits no damage and/or wear.
 - (3) Ensure that the dust seal of the steering idler arm exhibits no damage, such as cracks and/or rupture. If any damage is present, replace the dust seal.
4. Ensure that the collar exhibits no damage, such as cracks and/or wear.



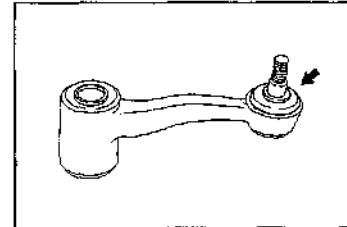
WFE90-SR217



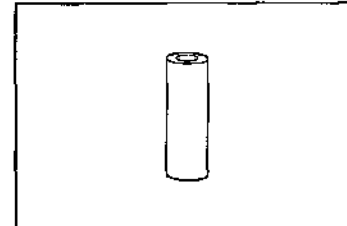
WFE90-SR218



WFE90-SR219



WFE90-SR220

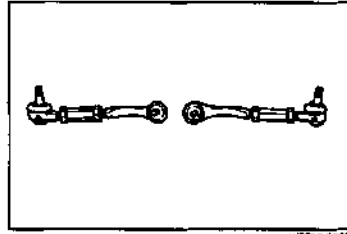


WFE90-SR221

STEERING

5. Inspection of tie rod end

Ensure that each section of the tie rod end exhibits no damage, such as deformation, excessive play and/or cracks.



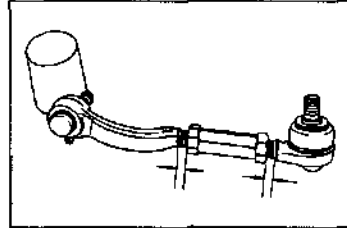
WFE90-SR222

6. Disassembly and assembly of tie rod end

(Only cases where such operation is required)

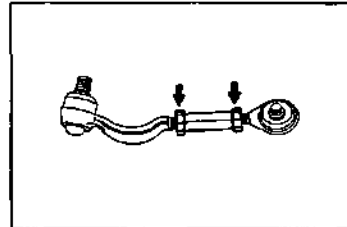
- (1) Measure the distances between the tie rod adjusting tube lock nut and the tie rod end as well as between the tie rod adjusting tube lock nut and the tie rod, respectively.

Reference Value: About 10 mm



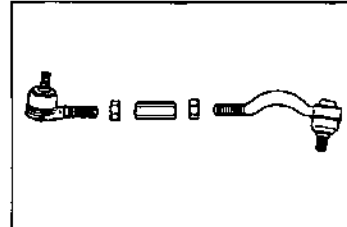
WFE90-SR223

- (2) Loosen the tie rod adjusting tube lock nut.



WFE90-SR224

- (3) Remove the tie rod and tie rod end from the tie rod adjusting screw.
- (4) Remove the lock nut from the tie rod and tie rod end.



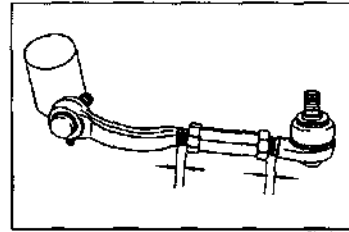
WFE90-SR225

- (5) Install the lock nut to the tie rod and tie rod end, respectively.
- (6) Install the tie rod and tie rod end to the tie rod adjusting screw.

WFE90-SR226

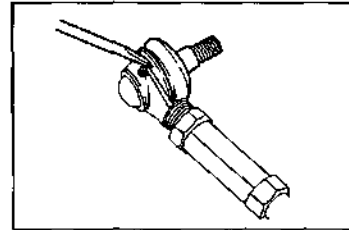
STEERING

- (7) Adjust the distances between the tie rod adjusting tube lock nut and the tie rod end as well as between the tie rod adjusting tube lock nut and the tie rod to the values measured at the step (1), respectively.
- (8) Temporarily tighten the lock nut.
(After this operation, be sure to adjust the side slip.)



WF890-SR227

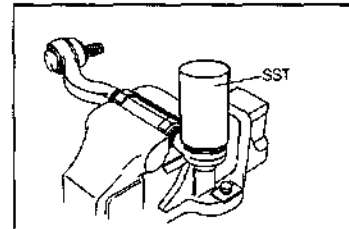
- (9) Replacement of dust seal
(Only cases where such operation is required)
- ① Remove the steering joint dust seat of the tie rod end by prying it with a standard screwdriver.
- ② Remove oil grease or the like.
- ③ Install a new dust seal to the tie rod end.



WF890-SR228

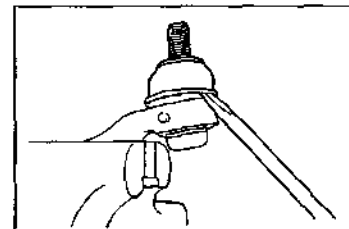
- ④ Drive the new dust seal into position by lightly tapping it with a hammer in combination with the following SST.

SST: 09608-87611-000



WF890-SR229

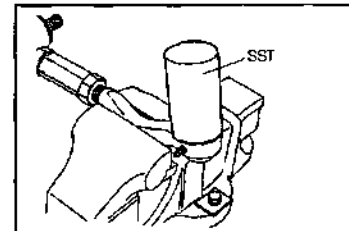
- ⑤ Remove the dust seat of the tie rod by prying it with a standard screwdriver.
- ⑥ Remove old grease or the like.



WF890-SR230

- ⑦ Install a new dust seal to the tie rod end.
- ⑧ Drive the new dust seal into position by lightly tapping it with a hammer in combination with the following SST.

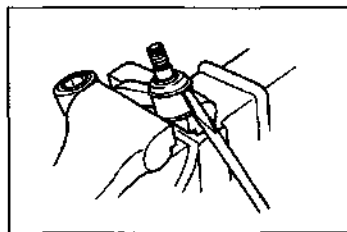
SST: 09608-87613-000



WF890-SR231

STEERING

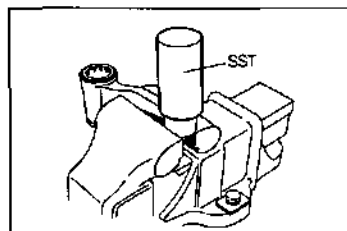
7. Replacement of steering idler arm dust seal
(Only cases where such operation is required)
 - (1) Remove the steering idler arm dust seal by prying it with a standard screwdriver or the like.
 - (2) Remove old grease or the like.
 - (3) Pack a new dust seal with rubber grease.



WPB90-SR232

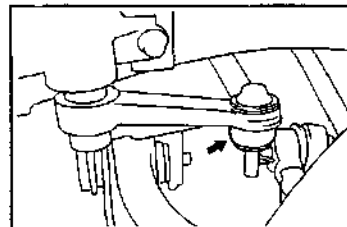
- (4) Install the dust seal to the idler arm.
 - (5) Drive the dust seal into the idler arm by lightly tapping it with a hammer in combination with the following SST.

SST: 09608-87614-000



WPB90-SR233

8. Ensure that the steering ring joint seal of the pitman arm exhibits no damage.
Replace the joint seal if it is damaged.



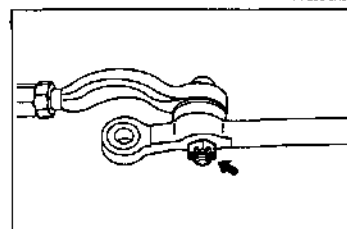
WPB90-SR234

ASSEMBLY

1. Connect the tie rod to the steering relay rod. Install a castle nut.
2. Tighten the castle nut to the specified torque.
Tightening Torque: 68.6 - 137 N·m
(7.0 - 14.0 kgf-m, 50.6 - 101 ft-lb)

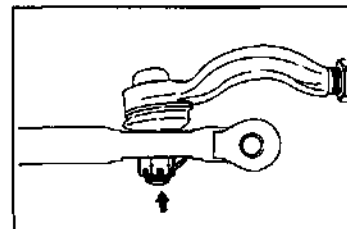
NOTE:

- Be sure to align the cotter pin hole of the tie rod with the cut out section of castle nut after tightening.



WPB90-SR235

3. Insert a cotter pin and bend its legs, as indicated in the right figure.



WPB90-SR236

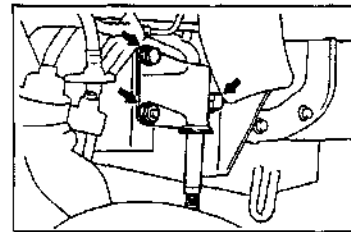
STEERING

4. Install the idler arm support pin to the frame. Tighten the attaching bolts and nuts to the specified torque with new washer interposed.

Tightening Torque: 34.3 - 53.9 N·m
(3.5 - 5.5 kgf-m, 25.4 - 39.8 ft-lb)

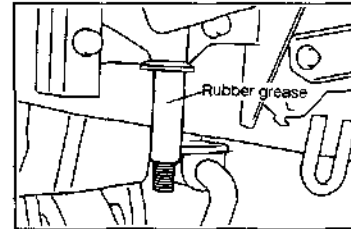
NOTE:

- Do not reuse the washer.



WFE90-SR237

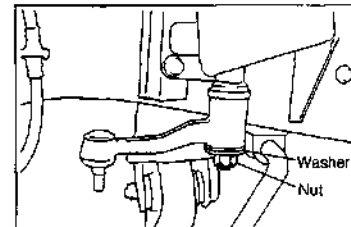
5. Apply rubber grease to the collar. Install it to the idler arm support pin.



WFE90-SR238

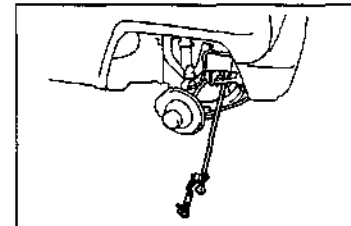
6. Apply rubber grease to the bush section of the idler arm. Install it to the collar with a washer interposed. Tighten the nut to the specified torque.

Tightening Torque: 108 - 167 N·m
(12 - 17 kgf-m, 87 - 123 ft-lb)



WFE90-SR239

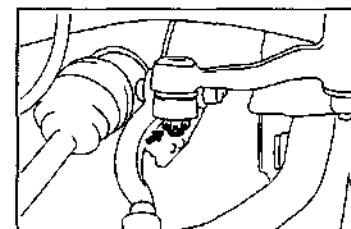
7. Insert the relay rod together with the tie rod onto the vehicle.



WFE90-SR240

8. Connect the relay rod to the idler arm. Install a new castle nut and tighten it to the specified torque.

Tightening Torque: 49.0 - 68.6 N·m
(5.0 - 7.0 kgf-m, 36.2 - 50.6 ft-lb)



WFE90-SR241

NOTE:

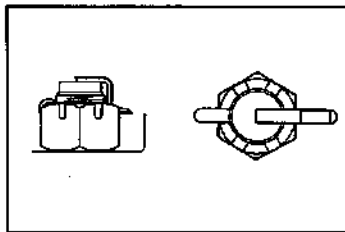
- Be sure to align the cotter pin hole of the idler arm with the cut-out section of the castle nut.

CAUTION:

- Make sure that the tapered and threaded portions of the ball joint are free of grease. If grease exists on these portions, be sure to wipe off the grease prior to reassembling. Failure to observe the caution may cause insufficient tightening torque.

STEERING

9. Bend the legs of the cotter pin, as indicated in the right figure.



10. Connect the relay rod to the pitman arm. Install a new castle nut and tighten it to the specified torque.

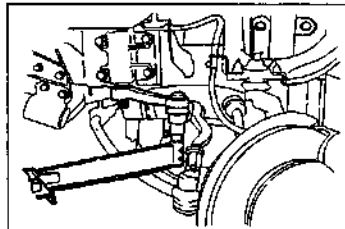
Tightening Torque: 68.6 - 137 N·m
(7.0 - 14.0 kgf-m, 50.6 - 101 ft-lb)

NOTE:

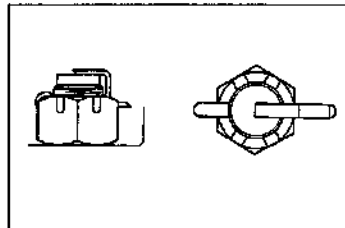
- Be sure to align the cotter pin hole of the pitman arm with the cut out section of the castle nut after tightening.

CAUTION:

- Make sure that the tapered and threaded portions of the ball joint are free of grease. If grease exists on these portions, be sure to wipe off the grease prior to reassembling. Failure to observe the caution may cause insufficient tightening torque.



11. Bend the legs of the cotter pin, as indicated in the right figure.



12. Connect the tie rod end to the steering knuckle. Install a new castle nut and tighten it to the specified torque.

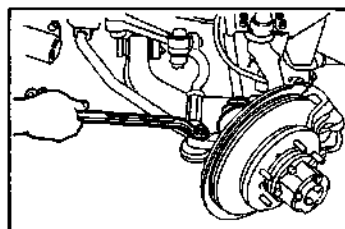
Tightening Torque: 68.6 - 137 N·m
(7.0 - 14.0 kgf-m, 50.6 - 101 ft-lb)

NOTE:

- Be sure to align the cotter pin hole of the tie rod end with the cut out section of the castle nut after tightening.

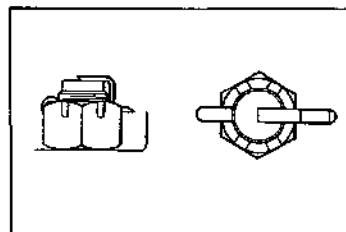
CAUTION:

- Make sure that the tapered and threaded portions of the ball joint are free of grease. If grease exists on these portions, be sure to wipe off the grease prior to reassembling. Failure to observe the caution may cause insufficient tightening torque.



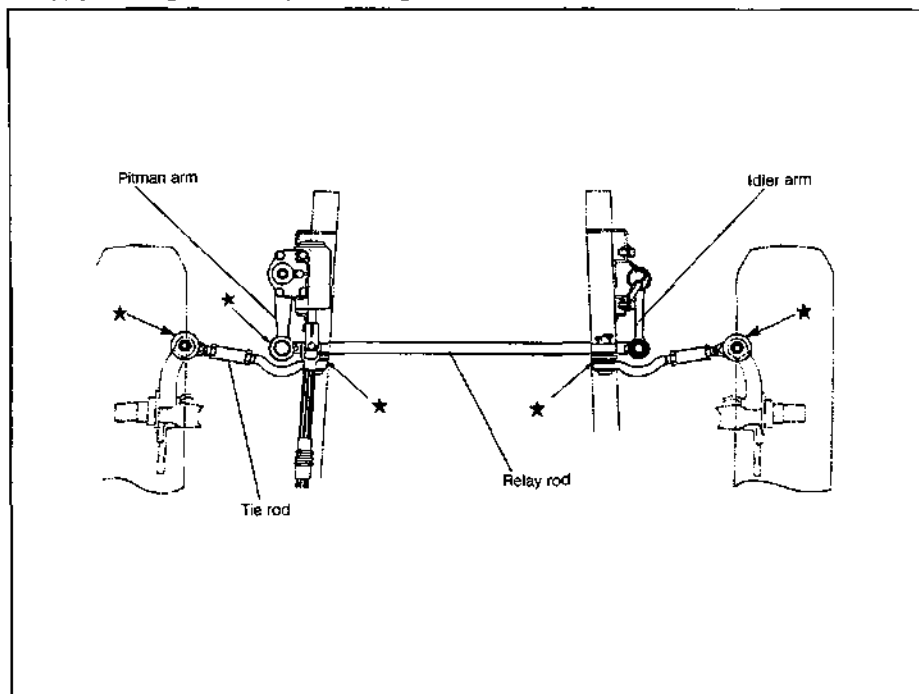
STEERING

13. Bend the legs of the cotter pin, as indicated in the right figure.



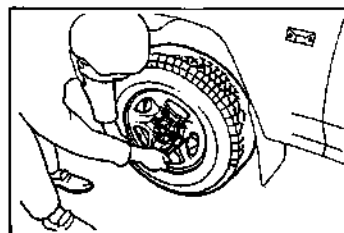
WF190-SR246

14. Apply chassis grease to the points bearing an asterisk "★" mark, as shown in the illustration below.



WF190-SR247

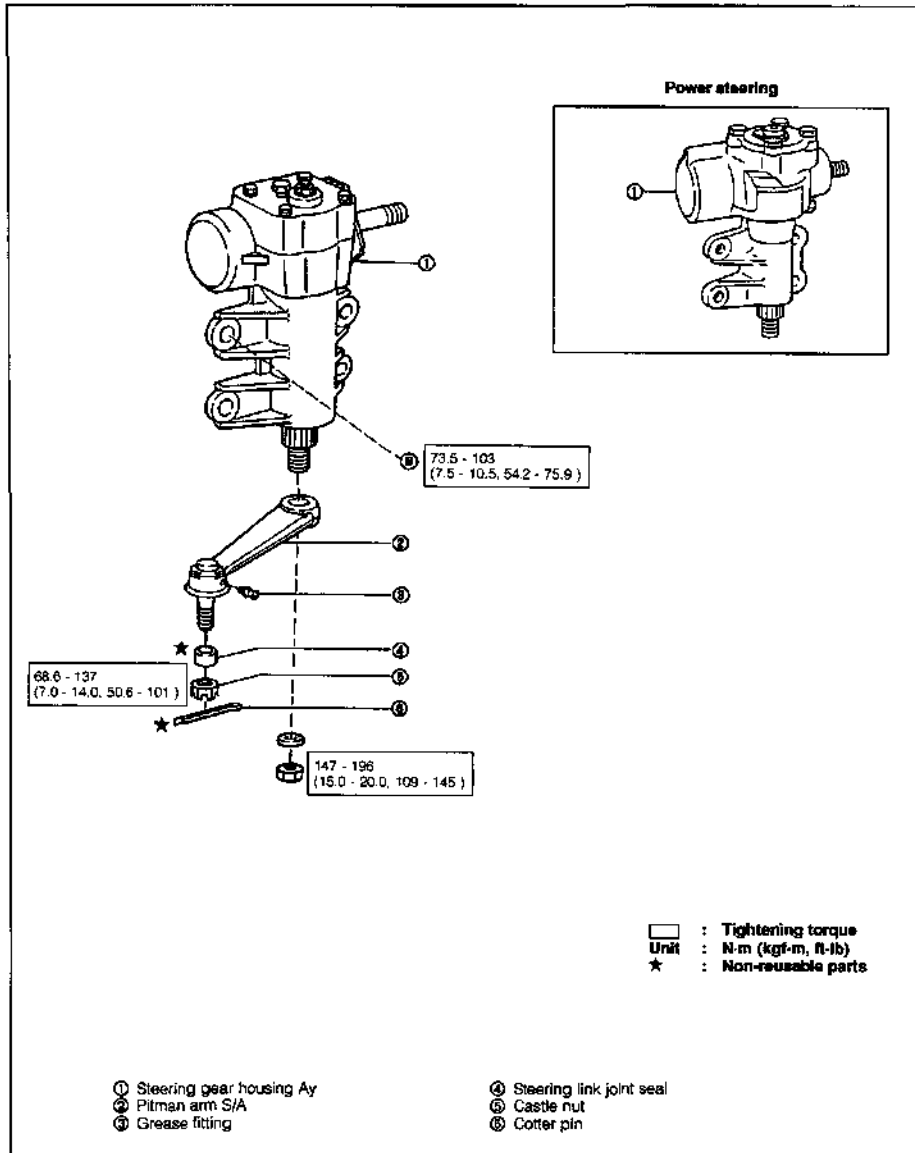
15. Install the front tires and tighten the attaching nuts.
 16. Jack down the vehicle.
 17. Tighten the front tire attaching nuts to the specified torque evenly over two or three stages.
 Tightening Torque: 88.3 - 118 N·m
 (9.0 - 12.0 kgf-m, 65.1 - 87.0 ft-lb)
 18. Check and adjust the toe-in and side slip.
 (For further details, see front axle and suspension section)



WF190-SR248

STEERING

STEERING GEAR HOUSING COMPONENTS

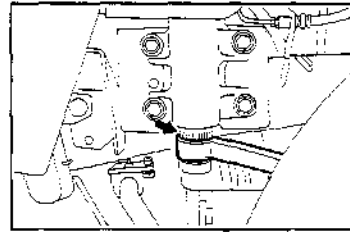


SR-70

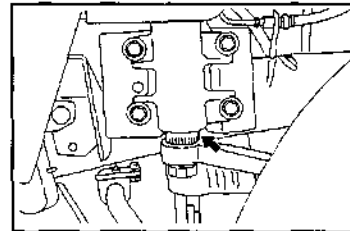
STEERING

IN-VEHICLE INSPECTION

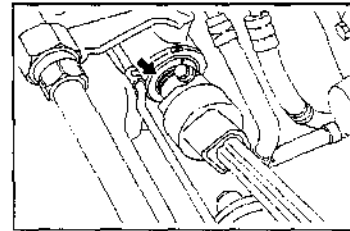
1. Ensure that the connecting section of the pitman arm and steering gear housing exhibits no defect, such as excessive play and looseness.
If any defect is present, check the tightening torque of the nuts and perform retightenings, as required and/or replace defective parts.



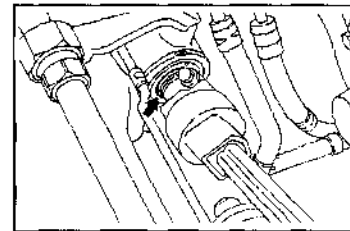
2. Ensure that no excessive play, etc. is present between the steering gear housing and the cross shaft.
If excessive play, etc. is present, replace the steering gear housing assembly.



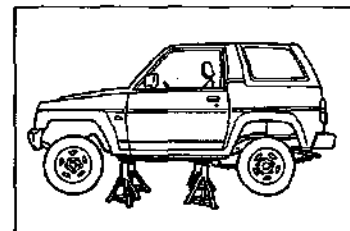
3. Ensure that the connecting section of the steering shaft of the steering gear housing and the intermediate shaft exhibits no defect, such as excessive play and looseness.
If any defect is present, perform retightenings or replace defective parts.



4. Ensure that no defect, such as excessive play, is present between the steering gear housing and the steering shaft.
If any defect is present, replace the steering gear housing assembly.



5. Check of total preload of steering gear housing
(1) Jack up the vehicle and support it with safety stands.
(See page G1 section.)

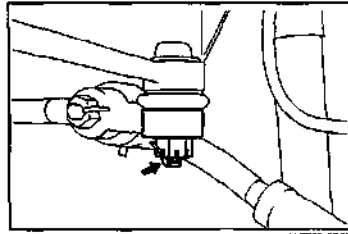


STEERING

- (2) Pull out the cotter pin from the nut which connects the relay rod with the pitman arm.
(3) Loosen the castle nut.

NOTE:

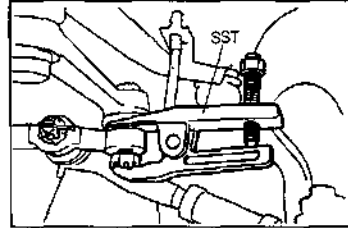
- The castle nut should be loosened two or three threads.



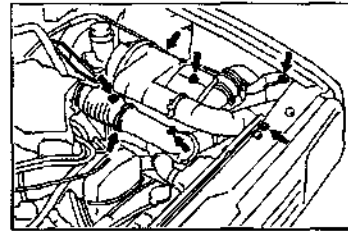
- (4) Disconnect the relay rod from the pitman arm, using the following SST.

NOTE:

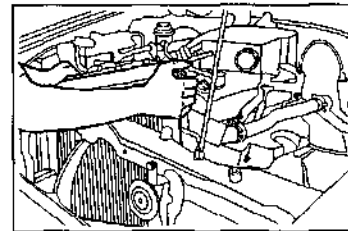
- Be very careful not to apply excessive load, which may lead to damage to the threaded portion and castle nut.
- If the parts will not be disconnected even when load is applied, while applying the load, put a suitable metal rod to the side of the tapered section of the relay rod and tap the rod with a hammer or the like to give impact. This will facilitate the disconnection.



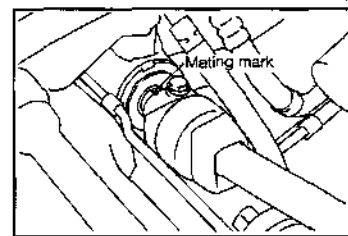
- (5) Remove the attaching bolts and hose bands for the air cleaner and air hose. Also remove the clutch cable clamp bolt. Remove the air cleaner and air hose as an assembly from the vehicle. (L.H.D. vehicle only)
(For details, refer to the Engine section.)



- (6) Remove the reservoir tank. (R.H.D. vehicle only)
(See the Cooling System section.)
(7) Remove the radiator. (R.H.D. vehicle only)
(See the Cooling System section.)

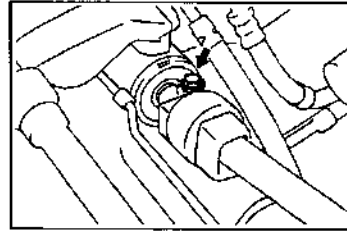


- (8) Put a mating mark on between the intermediate shaft and the steering gear housing.



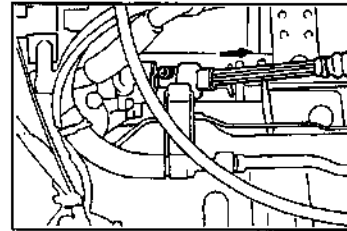
STEERING

- (9) Remove the bolts connecting the intermediate shaft to the steering gear housing.



WFE90-SR250

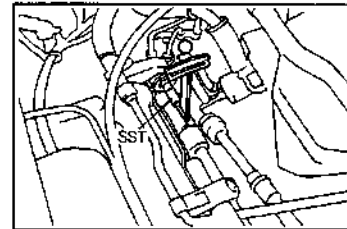
- (10) Disconnect the intermediate shaft from the steering gear housing by contracting the intermediate shaft.



WFE90-SR261

- (11) Install the following SST to the steering shaft with small-sized torque wrench. Locate the center (center of gear meshing) of the rotation of the cross shaft by turning the steering shaft. Turn the steering shaft in such a way that the cross shaft assumes the center position. Keep the steering shaft in this position.

SST: 09616-00010-000



WFE90-SR262

NOTE:

- At this time, the pitman arm becomes virtually parallel with the chassis.

- (12) Install a small-sized torque wrench to the SST. Turn the SST slowly about 90 degrees clockwise and counterclockwise. Ensure that the maximum torque during this operation is within the specified value.

Specified Pre-load

Standard Steering:

0.7 - 0.98 N·m (7 - 10 kgf-cm, 6.1 - 8.7 inch-lb)

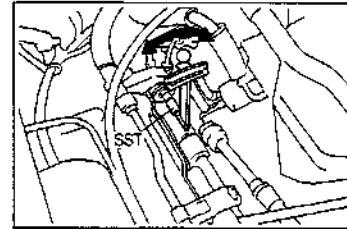
Power Steering:

0.6 - 0.9 N·m (6 - 9.5 kgf-cm, 5.2 - 8.2 inch-lb)

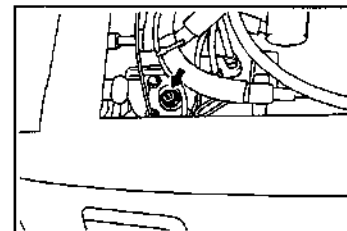
If the maximum torque does not conform to the specified value, loosen the lock nut of the cross shaft adjusting screw. Then, adjust the preload to the specified value by means of the cross shaft adjusting screw. Tighten the lock nut to the specified torque.

Tightening Torque: 19.6 - 34.3 N·m

(2.0 - 3.5 kgf-m, 14.5 - 25.3 ft-lb)



WFE90-SR263



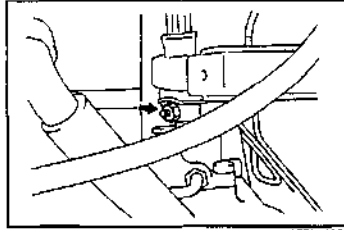
WFE90-SR264

NOTE:

- When tightening the lock nut, prevent the adjusting screw from turning.

STEERING

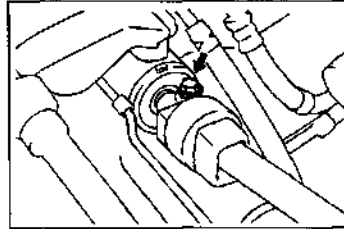
- (13) Remove the SST.
- (14) Connect the intermediate shaft in such a way that the shaft cut-out section of the steering gear housing may be aligned with the bolt hole or in such a way that the mating marks put during the removal may be aligned. Tighten the attaching bolts to the specified torque.
Tightening Torque: 24.5 - 34.3 N·m
(2.5 - 3.5 kgf-m, 18.1 - 25.3 ft-lb)



WPB90-SR285

NOTE:

- Ensure that the steering wheel is installed in the correct direction.
- Be sure to positively connect the universal joint to the serration section as far as it will go, until the serration section of the steering shaft becomes invisible from the edge surface of the intermediate shaft.

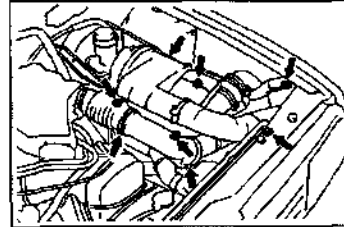


WPB90-SR286

- (15) Install the air cleaner and air hose to the vehicle. Tighten the attaching bolts. (L.H.D. vehicle only)
- (16) Tighten the hose clamp. (L.H.D. vehicle only)
- (17) Install the clutch cable to the air cleaner by means of the clamp bolt. (L.H.D. vehicle only)

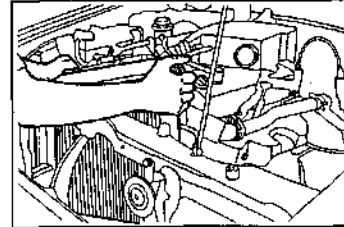
NOTE:

- For details, refer to the Engine section.



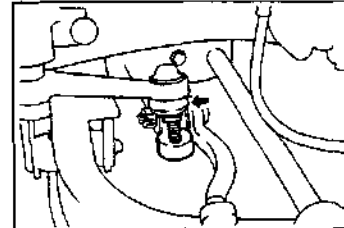
WPB90-SR287

- (18) Install the radiator. (R.H.D. vehicle only)
(For details, refer to the Cooling System section.)
- (19) Install the reservoir tank. (R.H.D. vehicle only)
(For details, refer to the Cooling System section.)



WPB90-SR288

- (20) Ensure that the boot of the pitman arm exhibits no damage, such as cracks and/or rupture. If any damage is present, replace the boot with a new one.
(See page SR-81.)



WPB90-SR289

STEERING

- (21) Connect the pitman arm to the relay rod.

CAUTION:

- Ensure that no oil nor grease gets to the tapered section and/or threaded portions.

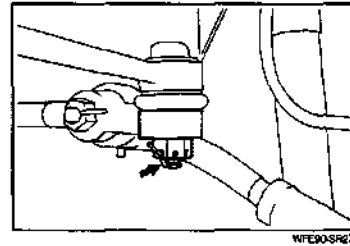
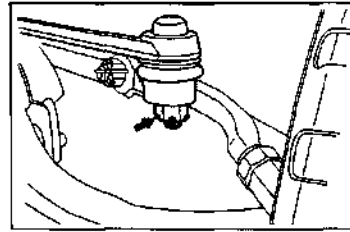
- (22) Install the castle nut and tighten it to the specified torque.

Tightening Torque: 68.6 - 137 N·m
(7.0 - 14.0 kgf-m, 50.6 - 101 ft-lb)

NOTE:

- Be sure to align the cotter pin hole of the pitman arm with the cut-out section of the castle nut after tightening.

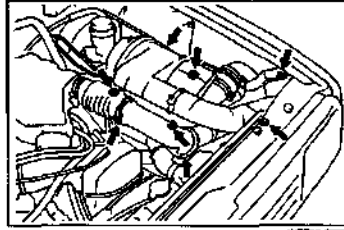
- (23) Install a new cotter pin and bend its legs as indicated in the right figure.



STEERING

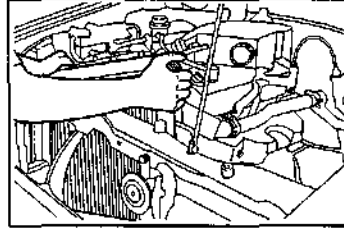
REMOVAL

1. Remove the air cleaner and air hose attaching bolts, hose bands and clutch cable clamp bolt. Remove the air cleaner and air hoses together from the vehicle.
(For details, refer to the Engine section)



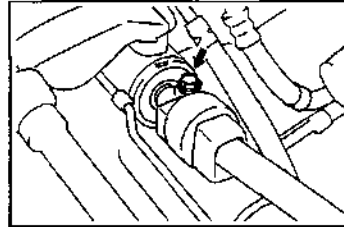
WFE90-SR272

2. Remove the reservoir tank. (R.H.D. vehicle only)
(See the Cooling System section.)
3. Remove the radiator. (R.H.D. vehicle only)
(See the Cooling System section.)



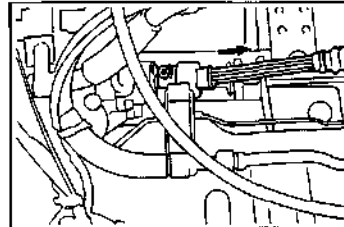
WFE90-SR273

4. Remove the bolts connecting the intermediate shaft to the steering gear housing.



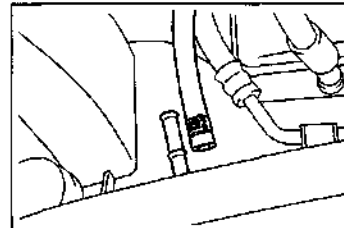
WFE90-SR274

5. Disconnect the intermediate shaft from the steering gear housing by contracting the intermediate shaft.



WFE90-SR275

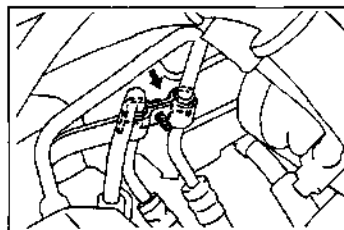
6. Draining of power steering oil
(Power steering-equipped vehicle only)
(As for the draining procedure, see page SR-22.)



WFE90-SR276

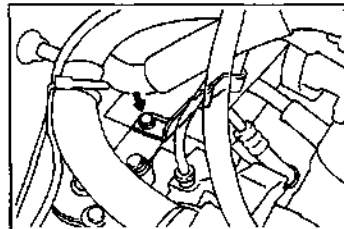
STEERING

7. Removal of pressure feed tube clamp.
Detach the clamp by removing the screw.
(Power steering-equipped vehicle only)



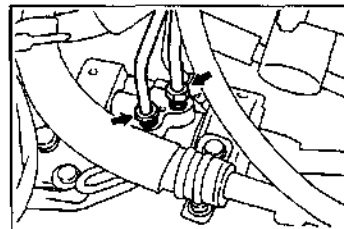
WP500-SR277

8. Remove the pressure feed tube clamp bracket from the steering gear housing.
(Power steering-equipped vehicle only)



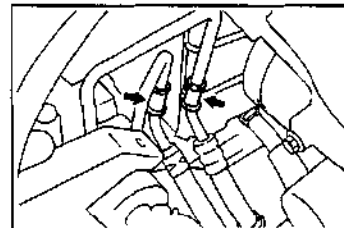
WP500-SR278

9. Remove the pressure feed tubes from the power steering gear housing.
(Power steering-equipped vehicle only)



WP500-SR279

10. Remove the rubber grommet from the pressure feed tube.
(Power steering-equipped vehicle only)



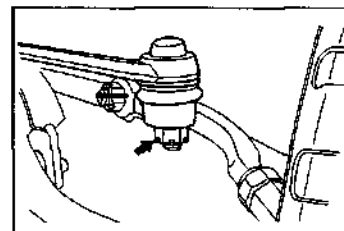
WP500-SR280

11. Remove the cotter pin.

12. Loosen the castle nut.

NOTE:

- Loosen the castle nut two or three threads.



WP500-SR281

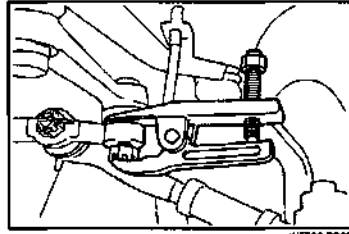
STEERING

13. Disconnect the pitman arm from the relay rod, using the following SST.

SST: 09611-87701-000

NOTE:

- Be careful not to apply excessive load during the removal.
- If the parts will not be disconnected even if the load is applied, put a suitable metal rod against the side of the tapered section of the relay rod and lightly tap the metal rod with a hammer or the like to give impact. This will facilitate the disconnection.

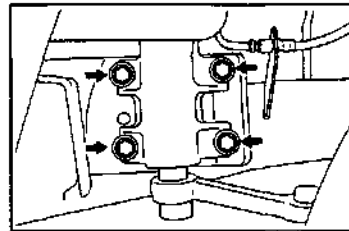


WFE00-SR262

14. Remove the pitman arm attaching nut to the steering gear housing.

WFE00-SR263

15. Loosen the attaching bolts and nuts for the steering gear housing evenly. Remove them.

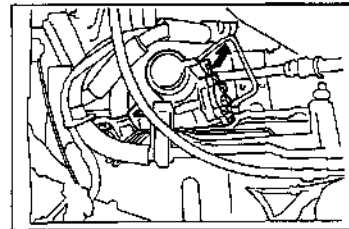


WFE00-SR264

16. Remove the steering gear housing from the vehicle.

NOTE:

- Be very careful not to damage the brake pipe. Also, prevent the steering gear housing from interfering with other parts strongly.

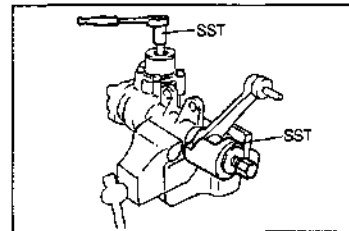


WFE00-SR265

17. While preventing the steering shaft from turning with the SST given below, remove the pitman arm from the cross shaft, using the following SST.

SSTs: 09616-00010-000

09610-87301-000

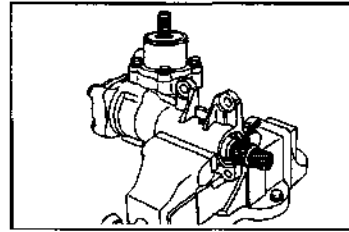


WFE00-SR266

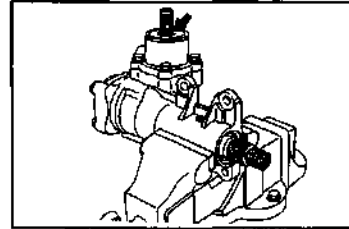
STEERING

INSPECTION

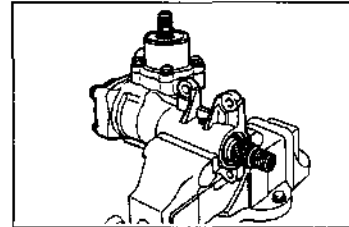
1. Ensure that no abnormal play is present between the cross shaft and the housing.
If abnormal play is present, replace the steering gear housing assembly.
2. Ensure that no excessive play is present between the steering shaft and the housing.
If excessive play is present, replace the steering gear housing.
3. Ensure that the steering gear housing assembly exhibits no damage, such as cracks and oil leakage.
If any damage is present, replace the steering gear housing assembly.
4. Ensure that no damage, such as cracks, wear and deformation, is present at the threaded portion and spline section of the steering gear housing assembly.
If any damage is present, replace the steering gear housing assembly.
5. Ensure that the pitman arm exhibits no damage, such as cracks and/or deformation.



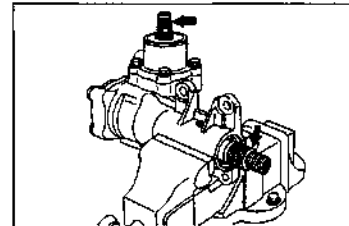
WP690-SR287



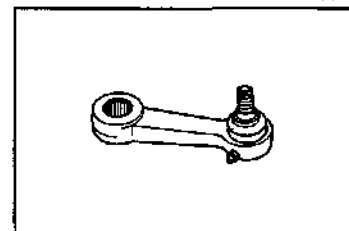
WP690-SR288



WP690-SR289



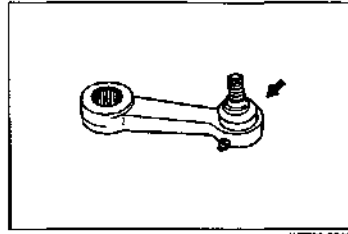
WP690-SR290



WP690-SR291

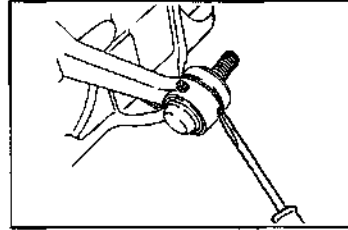
STEERING

6. Ensure that the ball joint section of the pitman arm exhibits no excessive play.
7. Ensure that no damage is present at the steering link joint seal of the pitman arm ball joint section.
If damage is present, replace the joint seal.



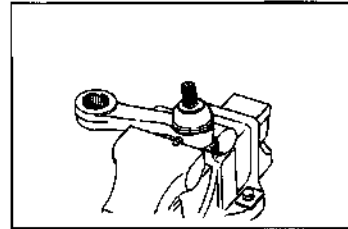
WPED0-SR262

8. Replacement of steering link joint seal
(Only cases where such operation is necessary)
 - (1) Remove the steering link joint seal from the pitman arm with a chisel or the like.



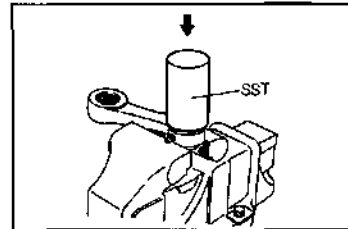
WPED0-SR203

- (2) Remove the old grease.
 - (3) Install a new steering joint seal to the pitman arm.



WPED0-SR264

- (4) Install the following SST on the steering joint seal. Press the steering joint seal to the pitman arm by lightly tapping the SST with a hammer.
SST: 09608-87613-000



WPED0-SR265

NOTE:

- Care must be exercised so that the steering joint seal may not be press-fitted in a tilted state.

ASSEMBLY

CAUTION:

- When connecting the power steering tube, be sure to follow the connecting procedure. Failure to observe this caution may lead to bend of the power steering tube or oil leakage.

- Clamp the steering gear housing in a vice or the like.

NOTE:

- Be very careful not to apply excessive load during the assembly.

- With the cut-out section of the pitman arm aligned with that of the cross shaft, install the pitman arm to the cross shaft.

NOTE:

- At this time, make sure that the mating mark at the pitman arm side is aligned with that at the gear side.

- Install a new spring washer and a nut to the cross shaft temporarily.

- Insert the steering gear housing in the vehicle.

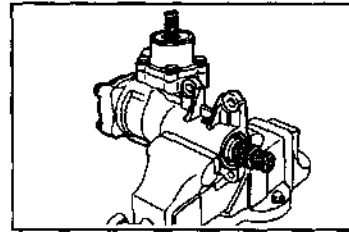
NOTE:

- Be very careful not to damage the brake pipe. Also, prevent the steering gear housing from interfering with other parts strongly.

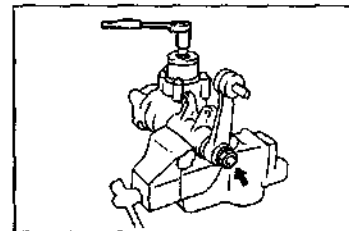
- Install the steering gear housing in the vehicle. Install the attaching bolts and nuts with new spring washers interposed.

- Tighten the attaching bolts and nuts of the steering gear housing evenly over two or three stages to the specified torque.

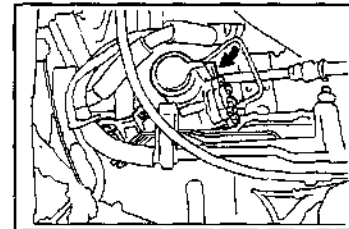
Tightening Torque: 73.5 - 103 N·m
(7.5 - 10.5 kgf·m, 54.2 - 75.9 ft·lb)



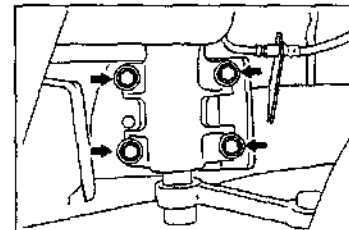
WP590-SR296



WP590-SR297



WP590-SR298

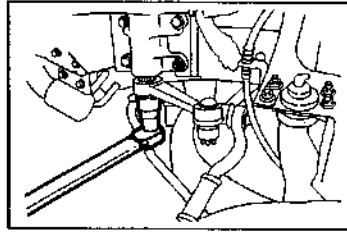


WP590-SR299

STEERING

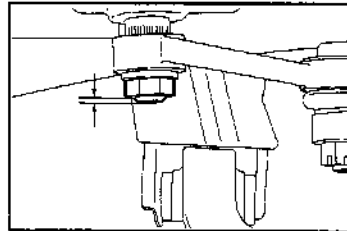
7. Tighten the pitman arm attaching nut to the specified torque.

Tightening Torque: 147 - 196 N-m
(15 - 20 kgf-m, 109 - 145 ft-lb)



8. After the pitman arm attaching nut has been tightened, ensure that the shaft is protruding from the nut edge surface by the specified amount given below.

Specified Amount: 2.4 ± 1.5 mm

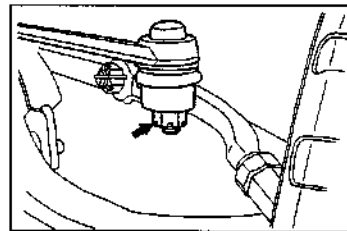


9. Connect the relay rod to the Pitman arm, and tighten the castle nut to the specified torque:

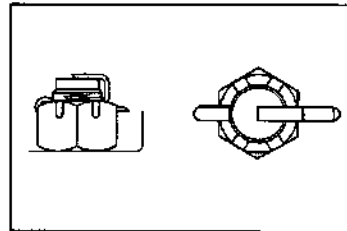
Tightening Torque: 68.6 - 137 N-m
(7.0 - 14 kgf-m, 50.6 - 101 ft-lb)

NOTE:

- At this time, align the recess in the castle nut with the hole in the Pitman arm ball joint.



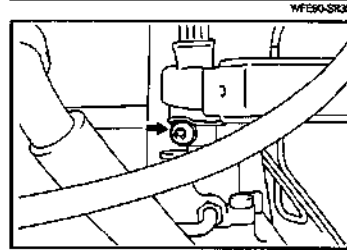
10. Install the cotter pin to the castle nut. Bend the legs as indicated in the right figure.



11. Connect the intermediate shaft onto the steering shaft in such a way that the cut-out section of the steering shaft may be aligned with the bolt hole of the intermediate shaft or in such a way that the mating marks put during the removal may be aligned.

NOTE:

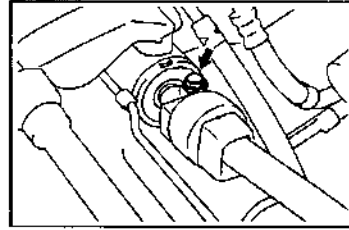
- Ensure that the tires are set to a straight-ahead condition and that the steering wheel assumes the normal straight-ahead position.
- Be sure to positively connect the universal joint to the serration section as far as it will go, until the serration section of the steering shaft becomes invisible from the edge surface of the intermediate shaft.



STEERING

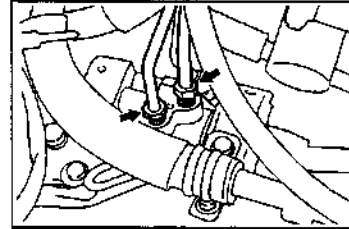
12. Insert the connecting bolts of the intermediate shaft and tighten them to the specified torque.

Tightening Torque: 24.5 - 34.3 N·m
(2.5 - 3.5 kgf-m, 18.1 - 25.3 ft-lb)



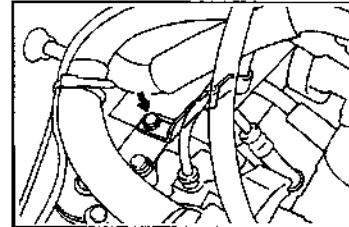
WFE90-SR905

13. Temporarily install the pressure feed tubes to the power steering gear housing.
(Power steering-equipped vehicle only)



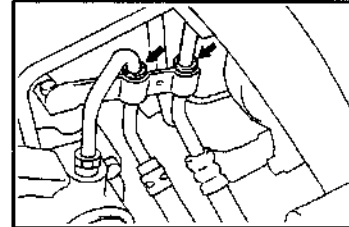
WFE90-SR906

14. Install the pressure feed tube clamp bracket to the power steering gear housing.
(Power steering-equipped vehicle only)



WFE90-SR907

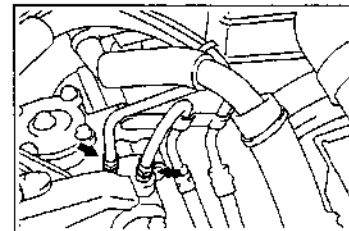
15. Install the rubber grommets to the pressure feed tubes.
(Power steering-equipped vehicle only)



WFE90-SR908

16. Tighten the flare nuts which attach the pressure feed tubes to the pressure feed tube bracket, until the installed rubber grommet section contacts with the pressure feed tube.
(Power steering-equipped vehicle only)

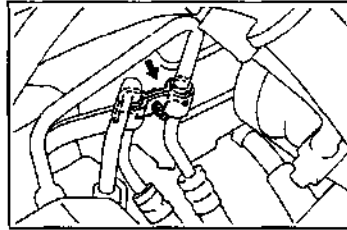
Tightening Torque: 39.2 - 49.0 N·m
(4.0 - 5.0 kgf-m, 28.9 - 36.2 ft-lb)



WFE90-SR909

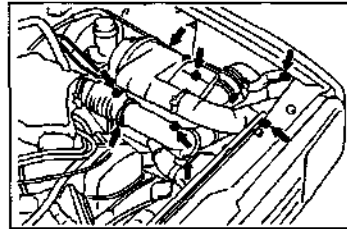
STEERING

17. Install the pressure feed tube clamp and tighten the attaching screws.
(Power steering-equipped vehicle only)



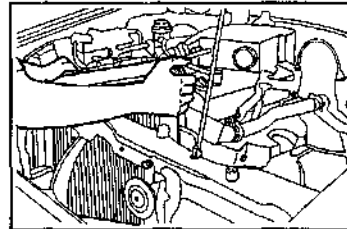
WF80-SR310

18. Install the air cleaner and air hose assembly to the vehicle. Tighten the attaching bolts. (L.H.D. vehicle only)
(For details, refer to the Engine section.)
19. Tighten the air cleaner hose band. (L.H.D. vehicle only)
(For details, refer to the Engine section.)
20. Clamp the clutch cable to the air cleaner with the clamp bolt. (L.H.D. vehicle only)
(For details, refer to the Engine section.)



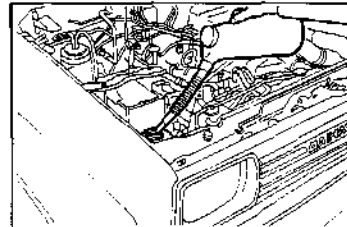
WF80-SR311

21. Install the radiator. (R.H.D. vehicle only)
(For details, refer to the Cooling System section.)
22. Install the reservoir tank. (R.H.D. vehicle only)
(For details, refer to the Cooling System section.)



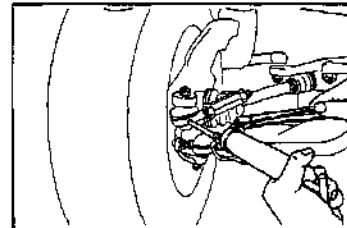
WF80-SR312

23. Fill power steering fluid.
(Power steering-equipped vehicle only)
(See page SR-24.)



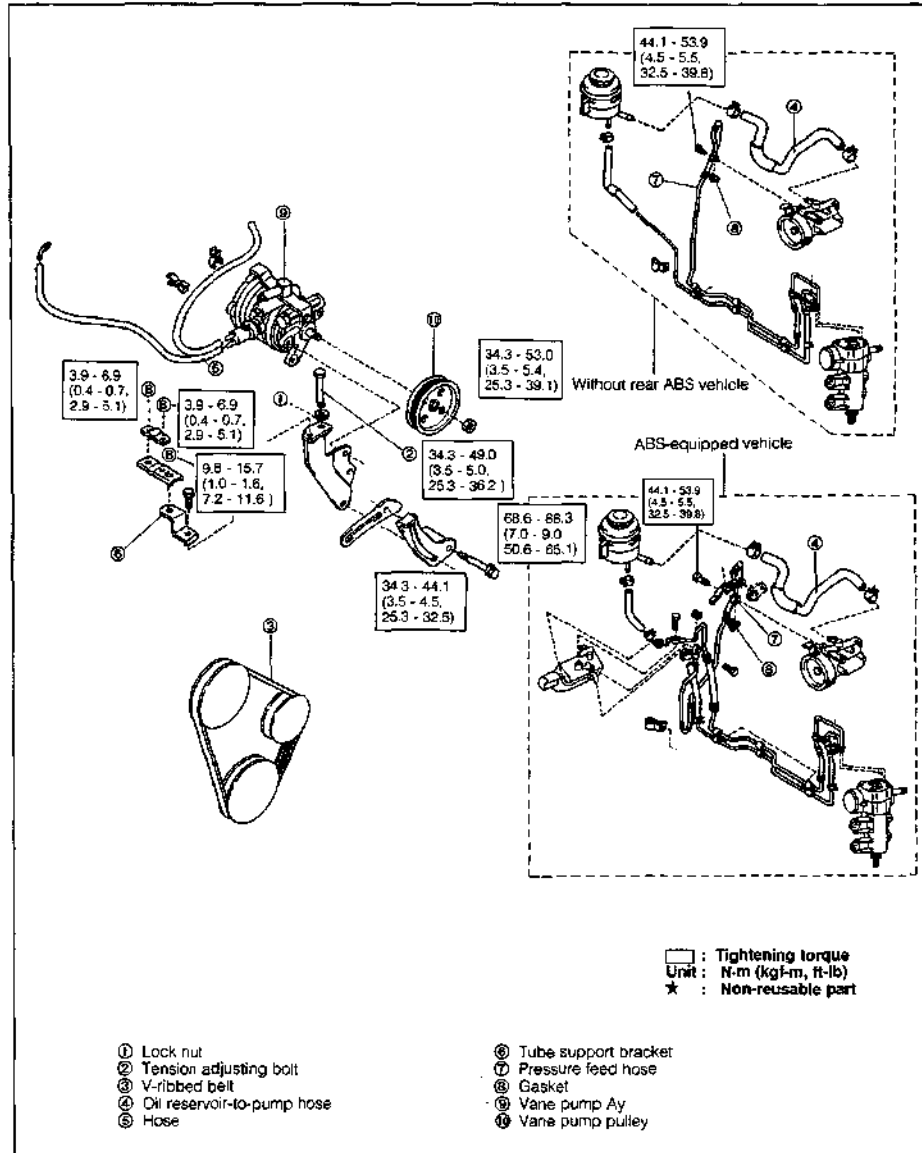
WF80-SR313

24. Fill lithium-based MP grease to the pitman arm.



WF80-SR314

VANE PUMP COMPONENTS

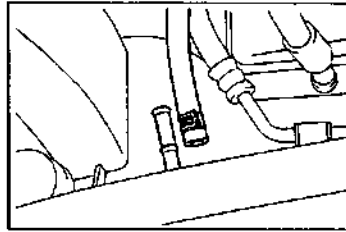


WF250-SR815

STEERING

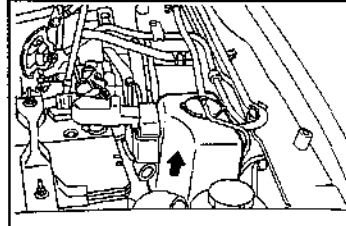
REMOVAL

1. Drain the power steering fluid.
(As for the draining procedure, see page SR-22 to SR-23.)



WPB90-SR316

2. Remove the radiator reservoir tank from the vehicle by raising it. Place the tank on the radiator.



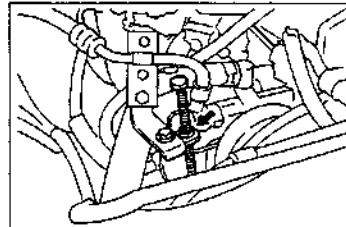
WPB90-SR317

3. Loosen the vane pump attaching bolts.
4. Loosen the vane pump drive belt adjusting set bolt.



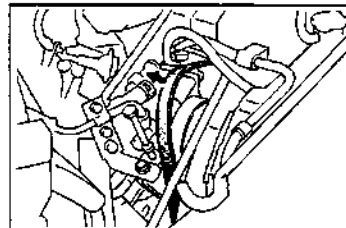
WPB90-SR318

5. Loosen the lock nut of the drive belt adjusting bolt. Loosen the adjusting bolt.



WPB90-SR319

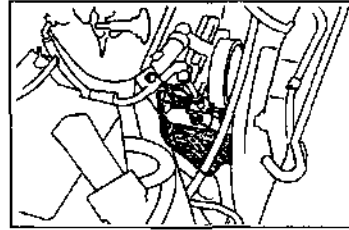
6. Remove the drive belt.



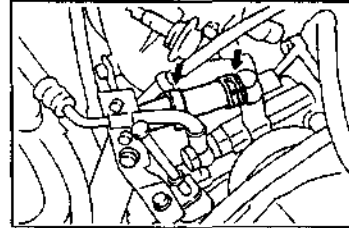
WPB90-SR320

STEERING

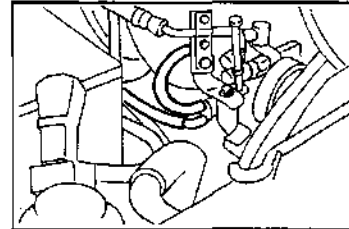
7. Place an adequate cloth under the vane pump so as not to soil the alternator and alternator drive belt.



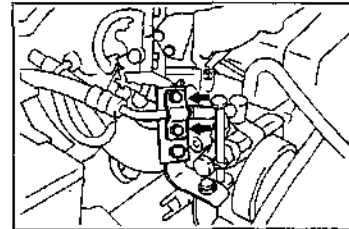
8. Detach the hose clamp from the oil reservoir-to-pump hose.
9. Disconnect the oil reservoir-to-pump hose from the vane pump.



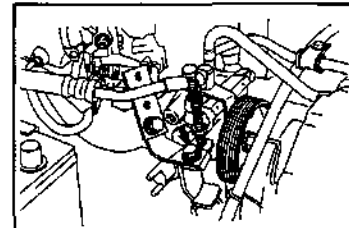
10. Disconnect the air hoses for idle-up use from the air control valve.
NOTE:
 - The carburetor-equipped vehicle has three air hoses.



11. Remove the attaching bolt of the pressure feed tube clamp. Detach the clamp.



12. Remove the tube support bracket from the pump front stay.

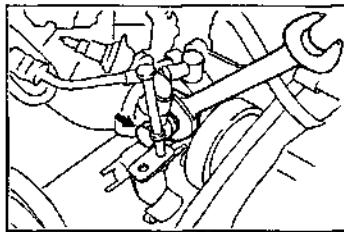


STEERING

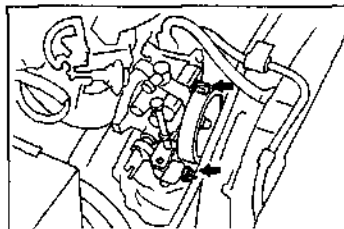
13. Loosen and remove the pressure feed tube attaching union bolts, while preventing them from turning at the nut section of the pressure feed pump side.

NOTE:

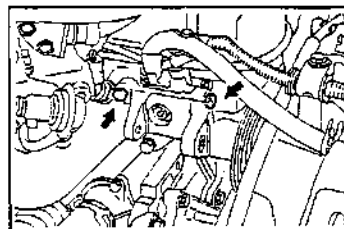
- Never reuse the gasket.



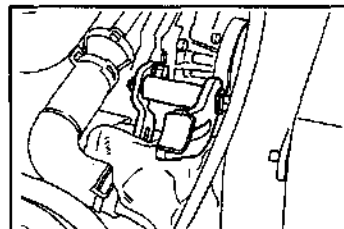
14. Remove the vane pump attaching bolts and set bolt. Remove the vane pump from the engine.



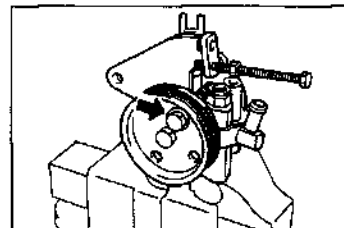
15. Remove the pump bracket attaching bolts.



16. Visually inspect the adjusting strut for damage, such as cracks and deformation. If any damage is present, remove the adjusting strut by removing the set bolt and nut.

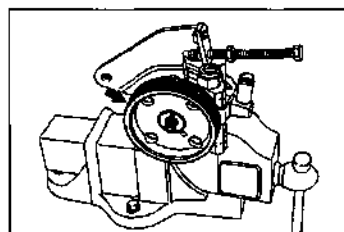


17. Remove the set bolt, while preventing the vane pump pulley from turning by inserting a suitable bolt to the pulley, as indicated in the right figure.



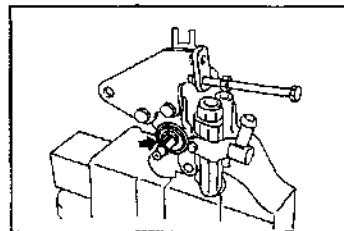
STEERING

18. Remove the pulley from the vane pump.



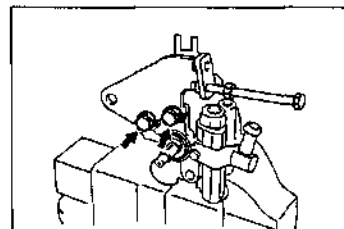
WP80-SR331

19. Remove the woodruff key from the vane pump.



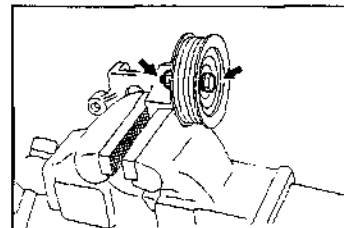
WP80-SR332

20. Remove the pump front stay from the vane pump.



WP80-SR333

21. Remove the idle pulley from the vane pump bracket.

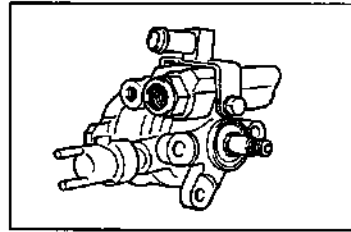


WP80-SR334

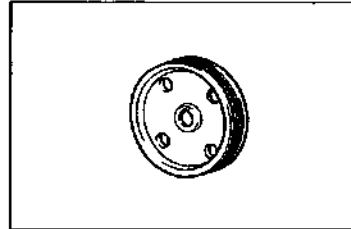
STEERING

INSPECTIONS

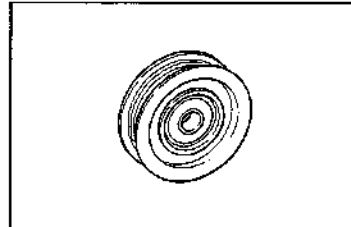
1. Ensure that the vane pump exhibits no damage, such as deformation, breakage and oil leakage.
2. Ensure that the vane pump pulley exhibits no damage, such as deformation and cracks.
3. Ensure that the idle pulley exhibits no damage, such as deformation and cracks. Ensure that the bearing can rotate smoothly.
If not, replace the idle pulley.
4. Ensure that no damage is present at the brackets and attaching bolts.
If any damage is present, replace defective parts.



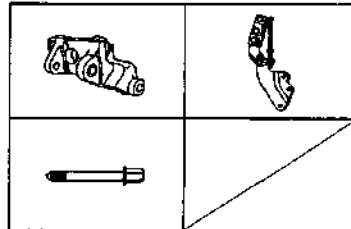
WFEBQ-SR336



WFEBQ-SR336



WFEBQ-SR337

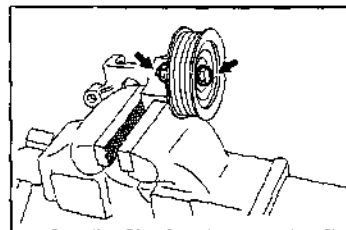


WFEBQ-SR338

INSTALLATION

1. Install the idle pulley to the vane pump bracket with the bolts and nuts. Tighten the attaching bolts and nuts to the specified torque.

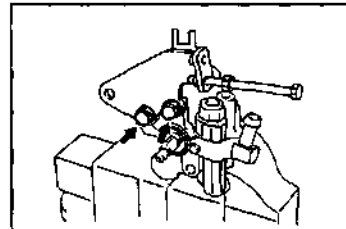
Tightening Torque: 34.3 - 49.0 N·m
(3.5 - 5.0 kgf-m, 25.3 - 36.2 ft-lb)



WFE20-SR339

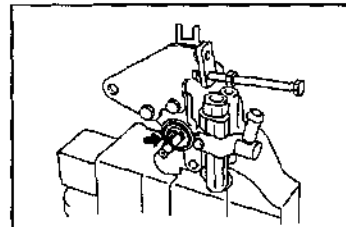
2. Install the pump front stay to the vane pump with the attaching bolts.

Tightening Torque: 34.3 - 49.0 N·m
(3.5 - 5.0 kgf-m, 25.3 - 36.2 ft-lb)



WFE20-SR340

3. Install the woodruff key to the vane pump.

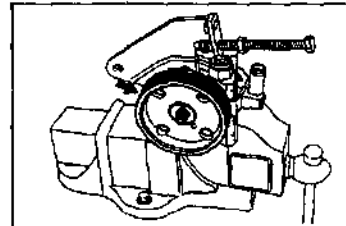


WFE20-SR341

4. Install the pulley to the vane pump.

NOTE:

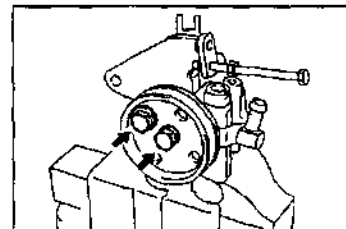
- Make sure that the woodruff key will not be displaced during the installation.



WFE20-SR342

5. Insert a suitable bolt to the vane pump pulley as indicated in the right figure. While preventing the pulley from turning, tighten the set bolt to the specified torque.

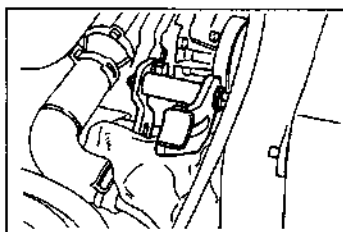
Tightening Torque: 34.3 - 53.0 N·m
(3.5 - 5.4 kgf-m, 25.3 - 39.1 ft-lb)



WFE20-SR343

STEERING

6. Temporarily install the adjusting strut to the alternator adjusting bar.
(Only cases where the adjusting strut was removed)



WFE80-SR344

7. Install the vane pump bracket to the engine. Tighten the attaching bolts to the specified torque.

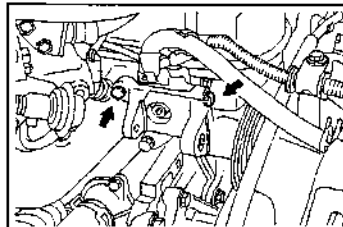
Tightening Torque:

M8 bolt

9.8 - 15.7 N·m (1.0 - 1.6 kgf-m, 7.2 - 11.6 ft-lb)

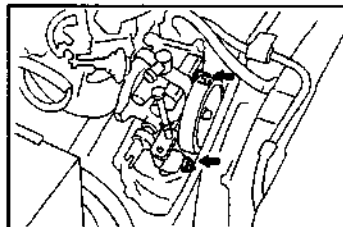
M10 bolt

34.3 - 44.1 N·m (3.5 - 4.5 kgf-m, 25.3 - 32.5 ft-lb)



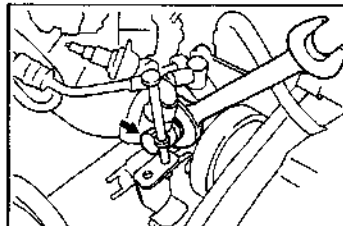
WFE80-SR345

8. Connect the vane pump to the engine. Temporarily tighten the attaching bolt and set bolt.



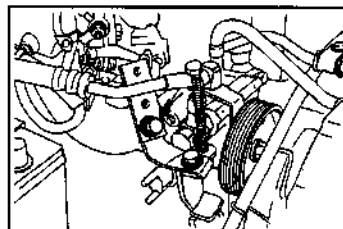
WFE80-SR346

9. Temporarily install the pressure feed tube to the vane pump with a new gasket interposed.



WFE80-SR347

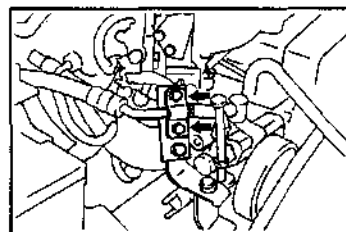
10. Temporarily install the tube support bracket to the pump front stay. Loosen the bolts connecting the tube support bracket to the tube support bracket No. 2.



WFE80-SR348

STEERING

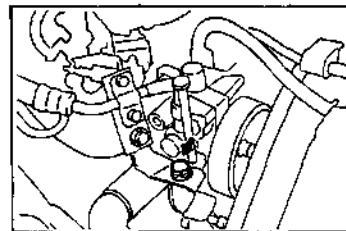
11. Temporarily install the pressure feed tube to the tube support bracket No. 2 with a clamp.



WPED0-SR649

12. Tighten the bolt connecting the tube support bracket to the pump front stay to the specified torque.

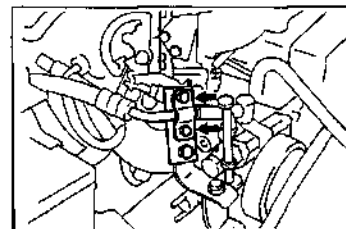
Tightening Torque: 9.8 - 15.7 N·m
(1.0 - 1.6 kgf-m, 7.2 - 11.6 ft-lb)



WPED0-SR650

13. Tighten the clamp attaching bolts to the specified torque.

Tightening Torque: 3.9 - 6.9 N·m
(0.4 - 0.7 kgf-m, 2.9 - 5.1 ft-lb)



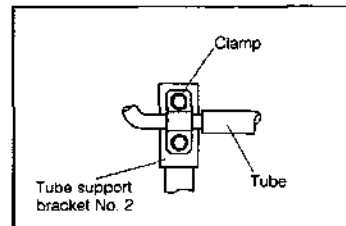
WPED0-SR651

CAUTION:

- Prior to the tightening, make sure that the tube support does not overlap the large diameter section of the tube.

NOTE:

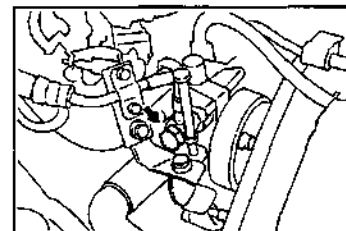
- If the attaching bolts were tightened under the condition that the larger diameter section of the tube rode over the tube support, be sure to replace the tube support bracket and clamp with new parts.



WPED0-SR652

14. Tighten the union bolt to the specified torque, while preventing it from turning at the nut section at the vane pump side.

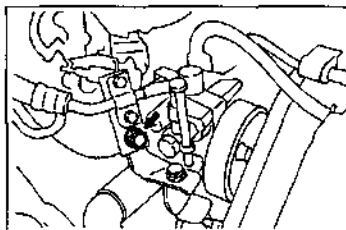
Tightening Torque: 44.1 - 53.9 N·m
(4.5 - 5.5 kgf-m, 32.5 - 39.8 ft-lb)



WPED0-SR653

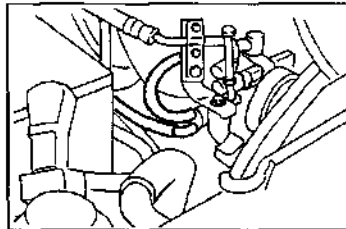
STEERING

15. Tighten the bolts connecting the tube support bracket No.2 to the tube support bracket to the specified torque.
Tightening Torque: 9.8 - 15.7 N·m
(1.0 - 1.6 kgf-m, 7.2 - 11.6 ft-lb)



WFE90-SR354

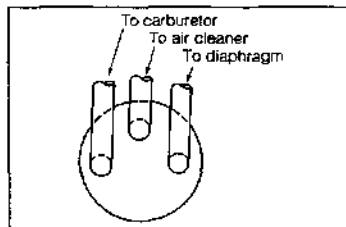
16. Connect the air hoses for idle-up use to the air control valve.



WFE90-SR355

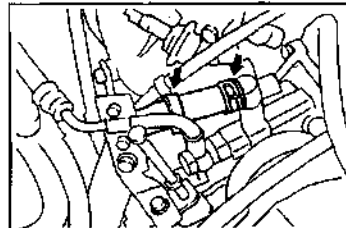
NOTE:

- As for air hoses for the carburetor-equipped vehicle, connect them as shown in the right figure.



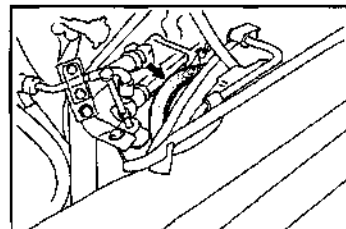
WFE90-SR356

17. Connect the oil reservoir-to-pump hose to the vane pump.
18. Attach the hose clip.
19. Remove the cloth placed during the disassembly.



WFE90-SR357

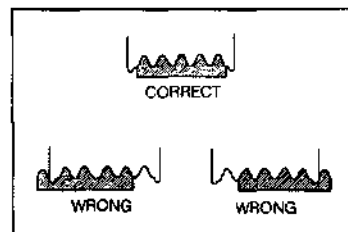
20. Insert the drive belt.



WFE90-SR357

STEERING

21. Correctly install the drive belt to each pulley.



WFE90-SR358

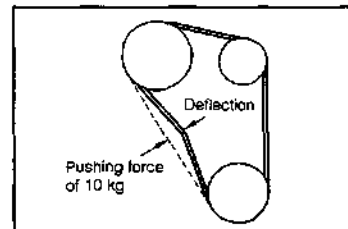
22. Adjust the drive belt tension by tightening the adjusting bolt so that the belt tension may become the specified value. Lock the adjusting bolt with the lock nut.

Specified Belt Deflection: 9 - 11 mm

[When a force of 10 kgf is applied]

Tightening Torque (lock nut):

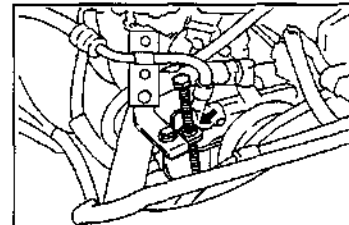
9.8 - 15.7 N·m (1.0 - 1.6 kgf·m, 7.2 - 11.6 ft·lb)



WFE90-SR359

NOTE:

- As for the belt tension of the air conditioner-equipped vehicle, see the Air Conditioner section.

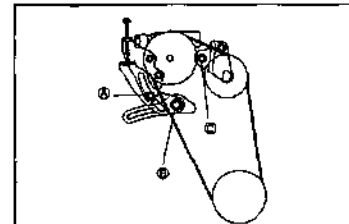


WFE90-SR360

23. Tighten the remaining bolts to the specified torque.

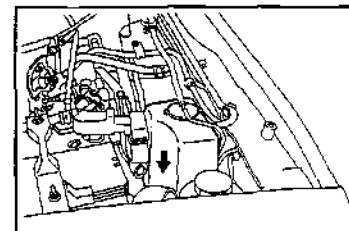
Tightening Torque:

- Ⓐ: 34.3 - 44.1 N·m
(3.5 - 4.5 kgf·m, 25.3 - 32.5 ft·lb)
- Ⓑ: 68.6 - 88.3 N·m
(7.0 - 9.0 kgf·m, 50.6 - 65.1 ft·lb)
- Ⓒ: 49.0 - 68.6 N·m
(5.0 - 7.0 kgf·m, 36.2 - 50.6 ft·lb)



WFE90-SR361

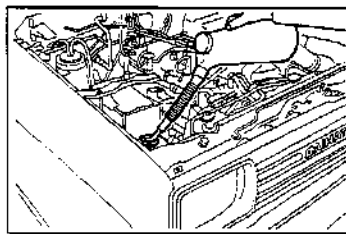
24. Install the radiator reservoir tank by inserting it to the clamp at the vehicle side.



WFE90-SR362



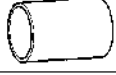



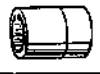

STEERING

25. Fill power steering fluid.
(See page SR-24 to SR-25.)
26. Carry out the in-vehicle inspection of the power steering.
(See page SR-20.)



STEERING

SSTs (Special Service Tools)

Shape	Parts No. and Name	Purpose	Remarks
	09608-87611-000 Lower arm dust cover & tie rod end dust cover replacer	Assembling of tie rod end dust cover	
	09608-87613-000 Pitman arm, tie rod and dust cover & hub cap replacer	Assembling of pitman arm, tie rod end dust cover Assembling of hub cap	Except for hub cap for free wheel hub
	09608-87614-000 Idler arm dust cover replacer	Assembling of idler arm dust cover	
	09610-20012-000 Pitman arm puller	Disconnection of upper arm and lower arm	
	09610-87301-000 Pitman arm puller	Removal of pitman arm	
	09611-87701-000 Tie rod end puller	Disconnection of tie rod end	
	09616-00010-000 Steering pinion bearing adjusting socket	Holding of steering shaft	
	09950-20017-000 Universal puller	Removal of bearing	

WFE90-SR065

SERVICE SPECIFICATION

Steering wheel free play	0 - 30 mm (0 - 1.18 inch)
Steering gear box oil level (Except power steering equipped model)	13 - 23 mm (0.51 - 0.91 inch) from upper side of steering gear box hole
Drive belt tension	9 - 11 mm (0.35 - 0.43 inch) when 10 kgf (22 lb) applied (Except for A/C equipped vehicle)
Maximum steering torque (Only for power steering equipped model)	7.8 N-m (80 kgf-cm, 5.8 ft-lb)
Vane pump hydraulic pressure Difference of hydraulic pressure	65 kg/cm ² (924.5 psi) or more 5 kg/cm ² (71.1 psi) at 1000 and 3000 rpm

WFE90-SR066

STEERING

TIGHTENING TORQUE

Tightening component	N·m	kgf·m	ft·lb
Steering gear housing x Oil filler plug (Except power steering equipped model)	2.0 - 3.9	0.2 - 0.4	1.4 - 2.9
Steering gear box x Pressure tubes (Only power steering equipped model)	39.2 - 49.0	4.0 - 5.0	28.9 - 36.2
Steering wheel x Steering shaft	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Steering shaft x Intermediate shaft	24.5 - 34.3	2.5 - 3.5	18.1 - 25.3
Steering hole cover x Floor panel	3.9 - 6.9	0.4 - 0.7	2.9 - 5.1
Steering colum tube x Brace (Instrument panel)	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Steering colum tube x Steering hole cover (Tilt steering equipped model only)	3.9 - 6.9	0.4 - 0.7	2.9 - 5.1
Steering support x long nut (Tilt steering equipped model only)	12.7	1.3	9.4
Steering lever x long nut (Tilt steering equipped model only)	29.4 - 49.0 24.5 - 34.3	3.0 - 4.5 2.5 - 3.5	21.7 - 36.2 18.1 - 25.3
Steering relay rod x Tie rod	68.6 - 137	7.0 - 14.0	50.6 - 101
Idler arm support pin x Frame	34.3 - 53.9	3.5 - 5.5	25.4 - 39.8
Idler arm support pin x Idler arm assembly	108 - 167	12.0 - 17.0	87 - 123
Idler arm x Relay rod	49.0 - 68.6	5.0 - 7.0	36.2 - 50.6
Pitman arm x Relay rod	68.6 - 137	7.0 - 14.0	50.6 - 101
Tie rod x Steering knuckles	68.6 - 137	7.0 - 14.0	68.6 - 137
Wheel hub nuts	88.3 - 118	9.0 - 12.0	65.1 - 87.0
Steering gear housing x Frame	73.5 - 103	7.5 - 10.5	54.2 - 75.9
Steering gear housing x Pitman arm	147-196	15.0 - 20.0	109 - 145
Cross shaft adjust screw x Lock nut	19.6 - 34.3	2.0 - 3.5	14.5 - 25.3
Intermediate shaft x Steering gear housing	24.5 - 34.3	2.5 - 3.5	18.1 - 25.3
Idle pulley x Vane pump bracket	34.3 - 49.0	3.5 - 5.0	25.3 - 36.2
Vane pump x Pump front stay	34.3 - 49.0	3.5 - 5.0	25.3 - 36.2
Vane pump x Pulley	34.3 - 53.0	3.5 - 5.4	25.3 - 39.1
Vane pump bracket x Engine M8 M10	9.8 - 15.7 34.3 - 44.1	1.0 - 1.6 3.5 - 4.5	7.2 - 11.6 25.3 - 32.5
Pump front stay x Tube support bracket	9.8 - 15.7	1.0 - 1.6	7.2 - 11.6
Tube support bracket x Clamp	3.9 - 6.9	0.4 - 0.7	2.9 - 5.1
Vane pump x Union bolt	44.1 - 53.9	4.5 - 5.5	32.5 - 39.8
Tube support bracket x Tube support bracket	9.8 - 15.7	1.0 - 1.6	7.2 - 11.6
Drive belt tension adjust bolt x Lock nut	9.8 - 15.7	1.0 - 1.6	7.2 - 11.6
Vane pump front stay x Adjusting strut	34.3 - 44.1	3.5 - 4.5	25.3 - 32.5
Adjusting strut x Adjusting bar	68.6 - 88.3	7.0 - 9.0	50.6 - 65.1
Vane pump x Vane pump bracket	49.0 - 68.6	5.0 - 7.0	36.2 - 50.6

WFED-SR367

DAIHATSU F300

BODY

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WFE90-BC001

BODY

GENERAL INFORMATION

BODY COLOR INFORMATION

Body color	Daihatsu color code	Stripe color		
		A	B	C
Red Gray M. San Remo green/Grey M.	3E7 166 NB1 (G09/166)	Dark Gray Metallic	Silver Metallic	Dark Blue
Green Dark blue M. Black M. Red mica/silver M. Dark blue M./silver M. Black M./silver M. White/silver M. White	G05 8G4 6A5 NA1 (3H1/148) NA2 (8G4/148) NA3 (6A5/148) NA4 (045/148) 045		Gray Metallic	Red

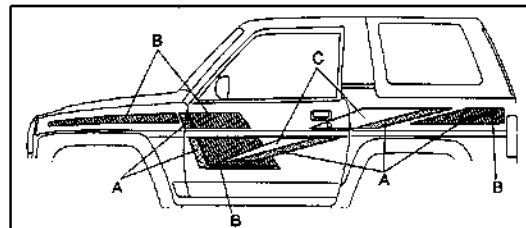
WFE90-B0002

COLOR CODE OF THE WORLD

COLOR		AXZO	DUPONT	I.C.I	SPIES HECKER	STANDOX
WHITE	045	DAH045	L8997	NW-80	16067	045
RED	3E7	DAH3E7	G8690	KK26	38299	3E7
GREEN	G05	DAHG05	G8691	KV77	68470	G05
GRAY, M	166	DAH166	N8632	B936B	97728	166
DARK BLUE, M	8G4	DAH8G4	K9131	C247B	97909	8G4
BLACK, M	6A5	DAH6A5	G8742	A403B	97806	6A5
TWO TONE	NA1	DAHNA1	G8730/N8221	PC86B/0985B	47840	NA1
TWO TONE	NA2	DAHNA2	K9131/N8221	C247B/0985B	48225	NA2
TWO TONE	NA3	DAHNA3	G8742/N8221	A403/0985B	48231	NA3
TWO TONE	NA4	DAHNA4	L8997/N8221	NW80/0985B	48232	NA4
TWO TONE	NB1	DAHNB1	N9305/N8832	XW13/B936B	48480	NB1

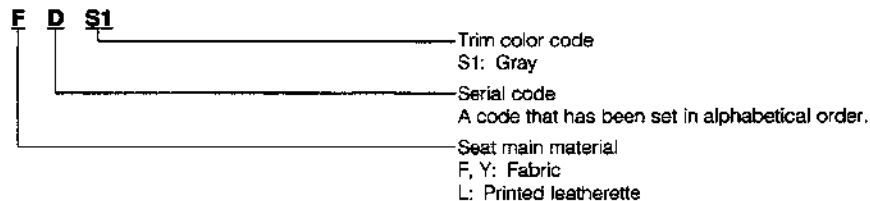
WFE90-B0003

BODY STRIPE INFORMATION



WFE90-B0004

TRIM INFORMATIONS



WFE90-B0005

BODY

BODY

There are two kinds of body shapes: They are the resin top specifications and the simple type tarpaulin specifications. These two specifications employ basically the same body construction.

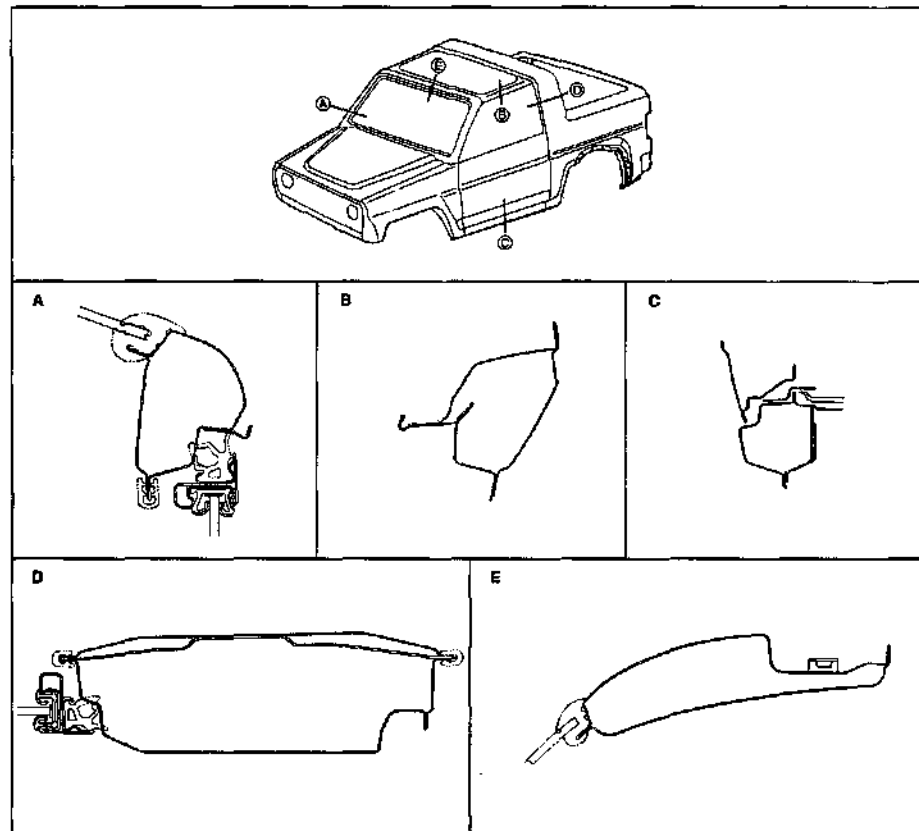
WP590-B0005

Body shell

Reinforcements are provided at various parts of the body in order that adequate rigidity may be assured and the noise and vibration levels may be reduced.

Basically, the resin top vehicle and soft top vehicle share the same shell.

The resin top vehicle (which has the identical body construction with the simple type tarpaulin vehicle) differs from the standard tarpaulin type vehicle in detailed construction.



WP590-B0007

BODY

Resin top vehicle

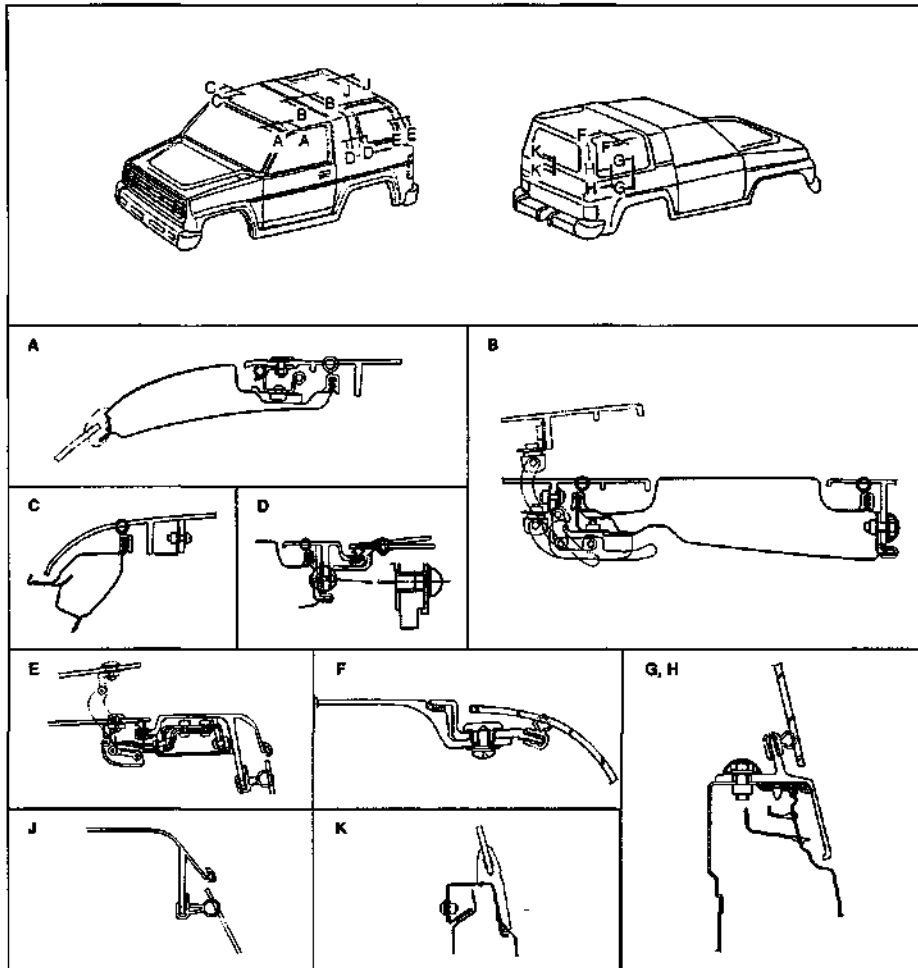
The rear upper body made of FRP (fiber glass reinforced plastic) is composed of a roof panel and side panels.

The front roof is equipped with an FRP removable type roof.

The rear upper body section is attached to the body by means of bolts. Such construction allows easy removal and installation of this section. It is, therefore, possible to replace this section with the simple type tarpaulin which is available as optional equipment.

Furthermore, as regards the front roof, it incorporates a tilt-up mechanism which allows the rear part of the roof to be raised.

The back door glass has been so designed that it can be removed or installed easily from the back door panel.

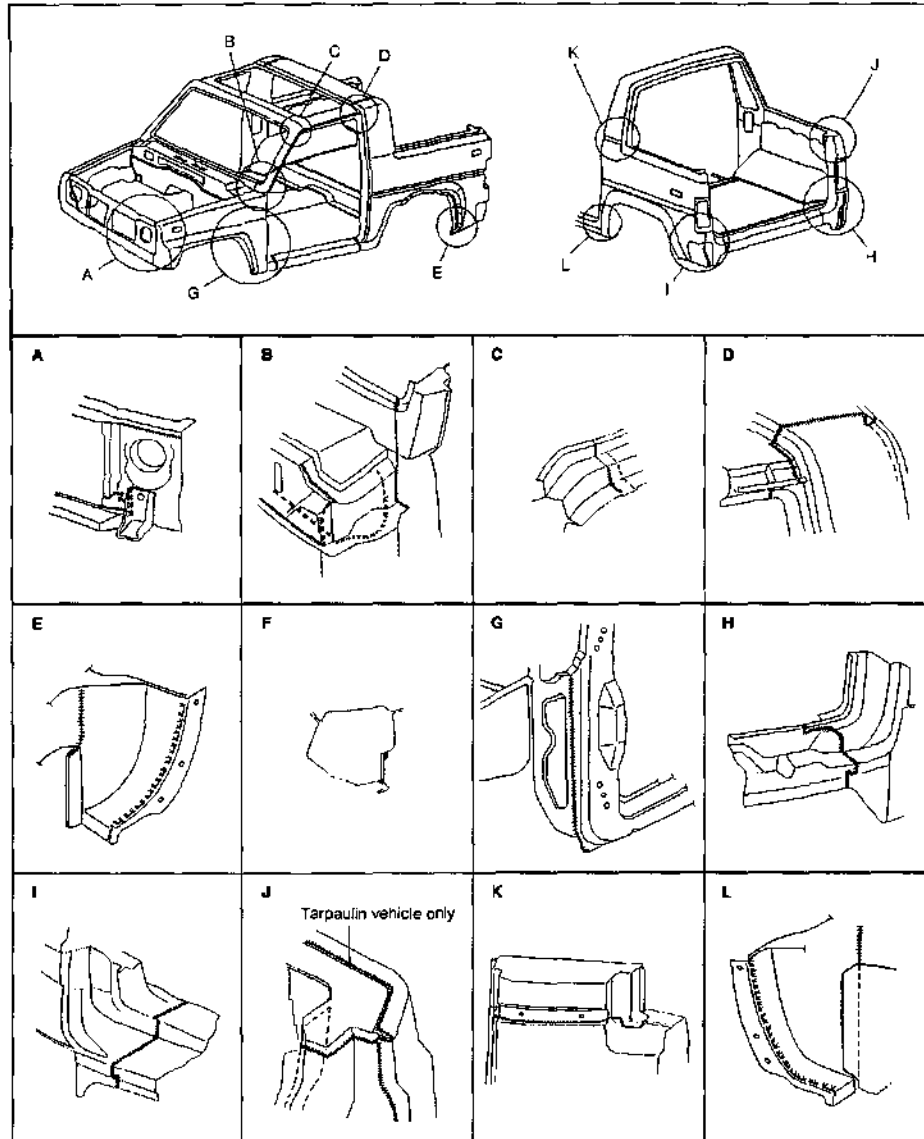


WP250-B0008

BODY

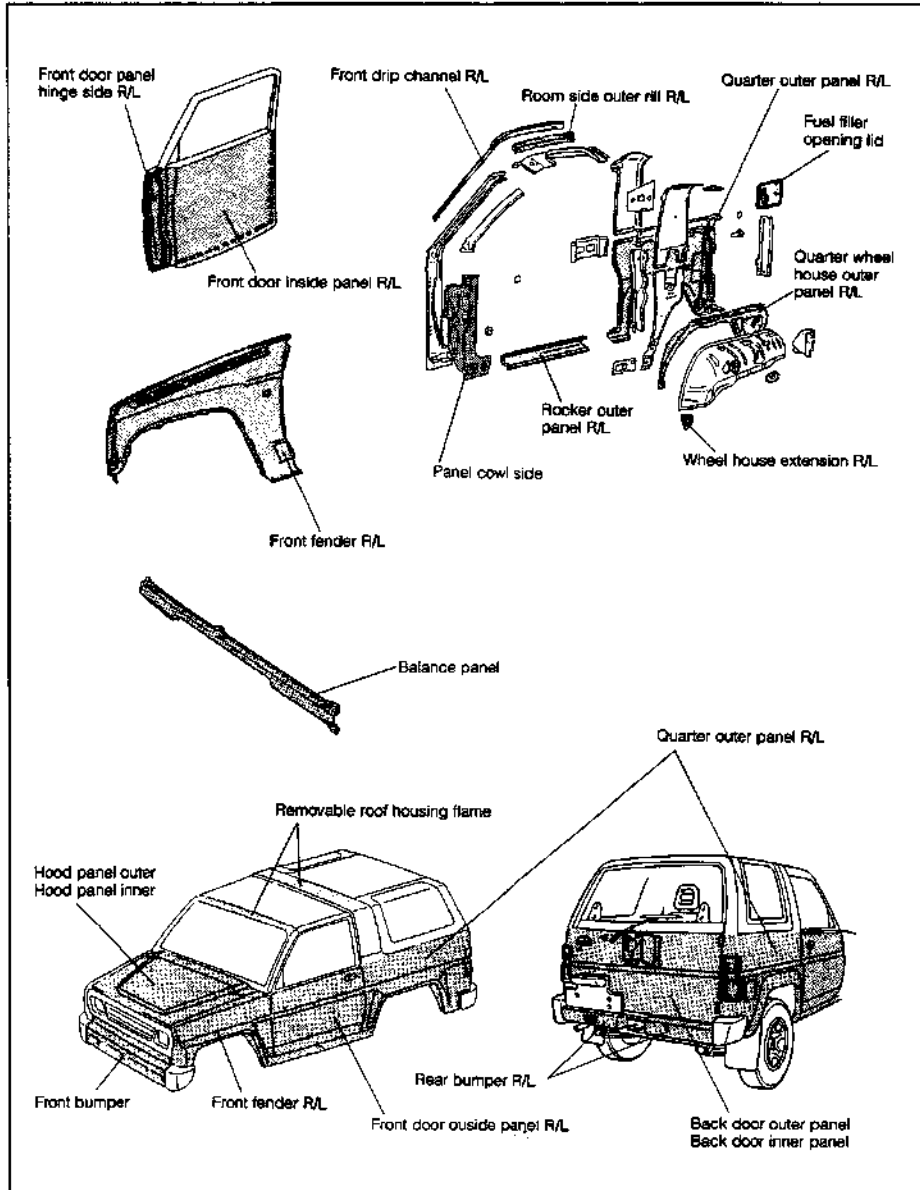
BODY SEALER

Body sealer is applied to the body panel mating surfaces and door-to-hood hemming sections so that rust preventive and water-proof characteristics may be strengthened.



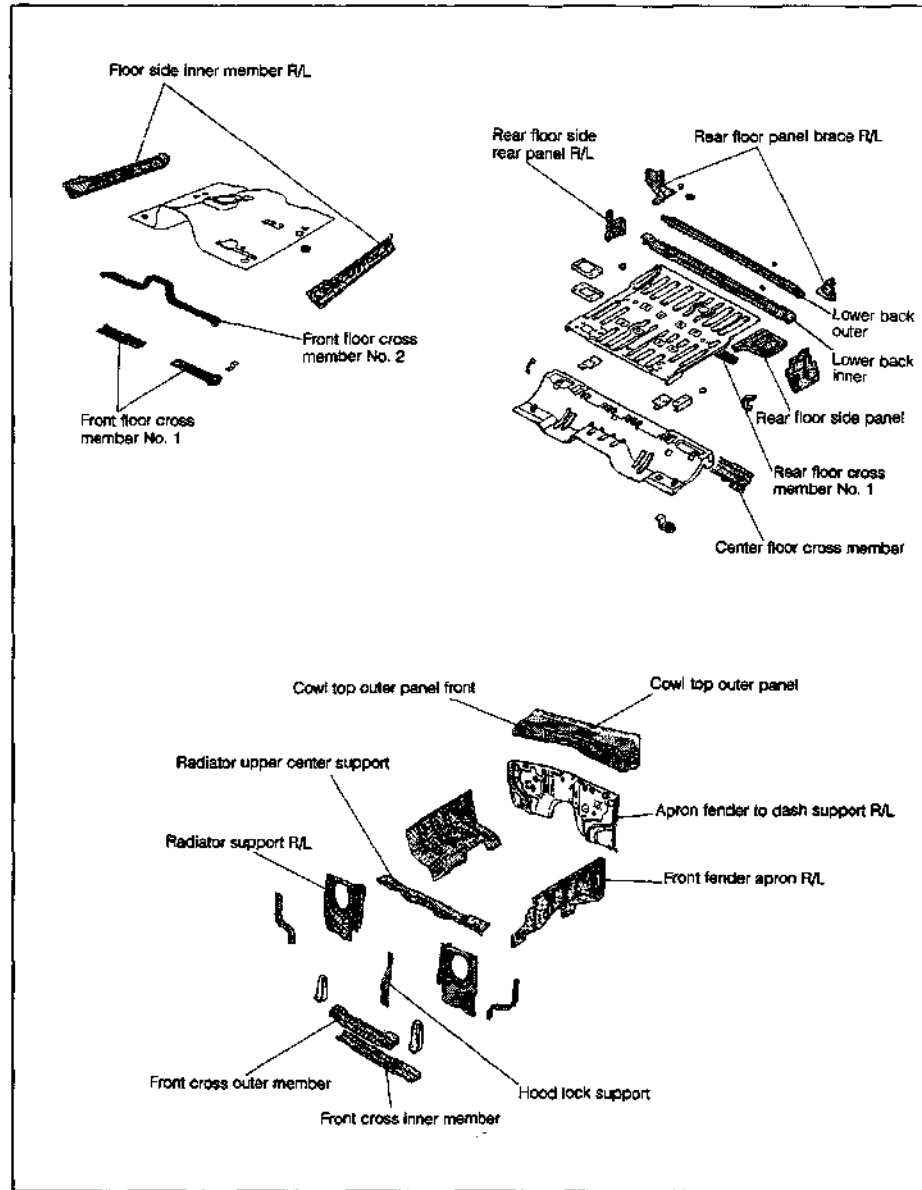
BODY

PARTS WHERE GALVANIZED STEEL SHEETS ARE USED



WFE30-80010

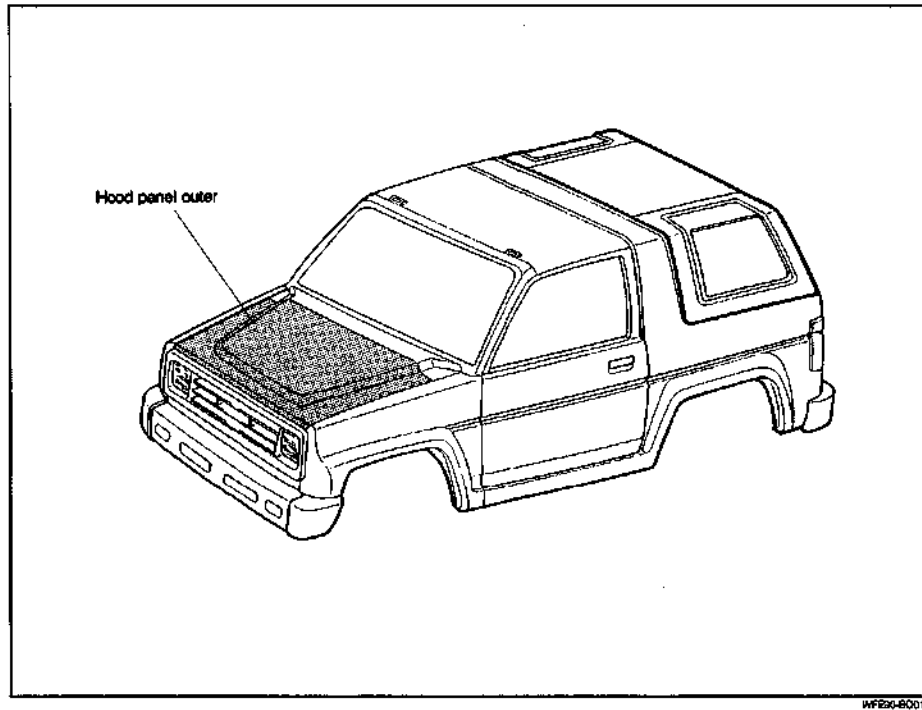
(Continued)



W1930-B0011

BODY

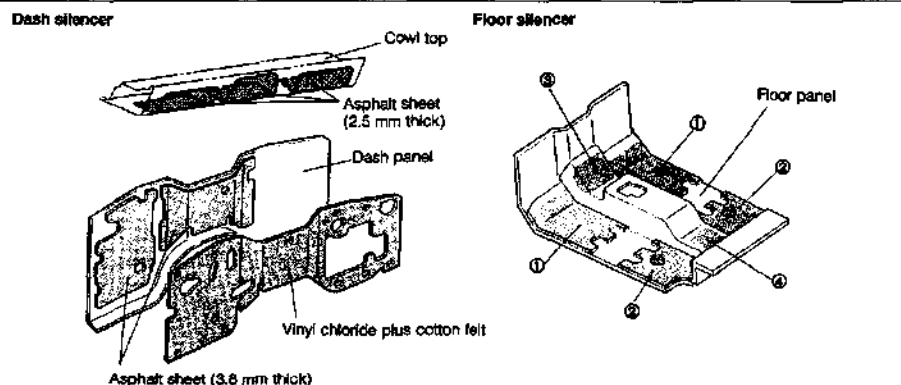
PARTS WHERE HIGH-TENSILE STEEL SHEETS ARE USED



SILENCERS

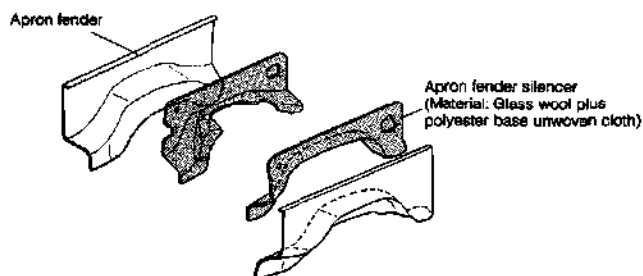
On all models, various silencers are provided at the dash panel and floor panel so as to prevent the noise at the vehicle exterior and engine from being transmitted into the vehicle interior.

Furthermore, on those vehicles with EFI specifications, as a noise control measure silencers (glass wool plus polyester base unwoven cloth) are mounted on the apron fender.



No.	Nomenclature	Resin top vehicle	Soft top vehicle
		Material	Material
①	Front floor silencer pad	Asphalt sheet + Cotton felt	Asphalt sheet + Cotton felt
②	Center floor silencer pad	Asphalt sheet + Cotton felt	Asphalt sheet + Cotton felt
③	Front floor silencer pad	Asphalt sheet	Asphalt sheet
④	Center floor silencer rear center pad	Asphalt sheet	

Apron fender silencer (Only for EFI vehicle)

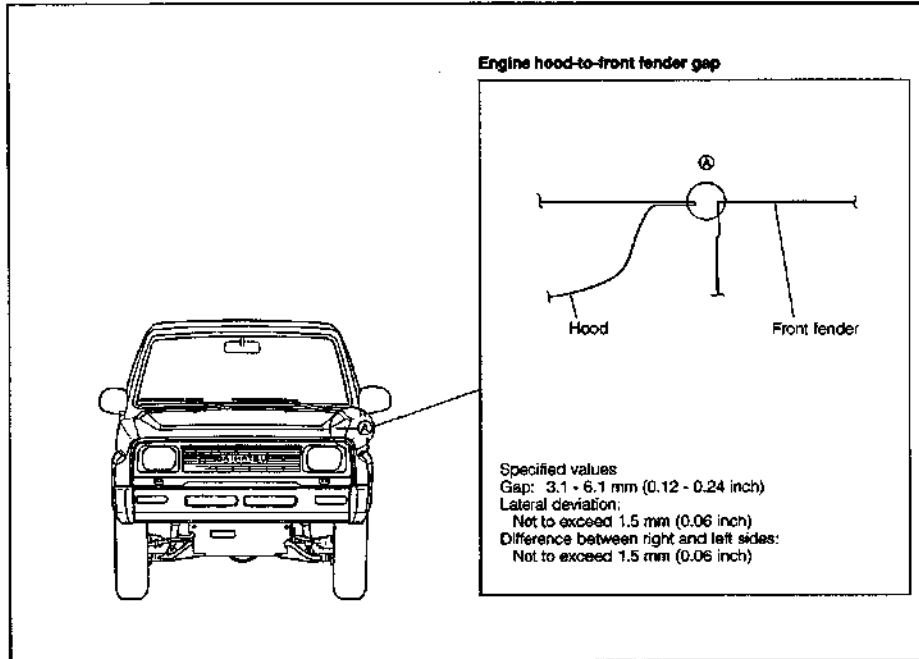


WP820-B00 13

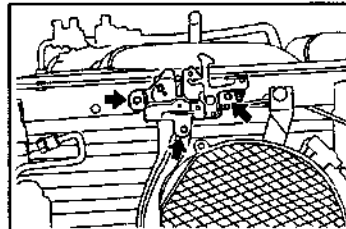
BODY

ALIGNMENT ADJUSTMENTS

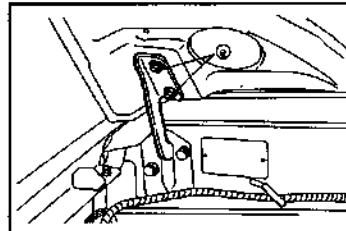
ENGINE HOOD ALIGNMENT ADJUSTMENT



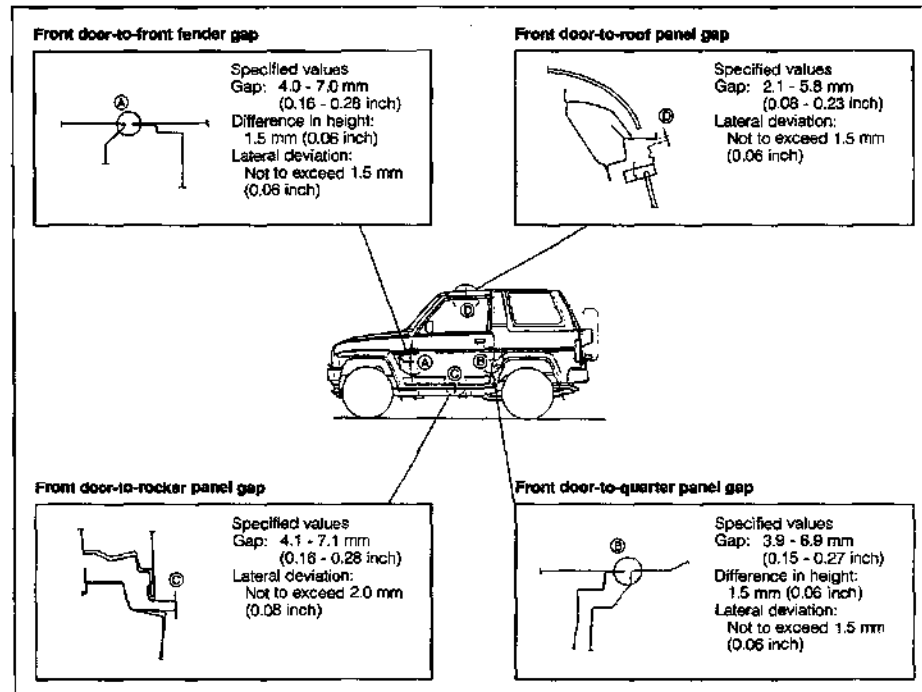
1. Adjustment of engine hood-to-front fender gap
Loosen the bolts **a**. Perform the adjustment by moving the hood.



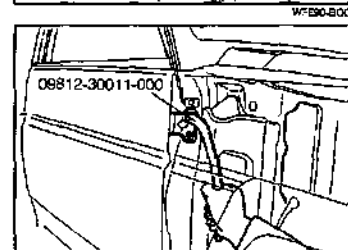
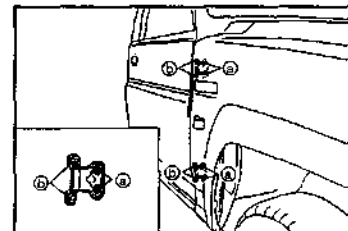
2. Hood lock adjustment
Loosen the three attaching bolts of the hood lock. Perform the adjustment by moving the hood lock.
(Adjust the hood lock in such a way that you will feel a slight looseness when the center section of the hood end is pushed strongly.)



FRONT DOOR ALIGNMENT ADJUSTMENT



1. Adjustment of front door-to-front fender gap and front door-to-quarter panel gap
Loosen the bolts (A). Perform the adjustment by moving the door panel in a fore-and-aft direction.
SST: 09812-30011-000
2. Adjustment of front door-to-rocker panel gap and front door-to-roof panel gap
Loosen the bolts (B). Perform the adjustment by moving the door panel in an up-and-down direction.
SST: 09812-30011-000
3. Adjust of difference in height between front door and front fender
Loosen the bolts (C). Perform the adjustment by moving the door panel in a right-and-left direction.
SST: 09812-30011-000



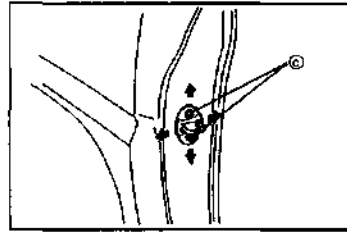
BODY

4. Door lock adjustment

Loosen the screws ② of the lock striker. Perform the adjustment by tapping the striker lightly.

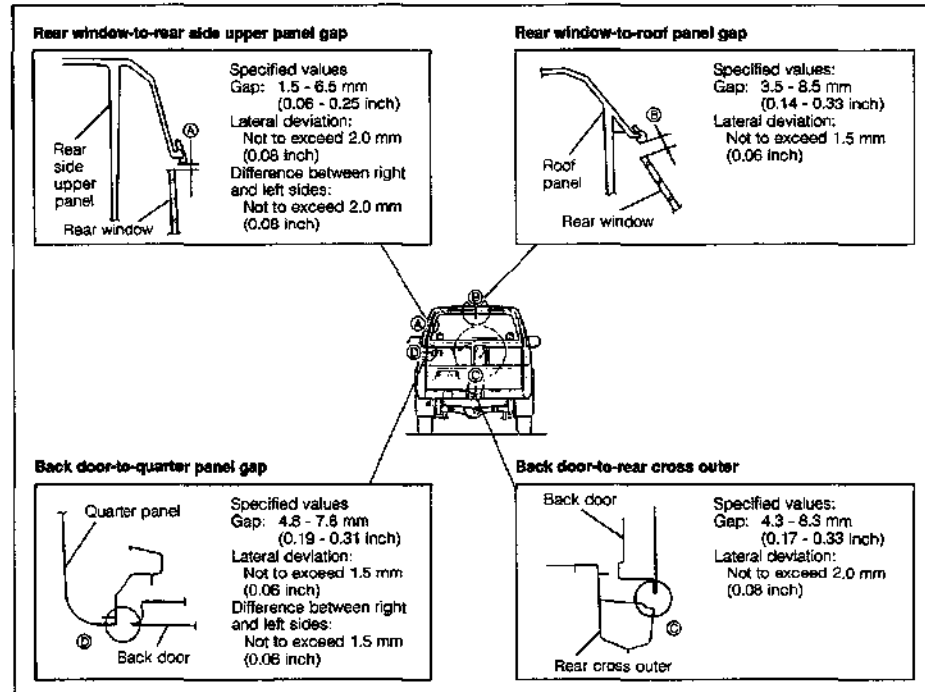
NOTE:

- Never attempt to correct the door sagging at its rear part by the adjustment of this lock striker. The correction should be made by adjusting the door hinge section.



WFE90-B0020

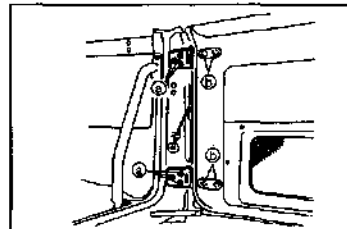
BACK DOOR ALIGNMENT ADJUSTMENT



WFE90-B0021

1. Adjustments of rear window-to-rear side upper panel gap, Back window-to-roof panel gap, Back door-to-quarter panel gap, Back door-to-cross outer

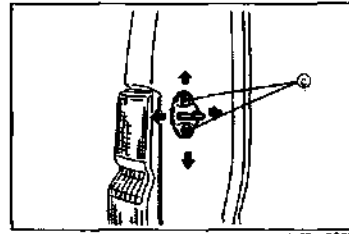
- (1) Loosen the bolts ②. Perform the adjustment.
- (2) If the adjustment can not be performed properly, loosen the nuts ③ at the adjustment.



WFE90-B0022

BODY

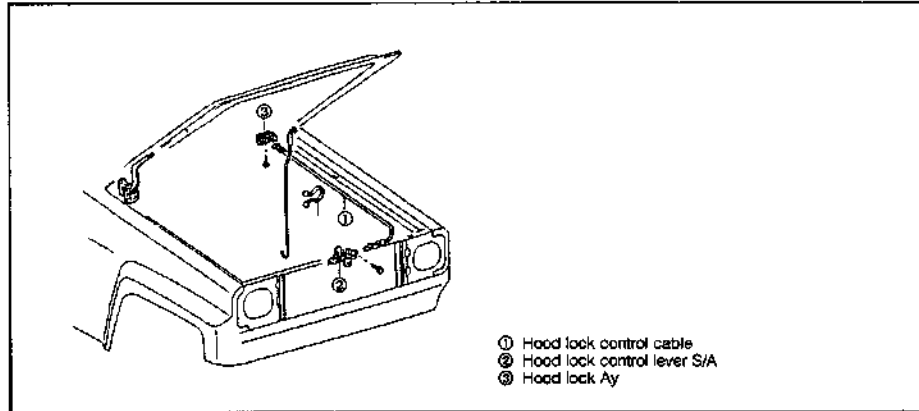
2. Back door lock adjustment
Loosen the screw ⑥ of the lock striker. Perform the adjustment by tapping the striker lightly.



WFE80-80028

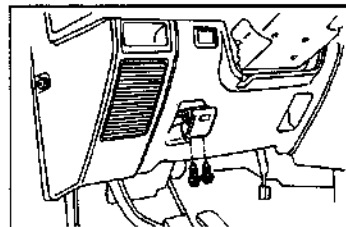
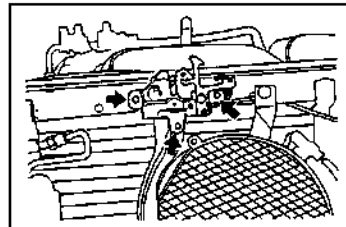
BODY

HOOD LOCK CONTROL CABLE COMPONENTS



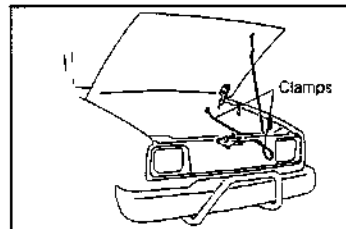
REMOVAL

1. Remove the radiator grille.
2. Removal of hood lock control cable assembly.
 - (1) Remove the hood lock assembly by removing the three bolts.
 - (2) Disconnect the hood lock control cable from the hood lock assembly.
- (3) Remove the hood lock control lever subassembly by removing the two screws.
- (4) Disconnect the hood lock control cable from the hood lock control lever subassembly.
- (5) Remove the hood lock control cable from the body.

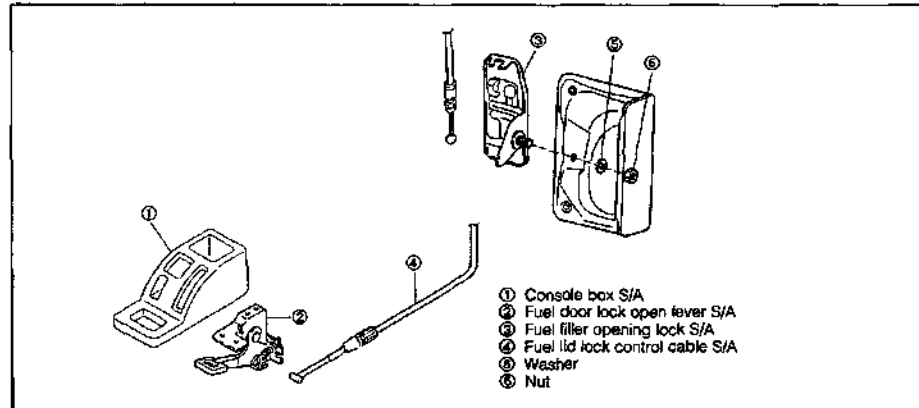


INSTALLATION

1. Installation of hood lock control cable assembly.
 - (1) Install the hood lock control cable to the body.
 - (2) Connect the hood lock control cable to the hood lock control lever subassembly.
 - (3) Install the hood lock control lever subassembly with the two screws.
 - (4) Connect the hood lock control cable to the hood lock assembly.
 - (5) Install the hood lock assembly with the three bolts.
2. Install the radiator grille.

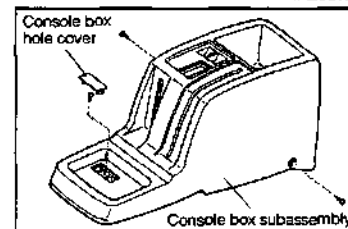


FUEL LID OPENER COMPONENTS

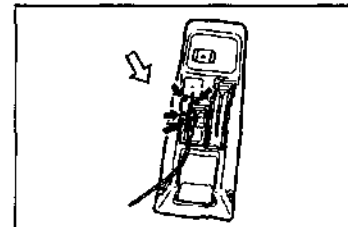


REMOVAL

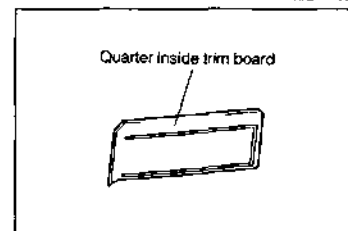
1. Removal of console box subassembly.
 - (1) Remove the console box hole cover.
 - (2) Remove the console box subassembly by removing the three screws.



2. Removal of fuel door lock open lever subassembly
 - (1) Remove the fuel door lock open lever subassembly from the console box subassembly removing the four screws.
 - (2) Disconnect the fuel lid lock control cable from the fuel lock open lever subassembly.

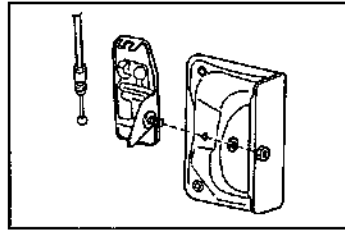


3. Remove the Quarter inside trim board.



BODY

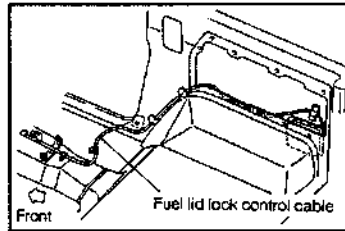
4. Removal of fuel filler opening lock subassembly
 - (1) Remove the rear combination lamp by removing the three screws.
 - (2) Remove the fuel filler opening lock subassembly by removing the nut.
 - (3) Disconnect the fuel lid lock control cable from the fuel filler opening lock subassembly.
5. Remove the fuel lid lock control cable from the body.



WP80-B0032

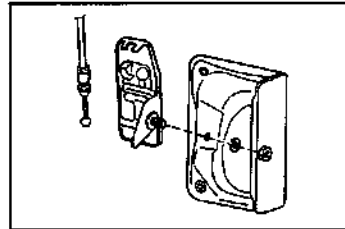
INSTALLATION

1. Install the fuel lid lock control cable to the body.



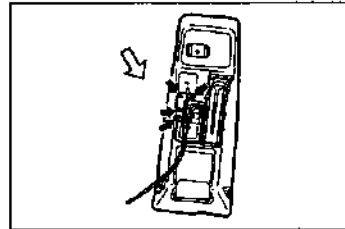
WP80-B0033

2. Installation of fuel filler opening lock subassembly.
 - (1) Connect the fuel lid lock control cable to the fuel filler opening lock subassembly.
 - (2) Install the fuel filler opening lock subassembly with the nut.
 - (3) Install the rear combination lamp with the three screws.



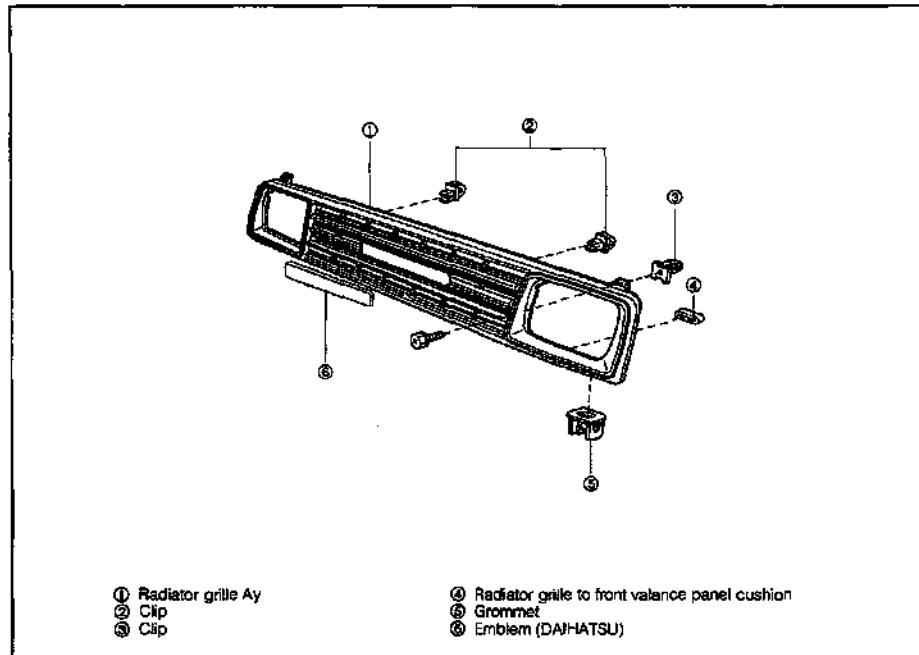
WP80-B0034

3. Installation of fuel door lock open lever subassembly
 - (1) Connect the fuel lid lock control cable to the fuel lock open lever subassembly.
 - (2) Install the fuel door lock open lever subassembly to the console box subassembly with the four screws.
4. Install the center pillar garnish and Quarter inside trim board.
5. Installation of console box subassembly
 - (1) Install the console box subassembly with the three screws.
 - (2) Install the console box cover.



WP80-B0035

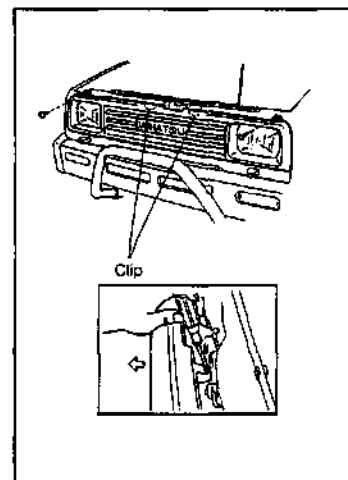
RADIATOR GRILLE COMPONENTS



WP580-BO056

REMOVAL

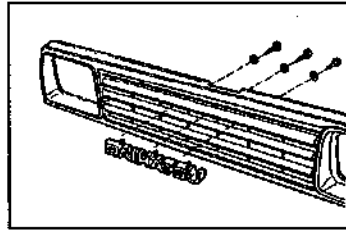
1. Removal of radiator grille assembly.
 - (1) Remove the two screws.
 - (2) Detaching the clips at two points.
(Push the pawl section at the upper side of the clip, using a screwdriver. Then, pull the radiator grille toward your side.)
 - (3) Remove the radiator grille assembly from the body.



WP580-BO057

BODY

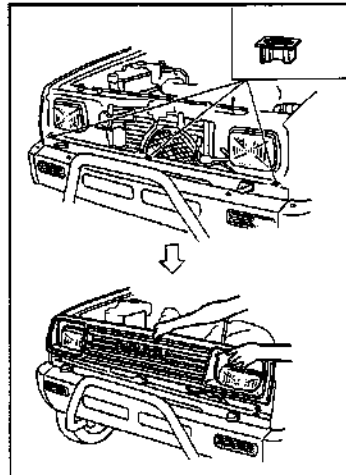
2. Remove the emblems by removing the screws.



WFE80-80038

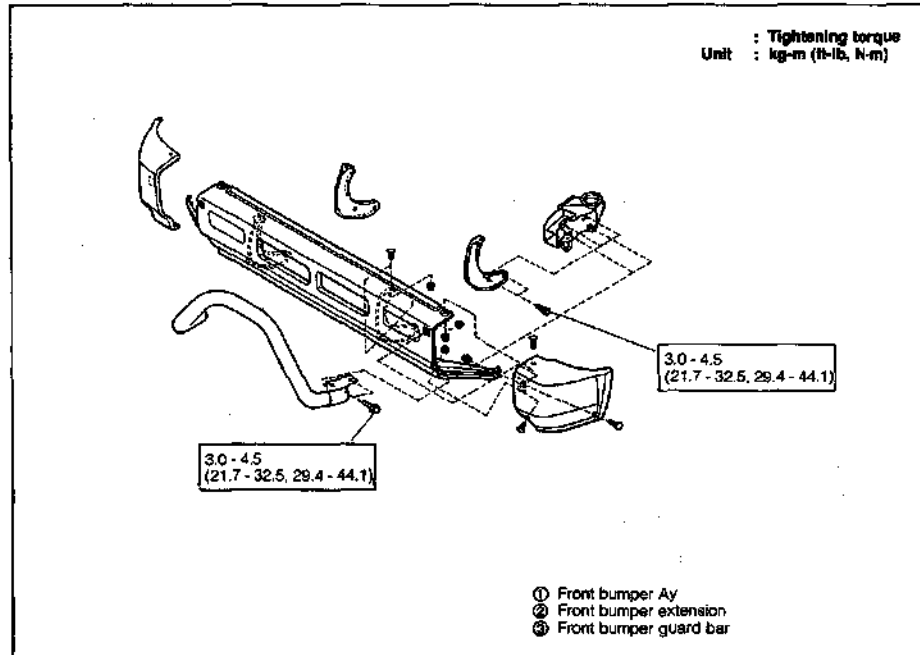
INSTALLATION

1. Install the emblems with the screws.
2. Install the three grommets to the body.
3. Installation of radiator grille assembly.
 - (1) Insert the three protruded position of the radiator grille lower side into the grommets.
 - (2) Attach the two clips at the upper side of the radiator grille.
 - (3) Install the two screws at the upper both side of the radiator grille.



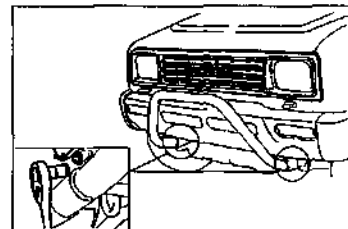
WFE80-80039

FRONT BUMPER COMPONENTS

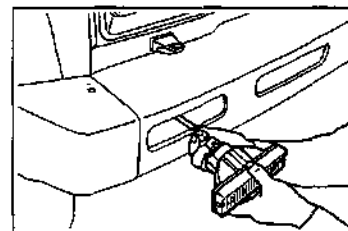


REMOVAL

1. Remove the front bumper guard bar by removing the four bolts.



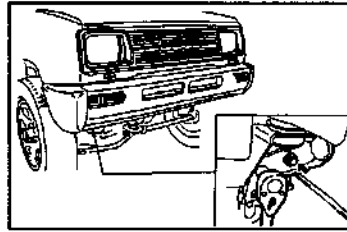
2. Remove the front turn signal lamp assembly by removing the screws and disconnect the connector.



WF80-BC042

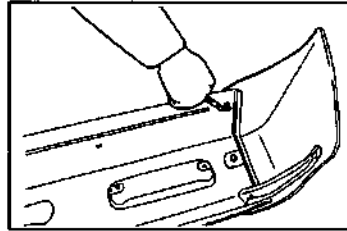
BODY

3. Remove the attaching bolts of the front bumper.



WPB0-80043

4. Remove the front bumper extension from the front bumper subassembly.



WPB0-80044

INSTALLATION

1. Install the front bumper extension to the front bumper subassembly.
2. Install the front bumper assembly to the vehicle with the four bolts.

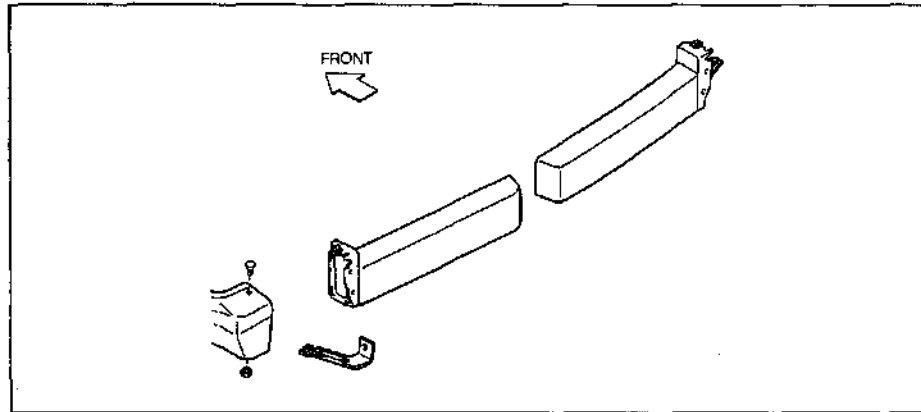
Tightening Torque: 3.0 - 4.5 kg-m
(21.7 - 32.5 ft-lb, 29.4 - 44.1 N-m)

3. Install the front turn signal lamp assembly.
4. Install the front bumper guard bar with the four bolts.

Tightening Torque: 3.0 - 4.5 kg-m
(21.7 - 32.5 ft-lb, 29.4 - 44.1 N-m)

WPB0-80045

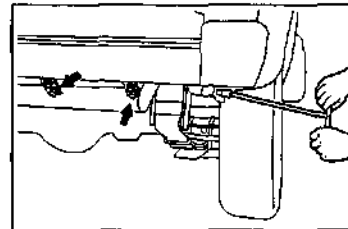
REAR BUMPER COMPONENTS



WP80-B0046

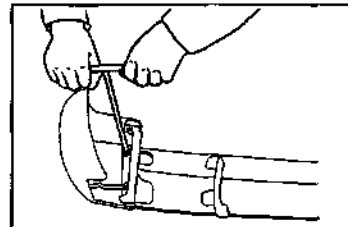
REMOVAL

1. Remove the rear bumper subassembly by removing the five bolts.



WP80-B0047

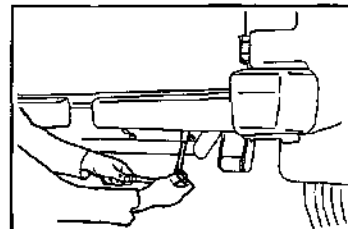
2. Remove the rear bumper extension by removing the three nuts.



WP80-B0048

INSTALLATION

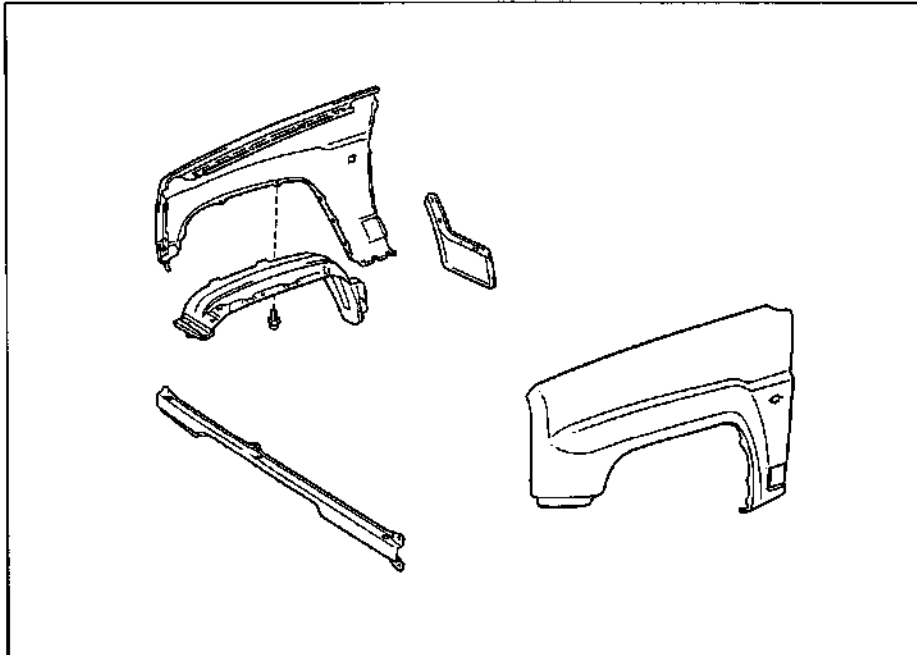
1. Install the rear bumper extension with the three nuts.
2. Install the rear bumper subassembly with the five bolts.



WP80-B0049

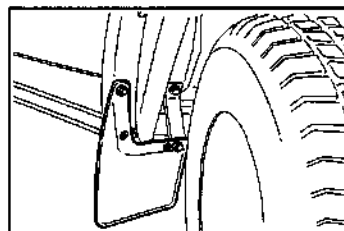
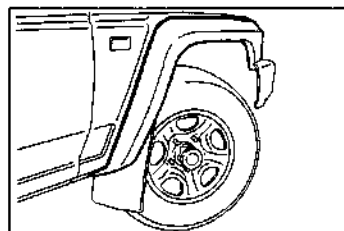
BODY

FRONT FENDER COMPONENTS



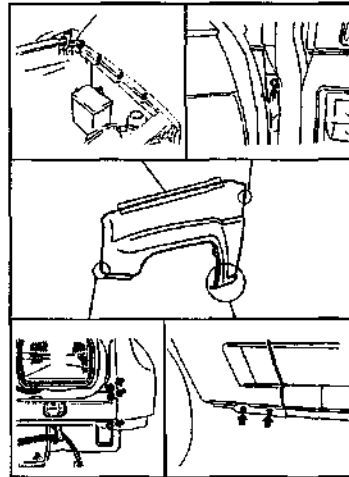
REMOVAL

1. Remove the radiator grille.
2. Remove the front bumper guard bar and front bumper assembly.
3. Remove the front fender liner.
4. Remove the front wheel opening extension.
5. Remove the front turn lamp assembly.
6. Remove the front fender by removing the attaching bolts.

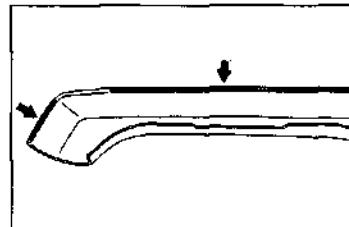


INSTALLATION

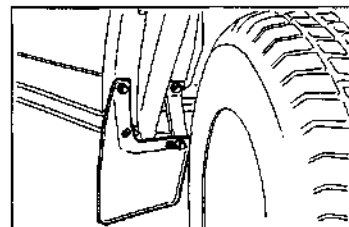
1. Install the front fender to the body with the bolts.
NOTE:
 - To prevent rust formation, apply rust preventive liquid or paint having the same color as the body to the front fender attaching sections, attaching bolts and so forth.
2. Install the front turn lamp assembly.



3. Install the front wheel opening extension.
NOTE:
 - If a new front wheel opening extension is to be installed, first detach the two-faced adhesive tape seal provided at the arrow-headed section. Then, install the new extension in place. (Be sure to detach the tape seal very slowly.)

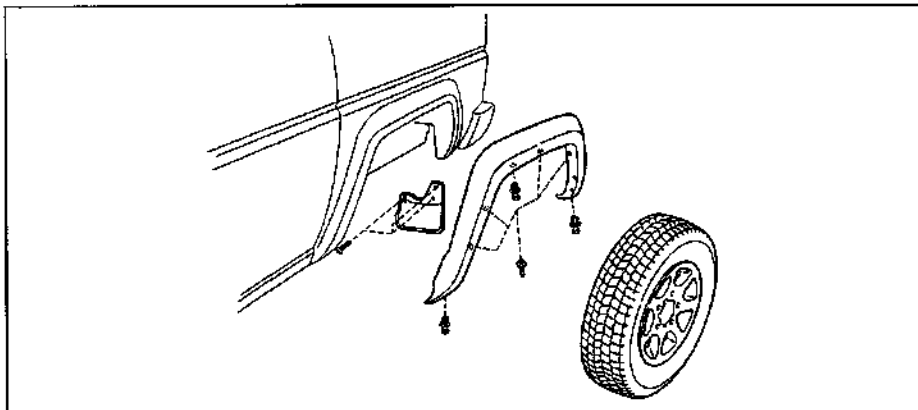


4. Install the front fender liner.
5. Install the front bumper assembly and front bumper guard bar.
6. Install the radiator grille.



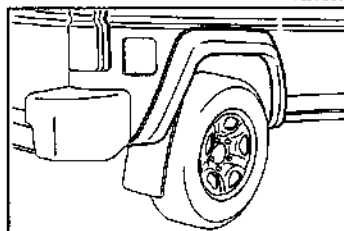
BODY

REAR WHEEL OPENING EXTENSION COMPONENTS



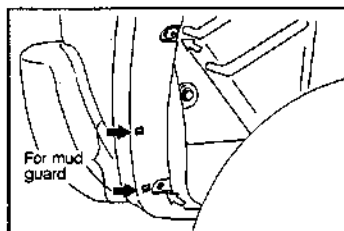
REMOVAL

1. Remove the rear mud guard.
2. Remove the rear fender liner.
3. Remove the rear wheel opening extension.

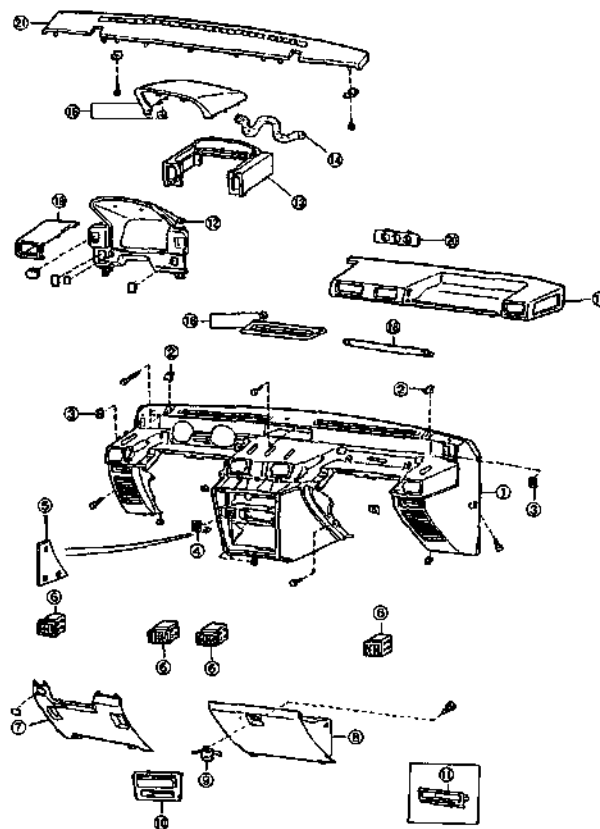


INSTALLATION

1. Install the rear wheel opening extension.
2. Install the rear fender liner.
3. Install the rear mud guard.



INSTRUMENT PANEL **COMPONENTS (PART 1)**

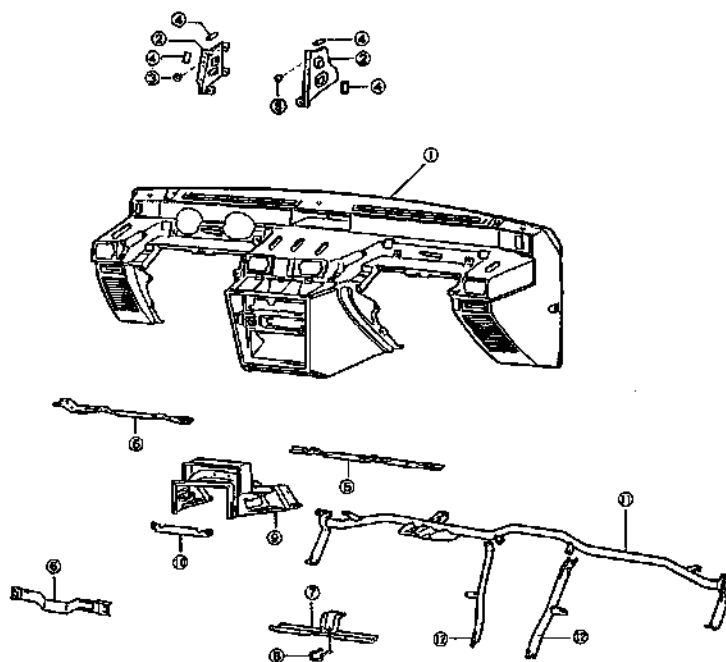


- | | |
|---------------------------------------|---|
| ① Instrument panel S/A | ⑫ Rear panel instrument cluster finish |
| ② Instrument panel hole cover | ⑬ Front panel instrument cluster finish |
| ③ Defroster nozzle A/y | ⑭ Meter hood set bracket No. 3 |
| ④ Cigarette lighter bezel | ⑮ Upper instrument cluster finish panel |
| ⑤ Instrument panel center pad A/y | ⑯ Center instrument panel tray |
| ⑥ Instrument panel register A/y | ⑰ Instrument panel safety pad S/A |
| ⑦ Instrument panel finish panel lower | ⑱ Front grip |
| ⑧ Glove compartment S/A | ⑲ Side instrument panel safety pad S/A |
| ⑨ Glove compartment door lock A/y | ⑳ Upper instrument panel finish panel |
| ⑩ Radio cover | ㉑ Defroster nozzle opening cover |
| ⑪ Stereo opening cover | |

WFE20-80052

BODY

COMPONENTS (PART 2)



- | | |
|--|---|
| ① Instrument panel S/A | ⑫ Glove compartment door lock retainer S/A |
| ② Meter hood set bracket | ⑬ Glove compartment door lock striker |
| ③ Clip No. 1 | ⑭ Instrument panel center reinforcement |
| ④ Edge protector | ⑮ Instrument panel lower center reinforcement |
| ⑤ Instrument panel reinforcement | ⑯ Pillar to pillar member Ay |
| ⑥ Instrument panel finish panel retainer No. 1 | ⑰ Instrument panel brace S/A |

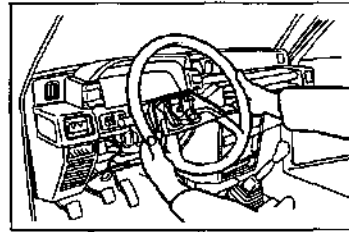
WFE90-80090

REMOVAL OF INSTRUMENT PANEL

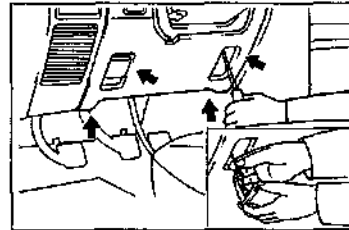
NOTE:

- The instrument panel, together with the heater control unit and cable, should be removed from the body.

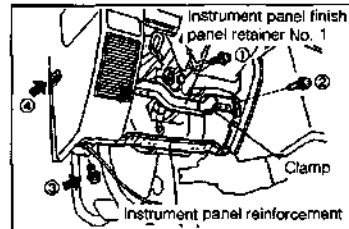
1. Disconnect the battery cable from the negative \ominus terminal.
2. Remove the steering wheel assembly.
3. Removal of lower instrument panel finish panel
 - (1) Remove the hood lock control lever and wire.
 - (2) Remove the screws retaining the rheostat.
 - (3) Remove the two lower screws retaining the lower instrument panel finish panel.
 - (4) Disconnect the rear heater switch connector and the rheostat connector.
4. Remove the screws ① and ② which retain the instrument panel finish panel retainer No. 1 at the right and left sides. (It is not necessary to remove the multi-use lever switch connector. Also, do not disconnect the connector.)
5. Remove the screws ③ and ④ located at the left side of the instrument panel. (It is not necessary to remove the instrument panel reinforcement.)
6. Detach the clip retaining the air No. 1 duct subassembly. Remove the duct.
7. Remove the bolt connecting the instrument panel to the brace.
8. Disconnect the connector of the instrument panel wire.



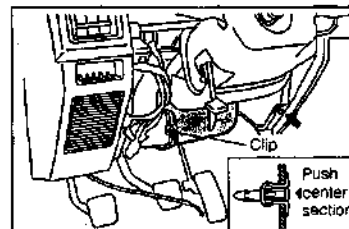
WPESD-BC0061



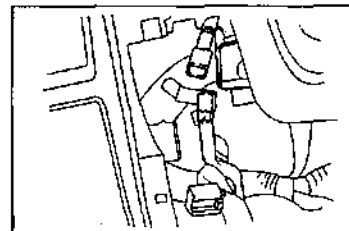
WPESD-BC0062



WPESD-BC0063



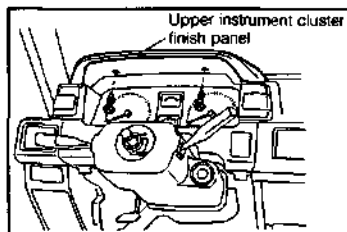
WPESD-BC0064



WPESD-BC0065

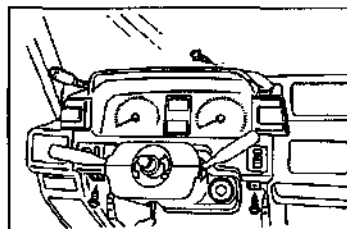
BODY

9. Remove the upper instrument cluster finish panel by removing the two screws.



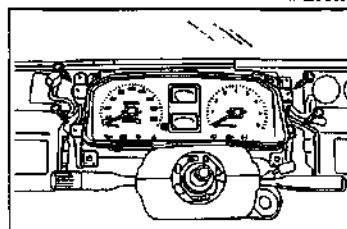
WP80-B0066

10. Removal of instrument cluster finish panel subassembly
- (1) Remove the instrument cluster finish panel subassembly by removing the four screws.
 - (2) Disconnect the connectors for the rear window defogger switch, hazard warning signal switch and rear wiper switch.



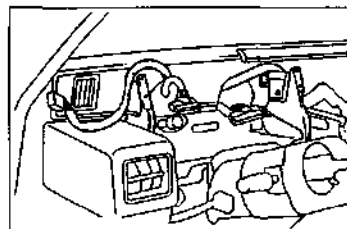
WP80-B0067

11. Removal of combination meter assembly
- (1) Remove the four attaching screws of the combination meter assembly.
 - (2) Pull out the combination meter assembly toward your side. Disconnect the speedometer cable and the two couplers of the wire harness. Remove the combination meter assembly.



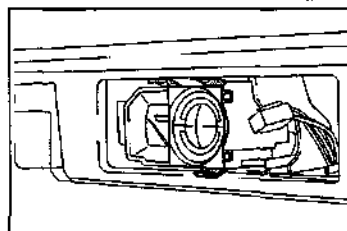
WP80-B0068

12. Disconnect the clamp of the wire harness.



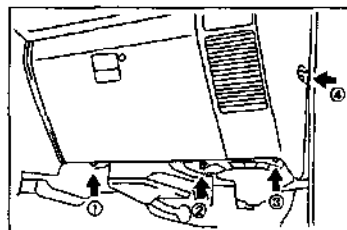
WP80-B0069

13. Removal of triple meter
- (1) Remove the upper instrument panel finish by means of a bamboo spatula wrapped with a cloth.
 - (2) Pull out the voltmeter, clinometer and clock toward your side, while pushing the upper and lower claws by means of a spatula or the like.
 - (3) Disconnect the connectors.



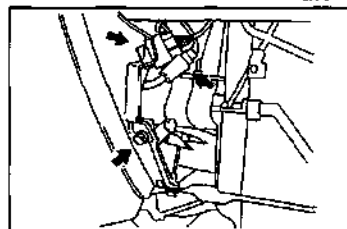
WP80-B0070

14. Remove the glove compartment door subassembly (screws ① and ②).
15. Remove the screws ③ and ④.
(It is not necessary to remove the instrument panel reinforcement.)



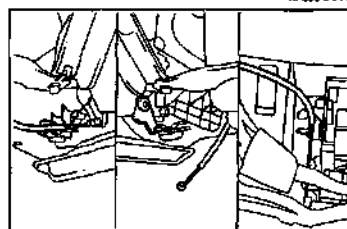
WP80-B0071

16. Disconnect the connectors of the wire harnesses of the heater control switch (and the air conditioner switch).
17. Remove the attaching screw of the instrument panel and brace.



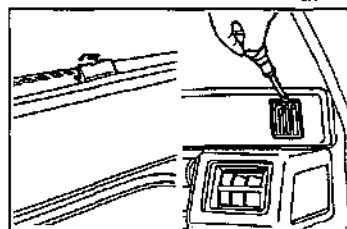
WP80-B0072

18. Disconnect the heater control cable.



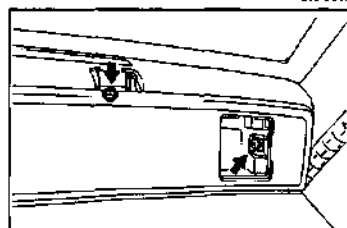
WP80-B0073

19. Remove the defroster nozzles (at the left and right sides).
20. Remove the instrument panel hole covers (at the right and left sides).



WP80-B0074

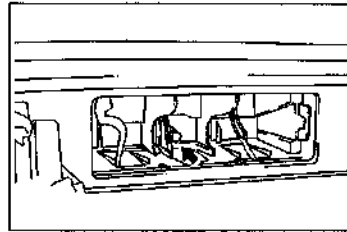
21. Remove the attaching screws of the instrument panel (at the right and left sides).



WP80-B0075

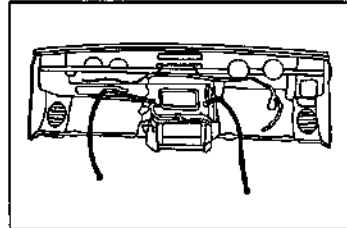
BODY

22. Remove the attaching screws of the instrument panel (center).



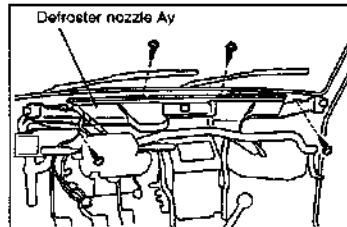
WPES0-8C0076

23. Remove the instrument panel from the body.



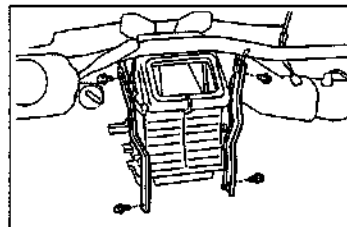
WPES0-8C0077

24. Remove the defroster nozzle assembly.



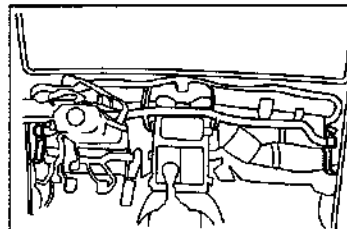
WPES0-8C0078

25. Remove the instrument panel panel brace subassembly.
26. Remove the following parts.
(1) Bracket of key reminder buzzer, heater relay and horn relay
(2) Sub-fuse box



WPES0-8C0079

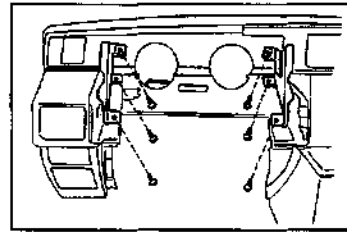
27. Remove the steering column from the pillar-to-pillar member subassembly.
28. Remove the pillar-to-pillar member subassembly from the pillar.



WPES0-8C0080

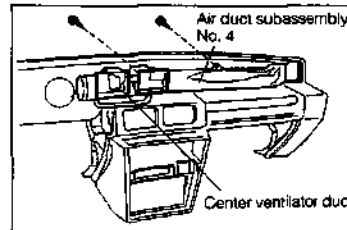
BODY

29. Remove the meter hood set bracket (right and left side) by removing the six screws.



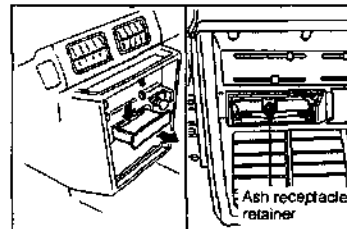
WFE90-80061

30. Remove the air duct subassembly No. 4 by removing the screw.
31. Remove the center ventilator duct by removing the screw.



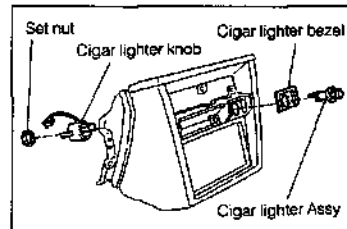
WFE90-80062

32. Removal of ash receptacle box and ash receptacle retainer
(1) Pull out the ash receptacle box.
(2) Remove the ash receptacle retainer by removing the three screws, Disconnect the optical cord.



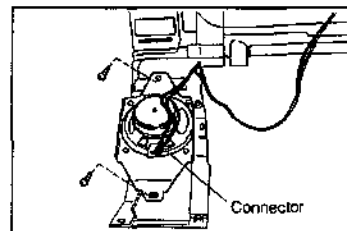
WFE90-80063A

33. Removal of cigar lighter
(1) Disconnect the connectors.
(2) Remove the set nut.
(3) Remove the cigar lighter knob.
(4) Remove the cigar lighter assembly.
(5) Remove the cigar lighter bezel.



WFE90-80063B

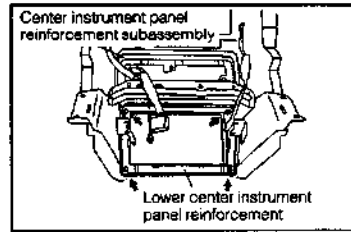
34. Removal of speaker (right and left side)
(1) Disconnect the connectors.
(2) Remove the speaker by removing screws.



WFE90-80064

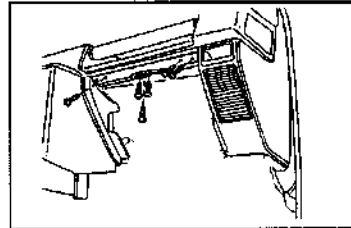
BODY

35. Remove the center instrument panel reinforcement subassembly and lower center instrument reinforcement by removing the four bolts.



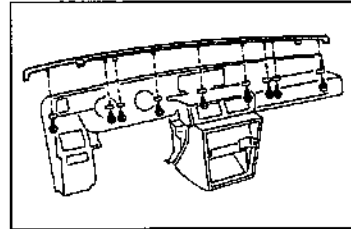
WFE90-B0085

36. Removing the glove compartment door lock striker by removing the two screws.
37. Removing the glove compartment door lock retainer subassembly by removing the five screws.



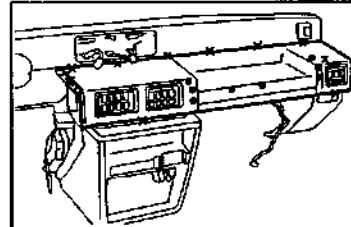
WFE90-B0086

38. Remove the defroster nozzle opening cover by removing the nine screws.



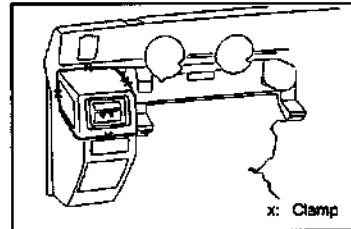
WFE90-B0087

39. Remove the instrument panel safety pad subassembly by removing the eight bolts and ten clamps.



WFE90-B0088

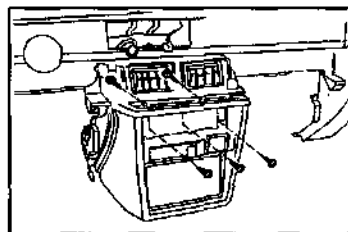
40. Remove the side instrument panel safety pad subassembly by removing the four clamps.



WFE90-B0089

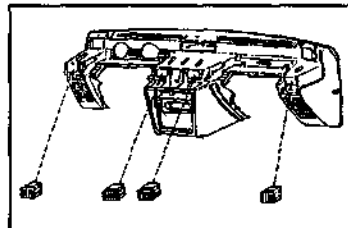
BODY

41. Remove the center instrument panel tray by removing the five screws.



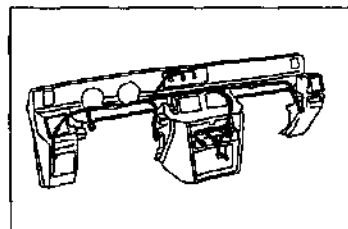
WP80-BO080

42. Remove the side and center instrument panel register Assy.



WP80-BO081

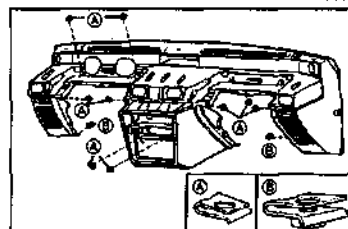
43. Remove the instrument panel wire from instrument panel.



WP80-BO082

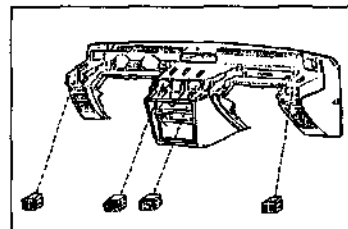
INSTALLATION

1. Install the snapping nuts.
2. Install the instrument panel wire.



WP80-BO083

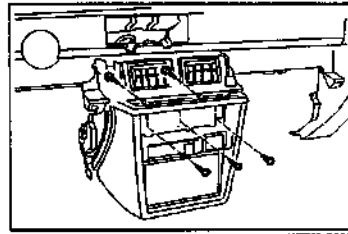
3. Install the side and center instrument panel register Assy.



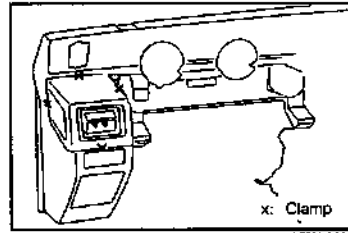
WP80-BO084

BODY

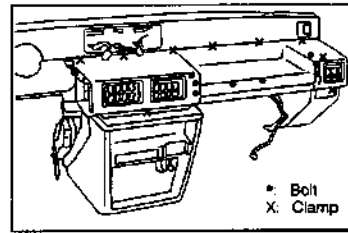
4. Install the center instrument panel tray with the five screws.



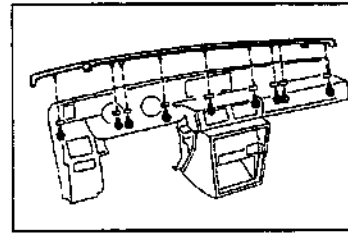
5. Install the side instrument panel safety pad subassembly with the four clamps.



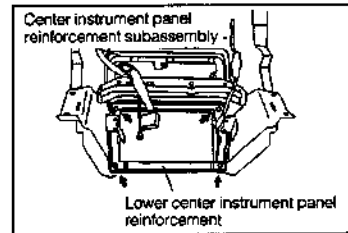
6. Install the instrument panel safety pad subassembly with eight bolts and ten clamps.



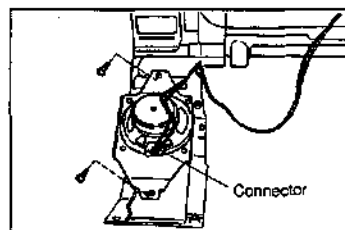
7. Install the defroster nozzle opening cover with the nine screws.



8. Install the center instrument panel reinforcement subassembly and lower center instrument reinforcement with the four bolts.

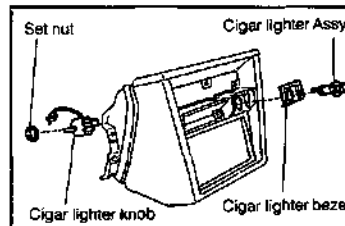


9. Installation of speaker (right and left side)
 (1) Install the speaker with the screws.
 (2) Connect the connectors.



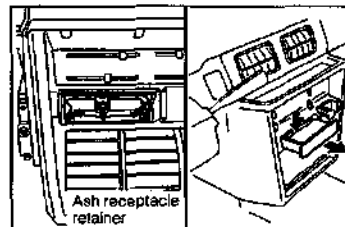
WFB0-BO100

10. Installation of cigar lighter
 (1) Install the cigar lighter bezel, cigar lighter Assy, cigar lighter knobs and set nut.
 (2) Connect the connectors.



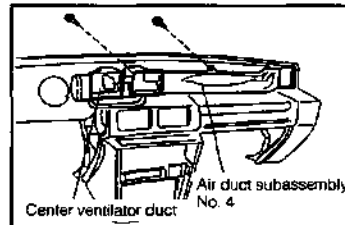
WFB0-BO101

11. Installation of ash receptacle box and ash receptacle retainer.
 (1) Install the optical cord to the ash receptacle retainer.
 (2) Install the ash receptacle retainer with the three screws.
 (3) Install the ash receptacle box.



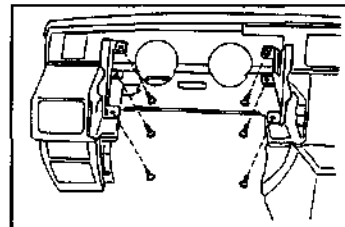
WFB0-BO102

12. Install the center ventilator duct with the screw.
 13. Install the air duct subassembly No. 4 with the screw.



WFB0-BO103

14. Install the meter hood set bracket (right and left side) with the six bolts.

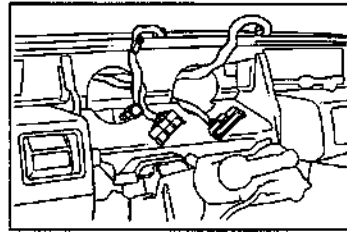


WFB0-BO104

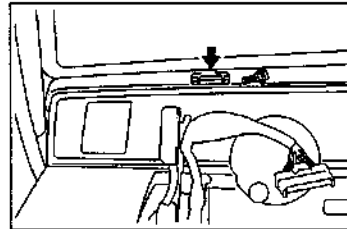
BODY

INSTALLATION OF INSTRUMENT PANEL

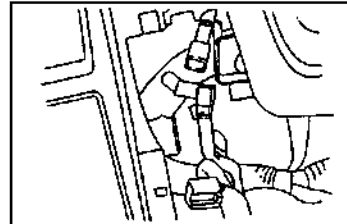
1. Put the instrument panel in place.
2. Draw out the wire harnesses and speedometer cable from the hole for the combination meter.
3. Temporarily install the instrument panel with two bolts at upper right and left points.
4. Connect the coupler of the wire harness.
 - (1) Wire, instrument panel
 - (2) Wire, heater control switch
 - (3) Wire, air conditioner switch
5. Clamp of wire harness
 - (1) Wire cowl in left figure (for instrument panel wire)
 - (2) Wire harnesses for hazard of combination meter section and rear wiper switch
6. Connect the wire of the heater control unit to the lever of the heater/blower unit.
 - (1) Install the mode switching cable, as follows:
 - 1) Set the mode switching lever of the heater control to the (DEF) side; the mode switching lever of the heater unit to the DEF side.
 - 2) Connect the mode switching cable. Insert it into the clamp securely.
 - (2) Install the temperature regulating cable, as follows:
 - 1) Set the temperature regulating lever of the heater control to the (COOL) side; the temperature regulating lever of the heater unit to the COOL side.
 - 2) Connect the temperature regulating cable. Insert it into the clamp securely.



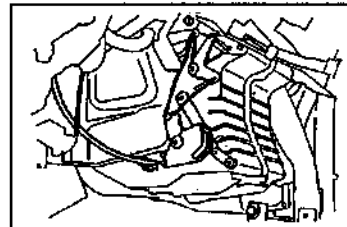
WFE90-B0106



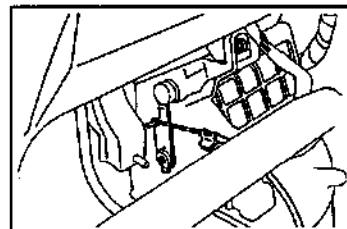
WFE90-B0106



WFE90-B0107




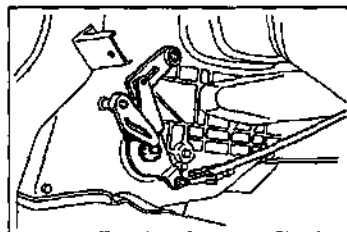
WFE90-B0108



WFE90-B0109

(3) Install the inside air/outside air switching cable, as follows:

- 1) Set the inside air/outside air switching lever of the heater control to the  (RECIRC) side; the inside air/outside air switching lever of the blower assembly to the RECIRC side.
- 2) Connect the inside air/outside air switching cable. Insert it to the clamp securely.

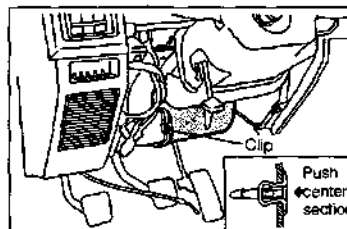


WFES0-B0110

7. Install the air No. 1 duct subassembly. Install the clip.

NOTE:

- Before the instrument panel is tightened securely, make sure that the wire harnesses, clamps and connectors are installed without applying undue force.



WFES0-B0111

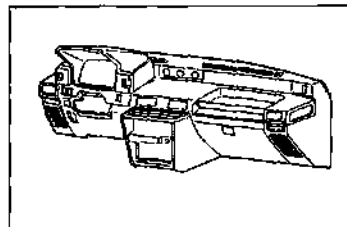
8. Tighten all screws which have been removed during the removal operation.

NOTE:

- Refer to the sequence numbers 4, 5, 17, 21 and 22.

9. Install the defroster nozzle assembly.

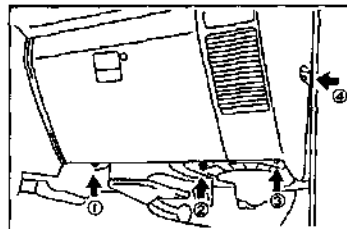
10. Install the instrument panel hole cover.



WFES0-B0112

11. Install the glove compartment door subassembly. (Tighten the screws ① and ②.)

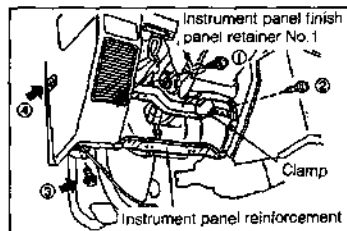
12. Tighten the screws ③ and ④.



WFES0-B0113

13. Install the instrument panel finish panel retainer No. 1. (Tighten the screws ① and ②.)

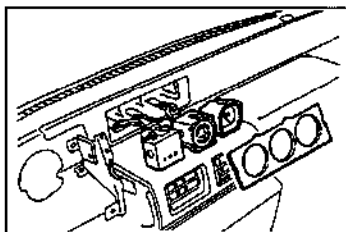
14. Tighten the screws ③ and ④.



WFES0-B0114

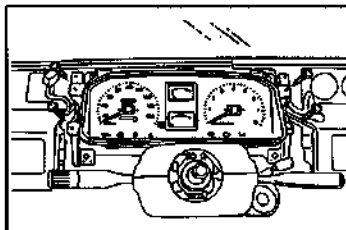
BODY

15. Install the triple meter.
 - (1) Connect each connector to the respective meters. Press the meter into the groove by hands.
 - (2) Press the upper instrument panel finish into position by hands.



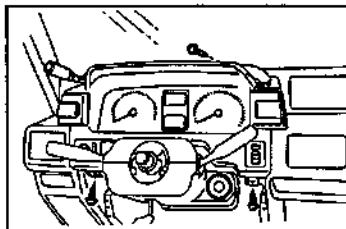
WPBXO-B0115

16. Installation of combination meter
 - (1) Connect the connector of the speedometer cable and the couplers of the wire harnesses.
 - (2) Tighten the attaching screws.



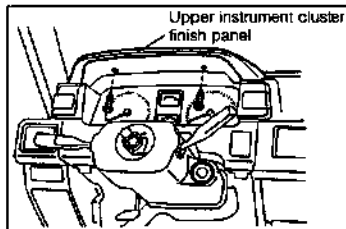
WPBXO-B0116

17. Install the instrument cluster finish panel subassembly with the attaching screws.



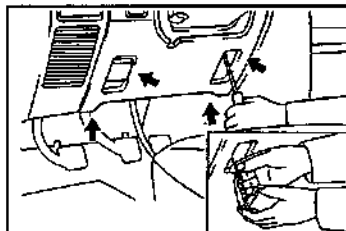
WPBXO-B0117

18. Install the upper instrument cluster finish panel with the attaching screws.



WPBXO-B0118

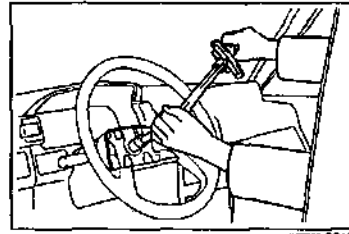
19. Installation of lower instrument panel finish panel.
 - (1) Connect the connector for the rear heater switch and rheostat.
 - (2) Tighten the attaching screws of the lower instrument panel finish panel.
 - (3) Tighten the attaching screws of the rheostat.
 - (4) Connect the wire for the hood lock control lever and tighten the attaching screws.



WPBXO-B0119

BODY

20. Install the steering wheel.
Tightening Torque: 29.4 - 49.0 N·m
21. Connect the horn wire and install the horn pad.
22. Tighten the screw of the horn pad.



WPB0-BO120

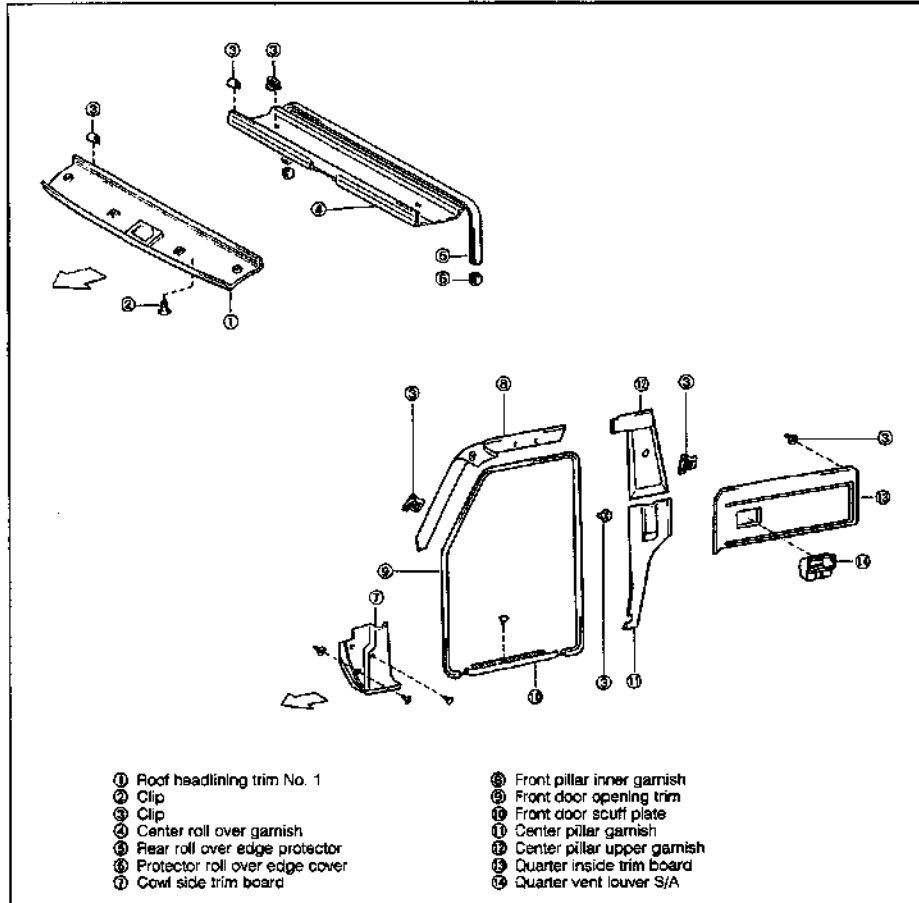
OPERATION AFTER INSTALLATION

1. Connect the battery.
2. Ensure that each switch of the instrument panel functions properly.
3. Ensure that all of the electrical system functions properly.

WPB0-BO121

BODY

TRIMS COMPONENTS



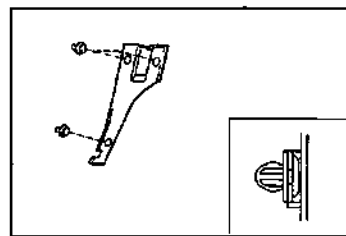
CENTER PILLAR GARNISH

Removal

1. Disengage the clips, using a screw driver.
2. Remove the center pillar garnish.

Installation

1. Align the clips in place. Install the center pillar garnish by lightly tapping around the clips by hand.



CENTER PILLAR UPPER GARNISH

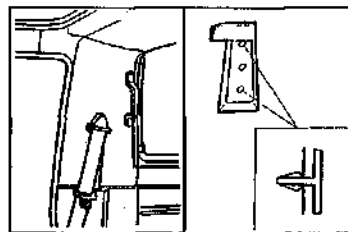
Removal

1. Remove the attaching bolt of the front seat outer belt shoulder anchor.
2. Remove the assist grip.
3. Disengage the clip, using a screwdriver.
4. Remove the center pillar garnish.

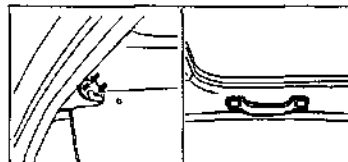
Installation

1. Align the clips in place. Install the center pillar garnish by lightly tapping around the clips by hand.
2. Install the assist grip.
3. Install the attaching bolt of the front seat outer belt shoulder anchor.

Tightening Torque: 2.9 - 5.4 kg-m



WFE90-BO124



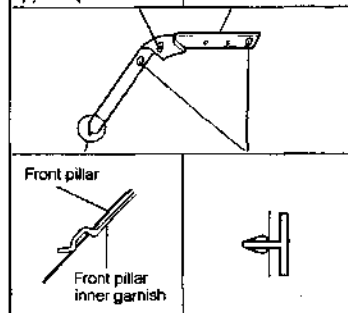
FRONT PILLAR INNER GARNISH

Removal

1. Remove the sun visor assembly.
2. Remove the assist grip or two clips.
3. Disengage the clips, using a screwdriver.
4. Remove the front pillar inner garnish.

Installation

1. Hang the hanger located at the lower part of the front pillar inner garnish to the body.
2. Align the two clips in place. Install the front pillar garnish by tapping it lightly by your hand.
3. Install the assist grip or two clips.
4. Install the sun visor assembly.



WFE90-BO125

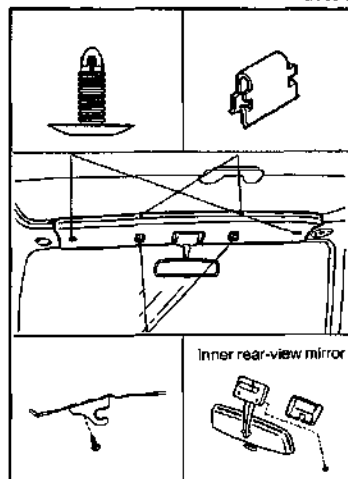
ROOF HEADLINING TRIM No. 1

Removal

1. Remove the inner rear-view mirror.
2. Remove the visor holders.
3. Disengage the clips, using a screwdriver.
4. Remove the roof headlining trim No. 1.

Installation

1. Install the roof headlining trim No. 1 with the four clips.
2. Install the visor holders with the screws.
3. Install the inner rear-view mirror.



WFE90-BO126

BODY

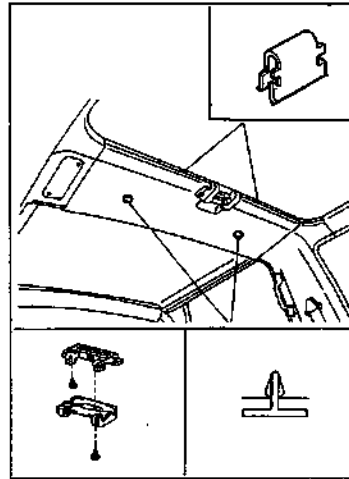
ROLL OVER CENTER GARNISH

Removal

1. Remove the removable roof lock garnish and removable roof lock base assembly.
2. Disengage the clips.
3. Remove the roll over center garnish.

Installation

1. Install the roll over center garnish with the four clips.
2. Install the removable roof lock garnish and removable roof lock base assembly.



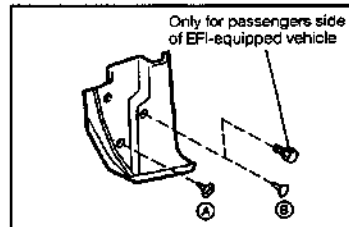
COWL SIDE TRIM BOARD

Removal

1. Disengage the clips (A), using a screwdriver.
2. Disengage the clip (B) or remove the bolt.
3. Remove the cowl side trim board.

Installation

1. Install the cowl side trim board with the clip (A) and clip (B) or bolt.



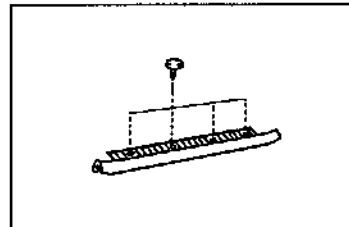
FRONT DOOR SCUFF PLATE

Removal

1. Disengage the clips, using a screwdriver.
2. Remove the front door scuff plate.

Installation

1. Install the front door scuff plate with the clips.



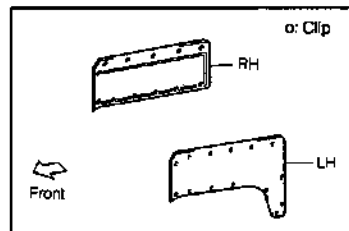
QUARTER INSIDE TRIM BOARD

Removal

1. Disengage the clips, using a screwdriver.
2. Remove the quarter inside trim board.

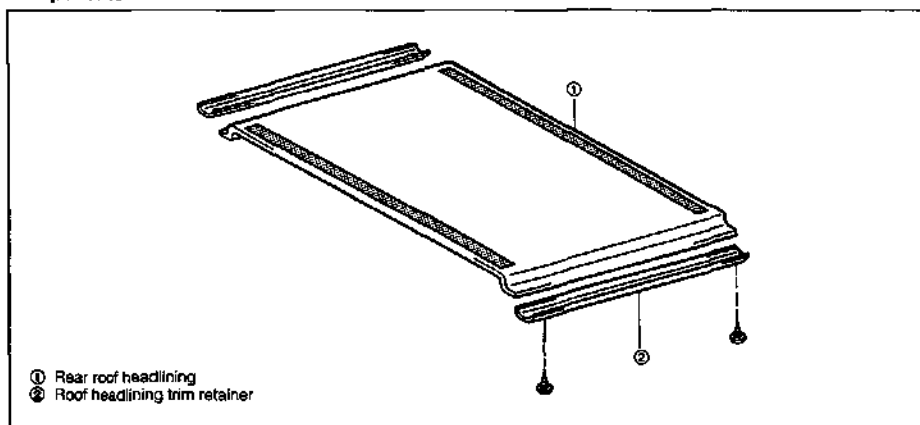
Installation

1. Align the clip in place. Install the quarter inside trim board by lightly tapping around the clips by hand.



REAR ROOF HEADLINING

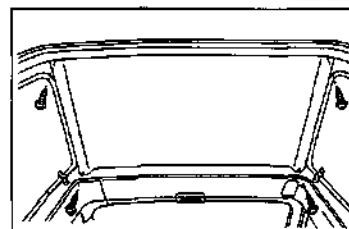
Components



WFE0-BO131

Removal

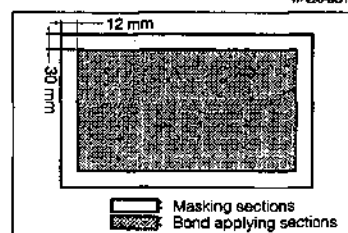
1. Remove the rear roll bar.
2. Remove the roof headlining trim retainer by removing the screws.
3. Remove the roof headlining.



WFE0-BO132

Installation

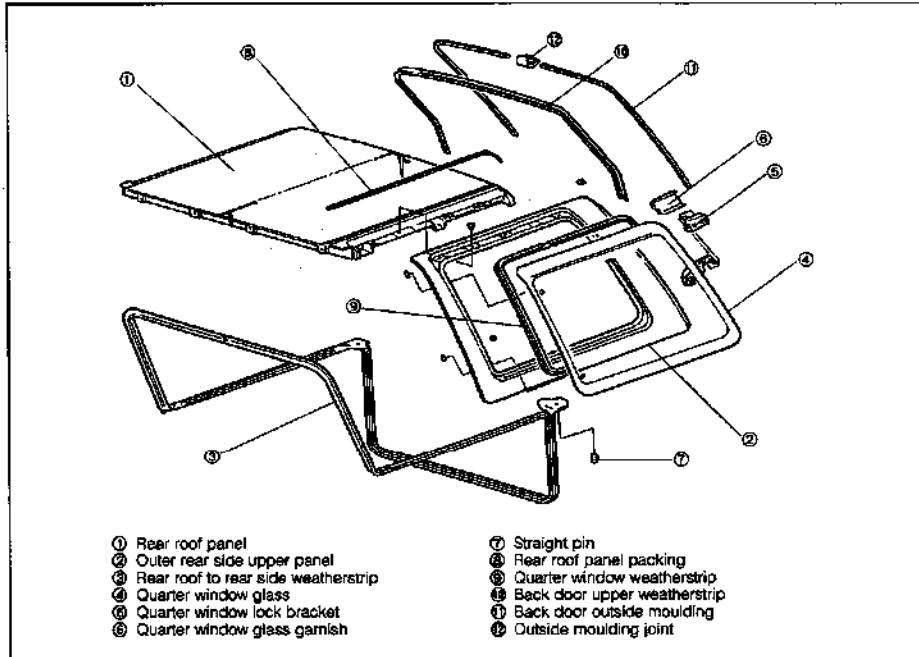
1. Mask the periphery of the rear roof headlining. Apply the bond. (Sunstar-Made Penguin cement #386)
2. Affix the rear roof headlining.
3. Install the rear headlining trim retainer by the screws.
4. Install the rear roll bar.



WFE0-BO133

BODY

RESIN TOP COMPONENTS



REMOVAL

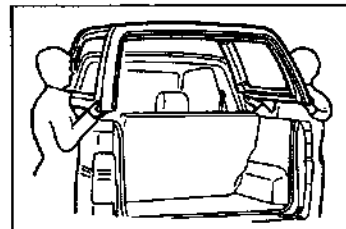
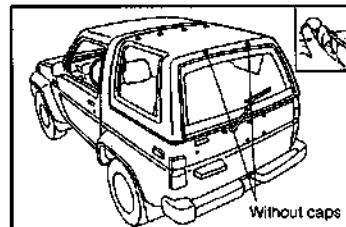
1. Remove the caps for resin panel attaching bolts (10 points). Then remove the resin top panel attaching bolts (12 points).

NOTE:

- When removing the caps, use a cloth to avoid any damage to the vehicle body.

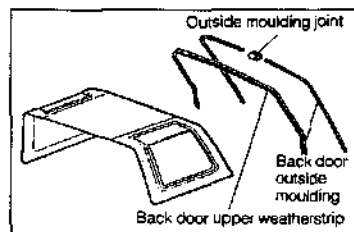
2. Remove the mounting roll over bracket by removing the screws.

3. Remove the resin top panel from the vehicle.



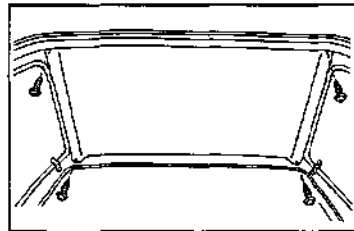
DISASSEMBLY

1. Remove the quarter window glass-related parts.
2. Remove the outside moulding joint, back door outside moulding and back door upper weatherstrip.



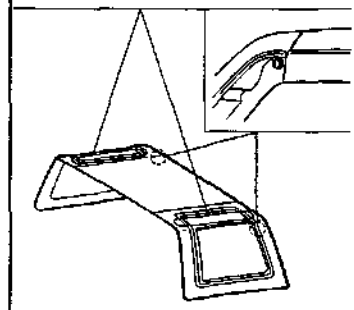
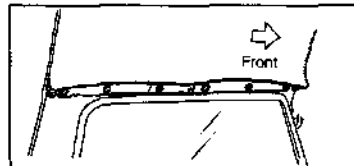
WPB0-BO137

3. Remove the roof headlining trim retainer by removing the screws.



WPB0-BO138

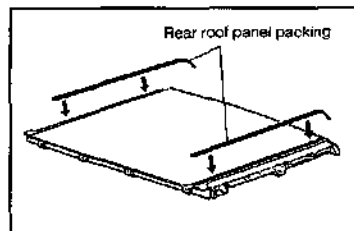
4. Separate the rear roof panel and outer rear side upper panel by removing the screws.
5. Remove the rear roof panel packing.



WPB0-BO139

ASSEMBLY

1. Peel off the liner of a two-faced adhesive tape which is installed on the rear roof panel packing. Then, install the rear roof panel packing onto the rear roof panel.

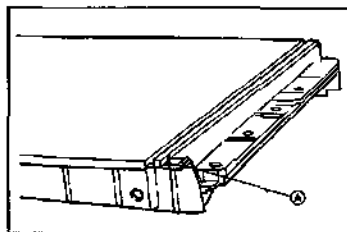


WPB0-BO140

BODY

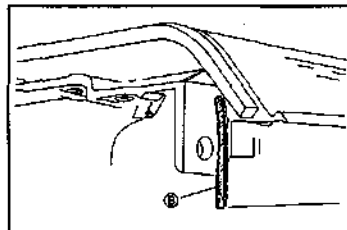
2. Apply the adhesive agent specified below to the section ㉑ (both right and left sides) at the front side of the rear roof panel, as indicated in the right figure.

Adhesive Agent To Be Used:
Sunstar-Made Penguin Seal #255A



WFED0-BO141

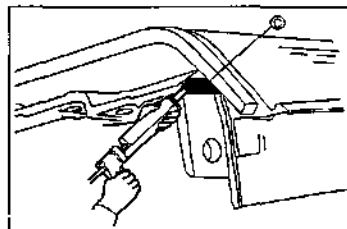
3. Affix the packing to the section ㉒ at the rear side of the rear roof panel.



WFED0-BO142

4. Apply the adhesive agent specified below to the section ㉓ (both right and left sides) at the rear side of the rear roof panel, as indicated in the right figure.

Adhesive Agent To Be Used: Cemedine 370S

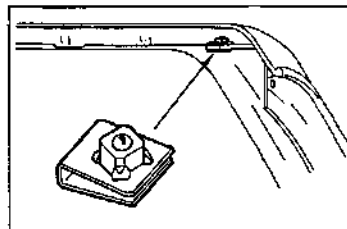


WFED0-BO143

5. Install the plate nut on the outer rear side upper panel.

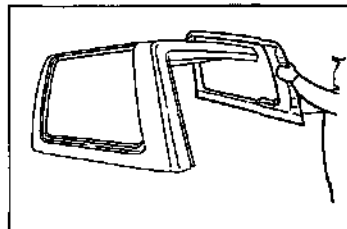
NOTE:

- Be sure to install the plate nut in such a direction that the nut side may face upward.



WFED0-BO144

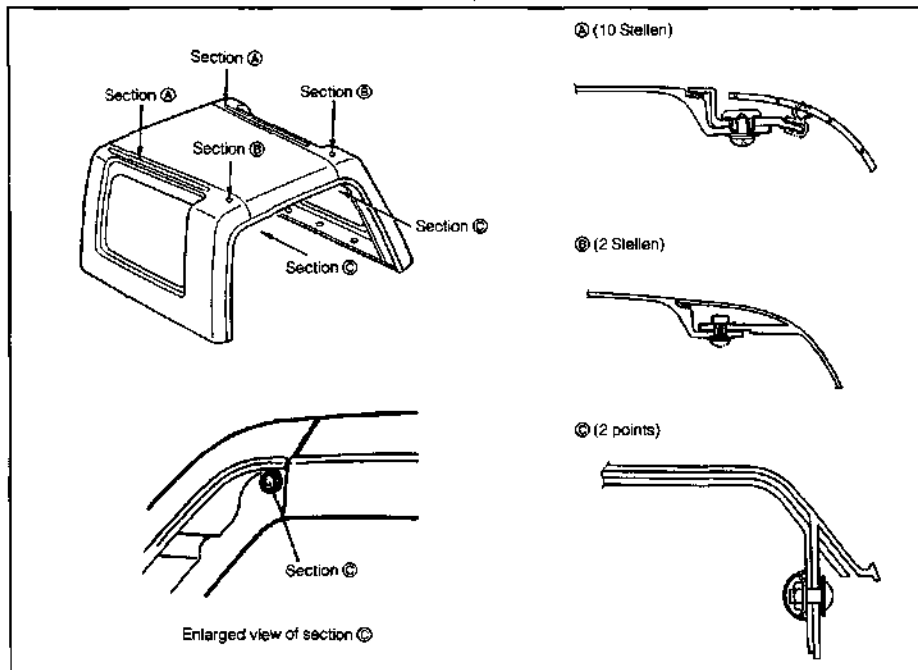
6. Install the outer rear side upper panel on the rear roof panel.



WFED0-BO145

BODY

7. Secure the rear roof panel and outer rear side upper panel, referring to the attachment sectional views below.



WFE90-BC146

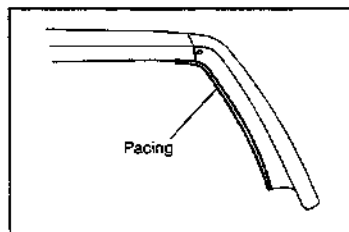
Table of bolts and nuts, etc.

Section A	Section B	Section C
<p>① Rear roof-to-rear side upper retainer</p> <p>② Screw with washer Nominal dimension: 15 mm (0.56 inch)</p>	<p>① Plate nut</p> <p>② Screw with washer Nominal dimension: 27 mm (1.06 inches)</p>	<p>① Bolt cap ② Nut ③ Screw with washer Nominal dimension: 20 mm (0.79 inch)</p> <p>NOTE: Use a screw having the same color as with the rear roof panel.</p> <p>④ Rear side panel upper plate ⑤ Gasket</p>

WFE90-BC147

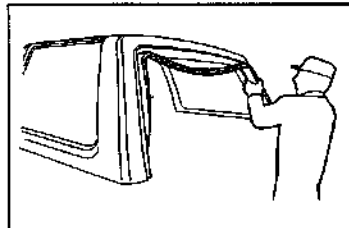
BODY

8. Affix the back door opening packing on the rear roof panel.



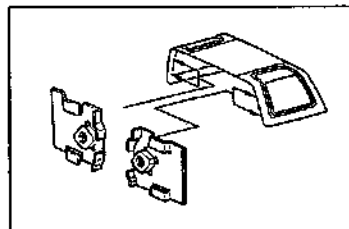
WFE90-9C148

9. Install the back door upper weatherstrip to the rear roof panel.



WFE90-9C149

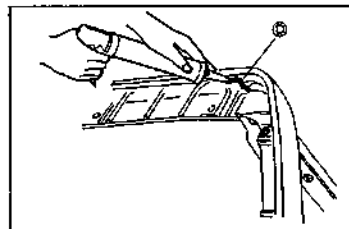
10. Insert the nut plate into the corresponding section of the rear roof panel, as indicated in the right figure.



WFE90-9C150

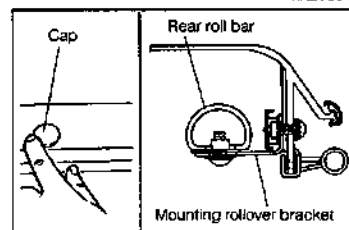
11. Apply the following bonding agent given below to the front side of the rear roof panel at the section D (both right and left sides), as indicated in the right figure.

Bonding Agent: Cemedine 370S



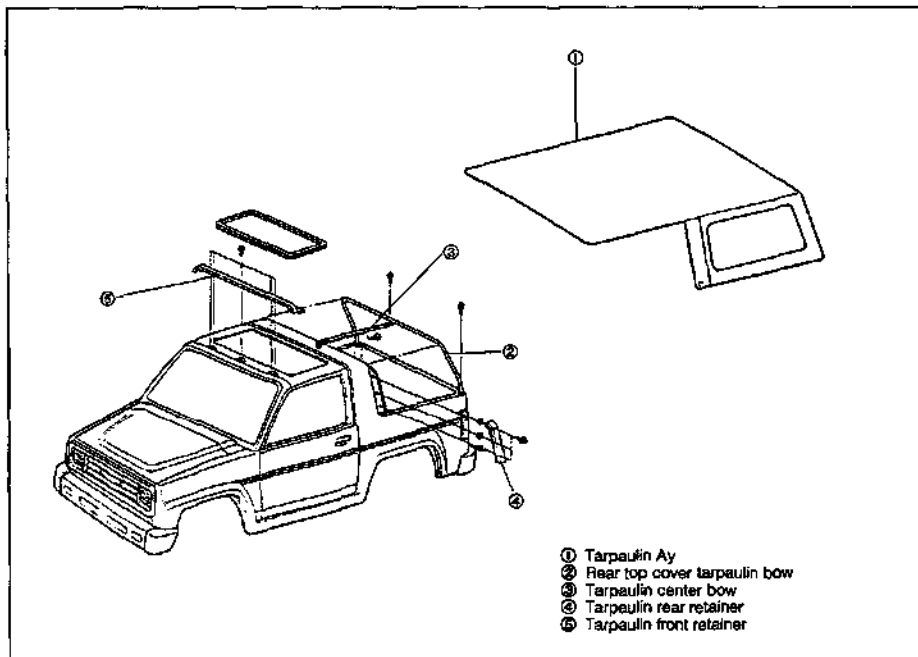
WFE90-9C151

12. Install the resin top panel to the vehicle.
13. Install the attaching bolts and caps (10 points).
14. Install the mounting roll over bracket with the screws.
15. Install the quarter window assembly.



WFE90-9C152

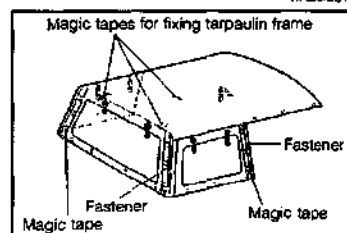
SOFT TOP COMPONENTS



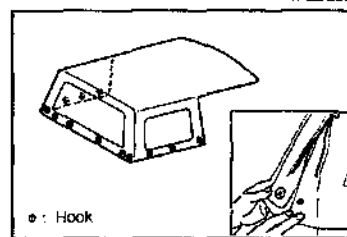
TARPAULIN

Removal

1. Remove the magic tapes and raise all fasteners.

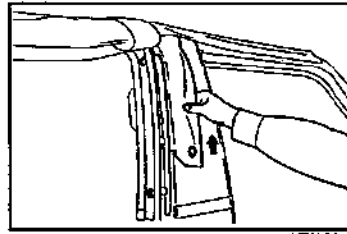


2. Detach the fourteen points of hooks.



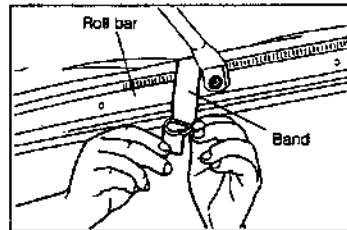
BODY

3. Pull up the tarpaulin upward. If any difficulties should encounter in pulling up the tarpaulin, loosen the rear tarpaulin retainer attaching screws to remove the tarpaulin, then tighten the screw again after removing the tarpaulin.



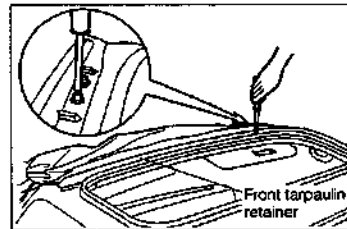
WPB0-BO156

4. Untie the band fixing tarpaulin at the roll bar.



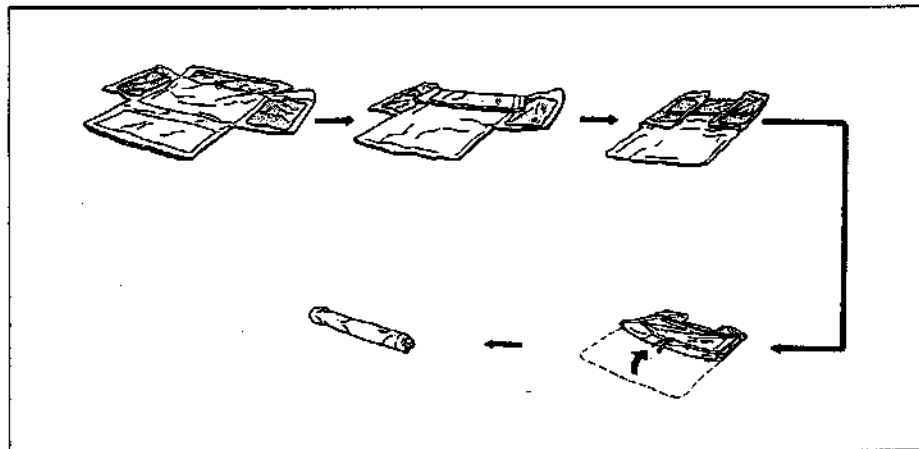
WPB0-BO157

5. Working from the rear side, wind the tarpaulin toward the front so that the inner side of the tarpaulin can face upward.
6. Remove the tarpaulin by loosening the front tarpaulin retainer attaching screws.



WPB0-BO158

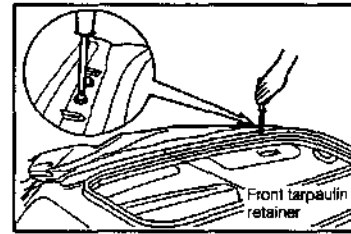
7. How to fold removed-tarpaulin.



WPB0-BO159

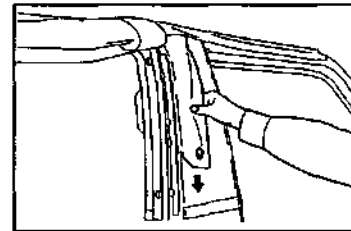
Installation

1. Install the tarpaulin with tightening the front tarpaulin retainer attaching screws.



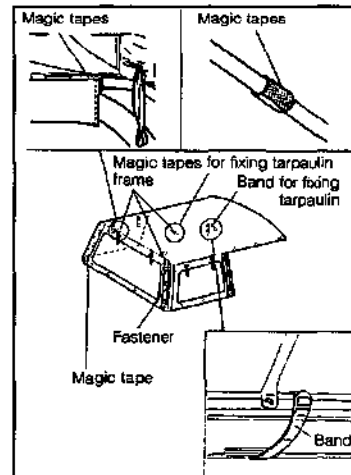
WPB0-BO160

2. Cover the tarpaulin over the vehicle body by turning the tarpaulin over.



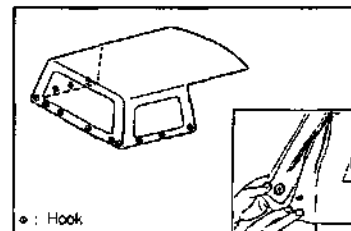
WPB0-BO161

3. Tie the band to fix the tarpaulin at the roll bar.
4. Affix the magic tape at the center bow (1 point) and the rear bow (2 point).
5. Lower all fasteners.
6. Affix the magic tapes.



WPB0-BO162

7. Attach the hooks fourteen points at the rear body side.



WPB0-BO163

BODY

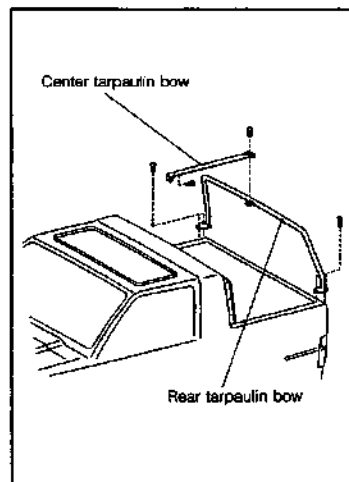
TARPAULIN BOW

Removal

1. Remove the tarpaulin assembly.
2. Remove the center tarpaulin bow assembly by removing the two attaching bolts.
3. Remove the rear tarpaulin bow assembly by removing the four attaching bolts.

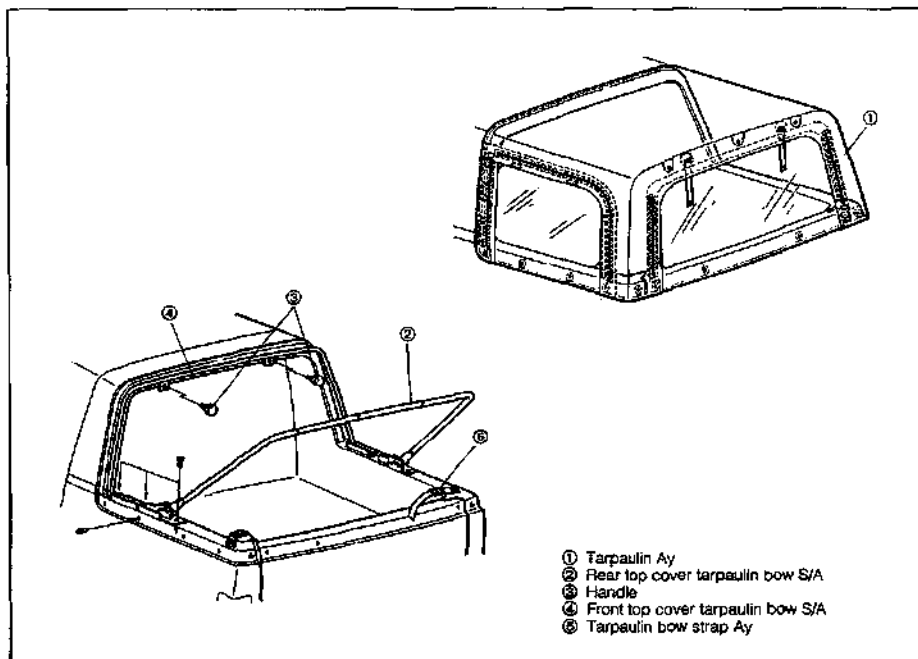
Installation

1. Install the rear tarpaulin bow assembly with the four attaching bolts.
2. Install the center tarpaulin bow assembly with the two attaching bolts.
3. Install the tarpaulin assembly.



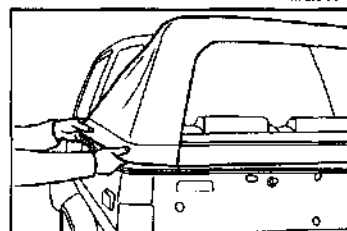
WFED-BO164

TARPAULIN COMPONENTS

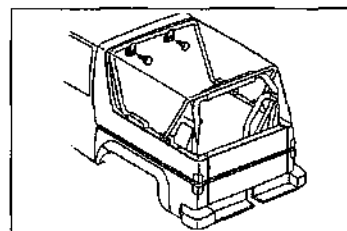


REMOVAL

1. Detach the hooks (14 points) of the tarpaulin.
2. Detach the hooks (3 points) from the rear bow.



3. Remove the two handles that retain the front tarpaulin bow assembly.
4. Remove the tarpaulin assembly from the front tarpaulin bow assembly.

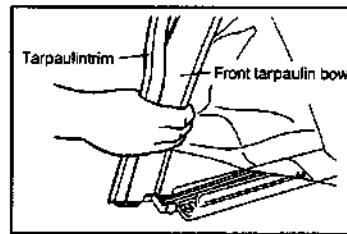


WFE93-BO157

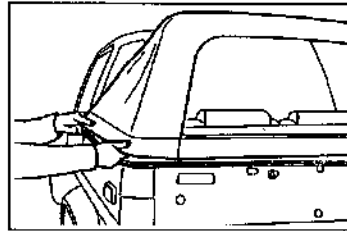
BODY

INSTALLATION

1. Install the tarpaulin trim (tarpaulin assembly) to the front tarpaulin bow.
2. Fix the front tarpaulin bow with two handles.
3. Install the hooks (3 points) to the rear bow.
4. Install the hooks (14 points) of the tarpaulin to the male hooks of the vehicle body.



WP590-BC168



WP590-BC168

TARPAULIN BOW

Removal

1. Remove the tarpaulin assembly.
2. Remove the tarpaulin bow assembly by removing the six screws.

Installation

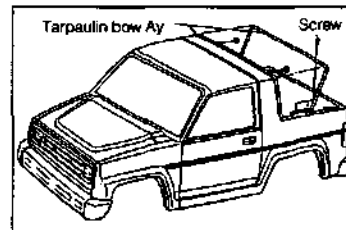
1. Install the tarpaulin bow assembly with the six screws.
2. Install the tarpaulin assembly.

Disassembly

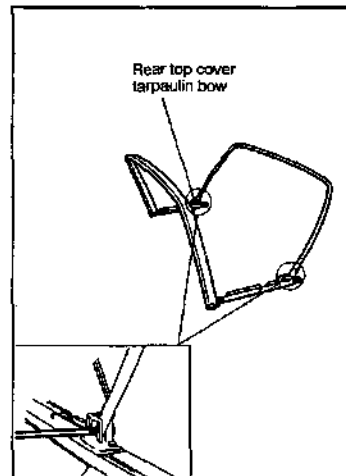
1. Removal of rear top cover tarpaulin bow subassembly.
 - (1) Remove the nut.
 - (2) Remove the washer and head pin from the tarpaulin bow base.
 - (3) Remove the rear top cover tarpaulin bow subassembly from the tarpaulin bow base.
2. Removal of front top cover tarpaulin bow subassembly
 - (1) Remove the "E" ring.
 - (2) Remove the head pin from the tarpaulin bow base.
 - (3) Remove the front top cover tarpaulin bow subassembly from the tarpaulin bow base.

Assembly

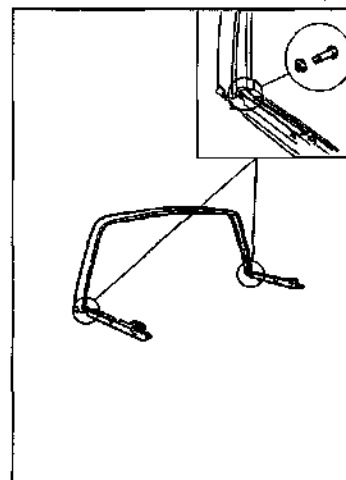
1. Installation of front top cover tarpaulin bow subassembly
 - (1) Install the front top cover tarpaulin bow subassembly to the tarpaulin bow base.
 - (2) Install the head pin and "E" ring.
2. Installation of rear top cover tarpaulin bow subassembly
 - (1) Install the rear top cover tarpaulin bow subassembly to the tarpaulin bow base.
 - (2) Install the head pin, washer and nut.



WP80-B0170



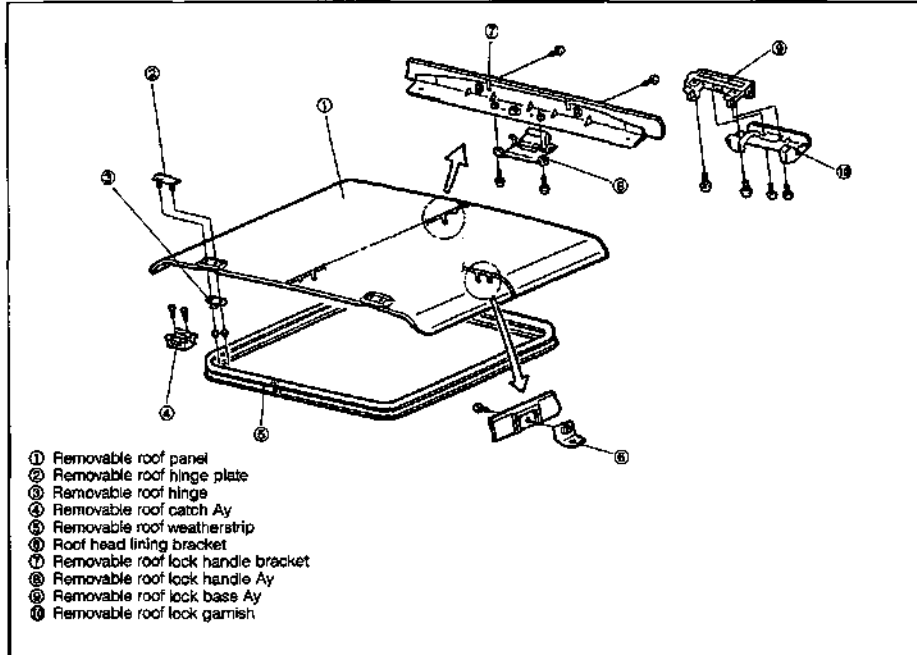
WP80-B0171



WP80-B0172

BODY

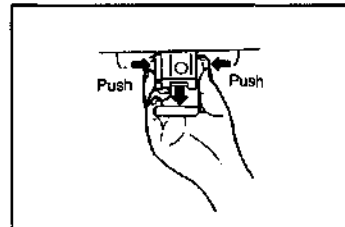
SUNROOF COMPONENTS



WFE00-BO173

REMOVAL

1. Removal of removable roof lock handle assembly
 - (1) Pull the handle toward you while pushing the lock buttons.
 - (2) Remove the handle from the vehicle by pushing the links at the right and left sides.

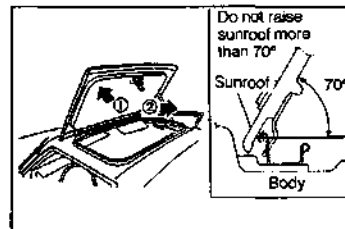


WFE00-BO174

3. Raise the roof. Remove the roof by pulling it upward.

NOTE:

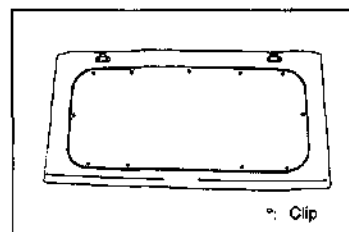
- Do not raise the sunroof more than 70 degrees. If the sunroof is raised in excess of 70 degrees, the sunroof will interfere with the body, resulting in hinge deformation or sunroof breakage.
- When the sun roof is removed, do not hang on or sit on the sunroof frame.



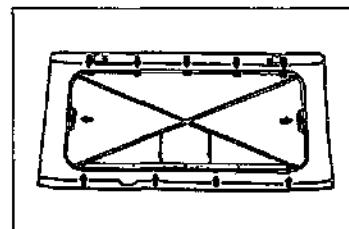
WFE00-BO175

DISASSEMBLY

1. Remove the sunroof headlining assembly by removing the clips.
2. Remove the roof headlining bracket and removable roof lock handle bracket by removing the screws.
3. Remove the removable roof hinge plate and removable roof hinge by removing the nuts.



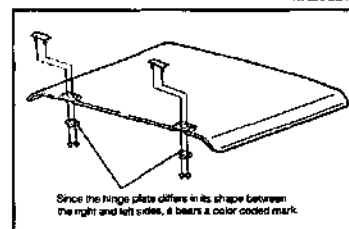
WFE90-BC176



WFE90-BC177

ASSEMBLY

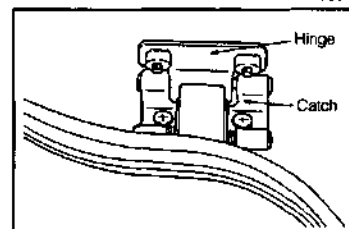
1. Install the removable roof hinge plate and removable roof hinge with the nuts.
2. Install the roof headlining bracket and removable roof lock handle bracket with the screws.
3. Installation of sunroof headlining assembly
 - (1) Ensure that the clips are attached to the sunroof headlining assembly.
 - (2) Install the sunroof headlining assembly to the roof panel.



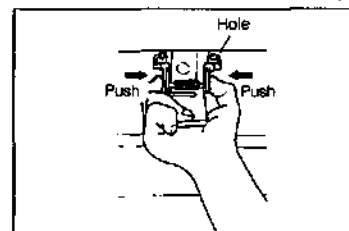
WFE90-BC178

INSTALLATION

1. Align the hinge on the sunroof front end to catch on the roof front open end then push into position from diagonally upper back direction.
2. Close the roof, push the left and right links on the handle and push into the hole on the base securely.
3. Lock the handle by pushing it until clicking sound can be heard. Make sure that the handle is locked.



WFE90-BC179



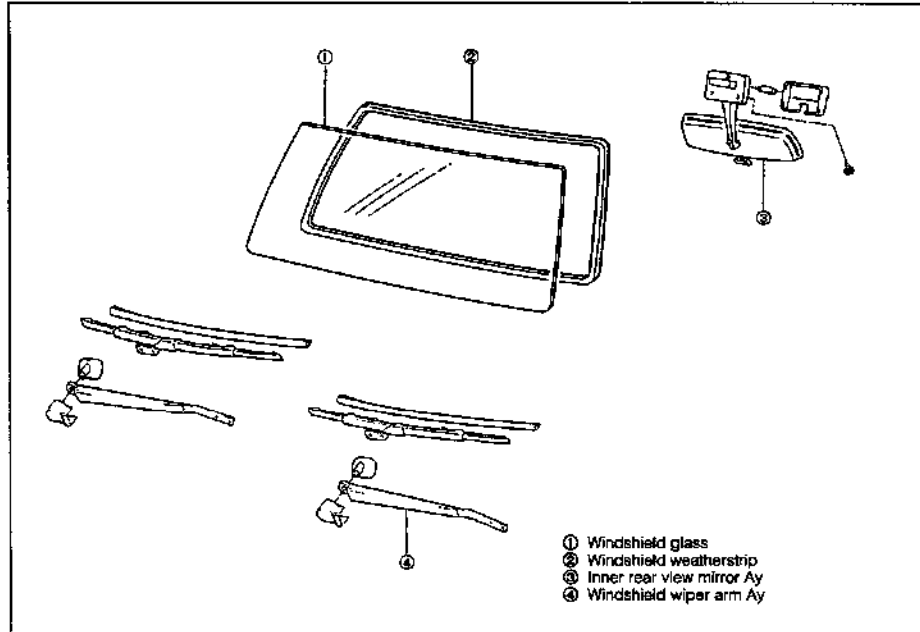
WFE90-BC180

BODY

WINDOWS

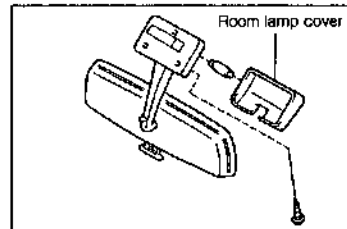
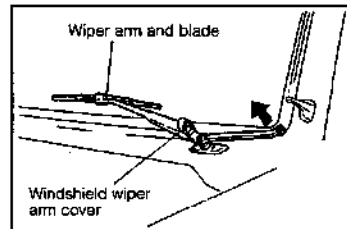
FRONT WINDSHIELD

Components



Removal

1. Removal of windshield wiper arm assembly
 - (1) Remove the windshield wiper arm cover.
 - (2) Remove the windshield wiper arm assembly by removing the attaching nut of the front wiper arm assembly.
2. Removal of inner rear-view mirror assembly
 - (1) Remove the room lamp cover.
 - (2) Remove the inner rear-view mirror by removing the three screws, and disconnect the connector.



3. Removal of front windshield glass

(If reusing weatherstrip)

- (1) Push the lip section of the weatherstrip outward from the body flange, using a screwdriver or a bamboo spatula. This operation is performed from the vehicle interior.

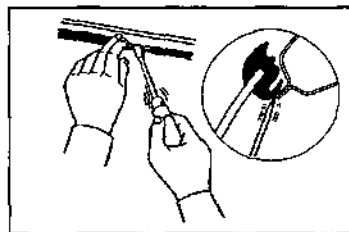
NOTE:

- Be very careful not to scratch the body paint finish surface.

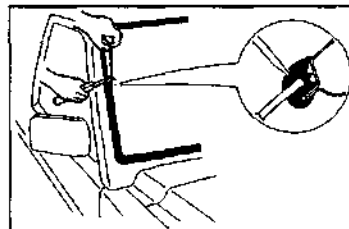
- (2) Remove the front windshield weatherstrip from the front windshield glass.

(If not reusing weatherstrip)

- (1) Cutting off the weatherstrip lip with a knife, from the outside.
- (2) Push the glass with an even force, from the interior.
- (3) Remove the front windshield weatherstrip from the body.



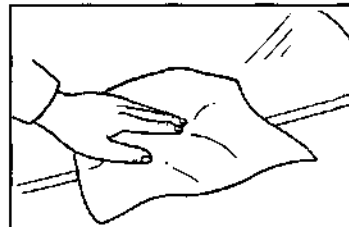
WPB0-BO184



WPB0-BO185

Inspection and cleaning

1. Clean the adhesion sections of the glass and body, using a solvent such as alcohol or white gasoline.



WPB0-BO186

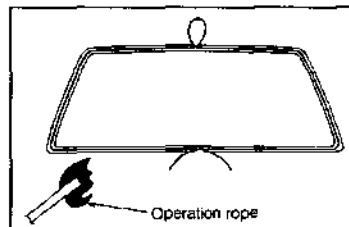
Installation

1. Install the front windshield weatherstrip to the front windshield glass.
2. Installation of front windshield glass.

- (1) Set an operation rope to the weatherstrip.

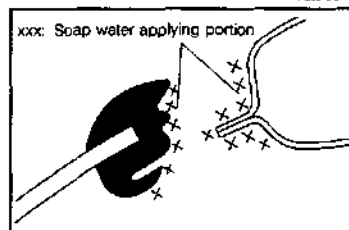
NOTE:

- Never reuse any weatherstrip which exhibits deterioration. Failure to observe this instruction will cause water leakage.



WPB0-BO187

- (2) Apply soap water to the body flange contact sections of the weatherstrip. Also, apply soap water to the body flange.
- (3) Install the front windshield glass to the body.



WPB0-BO188

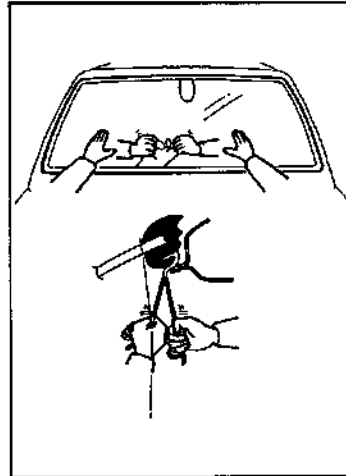
BODY

- (4) Hold the one end of the rope that is suspending in the vehicle interior. Pull the rope in such an angle that allows the weatherstrip to cross over the flange. While so doing, pound the surface of the glass at points adjacent to the weatherstrip using one's palm from the vehicle exterior in order that the windshield may be installed into position.
- (5) Pound the surface of the glass using one's palm from the vehicle exterior so that the windshield may be settled in place.
- (6) Application of non-drying window sealer
Working from the outside, apply the non-drying window sealer between the weatherstrip and the glass as well as between the weatherstrip and the body.

NOTE:

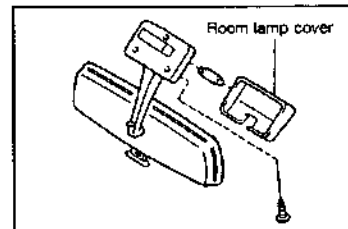
- Remove the any excessive sealer.

- (7) Water leakage check
If water leakage exists, dry the leaky point thoroughly. Then, fill the leaky point with the non-drying sealer.



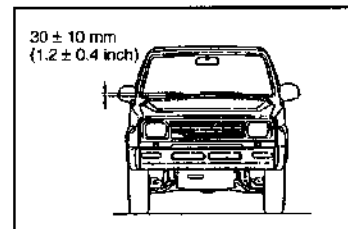
WPB0-BO189

3. Installation of inner rear-view mirror assembly
 - (1) Connect the connector
 - (2) Install the inner rear-view mirror with the three screws.
 - (3) Attach the room lamp cover.



WPB0-BO190

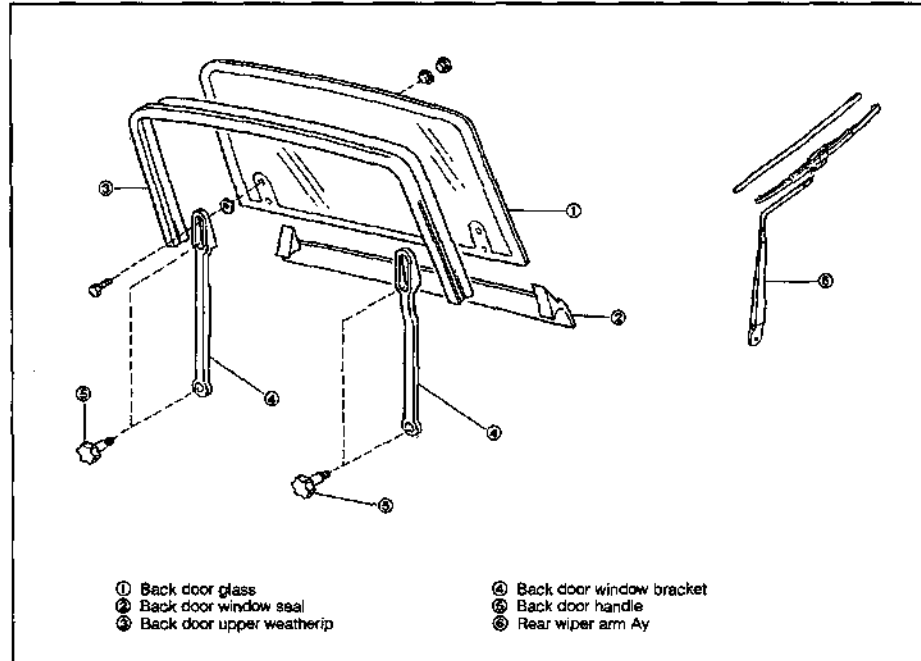
4. Installation of windshield wiper arm assembly
 - (1) Operate the wiper motor, until it assumes the automatic stopping position.
 - (2) Set the wiper arms at the positions indicated in the right figure.
 - (3) Tighten the nut and attach the front wiper arm cover.



WPB0-BO191

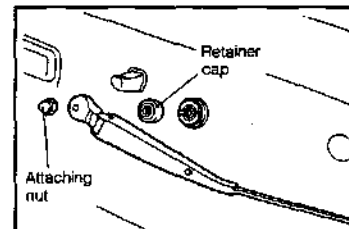
BACK DOOR GLASS

Components



Removal

1. Remove the spare tire.
2. Remove the rear wiper arm assembly.

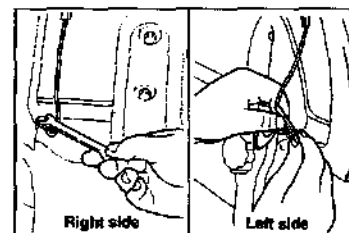


3. Removal the rear window deffogger ground harness
(1) Remove the attaching bolt to disconnect the rear window deffogger ground harness from the back door.

NOTE:

- After the harness has been disconnected, reinstall the bolt to the back door for next use.

- (2) Disconnect the connector for the rear window deffogger at left side.

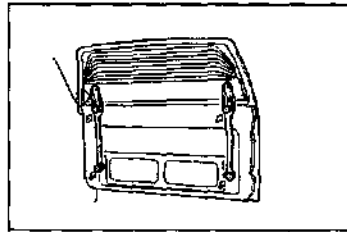


BODY

4. Remove the handles (4-points).

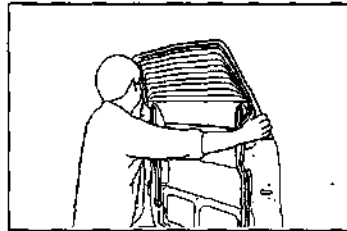
CAUTION:

- When installing the back door glass, make sure that the handles have been tightened positively (four points).



WFEBO-BO192

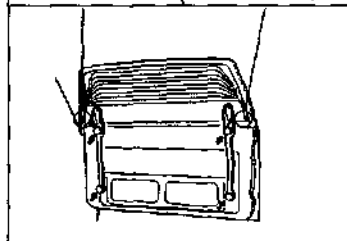
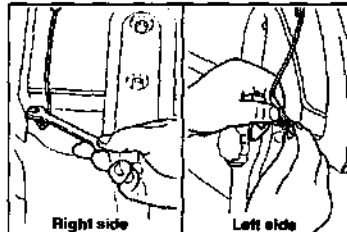
5. Remove the rear window glass.



WFEBO-BO196

Installation

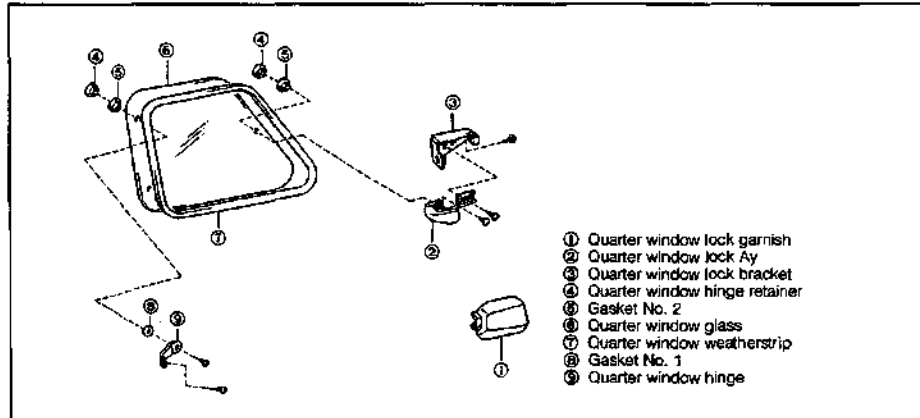
1. Install the back door glass assembly to the body using the four handles.
2. Install the rear window defogger ground harness.
3. Install the rear wiper arm assembly.
4. Install the spare tire.



WFEBO-BO197

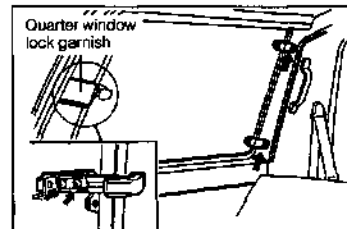
QUARTER WINDOW GLASS

Components



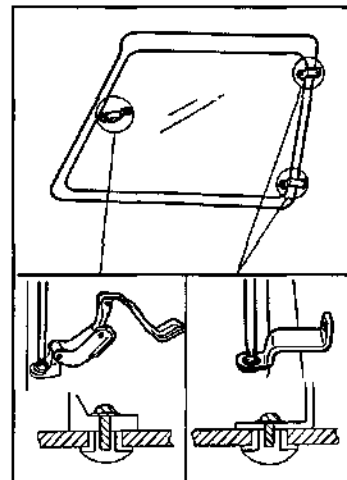
Removal

1. Remove the rear roll bar.
2. Removal of quarter window glass assembly
 - (1) Remove the quarter window lock garnish.
 - (2) Remove the screws attaching the quarter window lock to the body.
 - (3) Remove the screws attaching the quarter window hinge to the body.
 - (4) Remove the quarter window assembly from the body.
3. Remove the quarter window lock and quarter window hinge from the quarter window assembly.



Installation

1. Install the quarter window lock and quarter window hinge to the quarter window assembly.
 2. Install the quarter window assembly to the body, as follows:
 - (1) Install the quarter window hinge to the body with the screws.
 - (2) Install the quarter window lock to the body with the screws.
- NOTE:**
- When tightening the screw, fill the nut with an adhesive agent (instantaneous adhesive agent).
- (3) Install the quarter window lock garnish.
 3. Install the rear roll bar.

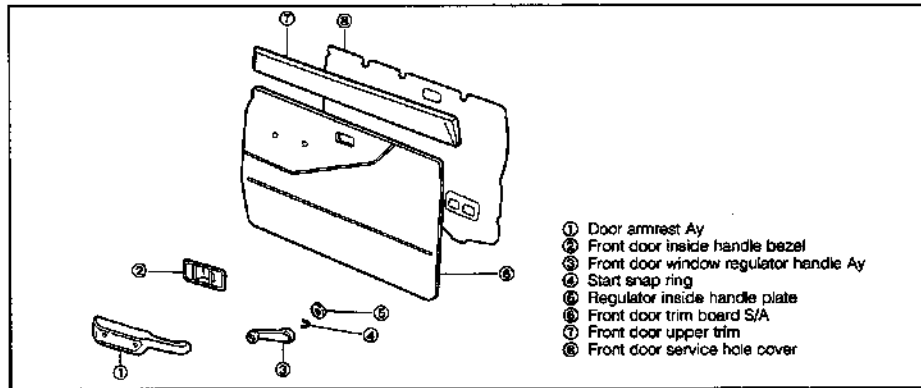


BODY

FRONT DOOR

DOOR TRIM AND SERVICE HOLE COVER

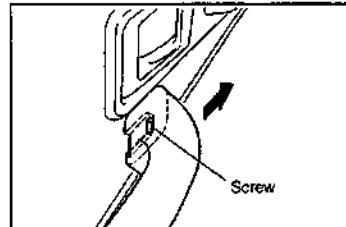
Components



Removal

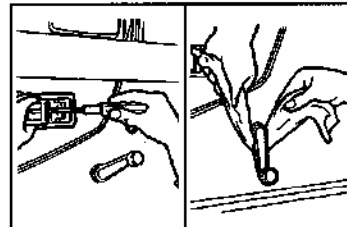
1. Removal of door armrest assembly

- (1) Remove the two screws.
- (2) Remove the door armrest assembly from front door.
- (3) Remove the screw.

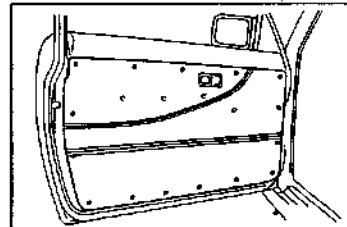


2. Remove the front door inside handle bezel by removing the screw.

3. Removal of front door window regulator handle assembly
- (1) Pull off the snap ring with a cloth as indicated in the figure.
- (2) Remove the front door window regulator handle and door regulator inside handle plate.



4. Remove the front door trim board subassembly by removing the clips.
5. Remove the front door service hole cover.



Installation

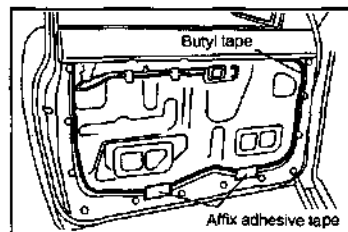
1. Installation of front door service hole cover
 - (1) Affix butyl tape to the points indicated in the right figure.
 - (2) Insert the cover at the lower end into the aperture at the lower side of the door panel. Affix adhesive tape on the holes.

NOTE:

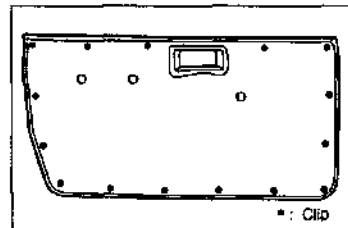
1. Never plug the clip hole of the door trim with adhesive tape.
2. Replace any service hole cover which exhibits rupture.

2. Installation of front door trim panel assembly
 - (1) Ensure that the clips are attached to the front door trim panel assembly.
 - (2) Install the front door trim panel assembly to the front door.

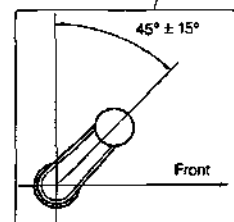
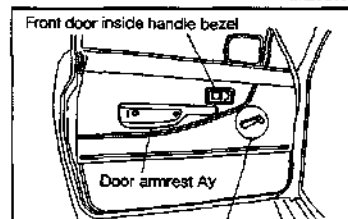
3. Install the front door inside handle bezel and door armrest assembly.
4. Installation of front door window regulator handle assembly.
 - (1) Install the door regulator inside handle plate.
 - (2) Set the snap ring to the front door window regulator handle.
 - (3) Install the front door window regulator handle in the angle specified in the right figure.



WFE90-BC005



WFE90-BC006

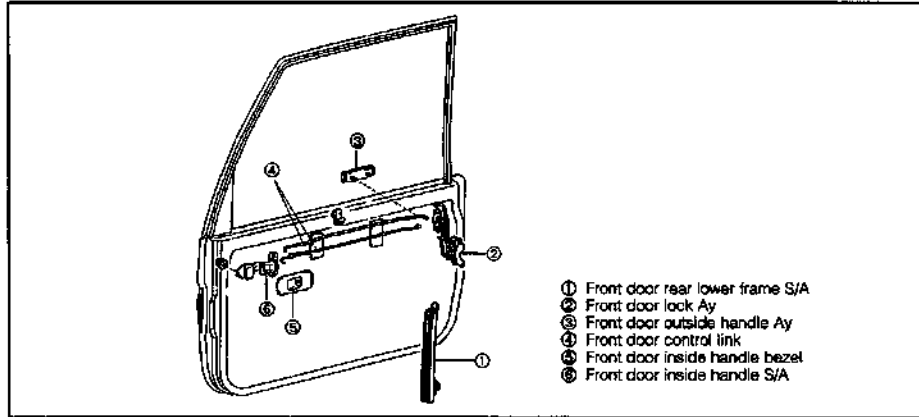


WFE90-BC007

BODY

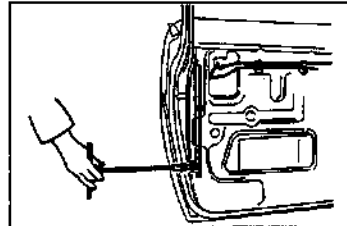
DOOR LOCK AND OUTSIDE DOOR HANDLE

Components

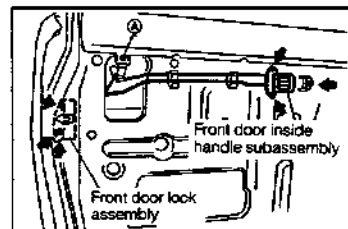


Remove

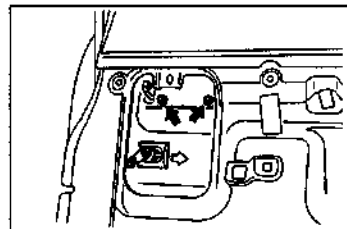
1. Remove the front door trim-related parts.
2. Remove the front door rear lower frame subassembly.



3. Removal of front door lock assembly
 - (1) Remove the front door inside handle subassembly.
 - (2) Remove the bolt ④.
 - (3) Remove the front door lock assembly.



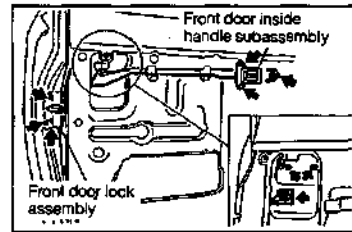
4. Detach the front door outside handle assembly by removing the two nuts.
5. Detach the clip. Remove the key cylinder.



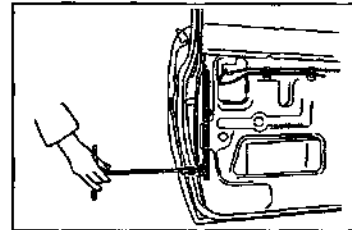
BODY

Installation

1. Install the front door outside handle assembly with the two nuts.
2. Install the key cylinder into position with the clip.
3. Installation of front door lock assembly.
 - (1) Install the front door lock assembly with the three screws.
 - (2) Set the control links and tighten the bolt ④.
 - (3) Install the front door inside handle subassembly with three bolts.
4. Install the front door rear lower frame subassembly with bolt.
5. Install the front door trim-related parts.



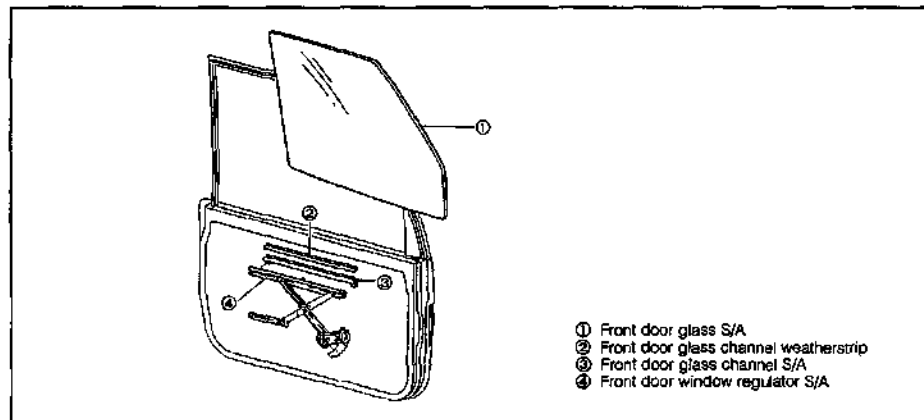
WFEBO-BO212



WFEBO-BO213

DOOR GLASS AND REGULATOR

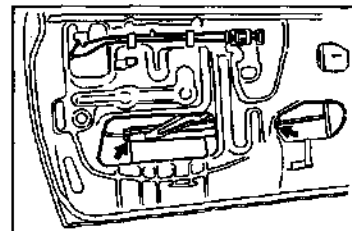
Components



WFEBO-BO214

Removal

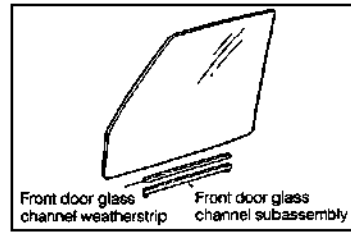
1. Remove the door trim-related parts.
2. Remove the two attaching bolts of the front door glass subassembly. Remove the front door glass subassembly from the front door.



WFEBO-BO215

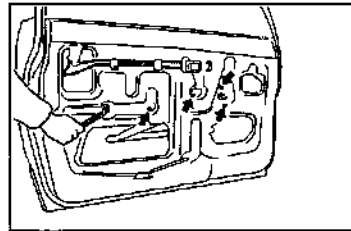
BODY

3. Remove the front door glass channel subassembly and front door glass channel weatherstrip.



WFE90-BO216

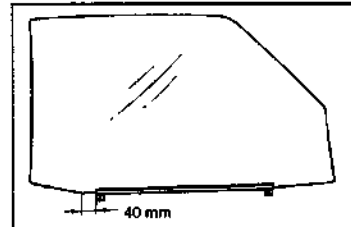
4. Remove the front door window regulator assembly by removing the five bolts.
5. Remove the front door glass weatherstrip outer and inner.
6. Remove the front door glass run.
7. Remove the front door rear lower frame subassembly.



WFE90-BO217

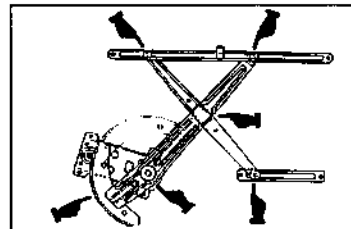
Installation

1. Install the front door rear lower frame subassembly to the body.
2. Install the front door glass run and front door upper trim to the body.
3. Install the front door glass weatherstrip outer and inner.
4. Install the front door glass channel weatherstrip and front door glass channel subassembly to the front door glass.



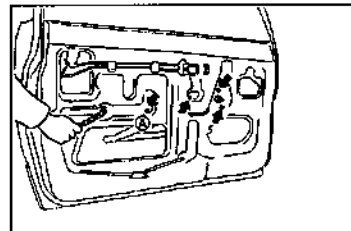
WFE90-BO218

5. Installation of front door window regulator assembly
 - (1) Apply MP grease to the sliding section.



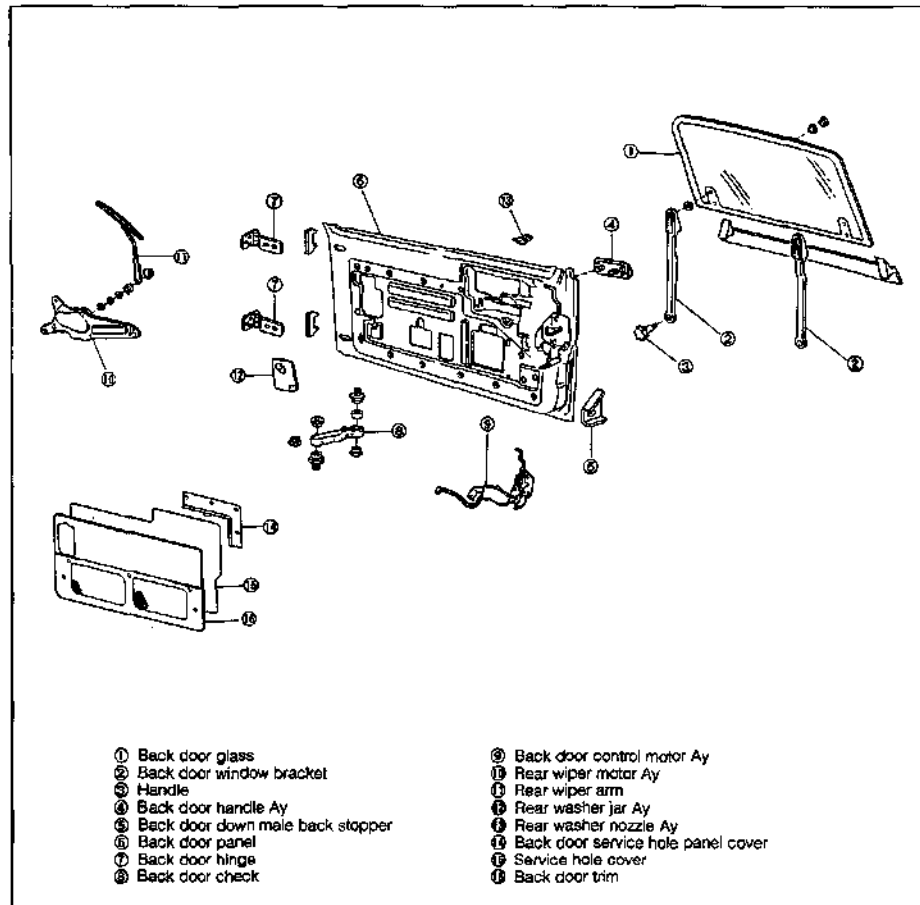
WFE90-BO219

- (2) Install the front door window regulator assembly. (Tighten the bolts other than the bolts A. Then, tighten the two bolts A at the center section of the elongated hole of the door panel.)
6. Installation of front door glass subassembly
 - (1) Install the front door glass subassembly.
 - (2) Close the front door glass fully. Then, lower the front door glass 40 mm (1.57 inches).
 - (3) First loosen the bolts A and then tighten them again.
7. Install the door trim-related parts.



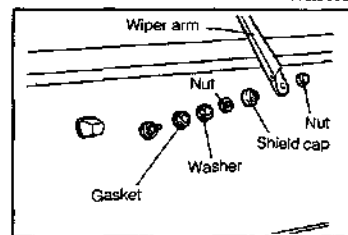
WFE90-BO220

BACK DOOR COMPONENTS



REMOVAL

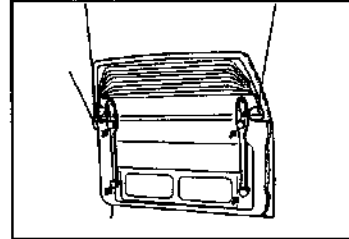
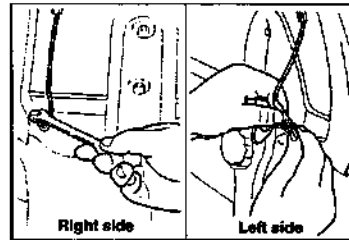
1. Remove the spare tire and spare wheel carrier.
2. Removal of wiper arm and blade
 - (1) Remove the nut wiper arm and shield cap.
 - (2) Remove the nut, washer and gasket.



BODY

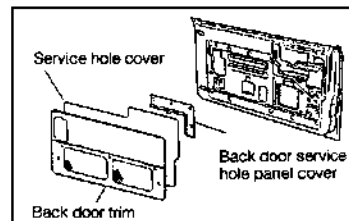
3. Removal of back door glass

- (1) Remove the back door glass defogger ground harness attaching bolt to disconnect the rear window defogger ground harness from the back door.
- (2) Disconnect the connector for the rear window defogger at left side.
- (3) Remove the rear window by removing the four handles.



WPB0-B0223

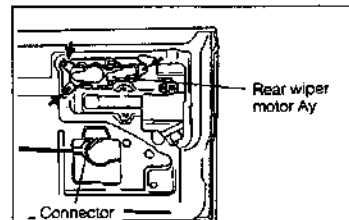
4. Remove the back door trim by removing the clips (14 points).
5. Remove the back door service hole panel cover No. 1 by removing the four screws.
6. Remove the service hole cover.



WPB0-B0224

7. Removal of rear wiper motor assembly

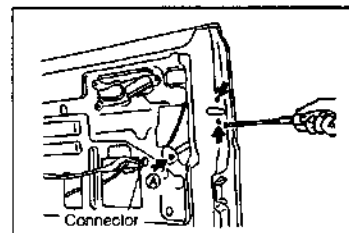
- (1) Disconnect the connector.
- (2) Remove the rear wiper motor assembly by removing the three bolts.



WPB0-B0225

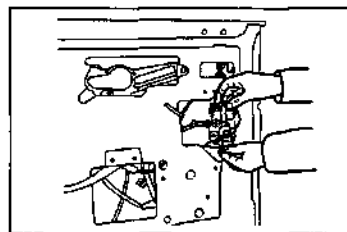
8. Removal of back door lock assembly

- (1) Remove the link-related parts.
- (2) Remove the three attaching screws of the back door lock assembly. (In the case of the back door opener-equipped vehicle, remove the bolt ④ and disconnect the connector.)
- (3) Tack out the back door lock assembly from the back door.



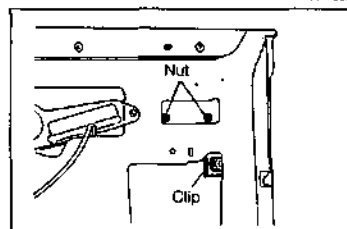
WPB0-B0226

- (4) Remove the back door control motor assembly from the back door lock assembly. (In the case of the back door opener-equipped vehicle only.)



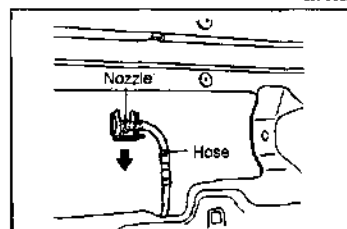
WFE90-80227

9. Remove the back door outside handle assembly by removing the two nuts.
10. Detach the clip. Remove the key cylinder.



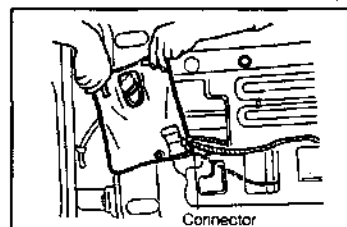
WFE90-80228

11. Remove the rear window washer-related parts.
(1) Remove the rear washer nozzle assembly. Detach the hose and clip from the nozzle assembly.



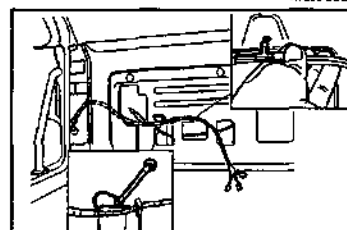
WFE90-80229

- (2) Remove the rear washer jar assembly with hose. Disconnect the connector.



WFE90-80230

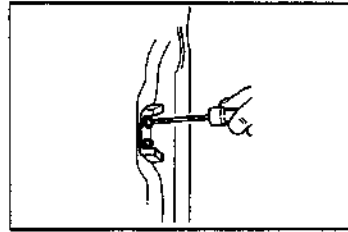
12. Remove the harness and grommet from the back door.



WFE90-80231

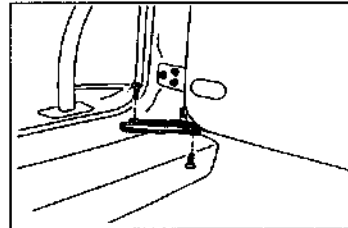
BODY

13. Remove the back door down male stopper.



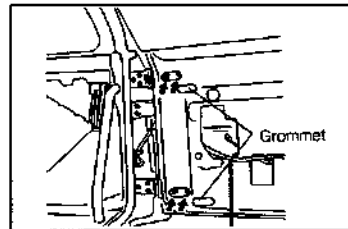
WPBQ-BQ232

14. Remove the back door check subassembly.



WPBQ-BQ233

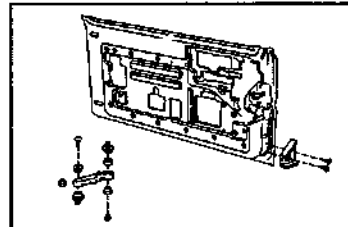
15. Removal of back door panel
(1) Remove the grommets.
(2) Remove the back door panel from the vehicle by removing the bolts.



WPBQ-BQ234

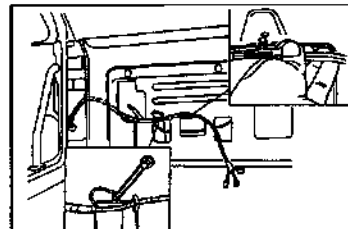
INSTALLATION

1. Installation of back door panel
(1) Install the back door panel to the vehicle with the bolts.
(2) Install the grommets.
(3) Install the back door check subassembly.



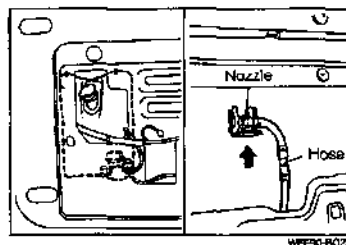
WPBQ-BQ235

2. Install the back door down male stopper with the two screws.
3. Install the harness to the back door.

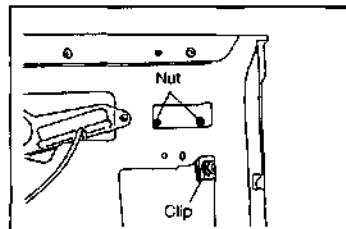


WPBQ-BQ236

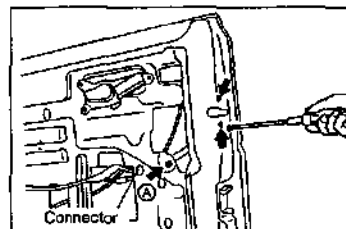
4. Installation of rear window washer-related parts.
 - (1) Install the rear washer jar assembly with hose and connector to the rear washer jar.
 - (2) Install the rear washer nozzle assembly, attached hose and clip to the nozzle assembly.



5. Place the key cylinder on the back door. Secure the lock cylinder with the clip.



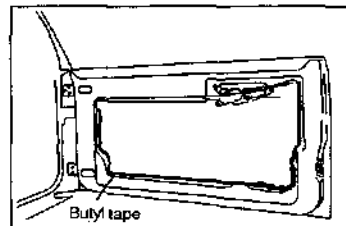
6. Installation of back door lock assembly
 - (1) Install the back door control solenoid assembly in the back door lock assembly. (In the case of the back door opener-equipped vehicle only)
 - (2) Install the back door lock assembly with the three screws. (In the case of the back door opener-equipped vehicle, install the bolt ④ and connect the connector.)
 - (3) Install the link-related parts.



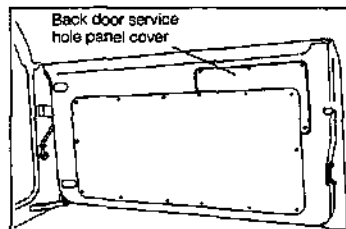
7. Install the service hole cover.

NOTE:

1. Affix butyl tape to the points indicated in the right figure.
2. Replace any service hole cover which exhibits rupture.

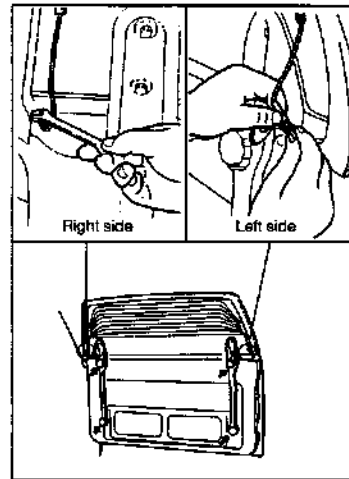


8. Install the back door service hole panel cover No. 1 by with the four screws.
9. Installation of back door trim
 - (1) Ensure that the clips are attached to the back door trim.
 - (2) Install the back door trim to the back door.

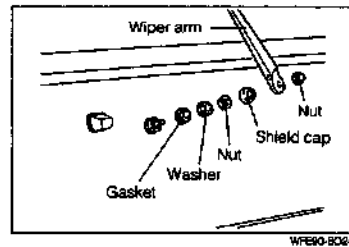


BODY

10. Installation of back door glass
 (1) Install the back door glass with the for handles.
 (2) Install the rear window deffogger ground harness.

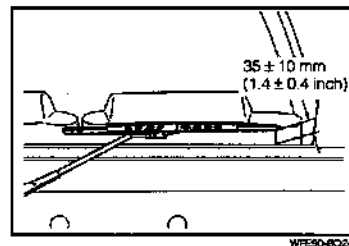


11. Installation of wiper arm and blade.
 (1) Install the Gasket, washer, nut and shield cap.
 (2) Install the wiper arm and nut.

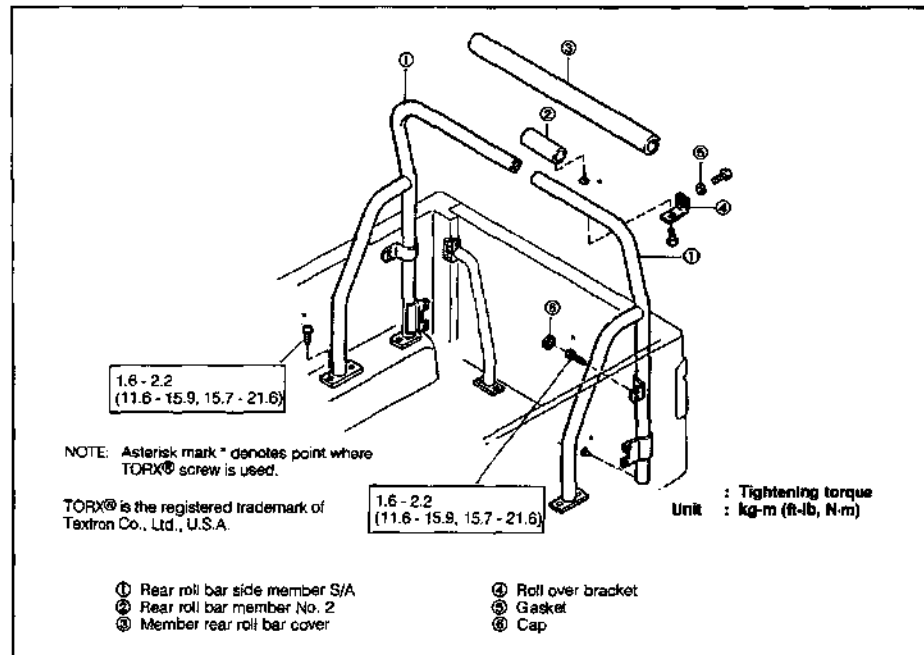


NOTE:

1. Operate the wiper motor and set the wiper arm to the automatic stopping position.
2. Set the wiper arm to the position as indicated in the right figure.

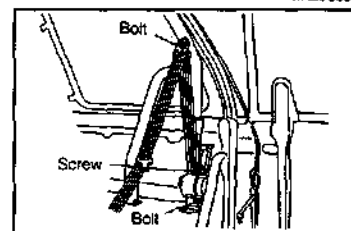


REAR ROLL BAR COMPONENTS

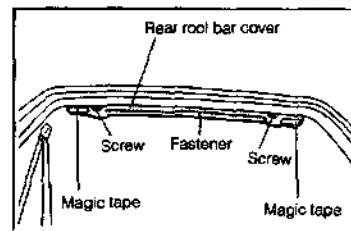


REMOVAL

1. Remove the three point rear seat belts.



2. Removal of rear roll bar cover
 - (1) Remove the magic tapes.
 - (2) Remove the fastener.
 - (3) Remove the rear roll bar cover from the rear roll bar.
 - (4) Remove the two screws.

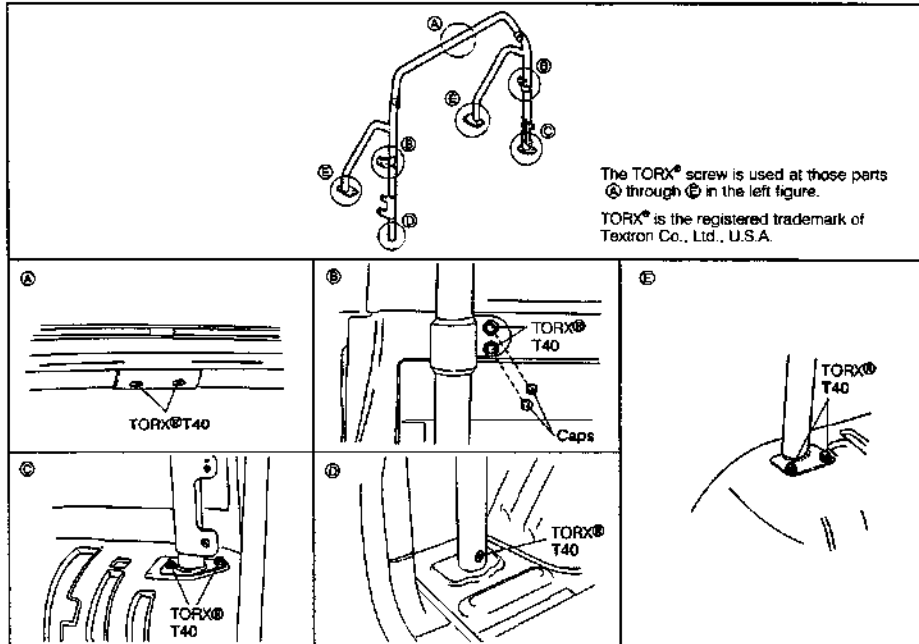


BODY

3. Remove the rear roll bar.

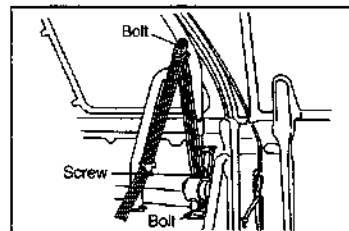
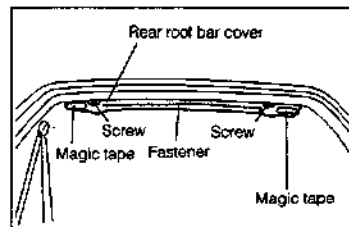
NOTE:

- The rear roll bar employs the TORX® screw so that the owner may not detach the roller bar easily.



INSTALLATION

- Install the rear roll bar to the body.
Tightening Torque: 1.6 - 2.2 kg-m
(11.6 - 15.7 ft-lb, 15.7 - 21.6 N-m)
- Installation of rear roll bar cover
 - Install the two screws.
 - Install the rear roll bar cover to the rear roll bar with the fastener and magic tapes.
- Install the three point rear seat belts.
Tightening Torque: 2.9 - 5.4 kg-m
(21 - 39 ft-lb, 28.4 - 53.0 N-m)



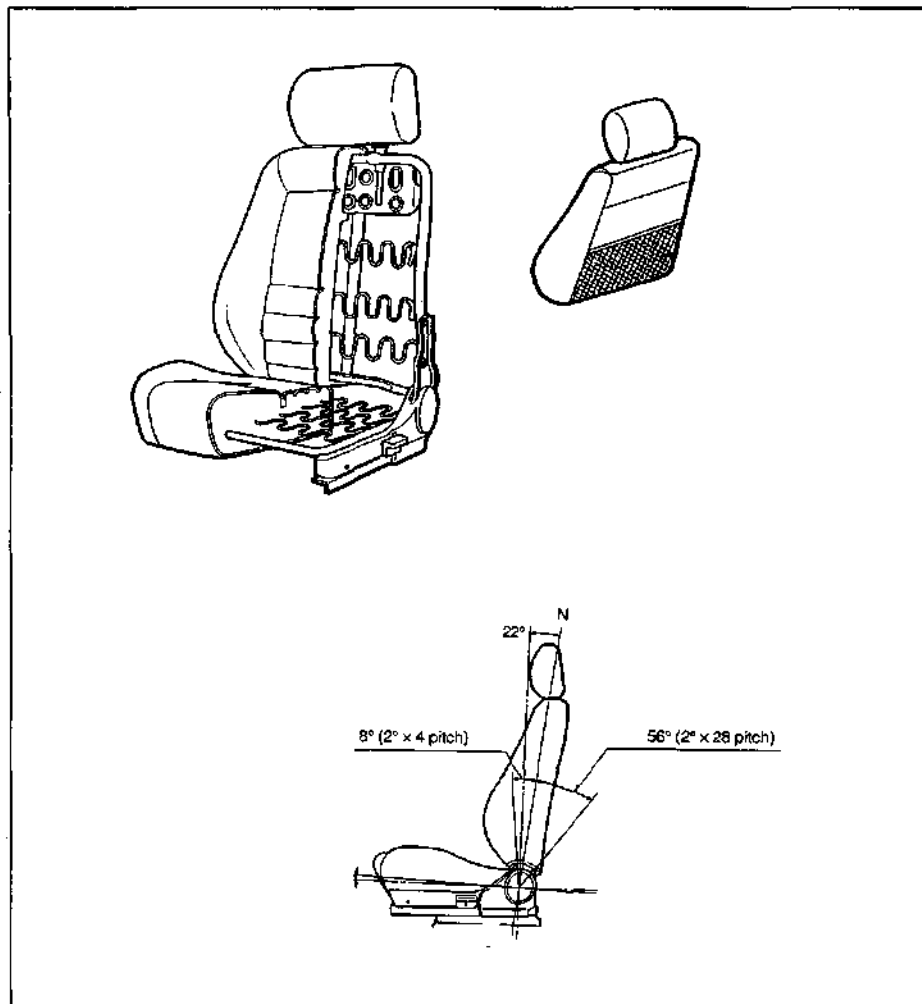
FRONT SEAT

For enhanced rigidity and reduced weight, the seat frame of the front seat adopts a pipe frame and an "S" spring structure.

The front seat uses urethane having an adequate hardness as the seat pad material.

The front seat is so constructed that the seat sliding pitch is 15 mm (0.59 inch), whereas the reclining (pitch) angle can be adjusted in increments of 2 degrees. Consequently, it is possible to make fine adjustments in accordance with the body size of the driver or passenger.

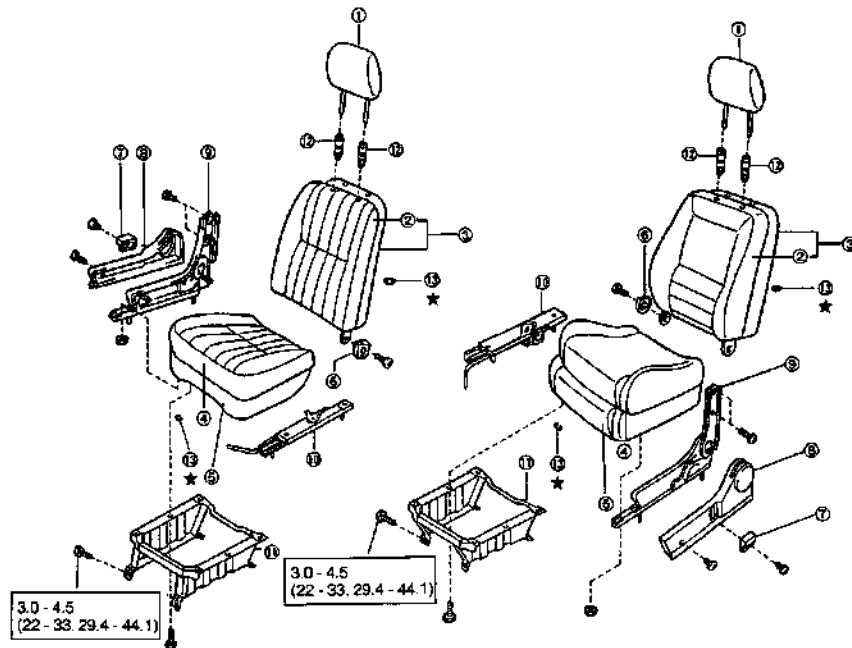
The headrest has been so designed that its height can be adjusted in accordance with the driver or passenger.



WFE90-80251

BODY

COMPONENTS



- ① Front seat headrest
- ② Front seat back cover
- ③ Front seat back Ay
- ④ Front seat cushion cover
- ⑤ Front seat cushion Ay
- ⑥ Front seat hinge cover
- ⑦ Adjusting reclining release handle

- ⑧ Front seat cushion shield
- ⑨ Reclining seat adjuster Ay
- ⑩ Seat track
- ⑪ Front seat cushion leg Ay
- ⑫ Seat headrest support
- ⑬ Hook snap ring

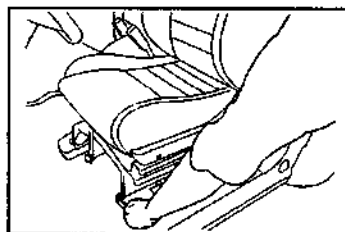
T : Tightening torque
Unit : kg-m (ft-lb, N-m)
* : Non-reusable parts

REMOVAL

NOTE:

- The following disassembly and assembly procedures have been described primarily based on a model seat.

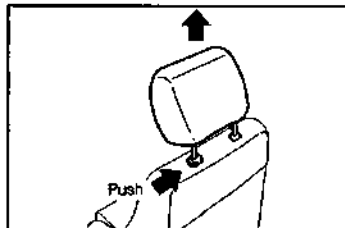
- Remove the front seat from the vehicle by removing the four bolts.



WFE90-80253

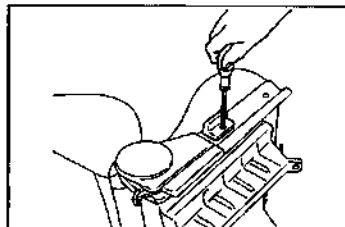
DISASSEMBLY

- Remove the headrest with the stopper pushed toward "Unlock" direction.



WFE90-80254

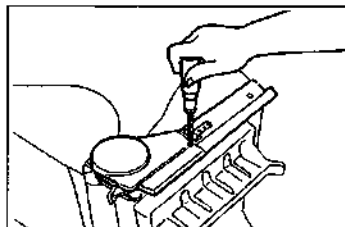
- Remove the adjusting reclining release handle.



WFE90-80255

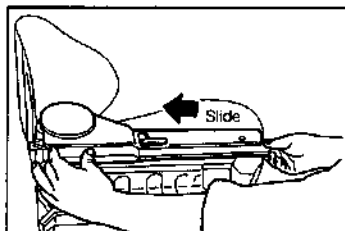
- Remove the front seat cushion shield, following the procedure given below.

- (1) Remove the three attaching screws.



WFE90-80256

- (2) Remove the front seat cushion shield by sliding it, as indicated in the right figure.



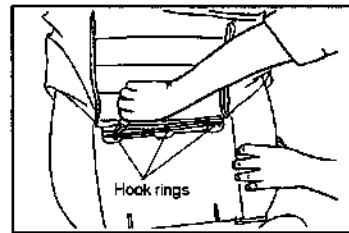
WFE90-80257

BODY

4. Detach the four hook rings of the front seatback cover, as indicated in the right figure.



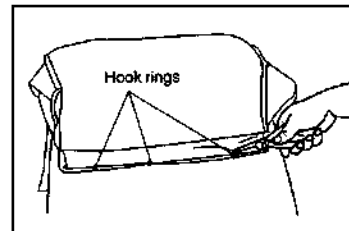
5. Detach the three hook rings of the front seatback cover, as indicated in the right figure.



6. Detach the three hook rings of the front seatback cover, as indicated in the right figure.



7. Detach the three hook rings provided at the rear side of the front seatback cover, as indicated in the right figure.

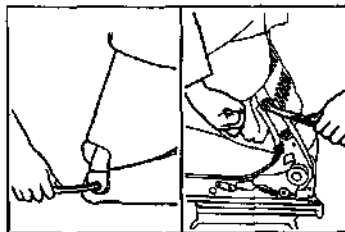


8. Remove the seat headrest support.



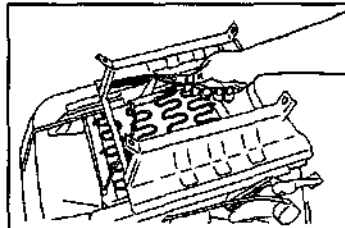
BODY

9. Remove the front seatback assembly.
 - (1) Remove the seatback by removing the one small bolt and two bolts which are attaching the seatback.
 - (2) Remove the front seat hinge cover from the seatback.



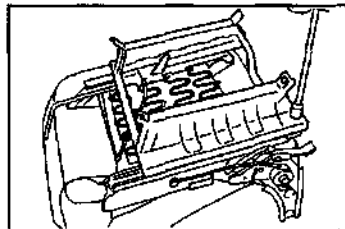
WPB0-BC255

10. Detach the return spring.



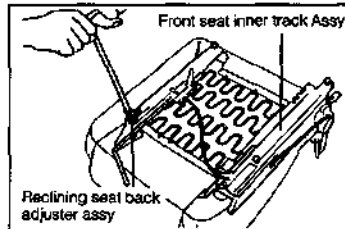
WPB0-BC264

11. Remove the front seat cushion leg assembly by removing the four bolts.



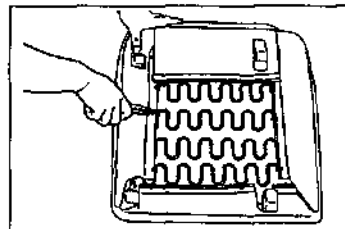
WPB0-BC265

12. Remove the reclining seat back adjuster assembly by removing the two bolts.
13. Remove the front seat inner track assembly by removing the two bolts.



WPB0-BC266

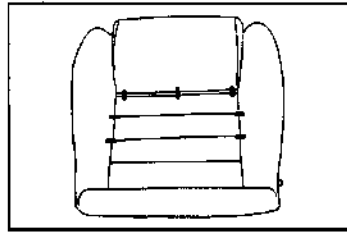
14. Detach the hook rings of the front seat cushion cover at the 13 points, as indicated in the right figure.



WPB0-BC267

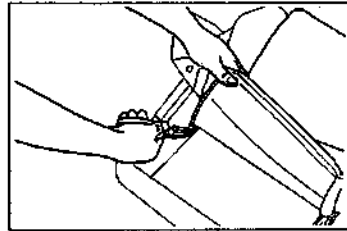
BODY

15. Detach the seven hook rings provided at the front side of the front seatback cover, as indicated in the right figure.



WFE80-BO286

16. Remove the front seat cushion cover from the front seat cushion assembly.



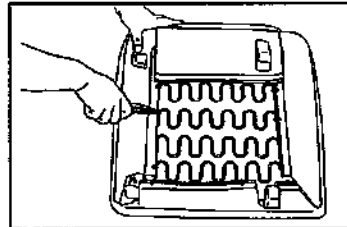
WFE80-BO289

ASSEMBLY

1. Installation of front sea cushion cover
- (1) Install the new hook rings at the back side of the front seat cushion.
 - (2) Install the new hook rings at the back side of the front seat cushion.

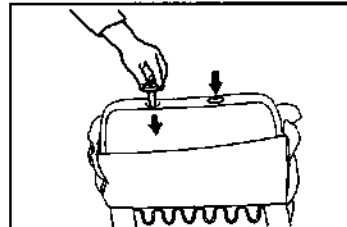
NOTE:

- Be very careful not to smear or scratch the seat cover during the assembly.
- When installing the hook rings, make sure that no wrinkle is formed on the front seat cushion cover wherever possible.



WFE80-BO270

2. Install the front seatback cover to the front seatback. Also, install the headrest support.



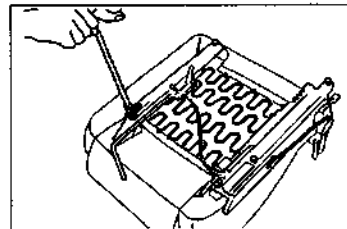
WFE80-BO271

3. Install the reclining seatback adjuster assembly by installing the two bolts.

Tightening Torque: 0.6 - 1.0 kg-m
(4.3 - 7.2 ft-lb, 5.9 - 9.8 N-m)

4. Install the front seat inner track assembly by installing the two bolts.

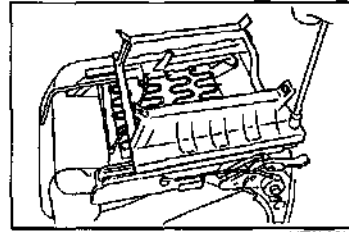
Tightening Torque: 0.6 - 1.0 kg-m
(4.3 - 7.2 ft-lb, 5.9 - 9.8 N-m)



WFE80-BO272

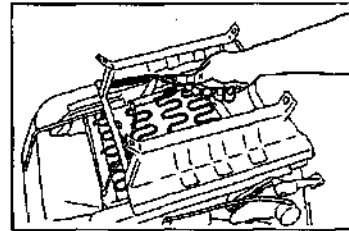
5. Install the front seat cushion leg assembly with the four bolts.

Tightening Torque: 0.9 - 1.5 kg-m
(6.5 - 10.8 ft-lb, 8.8 - 14.7 N-m)



WP80-B0273

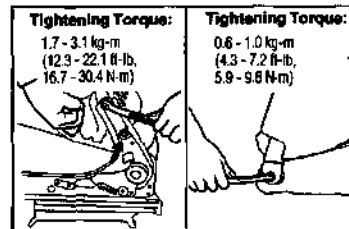
6. Install the return spring.



WP80-B0274

7. Installation of front seatback assembly

- (1) Install the front seat hinge cover to the front seatback assembly. Then, install them to the seat cushion with the two bolts and one small bolt.
- (2) Install new hook rings to the back side of the seatback.



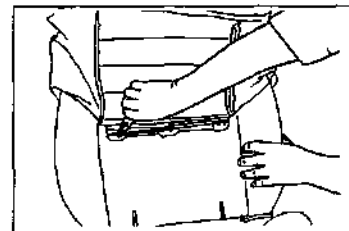
WP80-B0275

8. Install new hook rings to the front seatback cover at the three points, as indicated in the right figure.



WP80-B0276

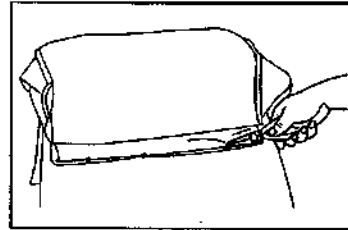
9. Install new hook rings to the front seatback cover at the three points, as indicated in the right figure.



WP80-B0277

BODY

10. Install new hook rings to the rear side of the front seatback cover at the three points, as indicated in the right figure.



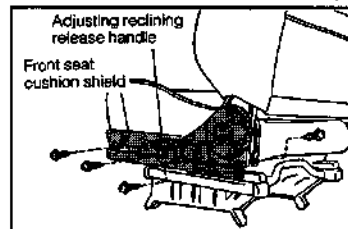
WFE90-80276

11. Install new hook rings to the front seatback cover at the four points, as indicated in the right figure.



WFE90-80279

12. Install the front seat cushion shield with the three screws.
13. Install the adjusting reclining release handle with the one screw.
14. Install the headrest.

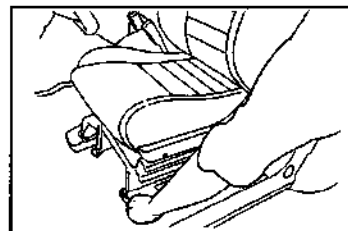


WFE90-80280

INSTALLATION

Install the front seat with the four bolts.

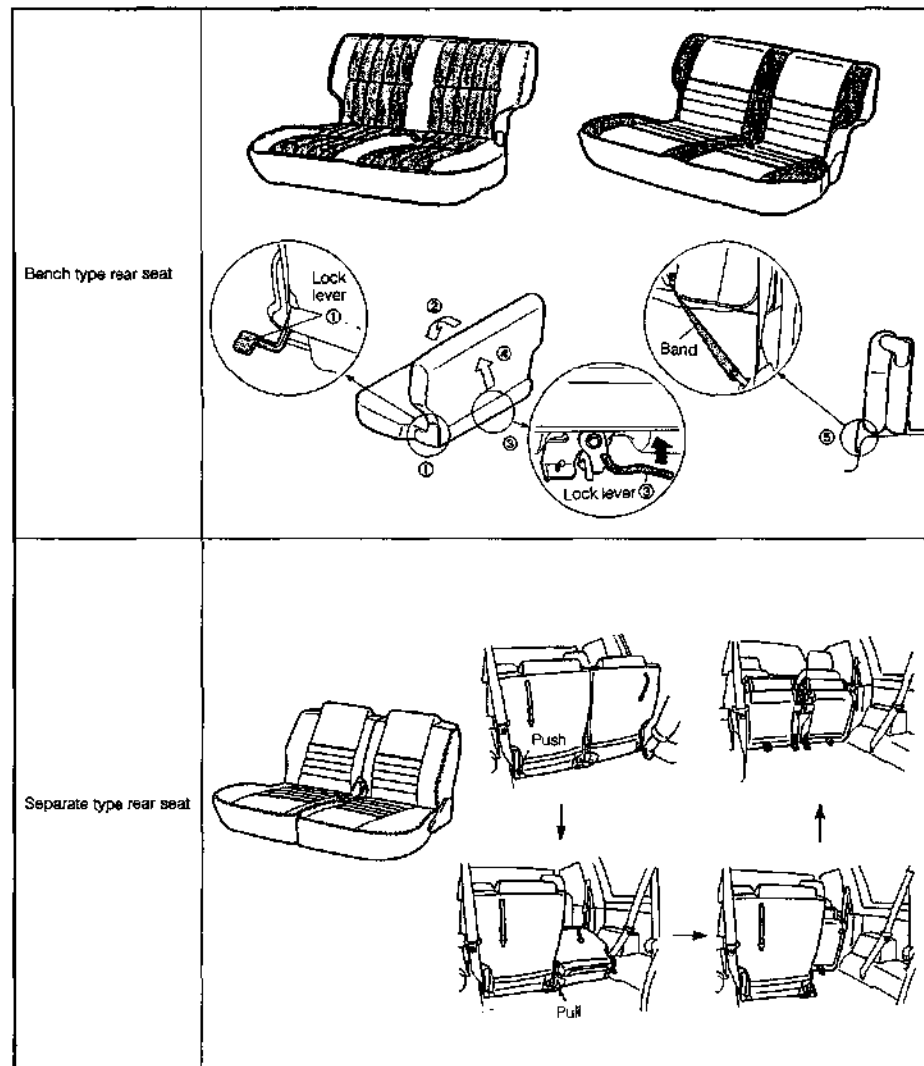
Tightening Torque: 3.0 - 4.5 kg-m
(22 - 33 ft-lb, 29.4 - 44.1 N-m)



WFE90-80281

REAR SEAT

For enhanced rigidity and reduced weight, the seat cushion frame of the rear seat adopts a pipe frame and an "S" spring structure. On the other hand, the seatback frame employs a pipe frame and a wire structure. The rear seat uses urethane having an adequate hardness as the seat pad material. Moreover, the rear seat employs a foldable construction. In addition, the separate type rear seat is available as optional equipment.

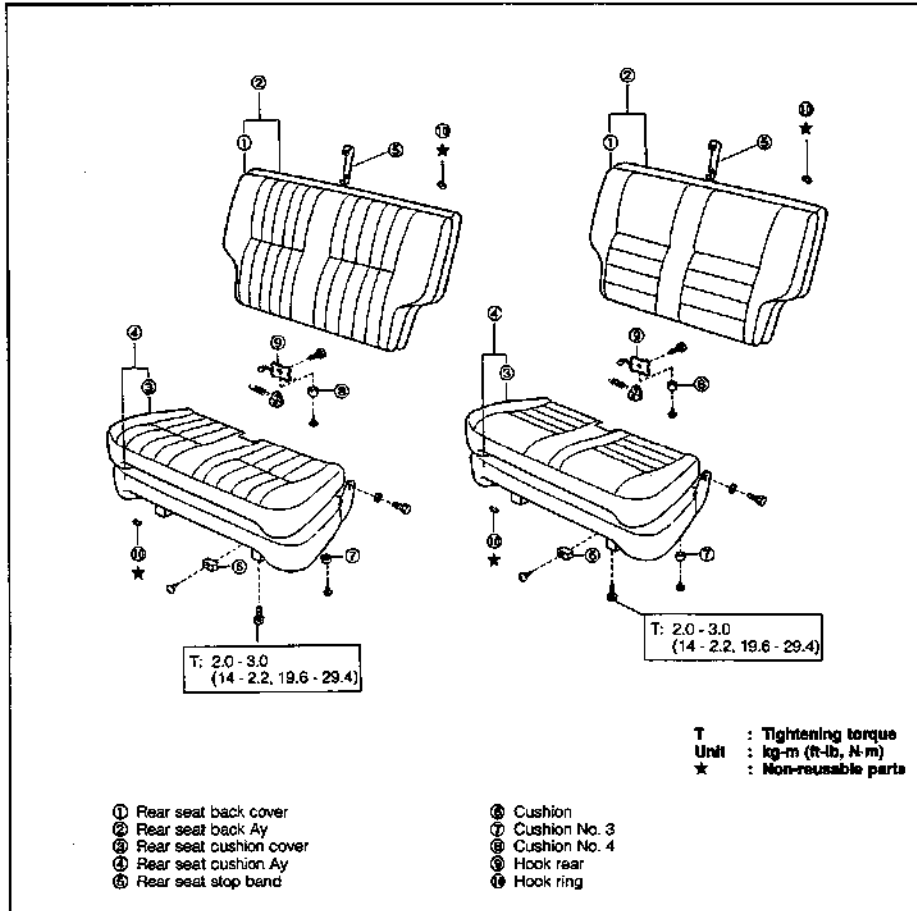


WFE30-50282

BODY

BENCH TYPE REAR SEAT

Components

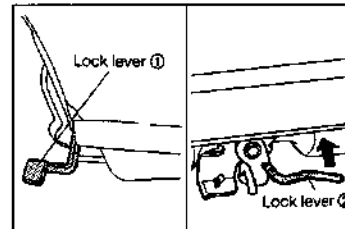


WFE904C0263

Removal

1. Removal of rear seat

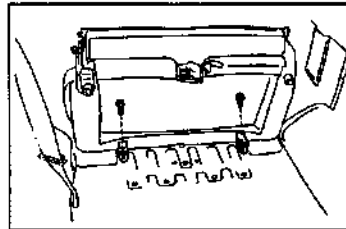
- (1) Push the lock lever ①
- (2) Pull up the lock lever ②
- (3) Raise the entire seat forward



WFE904C0264

BODY

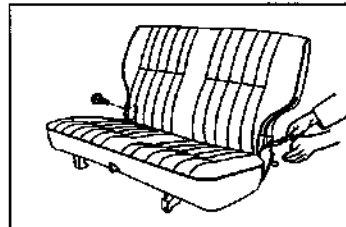
- (4) Remove the rear seat by removing the two bolts.



WFE90-BC086

Disassembly

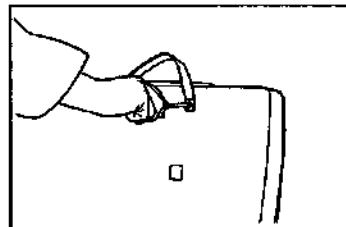
1. Remove the rear seatback by removing the two bolts.



WFE90-BC086

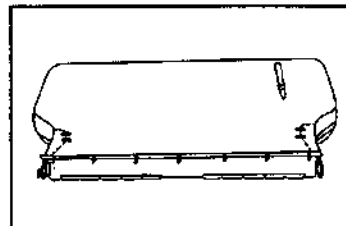
2. Removal of rear seatback cover

- (1) Remove the band by removing the one screw.



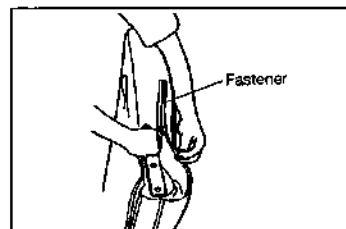
WFE90-BC087

- (2) Remove the hook ring at the back side of the seatback.



WFE90-BC088

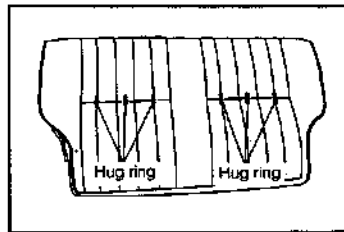
- (3) Raise the fasteners.



WFE90-BC089

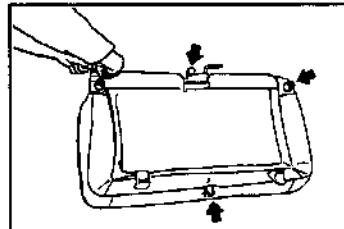
BODY

- (4) Turn over the rear seatback cover.
Remove the rear seatback cover by removing the hook rings at the front section of the seatback.
- (5) Remove the rear seatback cover.



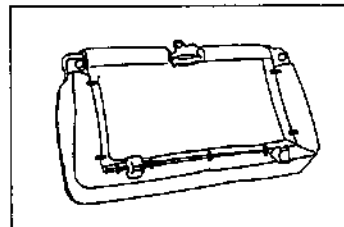
WFE90-BO290

3. Removal of rear seat cushion cover
- (1) Remove the four cushion by removing the screws.



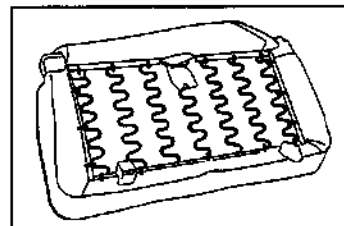
WFE90-BO291

- (2) Remove the hook ring at the back side of the rear seat cushion.

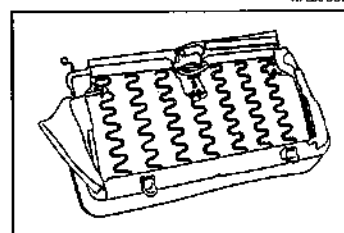


WFE90-BO292

- (3) Turn over the rear seat cushion cover.
Remove the hook ring at the back side of the rear seat cushion.



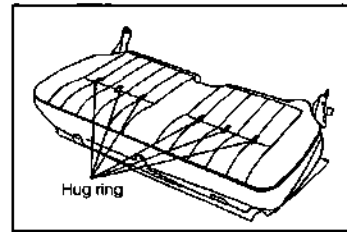
WFE90-BO293



WFE90-BO294

BODY

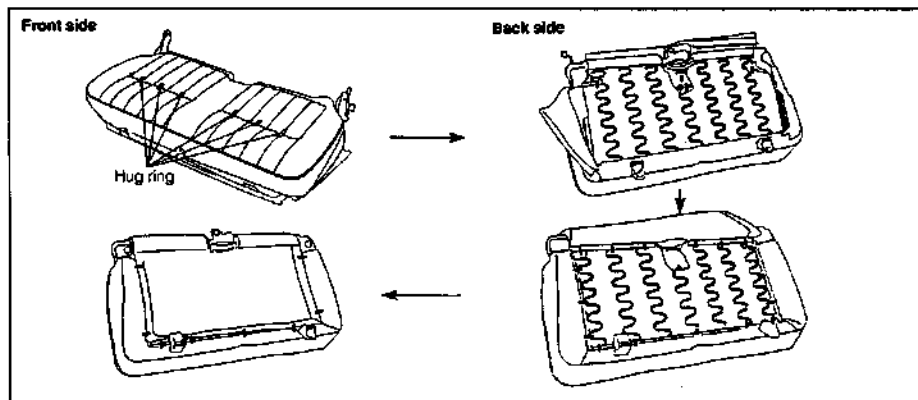
- (4) Turn over the rear seat cushion cover.
Remove the rear seat cushion cover by removing the hook rings at the front section of the rear seat cushion.
- (5) Remove the rear seat cushion cover.



WPB30-BC236

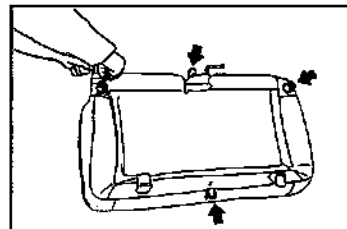
Assembly

1. Installation of rear seat cushion cover
 - (1) Install the new hook rings at the rear seat cushion cover.



WPB30-BC236

- (2) Install the four cushion with the screws.

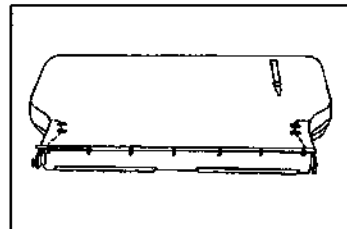


WPB30-BC237

2. Installation of rear seatback cover
 - (1) Install the new hook rings at the front side of the rear seatback.
 - (2) Lower all the fasteners.
 - (3) Install the new hook rings at the back side of the rear seatback.

NOTE:

- Be very careful not to smear or scratch the rear seatback cover during the assembly.
- When installing the hook rings, make sure that no wrinkle is formed on the rear seatback cover whenever possible.



WPB30-BC238

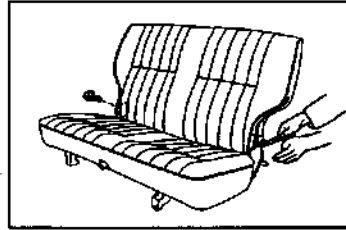
BODY

3. Install the rear seatback to the rear seat cushion with the two bolts.

Tightening Torque: 1.8 - 3.2 kg-m
(13 - 23 ft-lb, 17.7 - 31.4 N-m)

NOTE:

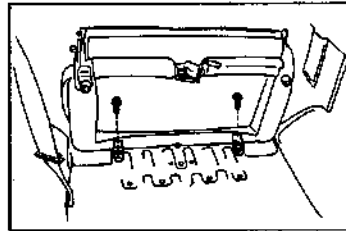
- Make sure that the rear seat cushion bolts at the right and left are tightened securely.



WPB30-8C208

4. Install the rear seat with the two bolts.

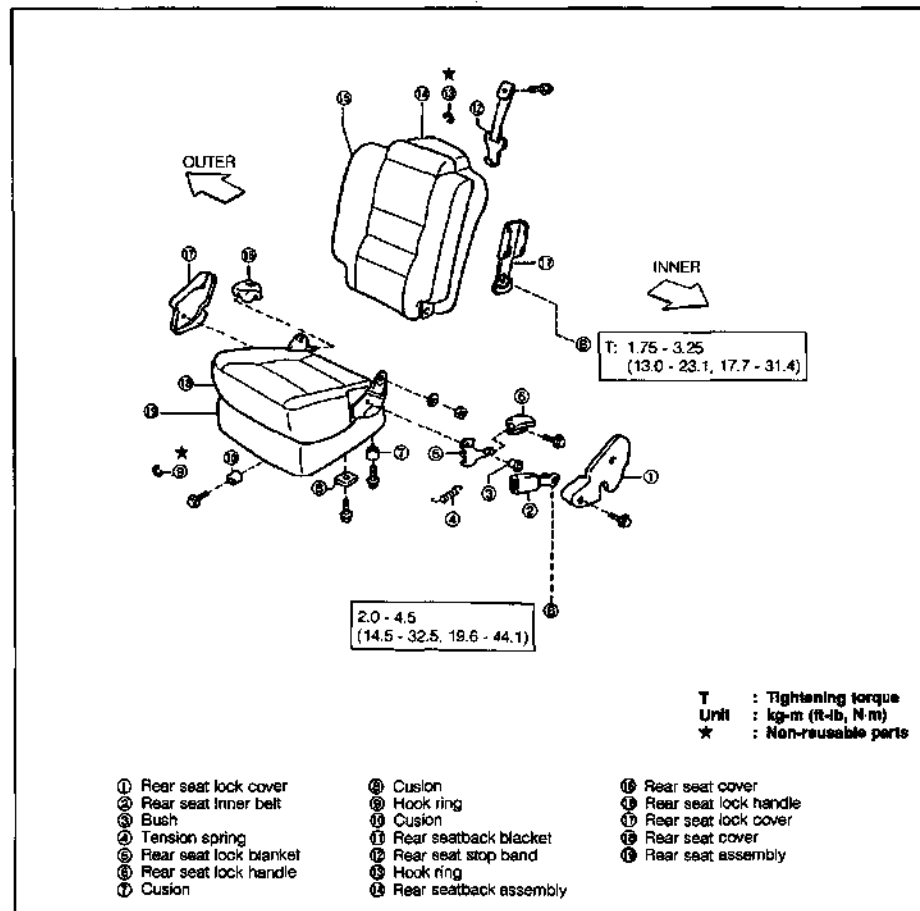
Tightening Torque: 2.0 - 3.0 kg-m
(14 - 22 ft-lb, 19.6 - 29.4 N-m)



WPB30-8C300

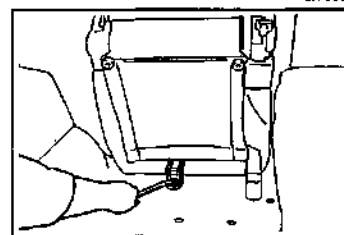
SEPARATE TYPE REAR SEAT

Components



Removal

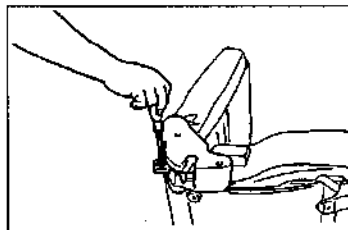
1. Remove the rear seat by removing the two bolts.



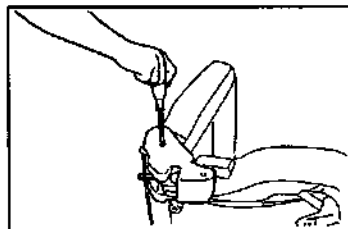
BODY

Disassembly

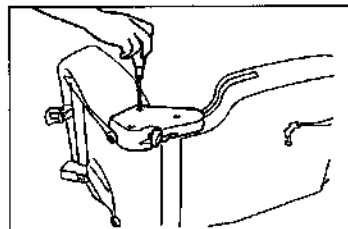
1. Remove the rear seat lock handle.



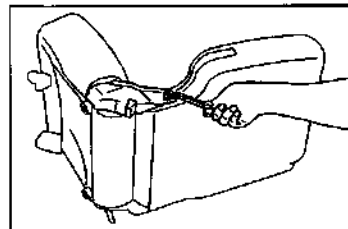
2. Remove the rear seat lock cover.



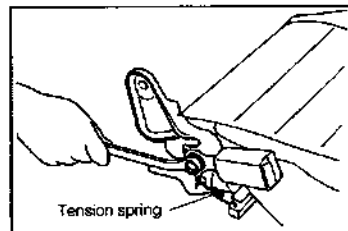
3. Remove the rear seatback lower cover.



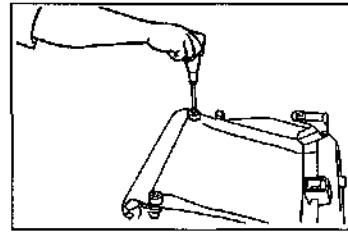
4. Remove the rear seatback assembly from the rear seat cushion assembly.



5. Remove the rear seat inner belt assembly.
6. Remove the tension spring.

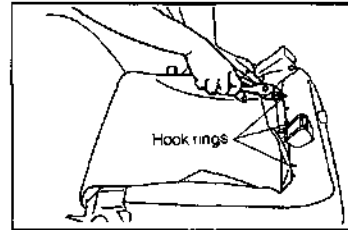


7. Remove the two cushions.



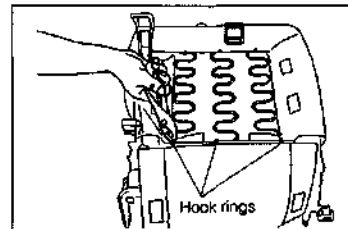
WFE90-BC008

8. Detach the three hook rings of the rear seat cushion, as indicated in the right figure.



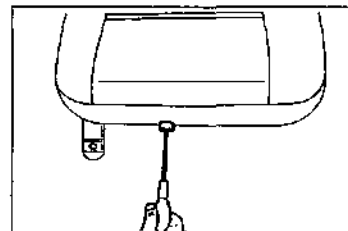
WFE90-BC009

9. Detach the three hook rings of the rear seat cushion, as indicated in the right figure. Remove a part of the rear seat cushion cover.



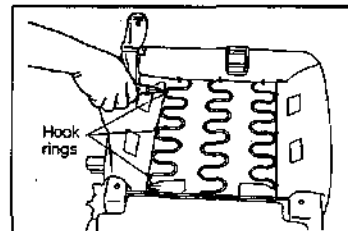
WFE90-BC010

10. Remove the cushion.



WFE90-BC011

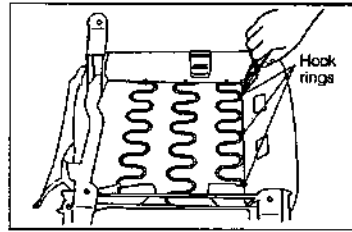
11. Detach the three hook rings of the rear seat cushion cover, as indicated in the right figure.



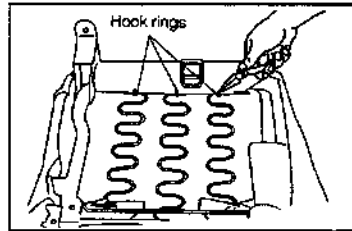
WFE90-BC012

BODY

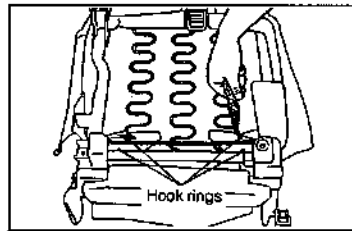
12. Detach the three hook rings of the rear seat cushion cover, as indicated in the right figure.



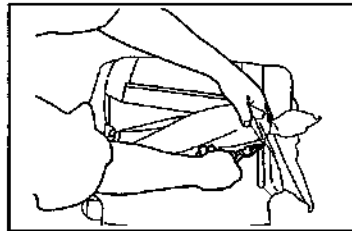
13. Detach the three hook rings of the rear seat cushion cover, as indicated in the right figure.



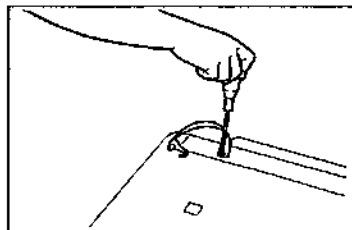
14. Detach the four hook rings of the rear seat cushion cover, as indicated in the right figure.



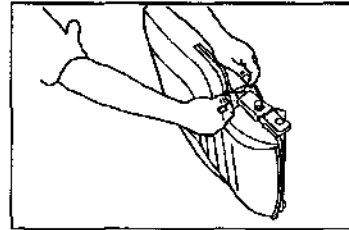
15. Detach the seven hook rings of the rear seat cushion cover. Remove the rear seat cushion cover from the rear seat cushion.



16. Remove the rear seat stop band from the rear seatback assembly.

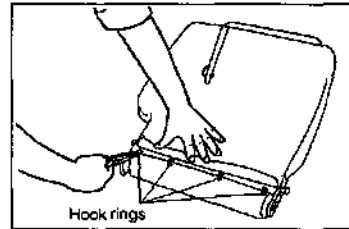


17. Raise the fastener of the rear seatback cover.



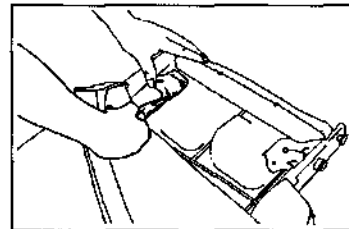
WFE50-80318

18. Detach the four hook rings of the rear seatback cover, as indicated in the right figure.



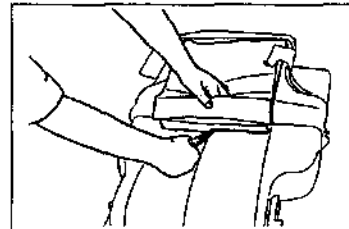
WFE50-80318

19. Detach the four hook rings of the rear seatback cover, as indicated in the right figure.



WFE50-80320

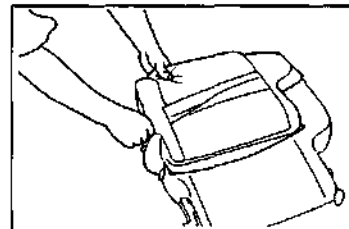
20. Detach the three hook rings of the rear seatback cover, as indicated in the right figure. Remove the rear seatback cover from the rear seatback assembly.



WFE50-80321

Assembly

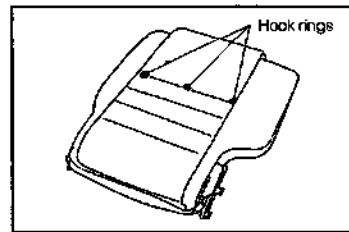
1. Install the rear seat cover to the rear seatback assembly.



WFE50-80322

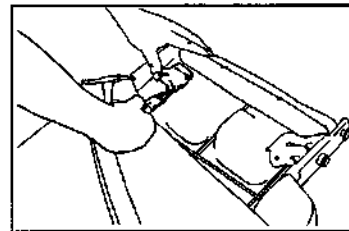
BODY

2. Install new hook rings to the rear seatback cover, as indicated in the right figure.



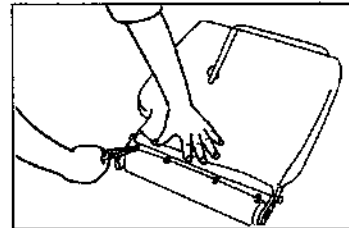
WFE90-B0323

3. Install new hook rings to the rear seatback cover at the four points, as indicated in the right figure.



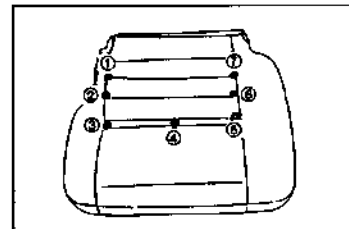
WFE90-B0324

4. Install new hook rings to the rear seatback cover at the four points, as indicated in the right figure.
5. Lower the fastener of the rear seatback.
6. Install the rear seat stop band.



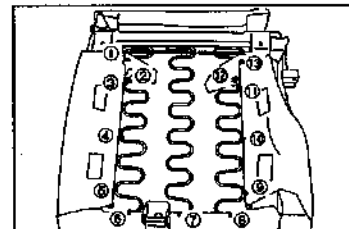
WFE90-B0325

7. Install the rear seat cushion cover to the rear seat cushion assembly. Install new hook rings at the seven points, as indicated in the right figure.



WFE90-B0326

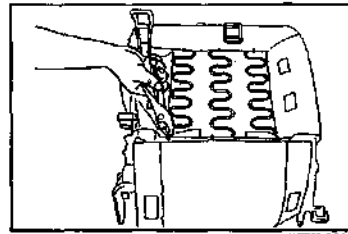
8. Install new hook rings to the rear seat cushion cover at the 13 points, as indicated in the right figure.



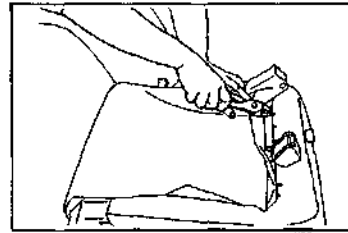
WFE90-B0327

BODY

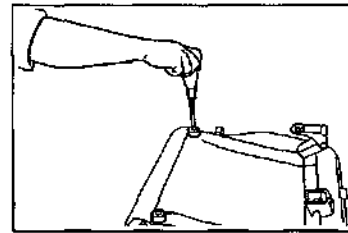
9. Install new hook rings to the rear seat cushion cover at the three points, as indicated in the right figure.



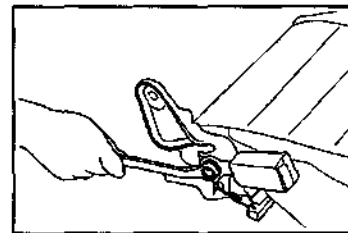
10. Install new hook rings to the rear seat cushion cover at the three points, as indicated in the right figure.



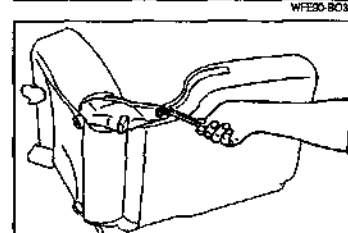
11. Install the rear seat cushion at the three points, as indicated in the right figure.



12. Install the rear seat inner belt assembly.
Tightening Torque: 2.0 - 4.5 kg-m
(14.5 - 32.5 ft-lb, 19.6 - 44.1 N-m)



13. Install the tension spring.



14. Install the rear seat cushion assembly to the rear seatback assembly.

Tightening Torque: 1.75 - 3.25 kg-m
(13.0 - 23.1 ft-lb, 17.7 - 31.4 N-m)

NOTE:

- Make sure that the rear seatback attaching bolts at the right and left are tightened securely.

BODY

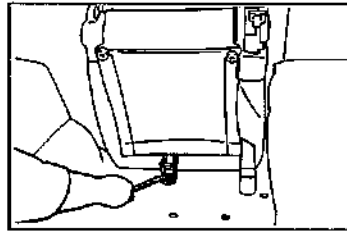
15. Install the rear seatback lock cover.
16. Install the rear seat lock cover.
17. Install the rear seat lock handle.

WFE90-BO333

Installation

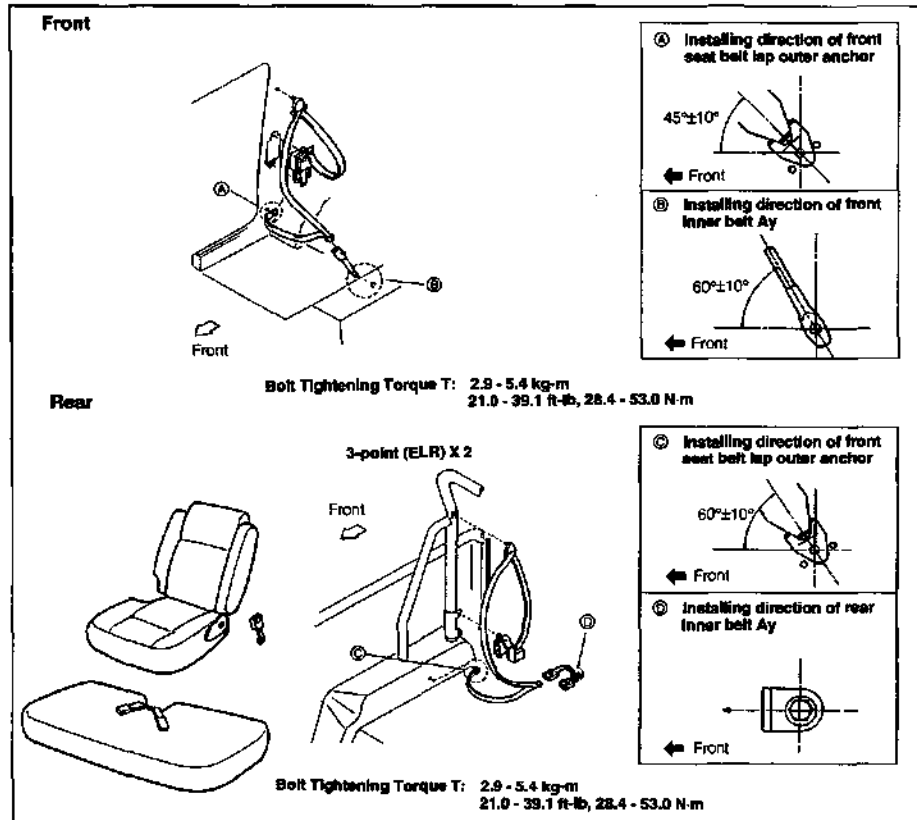
1. Install the rear seat by installing the two bolts.

Tightening Torque: 2.0 - 3.0 kg-m
(14 - 22 ft-lb, 19.6 - 29.4 N-m)



WFE90-BO334

SEAT BELTS COMPONENTS



WFE90-BC335

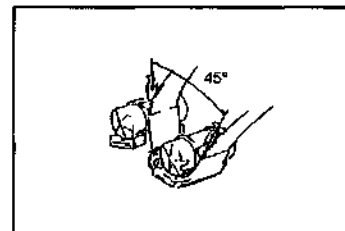
INSPECTION

ELR Locking check

Slowly tilt the retractor from the installation angle. Ensure that no belt locking takes place within 15 degrees in all directions. Also, ensure that the locked state is retained when the retractor is tilted 45 degrees or more.

NOTE:

- Never attempt to disassemble the retractor.
- After the anchor bolts have been tightened, make sure that each anchor can move in the bolt's circumferential direction.
- Be sure that the belt in the installed state can be pulled out smoothly and also it can be retracted smoothly into position.



WFE90-BC336

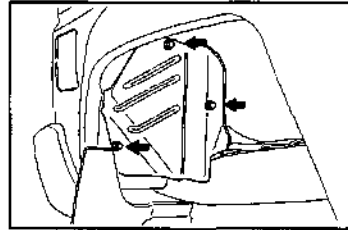
FUEL TANK COMPONENTS



Downloaded from www.Manualslib.com manuals search engine

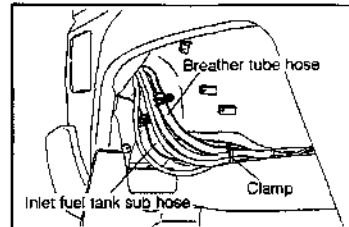
FUEL INLET PIPE**Removal**

1. Remove the inlet fuel protector by removing the three bolts and one clip.



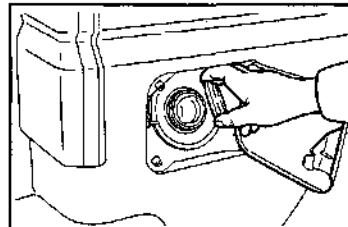
WFE00-80339

2. Remove the inlet fuel tank sub hose and breather hose.



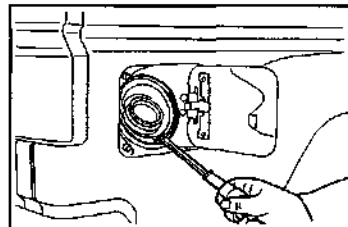
WFE00-80340

3. Remove the fuel tank cap assembly.



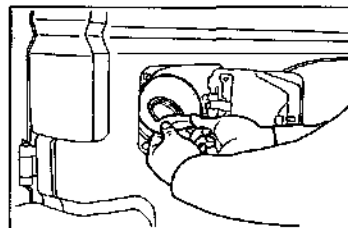
WFE00-80341

4. Remove the inlet box ring.



WFE00-80342

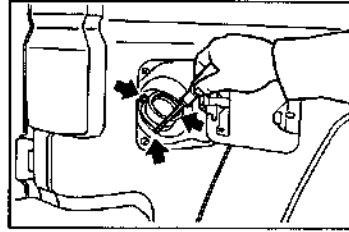
5. Remove the fuel tank filler pipe shield No. 2.



WFE00-80343

BODY

6. Remove the fuel tank inlet pipe subassembly by removing the three screws.

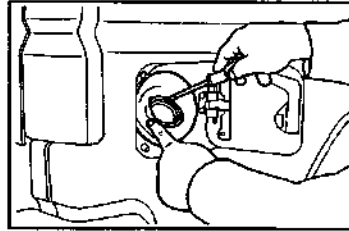


Installation

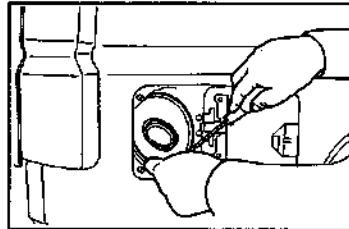
1. Install the fuel tank inlet pipe subassembly and inlet shield fuel tank No. 1 with the three screws.
2. Install the fuel tank filler pipe shield No. 2.

NOTE:

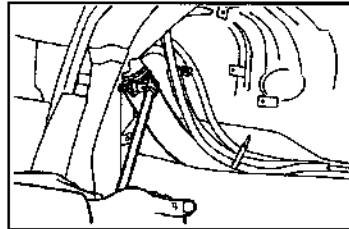
- The cut-out section should face toward the lower side.



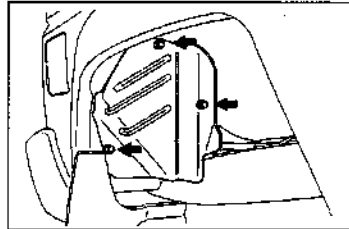
3. Install the inlet box ring.
4. Install the tank cap assembly.



5. Attach the inlet fuel tank sub hose and breather hose to the fuel tank inlet pipe.



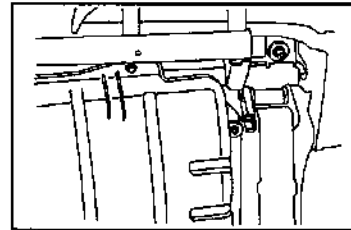
6. Install the inlet fuel protector with the three bolts and one clip.



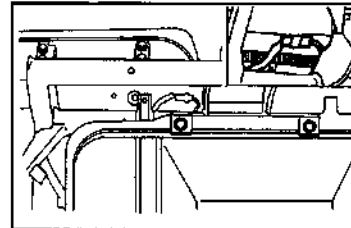
FUEL TANK

Removal

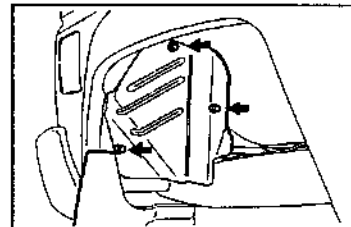
1. Drain the fuel from the fuel tank by removing the drain plug. After the fuel has been drained, install the drain plug.
2. Remove the fuel tank protector subassembly.



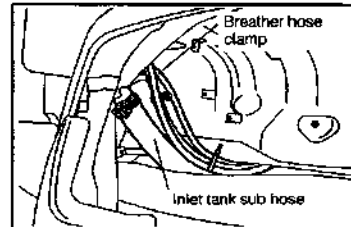
3. Disconnect the fuel sender gauge connector.



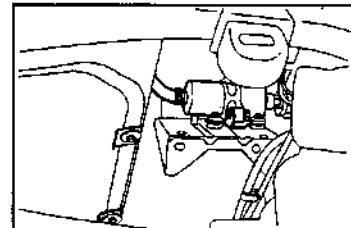
4. Remove the inlet fuel protector by removing the three bolts and one clip.



5. Remove the inlet tank sub hose, breather hose and clamp.



6. Removal of fuel hose and fuel return hose
 - HD-E engine
 - (1) Remove the fuel pump bracket subassembly by removing the three bolts.
 - (2) Remove the clamps and separate the fuel hose and fuel return hose.
 - HD-C engine
 - (1) Remove the clamps and separate the fuel hose and fuel return hose.

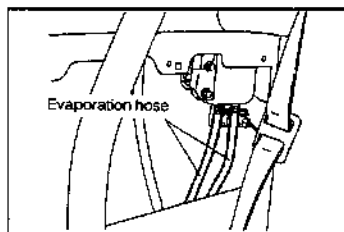


BODY

7. Remove the clamps and disconnect the evaporation hoses.

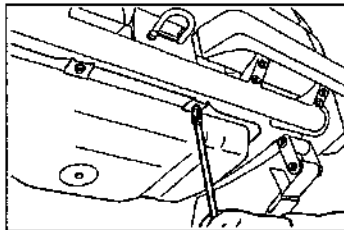
NOTE:

- It is not necessary to disconnect the black hose.



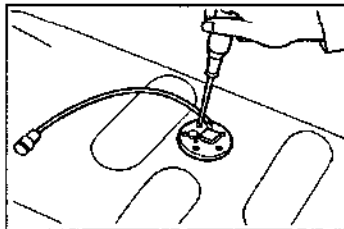
8. Removal of fuel tank assembly

- (1) Support the fuel tank assembly with a jack.
- (2) Remove the five attaching bolts of the fuel tank.



9. Remove the fuel hoses.

10. Remove the fuel sender gauge assembly by removing the five screws.



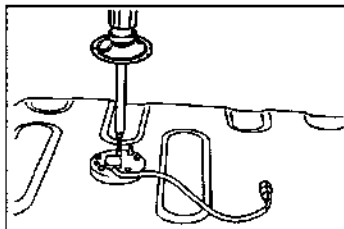
Installation

1. Install of fuel tank assembly

- (1) Install the fuel sender gauge assembly with the five screws.

Tightening Torque: 2kg-cm

- (2) Install the evaporation hoses.

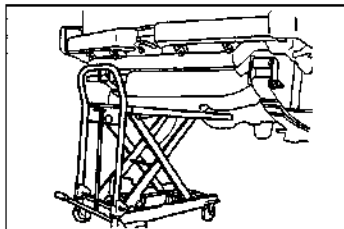


- (3) Install the fuel hoses to the fuel tank assembly.

- (4) Install the fuel tank assembly with the five bolts.

NOTE:

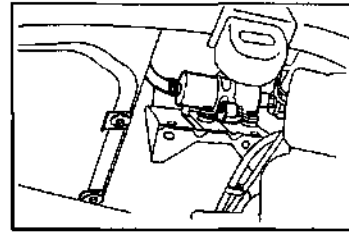
- The wire harness of the fuel sender gauge should be brought outside.



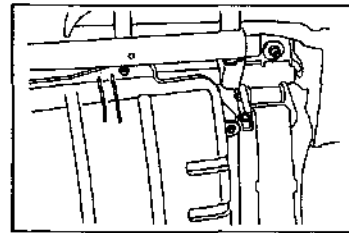
2. Install of fuel hose and fuel return hose
 - (1) Attach the fuel hose and fuel return hose to the fuel tank assembly. Secure it with the clamps.

CAUTION:

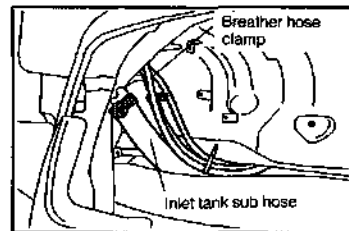
 - When installing the fuel hose, ensure that the filter is attached at the magnetic pump side.
 - (2) Install the fuel pump bracket subassembly with the three bolts.



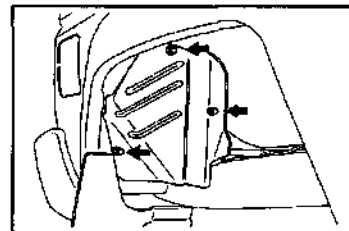
3. Connect the fuel sender gauge connector.



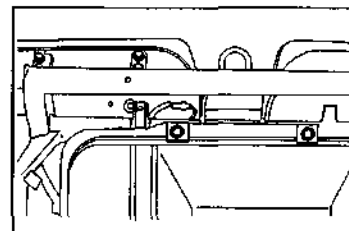
4. Attach the inlet tank sub hose, breather hose and clamp.



5. Install the inlet fuel protector with the three bolts and one clip.



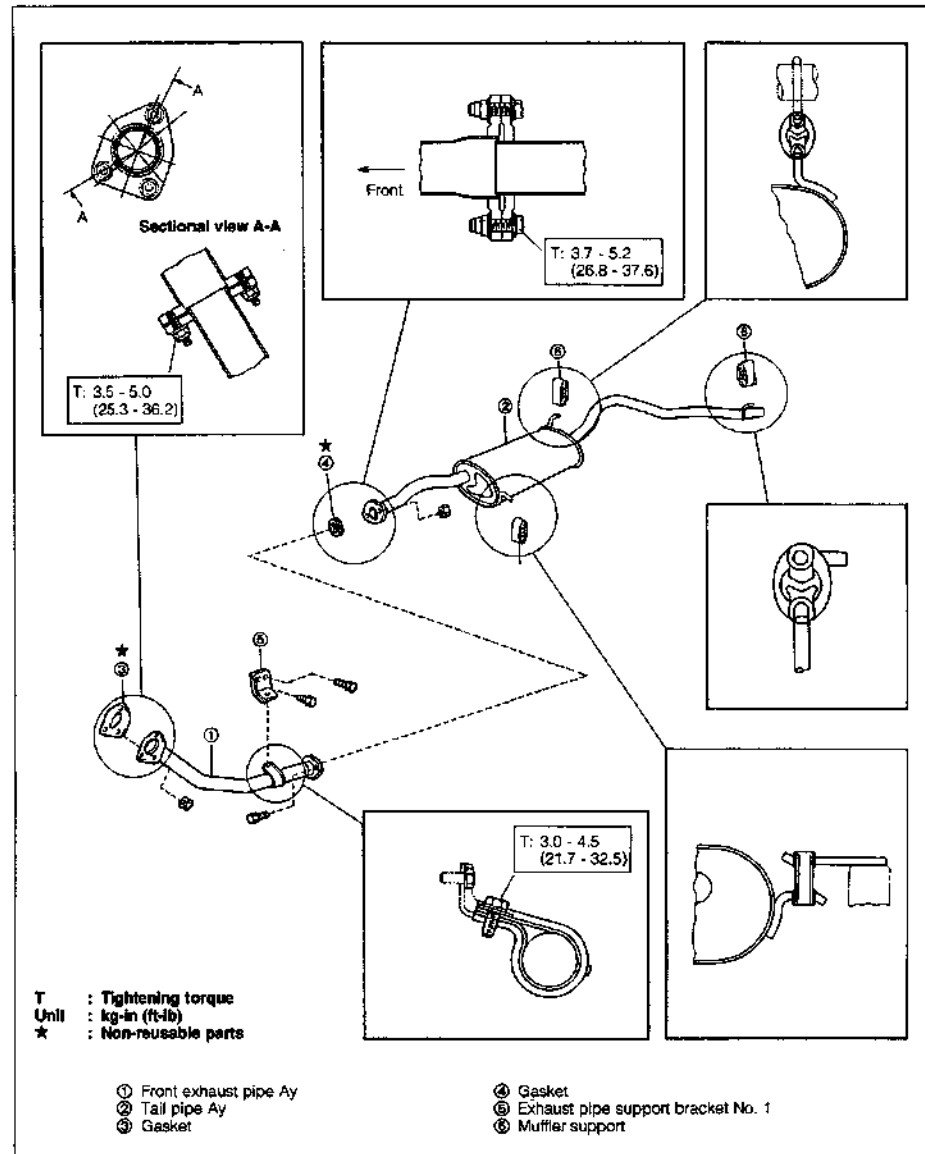
6. Install the fuel tank protector subassembly with the four bolts.



BODY

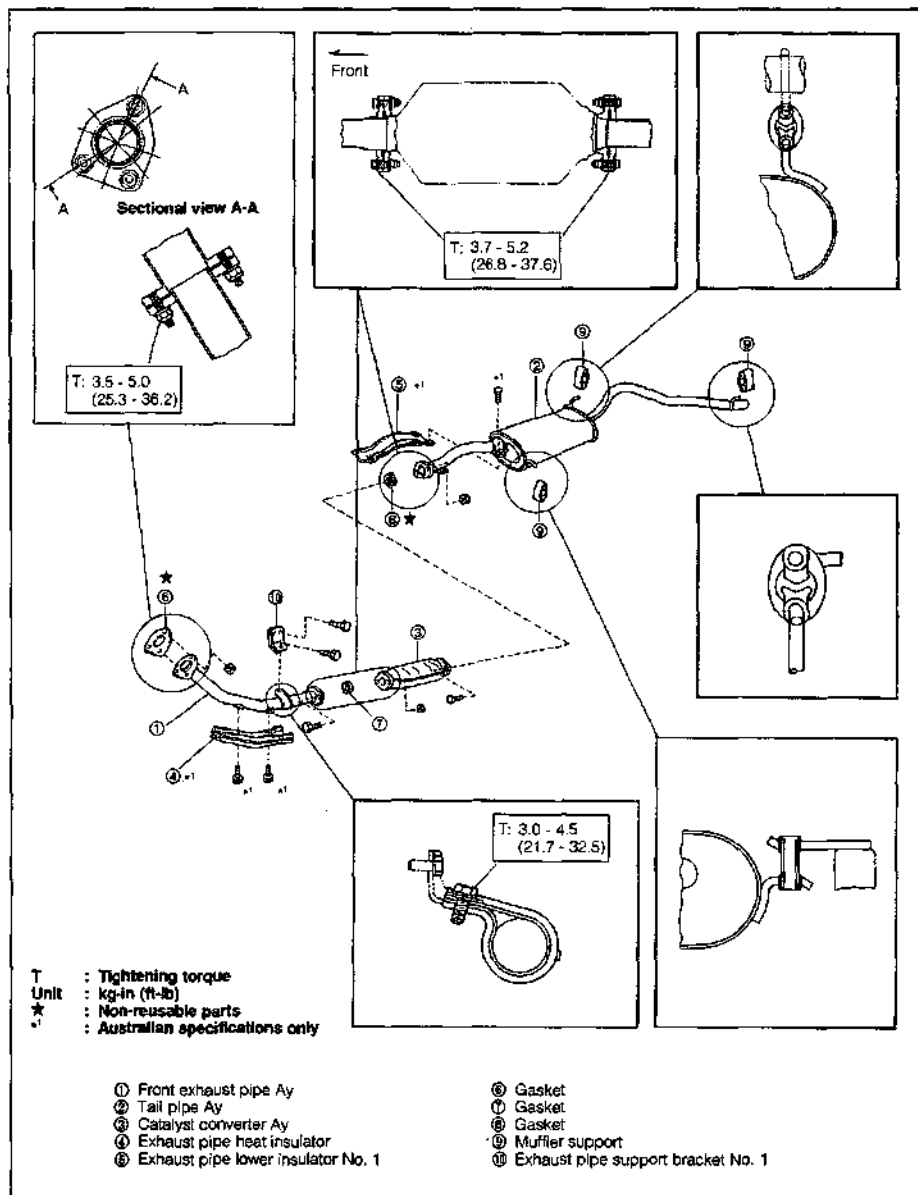
EXHAUST PIPE

COMPONENTS (Carburetor vehicle)



WFEBO-BO364

COMPONENTS (EFI vehicle)

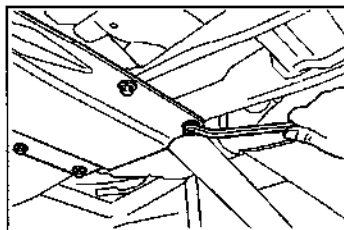


WFE90-B0366

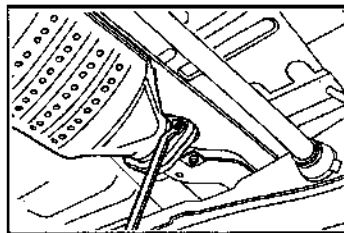
BODY

REMOVAL

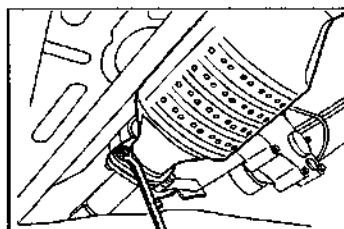
1. Remove the transmission undercover.



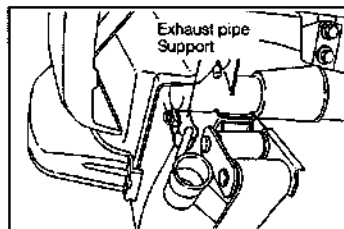
2. Separate the tail pipe assembly from the catalyst converter assembly. (HD-E engine)



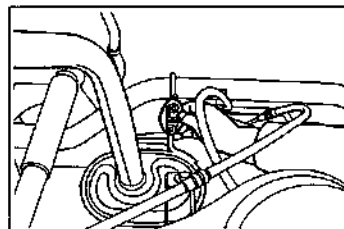
3. Separate the catalyst converter assembly from the front exhaust pipe assembly. (HD-E engine)



4. Remove the exhaust pipe support of the tail pipe assembly.



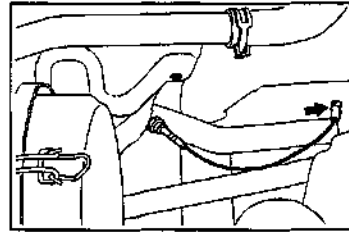
5. Remove the muffler support of the tail pipe assembly from the vehicle body hanger. Remove the tail pipe assembly.



6. Disconnect the coupler of the O₂ sensor.

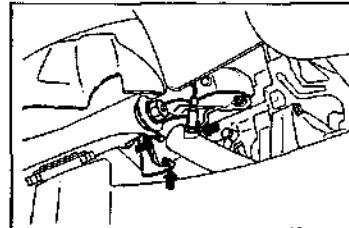
NOTE:

- Do not disconnect the O₂ sensor from the exhaust pipe, for the gasket of the O₂ sensor is a non-reusable part and the gasket alone is not available.



WFE90-90371

7. Remove the nuts of the front exhaust pipe assembly.

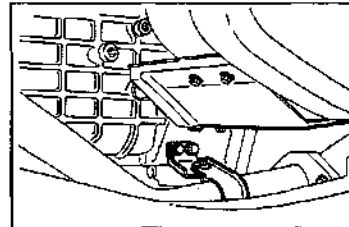


WFE90-90372

8. Remove the exhaust pipe support bracket No. 1 of the front exhaust pipe assembly.
9. Remove the front exhaust pipe assembly.

CAUTION:

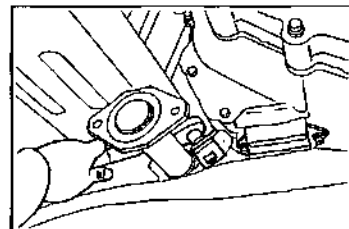
- While removing the front exhaust pipe assembly, be very careful not to damage the O₂ sensor.



WFE90-90373

INSTALLATION

1. Temporarily install the exhaust pipe support bracket No. 1 to the transfer adaptor bracket.

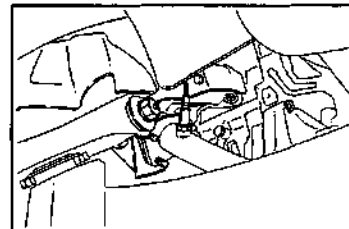


WFE90-90374

2. Install the front exhaust pipe assembly to the exhaust manifold.

NOTE:

- Be sure to install a new gasket, for it is a non-reusable part.
Tightening Torque: 3.5 - 5.0 kg-m
(25.3 - 36.2 ft-lb, 34.3 - 49.0 N-m)
- Be sure to tighten the three nuts evenly and progressively.

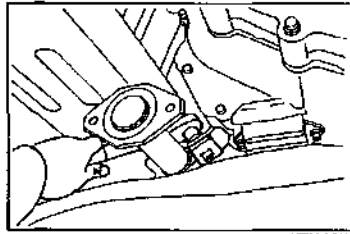


WFE90-90375

BODY

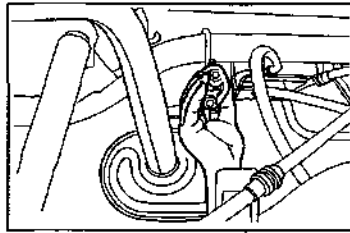
3. Tighten the bolt for the exhaust pipe support bracket No. 1 of the front exhaust pipe assembly.

Tightening Torque: 3.0 - 4.5 kg-m
(21.7 - 32.5 ft-lb, 29.4 - 44.1 N-m)



WFE90-6C376

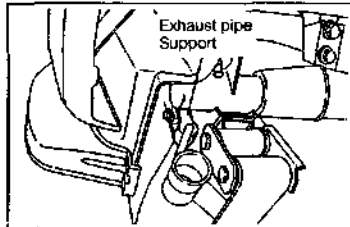
4. Attach the muffler support of the tail pipe assembly to the vehicle body hangers at the three points.



WFE90-6C377

5. Install the exhaust pipe support of the tail pipe assembly.

Tightening Torque: 1.0 - 1.6 kg-m
(7.2 - 11.6 ft-lb, 9.8 - 15.7 N-m)

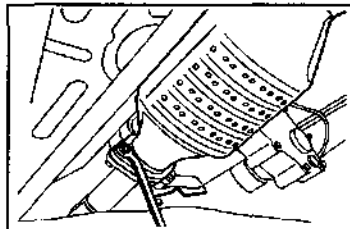


WFE90-6C378

6. Install the catalyst converter assembly to the front exhaust pipe assembly. (HD-E engine)

NOTE:

- Be sure to install a new gasket, for it is a non-reusable part.
Tightening Torque: 3.7 - 5.2kg-m
(26.8 - 37.6 ft-lb, 36.3 - 51.0 N-m)
- Be sure to tighten the two bolts and nuts evenly and progressively.

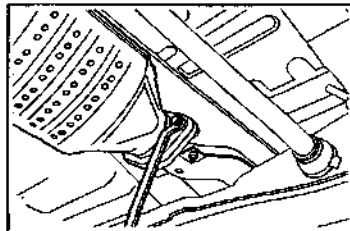


WFE90-6C379

7. Install the tail pipe assembly to the catalyst converter assembly. (HD-E engine)

NOTE:

- Be sure to install a new gasket, for it is a non-reusable part.
Tightening Torque: 3.7 - 5.2kg-m
(26.8 - 37.6 ft-lb, 36.3 - 51.0 N-m)
- Be sure to tighten the two bolts and nuts evenly and progressively.

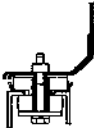
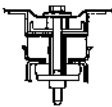
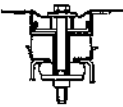
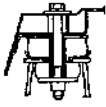
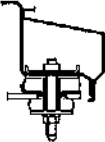



WFE90-6C380

8. Connect the coupler of the O₂ sensor.
9. Install the transmission undercover.


BODY MOUNTINGS

The mountings used for connecting the vehicle body to the frame have been further improved so that the transmission of noise from the suspensions and power train system to the vehicle body may be kept at a minimum level.

No	1	2	3	4	5
Hardness (Hs)	46	Upper 40° Lower 44	60	Upper 40 Lower 44	60
Identification	Yellow	Black	White	Black	White
Shape					
Tightening torque kg-m (ft-lb, N-m)	4.2 - 6.5 (30.4 - 47.0, 41.2 - 63.7)	4.2 - 6.5 (30.4 - 47.0, 41.2 - 63.7)	4.2 - 6.5 (30.4 - 47.0, 41.2 - 63.7)	4.2 - 6.5 (30.4 - 47.0, 41.2 - 63.7)	4.2 - 6.5 (30.4 - 47.0, 41.2 - 63.7)



Mounting cushion



Identification

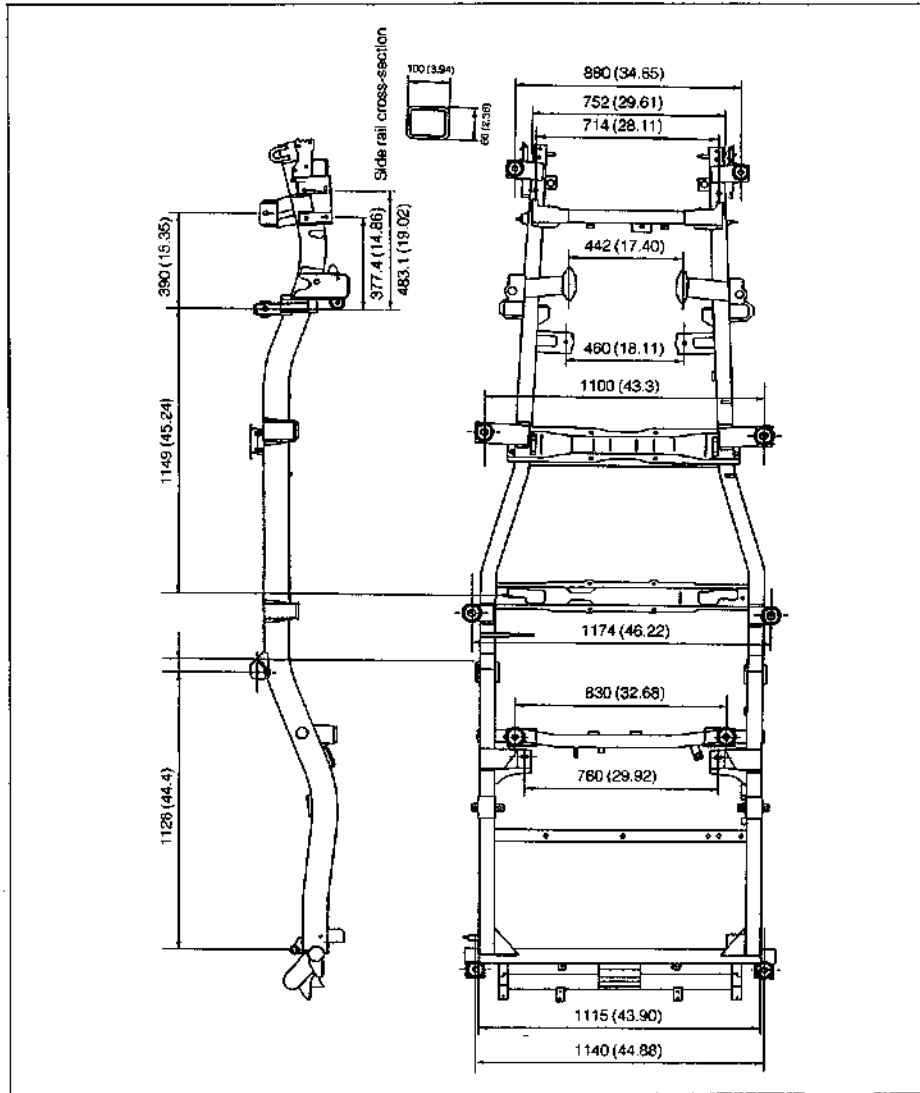
WFE50-80381

BODY

FRAME

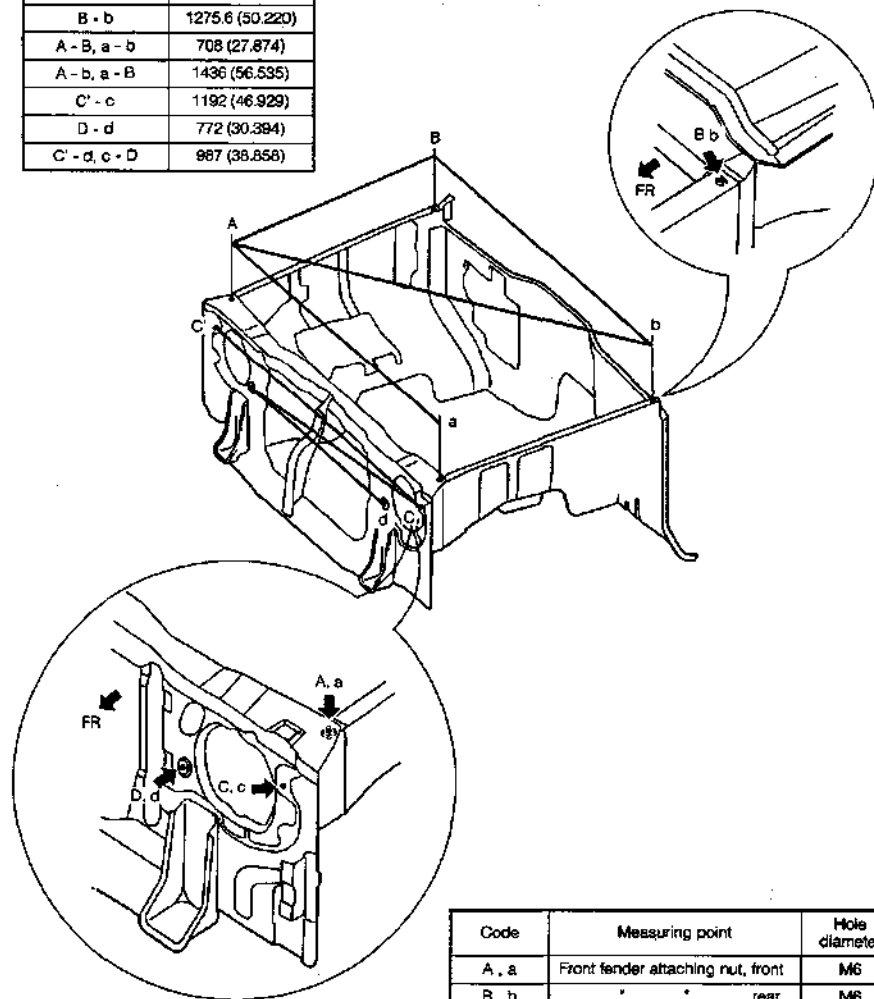
The frame employs a ladder type frame which retards the transmission of vibrations and noises from the road or engine to the body. Furthermore, the ladder type frame contributes to soft riding comfort and quieter vehicle interior.

The frame has box shaped cross-section.



BODY DIMENSIONS**<Engine Compartment>**

Code	Dimensions mm (inches)
A - a	1225.2 (48.236)
B - b	1275.6 (50.220)
A - B, a - b	708 (27.874)
A - b, a - B	1436 (56.535)
C' - c	1192 (46.929)
D - d	772 (30.394)
C' - d, c - D	987 (38.858)

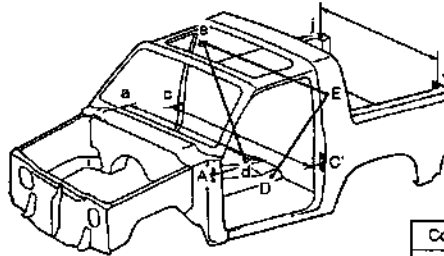
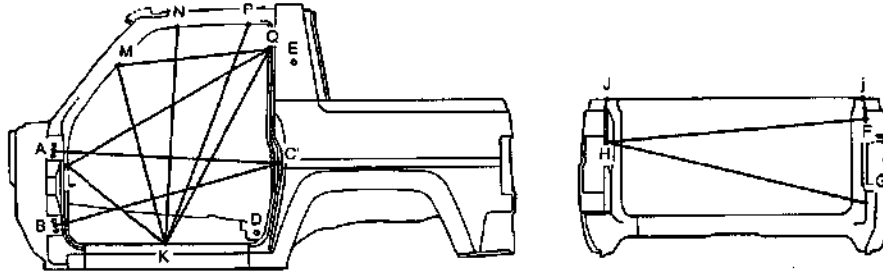


Code	Measuring point	Hole diameter
A , a	Front fender attaching nut, front	M6
B , b	" " " " , rear	M6
C , c	(Headlamp installation hole)	6 mm dia.
D , d	Headlamp attaching nut	M6

WFE00-00383

BODY

<Main Body Subassembly>

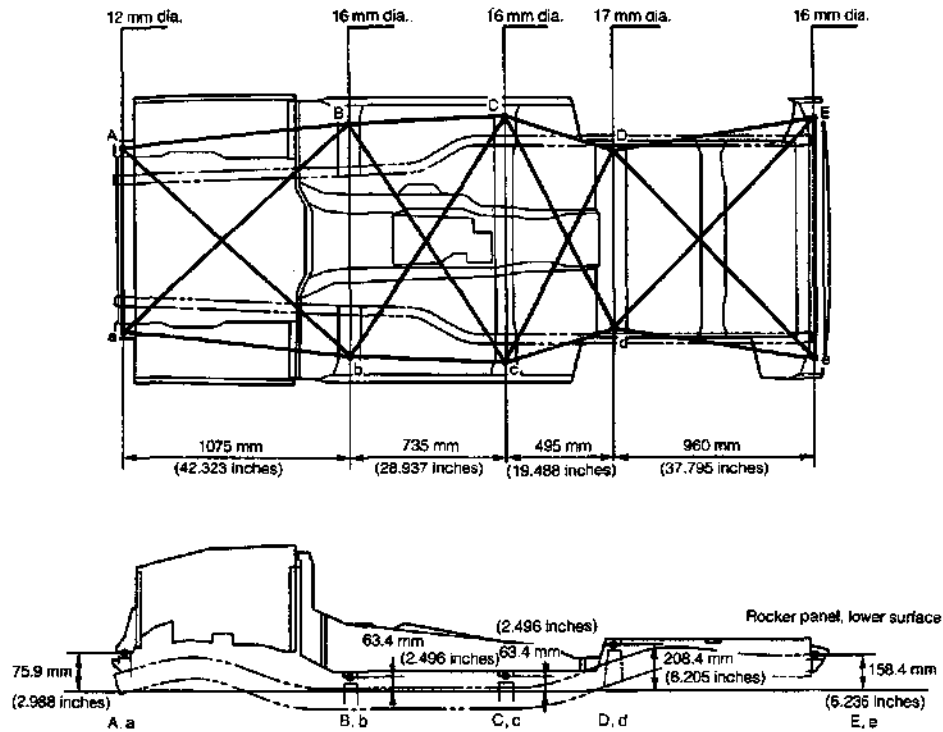


Code	Dimensions mm (inches)
A - C'	1120 (44.094)
B - C'	1159 (45.630)
C' - C	1387 (54.606)
D - E	1001 (39.409)
E - e	1206 (47.480)
A - a	1310 (51.575)
F - H	1274 (50.157)
H - G	1312 (51.653)
L - K	627 (24.685)
L - Q	1167 (45.945)
K - M	921 (36.260)
K - N	1103 (43.425)
K - P	1176 (46.299)
K - Q	1103 (43.425)
M - Q	752 (29.606)
J - j	1260 (49.606)

Code	Measuring point	Hole diameter
A , a	Front door hinge installation reference hole (upper hinge)	10 mm dia.
B , b	Front door hinge installation reference hole (lower hinge)	10 mm dia.
C' , d	Front door lock striker installation reference hole	9 mm dia.
D , d	Front floor seat belt installation hole	16 mm dia.
E , e	Rear pillar upper seat belt installation hole	15.5 dia.
F	Back door hinge installation hole (upper hinge)	13 mm dia.
G	Back door hinge installation hole (lower side)	13 mm dia.
H	Back door hinge installation hole (upper side)	13 mm square
J , j	Side panel top rail assembling reference hole	7 mm dia.
K	Rocker panel flange cut-out	7 mm wide
L	Front body pillar, lower cut-out	—
M	Front body pillar, upper cut-out	—
N	Roof side rail cut-out (front)	8 mm wide
P	Roof side rail cut-out (rear)	—
Q	Rear pillar, upper	—

WFE90-30364

<Underbody>



Code	Dimensions mm (inches)
A - a	880 (34.646)
B - b	1100 (43.307)
C - c	1174 (46.220)
D - d	830 (32.677)
E - e	1140 (44.882)
A - B, a - b	1081 (42.559)
A - b, a - B	1461 (57.520)
B - C, b - c	736 (28.976)
B - C, b - c	1354 (53.307)
C - D, c - d	544 (21.417)
C - d, c - D	1127 (44.370)
D - E, d - e	974 (38.346)
D - e, d - E	1376 (54.173)

Code	Measuring point	Hole diameter
A , a	Body mounting No. 1 installation hole	12 mm dia.
B , b	" No. 3 "	16 mm dia.
C , c	" No. 4 "	16 mm dia.
D , d	" No. 5 "	17 mm dia.
E , e	" No. 6 "	16 mm dia.

WFE90-B0385

DAIHATSU F300

BODY ELECTRICAL SYSTEM

INTRODUCTION	BE- 2
LOCATION OF THE PARTS	BE- 4
1. COMBINATION METER	BE- 7
2. WARNING & INDICATOR	BE- 22
3. IGNITION KEY SWITCH	BE- 31
4. HORN	BE- 33
5. LIGHTING	BE- 34
6. FRONT WIPER & WASHER	BE- 57
7. REAR WIPER & WASHER	BE- 65
8. REAR WINDOW DEFOGGER	BE- 72
9. HEADLAMP CLEANER	BE- 75
10. FRONT HEATER	BE- 80
11. REAR HEATER	BE- 91
12. CIGARETTE LIGHTER	BE- 95
13. REMOTE CONTROL MIRROR	BE- 96
14. POWER WINDOW	BE- 98
15. POWER FRONT DOOR LOCK	BE-100
16. BACK DOOR OPENER	BE-102
17. DAY-LIGHT RELAY	BE-104
18. DIM-DIP LAMP	BE-105
20. INCLINOMETER	BE-106
21. VOLTMETER	BE-110
22. CLOCK	BE-112

WFE90-BE001

BODY ELECTRICAL SYSTEM

INTRODUCTION

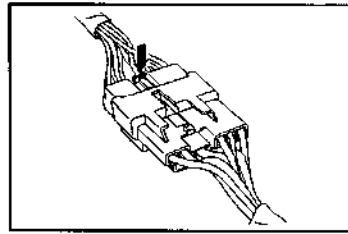
1. Handling of connectors with lock

(1) Disconnection

While pushing the lock lever as shown in the right figure, disconnect the connector. Do not pull the harness during this operation.

(2) Connection

Connect the male connector to the female connector. Ensure that the lock is engaged completely.

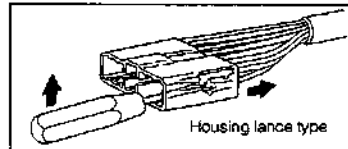


WFE90-BE002

(3) Removal of terminal

Housing lance type

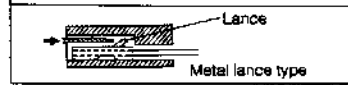
Insert a miniature screwdriver through the opening section of the connector into between the locking lug and the terminal. While prying up the locking lug with the screwdriver, pull the terminal backward.



Housing lance type

Metal lance type

While pushing the lance with the screwdriver, pull the terminal backward.



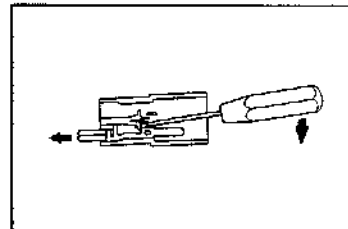
Metal lance type

WFE90-BE003

(4) Installation of terminal

Housing lance type

Push the terminal into the protruding section of the connector, until the lock is engaged completely. Lightly pull the harness to assure that the locking has been made completely.



WFE90-BE004

Metal lance type

Insert the terminal into the connector, until lance is locked completely. Lightly pull the harness to assure that the locking has been made completely.

CAUTION:

HANDLING INSTRUCTIONS ON LOCK TYPE CONNECTOR

- Do not disconnect or connect the lock type connector, unless such operation is absolutely necessary. If the connector should be disconnected or connected, be sure to follow the procedure given below.

WFE90-BE005

BODY ELECTRICAL SYSTEM

2. Disconnection

The lock type of the connector comes in a push release type, a pull release type, a spring lock type, an one-way lock type and so on.

After confirming the shape of the lock, unlock the lock. Disconnect the connector while holding the connector by hand.

NOTE:

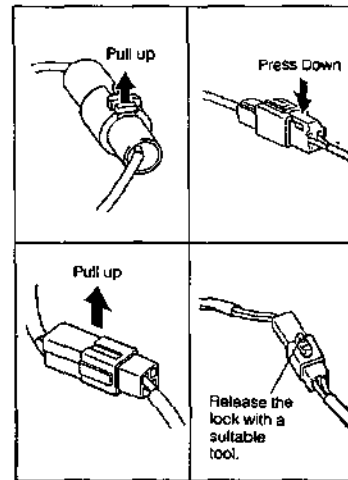
- Never pull the harness during the disconnection.
- Be sure to pull out the connector straight so as not to damage the terminal.

3. Connection

Perform the connection, until the lock is completely engaged.

NOTE:

- To confirm whether the connector has been locked or not, lightly pull the connector. Make sure that the connector will not be disconnected. Be sure to press the connector again before finishing the confirmation.

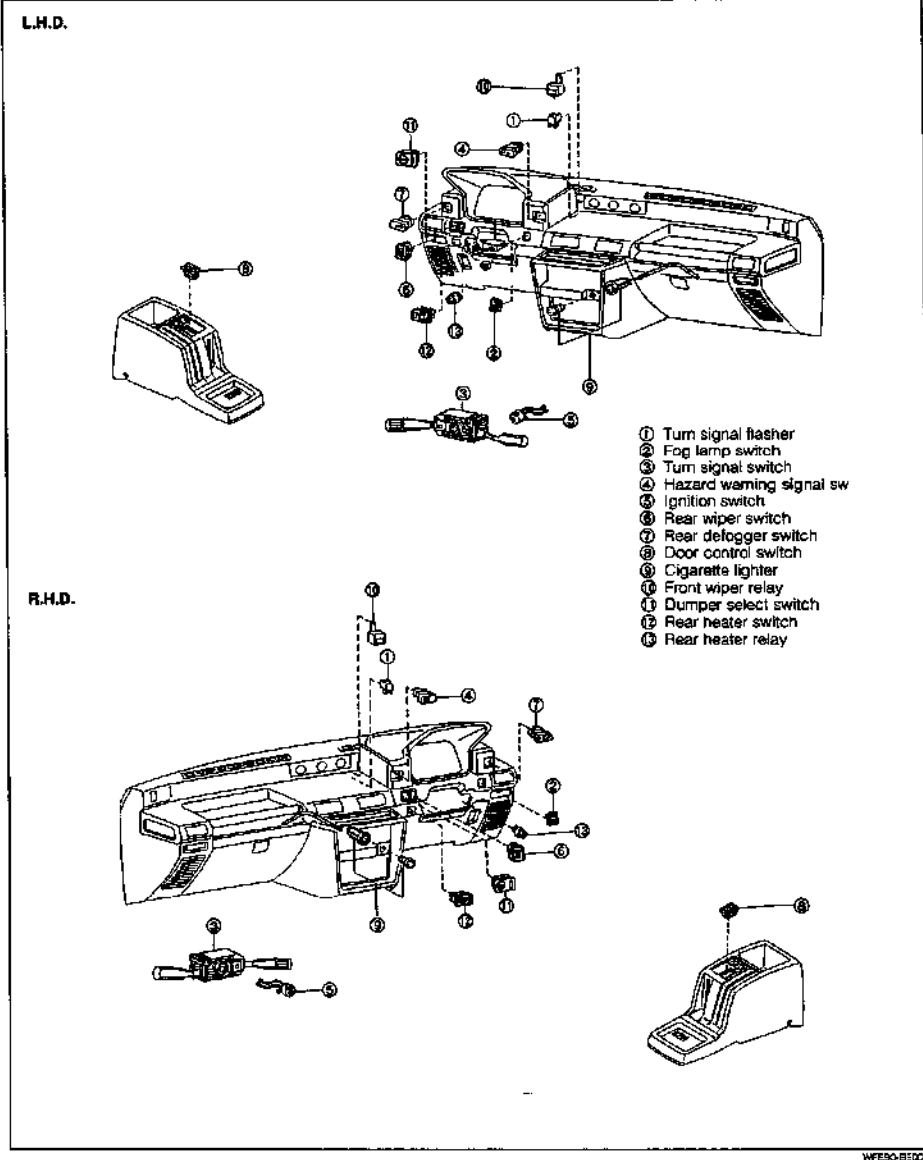


WPE80-02/006

BODY ELECTRICAL SYSTEM

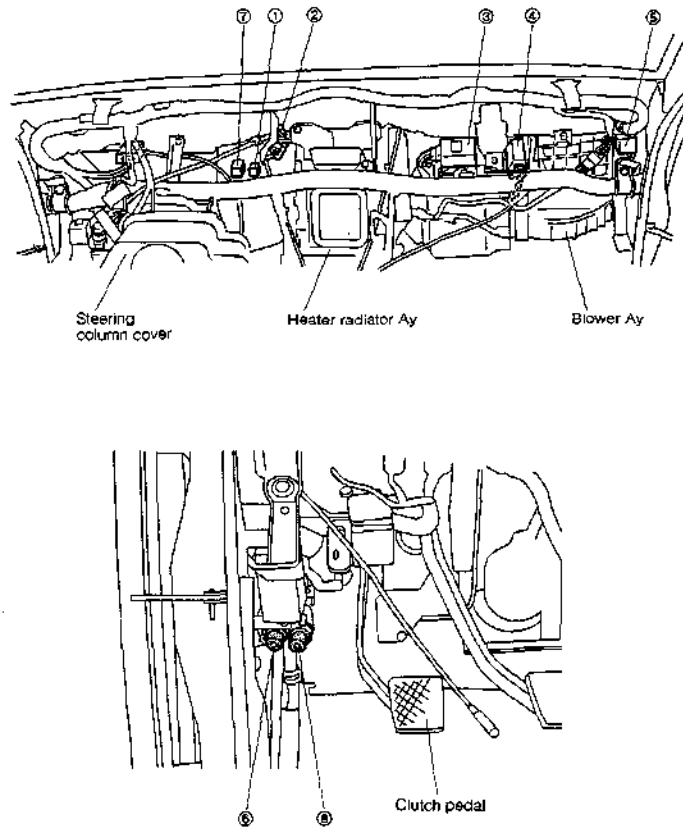
LOCATION OF THE PARTS

ARRANGEMENT OF SWITCHES AND RELAYS



BODY ELECTRICAL SYSTEM

Instrument panel-related parts (LHD)

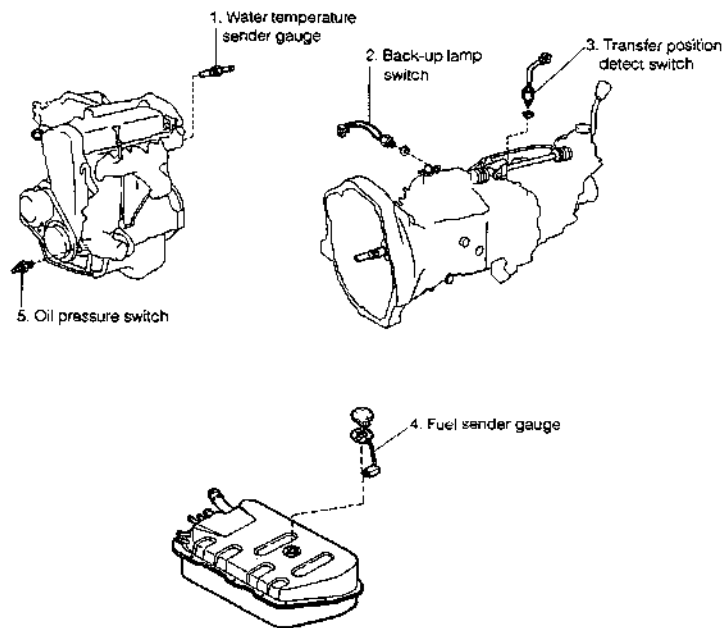


- | | |
|----------------------------------|---------------------------|
| ① Turn signal flasher relay | ⑤ Headlamp cleaner relay |
| ② Intermittent wiper relay | ⑥ Front heater relay |
| ③ A/C acceleration cut amplifier | ⑦ Rear heater relay |
| ④ A/C amplifier | ⑧ Door lock control relay |

WPER0-BE008

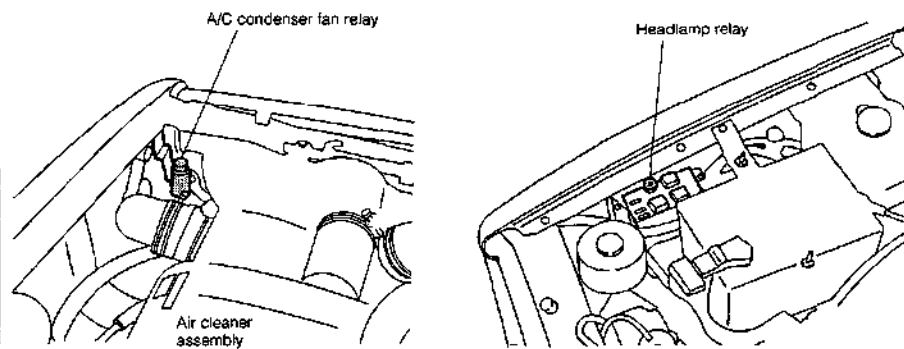
BODY ELECTRICAL SYSTEM

Parts related to engine, transmission with transfer, and fuel tank



WFE90-BE109

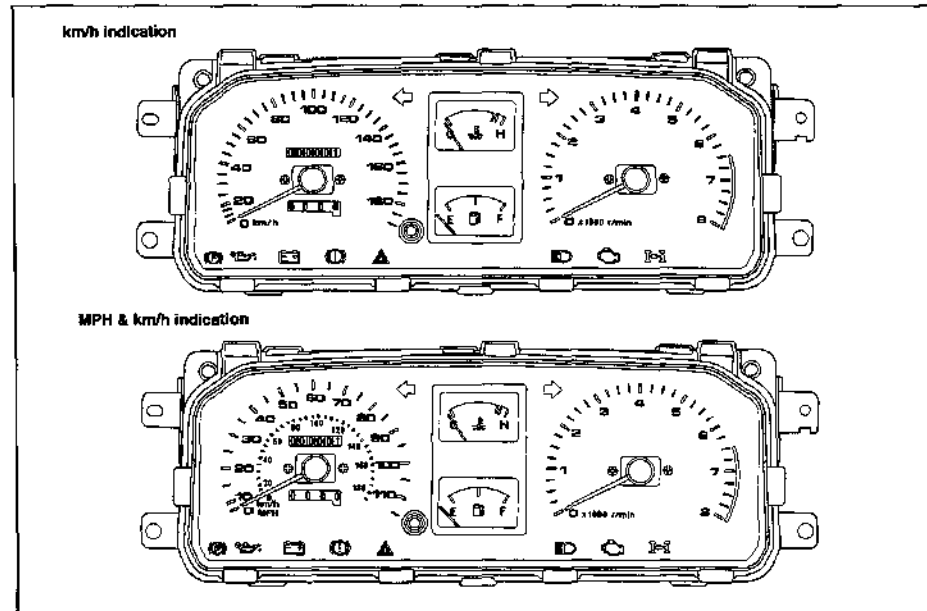
Engine room-related parts



WFE90-BE110

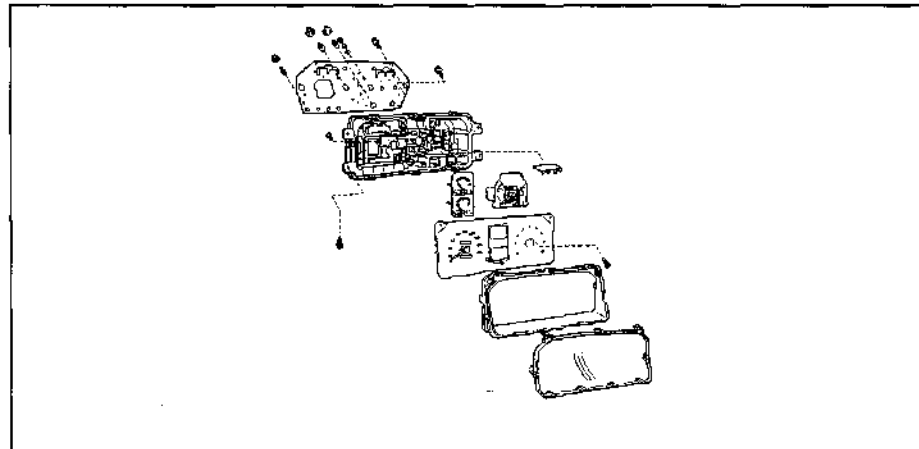
1. COMBINATION METER

A two-meter type combination meter is mounted on all models. As regards the meter dial plate, the speedometer and tachometer shares the same integral dial plate. The speedometer and tachometer employs a transillumination. The gauges are illuminated indirectly.



WFE90-6E011

COMPONENTS

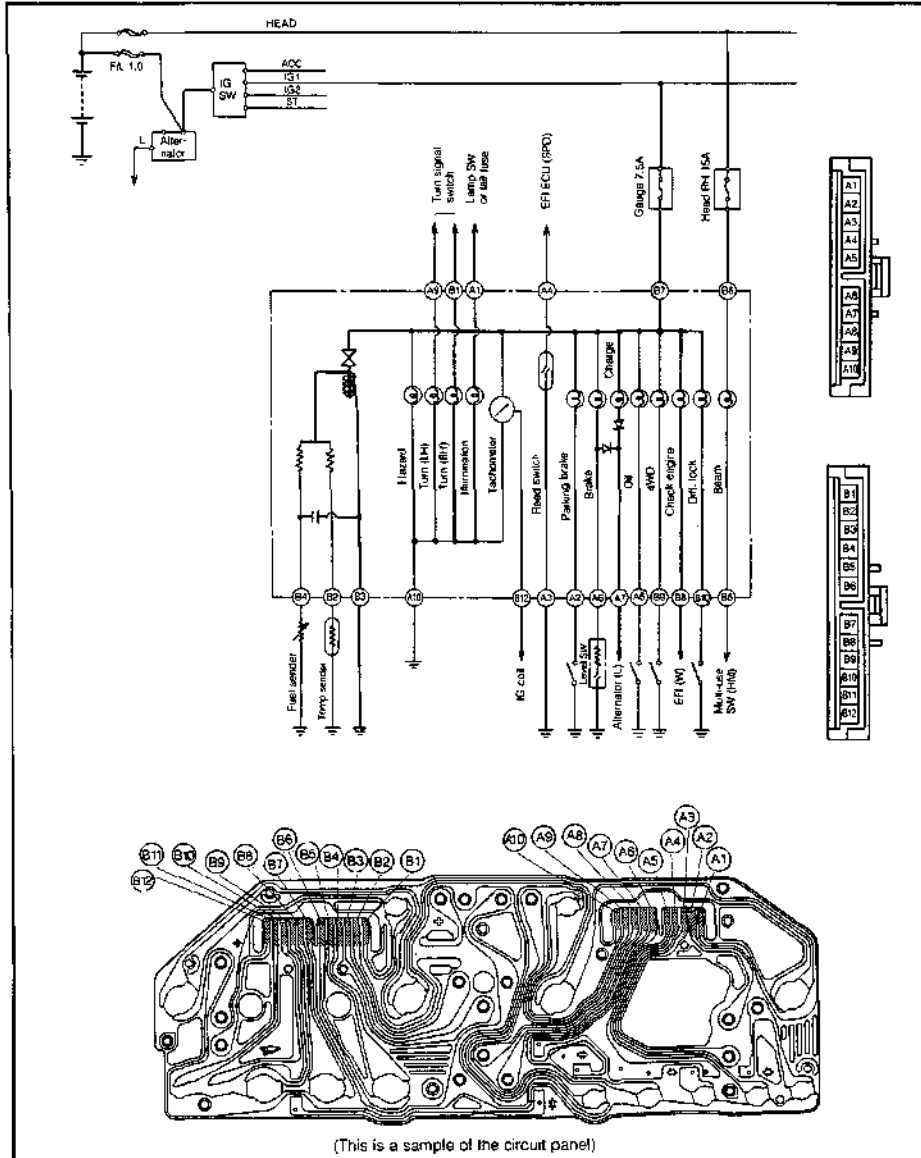


WFE90-6E012

BODY ELECTRICAL SYSTEM

1-1. WIRING DIAGRAM

Version A (EC, AUS, GE)

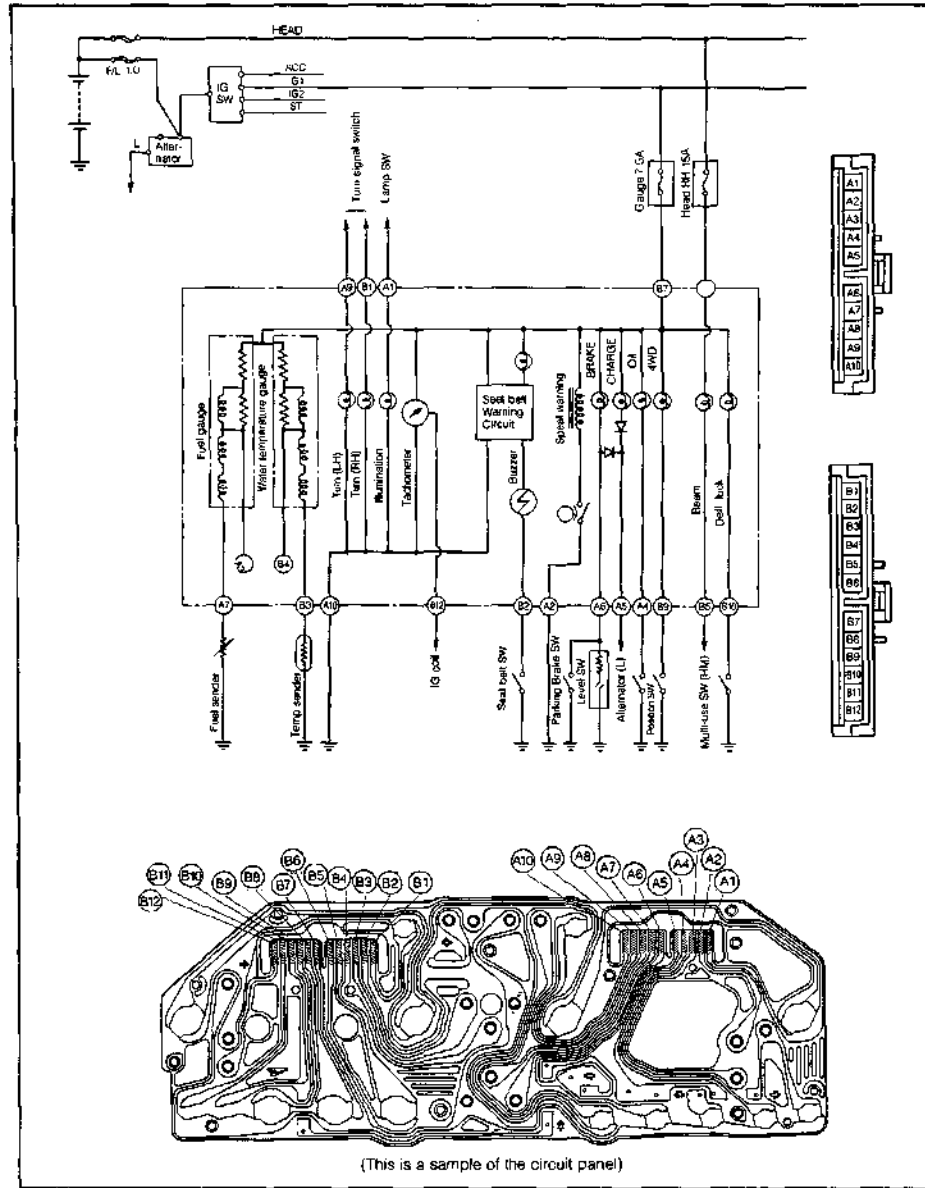


BE-8

WFE90-88013

BODY ELECTRICAL SYSTEM

Version B (G.C.C.)

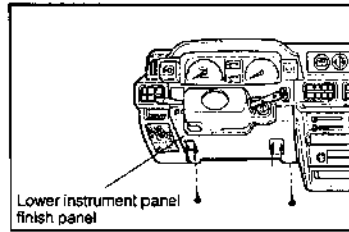


BODY ELECTRICAL SYSTEM

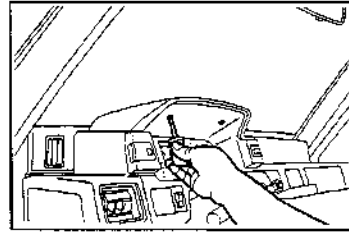
1-2. REMOVAL AND INSTALLATION

REMOVAL

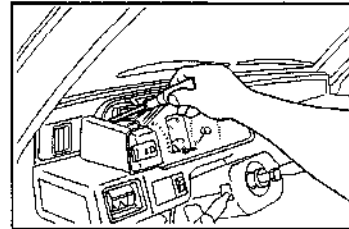
1. Disconnect the battery cable from the negative (-) terminal.
2. Remove the steering wheel assembly.
3. Remove the lower instrument panel finish panel by removing the six screws.



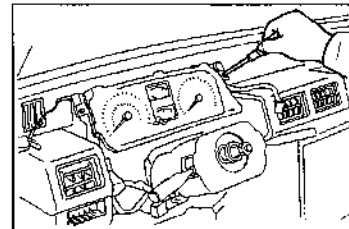
4. Remove the instrument cluster finish upper panel by removing the two screws.



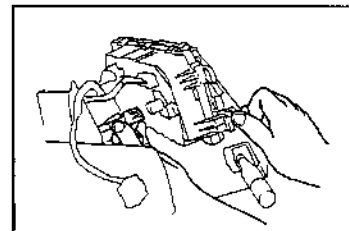
5. Remove the instrument cluster finish panel by removing the four screws.
Remove the coupler for the rear window defogger switch and hazard warning switch.



6. Remove the combination meter assembly.



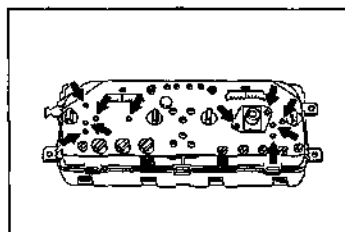
7. Remove the speedometer cable.
8. Remove the coupler of the combination meter.



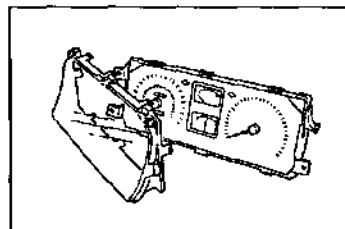
BODY ELECTRICAL SYSTEM

DISASSEMBLY

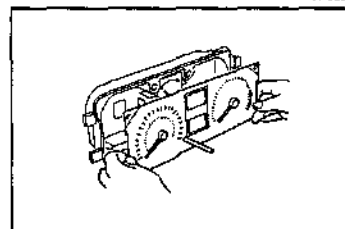
1. Remove the screws.



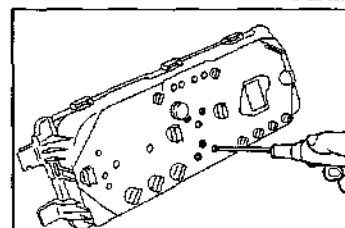
2. Remove the combination meter cover with glass.



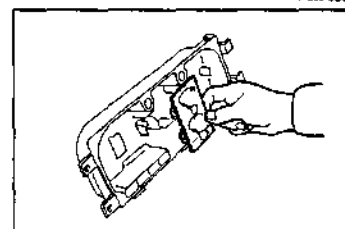
3. Remove the speedometer/tacho-meter panel.



4. Remove the attaching screws of the fuel/temp. gauge.



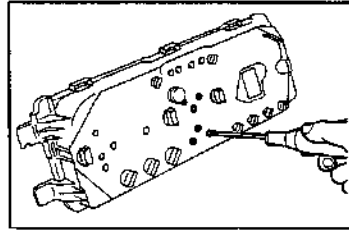
5. Remove the gauge.



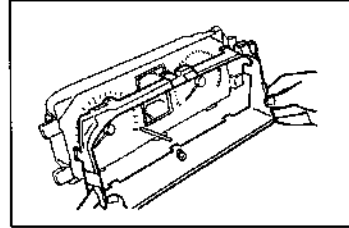
BODY ELECTRICAL SYSTEM

ASSEMBLY

1. Install the fuel/temp. gauge.
2. Install the speedometer/tacho-meter panel.

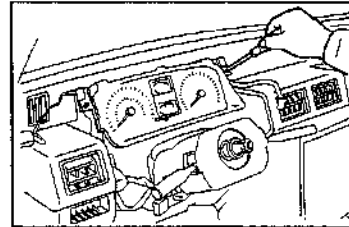


3. Attach the meter cover with glass to the combination cover. Install it to the meter case.

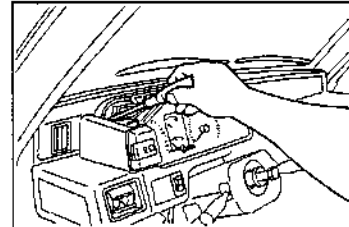


INSTALLATION

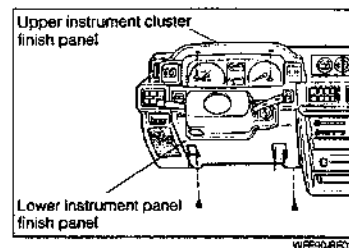
1. Installation of combination meter assembly
 - (1) Connect the two couplers of the wiring harness and speedometer cable to the combination meter assembly.
 - (2) Install the combination meter assembly with the four screws.



2. Connect the couplers for the rear window defogger switch and hazard warning switch.
3. Install the instrument cluster finish panel with four screws.



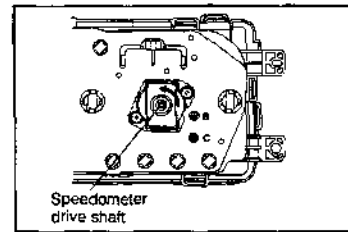
4. Install the upper instrument cluster finish panel with two screws.
5. Install the lower instrument panel finish panel with six screws.
6. Install the steering wheel assembly.
7. Install the negative terminal \ominus of the battery.



1-3. SPEED SENSOR

(EFI equipped vehicle only)

1. Remove the combination meter.
2. Ensure that continuity occurs four times at the reed switch, while the speedometer drive shaft completes a turn. (Between Ⓑ and Ⓒ).



WFE90-85030

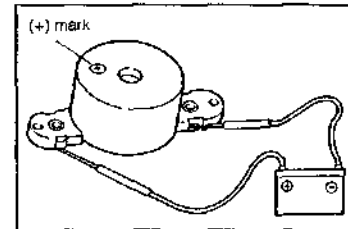
1-4. SPEED WARNING BUZZER

(G.C.C. specification only)

1. Remove the combination meter.
2. Apply the battery voltage across the terminals of the buzzer unit.
3. Ensure that the buzzer is set on.

NOTE:

- Be sure to connect the buzzer's side having a (+) mark to the positive (+) terminal of the battery.



WFE90-85031

1-5. GAUGES

**FUEL GAUGE AND WATER TEMPERATURE GAUGE
CROSS COIL GAUGE**

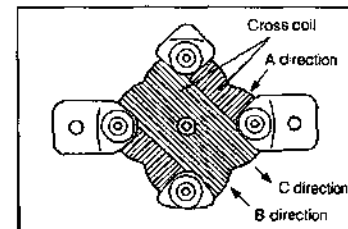
A pointer-zero-position-returning type cross coil gauge is employed for the water temperature gauge, whereas a pointer remaining type cross coil gauge is employed for the fuel gauge.

Pointer-zero-position-returning type cross coil gauge

In this gauge, coils are wound around the outer periphery of the magnet armature in three directions, spaced 90 degrees from each other. The armature is actuated by the change in the magnetic field generated by this coil.

When the engine switch is turned OFF, the returning of the gauge's pointer to the zero-position is carried out by the locating magnet.

Furthermore, silicon oil for control use is filled at the lower shaft of the armature.



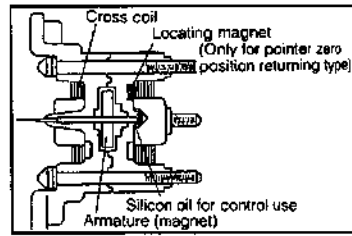
WFE90-85032

BODY ELECTRICAL SYSTEM

Pointer-remaining type cross coil gauge

In this gauge, even after the engine switch is turned OFF, the pointer remains at the position where the pointer registered during the operation, rather than it returns to the zero-position. Such design has been made possible by eliminating the locating magnet of the pointer-zero-position-returning type and by increasing the viscosity and amount of the silicon oil for control use.

Compared with the pointer-zero-position-returning type cross coil gauge, the pointer-remaining type cross gauge is slightly slow in the movement of the pointer.

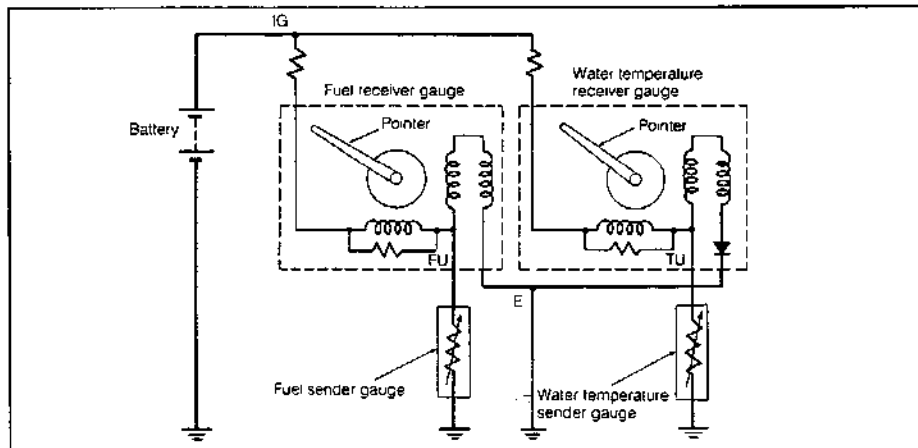


WPE90-8E033

NOTE:

1. Even after the ignition switch is turned OFF, the pointer will not return down to the "E" position completely. This does not mean that the gauge is malfunctioning.
2. There are cases where the indication of the pointer at the time when the ignition switch is turned OFF may be deviated because of mechanical vibrations or after the lapse of time.
3. After the fuel tank has been filled with fuel to the full and the ignition switch is turned ON, it will take a little while (about two minutes) before the pointer's indication stabilizes.

GAUGE CIRCUIT



WPE90-BE034

BODY ELECTRICAL SYSTEM

BIMETAL GAUGE

A bimetal type gauge is employed for the water temperature gauge and for the fuel gauge.

This gauge adopts such a combination that a bimetal is employed at the receiver section, whereas a resistor is installed at the sender section.

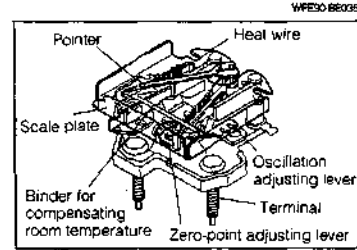
The following is brief description of the construction. A heat wire is wound around the bimetal. As a result, the bimetal bends in proportion to the heat amount which the bimetal receives from the heat wire. As the bimetal bends, the pointer is interlocked with that deflection of the heat wire.

As respects the resistance at the sender section, a sliding type resistor is employed in the case of the fuel gauge, while a thermistor is used in the case of the water temperature gauge.

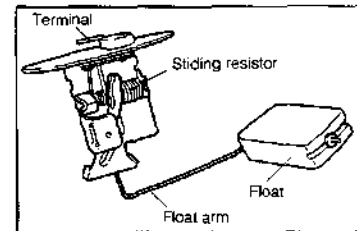
The right figure indicates the receiver section.

In the case of the bimetal-resistor combination type gauge, heat is generated by current which flows through the circuit.

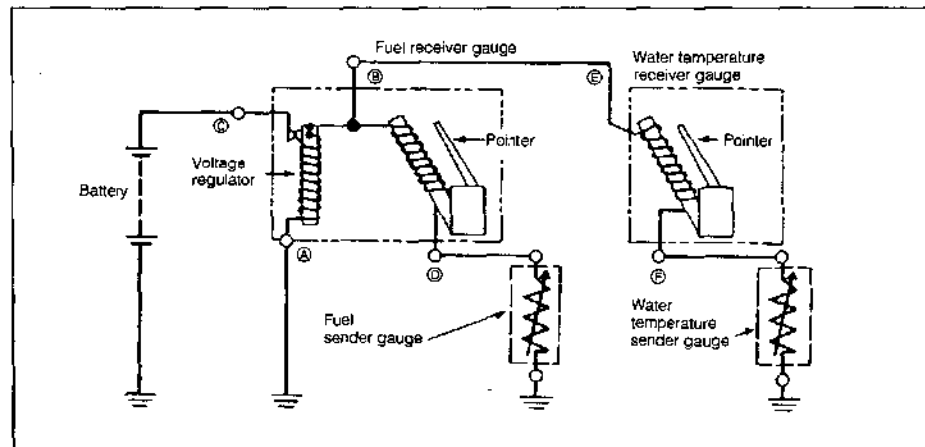
Therefore, any variation in the power supply voltage will affect the amount of current flowing through the circuit, thereby causing an error in the reading at the receiving section. To prevent this error, the gauge incorporates a voltage regulator.



The right figure represents the sender section which employs a sliding resistor. The gauge of this type is used for the fuel gauge.



Circuit diagram of pin type, bimetal gauge



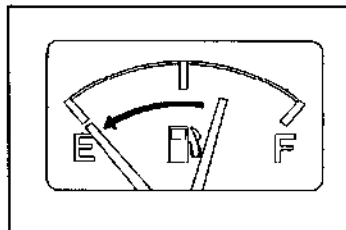
BODY ELECTRICAL SYSTEM

FUEL RECEIVER GAUGE

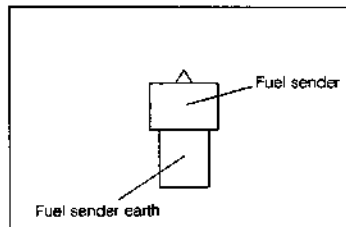
(Cross coil type)

1. IN-VEHICLE INSPECTION

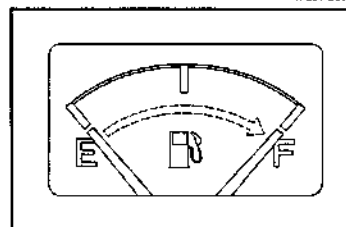
- (1) Disconnect the connector of the fuel sender gauge located at the upper part of the fuel tank. Under this condition, turn ON the engine switch. Ensure that the pointer of the receiver gauge returns to the position "E".



- (2) Turn OFF the engine switch. Ground the harness connector of the fuel sender gauge. Under this condition, turn ON the engine switch. Ensure that the pointer of the receiver gauge rises gradually and registers the position "F".

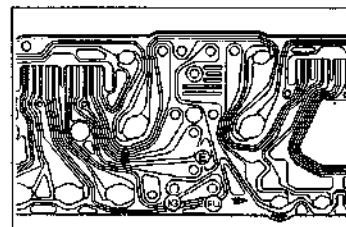


- (3) Turn OFF the engine switch. Ensure that the pointer of the receiver gauge remains stationary and registers the position "F".



2. UNIT CHECK

- (1) Remove the combination meter. Measure the resistance between the terminals "IG" and "FU".
Specified Value: Approx. 82Ω
- (2) Connect the multi-pole connector to the combination meter. Turn ON the engine switch. Ensure that the battery voltage is applied between the terminal "IG" and the body earth.



FUEL RECEIVER GAUGE (Bimetal type)

1. IN-VEHICLE INSPECTION

Disconnect the connector located at the upper part of the fuel tank. Carry out the following checks at the terminal at the receiver side.

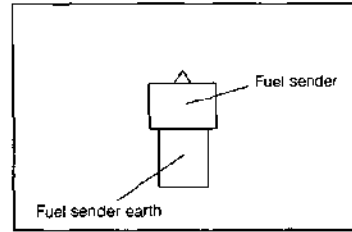
- (1) Disconnect the connector from the harness of the fuel sender gauge. Ground the gauge through a test lamp (12V - 3.4W).
- (2) Turn ON the engine switch. Ensure that the test lamp goes on and, several seconds later, the test lamp starts flashing.
- (3) Ensure that the pointer of the receiver gauge starts to rise gradually.

NOTE:

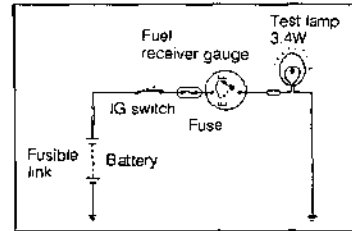
- In case that the fuel sender earth terminal is used, in advance, make sure that it has continuity with the body earth.

2. UNIT CHECK

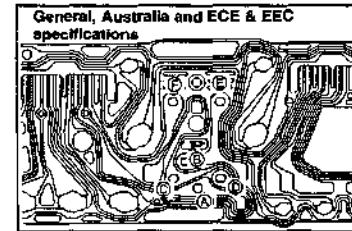
- (1) Remove the combination meter.
- (2) Measure the resistance between the terminals ⑥ and ⑦.
Specified Value: 55Ω
- (3) Connect the multi-pole connector to the combination meter. Turn ON the engine key. Ensure that the battery voltage is applied between the terminal ③ and the body earth.
- (4) Under the conditions in the step (3), ensure that a voltage varying approximately from 2 to 7V is applied between the terminal ⑥ and the body earth.



WFE00-BE043



WFE00-BE044



WFE00-BE045

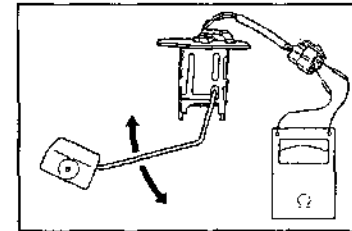
FUEL SENDER GAUGE (Common use for cross coil or bimetal type gauge)

The fuel sender gauge is located at the upper part of the fuel tank.

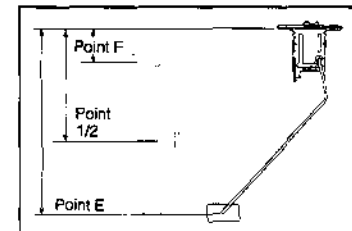
1. MEASUREMENT OF RESISTANCE OF FUEL SENDER GAUGE

- (1) Ensure that the resistance varies when the float is moved from the upper position to the lower position.
- (2) Measure the resistance between the fuel terminal and the body at each float level.

Float position	Resistance (Ω)	Reference dimension mm (inch)
F	1 - 5	48 ± 3 (1.9 ± 0.12)
1/2	28.5 - 36.5	144 (5.7)
E	103 - 117	221 ± 3 (8.7 ± 0.12)



WFE00-BE046



WFE00-BE047

BODY ELECTRICAL SYSTEM

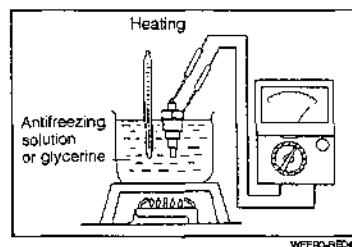
WATER TEMPERATURE SENDER GAUGE (Common use for cross coil or bimetal type gauge)

The water temperature sensor gauge is located at the rear end of cylinder head.

UNIT INSPECTION

Measure the resistance between the terminal and the earth, as indicated in the right figure.

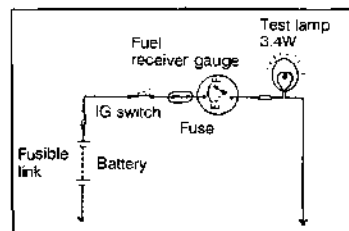
Temperature (°C)	Resistance (Ω)
50	226 $\pm \frac{34}{37}$
115	28.4 $\pm \frac{17}{22}$



WATER TEMPERATURE RECEIVER GAUGE (Cross coil type use)

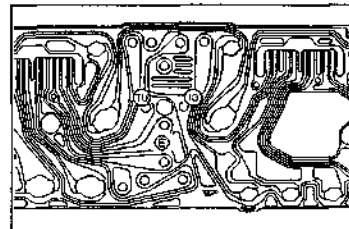
1. IN-VEHICLE INSPECTION

- (1) Disconnect the connector from the harness of the water temperature sender gauge. Ground the gauge through a test lamp (12V - 3.4W).
- (2) Turn ON the engine switch. Ensure that the test lamp goes on and the pointer of the receiver gauge starts to rise gradually.



2. UNIT CHECK

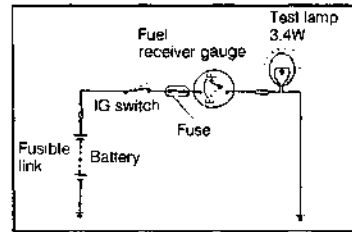
- (1) Remove the combination meter. Measure the resistance between the terminals "IG" and "TU".
Specified Value: Approx. 134Ω
- (2) Connect the multi-pole connector to the combination meter. Turn ON the engine switch. Ensure that the battery voltage is applied between the terminal "IG" and the body earth.



WATER TEMPERATURE RECEIVER GAUGE (Bimetal type use)

1. IN-VEHICLE INSPECTION

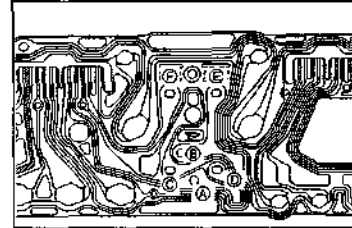
- (1) Disconnect the connector from the harness of the water temperature sender gauge. Ground the gauge to the connector at the harness through a test lamp (12V - 3.4W).
- (2) Turn ON the engine switch. Ensure that the test lamp goes on and, several seconds later, the test lamp starts flashing.
- (3) Ensure that the pointer of the receiver gauge starts to rise gradually.



WPB90-BE051

2. UNIT CHECK

- (1) Remove the combination meter.
- (2) Measure the resistance between the terminals ③ and ④.
Specified Value: Approx. 25Ω
- (3) Connect the multi-pole connector to the combination meter. Turn ON the engine key. Ensure that the battery voltage is applied between the terminal ③ and the body earth.
- (4) Under the conditions in the step (3), ensure that a voltage varying approximately from 2 to 7V is applied between the terminal ③ and the body earth.



WPB90-BE052

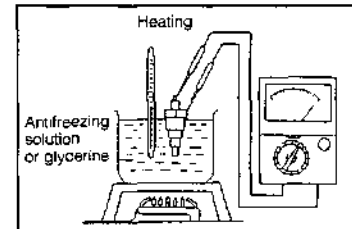
WATER TEMPERATURE SENDER GAUGE (Common use for cross coil ro bimetal type gauge)

The water temperature sensor gauge is located at the rear end of the cylinder head.

UNIT INSPECTION

Measure the resistance between the terminal and the earth, as indicated in the right figure.

Temperature (°C)	Resistance (Ω)
50	226 ⁺³⁶ ₋₃₇
115	26.4 ^{+1.7} _{-2.2}



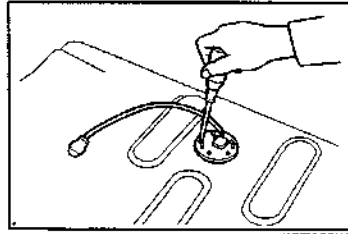
WPB90-BE053

BODY ELECTRICAL SYSTEM

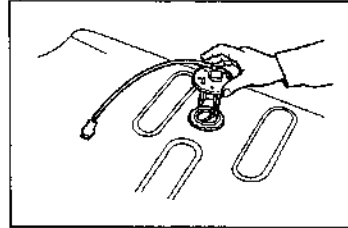
FUEL SENDER GAUGE

Removal

1. Remove the fuel tank assembly.
2. Remove the five attaching screws of the fuel sender gauge.

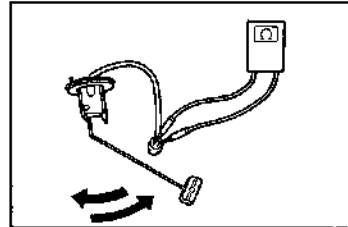


3. Remove the fuel sender gauge from the fuel tank.



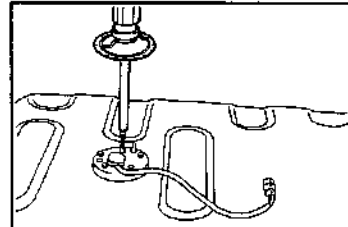
Inspection

Ensure that the resistance varies when the float is moved from the upper position to the lower position.
Refer to previous pages.



Installation

1. Install the fuel sender gauge to the fuel tank.
Tightening Torque: 1.8 - 2.0 kg-cm (0.18 - 0.20 N-m)
2. Install the fuel tank assembly to the vehicle body.



BODY ELECTRICAL SYSTEM

WATER TEMPERATURE SENDER GAUGE

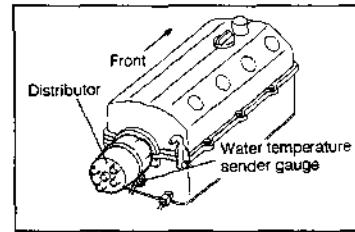
The water temperature sensor gauge is located at the rear end of the cylinder head.

Removal

1. Drain the cooling water
2. Remove the water temperature sender gauge.

Unit inspection

Measure the resistance between the terminal and the earth, as indicated in the right figure.
Refer to previous pages.



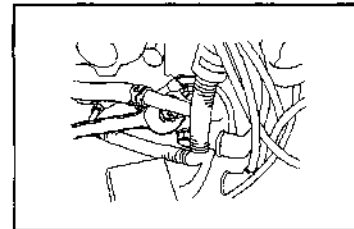
Installation

1. Installation of water temperature Sender gauge.
 - (1) Wind sealing tape to the water temperature sender gauge and install it to the cylinder.
Tightening Torque: 1.2 - 2.0 kg-m
(8.7 - 14.5 ft-lb, 11.8 - 19.6 N-m)

NOTE:

- The new sensor is coated with sealer, therefore seal tape is unnecessary if the gauge is replaced with new one.

- (2) Connect the connector.
2. Fill the coolant



BODY ELECTRICAL SYSTEM

2. WARNING & INDICATOR

CHECK WARNING LAMPS

1. Set the ignition switch to the ON position. Ensure that the warning lamps given below are illuminated.
2. Set the ignition switch to the START position. Start the engine. Ensure that the warning lamps given below are extinguished. (With the parking lever not applied)
3. Stop the engine. Set the ignition switch to the START position again. Start the engine. Ensure that, four to eight seconds later, the seat belt warning buzzer ceases its operation and the seat belt warning lamp goes out.

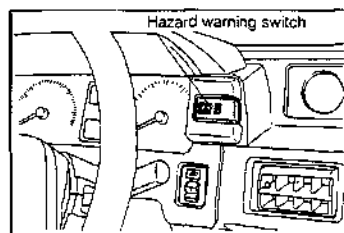
2-1. WARNING & INDICATOR

	Kind	Indication	Function
Warning lamp	Hazard warning		Flashes when hazard switch is turned ON. Indicating color: Red
	Brake warning		Glow when brake fluid becomes too low or empty, or when parking brake is applied. Indicating color: Red
	Oil pressure warning		Glow when engine oil pressure system is encountered with abnormality while engine is running. Indicating color: Red
	Charge warning		Glow when engine charging system is encountered with abnormality while engine is running. Indicating color: Red
	Seat belt warning		Glow for about six seconds when driver fails to buckle up seat belt at driver's seat after ignition switch has been turned ON or engine has started. Indicating color: Red
	Check engine warning		Glow when CPU detects malfunction of Electronic Fuel Injection system. Indicating color: Amber
Indicator lamp	High beam indicator		Glow when upper beams of headlamps are turned ON. Indicating color: Blue
	Turn signal indicator		Flashes when turn signal switch or hazard warning switch is turned ON. Indicating color: Green
	4WD indicator		Glow when the transfer shift lever is moved to the 4H or 4L position with the engine switch turned ON. Indicating color: Green
	Differential lock indicator	DIFF-LOCK	Glow when the transfer shift lever is shifted to CENTER DIFF-LOCK with the engine switch turned ON. Indicating color: Amber

WFE20-65260

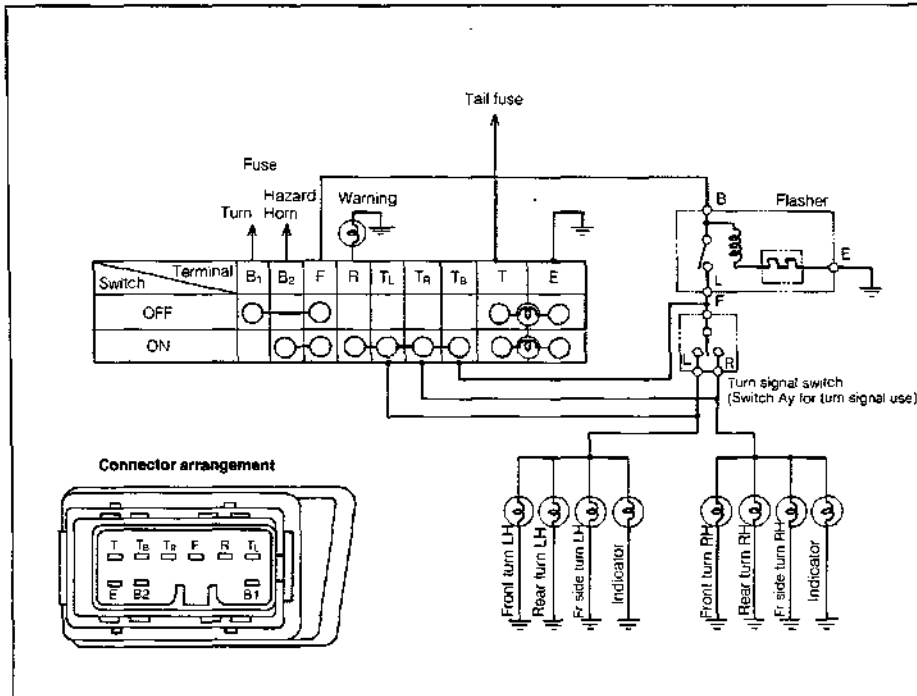
2-2. HAZARD WARNING

The hazard warning switch is a seesaw type switch which incorporates a symbol mark showing night illumination. Furthermore, the switch is installed in the meter cluster toward the inboard side of the vehicle.



WFE20-65261

CIRCUIT DIAGRAM



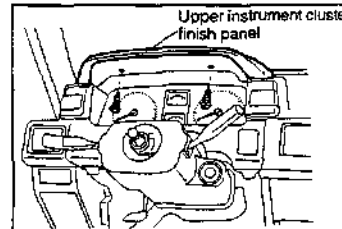
WFE30-BE062

REMOVAL

1. Remove the upper instrument cluster finish panel by removing the two screws.
2. Remove the instrument panel finish lower panel.

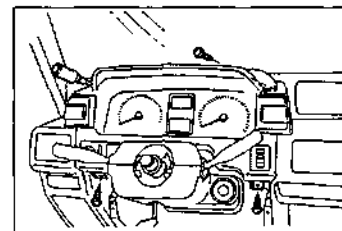
NOTE:

- The removal of the steering wheel in advance will facilitate this removal operation.



WFE30-BE063

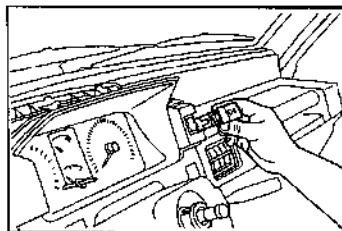
3. Remove the instrument cluster finish panel subassembly by removing the four screws.



WFE30-BE064

BODY ELECTRICAL SYSTEM

- Remove the hazard warning switch assembly.



WFE90-6E066

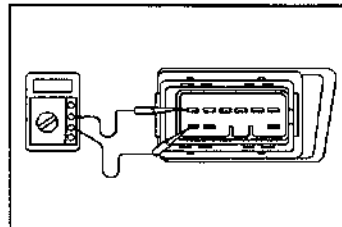
INSPECTION

Ensure that continuity exists between the respective terminals as indicated in the continuity table below.

Continuity table

- Continuity exists.
 Bulb in installed state

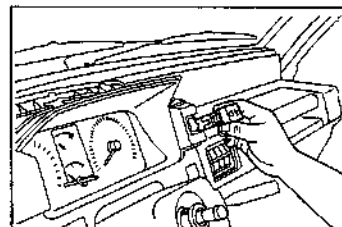
Terminal	B ₁	B ₂	F	R	T _L	T _R	T ₆	T	E
Switch									
OFF									
ON									



WFE90-6E066

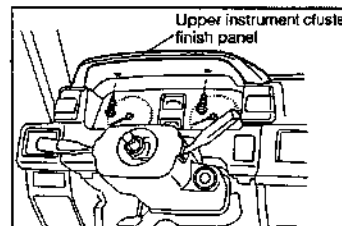
INSTALLATION

- Connect the coupler of the hazard warning switch and install it to the instrument cluster finish panel subassembly.



WFE90-6E067

- Install the instrument cluster finish panel subassembly.
- Install the instrument cluster finish upper panel.
- Install the instrument panel finish lower panel.



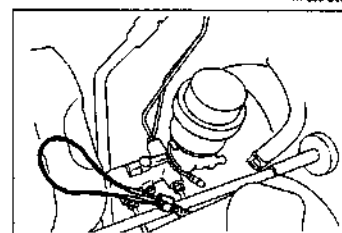
WFE90-6E068

2-3. BRAKE WARNING

BRAKE FLUID LEVEL SWITCH

Inspection

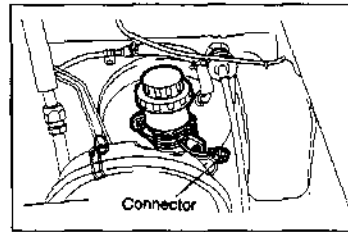
- Start the engine.
- Return the parking brake lever to the original position.
- Disconnect the connector of the brake level warning switch. Short the connector terminals at the wire harness side with each other, as indicated in the right figure. Ensure that the brake warning lamp glows.



WFE90-6E069

BODY ELECTRICAL SYSTEM

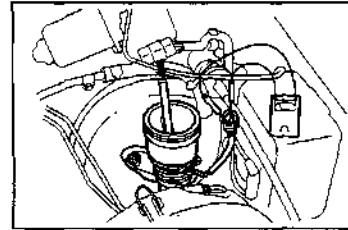
4. Pull out the connector of the brake fluid level warning switch and connect a tester.



5. Press down the brake fluid level warning switch (float) with a rod. Ensure that continuity exists between the connector terminals.

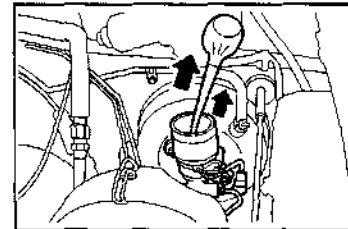
NOTE:

- As for a rod to be used for pressing down the float, be sure to thoroughly clean it. Special care must be exercised to ensure that no dust nor water gets into the reservoir.



Removal

1. Detach the reservoir tank cap.
2. Suck the brake fluid in the reservoir tank, using a syringe.
3. Remove the master cylinder reservoir assembly.



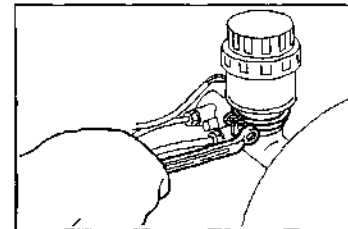
Installation

1. Install the master cylinder reservoir assembly to the master cylinder.

Tightening Torque: 0.55 - 0.70 kg-m
(4.0 - 5.0 ft-lb, 4.9 - 6.9 N-m)

2. Fill the reservoir tank with brake fluid up to the MAX level mark.

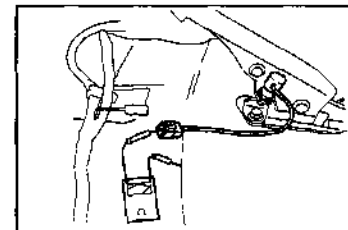
Brake Fluid to be Used: DOT3 or SAE J1703



PARKING BRAKE SWITCH

Inspection

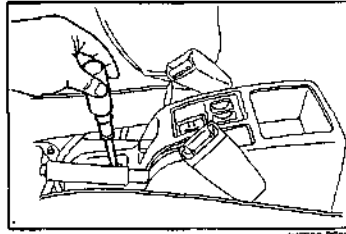
1. Pull out the connector of the parking brake switch and conduct continuity checks between the terminal and the body earth.
 - (1) Ensure that continuity exists between the terminals when the parking brake lever is pulled upward.
 - (2) Ensure that no continuity exists between the terminals when the parking brake lever is returned.



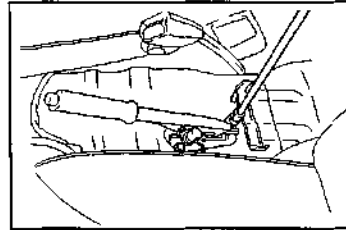
BODY ELECTRICAL SYSTEM

Removal

1. Remove the rear console box.



2. Remove the parking brake lever. Remove the parking brake switch.



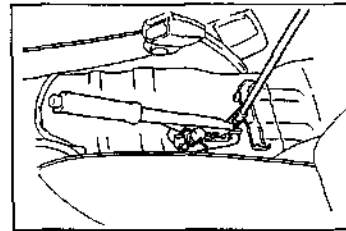
Installation

1. Install the parking brake switch and parking brake lever.

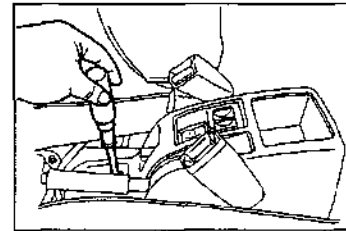
NOTE:

- Ensure that the parking brake switch operates normally. If the switch is installed improperly, the switch may malfunction.

Tightening Torque: 1.0 - 1.6 kg-m
(7.2 - 11.5 ft-lb, 9.8 - 15.7 N-m)



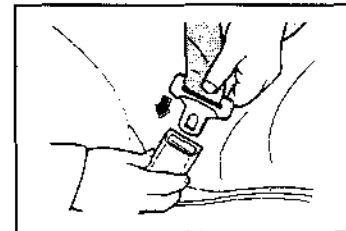
2. Install the rear console box.



2-4. SEAT BELT WARNING

OPERATION CHECK

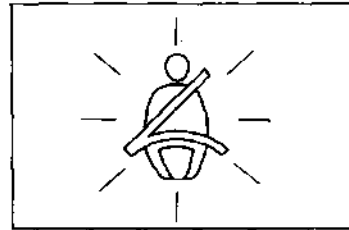
1. Seat belt warning buzzer
 - (1) Ensure that the buzzer is set off for the specified time when the ignition switch is turned ON.
Specified Set-off Time: 4 - 8 seconds
 - (2) Ensure that the buzzer is not set off when the ignition switch is turned ON with the seat belt locked.



BODY ELECTRICAL SYSTEM

2. Seat belt warning lamp
 - (1) Ensure that, when the ignition switch is turned ON, the lamp glows for the specified time regardless of the seat belt lock.

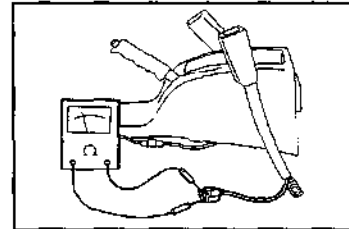
Specified Set-off Time: 4 - 8 seconds



WPB90-BE030

INSPECTION OF SEAT BELT SWITCH

1. Pull out the connector of the seat belt switch and connect a tester.
2. Buckle the seat belt. Ensure that continuity exists between the connector terminals.

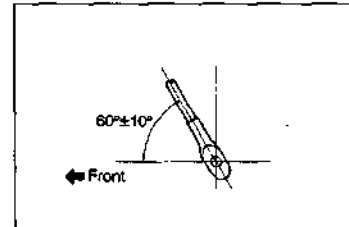


WPB90-BE031

REMOVAL AND INSTALLATION

Install the seat belt so that the installation angle of the front/inner seat belt may become 50 - 70 degrees.

Tightening Torque: 2.9 - 5.4 kg-m
(21.0 - 39.1 ft-lb, 28.4 - 53.0 N-m)



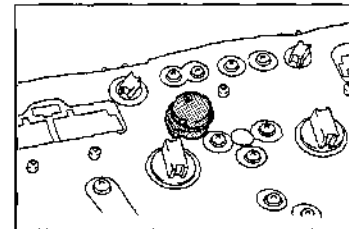
WPB90-BE032

INSPECTION OF BUZZER

1. Remove the buzzer.
2. Apply a voltage of 12V between the terminals of the buzzer.
3. Ensure that the buzzer is set off.

NOTE:

- ♦ It must be noted that the buzzer will not be set off if the positive ⊕ and negative ⊖ terminals are connected reversely.



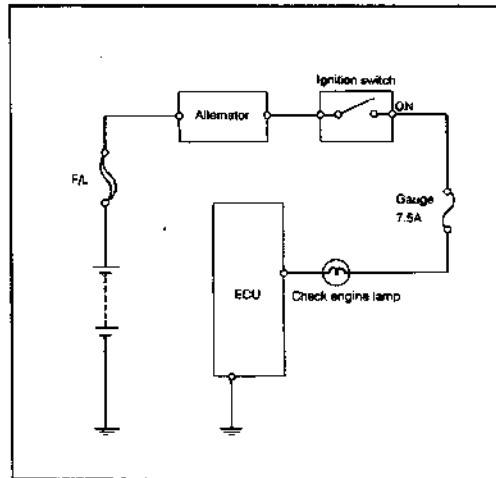
WPB90-BE033

BODY ELECTRICAL SYSTEM

2-5. CHECK ENGINE WARNING (EFI engine only)

INSPECTION

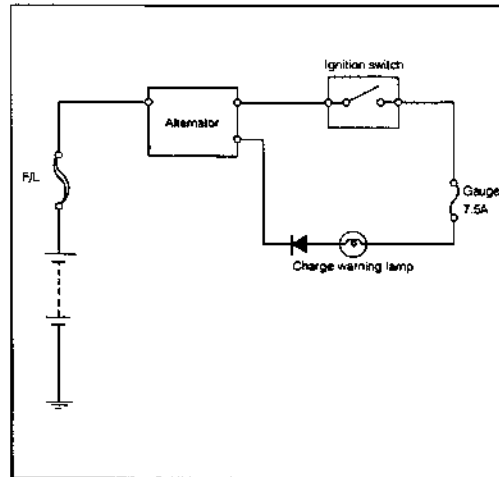
The inspection of the check engine lamp is performed under the inspection of the EFI system.



2-6. CHARGE WARNING

INSPECTION

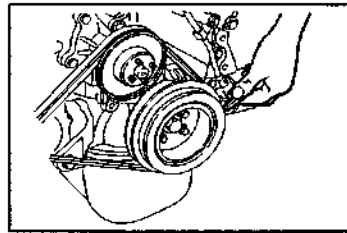
The inspection of the charge warning lamp is performed under the inspection of the charge system.



2-7. OIL PRESSURE WARNING

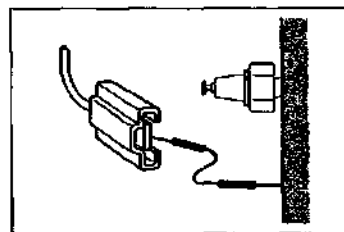
INSPECTION

1. Disconnect the oil pressure switch connector.



BODY ELECTRICAL SYSTEM

2. Ground the connector at the harness side.
3. Ensure that the oil pressure warning lamp glows when the engine switch is turned ON.

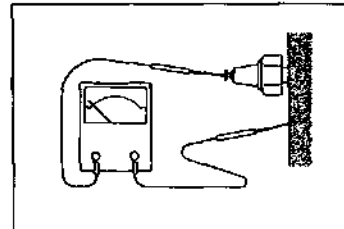


WP690-BE067

4. Pull out the connector located at the front/left part of the oil filter bracket.
5. Ensure that continuity exists between the oil pressure switch terminal and the earth.

NOTE:

- It should be noted that continuity exists while the engine is stopped, whereas no continuity exists while the engine is running.



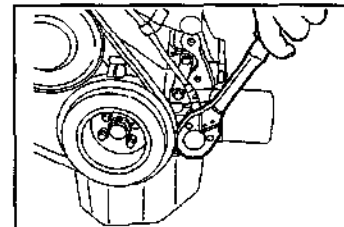
WP690-BE068

REMOVAL

1. Disconnect the oil pressure switch connector.
2. Remove the oil pressure switch.

NOTE:

- Use a hexagonal long box wrench for the removal.



WP690-BE069

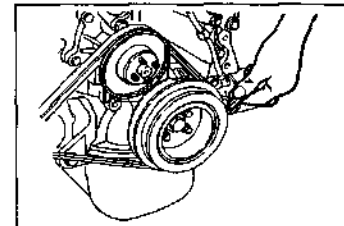
INSTALLATION

1. Clean the threaded portion of the oil pressure switch. Wind seal tape around the threaded portion. Install the oil pressure switch in the oil pump.

Tightening Torque: 1.2 - 2.0 kg-m (8.7 - 14.5 ft-lb)

NOTE:

- (1) Use a hexagonal long box wrench for the installation.
- (2) The new oil pressure switch is coated with sealing materials.



WP690-BE070

2. Connect the connector of the oil pressure switch.
3. Start the engine and check it for oil leakage. Repair the leaky point if oil leakage exists.

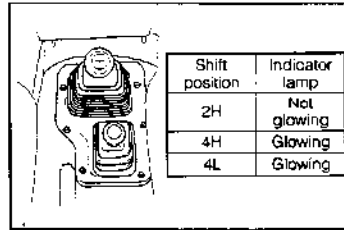
WP690-BE071

BODY ELECTRICAL SYSTEM

2-8. 4WD INDICATOR LAMP

IN-VEHICLE CHECK

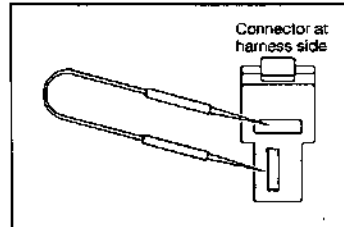
1. Turn ON the ignition switch.
2. Place the transfer shift lever in the 4H or 4L position. Ensure that the indicator lamp glows.
3. Place the transfer shift lever in the 2H position. Ensure that the indicator lamp is extinguished.



WFE90-8B062

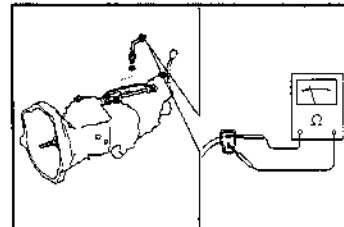
INSPECTION

1. Pull out the connector located at the top side part of the transfer front case.
2. Short the connector at the harness side.
3. Ensure that the 4WD indicator glows when the engine switch is turned on.



WFE90-8B093

4. Pull out the connector of the transfer position detect switch and connect a tester.
5. Shift the transfer shift lever to 4H and 4L. Ensure that continuity exists between the connector terminals.

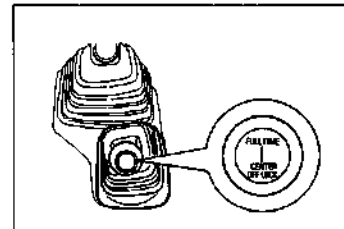


WFE90-8B064

2-9. DIFFERENTIAL LOCK INDICATOR LAMP

IN-VEHICLE CHECK

1. Turn ON the ignition switch.
2. Place the transfer shift lever in the CENTER DIFF LOCK position. Ensure that the indicator lamp glows.



WFE90-8B065

INSPECTION

1. Pull out the connector located at the top side part of the transfer front case.
2. Short the connector at the harness side.
3. Ensure that the DIFF-LOCK indicator glows when the engine switch is turned on.
4. Pull out the connector of the transfer position detect switch and connect a circuit tester.
5. Shift the transfer shift lever to CENTER DIFF LOCK. Ensure that continuity exists between the connector terminals.

WFE90-8B066

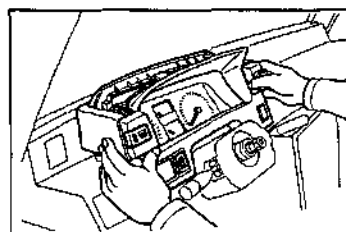
3. IGNITION KEY SWITCH

REMOVAL

1. Remove the instrument panel finish lower panel.
2. Remove the instrument cluster finish panel subassembly.

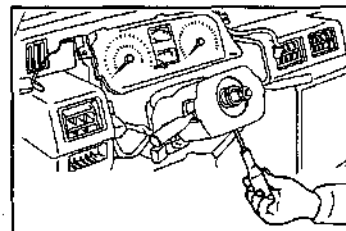
NOTE:

- The removal of the steering wheel in advance will facilitate this removal operation.



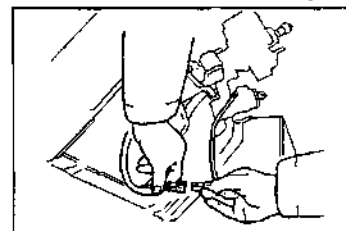
WFE0-BE007

3. Remove the steering column lower/upper cover.



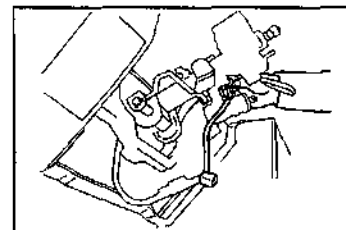
WFE0-BE008

4. Pull out the coupler of the ignition switch.



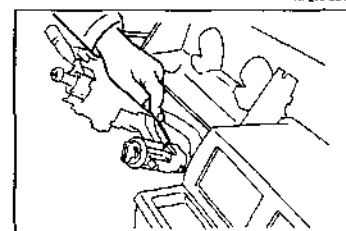
WFE0-BE009

5. Remove the ignition key switch.



WFE0-BE100

6. Remove the ignition key cylinder.
 - (1) Set the key to the ACC position.
 - (2) Push in the knock button, using a piece of wire, as indicated in the right figure.
 - (3) Draw out the ignition key cylinder.



WFE0-BE101

BODY ELECTRICAL SYSTEM

INSPECTION

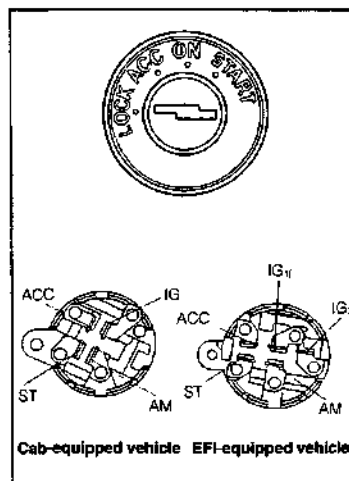
Ensure that continuity exists between the respective terminals as indicated in the continuity table.

Continuity table (HD-E engine) ○—○ Continuity exists.

	AM	ACC	IG ₁	IG ₂	ST
LOCK					
↓					
ACC	○—○				
↓					
ON	○—○	○—○	○—○	○—○	
↓					
START	○—○		○—○	○—○	○—○

Continuity table (HD-C engine) ○—○ Continuity exists.

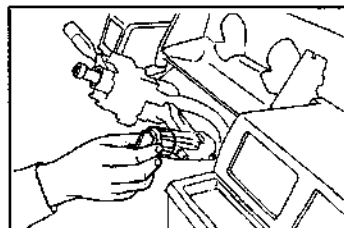
	AM	ACC	IG	ST
LOCK				
↓				
ACC	○—○			
↓				
ON	○—○	○—○	○—○	
↓				
START	○—○		○—○	○—○



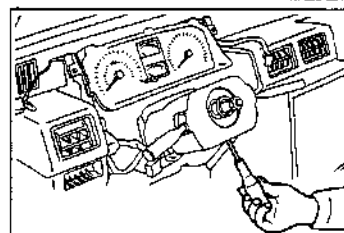
WPBX-BE102

INSTALLATION

1. Install the ignition key cylinder.
(1) Set the key to the ACC position.
(2) Insert the ignition key cylinder.
2. Install the ignition key cylinder.
3. Connect the coupler of the ignition switch.
4. Install the steering column lower/upper cover.
5. Install the instrument cluster finish panel subassembly.
6. Install the instrument panel finish lower panel.
7. Install the steering wheel subassembly.



WPBX-BE103

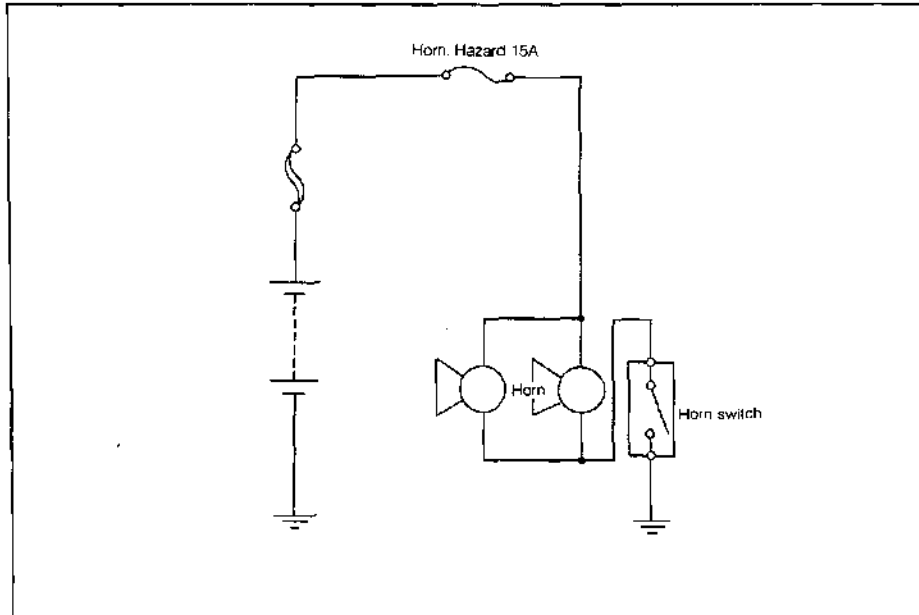


WPBX-BE104

4. HORN

The horn is installed at the front of the radiator support panel.

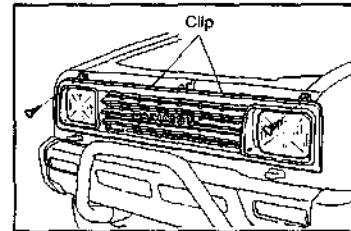
CIRCUIT DIAGRAM



WP20-BE106

REMOVAL

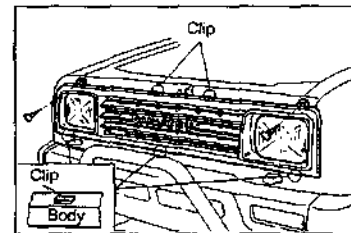
1. Removal of radiator grille
 - (1) Remove the two screws.
 - (2) Detach the two clips, using a screwdriver.
 - (3) Remove the radiator grille from the vehicle body by raising it diagonally toward you.
2. Removal of horn assembly



WP20-BE106

INSTALLATION

1. Install the horn assembly.
2. Installation of headlamp grille
 - (1) Ensure that three clips are provided at the body side.
 - (2) Set the headlamp grille on the body. Secure the headlamp grille with the two clips at the upper side.
 - (3) Attach the headlamp grille to the body with the two screws.

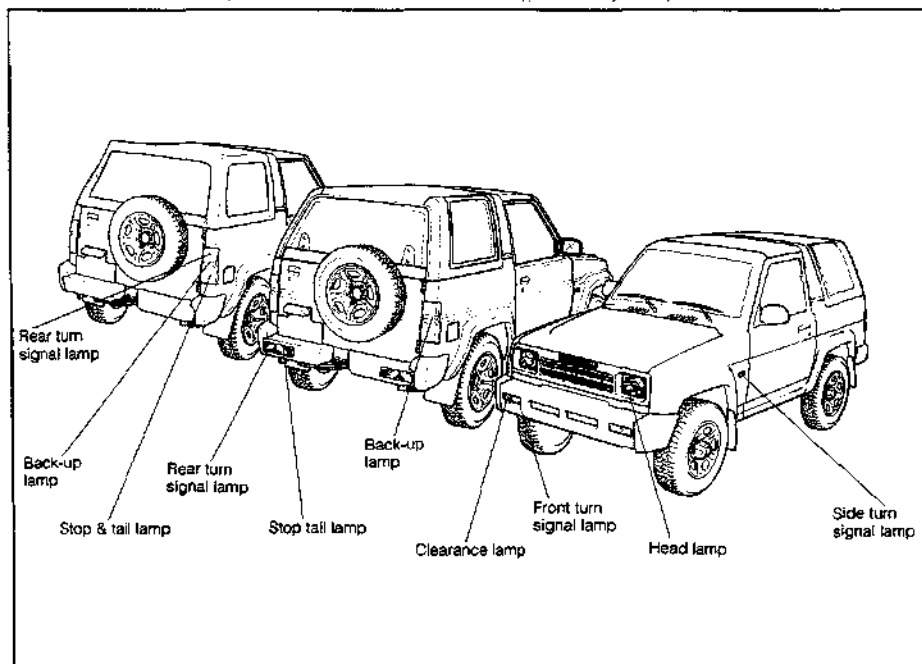


WP20-BE107

BODY ELECTRICAL SYSTEM

5. LIGHTING

The rear combination lamp has been built into the rear bumper for only European and Australian markets.



WFE90-G1109

Lamp specifications

Lamp		Specifications	Wattage	Remarks
Headlamp	Bulb specifications	Candescent	45/40	
		Halogen	80/55	
		Yellow	45/40	
Front combination lamp		Clearance lamp	5	
		Turn signal lamp	21	
Side turn signal lamp			5	
Rear combination lamp		Stop/tail lamp	21/5	Figures in () denote European specifications
		Turn signal lamp	23 (21)	
		Back up lamp	21	
License plate lamp			5	
Room lamp			10	
Fog lamp		Front	35	• Option on Australian & General specifications
		Rear	21	• Standard on R.H.D. vehicles for European specifications • Option on L.H.D. vehicles for European specifications

WFE90-G1109

BODY ELECTRICAL SYSTEM

5-1. TROUBLE SHOOTING

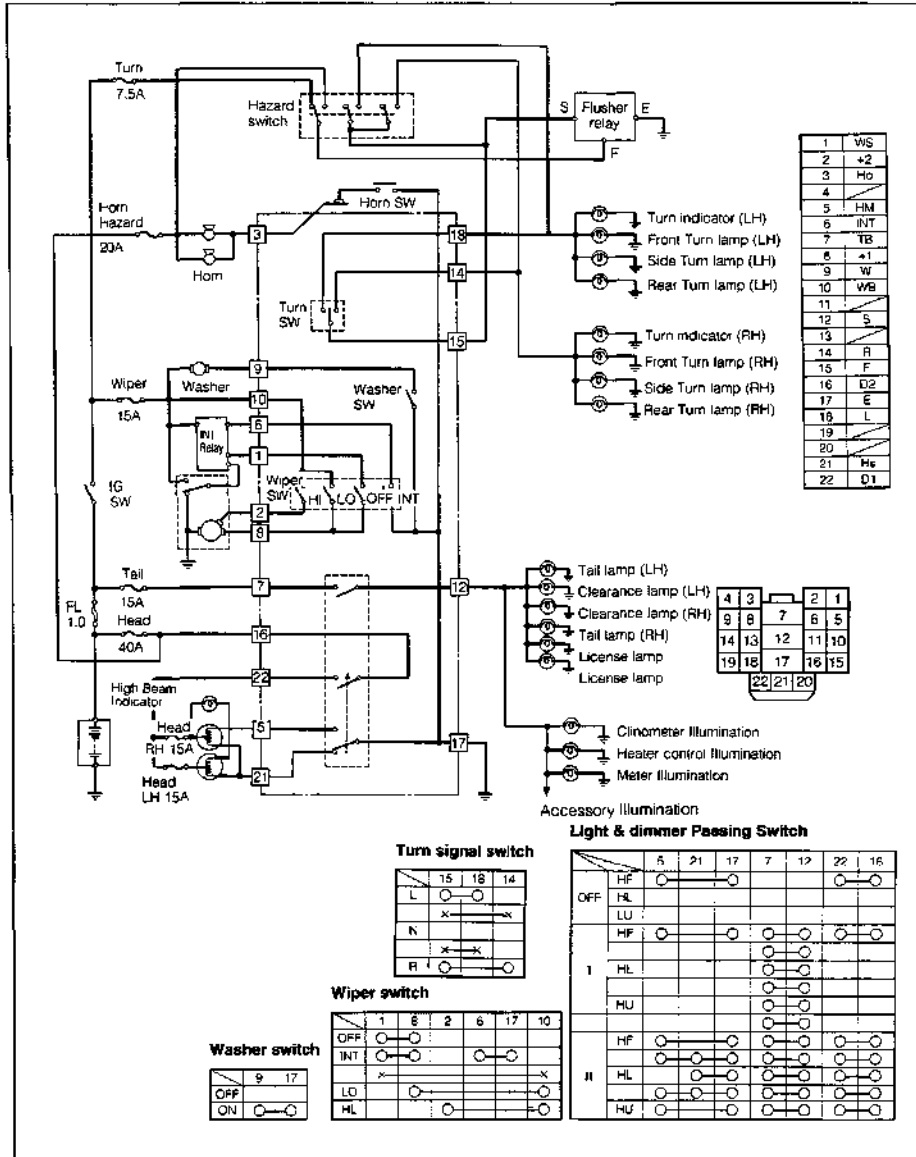
Problem	Possible causes	Remedies
One headlamp will not glow.	<ul style="list-style-type: none"> • Burnt bulb • Faulty socket • Faulty wiring or earth 	<ul style="list-style-type: none"> • Replace bulb. • Repair, as required.
Headlamps will not glow.	<ul style="list-style-type: none"> • Fusible link and/or fuse blown out • Faulty lighting switch • Faulty wiring or earth 	<ul style="list-style-type: none"> • Replace fusible link and/or fuse. • Check switch. • Repair, as required.
High beam or low beam will not glow.	<ul style="list-style-type: none"> • Faulty lighting switch or dimmer switch • Faulty wiring 	<ul style="list-style-type: none"> • Check switch. • Repair, as required.
Clearance lamp, tail lamp or license lamp will not glow.	<ul style="list-style-type: none"> • "Tail" fuse blown out • Fusible link blown out • Faulty side lamp switch • Faulty wiring or earth 	<ul style="list-style-type: none"> • Check for short. Replace fuse. • Replace fusible link. • Check switch. • Repair, as required.
Turn signal lamps at one side will not glow.	<ul style="list-style-type: none"> • Faulty turn signal lamp switch • Faulty wiring or earth 	<ul style="list-style-type: none"> • Check switch. • Repair, as required.
Turn signal lamps at both sides will not glow.	<ul style="list-style-type: none"> • "Turn" fuse blown out • Faulty turn signal/hazard switch • Faulty turn signal flasher relay • Faulty wiring or earth 	<ul style="list-style-type: none"> • Check for short. Replace fuse. • Check switch. • Check flasher relay • Repair, as required.
Stop lamp will not glow.	<ul style="list-style-type: none"> • "Stop" fuse blown out • Faulty stop lamp switch • Faulty wiring or earth 	<ul style="list-style-type: none"> • Check for short. Replace fuse. • Check switch. • Repair, as required.
Stop lamp remains in glow state.	<ul style="list-style-type: none"> • Faulty stop lamp switch. 	<ul style="list-style-type: none"> • Adjust or replace switch.
Hazard warning lamp will not glow.	<ul style="list-style-type: none"> • "Horn" fuse blown out • Faulty flasher relay • Faulty hazard switch • Faulty wiring or earth 	<ul style="list-style-type: none"> • Check for short. Replace fuse. • Check flasher. • Check switch. • Repair, as required.

WP50-BE110

BODY ELECTRICAL SYSTEM

5-2. WIRING DIAGRAM

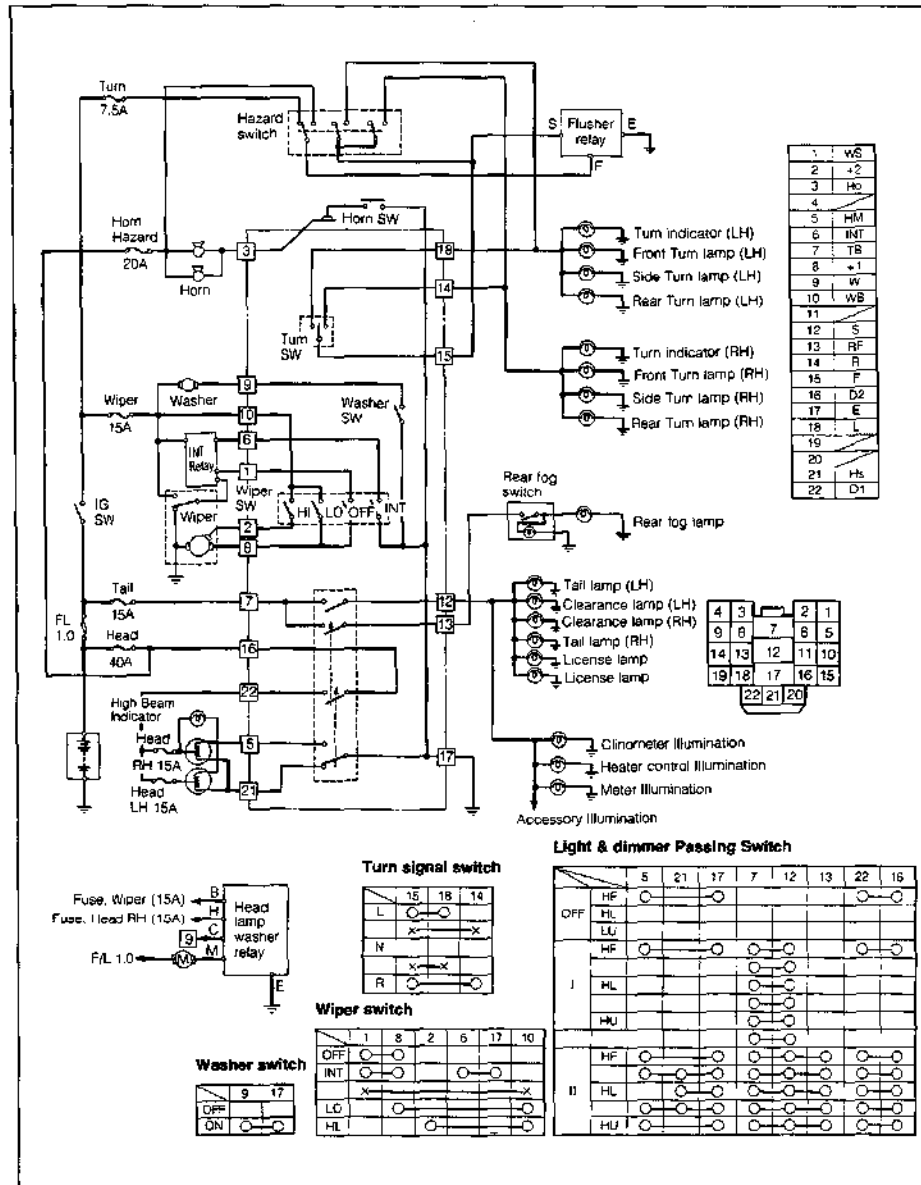
Version A: AUS, GE Specification



WFE90-BE111

BODY ELECTRICAL SYSTEM

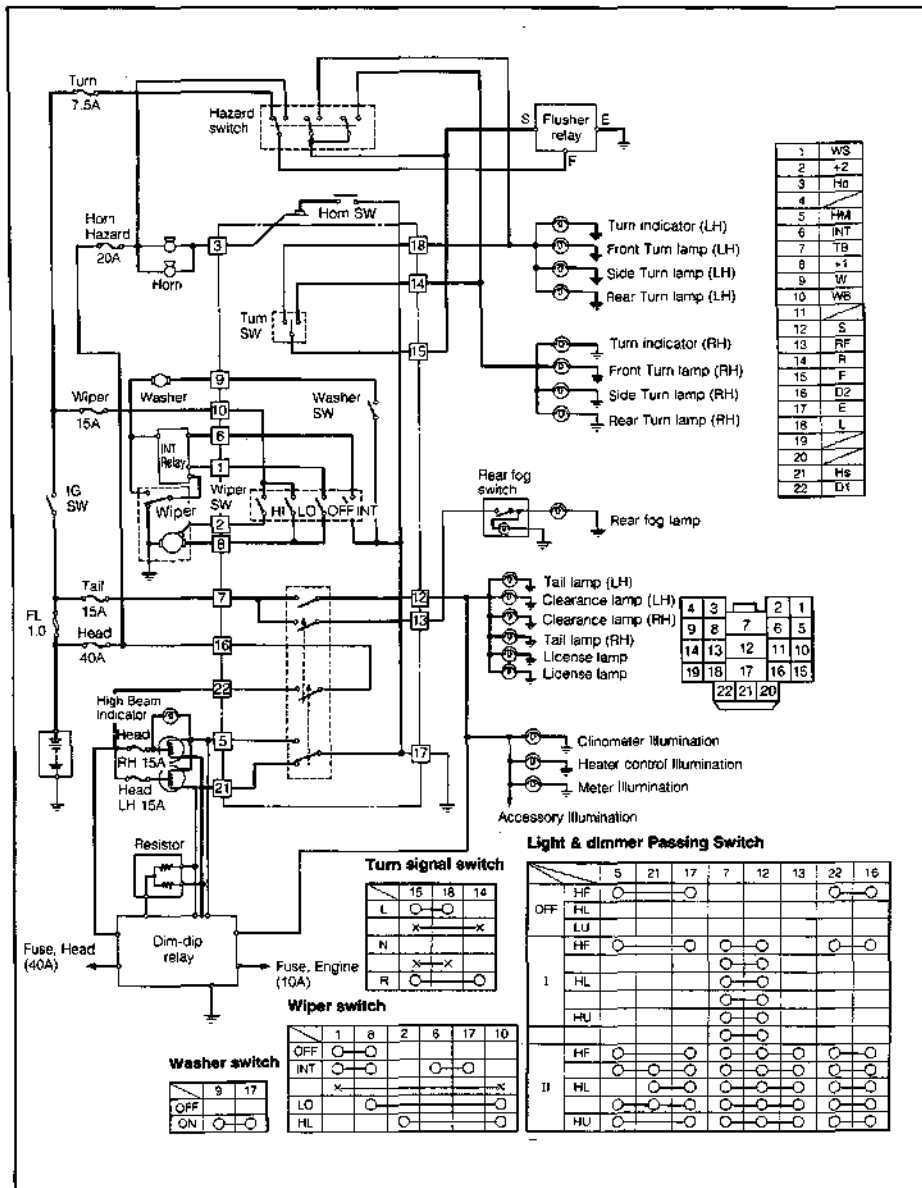
Version B: EC Specification



WPE00-BE112

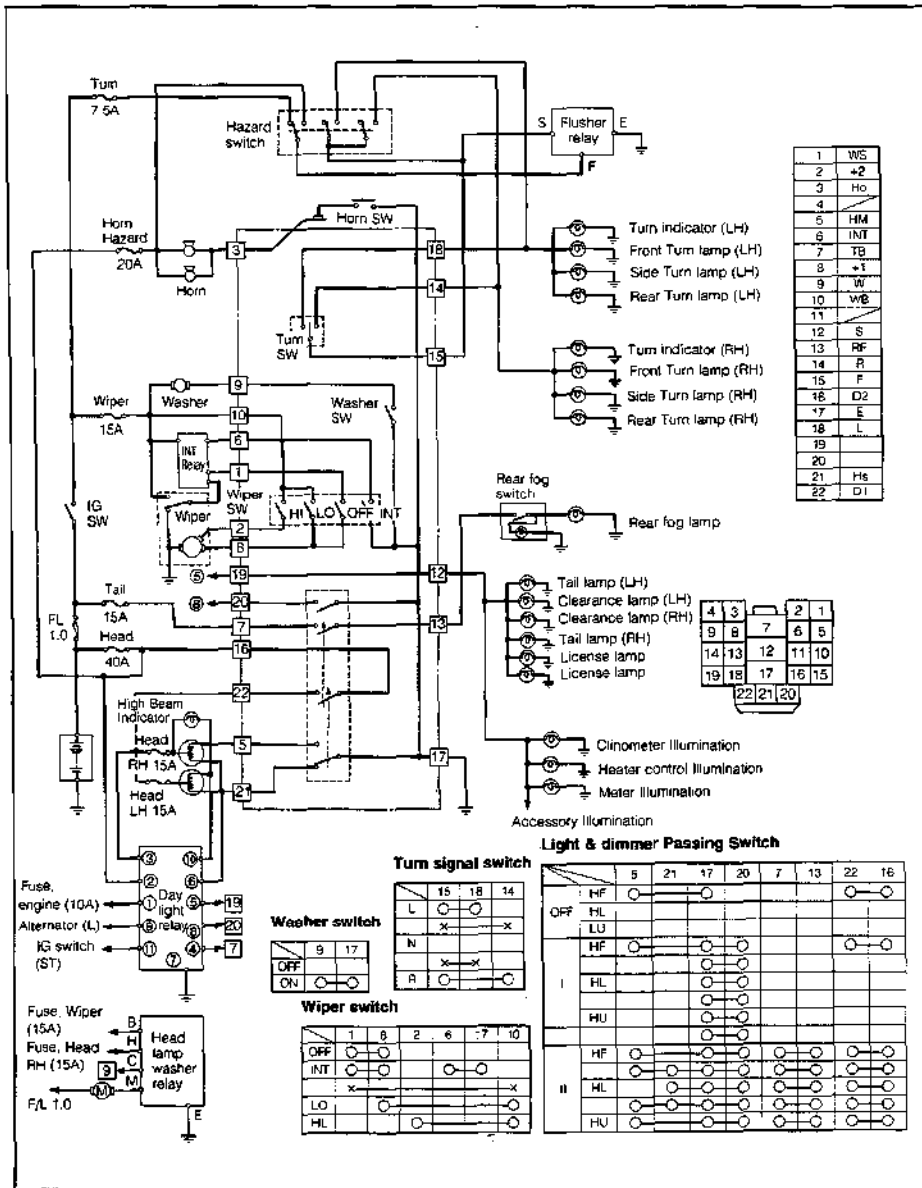
BODY ELECTRICAL SYSTEM

Version C: EC Specification with Dim-dip system



BODY ELECTRICAL SYSTEM

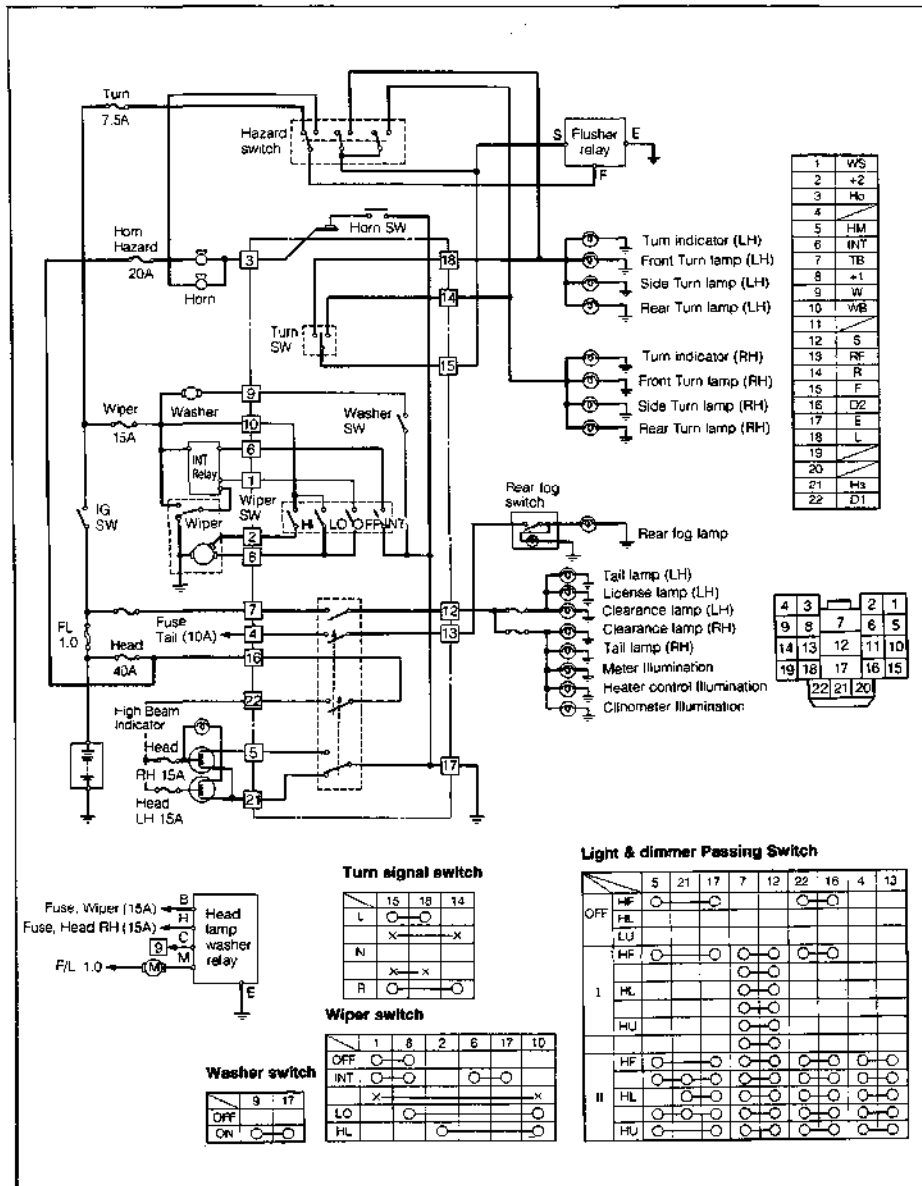
Version D: EC Specification with Day-light system



WFE90-EE114

BODY ELECTRICAL SYSTEM

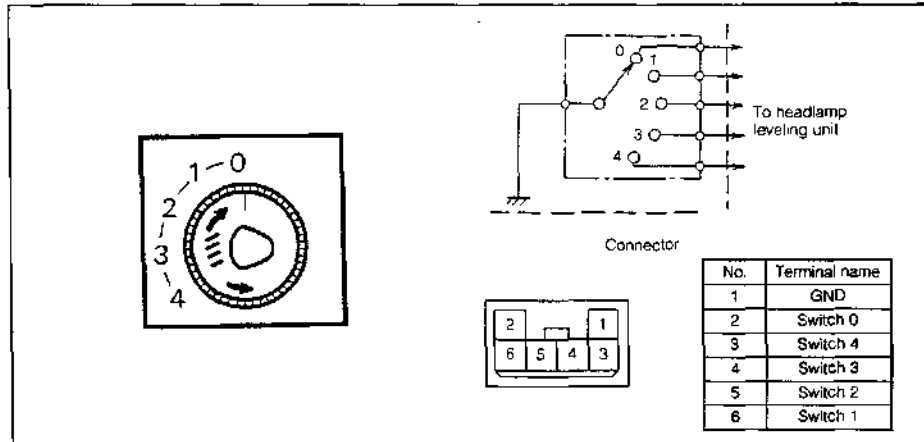
Version E: German Specification



WPERO-GE115

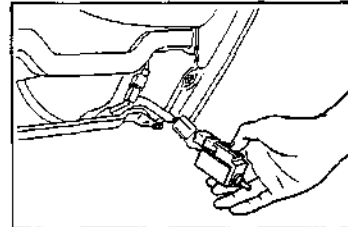
BE-40

HEADLAMP LEVELING SWITCH



REMOVAL

1. Push out the headlamp leveling switch from the back of the switch.
2. Disconnect the connector. Remove the switch.



INSPECTION

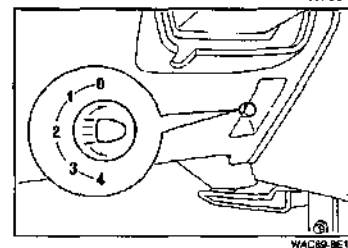
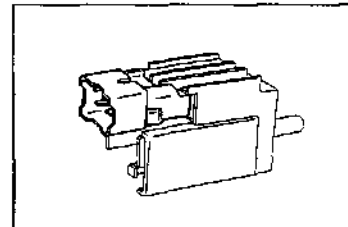
Ensure that continuity exists, as indicated in the table below, when the switch is operated.

Terminal Switch position	1	2	3	4	5	6
0						
1						
2						
3						
4						

If not, replace the switch.

INSTALLATION

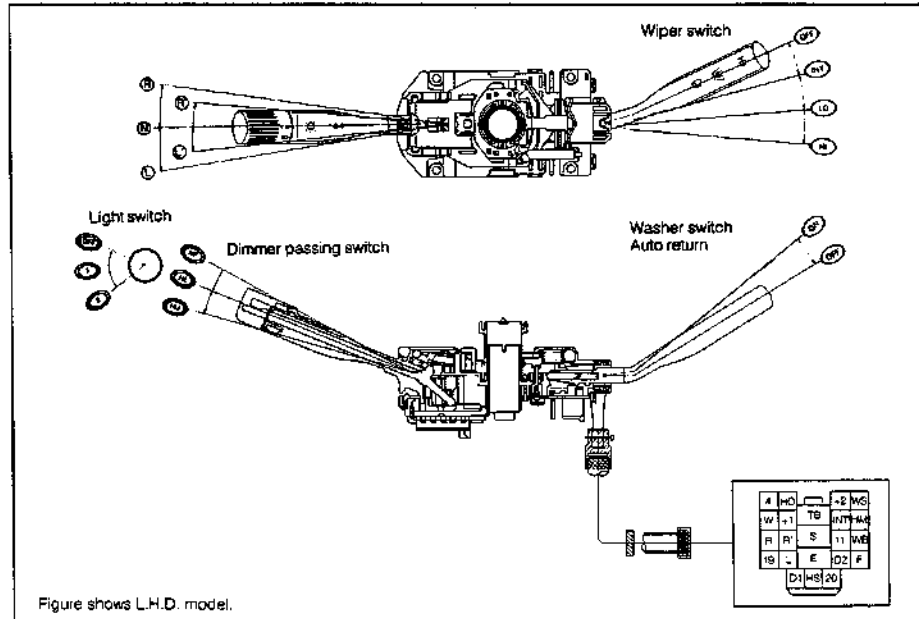
1. Connect the connector.
2. Push the headlamp leveling switch until it is locked.



BODY ELECTRICAL SYSTEM

5-3. MULTI-USE LEVER SWITCH

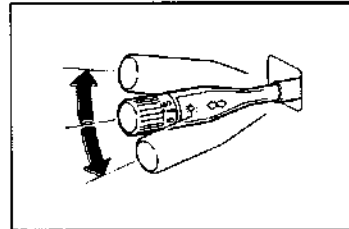
A multi-use lever type in which all switches to be used most frequently during the driving, such as the lighting switches, turn signal switch and wiper switch, are arranged concentrated around the steering column has been employed.



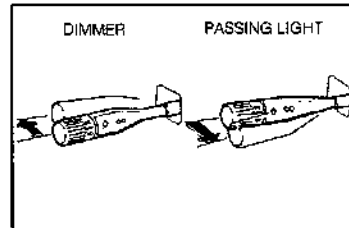
WPED0-BE120

INSPECTION

1. Ensure that each of the turn signal, dimmer, lighting, hazard warning and front wiper switches is functioning smoothly with a positive detent feeling.
2. With the ignition switch turned ON, move the turn signal switch to the right or left. Ensure that the turn signal indicator lamp flashes.
3. Ensure that the upper beam indicator lamp glows regardless of the ignition switch position when the dimmer switch and passing light switch are operated.



WPED0-BE121

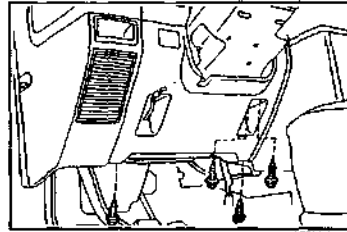


WPED0-BE122

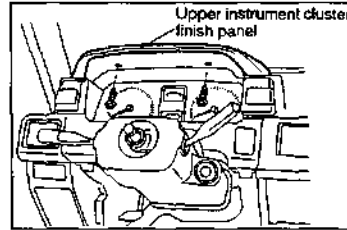
BODY ELECTRICAL SYSTEM

REMOVAL

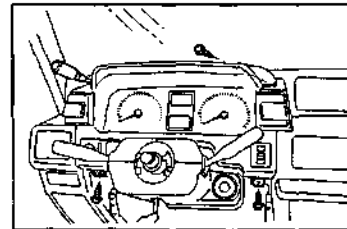
1. Disconnect the battery cable from the negative \ominus terminal.
2. Remove the steering wheel assy.
3. Removal of lower instrument panel finish panel.



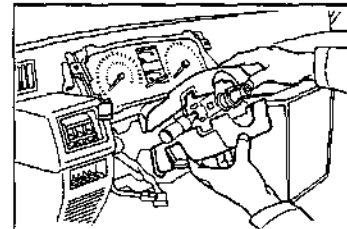
4. Remove the upper instrument cluster finish panel by removing the two screws.



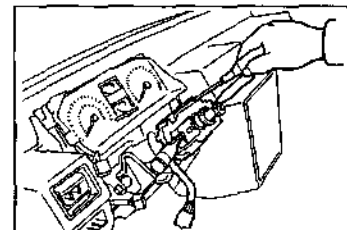
5. Removal of instrument cluster finish panel subassembly
(1) Remove the instrument cluster finish panel subassembly by removing the four screws.
(2) Disconnect the connectors.



6. Remove the steering column lower/upper cover.



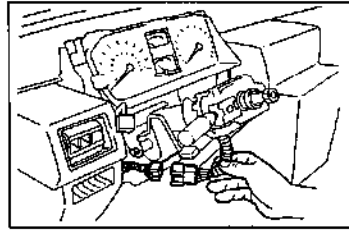
7. Remove the coupler of the multi-use lever.
8. Remove the multi-use lever switch.



BODY ELECTRICAL SYSTEM

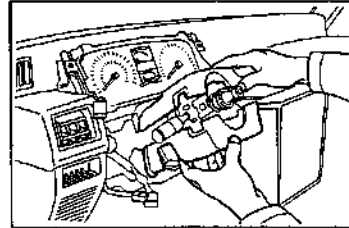
INSTALLATION

1. Install the multi-use lever switch. Connect the coupler.



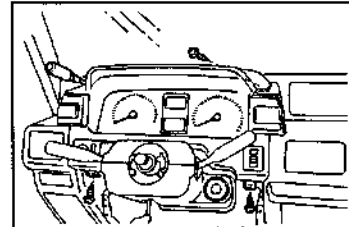
WP620-BE128

2. Install the steering column lower/upper cover.



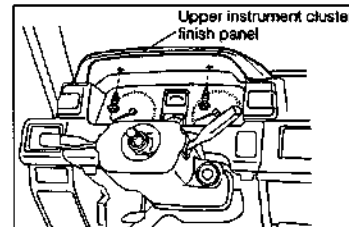
WP620-BE129

3. Install the instrument cluster finish panel subassembly.



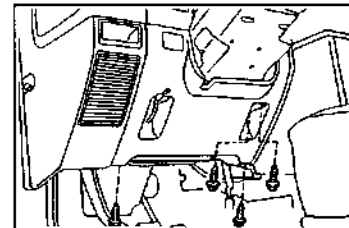
WP620-BE130

4. Install the instrument cluster finish upper panel.



WP620-BE131

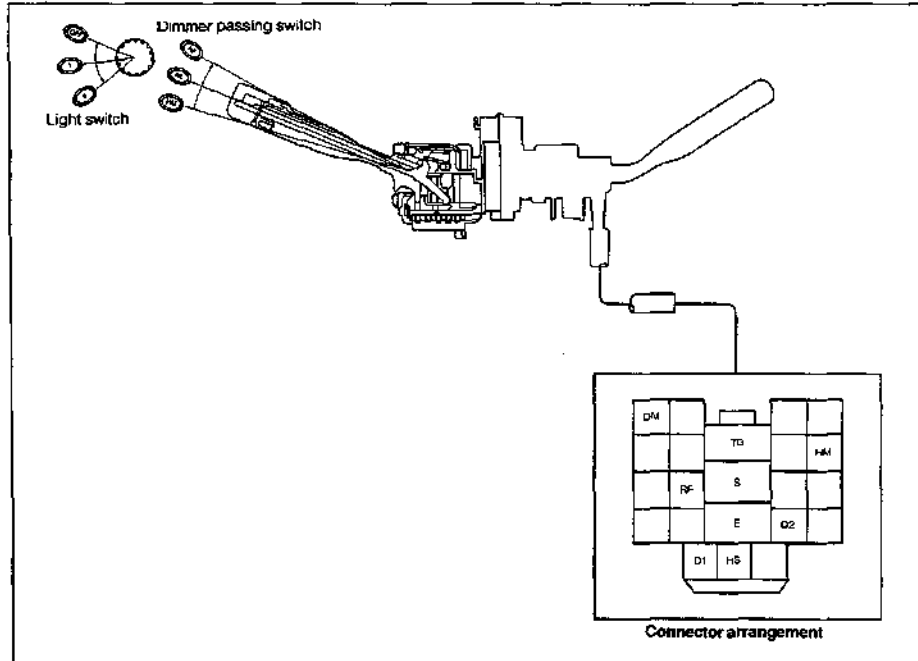
5. Install the instrument cluster finish lower panel.
6. Install the steering wheel subassembly.
7. Connect the battery cable to the negative \ominus terminal.



WP620-BE132

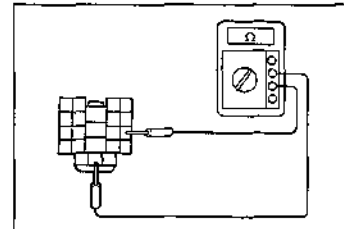
INSPECTION

1. Light & dimmer passing switch



WP890-BE133

1. Ensure that continuity exists between the terminals of the connector, as indicated in the table as previous pages.



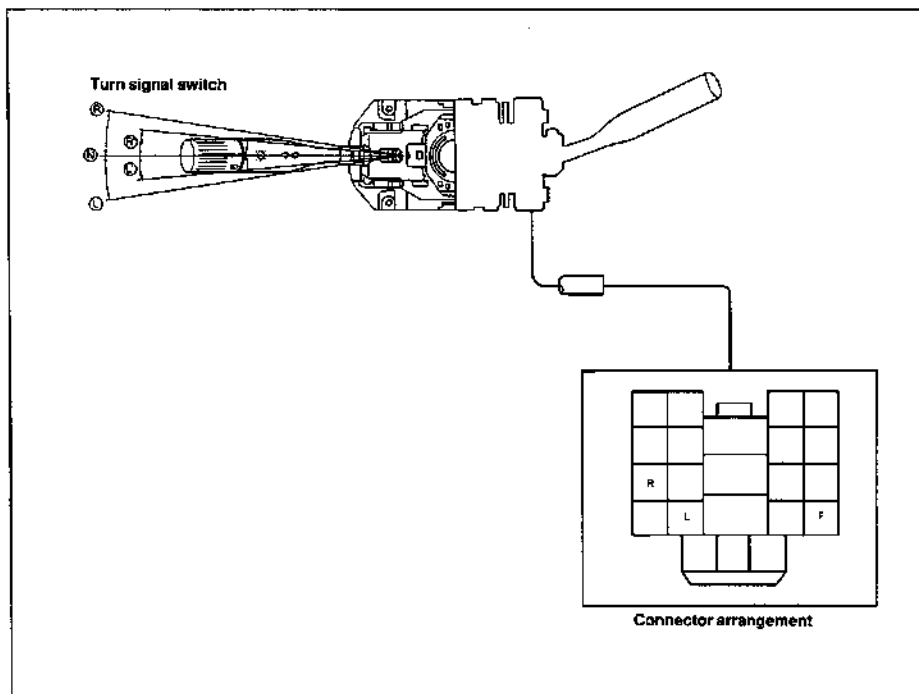
WP890-BE134

2. Operate the light switch and dimmer passing switch. Ensure that each switch can be operated without any binding and with a detent feeling.

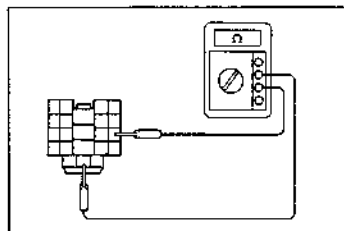
WP890-BE135

BODY ELECTRICAL SYSTEM

2. Turn signal switch



1. Ensure that continuity exists between the terminals of the connector, as indicated in the table as previous pages.



2. Ensure that the turn signal switch can be operated smoothly and with a detent feeling.

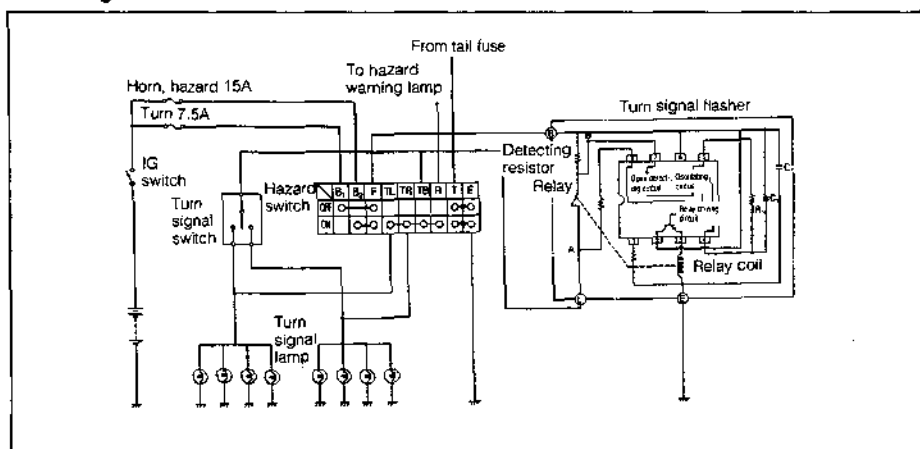
WF890-BE136

5-4. FLASHER RELAY

The turn signal flasher relay controls turn signal and hazard warning.
The flasher relay is located under the dash board, next to the heater unit.

WFE90-8E139

Circuit diagram



WFE90-8E140

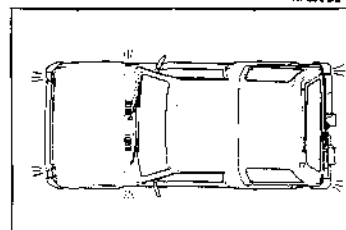
INSPECTION

Check each lamp for the state of glowing, flashing and not glowing.

Specified Flashing Speed: 85 ± 10 times/min.

NOTE:

- If any of the front or rear turn signal lamps has open wire, the flashing speed will exceed 120 times/min.
- If any abnormality is found in the inspection, check for burnt bulb and check each switch. When no abnormality is found in these checks, replace the lamp control relay.



WFE90-8E141

BODY ELECTRICAL SYSTEM

5-5. HAZARD WARNING SWITCH

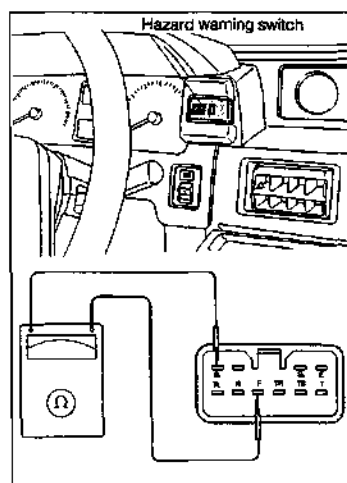
Hazard switch is located at the meter cluster toward the in-board side of the vehicle.

Remove the hazard warning switch. Ensure that continuity exists between the respective terminals as indicated in the continuity table below.

Continuity table

○—○ Continuity exists.
○⊕○ Bulb in installed state

Terminal Switch	B ₁	B ₂	F	T ₁	T _A	T _S	R	T	E
OFF	○	—	○	—	—	—	—	○⊕○	○⊕○
ON	—	○	○	○	○	○	○	○⊕○	○⊕○

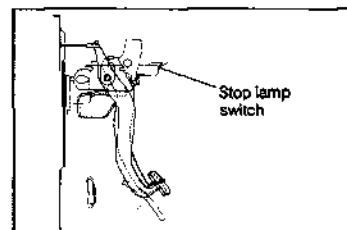


WFE30-GE142

5-6. STOP LAMP SWITCH

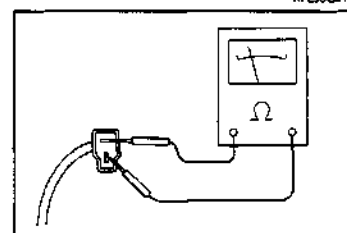
INSPECTION

1. Disconnect the connector of the stop lamp switch.
2. Ensure that continuity exists between the terminals when the brake pedal is depressed.



WFE30-GE143

3. Ensure that no continuity exists between the terminals when the brake pedal is not depressed.



WFE30-GE144

5-7. HEADLAMP

NOTE:

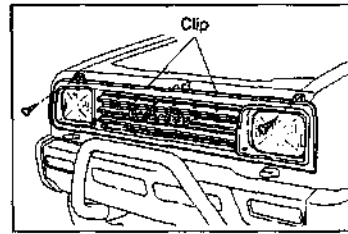
- It should be noted that the bulb replacement can be performed only after socket cover has been detached.

REMOVAL

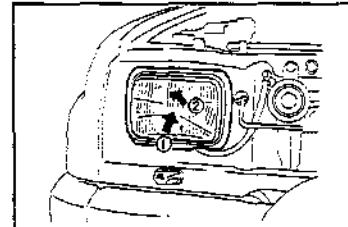
1. Removal of radiator grille
 - (1) Remove the two screws.
 - (2) Detach the two clips, using a screwdriver.
 - (3) Remove the radiator grille from the vehicle body by raising it diagonally toward you.
2. Removal of headlamp assembly
 - (1) Turn the headlamp counterclockwise while pushing it.
 - (2) Remove the headlamp from the vehicle body. Disconnect the connector.

DISASSEMBLY

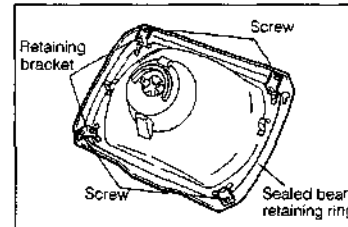
1. Remove the retaining bracket and sealed beam retaining ring by removing the four screws located at the back side of the headlamp.
2. Removal of bulb (halogen, white and yellow bulb)
 - (1) Remove the socket cover.
 - (2) Remove the spring set by turning it counterclockwise while pushing it.
 - (3) Remove the bulb.



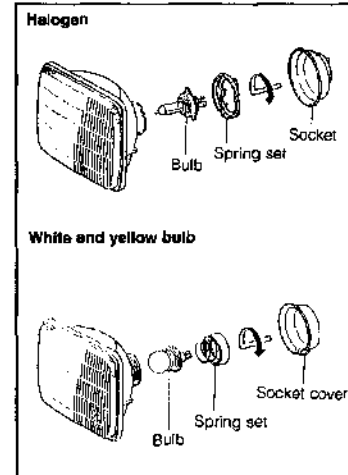
WPB30-BE145



WPB30-BE146



WPB30-BE147



WPB30-BE148

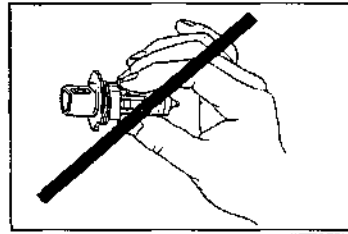
BODY ELECTRICAL SYSTEM

Replacement of halgen headlamp bulb.

The bulb can be replaced from the engine compartment without a need of removing the headlamp proper.

WARNING

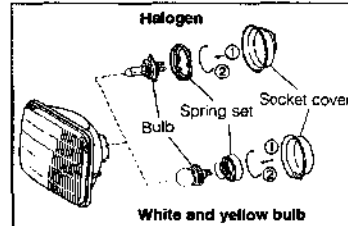
The halogen bulb reaches a very high temperature while it is put into use. If any lubricant gets on the bulb surface, it will result in significantly reduced lamp life. Hence, be very careful not to allow your fingers, etc. to touch with the glass portion during the replacement. Be sure to hold the flange section to replace the bulb.



WFE50-BE149

ASSEMBLY

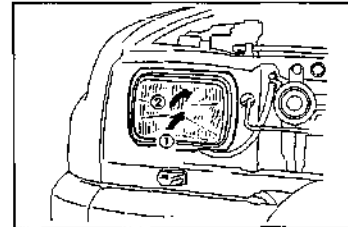
1. Installation of bulb (halogen, white and yellow bulb)
 - (1) Set the bulb in the headlamp socket.
 - (2) Secure the bulb by turning it clockwise while pushing it.
 - (3) Install the socket cover.
2. Install the sealed beam retaining ring and retaining bracket to the headlamp by means of the four screws.



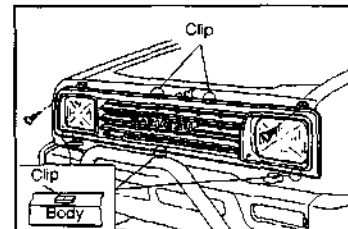
WFE50-BE150

INSTALLATION

1. Install the headlamp.
 - (1) Ensure that three clips are provided at the body side.
 - (2) Set the headlamp grille on the body. Secure the headlamp grille with the two clips at the upper side.
 - (3) Attach the headlamp grille to the body with the two screws.
2. Installation of headlamp grille



WFE50-BE151



WFE50-BE152

HEADLAMP AIMING ADJUSTMENT

Screen type

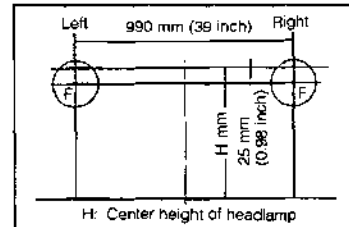
Conditions of vehicle during aiming adjustment

1. Perform the aiming adjustment with the tire air inflation pressure set to the specified value and with one person seated at the driver's seat.
2. Rock the vehicle in an up-and-down direction as well as in a right-and-left direction so that the suspensions may be settled in a normal state.
3. Carry out the headlamp aiming adjustment while the engine is running at 1500 rpm or more.
(If the revolution speed is too low, the lamp terminal voltage drops, thus making it difficult to recognize the hot zone.)

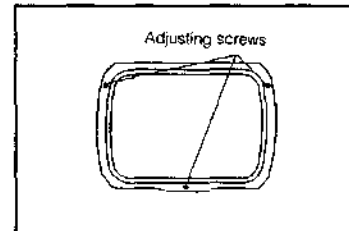
WFE20-0E153

Sealed beam, white bulb type

1. Setting of reference points on screen
 - (1) Measure the center height "H" of the headlamp. Draw a line as the adjustment line on the screen at a height 25 mm (0.98 inch) below the center height "H".
 - (2) Draw a vertical line on the screen at each center of the headlamps at a height of [H] on both right and left sides. Determine each intersection point [F] of the vertical center line with the adjustment line.
2. Adjustment of headlamp photometric axis
 - (1) Position the vehicle in front of the screen such that the headlamps of the vehicle may come at a distance of three meters from the screen. Moreover, place the vehicle normal to the screen.
 - (2) Turn ON the headlamps with the upper beams selected. Adjust the beams by means of the adjusting screws in such a way that the headlamps may aim the intersection points [F], respectively.
 - (3) Upon completion of the headlamp aiming adjustment, switch the upper beams to the low beams. Ensure that each low beam is now aiming in the diagonally lower direction.



WFE20-0E154

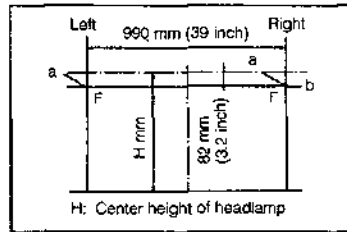


WFE20-0E155

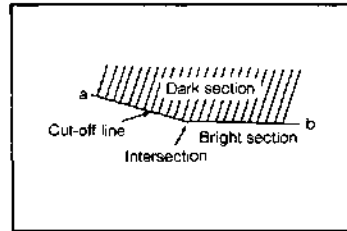
BODY ELECTRICAL SYSTEM

Sealed beam, yellow bulb type

1. Setting of reference points on screen
 - (1) Measure the center height "H" of the headlamp. Draw a line as the adjustment line on the screen at a height 82 mm (3.2 inch) below the center height "H".
 - (2) Draw a vertical line on the screen at each center of the headlamps on both right and left sides. Determine each intersection point [F] of the vertical center line with the adjustment line.
2. Adjustment of headlamp photometric axis
 - (1) Position the vehicle in front of the screen such that the headlamps of the vehicle may come at a distance of three meters from the screen. Moreover, place the vehicle normal to the screen.
 - (2) Turn ON the headlamps with the low beams selected. Then, you can get a light distribution pattern as indicated at the right figure. Perform the aiming adjustment at an intersection point of the line "a" with the line "b".
 - (3) With the low beams of the headlamps turned ON, perform the headlamp aiming adjustment by means of the adjusting screws in such a way that the intersection points of the cut-off lines may come at the intersection points [F], respectively.
 - (4) Upon completion of the headlamp aiming adjustment, set the headlamps to the upper beams. Ensure that the main photometric axis of each headlamp aims downward. Moreover, ensure that the headlamps are aiming correctly straight in the forward direction of the vehicle.



WPB20-BE156

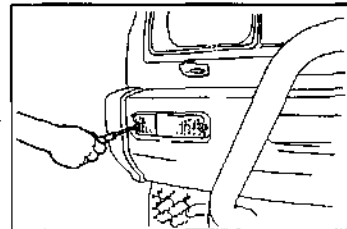


WPB20-BE157

5-8. FRONT TURN SIGNAL LAMP

REMOVAL

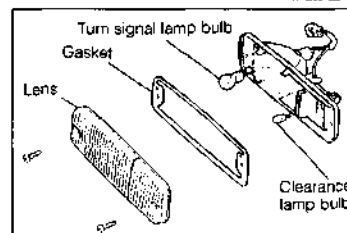
1. Remove the front turn signal lamp by removing the two screws.
2. Detach the lens and gasket.
3. Remove the turn signal bulb and clearance bulb.



WPB20-BE158

INSTALLATION

1. When the bulb is burnt out, install a new bulb with the designated wattage.
2. Install the gasket and lens. Secure the front turn signal lamp assembly with the two screw.

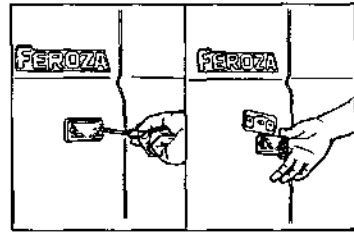


WPB20-BE159

5-9. SIDE TURN SIGNAL LAMP

REMOVAL

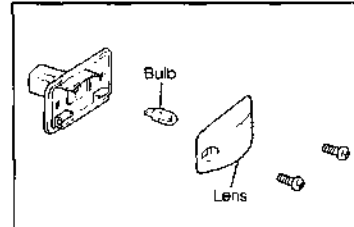
1. Remove the side turn signal lamp by removing the two screws.
2. Detach the lens.
3. Remove the bulb.



WF200-BE160

INSTALLATION

1. When the bulb is burnt out, install a new bulb with the designated wattage.
2. Install the lens. Secure the side turn signal lamp assembly with the screw.

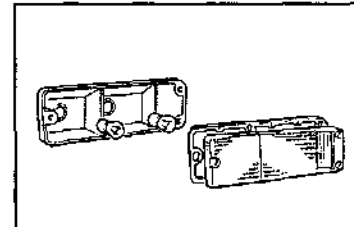


WF200-BE161

5-10. REAR COMBINATION LAMP

REMOVAL

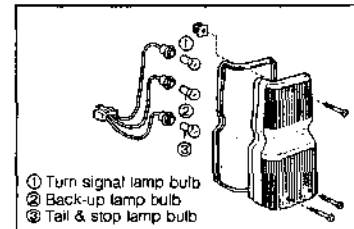
1. Remove the rear combination lamp assembly by removing the three screws.
2. Detach the socket and bulb.



WF200-BE162

INSTALLATION

1. When the bulb is burnt out, install a new bulb with the designated wattage.
2. Install the bulb and socket in the rear combination lamp assembly.
3. Install the rear combination lamp assembly with the three screws.



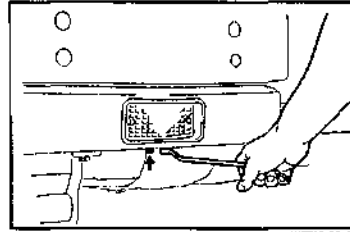
WF200-BE163

BODY ELECTRICAL SYSTEM

5-15. REAR FOG LAMP

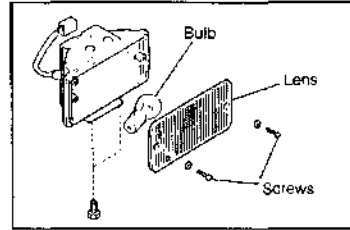
REMOVAL

1. Remove the rear fog lamp assembly by removing the two bolts and disconnect the connector.
2. Disassembly the rear fog lamp.
 - (1) Remove the two screws.
 - (2) Detach the lens.
 - (3) Remove the bulb.



INSTALLATION

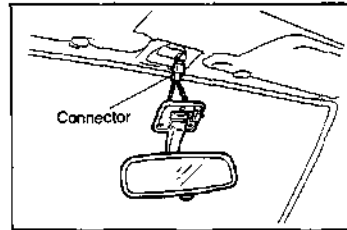
1. Assembly the rear fog lamp.
 - (1) When the bulb is burnt out, install a new bulb with the designated wattage.
 - (2) Attach the lens.
 - (3) Install the two screws.
2. Connect the connector.
3. Install the rear fog lamp assembly with the two bolts.



BODY ELECTRICAL SYSTEM

INSTALLATION

1. Connect the connector.
2. Install the room lamp assembly with the three screws.
3. Attach the room lamp cover.



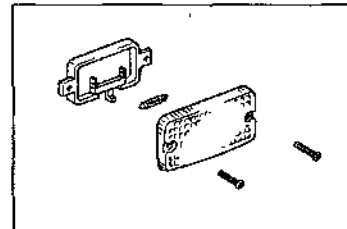
5-13. LUGGAGE ROOM LAMP

REMOVAL

1. Remove the two screws to detach the lamp assembly.
2. Pull the bulb straight out.

INSTALLATION

Reverse the removal procedure to install the lamp assembly.



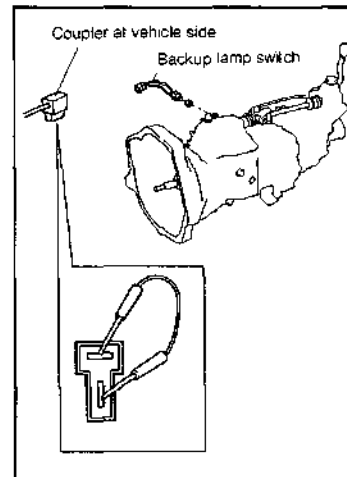
5-14. BACKUP LAMP SWITCH

The backup lamp switch is mounted on the transmission case cover.

Inspection

1. Draw out the coupler which is connected to the backup lamp switch. This disconnection should be made at the vehicle side. Then, short the coupler.
2. Ensure that the backup lamp goes on.
3. Connect the backup lamp switch coupler again. Place the transmission in the reverse gear.
4. If the backup lamp fails to go on, replace the backup lamp switch.

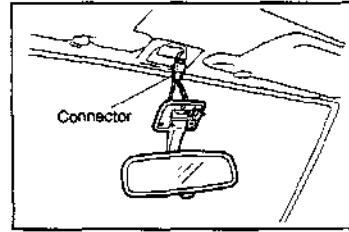
Tightening Torque: 0.3 - 0.5 kg-m
(2.2 - 3.6 ft-lb, 2.9 - 4.9 N-m)



BODY ELECTRICAL SYSTEM

INSTALLATION

1. Connect the connector.
2. Install the room lamp assembly with the three screws.
3. Attach the room lamp cover.



WF500-BE168

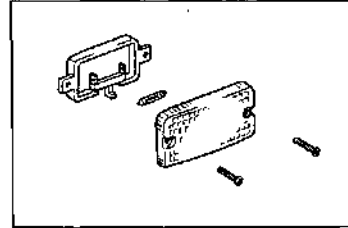
5-13. LUGGAGE ROOM LAMP

REMOVAL

1. Remove the two screws to detach the lamp assembly.
2. Pull the bulb straight out.

INSTALLATION

Reverse the removal procedure to install the lamp assembly.



WF500-BE169

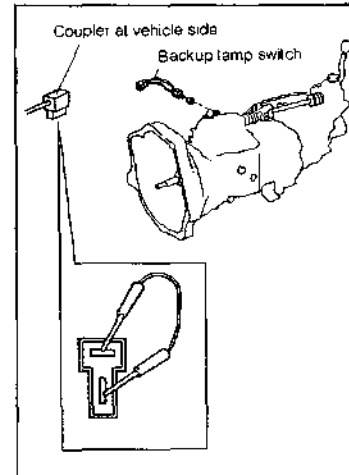
5-14. BACKUP LAMP SWITCH

The backup lamp switch is mounted on the transmission case cover.

Inspection

1. Draw out the coupler which is connected to the backup lamp switch. This disconnection should be made at the vehicle side. Then, short the coupler.
2. Ensure that the backup lamp goes on.
3. Connect the backup lamp switch coupler again. Place the transmission in the reverse gear.
4. If the backup lamp fails to go on, replace the backup lamp switch.

Tightening Torque: 0.3 - 0.5 kg-m
(2.2 - 3.6 ft-lb, 2.9 - 4.9 N-m)

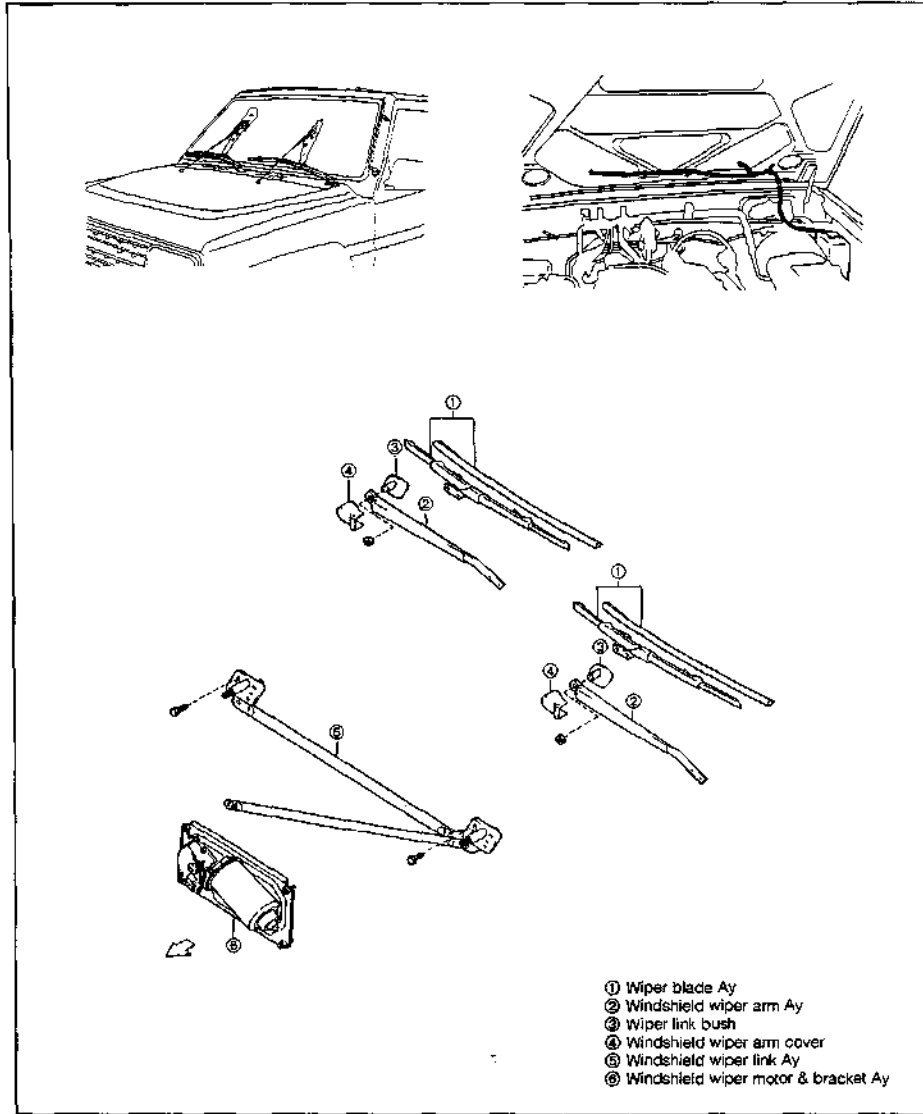


WF500-BE170

6. FRONT WIPER & WASHER

The wiper motor is located inside the engine compartment.

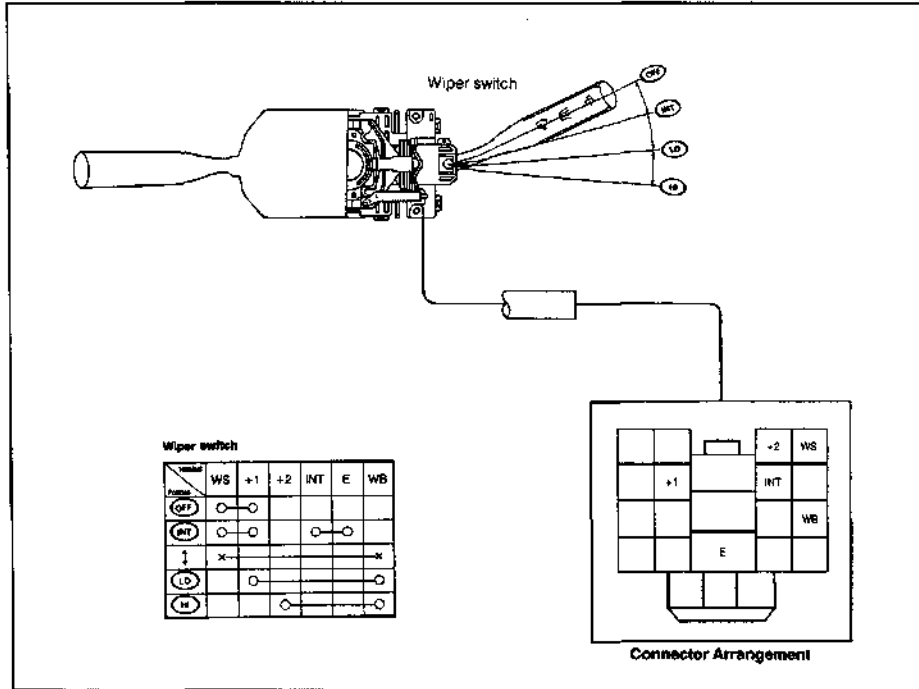
The wiper link comes in two kinds: One is the standard specifications and the other is cold region specifications having upgraded strength.



WFD0-BE173

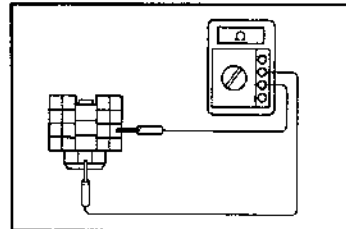
BODY ELECTRICAL SYSTEM

6-1. WIPER SWITCH



WPES0-BE174

1. Ensure that continuity exists between the terminals of the connector, as indicated in the table above.

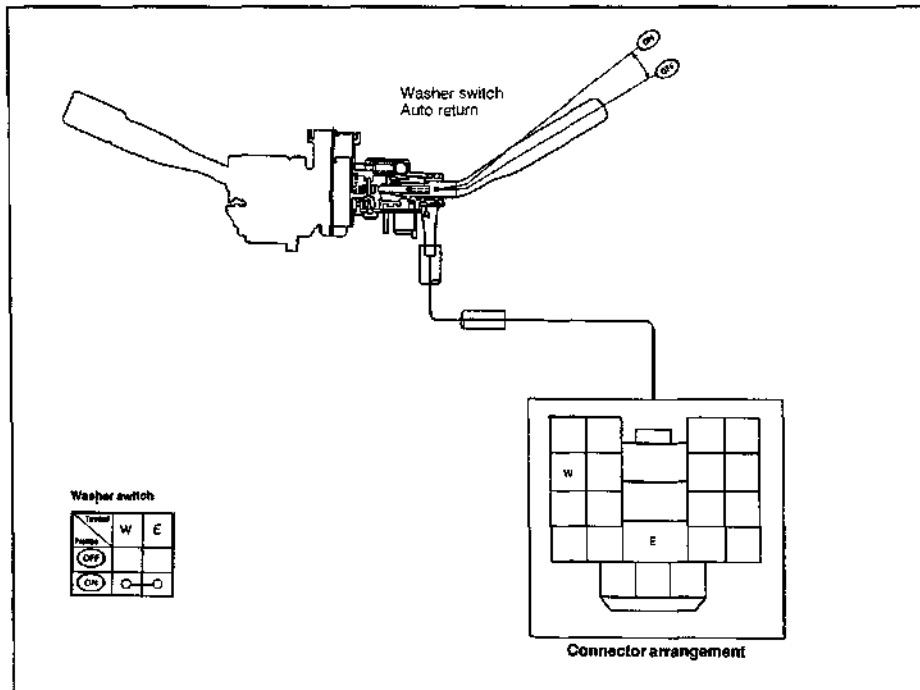


WPES0-BE175

2. Operate the wiper switch. Ensure that the switch can be operated without any binding and with a sharp feeling.

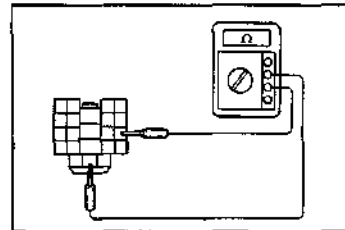
WPES0-BE176

6-2. WASHER SWITCH



WFE00-BE177

1. Ensure that continuity exists between the terminals of the connector, as indicated in the table above.



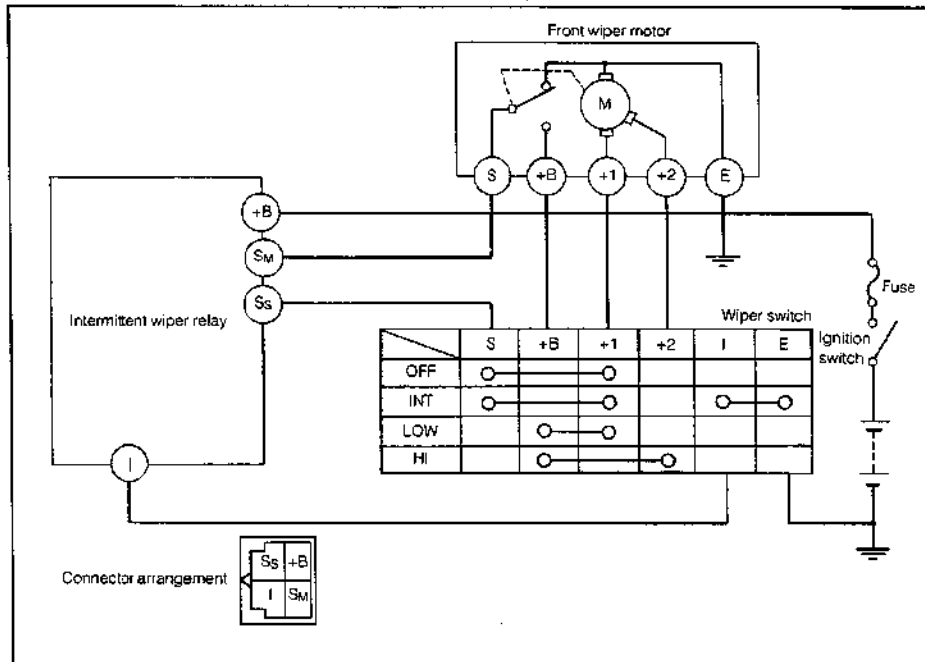
WFE00-BE178

2. Operate the washer switch. Ensure that the switch automatically returns to the OFF state.

WFE00-BE179

BODY ELECTRICAL SYSTEM

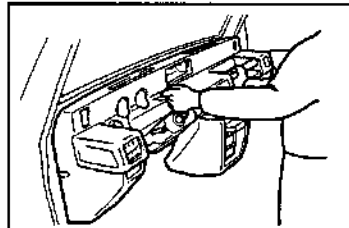
6-3. INTERMITTENT WIPER RELAY CIRCUIT DIAGRAM



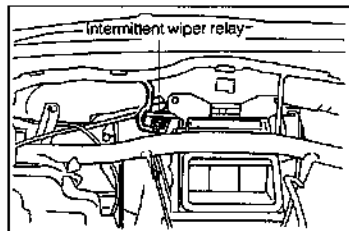
WFE90-BE180

REMOVAL

1. Remove the instrument panel assembly.
(For the removal procedure, refer to FRONT HEATER section.)



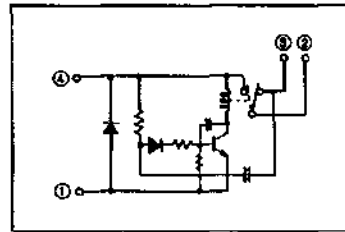
2. Remove the intermittent wiper relay.



BODY ELECTRICAL SYSTEM

INSPECTION

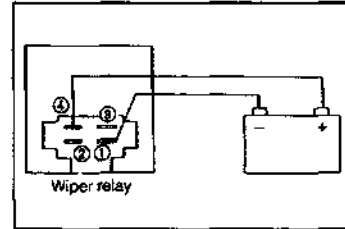
1. Perform continuity checks between terminals given below.
 - (1) Between terminals ② and ③ ... Continuity exists.
 - (2) Between terminals ② and ④ ... No continuity exists.



WPB30-BE183

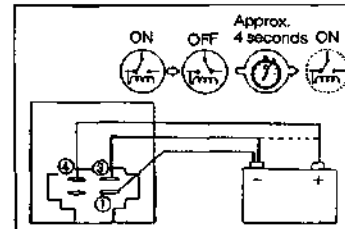
2. Intermittent operation check

- (1) Connect the terminal ④ to the positive \oplus terminal of the battery; terminal ① to the negative \ominus terminal of the battery.
(At this time, the relay emits an operating sound.): The relay is turned ON.



WPB30-BE184

- (2) Connect the terminal ③ to the positive \oplus terminal of the battery for about one second. Then, ground the terminal ③.
(The relay emits an operating sound.): The relay is turned OFF.
- (3) Ensure that, about four seconds later, the relay emits an operating sound (intermittent operation.)



WPB30-BE185

INSTALLATION

1. Install the intermittent wiper relay on the vehicle body.
2. Install the instrument panel assembly.

WPB30-BE186

BODY ELECTRICAL SYSTEM

6-4. WIPER MOTOR & BLADE

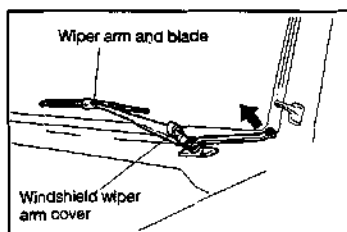
REMOVAL

1. Remove the windshield wiper arm cover. Remove the nut.

NOTE:

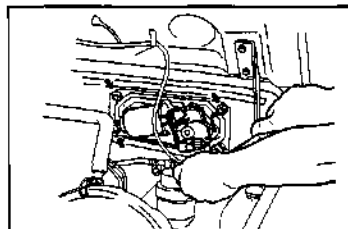
- Care must be exercised to ensure that no scratch is made to the body.

2. Remove the wiper arm and blades.



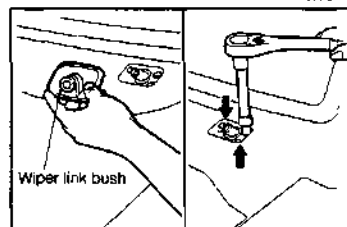
WFE90-BE187

3. Remove the wiper motor assembly.
 - (1) Disconnect the connector.
 - (2) Remove the set bolt.
 - (3) Disconnect the motor from the link. Remove the motor.



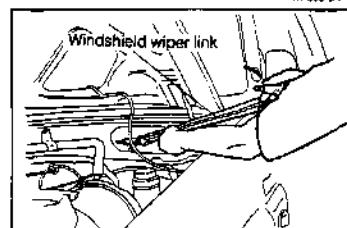
WFE90-BE188

4. Remove the windshield wiper link assembly.
 - (1) Remove the wiper link bush.
 - (2) Remove the set bolt.



WFE90-BE189

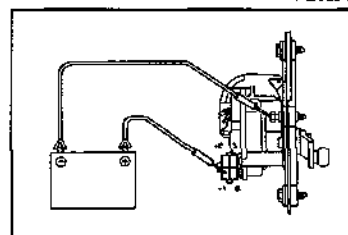
- (3) Take out the windshield wiper link assembly from the cowl lower hole.



WFE90-BE190

INSPECTION OF WIPER MOTOR UNIT

1. Low speed operation check
 - (1) Connect the terminal +1 to the positive \oplus terminal of the battery; the body to the negative \ominus terminal of the battery. Ensure that the wiper operates at the low speed.

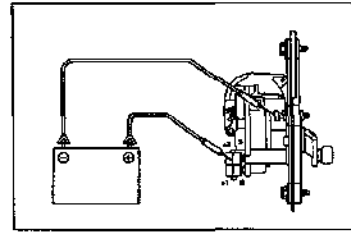


WFE90-BE191

BODY ELECTRICAL SYSTEM

2. High speed operation check

- (1) Connect the terminal +2 to the positive \oplus terminal of the battery; the body to the negative \ominus terminal of the battery. Ensure that the wiper operates at the high speed.

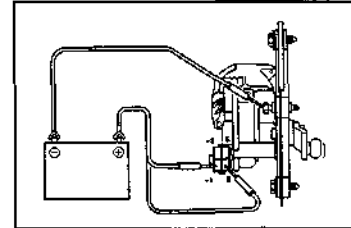


WFE90-BE192

3. OFF operation check

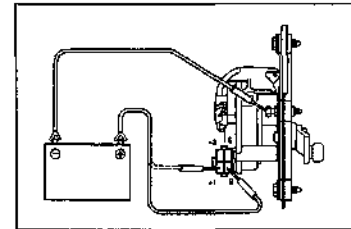
With the wiper motor body connected to the negative \ominus terminal of the battery, perform the following checks.

- (1) Connect the terminal B to the positive \oplus terminal of the battery.
- (2) Operate the wiper at the low speed by connecting the terminal +1 to the positive \oplus terminal of the battery.



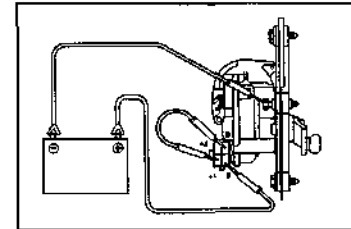
WFE90-BE193

- (3) Under the operating conditions in the step (2), disconnect the terminal +1 so as to interrupt the wiper motor operation.

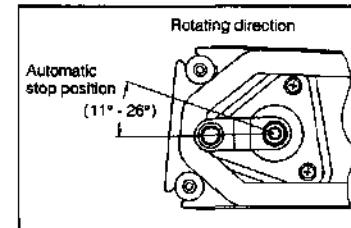


WFE90-BE194

- (4) Connect the terminal +1 to the terminal S. Ensure that the wiper operates and stops at the automatic stopping position.



WFE90-BE195

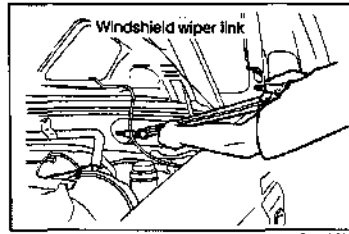


WFE90-BE196

BODY ELECTRICAL SYSTEM

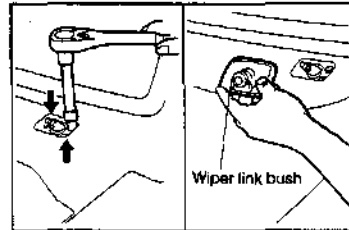
INSTALLATION

1. Install the windshield wiper link assembly.
 - (1) Into the windshield wiper link assembly to the cowl louver hole.



WFE80-BE187

- (2) Install the windshield wiper link assembly to the body using a bolts.
 - (3) Install the wiper link bush.

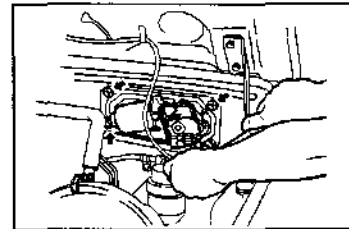


WFE80-BE198

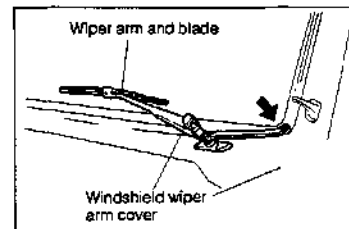
2. Install the motor assembly.

NOTE:

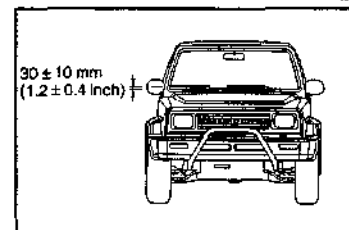
 - Connect the motor assembly with the link securely.



3. Installation of windshield wiper arm assembly
 - (1) Operate the wiper motor, until it assumes the automatic stopping position.
 - (2) Set the wiper arms at the positions indicated in the right figure.
 - (3) Tighten the nut and attach the front wiper arm cover.



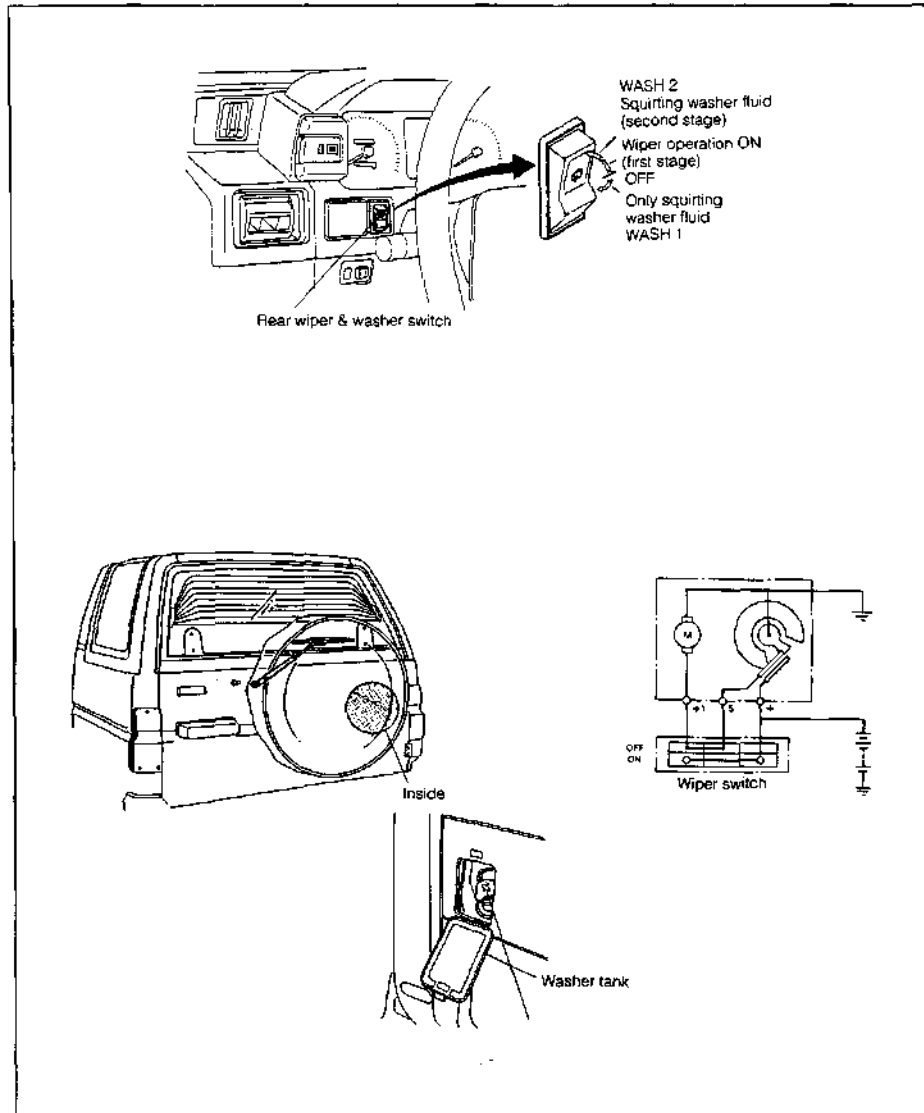
WFE80-BE200



WFE80-BE201

7. REAR WIPER & WASHER

A seesaw type switch which serves as both wiper switch and washer switch has been employed. The washer fluid squirts when the switch knob is further pushed with the wiper switch set to the [ON] or [OFF] position.



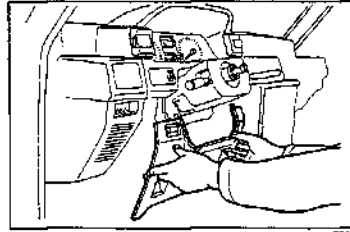
WPE50-BE202

BODY ELECTRICAL SYSTEM

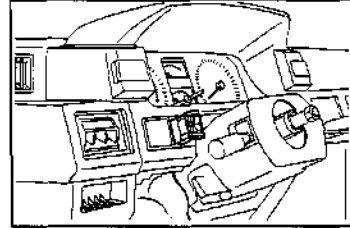
7-1. REAR WIPER & WASHER SWITCH

REMOVAL

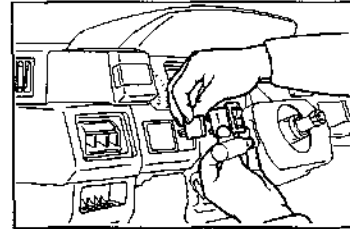
1. Remove the instrument panel finish lower panel.
2. Remove the rear wiper switch from the instrument cluster finish panel subassembly.
3. Disconnect the coupler of the rear wiper switch.



WFE90-BE203



WFE90-BE204



WFE90-BE205

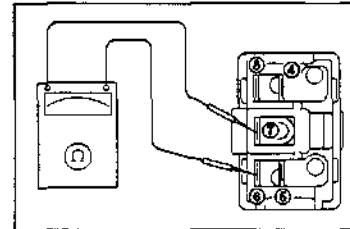
INSPECTION

Ensure that continuity exists between the respective terminals as indicated in the continuity table below.

Continuity table

○—○ Continuity exists.

Switch \ Terminal	8	7	6	5	4
WASH 2		○—○	○—○	○—○	○—○
ON		○—○	○—○		
OFF	○—○	○—○			
WASH 1	○—○	○—○		○—○	○—○

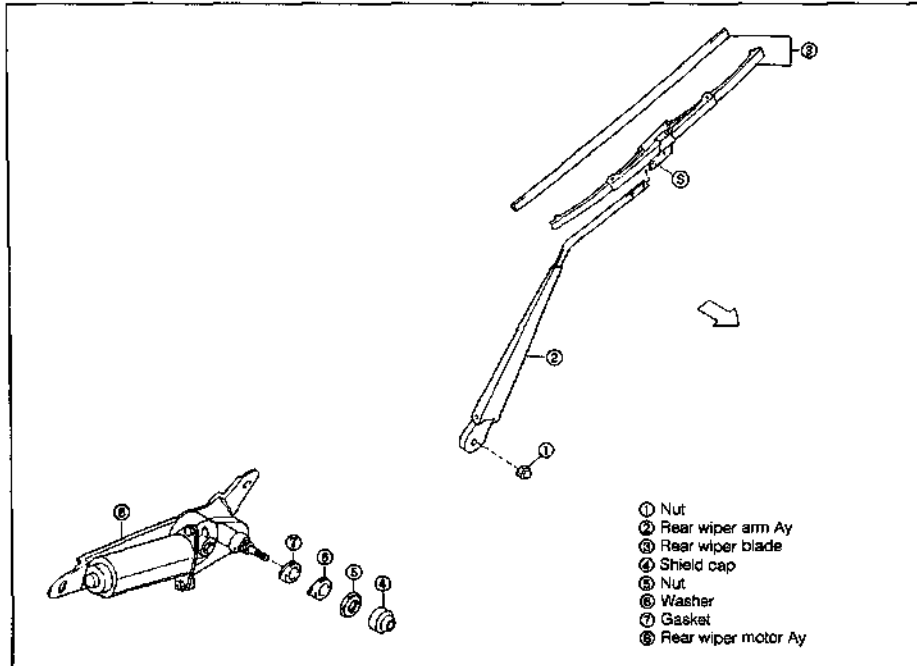


WFE90-BE206

INSTALLATION

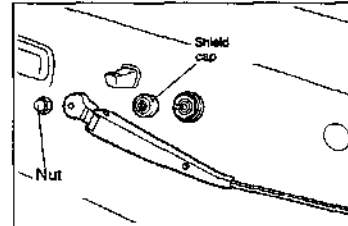
1. Connect the coupler of the rear wiper switch. Install the rear wiper switch to the instrument cluster finish panel subassembly.
2. Install the instrument panel finish lower panel.

7-2. REAR WIPER MOTOR AND BLADE COMPONENTS

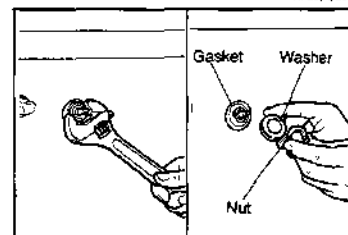


REMOVAL

1. Remove the spare tire.
2. Remove the wiper arm and blade by removing the nut.
3. Remove the shield cap.

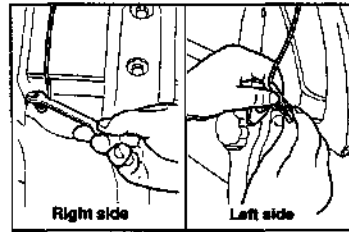


4. Remove the washer and gasket by removing the nut.



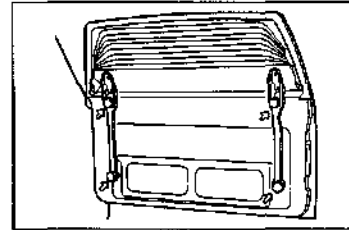
BODY ELECTRICAL SYSTEM

5. Remove the rear window.
 - (1) Remove the rear window defogger ground harness attaching bolt to disconnect the rear window defogger ground harness from the back door.
 - (2) Disconnect the connector for the rear window defogger at left side.



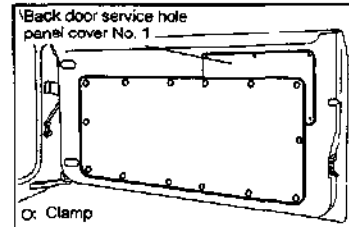
WF290-BE211

- (3) Remove the rear window by removing the handles (4 points).



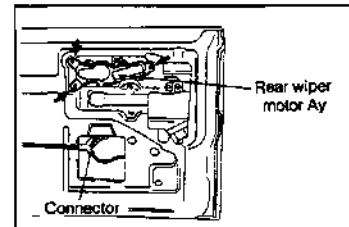
WF290-BE212

6. Remove the back door trim by removing the clips (14 points.)
7. Remove the back door service hole panel cover No. 1 by removing the screws (4 points).
8. Remove the service hole cover.



WF290-BE213

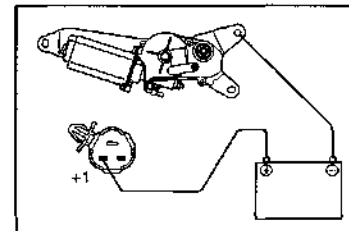
9. Remove the rear wiper motor assembly.
 - (1) Disconnect the connector.
 - (2) Remove the rear wiper motor by removing the three bolts.



WF290-BE214

REAR WIPER MOTOR CHECK

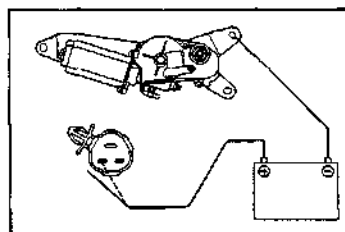
1. Connect the terminal +1 to the positive \oplus terminal of the battery; the body to the negative \ominus terminal of the battery. Ensure that the wiper operates.



WF290-BE215

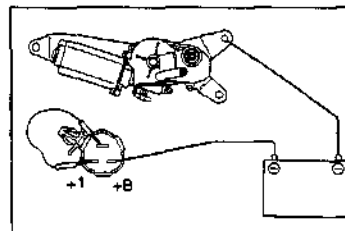
BODY ELECTRICAL SYSTEM

2. Under the operating conditions in the step 1, disconnect the terminal +1 so as to interrupt the wiper motor operation.

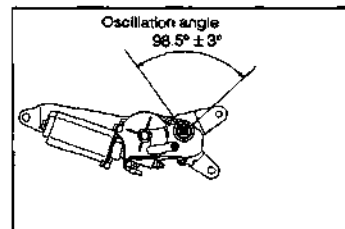


WPB90-BE216

3. Connect the terminal +1 to the terminal S; the terminal +B to the positive ⊕ terminal of the battery. Ensure that the wiper operates and stops at the automatic stopping position.



WPB90-BE217



WPB90-BE218

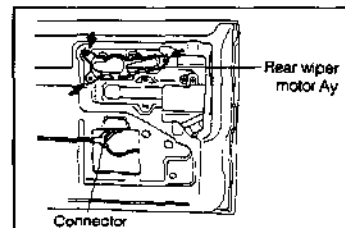
INSTALLATION

1. Install the rear wiper motor assembly, as follows:
 - (1) Install the rear wiper motor assembly by tightening the set bolt.

NOTE:

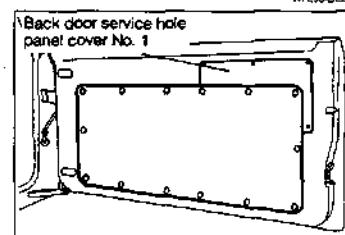
- Make sure that the body earth is provided properly.

- (2) Connect the connector.



WPB90-BE219

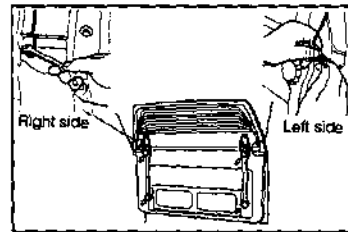
2. Install the back door trim, as follows:
 - (1) Install the service hole cover.
 - (2) Install the back door service hole panel cover No. 1.
 - (3) Install the back door trim.



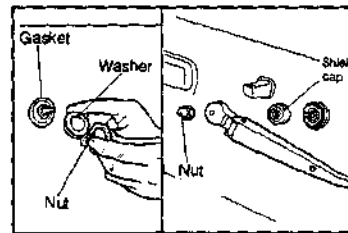
WPB90-BE220

BODY ELECTRICAL SYSTEM

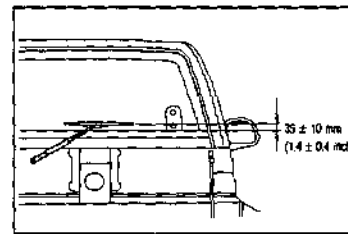
3. Install the rear window.
 - (1) Install the rear window using the handles.
 - (2) Connect the connect to the rear window defogger at left side.
 - (3) Install the rear window defogger ground harness using the bolt.



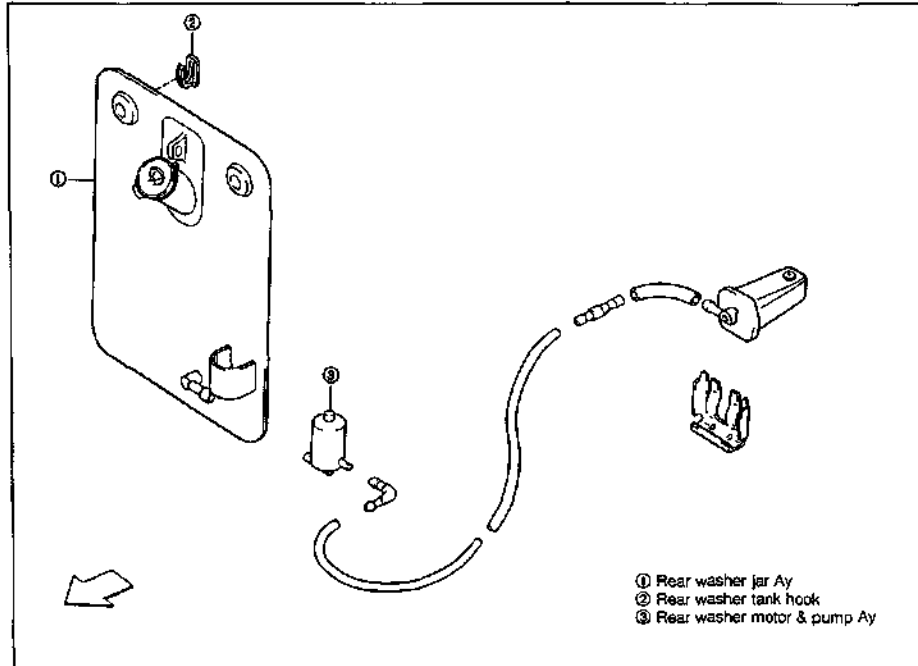
4. Install the gasket, washer and nut.
5. Install the shield cap.



6. Install the wiper arm and blade.
 - (1) Operate the wiper motor and set the wiper arm to the automatic stopping position.
 - (2) Set the wiper arm to the position as indicated in the right figure.
 - (3) Tighten the nut.



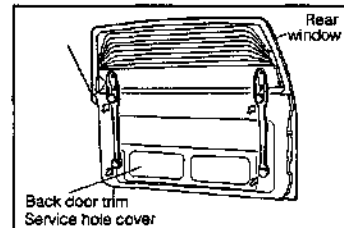
**7-3. REAR WASHER TANK
COMPONENTS**



WP690-BE224

REMOVAL

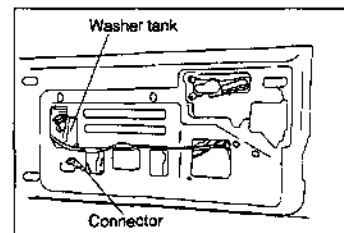
1. Remove the rear window assembly.
2. Remove the back door trim and service hole cover.
3. Disconnect the connector and water hose. Remove the washer tank assembly.



WP690-BE225

INSTALLATION

1. Install the washer tank assembly to the back door.
2. Connect the connector and water hose.
3. Install the service hole cover and back door trim.
4. Install the rear window assembly.



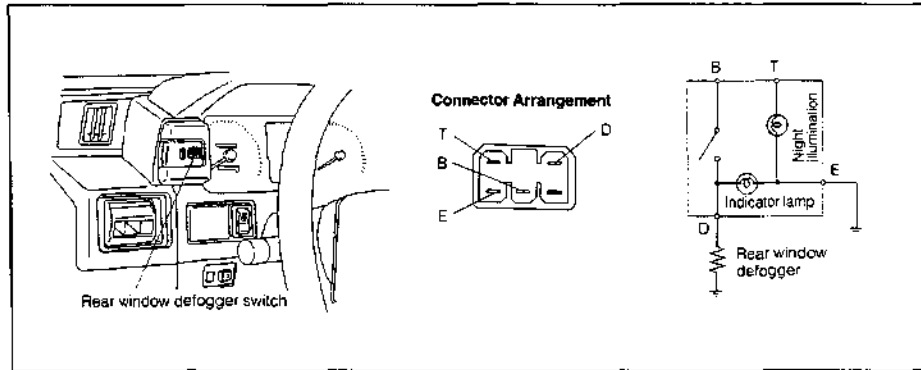
WP690-BE226

BODY ELECTRICAL SYSTEM

8. REAR WINDOW DEFOGGER

The rear window defogger switch is a seesaw type switch which incorporates a symbol mark with night illumination and an indicator lamp.

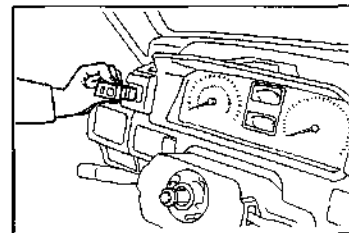
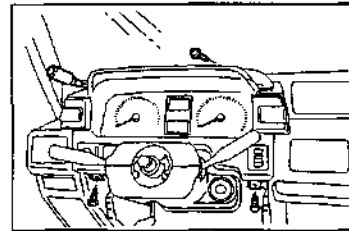
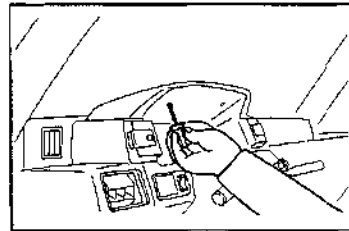
Furthermore, the switch is installed in the meter cluster toward the outboard side of the vehicle.



8-1. DEFOGGER SWITCH

REMOVAL

1. Remove the instrument cluster finish upper panel.
2. Remove the instrument cluster finish lower panel.
3. Remove the instrument cluster finish panel subassembly.
4. Remove the rear window defogger switch.



BODY ELECTRICAL SYSTEM

INSPECTION

Ensure that continuity exists between the respective terminals as indicated in the continuity table below.

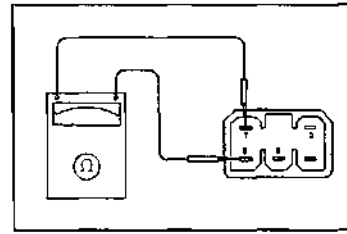
Continuity table

○—○ Continuity exists.
 ○⊗○ Bulb in installed state

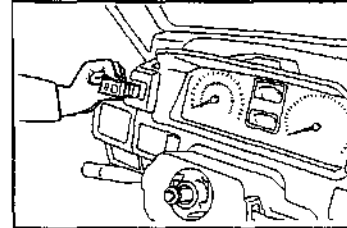
Switch \ Terminal	B	D	E	T
OFF		○—○	○⊗○	○⊗○
ON	○—○	○—○	○⊗○	○⊗○

INSTALLATION

1. Connect the coupler to the rear window defogger switch.
2. Install the rear window defogger switch to the instrument cluster finish panel subassembly.

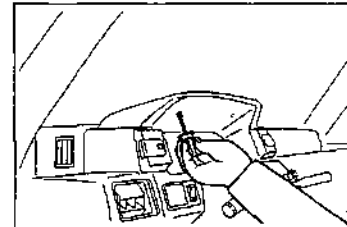


WP80-BE231



WP80-BE232

3. Install the instrument cluster finish panel subassembly.
4. Install the instrument cluster finish upper panel.
5. Install the instrument cluster finish lower panel.



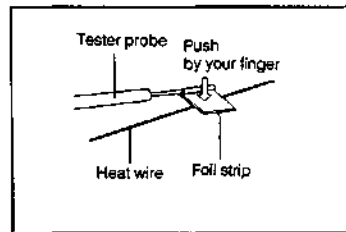
WP80-BE233

BODY ELECTRICAL SYSTEM

8-2. DEFOGGER WIRE

NOTE:

- (1) When wiping the glass surface, use a soft, dry cloth. Move the cloth along the wire. Be careful not to damage the wire.
- (2) Never use washing agent or glass cleaner which contains abrasive compound.
- (3) Wrap the tip end of the tester probe with foil strip so that the tester probe causes no damage on the heat wire during the voltage measurement. Check the voltage by pushing the foil strip against the heat wire by your finger, as shown in the figure.

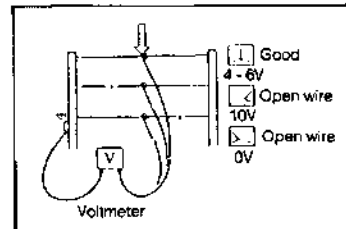


WF890-BE234

1. OPEN WIRE CHECK

- (1) Turn ON the ignition key switch.
- (2) Turn ON the defogger switch so as to energize the defogger wire.
- (3) Check the voltage at the center section of each heat wire.

Voltage	Judgement criteria
Approx. 5V	Good (No open wire)
Approx. 10V or 0V	Open wire



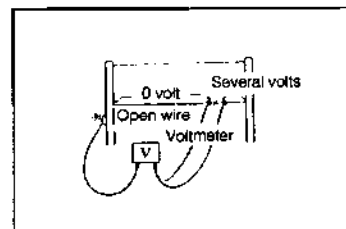
WF890-BE235

REFERENCE:

- If the voltage is 10V, it means that open wire exists between the center of the wire and the end of the positive ⊕ side. If the voltage is 0V, it means that open wire exists between the center of the wire and the end of the earth side.

2. LOCATING POINT OF OPEN WIRE

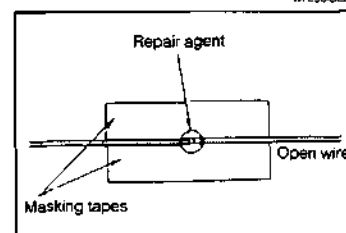
- (1) Connect the positive ⊕ terminal of the voltmeter to the positive ⊕ side of the defogger wire.
- (2) Slide the voltmeter's negative ⊖ terminal wrapped with foil strip on the defogger wire from its positive ⊕ side to its negative ⊖ side.
- (3) The voltmeter reading changes from 0V to several volts at the point where open wire exists.



WF890-BE236

3. REPAIRING POINT OF OPEN WIRE

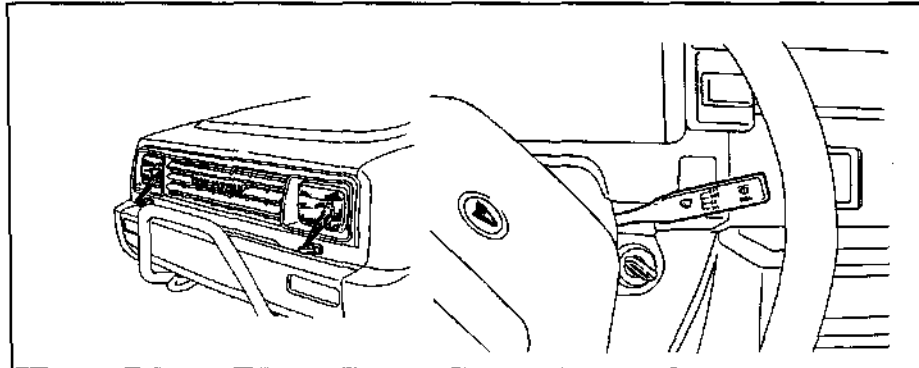
- (1) Clean the point of open wire with white gasoline.
- (2) Affix masking tapes to both upper and lower portions of the point to be repaired.
- (3) Stir repair agent (Du Pont Paste No. 4817) thoroughly. Apply a small amount of the repair agent to the repairing point, using a fine brush.
- (4) Two to three minutes later, peel off the masking tapes.
- (5) Do not energize the defogger wire within 24 hours after the repair.



WF890-BE237

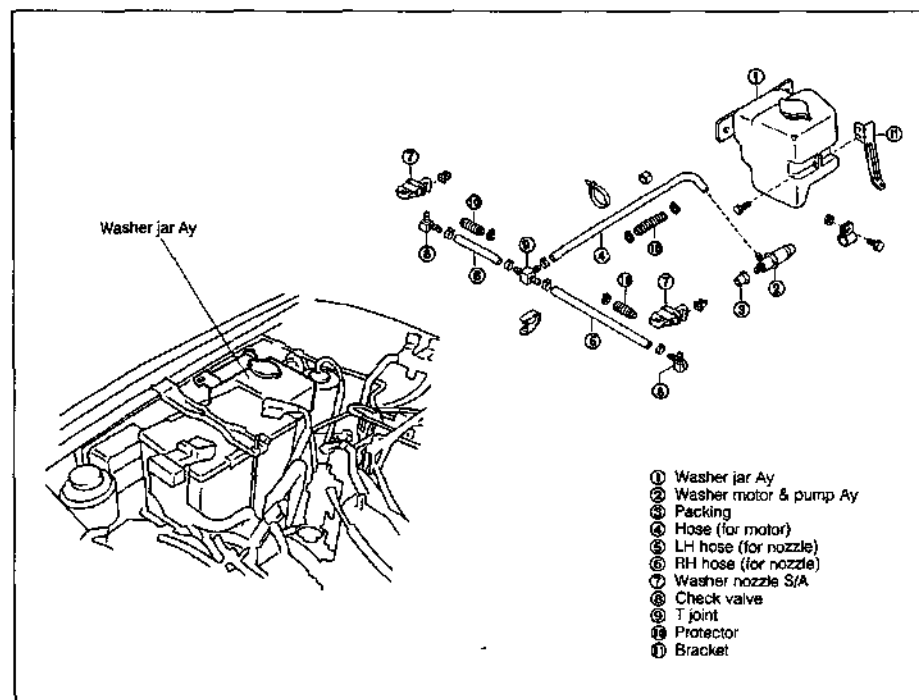
9. HEADLAMP CLEANER

Under conditions where the ignition switch and headlamp switch are turned ON, the washer switch can operate. When the washer switch is actuated again within about 0.8 second, the washer cleaner motor will start operating and squirt the washer liquid for headlamp use for a duration of about 0.5 second.



WPB90-BE736

COMPONENTS



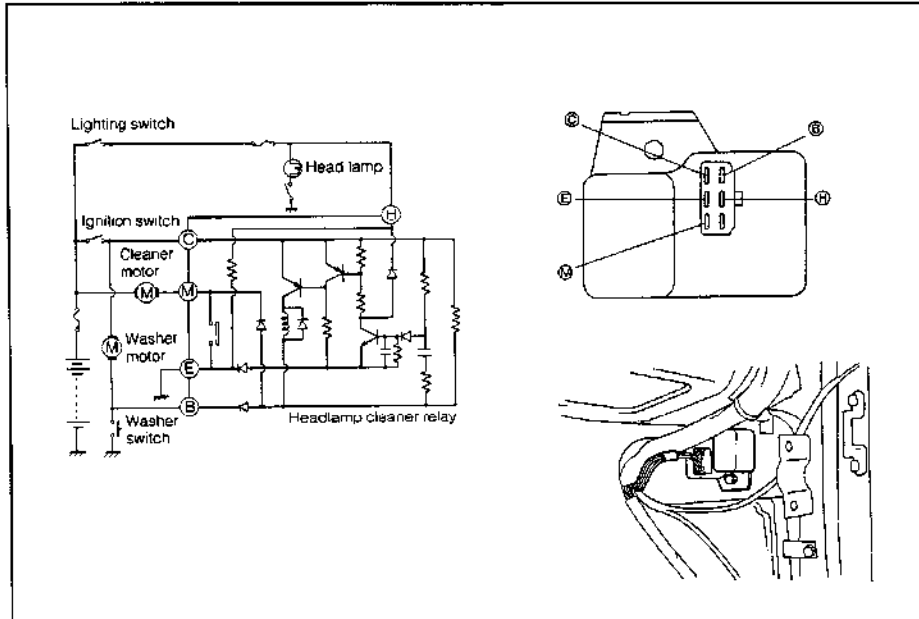
WPB90-6B239

BODY ELECTRICAL SYSTEM

9-1. CONTROL RELAY

The headlamp cleaner relay controls the operation of the headlamp cleaner motor.

CIRCUIT DIAGRAM



WFE90-BE240

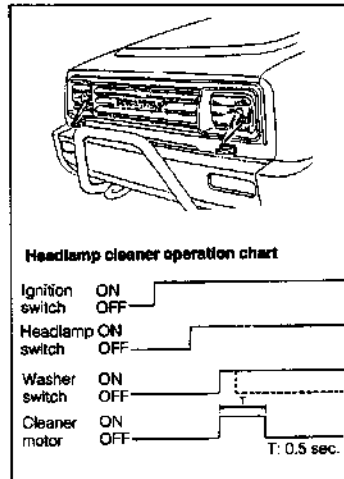
OPERATION CHECK

While the ignition switch is turned ON, carry out the following check: Operate the washer switch one time. Within about 0.8 second, operate the washer switch again. Ensure has the cleaner motor operates for about 0.5 second.

INSPECTION

If the headlamp cleaner is malfunctioning persistently when the following unit inspection reveals no malfunction, replace the headlamp cleaner relay.

- (1) Wiper fuse 15A
- (2) Headlamp cleaner motor
- (3) Washer switch
- (4) Front windshield washer motor

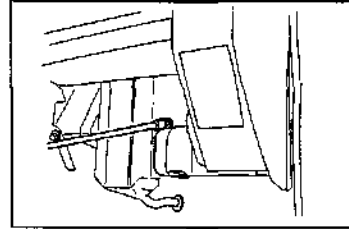
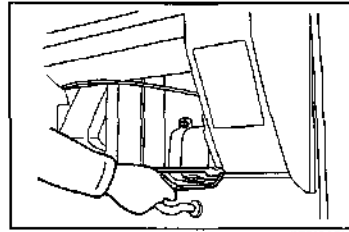


WFE90-BE241

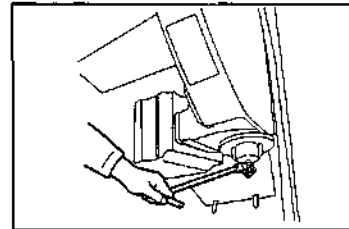
BODY ELECTRICAL SYSTEM

REMOVAL

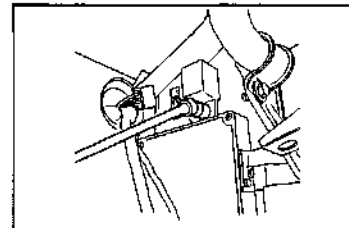
1. Remove the glove compartment box.
2. Remove the instrument panel reinforcement.
3. Disconnect the coupler of the blower assembly.
4. Remove the clamp.



5. Remove the blower assembly.

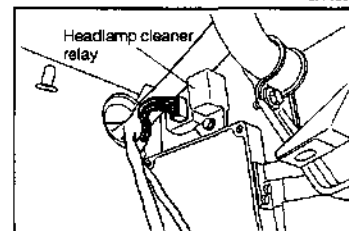


6. Disconnect the coupler of the headlamp cleaner relay.
7. Remove the headlamp cleaner relay.



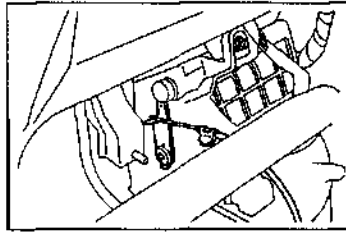
INSTALLATION

1. Install the headlamp cleaner relay.
2. Connect the coupler of the headlamp cleaner relay.

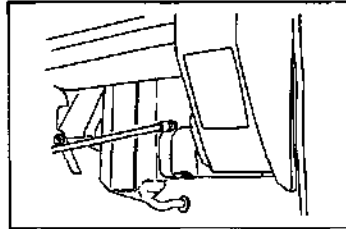


BODY ELECTRICAL SYSTEM

3. Install the headlamp cleaner relay, following the procedure given below.
 - (1) Set the inside/outside air selection lever to the outside air admission side.
 - (2) Install the heater control cable with the lever set in the raised state.



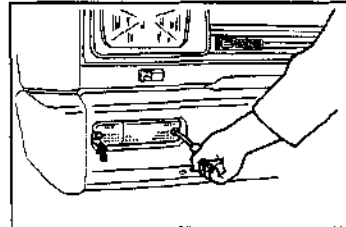
4. Install the blower assembly.
5. Install the clamp.
6. Connect the coupler of the blower assembly.
7. Install the instrument panel reinforcement.
8. Install the glove compartment box.



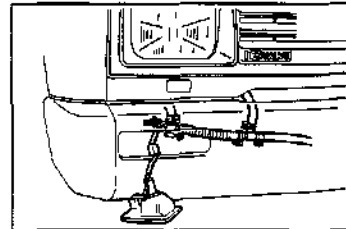
9-2. NOZZLE

REMOVAL

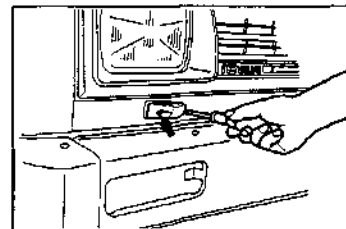
1. Remove the front turn signal lamp assembly by removing the two screws.



2. Disconnect the washer nozzle and check valve.



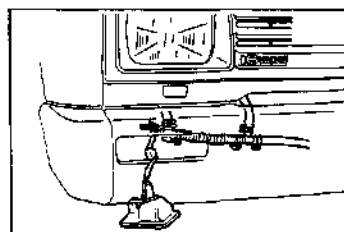
3. Remove the washer nozzle by removing the two screws.



BODY ELECTRICAL SYSTEM

INSTALLATION

1. Install the washer nozzle with the two screws.
2. Connect the washer nozzle and check valve.
3. Install the front turn signal lamp assembly with the two screws.



WFE90-6E22

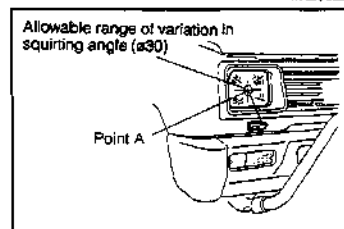
ADJUSTING PROCEDURE FOR NOZZLE INJECTION ANGLE

Operation prior to adjustment

1. Perform the headlamp aiming operation.

Adjustment

1. Set the nozzle so that the center of squirt come to the bulb installation position of the headlamp. (Bulb center: point A)
2. Ensure that the variation in the squirting angle is within the allowable range.

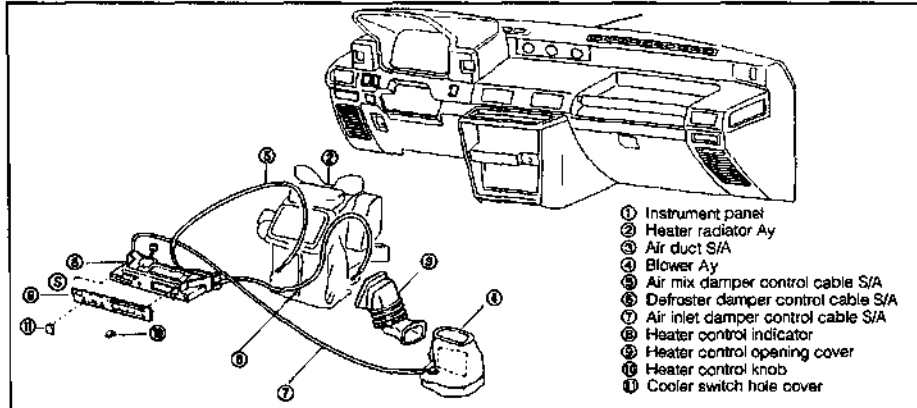


WFE90-6E23

BODY ELECTRICAL SYSTEM

10. FRONT HEATER

10-1. HEATER UNIT



WPB00-BE254

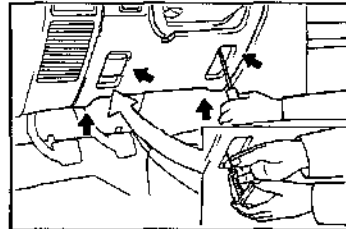
REMOVAL OF INSTRUMENT PANEL

NOTE:

1. This installation and removal procedure has been described for those vehicles equipped with no air conditioner. As for those vehicles equipped with air conditioner, see the AC section.
2. The instrument panel, together with the heater control unit and cable, should be removed from the body.

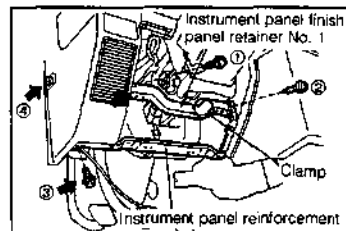
WPB00-BE255

1. Disconnect the battery cable from the negative \ominus terminal.
2. Remove the steering wheel assembly.
3. Removal of lower instrument panel finish panel
 - (1) Remove the hood lock control lever and wire.
 - (2) Remove the screws retaining the rheostat.
 - (3) Remove the two lower screws retaining the lower instrument panel finish panel.
 - (4) Disconnect the rear heater switch connector and the rheostat connector.



WPB00-BE256

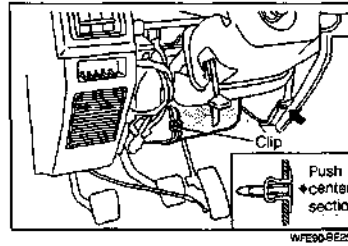
4. Remove the screws ① and ② which retain the instrument panel finish panel retainer No. 1 at the right and left sides. (It is not necessary to remove the multi-use lever switch connector. Also, do not disconnect the connector.)
5. Remove the screws ③ and ④ located at the left side of the instrument panel. (It is not necessary to remove the instrument panel reinforcement.)



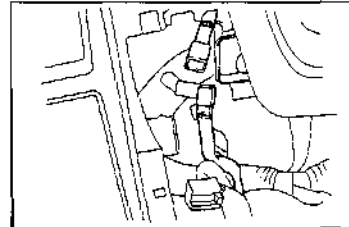
WPB00-BE257

BODY ELECTRICAL SYSTEM

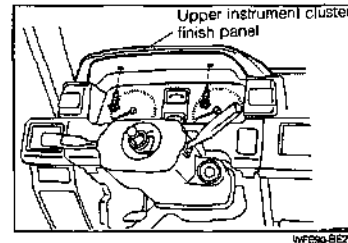
6. Detach the clip retaining the air No. 1 duct subassembly. Remove the duct.
7. Remove the bolt connecting the instrument panel to the brace.



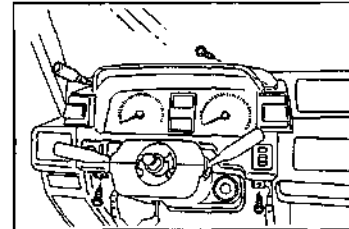
8. Disconnect the connector of the instrument panel wire.



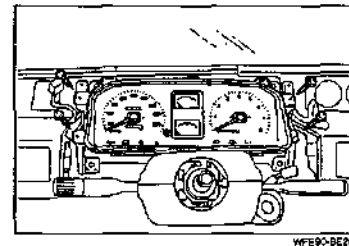
9. Remove the upper instrument cluster finish panel.



10. Removal of instrument cluster finish panel subassembly
 - (1) Remove the instrument cluster finish panel subassembly.
 - (2) Disconnect the connectors of the rear window defogger switch, hazard warning signal switch and rear wiper switch.

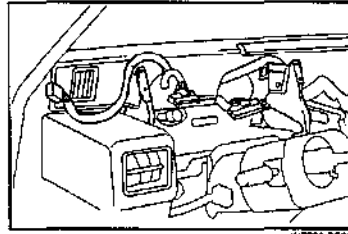


11. Removal of combination meter assembly
 - (1) Remove the attaching screw of the combination meter assembly.
 - (2) Pull out the combination meter assembly toward your side.
 - (3) Disconnect the speedometer cable and the two couplers of the wire harness.



BODY ELECTRICAL SYSTEM

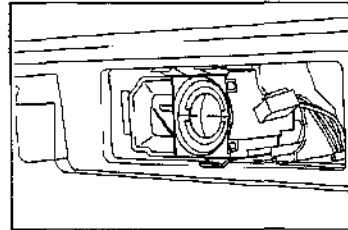
12. Disconnect the clamp of the wire harness.



WPED0-BE263

13. Removal of triple meter

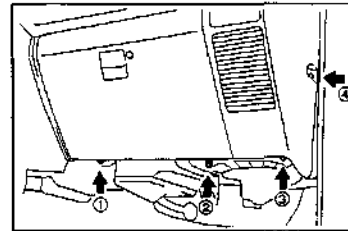
- (1) Remove the upper instrument panel finish by means of a bamboo spatula wrapped with a cloth.
- (2) Pull out the voltmeter, clinometer and clock toward your side, while pushing the upper and lower claws by means of a spatula or the like.
- (3) Disconnect the connectors.



WPED0-BE264

14. Remove the glove compartment door subassembly (screws ① and ②).

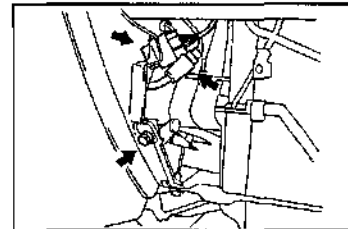
15. Remove the screws ③ and ④.
(It is not necessary to remove the instrument panel reinforcement.)



WPED0-BE265

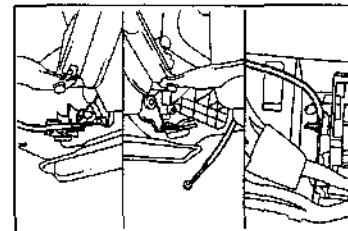
16. Disconnect the connectors of the wire harnesses of the heater control switch (and the air conditioner switch).

17. Remove the attaching screw of the instrument panel and brace.



WPED0-BE266

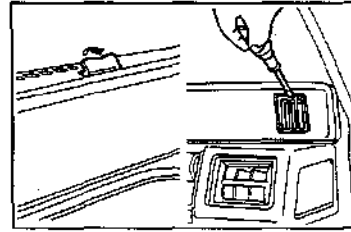
18. Disconnect the heater control cables.



WPED0-BE267

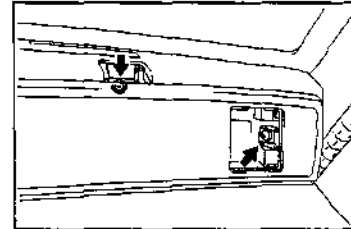
BODY ELECTRICAL SYSTEM

19. Remove the defroster nozzles by means of a spatula wrapped with a cloth or the like (at the right and left sides).
20. Remove the instrument panel hole covers (at the right and left sides).



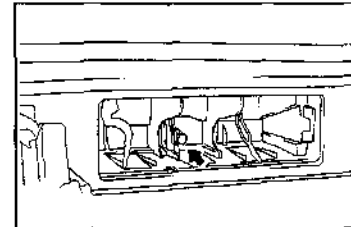
WFE90-BE268

21. Remove the attaching screws of the instrument panel (at the right and left sides).



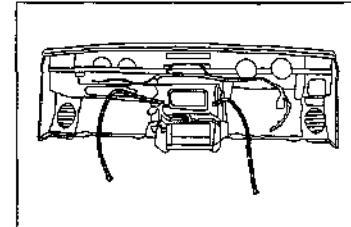
WFE90-BE269

22. Remove the attaching screws of the instrument panel (center).



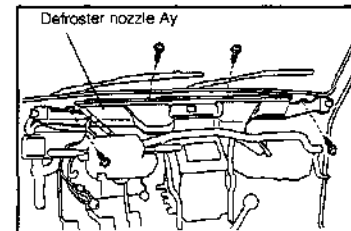
WFE90-BE270

23. Remove the instrument panel from the body.



WFE90-BE271

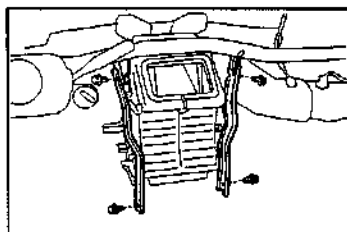
24. Remove the defroster nozzle assembly.



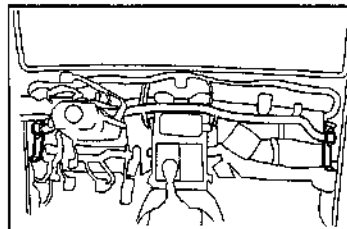
WFE90-BE272

BODY ELECTRICAL SYSTEM

25. Remove the instrument panel panel brace subassembly.
26. Remove the following parts.
 - (1) Bracket of key reminder buzzer, heater relay and horn relay
 - (2) Sub-fuse box

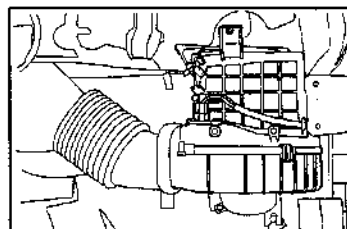


27. Remove the steering column from the pillar-to-pillar member subassembly.
28. Remove the pillar-to-pillar member subassembly from the pillar.



REMOVAL OF BLOWER

Remove the blower assembly and disconnect the connector of the wire harness.



INSPECTION OF BLOWER

NOTE:

- The unit of the heater blower can be removed without removing the instrument panel. Refer to the headlamp cleaner section.
- The unit of the blower switch can be removed from the back side after the instrument panel has been removed.

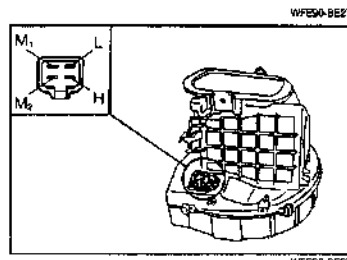
1. Blower resistor
Ensure that the resistance between the respective terminals conforms to the specifications below.

Specified Values:

Between Terminals L and M ₁ :	About 1.17 Ω
L and M ₂ :	About 1.88 Ω
H and M ₂ :	About 0.32 Ω

NOTE:

- The resistor is cooled by the air flow from the blower. Therefore, it should be noted that the resistor may be burnt out if the cooling air should be suspended owing to some reasons.



BODY ELECTRICAL SYSTEM

2. Blower motor & case

- (1) Turn the blades of the blower by hand. Ensure that the blades rotate lightly.
- (2) Ensure that the screws retaining the blades to the motor axle are not loose.
- (3) Ensure that the blades are not turning eccentrically.
- (4) Check the flow route switching plate and packing for damage. Also, ensure that they can be switched smoothly.

NOTE:

- In the step (3) above, there is the possibility that water enters the case and freezes there, thereby preventing the sirocco fan from rotating.

3. Blower switch

When the blower switch is set to each stage, ensure that continuity exists between the respective terminals, as indicated in the continuity table below.

Switch \ Terminal	E	Lo	M ₁	M ₂	Hi
OFF					
I	○	○			
II	○	○	○		
III	○	○		○	
IV	○	○			○

REMOVAL OF HEATER

1. Remove the heater cover.
2. Remove the attaching screws ① through ④ for the heater case.
3. Slightly pull out the heater case toward your side. Then, draw it out toward the left side.

NOTE:

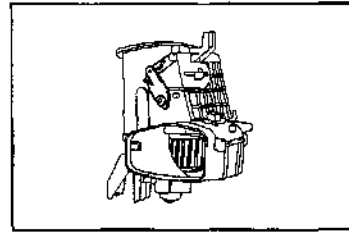
- Never disconnect the water hoses from the engine, unless such disconnection is required. Failure to observe this caution may cause dents or scratches of the copper pipe, resulting in water leakage.

INSPECTION OF HEATER UNIT SUBASSEMBLY

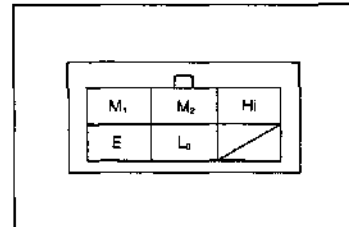
Check the heater unit for cracks.
Check the packing for damage.
Ensure that the flow route switching plate moves smoothly.

INSPECTION OF HEATER RELAY

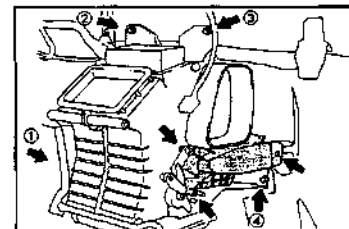
1. If the blower will not functioning properly, replace the heater relay.
2. Check the operation.



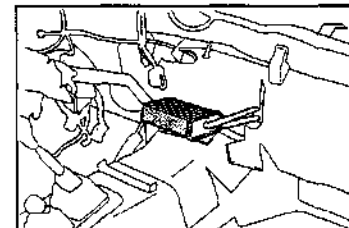
WFE90-BE278



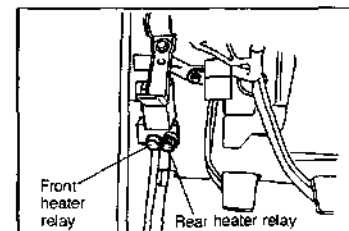
WFE90-BE279



WFE90-BE280



WFE90-BE281

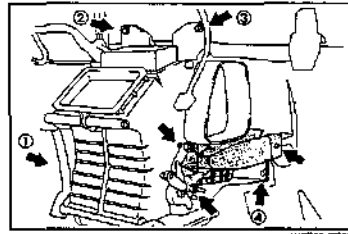


WFE90-BE282

BODY ELECTRICAL SYSTEM

INSTALLATION OF HEATER-RELATED PARTS

1. Install the heater radiator assembly with the two nuts and two bolts.
2. Install the heater cover with the two nuts and screws.



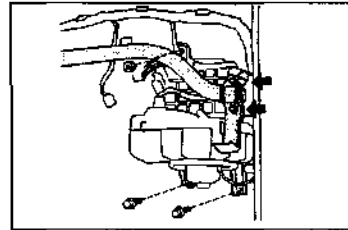
3. Install the blower assembly with the two bolts, nuts and the connector.
4. Install the pillar-to-pillar member subassembly and steering column.

Tightening Torque:

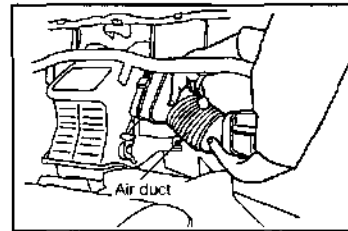
- 14.7 - 21.6 N·m (Steering column)
- 29.4 - 44.1 N·m (M10, pillar)
- 14.7 - 21.6 N·m (M8, body center)

NOTE:

- Install the arrow-headed bolts after the left bolts (pillar and body center) have been installed. This procedure will facilitate the operation.



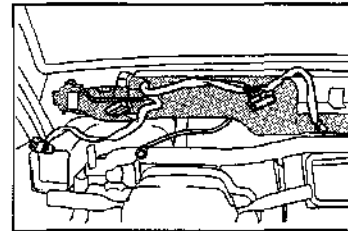
5. Install the air duct.



6. Install the defroster nozzle.

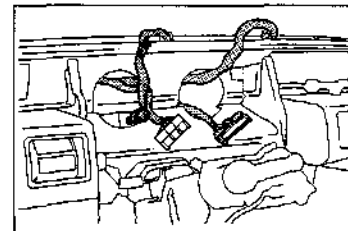
NOTE:

- The wire harness of the combination meter should be drawn from the position as indicated by the arrow in the right figure.



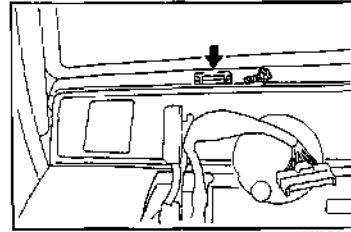
INSTALLATION OF INSTRUMENT PANEL

1. Put the instrument panel in place.
2. Draw out the wire harnesses and speedometer cable from the hole for the combination meter.

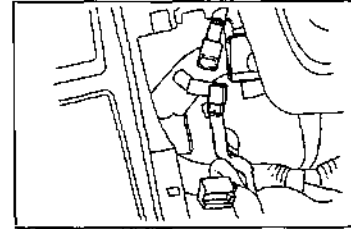


BODY ELECTRICAL SYSTEM

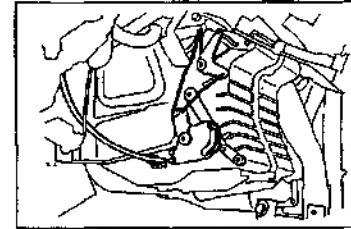
3. Temporarily install the instrument panel with two bolts at upper right and left points.



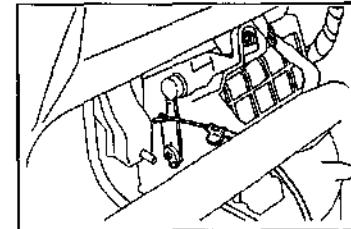
4. Connect the coupler of the wire harness.
 - (1) Wire, instrument panel
 - (2) Wire, heater control switch
 - (3) Wire, air conditioner switch
5. Clamp of wire harness
 - (1) Wire cowl in left figure (for instrument panel wire)
 - (2) Wire harnesses for hazard of combination meter section and rear wiper switch



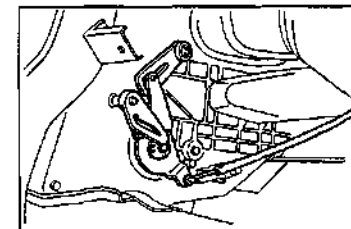
6. Connect the wire of the heater control unit to the lever of the heater/blower unit.
 - (1) Install the mode switching cable, as follows:
 - 1) Set the mode switching lever of the heater control to the DEF side; the mode switching lever of the heater unit to the DEF side.
 - 2) Connect the mode switching cable. Insert it into the clamp securely.



- (2) Install the temperature regulating cable, as follows:
 - 1) Set the temperature regulating lever of the heater control to the COOL side; the temperature regulating lever of the heater unit to the COOL side.
 - 2) Connect the temperature regulating cable. Insert it into the clamp securely.



- (3) Install the inside air/outside air switching cable, as follows:
 - 1) Set the inside air/outside air switching lever of the heater control to the RECIRC side; the inside air/outside air switching lever of the blower assembly to the RECIRC side.
 - 2) Connect the inside air/outside air switching cable. Insert it to the clamp securely.

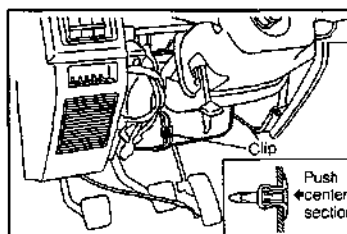


BODY ELECTRICAL SYSTEM

7. Install the air No. 1 duct subassembly. Install the clip.

NOTE:

- Before the instrument panel is tightened securely, make sure that the wire harnesses, clamps and connectors are installed without applying undue force.



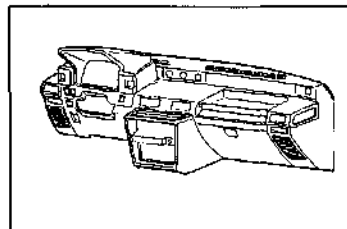
WFE90-BE293

8. Tighten all screws which have been removed during the removal operation.

NOTE:

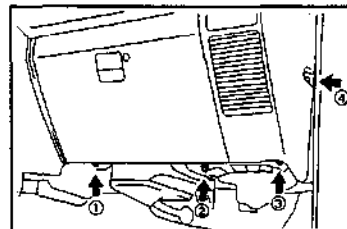
- Refer to the sequence numbers 4, 5, 17, 21 and 22.

9. Install the defroster nozzle assembly.
10. Install the instrument panel hole cover.



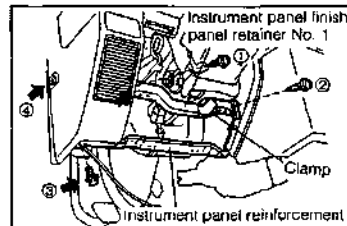
WFE90-BE294

11. Install the glove compartment door subassembly. (Tighten the screws ① and ②.)
12. Tighten the screws ③ and ④.



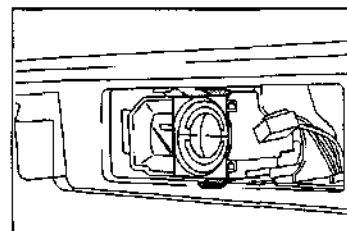
WFE90-BE295

13. Install the instrument panel finish panel retainer No. 1. (Tighten the screws ① and ②.)
14. Tighten the screws ③ and ④.



WFE90-BE296

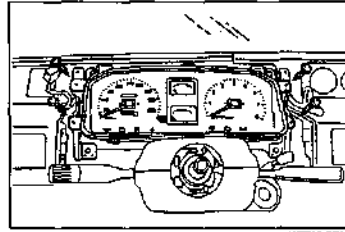
15. Install the triple meter.
(1) Connect each connector to the respective meters. Press the meter into the groove by hands.
(2) Press the upper instrument panel finish into position by hands.



WFE90-BE297

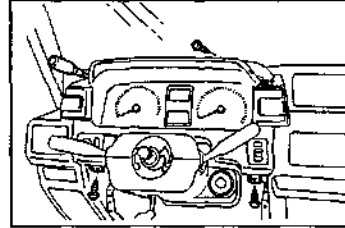
BODY ELECTRICAL SYSTEM

16. Installation of combination meter
(1) Connect the connector of the speedometer cable and the couplers of the wire harnesses.
(2) Tighten the attaching screws.



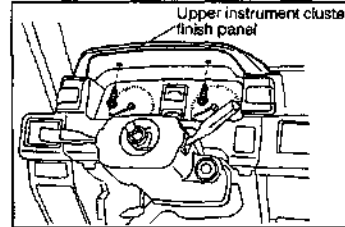
WFE60-BE296

17. Install the instrument cluster finish panel subassembly with the attaching screws.



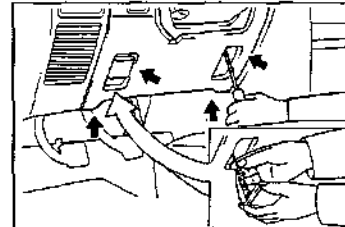
WFE60-BE299

18. Install the upper instrument cluster finish panel with the attaching screws.



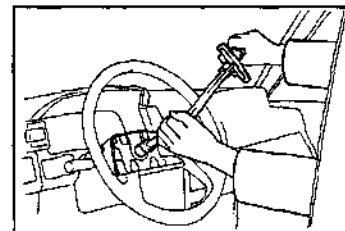
WFE60-BE300

19. Installation of lower instrument panel finish panel.
(1) Connect the connector for the rear heater switch and rheostat.
(2) Tighten the attaching screws of the lower instrument panel finish panel.
(3) Tighten the attaching screws of the rheostat.
(4) Connect the wire for the hood lock control lever and tighten the attaching screws.



WFE60-BE301

20. Install the steering wheel.
Tightening Torque: 29.4 - 49.0 N·m
21. Connect the horn wire and install the horn pad.
22. Tighten the screw of the horn pad.



WFE60-BE302

BODY ELECTRICAL SYSTEM

OPERATION AFTER INSTALLATION

1. Connect the battery.
2. Ensure that each switch of the instrument panel functions properly.
3. Start the engine.

NOTE:

- (1) Replenish cooling water in advance if the cooling water has been drained out.
 - (2) When starting the engine, place the shift lever of the transmission in the neutral position and apply the parking brake.
4. Ensure that all of the electrical system functions properly.

WPER0-BE303

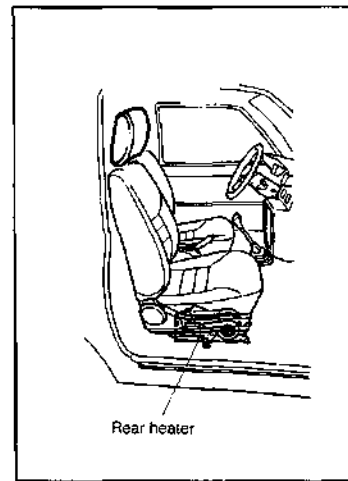
11. REAR HEATER

The rear heater is available as optional equipment on all models.

The rear heater is located below the front passenger seat.

Heater specifications

Heat radiating rate	kCal/h	1,600
Air flow rate	m ³ /h (ft ³ /h)	120 (4238)
Power consumption	W	30
Fan diameter	mm (inch)	80 (3.1)

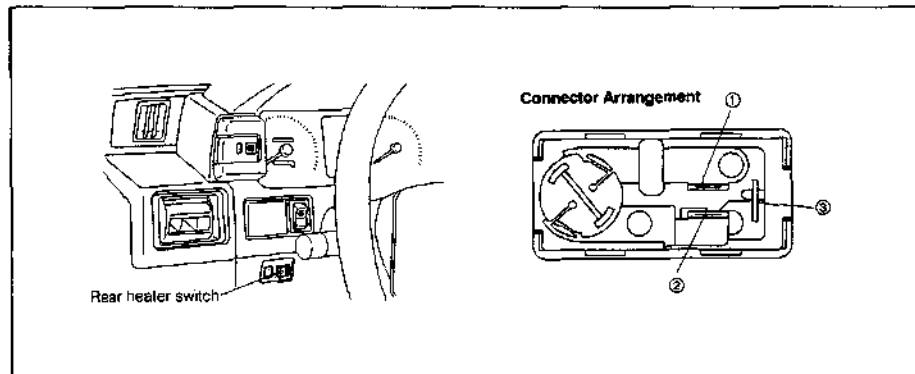


WFE90-BE304

11-1. REAR HEATER SWITCH

The rear heater switch is a seesaw type switch which incorporates an indicator lamp.

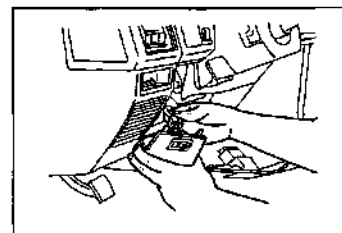
Furthermore, the switch is installed on the finish lower panel of the instrument panel toward the left side of the vehicle.



WFE90-BE305

REMOVAL

1. Remove the instrument panel finish lower panel.
2. Remove the coupler of the rear heater switch.
3. Remove the rear heater switch from the instrument panel finish lower panel.



WFE90-BE306

BODY ELECTRICAL SYSTEM

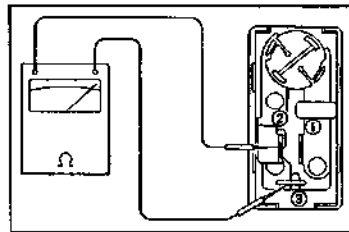
INSPECTION

Ensure that continuity exists between the respective terminals as indicated in the continuity table below.

Continuity table

○—○ Continuity exists.
○●○ Bulb in installed state

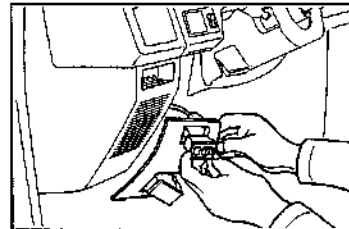
Switch \ Terminal	3	1	2
OFF		○—○	○—○
ON	○—○	○—○	○—○



WFE00-BE307

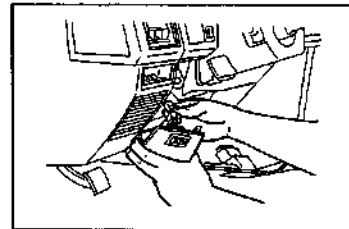
INSTALLATION

1. Install the rear heater switch to the instrument panel finish lower panel.



WFE00-BE308

2. Connect the coupler of the rear heater switch.
3. Install the instrument panel finish lower panel.



WFE00-BE309

11-2. REAR HEATER RELAY

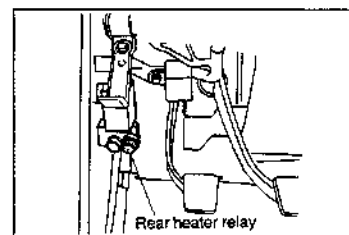
INSPECTION

If the air flow rate of the rear heater exhibits abnormality when the rear heater switch is functioning properly, replace the rear heater relay. Check the operation.

WFE00-BE310

INSTALLATION POSITION OF REAR HEATER RELAY

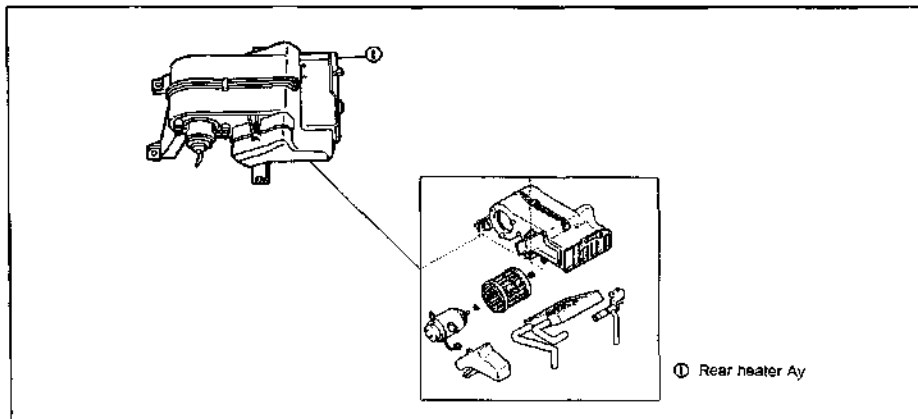
The rear heater relay is located below the main fuse box at the lower left of the instrument panel subassembly.



WFE00-BE311

11-3. HEATER UNIT

RELATED PARTS



WP80-BE312

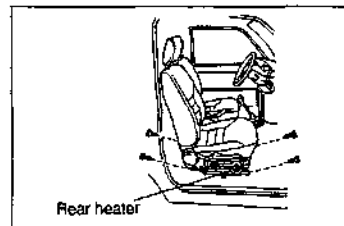
OPERATION PRIOR TO REMOVAL

1. Disconnect the negative \ominus terminal of the battery.
2. Drain the cooling water from the radiator.

WP80-BE313

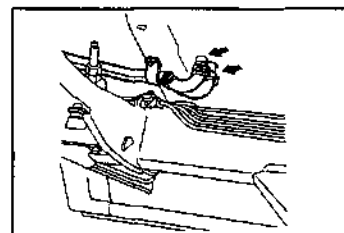
REMOVAL

1. Remove the right side of the front seat by removing the four bolts.



WP80-BE314

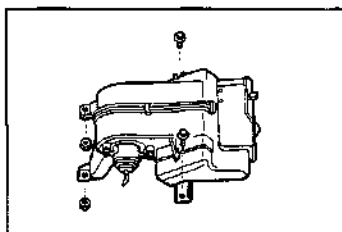
2. Disconnect the two water hoses from the rear heater assembly.



WP80-BE315

BODY ELECTRICAL SYSTEM

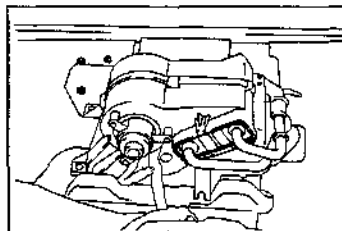
3. Remove the rear heater assembly by removing two nuts and two bolts.



WPBX0-6E316

INSPECTION

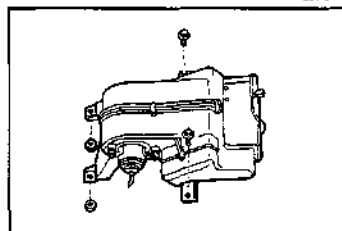
1. Blower unit
 - Ensure that the radiator exhibits no cracks.
 - Ensure that the packing is not damaged.
 - Ensure that the blower fan rotates smoothly when it is turned by hand.



WPBX0-6E317

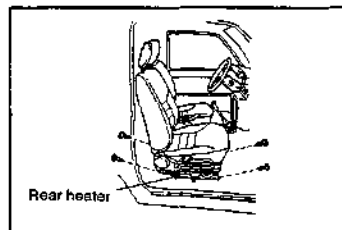
INSTALLATION

1. Install the rear heater assembly with two bolts and two nuts.
2. Install the two water hoses to the rear heater assembly.



WPBX0-6E316

3. Install the front seat with four bolts.
Tightening Torque: 3.0 - 4.5 kg-m
(22 - 33 ft-lb, 29.4 - 44.1 N-m)



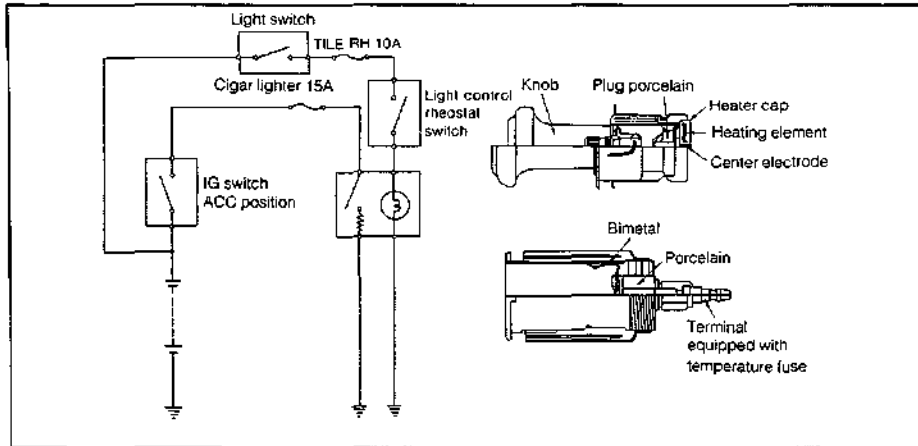
WPBX0-6E319

12. CIGARETTE LIGHTER

The cigarette lighter system consists of a plug and a socket. When the plug knob is pushed in, current flows from the bimetal to the heating element, thereby causing the heating element to generate heat. When the specified heating temperature is attained, the bimetal opens. As a result, the retention of the heater cap is released. The plug has been so constructed that it will pop up owing to its own spring tension. To assure the safety in the event of overheating, a temperature fuse is employed in order that fusing may take place, as required.

WFE90-8E320

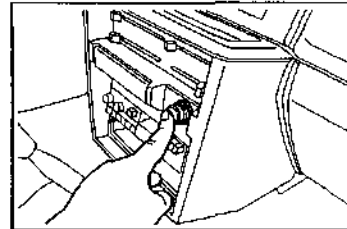
CIRCUIT DIAGRAM



WFE90-8E321

INSPECTION

1. With the ignition switch set to the ON position, push in the cigarette lighter. Ensure that the plug pops out with the heating element in a glow state.
If the normal function fails to take place, check for the fuse-related parts. Replace the cigarette lighter assembly, as required.
2. With the ignition switch set to the ON position, set the light control switch to the ON position. Ensure that the cigarette lighter position lamp goes on.
If the normal function fails to take place, check for the fuse-related parts. Replace the cigarette lighter assembly, as required.



WFE90-8E322

REMOVAL & INSTALLATION PROCEDURE

NOTE:

- The replacement of the socket section of the cigarette lighter can be carried out from the back side after the instrument panel has been removed from the body.
For the removal procedure for the instrument panel, see the "Front Heater Section."

WFE90-8E323

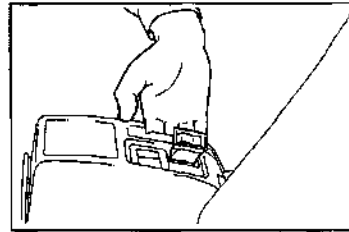
BODY ELECTRICAL SYSTEM

13. REMOTE CONTROL MIRROR

13-1. REMOTE CONTROL SWITCH

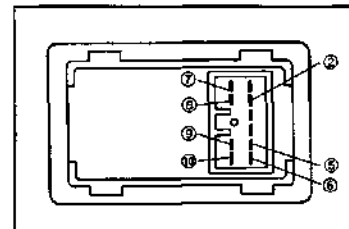
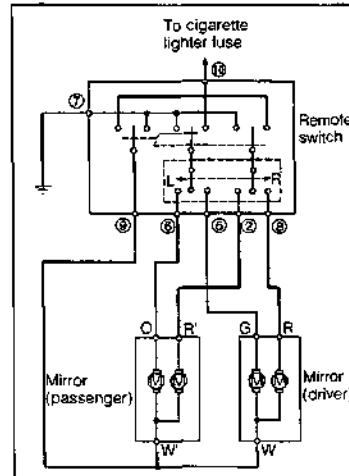
Inspection

1. Take out the remote control switch by pushing it from the inside of the floor console box.
2. Disconnect the coupler.
3. Ensure that continuity exists between the respective terminals by operating the switch as indicated in the table below.



WFE90-BE324

	Switch	⑩	⑨	⑧	⑦	⑥	⑤	②
Left	Up	○	○	○	○			
	Down	○	○		○	○		
	OFF							
	Left	○	○	○	○		○	
	Right	○	○		○	○		○
OFF	Up		○	○				
	Down	○	○					
	OFF							
	Left		○	○				
	Right	○	○					
Right	Up	○	○	○	○			○
	Down	○	○		○	○		○
	OFF							
	Left	○	○	○	○			
	Right	○	○		○	○		

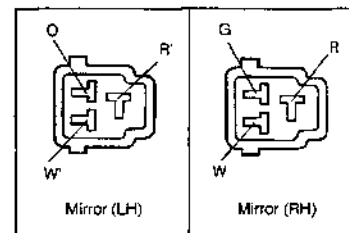


13-2. REMOTE CONTROL MOTOR

Inspection

1. Remove the door trim. Take out the coupler.
2. Ensure that the motor operates properly by applying the battery voltage across the respective terminals as indicated in the table below.

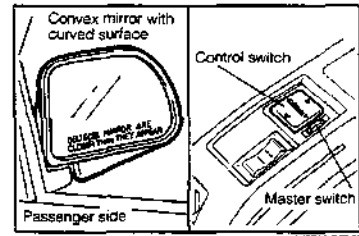
(RH)	W	G	R
Up	—	+	—
Down	+	—	—
Left	—	—	+
Right	+	—	—



WFE90-BE325

BODY ELECTRICAL SYSTEM

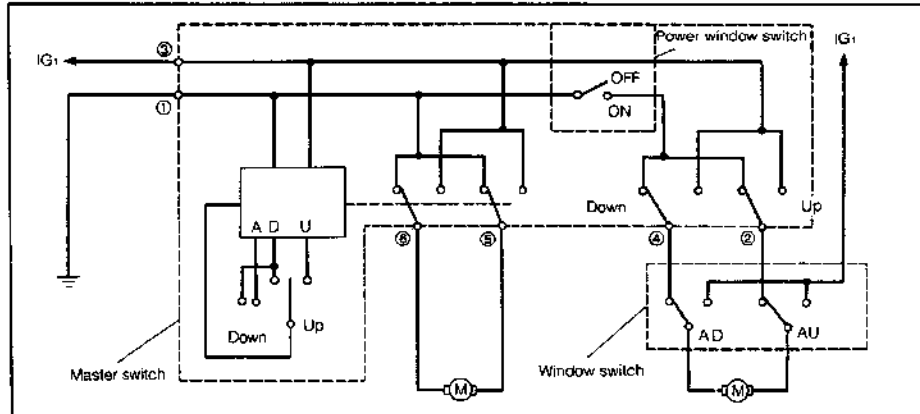
(LH)	W	O	R
Up	—	+	—
Down	+	—	—
Left	—	—	+
Right	+	—	—



BODY ELECTRICAL SYSTEM

14. POWER WINDOW

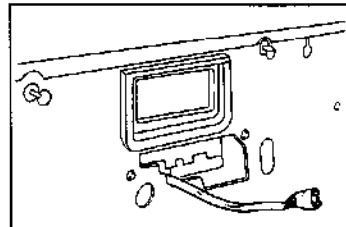
14-1. CIRCUIT DIAGRAM



14-2. MASTER SWITCH (Driver's switch)

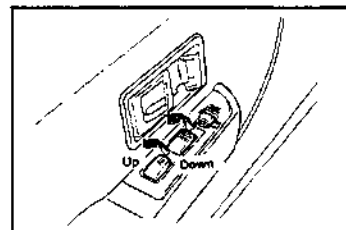
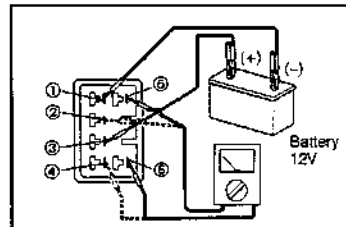
REMOVAL

1. Remove the three screws of the arm rest.
2. Remove the screw of the door inside handle. Remove the bezel.
3. Remove the door trim board assembly.
4. Disconnect the wiring coupler.



INSPECTION

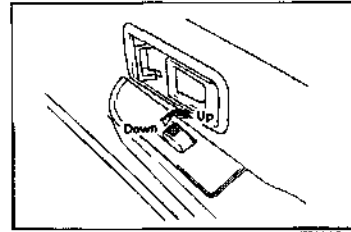
1. Connect the wiring, as indicated in the right figure, to make a test circuit.
2. Operate the AUTO switch. Measure the voltage between the terminals ⑤ and ⑥.
 - (1) OFF: 0V
 - (2) UP: Battery voltage
 - (3) DOWN, first stage: Battery voltage (The polarity becomes opposite to the item ②.)
 - (4) DOWN, second stage: Battery voltage should remain for about 20 seconds even if the switch is not held pushed.
3. Operate the window switch, Measure the voltage between the terminals ② and ④. (The power window switch is in the ON state.)
 - (1) OFF: 0V
 - (2) UP: Battery voltage
 - (3) DOWN: Battery voltage (However, the polarity is opposite to the item ②.)
4. When the power window switch is turned OFF, ensure that no voltage is applied across the terminals ② and ④ even if the window switch is operated.



14-3. WINDOW SWITCH (Passenger's switch)

REMOVAL

1. Remove the three screws of the arm rest.
2. Remove the screw of the door inside handle. Remove the bezel.
3. Remove the door trim board assembly.
4. Disconnect the wiring coupler.

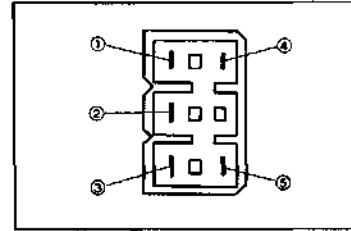


WP690-BE331

INSPECTION

Ensure that continuity exists between the respective terminals as indicated in the table below.

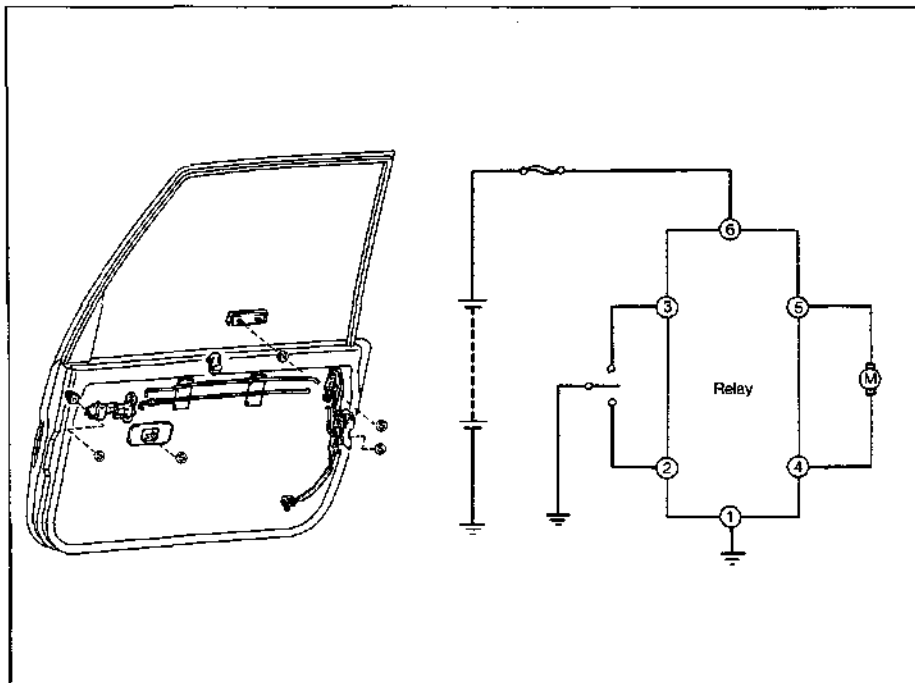
	①	②	③	④	⑤
UP	○	○		○	○
OFF	○	○	○		○
DOWN	○		○		○



WP690-BE332

BODY ELECTRICAL SYSTEM

15. POWER FRONT DOOR LOCK

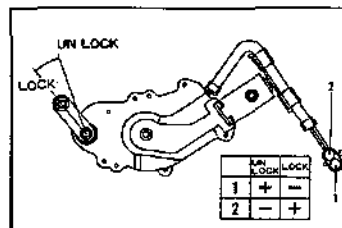


WPB90-BE333

15-1. DOOR LOCK CONTROL MOTOR (Passenger side door)

REMOVAL

1. Remove the three screws of the arm rest.
2. Remove the screw of the door inside handle. Remove the bezel.
3. Remove the door trim board assembly. Disconnect the wiring coupler.
4. Remove the water seal.



WPB90-BE334

INSPECTION

When the positive \oplus and negative \ominus polarities of a 12V battery are connected to the terminals of the coupler, the lever of the motor should move to the LOCK or UNLOCK direction.

WPB90-BE335

15-2. DOOR LOCK CONTROL SWITCH (Driver side door)

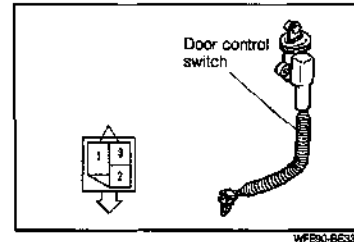
REMOVAL

1. Remove the three screws of the arm rest.
2. Remove the screw of the door inside handle. Remove the bezel.
3. Remove the door trim board assembly. Disconnect the wiring coupler.
4. Remove the water seal.

INSPECTION

Ensure that continuity exists between the respective terminals as indicated in the table below.

	1	2	3
Lock	○	○	
Unlock	○		○

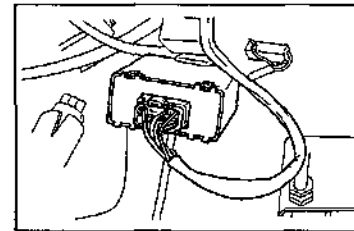
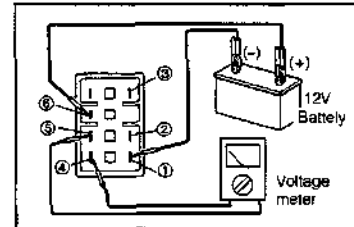


WFE90-BE336

15-3. DOOR LOCK CONTROL RELAY

INSPECTION

1. Fabricate a test circuit as indicated in the right figure.
2. Set the circuit tester to the voltmeter range.
3. When the terminal ② is connected to the negative (-) terminal of the battery, ensure that the battery voltage is momentarily applied across the terminals ④ and ⑤.
4. When the terminal ③ is connected to the negative (-) terminal of the battery, ensure that the battery voltage is momentarily applied across the terminals ④ and ⑥. However, the polarity of the voltage at this time should be opposite to that under the step ③ above. page 80



WFE90-BE337

BODY ELECTRICAL SYSTEM

16. BACK DOOR OPENER

16-1. BACK DOOR OPENER SWITCH

The back door opener switch is located at the rear console box.

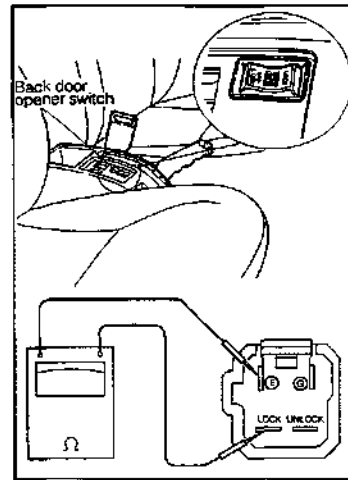
INSPECTION

Remove the back door opener switch. Ensure that continuity exists between the respective terminals as indicated in the continuity table below.

Continuity table

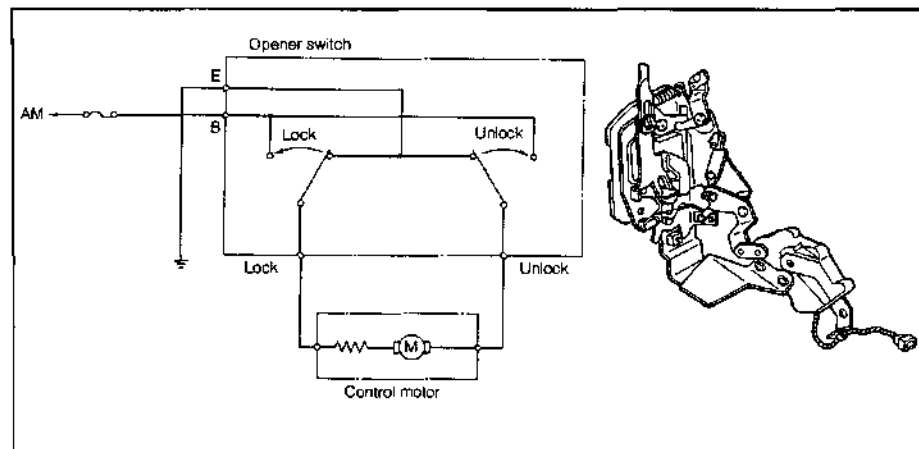
○—○ Continuity exists.

Switch \ Terminal	B	E	LOCK	UNLOCK
LOCK	○—○	○—○	○—○	○—○
OFF		○—○	○—○	○—○
UNLOCK	○—○	○—○	○—○	○—○



WPB90-BE338

CONTROL MOTOR CIRCUIT DIAGRAM



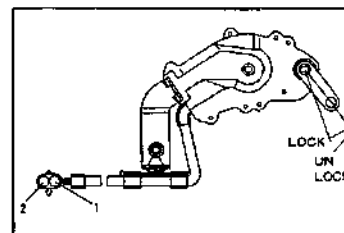
WPB90-BE339

INSPECTION

Solenoid assembly

Apply a voltage of 12V across the following two terminals. Ensure that the motor operates in accordance with the table below.

Operation direction \ Terminal	①	②
UNLOCK	⊕	⊖
LOCK	⊖	⊕

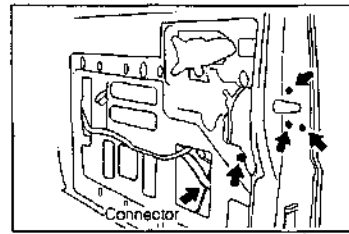


WPB90-BE340

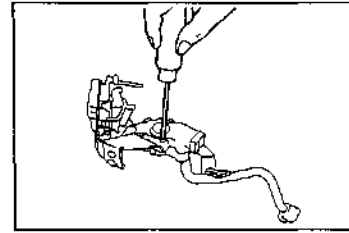
BODY ELECTRICAL SYSTEM

REMOVAL

1. Remove the rear window assembly.
2. Remove the back door trim and service hole cover.
Disconnect the connector.
Remove the assembly by removing the bolt and three screws.



3. Detach the control motor and back door lock by removing the two screws.

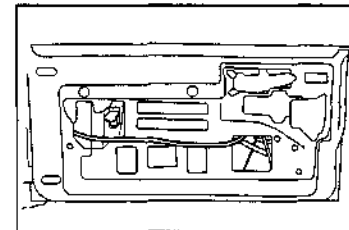


INSTALLATION

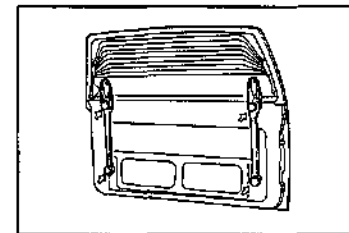
1. Install the control motor assembly.
(1) Attach the control motor and back door lock using two screws.

WF690-BE343

- (2) Install the back door opener assembly to the back door using the bolt and three screws.
- (3) Connect the connector.



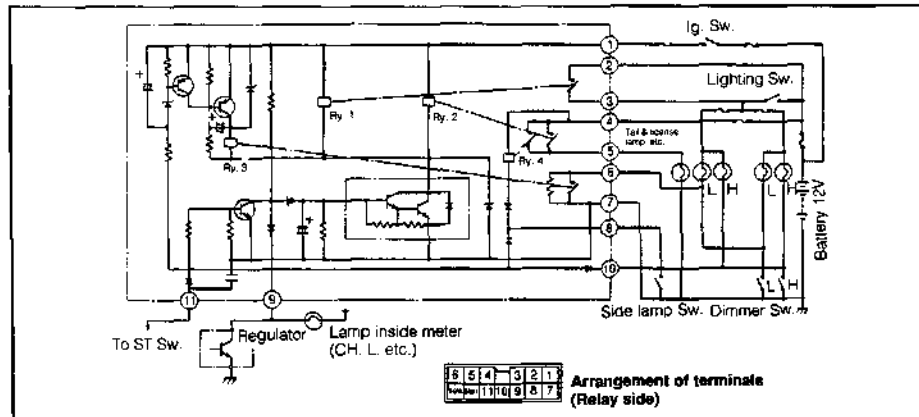
2. Install the service hole cover and back door trim.
3. Install the rear window assembly.



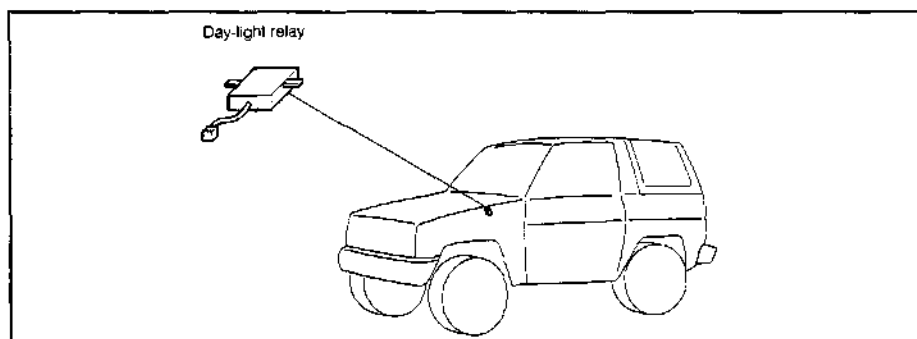
BODY ELECTRICAL SYSTEM

17. DAY-LIGHT RELAY

CIRCUIT DIAGRAM



LOCATION OF DAY-LIGHT RELAY



OPERATION CHECK

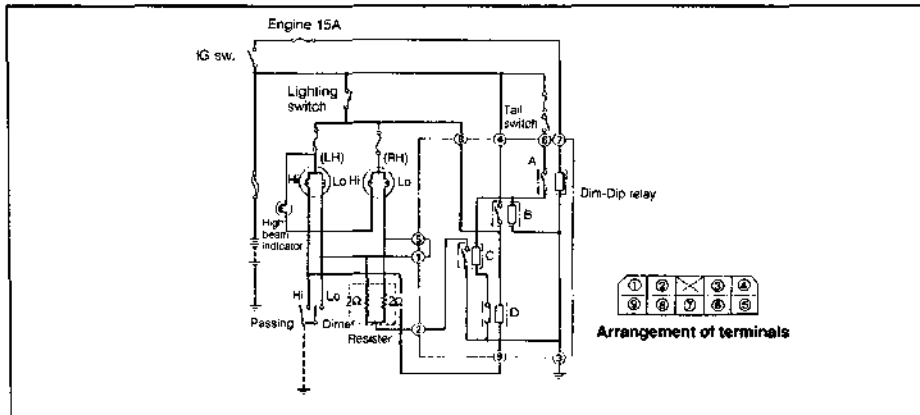
While the engine is rotating, ensure that the day-light goes on under the conditions given below.

○ ... Goes on
× ... Goes off.

Engine	Ignition switch	Side lamp switch	Lighting switch	Dimmer switch	Tail & license lamp	Headlamp	
						Lo	Hi
STOP	ON	Normal glowing mode					
	OFF						
RUN	ON	OFF	OFF	OFF	○	○	×
	ON	ON	OFF	OFF	○	×	×
	ON	ON	ON	Lo	○	○	×
	ON	ON	ON	Hi	○	×	○
	ON	ON	Passing	Passing	○	×	○

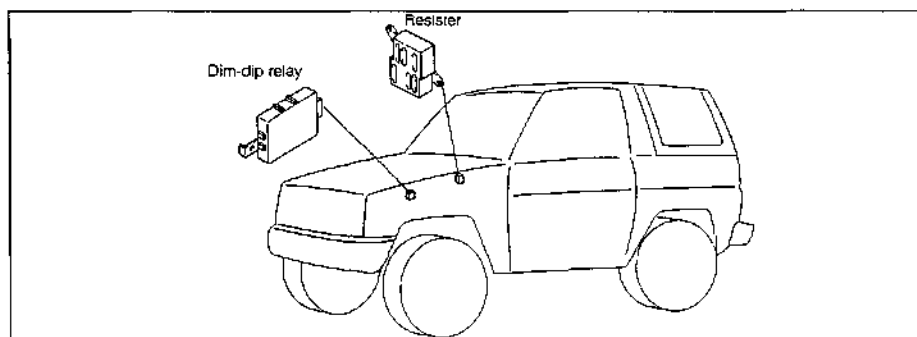
18. DIM-DIP LAMP

CIRCUIT DIAGRAM



WPE90-BE3-49

LOCATION OF DIM-DIP RELAY AND RESISTOR



WPE90-BE350

OPERATION CHECK

Under the conditions given below, ensure that the luminous intensity of the dim-dip lamp is reduced 10% compared with the normal operation.

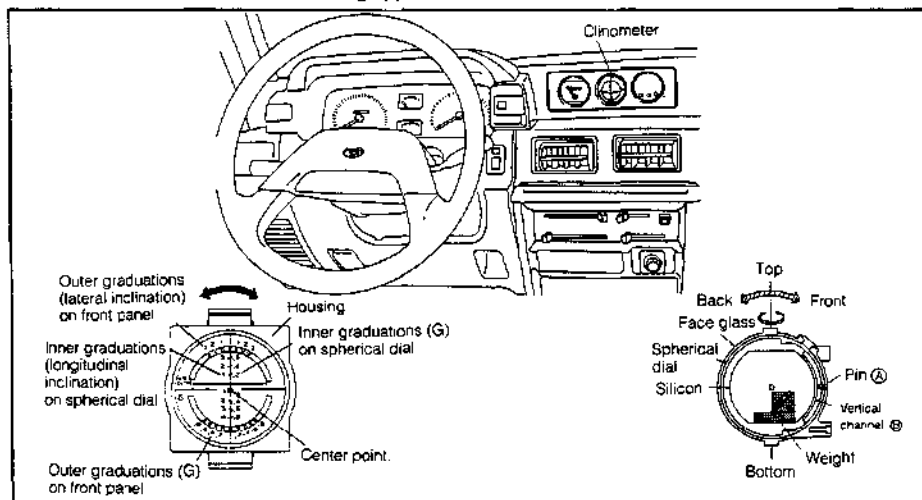
Ignition switch	Switch condition			Headlamp condition	Remarks
	Tail switch	Lighting switch L	Lighting switch H		
OFF	OFF	OFF	OFF	OFF	
	ON	OFF	OFF	OFF	Tail lamp only goes on.
	ON	ON	OFF	Lo	
	ON	OFF	ON	Hi	
	OFF	OFF	ON	Hi	Passing
ON	OFF	OFF	OFF	OFF	
	ON	OFF	OFF	Dim-dip	
	ON	ON	OFF	Lo	
	ON	OFF	ON	Hi	
	OFF	OFF	ON	Hi	Passing

WPE90-BE351

BODY ELECTRICAL SYSTEM

20. INCLINOMETER

The inclinometer indicates any inclination angle of the vehicle in a fore-and aft direction or in a right-and left direction as well as an acceleration being applied to the vehicle.



WFE90-62362

Specifications

Item		Specification
Operative method		Gravity method by weight
Indications	Front-back	40 degrees max
	Right-left	30 degrees max
Illumination		12V, 1.4W bulb

WFE90-62363

Construction

The inclinometer consists of an outer casing which inclines in the same way as with the vehicle inclination, a front panel scale plate, a front glass (fixed to the outer casing) and a spherical dial which maintains the horizontal state at all times.

The inclinometer has a pin (A) which protrudes at the rear/inner part of the front glass. Also, a vertical groove (B) is provided at the back side of the spherical dial.

The provision of this pin (A) and vertical groove (B) prevents any rotation of the inclinometer (↺↻) around an axis in an up-and-down direction. However, this construction makes it possible for the inclinometer to turn in a fore-and-aft direction (↔) as well as in a right-and left direction (↻↺).

A weight is fixed at the inside of the spherical dial. This weight indicates always the direction of gravity (lower side).

Furthermore, silicon oil is filled between the spherical dial and the front glass in order that the spherical dial may slide smoothly.

WFE90-62364

BODY ELECTRICAL SYSTEM

Operation

This weight indicates always the direction of gravity regardless of the vehicle posture. Thus, the inclinometer indicates the vehicle posture in a unit of degree. While the vehicle is running, the meter indicates the acceleration (G).

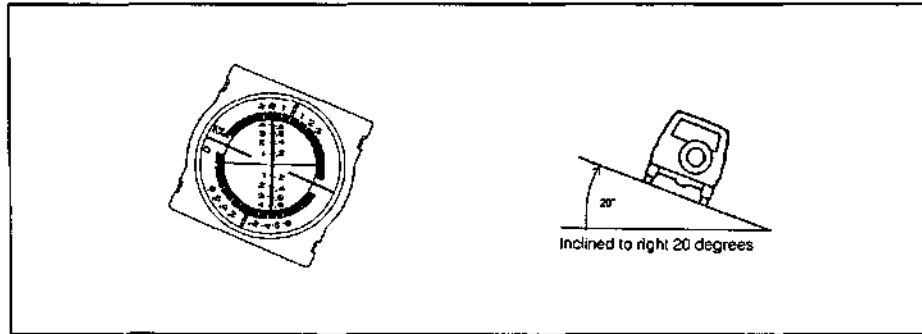
WP690-BE355

Example of indication

1. Inclination condition when vehicle is running at a constant speed or stopped:

- Case where vehicle is inclined in right-&-left direction (inclined 20 degrees to left):

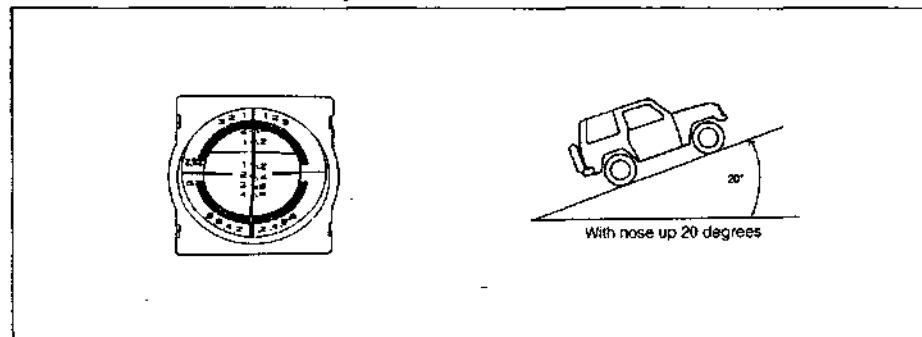
The front panel dial is inclined in the same inclination of the vehicle. However, the spherical dial retains its horizontal state. Hence, the vertical center line of the spherical dial indicates the inclination angle in a right-and-left direction.



WP690-BE356

- Case where vehicle is inclined in fore-&-aft direction (with nose upward 20 degrees):

The front glass is inclined in the same inclination of the vehicle. However, the spherical dial retains its horizontal state. Hence, the intersection of the center point of the front glass with the spherical dial indicates the inclination angle in a fore-and-aft direction.

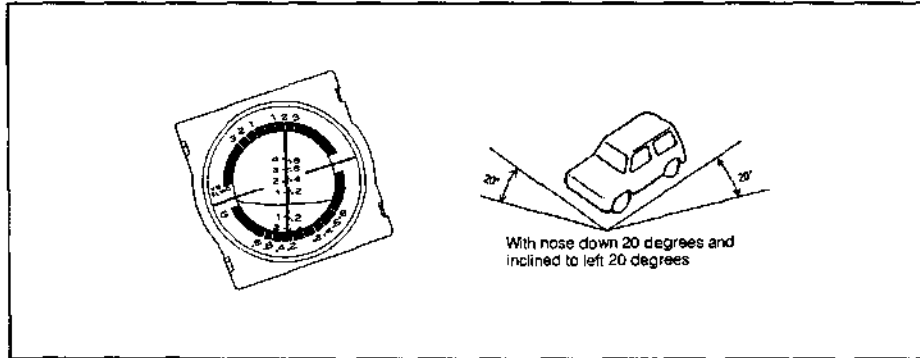


WP690-BE357

BODY ELECTRICAL SYSTEM

- Case where vehicle is inclined in fore&-aft direction as well as in right-&-left direction (with nose down 20 degrees and inclined to left 20 degrees):

The inclination angle in a fore-and-aft direction as well as in a right-and-left direction is indicated by means of the spherical dial, front glass and front panel dial.



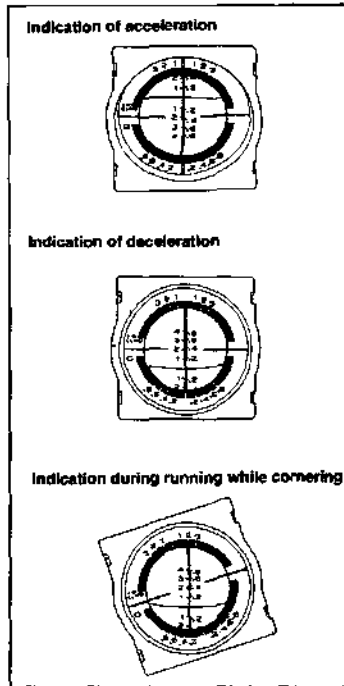
WFB90-BE358

2. When vehicle is under accelerating or decelerating condition:

When an acceleration is applied to the vehicle, the indication of the clinometer changes even while the vehicle is running on a level road.

The greater this rate of change, the greater the acceleration.

- Case where vehicle is under acceleration:
A dipping force is applied to front glass in the same dipping direction of the vehicle. However, the spherical dial tends to turn upward. As a result, the intersection of the center point of the front glass with the spherical dial indicates the acceleration.
- Case where vehicle is under deceleration:
A floating force is applied to front glass in the same floating direction of the vehicle. However, the spherical dial tends to turn downward. As a result, the intersection of the center point of the front glass with the spherical dial indicates the deceleration.
- Case where vehicle is cornering:
A centrifugal is applied to the vehicle, thereby changing the indication. The greater this rate of change, the quicker the vehicle is making a turn.

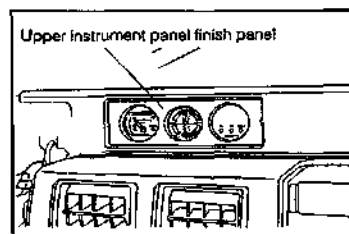


WFB90-BE359

BODY ELECTRICAL SYSTEM

REMOVAL

1. Remove the upper instrument panel finish panel.
2. Remove the clinometer.



WPB20-BE360

INSTALLATION

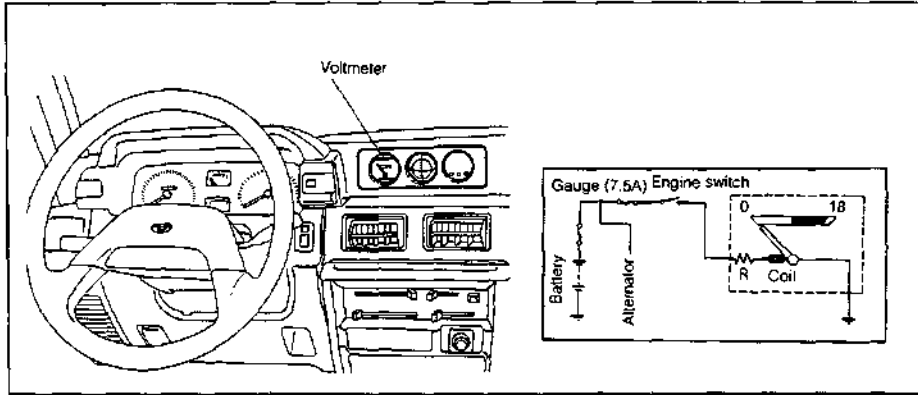
1. Install the clinometer to the instrument panel.
2. Install the upper instrument panel finish panel.

WPB20-BE361

BODY ELECTRICAL SYSTEM

21. VOLTMETER

While the engine is running, the voltmeter indicates the charging voltage. When the engine is stopped (with the engine switch turned ON), this voltmeter indicates the battery terminal voltage.



WFE90-BE362

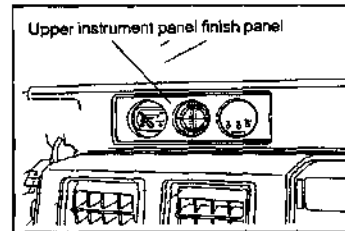
Specification

Type	Bi-metal	
Resistance value (Ω)	R	460
	Coil	70

WFE90-BE363

REMOVAL

1. Remove the upper instrument panel finish panel.
2. Remove the voltmeter.



WFE90-BE364

INSTALLATION

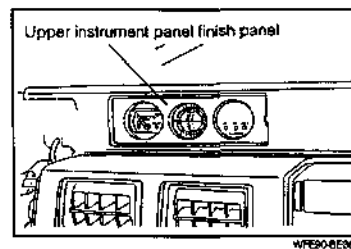
1. Install the voltmeter to the instrument panel.
2. Install the instrument panel finish upper panel.

WFE90-BE365

BODY ELECTRICAL SYSTEM

REMOVAL

1. Remove the upper instrument panel finish panel.
2. Remove the clock.

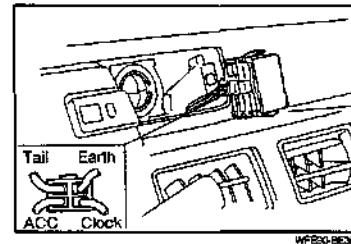


INSPECTION

Connect the wire harness at the vehicle side to the clock. Perform the following checks given below.

- (1) Ensure that continuity exists between the EARTH terminal and the body ground.
- (2) Measure the voltage between each terminal and the body ground.

Terminal	Voltage	Remarks
CLOCK	Approx. 12V	At all times
ACC	Approx. 12V	When IG switch is set to ACC.
TAIL	Approx. 12V	When light control switch is turned ON.



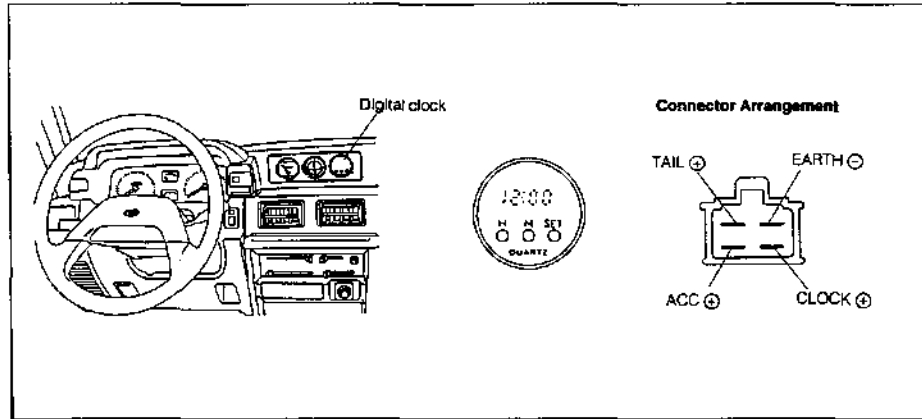
INSTALLATION

1. Install the clock to the instrument panel.
2. Install the upper instrument panel finish panel.

BODY ELECTRICAL SYSTEM

22. CLOCK

The clock is provided at the central part of the instrument panel.



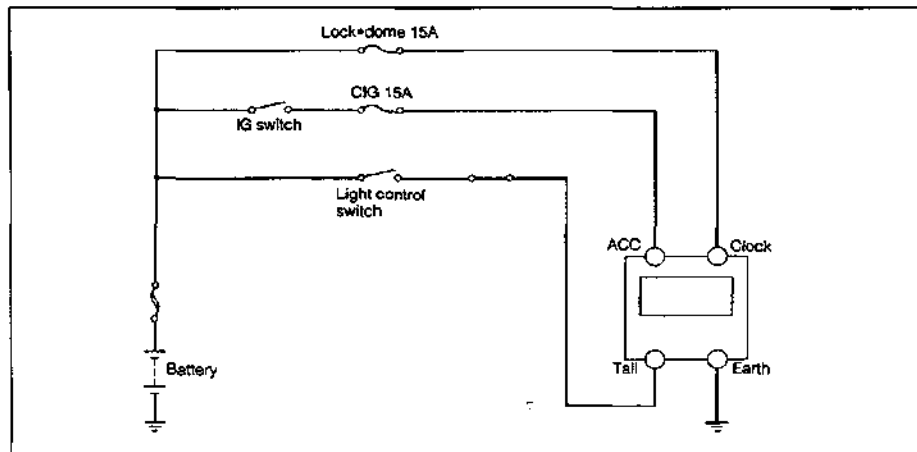
WPB30-BE368

Clock specification

		Specifications
Rating voltage	(V)	12
Accuracy	(second/day)	± 1.5
Consuming current	(mA)	160 (During indication period with glowing) 5 (During indications period without glowing)
Operating range characteristics	(V)	10 - 12

WPB30-BE369

CIRCUIT DIAGRAM



WPB30-BE370



DAIHATSU **F300**



HARNESS & WIRING DIAGRAM

GENERAL HANDLING	
INSTRUCTIONS	HW- 2
FUSE BLOCK	HW- 6
FUSIBLE LINK BLOCK	HW- 7
FUSE CIRCUIT	HW- 8
WIRING HARNESSSES	HW-14
WIRING CLAMPING	HW-43

WFES0-14WD01

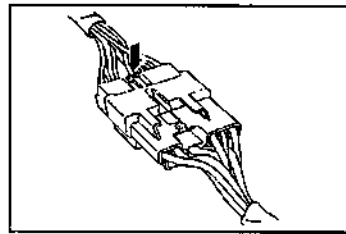
HARNESS & WIRING DIAGRAM

GENERAL HANDLING INSTRUCTIONS

HANDLING AND INSPECTION

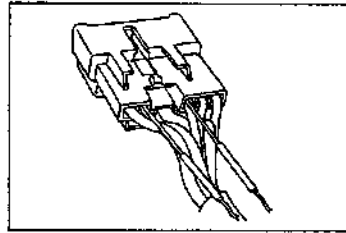
Removal

To disconnect the connector, simply pull out the connector while the lock lever is being pressed down, as indicated in the right figure.



Inspection

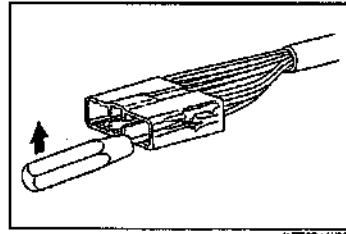
When you conduct continuity checks or voltage checks using a circuit tester, if you insert a test probe from the connector side, it is impossible to get an adequate fitting. Hence, be sure to positively insert the test probe from the harness side, as indicated in the right figure.



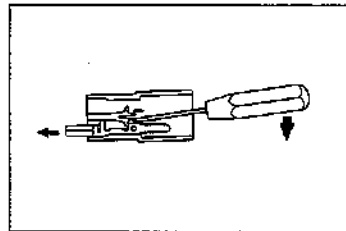
REPLACEMENT

Removal

- (1) From the aperture, insert a miniature type common screwdriver into between the locking lug and the terminal.

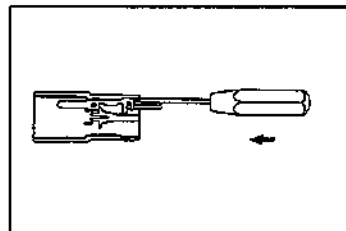


- (2) While the locking lug is being pried upward by means of a screwdriver, pull out the terminal from the backside.



Installation

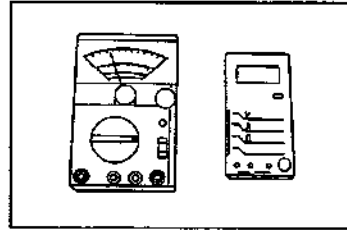
- (1) Insert the terminal, until the locking lug is locked positively.
- (2) Ensure that the locking lug is locked positively by raising the wire.



INSPECTION

Tester (Volt/ohmmeter)

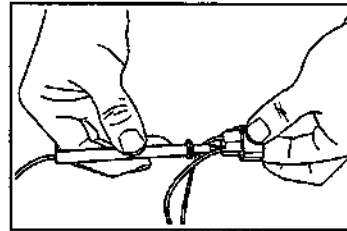
For the inspection, use a tester having an internal resistance of more than 10 kΩ/V.
Use of a tester with a low internal resistance may cause wrong measurement or secondary troubles.



WFEB0-HWC07

Conventional type connector

When resistance measurement and/or voltage measurement is conducted at the connector section, insert the measuring probe from the back of the connector, being very careful not to damage the harness-to-terminal connections.



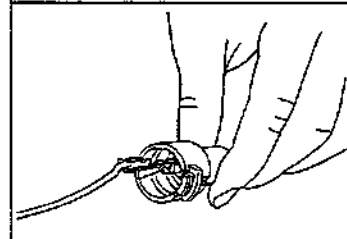
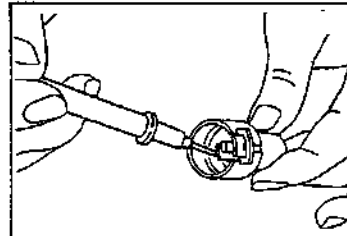
WFEB0-HWC08

Water-proof type connector

When resistance measurement and/or voltage measurement is conducted at the connector section, bring the measuring probe into contact with the terminal at the connection side of the connector.

Be very careful not to apply excessive force to the terminal at the connector side. Failure to observe this caution may deform the terminal, causing poor continuity.

As an alternative method, insert a male or female terminal into the connector terminal or connect an adequate attachment. Then, connect the measuring probe.



WFEB0-HWC09

CONNECTION

Perform the connection, until the lock is completely engaged.

NOTE:

- To confirm whether the lock type connector has been locked or not, lightly pull the connector. Make sure that the connector will not be disconnected.
- Be sure to press the connector again before finishing the confirmation.

WFEB0-HWC10

HARNESS & WIRING DIAGRAM

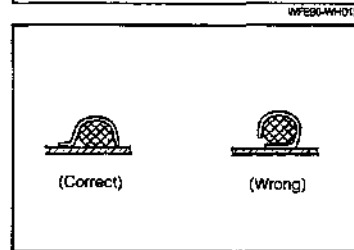
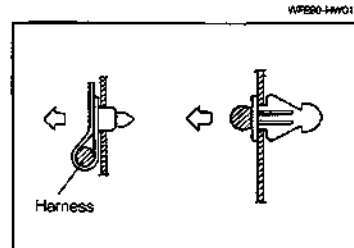
OPERATION OF WIRE HARNESS

1. General instructions

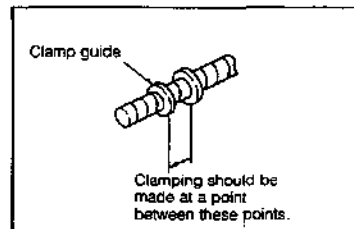
- (1) Never pull the connectors or step on them during the wire harness transport or assembly.
(Prevention of pulling-out of terminals, connector cracks, deformation and so forth)
- (2) Care must be exercised to ensure that no scratch is made to the wire harness by burrs or edges during the wire harness transport or assembly.
(Prevention of scratches to the outer trim, electrical insulators and so forth)
- (3) Clamping method
In the case of resin clamps, ensure that the clamp section is fitted in the body hole.

NOTE:

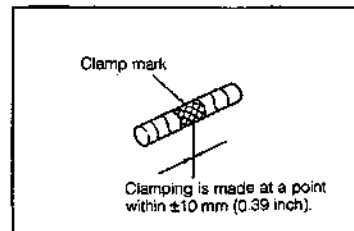
- Ensure that the clamp will not be detached when it is pulled lightly in the arrow-headed direction.
(Prevention of interference due to the detachment of the clamp)



- In the case of metal sheet welded clamps, be sure to assemble the harness in such a way that the harness will not come in contact with the welded surface.
(Prevention of wire harness damage due to welding burrs)
- In case that the locating guide of the clamp position or the clamp mark is clamped, make sure that the clamp is located within the guide. As for the clamp at the clamp mark section, ensure that the clamping is made at a point within ± 10 mm (0.39 inch).



(Prevention of slackness or interference)



WF80-HW015

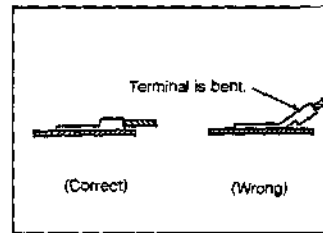
HARNESS & WIRING DIAGR

(4) Terminals and connectors

- Perform the connection of connectors positively.
 - Connector with lock Ensure that the locking is made.
 - Connector without lock Connect the connector positively until it stops.

WPB0-1101

- Retention by screws
 - When the tightening torque is specified, be sure to observe the specification strictly. (The tightening torque is posted in the table separately.)
 - Ensure that the staked section may not come on the assembling surface.
 - After completion of the tightening operation, lightly pull out the terminal. Ensure that there is no slackness.
- When performing other operations, care must be exercised to ensure that no connected connector is detached by pulling out the wire harness forcibly.



WPB0-1102

WPB0-1103

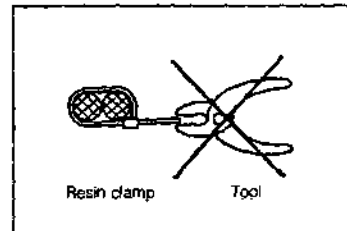
2. Work Procedure for Tightening-up Type Resin Clamps

<Work procedure>

When the tightening-up type resin clamps are employed, do not use any pliers, cutting pliers or the like.

<Reason>

Prevention of clamps being cut or scratched



WPB0-1104

WIRING HARNESSSES

WARNING:

- The wire diameter and capacity of each harness have been determined to assure the normal operation of the electrical system.
- Hence, do not take power for accessories carelessly through the original wiring harness. Failure to observe this caution may cause system malfunction or fire.

WPB0-1105

HW-5

HARNESS & WIRING DIAGRAM

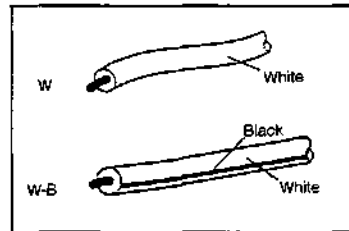
Wiring Color Code

- For identification purpose, each wire has its own color. Each color bears a code as described in the right table. These codes are used in the wiring diagram and will be helpful during trouble shooting.

Code	Gr	Br	B
Color	Gray	Brown	Black
Code	W	R	G
Color	White	Red	Green
Code	Y	L	O
Color	Yellow	Blue	Orange
Code	P	Lg	V
Color	Pink	Light green	Violet

WPB30-HW021

- The wire color comes in two kinds: single color and composite color. In the case of single color, the whole outer coat of the harness is of a single color. In the case of composite color, a fine line of the second color is drawn on the harness basic color. In this case, the code is composed of the basic color code which comes first and the second color code which comes after a hyphen.

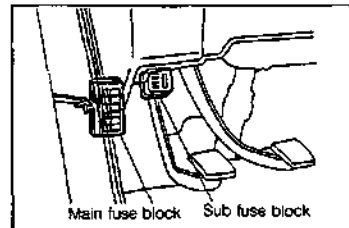


WPB30-HW022

FUSE BLOCK

Installing position

The fuse block is located at the left side of the steering wheel.



WPB30-HW023

REPLACEMENT OF FUSES & FUSIBLE LINK

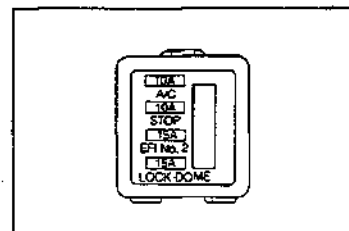
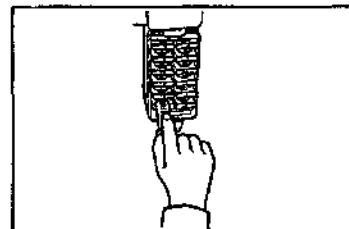
PRECAUTION

The fuse replacement must be made at all times by using a new fuse with the correct amperage.

NOTE:

- Before any fuse is replaced, be certain to turn OFF all electrical equipment and ignition switch. Never use any fuse in excess of the designated rating.
- Be sure to employ a putter for removing/installing fuses. Also, the removal/installation of fuses must be performed straight. If the fuse is removed or installed in a twisted condition, the terminal will be expanded unduly, resulting in poor contact.

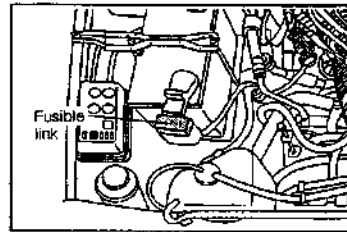
If any fuse is blown out repeatedly, the likelihood is that there exists a short in the relevant system. Hence, perform checks for possible systems, referring to Page and Section under "Wiring Diagram."



WPB30-HW024

FUSIBLE LINK BLOCK

If the fusible link is blown out repeatedly, the likelihood is that there exists a short in the relevant system. Hence, perform checks for possible systems, referring to the wiring diagram.

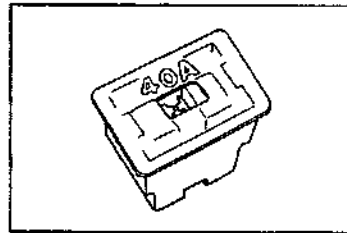


Replacement

1. If visual inspection reveals that the fusible link is blown out, replace it with a new fusible link with the designated rating.

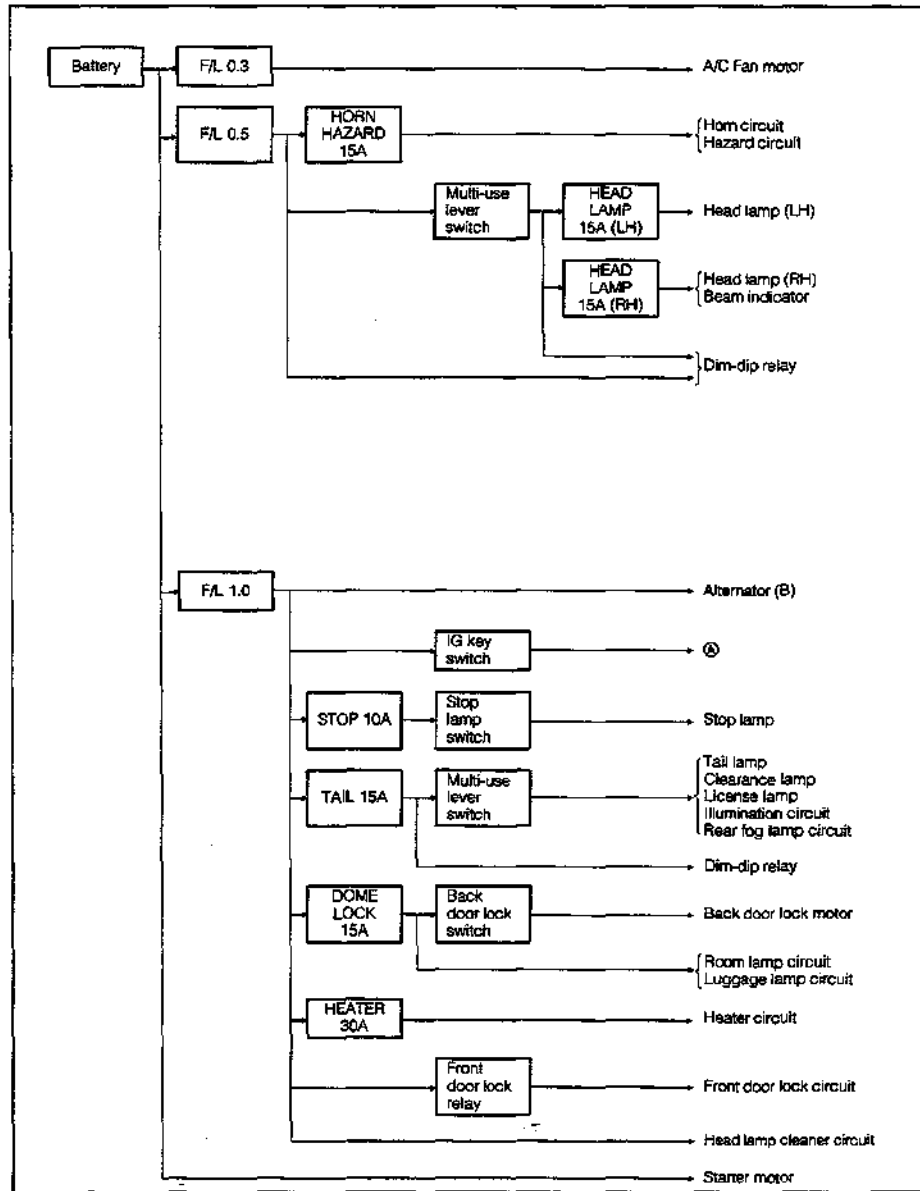
NOTE:

1. Before the fusible link is replaced, be sure to turn OFF the ignition key.
2. Care must be exercised to ensure that the fusible link is not twisted during the removal/installation. If the fusible link is replaced forcibly, it will cause breakage or poor contact.



HARNESS & WIRING DIAGRAM

FUSE CIRCUIT (HD-C engine)

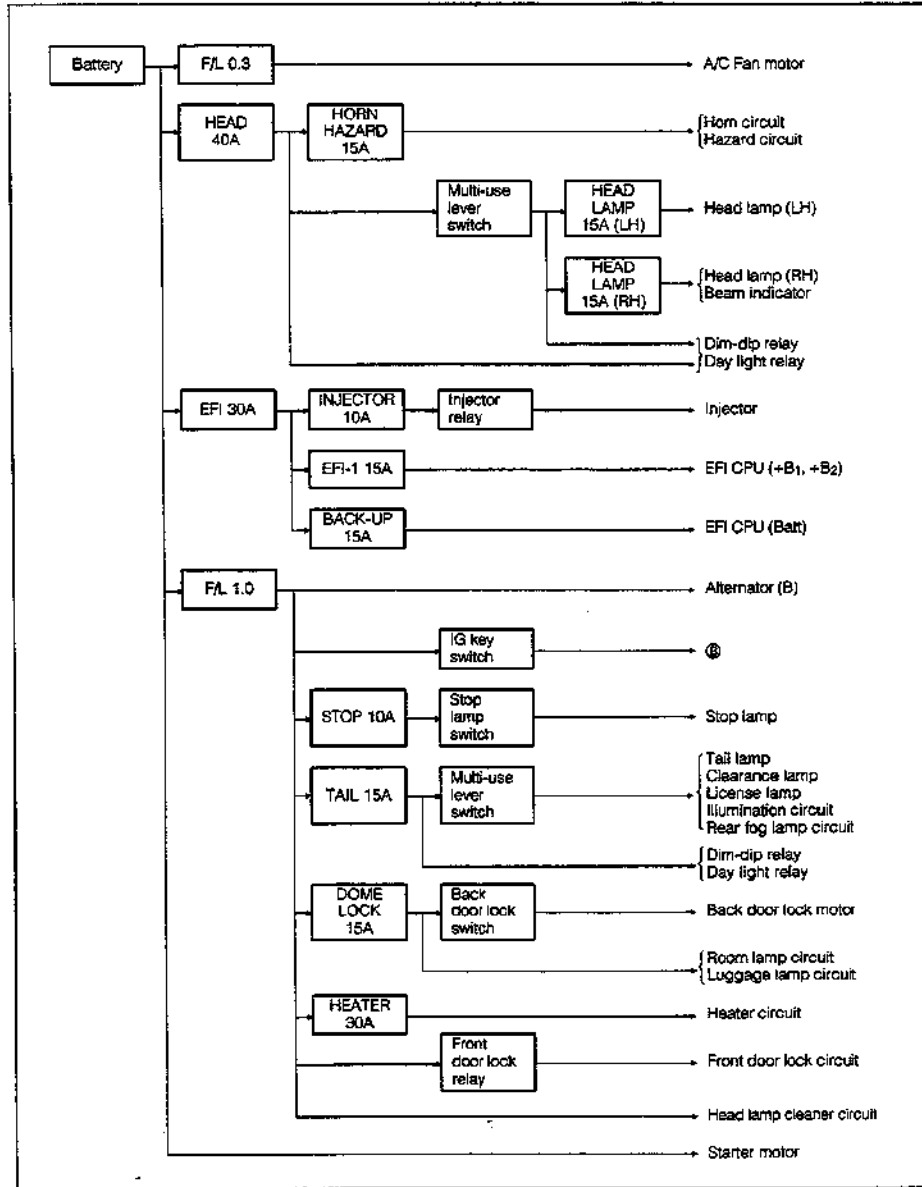


HW-8

WFE80-11027

HARNESS & WIRING DIAGRAM

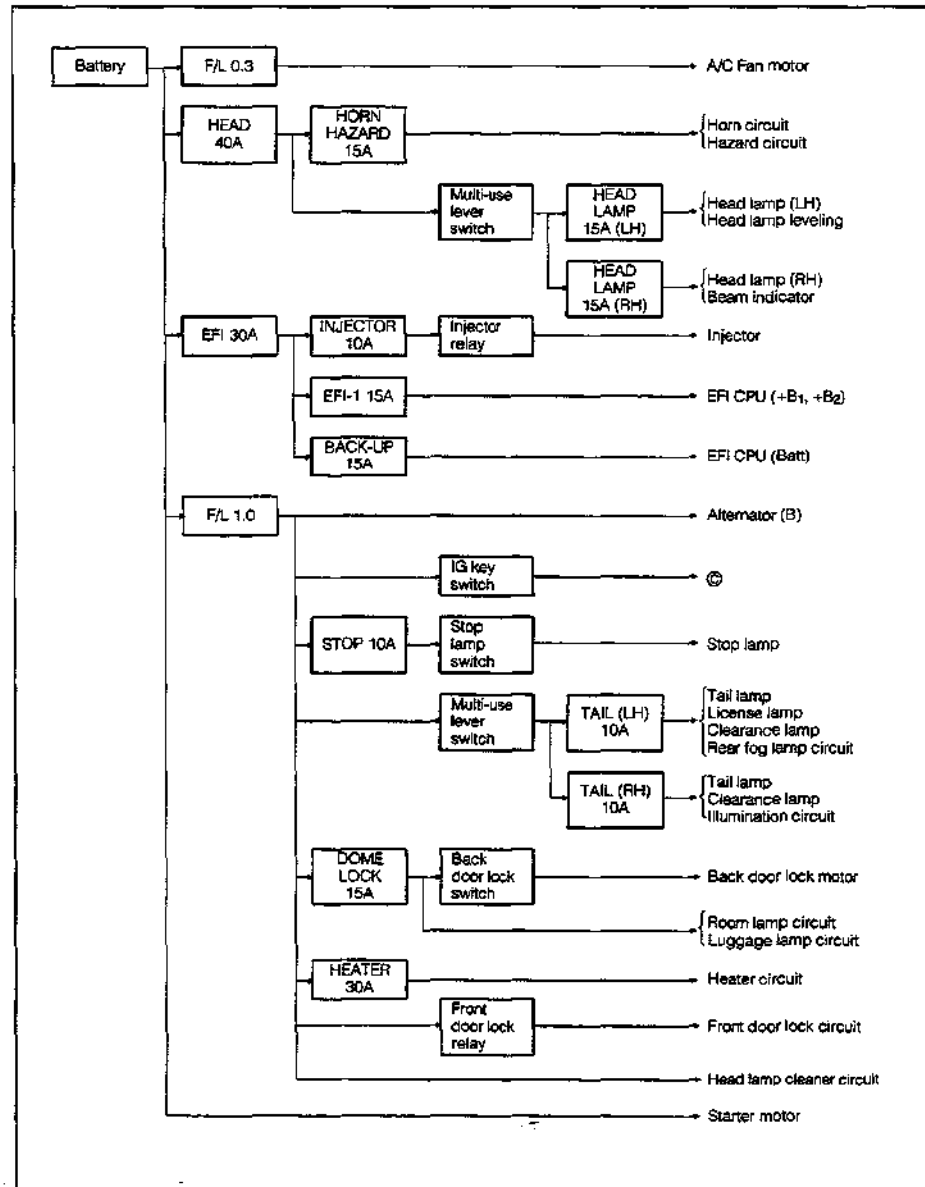
FUSE CIRCUIT (HD-E engine)



WPE90-4W028

HARNESS & WIRING DIAGRAM

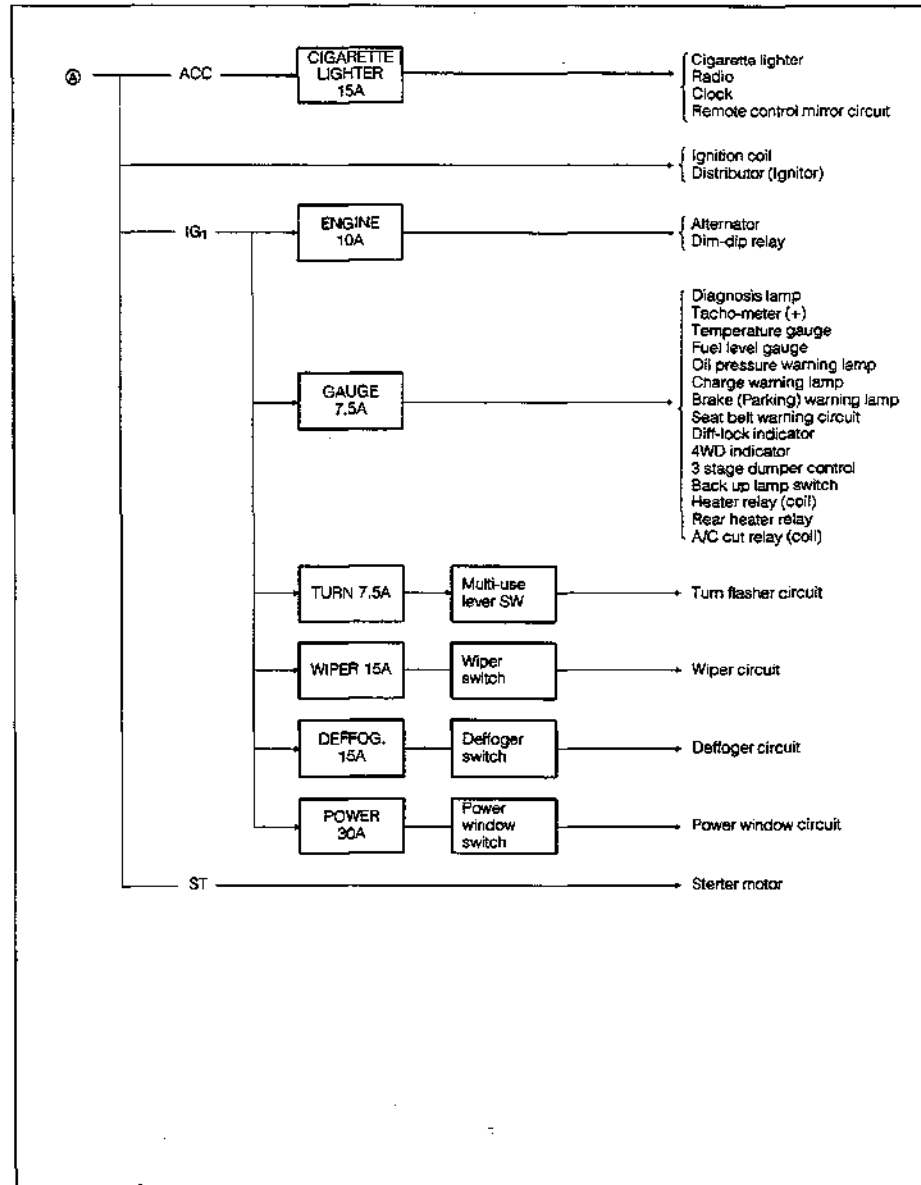
FUSE CIRCUIT (HD-E/German Specification)



WFBD-HW029

HARNESS & WIRING DIAGRAM

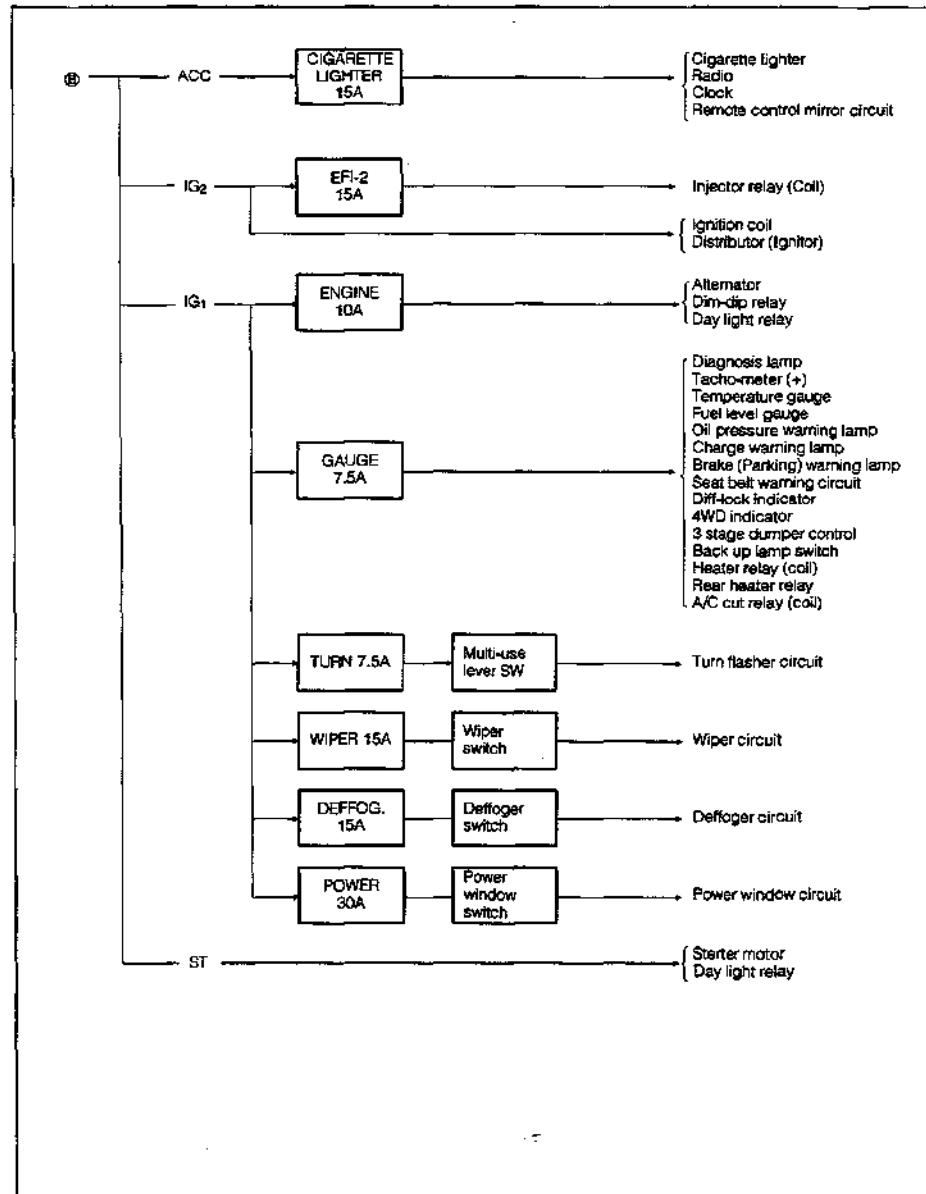
FUSE CIRCUIT (HD-C engine)



WFE30-HW330

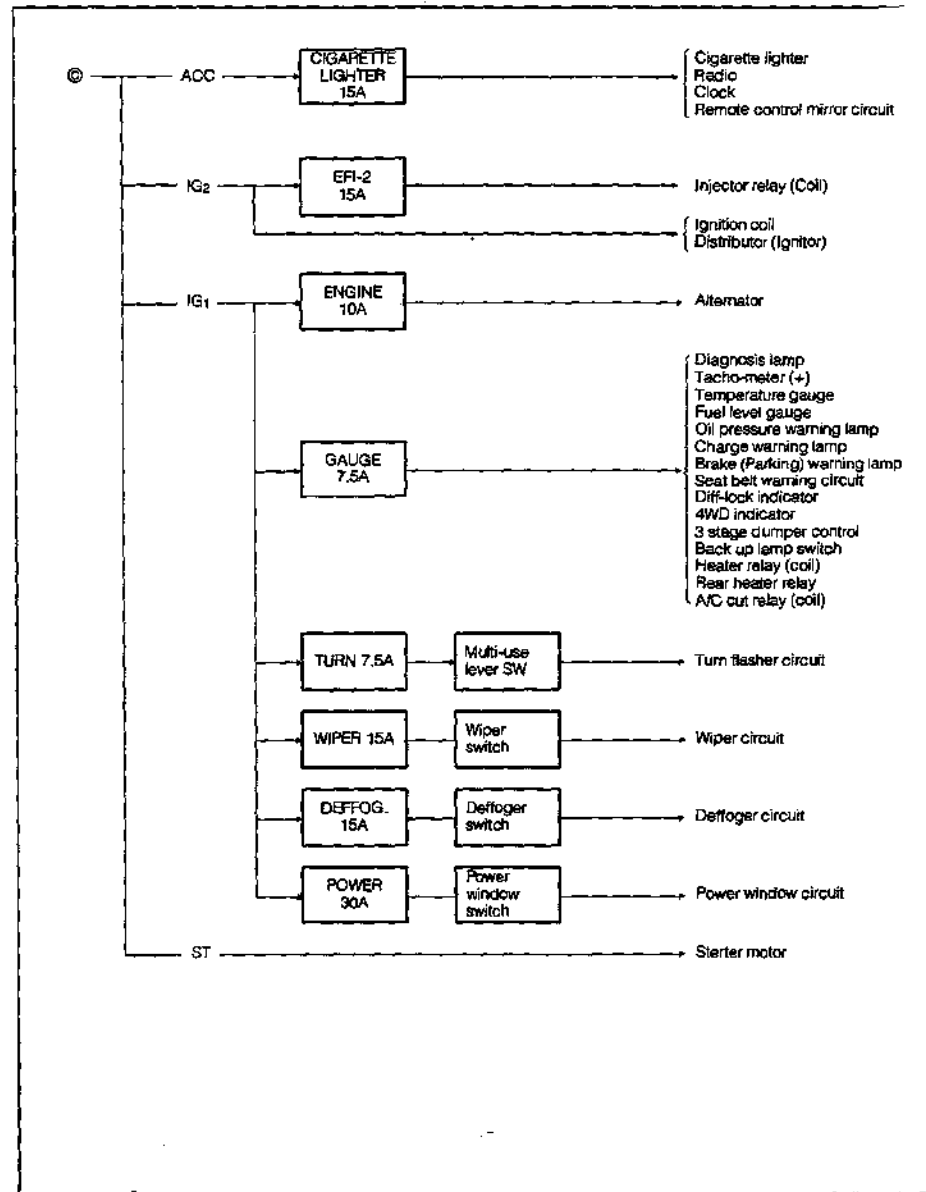
HARNESS & WIRING DIAGRAM

FUSE CIRCUIT (HD-E engine)



WRE90-HW031

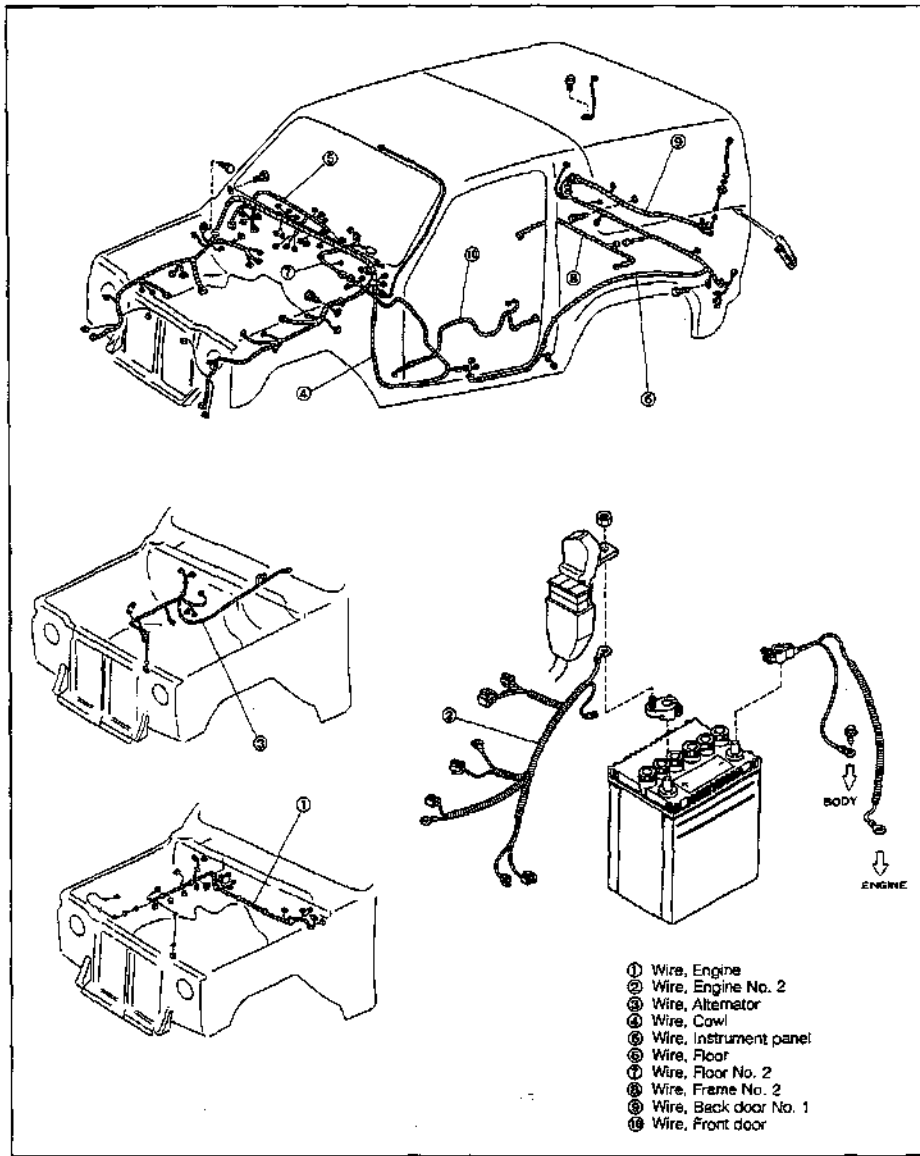
FUSE CIRCUIT (HD-E/German Specification)



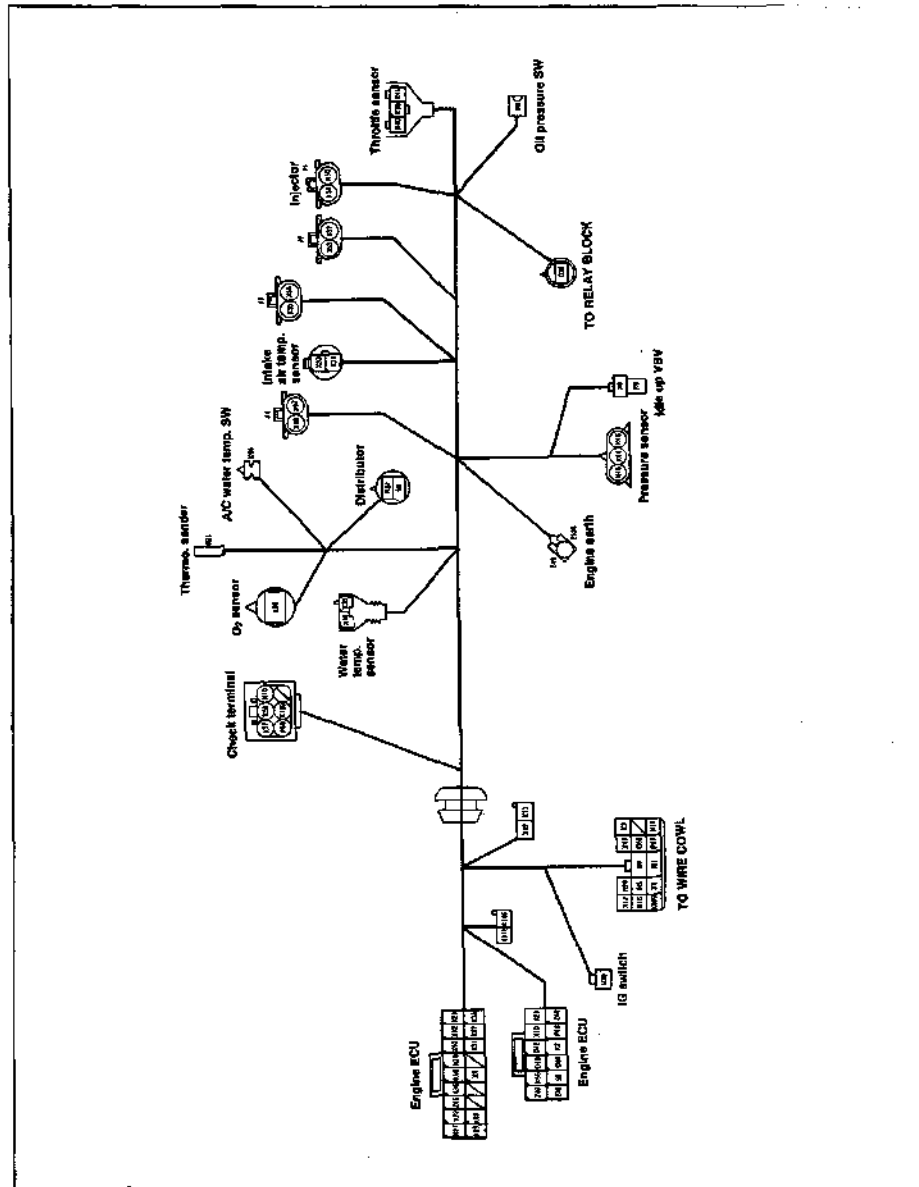
WFE90-114032

HARNESS & WIRING DIAGRAM

WIRING HARNESSSES SCHEMATIC DIAGRAM

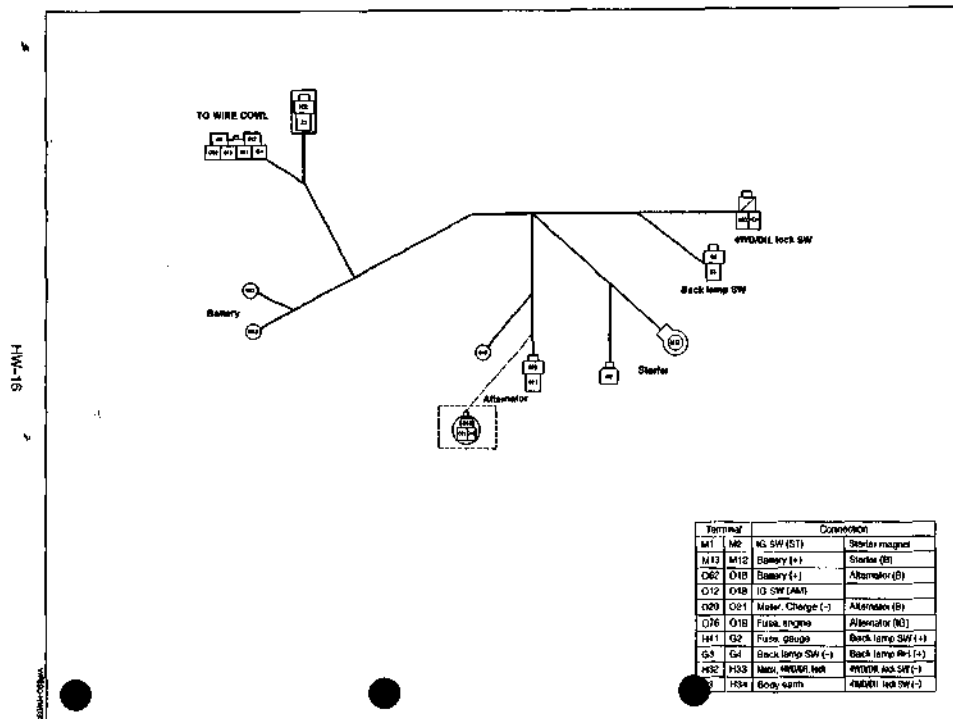


WIRE, ENGINE (HD-E engine)



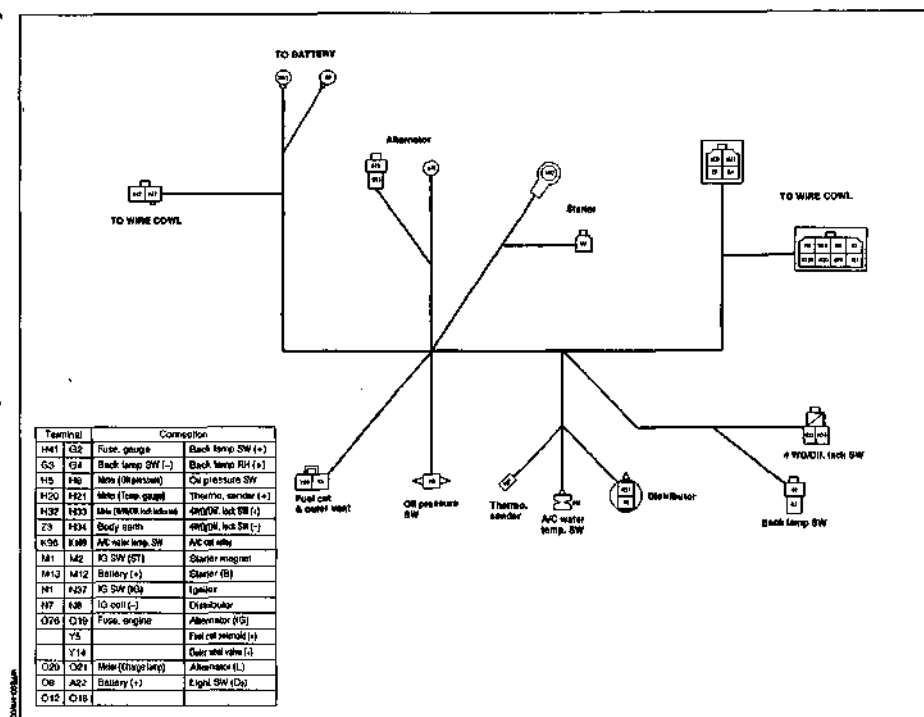
W1E20-11W024

HARNESSES & WIRING DIAGRAM **WIRE, ENGINE NO. 2 (HD-E engine)**



HW-16

HW-17



WIRE, ALTERNATOR (HD-C engine)

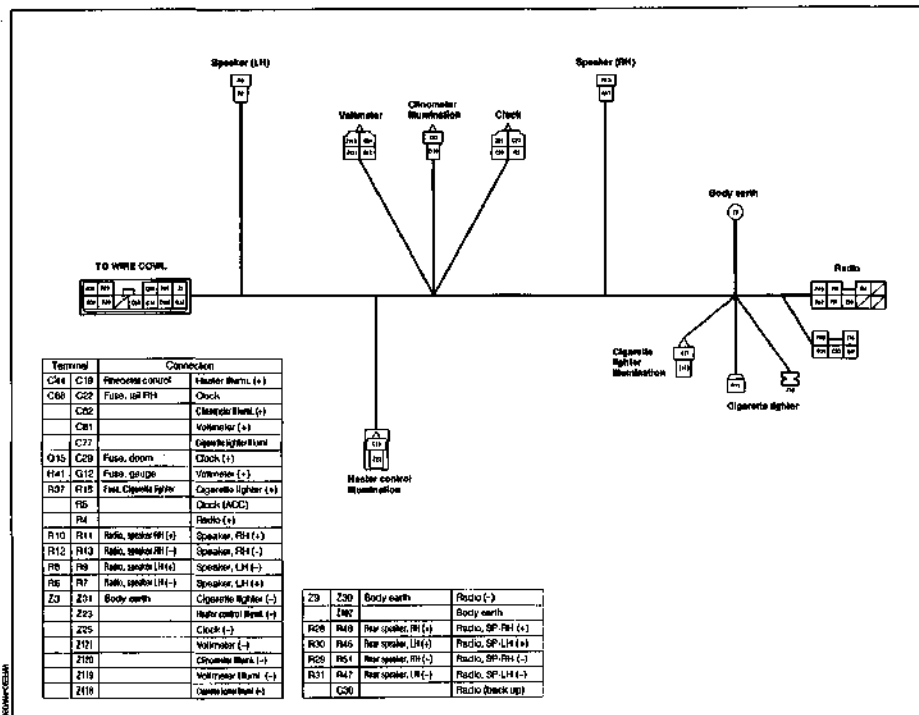
HARNES & WIRING DIAGRAM

HARNESSES & WIRING DIAGRAM



HW-19

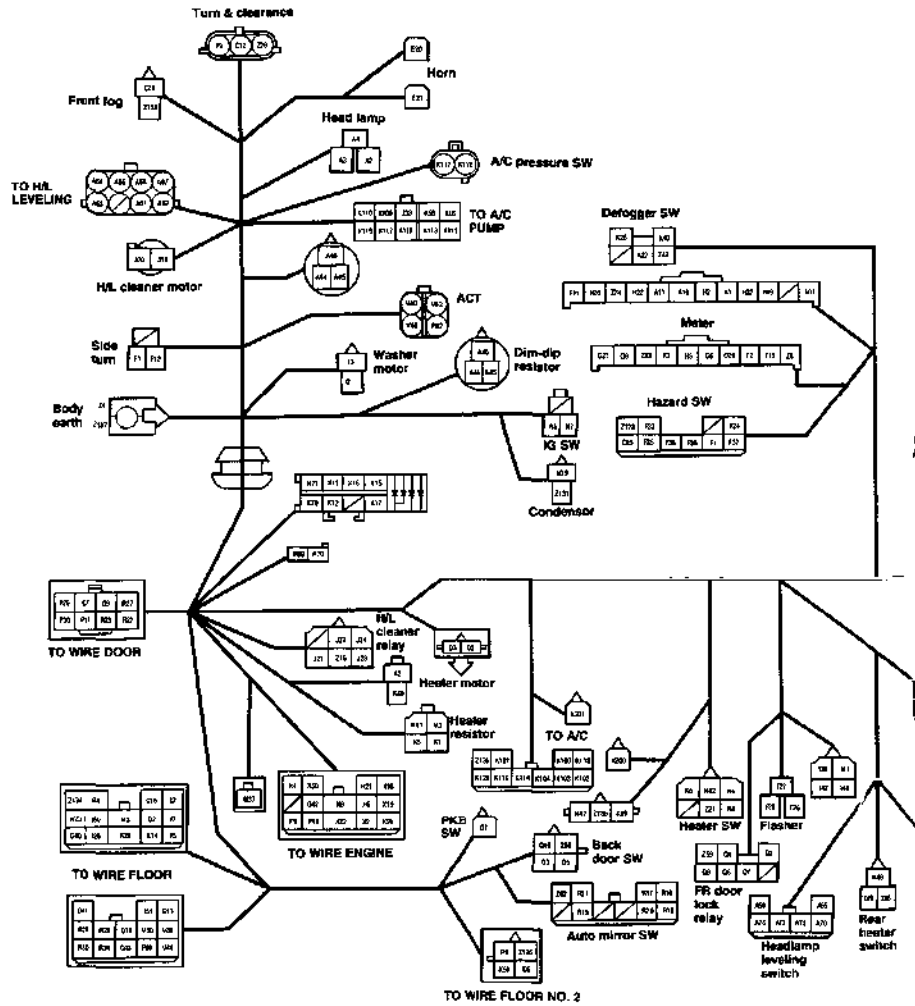
WIRING



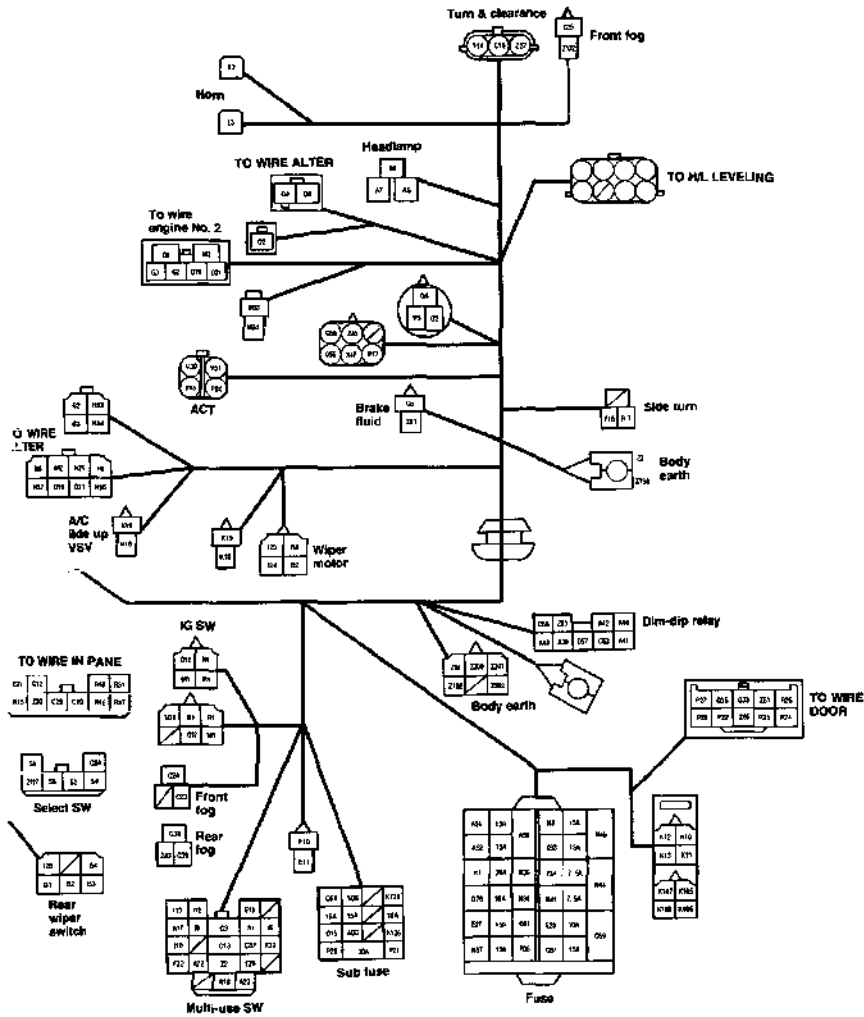
WIRE, INSTRUMENT PANEL (LHD)

HARNES & WIRING DIAGRAM

WIRE, COWL (RHD)

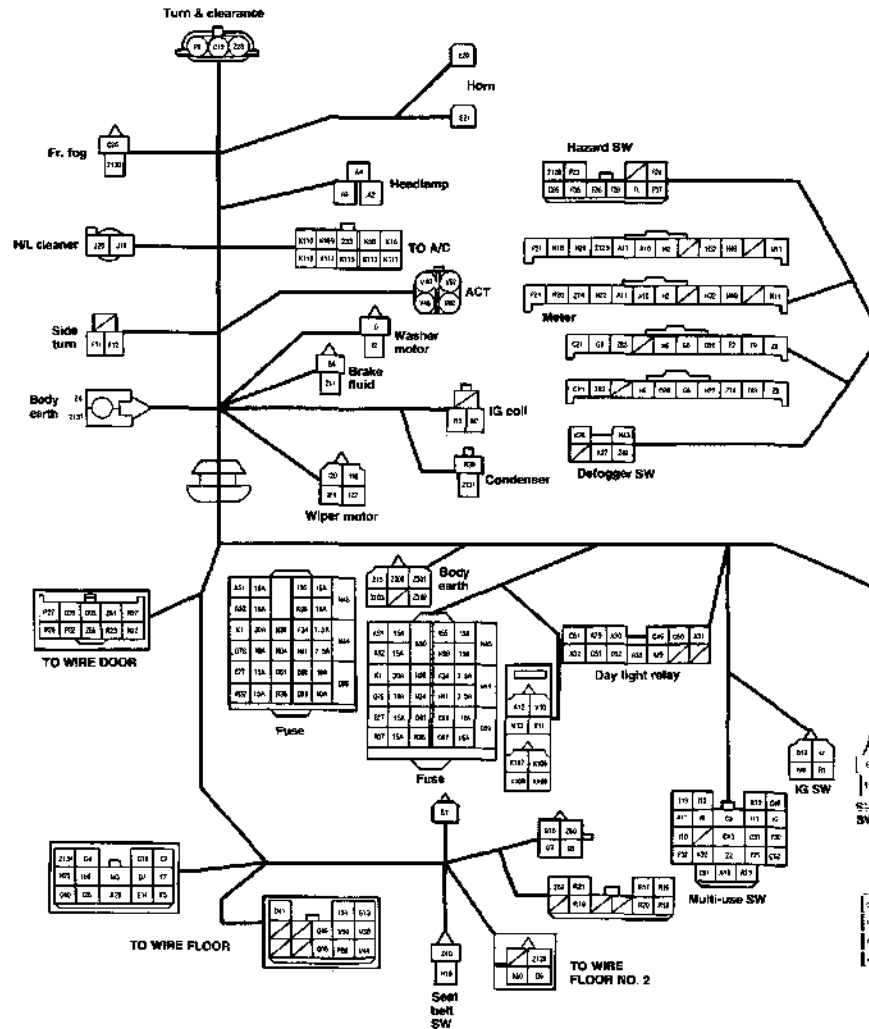


HARNESS & WIRING DIAGRAM



WF290-1WC39

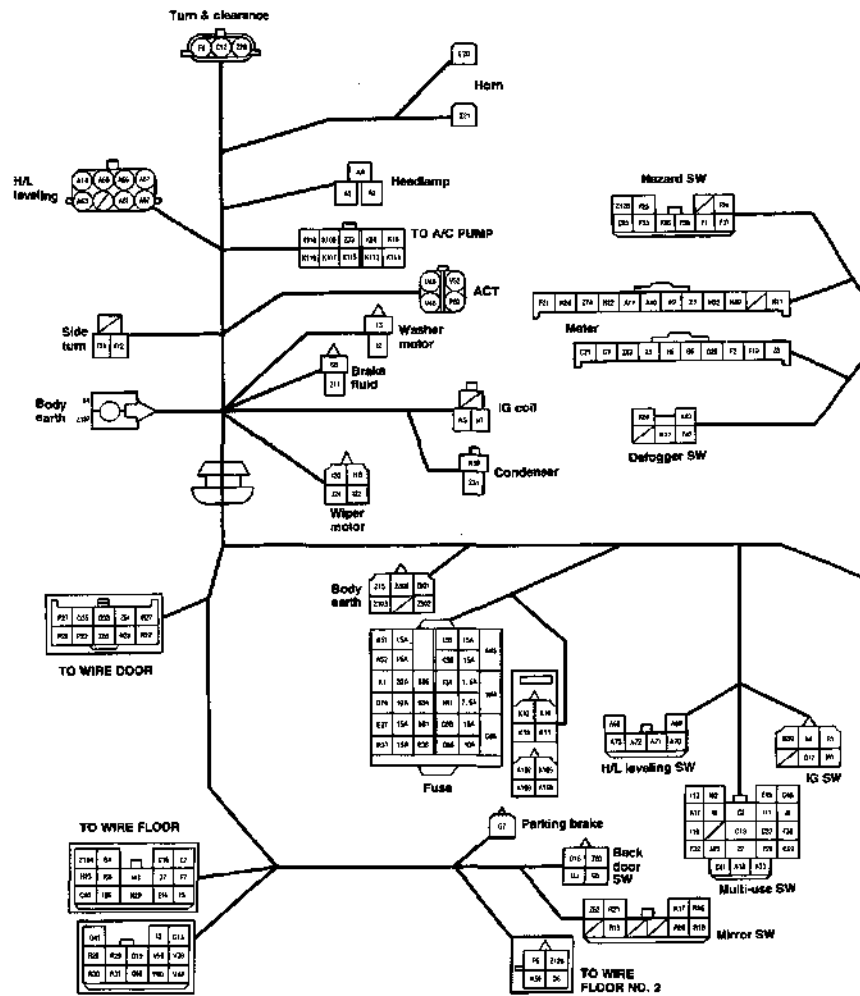
WIRE, COWL (LHD)



The diagram illustrates the electrical wiring for a vehicle, organized into several functional sections:

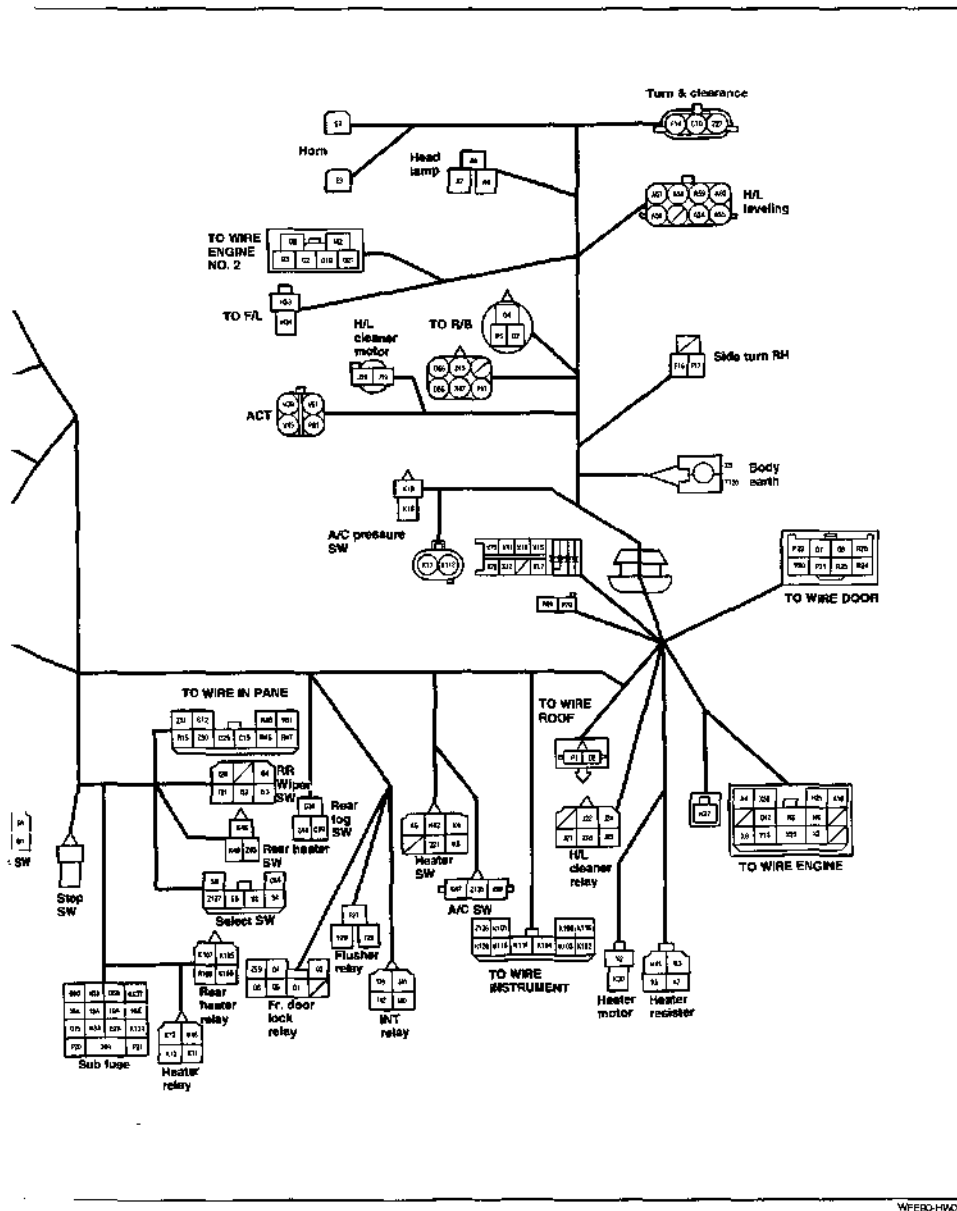
- Top Section:** Includes the "Turn & clearance" switch (74, 75, 76, 77), "Front fog" light (25, 26), "Side turn" switch (78, 79), and "Body earth" connection (300).
- Headlamp Section:** Features the "Headlamp" switch (45, 46) and "TO WIRE ALTER" connection (47, 48).
- A/C Section:** Includes the "A/C" switch (49, 50), "A/C idle up" switch (41, 42), and "A/C pressure SW" (43, 44).
- Door and Heater Section:** Shows the "TO WIRE DOOR" connection (61, 62, 63, 64), "Heater register" (11, 12), "Heater motor" (13, 14), "H/L cleaner relay" (21, 22, 23, 24), and "TO WIRE ROOF" connection (25, 26).
- Interior Controls Section:** Includes the "Stop SW" (111), "Select SW" (31, 32, 33, 34), "Rear heater SW" (35, 36, 37, 38), "Fog SW" (39, 40), "Heater SW" (41, 42, 43, 44), "A/C SW" (45, 46, 47, 48), "Fisher relay" (49, 50), "BNT relay" (51, 52), "Front door lock relay" (53, 54, 55, 56), "Rear heater relay" (57, 58, 59, 60), and "Sub fuse" (61, 62, 63, 64).
- Wiring Paths:** The diagram shows the flow of electricity from the battery (300) through various switches and relays to the components. Key wiring paths include:
 - From the battery to the "Turn & clearance" switch and "Front fog" light.
 - From the battery to the "Headlamp" switch and "TO WIRE ALTER" connection.
 - From the battery to the "A/C" switch and "A/C idle up" switch.
 - From the battery to the "TO WIRE DOOR" connection and "Heater register".
 - From the battery to the "H/L cleaner relay" and "TO WIRE ROOF" connection.
 - From the battery to the "Stop SW" and "Select SW".
 - From the battery to the "Rear heater SW" and "Fog SW".
 - From the battery to the "Heater SW" and "A/C SW".
 - From the battery to the "Fisher relay" and "BNT relay".
 - From the battery to the "Front door lock relay" and "Rear heater relay".
 - From the battery to the "Sub fuse" and "Heater relay".

WIRE, COWL (German Spec.)



HW-2

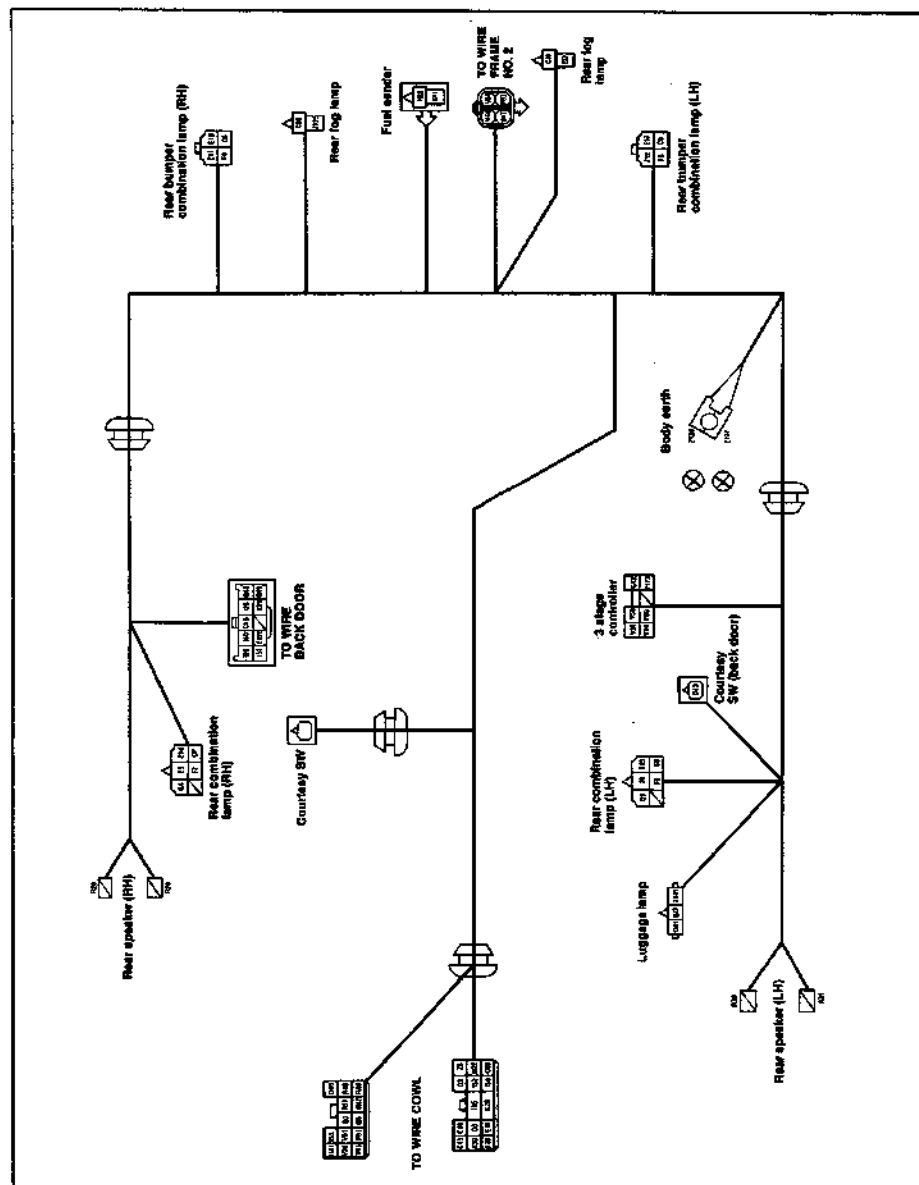
HARNESS & WIRING DIAGRAM



WFEBO-HVX040

HARNESS & WIRING DIAGRAM

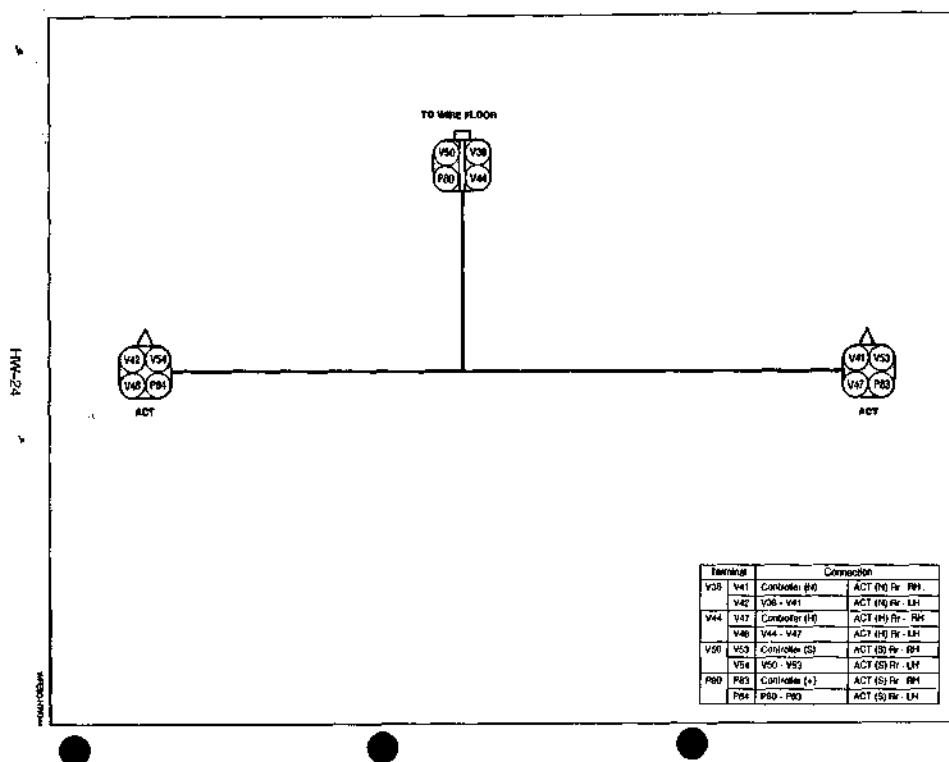
WIRE, FLOOR



VF290-11W642

HW-23

WIRE, FRAME NO. 2 (For 3 stage dumper)

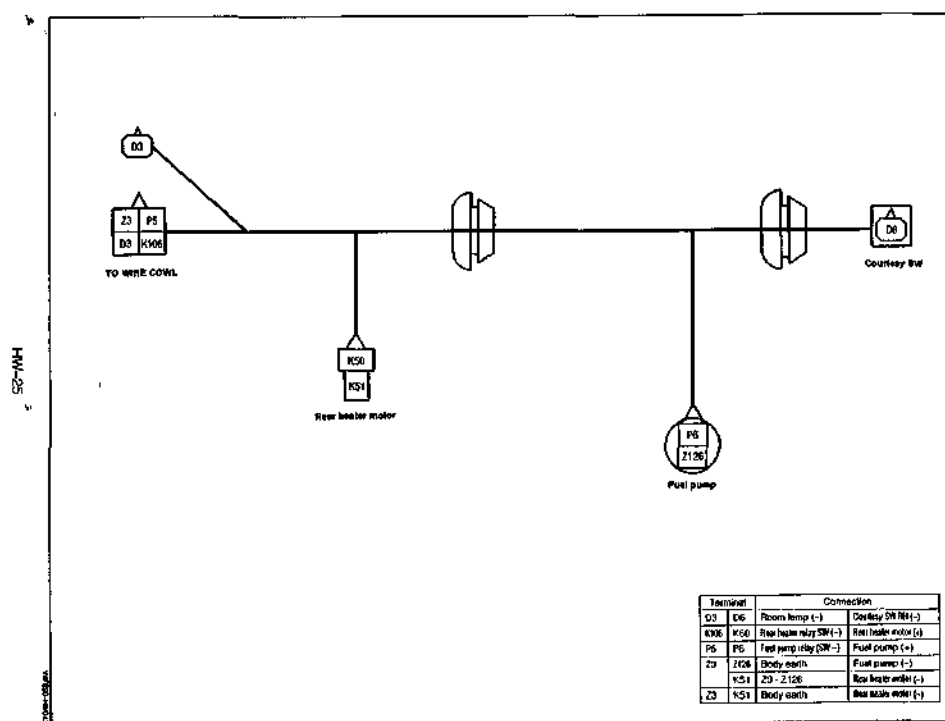


HARNESSES & WIRING DIAGRAM



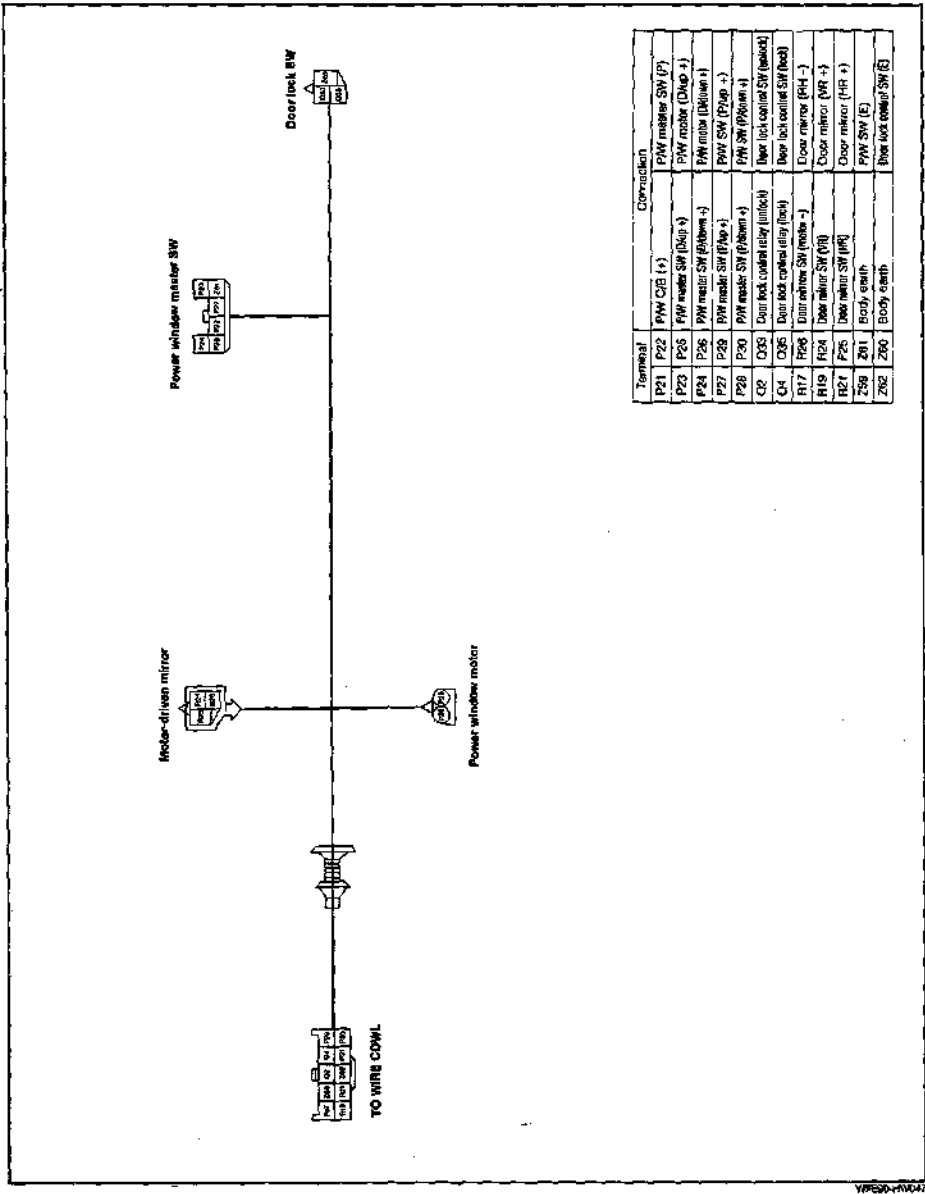
WIRE, FLOOR NO. 2

HARNES & WIRING DIAGRAM



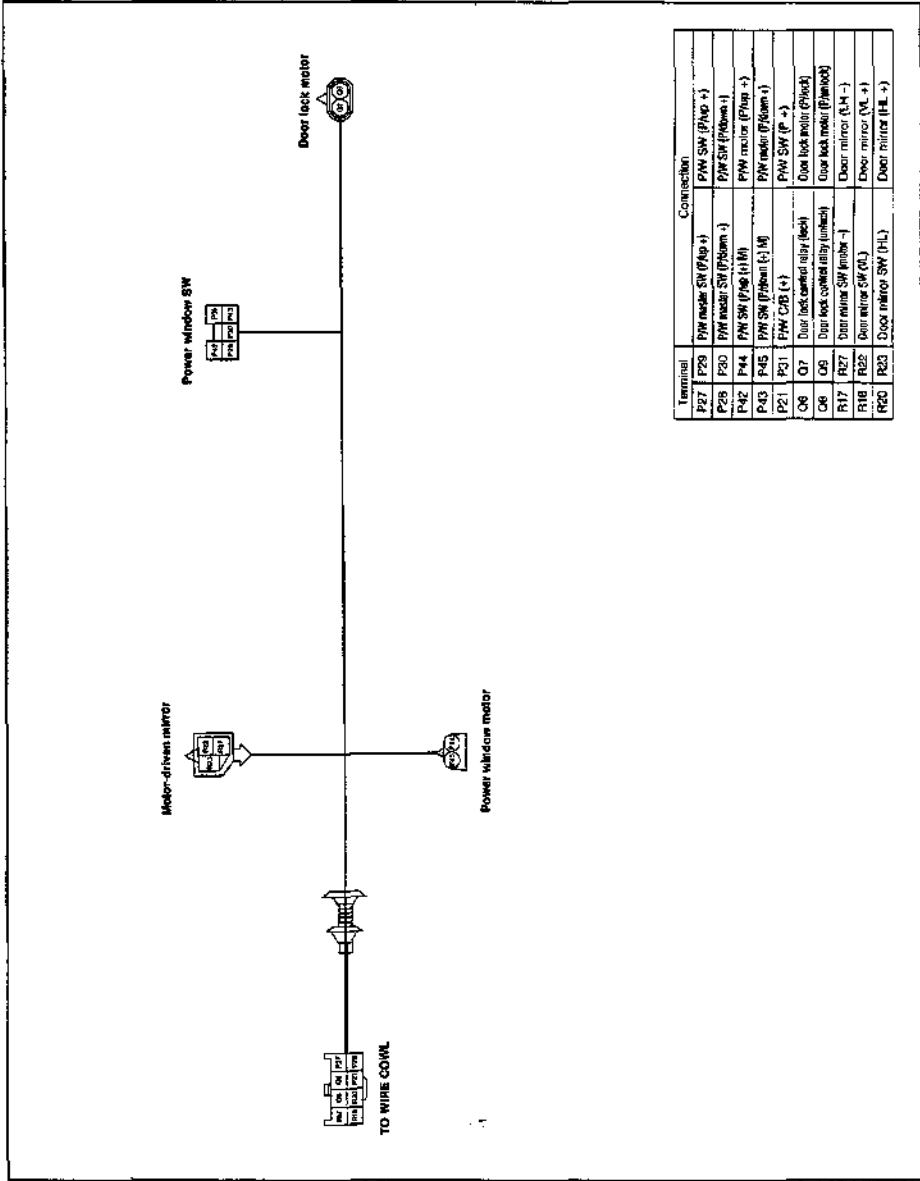
HARNESS & WIRING DIAGRAM

WIRE, FRONT DOOR (RH)



HARNES & WIRING DIAGRAM

WIRE, FRONT DOOR (LH)



Terminal	Connector
P27	PW motor SW (Up +)
P28	PW motor SW (Down -)
P29	PW motor SW (Up +)
P30	PW motor SW (Down -)
P42	PW SW (Up +)
P43	PW SW (Down -)
P44	PW SW (Up +)
P45	PW SW (Down -)
P46	PW SW (Up +)
P47	PW SW (Down -)
P48	PW SW (Up +)
P49	PW SW (Down -)
P50	PW SW (Up +)
P51	PW SW (Down -)
P52	PW SW (Up +)
P53	PW SW (Down -)
P54	PW SW (Up +)
P55	PW SW (Down -)
P56	PW SW (Up +)
P57	PW SW (Down -)
P58	PW SW (Up +)
P59	PW SW (Down -)
P60	PW SW (Up +)
P61	PW SW (Down -)
P62	PW SW (Up +)
P63	PW SW (Down -)
P64	PW SW (Up +)
P65	PW SW (Down -)
P66	PW SW (Up +)
P67	PW SW (Down -)
P68	PW SW (Up +)
P69	PW SW (Down -)
P70	PW SW (Up +)
P71	PW SW (Down -)
P72	PW SW (Up +)
P73	PW SW (Down -)
P74	PW SW (Up +)
P75	PW SW (Down -)
P76	PW SW (Up +)
P77	PW SW (Down -)
P78	PW SW (Up +)
P79	PW SW (Down -)
P80	PW SW (Up +)
P81	PW SW (Down -)
P82	PW SW (Up +)
P83	PW SW (Down -)
P84	PW SW (Up +)
P85	PW SW (Down -)
P86	PW SW (Up +)
P87	PW SW (Down -)
P88	PW SW (Up +)
P89	PW SW (Down -)
P90	PW SW (Up +)
P91	PW SW (Down -)
P92	PW SW (Up +)
P93	PW SW (Down -)
P94	PW SW (Up +)
P95	PW SW (Down -)
P96	PW SW (Up +)
P97	PW SW (Down -)
P98	PW SW (Up +)
P99	PW SW (Down -)
P100	PW SW (Up +)

HARNESS & WIRING DIAGRAM

WIRE, ENGINE

Terminal		Connection	
H5	H6	Meter, oil pressure	Oil pressure SW
H20	H21	Meter, temp. gauge	Thermo. sender (+)
K16	X19	A/C magnet clutch	ECU (A/C)
K96	K109	Water temp. SW (A/C)	A/C cut relay
N37	N30	Igniter (+B)	IG SW (IG2)
N7	N27	IG coil (-)	ECU (IG)
	N8		Distributor (-)
O55	O42	Fuse, back-up (-)	ECU (BATT)
O39	O40	Relay box, EFI main (-)	ECU (+E1)
	O41		ECU (+B2)
	X8		Idle up VSV (+)
P17	P18	Fuel pump relay coil (-)	ECU (FC)
	P68		Check terminal (F/P)
X1	X2	Meter, diag.	ECU (W)
	X109		Check terminal (W)
X3	X4	Meter, reed SW	ECU (SPD)
X9	X12	Idle up VSV (-)	Diode
	X11		Blower SW
X17	X18	Diode (-)	ECU (ELS)
X20	X21	VF output	ECU (VF)
X13	X10	Diode	ECU (Visc)
X29	X30	ECU (THW)	Water temp. (+)
X32	X33	ECU (THA)	Intake temp. (+)
X35	X39	ECU (E2)	Throttle sensor (E2)
	X31		Water temp. sensor (-)
	X34		Intake temp. sensor (-)
X99	X44	ECU (E21)	Pressure sensor (E21)
X36	X40	ECU (IDL)	Throttle sensor (IDL)
X37	X41	ECU (PSW)	Throttle sensor (PSW)
X38	X46	ECU (VCC)	Pressure sensor (VCC)
X43	X45	ECU (PIM)	Pressure sensor (PIM)
X47	X50	Injector relay (-)	Injector #1 (+)
	X52		Injector #2 (+)
	X54		Injector #3 (+)
	X57		Injector #4 (+)

Terminal		Connection	
X56	X55	ECU #10	Injector #3 (-)
	X51		Injector #1 (-)
	X53		Injector #2 (-)
	X58		Injector #4 (-)
X96			ECU #20
X22	X116	ECU (STA)	Diode
M1	X115	IG SW (ST)	Diode
Z46	X57	ECU (T1)	Check terminal (T1+)
Z47	Z49	ECU (E01)	Engine earth
Z48	Z138	ECU (E1)	Engine earth
	X58		Check terminal (T1-)
	X65		Sealed wire
	X88		Sealed wire
Z44	Z76	Engine earth	ECU (E02)
X27	X28	ECU	O ₂ sensor

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HARNESS & WIRING DIAGRAM

WIRE, COWL (RHD) — (1)

Terminal	Connection
O4	A22 Fusible link Light SW (D2)
A50	A23 Fuse Headlamp Light SW (D1)
A52	A2 Fuse Headlamp (LH) Headlamp LH
A51	A6 Fuse Headlamp (RH) Headlamp RH
	A10 A51 - A6 Meter, high beam indicator
A3	A17 Headlamp LH (Hi) Dimmer SW (HM)
	A7 A3 - A19 Headlamp RH (Hi)
	A11 A3 - A17 Meter high beam indicator
A4	A18 Headlamp LH (Lo) Dimmer SW (Hs)
	A8 A4 - A18 Headlamp RH (Lo)
A8	A18 Headlamp RH (Lo) Dimmer SW (Hs)
	A40 A8 - A18 Dim-Dip relay (1)
	A44 A8 - A18 Dim-Dip resistor (RH)
A4	A41 Headlamp LH (Lo) Dim-Dip relay (5)
	A45 A4 - A41 Dim-Dip resistor (LH)
A42	A46 Dim-Dip relay (2) Dim-Dip resistor (-)
	A39 A50 - A23 Dim-Dip relay (8)
	A43 A3 - A17 Dim-Dip relay (9)
C87	C3 Fuse, tail Side lamp SW (TB)
C13	C7 Side lamp SW (S) Tail lamp RH (+)
	C10 C13 - C7 Clearance lamp RH (+)
	C12 C13 - C7 Clearance lamp LH (+)
	C16 C13 - C7 License lamp (+)
	C19 C13 - C7 Heater illumin. (+)
	C21 C13 - C7 Meter illumin. (+)
	C29 Q15 - Q16 Clock (+)
	C84 C13 - C7 Select SW illumin. (+)
	C86 C18 - C7 Hazard SW illumin. (+)
	C63 C13 - C7 Dim-Dip relay (6)
C37	C38 Light SW (RF) RR. fog lamp SW (+)
C39	C40 RR fog lamp SW (-) RR. fog lamp (+)
	C23 C13 - C7 FR. fog lamp SW (+)
C24	C25 FR fog lamp SW (-) FR. fog RH (+)
	C26 C24 - C25 FR. fog LH (+)
	D41 Q15 - Q16 Luggage lamp (+)
	D2 Q15 - Q16 Room lamp (+)
D3	D7 Room lamp (-) Courtesy SW LH

Terminal	Connection
D3	D6 D3 - D7 Courtesy SW RH
E28	E10 Fuse, stop Stop lamp SW (+)
E11	E14 Stop lamp SW (-) Stop lamp RH (+)
E21	E19 Horn LH (-) Horn SW (+)
	E3 E21 - E19 Horn RH (+)
E27	F23 Fuse, horn Hazard SW (B2)
	E2 E27 - F23 Horn RH (+)
	E20 E27 - F23 Horn LH (+)
F1	F2 Hazard SW (R) Meter, red hazard
F34	F24 Fuse, turn Hazard SW (B1)
F26	F38 Flusher relay (B) Hazard SW (F1)
F27	F35 Flusher relay (L) Hazard SW (TB)
	F32 F27 - F35 Turn SW (+)
F29	F9 Turn SW (L) FR. turn lamp LH (+)
	F5 F29 - F9 RR. turn lamp LH (+)
	F11 F29 - F9 Side turn lamp LH (+)
	F19 F29 - F9 Meter turn indicator LH
	F37 F29 - F9 Hazard SW (TL)
F30	F14 Turn SW (R) FR. turn lamp RH (+)
	F7 F30 - F14 RR. turn lamp RH (+)
	F16 F30 - F14 Side turn lamp RH (+)
	F21 F30 - F14 Meter turn indicator RH
	F36 F30 - F14 Hazard SW (TR)
	F12 Z137 - Z28 Side turn lamp LH (-)
	F17 Z130 - Z27 Side turn lamp RH (-)
	F28 Z302 - Z126 Flusher relay (E)
G3	G4 Back lamp SW (-) Back lamp RH (+)
G6	G7 Meter, brake fluid Parking brake SW
	G8 G6 - G7 Brake fluid level SW
G9	G7 Meter, parking brake Parking brake SW
	G12 H41 - H2 Volt meter (+)
	G13 H41 - H2 3 stage controller
H41	H2 Fuse, gauge Meter IG (+)
	G2 Back lamp SW (+)
H5	H6 Meter, Oil pressure Oil pressure SW
H25	H21 Meter, temp. gauge Thermo. senda
H22	H23 Meter, fuel gauge Fuel senda

HARNESS & WIRING DIAGRAM

WIRE, COWL (RHD) — (2)

Terminal		Connection
H32	H33	Meter, 4WD Indicator 4WD/Dif. lock SW (+)
	H34	Z130 - Z27 4WD/Dif. lock SW (-)
	H49	H32 - H33 Meter, dif. lock Indicator
I55	I10	Fuse, wiper FR. wiper SW (+)
	I2	I55 - I10 FR. washer motor (+)
	I22	I55 - I10 FR. wiper motor (+)
	I42	I55 - I10 INT. relay (B)
I3	I6	FR. washer motor (-) FR. washer SW (+)
I8	I41	FR. wiper SW (INT) INT. relay (INT)
I11	I18	FR. wiper SW (Lo) FR. wiper motor (Lo)
I12	I20	FR. wiper SW (Hi) FR. wiper motor (Hi)
I13	I39	FR. wiper SW (OFF) INT. relay (WS)
I24	I40	FR. wiper motor (com) INT. relay (WM)
	I28	I55 - I10 RR. washer SW (+)
I28	I31	RR. washer SW (+) RR. wiper SW (+)
	I43	I55 - I10 RR. wiper motor (B)
I52	I50	RR. wiper SW (Wip) RR. wiper motor (+1)
I53	I51	RR. wiper SW (S) RR. wiper motor (S)
I54	I26	RR. washer SW (-) RR. washer motor (+)
K8	K70	Heater SW (L) Diode
	J19	O8 - O12 H/L cleaner motor (+)
J20	J21	H/L cleaner motor (-) H/L cleaner relay (M)
	J22	A51 - A6 H/L cleaner relay (H/L)
	J23	I55 - I10 H/L cleaner relay (B)
	J24	I3 - I6 H/L cleaner relay (WM)
K71	K13	Diode Heater relay
K98	K27	Fuse, defogger Defogger SW (+)
K28	K29	Defogger SW (-) RR. defogger (+)
	K43	C13 - C7 Defogger SW Illum. (+)
K1	K10	Fuse, heater Heater relay (+)
K2	K11	Heater motor (+) Heater relay (-)
K30	K4	Heater motor (-) Heater SW (M)
	K3	K3 - K4 Heater resistor (H)
K41	K42	Heater resistor (H2) Heater SW (M2)
K5	K6	Heater resistor (M1) Heater SW (M1)
	K7	Z4 - Z300 Heater resistor (L)
	K12	H41 - H2 Heater relay (coil +)

Terminal		Connection
K8	K13	Heater SW (L) Heater relay (coil -)
K48	K106	RR. heater SW (+) RR. heater relay (coil -)
K50	K106	RR. heater motor (+) RR. heater relay (-)
	K40	K50 - K106 RR. heater SW (-)
	K105	K1 - K10 RR. heater relay (+)
	K107	H41 - H2 RR. heater relay (coil +)
O2	K58	Fusible link A/C relay (+)
K2	K137	K2 - K11 Fuse, A/C
K136	K47	Fuse, A/C A/C SW (+)
K99	K100	A/C SW (-) A/C amp. (B)
	K11	K99 - K100 A/C sub. (G1)
	K101	N7 - N8 A/C amp. (C)
K16	K102	A/C sub. A/C amp. (D)
K18	K103	A/C idle up VSV A/C amp. (E)
K19	K104	A/C idle up VSV A/C amp. (F)
	K17	K19 - K104 A/C pressure SW (1)
K109	K96	A/C sub. (E1) A/C water temp. SW
	K110	H41 - M2 A/C sub. (F1)
K112	K113	A/C pressure SW A/C sub. (H1)
K114	K115	A/C amp. (M) A/C sub. (J1)
K116	K117	A/C amp. (L) A/C sub. (K1)
K118	K119	A/C amp. (Q) A/C sub. (L1)
K120	Z135	A/C amp. (P) A/C SW (E)
K200	K201	A/V volume A/C amp.
M1	M2	IG SW (ST) Starter magnet
N1	N34	IG SW (IG) Fuse
	N44	N1 - N34 Fuse, turn gauge
	N45	N1 - N34 Fuse, wiper defogger
	N5	N1 - N34 IG coil (IG +)
	N37	N1 - N34 Igniter (B)
	N39	N1 - N34 Condensor (+)
	N36	O8 - O12 Fuse heater
	N7	N8 IG coil (-) Distributor (+)
N30	N11	N7 - N8 Meter, IG (-)
	N5	IG SW (IG2) IG coil (IG +)
	N37	N5J - N5 Ignitor (B)
	N38	N30 - N5 Fuse, EFI 2

HARNESS & WIRING DIAGRAM

WIRE, COWL (RHD) — (3)

Terminal	Connection
N30	N30 - N5 Condensor (+)
N33	Q56 Fuse, EFI 2 EFI relay
O8	O12 Fusible link IG SW (AM)
O8	Fusible link O12
O12	O8 IG SW (AM)
O42	O55 ECU (BATT) Fuse, back up
O59	O8 - O12 Fuse, tail-stop
O60	O8 - O12 Fuse, lock-doom
O61	O4 - A22 Fuse, Horn
O19	O76 Alternator (IG) Fuse, engine
O20	O21 Meter, CHG Alternator
O57	O19 - O76 Dim-Dip relay (7)
O68	O4 - A22 Dim-Dip relay (4)
Z4	Z131 Body earth Condensor (E)
P5	P6 Fuel pump relay (-) Fuel pump (+)
P17	P68 Fuel pump relay (-) Diode
P18	P70 ECU (FC) Diode
Z4	Z300 Body earth Body earth
Z302	Z126 Body earth Fuel pump (E)
P80	P81 Controller (-) ACT, FR-RH motor (-)
P82	P80 - P81 ACT, FR-LH motor (-)
Q15	Q16 Fuse, doom-lock Lock SW (E)
Q5	Q18 Lock SW (lock) Lock motor (lock)
Q3	Q19 Lock SW (unlock) Lock motor (unlock)
R1	R36 IG SW (ACC) Fuse, cigarette lighter
R15	R37 Cigarette lighter Fuse, cigarette lighter
S8	Z4 - Z300 Select SW (-)
S2	V38 - V39 Select SW (N)
S4	V44 - V45 Select SW (N)
S6	V50 - V51 Select SW (S)
V38	V39 Controller (N) ACT SW (N), FR, RH
V40	V38 - V39 ACT SW (N), FR, LH
V44	V45 Controller (N) ACT SW (H), FR, RH
V46	V44 - V45 ACT SW (H), FR, LH
V50	V51 Controller (S) ACT SW (S), FR, RH
V52	V50 - V51 ACT SW (S), FR, LH
X1	X2 Meter, diagnosis ECU (W)

Terminal	Connection
X3	X4 Meter, read SW ECU (SPD)
X9	X11 Idle up VSV Diode
X12	K8 - K70 Diode
X15	K28 - K29 Diode
X16	A52 - A2 Diode
X17	X18 Diode ECU (ELS)
X19	K16 - K102 ECU (A/C)
X22	M1 - M2 ECU (STA)
X47	X50 Injector relay Injector #1
Z3	Z301 Body earth Body earth
Z4	Body earth Body earth
Z130	Z27 Body earth Clearance RH (E)
Z137	Z126 Body earth Fuel pump (E)
Z2	Z3 - Z301 Dimmer SW (E)
Z11	Z130 - Z27 Oil level SW (E)
Z16	Z4 - Z300 H/L cleaner relay (E)
Z21	Z4 - Z300 Heater SW (E)
Z14	Z8 Body earth Meter earth
Z102	Z30 Body earth Radio (E)
Z137	Z28 Body earth Clearance LH (E)
Z131	Body earth Condensor (E)
Z31	Z4 - Z300 Cigarette lighter (E)
Z33	Z132 - Z28 A/C sub. (E)
Z42	Z302 - Z126 Defogger SW (E)
Z43	Z130 - Z21 FR, fog, SW (E)
Z45	Z130 - Z27 Relay box (E)
Z60	Z302 - Z126 Lock SW (E)
Z102	Z74 Body earth Meter gauge (E)
Z14	Z83 Body earth Meter speed sensor (E)
Z80	Z130 - Z21 Dim-Dip relay (E)
Z85	Z4 - Z300 RR, heater SW (E)
Z127	Z4 - Z300 Select SW Illumi. (E)
Z128	Z302 - Z126 Hazard SW Illumi. (E)
Z132	Z130 - Z27 FR, fog RH (-)
Z14	Z133 Z137 - Z28 FR, fog, LH (-)
Z134	Z302 - Z126 RR, body earth
Z136	Z302 - Z126 A/C amp. (E)

HARNESS & WIRING DIAGRAM

WIRE, COWL (RHD) — (4)

Terminal	Connection		
Z130	Z21	Body earth	Heater SW
	A61	A52 - A2	H/L leveling LH (+)
	A54	A51 - A6	H/L leveling RH (+)
A56	A63	H/L leveling RH (0)	H/L leveling LH (0)
	A69	A56 - A63	H/L leveling SW (0)
A57	A64	H/L leveling RH (1)	H/L leveling LH (1)
	A70	A59 - A64	H/L leveling SW (1)
A58	A65	H/L leveling RH (2)	H/L leveling LH (2)
	A71	A58 - A65	H/L leveling SW (2)
A59	A66	H/L leveling RH (3)	H/L leveling LH (3)
	A72	A59 - A66	H/L leveling SW (3)
A60	A67	H/L leveling RH (4)	H/L leveling LH (4)
	A73	A60 - A67	H/L leveling SW (4)
	A55	Z130 - Z27	H/L leveling RH (E)
	A62	Z137 - Z28	H/L leveling LH (E)
	A68	Z3 - Z4	H/L leveling SW (E)
	P20	N1 - N34	Power window C/B (+)
P21	P22	Power window C/B (-)	P/W master SW (+)
	P31	P21 - P22	P/W passenger (+)
P27	P29	P/W master SW (P) up	P/W SW (P) up
P28	P30	P/W master SW (P) down	P/W SW (P) down
Q2	Q33	Door lock relay (unlock)	Door lock SW (unlock)
Q4	Q35	Door lock relay (lock)	Door lock SW (lock)
Q6	Q7	Door lock relay (lock)	Motor (lock)
Q8	Q9	Door lock relay (unlock)	Motor (unlock)
	Q1	Q8	Door lock relay (+)
R18	R22	Door mirror SW (VL)	Door mirror (VL +)
R19	R24	Door mirror SW (VR)	Door mirror (VR +)
R20	R23	Door mirror SW (HL)	Door mirror (HL +)
R21	R25	Door mirror SW (HR)	Door mirror (HR +)
R17	R27	Door mirror SW (M)	Door mirror (LH -)
	R26	R17 - R27	Door mirror (RH -)
	R16	R15 - R37	Door mirror SW (+)
	Z59	Z302 - Z126	Door lock relay (E)
	Z61	Z3 - Z301	P/W SW (E)
	Z62	Z302 - Z126	Door mirror SW (E)
	Z65	Z3 - Z301	Door lock SW (E)

Terminal	Connection		
R28	R48	Rear speaker RH (+)	Radio (SP. RH +)
R29	R51	Rear speaker RH (-)	Radio (SP. RH -)
R30	R46	Rear speaker LH (+)	Radio (SP. RH +)
R30	R47	Rear speaker LH (-)	Radio (SP. RH -)

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HARNESS & WIRING DIAGRAM

WIRE, COWL (LHD) — (1)

Terminal	Connection	
O4	A22	Fusible link Light SW (D2)
A50	A23	Fuse, headlamp Light SW (D1)
A52	A2	Fuse, headlamp LH Headlamp LH (B)
A51	A6	Fuse, headlamp RH Headlamp RH (B)
	A10	A51 - A6 Meter, high beam indicator (+)
A3	A17	Headlamp LH (Hi) Dimmer SW (HiM)
	A7	A3 - A17 Headlamp RH (Hi)
	A11	A3 - A17 Meter, high beam indicator (-)
A4	A18	Headlamp LH (Lo) Dimmer SW (HiS)
	A8	A4 - A18 Headlamp RH (Lo)
	A29	O4 - A22 Day light relay (2)
	A30	A50 - A23 Day light relay (3)
	A31	A4 - A18 Day light relay (6)
	A32	Z3 - Z301 Day light relay (7)
	A33	A3 - A17 Day light relay (10)
C87	C3	Fuse, tail Side light SW (TB)
C13	C7	Side lamp SW (S) Tail lamp RH (+)
	C10	C13 - C7 Clearance lamp RH (+)
	C12	C13 - C7 Clearance lamp LH (+)
	C16	C13 - C7 License lamp (+)
	C19	C13 - C7 Heater Illum. (+)
	C21	C13 - C7 Meter Illum. (+)
	C29	Q15 - Q16 Clock (+)
	C84	C13 - C7 Select SW Illum. (+)
	C85	C13 - C7 Hazard SW Illum. (+)
C37	C38	Light SW (RF) RR. fog SW (+)
C39	C40	RR. fog SW (-) RR. fog lamp (+)
	C23	C13 - C7 RR. fog SW (+)
C24	C25	FR. fog SW (-) FR. fog lamp RH (+)
	C26	C24 - C25 FR. fog lamp LH (+)
	C49	C87 - C3 Day light relay (4)
C92	C50	Tail SW Day light relay (5)
C91	C51	Tail SW Day light relay (8)
	C3	O8 - O12 Side lamp SW (TB)
C13	C86	Side lamp SW (S) Fuse, tail
C88	C10	Fuse, tail RH Clearance lamp RH (+)
	C7	C88 - C10 Tail lamp RH (+)

Terminal	Connection	
C88	C19	C88 - C10 Heater Illum. (+)
	C21	C88 - C10 Meter Illum. (+)
	C84	C88 - C10 Select SW Illum. (+)
	C85	C88 - C10 Hazard SW Illum. (+)
C89	C12	Fuse, tail LH Clearance lamp LH (+)
	C16	C89 - C12 License lamp (+)
	C48	C89 - C12 Light SW (DM)
	D2	Q15 - Q16 Room lamp (+)
D3	D7	Room lamp (-) Courtesy SW LH
	D6	D3 - D7 Courtesy SW RH
	D41	Q15 - Q16 Luggage lamp (+)
E26	E10	Fuse, stop Stop lamp SW (+)
E11	E14	Stop lamp SW (-) Stop lamp RH (+)
E21	E19	Horn LH (-) Horn SW (+)
	E3	E21 - E19 Horn RH (-)
E27	F23	Fuse, horn Hazard SW (B2)
	E2	E27 - F23 Horn RH (+)
	E20	E27 - F23 Horn LH (+)
F1	F2	Hazard SW (R) Red hazard lamp (+)
F34	F24	Fuse, turn Hazard SW
F26	F38	Flusher relay (B) Hazard SW (F1)
F27	F35	Flusher relay (L) Hazard SW (TB)
	F32	E27 - F35 Turn SW (+)
F29	F9	Turn SW (L) FR. turn lamp LH (+)
	F5	F29 - F9 RR. turn lamp LH (+)
	F11	F29 - F9 Side turn lamp LH (+)
	F19	F29 - F9 Meter turn indicator LH (+)
	F37	F29 - F9 Hazard SW (TL)
F30	F14	Turn SW (R) FR. turn lamp RH (+)
	F7	F30 - F14 RR. turn lamp RH (+)
	F16	F30 - F14 Side turn lamp RH (+)
	F21	F30 - F14 Meter turn indicator RH (+)
	F36	F30 - F14 Hazard SW (TR)
	F12	Z139 - Z28 Side turn lamp LH (-)
	F17	Z130 - Z27 Side turn lamp RH (-)
	F28	Z8 - Z301 Flusher relay (E)
	G2	H41 - H2 Back up lamp SW (+)

HARNESS & WIRING DIAGRAM

WIRE, COWL (LHD) — (2)

Terminal		Connection
G3	G4	Back up lamp SW (-) Back up lamp RH (+)
G6	G7	Meter brake fluid Parking brake SW (+)
	G8	G6 - G7 Brake fluid level SW (+)
G6	G8	Meter brake fluid Brake fluid level SW (+)
G9	G7	Meter, parking brake Parking brake SW (+)
	G12	H41 - H2 Volt meter (+)
	G13	H41 - H2 3 stage controller (+)
	H49	H32 - M33 Meter, oil lock indicator
H41	H2	Fuse, gauge Meter, IG (+)
H5	H6	Meter, oil pressure Oil pressure SW
H18	H19	Meter, seat belt warning Seat belt SW
H20	H21	Meter, temp. gauge Thermo. sender
H22	H23	Meter, fuel gauge Fuel sender
H32	H33	Meter, 4WD indicator 4WD/Dif. lock SW (+)
	H34	Z130 - Z27 4WD/Dif. lock SW (-)
I55	I10	Fuse, wiper FR. wiper SW (+)
	I2	I55 - I10 FR. washer motor (+)
	I22	I55 - I10 FR. wiper motor (+)
	I42	I55 - I10 INT relay (B)
I3	I6	FR. washer motor (+) FR. washer SW (+)
I8	I41	FR. wiper SW (INT) INT relay (INT)
I11	I18	FR. wiper SW (Lo) FR. wiper motor (Lo)
I12	I20	FR. wiper SW (Hi) FR. wiper motor (Hi)
I13	I39	FR. wiper SW (OFF) INT relay
I24	I40	FR. wiper motor (comm) INT relay
I31	I28	FR. wiper SW (+) RR. washer SW (+)
	I31	I55 - I10 RR. wiper SW (+)
	I43	I55 - I10 RR. wiper motor (B)
I56	I50	RR. wiper SW (wip) RR. wiper motor (+1)
I53	I51	RR. wiper SW (S) RR. wiper motor (S)
I54	I26	RR. washer SW (-) RR. washer motor (+)
	J19	O8 - O12 H/L cleaner motor (+)
J20	J21	H/L cleaner motor (-) H/L cleaner relay
	J22	A51 - A6 H/L cleaner relay (H/L)
	J23	I55 - I10 H/L cleaner relay
	J24	I3 - I6 H/L cleaner relay
K98	K27	Fuse, defogger Defogger SW (+)

Terminal		Connection
K28	J29	Defogger SW (-) RR. defogger (+)
	K43	C13 - C7 (C88 - C10) Defogger SW (Illum.) (+)
K1	K10	Fuse, heater Heater relay (+)
K2	K11	Heater motor (+) Heater relay (-)
K30	K4	Heater motor (-) Heater SW
	K3	K30 - K4 Heater resistor
K41	K42	Heater resistor (H2) Heater SW (H2)
K5	K6	Heater resistor (H1) Heater SW (H1)
	K7	Z3 - Z301 Heater resistor (L)
	K12	H41 - H2 Heater relay (coil +)
K8	K13	Heater SW (L) Heater relay (coil -)
	K105	K1 - K10 RR. heater relay (+)
	K107	H41 - H2 RR. heater relay (coil +)
K48	K108	RR. heater SW (+) RR. heater relay (coil -)
K50	K106	RR. heater motor (+) RR. heater (-)
	K49	K50 - K106 RR. heater SW (-)
O2	K58	F/L A/C A/C sub.
K136	K47	Fuse, A/C A/C SW (+)
K99	K100	A/C SW (-) A/C amp. (B)
	K111	K99 - K100 A/C sub.
	K101	N7 - N8 A/C amp.
K16	K102	A/C sub. A/C amp.
K18	K103	A/C idle up VSV A/C amp.
K19	K104	A/C idle up VSV A/C amp.
	K17	K19 - K104 A/C pressure SW
K109	K96	A/C sub. A/C water temp. SW
	K110	H41 - H2 A/C sub.
K112	K113	A/C pressure SW A/C sub.
K114	K115	A/C amp. A/C sub.
K116	K117	A/C amp. A/C sub.
K118	K119	A/C amp. A/C sub.
K120	Z135	A/C amp. A/C SW
	K137	K2 - K11 Fuse A/C
K220	K201	A/C volume A/C amp.
M1	M2	IG SW (ST) Starter magnet
	M9	M1 - M2 Day light relay
N1	N37	IG SW (IG) Igniter (B)

HARNESS & WIRING DIAGRAM

WIRE, COWL (LHD) — (3)

Terminal	Connection
N1	N5 N1 - N37 IG coil (IG +)
	N34 N1 - N37 Fuse, engine
	N39 N1 - N37 Condenser (+)
	N44 N1 - N37 Fuse, turn-gauge
	N45 N1 - N37 Fuse, wiper-washer
N7	N8 IG coil (-) Distributor (+)
	N11 N7 - N8 Meter IG (-)
	N36 O8 - O12 Fuse, heater
O8	FA - O12
	O12 O8 - IG SW
	O59 O8 - Fuse, tail-stop
	O60 O8 - Fuse, door-lock
O19	O76 Alternator (IG) Fuse, engine
	O51 O19 - O76 Day light relay
O20	O21 Meter, CHG Alternator (L)
	O52 O20 - O21 Day light relay
	O81 O4 - A22 Fuse, horn
P80	P81 Controller (-) ACT FR. RH (motor)
	P82 P80 - P81 ACT FR. LH (motor)
Q25	W16 Fuse, door-lock Back door lock SW
Q5	Q18 Door lock SW (lock) Back door motor (lock)
Q3	Q19 Door lock SW (unlock) Back door motor (unlock)
R1	R36 IG SW (ACC) Fuse, cigarette lighter
R15	R37 Cigarette lighter (+) Fuse, cigarette lighter
	S2 V38 - V39 Select SW (N)
	S4 V44 - V45 Select SW (H)
	S6 V50 - V51 Select SW (S)
	S8 Z4 - Z21 Select SW (-)
V38	V39 Controller (N) ACT SW (N) FR. RH
	V40 V38 - V39 ACT SW (N) FR. LH
V44	V45 Controller (H) ACT SW (H) FR. RH
	V46 V44 - V45 ACT SW (H) FR. LH
V50	V51 Controller (S) ACT SW (S) FR. RH
	V52 V50 - V51 ACT SW (S) FR. LH
Z3	Z301 Body earth Body earth
Z130	Z27 Body earth Clearance RH (E)
Z301	Z128 Body earth Fuel pump

Terminal	Connection
Z301	Z2 Z4 - Z21 Dimmer SW (E)
	Z8 Z3 - Z301 Meter, earth
	Z11 Z137 - Z28 Oil level SW (E)
	Z16 Z3 - Z201 H/L cleaner relay (E)
Z4	Z21 Body earth Heater SW (E)
Z103	Z30 Body earth Radio (E)
Z15	Z8 Body earth Meter (E)
Z103	Z129 Body earth Meter, gauge earth
	Z31 Z4 - Z21 Cigarette lighter (E)
	Z33 Z137 - Z28 A/C sub. (earth)
	Z42 Z3 - Z301 Defogger SW (E)
	Z43 Z4 - Z21 RR. fog SW (E)
	Z60 Z302 - Z126 Lock SW
Z103	Z74 Body earth Meter, gauge (E)
Z15	Z63 Body earth Meter, speed sensor (E)
Z137	Z28 Body earth Clearance LH (E)
	Z131 Body earth Condenser (E)
	Z40 Z302 - Z126 Seat belt SW (E)
	Z85 Z4 - Z21 RR. heater SW (E)
	Z127 Z4 - Z21 Select SW illumin. (-)
	Z128 Z3 - Z301 Hazard SW illumin. (-)
	Z132 Z137 - Z27 FR. fog lamp RH (-)
	Z133 V139 - Z28 FR. fog lamp LH (-)
	Z134 Z302 - Z126 RR. body earth
	Z65 Z302 - Z128 Door lock SW (E)
Z15	Z136 Z3 - Z301 A/C amp. (E)
	Z74 Body earth Meter, gauge (E)
	Z59 Z3 - Z301 Door lock relay (E)
	Z61 Z302 - Z126 P/W SW (E)
	Z62 Z302 - Z126 Door mirror SW (E)
	Z300 Z4 - Z21 Body earth
	P20 N1 - N37 Power window C/B (+)
	P21 P22 Power window C/B (-) P/W master SW (+)
P21	P31 P21 - P22 P/W passenger (+)
	P27 P29 P/W master SW (P) up P/W SW (P) up
P28	P30 P/W master SW (P) down P/W SW (P) down
Q2	Q33 Door lock relay Door lock SW (unlock)

HARNESS & WIRING DIAGRAM

WIRE, COWL (LHD) — (4)

Terminal		Connection	
Q4	Q35	Door lock relay	Door lock (lock)
Q6	Q7	Door lock relay	Motor (FR-P-lock)
Q8	Q9	Door lock relay	Motor (FR-P-unlock)
	Q1	Q6 -	Door lock relay (+)
R18	R22	Door mirror SW (VL)	Door mirror (VL +)
R19	R24	Door mirror SW (VR)	Door mirror (VR +)
R20	R23	Door mirror SW (HL)	Door mirror (HL +)
R21	R25	Door mirror SW (HR)	Door mirror (HR +)
R17	R27	Door mirror SW (motor)	Door mirror (LH -)
	R26	R17 - R27	Door mirror (RH -)
	R16	R15 - R37	Door mirror SW (+)

WP200-HW02

HARNESS & WIRING DIAGRAM

WIRE, COWL (German Spec.) — (1)

Terminal	Connection
O4	A22 Fusible link Light SW (D2)
A50	A23 Fuse, H/L Light SW (DL)
A52	A2 Fuse, H/L LH H/L LH (B)
A51	A6 Fuse, H/L RH H/L RH (B)
	A10 A51 - A6 High beam indicator (+)
A3	A17 H/L LH (Hi) Dimmer SW (H/L)
	A7 A3 - A17 H/L RH (Hi)
	A11 A3 - A17 High beam indicator (-)
A4	A18 H/L LH (Lo) Dimmer SW (HS)
	A8 A4 - A18 H/L RH (Lo)
	A29 O4 - A22 Day light relay
	A30 A50 - A23 Day light relay
	A31 A4 - A18 Day light relay
	A32 Z3 - Z301 Day light relay
	A33 A3 - A17 Day light relay
C87	C3 Fuse, tail Side lamp SW (TB)
C13	C7 Side lamp SW (S) Tail lamp RH (+)
	C10 C13 - C7 Clearance lamp RH (+)
	C12 C13 - C7 Clearance lamp LH (+)
	C16 C13 - C7 License lamp (+)
	C19 C13 - C7 Heater illumin. (+)
	C21 C13 - C7 Meter illumin. (+)
	C29 Q15 - Q16 Clock (+)
	C84 C13 - C7 Select SW illumin. (+)
	C85 C13 - C7 Hazard SW illumin. (+)
C37	C38 Lighting SW (RF) Rear fog SW (+)
C39	C40 Rear fog SW (-) Rear fog (+)
	C49 C87 - C3 Day light relay (4)
C92	C50 Tail SW (5) Day light relay (5)
C91	C61 Tail SW (8) Day light relay (8)
	C3 C8 - C12 Side lamp SW (TB)
C13	C86 Side lamp SW (S) Fuse, tail
C88	C10 Fuse, tail RH Clearance lamp RH (+)
	C7 C88 - C10 Tail lamp RH (+)
	C19 C88 - C10 Heater illumin. (+)
	C21 C88 - C10 Meter illumin. (+)
	C84 C88 - C10 Select SW illumin. (+)

Terminal	Connection
C88	C85 C88 - C10 Hazard SW illumin. (+)
C89	C12 Fuse, tail LH Clearance lamp LH (+)
	C16 C89 - C12 License lamp (+)
	C48 C89 - C12 Lighting SW (DM)
	D2 Q15 - Q16 Room lamp (+)
D3	D7 Room lamp (-) Courtesy SW LH
	D6 D8 - D7 Courtesy SW RH
	D41 Q15 - Q16 Luggage lamp (+)
E28	E10 Fuse, stop Stop lamp SW (+)
E11	E14 Stop lamp SW (-) Stop lamp RH (+)
E21	E19 Horn LH (-) Horn SW (+)
	E3 E21 - E19 Horn RH (-)
E27	F23 Fuse, horn Hazard SW
	E2 E27 - F23 Horn RH (+)
	E20 E27 - F23 Horn LH (+)
F1	F2 Hazard SW (R) Meter, red hazard (+)
F34	F24 Fuse, turn Hazard SW (B1)
F26	F38 Flusher relay (B) Hazard SW (F)
F27	F35 Flusher relay (L) Hazard SW (TB)
	F32 F27 - F35 Turn SW (+)
F29	F9 Turn SW (L) Fr. turn lamp LH (+)
	F5 F29 - F9 Rr. turn lamp LH (+)
	F11 F29 - F9 Side turn lamp LH (+)
	F19 F29 - F9 Meter, turn indicator LH (+)
	F37 F29 - F9 Hazard SW (TL)
F30	F14 Turn SW (R) Fr. turn lamp RH (+)
	F7 F30 - F14 Rr. turn lamp RH (+)
	F16 F30 - F14 Side turn lamp RH (+)
	F21 F30 - F14 Meter, turn indicator RH (+)
	F36 F30 - F14 Hazard SW (TR)
	F12 Z137 - Z26 Side turn lamp LH (-)
	F17 Z130 - Z27 Side turn lamp RH (-)
	F28 Z3 - Z301 Flusher relay (E)
	H49 H32 - H33 Meter, diff. lock
	G2 H41 - H2 Back lamp SW (+)
G3	G4 Back lamp SW (-) Back lamp RH (+)
G6	G8 Meter, brake fluid Brake fluid level SW (+)

HARNESS & WIRING DIAGRAM

WIRE, COWL (German Spec.) — (2)

Terminal		Connection	
G9	G7	Meter, parking brake	Parking brake SW (+)
	G12	H41 - H2	Volt meter
	G13	H41 - H2	3 stage controller
H41	H2	Fuse, gauge	Meter IG (+)
H5	H6	Meter, oil pressure	Oil pressure SW
H20	H21	Meter, temp. gauge	Thermo. sender
H22	H23	Meter, fuel gauge	Fuel sender
H32	H33	Meter, 4WD indicator	4WD/Diff. lock SW (+)
	H34	Z130 - Z27	4WD/Diff. lock SW (-)
I55	I10	Fuse, wiper	Fr. wiper SW (+)
	I2	I55 - I10	Fr. washer motor (+)
	I22	I55 - I10	Fr. wiper motor (+)
	I42	I55 - I10	INT relay (B)
I3	I6	Fr. washer motor (-)	Fr. washer SW (+)
I8	I41	Fr. wiper SW (INT)	INT relay (INT)
I11	I18	Fr. wiper SW (Lo)	Fr. wiper motor (Lo)
I12	I20	Fr. wiper SW (Hi)	Fr. wiper motor (Hi)
I13	I38	Fr. wiper SW (Off)	INT relay (WS)
I24	I40	Fr. wiper motor (Comm)	INT relay (Wh)
	I28	I55 - I10	Rr. washer SW (+)
	I31	I55 - I10	Rr. wiper SW (+)
	I43	I55 - I10	Rr. wiper motor (B)
I52	I50	Rr. wiper SW (WIP)	Rr. wiper motor (+1)
I53	I51	Rr. wiper SW (S)	Rr. wiper motor (+)
I54	I26	Rr. washer SW (-)	Rr. washer motor (+)
	J19	O8 - O12	H/L cleaner motor (+)
J20	J21	H/L cleaner motor (-)	H/L cleaner relay (M)
	J22	A51 - A6	H/L cleaner relay (HL)
	J23	I55 - I10	H/L cleaner relay (B)
	J24	I3 - I6	H/L cleaner relay (INT)
K98	K27	Fuse, defogger	Defogger SW (+)
	K43	C13 - C7	Defogger SW illum. (+)
	K43	C88 - C10	Defogger SW illum. (+)
K1	K10	Fuse, heater	Heater relay (+)
K2	K11	Heater motor (+)	Heater relay (-)
K30	K4	Heater motor (-)	Heater SW (M)
	K3	K30 - K4	Heater resistor (M)

Terminal		Connection	
K41	K42	Heater resistor (M2)	Heater SW (M2)
K5	K6	Heater resistor (M1)	Heater SW (M1)
	K7	Z3 - Z301	Heater resistor (L)
	K12	H41 - H2	Heater relay coil (+)
K8	K13	Heater SW (Lo)	Heater relay coil (-)
	K107	H41 - H2	Rr. heater relay coil (+)
K48	K108	Rr. heater SW (+)	Rr. heater relay coil (-)
K50	K106	Rr. heater motor (+)	Rr. heater relay (-)
	K49	K50 - K106	Rr. heater SW (-)
	K105	K1 - K10	Rr. heater relay (+)
K8	K70	Heater SW (Lo)	Diode (-)
K71	K13	Diode (+)	Heater relay coil (-)
	K137	K2 - K11	Fuse, A/C
K19	K104	A/C, idle up VSV (-)	A/C, amp. (F)
	K19 - K104		A/C, pressure SW (1)
K136	K47	Fuse, A/C	A/C, SW (+)
K99	K100	A/C, SW (-)	A/C, amp. (B)
	K101	N7 - N8	A/C, amp. (C)
K16	K102	A/C, magnet clutch	A/C, amp. (D)
K18	K103	A/C, idle up VSV (+)	A/C, amp. (E)
K19	K104	A/C, idle up VSV (-)	A/C, amp. (F)
K120	Z135	A/C, amp. P	A/C, SW (-)
K109	K96	A/C, sub. E	Wat temp. SW (A/C)
	K110	H41 - H2	A/C, sub. F1
	K111	K99 - K100	A/C, sub. G1
K112	K113	A/C, pressure SW (2)	A/C, sub. M1
K114	K115	A/C, amp. M	A/C, sub. J1
K116	K117	A/C, amp. L	A/C, sub. K1
K118	K119	A/C, amp. Q	A/C, sub. L1
M1	M2	IG SW (ST)	Starter magnet
	M9	M1 - M2	Day light relay
	N36	O8 - O12	Fuse, heater
N1	N34	IG SW (IG1)	Fuse, engine
	N44	N1 - N34	Fuse, turn gauge
	N45	N1 - N34	Fuse, wiper defogger
N7	N8	IG coil (-)	Distributor (+)
	N11	N7 - N8	Meter IG (-)

HARNESS & WIRING DIAGRAM

WIRE, COWL (German Spec.) — (3)

Terminal		Connection
N30		IG SW (IG2) - N37
	N37	N30 - Igniter (B)
	N5	- N37 IG coil (IG +)
	N38	- N37 Fuse, EFI 2
	N39	- N5 Condenser (+)
N33	O56	Fuse, EFI 2 EFI relay coil (+)
O8		Fusible link - O12
	O12	O8 - IG SW (AM)
	O59	O8 - Fuse, tail stop
	O60	O8 - Fuse, door lock
O19	O76	Alternator (IG) Fuse, engine
	O51	O19 - O76 Day light relay (1)
Q2	K58	Fusible link A/C relay (+)
O20	O21	Meter, CHG Alternator (L)
	O52	O20 - O21 Day light relay (9)
O42	O55	ECU (BATT) Fuse, back-up
	O61	O4 - A22 Fuse, horn
P5	P6	Fuel pump relay (-) Fuel pump (+)
P17	P69	Fuel pump relay coil (-) Diode
P18	P70	ECU (FC) Diode
P17	P18	Fuel pump relay coil (-) ECU (FC)
P80	P81	Controller (-) ACT Fr. RH motor (-)
	P82	P89 - P82 ACT Fr. LH motor (-)
Q15	Q16	Fuse, door lock Lock SW (B)
Q5	Q18	Lock SW (lock) Motor (lock)
Q3	Q19	Lock SW (unlock) Motor (unlock)
R1	R36	IG SW (ACC) Fuse, cigarette lighter
R15	R37	Cigarette lighter Fuse, cigarette lighter
	S2	V38 - V39 Select SW (N)
	S4	V44 - V45 Select SW (H)
	S6	V50 - V51 Select SW (S)
	S8	Z4 - Z21 Select SW (-)
V38	V39	Controller (N) ACT SW (N) Fr. RH
	V40	V38 - V39 ACT SW (N) Fr. LH
V44	V45	Controller (H) ACT SW (H) Fr. RH
	V46	V44 - V45 ACT SW (H) Fr. LH
V50	V51	Controller (S) ACT SW (S) Fr. RH

Terminal		Connection
V50	V52	V50 - V51 ACT SW (S) Fr. LH
X1	X2	Meter, diagnosis ECU (W)
X3	X4	Meter, reed SW ECU (SPD)
X9	X11	Idle up VSV Diode
	X12	K6 - K70 Diode
	X15	K28 - K29 Diode
	X16	A52 - A2 Diode
X17	X18	Diode ECU (ELS)
	X12	K8 - K13 Diode
	X22	M1 - M2 ECU (STA)
X47	X50	Injector relay Injector #1
	X92	E11 - E14 ECU (B/K)
Z3	Z301	Body earth Body earth
	Z33	Z3 - Z4 A/C, fan motor (-)
	Z136	Z3 - Z4 A/C, amp. (-)
X130	Z27	Body earth Clearance RH (-)
Z302	Z126	Body earth Fuel pump (-)
	Z2	Z4 - Z21 Dimmer SW (E)
	Z11	Z137 - Z28 Oil level SW (E)
	Z16	Z3 - Z301 H/L cleaner relay (E)
Z4	Z21	Body earth Heater SW (E)
Z108	Z30	Body earth Radio (E)
Z15	Z8	Body earth Meter (E)
	Z31	Z4 - Z21 Cigarette lighter (E)
	Z42	Z3 - Z301 Delogger SW (E)
	Z43	Z4 - Z21 Rear fog SW (E)
	Z45	Z130 - Z27 Relay Box (E)
	Z60	Z302 - Z126 Lock SW (E)
Z103	Z74	Body earth Gauge earth
Z15	Z83	Body earth Meter, speed sensor (-)
Z137	Z28	Body earth Condenser (E)
Z137	Z131	Body earth Condenser (E)
	Z85	Z4 - Z21 Rear heater SW (E)
	Z127	Z4 - Z21 Select SW illum. (-)
	Z128	Z3 - Z301 Hazard SW illum. (-)
	Z134	Z302 - Z126 Rr. body earth
	Z300	Z4 - Z21 Body earth

HARNESS & WIRING DIAGRAM

WIRE, COWL (German Spec.) — (4)

Terminal	Connection	
Z137	P20	N1 - N34
		Power window (+)
P21	P22	Power window (-)
		P/W master SW (+)
	P31	P21 - P22
		P/W passenger (+)
P27	P29	P/W master SW (P) up
		P/W SW (P) up
P28	P30	P/W master SW (P) down
		P/W SW (P) down
Q2	Q33	Door lock relay (unlock)
		Door lock SW (unlock)
Q4	Q3	Door lock relay (lock)
		Door lock SW (lock)
Q6	Q7	Door lock relay (motor)
		Motor Fr. P (lock)
Q8	Q9	Door lock relay (motor)
		Motor Fr. P (unlock)
Q8	Q1	Q8 -
		Door lock relay (+)
R18	R22	Door mirror SW (VL)
		Door mirror (VL +)
R19	R24	Door mirror SW (VR)
		Door mirror (VR +)
R20	R23	Door mirror SW (HL)
		Door mirror (HL +)
R21	R25	Door mirror SW (HR)
		Door mirror (HR +)
R17	R27	Door mirror SW (M)
		Door mirror (LH -)
	R26	R17 - R27
		Door mirror (RH -)
	R16	R15 - R37
		Door mirror SW (+)
	Z65	Z302 - Z126
		Door control SW (E)
	Z59	Z3 - Z301
		Door lock relay (E)
	Z61	Z302 - Z126
		P/W SW (E)
	Z62	Z302 - Z126
		Door mirror SW (E)
	A61	A52 - A2
		H/L leveling LH (+)
	A54	A51 - A6
		H/L leveling RH (+)
A56	A63	H/L leveling RH (0)
		H/L leveling LH (0)
	A69	A56 - A63
		H/L leveling SW (0)
A57	A64	H/L leveling RH (1)
		H/L leveling LH (1)
	A70	A57 - A64
		H/L leveling SW (1)
A58	A65	H/L leveling RH (2)
		H/L leveling LH (2)
	A71	A58 - A65
		H/L leveling SW (2)
A59	A66	H/L leveling RH (3)
		H/L leveling LH (3)
	A72	A59 - A66
		H/L leveling SW (3)
A60	A67	H/L leveling RH (4)
		H/L leveling LH (4)
	A73	A60 - A67
		H/L leveling SW (4)
	A55	Z130 - Z27
		H/L leveling RH (E)
	A62	Z137 - Z28
		H/L leveling LH (E)
	A68	Z4 - Z21
		H/L leveling SW (E)
R28	R48	Rear speaker RH (+)
		Radio (SP. RH +)

Terminal	Connection	
R29	R51	Rear speaker RH (-)
		Radio (SP. RH -)
R30	R46	Rear speaker LH (+)
		Radio (SP. LH +)
R31	R47	Rear speaker LH (-)
		Radio (SP. LH -)

WPB0-HV653

HARNESS & WIRING DIAGRAM

WIRE FLOOR

Terminal	Connection
C13	C7 Turn signal SW (S) Tail RH (+) (Body)
C13	C6 Turn signal SW (S) Tail RH (+) (Bumper)
C89	C16 Turn signal SW (S) Licence lamp (+)
	C8 C89 - C16 Tail LH (+) (Body)
	C9 C89 - C16 Tail LH (+) (Bumper)
C39	C40 Rear fog SW (-) Rear fog lamp (+)
	C83 C39 - C40 Rear fog lamp (+)
D3	D7 Door lamp SW (-) Door courtesy SW LH (+)
D40	D41 Fuse, door-lock Luggage lamp (+)
D42	D43 Luggage lamp (door) Courtesy SW (Back door)
E11	E17 Stop lamp SW (-) Stop lamp LH (+)/Bumper
E11	E14 Stop lamp SW (-) Stop lamp RH (+)/Body
	E15 E11 - E14 Stop lamp LH (+)/Body
	E16 E11 - E17 Stop lamp RH (+)/Bumper
F29	F5 Turn signal SW (L) Turn lamp LH (+)/Body
F29	F6 Turn signal SW (L) Turn lamp LH (+)/Bumper
F30	F7 Turn signal SW (R) Turn lamp RH (+)/Body
F30	F8 Turn signal SW (R) Turn lamp RH (+)/Bumper
G3	G5 Back up lamp SW (-) Back up lamp LH (+)
	G4 G3 - G5 Back up lamp RH (+)
H22	H23 Meter, fuel gauge Fuel sender
H41	G13 Fuse, gauge 3 stage controller (+)
I55	I29 Fuse, wiper Rear wiper motor (+)
I52	I50 Rear wiper SW (WIP) Rear wiper motor (+)
I53	I51 Rear wiper SW (WIP) Rear wiper motor (S)
I54	I26 Rear wiper SW (WAS) Rear washer motor (B)
K28	K29 Defogger SW (-) Defogger (+)
P80	P81 3 stage controller (-) ACT, Fr. RH motor (-)
	P83 P80 - P81 ACT, Rr. RH motor (-)
Q5	Q18 Motor lock SW (lock) Motor lock (lock)
Q3	Q19 Motor lock SW (unlock) Motor lock (unlock)
R28	R48 Rear speaker RH (+) Radio (Rr. SP. RH +)
R29	R51 Rear speaker RH (-) Radio (Rr. SP. RH -)
R30	R46 Rear speaker LH (+) Radio (Rr. SP. LH +)
R31	R47 Rear speaker LH (-) Radio (Rr. SP. LH -)
V38	V39 3 stage controller (N) ACT, Fr. RH (N)
	V41 V38 - V39 ACT, Rr. RH (N)

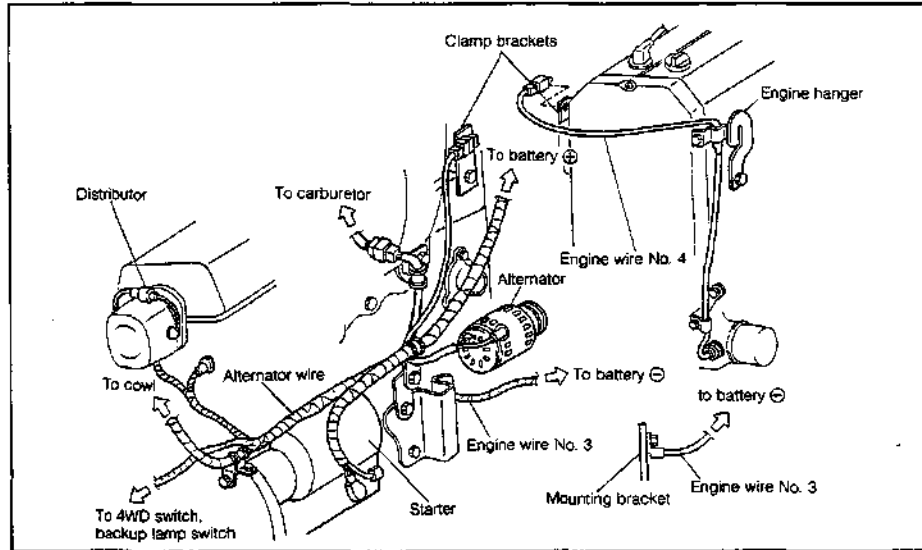
Terminal	Connection
V44	V45 3 stage controller (H) ACT, Fr. RH (H)
	V47 V44 - V45 ACT, Rr. RH (H)
V50	V51 3 stage controller (S) ACT, Fr. RH (S)
	V53 V50 - V51 ACT, Rr. RH (S)
Z137	Z3 Body earth Body earth
Z137	Z6 Body earth Rear comb. LH (-)/Body
	Z123 Z137 - Z6 3 stage controller (-)
	Z141 Z137 - Z6 Luggage lamp (-)
	Z12 Z137 - Z6 Rear comb. LH (-)/Bumper
Z134	Z41 Body earth Fuel sender (-)
Z134	Z122 Body earth Body earth
	Z5 Z134 - Z122 Rear comb. RH (-)/Body
	Z77 Z134 - Z122 Rear fog lamp (-)
	Z125 Z134 - Z122 Rear fog lamp (-)
	Z11 Z134 - Z122 Rear comb. RH (-)/Bumper

W/250-11W054

HARNESS & WIRING DIAGRAM

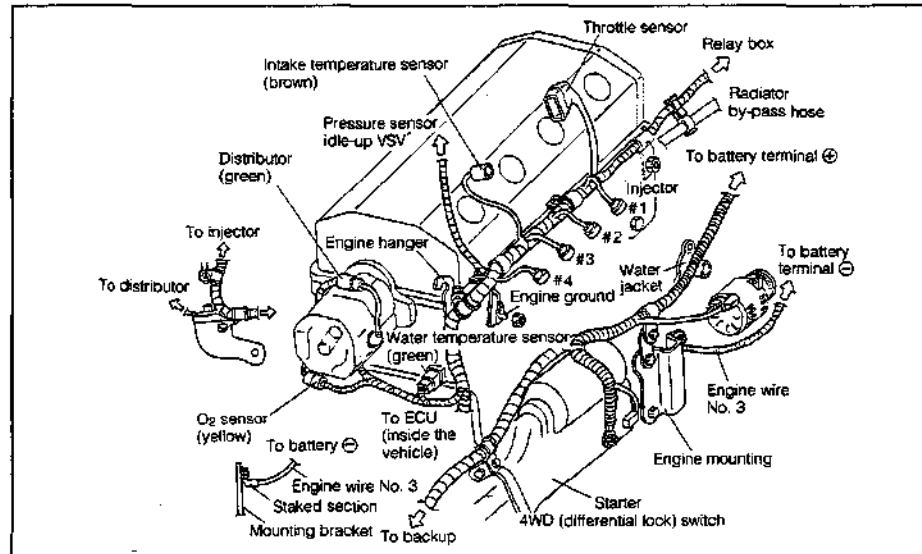
WIRING CLAMPING

Engine wire harness for HD-C engine



WPB01-HW046

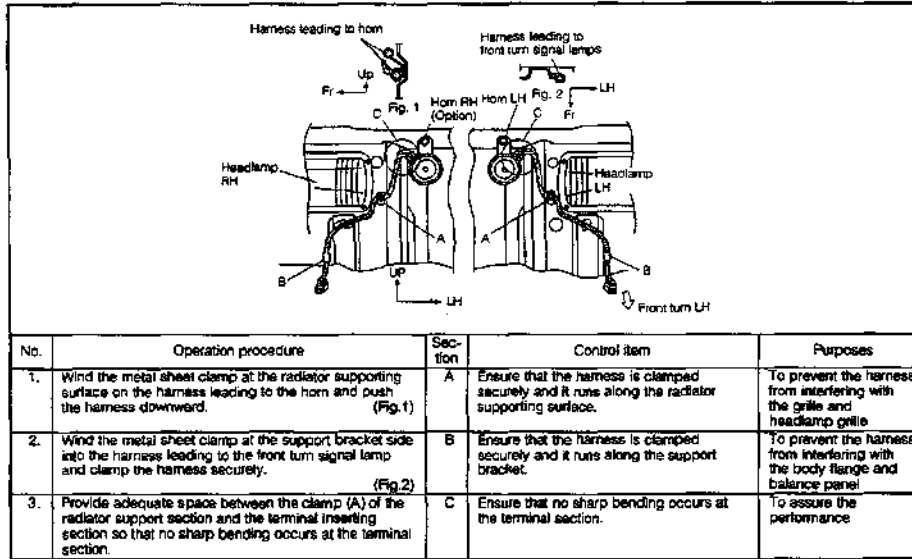
Engine wire harness for HD-E engine



WPB01-HW049

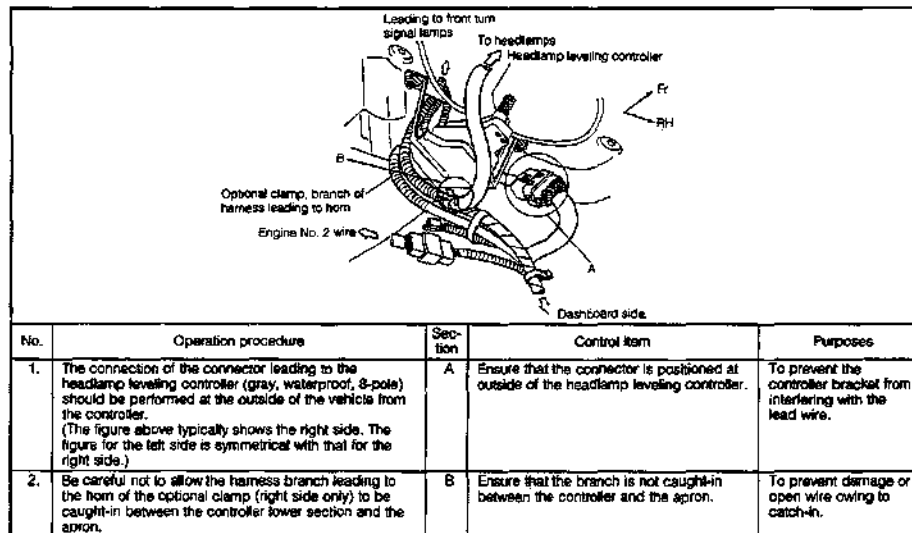
HARNESS & WIRING DIAGRAM

Section: Harness leading to horn and front turn signal lamps **Application: All vehicles**



WFEB-HW020

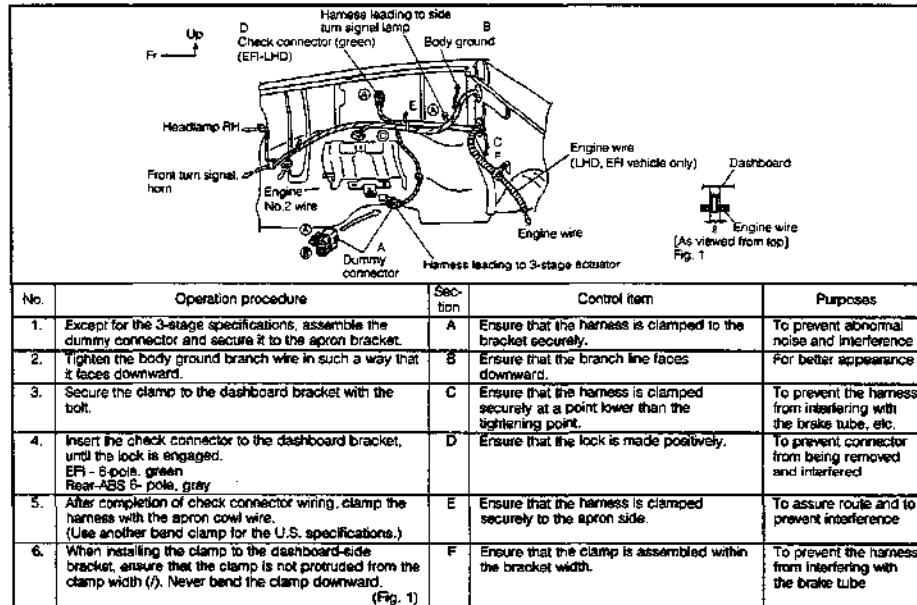
Section: Harness leading to headlamp leveling controller
Application: Headlamp leveling-equipped vehicles



WFEB-HW051

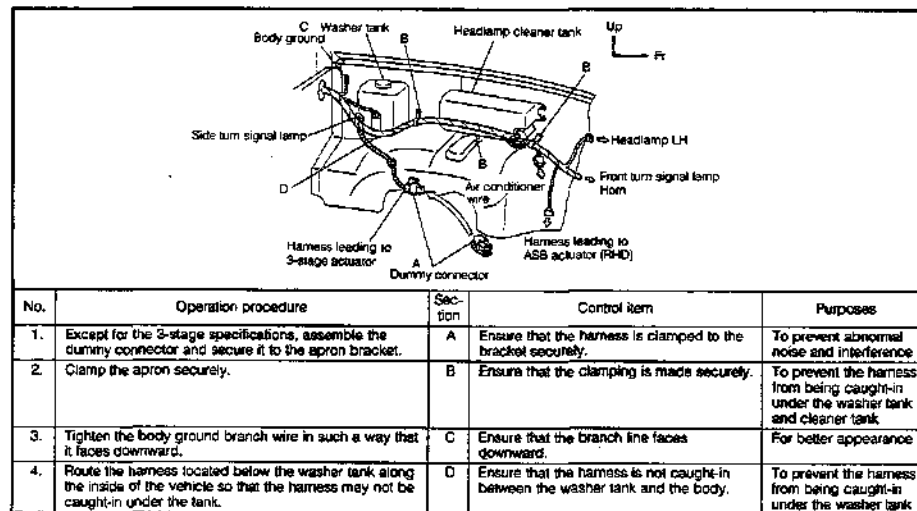
HARNESS & WIRING DIAGRAM

Section: Apron (right side) Application: All vehicles



WFEO-HW052

Section: Apron (left side) Application: All vehicles



WFEO-HW053

HARNESS & WIRING DIAGRAM

Section: Coil, resistor and engine wire Application: R.H.D. vehicles

No.	Operation procedure	Section	Control item	Purposes
1.	Clamp the harness to the dashboard bracket section, working from the top.	A	Ensure that the clamp is secured positively.	To prevent harness from interfering with brake and air conditioner-related piping and engine wire attaching bolts
2.	Secure the clamp to the dashboard bracket with the bolt.	B	Ensure that the harness is clamped securely at a point lower than the tightening point.	To prevent the harness from interfering with the brake tube, etc.
3.	Working from the top, insert the check connector to the dashboard bracket, until the lock is engaged.	C	Ensure that the lock is made positively.	To prevent connector from being disconnected and interfered
4.	When installing the clamp to the dashboard-side bracket, ensure that the clamp is not protruded from the clamp width (E). Never bend the clamp downward. (Fig. 1)	D	Ensure that the clamp is installed within the bracket width.	To prevent the harness from interfering with the brake tube To prevent interference with distributor and air-bleeding hose
5.	Place the connector (yellow, waterproof) with the dim dip resistor in front of the harness leading to the coil.	E	Ensure that the connector is positioned at front side of the harness leading to the coil.	To prevent the harness connector from interfering with the resistor

WP150-HW054

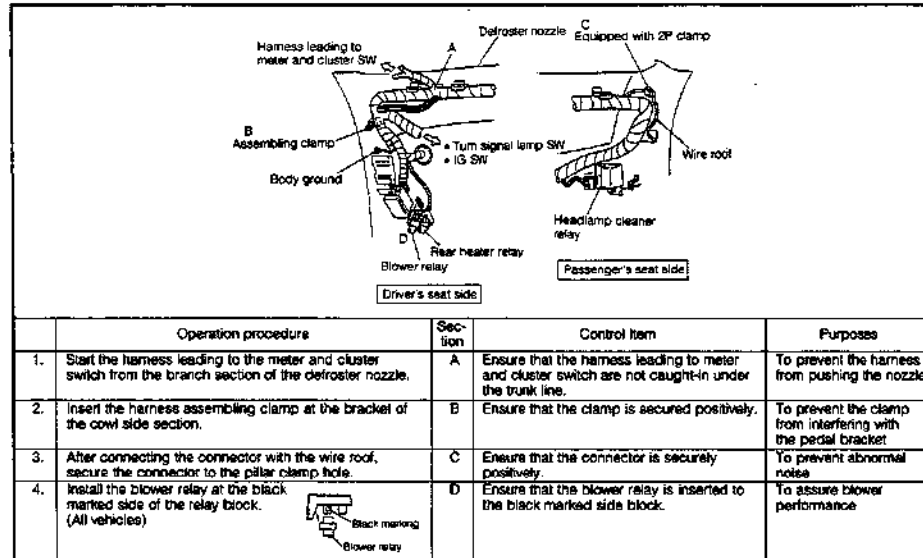
Section: Cowl top Application: All carburetor-equipped vehicles

No.	Operation procedure	Section	Control item	Purposes
1.	Secure the harness rising to the cowl top just under the hinge center by means of a S-shaped clamp. (Clamp the clamp marking tape (yellow) section.)	A	Ensure that the harness is secured positively at the body flange "U"-shaped zone just below the hinge center.	To prevent the harness to interfere with the hinge. ④ To prevent sag
2.	As for the harness leading to the air conditioner VSV, provide a branch point at inside of the band type clamp.	B	Ensure that the branch starts from the left side ⑤ of the clamp.	To prevent the harness to sag
			Ensure that the connector and harness are not sagging, thus interfering the booster hose.	To prevent the harness to interfere with the booster hose

WP150-HW055

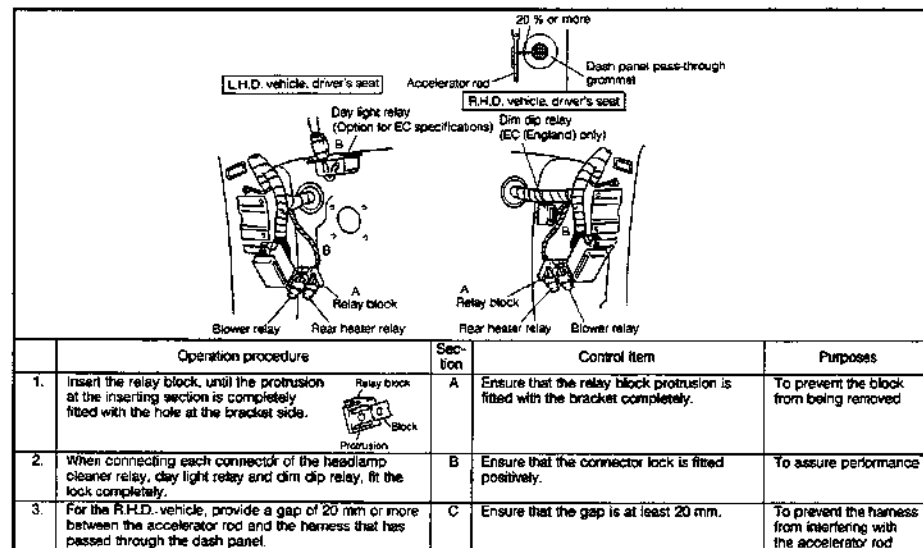
HARNESS & WIRING DIAGRAM

Section: Back side of instrument panel Application: All vehicles



WFB90-HW056

Section: Relays related to cowl side Application: All vehicles



WFB90-HW057

HARNESS & WIRING DIAGRAM

Section: Harness leading to instrument panel switch Application: R.H.D. vehicles

	Operation procedure	Section	Control item	Purposes
1.	Clamp the harness leading to the ignition switch by means of the metal sheet clamp of the instrument panel reinforcement.	A	Ensure that the clamp is secured positively.	To prevent the harness from interfering with the instrument panel, lower cover and duct.
2.	When any of the rear wiper, rear heater and fog lamp is not provided on the specifications, secure their switches by inserting the terminal section to the pin at the back side of the switch cover.	B	Ensure that the connector is secured positively.	To prevent the connector from interfering with the instrument panel and reinforcement.
3.	Route the branch lines of the harnesses leading to the rear heater switch, 3-stage switch and rear wiper switch under the instrument panel reinforcement and duct.	C	Ensure that the branch line passes under the instrument panel reinforcement and duct.	To prevent abnormal noise To prevent the branch lines from interfering with the steering bracket and the bolt at tilt section.

WFB04-HV080

Section: Harness leading to instrument panel switch Application: L.H.D. vehicles

	Operation procedure	Section	Control item	Purposes
1.	Clamp the harnesses leading to the instrument panel wire, selection switch, rear wiper switch and rear heater switch by means of the metal sheet clamp of the instrument panel reinforcement.	A	Ensure that the clamp is secured positively.	To prevent the harness from interfering with the instrument panel, lower cover and duct.
2.	When any of the rear wiper, rear heater and fog lamp is not provided on the specifications, secure their switches by inserting the terminal section to the rib at the back side of the switch cover.	B	Ensure that the connector is secured positively.	To prevent abnormal noise To prevent the connector from interfering with the instrument panel, duct and reinforcement.
3.	Route the harnesses leading to the turn signal lamp switch and ignition switch at the back side of the harness leading to the sub-fuse block and heater relay.	C	Ensure that the harnesses leading to the turn signal lamp switch and ignition switch pass at the back side of the harness leading to the sub-fuse block and heater relay.	To prevent abnormal noise
4.	Install the harness laterally in relation to the sub-fuse block installation.	D	Ensure that the harness is installed laterally in relation to the sub-fuse block installation.	To assure route To improve clutch pedal assembling operation

WFB04-HV081

HARNESS & WIRING DIAGRAM

Section: Harness leading to turn signal lamp switch Application: All vehicles

Operation procedure	Section	Control item	Purposes
1. After connecting the turn signal lamp switch connector, secure it to the bracket of the instrument panel retainer.	A	Ensure that the connector is secured to the bracket positively.	To prevent the connector from interfering with the retainer flange
2. Positively clamp the lead wire at the turn signal lamp switch side by means of the steering post clamp.	B	Ensure that the clamp is secured positively.	To prevent the lead wire from interfering with the retainer flange
3. Route the harness leading to the ignition switch in front of the turn signal lamp switch lead wire.	C	Ensure that the harness leading to the ignition switch is routed in front of the turn signal lamp switch wire.	To prevent the harness from interfering with the retainer flange

WFED-HW02

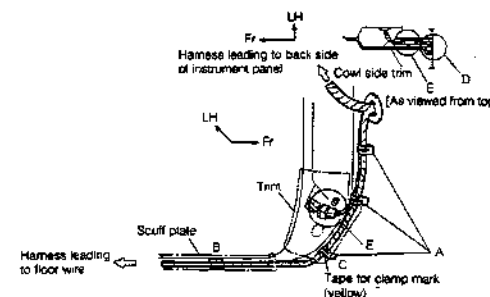
Section: Related to right cowl side Application: All vehicles

Operation procedure	Section	Control item	Purposes
1. L.H.D. vehicle: Route the branch line of the harness leading to the door between the dash panel attaching bracket of the ECU and the dash panel.	A	Ensure that the branch lines of the harnesses leading to the door and leading to the ABS ECU are placed between the ECU bracket and the dash panel. Ensure that the harness is not caught-in by the attaching bolt and bracket.	To assure the route
2. L.H.D. vehicle: When tightening the ECU attaching bracket, be careful not to allow the harness to be caught-in.			To assure the function
3. R.H.D. vehicle: Ensure that the branch line of the harness leading to the door is not protruded from the edge surface of the relay block toward the interior side.	B	Ensure that the branch lines of the harnesses leading to the door and leading to the ABS ECU are placed at the inside of the edge surface of the relay block. Also, ensure that the branch lines run along the cowl side.	To prevent the harness from interfering with the accelerator pedal
4. Place the connector connected with the door wire between the upper trim of the trim clip and the cowl side.	C	Ensure that the connector is placed between the upper trim of the trim clip and the cowl side.	To assure the route To prevent the trim from floating

WFED-HW03

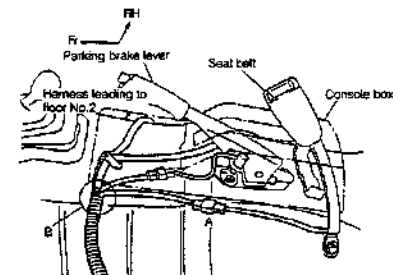
HARNESS & WIRING DIAGRAM

Section: Harness leading to cowl side floor Application: All vehicles

				
	Operation procedure	Section	Control item	Purposes
1.	When clamping with the metal sheet clamp at the dash panel section, ensure that the harness runs along the cowl side.	A	Ensure that the harness is clamped along the body.	To prevent the trim from floating
2.	Route the harness leading to the floor along the rocker panel and secure the harness with a gum tape.	B	Ensure that the harness leading to the floor is routed along the rocker panel.	To prevent the scuff plate from protruding toward the outside
3.	Clamp the harness at the tape section (yellow) for clamp mark.	C	Ensure that the harness is clamped securely at the position of the clamp mark.	To prevent the harness from meandering
4.	Route the branch line of the harness leading to the door wire along the trunk line of the harness leading to the wire floor. Clamp these lines together by means of the metal sheet clamp and store them inside the cowl side trim.	D	Ensure that the harness is clamped along the trunk line leading to the floor. Also, ensure that the line is stored inside the cowl side trim.	To assure the route To prevent the trim from floating
5.	Place the connector connected with the door wire on the upper side of the trim clip and between the trim and the cowl side.	E	Ensure that the connector is placed between the upper trim of the trim clip and the cowl side.	To assure the route To prevent the trim from floating

W7E50-HW084

Section: Related to console Application: Seat belt caution-equipped vehicles

				
	Operation procedure	Section	Control item	Purposes
1.	Place the connector and route of the harness leading to the seat belt switch at the outside of the console box.	A	Ensure that the connector and route of the harness leading to the seat belt switch are placed at outside of the console box.	To prevent the harness from being caught-in by the parking brake lever
2.	In cases where the branch starts from the front of the vehicle, provide branch points for the harnesses leading to the parking brake switch and leading to the seat belt switch at under the harness leading to the floor No.2 wire.	B	Ensure that the branch lines of the harnesses leading to the parking brake switch and leading to the seat belt switch are routed under the wire leading to the floor No.2.	To prevent the carpet from floating

W7E50-HW085

HARNESS & WIRING DIAGRAM

Section: Related to floor Application: All vehicles

Operation procedure	Section	Control item	Purposes
1. Positively clamp the harness at the floor side with the harness assembling clamp so that the harness may not interfere with the body mount. (Fig. 1)	A	Ensure that the harness runs along the floor side surface. Also, ensure that the harness is routed at the lower surface of the floor side at the assembling clamp section.	To prevent the harness from interfering with the body mount.
2. Positively secure the screw retaining clamp at a point where the harness runs at outside of the vehicle.	B	Ensure that the harness is routed at the outside of the vehicle against the top of the screw.	Measures against heat damage from the muffler. To prevent the harness from interfering with the heat insulator.
3. Set the floor pass-through grommet at the L.H. side of the vehicle in such a direction that the harness runs along the frame side. (As viewed from arrow A) (Install the grommet so that the white line for installation instruction may come at the front side of the vehicle.)	C	Ensure that the white line for installation instruction is parallel with the floor side and that it comes at the front side of the vehicle. (A)	To prevent the harness from interfering with the body mount. To prevent the metal sheet clamp from being detached. (A)
4. Install the metal sheet clamp, wrapping the edge of the clamp.	D	Ensure that the edge of the clamp is wrapped.	To prevent the clamp from being detached and sagging.

WFE20-HV006

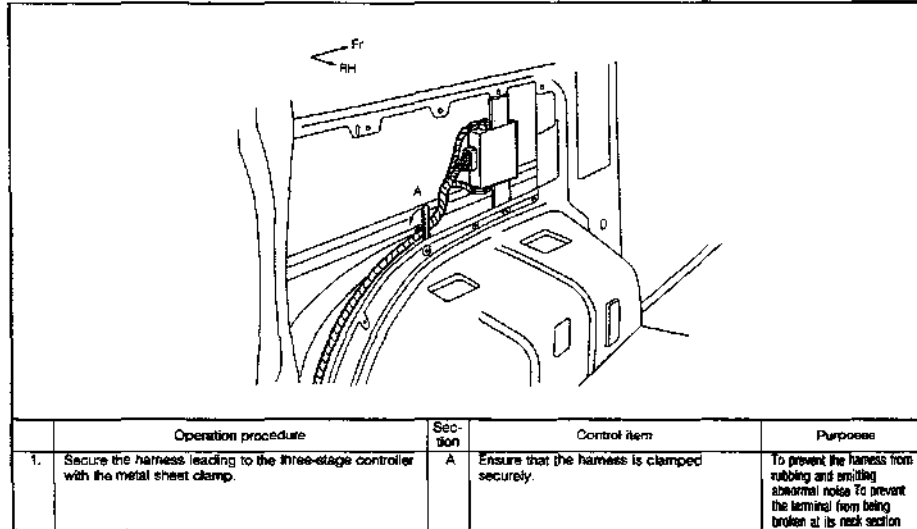
Section: Related to back door Application: All vehicles

Operation procedure	Section	Control item	Purposes
1. Secure the connectors of the license plate lamp, rear wiper and lock motor to the back side of the instrument panel.	A	Ensure that the connectors are secured positively.	To prevent abnormal noise and interference.
2. Connect the defogger (-) line so that the staked section of the harness may tilt 45 degrees from the front/inside of the vehicle.	B	Ensure that the angle is within 45 degrees.	To prevent the harness from being caught-in between the rear window seal rubber and the body.
3. Secure the wire leading to the defogger with a band clamp.	C	Ensure that the harness is clamped securely.	To prevent the harness from interfering with the door lock parts.

WFE20-HV007

HARNESS & WIRING DIAGRAM

Section: Harness leading to three-stage controller (L.H. wheel house) **Application:** Three-stage-equipped vehicles



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F300





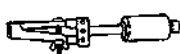







APPENDIX

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WF290-A001



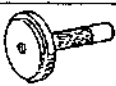









APPENDIX

1. SSTs

Shape	Part No. & Part Name	Section										
		Engine	Clutch	Transmission & Transfer	Propeller shaft	Differential	Front axle & Suspension	Rear axle & Suspension	Brake	Steering	Body	Body electrical
	09032-00100-000 Oil pan seal cutter	○										
	09090-04010-000 Engine sling device	○										
	09201-60011-000 Valve guide bush remover & replacer		○									
	09201-87201-000 Valve guide bush remover & replacer			○								
	09201-87704-000 Valve stem oil seal cover replacer	○										
	09201-87705-000 Valve guide bush remover & replacer	○										
	09202-87002-000 Valve cotter remover & replacer	○										
	09210-87701-000 Flywheel holder	○										
	09217-87001-000 Piston replacing guide	○										
	09219-87202-000 Engine overhaul stand	○		○		○						
	09219-87203-000 Engine overhaul attachment			○								
	09219-87701-000 Engine overhaul attachment	○										




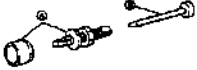


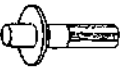
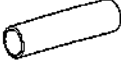


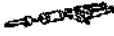

WP830-A003

APPENDIX

Shape	Part No. & Part Name	Section									
		Engine	Clutch	Transmission & Transfer	Propeller shaft	Differential	Front axle & Suspension	Rear axle & Suspension	Brake	Steering	Body
	09221-87704-000 Piston pin remover & replacer body	○									
	09221-87705-000 Piston pin remover & replacer guide	○									
	09223-41010-000 Crankshaft rear oil seal replacer	○									
	09228-87201-000 Oil filter wrench	○									
	09240-00014-000 Carburetor adjusting gauge	○									
	09240-00020-000 Wire gauge set	○									
	09243-00020-000 Idle adjust wrench	○									
	09253-87101-000 Water pump bearing anvil					○					
	09258-00030-000 Plug set	○									
	09268-87701-000 EFI fuel pressure gauge	○									
	09268-87702-000 Injection measuring tool set	○									
	09268-87703-000 Plug wrench	○									








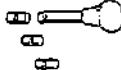




WFES0-A004

APPENDIX

Shape	Part No. & Part Name	Section										
		Engine	Clutch	Transmission & Transfer	Propeller shaft	Differential	Front axle & Suspension	Rear axle & Suspension	Brake	Steering	Body	Body electrical
	09268-87704-000 Oil cooler set bolt box wrench	○										
	09278-87201-000 Tool timing belt pulley holding	○										
	09283-87703-000 Pressure regulator adopter	○										
	09286-87602-000 Crankshaft rear end bearing remover	○										
	09286-87603-000 Crankshaft rear end bearing replacer	○										
	09301-87601-000 Clutch guide tool		○									
	09302-87702-000 Clutch diaphragm spring height No. 5 gauge		○									
	09304-87601-000 Replacer input shaft bearing			○								
	09306-87601-000 Replacer counter shaft bearing			○								
	09306-87602-000 Fuller counter gear front bearing			○								
	09308-00010-000 Oil seal puller					○	○	○				
	09308-10010-000 Oil seal puller					○						

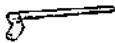











WPER0-A002

APPENDIX

Shape	Part No. & Part Name	Section									
		Engine	Clutch	Transmission & Transfer	Propeller shaft	Differential	Front axle & Suspension	Rear axle & Suspension	Brake	Steering	Body
	09309-87201-000 Transmission bearing replacer			○							
	09309-87202-000 Transmission bearing replacer				○						
	09309-87301-000 Output shaft bearing replacer			○							
	09310-87102-000 Counter shaft rear bearing replacer	○		○							
	09326-20020-000 Output shaft bearing lock nut wrench			○							
	09330-00021-000 Companion flange holding tool				○						
	09333-00012-000 Clutch diaphragm spring aligner		○								
	09339-87301-000 Shift fork shaft guide			○							
	09368-87702-000 Transfer replacer	○									
	09438-87601-000 Attachment differential overhaul				○						
	09502-10012-000 Differential side bearing puller				○						
	09504-87601-000 Differential side bearing adjust nut wrench				○						













WP390-4005

APPENDIX

Shape	Part No. & Part Name	Section									
		Engine	Clutch	Transmission & Transfer	Propeller shaft	Differential	Front axle & Suspension	Rear axle & Suspension	Brake	Steering	Body
	09511-87202-000 Brake drum stopper						○				
	09517-87601-000 Replacer oil seal			○		○					
	09517-87602-000 Attachment oil seal puller					○					
	09520-00031-000 Rear axle shaft puller						○	○			
	09520-87603-000 Rear wheel bearing puller set							○			
	09520-87604-000 Puller universal joint				○						
	09530-87602-000 Rear differential drive pinion adjust gauge set					○					
	09530-87603-000 Front differential drive pinion adjust gauge set					○					
	09602-87301-000 Counter gear bearing puller			○							
	09607-87602-000 Front axle hearing lock nut wrench						○				
	09607-87603-000 Front axle hub nut wrench						○				
	09608-87302-000 Axle hub & drive pinion bearing tool set			○		○					













WF290-A006

APPENDIX

Shape	Part No. & Part Name	Section	Engine	Clutch	Transmission & Transfer	Propeller shaft	Differential	Front axle & Suspension	Rear axle & Suspension	Brake	Steering	Body	Body electrical
	09608-87602-000 Front axle hub oil seal replacer							○					
	09608-87603-000 Front axle hub outer bearing outer race replacer							○					
	09608-87604-000 Front axle hub inner bearing outer race replacer							○					
	09608-87605-000 Steering knuckle oil seal & dust deflector replacer							○					
	09608-87606-000 Rear axle shaft oil seal replacer								○				
	09608-87607-000 Leaf spring bush No. 1 remover & replacer								○				
	09608-87608-000 Leaf spring bush No. 2 remover & replacer								○				
	09608-87609-000 Upper arm bush remover							○					
	09608-87610-000 Upper arm bush replacer							○					
	09608-87611-000 Lower arm dust cover & tie rod end dust cover replacer							○			○		
	09608-87612-000 Upper arm bush remover & replacer holder							○					
	09608-87613-000 Pitman arm tie rod end dust cover & hub cap replacer							○			○		



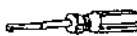





WFE80-A007

APPENDIX

Shape	Part No. & Part Name	Section									
		Engine	Clutch	Transmission & Transfer	Propeller shaft	Differential	Front axle & Suspension	Rear axle & Suspension	Brake	Steering	Body
	09608-87614-000 Idler arm dust cover replacer										
	09608-87615-000 Lower arm bush remover & replacer										
	09609-20011-000 Steering wheel puller										
	09610-20012-000 Pitman arm puller										
	09610-87301-000 Pitman arm puller										
	09611-87506-000 Handle										
	09611-87701-000 Tie rod end puller										
	09612-12010-000 Steering gear housing overhaul										
	09616-00010-000 Steering pinion bearing adjusting socket										
	09636-20010-000 Upper ball joint dust cover replacer										
	09737-87601-000 Brake booster push rod gauge										
	09842-30070-000 EFI inspection wire F										

WFEBC-4008

APPENDIX

Shape	Part No. & Part Name	Section									
		Engine	Clutch	Transmission & Transfer	Propeller shaft	Differential	Front axle & Suspension	Rear axle & Suspension	Brake	Steering	Body electrical
	09842-87204-000 EFC-II computer check sub harness	○									
	09842-87704-000 EFC computer check sub harness	○									
	09860-11011-000 Carburetor screwdriver set	○									
	009921-00010-000 Spring tension tool			○					○		
	09950-20017-000 Universal puller			○			○				
	09956-00010-000 Tightening piece				○	○		○			
	09990-87702-000 Engine oil pressure gauge	○									
	09991-87702-000 Engine control system inspection sub harness	○									
	09991-87703-000 Tacho pulse pick-up wire	○									

VF290-A000

APPENDIX








2. TIGHTENING TORQUE FOR MAIN COMPONENTS

1. When you want to find out a suitable tightening torque for a bolt, first determine the strength division of the said bolt, using the table below. Then, locate suitable tightening torque in the tightening torque table described later.
2. As for the tightening torque for a nut, find out suitable tightening torque in the same way as with the paragraph 1 above, based on the mating bolt.
3. Tightening torque posted in the workshop manual is a standard value for steel fasteners. It is, therefore, necessary to modify these tightening torque when you tighten fasteners made of materials other than steel.
This rule also applies to such instances where bolts are undergoing heat or other stress, such as vibratory loads and so forth.

WPB90-A010

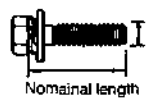
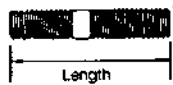
METHOD TO IDENTIFY STRENGTH DIVISION OF BOLTS

1. Identification Method by Checking Bolts Themselves

	Configuration and how to determine strength division	Strength division		Configuration and how to determine strength division	Strength division
Hexagon bolt	 Bolt having an embossed or stamped figure at its head section	4 = 4T 5 = 5T 6 = 6T 7 = 7T	Welded bolt		4T
	 No mark	4T	Stud bolt	 No mark	4T
	 Bolt having two embossed lines at its head section	5T 6T		 Bolt having about 2 mm deep recess at one end or both ends	6T
	 Bolt having three embossed lines at its head section	7T			

WPB90-A011

2. Identification Method by Part Numbers

Hexagon Bolt	Stud Bolt
<p>Part number example 9 1 1 1 - 4 0.6 2.0</p> <p>Nominal length (mm) 2.0</p> <p>Nominal diameter (mm) 0.6</p> <p>Strength division 4</p>  <p>Nominal diameter</p> <p>Nominal length</p>	<p>Part number example 9 1 1 1 - 4 0.6 2.0</p> <p>Nominal length (mm) 2.0</p> <p>Nominal diameter (mm) 0.6</p> <p>Strength division 4</p>  <p>Nominal diameter</p> <p>Length</p>

WPB90-A012

TIGHTENING TORQUE TABLE FOR GENERAL STANDARD BOLTS & NUTS

NOTE:

The table below indicates the tightening torques for those standard bolts and nuts which are not posted in the tightening torque table.

Category	Nominal diameter mm	Pitch mm	Standard tightening torque					
			Target value			Tightening range		
			N·m	kgf·m	ft·lb	N·m	kgf·m	ft·lb
4T (Bolt having a mark of "4" at its head section) Example of part number (91000 - 4000)	6	1.0	5.39 [5.88]	0.55 [0.60]	3.98 [4.34]	4.31 - 6.47 [4.71 - 7.06]	0.44 - 0.66 [0.48 - 0.72]	3.18 - 4.77 [3.47 - 5.21]
	8	1.25	12.75 [14.22]	1.30 [1.45]	9.40 [10.49]	10.2 - 15.3 [11.38 - 17.08]	1.04 - 1.56 [1.16 - 1.74]	7.52 - 11.28 [8.39 - 12.59]
	10	1.25	25.50 [28.44]	2.6 [2.90]	18.81 [20.98]	20.4 - 30.6 [22.75 - 34.13]	2.08 - 3.12 [2.32 - 3.48]	15.04 - 22.57 [16.78 - 25.17]
	12	1.25	47.07 [52.96]	4.8 [5.4]	34.72 [39.06]	37.66 - 58.49 [42.36 - 63.55]	3.84 - 5.76 [4.32 - 6.48]	27.77 - 41.66 [31.25 - 46.87]
5T (Bolt having a mark of "5" at its head section) Example of part number (91000 - 5000)	6	1.0	6.37 [7.35]	0.65 [0.75]	4.70 [5.42]	5.1 - 7.65 [5.88 - 8.83]	0.52 - 0.78 [0.6 - 0.9]	3.76 - 5.64 [4.34 - 6.51]
	8	1.25	15.69 [17.16]	1.60 [1.75]	11.57 [12.66]	12.55 - 18.83 [13.73 - 194.86]	1.28 - 1.92 [1.40 - 2.10]	9.26 - 13.89 [10.13 - 15.19]
	10	1.25	32.36 [35.30]	3.3 [3.6]	23.87 [26.04]	25.89 - 38.83 [28.24 - 42.36]	2.64 - 3.96 [2.88 - 4.32]	19.1 - 28.64 [20.83 - 31.25]
	12	1.25	58.84 [65.70]	6.0 [6.7]	43.4 [48.46]	47.07 - 70.61 [52.56 - 78.85]	4.80 - 7.20 [5.36 - 8.04]	34.72 - 52.08 [38.77 - 58.16]
6T (Bolt having a mark of "6" at its head section) Example of part number (91000 - 6000)	6	1.0	7.85 [8.83]	0.8 [0.9]	5.79 [6.51]	6.28 - 9.41 [7.06 - 10.59]	0.64 - 0.96 [0.72 - 1.08]	4.63 - 6.94 [5.21 - 7.81]
	8	1.25	19.12 [20.59]	1.95 [2.10]	14.10 [15.19]	15.3 - 22.95 [16.48 - 24.71]	1.56 - 2.34 [1.68 - 2.52]	11.28 - 16.93 [12.15 - 18.23]
	10	1.25	39.23 [43.15]	4.00 [4.40]	28.93 [31.63]	31.38 - 47.07 [34.52 - 51.78]	3.20 - 4.80 [3.52 - 5.28]	23.15 - 34.72 [25.46 - 38.19]
	12	1.25	71.59 [79.43]	7.30 [8.10]	52.80 [58.59]	57.27 - 85.91 [63.55 - 95.32]	5.84 - 8.76 [6.48 - 9.72]	42.24 - 63.36 [46.87 - 70.30]
7T (Bolt having a mark of "7" at its head section) Example of part number (91000 - 7000)	6	1.0	10.79 [11.76]	1.10 [1.20]	7.96 [8.68]	8.63 - 12.94 [9.41 - 14.12]	0.88 - 1.32 [0.96 - 1.44]	6.37 - 9.55 [6.94 - 10.42]
	8	1.25	25.5 [28.44]	2.60 [2.90]	18.81 [20.98]	20.4 - 30.6 [22.75 - 34.13]	2.08 - 3.12 [2.32 - 3.48]	15.04 - 22.57 [16.78 - 25.17]
	10	1.25	51.96 [57.86]	5.30 [5.90]	38.33 [42.67]	41.56 - 62.37 [46.29 - 69.43]	4.24 - 6.36 [4.72 - 7.08]	30.67 - 47.95 [34.14 - 51.21]
	12	1.25	95.12 [109.97]	9.70 [10.50]	70.16 [75.94]	76.1 - 114.15 [82.38 - 123.56]	7.76 - 11.64 [8.40 - 12.60]	56.13 - 84.19 [60.76 - 91.14]
Pipe tapered thread	PT8/1	*0.9071	16.67	1.7	12.3	11.76 - 21.57	1.2 - 2.2	8.67 - 15.91
	PT1/4	*1.3368	24.52	2.5	18.08	19.61 - 29.42	2.0 - 3.0	14.46 - 21.67
	PT3/8	*1.3368	29.42	3.0	21.7	24.52 - 34.32	2.5 - 3.5	18.08 - 25.32
	PT1/2	*1.8143	29.42	3.0	21.7	24.52 - 34.42	2.5 - 3.5	18.08 - 25.32

Numerals in [] denote those for flange bolts.
The asterisked mark (*) represents pitch conversion value.

WFES0-A013

APPENDIX

3. TIGHTENING TORQUE ENGINE

Tightening component	Tightening torque		
	N·m	kgf·m	ft·lb
Cylinder head x Spark plug	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Cylinder head x Cylinder head cover	2.9 - 4.9	0.3 - 0.5	2.2 - 3.6
Cylinder head x Rocker shaft M10 Bolt	28.4 - 36.3	2.9 - 3.7	21.0 - 26.8
MB Bolt	12.7 - 16.7	1.3 - 1.7	9.4 - 12.3
Cylinder head x Cylinder block	58.8 - 66.6*	6.0 - 6.8*	43.4 - 49.2*
Cylinder head x Water temperature sensor (HD-E engine only)	24.5 - 34.3	2.5 - 3.5	18.1 - 25.3
Cylinder head x BVS/V (HD-C engine only)	24.5 - 34.3	2.5 - 3.5	18.1 - 25.3
Cylinder head x Water temperature sender gauge	11.8 - 19.6	1.2 - 2.0	8.7 - 14.5
Cylinder head x Distributor	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Cylinder head x Exhaust manifold	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5
Cylinder head x Intake manifold	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Cylinder head x Fuel pump (HD-C engine only)	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Cylinder block x Water inlet	5.9 - 8.8	0.6 - 0.9	4.3 - 6.5
Cylinder block x Crankshaft main bearing cap	29.4 - 53.9*	4.5 - 5.5*	32.5 - 39.8*
Cylinder block x Oil pump	5.9 - 8.8	0.6 - 0.9	4.3 - 6.5
Cylinder block x Rear oil seal retainer	5.9 - 8.8	0.6 - 0.9	4.3 - 6.5
Cylinder block x Water pump	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Cylinder block x Engine mounting bracket	39.2 - 53.9	4.0 - 5.5	28.9 - 39.8
Cylinder block x Transmission	49.0 - 68.6	5.0 - 7.0	36.2 - 50.6
Cylinder block x Oil cooler pipe	24.5 - 34.3	2.5 - 3.5	18.1 - 25.3
Surge tank x Intake air temperature sensor	29.4 - 36.2	3.0 - 4.0	21.7 - 28.9
Surge tank x Gas filter	11.8 - 19.6	1.2 - 2.0	8.7 - 14.5
Surge tank x Throttle body	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Crankshaft x Flywheel	78.4 - 98.0**	8.0 - 10.0**	57.9 - 72.0**
Crankshaft x Crankshaft timing belt pulley	88.2 - 98.0	9.0 - 10.0	65.1 - 72.0
Intake manifold x Delivery pipe (HD-E engine only)	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Intake manifold x Carburetor (HD-C engine only)	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Exhaust manifold x Exhaust pipe	34.3 - 49.0	3.5 - 5.0	25.3 - 36.2
Exhaust pipe clamp	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5
Engine mounting bracket x Engine mounting (bolt)	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5
Engine mounting bracket x Engine mounting (nut)	29.4 - 44.1	3.5 - 5.5	25.3 - 39.8

* Wet base

** Non-reusable

WP29-AD14

APPENDIX

Tightening component	Tightening torque		
	N·m	kgf·m	ft·lb
Oil pump body x Oil cooler	24.5 - 34.3	2.5 - 3.5	18.1 - 25.3
Oil pump x Oil pressure switch	11.8 - 19.6	1.2 - 2.0	8.7 - 14.5
Oil pan	6.9 - 11.8	0.7 - 1.2	5.1 - 8.7
Oil pan x Drain plug	19.6 - 29.4	2.0 - 3.0	14.5 - 21.7
Oil pump body x Oil pump cover	7.8 - 12.7	0.8 - 1.3	5.8 - 9.4
Oil level gauge guide	18.6 - 30.4	1.9 - 3.1	13.7 - 22.4
Surge tank stay No. 1	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Surge tank stay No. 2	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5
Surge tank stay No. 3	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Camshaft x Camshaft timing belt pulley	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Timing belt cover	2.0 - 3.9	0.2 - 0.4	1.4 - 2.9
Timing belt tensioner	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5
Crankshaft timing belt pulley x Crankshaft pulley	19.6 - 29.4	2.0 - 3.0	14.5 - 21.5
Fluid coupling x Water pump pulley x Water pump	9.8 - 19.6	1.0 - 1.8	7.2 - 13.0
Cooling fan x Fluid coupling	4.9 - 5.9	0.5 - 0.6	3.6 - 4.3
Fuel filter x Fuel hose No. 1	34.3 - 44.1	3.5 - 4.5	25.3 - 32.5
Fuel filter x Fuel pipe	34.3 - 44.1	3.5 - 4.5	25.3 - 32.5
Fuel hose No. 1 x Delivery pipe	34.3 - 44.1	3.5 - 4.5	25.3 - 32.5
Connecting rod x Connecting rod cap	34.3 - 44.1*	3.5 - 4.5*	25.3 - 32.5*
Clutch cover x Fly wheel	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Transmission x Starter motor	49.0 - 68.6	5.0 - 7.0	36.2 - 50.6
Front pipe x Rear pipe	36.3 - 51.0	3.7 - 5.2	26.8 - 37.6
Fuel pump x Fuel pipe	34.3 - 43.1	3.5 - 4.4	25.3 - 31.8

* Wet base

WFE80-A016

APPENDIX

CLUTCH (PART & FULL TIME)

Tightening component	Tightening torque		
	N-m	kgf-m	ft-lb
Flywheel x Clutch cover A/y	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Clutch release lever S/A x Clutch release lever yoke	29.4 - 39.2	3.0 - 4.0	21.7 - 28.9

WPB90-A015

TRANSMISSION CASE COVER (PART & FULL TIME)

Tightening component	Tightening torque		
	N-m	kgf-m	ft-lb
T/M case cover x Transmission case	14.7 - 19.6 6.9 - 9.8	1.5 - 2.0 0.7 - 1.0 (only three bolts)	10.8 - 14.5 5.1 - 7.2
Reverse restrict pin holder x T/M case cover	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Back up lamp switch x T/M case cover	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Set bolt x T/M case cover	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5
Shift lock plate x T/M case cover	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Union x T/M case cover	12.7 - 15.7	1.3 - 1.6	9.4 - 11.6

WPB90-A017

TRANSMISSION (PART & FULL TIME)

Tightening component	Tightening torque		
	N-m	kgf-m	ft-lb
Cylinder block x T/M case	49.0 - 68.6	5.0 - 7.0	36.2 - 50.6
Exhaust pipe support bracket x T/M case	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Bolt for 5th shift arm x T/M case	39.2 - 58.8	4.0 - 6.0	28.9 - 43.4
Bolt for reverse shift arm x T/M case	34.3 - 53.9	3.5 - 5.5	25.3 - 39.8
Front bearing retainer x T/M case	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Counter shaft 5th gear x Lock nut	98.0 - 137.0	10.0 - 14.0	72.0 - 101.0

WPB90-A018

APPENDIX

TRANSFER (PART TIME)

Tightening component	Tightening torque		
	N·m	kgf·m	ft·lb
T/F adapter case x T/M case	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5
T/F low speed input gear x Lock nut	177.0 - 216.0	18.0 - 22.0	130.0 - 159.0
T/F front case x T/F adapter case	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5
Bolt for transfer high & low shift fork shaft x T/F front case	18.6 - 30.4	1.9 - 3.1	13.7 - 22.4
Bolt for T/F front drive shift fork shaft x T/F front case	18.6 - 30.4	1.9 - 3.1	13.7 - 22.4
Transposition detect switch x T/F front case	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
T/F rear case x T/F front case	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5
T/F rear output shaft x Lock nut	137.0 - 196.0	14.0 - 20.0	101.0 - 145.0
Output shaft bearing retainer x T/F rear case	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Speedometer sleeve lock plate x Output shaft bearing retainer	6.9 - 9.8	0.7 - 1.0	5.1 - 7.2
Control shaft lower No. 1 bracket x T/F rear case	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5
T/F shift lever retainer x Output shaft bearing retainer	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Control shift lever retainer x Control shaft lower No. 1 bracket	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Control shaft x Shift & select shaft No. 1	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5

WF200-A016

TRANSFER (FULL TIME)

Tightening component	Tightening torque		
	N·m	kgf·m	ft·lb
T/F oil pump body x T/F adapter case	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
T/F oil strainer tube x T/F oil pump body	6.9 - 9.8	0.7 - 1.0	5.1 - 7.2
T/F oil pump body x Lock nut	177.0 - 216.0	18.0 - 22.0	130.0 - 159.0
T/F oil strainer x T/F adapter case	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
T/F oil pump cover x T/F adapter case	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Bolt for differential lock shift fork shaft x T/F front case	18.6 - 30.4	1.9 - 3.1	13.7 - 22.4
Bolt for transfer front drive shift fork shaft x T/F front case	18.6 - 30.4	1.9 - 3.1	13.7 - 22.4
T/F output rear shaft x Lock nut	137.0 - 196.0	14.0 - 20.0	101.0 - 145.0
T/F front drive shift lock sleeve x Output shaft bearing retainer	49.0 - 68.6	5.0 - 7.0	36.2 - 50.6
Bolt for shift preventive x T/F front drive shift lock sleeve	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5

WF200-A020

PROPELLER SHAFT

Tightening component	Tightening torque		
	N·m	kgf·m	ft·lb
Front differential companion flange x Propeller shaft	58.8 - 78.5	6.0 - 8.0	43.4 - 57.9
Rear differential companion flange x Propeller shaft	58.8 - 78.5	6.0 - 8.0	43.4 - 57.9

WF200-A021

APPENDIX

FRONT DIFFERENTIAL

Tightening component	Tightening torque		
	N·m	kgf·m	ft·lb
Front axle housing cover S/A x Differential carrier	17.7 - 23.5	1.8 - 2.4	13.0 - 17.4
Front axle housing cover S/A x Filter plug	39.2 - 58.8	4.0 - 6.0	28.9 - 43.4
Differential carrier x Drain plug	39.2 - 58.8	4.0 - 6.0	28.9 - 43.4
Differential carrier support bracket x Differential carrier	98.0 - 116.0	10.0 - 12.0	72.0 - 87.0
Chassis frame x Differential carrier support bracket	39.2 - 53.9	4.0 - 5.5	28.9 - 39.8
	39.2 - 49.0	4.0 - 5.0 (only right side)	28.9 - 36.2
Bearing cap x Differential carrier	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Differential bearing adjusting nut lock x Bearing cap	3.9 - 9.8	0.4 - 1.0	2.9 - 7.2
Ring gear x Differential case S/A (with wet condition)	78.5 - 88.3	8.0 - 9.0	57.9 - 65.1
Drive pinion x Lock nut	157.0 - 196.0	16.0 - 20.0	116.0 - 145.0

WP80-A022

REAR DIFFERENTIAL

Tightening component	Tightening torque		
	N·m	kgf·m	ft·lb
Rear axle housing x Differential carrier	53.9 - 78.5	5.5 - 8.0	39.8 - 57.9
Filter plug x Rear axle housing	39.2 - 58.8	4.0 - 6.0	28.9 - 43.4
Drain plug x Rear axle housing	39.2 - 58.8	4.0 - 6.0	28.9 - 43.4
Bearing cap x Differential carrier	68.6 - 88.3	7.0 - 9.0	50.6 - 65.1
Differential bearing adjusting nut lock x Bearing cap	3.9 - 9.8	0.4 - 1.0	2.9 - 7.2
Ring gear x Differential case S/A (with wet condition)	78.5 - 88.3	8.0 - 9.0	57.9 - 65.1
Drive pinion x Lock nut	186.0 - 226.0	19.0 - 23.0	137.0 - 166.0

WP80-A023

FRONT AXLE & SUSPENSION

Tightening component	N-m	kgf-m	ft-lb
Wheel hub nuts	89.2 - 118	9.0 - 12.0	65.1 - 87.0
Knuckle stopper bolt lock nut	78.5 - 98.0	8.0 - 10.0	57.9 - 72.0
Tie rod (Lock nut)	118 - 167	12 - 17	87 - 123
Torsion spring lock nut	68.6 - 88.3	7.0 - 9.0	50.6 - 65.1
Lock nut (Axle hub nut)	98.0 - 147	10 - 15	72 - 109
Steering knuckle x Brake mounting support	68.6 - 88.3	7.0 - 9.0	50.6 - 65.1
Lock nut (Axle hub nut) x brake drum (Automatic free wheel hub equipped vehicle only)	4.9 - 8.8	0.5 - 0.9	3.6 - 6.5
Axle hub x Hub cover (Free wheel hub body)	59.8 - 68.6	6.0 - 7.0	43.4 - 50.6
Free wheel hub body x Free wheel hub cover (Free wheel hub equipped vehicle only)	7.8 - 11.8	0.8 - 1.2	5.8 - 8.7
Axle hub x Brake disc	53.9 - 73.5	5.5 - 7.5	39.8 - 54.2
Drive shaft x Lock bolt with washer (Automatic locking hub equipped vehicle only)	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Stabilizer link x Stabilizer bracket cover	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5
Anchor arm stopper x Frame	4.9 - 7.8	0.5 - 0.8	3.6 - 5.8
Torque arm x Lower arm	39.2 - 53.9	4.0 - 5.5	28.9 - 39.8
Anchor bolt x Lock nut	68.6 - 88.3	7.0 - 9.0	50.6 - 65.1
Shock absorber x Frame	18.6 - 30.4	1.9 - 3.1	13.7 - 22.4
Shock absorber x Lower arm	49.0 - 68.6	5.0 - 7.0	36.2 - 50.6
Shock absorber x Shock absorber control bracket	25.5 - 38.2	2.6 - 3.9	18.8 - 28.2
Shock absorber control bracket x Three-stage actuator	2.0 - 3.9	0.2 - 0.4	1.4 - 2.9
Suspension upper arm shaft x Frame	102 - 128	10.4 - 13.0	75.2 - 94.0
Suspension upper arm shaft x Upper arm sub assembly	68.6 - 88.3	7.0 - 9.0	50.6 - 65.1
Upper arm x Front spring bumper	9.8 - 15.7	1.0 - 1.6	7.2 - 11.6
Upper arm x Upper ball joint	26.5 - 36.3	2.7 - 3.7	19.5 - 26.8
Lower arm x Lower ball joint	55.9 - 76.5	5.7 - 7.8	41.2 - 56.4
Steering knuckle x Tie rod end	68.6 - 137	7.0 - 14	50.6 - 101
Upper ball joint x Steering knuckle	88.3 - 118	9.0 - 12.0	65.1 - 87.0
Lower ball joint x Steering knuckle	88.3 - 118	9.0 - 12.0	65.1 - 87.0
Lower arm x Frame	128 - 177	13 - 18	94 - 130

WP580-A024

APPENDIX

REAR AXLE & SUSPENSION

Tightening component	N·m	kgf·m	ft·lb
Rear spring shackle	68.6 - 88.3	7.0 - 9.0	50.6 - 65.1
Leaf spring x Frame	118 - 137	12 - 14	87 - 101
"U"bolt	58.8 - 78.5	6.0 - 8.0	43.4 - 57.9
Rear shock absorber x Frame	18.6 - 30.4	1.9 - 3.1	13.7 - 22.4
Rear shock absorber x "U" bolt seat	34.3 - 53.9	3.5 - 5.5	25.3 - 39.8
Rear shock absorber x shock absorber control bracket (Three stage damper only)	25.5 - 38.2	2.6 - 3.9	18.8 - 28.2
Rear axle housing x Backing plate	39.2 - 49.0	4.0 - 5.0	28.9 - 36.2
Rear spring bumper x Frame	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Rear shock absorber x Frame (Lock nut)	18.6 - 30.4	1.9 - 3.1	13.7 - 22.4
Shock absorber x Actuator (Three stage damper only)	2.0 - 3.9	0.2 - 0.4	1.4 - 2.9

WFE90-A025

BRAKE

Tightening component	N·m	kgf·m	ft·lb
Brake tube (Flare nut)	12.7 - 17.7	1.3 - 1.8	9.4 - 13.0
Air bleeder plug	8.8 - 12.7	0.9 - 1.3	6.5 - 9.4
Brake pedal x Brake pedal bracket	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Stop lamp switch lock nut	17.7 - 29.4	1.8 - 3.0	13.0 - 21.7
Brake booster push rod x Clevis	12.7 ± 2.6	1.3 ± 0.2	9.4 ± 1.9
Brake mounting support x Steering knuckle	68.6 - 88.3	7.0 - 9.0	50.6 - 65.1
Brake mounting support x Stud bolt	39.2 - 49.0	4.0 - 5.0	28.9 - 36.2
Brake mounting support x Caliper body	31.4 - 41.2	3.2 - 4.2	23.1 - 30.4
Brake hose x Caliper body	20.6 - 26.5	2.1 - 2.7	15.2 - 19.5
Wheel cylinder x Brake tube	12.7 - 17.7	1.3 - 1.8	9.4 - 13.0
Backing plate x Wheel cylinder	7.8 - 11.8	0.8 - 1.2	5.8 - 8.7
Shoe x Automatic adjusting lever pin	2.55 - 4.9	0.26 - 0.5	1.88 - 3.62
Parking brake shoe strut (screw)	2.6 - 3.9	0.26 - 0.4	1.88 - 2.9
Wheel hub nut	88.3 - 11.8	9.0 - 12.0	65.1 - 87.0
Master cylinder piston set bolt	8.9 - 10.8	0.7 - 1.1	5.1 - 8.0
Master cylinder reservoir hose band	5.4 - 6.9	0.55 - 0.70	4.5 - 5.1
Master cylinder x Brake booster	10.2 - 15.3	1.04 - 1.56	7.52 - 11.3
Master cylinder x Brake tube	12.7 - 17.7	1.3 - 1.8	9.4 - 13.0
Brake booster lock nut x Adjust nut	20.4 - 30.6	2.08 - 3.12	15.1 - 22.5
Brake booster x Dash panel	9.8 - 15.7	1.0 - 1.6	7.2 - 11.6
Parking brake control handle x Floor panel	9.8 - 15.7	1.0 - 1.6	7.2 - 11.6
Parking brake control handle x Lock nut	3.9 - 6.9	0.4 - 0.7	2.8 - 5.1
P&B valve x Floor panel	5.9 - 9.8	0.6 - 1.0	4.3 - 7.2
P&B valve x Brake tube	12.7 - 17.7	1.3 - 1.8	9.4 - 13.0

WFE90-A025

STEERING

Tightening component	N·m	kgf·m	ft·lb
Steering gear housing x Oil filter plug (Except power steering equipped model)	2.0 - 3.9	0.2 - 0.4	1.4 - 2.9
Steering gear box x Pressure tubes (Only power steering equipped model)	39.2 - 49.0	4.0 - 5.0	28.9 - 36.2
Steering wheel x Steering shaft	29.4 - 49.0	3.0 - 5.0	21.7 - 36.2
Steering shaft x Intermediate shaft	24.5 - 34.3	2.5 - 3.5	18.1 - 25.3
Steering hole cover x Floor panel	3.9 - 6.9	0.4 - 0.7	2.9 - 5.1
Steering column tube x Brace (Instrument panel)	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9
Steering column tube x Steering hole cover (Tilt steering equipped model only)	3.9 - 6.9	0.4 - 0.7	2.9 - 5.1
Steering support x long nut (Tilt steering equipped model only)	12.7	1.3	9.4
Steering lever x long nut (Tilt steering equipped model only)	29.4 - 49.0 24.5 - 34.3	3.0 - 4.5 2.5 - 3.5	21.7 - 36.2 18.1 - 25.3
Steering relay rod x Tie rod	68.6 - 137	7.0 - 14.0	50.6 - 101
Idler arm support pin x Frame	34.3 - 53.9	3.5 - 5.5	25.4 - 39.8
Idler arm support pin x Idler arm assembly	108 - 167	12.0 - 17.0	87 - 123
Idler arm x Relay rod	49.0 - 68.6	5.0 - 7.0	36.2 - 50.6
Pitman arm x Relay rod	68.6 - 137	7.0 - 14.0	50.6 - 101
Tie rod x Steering knuckles	68.6 - 137	7.0 - 14.0	68.6 - 137
Wheel hub nuts	88.3 - 118	9.0 - 12.0	65.1 - 87.0
Steering gear housing x Frame	73.5 - 103	7.5 - 10.5	54.2 - 75.9
Steering gear housing x Pitman arm	147-196	15.0 - 20.0	109 - 145
Cross shaft adjust screw x Lock nut	19.6 - 34.3	2.0 - 3.5	14.5 - 25.3
Intermediate shaft x Steering gear housing	24.5 - 34.3	2.5 - 3.5	18.1 - 25.3
Idle pulley x Vane pump bracket	34.3 - 49.0	3.5 - 5.0	25.3 - 36.2
Vane pump x Pump front stay	34.3 - 49.0	3.5 - 5.0	25.3 - 36.2
Vane pump x Pulley	34.3 - 53.0	3.5 - 5.4	25.3 - 39.1
Vane pump bracket x Engine M8 M10	9.8 - 15.7 34.3 - 44.1	1.0 - 1.6 3.5 - 4.5	7.2 - 11.6 25.3 - 32.5
Pump front stay x Tube support bracket	9.8 - 15.7	1.0 - 1.6	7.2 - 11.6
Tube support bracket x Clamp	3.9 - 6.9	0.4 - 0.7	2.9 - 5.1
Vane pump x Union bolt	44.1 - 53.9	4.5 - 5.5	32.5 - 39.8
Tube support bracket x Tube support bracket	9.8 - 15.7	1.0 - 1.6	7.2 - 11.6
Drive belt tension adjust bolt x Lock nut	9.8 - 15.7	1.0 - 1.6	7.2 - 11.6
Vane pump front stay x Adjusting strut	34.3 - 44.1	3.5 - 4.5	25.3 - 32.5
Adjusting strut x Adjusting bar	68.6 - 88.3	7.0 - 9.0	50.6 - 65.1
Vane pump x Vane pump bracket	49.0 - 68.6	5.0 - 7.0	36.2 - 50.6

WF8D-AG27

APPENDIX

BODY & OTHERS

Tightening component	Nm	kgf-m	ft-lb
Frame x Body	41.2 - 63.7	4.2 - 6.5	30.4 - 47.0
Front bumper x Body	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5
Front bumper guard bar x Body	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5
Rear bumper x Body	18.6 - 30.4	1.9 - 3.1	13.7 - 22.4
Front seat x Body	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5
Rear seat x Body	19.6 - 29.4	2.0 - 3.0	14.5 - 21.7
Front seat belt x Body	28.4 - 53.0	2.9 - 5.4	21.0 - 39.1
Rear seat belt x Body	28.4 - 53.0	2.9 - 5.4	21.0 - 39.1
Exhaust manifold x Front exhaust pipe	34.3 - 49.0	3.5 - 5.0	25.3 - 36.2
Front exhaust pipe x Tail pipe	36.3 - 51.0	3.7 - 5.2	26.8 - 37.6
Front exhaust pipe x Catalyst converter	36.3 - 51.0	3.7 - 5.2	26.8 - 37.6
Catalyst converter x Tail pipe	36.3 - 51.0	3.7 - 5.2	26.8 - 37.6

TYPE00-A028

4. SPECIFICATIONS

PRE-DELIVERY INSPECTION SPECIFICATIONS

Items		Specifications
Tire Inflation Pressure Front/Rear	195R15	STD: 1.6/2.1, Full load: 1.6/2.3
	225/70R15	STD: 1.6/2.1, Full load: 1.6/2.3
	195/80R15	STD: 1.6/2.1, Full load: 1.6/2.3
Spare tire inflation pressure		2.3
Wheel nut tightening torque		N·m (kgf·m) 88.2 - 117.6 (9 - 12)
Accelerator pedal free play		mm 1 - 5
Engine idling speed	rpm HD-C	850 ± 50
	HD-E	850 ± 50
Engine oil	Capacity dm ³	3.8
	Grade	API SE or higher
Transmission oil	Capacity dm ³	1.7
	Grade	API GL-3 or GL-4
	Viscosity	SAE-75W-90
Transfer oil	Capacity dm ³	Part time: 1.4, Full time: 1.7
	Grade	API GL-3 or GL-4
	Viscosity	SAE-75W-90
Differential oil	Capacity dm ³	Front: 0.9
		Rear: 1.95
	Grade	API GL-5
	Viscosity	SAE 90 or 80W-90
Brake fluid	Grade	FMVSS116DOT3 or SAE J1703
Brake pedal (While engine is running)	Free travel mm	1 - 3
	Reserve travel mm	Not less than 80
Clutch pedal free travel		mm 16 - 27
Parking brake working travel		Should "set" within 4-6 notches when apply 25 kgf by hand

WFE00-14029

APPENDIX

TUNE-UP SPECIFICATIONS

Drive belt deflection when pressed with a force of 98N (10 kgf) Alternator		New belt	4 - 5 mm
		Used belt	5 - 6 mm
Coolant capacity w/heater [Excluding 1.0 dm ³ for reserve tank]			5.5 dm ³ [5.8 dm ³ for tropical specifications]
Engine oil capacity Whole amount			3.8 dm ³
When only oil is changed		Full level	3.3 dm ³
		Low level	2.3 dm ³
When oil and filter are changed			3.5 dm ³
			NOTE: For the oil cooler-equipped engine, add 79 cm ³ for whole amount.
Valve clearances (hot)		Intake	0.25 ± 0.05 mm
		Exhaust	0.33 ± 0.05 mm
[Reference (cold)]		Intake	0.18 mm
		Exhaust	0.25 mm
Spark plugs			
Manufacturer		NIPPONDENSO	NGK
Type		K20PR - U11 K22PR - U11	BKR6E - 11 BKR7E - 11
Thread		M14 × 1.25	
Spark plug gap mm		1.0 - 1.1	
Ignition timing			B.T.D.C. 3 ± 2°/100 rpm or less (However, engine revolution must be stable.)
Idle speed			
Engine type		HD-C	HD-E
Idle speed rpm		850 ± 50	850 ± 50
Fast idle speed adjustment (HD-C)			Full position
			1300 - 2000 rpm
Throttle positioner touch revolution (rpm)			
HD-C		HD-E (General)	HD-E (US)
1500 ± 50 rpm		1800 ± 50 rpm	1600 ± 100 rpm
Throttle positioner operating time		HD-C	0.5 - 5.0 seconds
		HD-E	0.5 - 5.0 seconds
Compression pressure at 3000 rpm		Standard	1373 kPa (14.0 kgf/cm ²)
		Minimum	1030 kPa (10.5 kgf/cm ²)
		Difference between cylinders	147 kPa (1.5 kgf/cm ²)

WFE90-A030

APPENDIX

Engine type				HD-C	HD-E		
Item							
Fuel System	Fuel tank	Capacity	liter	60	60		
		Location		Underneath rear seat floor	Underneath rear seat floor		
	Fuel pipe material			Rubber and steel tube	Rubber and steel tube		
	Fuel pump type			Diaphragm type	Electromotor type		
	Fuel filter type			Filter paper type	Filter paper type		
	Carburetor	Manufacturer		Aisan industry	—		
		Type		Down draft, 2-barrel type	—		
		Venturi diameter	mm	21, 28	—		
		Choke valve type		Wax type automatic choke	—		
	Fuel injection device			—	Electronic type		
	Injection nozzle or injector	Type of nozzle retainer		—	With cushion rubber type		
		Nozzle type		—	Electronically-controlled throttle type		
		Injection pressure	kPa (kgf/cm ²)	—	250 (2.55)		
Engine electrical system	Ignition system	Voltage		V	12 [Negative ground]	12 [Negative ground]	
		Type			Battery ignition type	Battery ignition type	
		Ignition timing		°/rpm	B.T.D.C. 3 ± 2/850 ± 50	B.T.D.C. 3 ± 2/850 ± 50	
		Firing order			1-3-4-2	1-3-4-2	
		Distributor	Distributor type		Full-transistorized type	Full-transistorized type	
			Breaker type		—	—	
			Performance of timing advancing mechanism	Centrifugal type	0°/600 rpm 15°/3000 rpm	0°/600 rpm 12°/3000 rpm	
		Vacuum type		0°/-13.3 kPa (-100 mmHg) 15°/-53.3 kPa (-400 mmHg)	0°/-20.0 kPa (-150 mmHg) 10°/-56.0 kPa (-420 mmHg)		
		Spark plug	Manufacturer		CHAMPION	NIPPONDENSO	NGK
			Type		RC9YC4	K20PR-U11	BKR6E-11
			Thread		M14 x 1.25	M14 x 1.25	M14 x 1.25
			Spark plug gap		mm	1.0 - 1.1	1.0 - 1.1
		Battery	Type	General specifications		36B20R (*55B24R)	36B20R (*55B24R)
	European specifications			36B20R (*55B24R)	36B20R (*55B24R)		
	Australian specifications			36B20R	36B20R		
	Capacity		General specifications		28 ("36)	28 ("36)	
			European specifications		28 ("36)	28 ("36)	
			Australian specifications		28	28	

WFE2C-4231

APPENDIX

ENGINE SPECIFICATIONS

Item		Engine type		HD-C	HD-E
Engine proper	Type			Petrol, 4-cycle	Petrol, 4-cycle
	Mounting location			Front	Front
	Number of cylinders and arrangement			4-cylinder-in-line, mounted longitudinally	4-cylinder-in-line, mounted longitudinally
	Combustion chamber type			Pent roof type	Pent roof type
	Valve mechanism			Belt-driven, SOHC	Belt-driven, SOHC
	Bore x stroke	mm		76 x 87.6	76 x 87.6
	Compression ratio			9.5 ± 0.3	9.5 ± 0.3
	Compression pressure	kPa (kgf/cm ²) - rpm		1373 (14.0) - 300	1373 (14.0) - 300
	Maximum output	SAE net	kW/rpm	General specifications	63/5000
		EEC	kW/rpm	Australian specifications	—
		EEC DIN	kW/rpm	European specifications	70/5700
	Maximum torque	SAE net	kW/rpm	General specifications	126/3500
		EEC	kW/rpm	Australian specifications	—
		EEC DIN	kW/rpm	European specifications	128/4800
	Engine dimensions (Length x width x height)	mm		*693 x 596 x 685	693 x 537 x 673
	Service engine weight	kg		96	95
	Number of piston rings	Compression ring		2	2
		Oil ring		1	1
	Valve timing	Intake	Open	2° BTDC	2° BTDC
			Close	48° ABDC	48° ABDC
		Exhaust	Open	43° BBDC	43° BBDC
			Close	1° ATDC	1° ATDC
	Valve clearance [HOT]	mm		Intake	0.25
				Exhaust	0.33
	Idling speed	rpm		850 ± 50	850 ± 50
	Blow-by gas recirculating system			Closed type	Closed type
Lubricating System	Lubricating method			Fully-forced feed method	Fully-forced feed method
	Oil Pump type			Trochoid type	Trochoid type
	Oil filter type			Full-flow filter type, filter paper type	Full-flow filter type, filter paper type
	Lubrication oil capacity	dm ³		Whole	3.8
				When only oil is changed	3.3
				When oil and oil filter are changed	3.5
Cooling System	Cooling method			V-belt driven type	V-belt driven type
	Radiator type			Corrugation type forced circulation	Corrugation type forced circulation
	Coolant capacity (Vehicle with front heater)	dm ³		5.5 (excluding 1.0 dm ³ in reserve tank)	5.5 (excluding 1.0 dm ³ in reserve tank)
	Water pump type			Centrifugal type, "V" belt-driven tank	Centrifugal type, "V" belt-driven tank
	Thermostat type			Wax pellet type	Wax pellet type
Air cleaner	Type			Filter unwoven fabric type	Filter paper type
	Number			1	1

* For GCC specifications: 693 x 602 x 685

WFE90-A032

APPENDI

CHASSIS SPECIFICATIONS

[]: General specification

Items				Specifications		
TRANSMISSION	Type			5-Speed, synchromesh		
	Gear ratio (tooth number)	1st	3,752 (34/23 × 33/13)			
		2nd	2,182 (34/23 × 31/21)			
		3rd	1,428 [1,529]			
		4th	1,000			
		5th	0,865 (34/23 × 24/41)			
		Reverse	3,942 (34/23 × 23/12 × 32/23)			
TRANSFER	Gear ratio	High	1,000			
		Low	1,754 (32/33 × 38/21) ... part time only			
DIFFERENTIAL	Gear ratio			5,285 (37/7)		
SUSPENSION	Suspension Type	Front	Double wish bone	Toe-in	4 mm	
				Camber	1°	
				Caster	2°	
	Spring	Rear	Rigid			
		Front	Torsion bar			
	Shock absorber	Rear	Leaf spring			
		Front	Double-acting telescopic type			
STEERING	Type			Ball-nut type		
	Over all gear ratio			24.2, 18.4 (With power steering)		
BRAKES	Type	Front	Disc, (Option: Ventilated rotor)			
			Drum (Leading and Trailing)			
	Service brake system		Vacuum booster, Power-assisted			
	Emergency brake system		Front/Rear split, hydraulic circuits			
WHEEL & RIM	Parking brake system		Mechanical hand operation which applies to rear wheels.			
	Tire size		195R15, 225/70R15, 195/80R15			
	Inflation pressure bar		Front: 1.6, Rear: 2.3			
	Rim	Size	15 × 655			
Off-set		19 mm				
BULB	Headlamp	W	Candescant	45/40		
			Halogen	60/55		
			Yellow	45/40		
	Front lamp	W	Clearance	5 (White)		
				21 (Amber)		
	Side turn signal lampW		5 (Amber)			
	Rear lamp	W	Stop/tail	21/5 (Red)		
			Turn Signal	23 (21: for European)		
			21 (White)			
	License plate lamp		W	5		
Rear fog lamp		W	21			
Interior lamp		W	10			
Luggage room lamp		W	8			

WFE90-A083

APPENDIX

ENGINE MECHANICALS

Timing belt pulley	Wear limit	Camshaft	119.80 mm
		Crankshaft	59.37 mm
Timing belt tension spring		Free length	46.5 mm
		Installation load	
Camshaft	Oil clearance (cylinder head-to-camshaft)		0.035 - 0.076 mm
	Maximum limit		0.17 mm
	Thrust clearance		0.1 - 0.25 mm
	Maximum limit		0.45 mm
	Journal diameter		
	Fuel pump cam diameter		
	Minimum		42.65 mm
	Fuel pump cam stroke		
	Standard		5.0 mm
	Minimum		4.8 mm
	Valve cam lobe height		
	Intake	Standard	33.08 - 33.28 mm
		Minimum	32.9 mm
	Exhaust	Standard	33.00 - 33.20 mm
		Minimum	32.85 mm
	Maximum circle runout		0.03 mm
Cylinder head	Warpage	Cylinder block side	0.10 mm
		Intake manifold side	0.10 mm
		Exhaust manifold side	0.10 mm
	Valve seat angle	Intake	30 - 45 - 70°
		Exhaust	20 - 45 - 70°
	Valve contacting angle		45°
	Valve seat contacting width		
	Standard		1.4 mm
	Allowance		1.2 - 1.6 mm
	Maximum valve seat recession		0.5 mm
Valves	Valve stem diameter	Intake valve	6.560 - 6.580 mm
		Exhaust valve	6.555 - 6.575 mm
	Valve length	Intake valve	112.8 mm
		Exhaust valve	114.5 mm
	Valve face angle		45.5°
	Valve stock thickness (Minimum)		
	Intake		0.8 mm
	Exhaust		1.0 mm
	Valve stem oil clearance		
	Intake	Standard	0.020 - 0.060 mm
		Maximum	0.080 mm
	Exhaust	Standard	0.025 - 0.065 mm
		Maximum	0.090 mm

WPB30-A034

APPENDIX

Valve springs	Free length	Standard	45.2 - 46.0 mm
		Minimum	44.3 mm
	Installed tension at 38.0 mm		258.9 N (26.4 kgf)
	Maximum out-of-squareness		1.6 mm
Valve rocker arm and valve rocker shaft	Oil clearance	Standard	0.012 - 0.053 mm
		Maximum	0.08 mm
	Valve rocker arm bore diameter		19.500 - 19.521
	Valve rocker shaft outer diameter		19.468 - 19.488 mm
Valve rocker arm spacer	Free width		22.00 mm
Exhaust manifold	Warpage		0.1 mm
Intake manifold	Warpage	Cylinder head side	0.1 mm
Cylinder block	Maximum cylinder head surface warpage		0.1 mm
	Cylinder bore diameter	Standard	76.000 - 76.030 mm
		O/S 0.25	76.250 - 76.280 mm
	Bore honing angle		35 ± 5°
	Coarse degree		1 - 4 Z
Piston, piston pin and piston rings	Piston-to-cylinder bore clearance	Standard	0.025 - 0.045 mm
		Maximum limit	0.11 mm
	Piston ring groove-to-piston ring side clearance		
	Standard	No. 1	0.03 - 0.07 mm
		No. 2	0.02 - 0.06 mm
	Maximum		0.12 mm
	Piston ring thickness		
	Standard	No. 1	1.17 - 1.19 mm
		No. 2	1.47 - 1.49 mm
Piston, piston pin and piston rings	Piston ring end gap		
	Standard	No. 1	0.27 - 0.42 mm
		No. 2	0.35 - 0.50 mm
		0.1	0.20 - 0.70 mm
	Maximum	No. 1	0.7 mm
		No. 2	0.8 mm
		0.1	1.0 mm
	Piston pin-to-connecting rod interference fit		0.012 - 0.044 mm
	Piston-to-piston pin clearance		0.005 - 0.011 mm
Flywheel	Runout	Maximum	0.1 mm
Connecting rod	Big end thrust clearance		
	Standard		0.15 - 0.4 mm
	Maximum		0.45 mm
	Maximum bend		0.05 mm
	Maximum twist		0.05 mm

WP520-A026

APPENDIX

Crankshaft	Crankpin journal oil clearance	0.020 - 0.044 mm
	Main journal oil clearance	0.024 - 0.042 mm
	Crankpin journal diameter	44.976 - 45.000 mm
	Main journal diameter	49.976 - 50.000 mm
	Thrust clearance Standard	0.02 - 0.22 mm
	Maximum limit	0.30 mm
Thermostat valve (HD-C)	RunoutMaximum	0.05 mm
	Operating temperature ON	63°C or more
	OFF	55°C or less

WPBX0-AD36

FUEL SYSTEM

Carburetor	Float level	Dimension assumed by its own weight	8 mm
		Lip dimension	1.6 mm
	Throttle valve closed angle		
	Primary		9°
	Secondary		20°
	Throttle valve fully opened angle		
	Primary		90°
	Secondary		80°
	Kick-up angle		23°
	Secondary touch angle		50°
	• Opening degree of throttle valve at a time when it is set to idling state by means of throttle adjust screw		11.4°
	• Opening degree of throttle valve at a time when throttle positioner is operating		16.0°
Fuel pump (HD-C)	Number of backing-off of idle mixture adjusting screw		4 1/2 rev
	Solenoid valve resistance		80 - 100 Ω
	Outer vent resistance		30 - 45 Ω
	Suction force at 300 rpm		13.3 kPa (100 mm Hg) or more
	Push rod length	Standard	87.95 - 88.25 mm
		Minimum	87.000 mm
	Push rod stroke	Standard	5.0 mm
		Minimum	4.8 mm

WFE90-A037

LUBRICATION SYSTEM

Oil pump	Compression spring free length		57 mm
	Body clearance		0.20 - 0.28 mm
	Tip clearance		0.16 - 0.24 mm
	Side clearance		0.035 - 0.085 mm
	Oil pressure	Idling	19.6 kPa (0.2 kg/cm ²) or more
		3000 rpm	24.5 - 490.4 kPa (0.25 - 5.0 kg/cm ²)

WFE90-A038

APPENDIX

COOLING SYSTEM

Radiator cap	Relief valve opening pressure	
	Standard	73.6 - 103.0 kPa (0.75 - 1.05 kgf/cm ²)
	Minimum	58.8 kPa (0.6 kgf/cm ²)
Thermostat	Valve opening temperature	
	General specifications	82 - 86°C
	European specifications	76 - 80°C
	Valve lift	
	General specifications	8.5 mm or more at 98°C
	European specifications	8.5 mm or more at 91°C

WFE90-A036

IGNITION SYSTEM

Ignition timing	No sub vacuum timing advance takes place. Engine revolution must be stable at 1000 rpm or less	BTDC $3 \pm 2^\circ$
High-tension cord	Resistance	Maximum
		15 k Ω per cord
Distributor	Air gap between signal rotor and signal generator	0.2 - 0.4 mm
Ignition coil	Primary coil	1.35 - 1.65 Ω at 20°C
	Secondary coil	22 - 30 k Ω at 20°C

WFE90-A040

EFI SYSTEM (General specifications)

Fuel pressure regulator	Fuel pressure at No. vacuum	225 - 275 kPa (2.3 - 2.8 kg/cm ²)
Injector	Resistance at 20°C (approx.)	11.0 - 15.0 Ω
	Injection amount (approx.)	152 - 168 cm ³ /60 seconds at 20°C
	Difference between each injector	5 cm ³ or less
	Fuel leakage	Less than one drop of fuel per minute
EFI main relay Injector relay	Between terminals ① - ②	60 - 85 Ω
	③ - ④	Infinity
Fuel pump relay	Between terminals ① - ②	70 - 90 Ω
	③ - ④	Infinity
Idle-up VSV	Resistance	30 - 50 Ω at 20°C
Throttle position sensor	Resistance	
	Between terminals ① - ② Throttle valve closed fully	0.2 Ω or less at 20°C
	Throttle valve opened fully	10 kΩ or more at 20°C
	Between terminals bH - bA Throttle valve closed fully	10 kΩ or more at 20°C
	Throttle valve opened fully	5 Ω or less at 20°C
Fuel pump	Fuel flow amount	235 cm ³ or more/15 seconds
Water temperature sensor Intake air temperature sensor	Cooling water temperature	Resistance
	80°C	0.322 ± 0.1 kΩ
	60°C	0.584 ± 0.2 kΩ
	40°C	1.14 ± 0.3 kΩ
	20°C	2.45 ± 0.5 kΩ
	0°C	5.88 ± 1.5 kΩ
	-20°C	16.2 ± 3.2 kΩ
Pressure sensor Output between SST terminals ③ - ② (ground) (When engine is stopped.)		
Measuring point	Atmospheric pressure	Voltage V
Altitude (height above sea level) m	kPa (mm Hg)	
0	101.3 (760)	3.2 - 4.0
500	95.5 (716)	3.1 - 3.8
1000	89.9 (674)	3.0 - 3.6

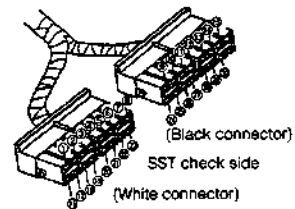
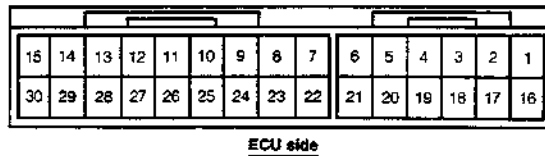
WF80-J041

APPENDIX

ECU CONNECTORS

(General specifications)

No.	Contents of connection	No.	Contents of connection
1	Power ground	15	Cooling water temperature sensor
2	Injector	16	Power ground
3	Battery +B (Main relay)	17	Injector
4	Battery +B (Back-up)	18	Battery +B (Main relay)
5	Idle-up VSV	19	Check engine lamp
6	Feedback check terminal	20	Fuel pump relay
7	Ignition coil (negative)	21	Engine ground
8	Starter switch	22	Pressure sensor ground
9	Test terminal	23	Air conditioner magnet clutch
10	Idle switch	26	Vehicle speed sensor
11	Electric load signal	28	Power switch
12	Sensor power supply (approx. 5V)	29	Oxygen sensor
13	Pressure sensor	30	Sensor ground
14	Intake air temperature sensor		



WFE80-40/2

VOLTAGES AT ECU WIRING CONNECTORS

(General specifications)

Terminals	STD voltage or resistance	Conditions	Remedies
(1) - (21)	Less than 1 Ω	Ignition switch OFF.	Proceed to flow chart (2).
(2) - (21)	Less than 1V	Ignition switch OFF (after more than one minute).	Check power supply.
	About battery voltage	Ignition switch ON.	
(3) - (21)	Less than 0.1V	Ignition switch OFF (after more than ten seconds).	Check power supply.
	About battery voltage	Ignition switch ON.	
(4) - (21)	About battery voltage	At all times (Measured voltage is lower than specified voltage only during starting period.)	Check power supply.
(5) - (21)	About battery voltage	Engine fully warmed up. All accessory switches turned OFF.	Check power supply.
	Less than 3V	Idle-up VSV ON.	Check idle-up VSV control.
(6) - (21)	4.5 - 5.5V	Ignition switch ON. T-terminal shorted with ground terminal. Throttle valve fully closed.	Proceed to flow chart (2).
	Less than 1V		Check diagnosis code.
	0 - 4.5 to 5.5V (Measured voltage varies)	Ignition switch ON. T-terminal shorted with ground terminal. Engine revolution speed builds at 3000 rpm after it has fully warmed up.	Oxygen sensor system.
(7) - (21)	Less than 0.1V	Ignition switch OFF.	Check power supply.
	About battery voltage	Ignition switch ON.	
(8) - (21)	Less than 0.1V	Ignition switch OFF.	Check power supply.
	More than 6V	When ignition switch is set to ST position.	
(9) - (21)	Less than 0.1V	Ignition switch OFF.	Check T-terminal wiring.
	About battery voltage	Ignition switch ON.	
(10) - (21)	Less than 0.5V	Ignition switch ON. Throttle valve fully closed.	Throttle position sensor system.
	About battery voltage	Ignition switch ON. Throttle valve fully opened.	
(11) - (21)	Less than 0.1V	Ignition switch ON. Headlamp switch and/or defogger switch OFF.	Check idle-up VSV control.
	More than 9V	Ignition switch ON. Headlamp switch and/or defogger switch ON.	
(12) - (22)	Less than 0.1V	Ignition switch OFF.	Check VCC wiring.
	4.5 - 5.5V	Ignition switch ON.	
(13) - (22)	3.2 - 4.0V	Ignition switch ON. Atmospheric pressure is 101.3 kPa (760 mmHg).	Check pressure sensor.
(14) - (30)	1.5 - 3.0V	Ignition switch ON. Air temperature inside surge tank; 20°C	Check intake air temperature sensor.
(15) - (30)	0.40 - 0.65V	Ignition switch ON. After engine has been warmed up fully. (Cooling water temperature: 80 - 90°C.	Check cooling water temperature sensor.
(16) - (1)	Less than 1 Ω	Ignition switch OFF.	Proceed to flow chart (2).
(17) - (21)	Less than 1V	Ignition switch OFF (after more than one minute).	Check/repair injector power supply.
	About battery voltage	Ignition switch ON.	

APPENDIX

Terminals	STD voltage or resistance	Conditions	Remedies
(18) - (21)	Less than 0.1V	Ignition switch OFF.	Check/repair ECU power supply.
	About battery voltage	Ignition switch ON.	
(19) - (21)	Less than 3V	Ignition switch ON. (Check engine lamp illuminated.)	Check power supply for check engine lamp.
	About battery voltage	Engine is rotating. (Check engine lamp not illuminated.)	
(20) - (21)	Less than 1V	Ignition switch ON. Fuel pump is operating.	Check/repair fuel pump power supply.
	About battery voltage	Ignition switch ON. Fuel pump is stopped.	
(21) - Engine ground	Less than 0.2Ω	Ignition switch OFF.	Check ground wiring.
(22) - (21)	Less than 0.5Ω	Ignition switch OFF.	Replace ECU.
(23) - (21)	About battery voltage	Engine is rotating. Air conditioner compressor is rotating. (Genuine air conditioner-equipped vehicle.)	Check air conditioner wiring.
(26) - (21)	0 to Approx. battery voltage	Ignition switch ON. When vehicle is moved. (Measured voltage changes 4 times for movement of 1.5 m.)	Check speed sensor.
(28) - (21)	About battery voltage	Ignition switch ON. Throttle valve fully closed.	Check throttle position sensor.
	Less than 0.5V	Ignition switch ON. Throttle valve fully opened.	
(29) - (21)	Less than 0.1V	Ignition switch ON (after more than 60 seconds).	Check oxygen sensor.
	Voltage varies within 0 - 1.0V.	After engine has warmed up fully. When engine revolution is held at 3000 rpm for more than two minutes.	Check fuel system.
(30) - (21)	Less than 1Ω	Ignition switch ON.	Proceed to flow chart (2).

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APPENDIX

EFI SYSTEM (U.S. specifications)

Fuel pressure regulator	Fuel pressure at No. vacuum	225 - 275 kPa (2.3 - 2.8 kgf/cm ²)												
Injector	Resistance at 20°C (approx.)	11.0 - 15.0 Ω												
	Injection amount(approx.)	152 - 168 cm ³ /60 seconds at 20°C												
	Difference between each injector	5 cm ³ or less												
	Fuel leakage	Less than one drop of fuel per minute												
EFI main relay injector relay	Between terminals ① - ② ③ - ④	60 - 85 Ω Infinity												
Fuel pump relay	Between terminals ① - ② ③ - ④	70 - 90 Ω Infinity												
Idle-up VSV	Resistance	30 - 50 Ω at 20°C												
Throttle position sensor	Resistance Between terminals ① - ③ Throttle valve closed fully	0.2 Ω or less at 20°C												
	Throttle valve opened fully	10 kΩ or more at 20°C												
	Between terminals ② - ③ Throttle valve closed fully	10 kΩ or more at 20°C												
	Throttle valve opened fully	5 Ω or less at 20°C												
Fuel pump	Fuel flow amount	235 cm ³ or more/15 seconds												
Water temperature sensor Intake air temperature sensor	Cooling water temperature	Resistance												
	80°C	0.322 ± 0.1 kΩ												
	60°C	0.584 ± 0.2 kΩ												
	40°C	1.14 ± 0.3 kΩ												
	20°C	2.45 ± 0.5 kΩ												
	0°C	5.88 ± 1.5 kΩ												
	-20°C	16.2 ± 3.2 kΩ												
Pressure sensor Output between SST terminals ③ - ④ (ground) (When engine is stopped.)														
<table border="1"> <thead> <tr> <th>Measuring point Altitude (height above sea level) m</th><th>Atmospheric pressure kPa (mmHg)</th><th>Voltage V</th></tr> </thead> <tbody> <tr> <td>0</td><td>101.3 (760)</td><td>3.2 - 4.0</td></tr> <tr> <td>500</td><td>85.5 (716)</td><td>3.1 - 3.8</td></tr> <tr> <td>1000</td><td>89.9 (674)</td><td>3.0 - 3.6</td></tr> </tbody> </table>			Measuring point Altitude (height above sea level) m	Atmospheric pressure kPa (mmHg)	Voltage V	0	101.3 (760)	3.2 - 4.0	500	85.5 (716)	3.1 - 3.8	1000	89.9 (674)	3.0 - 3.6
Measuring point Altitude (height above sea level) m	Atmospheric pressure kPa (mmHg)	Voltage V												
0	101.3 (760)	3.2 - 4.0												
500	85.5 (716)	3.1 - 3.8												
1000	89.9 (674)	3.0 - 3.6												

WF250-J044

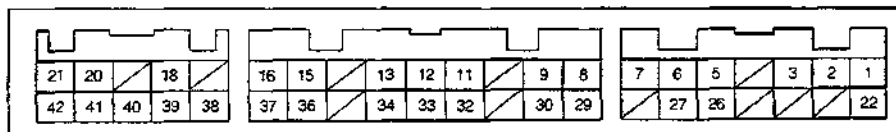
APPENDIX

ECU CONNECTORS

(U.S. specifications)

The figure below shows the arrangement of the ECU connector terminals.

ECU side



SST side

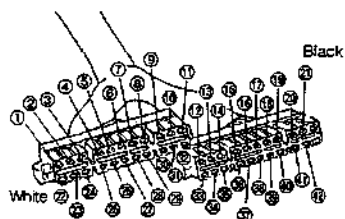


Table Showing ECU Connections (US Specification)

Terminal code	Contents of connection	Terminal code	Contents of connection
1	Main relay (Power supply)	22	Main relay (Power supply)
2	Battery (Backup power supply)	23	
3	Ignition coil primary voltage	24	
4		25	
5	Pressure sensor power supply	26	Oxygen sensor
6	Pressure sensor	27	Intake air temperature sensor
7	Cooling water temperature sensor	28	
8	Vehicle speed sensor	29	Operation system ground (Engine)
9	Electrical load (Headlamp and defogger)	30	Electrical load (Blower fan)
10		31	
11	Check connector (Test terminal)	32	Throttle position switch (Power switch)
12	Throttle position switch (Idle switch)	33	Stop lamp
13	Starter	34	Air conditioner magnet switch
14		35	
15	Oxygen sensor feedback check terminal	36	Operation system ground
16	Check engine lamp	37	Fuel pump relay
17		38	Pressure VSV
18	EGR VSV	39	System ground
19		40	Idle speed control VSV
20	Injector	41	Injector
21	Actuator drive ground (Engine)	42	Actuator drive ground (Engine)

VOLTAGES AT ECU CONNECTORS

Terminals	STD voltage or resistance	Condition		Remedies
① — ②	About battery voltage	Ignition switch ON		Check power supply.
② — ③	About battery voltage	At all time		Check power supply.
③ — ④	About battery voltage	Ignition switch ON	When engine is stopped.	Check power supply.
⑤ — ⑥	4.5 - 5.5 V	Ignition switch ON		Check power supply.
⑥ — ⑦	3.2 - 4.0 V	Ignition switch ON	When atmospheric pressure of 101.3 kPa (760 mmHg) exists.	Check pressure sensor.
⑦ — ⑧	0.4 - 0.65 V	Ignition switch ON	When cooling water temperature is 80°C.	Check water temperature sensor.
⑦ — ⑨	0.322 ± 0.1 W	When cooling water temperature is 80°C		Check water temperature sensor.
⑩ — ⑪	0 - About battery voltage	Ignition switch ON	Measured voltage changes when vehicle is moved 1.5 m.	Check speed sensor.
⑫ — ⑬	Less than 5.0 V	Ignition switch ON	When defogger and headlamp switches are turned OFF.	Check TSC VSV.
	About battery voltage	Ignition switch ON	When defogger and/or headlamp switches are turned ON.	
⑭ — ⑮	About battery voltage	Ignition switch ON	When test terminal of check connector is not connected with ground terminal.	Check T-terminal wiring.
	Less than 1.0 V	Ignition switch ON	When test terminal of check connector is connected with ground terminal.	
⑯ — ⑰	Less than 5.0 V	Ignition switch ON	Throttle valve fully closed	Check throttle position system.
	About battery voltage	Ignition switch ON	Throttle valve fully opened	
⑱ — ⑲	Less than 29 Ω	Throttle valve fully closed		
	More than 1000 Ω	Throttle valve fully opened		
⑳ — ㉑	0 V	Ignition switch ON		Check power supply.
	More than 6 V	When ignition switch is set to ST position.		
㉒ — ㉓	Measured voltage changes at a point between 0 - 5.0 V.	After warming up engine completely, connect test terminal of check connector with ground terminal. Hold engine revolution speed at 3000 rpm for two minutes.		Check fuel system.
㉔ — ㉕	Less than 3.0 V	Ignition switch ON	<ul style="list-style-type: none">Engine is stopped.When check engine lamp is illuminated:	Check power supply for engine lamp.
	About battery voltage	Ignition switch ON	<ul style="list-style-type: none">After engine starts.When check engine lamp is extinguished:	

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APPENDIX

Terminals	STD voltage or resistance	Condition		Remedies
① — ④	About battery voltage	Ignition switch ON	<ul style="list-style-type: none">After engine starts:Cooling water temperature is below 40°C.	Check power supply.
	Less than 3.0 V	Ignition switch ON	<ul style="list-style-type: none">After engine starts:Cooling water temperature is above 41°C.	Check ESV wiring.
② — ⑤	Less than 1.0 V	At least 30 seconds have elapsed after turning OFF ignition switch.		Check power supply.
	About battery voltage	Ignition switch ON	<ul style="list-style-type: none">Engine is stopped.	
③ — ⑥	Less than 0.01 V	Ignition switch ON		Proceed to flow chart (2).
⑦ — ⑧	About battery voltage	Ignition switch ON		Check power supply.
⑨ — ⑩	Change in output voltage	Ignition switch ON	After warming up engine completely, hold engine revolution speed at 3000 rpm for two minutes.	Check fuel system.
⑪ — ⑫	1.5 - 3.0 V	Ignition switch ON	Air temperature inside intake manifold is 20°C.	Check intake air temperature sensor.
⑬ — ⑭	2.45 ± 0.5 Ω	When air temperature inside intake manifold is 20°C:		
⑮ — ⑯	Less than 0.1 V	Ignition switch ON		Check ground wiring.
⑰ — ⑱	About battery voltage	Ignition switch ON	<ul style="list-style-type: none">Blower fan switch turned OFF	Check ISC.
	Less than 2.0 V	Ignition switch ON	When blower fan switch turned ON:	
⑲ — ⑳	About battery voltage	Ignition switch ON	Throttle valve fully closed	Check throttle system.
	Less than 5.0 V	Ignition switch ON	Throttle valve fully opened	
㉑ — ㉒	More than 1000 Ω	Throttle valve fully closed		
	Less than 29 Ω	Throttle valve fully opened		
㉓ — ㉔	Less than 1 V	Ignition switch ON	When brake pedal is not depressed:	Check brake wiring.
	About battery voltage	At all time	When brake pedal is depressed:	

WP530-A048

APPENDIX

Terminals	STD Voltage or resistance	Condition		Remedies
② — ③	Less than 1 V	Ignition switch ON	When compressor magnet switch of air conditioner is turned OFF:	Check air conditioner idle-up VSV.
	About battery voltage	Ignition switch ON	When compressor magnet switch of air conditioner is turned ON:	
② — ④	Less than 0.1 V	Ignition switch ON		Check ground wiring.
② — ⑤	About battery voltage	Ignition switch ON	When fuel pump is stopped:	Check or repair pump power supply.
	Less than 2.0 V	Ignition switch ON	When fuel pump is operating:	
② — ⑥	About battery voltage	Ignition switch ON	When pressure VSV is turned OFF:	Check pressure VSV.
	Less than 3.0 V	Ignition switch ON	For 0.5 second immediately after engine starts	
② — Engine ground	Less than 0.1 V	Ignition switch ON		Check ground wiring.
② — ⑦	Less than 3.0 V	Ignition switch ON	Engine is stopped.	Check ISC VSV.
	About battery voltage	Ignition switch ON	When test terminal of check connector is connected with ground terminal:	
② — ⑧	Less than 1.0 V	At least 30 seconds have elapsed after turning OFF ignition switch.		Check power supply.
	About battery voltage	Ignition switch ON	Engine is stopped.	
② — ⑨	Less than 0.1 V	Ignition switch ON		Check ground wiring.

WFS60-A043

APPENDIX

STARTING SYSTEM

Reduction type starter motor	Rating voltage and output power		12V 0.8 kW (STD) 1.0 kW (COLD. SPEC)	
	No-load characteristic at 11.5V Amperage		Less than 90A	
	Brush length	Standard	12V 0.8 kW 14.0 mm (0.55 inch)	12V 1.0 kW 13.0 mm (0.51 inch)
		Minimum	9.0 mm (0.35 inch)	8.5 mm (0.33 inch)
	Commutator Outer diameter	Standard	28 mm (1.10 inch)	30 mm (1.18 inch)
		Minimum	27 mm (1.06 inch)	29 mm (1.14 inch)
	Undercut depth	Standard	0.5 - 0.8 mm (0.020 - 0.031 inch)	
		Minimum	0.2 mm (0.0079 inch)	
	Maximum circle runout		0.05 mm (0.0020 inch)	
	Spring installed load	0.8 kW 15.7 N (1.6 kgf)		1.0 kW 17.5 - 23.7 N (1.78 - 2.41 kgf)

WFE90-A050

CHARGING SYSTEM

Battery specific gravity			1.25 - 1.27	
Alternator	Rated output	Amperage	45 A (50 A: OPTION)	
	Rotor coil resistance		2.9 ± 0.2 Ω at 20°C (68°F)	
	Slip ring diameter	Standard	14.4 mm (0.57 inch)	
		Minimum	14.0 mm (0.55 inch)	
	Brush exploded length	Standard	10.5 mm (0.41 inch)	
		Minimum	1.5 mm (0.06 inch)	

WFE90-A051

CLUTCH

Unit: mm (inch)

Item		Specified value	Allowable limit	Remarks
Clutch disc	Lining wear	—	0.3 (0.0118)	The smallest rivet depth is regarded as the allowable use limit
	Runout	—	1.0 (0.0394)	Longitudinal
			0.7 (0.0276)	Lateral
Clutch cover	Deviation in height	—	0.8 (0.0315)	The deviation can be corrected with the SST
Clutch pedal	Free travel	18 - 27 (0.709 - 1.063)	—	
	Installation height	221 $\frac{1}{2}$ (8.70 $\frac{3}{32}$)	—	The dimension from the body metal section to the pedal. It is, therefore, necessary to roll up the carpet and floor mat prior to the measurement.

WFE90-A052

APPENDIX

TRANSMISSION

Unit: mm (inch)

Item		Specified value	Allowable limit	Remarks
Shift fork groove width	Reverse gear	7.05 - 7.12 (0.278 - 0.280)	7.3 (0.287)	
	T/M Hub sleeve	7.05 - 7.12 (0.278 - 0.280)	7.3 (0.287)	
Synchronesh shifting key groove width	1st gear	9.9 - 10.1 (0.3898 - 0.3976)	—	
	Except 1st gear	11.3 - 11.5 (0.4449 - 0.4528)	—	
Synchronizer ring-to-gear clearance	1st gear	0.85 - 1.45 (0.0335 - 0.0571)	0.5 (0.0197)	
	2nd gear			
	3rd gear			
	4th gear			
	5th gear			
Transmission clutch hub (No. 1, No. 2, No. 3) outer diameter	Class ①	69.68 - 69.74 (2.743 - 2.746)	—	
	Class ②	69.76 - 69.84 (2.747 - 2.750)	—	
	Class ③	69.58 - 69.64 (2.739 - 2.742)	—	
Clutch hub sleeve maximum bore diameter		70 (2.7559)	—	
Clearance between clutch hub and clutch hub sleeve		0.03 - 0.19 (0.0012 - 0.0075)	—	
Height of synchronesh shifting key	1st & 2nd gears	5.0 - 5.2 (0.1969 - 0.2047)	4.7 (0.1850)	
	3rd & 4th gears			
	5th gears			
Runout of output shaft		—	0.05 (0.0020)	
Thickness at tip-end-section of shift fork	1st & 2nd shift fork	6.80 - 7.00 (0.2677 - 0.2756)	6.3 (0.2480)	
	3rd & 4th shift fork	6.80 - 7.00 (0.2677 - 0.2756)	6.3 (0.2480)	
Contact width of reverse shift fork		15.00 - 15.043 (0.5906 - 0.5923)	15.1 (0.5945)	
Contact width of 5th shift arm	Shift inner lever side	16.1 - 16.2 (0.6339 - 0.6378)	16.7 (0.6575)	
	5th shift arm side	12.1 - 12.2 (0.4764 - 0.4803)	12.7 (0.5001)	
Contact width of shift fork and detent sleeve		18.8 - 19.2 (0.7402 - 0.7559)	19.5 (0.7677)	
Backlash of each gear of transmission relative to counter gear	1st gear	0.05 - 0.18 (0.0020 - 0.0071)	—	
	2nd gear	0.05 - 0.16 (0.0020 - 0.0063)	—	
	3rd gear	0.05 - 0.14 (0.0020 - 0.0055)	—	
	5th gear	0.05 - 0.13 (0.0020 - 0.0051)	—	
	Input gear	0.05 - 0.13 (0.0020 - 0.0051)	—	

WPE90-A053

APPENDIX

TRANSFER (PART-TIME)

Unit: mm (inch)

Item		Specified value	Allowable limit	Remarks
Transfer high & low shift fork groove width	Transfer high & low clutch sleeve	7.05 - 7.12 (0.2776 - 0.2803)	7.3 (0.2874)	
Thickness at tip-section of transfer high & low shift fork		6.80 - 7.00 (0.2677 - 0.2756)	6.3 (0.2480)	
Thickness at tip-section of transfer front drive shift fork		6.80 - 6.90 (0.2677 - 0.2717)	6.3 (0.2480)	
Contact width of transfer high & low shift head		16.00 - 16.070 (0.6299 - 0.6327)	16.2 (0.6378)	
Contact width of transfer front drive shift head		16.000 - 16.070 (0.6299 - 0.6327)	16.2 (0.6378)	
Diameter of transfer front drive gear at sleeve fitting side	Class ①	87.18 - 87.24 (3.432 - 3.435)	—	
	Class ②	87.28 - 87.34 (3.436 - 3.439)	—	
	Class ③	87.08 - 87.14 (3.428 - 3.431)	—	
Diameter of low speed input gear installation section of output rear shaft		41.975 (1.653)	41.960 (1.652)	
Clearance between transfer front drive gear and transfer front drive gear sleeve		0.03 - 0.19 (0.0012 - 0.0075)	—	
Front drive gear sleeve contact width of front drive shift fork		6.80 - 6.90 (0.268 - 0.272)	6.30 (0.248)	

WFE90-A054

TRANSFER (FULL-TIME)

Unit: mm (inch)

Item		Specified value	Allowable limit	Remarks
Width of front drive shift fork installation section of differential lock sleeve		7.00 - 7.058 (0.276 - 0.278)	7.30 (0.287)	
Width of differential lock sleeve contact section of front drive shift fork		6.80 - 6.90 (0.268 - 0.272)	6.30 (0.248)	
Width of differential lock shift fork installation section of differential lock sleeve		7.00 - 7.058 (0.276 - 0.278)	7.30 (0.287)	
Width of differential lock sleeve contact section of differential lock shift fork		6.80 - 6.90 (0.268 - 0.272)	6.30 (0.248)	
Diameter of transfer front drive gear at sleeve fitting side	Class ①	87.18 - 87.24 (3.432 - 3.435)	—	
	Class ②	87.28 - 87.34 (3.436 - 3.439)	—	
	Class ③	87.08 - 87.14 (3.428 - 3.431)	—	
Clearance between transfer front drive gear sleeve and transfer front drive gear		0.03 - 0.19 (0.0012 - 0.0075)	—	
Lateral movement of side gear of center differential assembly (only for L.S.D.)		0.07 - 0.37 (0.0028 - 0.0146)	—	

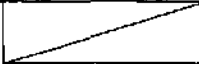
WFE90-A055

DIFFERENTIAL

Item		Specified value	Allowable limit	Remarks
Ring gear runout mm (inch)	Front	—	0.1 (0.004)	
	Rear			
Ring gear backlash mm (inch)	Front	0.07 - 0.17 (0.0028 - 0.0067)	—	
	Rear			
Side gear backlash mm (inch)	Front	0.03 - 0.15 (0.0020 - 0.0058)	—	Measure the over four teeth.
	Rear			
Drive pinion preload kg-cm (inch-lb)	Front	4 - 25 (3.47 - 21.70)	—	New bearing
		4 - 13 (3.47 - 11.28)	—	Bearing reused
	Rear	5 - 30 (4.34 - 26.04)	—	New bearing
		5 - 17 (4.34 - 14.76)	—	Bearing reused
Total preload kg-cm (inch-lb)	Front	6 - 51 (5.21 - 26.91)	—	
	Rear	6 - 19 (5.21 - 16.50)	—	
Clutch inner plate thickness (L.S.D) mm (inch)		1.6 (0.0630)	1.4 (0.0551)	
Clutch outer plate thickness (L.S.D) mm (inch)		1.6 (0.0630)	1.4 (0.0551)	

WP290-A056

FRONT AXLE & SUSPENSION

Side slip Toe-in Camber Caster King pin angle	3 mm (0.118 inch) 4 $\frac{3}{16}$ mm (0.157 $\frac{3}{16}$ inch) 1° $\frac{1}{2}$ ' 2° \pm 30' 9°30'					
Wheel turning angle	Tyre	Inner turning		Outer turning		
	195/80R15	31°05' \pm $\frac{3}{4}$ '		27°15'		
	225/70R15	27°05' \pm $\frac{3}{4}$ '		23°55'		
Tire inflation pressure		Front kgf/cm ²		Rear kgf/cm ²		
		Unloaded	Loaded	Unloaded	Loaded	
		195 R15 94S	1.6	1.6	2.1	2.3
		225/70 R15 100S	1.6	1.6	2.1	2.3
	195/80 R15 94S	1.6	1.6	2.1	2.3	
Wheel runout (maximum) Tyre runout (maximum)	0.1 mm (0.04 inch)					
Vertical runout	1.4 mm (0.0551 inch)					
Lateral runout	2.0 mm (0.0787 inch)					
Front vehicle height	41 \pm 10 mm (1.6 \pm 0.39 inches) (See page FS-75)					
Front axle bearing starting torque	1.4 - 3.6 kgf (3.1 - 7.9 lb)					

WP290-A057

APPENDIX

STEERING

Steering wheel free play	0 - 30 mm (0 - 1.18 inch)
Steering gear box oil level (Except power steering equipped model)	13 - 23 mm (0.51 - 0.91 inch) from upper side of steering gear box hole
Drive belt tension	9 - 11 mm (0.35 - 0.43 inch) when 10 kgf (22 lb) applied (Except for A/C equipped vehicle)
Maximum steering torque (Only for power steering equipped model)	7.8 N-m (80 kgf-cm, 5.8 ft-lb)
Vane pump hydraulic pressure Difference of hydraulic pressure	65 kg/cm ² (924.5 psi) or more 5 kg/cm ² (71.1 psi) at 1000 and 3000 rpm

WPB90-A058

BRAKE

Brake pedal height	216 ± 5 mm (0.83 ± 0.2 inch)
Brake pedal free travel	1 - 3 mm (0.039 - 0.12 inch)
Brake pedal reserve travel	80 mm (3.15 inches) or more
Brake pad thickness	New Minimum limit
	9 mm (0.35 inch) 1.5 mm (0.06 inch)
Brake disc thickness	Solid New Minimum limit Ventilation New Minimum limit
	12.5 mm (0.49 inch) 11.5 mm (0.45 inch) 18.0 mm (0.71 inch) 17.00 mm (0.006 inch)
Brake disc runout limit	0.15 mm (0.006 inch)
Brake drum inner diameter	New Minimum limit
	254 mm (10 inches) 256 mm (10.08 inches)
Brake shoe thickness	New Minimum limit
	5 mm (0.2 inch) 1 mm (0.04 inch)
Compression spring free length	57 ± 1.5 mm (2.24 ± 0.06 inches)
Clearance between master cylinder and brake booster	0.3 ± 0.2 mm (0.012 ± 0.008 inch)

WPB90-A059

APPENDIX

5. BODY COLOR INFORMATION

Body color	Daihatsu color code	Stripe color		
		A	B	C
Red Gray M. San Remo green/Grey M.	3E7 168 NB1 (G09/168)	Dark Gray Metallic	Silver Metallic	Dark Blue
Green Dark blue M. Black M. Red mica/silver M. Dark blue M./silver M. Black M./silver M. White/silver M. White	G05 8G4 6A5 NA1 (3H1/148) NA2 (8G4/148) NA3 (6A5/148) NA4 (045/148) 045		Gray Metallic	Red

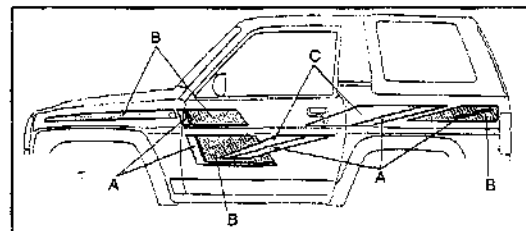
WPB90-A060

COLOR CODE

COLOR		AKZO	DUPONT	I.C.I	SPIES HECKER	STANDOX
WHITE	045	DAH045	L8997	NW-80	16067	045
RED	3E7	DAH3E7	G8890	KK26	38299	3E7
GREEN	G05	DAHG05	G8891	KV77	68470	G05
GRAY, M	168	DAH168	N8832	B936B	97728	168
DARK BLUE, M	8G4	DAH8G4	K9191	C247B	97909	8G4
BLACK, M	6A5	DAH6A5	G8742	A403B	97806	6A5
TWO TONE	NA1	DAHNA1	G8730/N8221	PC96B/D985B	47840	NA1
TWO TONE	NA2	DAHNA2	K9131/N8221	C247B/D985B	48225	NA2
TWO TONE	NA3	DAHNA3	G8742/N8221	A403/D985B	48231	NA3
TWO TONE	NA4	DAHNA4	L8997/N8221	NW80/D985B	48232	NA4
TWO TONE	NB1	DAHNB1	N9305/N8832	XW13/B936B	48480	NB1

WPB90-A061

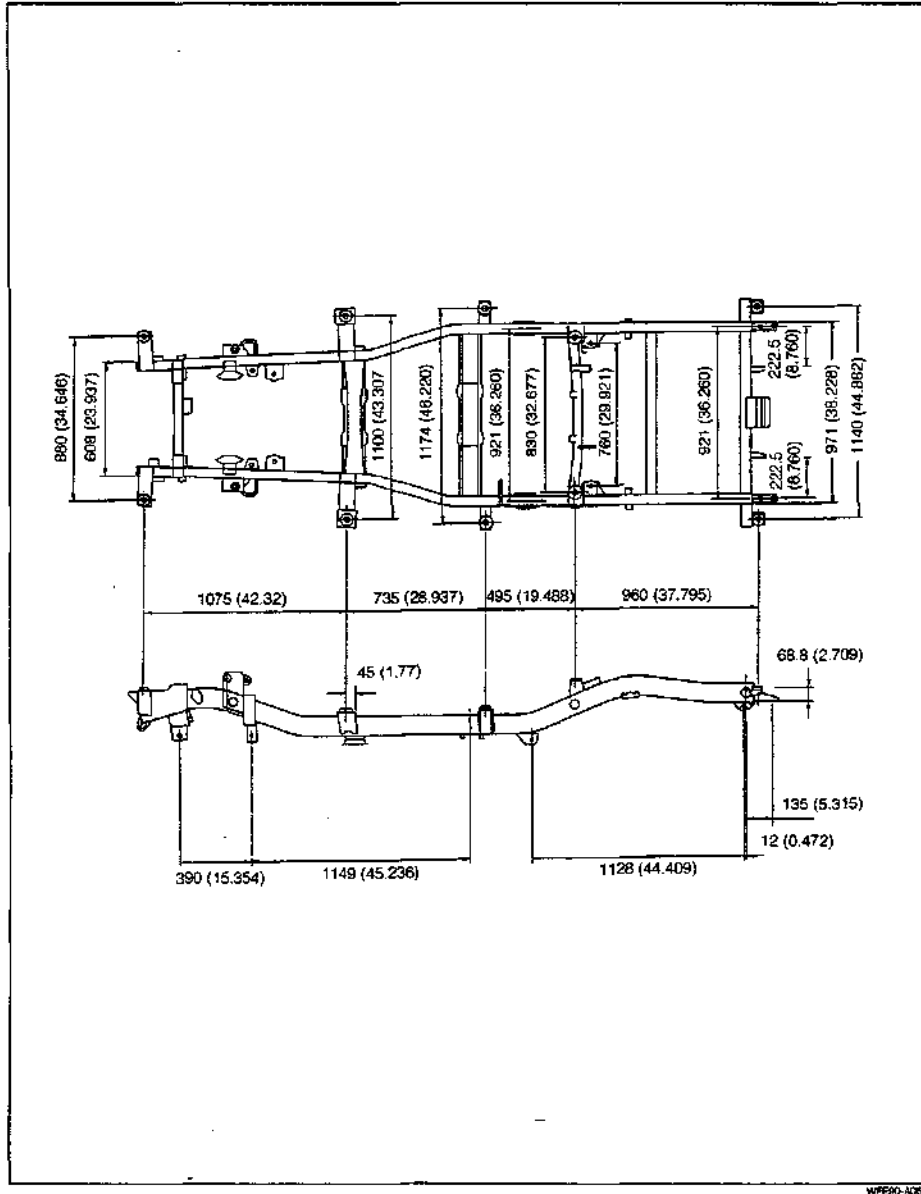
BODY STRIPE INFORMATION



WPB90-A062

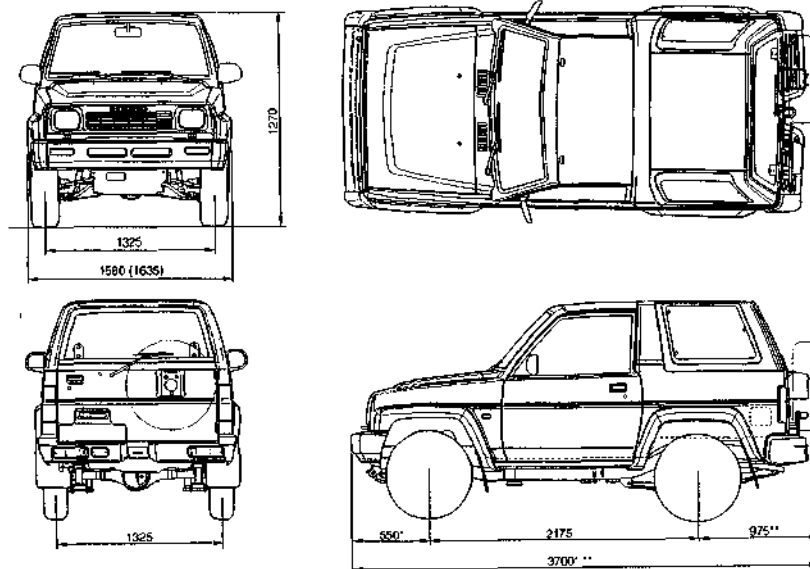
APPENDIX

6. FRAME DIMENSION



7. VEHICLE 4-PLANE DIAGRAMS

Version: A (Rear top)



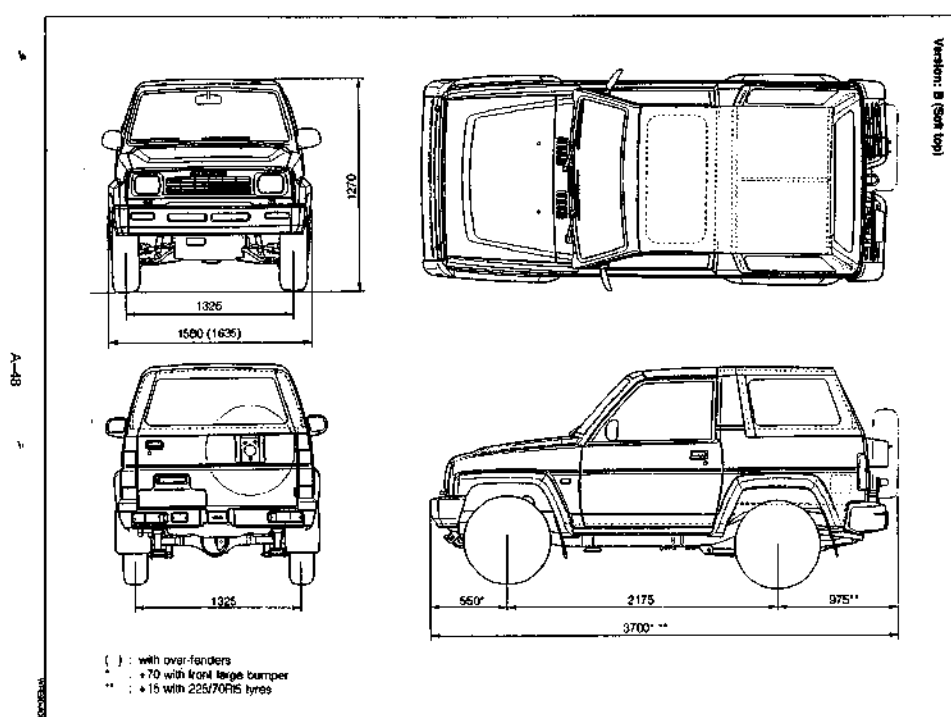
- () : with over-landers
- : +70 with front large bumper
- ** : +15 with 225/70R15 tyres

A-47

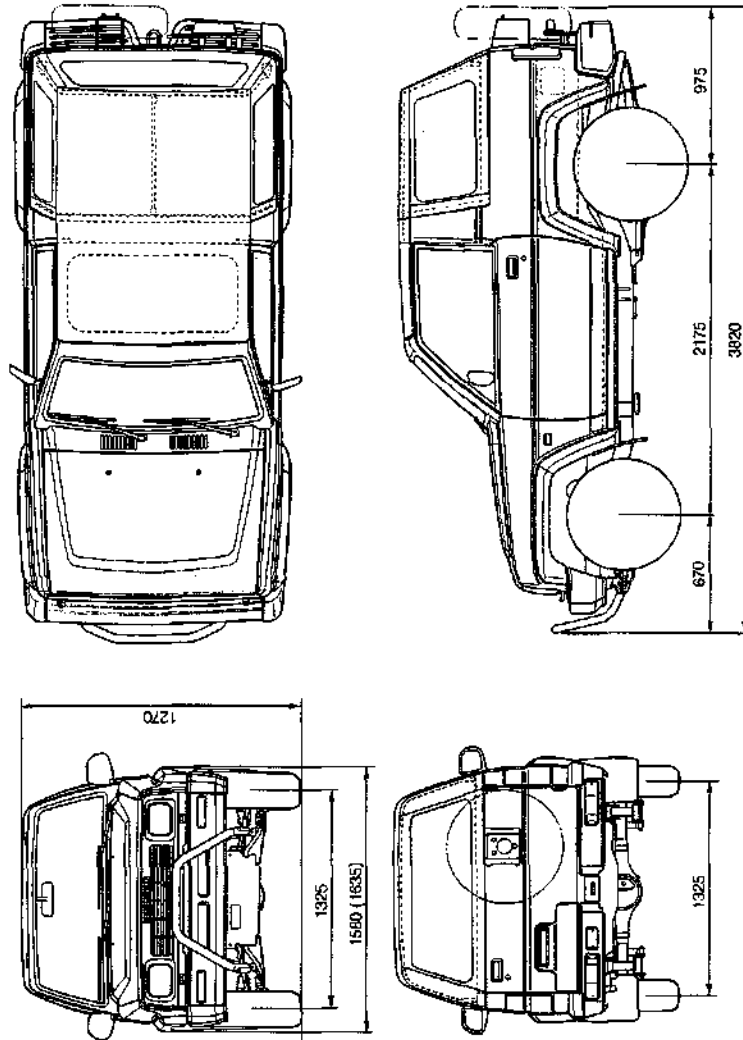
WIPAC-001

APPENDIX

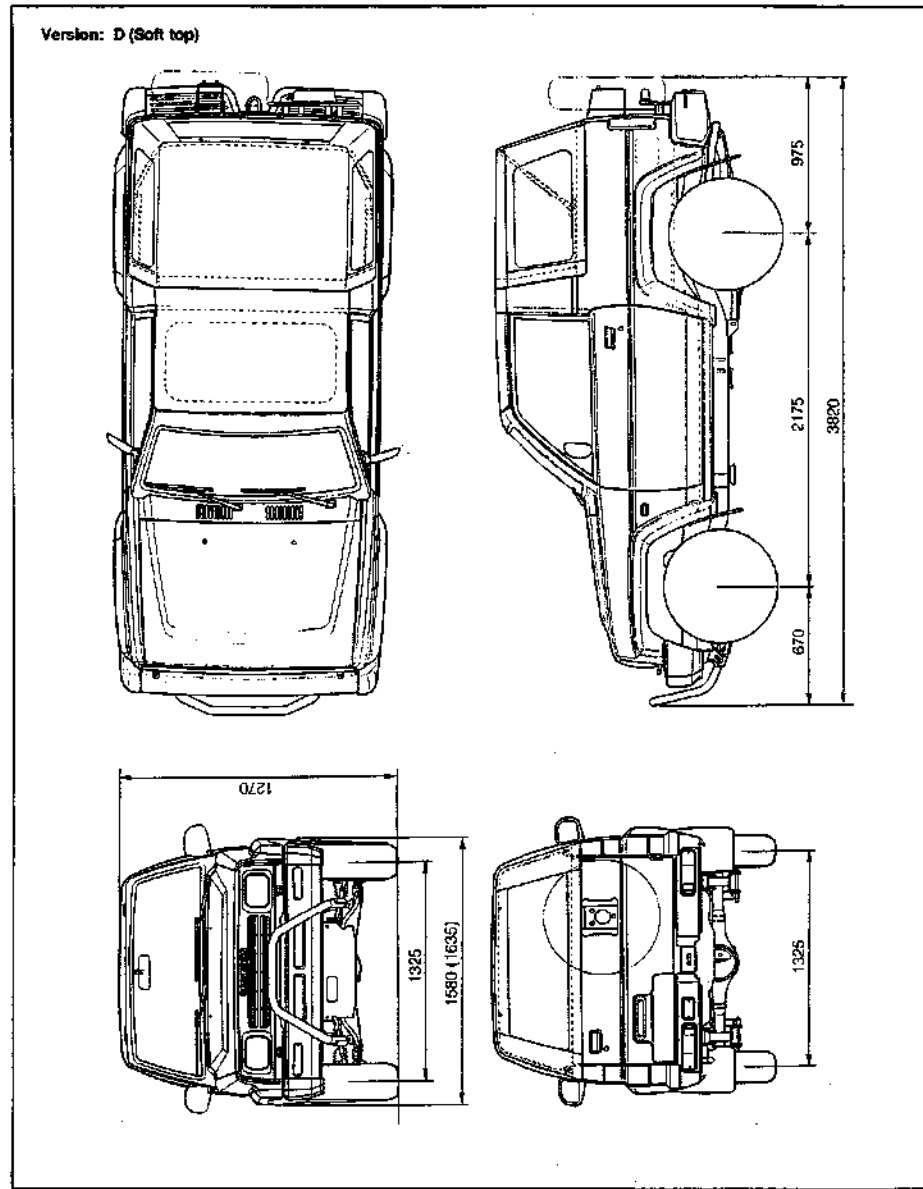
APPENDIX



Version: C (Soft top)



APPENDIX



8. METRIC-ENGLISH CONVERSION TABLE

Multiply	by	to get equivalent number of:
LENGTH		
Inch	25.4	millimetres (mm)
Foot	0.304 8	metres (m)
Yard	0.914 4	metres
Mile	1.609 3	kilometres (km)
AREA		
Inch ²	645.2	millimetres ² (mm ²)
	6.45	centimetres ² (cm ²)
Foot ²	0.092 9	metres ² (m ²)
Yard ²	0.836 1	metres ²
VOLUME		
Inch ³	16 387.	mm ³
	16.387 2	cm ³
	0.016 4	litres (l)
Quart	0.946 4	litres
Gallon	3.785 4	litres
Yard ³	0.764 6	metres ³ (m ³)
MASS		
Pound	0.453 6	kilograms (kg)
Ton	907.18	kilograms
Ton	0.907	tonne (t)
FORCE		
Kilogram	9.807	newtons (N)
Ounce	0.278 0	newtons
Pound	4.448	newtons
TEMPERATURE		
Degree Fahrenheit	(°F-32) ÷ 1.8	degree Celsius
TORQUE		
Pound-inch	0.112 98	newton-metres (N-m)
Pound-foot	1.355 8	newton-metres
POWER		
Horsepower	0.746	kilowatts (kW)
PRESSURE OR STRESS		
Inches of water	0.249 1	kilopascals (kPa)
Pounds/sq. in.	6.895	kilopascals
ENERGY OR WORK		
BTU	1 055.	joules (J)
Foot-pound	1.355 8	joules
Kilowatt-hour	3 600 000.	joules
	or 3.6 × 10 ⁶	

WP230-J068

APPENDIX

9. DECIMAL AND METRIC EQUIVALENTS

Fractions	Decimal In.	Metric mm.	Fractions	Decimal In.	Metric mm.
1/64	.015625	.397	33/64	.515625	13.097
1/32	.03125	.794	17/32	.53125	13.494
3/64	.046875	1.191	35/64	.546875	13.891
1/16	.0625	1.588	9/16	.5625	14.288
5/64	.078125	1.984	36/64	.578125	14.684
3/32	.09375	2.381	19/32	.59375	15.081
7/64	.109375	2.778	39/64	.609375	15.478
1/8	.125	3.175	5/8	.625	15.875
9/64	.140625	3.572	41/64	.640625	16.272
5/32	.15625	3.969	21/32	.65625	16.669
11/64	.171875	4.366	43/64	.671875	17.066
3/16	.1875	4.763	11/16	.6875	17.463
13/64	.203125	5.159	45/64	.703125	17.859
7/32	.21875	5.556	23/32	.71875	18.256
15/64	.234375	5.953	47/64	.734375	18.653
1/4	.250	6.35	3/4	.750	19.05
17/64	.265625	6.747	49/64	.765625	19.447
9/32	.28125	7.144	25/32	.78125	19.844
19/64	.296875	7.54	51/64	.796875	20.241
5/16	.3125	7.938	13/16	.8125	20.638
21/64	.328125	8.334	53/64	.828125	21.034
11/32	.34375	8.731	27/32	.84375	21.431
23/64	.359375	9.128	55/64	.859375	21.828
3/8	.375	9.525	7/8	.875	22.225
25/64	.390625	9.922	57/64	.890625	22.622
13/32	.40625	10.319	29/32	.90625	23.019
27/64	.421875	10.716	59/64	.921875	23.416
7/16	.4375	11.113	15/16	.9375	23.813
29/64	.453125	11.509	61/64	.953125	24.209
15/32	.46875	11.906	31/32	.96875	24.606
31/64	.484375	12.303	63/64	.984375	25.003
1/2	.500	12.7	1	1.00	25.4

WPF250-AC08

DAIHATSU

F300

MAINTENANCE

MAINTENANCE SCHEDULE	MA-2
MAINTENANCE OPERATIONS	MA-7

WFE9D-NA001

MAINTENANCE

MAINTENANCE SCHEDULE

SCHEDULE SELECTION

Daihatsu provides two kinds of maintenance schedules, one for NORMAL driving conditions and one for SEVERE driving conditions.

How to select schedule for SEVERE driving

Please follow the schedule for SEVERE driving if the vehicle is operated under one or more of the conditions below.

- Towing a trailer
- Operating when outside temperature remains below freezing.
- Repeated short trips less than 8 km (5 miles)
- Idling for extended periods and/or low speed operation for long distance such as police, taxi, door-to-door delivery or daily rental service.
- Operating in dusty, rough, muddy or salt sprayed roads
- Operating daily for a maximum of 25 km (15 miles) or less, or continuously for 30 minutes or less.



Follow schedule for SEVERE driving in addition to schedule for NORMAL driving.

WFE90-MA002

Schedule for NORMAL driving

Follow the distance and the period the vehicle has been driven whichever comes first, if without any notice. Continue periodic maintenance service after 100,000 km, following the schedule.

○...Check or inspect ●...Change or replace

Section	Items	What to check	× 1,000 km																				Refer to see page	
			× 1,000 miles																					
			(month) year																					
			1	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95		100
			0.5	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	
			—	(3)	(6)	(9)	1	(3)	(6)	(9)	2	(3)	(6)	(9)	3	(3)	(6)	(9)	4	(3)	(6)	(9)	5	
Engine	• Air cleaner element	• Cleaning, change			○		○		○		●		○		○		○		●		○		○	MA-8
	• Valve clearance	• Clearance									○								○					MA-13
	• Engine oil (API SG, SF or SE)	• Leakage • Level • Change	●	○	●	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	MA-8
	• Oil filter	• Change			●		●		●		●		●		●		●		●		●		●	MA-8
	• Fuel filter	• Change (HD-C engine)										●							●					MA-9
		• Change (HD-E engine)																						●
	• Fuel lines & connections	• Damage, crack • Tightness • Leakage	○					○			○				○				○				○	MA-9

MAINTENANCE

○...Check or inspect ●...Change or replace

Section	Items	What to check	× 1,000 km															
			× 1,000 miles															
			(month) year															
			1	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
			8	6	3	9	12	15	18	21	24	27	30	33	36	39	42	45
			(3)	(6)	(9)	1	(3)	(6)	(9)	2	(3)	(6)	(9)	3	(3)	(6)	(9)	4
			(3)	(6)	(9)	5												
			Refer to see page															
Engine	• Fuel lines & connections	• Fuel hose replacement	Every 4 years															
	• Carburetor (HD-C engine)	• Idle speed • Acceleration					○				○			○			○	
	• Coolant (LLC)	• Quantity • Leakage • Change	○	○		○	○		●		○	○		○	●		○	
	• V-belt	• Tension • Crack • Damage	○	○		○	○		○	○	○	○		○	○		○	
	• Timing belt	• Replacement	Every 100,000 km (60,000 miles)															
	• Distributor cap, rotor ¹	• Damage				○			○				○			○		○
	• Spark plug ¹	• Cleaning				○			○			○		○			○	
	• Ignition timing ²	• Timing				○			○			○		○			○	
Exhaust emission control system	• Blow-by gas ventilation hose	• Connection • Damage									○						○	
	• Dash pot	• Operation				○			○			○				○		○
	• Spark control system	• Operation				○			○			○				○		○
	• Charcoal canister	• Operation				○			○			○				○		○
	• EGR system ²	• Operation																○
Power transmitting system	• Clutch	• Free play • Reserved working travel		○		○		○		○		○		○		○		○
	• Transmission & differential	• Oil level • Oil leakage • Oil change	○	○		○		●		○		○		●		○		○
	• Propeller shaft	• Tightness • Rattle • Damage				○				○				○				○

*1: In case of US'83 engine, check every 30,000 km (18,000 miles).

*2: mark shows only for US'83 engine.

MAINTENANCE

○ ...Check or inspect ● ...Change or replace

Section	Items	What to check	× 1,000 km	1	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	Refer to see page
			× 1,000 miles	0.5	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	
			(month) year	—	(3)	(6)	(9)	1	(3)	(6)	(9)	2	(3)	(6)	(9)	3	(3)	(6)	(9)	4	(3)	(6)	(9)	5	
Suspension system	• Suspension arm, control arm, dust cover	• Tightness • Damage						○				○				○				○					○ MA-17
	• Shock absorber	• Function • Oil leakage • Damage						○				○				○				○					○ MA-17
	• Suspension ball joint	• Grease apply						○				○				○				○					○ MA-17
Running system	• Steering ball joint	• Grease apply						○				○				○				○					○ MA-19
	• Tire	• Pressure • Damage • Wear	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○ MA-18
	• Front wheel bearing	• Rattle						○				○				○				○					○ MA-19
		• Grease change										●								●					FS section
	• Rear wheel bearing	• Rattle						○				○				○				○					○ MA-19
Steering system	• Steering wheel	• Tightness • Free play						○				○				○				○					○ MA-20
	• Linkage, dust cover	• Tightness • Rattle						○				○				○				○					○ MA-20
	• Wheel alignment	• Side slip test						○				○				○				○					○ MA-20
	• Knuckles	• Rattle						○				○				○				○					○ MA-21
	• Ball joint dust seal	• Damage			○			○				○				○				○					○ MA-20
	• Steering knuckles	• Grease apply						○				○				○				○					○ MA-19
	• Gear box	• Oil check	○					○				○				○				○					○ MA-21

MAINTENANCE

○...Check or inspect ●...Change or replace

Section	Items	What to check	× 1,000 km																								Refer to see page
			× 1,000 miles																								
			(month) year																								
			1	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100				
			0.6	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60				
			(3)	(6)	(9)	1	(3)	(6)	(9)	2	(3)	(6)	(9)	3	(3)	(6)	(9)	4	(3)	(6)	(9)	5					
Steering system	• Gear box	• Tightness						○				○			○				○				○	MA-21			
	• Power steering belt	• Tightness • Damage			○		○		○		○		○		○		○		○		○		○	MA-22			
	• Power steering fluid	• Fluid check	○		○		○		○		○		○		○		○		○		○		○	MA-22			
		• Fluid hose change	Every 4 years																					SR section			
Brake system	• Brake pedal & parking brake	• Free play • Reserved working travel	○		○		○		○		○		○		○		○		○		○		○	MA-22			
	• Disc pad	• Clearance • Wear • Damage					○				○				○				○				○	MA-23			
	• Brake hose, tube	• Leakage • Damage • Loose clamps	○		○		○		○		○		○		○		○		○		○		○	MA-23			
		• Hose, caliper piston seal and boot change	Every 4 years																					BR section			
	• Brake fluid	• Level	○		○		○		○		○		○		○		○		○		○		○	MA-23			
		• Fluid change (Disc brake)	Every 1 year																					BR section			
	• Brake drum, lining	• Wear • Damage					○				○				○				○				○	MA-24			
	• Brake booster	• Function					○				○				○				○				○	MA-24			
		• Vacuum hose replacement	Every 4 years																					BR section			
	• Master & wheel cylinder	• Cup and dust seal replacement	Every 2 years																					BR section			
• Proportioning valve	• Replacement	Every 4 years																					BR section				
Chassis & body	• Exhaust pipe and muffler, mountings	• Tightness • Damage					○				○				○				○				○	MA-24			

MAINTENANCE

○ ... Check or inspect ● ... Change or replace

Section	Items	What to check	× 1,000 km																				Refer to see page	
			× 1,000 miles																					
			(month) year																					
			1	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	
			0.6	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	
			—	(3)	(6)	(9)	1	(3)	(6)	(9)	2	(3)	(6)	(9)	3	(3)	(6)	(9)	4	(3)	(6)	(9)	5	
Chassis & body	• All doors, hood	• Lock operation • Tightness																						MA-24
	• Seat belt	• Operation • Tightness																						MA-24
	• Chassis grease	• Condition • Grease apply	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	MA-25
	• Wheel hub nuts, other bolts and nuts	• Tightness	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	MA-25
Electrical system	• Battery	• Electrolyte level		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	MA-25
	• Wire harness	• Tightness clamps • Damage	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	MA-26
	• Lighting system, meter & gauge	• Function	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	MA-26
	• Heater	• Heater hose replacement	Every 4 years																				BR section	

WFE90-MA003

Schedule for SEVERE driving

Maintenance item	Interval
Engine oil (API SG, SF or SE)	Change every 5,000 km (3,000 miles)
Engine oil filter	Change every 5,000 km (3,000 miles)
Air cleaner element	Clean: every 2,500 km (1,500 miles) Replace: every 20,000 km (12,000 miles)
Exhaust pipe mountings	Inspect every 5,000 km (3,000 miles)

The SEVERE driving vehicles should be performed the above maintenance items in addition to the NORMAL driving maintenance items.

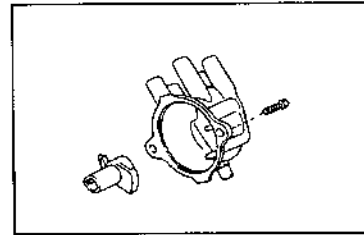
WFE90-MA004

MAINTENANCE OPERATIONS ENGINE

[COLD ENGINE OPERATIONS]

DISTRIBUTOR CAP

Inspection of distributor cap and rotor.
Visually inspect the distributor for cracks, wear or damage.



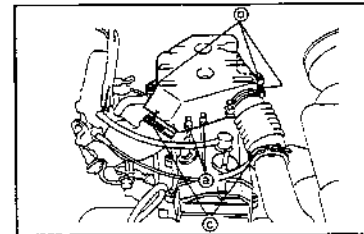
WFES0-MA005

SPARK PLUG

Inspection and cleaning of spark plug

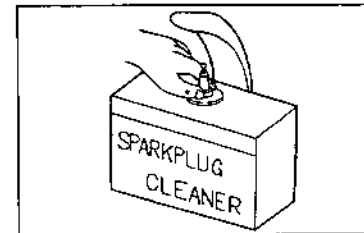
(1) Remove the air chamber (HD-E engine)

- ① Disconnect the air conditioner and/or power steering idle-up vacuum hoses from the air chamber ① (if equipped).
- ② Remove the 3 attaching bolts ②.
- ③ Disconnect the air chamber hose at the 2 clamping positions illustrated above ③.



WFES0-MA006

(2) If there are traces of oil, remove it with gasoline before the spark plug is cleaned by the spark plug cleaner.

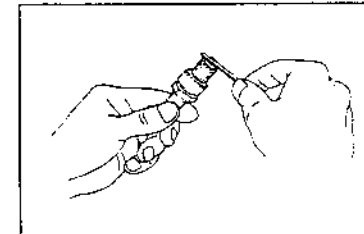


WFES0-MA007

(3) Measure the electrode gap, using a plug gap gauge.

Recommended a plug gap

Spark plug	Air gap mm (inch)
Champion: RC9YC4	1.0 - 1.1 (0.039 - 0.043)
NIPPONDENSO: K20PR-U11	
NGK: BKR 6E-11	



WFES0-MA100

Tightening Torque of Spark Plug:
14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)

(4) When install the air chamber, make sure to align the marks provided on the air chamber and hose.

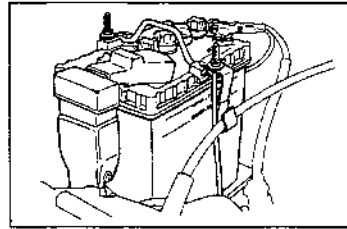
WFES0-MA101

MAINTENANCE

BATTERY

Check of battery electrolyte level

- (1) Visually check the electrolyte level between the upper line and the lower line.
- (2) If the electrolyte level is below the lower level, replenish distilled water up to the upper level.



WPB90-MA006

Check of wiring harness clamp

Visually check that the wiring harness is suitable clamp, damaged.

WPB90-MA009

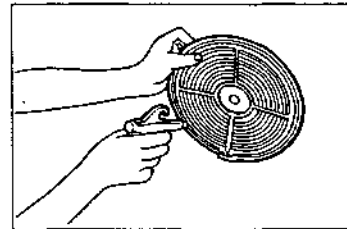
AIR CLEANER ELEMENT

Cleaning of air cleaner filter element

- (1) Remove the air cleaner filter element from the air cleaner case.
- (2) Clean the element with compressed air. First blow from the back side thoroughly. Then, blow off the front side of the element.

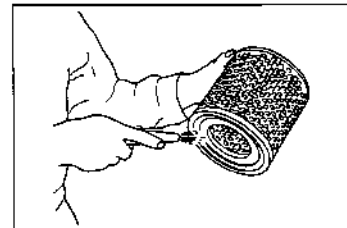
CAUTION:

The air pressure to be used for this cleaning operation should not exceed 4.0 kg/cm² (56.9 psi)



WPB90-MA010

- (3) Install the air cleaner filter element in the air cleaner.



WPB90-MA011

ENGINE OIL AND FILTER

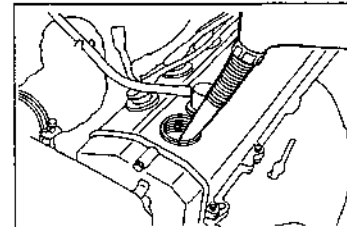
Engine oil change

Recommended oil grade: API grade SE, SF or SG

Oil capacity

When only engine oil is changed: 3.3 liter

When engine oil is changed and oil filter is replaced:
3.5 liter



WPB90-MA012

Engine oil filter replacement

- (1) Remove the oil filter, using the following SST.

SST: 09228-87201-000

NOTE:

Since the oil flows out during the replacement, receive the oil with an adequate container.

- (2) Inspect and clean the oil filter installation surface.

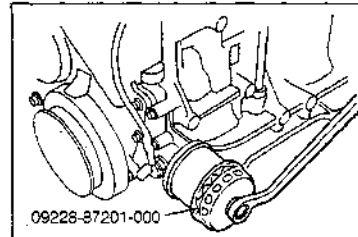
- (3) Apply clean engine oil to the gasket of a new oil filter.

- (4) Installation of oil filter

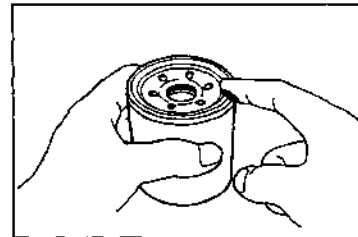
Screw in the oil filter lightly by hand until the oil seal surface contacts the oil cooler.

Then, tighten the oil filter one more turn, using the SST.

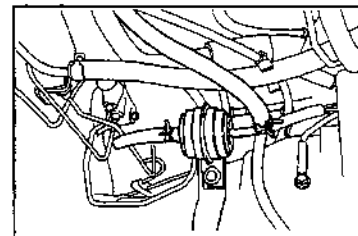
SST: 09228-87201-000



WPB90-MA015



WPB90-MA016



WPB90-MA017

FUEL FILTER

Fuel filter replacement

- **Carburetor installed engine:**

Disconnect the hose clamp. Then, replace the fuel filter.

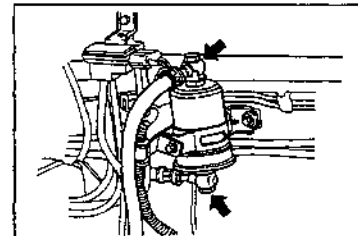
- **EFI installed engine:**

Loosen the union bolt slowly and pull it out.

WARNING:

The fuel in the fuel pipe is pressurized to a pressure of 2.55 kg/cm² (36.27 psi).

Therefore, the union bolt should be removed slowly. Otherwise, the fuel may be splashed.

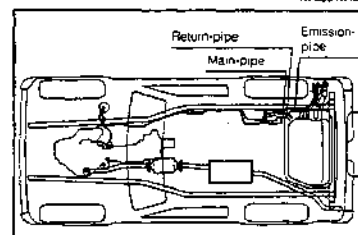


WPB90-MA018

FUEL LINES & CONNECTION

Inspection of fuel lines and connections

Visually inspect the fuel lines for cracks, leakage, loose connections, or deformation.

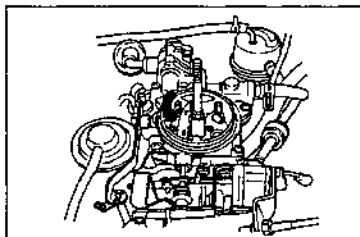


WPB90-MA019

MAINTENANCE

Inspection of auto choke system (Only for HD-C)

Check that choke valve is completely closed when cold engine. Then, start the engine, check that choke valve is gradually opened in accordance with the warming-up condition of the engine.



WFES0-MA018

ENGINE COOLANT

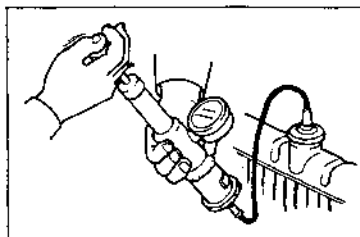
Check of engine coolant

(1) Check of cooling system for leakage

Apply a pressure of 1.2 kg/cm² (17 psi) to the cooling system by means of a radiator tester. Ensure that the pressure does not drop.

WARNING:

Never remove the radiator tester when the coolant temperature is still high.

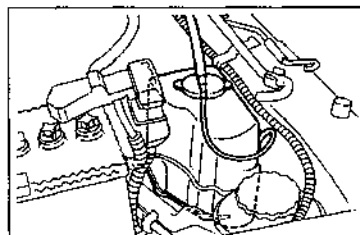


WFES0-MA019

(2) Check of coolant level

Check to see if the coolant level is between the LOW and FULL lines of the reserve tank.

If the coolant level is near the low level or below the low level, add the coolant up to the full level.

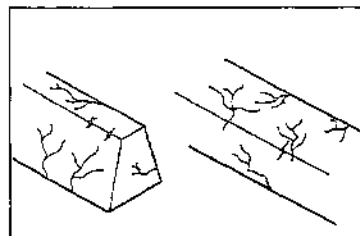


WFES0-MA020

DRIVE BELT

Inspection of drive belt

- (1) Visually check the V belt for separation of the adhesive rubber above and below the core, core separation from the belt side, severed core, separation of the rib from the adhesive rubber, cracks or separation of the ribs, torn or worn ribs or cracks in the inner ridges of the ribs.



WFES0-MA021

- (2) Measure the amount of the drive belt deflection when the midpoint of the drive belt between the alternator and the water pump pulley is pushed with a force of 98 N (10 kgf).

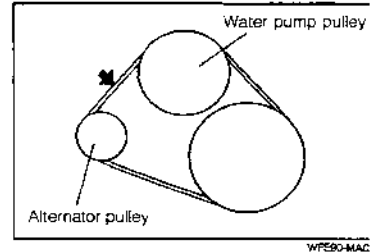
Specified Belt Deflection

V belt: 6.0 - 8.0 mm (0.24 - 0.31 inch)

V-ribbed belt: 5.0 - 6.0 mm (0.20 - 0.24 inch)

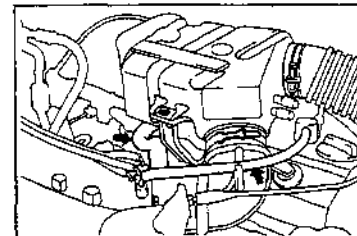
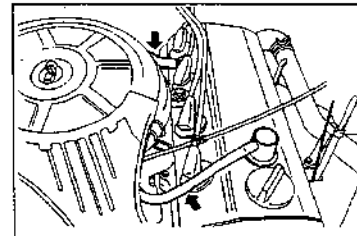
NOTE:

- "New belt" refers to a belt which has been used on a running engine for less than five minutes.
- After installing a new belt, run the engine for about five minutes and then recheck the tension.



BLOW-BY GAS SYSTEM

Inspection of blow-by gas recirculating system
Check the hose, connections for cracks, leak or damage.



CHARCOAL CANISTER

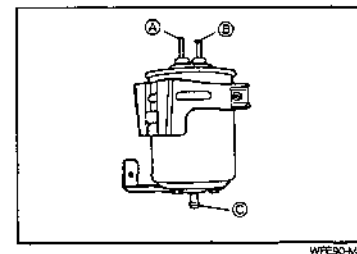
Inspection of charcoal canister

- (1) Disconnect the rubber hoses and remove the charcoal canister.

HD-E:

- (2) Blow air of 294 kPa (3 kgf/cm²) into the pipe ② while holding the pipe ① closed.

Ensure that air flows smooth from the pipe ③.



MAINTENANCE

HD-C (Only for GCC Specifications)

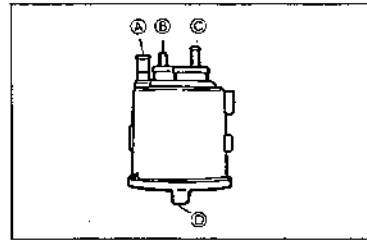
Plug the pipe ④ and ⑤ with your fingers and blow compressed air of 294 kPa (3 kgf/cm²) through the pipe ③ (fuel tank side).

- Check that the air comes out of the bottom pipe ⑥.
- Check that no activated charcoal comes out.

NOTE:

Do not attempt to wash the charcoal canister.

- (3) Install the charcoal canister and reconnect the rubber hose.



WFE90-MA026

[HOT ENGINE OPERATIONS]

IGNITION TIMING

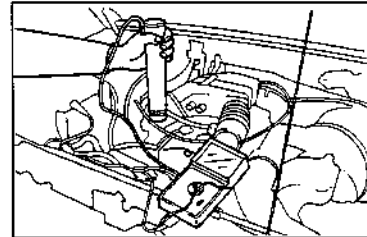
Adjustment of ignition timing

- (1) Connect the tachometer to the ignition coil.
- (2) With the engine idling as specified, use a timing light to check the timing.
Ignition timing: $3^{\circ} \pm 2^{\circ}$ BTDC/850 rpm

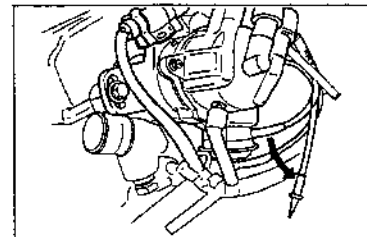
- (3) If necessary, loosen the distributor bolts and turn the distributor to align the marks. Re-check the timing after tightening the distributor.

NOTE:

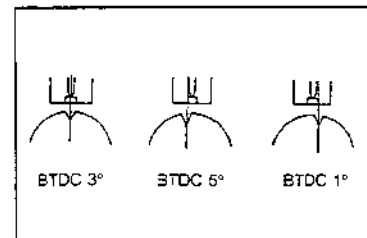
- Disconnect the vacuum hose of sub-diagram from the vacuum advancer of distributor and close the vacuum hose during test.



WFE90-MA026



WFE90-MA027



WFE90-MA028

VALVE CLEARANCE

Adjustment of valve clearances

NOTE:

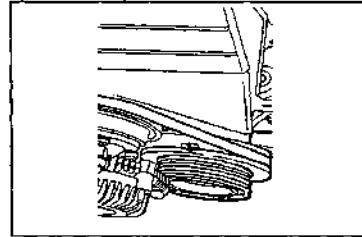
The valve clearance adjustment is performed normally when the engine is in a hot condition.

"Hot engine condition" denotes a condition in which the cooling water temperature is 75 - 85 °C (167 - 185°F) and the engine oil temperature is above 65°C (149°F).

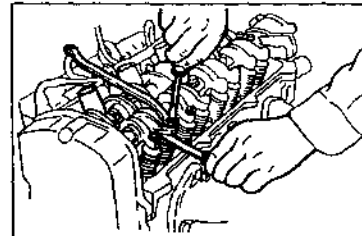
Valve clearances (Hot condition)

Intake: 0.25 ± 0.07 mm (0.0100 \pm 0.0028 inch)

Exhaust: 0.33 ± 0.07 mm (0.0130 \pm 0.0028 inch)



WPES0-MA029

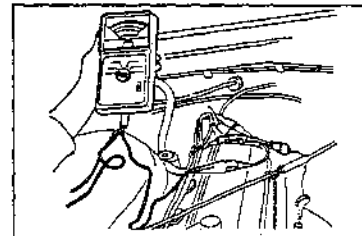


WPES0-MA030

IDLE SPEED

(1) Preparation to be made prior to idle check

- Warm up the engine thoroughly.
- All accessory switches are turned OFF.
On those vehicle equipped with a day-light system, set the light control switch to the OFF position with head light turned ON.
- Connect the tachometer with STT.
(SST: 09991-87703-000)



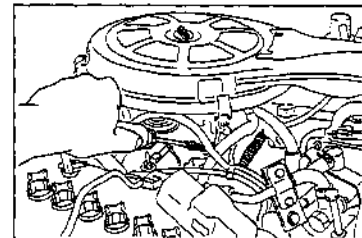
WPES0-MA031

(2) Adjustment

• Carburetor installed vehicle

Adjust the throttle adjusting screw so that the engine idle speed may become the specified.

Engine Idle Speed: 850 ± 50 rpm

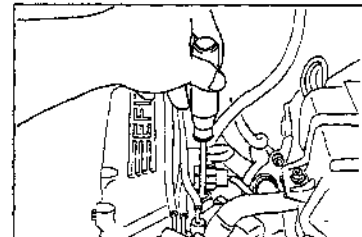


WPES0-MA032

• EFI installed vehicle

Remove the idle adjusting screw cap from the throttle body. Then, set the idle speed by turning the idle speed adjusting screw.

Engine Idle Speed: 850 ± 50 rpm

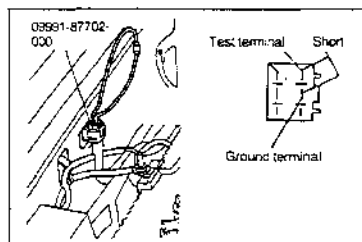


WPES0-MA033

MAINTENANCE

- NOTE: For US '83 Spec
Connect the following SST to the check terminal and connect the test terminal (Brown) with Ground (Black).
(SST: 09991-87702-000)
Engine Idle Speed: 800 ± 50 rpm

Afterward, disconnect the SST. Ensure that the engine idle speed becomes 850 ± 50 rpm.

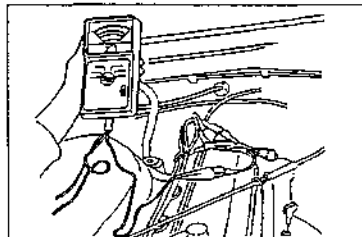


THROTTLE POSITIONER

Inspection of throttle positioner system

- **Carburetor installed vehicle**

- (1) Warm up the engine.
- (2) Raise the engine speed to approximately 2500 rpm and hold the engine speed at 2500 rpm for five seconds. Ensure that the dashpot shaft is fully extended.
- (3) Close the throttle valve quickly.
- (4) Make sure the time required for the engine speed to drop from 1500 rpm to 1200 rpm is the specified time.
Specified Time: 1.0 - 5.0 second



NOTE:

Dashpot touch engine speed: 1500 ± 50 rpm

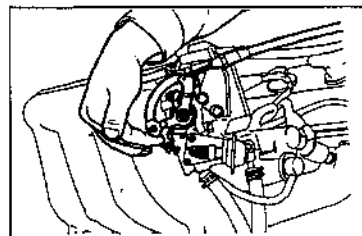
- **EFI installed vehicle**

- (1) Warm up the engine.
- (2) Raise the engine speed to approximately 3500 rpm and hold the engine speed at 3500 rpm for five seconds. Ensure that the dashpot lever should be fully extended.
- (3) Close the throttle valve quickly.

- (4) Measure the time required for the engine speed to drop from 1800 rpm to idle speed (850 ± 50 rpm).
Specified Time: 0.5 - 5.0 seconds

NOTE:

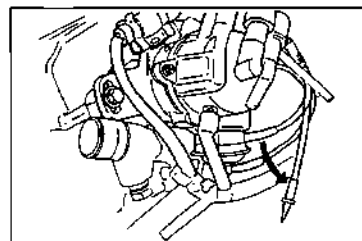
Dashpot touch engine speed: 1800 ± 100 rpm
For US'83 Spec: 1600 ± 100 rpm



SPARK CONTROL SYSTEM

Inspection of spark control system

- (1) Disconnect the vacuum hose of main and sub diagram from the vacuum advancer of distributor, and close the vacuum hose. Using a timing light, check the ignition advance timing, while engine speed is being raised.

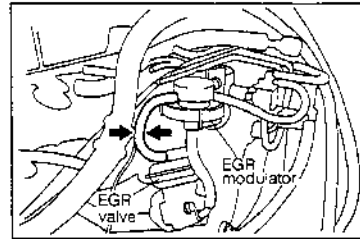


- (2) Dis-connect the plug from vacuum hose.
Connect the MitgVac to the vacuum advancer of distributor,
check the ignition advance timing, while vacuum is applied.

WFE90-MA039

EGR SYSTEM (For US'83)

- (1) Maintain the engine speed approximately at 3500 r.p.m.
- (2) While maintaining the engine speed at this level, clog the vacuum hose between the EGR valve and the EGR modulator (port Q).
- (3) Fully close the accelerator while the hose is held clogged.
Ensure that the engine stalls.



WFE90-MA040

MAINTENANCE

POWER TRANSMITTING SYSTEM

CLUTCH

Check of clutch

- (1) Adjust the clutch pedal height by means of the set bolt.

Clutch Pedal Installation Height:

216 - 226 mm (8.5 - 8.9 inches)

NOTE:

The clutch pedal height should be measured from the body metal by rolling up the carpet and floor mat.

- (2) Connect the clutch cable to the clutch pedal. Adjust the clutch free travel.

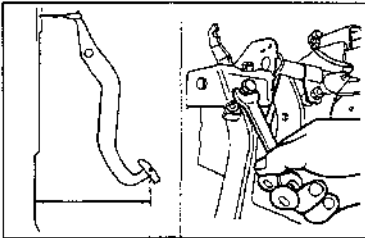
(Left hand drive vehicle): Adjust the clutch free travel by moving the clip of the clutch cable.

(Right hand drive vehicle): Adjust the clutch free travel by turning the knob for adjusting the play of the clutch cable.

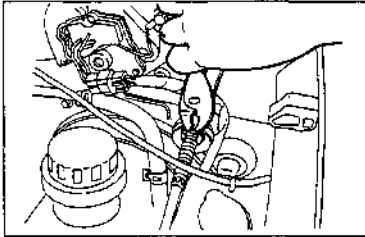
Specified Clutch Free Travel: 18 - 27 mm
(0.709 - 1.063 inches)

NOTE:

Apply grease to the clutch cable and the installation section of the pedal.



WFE90-MA041



WFE90-MA042

TRANSMISSION & DIFFERENTIAL

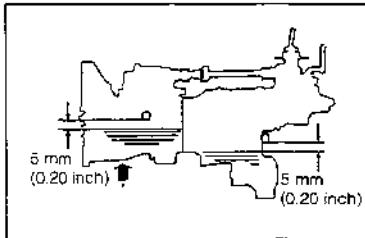
Checking of oil level and leakage

- (1) Checking of oil level and leakage

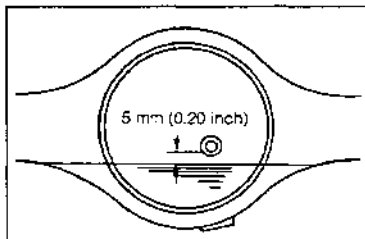
Oil should be up to the filler plug hole.

Add oil if low and inspect for oil leakage.

- (2) Oil change



WFE90-MA043



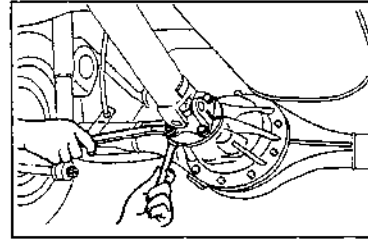
WFE90-MA044

		Grade/viscosity	liter
Transmission		API GL-3 or GL-4/SAE 75W-90	1.7
Transfer	Full time	API GL-3 or GL-4/SAE 75W-90	1.7
	Part time	↑	1.4
Differential	Front	API GL-5/SAE90 or 80W-90	0.9
	Rear	↑	1.95

PROPELLER SHAFT

Check of propeller shaft

Checking of propeller shaft for tightness damage and rattle



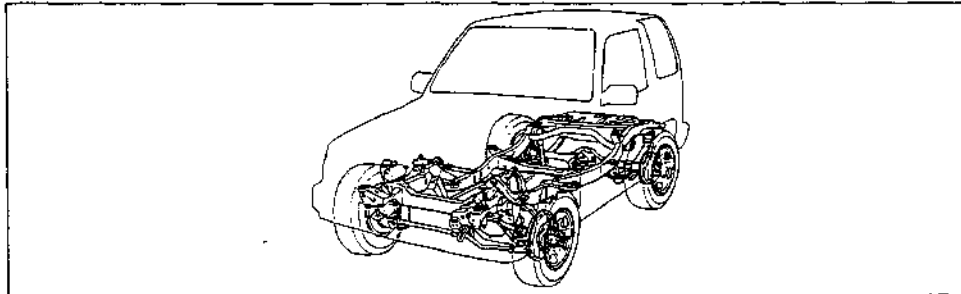
WPES0-MA045

SUSPENSION SYSTEM

SUSPENSION ARM, CONTROL ARM AND DUST COVER

Check of following parts

- (1) Check the suspension arm for damage.
- (2) Check the control arm, rod for damage.
- (3) Check the dust cover for cracking, damage or tears.
- (4) Check all parts of suspension for tightness.
- (5) Check the arm connecting section for excessive play.



WPES0-MA046

SHOCK ABSORBER

Check of performance

Bounce the front end of the vehicle and check that the bound and rebound action should be quickly damped.

Check of leakage and damage

Check fluid leakage and damage.

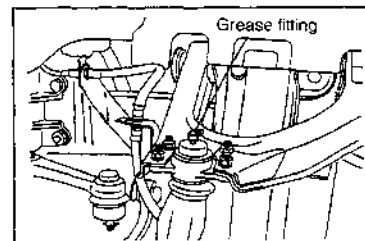
WPES0-MA047

SUSPENSION BALL JOINT

Grease apply of suspension ball joints

Apply grease to the upper arm ball joint and lower arm ball joint.

Grease to be used: Chassis grease



WPES0-MA048

MAINTENANCE

RUNNING SYSTEM

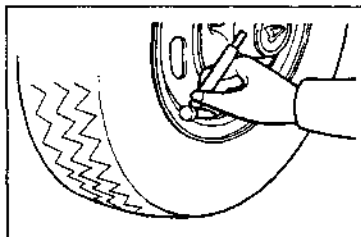
TIRES

Air pressure

- (1) Check to see if the tire air pressure conforms to the specification, using a tire gauge.
- (2) Ensure that no air leaks from the tire valve and that the valve cap is attached.

NOTE:

For the specified air inflation pressure, see the caution plate attached to the vehicle. Be very careful not to overinflate the tires excessively.



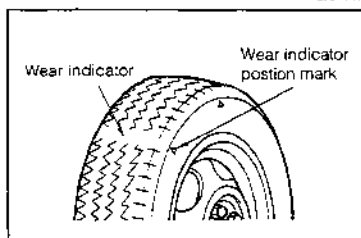
WF89G-MA-102

Wear

- (1) Inspect the tread section for wear. Ensure that the groove depth is at least 1.6 mm (0.063 in.).

NOTE:

Care must be exercised as to the wear indicator mark. (When the remaining groove depth is reduced to less than 1.6 mm (0.063 in.), the wear indicator mark will become visible.)

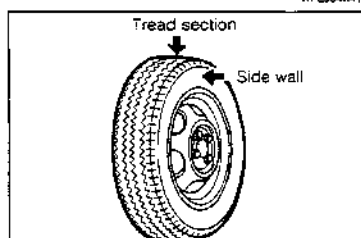


WF89G-MA-103

- (2) Inspect the tire for uneven wear, ridge and other abnormal wear.

NOTE:

If the tires exhibit an uneven wear pattern, check the wheel balancing and front wheel alignment.



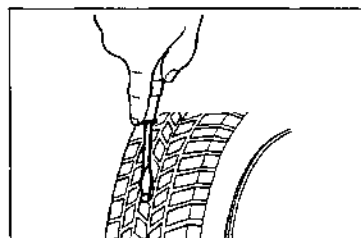
WF89G-MA-104

Crack and damage

Check that the tread section and side wall section are free from cracks and damage.

Objects caught in tire pattern

Ensure that no nail, metal chip, gravel or other foreign matters lodge at the grooves of each tire, or none of them sticks into the tire.



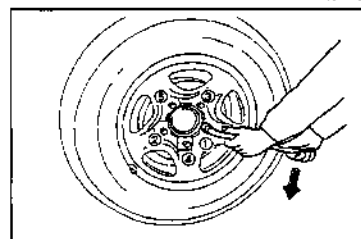
WT90-MA-052

WHEELS

Looseness of lug nuts and bolts

Check the wheel lug nuts and bolts for looseness, using a wheel nut wrench.

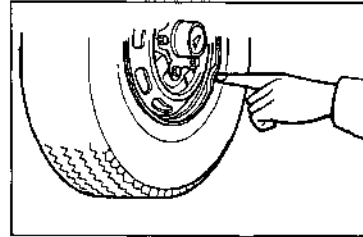
Tightening Torque: 88.2 - 117.6 N·m (9.0 - 12.0 kgf·m)



WT90-MA-053

Damage of rim and disc

Check that the rim and disc are free from damage.

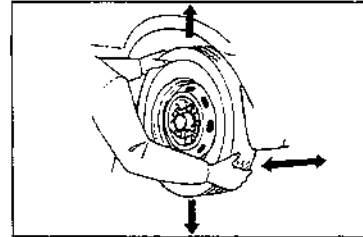


WF304-MA254

WHEEL BEARING

Rattle

- (1) Move the tire up and down, holding it at the top and bottom sections by your hands. Ensure that the rear wheel bearing exhibits no excessive play.
- (2) Ensure that no abnormal sound is emitted when the wheel is rotated.
- (3) If excessive rattle is found, perform the check while the brake pedal is being depressed.
- (4) If the rattle disappears, it indicates that the wheel bearing is loose. If the rattle persists, it indicates that the knuckle section or other suspension parts are loose.



WF293-MA105

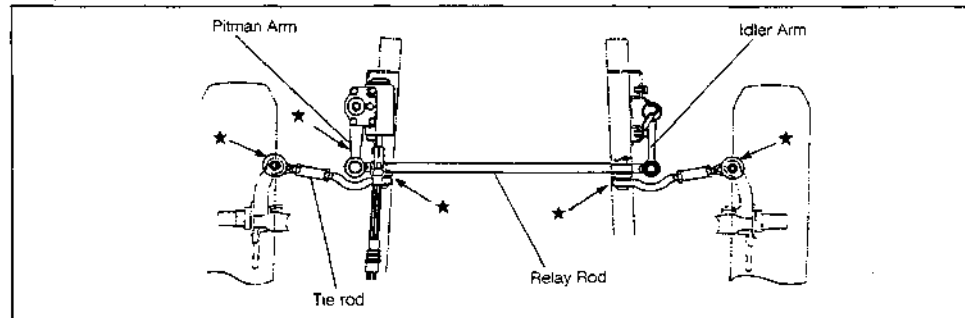
1. Steering ball joint

Inspection

Check that the castle nut at each ball joint section of the steering linkage is properly tightened. Also, check the cotter pins for proper installation.

Grease Application

Apply chassis grease to the points bearing a "★" mark, as shown in the illustration



WF293-MA265

MAINTENANCE

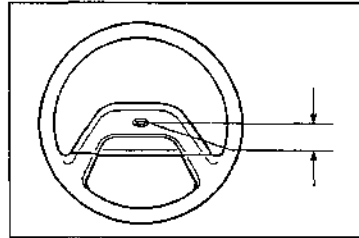
STEERING SYSTEM

STEERING WHEEL

Check of steering wheel play

Set the vehicle in a straight-ahead condition. Check the steering wheel play by turning it lightly with your fingers.

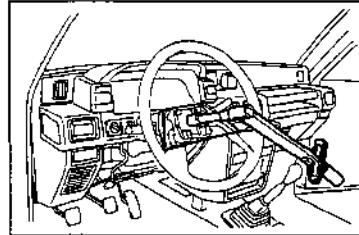
Specified Value: 0 - 30 mm (0 - 1.18 inches)



WFE90-MA057

Check of steering wheel tightness

Tightening Torque: 29.4 - 58.8 N·m (3.0 - 5.0 kgf·m)

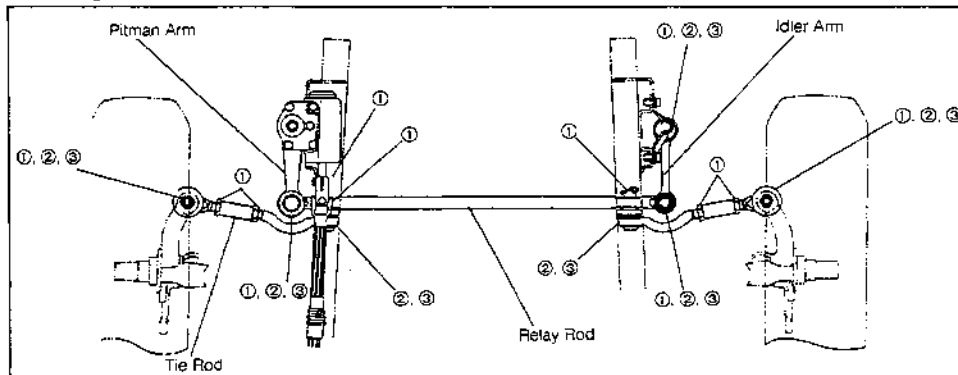


WFE90-MA058

LINKAGE & DUST COVER

Check of steering linkage and dust cover.

- ① Tightness
- ② Rattle
- ③ Damage



WFE90-MA059

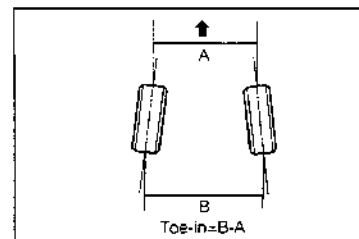
WHEEL ALIGNMENT

Check of wheel alignment

(1) Toe-in measurement

Measure the distance between the marks at the front side of each front wheel. Determine the toe-in amount by calculating the difference.

Specified Value: 1.0 - 4.0 mm (0.039 - 0.157 inch)



WFE90-MA060

- (2) Camber measurement
Specified Camber Amount: $1^{\circ} \pm 10'$

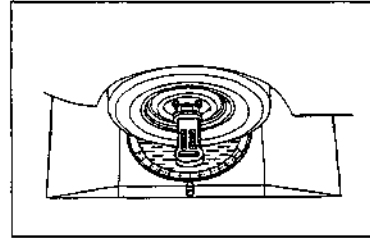
NOTE:

The measurement should be performed in the same way at the right and left wheels.

- (3) Caster measurement
Specified Caster Amount: $2^{\circ} \pm 30'$
Specified Kingpin Angle: $9^{\circ} \pm 30'$

NOTE:

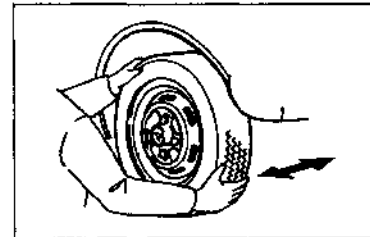
For the alignment checks, turn the steering wheel until the reading of the turning radius gauge becomes 20 degrees at the right wheel or the left wheel, respectively.



WFES0-MA061

KNUCKLE

Check of knuckles rattle



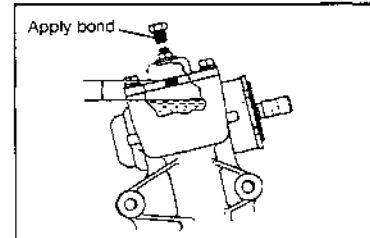
WFES0-MA062

GEAR BOX

Check of oil level of steering gear box
Check the steering gear box for oil level.
Specified Value: 13 - 23 mm (0.512 - 0.906 inch)

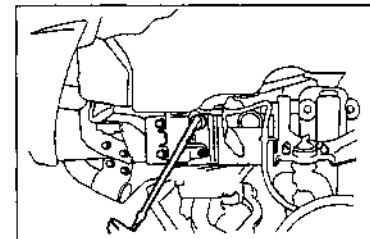
NOTE:

Apply the following bond to the attaching bolt.
Bond: Daihatsu genuine sealer (999-0480-8U90-00)



WFES0-MA063

Check of steering gear box tightness
Tightening Torque: 73.5 - 102.9 N·m (7.5 - 10.5 kgf·m)



WFES0-MA064

MAINTENANCE

POWER STEERING

Check of power steering belt

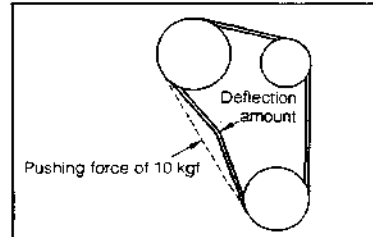
(1) Check of damage

(2) Check of V-belt tension

Check the belt tension by measuring the deflection amount of the V-belt.

9 - 11 mm (0.354 - 0.433 inch)

when a force of 10 kgf is applied:



WFE90-MA065

Check power steering fluid

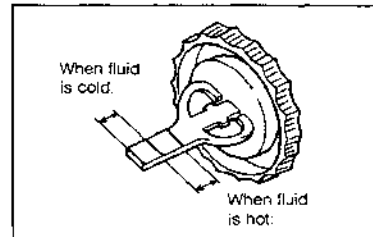
(1) Check the fluid level. If the fluid level is lower than the specified level replenish the Castle Power Steering Fluid.

Specification:

The fluid level should be within the "HOT" level range.

(2) Checking of fluid leakage

Check the connections of the hydraulic tube, steering gear housing and pump.



WFE90-MA066

BRAKING SYSTEM

BRAKE PEDAL

Check of brake pedal and parking brake

(1) Pedal free travel check

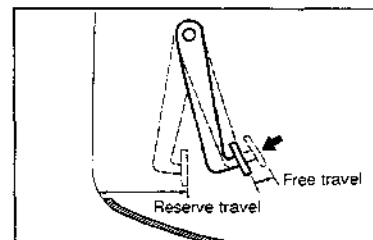
Pedal free travel: 1 - 3 mm (0.04 - 0.12 inch)

(2) Pedal reserve travel check

Pedal reserve travel: More than 80 mm (3.15 inch)

NOTE:

The brake pedal reserve travel should be measured from the body metal by rolling up the carpet and floor mat.

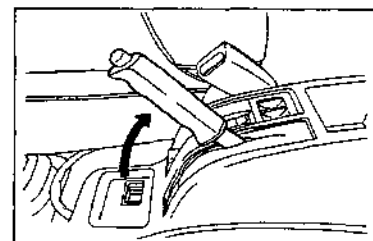


WFE90-MA067

PARKING BRAKE

With a force of 245 N (25 kgf), pull up the parking brake lever slowly and count the notches.

Specified working travel: 4 - 6 notches



WFE90-MA068

DISC PAD

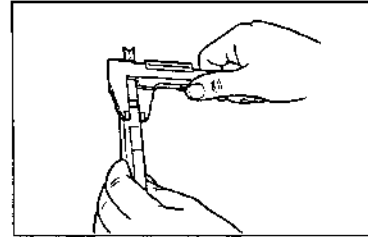
Check of disc pad

(1) Checking of brake disc pad for thickness, wear and damage

- ① Measure brake pad thickness.
If the pads thickness is less than 1.0 mm (0.04 inch), replace the pad.
- ② Inspect uneven wear and damage.

(2) Checking of brake disc for wear, damage

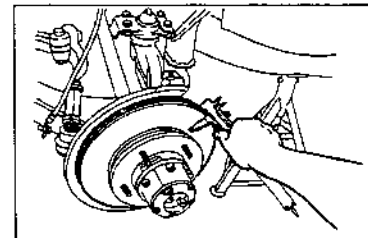
- ① Clean the brake disc surface and measure the disc thickness.



WFE90-MA059

	mm (inch)	
	Standard	Ventilation
Specified thickness	12.5 (0.49)	18.0 (0.71)
Minimum limit	11.5 (0.45)	17.0 (0.67)

Difference in stock thickness on the same circumference: Not to exceed 0.015 mm (0.0006 inch)



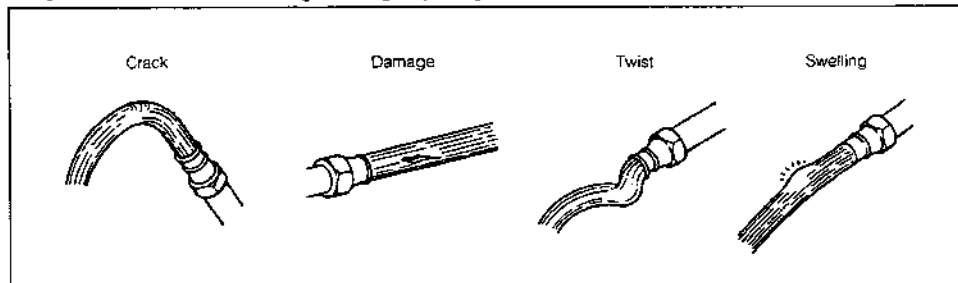
WFE90-MA070

BRAKE HOSE & TUBE

Check of brake hose and tube

Checking of following parts

- ① Hoses and tubes for damage, cracks
- ② Hoses for deformation or swelling
- ③ Tubes for corrosion or rust
- ④ Connection of fluid leakage
- ⑤ Tube clamps for tightness
- ⑥ Hoses for extreme bending, twisting or pulling

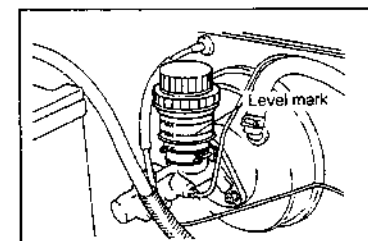


WFE90-MA071

BRAKE FLUID

Check of brake fluid

If the fluid level is below of the MIN line, check for leak in the hydraulic system and add fluid up to the MAX line.



WFE90-MA072

MAINTENANCE

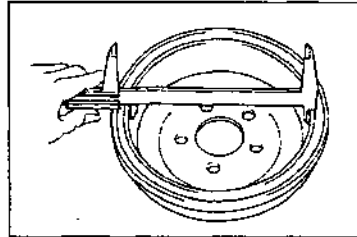
BRAKE DRUM & LINING

Check of brake drum and lining

- (1) Inspect the brake drum for damage, inner surface wear, scores, or uneven wear.

Specified Diameter: 254.0 mm (10.00 inch)

Allowable Limit: 256.0 mm (10.08 inch)

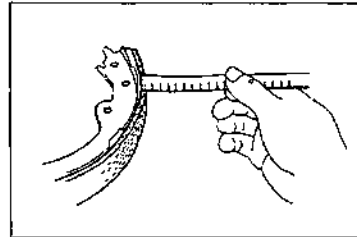


WFES0-MA073

- (2) Inspect the brake linings for wear.

Specified Value: 5.0 mm (0.197 inch)

Allowable Limit: 1.0 mm (0.0393 inch)



WFES0-MA074

BRAKE BOOSTER

Check the operation of the brake booster following the procedure given below.

- (1) With the engine stopped, depress the brake pedal several times. The travel distance should not change.
- (2) With the brake pedal slightly depressed, start the engine. The pedal should move down slightly when the engine starts.
- (3) Depress the brake pedal, stop the engine and hold the pedal, stop the engine and hold the pedal for about 30 seconds. The pedal should neither sink nor rise.
- (4) Restart the engine, run it for about a minute and turn it off. Then depress the brake pedal firmly several times. The pedal travel distance should decrease with each application.

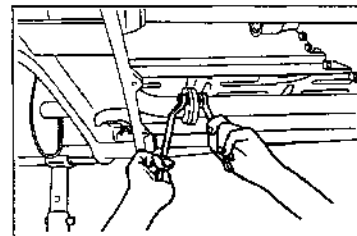
WFES0-MA075

CHASSIS & BODY

EXHAUST PIPE & MUFFLER

Check muffler, exhaust pipe, mountings

- (1) Checking of exhaust pipe for tightness.
- (2) Checking of muffler, exhaust pipe, mountings for damage.



WFES0-MA076

ALL DOORS & HOOD

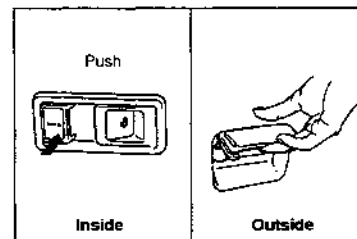
Check all doors, hood

Door

- (1) Door locks should operate properly.
- (2) Door locks should not hit striker.

Hood

- (1) Auxiliary catch should operate properly.
- (2) Hood should be locked securely when closed.



WFES0-MA077

SEAT BELT

Check of seat belt

Checking of seat belts for operation and looseness

- (1) Check that the belt components are free from damage.
- (2) Check that the tongue plate can be released smoothly when the buckle button is pressed.
- (3) Check that the tongue plate can be locked securely when inserted into the buckle.

WP590-MA078

CHASSIS GREASE

Check of chassis grease

Apply grease to grease fittings of chassis.

- (1) Check the each grease fittings of chassis for grease condition.
- (2) Apply lithium grease to the grease fittings given bellow.
 - (1) Steering related parts
 - (2) Propeller shaft
 - (3) Suspension related parts

WP590-MA079

Check of other bolts, nuts & wheel hub nuts

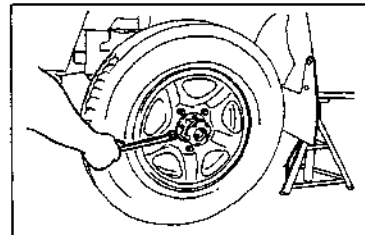
Retightening of bolts and nuts on chassis and body.

- (1) Front suspension parts
- (2) Power train parts
- (3) Rear suspension parts
- (4) Steering system parts

Check of wheel hub nuts

Retighten the hub nuts.

Tightening torque: 9.0 - 12.0 kg-m (65.1 - 86.7 ft-lb)



WP590-MA080

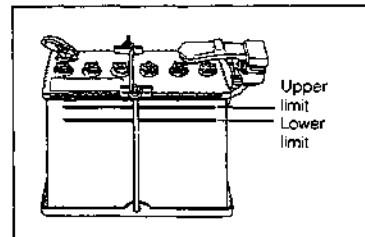
ELECTRICAL SYSTEM

BATTERY

Check of following parts

Check the battery electrolyte level.

The electrolyte level must be between upper and lower levels.



WP590-MA081

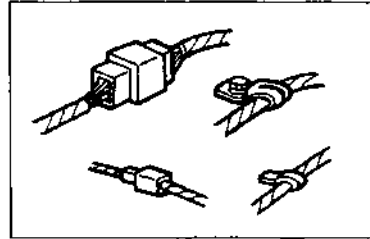
MAINTENANCE

WIRE HARNESS

Check of wire harness

Check of wire harness for damage

- (1) Check the wiring for damage or looseness.
- (2) Check each clamp and connection for looseness.



LIGHTING SYSTEM METER & GAUGE

Check of lighting system, meter & gauges

Check of lighting system, meter & gauges for function

- (1) Check headlamps, turn signal lamps, stop lamps, back-up lamps, tail lamps, licence plate lamps, hazard warning lamps and meter illumination lamps for function.
- (2) Check fuel gauge, water temperature gauge, charge warning lamp, oil pressure warning lamp, parking brake warning lamp, stop lamp warning lamp, brake fluid warning lamp and speedometer for function.

WFE90-MA063

DAIHATSU

F300

[HD - Engine]

ENGINE MECHANICALS

INTRODUCTION	EM- 2	CYLINDER BLOCK	EM-103
ABBREVIATION CODES	EM- 7	INSPECTION OF EACH PART	EM-121
TROUBLE SHOOTING		SST (Special Service Tools)	EM-175
(HD-C ENGINE)	EM- 8	TIGHTENING TORQUE FOR MAIN	
TROUBLE SHOOTING		COMPONENTS	EM-178
(HD-E ENGINE)	EM- 11	ENGINE SPECIFICATIONS	EM-182
ENGINE TUNE-UP	EM- 13	SERVICE SPECIFICATIONS	EM-184
CHECK AND ADJUSTMENT OF CO/HC		EFI SYSTEM	
CONCENTRATIONS	EM- 25	(General specifications)	EM-190
COMPRESSION CHECK	EM- 29	EFI SYSTEM	
TIMING BELT	EM- 32	(U.S. specifications)	EM-194
CYLINDER HEAD	EM- 49		
FILLING OF ENGINE OIL AND			
COOLING WATER	EM-102		

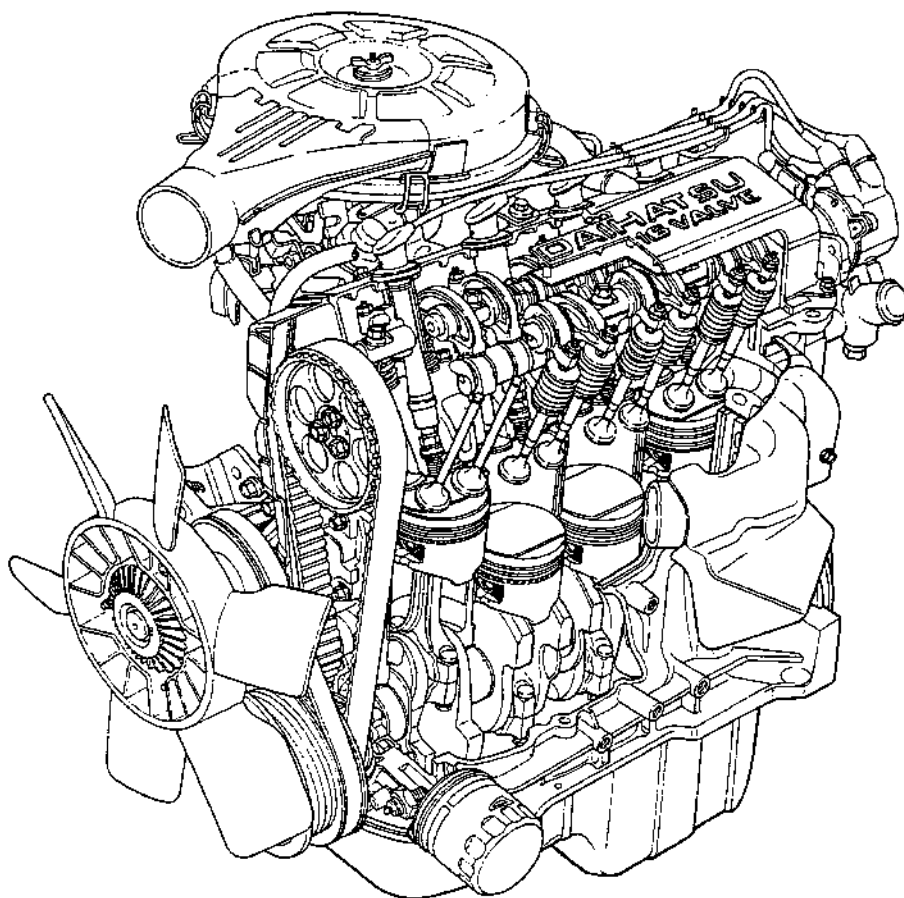
WP690-EM001

ENGINE MECHANICALS

INTRODUCTION

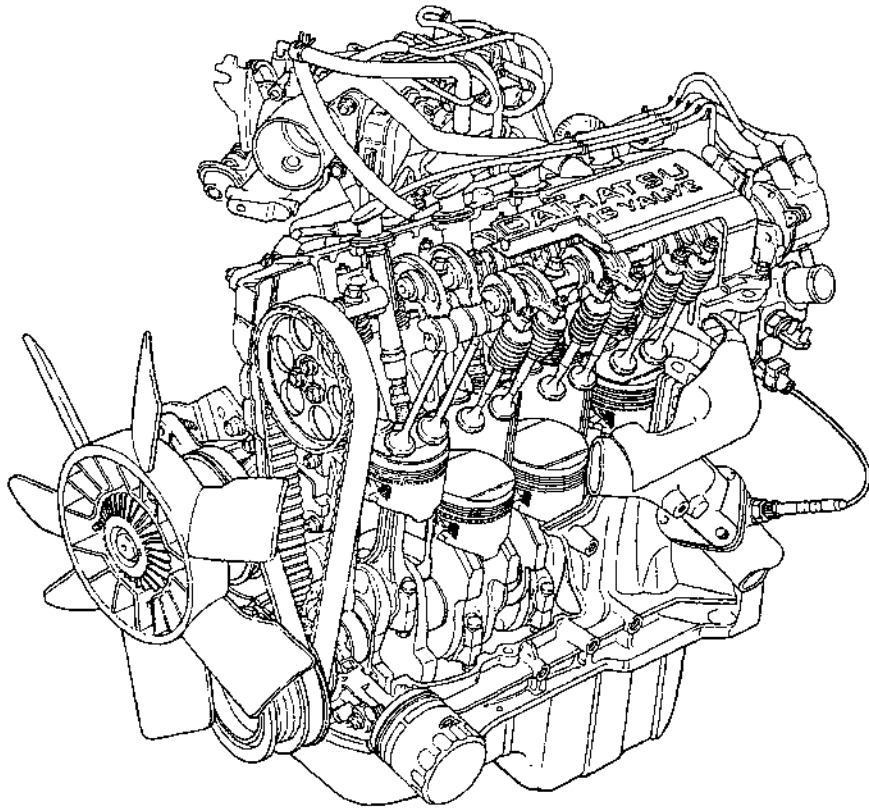
Type HD engine is a water-cooled, 4-cycle, 4-cylinder-in-line, SOHC 16-valve gasoline engine. The cylinders are arranged in a sequence of 1-2-3-4 from the timing belt side.

[HD-C engine]



WPED-EM002

[HD-E engine]



WFEDQ-EM003

EM-3

ENGINE MECHANICALS

FEATURES

Type HD engine is mounted in the engine compartment longitudinally relative to the vehicle forward direction. The firing order is 1-3-4-2.

CYLINDER HEAD COVER

The cylinder head cover is made of aluminum alloy. A ventilation baffle plate and an oil separator are integrated inside the cylinder head cover so that the oil contained in the blow-by gas may be separated. Moreover, to prevent the leakage of oil and blow-by gas, a grommet is press-fitted at the contact section with each spark plug tube.

CYLINDER HEAD

In this aluminum alloy cylinder head, its combustion chamber adopts a pent roof type. The spark plug is located at the central position in the combustion chamber. For improved flame propagation characteristics, the squash area is provided at the combustion chamber in order that a turbulence may be generated in the mixture during the compressed stroke.

CYLINDER HEAD GASKET

The cylinder head gasket employs a carbon gasket which features remarkable durability.

CYLINDER BLOCK

The cylinder block is made of aluminum alloy. The cylinder liner made of cast iron is cast at the cylinder block.

For assured rigidity, the crankshaft journal bearing caps are made of cast iron. Moreover, the bores have been machined integral with the cylinder block so as to improve the roundness accuracy.

OIL PAN

In this oil pan made of pressed a steel sheets, ribbed sections are provided in order to increase its strength. Moreover, the oil pan is provided with a baffle plate so as to prevent excessive movements of the oil while the vehicle is cornering, moving off or stopping quickly. Also, the baffle plate prevents the generation of resonating noises.

PISTON

The piston is made of aluminum alloy.

A triangle front mark is stamped on the piston's top.

The piston pin hole is offset 0.5 mm in relation to the center of the piston in order to reduce thrust pressure toward the piston cylinder wall.

In addition, slit type oil holes are provided in the oil ring groove in order that the lubricating performance may be further improved.

PISTON PIN

The piston pin is made of chrome molybdenum steel which features adequate strength and light weight. This piston pin adopts a semi-floating type.

CONNECTING ROD

The connecting rod employs a vanadium steel as the material in order to assure sufficient strength and reduce its weight for decreased stress of inertia. Also, a front mark is provided on each of the connecting rod and connecting rod cap.

Moreover, the adoption of serration type connecting rod bolts has improved the roundness of the connecting rod at its big end.

PISTON RINGS

The piston ring No. 1 is made of steel iron, whereas the piston ring No. 2 is made of cast iron.

The oil ring made of stainless steel employs a three-piece type.

WFS90-EM600

CAMSHAFT

The camshaft made of cast iron employs a hollow type so as to achieve the reduction in weight. This single camshaft actuates a total of 16 valves; two intake valves and two exhaust valves of each cylinder.

VALVE SPRING

For improved anti-surfing characteristics, the valve spring adopts an unequal pitch type.

The valve springs are assembled in such a direction that the side having a painted mark (the side with greater pitch) may come at the valve rocker arm side.

VALVE ROCKER ARM & VALVE ROCKER SHAFT

The valve rocker shaft made of carbon steel has undergone nitriding treatment.

The valve rocker shaft is bolt-attached to the cylinder head together with the camshaft caps of the cylinder head.

Furthermore, the valve rocker shaft at the intake side is provided with recessed portions so as to accommodate the spark plug tubes.

When installing the valve rocker shaft, care must be exercised as to its correct installing direction. The chamfer dimension at the timing belt side is greater than that at the distributor side.

The valve rocker arm employs aluminum alloy. Moreover, high chrome cast iron is provided at its contact surface with the camshaft so that the durability may be enhanced.

The valve rocker arm comes in four different shapes.

CAMSHAFT TIMING BELT PULLEY & CRANKSHAFT TIMING BELT PULLEY

Both the camshaft timing belt pulley and crankshaft timing belt pulley are made of sintered alloy.

The camshaft timing belt pulley is driven by the crankshaft timing belt pulley through an RU type cogged belt. The tension of this timing belt is maintained by means of a belt tensioner.

CRANKSHAFT

The crankshaft employs spheroidal graphite cast iron as the material.

The crankshaft is supported via crankshaft bearings by the five main journals provided in the cylinder block.

For reduced weight, the crankshaft is a hollow type.

Furthermore, four balance weights prevent the occurrence of vibrations.

CRANKSHAFT PULLEY

To reduce torsional vibrations, the crankshaft pulley adopts a damper.

The crankshaft pulley is attached to the crankshaft timing belt pulley by means of four bolts.

FLYWHEEL

A flywheel made of cast iron is employed.

The flywheel adopts a thin contour which features excellent heat radiating properties. To provide an adequate inertia weight, the outer diameter of the flywheel has been made larger.

An oil catch is provided so that the engine oil may flow to the cylinder block. This design prevents the oil from reaching the clutch disc surface in the event that oil leaks out from the crankshaft side through the flywheel attaching bolts.

The ring gear is shrinkage-fitted onto the outer periphery of the flywheel.

FLYWHEEL/ATTACHING BOLT

The bolt employs a six point type. To prevent these bolts from becoming loose, special care has been exercised to achieve the torque stability when tightening them.

In addition, the attaching holes at the crankshaft are of pass-through type. Therefore, the bolts are sealed by applying sealer to them.

WPEDG-EMR

ENGINE MECHANICALS

TIMING BELT COVER

The timing belt cover is divided into two parts; the upper cover and lower cover. The ignition timing indicator is mounted on the lower cover.

INTAKE MANIFOLD

Intake manifold is made of aluminum alloy. Design has been made so that the length from the throttle body attaching section to the intake manifold installation section on the cylinder head may become equal in all cylinders. Consequently, the air charging rate for each cylinder has been made uniformed. In addition, the intake tube portion from the surge tank to the intake manifold adopts a diffuser type so as to improve the air charging efficiency.

WF590-EM700

ABBREVIATION CODES

The abbreviation codes that appear in this workshop manual stand for the following, respectively.

A/C	Air Conditioner
BDC	Bottom Dead Center
BTDC	Before Top Dead Center
BVSV	Bimetal Vacuum Switching Valve
C/B	Choke Breaker
ECU	Electronic Control Unit
EFI	Electronic Fuel Injection
EGR	Exhaust Gas Recirculation
EVAP	Fuel evaporative emission control
EVSV	EGR Vacuum Switching Valve
EX	Exhaust (Manifold - Valve)
FL	Fusible Link
HIC	Hot Idle Compensator
IN	Intake (Manifold - Valve)
ISC	Idle Speed Control
ITC	Intake air Temperature Compensating Valve
LH	Left Hand
LHD	Left Hand Drive
LLC	Long Life Coolant
MP	Multipurpose
MT (M/T)	Manual Transmission
O ₂ S	Oxygen Sensor
PCV	Positive Crankcase Ventilation
PVSV	Pressure Vacuum Switching Valve
RH	Right Hand
SD	Spark Delay
SST	Special Service Tool
STD	Standard
TDC	Top Dead Center
TP	Throttle Positioner
TVSV	Thermostatic Vacuum Switching Valve
TWC	Three-Way Catalyst
VSV	Vacuum Switching Valve
VTV	Vacuum Transmitting Valve
W/	With
W/O	Without
2WD	Two-wheel Drive Vehicle
4WD	Four-wheel Drive Vehicle

The abbreviation codes that appear in the figure stand for the following, respectively

Ⓐ	Bolt	Ⓔ	Screw
Ⓑ	Nut	Ⓕ	Washer

WPE20-EM004

ENGINE MECHANICALS

TROUBLE SHOOTING (HD-C ENGINE)

Problem	Possible causes	Remedies	Page
Engine overheats.	Cooling system faulty Incorrect ignition timing Fuel system faulty Lubrication system faulty	Trouble shoot cooling system. Trouble shoot ignition system. Trouble shoot fuel system. Trouble shoot lubrication system.	CO-2 IG-2 FU-2 LU-2
Engine will not crank or cranks slowly.	Starting system faulty Charging system faulty	Trouble shoot starting system. Trouble shoot charging system.	
Engine will not start/Hard to start. (Only cases where cranking by starter motor is normal)	Ignition problem • Ignition coil • Distributor • Ignition timing Spark plugs faulty Resistive cords disconnected or faulty Vacuum leaks • PCV line • ITC line • Intake manifold • Carburetor hoses • Brake booster line Low compression No fuel supply to carburetor • Fuel line • Fuel filter • Fuel pump Carburetor problems • Carburetor out of adjustment • Choke operation • Flooding (outer vent valve, BVSV) • Needle valve sticking or clogged • Vacuum hose disconnected • Fuel cut solenoid valve not open	Inspect ignition coil. Inspect distributor. Reset ignition timing. Inspect spark plugs Inspect resistive cords. Check PCV line. Check ITC line. Check intake manifold. Check carburetor hoses. Check brake booster. Check compression. Check fuel line and fuel pump. Repair, as necessary.	IG-14 IG-16 EM-23 IG-12 IG-11 EC-4, 16 EC-3 EM-29 FU-4 FU-14
Rough idle/Engine stalls or misses.	Spark plug faulty Resistive cords faulty Ignition problems • Ignition coil • Distributor Incorrect ignition timing Incorrect valve clearance Low compression Incorrect idle speed Vacuum leaks • PCV line • ITC line • Intake manifold • Carburetor hoses • Brake booster line	Inspect spark plugs. Inspect resistive cords. Inspect ignition coil. Inspect distributor. Reset timing. Adjust valve clearances. Check compression. Adjust idle speed. Check PCV system. Check ITC system. Check intake manifold. Check carburetor hoses. Check brake booster.	IG-12 IG-11 IG-14 IG-16 EM-23 EM-16 EM-29 EM-23 EC-4, 16 EC-3

WPFB90-EM0005

ENGINE MECHANICAL:

Problem	Possible causes	Remedies	Page
Rough idle/Engine stalls or misses.	Engine overheating Carburetor problems <ul style="list-style-type: none"> • Slow jet clogged • Idle mixture incorrect • Fuel cut solenoid valve not open • Choke system faulty 	Repair, as necessary.	FU-14
Engine hesitates/poor acceleration	Spark plug faulty Resistive cords faulty Ignition problems <ul style="list-style-type: none"> • Distributor • Ignition coil Incorrect ignition timing Incorrect valve clearances Low compression Engine overheats Air cleaner clogged Fuel system clogged Carburetor problems <ul style="list-style-type: none"> • Float level too low • Accelerator pump faulty • Power valve faulty • Choke system faulty • Emission control system malfunctioning • ITC system always ON (hot engine) Intake manifold thermo-control valve (cold engine) Hot water circulating system (cold engine) Clutch slipping Brakes dragging	Inspect spark plugs. Inspect resistive cords. Inspect distributor. Inspect ignition coil. Reset ignition timing. Adjust valve clearances. Check compression. Check cooling system. Check air cleaner. Check fuel system. Repair, as necessary. Check ITC system. Check thermo-control valve. Check hot water circulating system. Trouble shoot clutch. Trouble shoot brakes.	IG-12 IG-11 IG-16 IG-14 EM-23 EM-16 EM-29 CO-7 EM-13 FU-4 FU-14
Engine dieseling (Runs after ignition switch is turned off)	Incorrect ignition timing Engine overheating Carburetor problems <ul style="list-style-type: none"> • Fuel cut solenoid faulty • Idle speed out of adjustment • Linkage sticking 	Reset ignition timing. Check cooling system. Repair, as necessary.	EM-23 CO-7 FU-14
Muffler explosion (after fire) during deceleration only.	TP system faulty	Check TP system.	EC-11
Muffler explosion (after fire) all the time.	Air cleaner clogged Choke system faulty Incorrect ignition timing Incorrect valve clearance	Check air cleaner. Check choke system. Reset ignition timing. Adjust valve clearances.	EM-13 FU-9 EM-23 EM-16

WFESD-EMD08

ENGINE MECHANICALS

Problem	Possible causes	Remedies	Page
Engine backfires.	Insufficient fuel flow Incorrect ignition timing Incorrect valve clearances Carbon deposits in combustion chambers Vacuum leaks • Carburetor hoses • PCV hoses • Intake manifold • Brake booster line	Trouble shoot fuel system. Reset ignition timing. Adjust valve clearances. Inspect cylinder head. Repair, as necessary. Check carburetor hoses. Check PCV system. Check intake manifold.	FJ-2 EM-23 EM-16 EM-65
Excessive oil consumption.	Oil leaks PCV line clogged Piston rings worn or damaged Valve stems worn Valve stem oil seals worn or damaged	Repair, as necessary. Check PCV hose. Check piston rings. (Check compression) Check valves and guides. Replace oil seals.	EC-4, 16 EM-124
Poor fuel economy	Spark plugs faulty Incorrect ignition timing Low compression Air cleaner clogged Fuel leak Carburetor problems • Choke system faulty • Idle speed too high • Power valve always on	Inspect spark plugs. Reset ignition timing. Check compression. Check air cleaner. Repair, as necessary. Repair, as necessary.	IG-12 EM-23 EM-29 EM-13 FU-15
Unpleasant odor	Incorrect idle speed Incorrect ignition timing Vacuum leaks • PCV line • Intake manifold • Carburetor hoses • Brake booster line Charcoal canister faulty Fuel filler cap faulty Outer vent valve faulty BVSV faulty	Adjust idle speed. Reset ignition timing Repair, as necessary. Check PCV system. Check intake manifold. Check carburetor hoses. Check brake booster. Check charcoal canister. Check fuel filler cap. Check outer vent valve.	EM-23 EM-23 EC-6, 19 EC-5, 18 EC-7

WPB30-EM007

TROUBLE SHOOTING (HD-E ENGINE)

Problem	Possible causes	Remedies	Page
Engine overheats.	Cooling system faulty. Incorrect ignition timing.	Trouble shoot cooling system. Reset timing.	CC-2 EM-23
Engine will not crank or cranks slowly.	Starting system faulty. Charging system faulty	Trouble shoot starting system. Trouble shoot charging system.	
Engine will not start/hard to start (Only cases where cranking by starter motor is normal)	Ignition problem • Ignition coil • Igniter • Distributor Spark plugs faulty Resistive cords disconnected or faulty. Low compression. No fuel supply to injector • No fuel in tank • Fuel pump not working • Fuel filter clogged • Fuel line clogged or leaking EFI system malfunctioning	Inspect ignition coil. Inspect igniter. Inspect distributor. Inspect ignition plugs. Inspect resistive cords. Check compression. Repair, as necessary. Trouble shoot EFI system.	IG-2 IG-14 IG-16 IG-12 IG-11 EM-29 EF-97, 220 EF-12, 118
Rough idle/Engine stalls or misses.	Spark plugs faulty. Resistive cords faulty. Ignition problem. • Ignition coil • Igniter • Distributor Incorrect ignition timing Incorrect valve clearance Low compression Incorrect idle speed Vacuum leaks. • Throttle body EFI system malfunctioning	Inspect spark plugs. Inspect resistive cords. Inspect ignition coil. Inspect igniter. Inspect distributor. Reset timing. Adjust valve clearance Check compression. Adjust idle speed. Check throttle body. Repair, as necessary.	IG-12 IG-11 IG-14 IG-16 EM-23 EM-16 EM-29 EM-23 EF-106, 224 EF-29, 136
Idle speed is too high.	Fuel line clogged Air suction • Intake manifold • Vacuum hose disconnected • Throttle body EFI system malfunctioning Incorrect idle speed.	Check fuel line. Check intake manifold. Check vacuum hose for proper piping. Check throttle body. Trouble shoot EFI system. Adjust idle speed.	FJ-4 EC-3, 14 EF-106, 224 EF-12, 118 EM-23

WP20-EM008

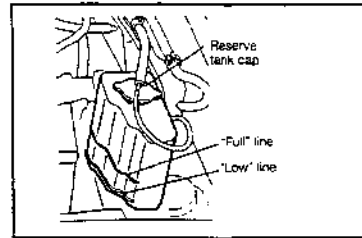
ENGINE MECHANICALS

Problem	Possible causes	Remedies	Page
Engine hesitates/Poor acceleration	Spark plugs faulty Resistive cords faulty. Incorrect ignition timing. Incorrect valve clearances. Low compression. Fuel system clogged. Air cleaner clogged. Engine overheats. Air leakage • Throttle body Emission control system malfunctioning (cold engine) EFI system malfunctioning	Inspect spark plugs. Inspect resistive cords. Reset ignition timing. Adjust valve clearances. Check compression. Check fuel system. Check air cleaner. Check cooling system. Check throttle body. Repair as necessary. Repair, as necessary.	IG-12 IG-11 EM-23 EM-16 EM-29 FU-4 EM-13 CO-7 EF-106, 224 EF-14, 15 EF-29, 136
Engine dieseling (Runs after ignition switch is turned off.)	EFI system malfunctioning Incorrect ignition timing.	Repair, as necessary. Reset timing.	EF-29, 136 EM-23
Muffler explosion (after fire) during deceleration only	Incorrect ignition timing. Incorrect valve clearance. Air cleaner clogged. EFI system malfunctioning	Reset timing. Adjust valve clearance. Check air cleaner. Repair, as necessary.	EM-23 EM-16 EM-13 EF-29, 136
Engine backfires.	Incorrect ignition timing. Incorrect valve clearances. EFI system malfunctioning	Reset timing. Adjust valve clearance. Repair, as necessary.	EM-23 EM-16 EF-29, 136
Excessive oil consumption.	Oil leak. PCV line clogged. Piston rings worn or damaged. Valve stems worn. Valve stem oil seals worn or damaged.	Repair, as necessary. Check PCV hose. Check piston rings. Check valves and guides. Replace oil seal.	EC-4, 16 EM-124
Poor fuel economy	Spark plugs faulty. Incorrect ignition timing. Low compression. Air cleaner clogged. Fuel leak. Tires improperly inflated Clutch slipping Brakes dragging EFI system malfunctioning	Inspect spark plugs. Reset timing. Check compression. Check air cleaner. Repair, as necessary. Inflate tires to specified pressure. Trouble shoot clutch. Trouble shoot brakes. Repair, as necessary.	IG-12 EM-23 EM-29 EM-13 EF-29, 136
Unpleasant odor	Incorrect idle speed Incorrect ignition timing Vacuum leaks • PCV line • Intake manifold • Throttle body EFI system malfunctioning	Adjust idle speed. Reset ignition timing. Check PCV system. Check intake manifold. Check throttle body. Repair, as necessary.	EM-23 EM-23 EF-29, 136

WFE20-5X009

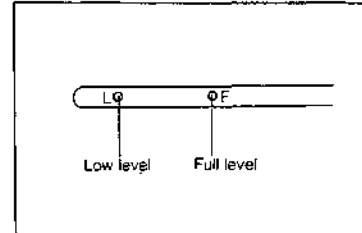
ENGINE TUNE-UP

1. **Inspection of engine coolant level**
(See page CO-12.)



WFES0-EM010

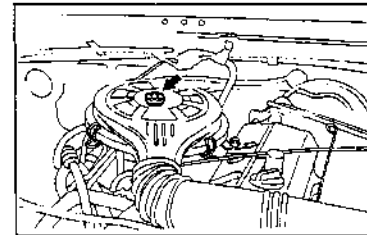
2. **Inspection of engine oil level**
(See page LU-9.)



WFES0-EM011

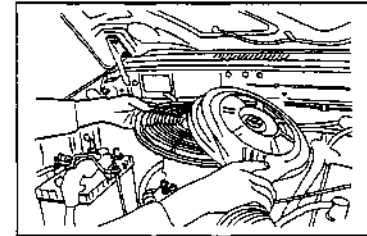
3. **Inspection of air cleaner filter element**
[HD-C Engine]

1. Detach the four air cleaner clamps. Remove the air cleaner upper case by loosen the wing nut.



WFES0-EM012

2. Remove the air filter element from the air cleaner case.
3. Visually inspect that the air filter element is not excessively dirty, damaged or oily.
Replace the air filter element, if necessary.

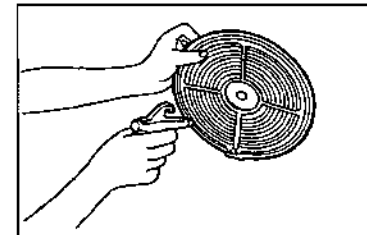


WFES0-EM013

4. Clean the element with compressed air.
First, blow compressed air from the back side of the element thoroughly. Then, blow off the upper side of the element.

CAUTION:

- The air pressure to be used for this cleaning operation should not exceed 392.3 kPa (4.0 kgf/cm²).

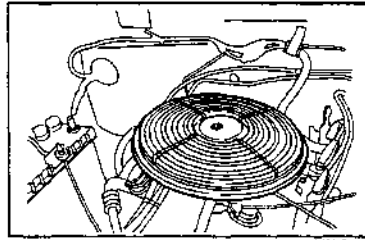


WFES0-EM014

ENGINE MECHANICALS

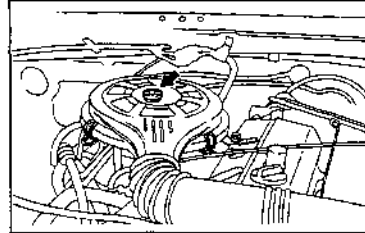
5. Install the air cleaner filter element in the air cleaner case.
NOTE:

- The air filter element has the correct installation direction to be observed. Turn the air filter element so that the element may be fitted securely in the air cleaner case.



WPES0-EM015

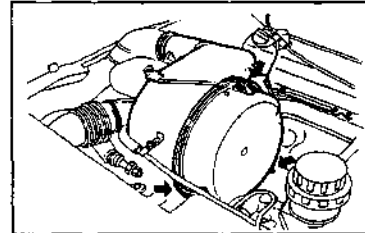
6. Install the air cleaner upper case. Attach the four air cleaner clamps and tighten the wing nut.



WPES0-EM016

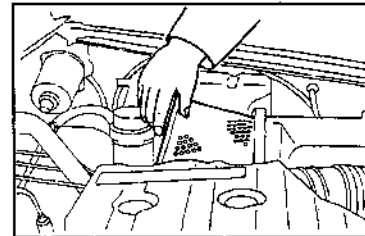
[HD-E Engine]

1. Loosen the three clamps. Remove the air cleaner cap.



WPES0-EM017

2. Loosen the wing nut retaining the element. Take out the element from the air cleaner case.



WPES0-EM018

3. Visually inspect that the air filter element is not excessively dirty, damaged or oily.
Replace the air filter element, if necessary.

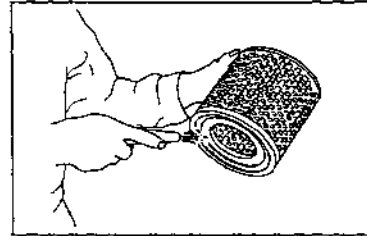
WPES0-EM019

4. Clean the element with compressed air. First, blow compressed air from the inner side of the element thoroughly. Then, blow off the outer side of the element.

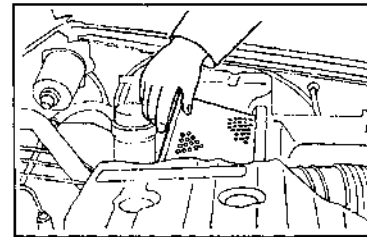
CAUTION:

- The air pressure to be used for this cleaning operation should not exceed 392.3 kPa (4.0 kgf/cm²).

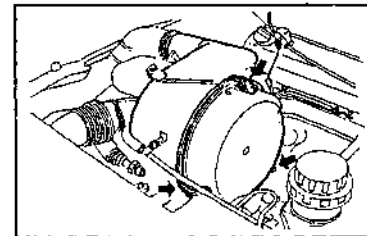
Replace the air filter element, if necessary.



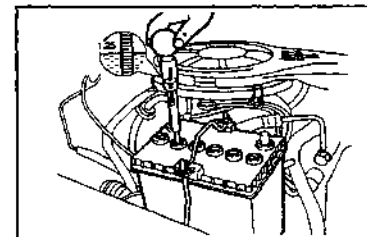
5. Place the element in the air cleaner case. Secure the element with the wing nut.



6. Install the air cleaner cap to the air cleaner case. Secure the air cleaner cap by tightening the three clamps.



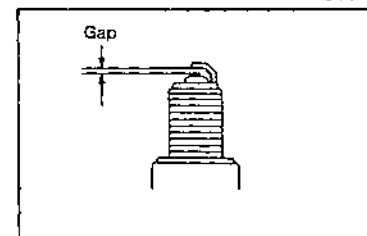
4. **Inspection of battery**
(See the Charging System Section.)



5. **Inspection of spark plugs**
(See page IG-12.)

Recommended Spark Plugs:

Engine	HD-C - HD-E		
Manufacturer	CHAMPION	NIPPONDENSO	NGK
Type	RC9YC4 RC7YC4	K20PR-U11 K22PR-U11	BKR6E-11 BKR7E-11
Spark plug gap	1.0 - 1.1 mm	←	←



ENGINE MECHANICALS

6. Inspection and adjustment of valve clearances

The measurement and adjustment of valve clearances are carried out when each of the pistons of the No. 1 and No. 4 cylinders is set to the top dead center at the end of the compression stroke.

NOTE:

- The valve clearance adjustment is performed normally when the engine is in a hot condition.
- "Hot engine condition" denotes a condition in which the cooling water temperature is 75 - 85°C and the engine oil temperature is above 65°C.

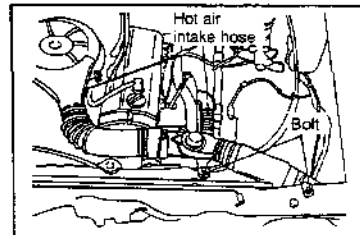
However, when the engine has been overhauled, it is necessary to adjust the valve clearances while the engine is cold and to readjust the valve clearances in a hot condition after warming up the engine.

WPES0-EM025

1. Removal of cylinder head cover

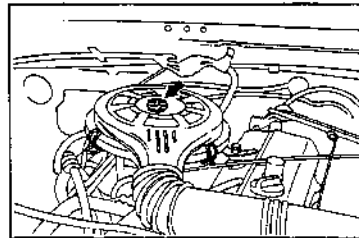
[HD-C Engine]

- (1) Remove the three bolts securing the air cleaner and air intake hose.



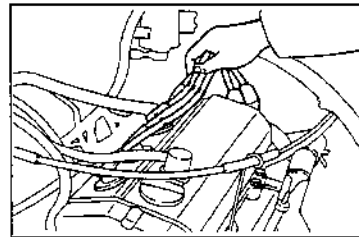
WPES0-EM026

- (2) Remove the wing nut located at the center of the air cleaner. Remove the air cleaner and air intake hose subassembly.



WPES0-EM027

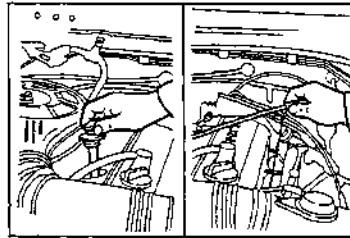
- (3) Detach the spark plug wires from the clamp.



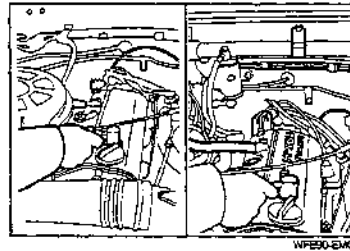
WPES0-EM028

- (4) Detach the spark plug wires at the cylinder head side.
NOTE:

- Be sure to hold the rubber boot during the spark plug wire disconnection. Never remove the spark plug wire, holding the cord portion.



- (5) Disconnect the PCV hoses from the cylinder head cover.



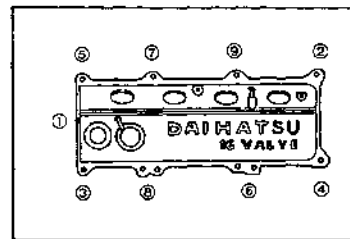
- (6) Remove the accelerator cable bracket from the cylinder head cover.

WP290-EM031

- (7) Loosen the nine bolts (10 mm) over two or three stages in the sequence shown in the right figure.
After removing the bolts, proceed to remove the cylinder head cover.

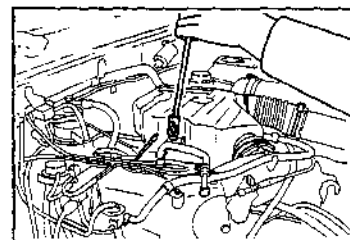
NOTE:

1. Be sure to loosen the bolts progressively and uniformly over two or three stage.
2. Be very careful not to damage the grommets of the spark plug tubes.
3. The timing belt cover attaching bolt ① should be pulled out fully.



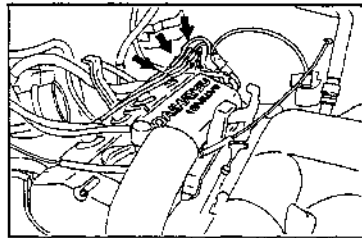
[HD-E Engine]

- (1) Removal of the air intake chamber
- ① Disconnect the vacuum hoses from the air intake chamber.
 - ② Remove the air intake chamber by removing the three attaching screws and two clamps.



ENGINE MECHANICALS

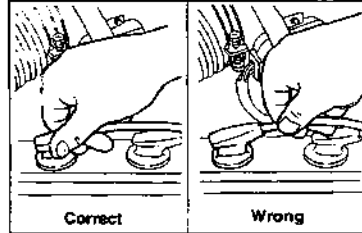
- (2) Detach the spark plug wires from the clamps.



WFE90-EM034

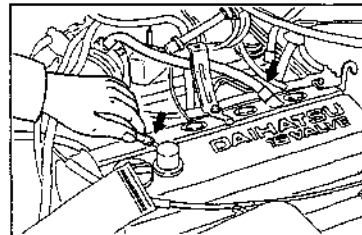
- (3) Detach the spark plug wires at the cylinder head side.
NOTE:

- Be sure to hold the rubber boot during the spark plug wire disconnection. Never remove the spark plug wire, holding the cord portion.



WFE90-EM035

- (4) Disconnect the PCV hoses from the cylinder head cover.

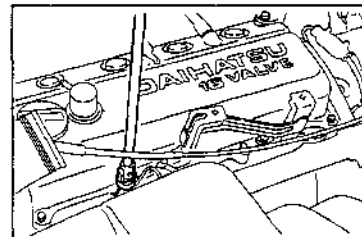


WFE90-EM036

- (5) Detach the engine bond cable from the cylinder head cover. (Radio equipped vehicle only)

WFE90-EM037

- (6) Detach the bolts for intake air chamber bracket and accelerator cable clamp

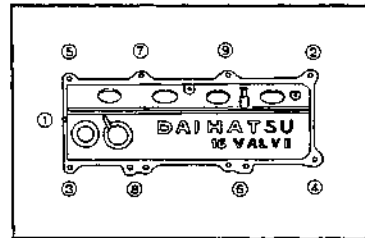


WFE90-EM038

- (7) Loosen the nine bolts (10 mm) over two or three stages in the sequence shown in the right figure. After removing the bolts, proceed to remove the cylinder head cover.

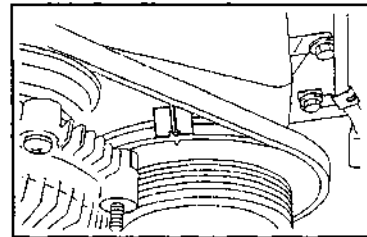
NOTE:

- Be sure to loosen the bolts progressively and uniformly over two or three stages.
- The timing belt cover attaching bolt ① should be pulled out fully.
- Be very careful not to damage the grommets of the spark plug tubes.

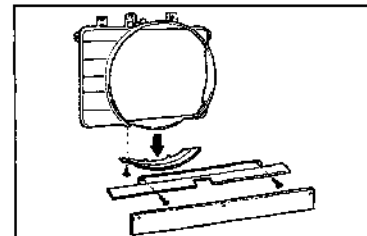


2. Inspection and adjustment of valve clearances

- (1) Turn the crankshaft until the recessed mark on the crankshaft pulley is aligned with the indicator mark on the timing belt cover.

**NOTE:**

- If the vehicles equipped with the power steering and the air-conditioner or only the power steering is equipped, turn the power steering pump pulley while pushing the drive belt.
- If the vehicles equipped with only the air conditioner, remove the engine under cover, rubber plate, the engine under cover No. 3 and lower fan shroud. Then turn the crankshaft pulley from the vehicle lower side.



- (2) Check to see if the valve rocker arms of the No. 1 cylinder are free or are being pushed up. According to the following table, check and/or adjust the valve clearances, using a thickness gauge.

Valve Clearances (Hot condition)

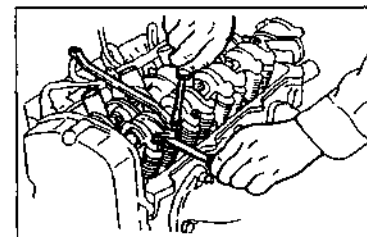
Intake: 0.20 - 0.30 mm

Exhaust: 0.28 - 0.38 mm

(Reference: Cold)

Intake: 0.18 mm

Exhaust: 0.25 mm

**NOTE:**

- Before the adjusting bolts are tightened, apply engine oil to the lock nuts and rocker arm adjusting bolts.

ENGINE MECHANICALS

The "O" marks denote those valves that can be adjusted under that setting.

Rocker arm condition		Cylinder No.	1	2	3	4
When valve rocker arms of No. 1 cylinder are free: (Piston of No. 1 cylinder is at top dead center under compression stroke)	IN		○	○		
	EX		○		○	
When valve rocker arms of No. 4 cylinder are free: (Piston of No. 4 cylinder is at top dead center under compression stroke)	EX				○	○
	IN			○		○

WFES0-EM043

- (3) Turn the crankshaft 360-degrees. Proceed to check and/or adjust the remaining valve clearances.

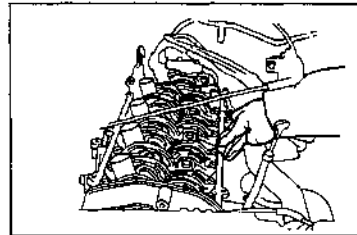
WFES0-EM044

3. Installation of cylinder head cover

- (1) Wipe off the oil or dirt from the gasket surface of the cylinder head cover.

CAUTION:

- Be sure not to drop the dirt or gasket tips into the timing belt cover.



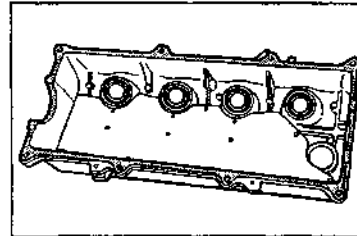
WFES0-EM045

- (2) Check the cylinder head cover gasket for evidence of damage.

Replace the gasket, as required.

NOTE:

- Install the cylinder head cover gasket in such a direction that the identification mark may come at the intake side.

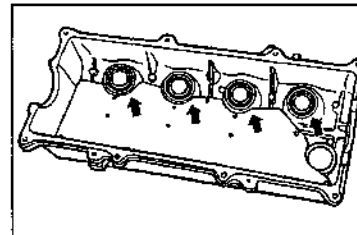


WVULB9-EM024

- (3) Check the rubber grommets of the spark plug tubes for evidence of damage.

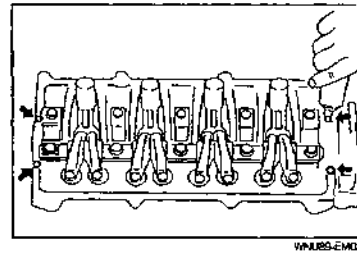
Replace the rubber grommets, as required.

(See page EM-93.)



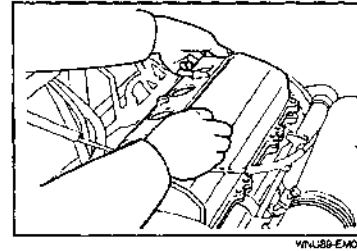
WFES0-EM046

- (4) Install the cylinder head cover gasket on the cylinder head. Apply the Three Bond 1104 to the four points on the cylinder head, as indicated in the figure.

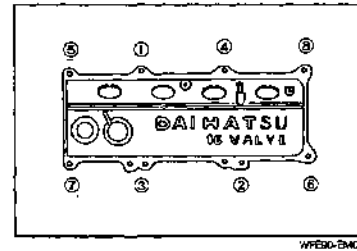


- (5) Install the cylinder head cover on the cylinder head.
NOTE:

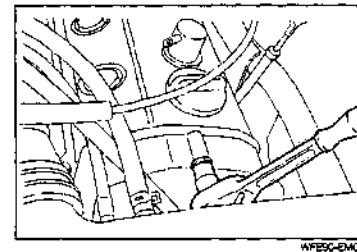
- Be very careful not to damage the rubber grommets for spark plugs during the cover installation.
- Make sure that the rubber grommet is fitted properly to the spark plug tube.



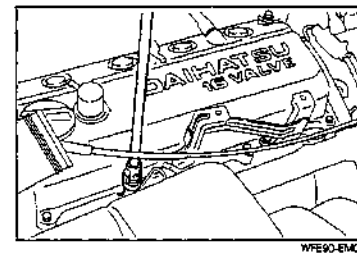
- (6) Tighten the cylinder head cover bolts over two or three stages in the sequence shown in the right figure, until they are tightened to the specified torque.
Tightening Torque: 2.9 - 4.9 N·m (0.3 - 0.5 kgf-m)



- (7) Tighten the timing belt cover attaching bolt.
Tightening Torque: 2.0 - 3.9 N·m (0.2 - 0.4 kgf-m)

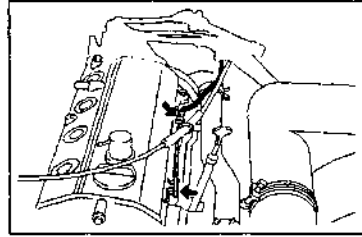


- (8) Tighten the air intake chamber bracket tightening bolts and the clamp bolt, and clamp the accelerator cable. (HD-E Engine only)
Tightening Torque: 3.0 - 4.9 N·m (0.3 - 0.5 kgf-m)



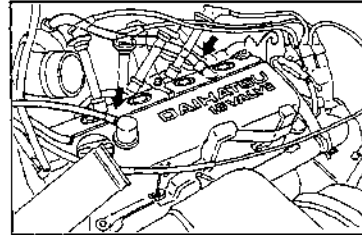
ENGINE MECHANICALS

- (9) Install the engine ground wiring harness to the cylinder head. (Radio equipped vehicle only)
Tightening Torque: 3.0 - 4.9 N·m (0.3 - 0.5 kgf·m)



WFE90-EM050

- (10) Connect the PCV hoses to the cylinder head cover.

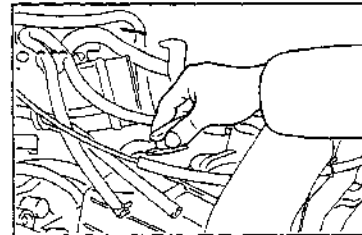


WFE90-EM051

- (11) Install the spark plug wires to the spark plugs.

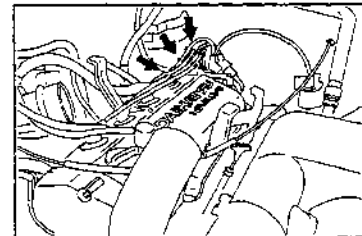
NOTE:

- Be sure that the spark plug wire is connected securely to each spark plug.
- Care should be exercised not to damage the spark plug wire rubber grommet with the spark plug tube.



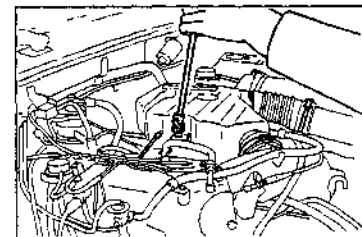
WFE90-EM052

- (12) Install the spark plug wires to the clamp.



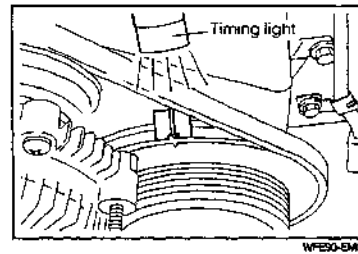
WFE90-EM053

- (13) Install the intake air chamber to the intake air hose.
Secure it to the bracket with the three bolts.
(HD-E Engine only)
- (14) Insert the vacuum hose into the intake air chamber.
(HD-E Engine only)
- (15) Start the engine. Ensure that the engine exhibits no trouble, such as oil leakage.



WFE90-EM054

7. Inspection of ignition timing
The ignition timing mark of crankshaft pulley is aligned with the indicator of timing belt cover.

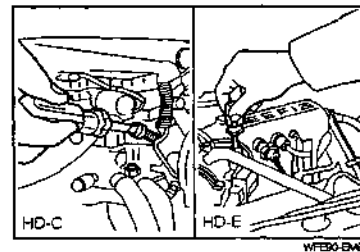


NOTE:

- This does not include the sub ignition timing advance of the distributor.

WP500-EM0

8. Adjustment of idle speed
Engine Idle Speed
HD-C engine: 850 ± 50 rpm
HD-E engine: 850 ± 50 rpm



9. Check of fast idle

[HD-C Engine]

Preparation to be made prior to fast idle check

- All accessory switches are turned OFF.
On those vehicles equipped with a day-lamp system, set the lamp control switch to the first stage.
- The air cleaner element is installed.
- All vacuum hoses are connected.
- Ensure that the intake system exhibits no air leakage.
- Ensure that the exhaust system exhibits no air leakage.

NOTE:

- HD-C engine is mounted with automatic choke carburetor.
Therefore, perform the engine fast idle check while the engine is cold.

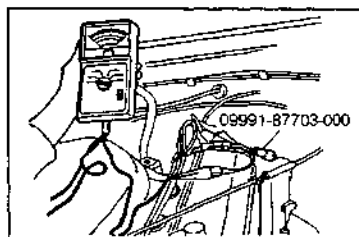
WP500-EM001

ENGINE MECHANICALS

- (1) Connect the tachometer to the engine with SST.
SST: 09991-87703-000
- (2) Check to see if the fast idle speed sets within the specified value.

REFERENCE:

Engine Fast Idle Speed:
1,300 - 2,000 rpm at 22 - 28°C



WP230-EM002

10. Check of throttle positioner

[HD-C Engine]

Dashpot Touch Revolution Speed:
1,500 \pm 50 rpm
Specified Time: 0.5 - 5 seconds.

[HD-E Engine]

Dashpot Touch Revolution Speed:
• General Spc. 1,800 \pm 100 rpm
• US Spc. 1,600 \pm 100 rpm
Specified Time: 0.5 - 5 seconds

WP230-EM002

CHECK AND ADJUSTMENT OF CO/HC CONCENTRATIONS [HD-C Engine]

- Warm up the engine thoroughly.
- All accessory switches are turned OFF.
On those vehicles equipped with a day-lamp system, set the lamp control switch to the first stage.
- The air cleaner element is installed.
- All vacuum hoses are connected.
- Ensure that the intake system exhibits no air leakage.
- Ensure that the exhaust system exhibits no air leakage.

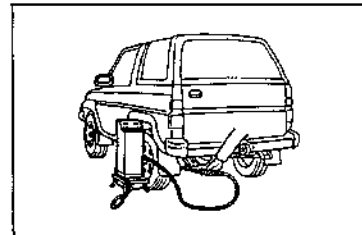
CO adjustment

1. Adjust the idle speed.
(See page EM-23.)
2. Race the engine until its speed reaches 2000 rpm.

WF290-EM062

3. Measure the CO concentration at the idle speed. Check to see if the CO concentration conforms to the specification.
Specified CO Concentration: $1.5 \pm 0.5\%$

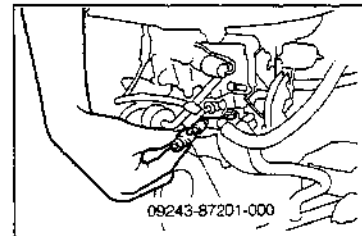
If the measured concentration fails to conform to the specification, perform the adjustments described in the step 4. onward.



W080E-EM046

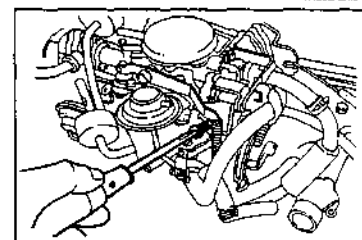
4. Using the following SST, gradually turn the mixture adjusting screw so that the CO concentration may conform to the specification.

SST: 09243-87201-000



W080E-EM047

5. Turn the throttle adjusting screw so that the idle speed may become the specified speed.
6. Measure the CO concentration. Check to see if the CO concentration conforms to the specification.
If the repeated adjustments will not get the conformity to the specification, carry out the trouble shooting in accordance with the table next page.



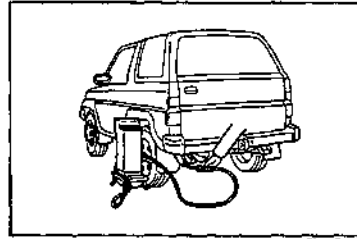
W080E-EM048

ENGINE MECHANICALS

HC adjustment

1. Adjust the idle speed.
2. Measure the HC concentration at the idle speed. Check to see if the HC concentration conforms to the specification.
Specified CO Concentration: Not to exceed 1000 rpm

If the measured concentration fails to conform to the specification, carry out the trouble shooting in accordance with the following tables.



Possible causes for improper CO/HC concentrations

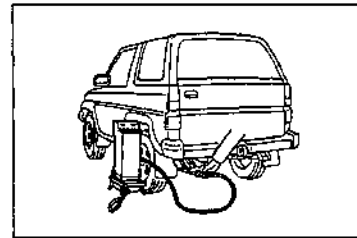
Possible cause \ Item	CO concentration	HC concentration	Remarks
Ignition timing		○	
Valve clearances		○	
Improper valve seating		○	Compression pressure
Ignition system problems Spark plugs Resistive cord Distributor Ignition coil	○	○	
Air leakage in intake system	○	○	
ITC valve malfunctioning	○	○	
Great mechanical loss of engine inner parts	○	○	

WFE90-EM063

[HD-E Engine]

NOTE:

- This check is used only to determine whether or not the idle HC/CO emissions comply with the regulations.



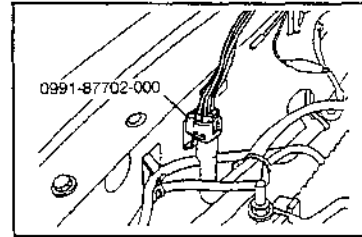
WFE90-EM064

1. Initial Conditions
 - (1) Air cleaner filter element installed.
 - (2) All accessories switched OFF.
 - (3) All vacuum lines connected.
 - (4) All pipes and hose of air intake system connected.
 - (5) Ignition timing set correctly.
 - (6) Transmission in "Neutral" Position.
 - (7) Warm up the engine thoroughly.
 - (8) Ensure that the exhaust system exhibits no gas leakage.
 - (9) Ensure that the intake system exhibits no air leakage.
 - (10) Tachometer and HC/CO meter at hand and calibrated.

WFE90-EM065

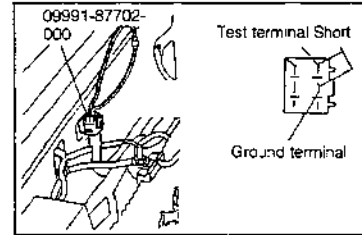
2. System inspection of oxygen sensor

- (1) Remove the cap of the check connector. Connect the following SST to the check connector.
SST: 09991-87702-000



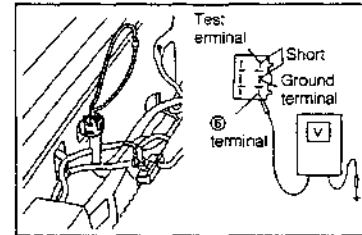
WNUEB-EF190

- (2) Start and warm up the engine completely.
- (3) Connect the test terminal (brown) of the SST to the ground terminal (black).



WNUEB-EF191

- (4) Connect a voltmeter to the output terminal (green) of the SST.



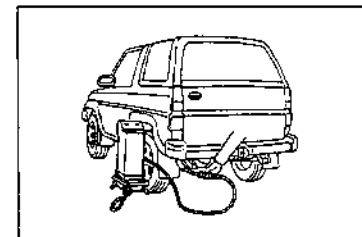
WNUEB-EF022

- (5) Hold the engine speed at 3000 rpm
- (6) After a lapse of two minutes, ensure that the reading of the voltmeter connected in the step (4) changes eight times or more for 10 seconds.
If the change in voltage fails to occur eight times or more, check the diagnosis code. Replace the oxygen sensor if no malfunction code is memorized.

WFE90-EM028

3. Measurement

- (1) Insert the HC/CO meter testing probe into the tail pipe at least 400 mm.



WFE90-EM027

ENGINE MECHANICALS

(2) Measurement of HC/CO concentrations at idle.

Wait at least one minute before the measurement so as to allow concentrations to stabilize.

Complete the measurement within three minutes.

If the HC/CO concentrations dose not conform to the regulations, see the following table for possible causes.

WNUS9-EM040

Trouble shooting

HC	CO	Problems	Possible causes
High	Normal	Rough idle	1. Faulty ignition <ul style="list-style-type: none">• Incorrect timing• Fouled, shorted or improperly gapped spark plugs• Open or crossed high tension cords• Cracked distributor cap
			2. Incorrect valve clearance 3. Leaky EGR valve (US: spc. only) 4. Leaky exhaust valves 5. Leaky cylinder
High	Low	Rough idle (Fluctuating HC reading)	1. Lean mixture causing misfire
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air filter 2. Faulty EFI system <ul style="list-style-type: none">• Faulty pressure regulator• Clogged fuel return line• Defective water temp. sensor• Defective air temp. sensor• Faulty throttle position sensor• Faulty pressure sensor• Faulty injector• Faulty ECU 3. Insufficient warmed up three way catalyst

WFB0-SMA08

COMPRESSION CHECK

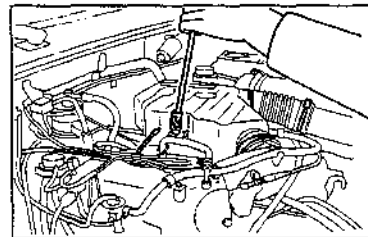
NOTE:

- After completion of the engine tune-up, if the engine exhibits lack of power, excessive oil consumption or poor fuel economy, measure the cylinder compression pressure.

- Warm up the engine thoroughly.
- Turn OFF the ignition key switch.

3. Removal of spark plugs

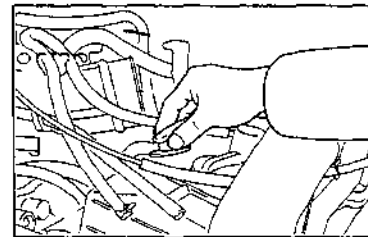
- Disconnect the vacuum hoses from the air intake chamber.
Remove the air intake chamber by removing the three attaching screws and two clamps.



- Remove the spark plug wires from the clamp.
- Disconnect the spark plug wires at spark plug side.

NOTE:

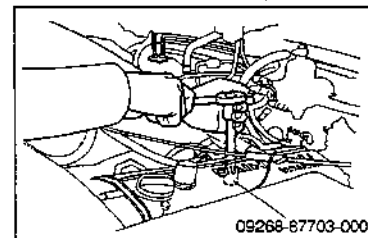
- Be sure to hold the rubber boot during the spark plug wire disconnection. Never remove the spark plug wire, holding the cord portion.



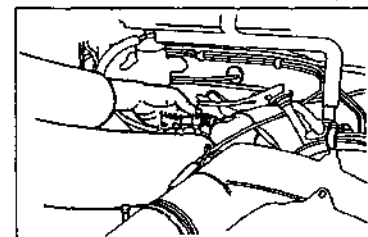
- Remove the all spark plugs, using the following SST {Plug wrench (16 mm)}.
SST: 09268-87703-000

WARNING:

- Be very careful not to burn yourself.

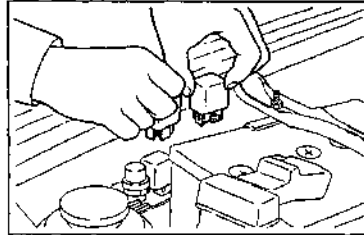


- Disconnect the distributor connector.



ENGINE MECHANICALS

5. Pull out the injector relay and fuel pump relay from the relay block.



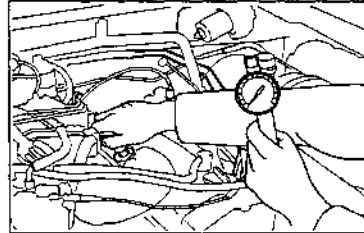
WP690-EM046

6. Measurement of cylinder compression pressure
- (1) Insert a compression gauge into the spark plug hole.
 - (2) Depress the accelerator pedal fully.
 - (3) While cranking the engine, measure the compression pressure.

NOTE:

- Always use a fully charged battery so that at least a revolution speed of 300 rpm is attained.

- (4) Repeat the steps (1) through (3) for each cylinder.



WP690-EM072

NOTE:

- Perform the measurement in the shortest possible time.
- Crank the engine for the same duration for each cylinder.

Compression Pressure:

1373 kPa (14 kgf/cm²)/at 300 rpm

Minimum Pressure:

1030 kPa (10.5 kgf/cm²)/at 300 rpm

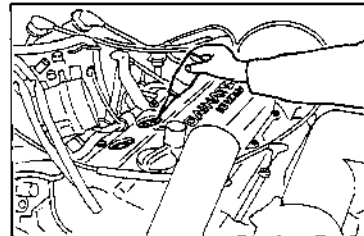
Difference Between Cylinders:

147 kPa (1.5 kgf/cm²)/at 300 rpm

WP690-EM073

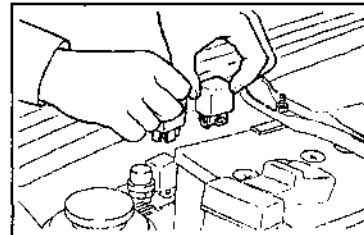
- (5) If the compression of one or more cylinders is low, pour a small amount of engine oil into that cylinder through the spark plug hole and repeat the steps (1) through (4) for the cylinder with low compression.

- If adding oil helps the compression to improve, chances are that the piston rings and/or cylinder bores are worn or damaged.
- If the pressure remains low after the operation described in the step (5) has been performed, the valve may be sticking or seated improperly, or there may be leakage past the gasket.



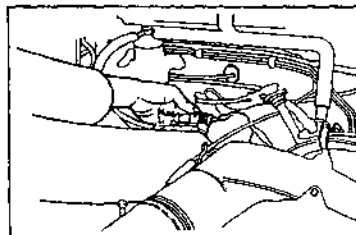
WMJ089-EM045

7. Install the injector relay and fuel pump relay to the relay block.



WP690-EM074

8. Connect the distributor connector. Install it to the clamp.

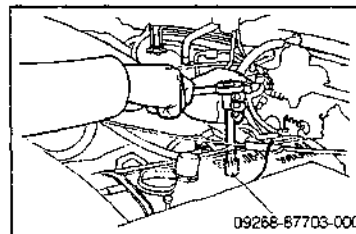


WF50-EM075

9. Install the spark plugs using the following SST.

SST: 09268-87703-000

Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)



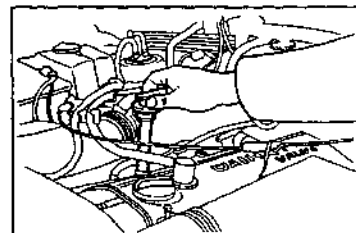
09268-87703-000

WF50-EM076

10. Connect the spark plug wires.

NOTE:

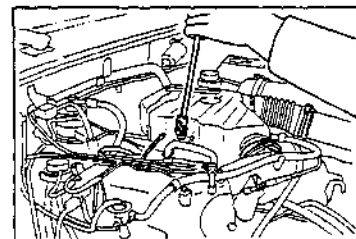
- Be sure that the spark plug wire is connected securely to each spark plug.
- Care should be exercised not to damage the spark plug wire with the spark plug tube.



WF50-EM077

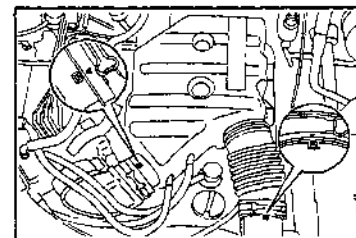
11. Attach the spark plug wires to the clamp.

12. Insert the intake air chamber into the intake air hose.
Secure it with the three attaching bolts.



WF50-EM078

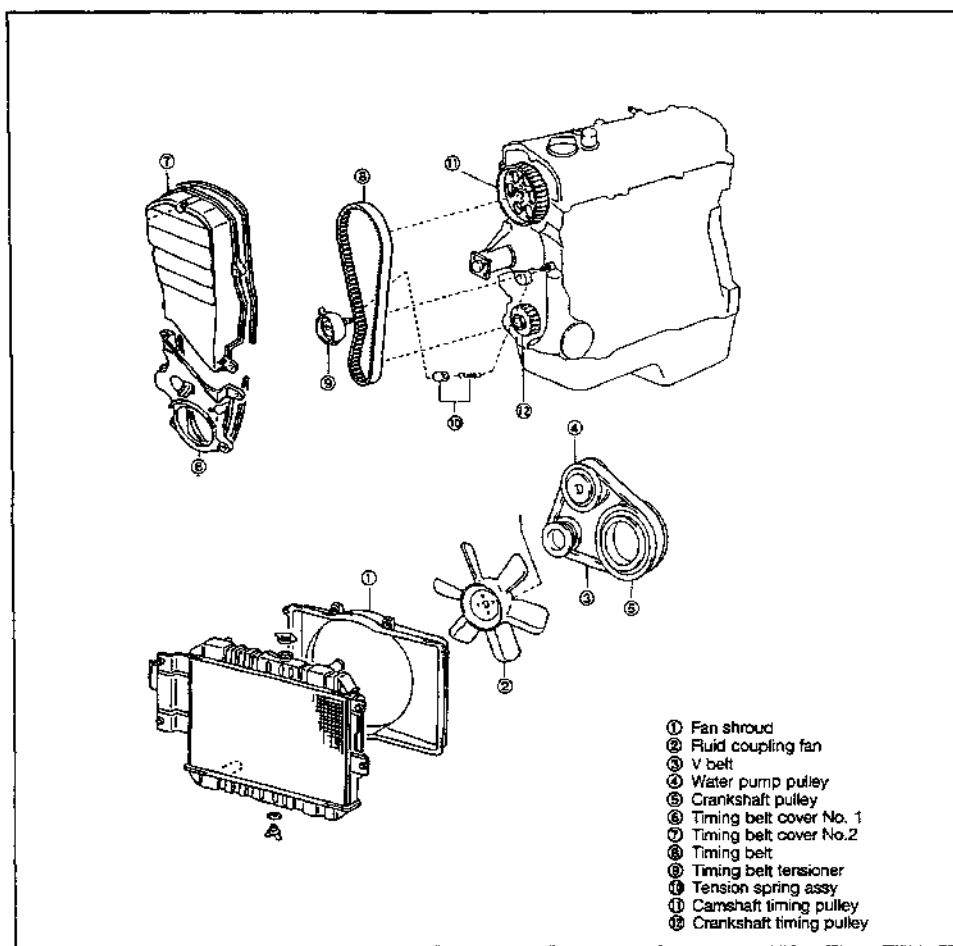
13. Insert the vacuum hoses into the intake air chamber.



WF50-EM079

ENGINE MECHANICALS

TIMING BELT COMPONENTS

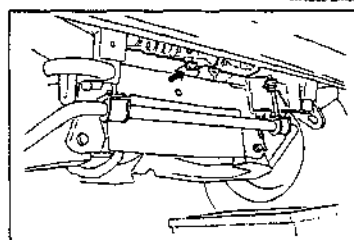


REMOVAL OF TIMING BELT

1. Disconnect the battery ground cable from the negative (-) terminal of the battery.
2. Remove the engine under cover and drain the engine coolant about 1 liter from drain plug of the radiator.

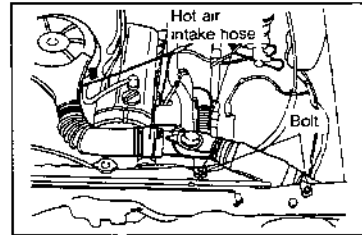
WARNING:

The engine coolant may be very hot. Care must be exercised to avoid getting scalded.

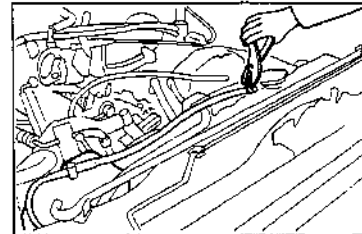


[HD-C Engine]

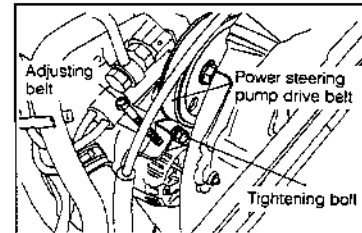
3. Removal of air cleaner hose
 - (1) Remove the air cleaner hose from the air cleaner case by removing the two bolts and one clamp.
 - (2) Disconnect the vacuum motor hose and hot air intake hose (except for GCC specification).
4. Removal of the radiator reserve tank
 - (1) Disconnect the radiator reserve tank hose from the radiator
 - (2) Pull up the radiator reserve tank together with hose.
5. Removal of the power steering pump drive belt. (Power steering equipped vehicle only)
 - (1) Loosen the adjusting bolt and two tightening bolts. Then push down the pump
 - (2) Remove the drive belt
6. Remove the air conditioner drive belt by loosening the adjusting bolt. (Air conditioner equipped vehicle)
 - (1) Loosen the adjusting bolt. (Air conditioner equipped vehicle)
7. Remove the three clamps for clutch cable provide on the fan shroud.



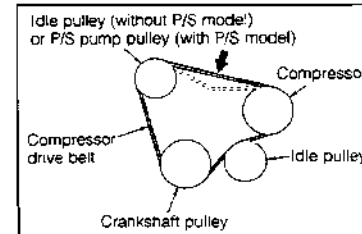
WFE90-EM061



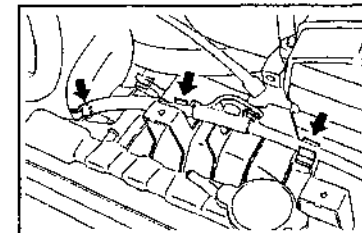
WFE90-EM062



WFE90-EM063



WFE90-EM064

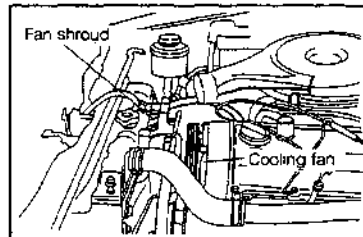


WFE90-EM065

ENGINE MECHANICALS

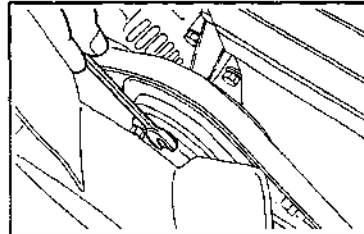
8. Removal of fluid coupling with fan and fan shroud

- (1) Disconnect the water hose from the radiator upper tank.



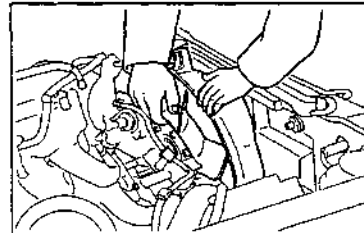
WP590-EM505

- (2) Remove the four water pump pulley attaching nuts. Then detach the fluid coupling with fan from the water pump pulley temporarily.
- (3) Remove the drive belt by loosening the alternator pulley adjusting bolt.
- (4) Remove the water pump pulley.



WP590-EM506

- (5) Remove the two fan shroud attaching bolts from the radiator.
- (6) Unlock the lock section of the fan shroud lower part from the radiator by pulling up the fan shroud.
- (7) Remove the fan shroud together with fluid coupling with fan from the engine compartment.

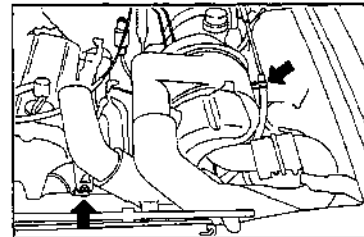


WP590-EM507

[HD-E Engine]

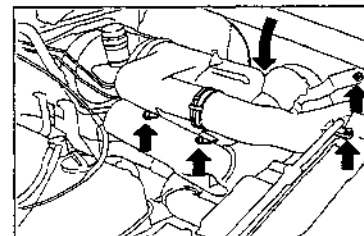
3. Removal of the air cleaner and the air cleaner hose subassembly.

- (1) Remove the tapping screw from the radiator fan shroud upper side.
- (2) Remove the clutch cable clamp provided at the air cleaner.



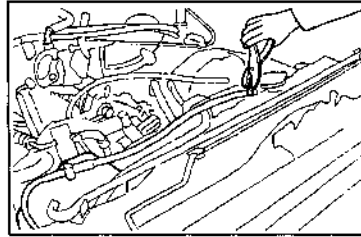
WP590-EM508

- (3) Remove the air cleaner hose attaching bolts provided at the left fender panel and radiator center support. Remove the three air cleaner attaching bolts. Then remove the air cleaner and air cleaner hose subassembly.



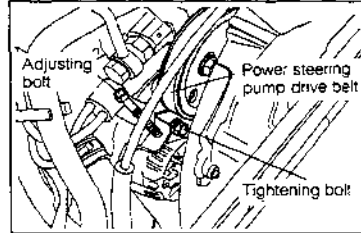
WP590-EM509

4. Removal of the radiator reserve tank
 - (1) Disconnect the radiator reserve tank hose from the radiator
 - (2) Pull up the radiator reserve tank together with hose.



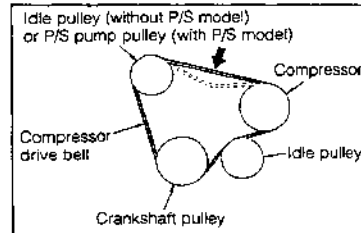
WFES0-EM086

5. Removal of the power steering pump drive belt. (Power steering equipped vehicle only)
 - (1) Loosen the adjusting bolt and two tightening bolts. Then push down the pump
 - (2) Remove the drive belt



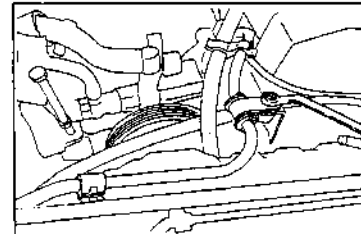
WFES0-EM087

6. Remove the air conditioner drive belt by loosening the adjusting bolt. (Air conditioner equipped vehicle)



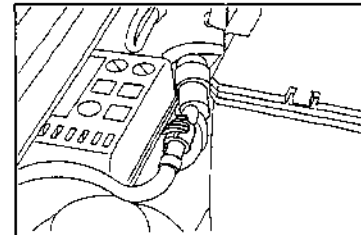
WFES0-EM088

7. Disconnection of the main relay wire
 - (1) Remove the clamping bolt and detach the clamp with lock.



WFES0-EM089

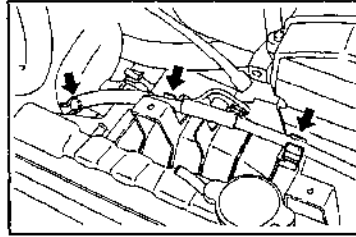
- (2) Disconnect the main relay wire connector at the relay box side.



WFES0-EM090

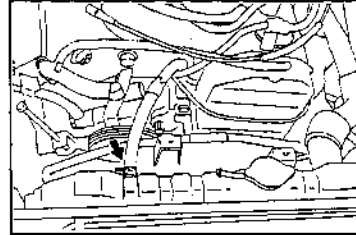
ENGINE MECHANICALS

8. Remove the three clamps for clutch cable provide on the fan shroud.



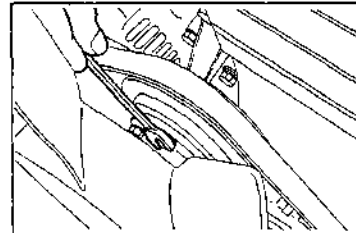
WPES0-EM091

9. Removal of fluid coupling with fan and fan shroud.
(1) Disconnect the air breather hose from the radiator upper tank.



WPES0-EM092

- (2) Remove the four water pump pulley attaching nuts. Then detach the fluid coupling with fan from the water pump pulley temporarily.
(3) Remove the drive belt by loosening the alternator pulley adjusting bolt.
(4) Remove the water pump pulley.



WPES0-EM093

- (5) Remove the two fan shroud attaching bolts from the radiator.
(6) Unlock the lock section of the fan shroud lower part from the radiator by pulling up the fan shroud.
(7) Remove the fan shroud together with fluid coupling with fan from the engine compartment.

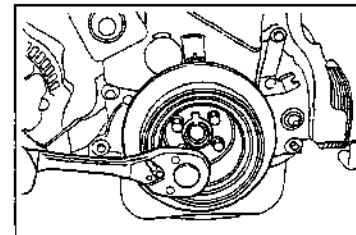


WPES0-EM094

10. Remove the crankshaft pulley by removing the four attaching bolts.

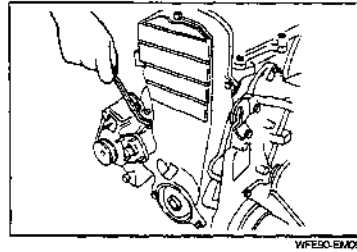
NOTE:

- Place the gear shift lever in the 5-th gear position so as to prevent the rotation of crankshaft.



WPES0-EM095

11. Remove the timing belt cover No. 1 and No. 2 by removing the eight bolts.



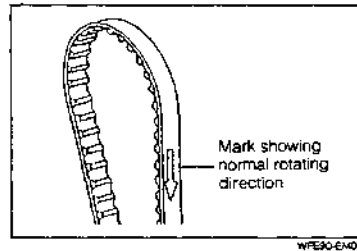
12. Removal of timing belt

NOTE:

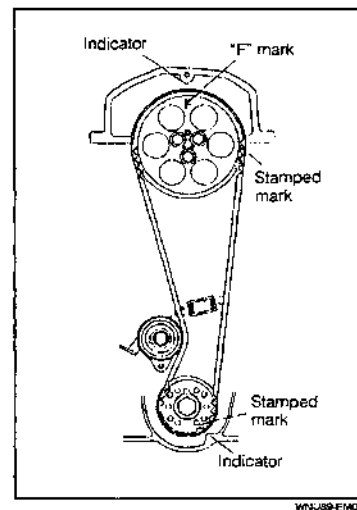
- Prior to removal of the timing belt, put an arrow mark indicating the normal rotating direction on the belt, using a chalk or the like.

CAUTION:

- Do not try to pry the timing belt with a screwdriver or the like during the removal or installation.
- Do not allow the belt to come into contact with oil, water or dust.
- Do not bend the belt at a sharp angle or turn the belt inside out, for it is very vulnerable to bending.
- Do not utilize the tension of the timing belt pulley when loosening the set bolt of the camshaft timing belt pulley.

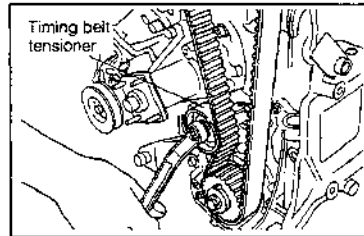


- (1) Rotate the crankshaft until the "F" mark of the camshaft timing belt pulley is aligned with the indicator of the cylinder head cover.

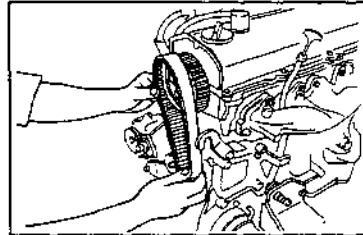


ENGINE MECHANICALS

- (2) Loosen the attaching bolt of the timing belt tensioner. Move the tensioner to the left as far as it will go and tighten the bolt temporarily.



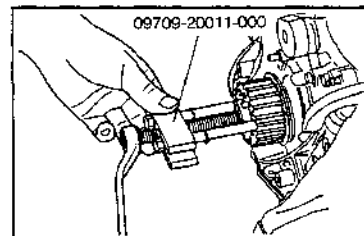
- (3) Remove the timing belt.



13. Remove the crankshaft timing belt pulley and pulley flange by removing pulley bolt.

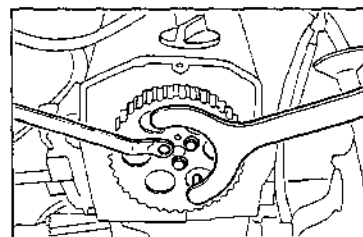
NOTE:

- Prevent the crankshaft from being rotated by placing the gear shift lever in the 5th gear position.
 - If any difficulty is encountered in removing the crankshaft timing belt pulley, lightly screw in the set bolt of the crankshaft timing belt pulley. Then, remove the pulley, using the following SST.
- SST: 09609-20011-000



14. Removal of camshaft timing belt pulley

- (1) Loosen the attaching bolts of the camshaft timing belt pulley, by using following the SST.
- SST: 09278-87201-000



- (3) Remove the camshaft timing belt pulley.

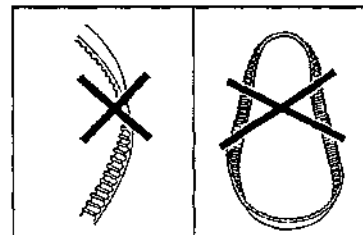
15. Remove the timing belt tensioner and tension spring.

INSPECTION OF COMPONENTS

1. Timing belt inspection

CAUTION:

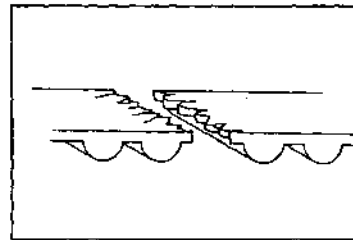
- Do not bend, twist or turn the belt inside out.
- Do not allow the belt to come into contact with oil, water or steam.
- Keep the belt clean.



If there are defects, as shown in the figures, check the following points and replace the timing belt, if necessary.

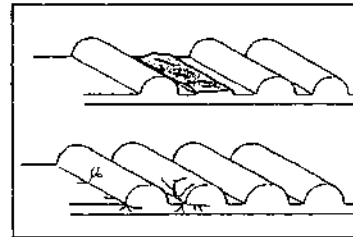
(1) Premature separation

- Check for proper installation.
- Check the timing gear cover gaskets for damage and check for correct installation.



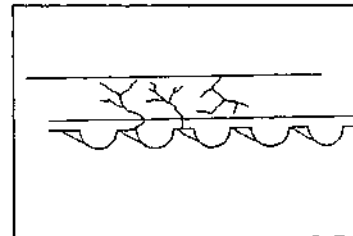
WHJUS9-EM4

(2) If the belt teeth are cracked or damaged, check to see if the camshaft is seized.



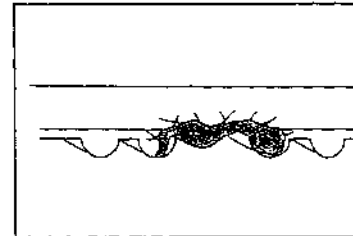
WHJUS9-EMC2

(3) If there is noticeable wear or cracks on the belt face, check to see if there are nicks on one side of the idler pulley lock.



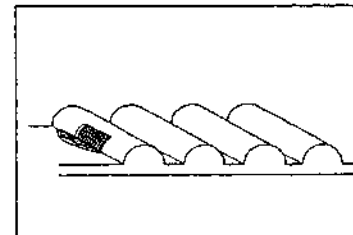
WHJUS9-EMD7

(4) If there is wear or damage on only one side of the belt, check the pulley flange.



WHJUS9-EMC7S

(5) If there is noticeable wear on the belt teeth, check the timing cover gasket for damage and check for correct gasket installation. Check for foreign material on the pulley teeth.



WHJUS9-EMC7S

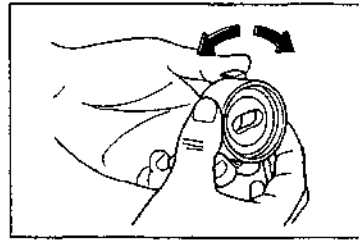
ENGINE MECHANICALS

2. Timing belt tensioner inspection

- Check the timing belt tensioner for smooth turning.
 - Check the belt contact surface for damage.
- If necessary, replace the timing belt tensioner.

CAUTION:

- Never wash the timing belt tensioner.



WNJ89-EM177

3. Inspect tension spring

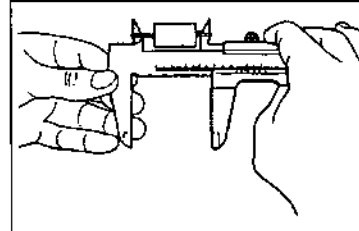
- (1) Check the free length of the spring

Free Length: 46.5 mm

- (2) Check the tension of the spring at the specified installation length.

Tension as Installed: 29.4 N (3.0 kgf) at 50.9 mm

If the tension does not conform to the specification, replace the spring.



WFE90-EM102

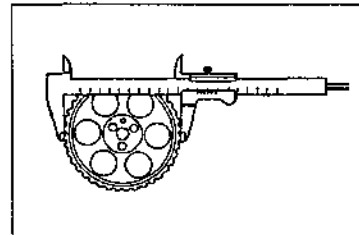
4. Inspection of timing belt pulley

- (1) Measure the maximum diameter of the timing belt pulley, using vernier calipers.

Reference:

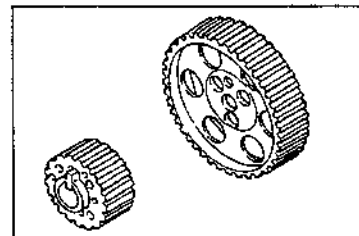
Camshaft timing belt pulley: 119.90 mm
--

Crankshaft timing belt pulley: 59.37 mm



WFE90-EM105

- (2) Visually inspect the timing belt pulley for damage.

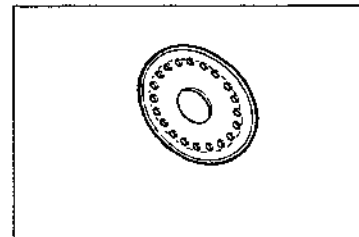


WNJ89-EM106

5. Inspection of crankshaft timing belt pulley flange

Check the crankshaft timing belt pulley flange for bend, damage and wear.

If necessary, replace the crankshaft timing belt pulley flange.



WNJ89-EM108

INSTALLATION OF TIMING BELT**NOTE:**

- Check the water pump for water leakage and the oil seal for oil leakage.

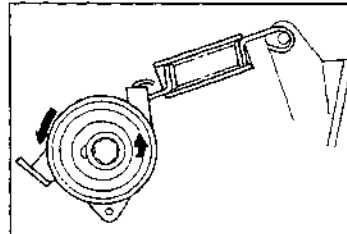
Repair any water leakage or oil leakage, if necessary.

WPB90-EM

1. Attach the tension spring to the timing belt tensioner. Hang the tension spring hook on the pin. Assemble the timing belt tensioner in place and install the bolt.

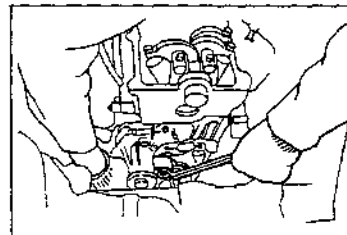
CAUTION:

- Hang the spring hook securely on the pin groove.
- Ensure that the pin at the oil pump is fitted into the pin hole of the timing belt tensioner.



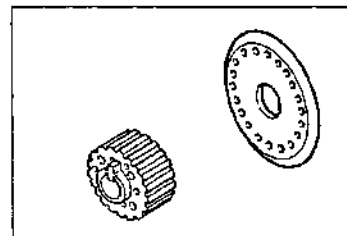
WPB90-EM1

2. While pulling the timing belt tensioner fully toward the water pump side, temporarily tighten the attaching bolt of the timing belt tensioner.



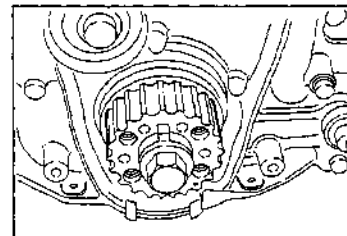
WPB90-EM1C

3. Installation of crankshaft timing belt pulley
 - (1) Install the crankshaft timing belt pulley flange with its recessed side facing toward the oil pump side.



WVU89-EM02

- (2) Install the crankshaft timing belt pulley on the crankshaft by aligning it with the key groove. Install the setting bolt of the crankshaft timing belt pulley. Align the stamped mark of the crankshaft timing belt pulley with the indicator.



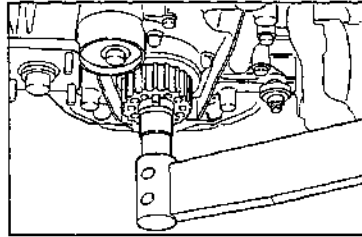
WPB90-EM1D7

ENGINE MECHANICALS

- (3) Tighten the crankshaft timing belt pulley bolt.
Tightening Torque: 88.3 - 98.0 N·m (9.0 - 10.0 kgf·m)

NOTE:

- Prevent the crankshaft from being rotated by placing the gear shift lever in the 5-th gear.

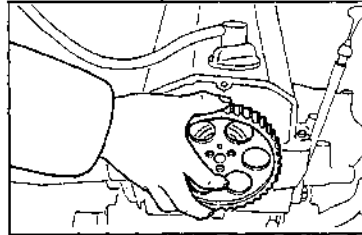


4. Installation of camshaft timing belt pulley

- (1) Install the camshaft timing belt pulley on the camshaft in such a way that the "F" mark can be seen and the locating pin hole is aligned.

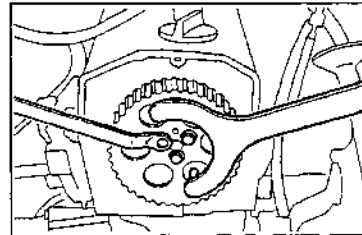
NOTE:

- Remove any oil or water from the camshaft timing belt pulley. Keep the pulley clean.



- (2) Install the three attaching bolts of the camshaft timing belt pulley, while preventing the pulley from turning by using SST.

Tightening Torque: 14.8 - 21.5 N·m (1.5 - 2.2 kgf·m)
SST: 09278-87201-000



CAUTION:

- Never allow the camshaft to turn.

5. Installation of timing belt

CAUTION:

- Do not try to pry the timing belt with a screwdriver or the like.
- Do not allow the belt to come into contact with oil, water or dust.
- Do not bend the belt at a sharp angle or turn the belt inside out.
- Perform the engine turning operation at the crankshaft side.
- Do not utilize the tension of the timing belt when tightening the set bolt of the timing belt pulley.
- When the timing belt is reused, install the timing belt in such a way that the direction of the arrow put during the removal may match with the engine rotation direction.
- The adjustment of belt tension should be made when the cylinder block and its ambient temperatures are in between 5 - 50°C.

WFES0-EM111

- (1) Align the "F" mark of the camshaft timing belt pulley with the indicator on the cylinder head cover.

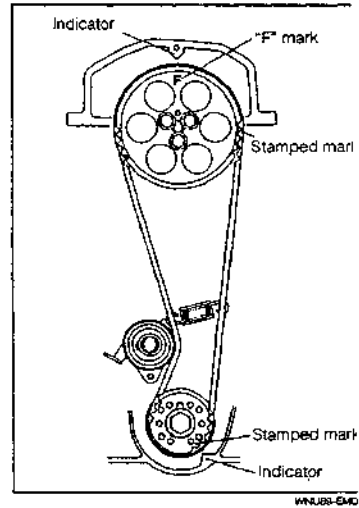
CAUTION:

- It should be noted that the piston may interfere with the valves if the camshaft is turned independently.

- (2) Align the stamped mark of the crankshaft timing belt pulley with the indicator.

CAUTION:

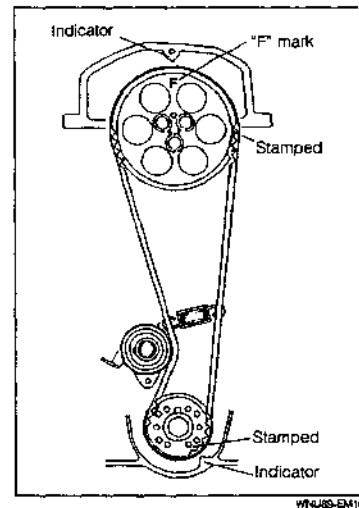
- It should be noted that the piston may interfere with the valves if the crankshaft is turned independently.



- (3) Assemble the timing belt in such a way that the two mating marks on the timing belt may be aligned with the corresponding stamped marks on the crankshaft timing belt pulley and camshaft timing belt pulley.

NOTE:

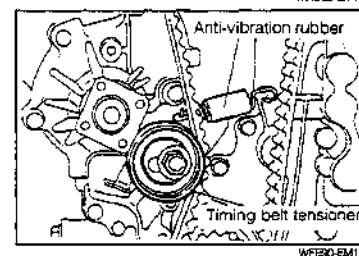
- When the timing belt is reused, install the timing belt in such a way that there exist 35 teeth of the belt between the stamped marks of the crankshaft timing belt pulley and camshaft timing belt pulley.
- When the timing belt is reused, install the timing belt in such a way that the arrowhead which was put during disassembly comes rotational direction of the timing belt.



- (4) Loosen the attaching bolt of the timing belt tensioner. Apply tension to the timing belt. Temporarily tighten the attaching bolt.

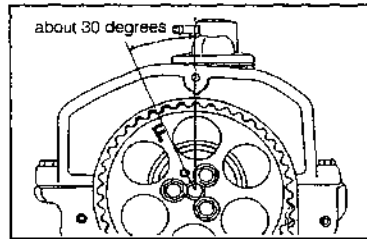
NOTE:

- Ensure that the belt exhibits no slack at the tension side of the belt (the side opposite to the tensioner).



ENGINE MECHANICALS

- (5) Rotate the crankshaft 1.9 turns in the normal direction (to the right as viewed from the engine cylinder No. 1) so that the "F" mark of the camshaft timing belt pulley comes at a point three teeth in the camshaft timing belt pulley before the indicator of the cylinder head cover.

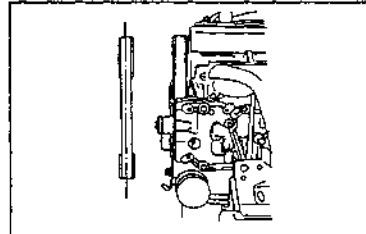


WVUJ83-EM102

CAUTION:

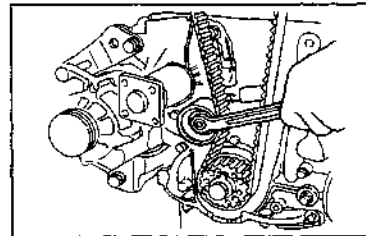
- At this time, never turn the crankshaft reversely.
- Make sure that the belt is not tilted between the crankshaft timing belt pulley and the camshaft timing belt pulley.

If the crankshaft should be reversed or the timing belt should be tilted, turn the crankshaft two more turns.



WVUJ83-EM103

- (6) Make the tensioner free by loosening the attaching bolt of the timing belt tensioner.

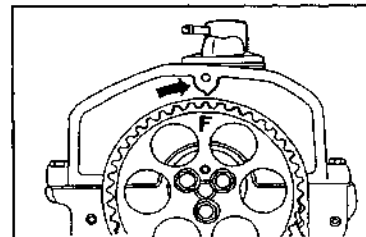


WVUJ83-EM104

- (7) Turn the crankshaft further in the normal direction until the "F" mark of the camshaft timing belt pulley is aligned with the indicator of the cylinder head cover.

CAUTION:

- Never turn the crankshaft reversely.
- Never turn the crankshaft beyond the point where the "F" mark of the camshaft timing belt pulley is aligned with the indicator.

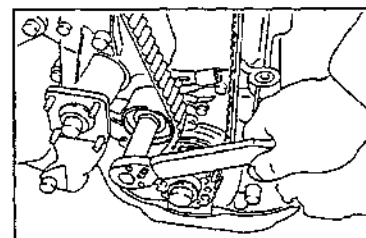


WVUJ83-EM105

If the crankshaft should be reversed or turned beyond that point, temporarily tighten the tensioner attaching bolt and repeat the operations from the step (5) onward.

- (8) Tighten the attaching bolt of the timing belt tensioner to the specified torque.

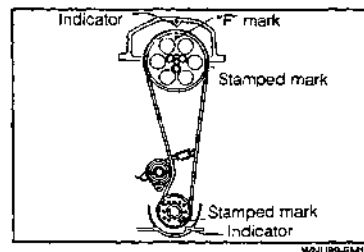
Tightening Torque: 29.4 - 44.1 N·m (3.0 - 4.5 kgf·m)



WVFE90-EM113

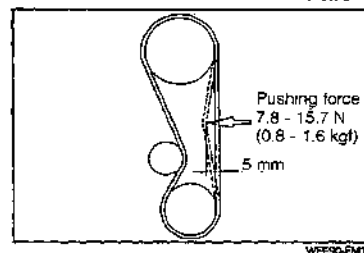
- (9) Ensure that the stamped marks of the crankshaft timing belt pulley and camshaft timing belt pulley are aligned with the corresponding indicators.

If the stamped mark is not aligned with the indicator, repeat the operations from the step (1) onward.



6. Check of timing belt tension
When the midpoint of the belt at the tension side is pushed 5.0 mm, ensure that the pushing force is
Specified Pushing Force: 7.8 - 15.7 N (0.8 - 1.6 kgf)
(When belt is deflected 5.0 mm)

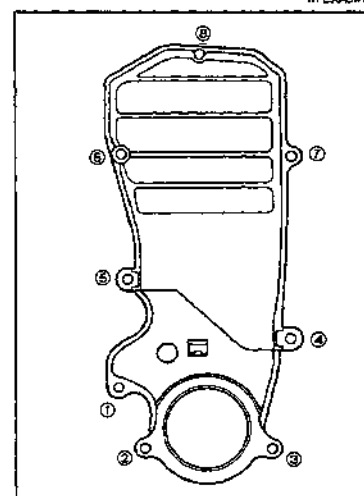
If the belt does not conform to the specification, repeat the operations from the step 15 (4) onward.



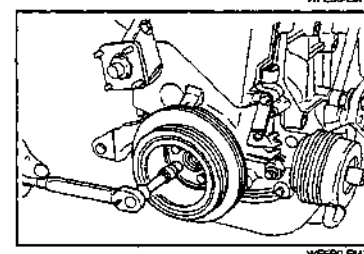
7. Installation of timing belt cover
(1) Install the timing belt cover No. 1 (lower side) with three bolts.
NOTE:
• Attaching bolts ④ and ⑤ in the figure are tightened both upper and lower side cover.

- (2) Install the timing belt cover No. 2 (upper side) with five bolts.
Tightening Torque: 2.0 - 3.9 N·m (0.2 - 0.4 kgf·m)
(For both upper and lower cover)

NOTE:
• First, attaching bolts ① and ④ should be installed.



8. Installation of crankshaft pulley
(1) Prevent the crankshaft from turning by placing the gear shift lever in the 5th gear position, and pull the parking break lever.
(2) Install the crankshaft pulley on the crankshaft timing belt pulley with four bolts.
Tightening Torque: 19.6 - 29.4 N·m (2.0 - 3.0 kgf·m)



ENGINE MECHANICALS

9. Installation of fluid coupling with fan and fan shroud

- (1) Install the water pump pulley to the water pump with temporarily attaching.
- (2) Insert the radiator fan shroud together with the fluid coupling with fan between radiator and the engine.

NOTE:

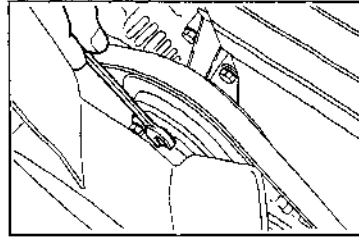
- Be sure that the water pump pulley is not ride to the spigot section of the water pump pulley seat.

- (3) Install the fluid coupling to with fan the water pump by means of four bolts through water pump pulley.

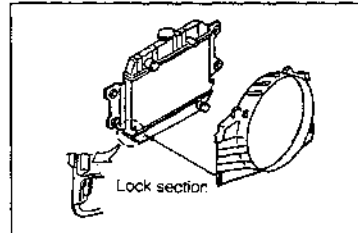
Tightening Torque: 9.8 - 17.7 N·m (1.0 - 1.8 kgf·m)

- (4) Insert the lock section of fan shroud to the radiator. Then, tighten the two attaching bolts of the radiator upper side.

- (5) Connect the water hose to the radiator upper tank. Securely clamp the water hose clamp.



WPB90-EM117



WPB90-EM118

10. Installation of V belt

- (1) Install the V belt.
- (2) Perform the adjustment in such a way that the deflection at the midpoint between the water pump pulley and the alternator may become the specified value when a force of 98 N (10 kgf) is applied to the midpoint.

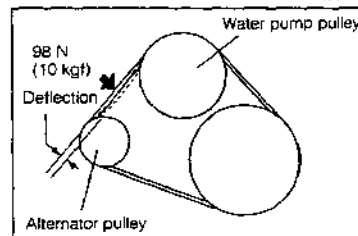
Specified Belt Deflection:

New Belt: 4.0 - 5.0 mm

With a force of 98 N (10 kgf) applied to point indicated in figure

Used Belt: 5.0 - 6.0 mm

With a force of 98 N (10 kgf) applied to point indicated in figure



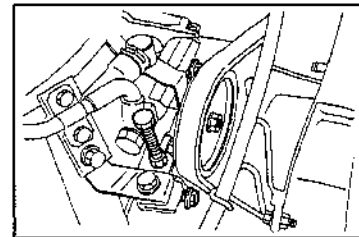
WPB90-EM119

NOTE:

- The used belt denotes a belt which has been used for more than five minutes after it was put into use.

11. Installation of power steering drive belt (Power steering equipped vehicle only)

- (1) Install the power steering drive belt.

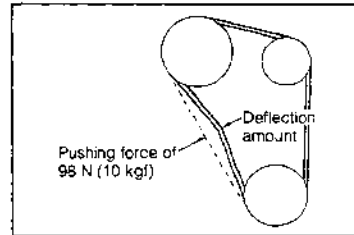


WPB90-EM120

- (2) Set the drive belt tension to specified value by tightening the adjusting bolt.

Specified Deflection: 9 - 11 mm

[When a force of 98 N (10 kgf) is applied]



WPB90-EM-121

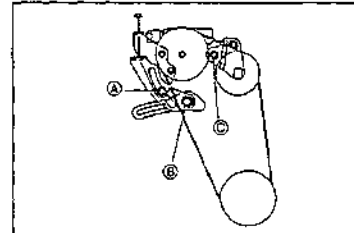
- (3) Tighten the bolts and nut to the specified value.

Tightening Torque:

Ⓐ 34.3 - 44.1 N·m (3.5 - 4.5 kgf·m)

Ⓑ 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)

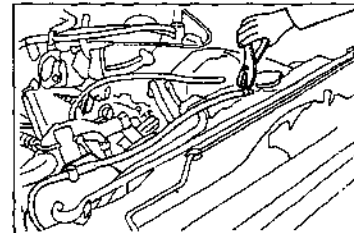
Ⓒ 49.0 - 68.6 N·m (5.0 - 7.0 kgf·m)



WPB90-EM-122

12. Installation of reserve tank.

- (1) Install the reserve tank to the radiator assy bracket.
- (2) Install the reserve tank hose to the radiator with clip.

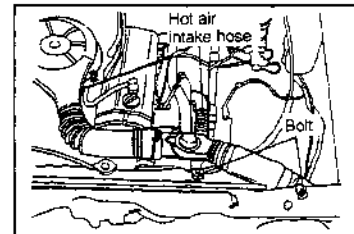


WPB90-EM-123

13. Installation of the air cleaner and the air cleaner hose.

[HD-C Engine]

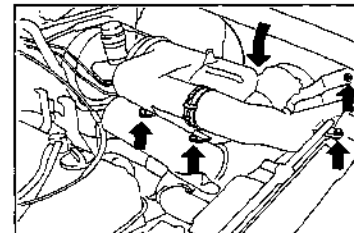
- (1) Connect the vacuum motor hose to the air cleaner hose.
(Except G.C.C. specification)
- (2) Connect the hot air intake hose to the pipe.
- (3) Connect the air cleaner hose to the air cleaner case and the pipe with two bolts and one clamp.



WPB90-EM-124

[HD-E Engine]

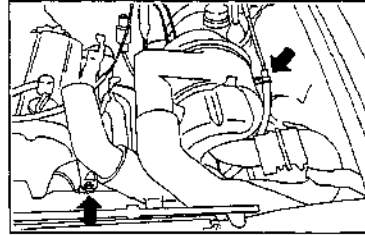
- (1) Put the air cleaner and the air cleaner hose into position.
- (2) Tighten the three air cleaner attaching bolts.
- (3) Tighten the air cleaner hose attaching bolts provided at the left fender panel and the radiator center support.



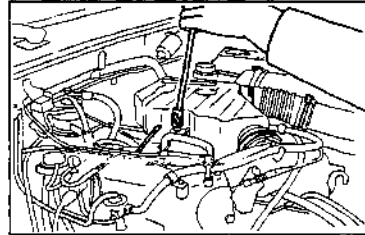
WPB90-EM-125

ENGINE MECHANICALS

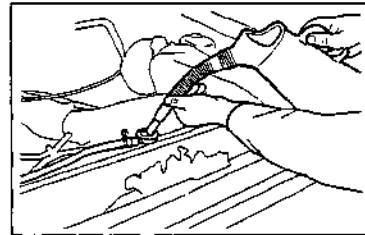
14. Install the clutch cable clamp provided at the air cleaner.
15. Install the tapping screw onto the radiator fan shroud upper side.



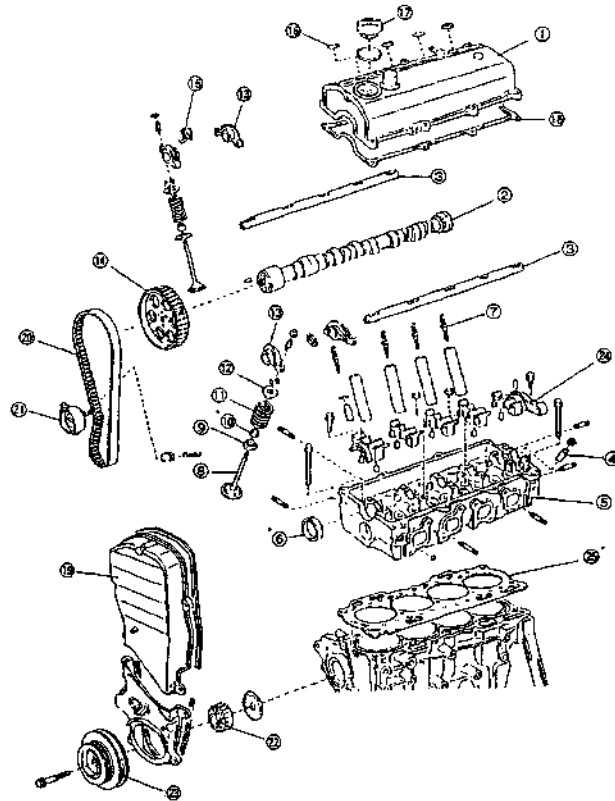
16. Install the air intake chamber.



17. Pour the engine coolant about 1 liter into the radiator.
NOTE:
 - Use the engine coolant which is drained from radiator in the step 2 of removal of timing belt.
18. Connect the battery ground cable to the negative (-) terminal of the battery.



CYLINDER HEAD COMPONENTS



- ① Cylinder head cover
- ② Camshaft
- ③ Valve rocker shaft
- ④ Valve guide
- ⑤ Cylinder head
- ⑥ Oil seal
- ⑦ Spark plug
- ⑧ Valve
- ⑨ Spring seat
- ⑩ Valve stem oil seal
- ⑪ Valve spring
- ⑫ Valve spring retainer
- ⑬ Valve rocker arm

- ⑭ Camshaft timing belt pulley
- ⑮ Spacer
- ⑯ Grommet
- ⑰ Oil filler cap
- ⑱ Gasket
- ⑲ Timing belt upper cover
- ⑳ Timing belt
- ㉑ Timing belt tensioner
- ㉒ Crankshaft timing belt pulley
- ㉓ Crankshaft pulley
- ㉔ Camshaft cap
- ㉕ Cylinder head gasket

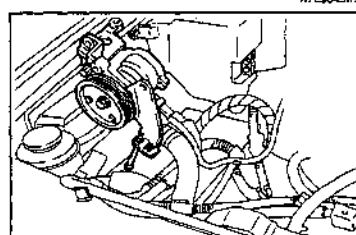
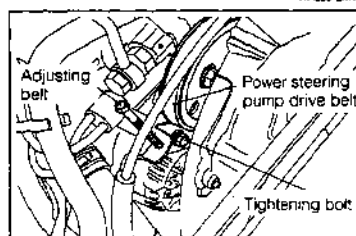
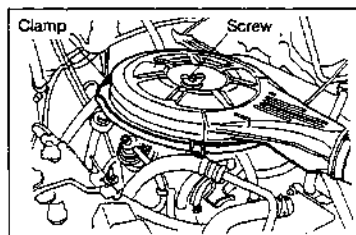
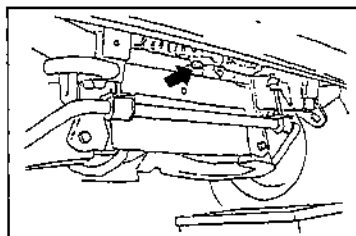
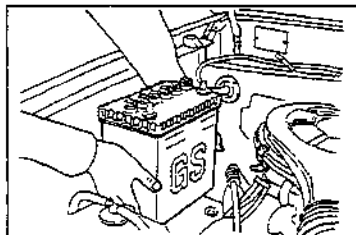
WPE30-EM702

ENGINE MECHANICALS

REMOVAL OF CYLINDER HEAD WITH MANIFOLDS

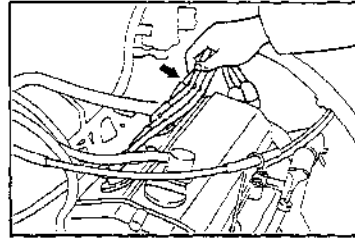
[HD-C Engine]

1. Removal of battery
 - (1) Disconnect the battery ground cable from the negative (-) terminal of battery.
Then disconnect the positive cable from the positive (+) terminal.
 - (2) Remove the battery from the engine compartment by removing the battery holding clamp.
2. Drain the coolant
3. Drain the engine oil
4. Removal of engine hood.
 - (1) Disconnect the window shield washer hose
 - (2) Remove the engine hood by removing four bolts.
5. Removal of air cleaner assembly.
 - (1) Disconnect the flowing hoses at air cleaner side.
 - ITC vacuum hose to carburetor
 - Vacuum hose to TVSV
 - PCV hoses
 - Vacuum hoses for vacuum motor
 - (2) Remove the air cleaner by removing the attaching bolt and wing nut.
6. Removal of the power steering pump assembly (Power steering equipped vehicle only)
 - (1) Loosen the adjusting bolt and two attaching bolts. Then pull down the pump.
 - (2) Remove the drive belt.
 - (3) Disconnect two tightening bolts.
 - (4) Remove the power steering pump assembly and put on the battery carrier temporarily.
 - (5) Disconnect the vacuum hose for idle up.



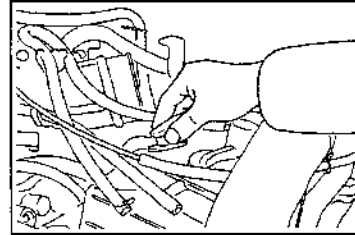
7. Removal of spark plugs.

(1) Detach the spark plug wires from the clamp.



WPES0-EM134

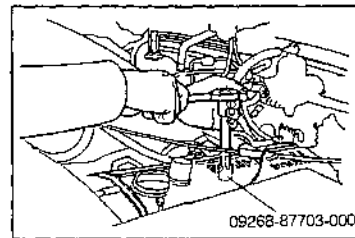
(2) Detach the spark plug wires at the cylinder head side.



WPES0-EM135

(3) Remove the spark plugs, using plug wrench (16 mm) or the following SST.

SST: 09268-87703-000



09268-87703-000

WPES0-EM136

12. Removal of timing belt.

(See Page EM-32.)

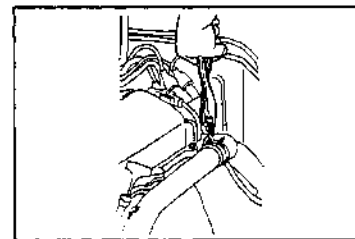
WPES0-EM137

13. Removal of water hose and coupler

(1) Disconnect the water out let hose at the engine rear side.

(2) Disconnect the heater hose at the rear right side of engine.

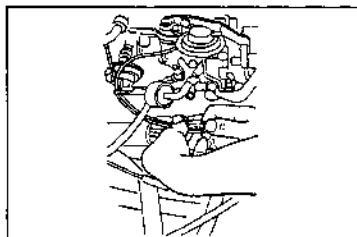
(3) Disconnect the small water hose at the water inlet side.



WPES0-EM138

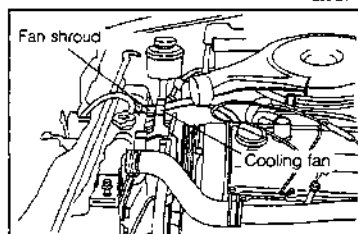
ENGINE MECHANICALS

- (4) Disconnect the coupler of solenoid valve wiring harness.
- (5) Disconnect the coupler of the water temperature sender wiring.



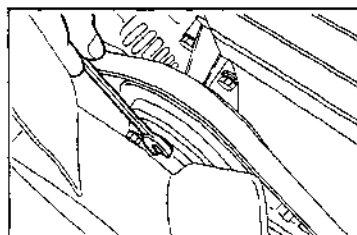
WPB90-EM139

8. Removal of fluid coupling with fan and fan shroud
 - (1) Remove the two clamps for clutch cable on the fan shroud.
 - (2) Disconnect the water hose from the radiator upper tank.



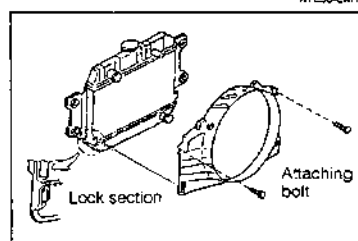
WPB90-EM140

- (3) Remove the fluid coupling with fan from water pump pulley by removing four nuts.
 - (4) Loosen the alternator pulley adjusting bolt.



WPB90-EM141

- (5) Remove the two attaching bolts of the fan shroud.
 - (6) Un-lock the lock section of fan shroud lower part from the radiator by pulling up the fan shroud. Remove the fan shroud together with fluid coupling fan.



WPB90-EM142

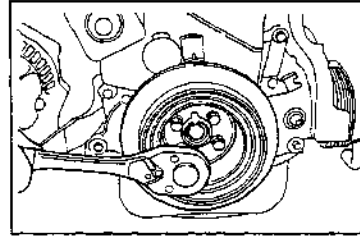
9. Remove the V-ribbed belt and water pump pulley.

WPB90-EM142

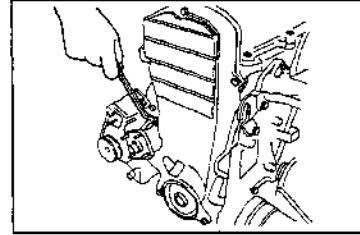
10. Remove the crankshaft pulley by removing the four attaching bolts.

NOTE:

- Place the gear shift lever in the 5th gear position so as to prevent the rotation of the crankshaft.



11. Remove the timing belt cover No. 1 and No. 2 by removing the eight bolts.



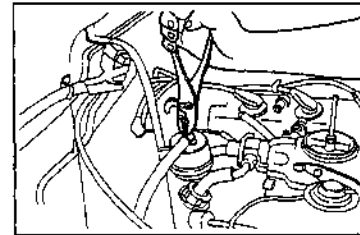
12. Removal of fuel line

- (1) Disconnect the fuel hoses to fuel filter from the fuel pump.

NOTE:

- When disconnecting the fuel hose, take precautionary measures to prevent any dirt from entering into the fuel line.

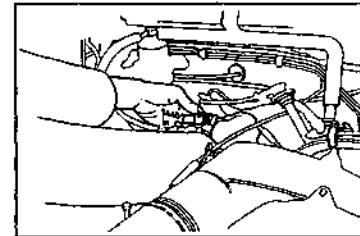
- (2) Disconnect the evaporative emission hoses at charcoal canister.



13. Disconnect the brake booster vacuum hoses from the intake manifold.

14. Removal of distributor

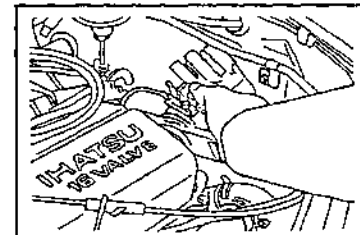
- (1) Disconnect the coupler of wiring harness of the distributor.



- (2) Remove the distributor from the cylinder head by removing the two attaching bolts.

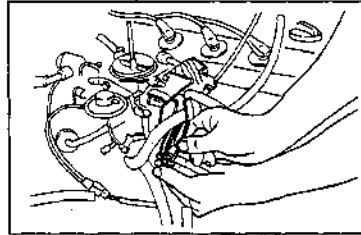
NOTE:

- Since the remaining engine oil will flow out, be certain to place a cloth or the like.



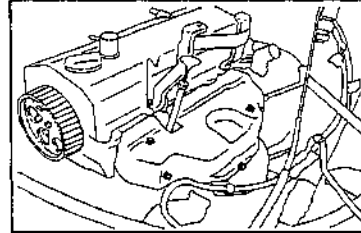
ENGINE MECHANICALS

15. Disconnect the accelerator cable from the carburetor.



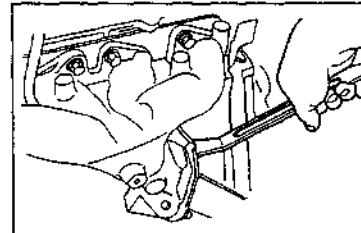
WPES0-EM146

16. Remove the hot air shroud from the exhaust manifold by loosening the five attaching bolts.



WPES0-EM148

17. Disconnect the exhaust pipe from the exhaust manifold by removing the three attaching nuts.

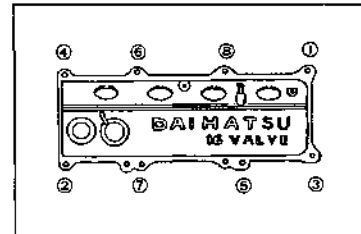


WPES0-EM150

18. Removal of cylinder head cover

- (1) Remove the spark plug wires from the cylinder head.
- (2) Remove the spark plugs, using the SST.
SST: 09268-877703-000

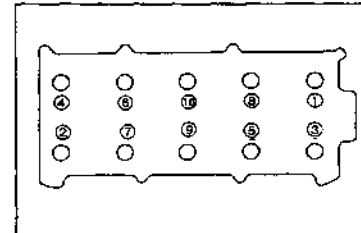
- (3) Loosen the cylinder head cover attaching bolts evenly over two or three stages in the sequence indicated in the figure. Remove the cylinder head cover attaching bolts.



WPES0-EN151

19. Removal of cylinder head

- (1) Disconnect the bypass hose from the intake manifold.
- (2) Disconnect the water hose from the thermo valve.
- (3) Remove the engine electrical wiring harness clamp from the intake manifold.
- (4) Disconnect the water outlet hose at the cylinder head side.
- (5) Disconnect the heater inlet hose at the cylinder head side.



WPES0-EN152

- (6) Loosen the cylinder head bolts, using a hexagon wrench.

NOTE:

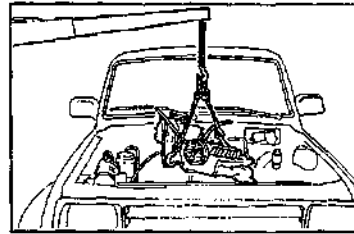
- Loosen the cylinder head bolts evenly over two or three stages in the sequence indicated in the figure.

- (7) Remove the cylinder head with intake and exhaust manifold, by using the chain block.

NOTE:

- Be careful not to allow the cylinder head to hit to the vehicle body and/or other parts.
- Place the removed cylinder head on suitable two wooden blocks in order that the cylinder head surface and valve may not be damaged.

- (8) Remove the cylinder head gasket.



WF50-EM10

[HD-E Engine]

1. Removal of the battery

- (1) Disconnect the battery ground cable from the negative (-) terminal of the battery.
Then disconnect the positive cable from the positive (+) terminal.

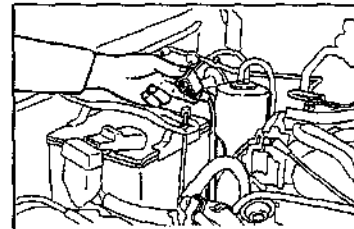
- (2) Remove the battery from the engine compartment by removing the battery holding clamp.

2. Drain the coolant.

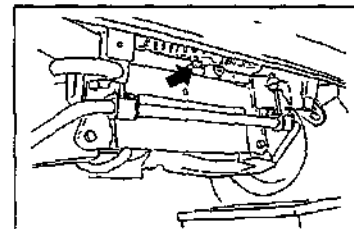
3. Drain the engine oil

4. Removal of engine hood.

- (1) Disconnect the window shield washer hose.
(2) Remove the engine hood by removing four bolts.

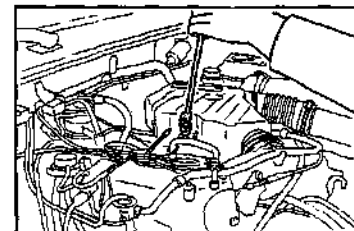


WF50-EM18



WF50-EM70

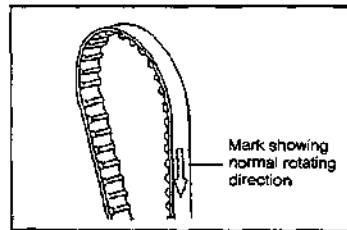
5. Removal of the air intake chamber.
(See page EM-17.)



WF50-EM18

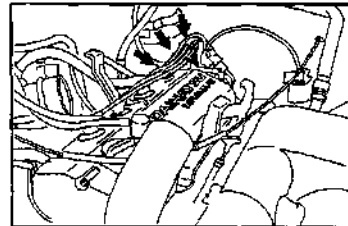
ENGINE MECHANICALS

6. Removal of the timing belt
(See page EM-36.)

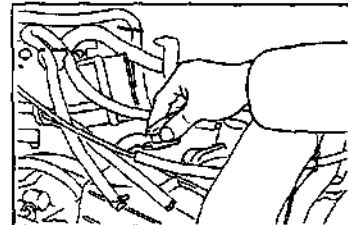


WFE90-EM161

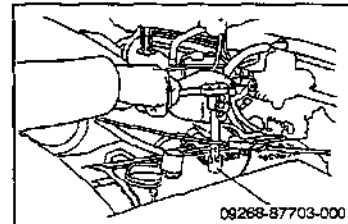
7. Removal of spark plugs.
(1) Remove the spark plug wire clamps.



- (2) Remove the spark plug wires.

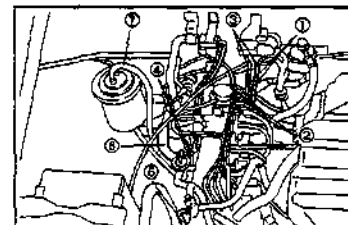


- (3) Remove the spark plugs, using the plug wrench (16 mm) or the flowing SST.
SST: 09268-87703-000



WFE90-EM164

8. Removal of following vacuum hoses at surge tank side.
(1) Distributor diaphragm ①
(2) BVSV ②
(3) Pressure VSV ③ (us spc only)
(4) Air conditioner idle up VSV ④
(5) Power steering ACV ⑤
(6) Brake booster ⑥
(7) Charcoal canister ⑦



9. Removal of distributor

- (1) Disconnect the distributor wire connector.
- (2) Remove the distributor from the cylinder head by removing the two attaching bolts.

NOTE:

- Since the remaining engine oil will flow out, be certain to place a cloth or the like.

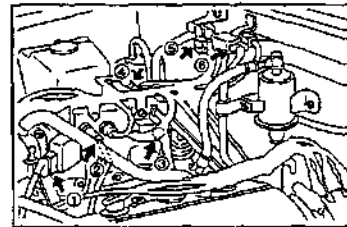


WP800-EN166

10. Removal of engine wire harness.

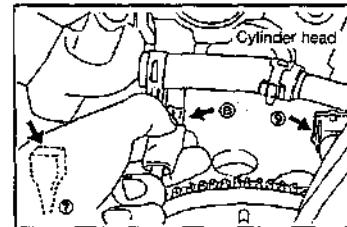
- (1) Disconnect the following connectors.

- ① Throttle position sensor ①
- ② Intake air temperature sensor ②
- ③ Idle speed control VSV ③
- ④ EGR VSV and harness clamp ④
- ⑤ Air conditioner idle up VSV ⑤
- ⑥ Idle up VSV connector (Pressure sensor, Pressure VSV and clamp. ⑥)



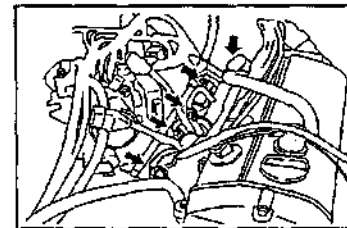
WP800-EN167

- ⑦ Air conditioner water temperature switch. ⑦
- ⑧ Water temperature sender gauge ⑧
- ⑨ Water temperature sensor ⑨



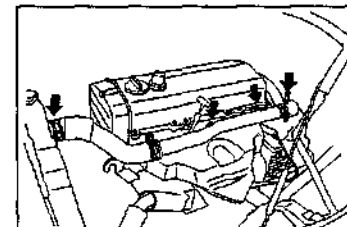
WP800-EN168

- (2) Disconnect the four injector connectors.
- (3) Remove the engine wire clamps and engine ground cables.



WP800-EN169

11. Remove the radiator hose No. 1 from the radiator upper tank by loosening the two clamps and attaching bolts.



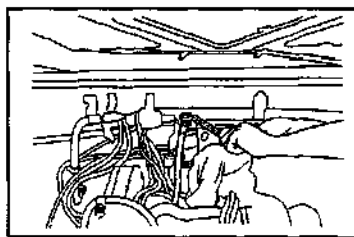
WP800-EN170

ENGINE MECHANICALS

12. Disconnect the hose No. 1 from the fuel filter.

CAUTION

- The fuel pressure inside the fuel line is set to a pressure 250 kPa (2.55 kgf/cm²) higher than the atmospheric pressure. Hence, gradual loosen the connection while preventing the fuel from splashing with a cloth or the like.

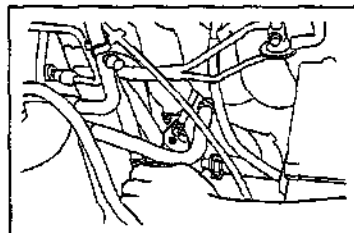


WF800-EM171

13. Disconnect the fuel return hose from the fuel pipe No.2.

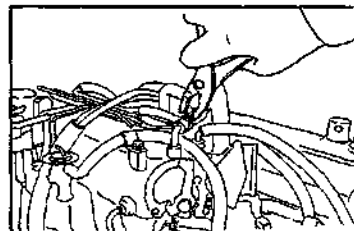
CAUTION:

- When disconnecting the fuel hose, take precautionary measures to prevent any dirt from entering the fuel line.
- Release the inner pressure of fuel tank by removing the fuel filler cap in advance.



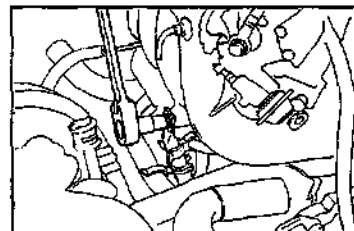
WF800-EM172

14. Disconnect the water hose from the upper side of the throttle body.



WF800-EM173

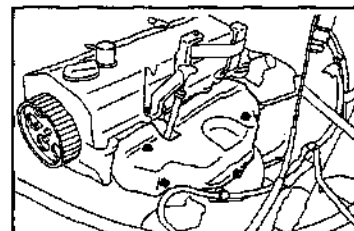
15. Remove the surge tank stay No. 2 from the surge tank.



WF800-EM174

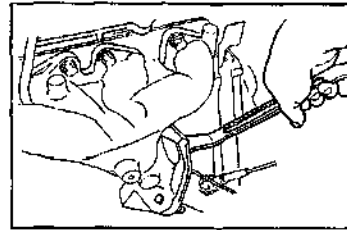
16. Remove the exhaust manifold cover by removing the five bolts.

17. Remove the oil level gauge support by removing the clamping bolt.



WF800-EM175

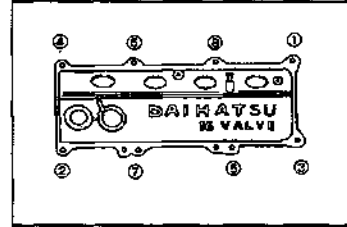
18. Disconnect the exhaust pipe from the exhaust manifold by removing the three attaching nuts.



WPED0-EM175

19. Removal of cylinder head cover

- (1) Remove the bond cable from the cylinder head cover.
 - (2) Remove the two air intake chamber bracket attaching bolts.
 - (3) Loosen the cylinder head cover attaching bolts evenly over two or three stages in the sequence indicated in the figure.
- Remove the cylinder head cover attaching bolts.



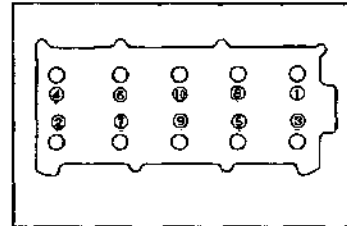
WPED0-EM177

20. Removal of cylinder head

- (1) Loosen the cylinder head bolts, using a hexagon wrench.

CAUTION:

- Loosen the cylinder head bolts evenly over two or three stages in the sequence indicated in the figure.

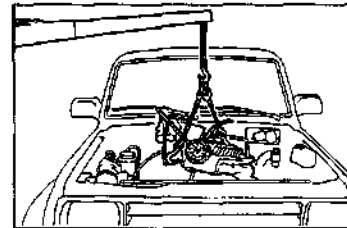


WPED0-EM178

- (2) Remove the cylinder head with intake and exhaust manifold, by using the chain block.

CAUTION:

- Be careful not to allow the cylinder head to hit to the vehicle body and/or other parts.
- Place the removed cylinder head on suitable two wooden blocks in order that the cylinder head surface and valve may not be damaged.



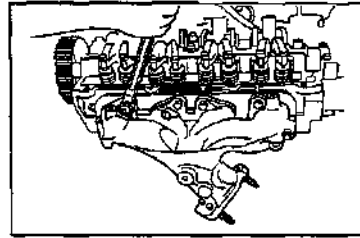
WPED0-EM179

ENGINE MECHANICALS

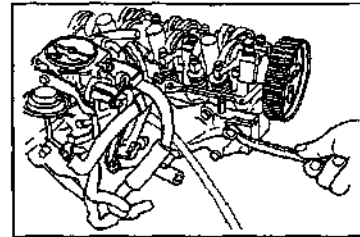
SEPARATION OF INTAKE AND EXHAUST MANIFOLDS

[HD-C Engine]

1. Remove the exhaust manifold by removing the six attaching bolts and two nuts.
2. Remove the exhaust manifold gasket.



3. Removal of intake manifold
 - (1) Disconnect the fuel hose at the carburetor side.
 - (2) Disconnect the choke breaker hoses.
 - (3) Disconnect the water by-pass hose.
 - (4) Remove the intake manifold with carburetor by removing the eight attaching bolts and the four nuts.

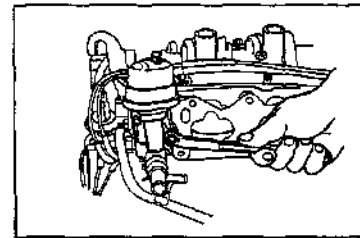


4. Removal of fuel pump

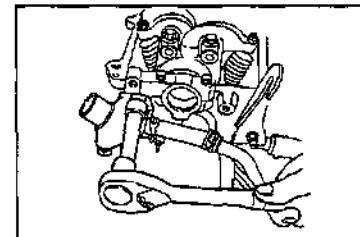
NOTE:

- When disconnecting the fuel pump, take precautionary measures to flow out the engine oil.

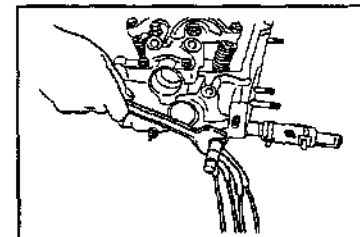
- (1) Remove the fuel pump by removing the two attaching bolts.
- (2) Remove the push rod and insulator.
- (3) Remove the intake manifold gasket.



5. Remove the water outlet housing by removing the attaching bolt and nut.
6. Remove the engine hanger by removing the attaching bolt and nut.



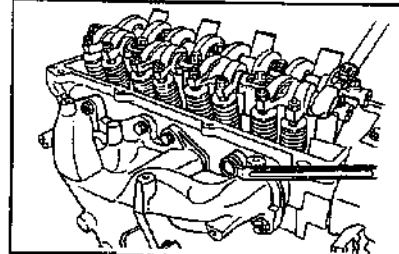
7. Remove the TVSV and water temperature sensor gauge.



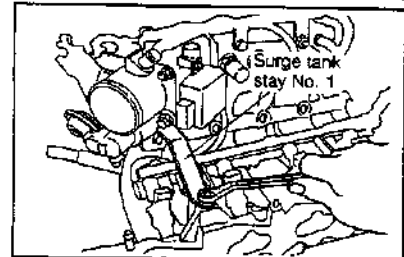
ENGINE MECHANICALS

[HD-E Engine]

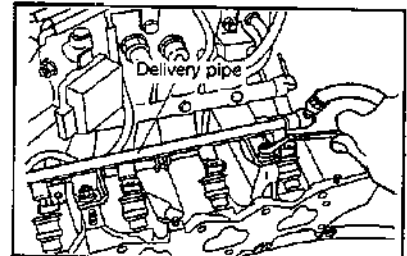
1. Remove the exhaust manifold by removing the six bolts and two nuts.
2. Remove the exhaust manifold gasket.



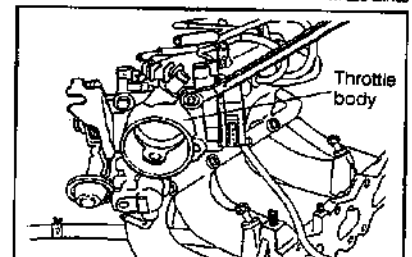
3. Removal of intake manifold assembly.
 - (1) Remove the surge tank stay No. 1 by removing the bolt and nut.



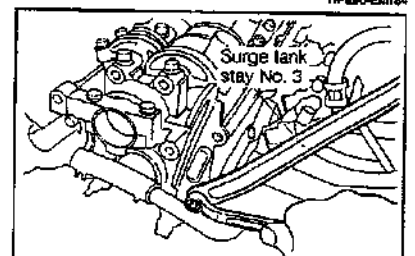
- (2) Remove the delivery pipe by removing the two attaching bolts.



- (3) Remove the throttle body by removing the two bolts and nut.

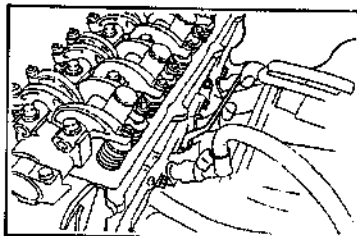


- (4) Remove the surge tank stay No. 3.



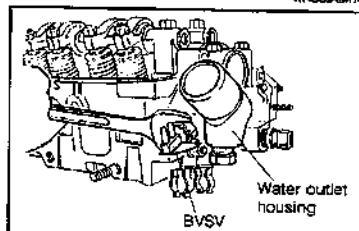
ENGINE MECHANICALS

- (5) Remove the intake manifold assembly by removing the eight bolts and four nuts.
- (6) Remove the intake manifold gasket.



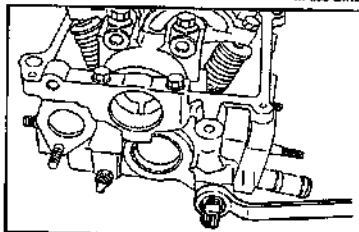
WV4053-EM149

- 4. Removal of water outlet housing from the cylinder head
 - (1) Remove the BVSU.
 - (2) Remove the water outlet housing by removing the attaching bolt and nut.



WV200-EM155

- 5. Remove the water temperature sensor and water temperature sender gauge.



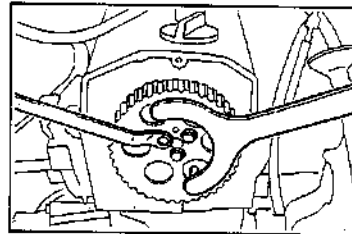
WV200-EM156

DISASSEMBLY OF CYLINDER HEAD

1. Removal of camshaft timing belt pulley
 - (1) Remove the attaching bolts of the camshaft timing belt pulley, while preventing the camshaft timing belt pulley from turning with SST.

SST: 09278-87201-000

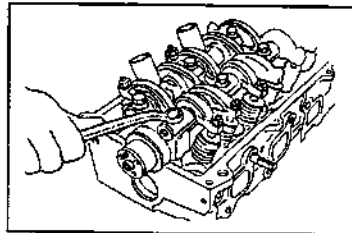
- (2) Remove the camshaft timing belt pulley.



2. Remove the valve rocker shaft sub assembly No. 1 (intake side) and No. 2 (exhaust side) by removing the ten attaching bolts.

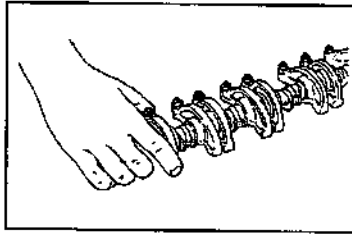
NOTE:

- Remove the attaching bolts by loosening them evenly over two or three stages.



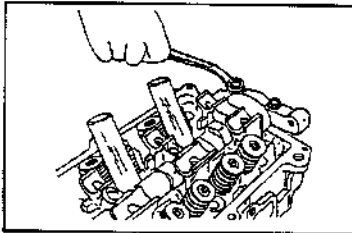
3. Remove the valve rocker shaft together with the rocker arms from the cylinder head.

4. Remove the valve rocker arm, spacer and wave washer from valve rocker shaft.

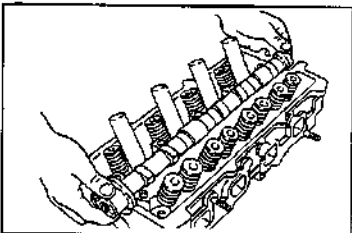


5. Removal of camshaft

- (1) Remove the camshaft bearing cap No. 5 by removing the two attaching bolts.
 - (2) Remove the camshaft bearing cap No. 1 to No. 4.



- (3) Remove the camshaft.
 - (4) Remove the oil seal from the camshaft.

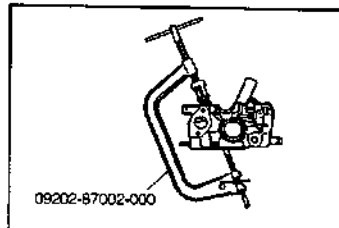


ENGINE MECHANICALS

6. Removal of intake and exhaust valve

- (1) Remove the valve spring retainer locks, using the following SST.

SST: 09202-87002-000

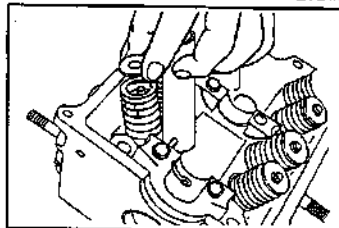


WPED0-EM102

- (2) Remove the valve spring retainers, compression springs, valves, valve stem oil seals and valve spring seats.

NOTE:

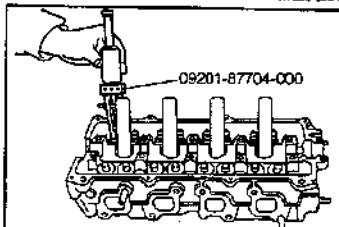
- Arrange the removal parts in order so that their installing positions may be known easily.



WPED0-EM103

- If any difficulty is encountered in removing the valve stem oil seal, pull the oil stem, using the following SST.

SST: 09201-87704-000

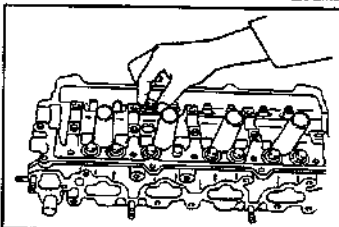


WPED0-EM104

7. Remove the valve spring seats.

NOTE:

- Arrange the removed parts in order so that their installing positions may be known easily.



WPED0-EM105

8. Wash the disassembled parts except for electrical parts, plastic parts and grease sealed bearings. Dry them by blowing compressed air.

WPED0-EM106

INSPECTION, CLEANING AND REPAIRS OF CYLINDER HEAD COMPONENTS

1. Cleaning of top of each piston and cylinder block
 - (1) Turn the crankshaft until each piston is brought to the top dead center.
Using a gasket scraper, remove all carbon deposits from the piston tops.
 - (2) Using a gasket scraper, remove any remaining gasket material from the top of the cylinder block.
Blow carbon deposits and oil from the bolt holes.

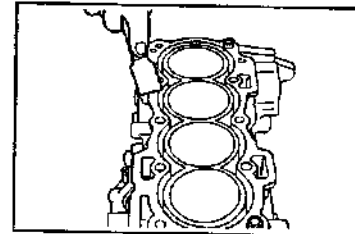
WARNING:
Protect your eyes during the cleaning operation using compressed air.

CAUTION:

- Do not scratch the gasket surfaces of the piston and cylinder block.

- (3) Set the piston No. 1 to the top dead center.

2. Removal of gasket material
Using a gasket scraper, remove any remaining gasket material from the cylinder head and manifold surfaces.

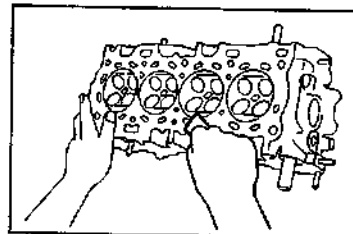


WF20-EM711

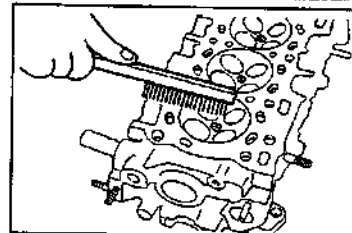
3. Cleaning of combustion chamber
Using a wire brush, remove all carbon deposits from the combustion chambers.

CAUTION:

- Be careful not to scratch the cylinder head gasket contact surfaces.

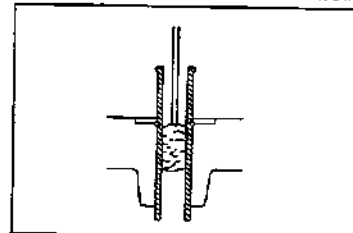


WF20-EM712



WF20-EM713

4. Cleaning of valve guide bushings
Using a valve guide brush and solvent, clean all the valve guide bushings.

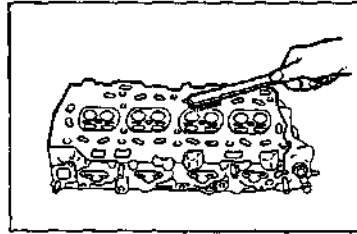


WF20-EM714

ENGINE MECHANICALS

5. Cleaning of cylinder head

Using a soft brush and solvent, thoroughly clean the cylinder head.



WPB90-EM715

6. Inspection of cylinder head for flatness

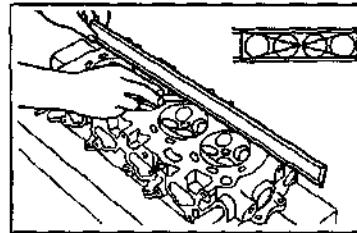
Using a precision straight edge and a thickness gauge, check the gasket surfaces contacting the cylinder block and manifolds for warpage.

Maximum Surface Warpage:

Cylinder Block Side: 0.10 mm

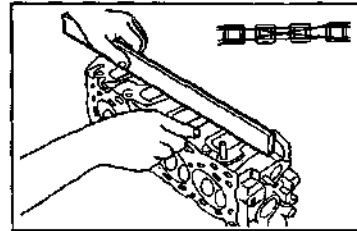
Intake Manifold Side: 0.10 mm

Exhaust Manifold Side: 0.10 mm



WPB90-EM719

If surface warpage of the cylinder block side exceeds the maximum limit replace the cylinder head.

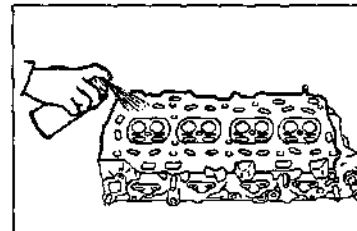


WPB90-EM716

7. Inspection of cylinder head for cracks

Using a dye penetrant, check the combustion chamber, intake and exhaust ports, head surface and top of the head for cracks.

If a crack is found, replace the cylinder head.



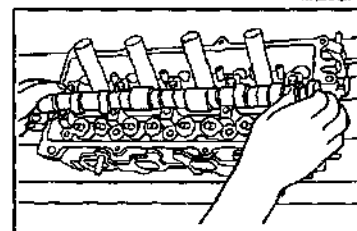
WPB90-EM717

8. Inspection of camshaft oil clearance

NOTE:

- Prior to this oil clearance check, the camshaft should be checked for bend in advance. (See page EM-76).

- (1) Clean the bearing and camshaft journals with cloth.
- (2) Install the camshaft to the cylinder head.
- (3) Place a plastigage on each bearing.



WPB90-EM152

ENGINE MECHANICALS

- (4) Install the bearing caps and valve rocker shaft. Tighten them to the specified torque.

Tightening Torque:

M10 bolt 28.4 - 36.3 N·m (2.9 - 3.7 kgf-m)

M8 bolt 12.7 - 16.7 N·m (1.3 - 1.7 kgf-m)

NOTE:

- Ensure that the bolt holes and bolts are dry when tightening the bolts.

- (5) Remove the bearing caps and measure the oil clearance.

Clearance:

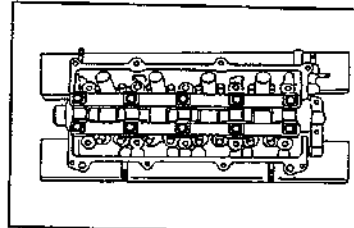
Specified Value: 0.035 - 0.076 mm

Allowable Limit: 0.17 mm

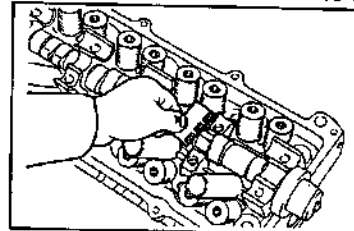
If the oil clearance exceeds the allowable limit, replace the cylinder head and camshaft as a set.

NOTE:

- After completion of the check, remove the plastigages. Wash the camshaft and bearing caps in cleaning solvent.



WPB0-EM150



WPB0-EM154

9. Inspection of camshaft thrust clearance

- (1) Apply engine oil to the camshaft journals.

- (2) Install the camshaft to the cylinder head. Install the bearing caps and rocker shafts and tighten them to the specified torque.

Tightening Torque:

M10 bolt 28.4 - 36.3 N·m (2.9 - 3.7 kgf-m)

M8 bolt 12.7 - 16.7 N·m (1.3 - 1.7 kgf-m)

NOTE:

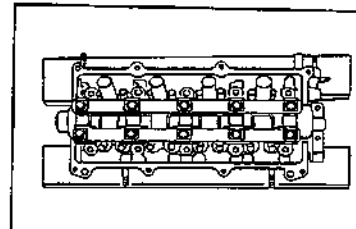
- Ensure that the bolt holes and bolts are dry when tightening the bolts.

- (3) With a dial gauge attached to the camshaft, measure the thrust clearance.

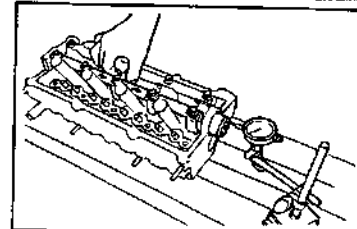
Thrust Clearance:

Specified Value: 0.1 - 0.25 mm

Allowable Limit: 0.45 mm



WPB0-EM155



WPB0-EM156

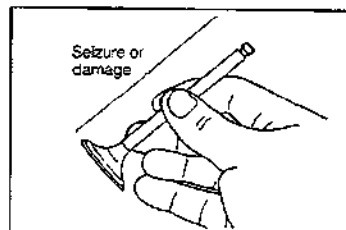
ENGINE MECHANICALS

10. Inspection and grinding of valves

(1) Visually inspect the valve stem for seizure or damage.

NOTE:

- If seizure or damage is found, replace the valve and valve guide bush as a set.
However, this replacement should be performed only after the checks for the cylinder head have been finished.
- The valve guide bush hole must be used for refacing the valve seat. Hence, if the valve guide bush hole exhibits any roughness due to seizure, etc., rectify the hole with an adjustable reamer.

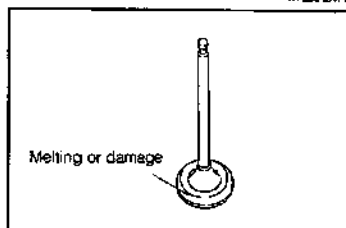


WPB90-EM119

(2) Visually inspect the valve head for melting or damage.

If the valve head exhibits any melting or damage, replace the valve.

If the roughness on the contact surface can be corrected, grind the valve seat contact surface with a valve refacer.



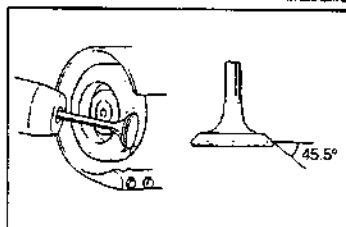
WPB90-EM120

(3) Grind the valves only enough to obtain a smooth contact surface with the valve seat.

Valve Face Angle: 45.5°

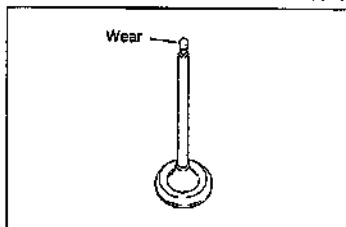
NOTE:

- Make sure the valves are ground to the correct valve face angle.



WPB90-EM187

(4) Visually inspect the valve stem end for abnormal wear.



WPB90-EM121

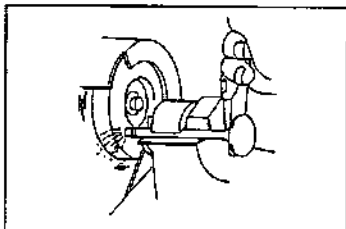
If the valve stem end exhibits abnormal wear, correct the stem end with a valve refacer. However, this correction should be made within a limit of 0.8 mm from that of standard length.

[Reference]

Valve Length (STD):

Intake Valve: 112.8 mm

Exhaust Valve: 114.5 mm

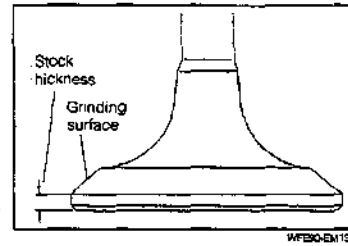


- (5) Inspect the valve head for its stock thickness.

Minimum Stock Thickness

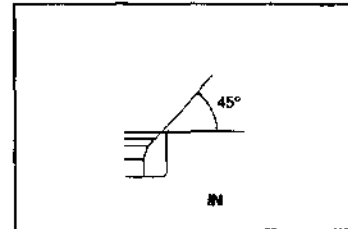
Intake Valve: 0.8 mm
Exhaust Valve: 1.0 mm

If the stock thickness of the valve head is less than the minimum stock thickness, replace it with a new one.



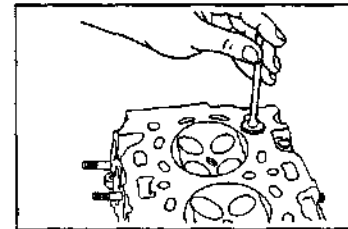
11. Inspection and cleaning of valve seats

- (1) Using a 45-degrees valve seat cutter, reface the valve seats. Remove only enough metal stock to clean the seats.
- (2) Apply a thin film of red lead (or white lead) to the valve seat.
- (3) Let the valve drop by its own weight onto the valve seat two or three times.
- (4) Take out the valve.



- (5) Inspect the valve face and seat for the following items.

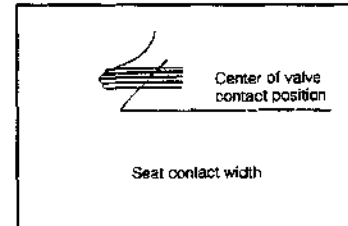
- ① Ensure that the valve seat contact surface of the valve is continuous over the whole circumference. If not, replace the valve.
- ② Ensure that the valve contact surface of the valve seat is continuous over the whole circumference. If not, reface the valve seat.



- ③ Measure the width of the contact surface of valve seat.

Contact Surface of Valve Seat: 1.2 - 1.6 mm

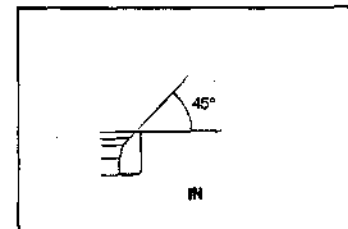
If not, reface the valve seat.



12. Refacing of valve seat

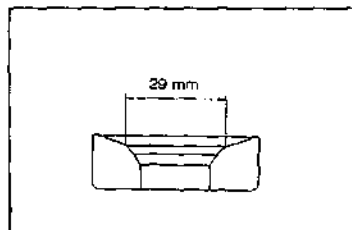
- (1) Refacing procedure for intake valve seats

- ① Using a 45-degrees cutter, recondition the roughness on the valve-to-valve seat contact surface, only enough to obtain a smooth surface.



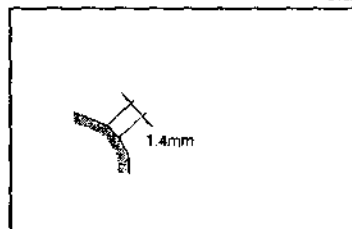
ENGINE MECHANICALS

- ② Using a 30-degrees cutter, cut the valve seat in such way that the circumference of the surface refaced by the 45-degrees cutter may become 29 ± 0.1 mm.



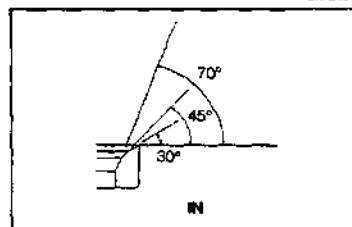
WPB0-EM202

- ③ Using a 70-degrees cutter, cut the seat in such way that the width, of the surface refaced by the 45-degrees cutter may become 1.4 mm.



WPB0-EM204

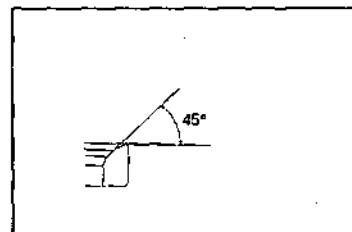
- ④ Using the 45-degrees cutter, remove burrs produced during the refacing by the 30-degrees and 70-degrees cutters.



WPB0-EM205

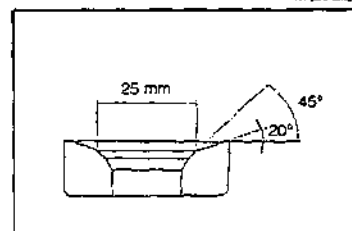
(2) Refacing procedure for exhaust valve seats

- ① Using a 45-degrees cutter, recondition the roughness on the valve-to-valve seat contact surface, only enough to obtain a smooth surface.



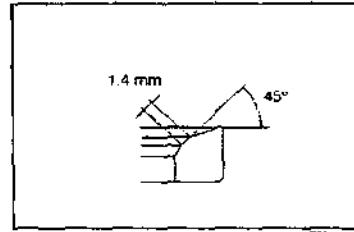
WPB0-EM206

- ② Using a 20-degrees cutter, cut the valve seat in such a way that the circumference of the surface refaced by the 45-degrees cutter may become 25 mm.

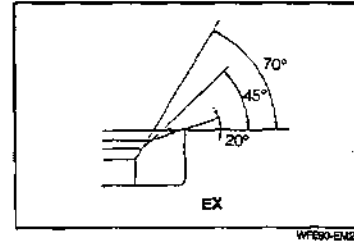


WPB0-EM207

- ③ Using a 70-degrees cutter, cut the valve seat in such a way that the width of the surface refaced by the 45-degrees cutter may become 1.4 mm.



- ④ Using the 45-degrees cutter, remove burrs produced during the refacing by the 20-degrees and 70-degrees cutters.



13. Hand lapping of valves

- (1) Perform hand lapping of the valves and valve seats, using an abrasive compound.
- (2) Clean the valves and valve seats after the hand lapping of the valves.

WFE90-BM723

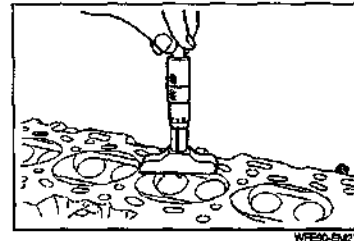
14. Inspection of valve recession

After the valve seat has been refaced, install the new valve. Measure the distance between the cylinder attaching surface of the cylinder head (attaching surface of the cylinder head gasket) and the upper most section of the valve. Ensure that the distance does not exceed the following maximum limit.

Maximum Limit

Intake Valve: 2.775 mm

Exhaust Valve: 6.026 mm



If the recession exceeds the maximum limit, replace the cylinder head.

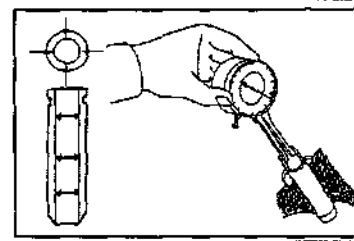
15. Inspection of valve stem-to-guide bushing oil clearance

- (1) Using a caliper gauge, measure the inner diameter of the valve guide at six points. Record the measured values.

Specified Value

IN: 6.600 - 6.620 mm

EX: 6.600 - 6.620 mm



ENGINE MECHANICALS

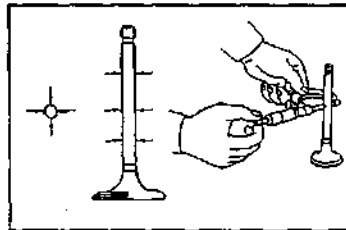
- (2) Using a micrometer, measure the diameter of the valve stem at six points.

Record the measured values.

Specified Value

IN: 6,560 - 6,580 mm

EX: 6,555 - 6,575 mm



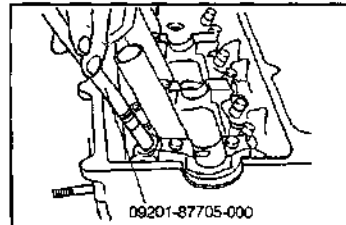
WPB0-EM12

16. Repairs of valve stem-to-guide bushing oil clearance

- (1) Intake valve guide bush

- ① Drive out the valve guide bush from the combustion chamber side, using the following SST.

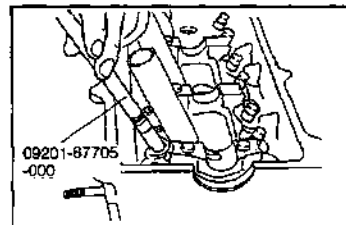
SST: 09201-87705-000



WPB0-EM13

- ② Drive a new valve guide bush into position, until the snap ring contacts the cylinder head, using the following SST.

SST: 09201-87705-000



WPB0-EM14

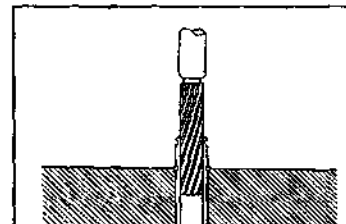
CAUTION:

- Be very careful not to give an excessive impact during the installation. Failure to observe this caution will result in valve guide bush cracks.
- Care should be exercised not to detach the snap ring due to driving the valve guide bush excessively.

- ③ Using an adjustable reamer, ream the valve guide bush to remove any burr or the like.

NOTE:

- This reaming should be made only enough to remove the burr or the like.



WPB0-EM15

- ④ Inspection of oil clearance

Ensure that the oil clearance meets the specifications.

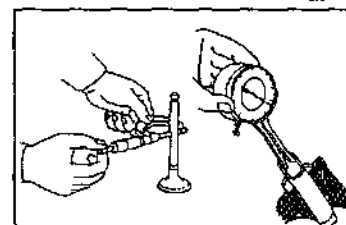
Oil Clearance:

Specified Value:

Intake 0.020 - 0.060 mm

Allowable Limit:

Intake 0.08 mm

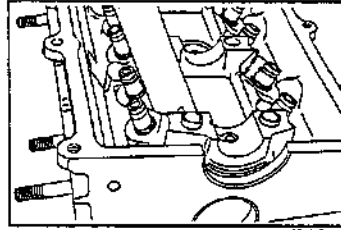


WPB0-EM16

(2) Exhaust valve guide bush

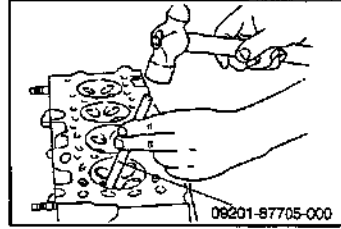
NOTE:

- When the locating ring for the valve guide bush is located 14 mm from the upper end of the valve guide bush, replace the cylinder head.



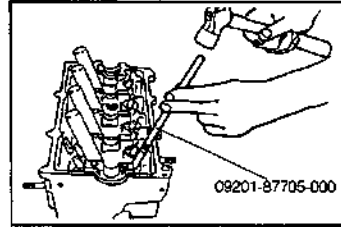
- Drive out the valve guide bush from the combustion chamber side, using the following SST.

SST: 09201-87705-000



- Drive a new valve guide bush into position, until the snap ring contacts the cylinder head, using the following SST.

SST: 09201-87705-000



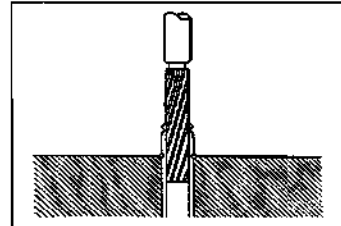
CAUTION:

- Be very careful not to give an excessive impact during the installation. Failure to observe this caution will result in valve guide bush cracks.
- Care should be exercised not to detach the snap ring due to driving the valve guide bush excessively.

- Using an adjustable reamer, ream the valve guide bush to remove any burr or the like.

NOTE:

- This reaming should be made only enough to remove the burr or the like.



- Inspection of oil clearance

Ensure that the oil clearance meets the specifications.

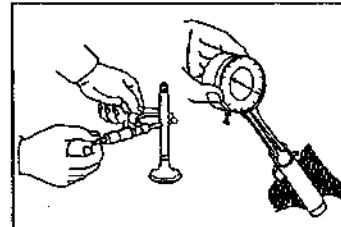
Oil Clearance:

Specified Value:

Exhaust 0.025 - 0.065 mm

Allowable Limit:

Exhaust 0.09 mm



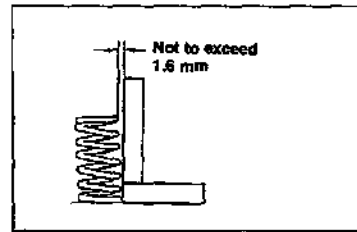
ENGINE MECHANICALS

17. Inspection of valve springs

- (1) Check the valve spring for squareness, using a steel square.

Maximum Squareness: 1.6 mm

If the squareness exceeds the maximum limit, replace the valve spring.



WF500-EM215

- (2) Measure the valve spring for free length and spring tension, using a spring tester.

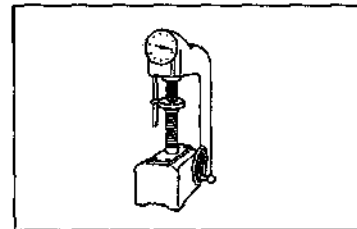
Minimum Free Length: 44.3 mm

Minimum Tension/Installation Height:
259 N (26.4 kgf)/38.0 mm

If the minimum free length and/or minimum tension is less than the minimum limit, replace the valve spring.

REFERENCE:

Standard Free Length: 45.2 - 46.0 mm

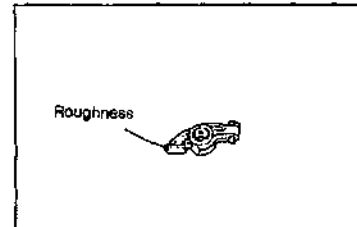


WF500-EM216

18. Inspection of valve rocker arms and valve rocker shaft

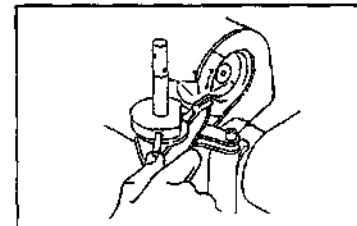
- (1) Visually inspect the valve rocker arm for cracks, seizure, or wear.

Replace the valve rocker arm, if necessary.



WF500-EM729

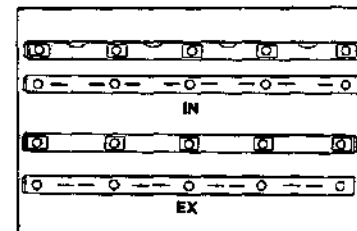
- (2) If the valve rocker arm-to-cam contact surface is worn excessively, grind or replace the rocker arm.



WF500-EM730

- (3) Visually inspect the valve rocker shaft for cracks, seizure or wear.

Replace the valve rocker shaft, if necessary.



WF500-EM731

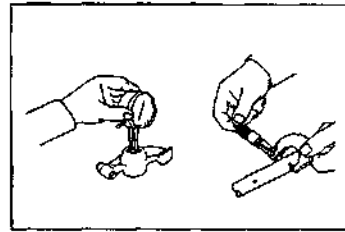
(4) Valve rocker shaft-to-valve rocker arm

- Using a dial gauge, measure the inner diameter of the valve rocker arm in two directions, 90 degrees apart from each other.
- Using a micrometer, measure the outer diameter of the valve rocker arm attaching position of the camshaft in two directions, 90-degrees apart from each other.
- Calculate the oil clearance by subtracting the rocker shaft diameter from the rocker arm diameter.

Oil Clearance

Specified Value: 0.012 - 0.053 mm

Allowable Limit: 0.08 mm



WPB90-8K277

NOTE:

- The measurement of the rocker shaft outer diameter must be performed at the assembling position of each rocker shaft.

Reference

- Identification of valve rocker shafts
On the intake valve rocker shaft, recesses for the spark plug tube are provided.
Also, the oil grooves are provided very closely to the bolt holes.

On the exhaust valve rocker shaft, the oil grooves are located near the midpoint of the bolt holes.

- Installing direction of valve rocker shaft
The valve rocker shaft should be installed in such a way that the side having a wider chamber comes at the timing belt side.

- Identification of valve rocker arm
The valve rocker arm comes in four kinds; two kinds each for the intake side and exhaust side, as shown in the right figure.

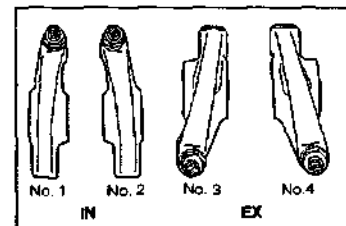
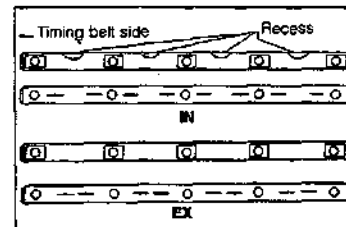
- Specified dimensions of valve rocker shaft and valve rocker arm

Outer Diameter of Valve Rocker Shaft:

19.468 - 19.488 mm

Bore Diameter of Valve Rocker Arm:

19.500 - 19.521 mm



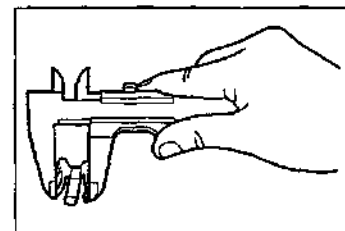
WPB90-8K216

19. Inspection of valve rocker arm, spacer and wave washer

- (1) Measure the free width of the spacer, using vernier calipers.

Minimum Free Width: 22.0 mm

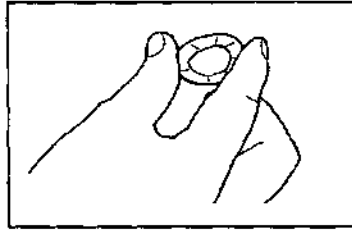
Replace the spacer whose free length is less than the minimum free width.



WPB90-8K216

ENGINE MECHANICALS

- (2) Visually inspect the wave washer for flattened condition or damage.
Replace the wave washer, if necessary.

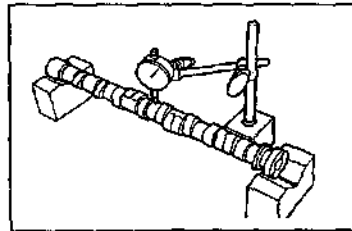


WPB00-5M732

20. Inspection of camshaft

(1) Checking camshaft for runout

Support the camshaft at its both ends with V-shaped blocks. Set a dial gauge to the mid-point of the center journal section of the camshaft. Turn the camshaft one turn, making sure that the camshaft will not move in the axial direction. Take a reading on the dial gauge during the turning. Calculate the maximum runout, i.e. the difference between the maximum and minimum readings.
Maximum Runout: 0.03 mm



WPB00-5M220

If the runout exceeds the maximum limit, replace the camshaft.

(2) Checking of cam lobe height

Measure the cam lobe height, using a micrometer.

Specified Cam Lobe Height:

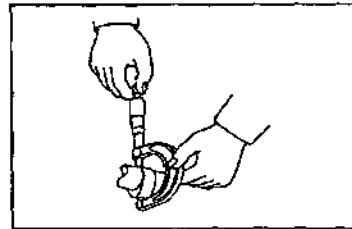
Intake: 33.08 - 33.28 mm

Exhaust: 33.00 - 33.20 mm

Minimum Limit:

Intake: 32.9 mm

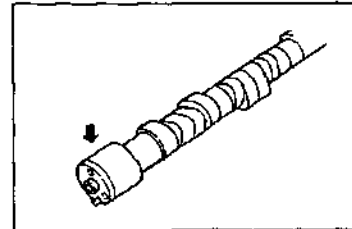
Exhaust: 32.85 mm



WPB00-5M221

(3) Inspection of oil seal contact surface

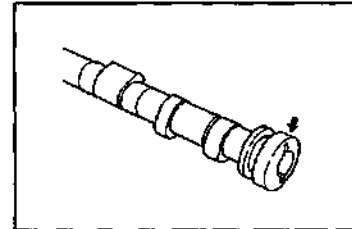
Inspect the oil seal contact surface for abnormal wear.
Replace the camshaft if the contact surface exhibits any abnormal wear.



WPB00-5M733

(4) Inspection of groove for driving distributor

Visually inspect to see if any damage is present at the groove for driving the distributor.
Replace the camshaft if the groove exhibits any damage.



WPB00-5M222

NOTE:

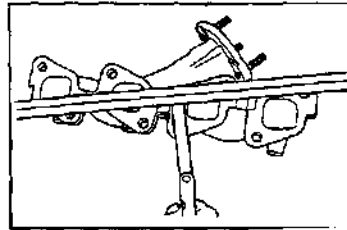
- If any damage is present, check the distributor side, too.

ENGINE MECHANICAL

21. Inspection of manifold and surge tank

- (1) Check the cylinder head attaching surface of the exhaust manifold for warpage, using a straight edge and a thickness gauge.

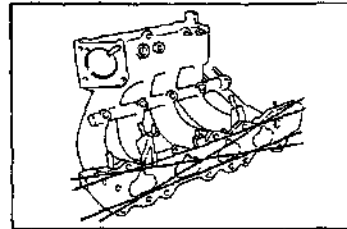
Maximum Warpage: 0.1 mm



WP590-EM22

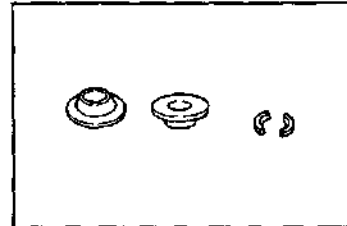
- (2) Check the contact surface of the intake manifold with the cylinder head.

Maximum Warpage: 0.1 mm



WP590-EM23

22. Check the valve spring seats, valve spring retainers and valve retainer locks for damage and cracks.
If any damage is present, replace such faulty parts.



WP590-EM78

ENGINE MECHANICALS

ASSEMBLY OF CYLINDER HEAD

NOTE:

- (1) Thoroughly clean all parts to be assembled.
- (2) Before installing the parts, apply new engine oil to all sliding and rotating surfaces.
- (3) Replace all gaskets and oil seals with new ones.

1. Assembly of cylinder head (When new cylinder head is installed:)

When new cylinder head is installed, spark plug tubes and a heater outlet tube have been furnished separately. Assemble these parts, following the procedure given below.

- (1) Wash the cylinder head in cleaning solvent and dry it with compressed air.
- (2) Apply a thin film of the Three Bond 1377B to the cylinder head attaching surfaces for the spark plug tubes.

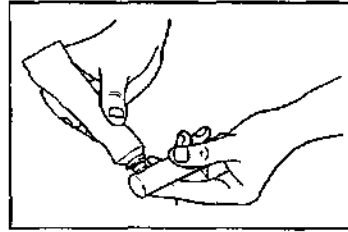
- (3) With a wooden piece or the like placed on the upper end of the spark plug tube, drive the spark plug tube to the cylinder head in such an extent that the distance between the spark plug tightening surface and the upper end of the spark plug tube becomes 139 mm.

NOTE:

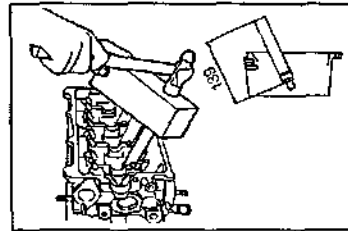
- Be very careful not to drive the spark plug tube too deeply.
- Be very careful not to damage the upper end of the spark plug tube.
- When driving the spark plug tube into position, make sure that the tube will not tilt in relation to the cylinder head tube hole.

- (4) Put mark at a point 45.0 ± 1.0 mm from the forward end of the heater outlet tube.

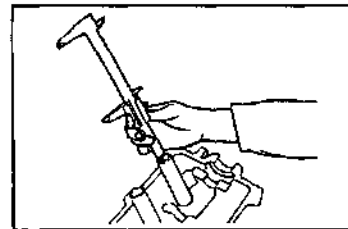
- (5) Apply a thin film of the Three Bond 1377B to the attaching section for the heater outlet tube on the cylinder head.



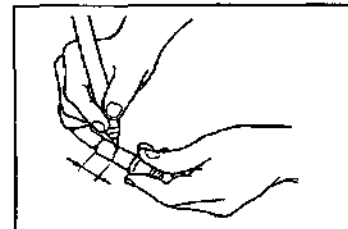
WFE30-EM225



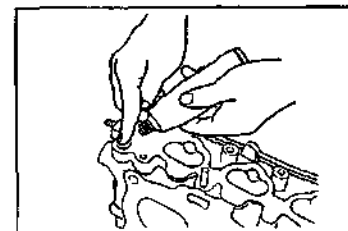
WFE30-EM226



WFE30-EM228

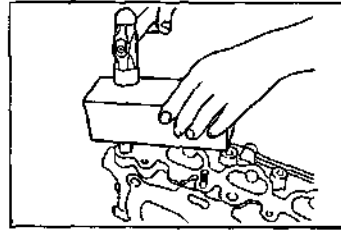


WFE30-EM227



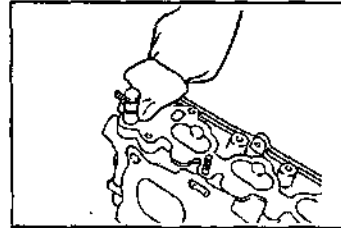
WFE30-EM229

- (6) With a wooden piece interposed, drive the heater outlet tube to the point marked in Step (4).



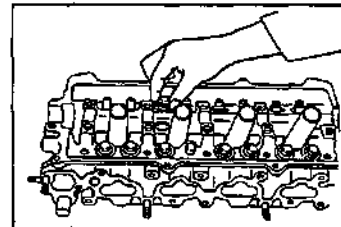
WFE90-EM732

- (7) After completion of the operation, remove any oozed bond, wooden chips and so forth.



WFE90-EM733

2. Install the valve spring seats to the cylinder head.



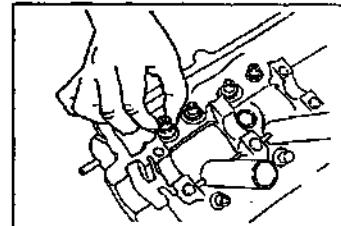
WFE90-EM735

3. Installation of valve stem oil seal

- (1) Apply engine oil to the bore of the valve stem oil seal.
(2) Drive the valve stem oil seal into the valve stem guide bush by hand.

NOTE:

- When driving the oil seal, make sure that the oil seal is not tilted.
- Do not reuse any oil seal which was tilted or driven diagonally.
- Hold the frame of the oil seal. Do not touch the rubber lip section of the oil seal.

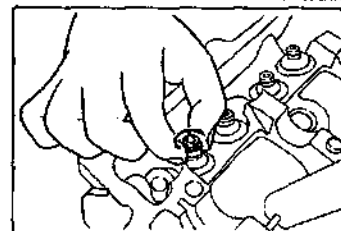


WFE90-EM740

- (3) Turn the oil seal slightly by hand to see if it can be turned.

NOTE:

- Never rotate the oil seal more than one turn, because excessive turning may cause scratches on the oil seal.
- If the oil seal can not be turned by hand, it means that the oil seal has been tilted, driven diagonally or press-fitted improperly.
- Do not reuse any oil seal which was tilted or driven diagonally.



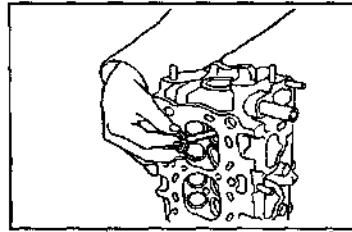
WFE90-EM741

ENGINE MECHANICALS

4. Apply oil to the valve stem. Install the valve to the cylinder head.

NOTE:

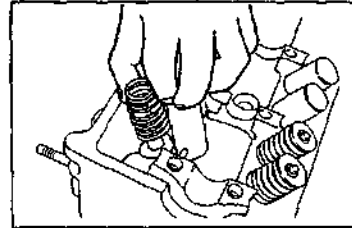
- Care must be exercised as to the installing position. Do not pull out the valve once it has been inserted.
- If the inserted valve should be pulled out, replace the valve stem oil seal.



WPB30-EM742

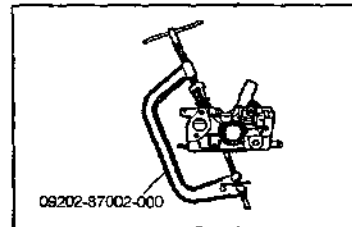
5. Assembly of valve springs, valve spring retainers and valve spring retainer locks

- (1) Assemble the valve spring in such a way that the painted side (the side having a larger pitch) comes at the valve spring retainer.



WPB30-EM743

- (2) Install the valve spring retainer to the valve spring. Install the valve spring retainer locks while compressing the valve spring retainer, using the following SST.

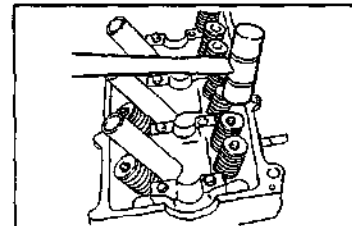


09202-87002-000

WPB30-EM744

- (3) After installing the valve spring retainer lock, lightly tap the valve spring retainer with a hammer or the like so as to ensure that the valve spring retainer locks are installed securely.

WARNING
During this operation, care must be exercised to ensure that the valve spring retainer or retainer locks are not jumped out.



WPB30-EM745

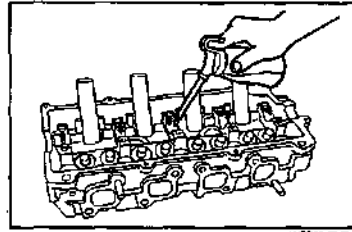
6. Installation of camshaft and rocker shafts

- (1) Wash and dry the holes for the camshaft cap attaching bolts.

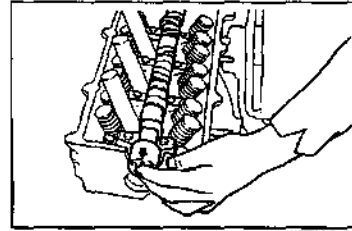
WARNING
When using compressed air, protect your eyes with safety goggles.

WPB30-EM746

- (2) Liberally apply engine oil to the journal sections and thrust bearing sections.



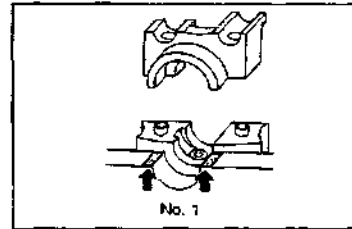
- (3) Assemble the camshaft on the cylinder head in such a way that the locating pin for the camshaft timing belt pulley comes exactly at the top position. Apply engine oil to the camshaft journal section.



- (4) Apply the Three Bond 1104 to the camshaft cap No. 1 attaching section of the cylinder head at those points shown in the right figure.

NOTE:

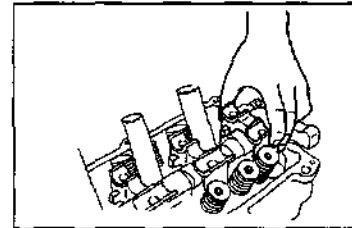
- Be careful not to allow any oil to flow into the bearing cap attaching holes.



- (5) Install the camshaft bearing caps in the sequence of embossed figures on the caps.

NOTE:

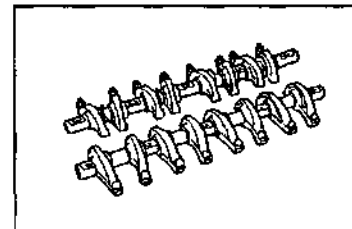
- Before the camshaft bearing caps are installed, wipe off any bond oozed from the camshaft cap No. 1.



- (6) Assemble the valve rocker arms and wave washers onto the valve rocker shaft, while applying engine oil liberally as shown in the right figure.

NOTE:

- The intake valve rocker shaft can be identified by the recessed sections.

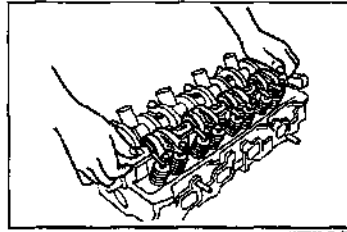


ENGINE MECHANICALS

- (7) Install the valve rocker shaft on the camshaft caps.

NOTE:

- For easier installation, it is advisable to insert the rocker arm first to the camshaft cap side.



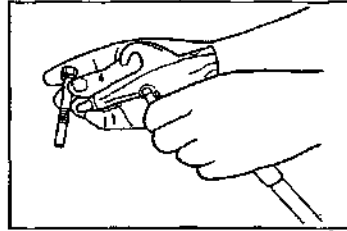
- (8) Clean the attaching bolts and dry them with compressed air. Install them to the cylinder head through the rocker shafts and camshaft caps. Tighten the bolts evenly over two or three stages to the specified torque.

Tightening Torque:

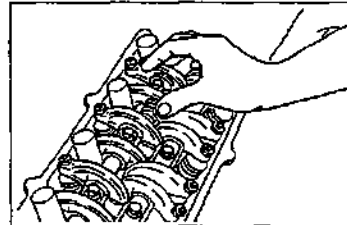
M10 bolt 28.4 - 36.3 N·m (2.9 - 3.7 kgf·m)/ Dry
M8 bolt 12.7 - 16.7 N·m (1.3 - 1.7 kgf·m)/ Dry

CAUTION:

- Never exceed the specified tightening torque.
- The bolts and bolt holes should be dry when tightening the bolts.
- When using compressed air, protect your eyes with safety goggles.



7. Install the spacers into between the intake valve rocker arms on the rocker shaft.

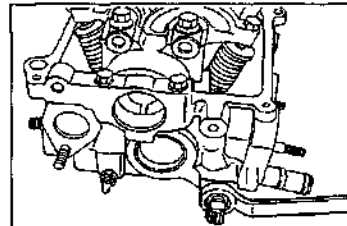


8. Clean the threaded portion of the water temperature sensor. Wind seal tape around the threaded portion and install the sensor to the cylinder head.

Tightening Torque: 24.5 - 34.3 N·m (2.5 - 3.5 kgf·m)

NOTE:

- When using a new water temperature sensor, seal tape is unnecessary since seal material is coated on the water temperature sensor.
- Ensure that the water temperature sensor is installed horizontally.

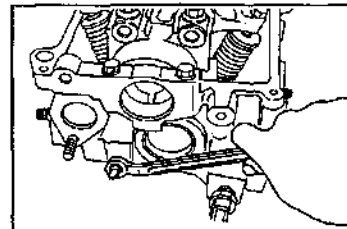


9. Clean the threaded portion of the water temperature sender gauge. Wind seal-tape around the threaded portion. Tighten the gauge to the cylinder head, using the long box wrench.

Tightening Torque: 11.8 - 19.6 N·m (1.2 - 2.0 kgf·m)

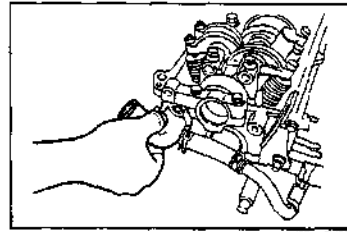
NOTE:

- When using a new sender gauge, seal-tape is unnecessary since seal material is coated on the sender gauge.



10. Install the water outlet to the cylinder head with a new gasket interposed.

11. Connect the by-pass hoses and by-pass pipe to the water outlet.



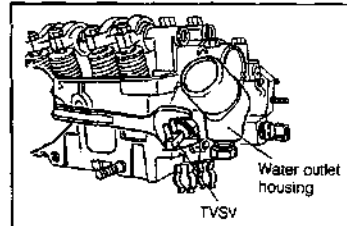
WP50-BM754

12. Clean the threaded portion of the TVSV. Wind seal tape around the threaded portion and install the TVSV to the cylinder head.

Tightening Torque: 24.5 - 34.3 N·m (2.5 - 3.5 kgf·m)

NOTE:

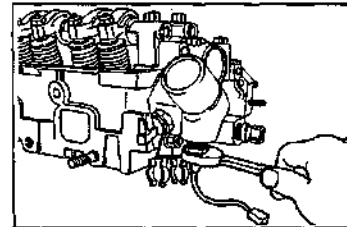
- When using a new TVSV, seal-tape is unnecessary since seal material is coated on the TVSV.



WP50-BM631

Clean the threaded portion of the A/C water temperature switch. Wind seal tape around the threaded portion and install the A/C water temperature switch to the water outlet (Air conditioner-equipped model only)

Tightening Torque: 24.5 - 34.3 N·m (2.5 - 3.5 kgf·m)



WP50-BM232

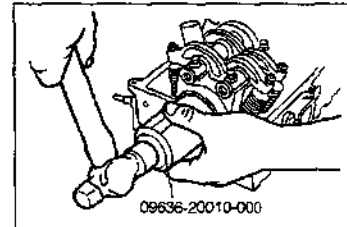
13. Apply engine oil to the bore of the type Y oil seal for the camshaft.

Drive the oil seal into position, using the following SST.

SST: 09636-20010-000

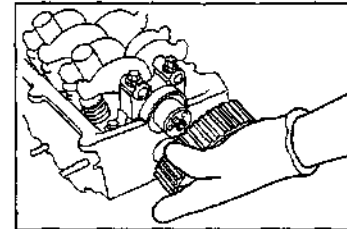
NOTE:

- Be very careful not to slant the oil seal during the installing.



WP50-BM233

14. Install the camshaft timing belt pulley in such a way that it is aligned with the locating pin of the camshaft and the "F" mark can be seen from the timing belt side.



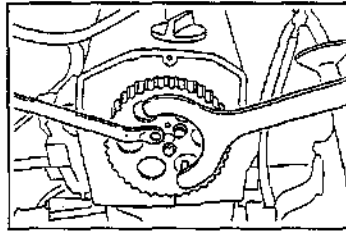
WP50-BM755

ENGINE MECHANICALS

15. Attach the attaching bolts of the camshaft timing belt pulley. Tighten the attaching bolt while preventing the camshaft timing belt pulley from turning, using the following SST.
SST: 09278-87201-000
Tightening Torque: 14.7 - 21.5 N·m (1.5 - 2.2 kgf·m)

NOTE:

- Do not turn the camshaft independently.
- The bolts and bolt holes should be dry during the tightening.

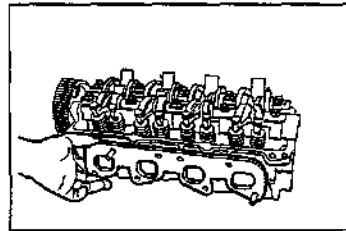


INSTALLATION OF EXHAUST MANIFOLD SIDE PARTS

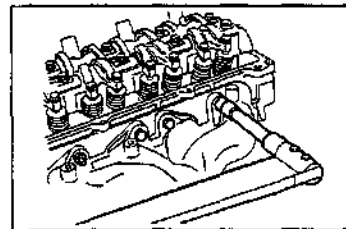
1. Install the exhaust manifold gasket on the cylinder head.

NOTE:

- The exhaust manifold gasket should be installed in such a direction that the side where the grommet turned-out section is bulged may come at the exhaust manifold.



2. Install the exhaust manifold to the cylinder head. Tighten the attaching bolts and nuts evenly over two or three stages.
Tightening Torque: 29.4 - 44.1 N·m (3.0 - 4.5 kgf·m)

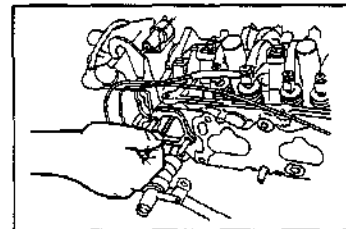


INSTALLATION OF INTAKE MANIFOLD SIDE PARTS

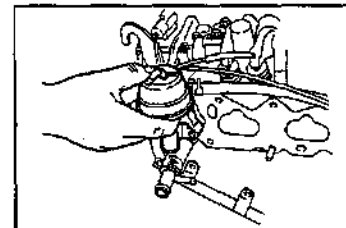
[HD-C Engine]

1. Installation of fuel pump

- (1) Attach a new intake manifold gasket.
- (2) Apply engine oil to the fuel pump rod. Insert it into the cylinder head.



- (3) Install the fuel pump to the cylinder head with a new fuel pump insulator interposed.
Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)



NOTE:

- Be careful to install the insulator in the correct assembly direction. Failure to observe this caution will fail to assemble the insulator because it will interfere with other parts.

2. Connect the fuel hose to the fuel pump.
Attach the hose bands.

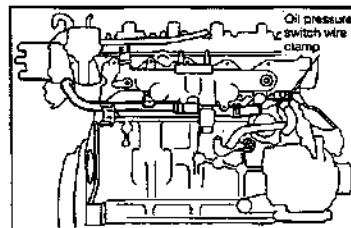
NOTE:

- The knobbed section of the hose clip for the fuel hose between the fuel pump and the carburetor should be faced down ward.

3. Installation of intake manifold

- (1) Attach the intake manifold to the cylinder head.

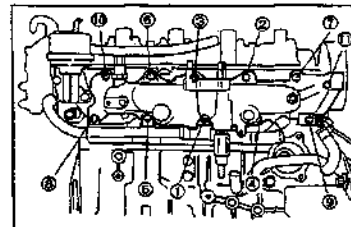
WP80-EM237



WP80-EM758

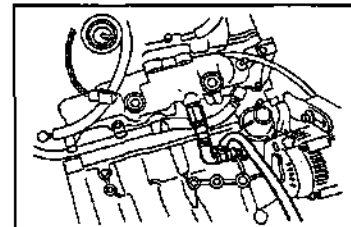
- (2) Install the water by-pass pipe to the stud bolt of the cylinder head, as shown in the figure.
Connect the by-pass hose to the intake manifold. Attach the hose bands.
- (3) Install the oil pressure switch wire clamp to the stud bolt, as shown in the figure.

- (4) Tighten the intake manifold attaching bolts and nuts evenly to the specified torque over two or three stages in the sequence as indicated in the figure.
Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf-m)



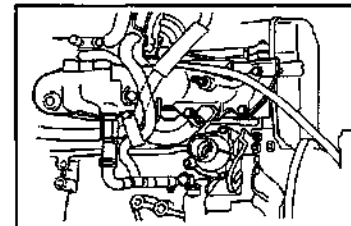
WP80-EM759

4. Connect the water hose to the thermo valve. Attach the hose bands.



WP80-EM759

5. Connect the brake booster hose to the intake manifold in such a way that the arrow mark of the booster hose faces the intake manifold side.
6. Install the water hose clamp to the intake manifold.



WP80-EM760

ENGINE MECHANICALS

7. Install the carburetor heat insulator to the intake manifold.

NOTE:

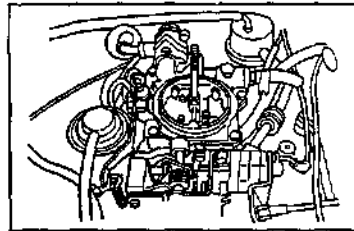
Be careful not to damage the gasket. Replace the heat insulator with a new part if the gasket exhibits damage.

WP80Z-EM746

8. Install the carburetor to the intake manifold.

Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)

9. Connect the connectors of the solenoid valve and outer vent valve.

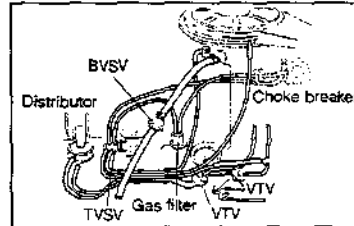


WP80Z-EM739

10. Connection of vacuum hoses

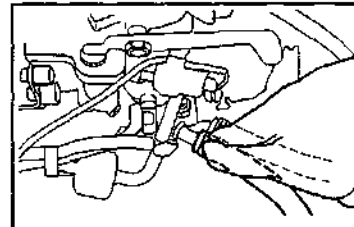
Connect the vacuum hose, as shown in the figure.

- Outer vent hose to outer vent
- Choke breaker to TVSV
- Carburetor to BVSV
- Throttle positioner to carburetor
- Vacuum hose to gas filter
- Vacuum hose to distributor



WP80Z-EM751

11. Connect the hot water circulating hose to the carburetor.
Attach the hose bands.

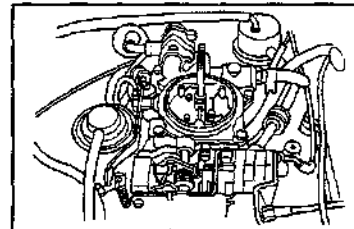


WP80Z-EM752

12. Connect the fuel hose to the carburetor.

Attach the hose bands.

13. Temporarily install the cylinder head cover to the cylinder head.



WP80Z-EM753

[HD-E engine]

1. Clean the intake manifold.

WARNING

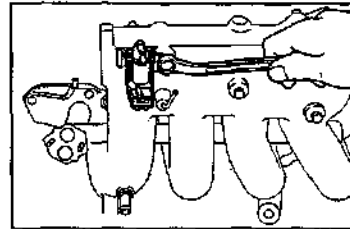
- When using compressed air, protect your eyes with safety goggles.

WP290-BM40

2. Install the EGR VSV to the surge tank. (US spec only)

NOTE:

- Apply thin film of the Three Bond 1104 to the threaded portion of the bolt.

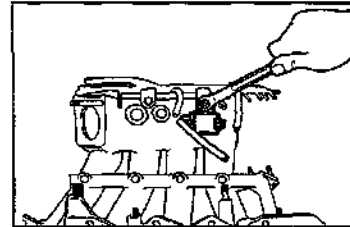


WP290-BM241

3. Install the vacuum hose sub assembly onto the surge tank.

NOTE:

- Apply the thin film of the Three Bond 1104 to the threaded portion of the bolt.

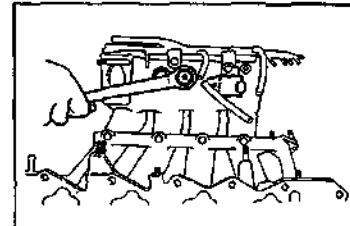


WP290-BM242

4. Install the ISC VSV to the surge tank. (US spec only)

NOTE:

- Apply thin film of the Three Bond 1104 to the threaded portion of the bolt.



WP290-BM243

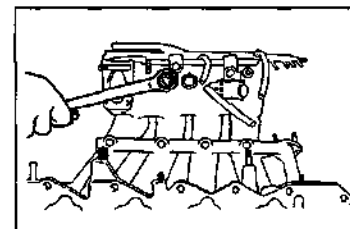
5. Clean the threaded portion of the gas filter.

Wind seal tape around the threaded portion and install it to the surge tank.

Tightening Torque: 11.8 - 19.6 N·m (1.2 - 2.0 kgf·m)

NOTE:

- This operation is required only when the gas filter has been removed.
- Use a hexagonal long box wrench for tightening.



WP290-BM244

6. Install the intake air temperature sensor to the surge tank with a new washer interposed.

Tightening Torque: 29.4 - 39.2 N·m (3.0 - 4.0 kgf·m)

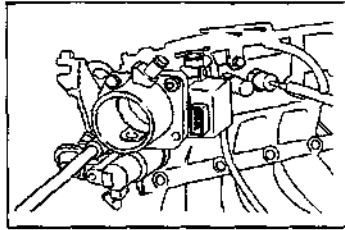
NOTE:

- This operation is required only when the intake air temperature sensor has been removed.

ENGINE MECHANICALS

7. Install the throttle body to the surge tank with a new gasket interposed.

Tightening Torque: 14.7 - 21.5 N·m (1.5 - 2.2 kgf·m)

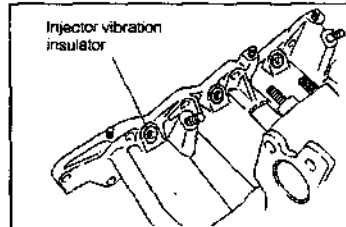


WP290-EM245

8. Install the injector vibration insulator to the intake manifold section.

CAUTION:

- Prior to installation, check the insulator for damage and cracks. Replace any faulty insulator with a new part.

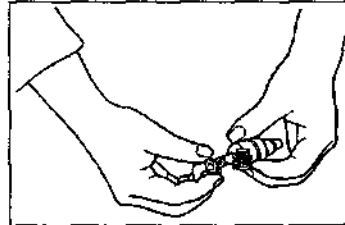


WP290-EM784

9. Remove the "O" ring of the injector. Remove the grommet and check it for damage or cracks.

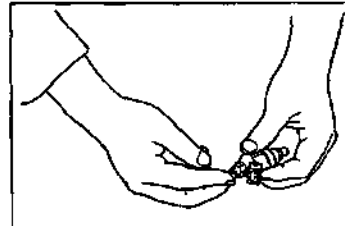
NOTE:

- If the grommet exhibits any fault, replace it with a new one.



WP290-EM785

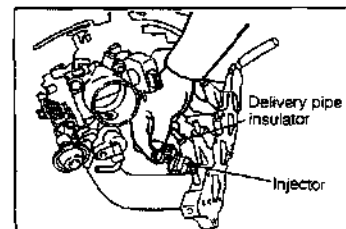
10. Install the grommet and new "O" ring to the injectors.



WP290-EM786

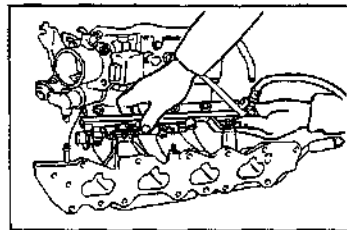
11. Insert the injector to the vibration insulator hole of the intake manifold.

12. Install the delivery pipe insulator to the stud bolt of the intake manifold.



WP290-EM246

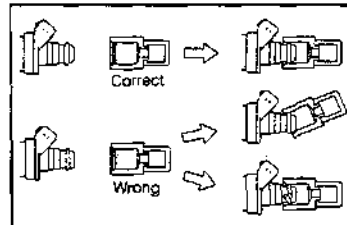
13. Apply silicon oil to the "O" ring of the injector.
Then, install the delivery pipe.



WFE90-EM247

CAUTION:

- Be very careful not to damage the "O" ring of the injector during the delivery pipe installation.
- Do not install the delivery pipe diagonally to the injector.

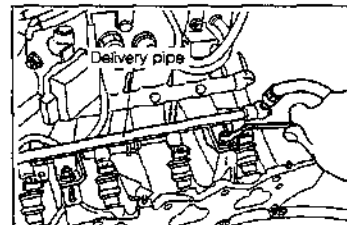


WFE90-EM248

14. Tighten the attaching nuts of the delivery pipe.
Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)

NOTE:

- After tightening the delivery pipe, make sure that the injector can be turned by hand. If the injector can not be turned, it indicates probably a damaged injection "O" ring. Hence, replace the injector "O" ring with a new part.

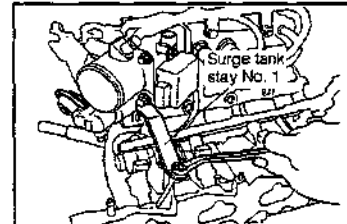


WFE90-EM249

15. Install the surge tank stay No. 1 to the throttle body and intake manifold, using bolt and nut.

Tightening Torque:

- Bolt: 14.7 - 21.5 N·m (1.5 - 2.2 kgf·m)
Nut: 14.7 - 21.5 N·m (1.5 - 2.2 kgf·m)

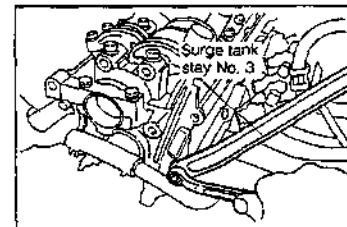


WFE90-EM250

16. Install the engine hanger No. 2 and surge tank stay No. 3 to the stud bolt at the cylinder head. Install the surge tank stay No. 3 to the surge tank side.

Tightening Torque:

- Bolt: 18.6 - 30.3 N·m (1.9 - 3.1 kgf·m)
Nut: 18.6 - 30.3 N·m (1.9 - 3.1 kgf·m)



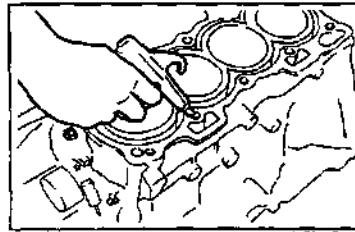
WFE90-EM251

ENGINE MECHANICALS

INSTALLATION OF CYLINDER HEAD WITH MANIFOLDS

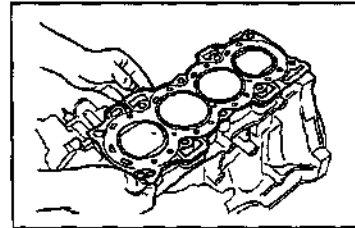
1. Clean the cylinder block head bolt holes.

WARNING:
Protect your eyes with goggles when using compressed air.



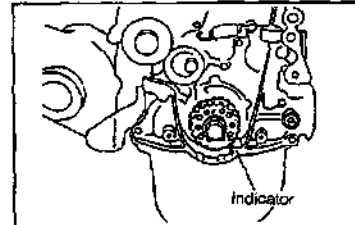
WPB30-84768

2. Clean the cylinder block upper gasket surface. Install the cylinder head gasket, while aligning it with the pin ring for locating use.



WPB30-84769

3. Turn the crankshaft so that the crankshaft key groove may come at the top position.



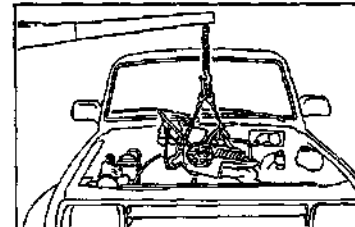
Indicator

WPB30-84770

4. Install the cylinder head onto the cylinder block, using chain block.

CAUTION:

- Be careful not to allow the cylinder head to hit to the vehicle body and/or other parts.



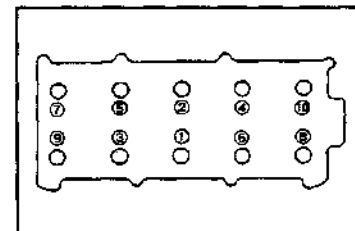
WPB30-84751

5. Coat each cylinder head bolt with a thin film of engine oil. Using these bolts, install the cylinder head to the cylinder block. Tighten the bolts evenly over two or three stages, following the sequence shown in the right figure.

Tightening Torque: 58.8 - 66.7 N·m (6.0 - 6.8 kgf-m)

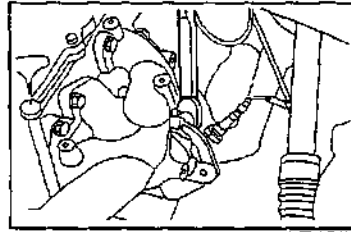
NOTE:

- Make sure that all the bolts are torqued uniformly to a constant level, not only they are torqued within the specified range.



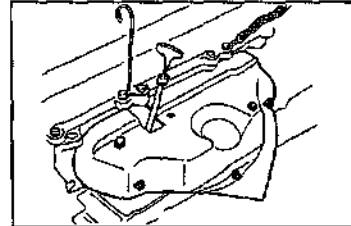
WPB30-84752

6. Connect the exhaust pipe to the exhaust manifold with a new gasket interposed.
Then, tighten the attaching nuts.
Tightening Torque: 34.3 - 49.0 N-m (3.5 - 5.0 kgf-m)



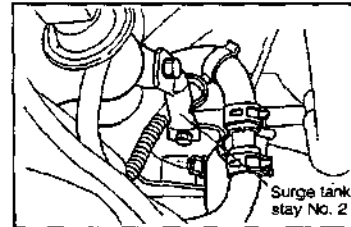
WP80-EM25

7. Install the oil level gauge support.
Tighten the clamping bolt.
8. Install the exhaust manifold cover.
Tighten the five attaching bolts.



WP80-EM77

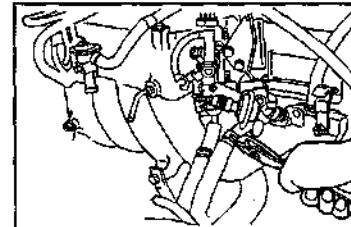
9. Fit the surge tank stay No. 2 to the surge tank. Tighten the attaching bolt and nut.
Tightening Torque: 29.4 - 44.1 N-m (3.0 - 4.5 kgf-m)



Surge tank stay No. 2

WP80-EM25

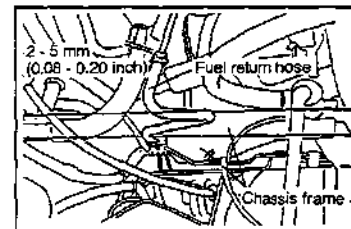
10. Connect the cooling water hoses to the air valve on the throttle body.



WP80-EM77

11. Connection of fuel return hose to fuel pipe No. 2.
(1) Insert the fuel return hose onto the fuel pipe No. 2 until second spool of fuel pipe.
(2) Securely clamp the fuel hose at 2 - 5 mm from fuel return hose end.

NOTE:
Install the fuel return hose in parallel with chassis frame.

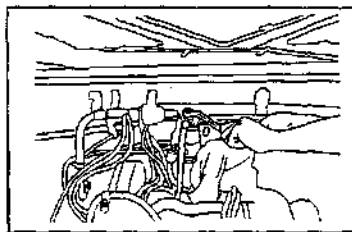


WP80-EM25

ENGINE MECHANICALS

12. Install the fuel hose No. 1 to the fuel filter with a new gasket interposed.

Tightening Torque: 34.3 - 44.1 N·m (3.5 - 4.5 kgf·m)

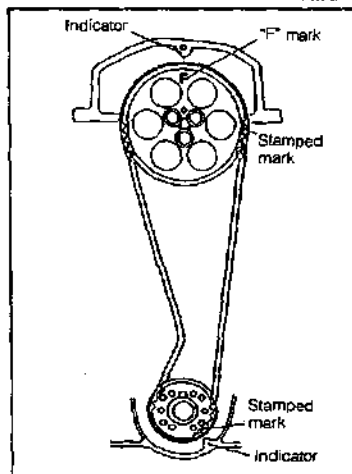


WPB30-EM426

INSTALLATION OF TIMING BELT

(See page EM-31.)

1. Install the cylinder head cover temporarily.
2. Install the timing belt tensioner and tensioner spring. Temporarily tighten them, while they are being pushed toward the alternator side.
3. Align the mating marks of the crankshaft timing belt pulley and camshaft timing belt pulley with the corresponding mating marks.
4. Install the timing belt.
5. Loosen the tensioner attaching bolt so that tension may be given to the belt.
Then, temporarily tighten the attaching bolt again.
6. Turn the crankshaft two turns in the normal direction.
7. Loosen the tensioner attaching bolt.
8. Turn the crankshaft until the "F" mark of the camshaft is aligned with the indicator on the cylinder head cover.
9. Tighten the tensioner attaching bolt to the specified torque.
10. Remove the cylinder head cover.



WPB30-EM427

ADJUSTMENT AND INSTALLATION OF OTHER PART

1. Adjustment of Valve Clearances

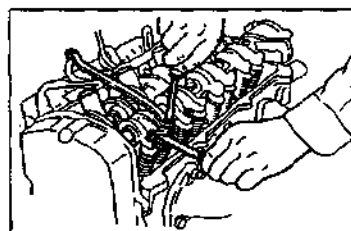
NOTE:

- When tightening the adjusting nuts, apply engine oil to the lock nuts, adjusting bolts and rocker arms.

- (1) Align the stamped mark of the crankshaft timing belt pulley with the indicator mark of the oil pump.

WPB30-EM473

- (2) Check to see if the valve rocker arms of the No. 1 cylinder are in a free state or they are pushed up by the cam.
Adjust the valve clearances in accordance with the table below.
The mark represents a valve which can be adjusted at that time.



WPB30-EM474

ENGINE MECHANICALS

Cylinder No.		1	2	3	4
Rocker arm condition					
(1) When valve rocker arms of No. 1 cylinder is free; "O" marks are available to adjust. (2) Turn the crankshaft 360 degrees. (3) When valve rocker arms of No. 4 cylinder is free; "x" marks are available to adjust.	IN	○	○	x	x
	EX	○	x	○	x

Valve Clearances (Cold):

Intake: 0.18 mm

Exhaust: 0.25 mm

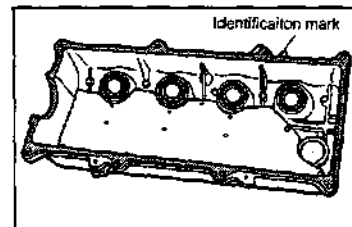
NOTE:

- The valve clearance should be readjusted after the engine has been warmed up thoroughly.

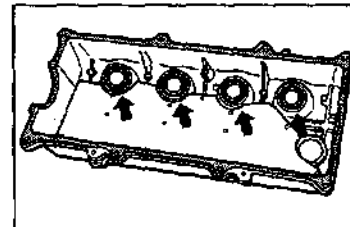
WP590-EM256

2. Installation of cylinder head cover

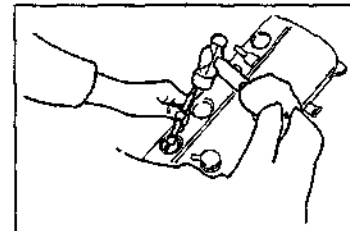
- Clean the cylinder head gasket surface of the cylinder head.
- Check the cylinder head gasket for damage. Replace the cylinder head gasket, as required. Assemble the cylinder head gasket with the identification mark facing toward the intake side.



- Check the rubber grommets of the spark plug tubes for damage. Replace the rubber grommets, as required.



- Replacement of rubber grommets**
For removal operation, use a slotted pin puller.



ENGINE MECHANICALS

- When installing the grommet, drive it into position, using the following SST.
SST: 09388-87702-000

NOTE:

- Make sure that the grommet is not tilted when it is driven into position.
- Be sure to use a suitable wooden piece so as to prevent the cylinder head cover from damage.
- Be careful not to damage the lip section of the grommet.

- (4) Apply the Three Bond 1104 to the cylinder head at points indicated in the figure.

- (5) Install the cylinder head cover to the cylinder head.

NOTE:

- Be careful not to scratch the rubber grommet for the spark plug tube during the installation.
- Care must be exercised to ensure that the rubber grommet will not ride over the spark plug tube.

- (6) Tighten the cylinder head cover bolts evenly over two or three stages to the specified torque, following the sequence shown at the figure.

Tightening Torque: 2.9 - 4.9 N·m (0.3 - 0.5 kgf·m)

- (7) Install the oxygen sensor harness to the clamp.

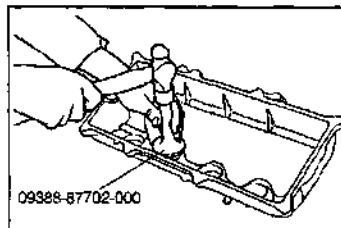
- (8) Connect the blow-by gas hoses to the cylinder head and throttle body.

3. Install the timing belt cover.

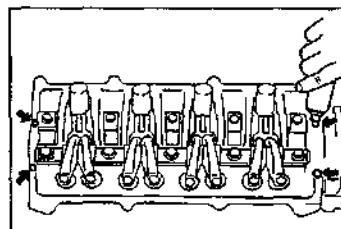
Tightening Torque: 2.0 - 3.9 N·m (0.2 - 0.4 kgf·m)

NOTE:

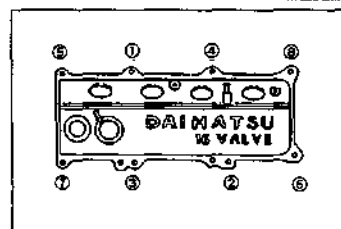
- Attaching bolts ① and ④ should be installed first of all.



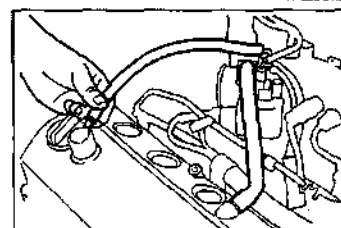
WP690-EM777



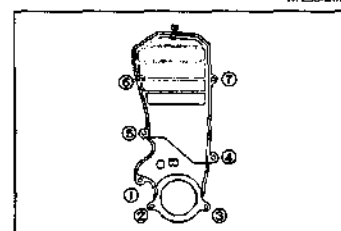
WP690-EM778



WP690-EM780



WP690-EM779

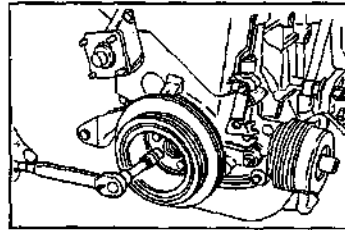


WP690-EM781

4. Installation of crankshaft pulley

- (1) Prevent the crankshaft from turning by placing the gear shift lever in the 5th gear position, and pull the parking break lever.
- (2) Install the crankshaft pulley on the crankshaft timing belt pulley with four bolts.

Tightening Torque: 19.6 - 29.4 N·m (2.0 - 3.0 kgf-m)



WPES0-EM202

5. Installation of fluid coupling with fan and fan shroud

- (1) Install the water pump pulley to the water pump with temporarily attaching.
- (2) Insert the radiator fan shroud together with the fluid coupling with fan between radiator and the engine.

NOTE:

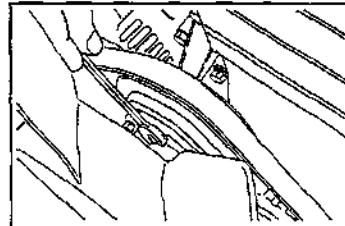
- Be sure that the water pump pulley is not ride to the spigot section of the water pump pulley seat.

- (3) Install the fluid coupling with fan to the water pump by means of four bolts through water pump pulley.

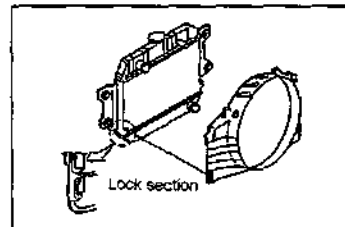
Tightening Torque: 9.8 - 17.7 N·m (1.0 - 1.8 kgf-m)

- (4) Insert the lock section of fan shroud to the radiator. Then, tighten the two attaching bolts of the radiator upper side.

- (5) Connect the water hose to the radiator upper tank. Securely clamp the water hose clamp.



WPES0-EM203



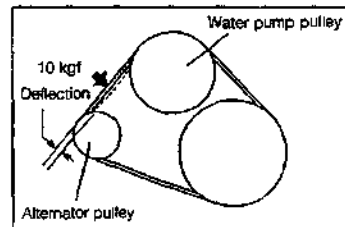
Lock section

WPES0-EM204

6. Install the V ribbed belt and perform the adjustment in such a way that the deflection at the midpoint between the water pump pulley and the alternator may become the specified value when a force of 98N (10 kgf) is applied to the midpoint.

Used Belt: 5.0 - 6.0 mm

With a force of 98N (10 kgf) applied to point indicated in figure



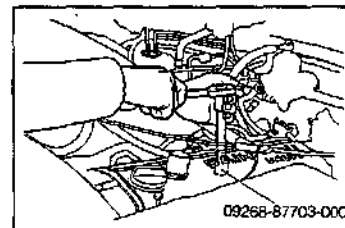
Alternator pulley

WPES0-EM205

7. Install the reserve tank to the radiator assembly bracket. Insert the over flow hose to the radiator.

8. Install the spark plug, using the following SST.

SST: 09268-87703-000



09268-87703-000

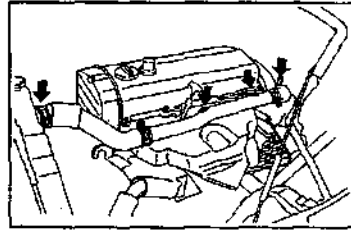
WPES0-EM206

ENGINE MECHANICALS

9. Install the radiator hose No. 1 to the radiator upper tank.
Tighten the two clamps and two attaching bolts.

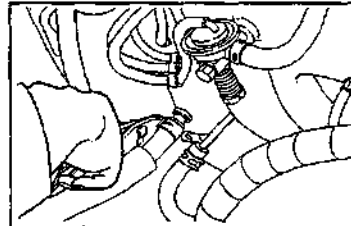
NOTE:

- Ensure that the clamp are installed as illustrated in right figure.



WFE90-EM257

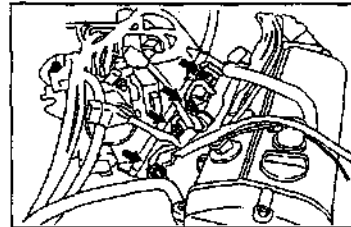
10. Connect the vacuum hose for the brake booster to the intake manifold.



WFE90-EM258

11. Installation of engine wire harness

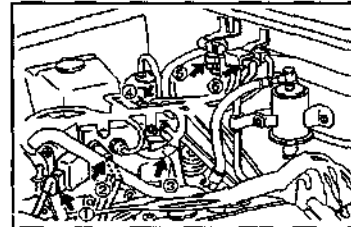
- (1) Install the engine wire clamps and engine ground cable.
- (2) Connect the injector connector.



WFE90-EM259

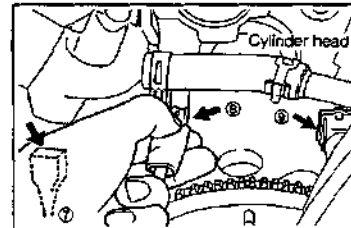
- (3) Connect the flowing connectors.

- ① Throttle position sensor ①
- ② Intake air temperature sensor ②
- ③ Idle speed control VSV ③
- ④ EGR VSV and harness clamp ④
- ⑤ Air conditioner idle up VSV ⑤
- ⑥ Idle up VSV connector
(Pressure sensor, Pressure VSV and clamp. ⑥)



WFE90-EM167

- ⑦ Air conditioner water temperature switch. ⑦
- ⑧ Water temperature sender gauge ⑧
- ⑨ Water temperature sensor ⑨



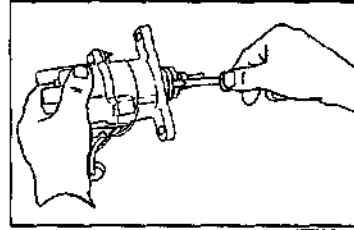
WFE90-EM168

12. Installation of the distributor

- (1) Replace the "O" ring of the distributor body with a new one.

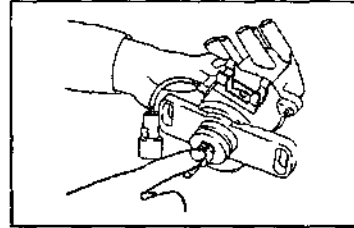
NOTE:

- Care must be exercised to avoid scratching the new "O" ring.



WPB00-EM271

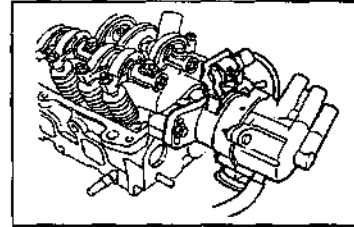
- (2) Align the cutout section of the distributor proper with the cutout groove of the coupling. Assemble the distributor on the cylinder head, lining up the protrusion of the distributor with the camshaft groove. During this installation, the aligned cutout sections must come at the top side of the engine.



WPB00-EM760

- (3) With the center of each elongated hole on the flange section of the distributor proper aligned with the corresponding threaded hole of the cylinder head, tighten the distributor attaching bolts.

Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)



WPB00-EM272

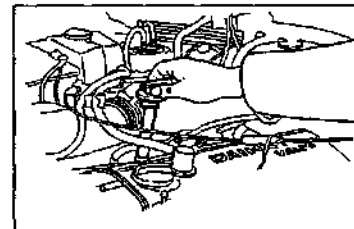
- (4) Connect the distributor connector.

WPB00-EM701

13. Connect the spark plug wire.

CAUTION:

- Hold the rubber boot section of the spark plug wire. Securely connect it to the spark plugs, the distributor cap and the ignition coil.
- Be careful not to damage the spark plug wire with the spark plug tube.

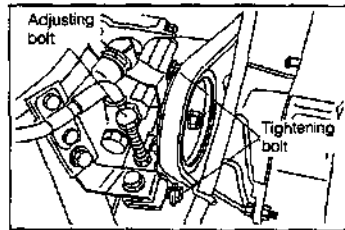


WPB00-EM273

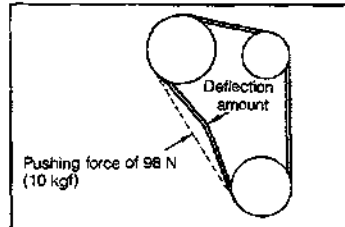
14. Connect the spark plug wire to the cord clamp.

ENGINE MECHANICALS

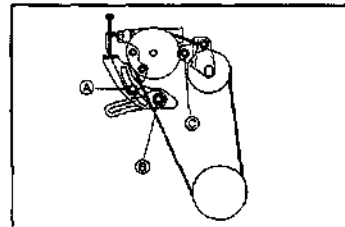
15. Installation of the power steering pump and drive belt
(P/S equipped vehicle only) (See page SR-54.)
- (1) Install the power steering pump assembly into the position.
 - (2) Install the power steering drive belt.



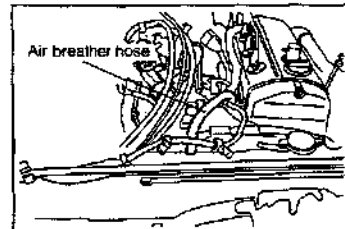
- (3) Set the drive belt tension to the specified value by tightening the adjusting bolt.
Specified Deflection: 9 - 11 mm
[When a force of 98N (10 kgf) is applied:]



- (4) Tighten the bolts to the specified value.
Tightening Torque:
A...34.3 - 44.1 N·m (3.5 - 4.5 kgf·m)
B...14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)
C...49.0 - 68.6 N·m (5.0 - 7.0 kgf·m)

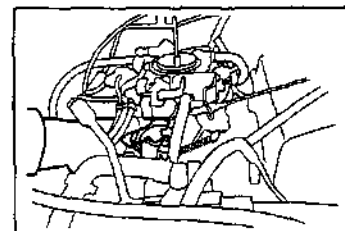


16. Connect the air breather hose to the radiator upper tank.

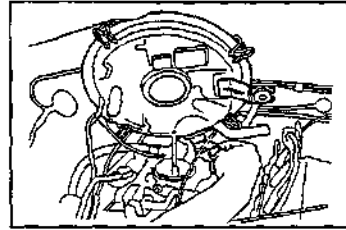


[HD-C engine]

17. Connect the accelerator cable to the carburetor. Adjust the accelerator cable so that the free play in its axial direction may be 3-8 mm.

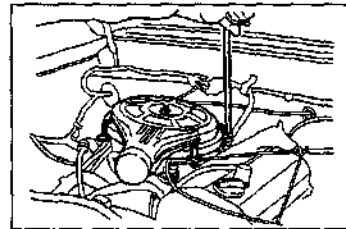


18. Connect the vacuum hoses as follows.
- Between the air cleaner and the TVSV
 - Between the carburetor and the ITC valve
 - Between the outer vent valve and the BVSV



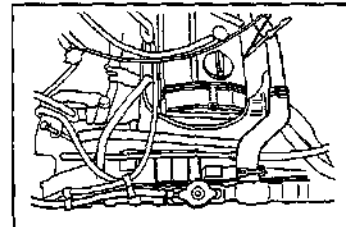
WPED-EN279

19. Install the air cleaner case onto the carburetor.
- NOTE:**
- In this time, if the gasket is damaged, replace the gasket.



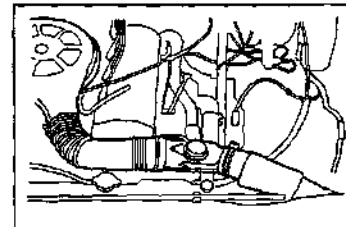
WPED-EN280

20. Connect the water outlet hose to the radiator upper tank.



WPED-EN281

21. Install the cool air intake.
22. Install the hot air intake hose.
23. Install the PCV hoses.

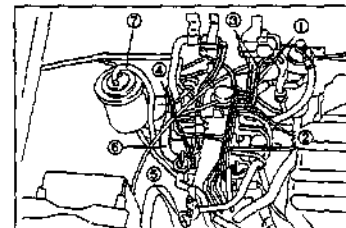


WPED-EN282

[HD-E Engine]

17. Installation of rubber hoses around the surge tank

- (1) Distributor diaphragm ①
- (2) BVSV ②
- (3) Pressure VSV ③
- (4) Air-conditioner idle up VSV ④
- (5) Power steering ACV ⑤
- (6) Brake booster ⑥
- (7) Charcoal canister ⑦

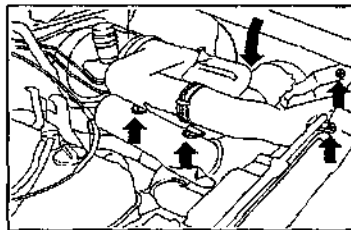


WPED-EN284

ENGINE MECHANICALS

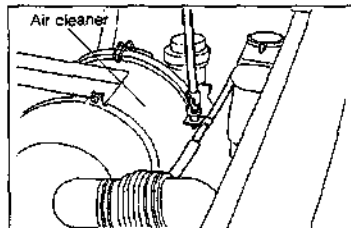
18. Installation of the air cleaner sub assembly

- (1) Install the air cleaner sub assembly into position. Tighten the three attaching bolts.
- (2) Tighten the attaching bolts to the left fender panel and radiator center support.



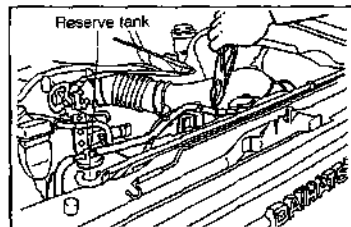
WP890-EM782

- (3) Tighten the tapping screw at the fan shroud.
- (4) Install the clutch cable clamp to the air cleaner.



WP890-EM225

19. Install the radiator reserve tank into position. Clamp the water hose securely.



WP890-EM226

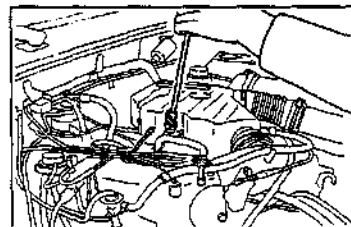
20. Installation of air intake chamber

- (1) Install the air intake chamber by attaching the three screws and two chams.

NOTE:

- Align the matching marks provided on the air intake chamber and air intake hose.

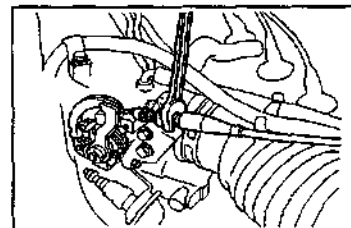
- (2) Install the air intake hoses for air conditioner and power steering idle up.



WP890-EM227

21. Connect the accelerator cable to the throttle body.

22. Adjust the accelerator cable so that the accelerator pedal free play may become 3 - 8 mm.

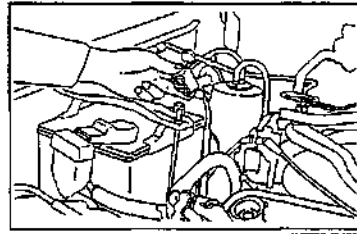


WP890-EM228

ENGINE MECHANICALS

23. Installation of the battery

- (1) Install the battery into position.
- (2) Install the battery holding clamp.
- (3) Connect the positive cable to the positive (+) terminal.
Then connect the battery ground cable to the negative (-) terminal of the battery.



ENGINE MECHANICALS

FILLING OF ENGINE OIL AND COOLING WATER

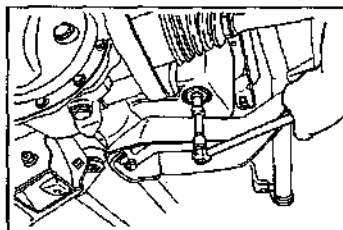
1. Filling engine oil

- (1) Clean the oil drain plug. Install it with a new gasket interposed.

NOTE:

- Remove any remaining gasket material from the oil pan, using a gasket scraper.

Tightening Torque: 19.6 - 29.4 N·m (2.0 - 3.0 kgf·m)



WPES0-EM250

- (2) Fill the engine with engine oil.

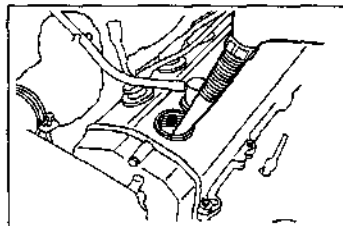
The oil should be API grade SG or SF multigrade viscosity, fuel-efficient oil.

Oil Capacity

When only engine oil is changed: 3.3 dm³

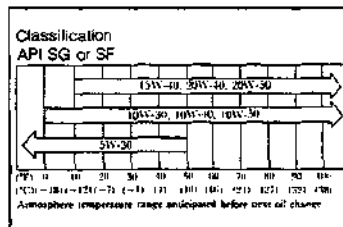
When engine oil is changed and oil filter is replaced: 3.5 dm³

After engine has been overhauled or when engine oil has been drained completely from engine: 3.8 dm³



WPES0-EM251

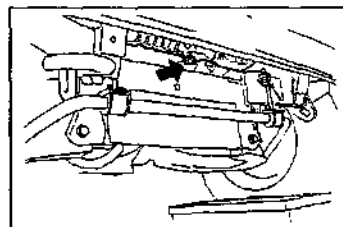
- (3) Check the engine oil level.
(See page LU-9.)



WPES0-EM252

2. Filling cooling water

- (1) Install the cooling water drain plug with new gasket.



WPES0-EM253

- (2) Fill the radiator and reserve tank with antifreeze solution in accordance with the instructions of the manufacturer of the antifreeze solution.

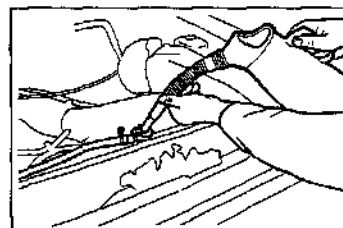
CAUTION:

- Use a Good brand of ethylene-glycol base antifreeze solution.

Coolant Capacity (Vehicle with Front Heater):

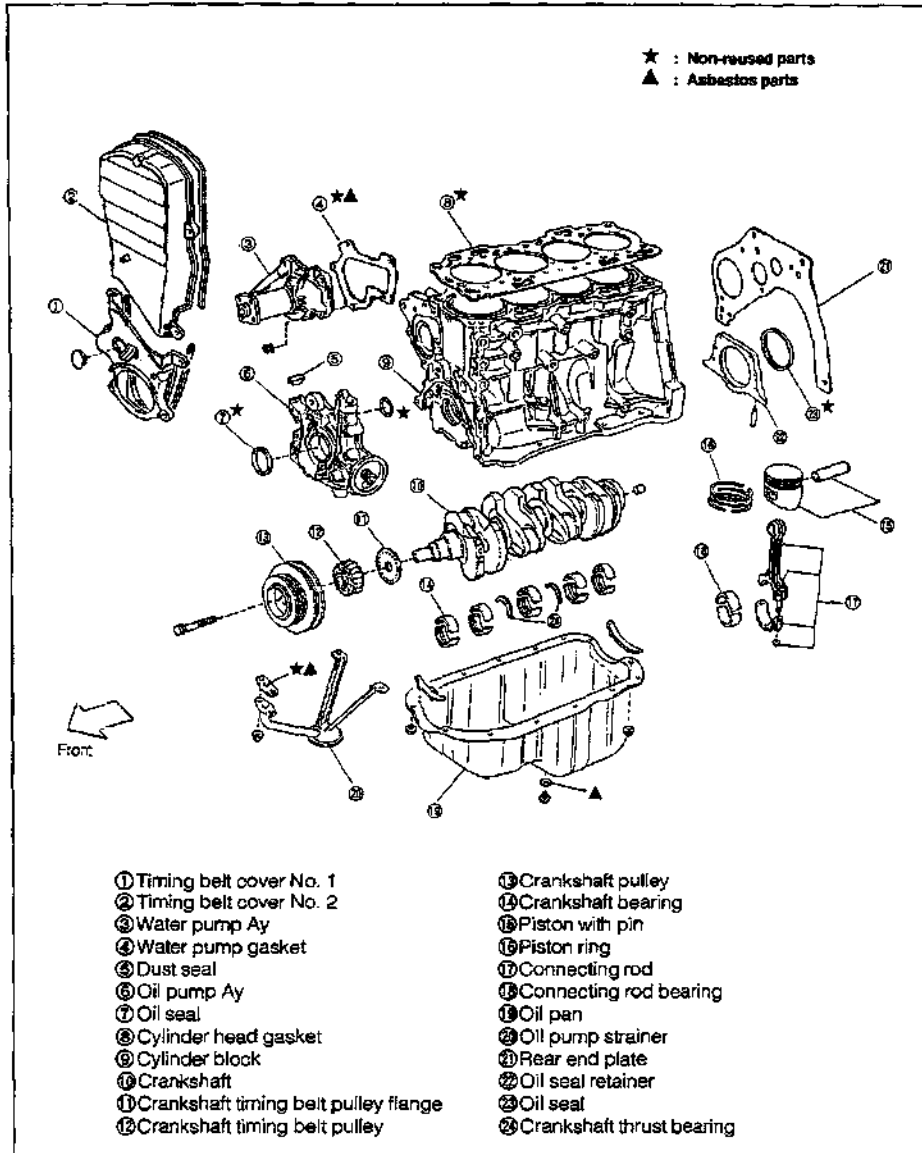
5.5 dm³

[excluding 1.0 dm³ for reserve tank]



WPES0-EM254

CYLINDER BLOCK COMPONENTS



WPE90-BU256

ENGINE MECHANICALS

INSTRUCTIONS PRIOR TO OPERATION

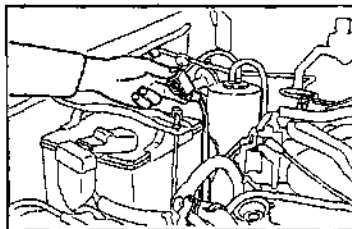
Install the fender covers to the fenders so that no scratch may be made to the fenders.

WP290-EM296

ENGINE REMOVAL

1. Removal of battery

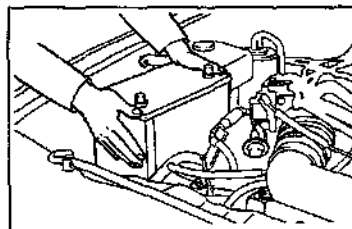
- (1) Disconnect the battery ground cable from the negative (-) terminal of the battery. Then disconnect the wires from the positive (+) terminal of the battery.



WP290-EM297

- (2) Remove the battery hold-down clamp and battery clamp bolts.
- (3) Remove the battery from the engine compartment.

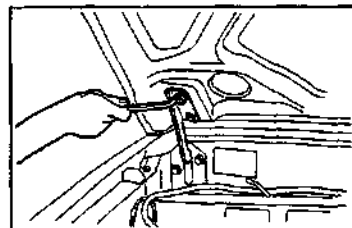
WARNING:
Handle the battery carefully. Never allow any flame to be brought to the battery.



WP290-EM298

2. Removal of engine hood

- (1) Disconnect the windshield washer hose from the three-way joint. Remove the hose from the clamp of the engine hood.
- (2) Remove the hood, being careful not to scratch the body and hood.



WP290-EM299

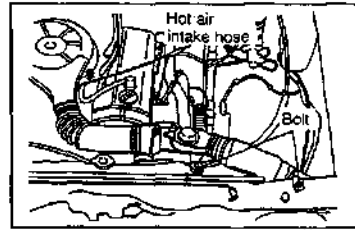
3. Drain the coolant.
(See page CO-3)
4. Drain the engine oil.
(See page LU-4)

WP290-EM299

5. Removal of air cleaner assembly with hose

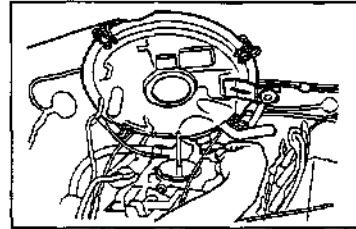
[HD-C Engine]

- (1) Remove the air cleaner hose from the air cleaner case by removing the two bolts.
- (2) Disconnect the vacuum motor hose and hot air intake hose.
(Except for GCC and tropical specifications)



WPB0-EM300

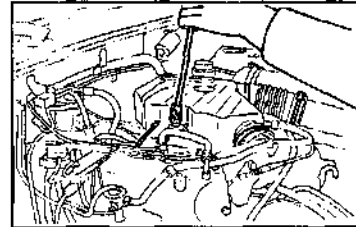
- (3) Disconnect the following hoses at the air cleaner side.
 - ITC vacuum hoses
 - PCV hoses
 - Vacuum hoses to BVS/V
- (4) Remove the air cleaner assembly by removing the attaching bolts of the air cleaner bracket and wing nut.



WPB0-EM301

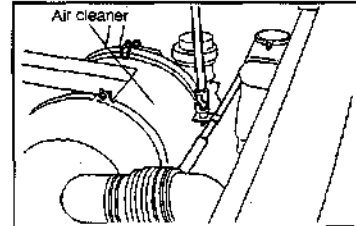
[HD-E Engine]

- (1) Remove the air intake chamber by removing the two clamps and three bolts.
- (2) Remove the two vacuum hoses for air conditioner idle-up and for power steering.



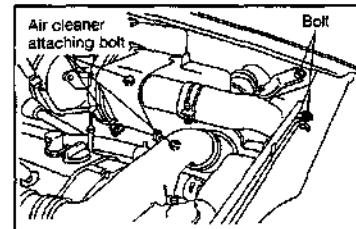
WPB0-EM302

- (3) Disconnect the clamp for the clutch cable at the air cleaner.



WPB0-EM303

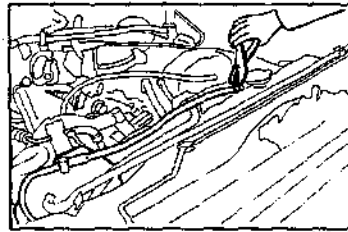
- (4) Remove the bolts provided at the left fender panel and radiator center support.
- (5) Remove the three air cleaner attaching bolts. Then, remove the air cleaner assembly.



WPB0-EM304

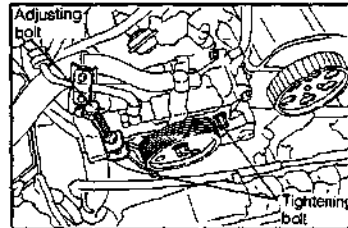
ENGINE MECHANICALS

6. Removal of radiator reserve tank
- (1) Disconnect the radiator reserve tank hose from the radiator.
 - (2) Pull up the radiator reserve tank together with the hose.



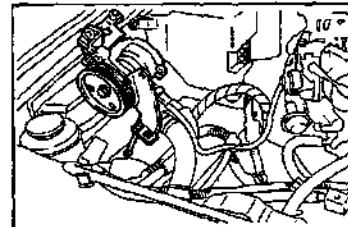
WP500-EM305

7. Removal of power steering pump and drive belt (power steering equipped vehicle)
- (1) Loosen the adjusting bolt and two tightening bolts. Then push down the pump.
 - (2) Remove the power steering drive belt.



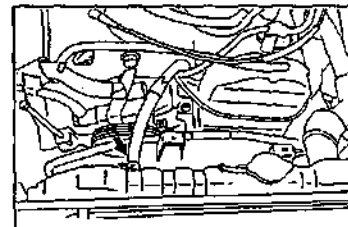
WP500-EM306

- (3) Remove the power steering pump assembly from the engine by removing the three bolts. Then, temporarily put the pump assembly onto the battery mounting location.



WP500-EM307

8. Removal of radiator
- (1) Disconnect the air breather hose from the radiator upper tank.

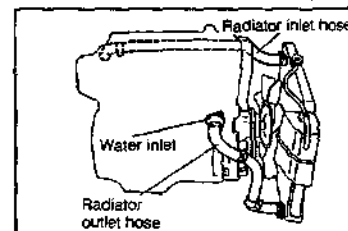


WP500-EM308

- (2) Remove the radiator inlet hose by disconnecting the radiator and water outlet side clamps.
- (3) Disconnect the radiator outlet hose at the center connection.

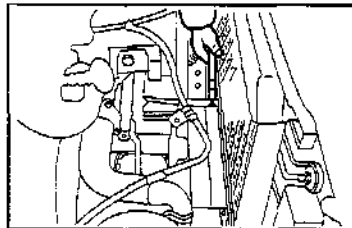
CAUTION:

- When disconnecting the radiator outlet hose, take measures to prevent the coolant from entering the alternator.



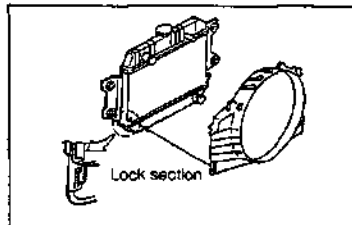
WP500-EM309

- (4) Disconnect the oil cooler hose from the radiator.



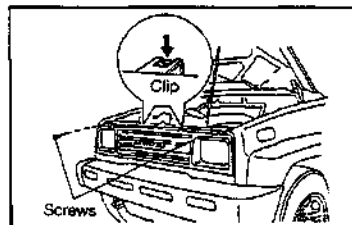
WP50-EM310

- (5) Remove the two attaching bolts of the fan shroud. Then, disconnect the lock section of the fan shroud from the radiator.
- (6) Disconnect the fluid coupling with fan by removing the four attaching bolts. Then, remove the fluid coupling with fan together with the fan shroud.



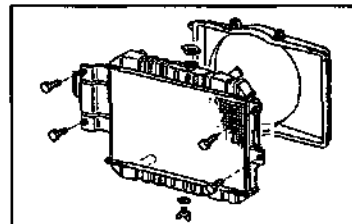
WP50-EM311

- (7) Remove the radiator grille.



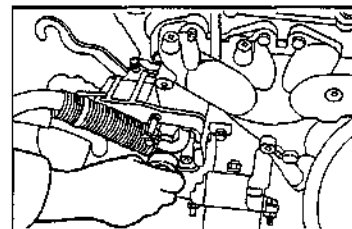
WP50-EM312

- (8) Remove the radiator by removing the four attaching bolts.



WP50-EM313

9. Removal of air conditioner compressor
 - (1) Remove the compressor cover by removing the attaching bolts.
 - (2) Remove the compressor assembly by removing the attaching bolts. Then, temporarily place the compressor assembly onto the engine compartment left side.

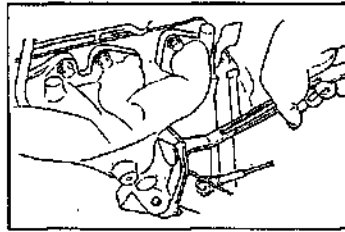


WP50-EM314

ENGINE MECHANICALS

10. Disconnection of exhaust pipe

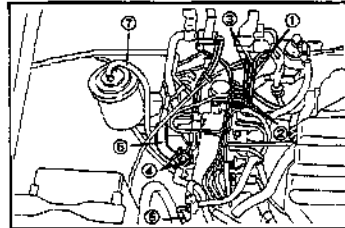
- (1) Remove the exhaust manifold cover.
- (2) Disconnect the exhaust pipe from the exhaust manifold by removing the three attaching nuts.
- (3) Disconnect the exhaust pipe bracket from the side of the transmission.



WPB0-ENG15

11. Removal of vacuum hoses at surge tank side

- (1) Distributor diaphragm ①
- (2) BVS ②
- (3) Pressure VSV ③ (U.S. specifications only)
- (4) Air conditioner idle-up VSV ④
- (5) Power steering ACV ⑤
- (6) Brake booster ⑥
- (7) Charcoal canister ⑦



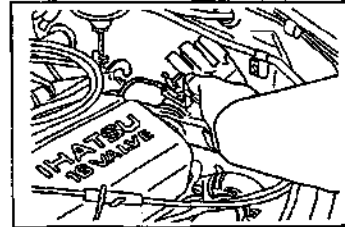
WPB0-ENG16

12. Removal of distributor

- (1) Disconnect the distributor wire connector.
- (2) Remove the distributor from the cylinder head by removing the two attaching bolts.

NOTE:

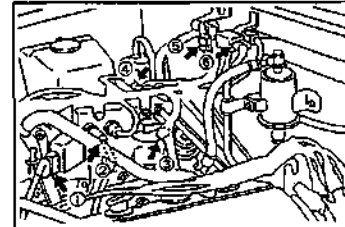
- Since the remaining engine oil will flow out, be certain to place a cloth or the like.



WPB0-ENG17

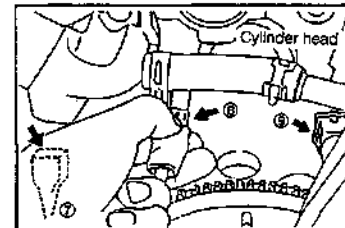
13. Removal of engine wire harness.

- (1) Disconnect the following connectors.
 - ① Throttle position sensor ①
 - ② Intake air temperature sensor ②
 - ③ Idle speed control VSV ③ (U.S. specifications only)
 - ④ EGR VSV and harness clamp ④ (U.S. specifications only)
 - ⑤ Air conditioner idle-up VSV ⑤
 - ⑥ Pressure sensor, pressure VSV and clamp ⑥



WPB0-ENG18

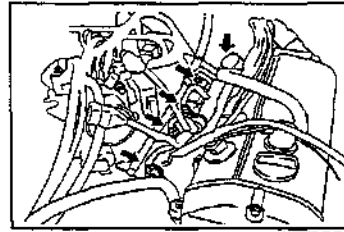
- ⑦ Air conditioner water temperature switch ⑦
- ⑧ Water temperature sender gauge ⑧
- ⑨ Water temperature sensor ⑨
- ⑩ Oxygen sensor ⑩



WPB0-ENG19

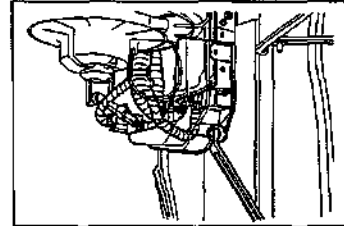
ENGINE MECHANICALS

- (2) Disconnect the four injector connectors.
- (3) Remove the engine wire clamps and engine ground cables.



WP80-BK320

- (4) Removal of engine wire from ECU
 - ① Remove the ECU cover at the cowl side panel of the passenger seat.
 - ② Disconnect the engine wire connector from the engine control computer assembly (ECU).
 - ③ Pull out the engine wire toward the engine compartment.
- (5) Remove the engine wire from the engine compartment.



WP80-EN021

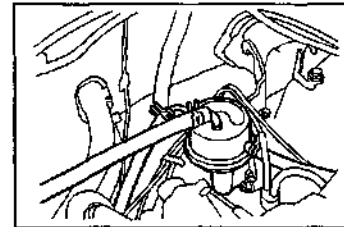
14. Disconnection of fuel line

[HD-C Engine]

Disconnect the fuel inlet hose and return hose from fuel pump.

NOTE:

- Make sure to plug the disconnected hose so that no fuel may flow out.



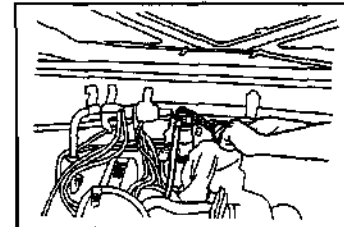
WP80-BK322

[HD-E Engine]

Disconnect the fuel hose at the upper part of fuel filter.

CAUTION:

- The pressure in the fuel line is kept 250 kPa (2.55 kgf/cm²) higher than the atmospheric pressure.
- Hence, when the fuel line is loosened, be sure to prevent the fuel from splashing using an adequate cloth or the like.
- Furthermore, place a suitable container under the fuel filter because the fuel flows out.

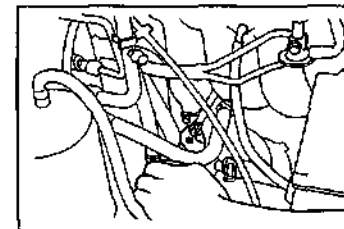


WP80-EN023

15. Disconnect the fuel return hose from the pressure regulator.

CAUTION:

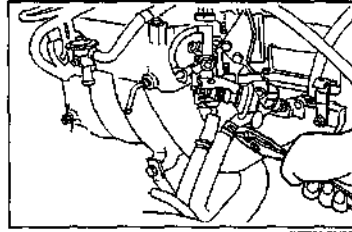
- When disconnecting the fuel hose, take precautionary measures to prevent any dirt from entering into the fuel line.



WP80-BK323

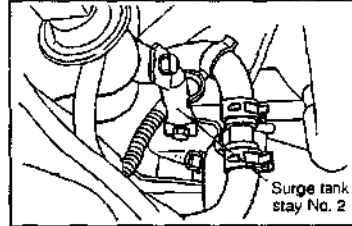
ENGINE MECHANICALS

16. Disconnect the two water hoses from the air valve.



WP590-EM025

17. Remove the surge tank stay No. 2 from the surge tank.

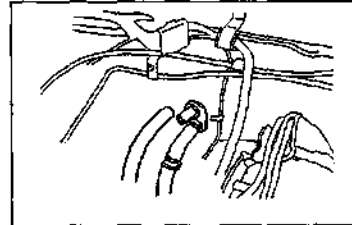


Surge tank
stay No. 2

WP590-EM026

18. Disconnect the inlet and outlet hoses from the heater pipes.
CAUTION:

- Care must be exercised not to damage the heater pipe end.

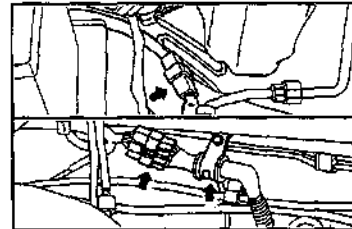


WP590-EM027

19. Disconnect the following wires and cords.

[HD-C Engine]

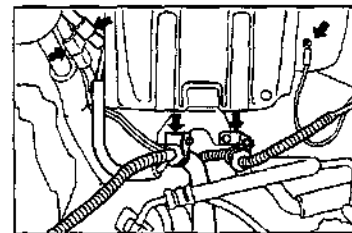
- (1) Clamp of battery negative \ominus terminal to engine bracket at battery carrier side.
- (2) Clamp of battery positive \oplus terminal to starter at battery carrier side.
- (3) Connector of cable leading to battery at battery carrier side.



WP590-EM028

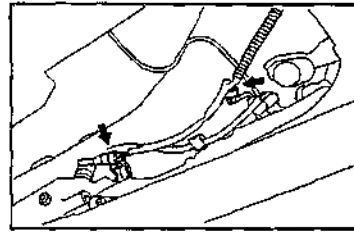
[HD-E Engine]

- (1) Clamp of battery negative \ominus terminal to engine bracket at battery carrier side.
- (2) Clamp of battery positive \oplus terminal to starter at battery carrier side.
- (3) Clamp of battery cable \oplus leading to cowl at battery carrier side.
- (4) Three connectors of cable leading to relay box at battery carrier side.



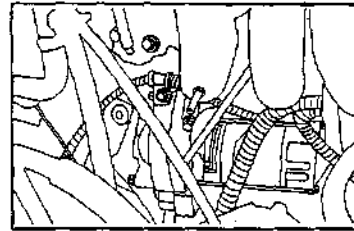
WP590-EM029

20. Disconnect the connectors from the transmission and transfer by jacking up the vehicle. Disconnect the air breather hose from the transmission.



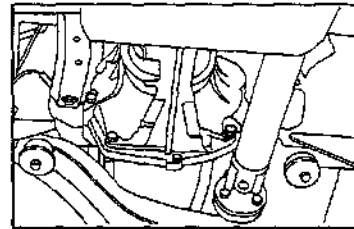
WPB0-EM330

21. Removal of starter
 (1) Disconnect the connector with lock and remove the harness clamping bolt.
 (2) Remove the starter by removing the two attaching bolts.



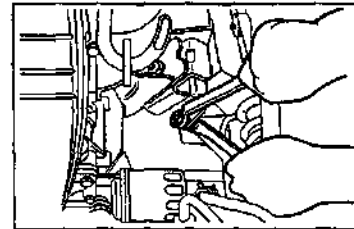
WPB0-EM331

22. Remove the attaching bolts which install the engine to the transmission.



WPB0-EM332

23. Remove the attaching bolts of the engine mountings while suspending the engine, using a chain block.

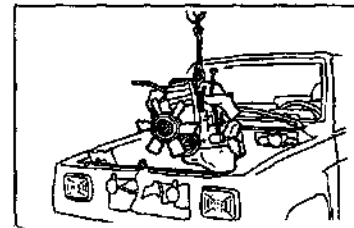


WPB0-EM333

24. Take out the engine from the engine compartment, using a chain block.

CAUTION:

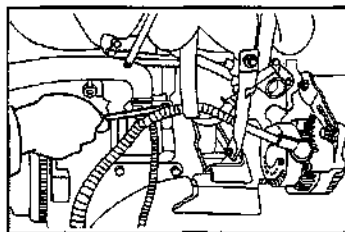
- Be careful not to allow the engine to hit the vehicle body or other parts.
- Make sure that all hoses and wires have been disconnected from the body.



WPB0-EM334

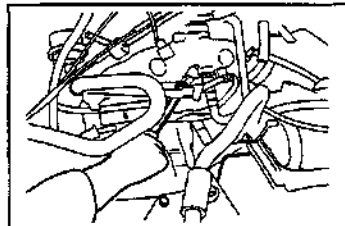
ENGINE MECHANICALS

25. Removal of engine harness from engine
(1) Disconnect the alternator connector.



WPB0-EM325

- (2) Remove the engine wire clamp.
(3) Remove the engine wire from engine.



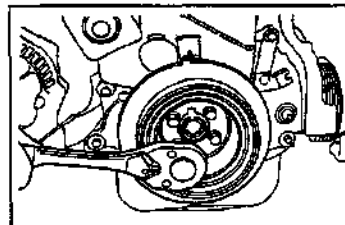
WPB0-EM326

26. Remove the crankshaft pulley by removing the four attaching bolts.

NOTE:

- Prevent the crankshaft from turning, using the following SST.

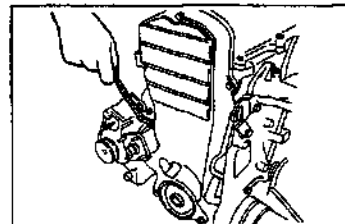
SST: 09210-87701-000



WPB0-EM327

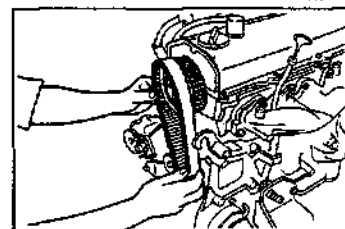
27. Removal of timing belt (See page EM-24.)

- (1) Remove the eight timing belt cover attaching bolts.
(2) Remove the timing belt covers No. 1 and No. 2.



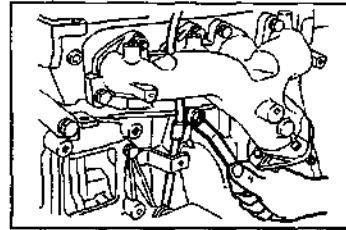
WPB0-EM328

- (3) Loosen the attaching bolt of the timing belt tensioner.
Move the tensioner to the left as far as it will go and tighten the bolt temporarily.
(4) Remove the timing belt.



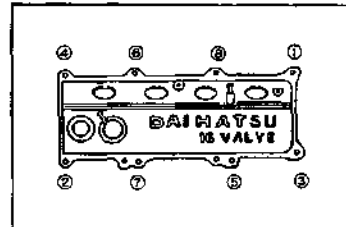
WPB0-EM784

28. Remove the oil level gauge guide attaching bolt.
29. Remove the oil level gauge guide from the cylinder block.



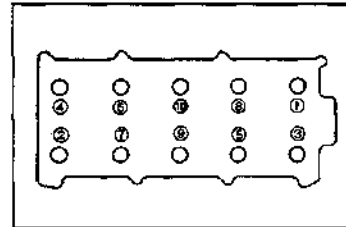
WP500-EM/335

30. Removal of cylinder head cover
 - (1) Remove the ground cable from the cylinder head cover.
 - (2) Remove the spark plugs, using the SST.
SST: 09268-87703-000
 - (3) Loosen the cylinder head cover attaching bolts evenly over two or three stages in the sequence indicated in the figure.
Remove the cylinder head cover attaching bolts.



WP500-EM/340

31. Removal of cylinder head
 - (1) Loosen the cylinder head bolts, using a hexagon wrench.
CAUTION:
 - Loosen the cylinder head bolts evenly over two or three stages in the sequence indicated in the figure.



WP500-EM/341

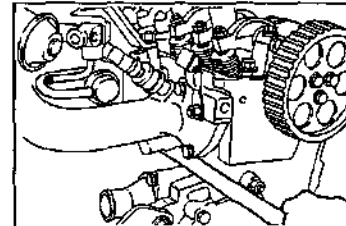
- (2) Remove the cylinder head with the intake and exhaust manifolds.

NOTE:

- If it is difficult to remove the cylinder head, pry up the cylinder head, using an iron bar.

CAUTION:

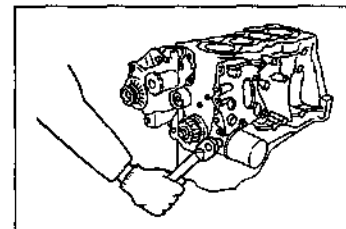
- Place the removed cylinder head on suitable two wooden blocks in order that the cylinder head surface and valve may not be damaged.



WP500-EM/342

DISASSEMBLY OF CYLINDER BLOCK

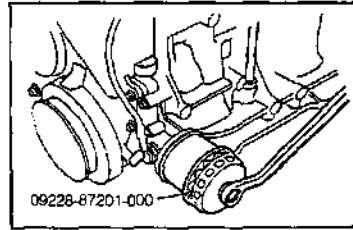
1. Remove the oil pressure switch.
NOTE:
 - Use a hexagon box wrench for the removal operation.



WP500-EM/343

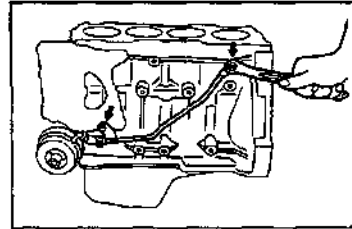
ENGINE MECHANICALS

2. Remove the oil filter, using the following SST.
SST: 09228-87201-000



WPB0-DK243

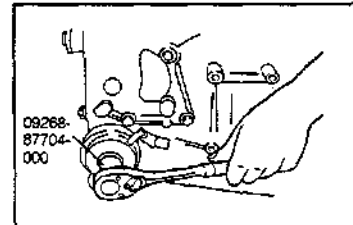
3. Removal of oil cooler
(1) Remove the oil cooler pipe from the cylinder block.
(2) Release the hose band and remove the oil cooler pipe.



WPB0-DK766

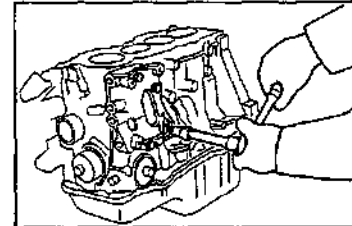
- (3) Remove the oil cooler from the cylinder block, using the following SST.
SST: 09268-87704-000

- (4) Remove the water hose from the oil cooler.



WPB0-DK344

4. Remove the compressor bracket by removing the four attaching bolts.



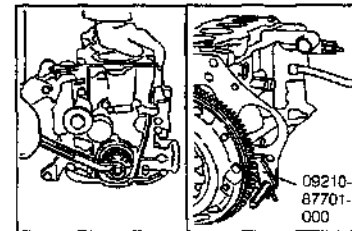
WPB0-DK345

5. Remove the crankshaft pulley bolt.

NOTE:

- Prevent the ring gear from turning, using the following SST.

SST: 09210-87701-000



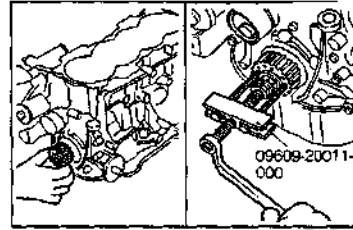
WPB0-DK787

6. Remove the crankshaft pulley.

NOTE:

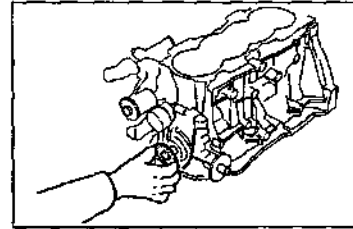
- If the crankshaft pulley can not be removed by hand, install the following SST with the crankshaft pulley bolt interposed.

SST: 09609-20011-000



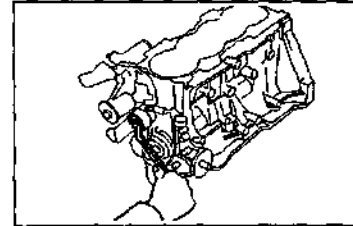
WPB0-EM788

7. Remove the crankshaft pulley flange.



WPB0-EM789

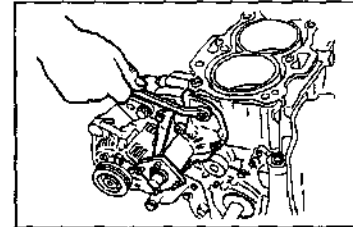
8. Remove the tensioner and tension spring.



WPB0-EM790

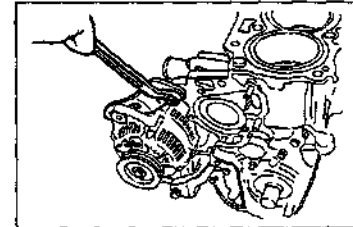
9. Remove the water pump by removing the three attaching bolts and two nuts.

10. Remove the water pump gasket.



WPB0-EM845

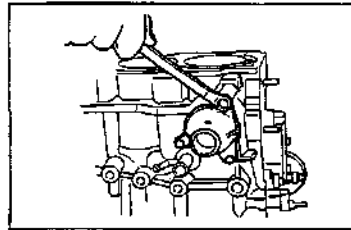
11. Remove the alternator assembly with bracket by removing the two attaching bolts and one adjusting bolt.



WPB0-EM847

ENGINE MECHANICALS

12. Remove the water inlet and thermostat by removing the three attaching bolts.

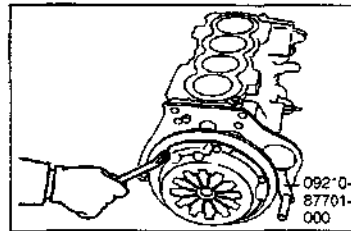


13. Remove the pressure plate and clutch disc by removing the six attaching bolts.

NOTE:

- Prevent the pressure plate from turning, using the following SST.

SST: 09210-87701-000

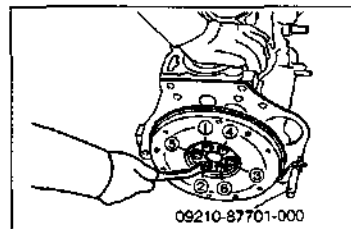


14. Loosen the attaching bolts of the flywheel in the sequence as indicated in the right figure. Remove the flywheel.

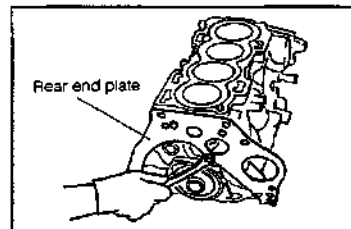
NOTE:

- Prevent the flywheel from turning, using the following SST.

SST: 09210-87701-000

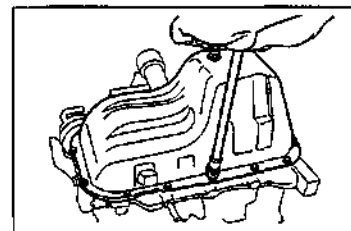


15. Remove the rear end plate by removing the two attaching bolts.



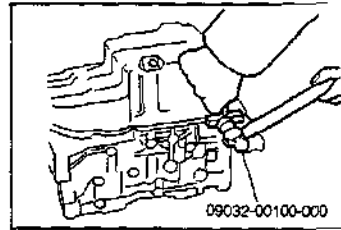
16. Removal of oil pan

- (1) Loosen the ten attaching bolts and four nuts of the oil pan over two or three stages. Pull out the bolts and nuts.



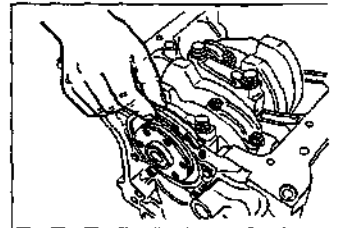
ENGINE MECHANICAL:

- (2) Separate the oil pan from the cylinder block by driving the following SST into between the cylinder block and the oil pan.
SST: 09032-00100-000



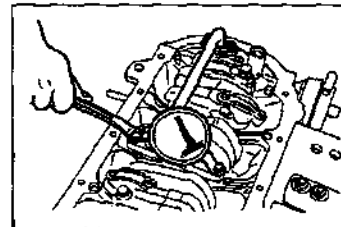
WPB0-EM79

17. Remove the oil pan gasket.



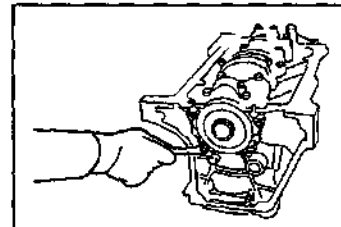
WPB0-EM80

18. Remove the oil pump strainer by removing the two attaching bolts and two nuts.



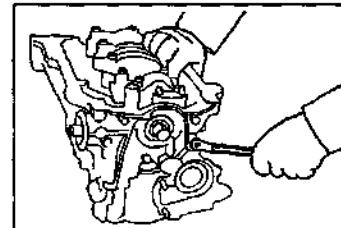
WPB0-EM84

19. Remove the rear oil seal retainer.



WPB0-EM85

20. Remove the oil pump.

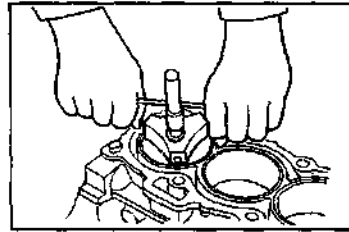


WPB0-EM86

ENGINE MECHANICALS

21. Removal of piston

- (1) Remove all carbon deposits from the piston ring ridges.
- (2) Turn the crankshaft, until the connecting rod bearing cap to be removed comes at the oil pan side.

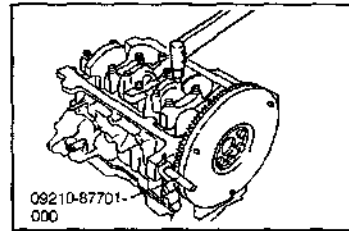


WP290-EM357

- (3) Lock the flywheel to prevent the crankshaft from turning, using the following SST.

SST: 09210-87701-000

- (4) Loosen the connecting rod bearing cap nuts evenly over two or three stages. Then, remove the connecting rod bearing cap nuts.



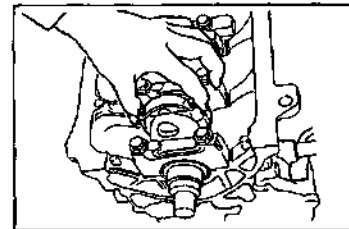
09210-87701-000

WP290-EM358

- (5) Remove the bearing cap.

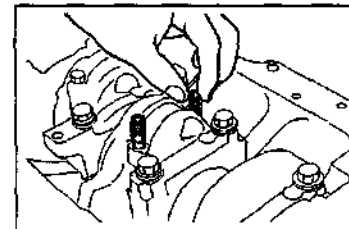
NOTE:

- Replace the crankshaft if the crankpin journals exhibit damages, such as seizure. (See page EM-121.)



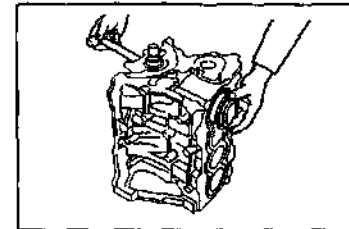
WP290-EM359

- (6) Cover each connecting rod bolt with a short piece of hose to protect the crankpin journal from damage.



WP290-EM360

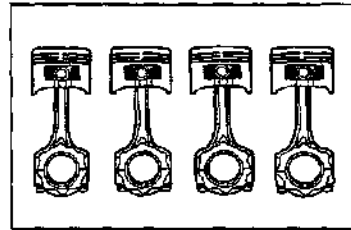
- (7) Push out the piston and connecting rod assembly and the upper bearing through the top of the cylinder block.



WP290-EM361

NOTE:

- Arrange the disassembled pistons and connecting rod in order that their installation positions may be known readily.
- Care should be exercised so as not to damage the bearings.



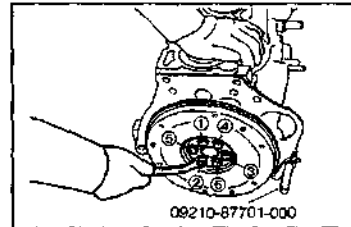
WPES0-EM732

22. Loosen the attaching bolts of the flywheel in the sequence as indicated in the right figure. Remove the flywheel.

NOTE:

- Prevent the flywheel from turning, using the following SST.

SST: 09210-87701-000

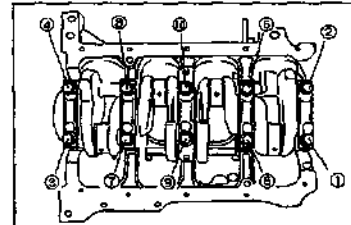


09210-87701-000

WPES0-EM062

23. Removal of crankshaft

- (1) Gradually loosen the main bearing cap bolts over three stages in the numerical sequence shown in the figure. Remove the bearing cap bolts.

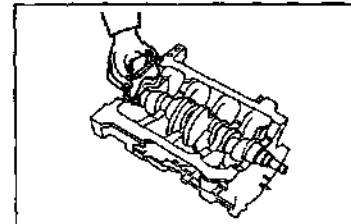


WPES0-EM532

- (2) With the main bearing cap bolts inserted into the bolt holes of the main bearing cap, wiggle the bearing cap back and forth. Remove the bearing cap together with the lower bearing.

NOTE:

- Keep the lower bearing fitted to the main bearing cap.
- Arrange the removed main bearing caps in order.

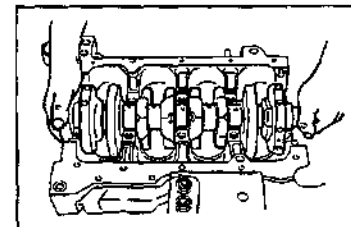


WPES0-EM730

- (3) Lift off the crankshaft.

NOTE:

- Be very careful not to allow the main bearings to be mixed with the bearings of the other cylinders.
- Remove the thrust washer.



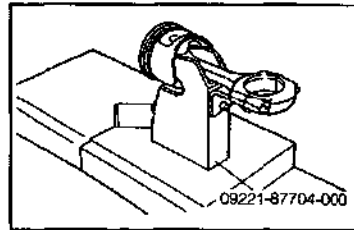
WPES0-EM734

ENGINE MECHANICALS

24. Disassembly of piston and connecting rod

- (1) Install the connecting rod in the following SST as shown in the right figure.

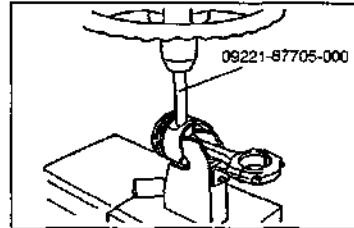
SST: 09221-87704-000



WFE90-EM354

- (2) Insert the longer SST into the piston pin hole. Press off the piston, using a hydraulic press.

SST: 09221-87705-000



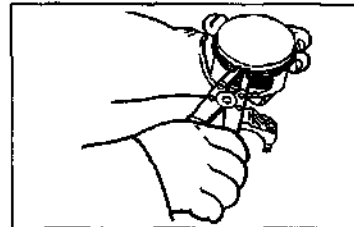
WFE90-EM355

25. Removal of piston rings

NOTE:

- Arrange the removed piston rings in order so that their installation positions may be known readily.
- Do not expand the piston ring unnecessarily beyond the required extent.

- (1) Remove the piston rings No. 1 and No. 2, using a piston ring expander.
- (2) Remove the oil ring side rails by hand.
- (3) Remove the oil ring expander by hand.



WFE90-EM356

26. Cleaning of pistons

- (1) Remove the carbon deposits from the piston top, using a gasket scraper or the like.

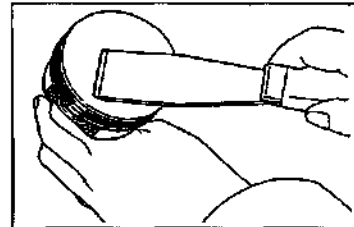
NOTE:

- Be very careful not to scratch the piston.

- (2) Clean the piston grooves with a broken piston ring or a groove cleaning tool.

NOTE:

- Be very careful not to scratch the piston.



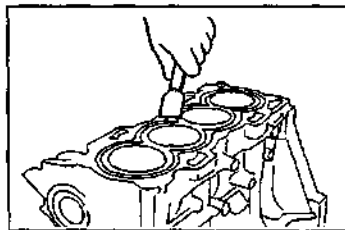
WFE90-EM357

27. Wash the disassembled parts with cleaning agent. Store the parts after drying them by blowing with compressed air.

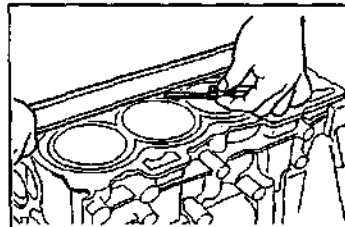
INSPECTION OF EACH PART

INSPECTION OF CYLINDER BLOCK

1. Removal of gasket material
Remove all gasket materials from the cylinder block.
2. Cleaning of cylinder block
Clean the cylinder block, using a soft brush and cleaning solvent.



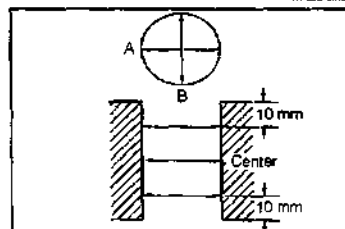
3. Inspection of top surface of cylinder block
Using a precision straight edge and a thickness gauge, check the surface contacting the cylinder head gasket for warpage in the four directions as shown in the figure.
Allowable Warpage: 0.1 mm



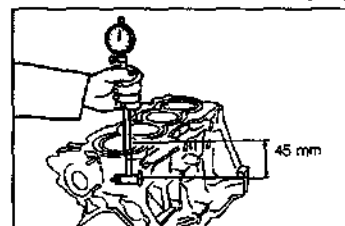
If the warpage exceeds the allowable limit, replace the cylinder block.

4. Measurement of cylinder bore
 - (1) Measure the bore diameter of each cylinder at the six points shown in the right figure. Ensure that the difference between the maximum and minimum bore diameters of each cylinder is within 0.1 mm.

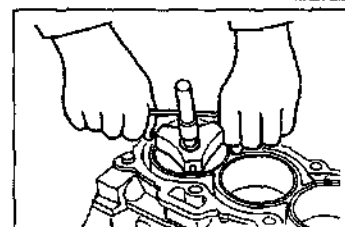
If the difference between the maximum and minimum values exceeds 0.1 mm, perform boring for the cylinder bore in accordance with the oversized piston.



- (2) Measure the bore diameter of each cylinder at a point shown in the right figure. The measured value is regarded as the cylinder bore diameter.
Specified Bore Diameter: 76.000 - 76.030 mm



5. Removal of cylinder ridges
If ridges are formed at the upper parts of the cylinder bores, use a ridge reamer to remove the ridges.

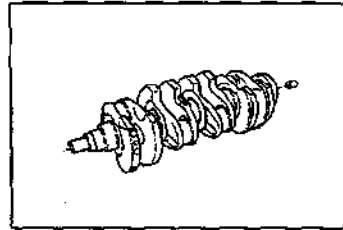


ENGINE MECHANICALS

INSPECTION OF CRANKSHAFT

1. Visually inspect the main journals and crankpin journals for pitting or scratches.

If the main journals and crankpin journals are damaged, replace the crankshaft.

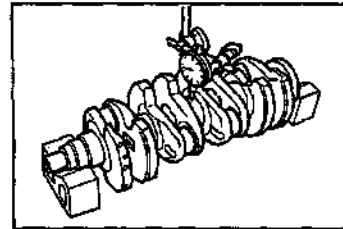


WP80-EM372

2. Measurement of crankshaft runout
 - (1) Support the both ends of the crankshaft with a V-shaped blocks.

Measure the crankshaft runout with a dial gauge.
Allowable Runout Limit: 0.6 mm

If the runout exceeds the allowable limit, replace the crankshaft.

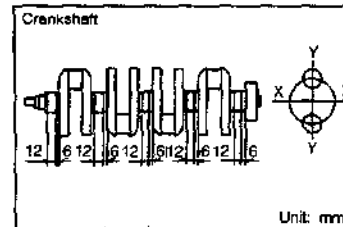


WP80-EM373

3. Measurement of crankshaft journals
 - (1) Measure the diameter of each crankshaft main journal at four points, 90 degrees spaced as shown in the right figure.

The maximum value is regarded as the crankshaft main journal diameter.

If the variation in the measured diameters exceeds 0.026 mm, replace the crankshaft.



Unit: mm

WP80-EM374

- (2) Measure the diameter of each crankpin journal at four points, 90 degrees spaced as shown in the right figure.

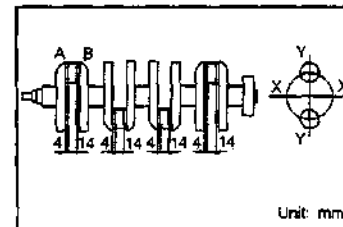
The maximum value is regarded as the crankpin journal diameter.

If the variation in the measured diameters exceeds 0.044 mm, replace the crankshaft.

Specified Diameter:

Main Journal: 49.976 - 50.000 mm

Crankpin Journal: 44.976 - 45.000 mm



Unit: mm

WP80-EM375

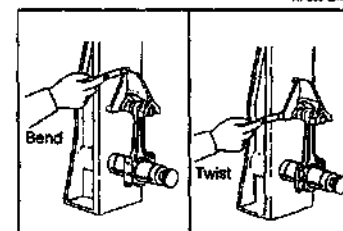
INSPECTION OF CONNECTING ROD

1. Visually inspect the connecting rods for damage or cracks.
2. Check the connecting rod for bend and twist, using a connecting rod aligner.

Allowable Bend: 0.05 mm

Allowable Twist: 0.05 mm

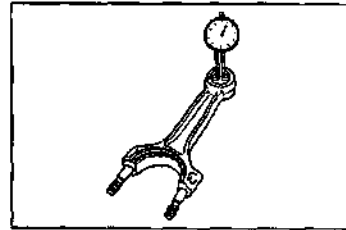
If the bend or twist is greater than the allowable limit, replace the connecting rod assembly.



WP80-EM376

3. Measure the inner diameter of the connecting rod small end, using a bore dial gauge.
Specified Value: 18.953 - 18.979 mm

If the inner diameter of the connecting rod small end exceeds the specified value, replace the connecting rod.



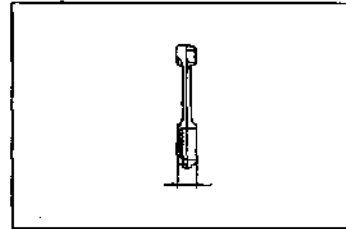
WP500-EM377

4. Measure the width of the connecting rod big end, using a micrometer.
Specified Value: 21.80 - 21.85 mm
Allowable Limit: 21.70 mm

If the width wear of the connecting rod big end exceeds the allowable limit, replace the connecting rod.

NOTE:

- Before measuring the width of the connecting rod big end, tighten the connecting rod bearing cap nuts evenly over two or three stages to the specified torque.
Specified Torque: 34.3 - 44.1 N·m (3.5 - 4.5 kgf·m)



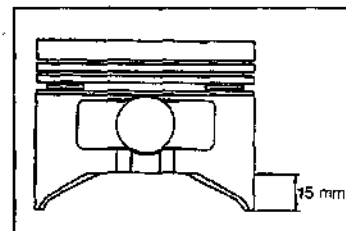
WP500-EM378

INSPECTION OF PISTONS

1. Visually inspect the piston for cracks, damage or seizure.
Replace the piston, as required.

WP500-EM379

2. Measurement of piston diameter
 - (1) Measure the piston outer diameter horizontally at a point 15 mm from the lower end of the piston at right angles to the piston pin.
Specified Value: 75.965 - 75.995 mm



WP500-EM380

ENGINE MECHANICALS

- (2) Calculation of piston-to-cylinder bore clearance
Subtract the measured piston outer diameter from the measured cylinder bore diameter.
Ensure that this piston-to-cylinder bore clearance is less than 0.11 mm.
Piston-to-cylinder bore clearance
Specified Value: 0.025 - 0.045 mm
Allowable Limit: 0.11 mm

WP590-EM361

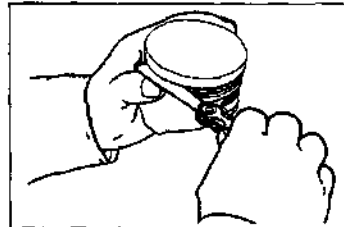
If the piston-to-cylinder bore clearance exceeds the allowable limit, perform boring and honing the cylinder bores so that the cylinder bore diameter may match with the oversized piston.

WP590-EM362

3. Measurement of piston ring groove width
Measure the groove width of the piston rings No. 1, No. 2 and No. 3 with a thickness gauge.

Specified Value:

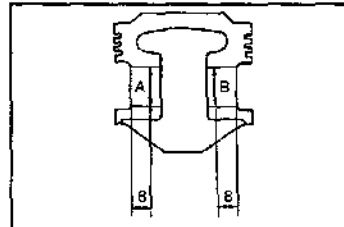
No. 1 piston ring groove width	1.202 - 1.204 mm
No. 2 piston ring groove width	1.501 - 1.503 mm
No. 3 piston ring groove width	3.01 - 3.03 mm



WP590-EM363

4. Measurement of piston pin bore diameter of piston
Measure the piston pin bore diameter at the two points as shown in the right figure, using a dial gauge for bore diameter measurement. Record the minimum measured value as the piston pin bore diameter.

Specified Value: 18.999 - 19.005 mm



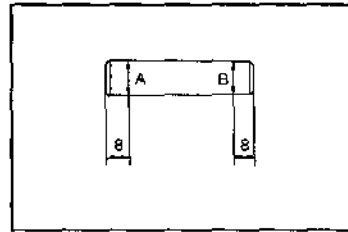
WP590-EM364

INSPECTION OF PISTON PIN

1. Visually inspect the piston pin for damage or scratches.
Replace the piston pin, as required.

WP590-EM365

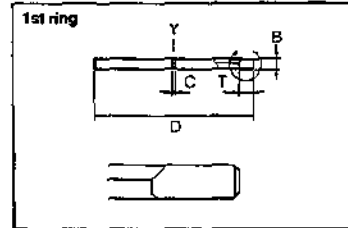
2. Measure the outer diameter of the piston pin at the two points as shown in the right figure, using a micrometer.
Specified Value: 18.991 - 18.997 mm



WFE90-EM385

INSPECTION OF PISTON RINGS

1. Visually inspect the piston ring for excessive uneven wear or scratches. If any abnormality exists, replace the piston ring with a new part.

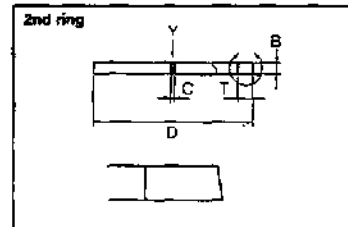


WFE90-EM387

2. Check of piston ring dimensions

- (1) Measure the width of the piston ring.

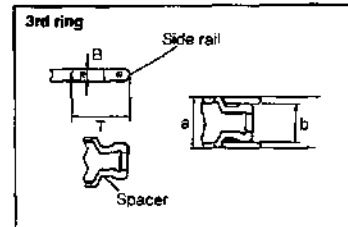
1st	2.80 - 3.00
2nd	3.00 - 3.20
3rd	Side rail 2.25 - 2.45
	Spacer .



WFE90-EM388

- (2) Measure the length of the piston ring.

1st	1.170 - 1.190
2nd	1.470 - 1.490
3rd	Side rail 0.48 - 0.52
	Spacer a 2.75 - 2.90
	b 1.87 - 1.92



WFE90-EM389

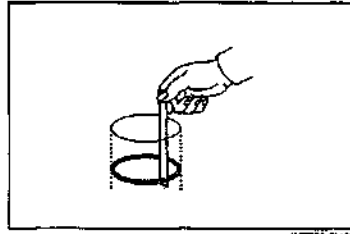
- (3) Inspection of piston ring end gap
 - ① Apply engine oil to the cylinder walls.
 - ② Insert the piston rings into the cylinder bore.
 - ③ Using a piston, push down the piston ring to a point 110 mm measured from the cylinder block upper surface.



WFE90-EM390

ENGINE MECHANICALS

- ④ Measure the piston ring end gap, using a thickness gauge or a feeler gauge.



WP530-EM391

Piston ring end gap

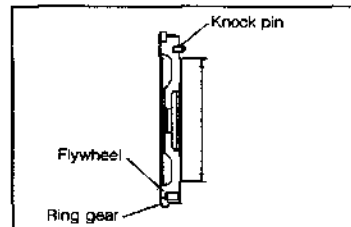
	Specified value mm	Allowable limit mm
Compression ring No. 1	0.27 - 0.42	0.7
Compression ring No. 2	0.35 - 0.50	0.8
Oil ring	0.20 - 0.70	1.0

If the piston ring end gap exceeds the allowable limit, a set of piston rings for one cylinder should be replaced.

WP530-EM392

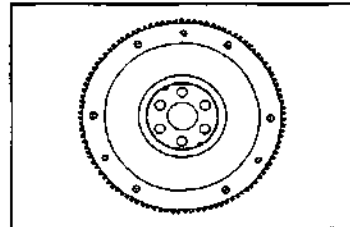
INSPECTION OF FLYWHEEL

1. Visually inspect the flywheel for damage or cracks.
Replace the flywheel, as required.



WP530-EM393

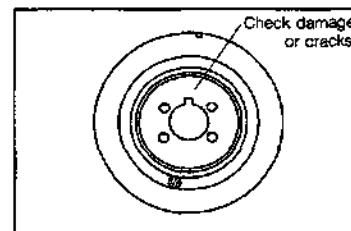
2. While holding the flywheel by your hands, ensure that there is no excessive play or displacement.
If any abnormality exists, replace the flywheel.



WP530-EM394

INSPECTION OF CRANKSHAFT PULLEY

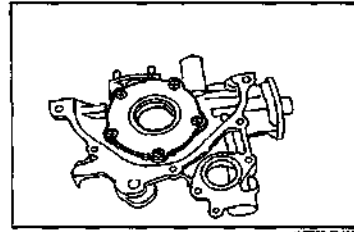
1. Visual inspection of crankshaft pulley
 - (1) Check the crankshaft pulley attaching seat for deformation, wear or cracks.
 - (2) Check the V-ribbed belt attaching surface for scratches, deformation or wear.
 Replace the crankshaft pulley, as required.



WP530-EM395

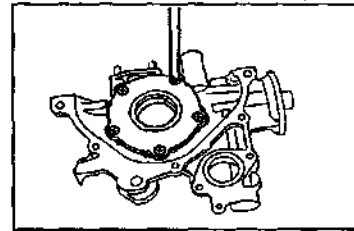
INSPECTION OF OIL PUMP

1. Visually inspect the rotor surface and oil seal section of the oil pump for scratches, wear and so forth.
If any abnormality exists, replace the oil seal or rotor.



WFE90-EM306

2. Using a screwdriver, ensure that the oil pump cover attaching bolt is not loose.
If the bolt is loose, retighten the bolt to the specified torque.
Tightening Torque: 7.8 - 12.7 N·m (0.8 - 1.3 kgf·m)

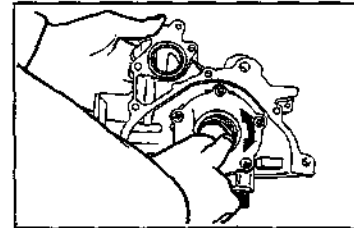


WFE90-EM307

3. Turn the rotor by hand. Ensure that the rotor turns smoothly. If the rotor will not turn smoothly, disassemble the oil pump and check each part carefully.
(See page EM-00.)
Replace the parts, as required.

NOTE:

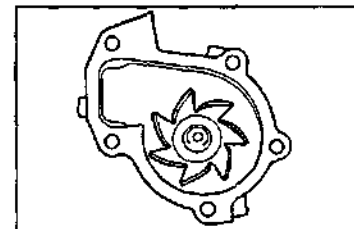
- The oil pump performance is described in the LU section.
(See page LU-6.)
- The disassembling and assembling procedures for the oil pump is described in the following paragraph.
(See page EM-144.)



WFE90-EM308

INSPECTION OF WATER PUMP

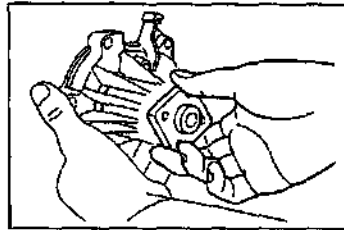
1. Visually inspect the water pump.
 - (1) Mechanical seal section for evidence of water leakage
 - (2) Rotary fin of water pump for scratches, deformation or cracks
 - (3) Water pump attaching surface for scratches
 - (4) Water pump pulley attaching seat for scratches or flattened condition
 Replace the water pump, as required.



WFE90-EM309

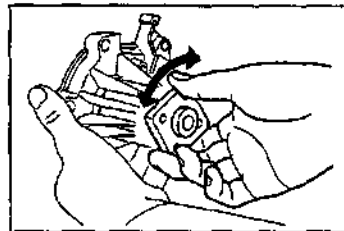
ENGINE MECHANICALS

2. Check the water pump bearing and water pump pulley attaching section for excessive play. Replace the water pump, as required.



WFES0-EM400

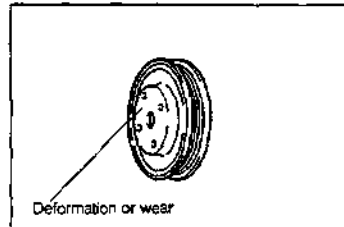
3. Turn the water pump by hand. Ensure that the water pump turns smoothly. Replace the water pump, as required.



WFES0-EM401

WATER PUMP PULLEY

1. Visual inspection of water pump pulley
 - (1) Inspect the water pump pulley attaching section for deformation or wear.
 - (2) Inspect the V-ribbed belt attaching surface for deformation or wear.Replace the water pump pulley, as required.

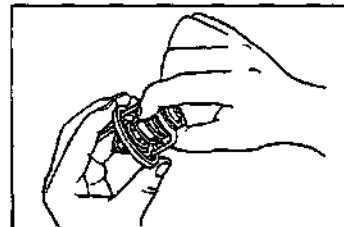


Deformation or wear

WFES0-EM402

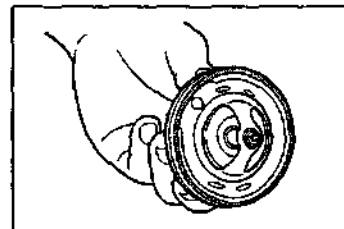
INSPECTION OF THERMOSTAT

1. Ensure that the thermostat valve is closed completely at room temperature 20°C and the spring has no play. Replace the thermostat if the valve is open or the spring has a play.



WFES0-EM403

2. Check the rubber grommet of the thermostat for damage or crack. Replace the thermostat if the rubber grommet exhibits damage or crack.

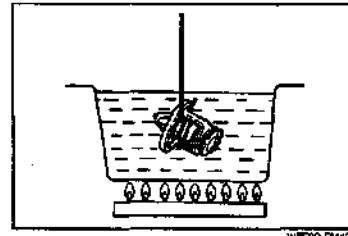


WFES0-EM404

3. Immerse the thermostat in water, and check the valve opening temperature by heating the water gradually.

Specifications	Valve opening temperature °C	Valve lift
Standard specifications	76 - 80	8.5 mm or more at 91°C
Cold area specifications	82 - 86	8.5 mm or more at 98°C

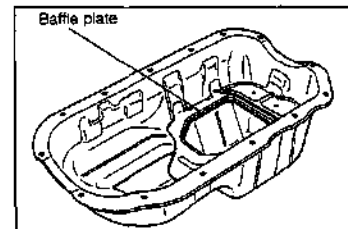
Replace the thermostat if the valve operation fails to conform to the specifications.



WPFB0-EM404

INSPECTION OF OIL PAN

1. Visually inspect the oil pan for damage or cracks.
Replace the oil pan, as required.



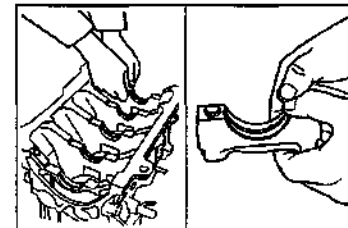
WPFB0-EM405

INSPECTION OF OIL CLEARANCE AND SELECTION OF BEARING

1. Measurement of main journal oil clearance
(1) Install the main bearings to the cylinder block and crankshaft main bearing cap.

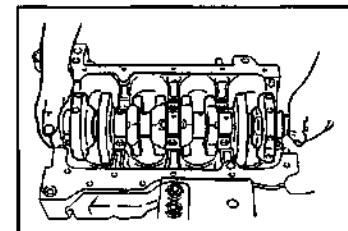
NOTE:

- Do not touch the metal surface of the bearing.



WPFB0-EM406

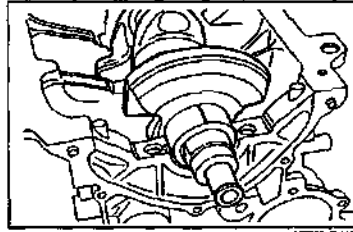
- (2) Place the crankshaft in the cylinder block.



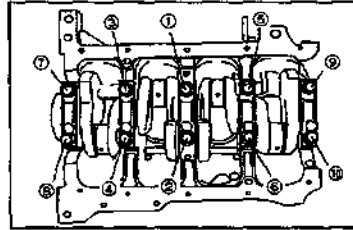
WPFB0-EM407

ENGINE MECHANICALS

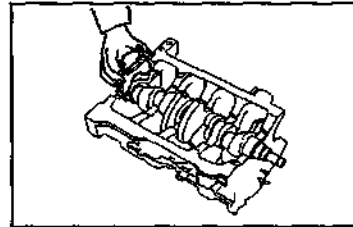
- (3) Lay a strip of plastigage across each crankshaft main journal.



- (4) Install the crankshaft bearing caps. Tighten the crankshaft bearing cap bolts evenly in the sequence indicated in the right figure.
Tightening Torque: 44.1 - 53.9 N·m (4.5 - 5.5 kgf·m)



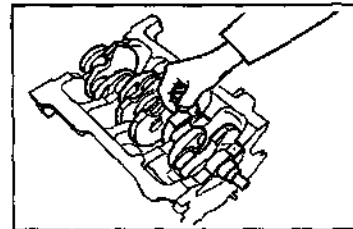
- (5) Remove the main bearing caps with the lower bearings fitted on them.



- (6) Measure the plastigage width at its widest point.
Oil Clearance: 0.024 - 0.042 mm

If the oil clearance fails to conform to the specified value, measure the crankshaft main journal diameter and select suitable crankshaft main journal bearings or replace the crankshaft.
(See page EM-131.)

- (7) Remove the plastigage from the crankshaft main journals.



2. Selection of crankshaft bearings

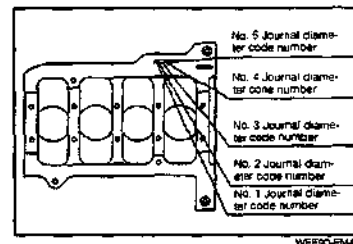
NOTE:

- The replacement of the crankshaft bearings should be performed after all inspections have been finished.

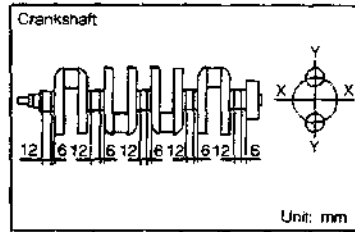
- (1) Read the cylinder block main journal diameter code number.

NOTE:

- The main journal diameter code comes in four kinds of 5, 6, 7 and 8.



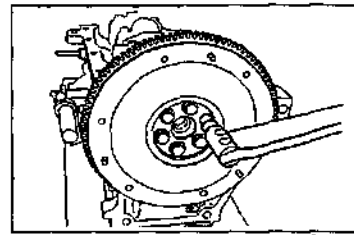
- (2) Measure the diameter of the crankshaft main journals. The measurement should be performed at four points, 90 degrees spaced, for each crankshaft main journal at the points shown in the right figure. The maximum value is regarded as the crankshaft main journal diameter. However, if the variation in the measured diameters exceeds 0.026 mm, replace the crankshaft.



- (3) Select the crankshaft bearings or replace the crankshaft, based on the results of (1) and (2).

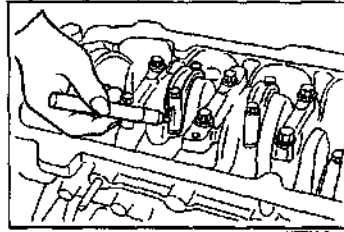
Main journal diameter code	Crankshaft main journal diameter mm	Bearing classification number (color)	Remarks
5	49.995 - 50.000	1 (Yellow)	—
	49.989 - 49.994	2 (Green)	—
	49.983 - 49.988	3 (Brown)	—
	49.976 - 49.982	4 (Black)	—
	49.975 or less	—	Crankshaft replacement
6	49.995 - 50.000	2 (Green)	—
	49.989 - 49.994	3 (Brown)	—
	49.983 - 49.988	4 (Black)	—
	49.976 - 49.982	5 (Blue)	—
	49.975 or less	—	Crankshaft replacement
7	49.995 - 50.000	3 (Brown)	—
	49.989 - 49.994	4 (Black)	—
	49.983 - 49.988	5 (Blue)	—
	49.976 - 49.982	6 (White)	—
	49.975 or less	—	Crankshaft replacement
8	49.995 - 50.000	4 (Black)	—
	49.989 - 49.994	5 (Blue)	—
	49.983 - 49.988	6 (White)	—
	49.976 - 49.982	7 (Pink)	—
	49.975 or less	—	Crankshaft replacement

3. Measurement of crankpin journal oil clearance
(1) Install the flywheel temporarily.



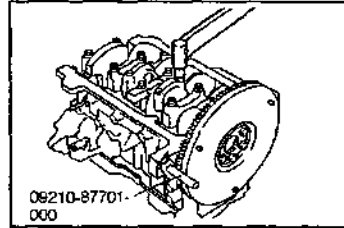
ENGINE MECHANICALS

- (2) Wipe off any oil from the side of the mate surface between the connecting rod bearing cap and the connecting rod. Daub a mate mark with an oily paint on the side so that the parts can be assembled correctly in the original combination.
(Also ensure that the cylinder number may be identified)
- (3) Turn the crankshaft, until the connecting rod bearing cap to be removed comes at the oil pan side.



WP20-EM757

- (4) Lock the flywheel to prevent the crankshaft from turning, using the following SST.
SST: 09210-87701-000



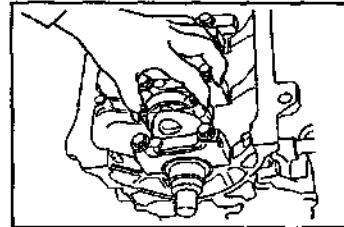
09210-87701-000

WP20-EM758

- (6) Remove the bearing cap.

NOTE:

- Replace the crankshaft if the crankpin journals exhibit damages, such as seizure.
(See page EM-121.)



WP20-EM759

- (7) Place a plastigage on the crankpin journal.

NOTE:

- Wipe off any oil from the crankpin journal.



WP20-EM800

- (8) Install the connecting rod cap, making sure that the mate marks are lined up. Tighten the connecting rod bearing cap nuts evenly over two or three stages to the specified torque.

Tightening Torque: 34.3 - 44.1 N·m (3.5 - 4.5 kgf·m)

NOTE:

- When tightening the bearing cap nuts, apply engine oil to the bearing cap nuts.
- Prevent the crankshaft from turning, using the following SST.

SST: 09210-87701-000

- (9) Loosen the connecting rod bearing cap nuts evenly over two or three stages. Then, remove the connecting rod bearing cap.

NOTE:

- Prevent the crankshaft from turning, using the SST.

SST: 09210-87701-000

- (10) Measure the plastigage width at its widest point.

Oil Clearance: 0.020 - 0.044 mm

NOTE:

- If the oil clearance fails to conform to the specified value, measure the crankpin journal diameter and select a suitable connecting rod bearing or replace the crankshaft.

- (11) Remove the plastigage from the crankpin journal.

- (12) Measure the oil clearances of the remaining crankpin journals.

4. Selection of connecting rod bearings

NOTE:

- The replacement of the connecting rod bearings should be performed after all inspections have been finished.

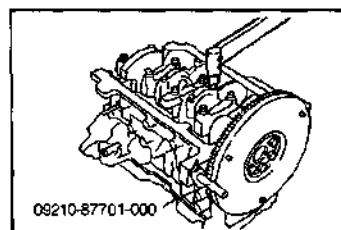
- (1) Read the connecting rod big end bore code number.

NOTE:

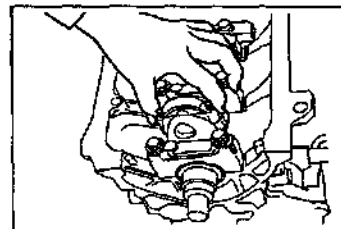
- The connecting rod big end bore code number comes in three kinds of 4, 5 and 6.

- (2) Measure the diameter of the crankpin journal.

The measurement should be performed at four points, 90 degrees spaced, for each crankpin journal at the points shown in the right figure. The maximum value is regarded as the crankpin journal diameter. However, if the variation in the measured diameters exceeds 0.044 mm, replace the crankshaft.



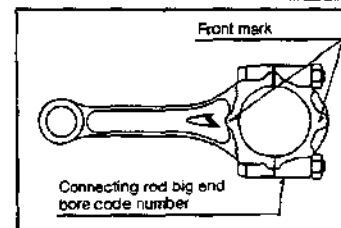
WPB0-EM416



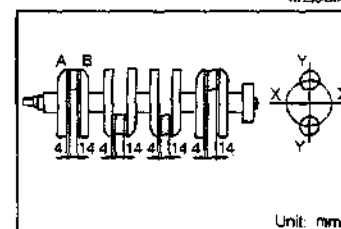
WPB0-EM401



WPB0-EM417



WPB0-EM418



WPB0-EM419

ENGINE MECHANICALS

- (3) Select the connecting rod bearing or replace the crankshaft, based on the results of (1) and (2).

Connecting rod big end bore code number	Crankpin journal diameter mm	Bearing classification number (color)	Remarks
4	44.993 - 45.000	1 (Yellow)	—
	44.985 - 44.992	2 (Green)	—
	44.976 - 44.984	3 (Brown)	—
	44.975 or less	—	Crankshaft replacement
5	44.993 - 45.000	2 (Green)	—
	44.985 - 44.992	3 (Brown)	—
	44.976 - 44.984	4 (Black)	—
	44.975 or less	—	Crankshaft replacement
6	44.993 - 45.000	3 (Brown)	—
	44.985 - 44.992	4 (Black)	—
	44.976 - 44.984	5 (Blue)	—
	44.975 or less	—	Crankshaft replacement

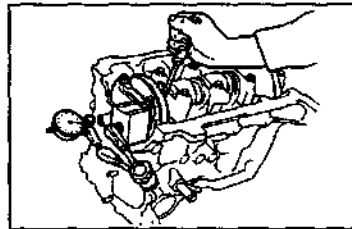
WPB90-EM420

5. Check of crankshaft thrust clearance

NOTE:

- Measure the thrust clearance, using a dial gauge.
Thrust Clearance:
Specified Value: 0.02 - 0.22 mm
Allowable Limit: 0.30 mm

If the thrust clearance exceeds the allowable limit, measure the width of the crankshaft thrust bearing contact surface. If the measured value is less than 39.92 mm, replace the thrust washer. If the measured value exceeds 39.92 mm, replace the crankshaft and thrust washer.



WPB90-EM421

6. Measurement of connecting rod thrust clearance

Measure the thrust clearance between the connecting rod and the crankshaft, using a thickness gauge.

- Thrust clearance:
Standard: 0.15 - 0.40 mm
Maximum: 0.45 mm

NOTE:


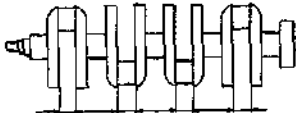
- The thrust clearance should be measured while the connecting rod is being pushed against either side of the crankshaft in the axial direction.
- Measure the thrust clearance at the opposite side.

If the clearance exceeds the specified value, replace the connecting rod or the crankshaft, or both of them, referring to the width of the big end of the connecting rod in the thrust direction and the side width of the crankpin journal.



WPB90-EM422

Reference

Width of big end of connecting rod in thrust direction	Side width of crankpin
21.80 - 21.85 mm	22.0 - 22.2 mm
	

WP250-EM423

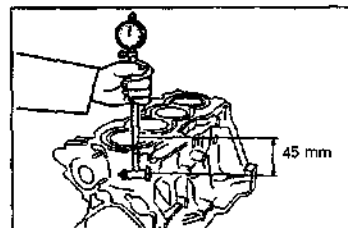
CYLINDER BORING

NOTE:

- When the cylinder is bored, all cylinders should be bored at the same time.
- As for piston rings, use oversized piston rings.

WP250-EM402

1. Measurement of cylinder bore diameter
Measure the diameter at a point 45 mm from the cylinder upper surface in the direction shown in the right figure.
If the measured value exceeds 76.28 mm, replace the cylinder block.



WP250-EM403

ENGINE MECHANICALS

2. Determining cylinder finishing diameter

- (1) Measure the diameter of the oversized piston to be used, using a micrometer.

NOTE:

- The measurement should be conducted at the skirt section 13 mm from the piston lower end.
- Perform the measurement horizontally, not in a tilted state.

- (2) Calculate the finishing dimension, as follows.

A: Piston diameter

B: Piston-to-cylinder bore clearance
0.025 - 0.045 mm

C: Honing allowance
0.02 mm

D: Finishing diameter

$$D = A + B - C$$

WP500-EN425

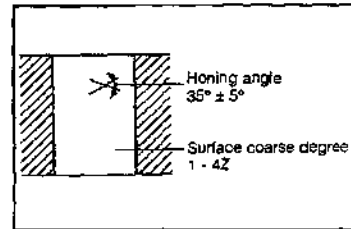
3. Hone the cylinder after the boring.

- (1) Bore the cylinder, leaving a honing allowance of 0.02 mm.

- (2) Hone the cylinder.

Honing Angle: $35 \pm 5^\circ$

Surface Coarse Degree: 1 - 4Z



WP500-EN426

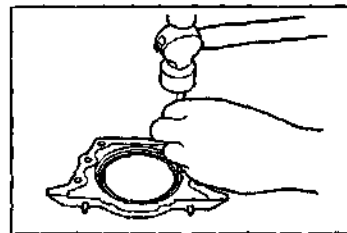
REPLACEMENT OF REAR OIL SEAL

1. Removal of rear oil seal

Remove the rear oil seal from the rear oil seal retainer, using a pin punch.

NOTE:

- Be very careful not to damage the oil seal retainer.

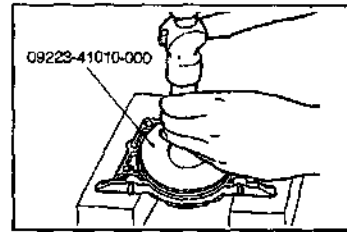


WP500-EN427

2. Installation of rear oil seal
Drive a new rear oil seal into position, using the following SST.
SST: 09223-41010-000

NOTE:

- Care must be exercised to ensure that the oil seal is not driven in a tilted state.



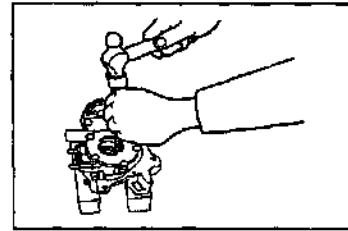
WFE90-EM615

REPLACEMENT OF FRONT OIL SEAL

1. Removal of front oil seal
Remove the front oil seal from the oil pump, using a pin punch.

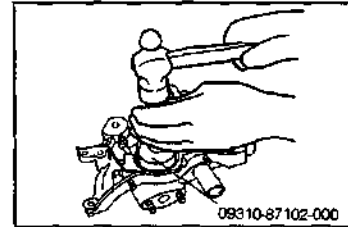
NOTE:

- Be very careful not to damage the oil pump during the removal.



WFE90-EM616

2. Installation of front oil seal
Drive a new front oil seal into position, using the following SST.
SST: 09310-87102-000



WFE90-EM617

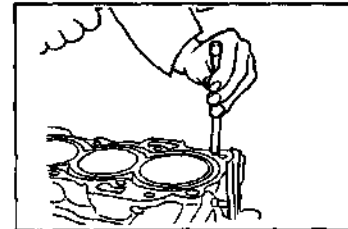
REPLACEMENT OF CYLINDER BLOCK**NOTE:**

- The cylinder block is furnished along with the pistons as a set. Hence, make sure that each piston is installed in the mated cylinder bore.

1. Wash the cylinder block using cleaning solvent.
2. Drive the oil orifice until it is recessed 3.0 ± 1.0 mm from the cylinder upper surface.

NOTE:

- For driving this oil orifice, use an iron rod having an outer diameter of 10 mm.

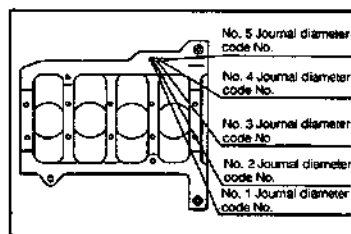


WFE90-EM620

ENGINE MECHANICALS

3. Selection of crankshaft bearings

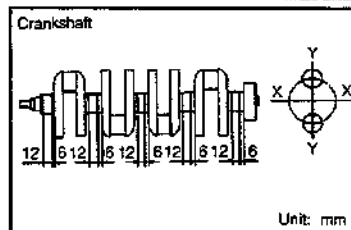
- (1) Read the crankshaft journal diameter code number on the cylinder block.



WPBQ-EM003

- (2) Measure the main journal diameter of the crankshaft at those points indicated in the right figure.

- The measurement should be conducted in four directions for each main journal, 90-degrees spaced, at those points indicated in the right figure.



WPBQ-EM439

- (3) Select the crankshaft bearings in accordance with the table in the next page.

WPBQ-EM430

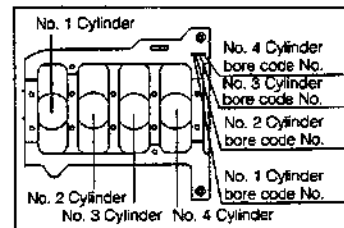
ENGINE MECHANICALS

Main journal hole code	Main journal diameter mm	Crankshaft bearing classification No. (color)	Remarks
5	50.000 - 49.995	1 (Yellow)	—
	49.994 - 49.989	2 (Green)	—
	49.988 - 49.983	3 (Brown)	—
	49.982 - 49.976	4 (Black)	—
	49.975 or less	—	Crankshaft replacement
6	50.000 - 49.995	2 (Green)	—
	49.994 - 49.989	3 (Brown)	—
	49.988 - 49.983	4 (Black)	—
	49.982 - 49.976	5 (Blue)	—
	49.975 or less	—	Crankshaft replacement
7	50.000 - 49.995	3 (Brown)	—
	49.994 - 49.989	4 (Black)	—
	49.988 - 49.983	5 (Blue)	—
	49.982 - 49.976	6 (White)	—
	49.975 or less	—	Crankshaft replacement
8	50.000 - 49.995	4 (Black)	—
	49.994 - 49.989	5 (Blue)	—
	49.988 - 49.983	6 (White)	—
	49.982 - 49.976	7 (Pink)	—
	49.975 or less	—	Crankshaft replacement

WFE90-EM4431

4. Selection of pistons (reference)

(1) Read the cylinder block bore code number.

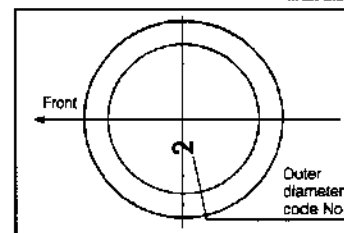


WFE90-EM804

(2) Select a piston having the same classification number as the cylinder block bore code number.

NOTE:

- The piston code number is stamped on the top of each piston.



WFE90-EM805

ENGINE MECHANICALS

REPLACEMENT OF CRANKSHAFT

(Replacement of the crankshaft only)

1. Wash the crankshaft using cleaning solvent. Dry it with compressed air.

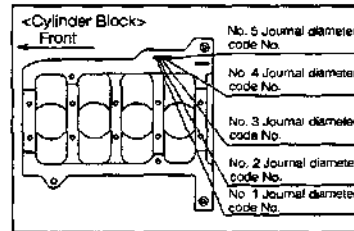
NOTE:

- Make sure that the oil gallery exhibits no restriction due to rust-proof oil.

WFE90-BM405

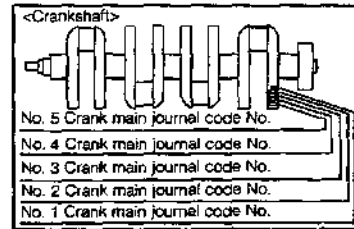
2. Selection of crankshaft bearings

- (1) Read the crankshaft journal diameter code number of the cylinder block.



WFE90-BM407

- (2) Read the crankshaft main journal diameter code number.



WFE90-BM432

- (3) Establish the crankshaft bearing classification number, using the table below.

Crankshaft		Crankshaft journal			
Cylinder block		1	2	3	4
Main journal diameter code No.	5	4	3	2	1
	6	5	4	3	2
	7	6	5	4	3
	8	7	6	5	4

WFE90-BM433

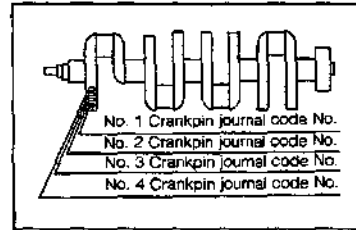
Reference

Bearing classification No.	1	2	3	4	5	6	7
Identification color	Yellow	Green	Brown	Black	Blue	White	Pink

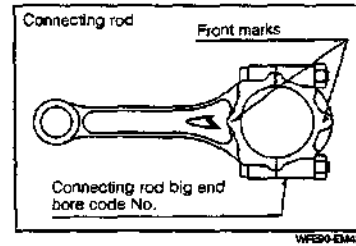
WFE90-BM435

ENGINE MECHANICALS

3. Selection of connecting rod bearings
(1) Read the crankpin journal diameter code number.



- (2) Read the connecting rod big end bore code number.



- (3) Establish the classification number of the connecting rod bearing, using the table below.

Connecting rod Connecting rod big end bore code No.	Crankshaft	Crankpin journal diameter code No.		
		1	2	3
	4	3	2	1
	5	4	3	2
	6	5	4	3

WP50-EM03

Reference

Bearing classification No.	1	2	3	4	5
Identification color	Yellow	Green	Brown	Black	Blue

WP50-EM11

REPLACEMENT OF CONNECTING RODS

1. Wash the connecting rods using cleaning solvent.

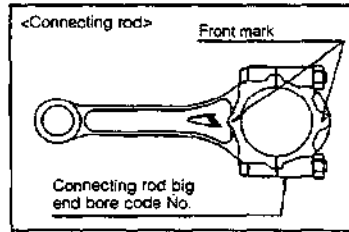
WARNING:
Be sure to protect your eyes, wearing goggles.

WP50-EM12

ENGINE MECHANICALS

2. Selection of connecting rod bearings

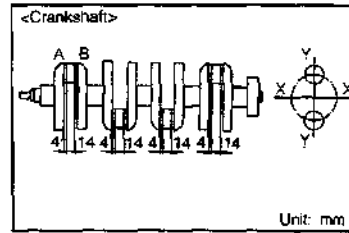
(1) Read the connecting rod big end bore code number.



(2) Measure the crankshaft pin diameter of the crankshaft in four directions for each crankshaft pin, 90-degrees spaced, at those points indicated in the right figure.

NOTE:

- The greatest value among the measured diameters is regarded as the crankpin journal diameter.
- However, if the difference among the measured values exceeds 0.044 mm, replace the crankshaft.



(3) Select the connecting rod bearing in accordance with the table below.

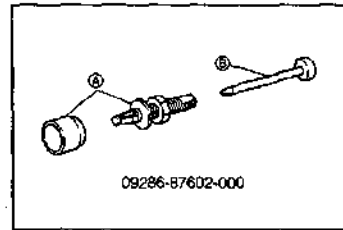
Connecting rod big end bore code No.	Crankpin journal diameter mm	Connecting rod bearing classification No. (color)	Remarks
4	45.000 - 44.993	1 (Yellow)	—
	44.992 - 44.985	2 (Green)	—
	44.984 - 44.976	3 (Brown)	—
	44.975 or less	—	Crankshaft replacement
5	45.000 - 44.993	2 (Green)	—
	44.992 - 44.985	3 (Brown)	—
	44.984 - 44.976	4 (Black)	—
	44.975 or less	—	Crankshaft replacement
6	45.000 - 44.993	3 (Brown)	—
	44.992 - 44.985	4 (Black)	—
	44.984 - 44.976	5 (Blue)	—
	44.975 or less	—	Crankshaft replacement

WF50-EM437

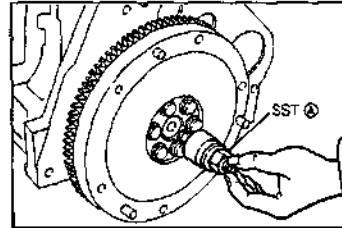
REPLACEMENT OF CRANKSHAFT REAR END BEARING

1. Remove the crankshaft rear end bearing, using the following SST.

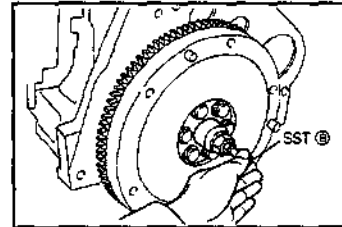
SST: 09286-87602-000



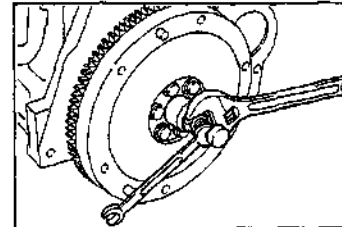
- (1) Insert the SST (A) into the crankshaft rear end bearing.



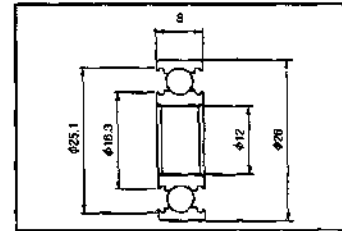
- (2) Insert the SST (B) into the SST (A).



- (3) While holding the SST (A) by means of a wrench or the like, tighten the nut. Then, remove the rear end bearing.



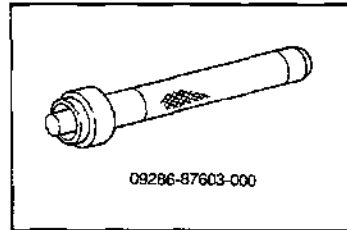
2. Inspect the crankshaft rear end bearing for damage or wear.



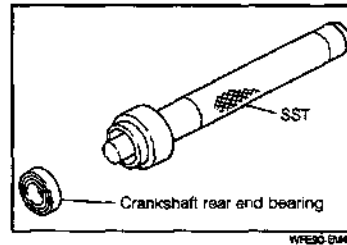
ENGINE MECHANICALS

3. Install the crankshaft rear end bearing, using the following SST.

SST: 09286-87603-000



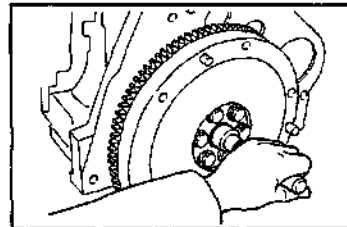
- (1) Install the crankshaft rear end bearing to the SST.



- (2) Press the crankshaft rear end bearing into the crankshaft rear end.

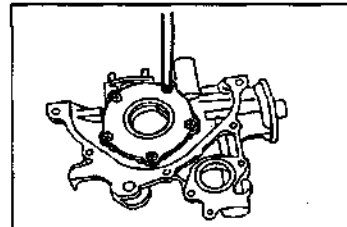
NOTE:

- Be sure to press the bearing, until the end surface of the SST contacts with the crankshaft rear end section.
- When pressing the bearing, be very careful not to allow the bearing to tilt.

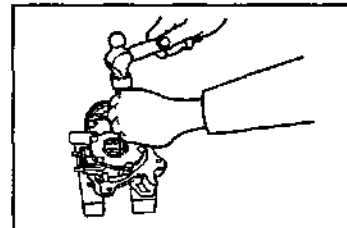


DISASSEMBLY OF OIL PUMP

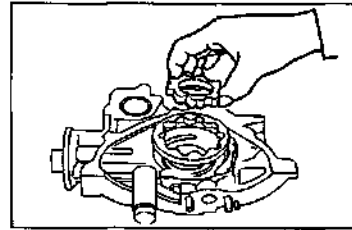
1. Detach the oil pump cover.
Disconnect the five attaching bolts.



2. Remove the front oil seal.



3. Remove the oil pump rotor set.

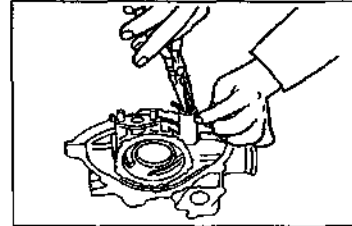


WPED0-EM813

4. Pull out the cotter pin, while pushing the spring retainer with nose pliers or the like.

NOTE:

- Put an appropriate cloth, etc. on the retainer spring so that it may not jump out.

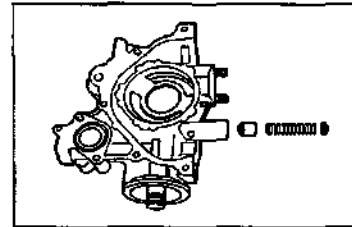


WPED0-EM814

5. Remove the oil pump relief valve spring retainer, compression spring and oil pump relief valve.

NOTE:

- Wash the disassembled parts in cleaning solvent.

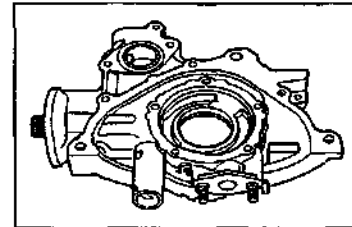


WPED0-EM815

6. Inspection of each part

- (1) Check the pump body for damage.

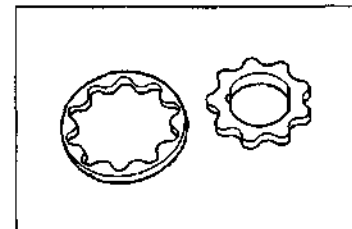
Replace the pump body if it exhibits damage.



WPED0-EM816

- (2) Check the rotor set for damage.

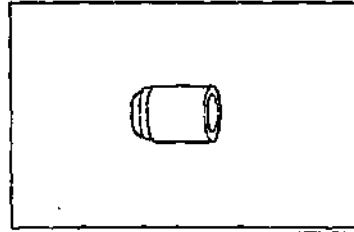
Replace the rotor set if it exhibits damage.



WPED0-EM817

ENGINE MECHANICALS

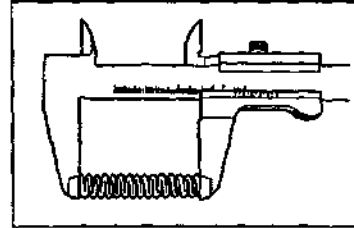
- (3) Check the oil pump relief valve for damage. Replace the relief valve if it exhibits damage. Also, check to see if any damage is present at the relief valve installation hole of the oil pump body.



WFE50-EM110

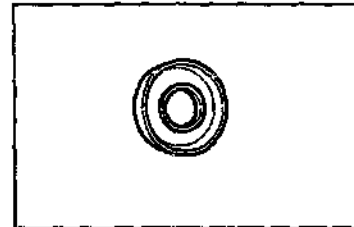
- (4) Check the compression spring for damage. Also, measure its free length. Specified Free Length: 57 mm

Replace the compression spring if it exhibits damage or the free length is less than the specified value.



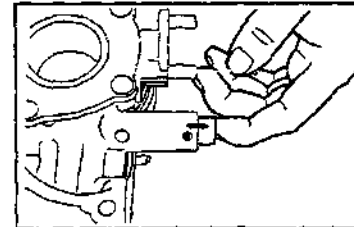
WFE50-EM405

- (5) Check the oil pump relief valve spring retainer for damage. Replace the retainer if it exhibits damage.



WFE50-EM116

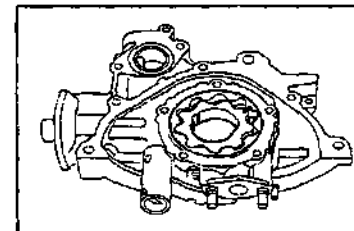
- (5) Apply engine oil to the oil pump relief valve. Insert the oil pump relief valve into the oil pump body. Check to see if the valve slides smoothly. Replace the oil pump body if the valve fails to slide smoothly.



WFE50-EM400

7. Measurement of body clearance, tip clearance and side clearance

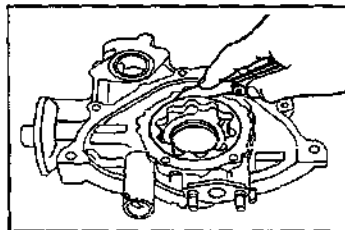
- (1) Apply a thin film of engine oil to the rotor mate surface of the oil pump body as well as to the rotor set. Assemble the rotor set in the oil pump body in such a way that the drilled mark may be seen from the outside.



WFE50-EM421

- (2) Measure the body clearance between the oil pump body and the outer rotor, using a thickness gauge.
Body Clearance: 0.20 - 0.28 mm

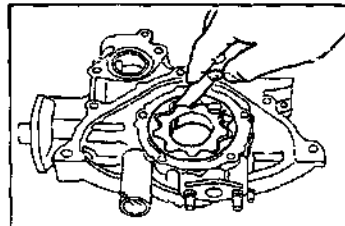
Replace the oil pump if the body clearance exceeds the specified value.



WF690-EM449

- (3) Measure the tip clearance of the rotor set, using a thickness gauge.
Tip Clearance: 0.16 - 0.24 mm

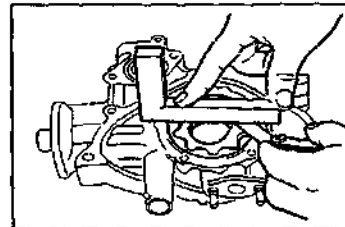
Replace the rotor set if the tip clearance exceeds the specified value.



WF690-EM450

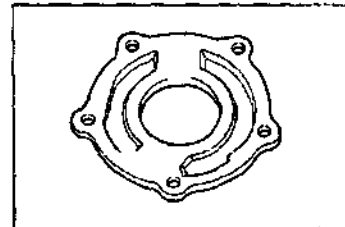
- (4) Measure the side clearance between the oil pump body and the rotor set, using a straightedge and a thickness gauge.
Side Clearance: 0.035 - 0.085 mm

Replace the oil pump if the side clearance exceeds the specified value.



WF690-EM451

8. Check to see if any wear is present at the rotor set mate surface of the pump cover.
 Replace the oil pump cover if it exhibits wear.



WF690-EM452

ASSEMBLY OF OIL PUMP

NOTE:

- Wash those parts to be assembled in cleaning solvent. Dry them using compressed air.



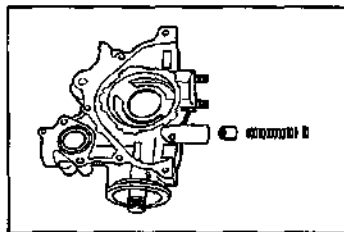
WF690-EM453

ENGINE MECHANICALS

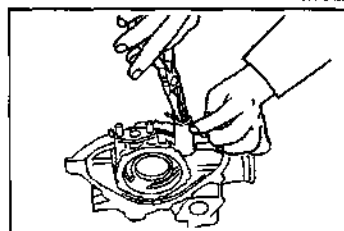
1. Apply engine oil to the relief valve. Then, insert the relief valve into the oil pump body.
2. Insert the compression spring and retainer into the oil pump body.

NOTE:

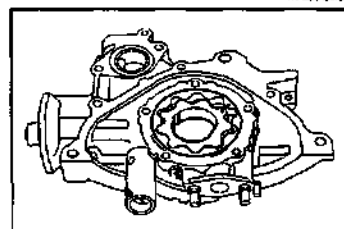
- Install the retainer in such a direction that its projected side may come at the compression spring side.



3. Insert a new cotter pin into the retainer while the retainer is being compressed with pliers, etc. Split the end of the cotter pin to form an anchor-like shape.

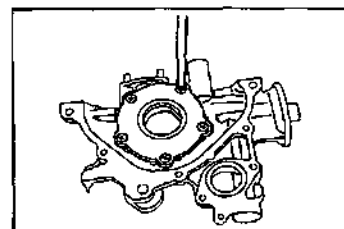


4. Apply engine oil to the rotor set. Assemble the rotor set in the pump body in such a direction that the drilled mark of the rotor may be seen from the outside.



5. Install the oil pump cover. Tighten the cover to the specified torque.

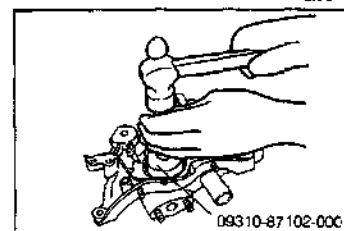
Tightening Torque: 7.8 - 12.7 N·m (0.8 - 1.3 kgf·m)



6. Drive a new oil seal into position, using the following SST.
SST: 09310-87102-000

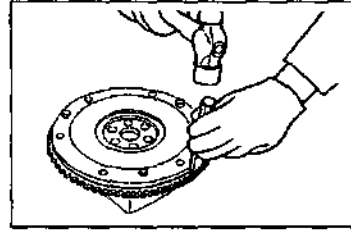
NOTE:

- Be very careful not to damage the oil pump during the installation.
- Make sure that the oil seal is not driven into position in a tilted state.



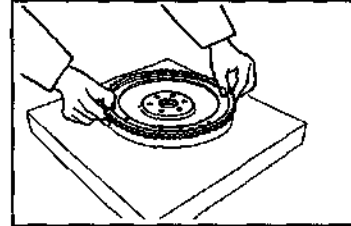
REMOVAL/INSTALLATION OF RING GEAR

1. Place the ring gear on an adequate wooden block. Drive out the ring gear, using a chisel in combination with a hammer.



WPB0-EM427

2. Place a new ring gear horizontally on the flywheel.



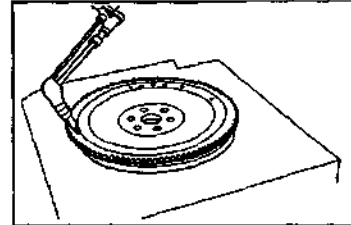
WPB0-EM428

3. Using a gas burner, heat the ring gear evenly, until the ring gear due to its own weight fits onto the flywheel.

NOTE:

- Do not tap the ring gear using a hammer or the like.
- Never cool the ring gear quickly using water or the like.

4. Allow the ring gear to cool naturally.

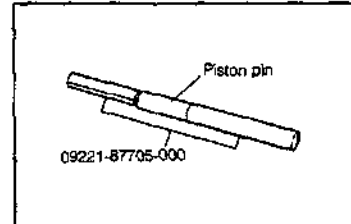


WPB0-EM429

ASSEMBLY OF PISTON AND CONNECTING ROD

1. Install the piston pin to the following SST in a way shown in the right figure.

SST: 09221-87705-000



WPB0-EM430

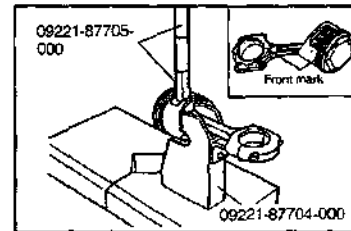
2. Install the piston and connecting rod in the SST in a way shown in the right figure. Insert the SST installed with the piston pin into the piston pin hole.

SST: 09221-87704-000

09221-87705-000

NOTE:

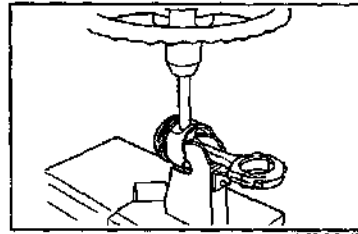
- The piston and connecting rod should be assembled in such a way that the piston front mark and connecting rod front mark come in the same direction.



WPB0-EM431

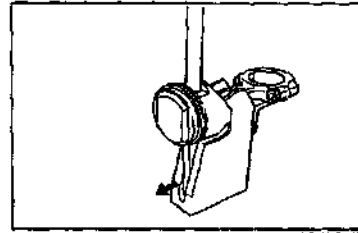
ENGINE MECHANICALS

3. Press the piston pin into the piston and connecting rod, using a hydraulic press.



WP590-EM457

4. Remove the piston and connecting rod assembly from the SST. Remove the SST from the piston pin.



WP590-EM458

ASSEMBLY OF CYLINDER BLOCK

NOTE:

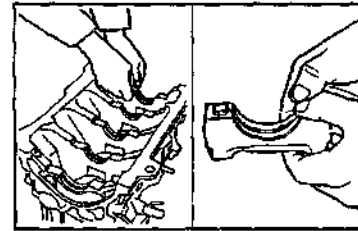
- As for those parts to be reassembled, wash them in cleaning solvent (excluding those parts, such as grease-sealed type bearings, dust seals and electrical parts). Then, dry them using compressed air.
- Remove any remaining sealer, etc. from the threaded portions of the switches and sensors.

WP590-EM459

1. Installation of crankshaft
(1) Install the bearings to the cylinder block and crankshaft bearing caps.

NOTE:

- Do not touch with the front and back surfaces of each bearing. Be sure to hold the bearing at its edge surfaces.

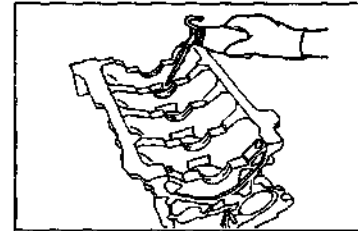


WP590-EM460

- (2) Lubricate the surface of each bearing with engine oil.

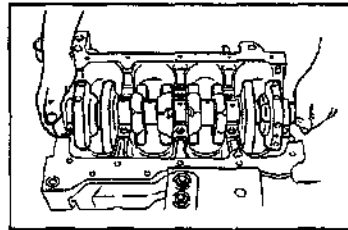
NOTE:

- Do not touch with the front and back surfaces of each bearing.
- Never apply engine oil to the crankshaft bearing caps.



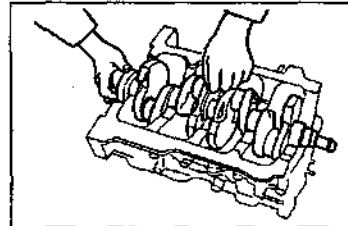
WP590-EM461

(3) Install the crankshaft in the cylinder block.



WFE90-EM401

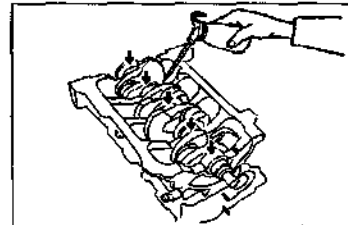
(4) Apply engine oil to the thrust washers. With the side having the oil groove facing toward the crankshaft side, insert each thrust washer between the crankshaft main journal No. 3 and the cylinder block.



WFE90-EM402

(5) Apply engine oil to the crankshaft main journal sections.
NOTE:

- Care must be exercised to ensure that no oil flows into the bearing cap attaching bolt holes.

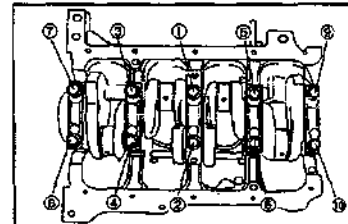


WFE90-EM403

(6) Install the crankshaft bearing caps with the arrow marks facing toward the oil pump side and also in the numerical sequence.

(7) Thinly apply engine oil to the crankshaft bearing cap bolts. Tighten the bolts to the specified torque over two or three stages in the sequence shown in the right figure.

Tightening Torque: 44.1 - 53.9 N·m (4.5 - 5.5 kgf·m)

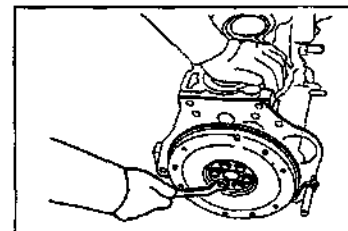


WFE90-EM404

2. Assembly of piston and connecting rod
Install the flywheel on the crankshaft temporarily.

NOTE:

- Care must be exercised to ensure that no oil, etc. gets to the bolts or bolt holes.



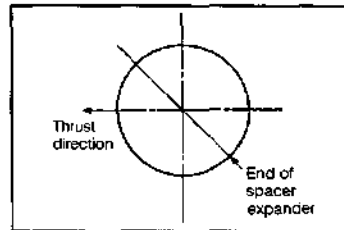
WFE90-EM405

ENGINE MECHANICALS

- (1) Install the oil ring spacer expander in the oil ring groove. Ensure that the expander end may not line up with the thrust direction nor with the axial direction.

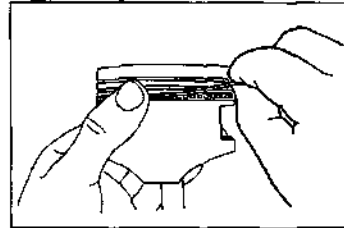
NOTE:

- Do not expand the spacer expander to an extent more than necessary.



WP290-BM435

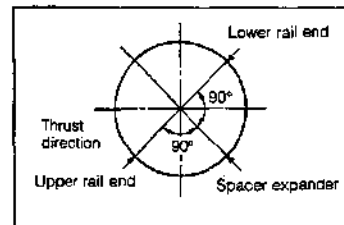
- (2) Fit the upper rail into position in such a manner that it is wound up while pushing the edge section of the oil ring spacer expander with your thumb.



WP290-EM436

NOTE:

- Ensure that the rail end is deviated 90-degrees to the left from the end of the oil ring spacer expander.
- Do not expand the rail to an extent more than necessary.

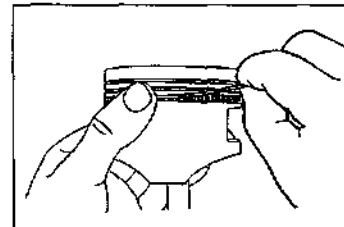


WP290-BM451

- (3) Fit the lower rail into position in such a manner that it is wound up.

NOTE:

- Ensure that the rail end is deviated 90-degrees to the right from the end of the oil ring spacer expander.
- Do not expand the rail to an extent more than necessary.
- Make sure that the oil ring can be rotated smoothly.

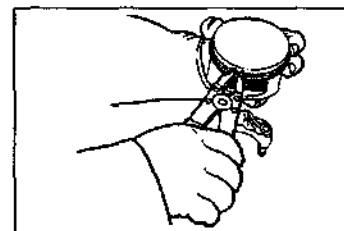


WP290-EM462

- (4) Install the compression ring No. 2 with the stamped mark of T, 2T, N or 2N facing upward, using a piston ring expander.

NOTE:

- Do not expand the piston ring to an extent more than necessary.



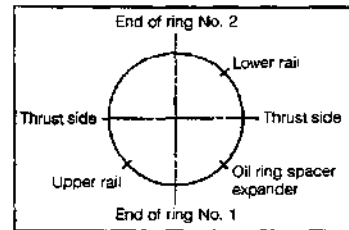
WP290-EM467

- (5) Install the compression ring No. 1 with the stamped mark of T or N facing upward, using a piston ring expander.

- (6) Position the piston rings so that each ring end may come at the respective points as indicated in the right figure.

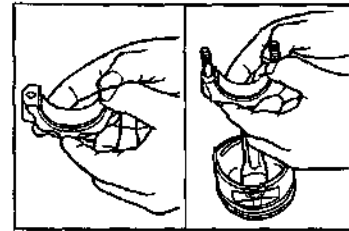
NOTE:

- It is not necessarily required to follow strictly the right figure. However, be sure that the ring end is not lined up with the thrust direction. Also, each ring should be deviated about 120 to 180 degrees from the adjacent ring.



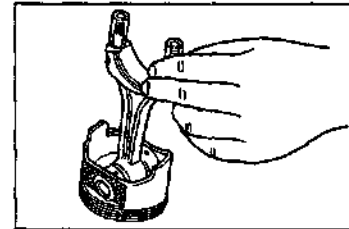
WF820-EM465

- (7) Install the connecting rod bearings on the connecting rod and connecting rod cap, making sure that your fingers will not touch with the front and back surfaces of the bearings.



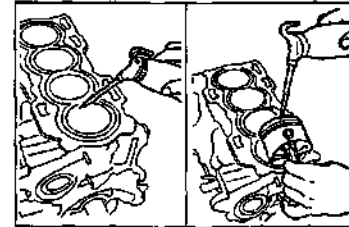
WF820-EM463

- (8) Cut an appropriate vinyl hose to a suitable length. Fit the vinyl hose to each connecting rod bolt sections.



WF820-EM462

- (9) Apply engine oil to the piston rings, piston pins, connecting rod bearings, cylinder walls and crankpin journals.



WF820-EM460

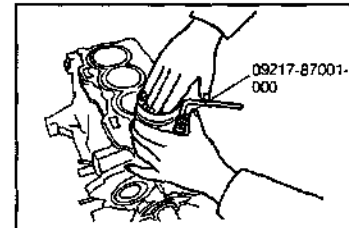
- (10) Compress the piston rings by means of the piston ring compressor SST, making sure that the piston ring ends will not move during the installation.

SST: 09217-87001-000

- (11) Push the piston by hand into the cylinder bore with the front mark facing toward the oil pump side.

NOTE:

- Be very careful to avoid damaging the connecting rod bearings during the installation.
- Care must be exercised to ensure that the crankpin journal is not scratched by the connecting rod.



WF820-EM461

- (12) Push the piston by hand until the connecting rod reaches the crankpin journal.

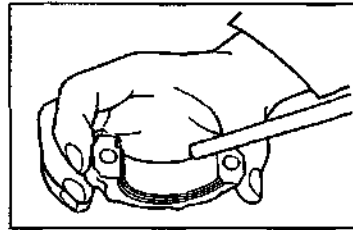
ENGINE MECHANICALS

- (13) Apply engine oil to the bearing surface of each connecting rod bearing.

NOTE:

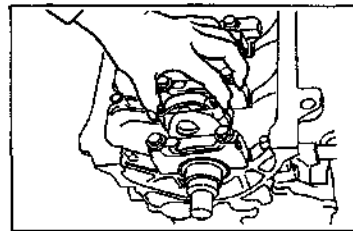
- Do not touch with the bearing front surface.

- (14) Remove the vinyl hoses which were attached to the connecting rod bolt sections.



WPES0-EM842

- (15) Install the connecting rod cap with the front mark facing toward the oil pump side.



WPES0-EM843

- (16) Prevent the crankshaft from turning, using the following SST.

SST: 09210-87701-000

- (17) Thinly apply engine oil to the connecting rod cap attaching nuts. Tighten the nuts to the specified torque evenly over two or three stages.

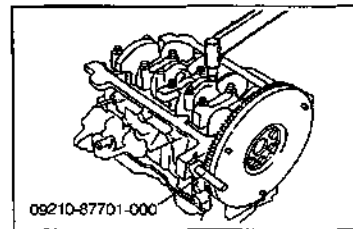
Tightening Torque: 34.3 - 44.1 N·m (3.5 - 4.5 kgf·m)

- (18) Perform the operations described in the steps (1) through (18) for each cylinder.

- (19) Remove the flywheel.

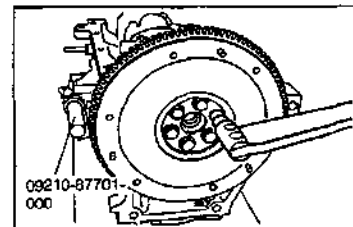
- (20) Remove the following SST.

SST: 09210-87701-000



09210-87701-000

WPES0-EM844



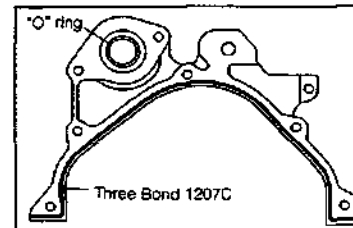
09210-87701-000

WPES0-EM844

3. Installation of oil pump

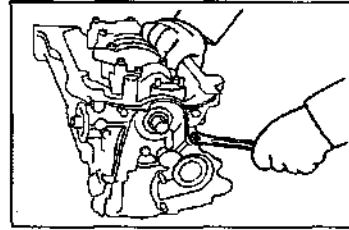
- (1) Apply the Three Bond 1207C to the oil pump installation surface of the cylinder block, as indicated in the right figure.

- (2) Replace the "O" ring of the oil pump with a new part.



WPES0-EM845

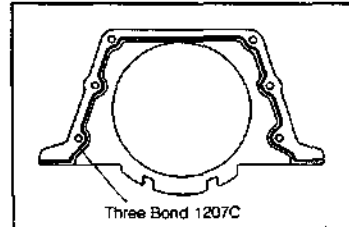
- (3) Apply engine oil to the inner surface of the oil seal. Install the oil pump to the cylinder block. Tighten the seven attaching bolts to the specified torque.
Tightening Torque: 5.9 - 8.8 N·m (0.6 - 0.9 kgf·m)



WPB0-EM465

4. Installation of oil seal retainer

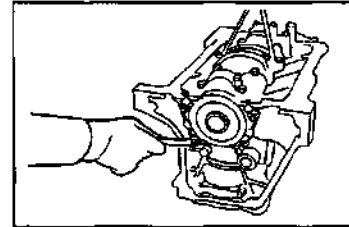
- (1) Apply the Three Bond 1207C to the oil seal retainer installation surface of the cylinder block, as indicated in the right figure.



Three Bond 1207C

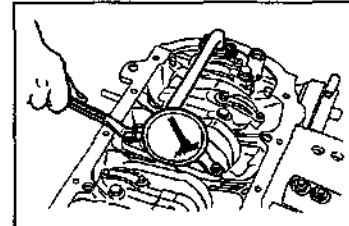
WPB0-EM466

- (2) Apply engine oil to the inner surface of the oil seal. Install the oil seal retainer to the cylinder block. Tighten the four attaching bolts to the specified torque.
Tightening Torque: 5.9 - 8.8 N·m (0.6 - 0.9 kgf·m)



WPB0-EM467

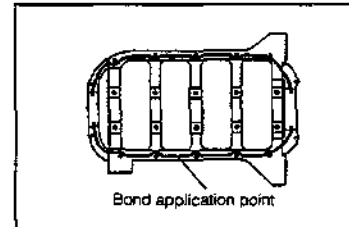
5. Install the oil strainer with a new gasket interposed. Tighten the two oil strainer nuts and two bolts to the specified torque.
Tightening Torque: 8.8 - 11.8 N·m (0.9 - 1.2 kgf·m)



WPB0-EM467

6. Installation of oil pan

- (1) Apply the Three Bond 1207C to the oil pan installation surface of the cylinder block, as indicated in the right figure.



Bond application point

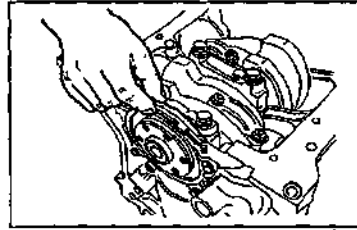
WPB0-EM467

ENGINE MECHANICALS

(2) Place the oil pan gasket.

NOTE:

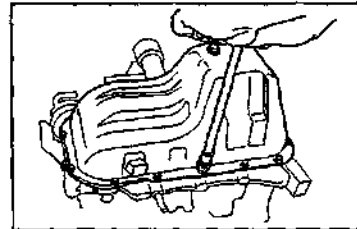
- Ensure that the end section of the oil pan gasket is overlapped at least 10 mm with the Three Bond 1207C.



WF230-EM462

(3) Install the oil pan. Tighten the four oil pan attaching nuts and ten bolts to the specified torque over two or three stages.

Tightening Torque: 6.9 - 11.8 N·m (0.7 - 1.2 kgf·m)

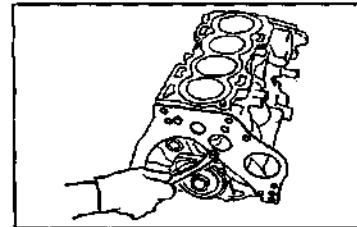


WF230-EM469

7. Install the rear end plate.

Tighten the two rear end plate attaching bolts to the specified torque.

Tightening Torque: 9.8 - 14.7 N·m (1.0 - 1.5 kgf·m)



WF230-EM470

8. Installation of flywheel

(1) Install the flywheel on the crankshaft.

WF230-EM478

(2) Application of flywheel bolt sealing material

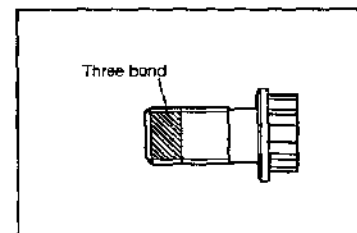
① Wash the flywheel bolts. Then, degrease and dry them.

NOTE:

- When degreasing the bolts, remove any oil completely, using a solvent such as a degreasing spraying agent or alcohol.

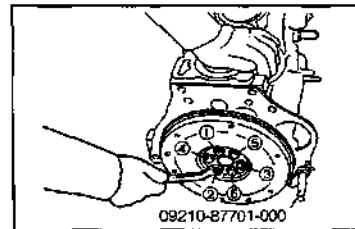
CAUTION:

- Make sure that no bond nor other foreign matter, such as dust, gets to the bolts.
- Even when new bolts are used, be sure to perform this operation.



WF230-EM479

- ② Check the flywheel bolts for damage. Replace any flywheel bolt which exhibits damage with a new one.
CAUTION:
 - Even when a new bolt is used, be sure to perform the operation in the step ①.
 - ③ Clean the flywheel bolt threaded holes at the rear end section of the crankshaft. Degrease and dry them.
CAUTION:
 - Make sure that no bond nor other foreign matter, such as dust, gets to the bolt threaded holes.
 - As for degreasing, wipe off any oil from the threaded portion with a cloth damped with alcohol.
 - Never allow alcohol to get to resin or rubber parts, specifically, the rear oil seal.
 - ④ Clean the bolt seating surface of the flywheel and degrease it.
NOTE:
 - As for degreasing, wipe the bolt seating surface with a cloth damped with alcohol.
 - Never allow alcohol to get to resin or rubber parts.
 - ⑤ Apply two to three drops of the Three Bond 1324 to the forward end of the threaded portion of each flywheel bolt.
CAUTION:
 - If the Three Bond 1324 is applied excessively beyond the specified amount, the bond sealer will penetrate up to the bolt seating surface. This may cause loosening of the bolts.
 - Never use bond sealers other than the designated one.
 - Never allow the bond sealer to get to resin or rubber parts.
- (3) Tighten the flywheel attaching bolts temporarily to the specified torque in the sequence indicated in the right figure.
Tightening Torque: 44.1 - 63.7 N·m (4.5 - 6.5 kgf·m)
- NOTE:
- Prevent the crankshaft from turning at the ring gear section, using the following SST.
- SST: 09210-87701-000
- CAUTION:
- When tightening the bolt, make sure that no bond is present on the bolt seating surface.
 - If the bond oozes out, perform the operations again, starting the step (2).
- (4) Tighten the flywheel attaching bolts to the specified torque in the sequence indicated in the right figure.
Tightening Torque: 78.5 - 98.0 N·m (8.0 - 10.0 kgf·m)

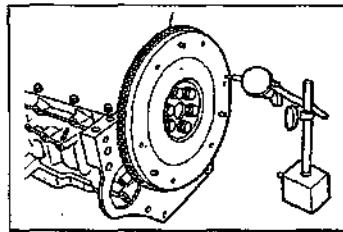


ENGINE MECHANICALS

- (5) Measure the flywheel runout, using a dial gauge.
Allowable Runout Limit: 0.1 mm

NOTE:

- Replace the flywheel if its runout exceeds the allowable limit.



WPED0-EM472

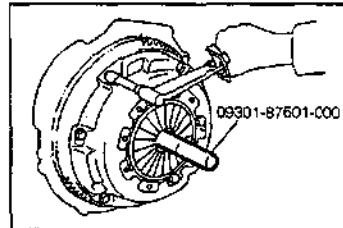
9. Assembly of clutch disc and pressure plate

- (1) Insert the following SST into the crankshaft rear end.
SST: 09301-87601-000

- (2) Install the clutch disc.

- (3) Install the pressure plate, lining up the locating pin of the pressure plate. Tighten the attaching bolts to the specified torque.

Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)

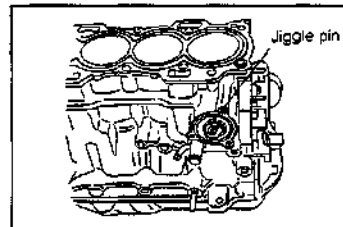


WPED0-EM473

10. Install the thermostat in the cylinder block in such a way that the jiggle pin section may come at the upper side.

CAUTION:

- Make sure to install the jiggle pin of the thermostat in the correct direction. Failure to observe this precaution will be cause of overheating.

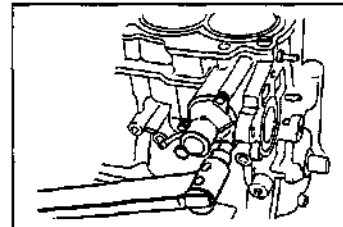


WPED0-EM650

11. Install the water inlet.

Tighten the three water inlet attaching bolts to the specified torque.

Tightening Torque: 5.9 - 8.8 N·m (0.6 - 0.9 kgf·m)



WPED0-EM474

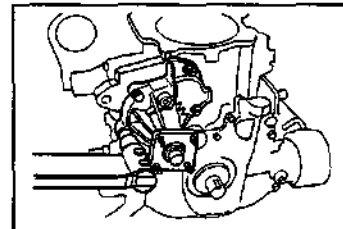
12. Installation of water pump

- (1) Install a new water pump gasket on the cylinder block.
(2) Install and tighten the three water pump attaching bolts and two nuts to the specified torque.

Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)

NOTE:

- When the stud bolts have been replaced, apply the Three Bond 1377B to the threaded portion at the cylinder block side.

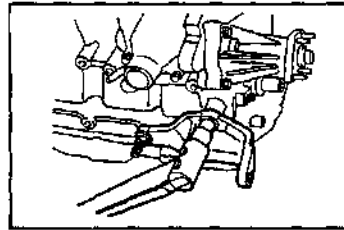


WPED0-EM475

13. Install the alternator bracket.

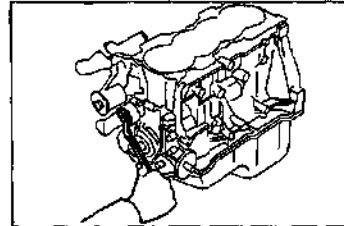
Tighten the one alternator bracket attaching bolt and nut to the specified torque.

Tightening Torque: 34.4 - 49.0 N·m (3.5 - 5.0 kgf·m)



WP590-EM476

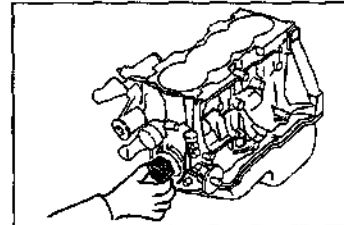
14. Assemble the tensioner tension spring as indicated in the right figure. Push the tensioner to the alternator side as far as it will go. Tighten the tensioner temporarily.



WP590-EM51

15. Install the crankshaft pulley flange in such a way that its recessed side may come at the cylinder block side.

16. Install the crankshaft timing belt pulley.



WP590-EM52

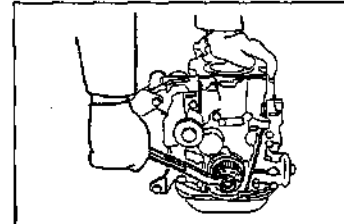
17. Install the crankshaft timing belt attaching bolt. Tighten the bolt to the specified torque.

Tightening Torque: 88.3 - 98.0 N·m (9.0 - 10.0 kgf·m)

NOTE:

- Prevent the crankshaft from turning, using the following SST.

SST: 09210-87701-000



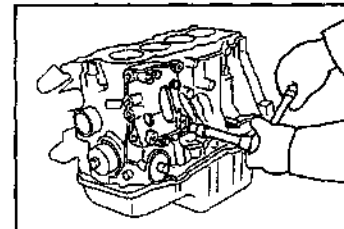
WP590-EM477

18. Install the compressor mounting bracket.

(Air conditioner equipped vehicle only)

Tighten the four compressor mounting bracket attaching bolts to the specified torque.

Tightening Torque: 29.4 - 44.1 N·m (3.0 - 4.5 kgf·m)

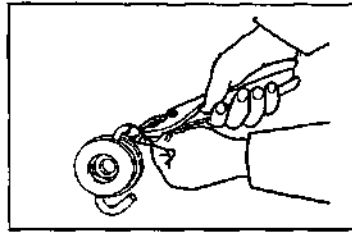


WP590-EM478

ENGINE MECHANICALS

19. Installation of the oil cooler.

- (1) Install a new "O" ring.
- (2) Connect the oil cooler hose to the oil cooler.
- (3) Place the rib for locating the oil cooler to the cylinder block. Then install the oil cooler with the set bolts.

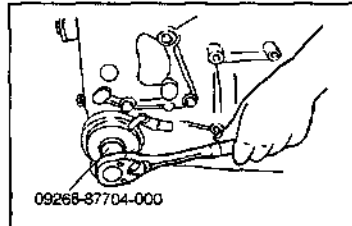


WP290-EM653

- (4) Tighten the set bolts to the specified torque using the following SST.

SST: 09268-87704-000

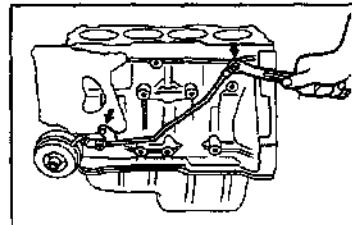
Tightening Torque: 24.5 - 34.3 N·m (2.5 - 3.5 kgf·m)



09268-87704-000

WP290-EM679

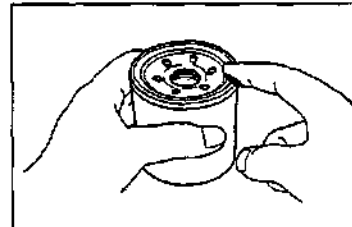
- (5) Connect the oil cooler inlet pipe into the oil cooler hose and install the hose band.
- (6) Install the oil cooler pipe to the cylinder block with a new gasket interposed.



WP290-EM654

20. Installation of oil filter

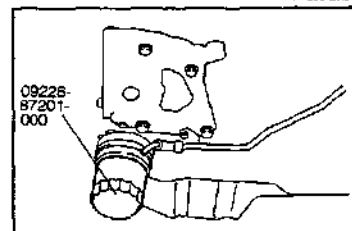
- (1) Thinly apply engine oil to the oil seal of the oil filter.



WP290-EM655

- (2) Screw in the oil filter until the oil seal of the oil filter comes in contact with the oil pump or the contact surface of the oil cooler.
- (3) Then, rotate the oil filter further one complete turn 360-degrees, using the following SST.

SST: 09228-87201-000



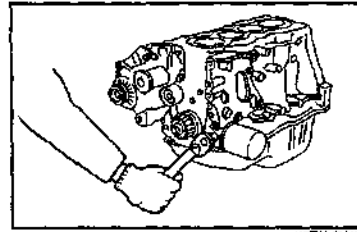
09228-87201-000

WP290-EM660

ENGINE MECHANICALS

21. Installation of oil pressure switch

- (1) Clean the threaded portion of the oil pressure switch. Wind seal tape around the threaded portion.
 - (2) Tighten the oil pressure switch to the specified torque, using a long box wrench having a hexagonal hole.
- Tightening Torque: 11.8 - 19.6 N·m (1.2 - 2.0 kgf·m)



WPED0-EM481

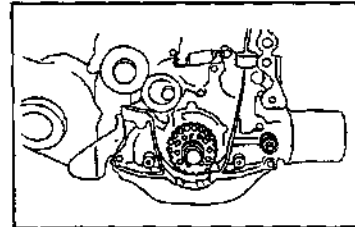
22. Install the alternator.

At this time, temporarily install the alternator by installing the alternator attaching bolts, adjusting bar, adjusting bar attaching bolt and alternator adjusting bolt.

WPED0-EM486

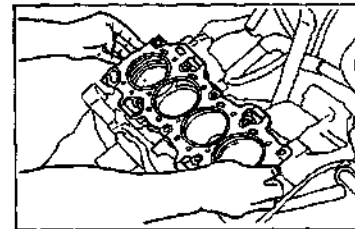
ASSEMBLY OF CYLINDER HEAD

1. Align the stamped mark of the crankshaft timing belt pulley with the indicator of the oil pump.



WPED0-EM487

2. Install the cylinder head gasket on the cylinder block.

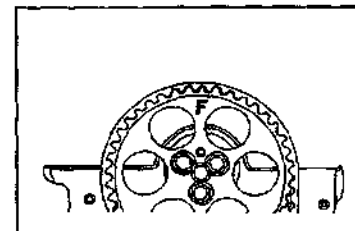


WPED0-EM488

3. Turn the camshaft, until the "F" mark of the camshaft timing belt pulley comes exactly at the top position.
4. Install the cylinder head assembly on the cylinder block.

NOTE:

- Be very careful not to damage the cylinder head gasket and cylinder head gasket surface.



WPED0-EM489

ENGINE MECHANICALS

5. Apply engine oil to the threaded portion of each cylinder head bolt. Install the bolts to the cylinder head.

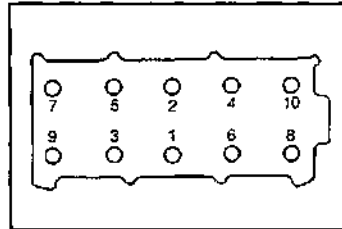
NOTE:

- As for the two bolts at the distributor side, use the bolt whose nominal length is 112 mm, which is shorter than that of others.
- The cylinder head bolt attaching holes provided on the cylinder block should be in dry condition.

WPB0-EM482

6. Tighten the cylinder head bolts evenly over two or three stages to the specified torque, following the sequence shown in the right figure.

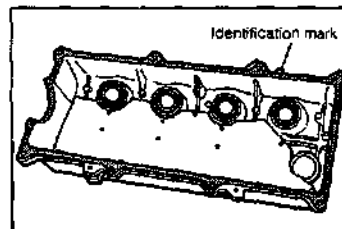
Tightening Torque: 58.8 - 66.7 N·m (6.0 - 6.8 kgf·m)



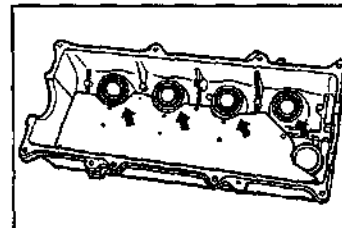
WPB0-EM480

INSTALLATION OF CYLINDER HEAD COVER

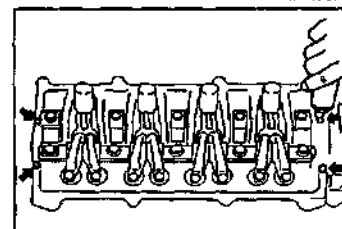
1. Check the cylinder head cover gasket for damage.
Replace the cylinder head cover gasket if it is damaged.
2. Removal of cylinder head cover gasket
(Only case where such replacement is required:)
Remove the cylinder head cover gasket from the cylinder head cover. Install a new cylinder head cover gasket in such a way that the identification mark comes at the intake side.
3. Check the spark plug tube grommets for damage.
Replace any grommet which exhibits damage.
4. Wipe off any oil from the cylinder head cover gasket surface of the cylinder head.
5. Apply the Three Bond 1104 to the mate surface of the cylinder head with the camshaft bearing caps No. 1 and No. 5, but only to those sections which contact the cylinder head gasket.



WPB0-EM489



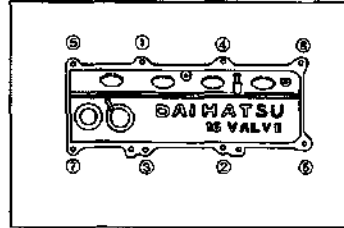
WPB0-EM490



WPB0-EM490

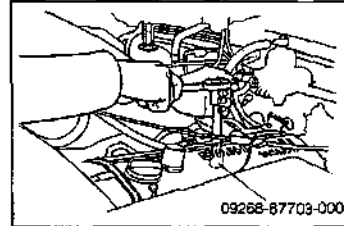
ENGINE MECHANICALS

6. Install the cylinder head cover to the cylinder head. Tighten the cylinder head cover attaching bolts to the specified torque, following the sequence in the right figure.
Tightening Torque: 2.9 - 4.9 N·m (0.3 - 0.5 kgf·m)



WPED-EM464

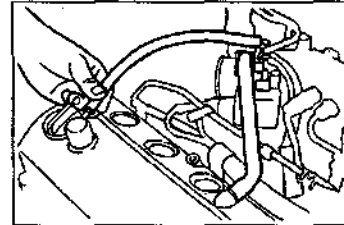
7. Install the spark plugs, using the following SST.
SST: 09268-87703-000



09268-87703-000

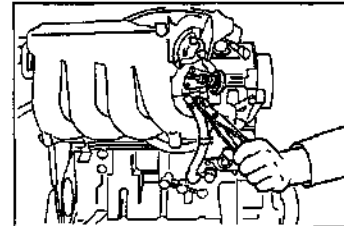
WPED-EM465

8. Connect the PCV hose to the cylinder head cover.



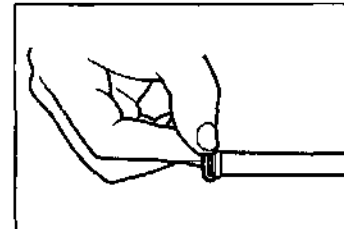
WPED-EM466

9. Connect the water hose to the throttle body.



WPED-EM467

10. Replace the "O" ring of the oil level gauge guide with a new "O" ring.

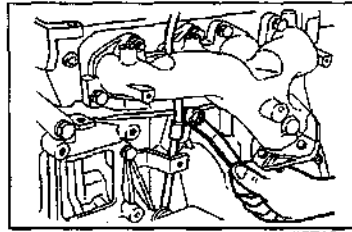


WPED-EM468

ENGINE MECHANICALS

11. Insert the oil level gauge guide into the cylinder block.
12. Install the oil level gauge guide attaching bolts.

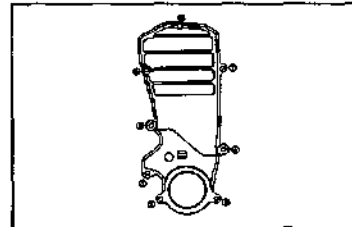
Tightening Torque: 18.6 - 30.4 N·m (1.9 - 3.1 kgf·m)



13. Install the oil level gauge.
14. Installation of timing belt.
 - (1) Check the timing belt.
(See page EM-38.)
 - (2) Install the timing belt.
(See page EM-32.)



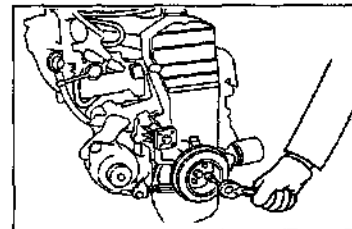
15. Install the timing belt cover.
(See page EM-45.)



16. Install the crankshaft pulley.
Tightening Torque: 19.6 - 29.4 N·m (2.0 - 3.0 kgf·m)

NOTE:

- Prevent the crankshaft from turning, using the following SST.
SST: 09210-87701-000

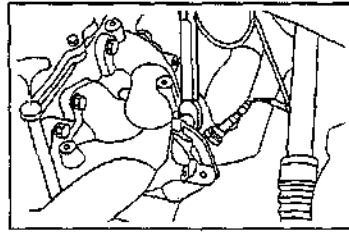


ENGINE MECHANICALS

5. Connection of exhaust pipe

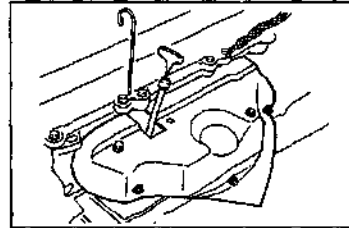
- (1) Connect the exhaust pipe to the exhaust manifold with a new gasket interposed.

Tightening Torque: 34.3 - 49.0 N·m (3.5 - 5.0 kgf-m)



- (2) Install the exhaust manifold cover with the five attaching bolts.

Tightening Torque: 5.9 - 8.8 N·m (0.6 - 0.9 kgf-m)



- (3) Connect the exhaust pipe bracket to the side of the transmission.

Tightening Torque: 15.7 - 21.6 N·m (1.6 - 2.2 kgf-m)

WFE90-EM485

6. Installation of starter

- (1) Install the starter to the engine block with the two attaching bolts.

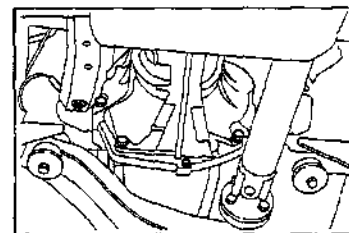
Tightening Torque: 49.0 - 68.6 N·m (5.0 - 7.0 kgf-m)

- (2) Connect the connector with lock and the harness clamping bolt.



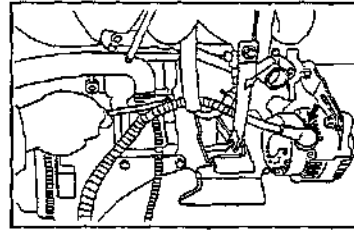
7. Tighten the five attaching bolts between the engine side and the transmission side.

Tightening Torque: 49.0 - 68.6 N·m (5.0 - 7.0 kgf-m)



ENGINE INSTALLATION

1. Installation of engine harness onto engine
 - (1) Install the engine wire to the engine.
 - (2) Connect the engine wire clamp.
 - (3) Connect the alternator connector and terminal.

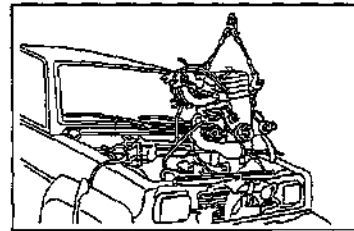


WPB30-EM488

2. Sling the engine, using a chain block. Place the engine in the engine compartment.

CAUTION:

- Be very careful not to allow the engine to hit to the vehicle body or other parts.



WPB30-EM489

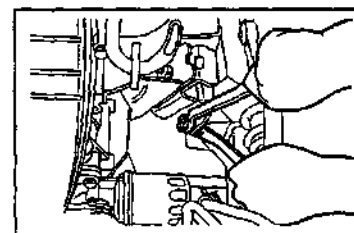
3. Connection of engine and transmission
 - (1) Lower the engine down to a height where the engine can be connected to the transmission with ease, using a chain block.
 - (2) Carefully bring the engine toward the transmission side. Insert the transmission input shaft into the clutch disc.
 - (3) While correcting the angle of the engine, align the attaching bolt holes of the transmission with those of the engine.
 - (4) Temporarily connect the engine with the transmission by inserting the attaching bolts so that the transmission may not be detached from the engine.

WPB30-EM490

4. Installation of engine mounting
 - (1) Install the engine mounting provided at the left side of the engine to the engine bracket.

WPB30-EM491

- (2) Adjust the engine position. Secure the engine mounting to the engine mounting attaching section at the vehicle body with the four bolts.
- Tightening Torque: 29.4 - 44.1 N·m (3.0 - 4.5 kgf·m)

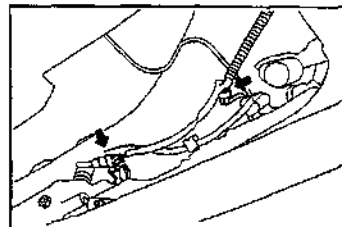


WPB30-EM492

8. Remove the chain block from the engine.

WPB90-EM496

9. Connect the connectors onto the transmission and transfer by jacking up the vehicle. Connect the air breather hose onto the transmission.

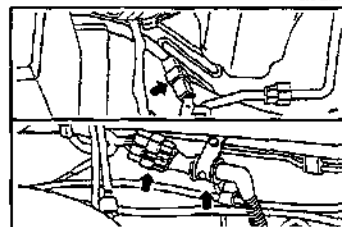


WPB90-EM498

10. Connect the harness and wire.

[HD-C Engine]

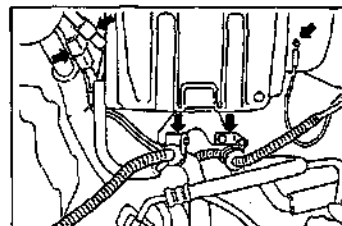
- (1) Clamp of battery negative \ominus terminal to engine bracket at battery carrier side
- (2) Clamp of battery positive \oplus terminal to starter at battery carrier side
- (3) Connector of cable leading to battery at battery carrier side



WPB90-EM499

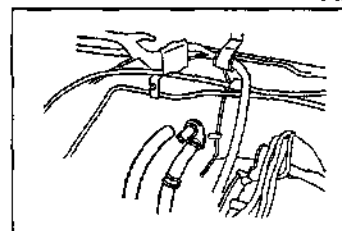
[HD-E Engine]

- (1) Clamp of battery negative \ominus terminal to engine bracket at battery carrier side
- (2) Clamp of battery positive \oplus terminal to starter at battery carrier side
- (3) Clamp of battery cable \oplus leading to cowl at battery carrier side
- (4) Three connectors of cable leading to relay box at battery carrier side



WPB90-EM501

11. Install the inlet and outlet hoses to the heater pipes at the dash panel.



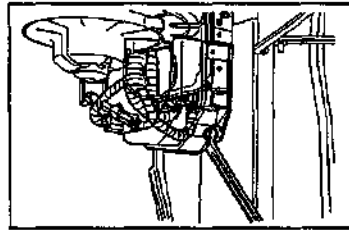
WPB90-EM502

ENGINE MECHANICALS

12. Installation of engine wire harness

(1) Installation of engine wire harness for ECU

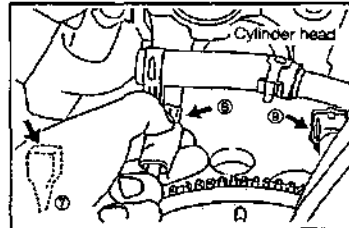
- ① Install the engine wire connector for ECU to the cowl side panel at the passenger seat side through the dash panel.
- ② Connect the engine wire connector to the engine control computer assembly.
- ③ Install the ECU cover at the cowl panel of passenger seat side.



WPED0-EM503

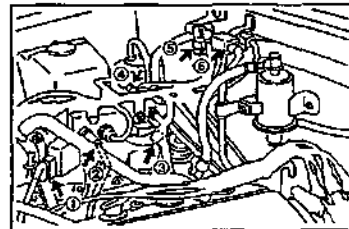
(2) Connect the following connectors.

- ① Oxygen sensor ⑩
- ② Water temperature sensor ③
- ③ Water temperature sender gauge ⑧
- ④ Air conditioner water temperature switch ⑦



WPED0-EM504

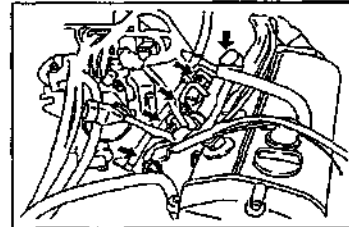
- ⑤ Pressure sensor, pressure VSV and clamp ⑥
- ⑥ Air conditioner idle-up VSV ⑤
- ⑦ EGR VSV ④ (U.S. specifications only)
- ⑧ Idle speed control VSV ② (U.S. specifications only)
- ⑨ Intake air temperature sensor ②
- ⑩ Throttle position sensor ①



WPED0-EM505

(3) Connect the four injector connectors.

(4) Connect the engine wire clamps and engine ground cables.



WPED0-EM506

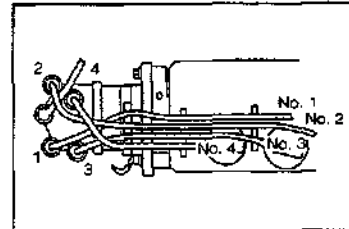
13. Connection of distributor

(1) Install the distributor into the cylinder head.

(2) Tighten the two attaching bolts.

(3) Connect the distributor wire connector.

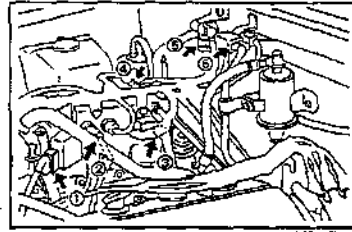
Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)



WPED0-EM507

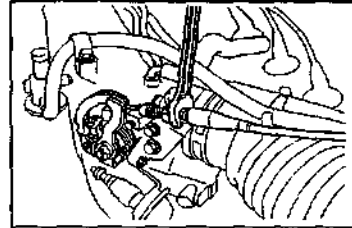
14. Connect the following vacuum hoses at surge tank side.

- (1) Distributor diaphragm ①
- (2) BVSV ②
- (3) Pressure VSV ③
- (4) Air conditioner idle-up VSV ④
- (5) Power steering ACV ⑤
- (6) Brake booster ⑥
- (7) Charcoal canister ⑦



WP50-EM500

15. Connect the accelerator cable.

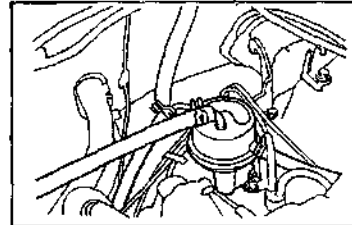


WP50-EM500

16. Connection of fuel hose

[HD-E Engine]

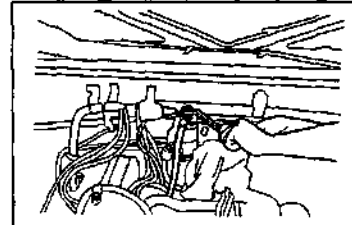
- (1) Connect the fuel hose to the fuel pump. Then, connect the clamp for fuel hose.
- (2) Connect the fuel return hose to the fuel pump. Then, connect the clamp for fuel return hose.



WP50-EM510

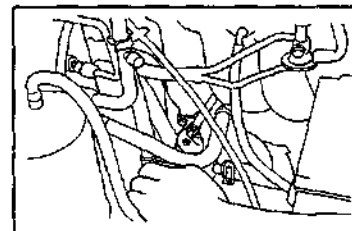
[HD-E Engine]

- (1) Connect the fuel hose at the upper part of the fuel filter.
- Tightening Torque: 34.3 - 44.1 N·m (3.5 - 4.5 kgf·m)



WP50-EM511

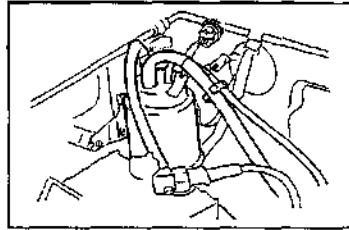
- (2) Install the fuel return hose to the fuel pipe No.2.



WP50-EM512

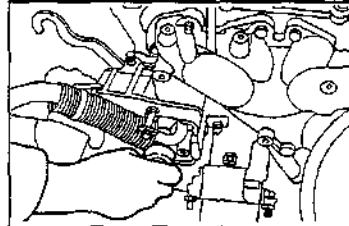
ENGINE MECHANICALS

17. Connect the outer vent hose to the charcoal canister.
(HD-C Engine: GCC specifications only)



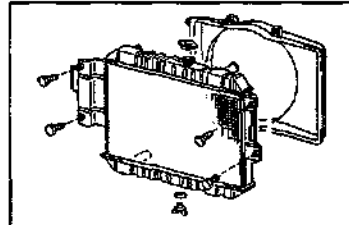
WP500-EM513

18. Installation of air conditioner compressor
(1) Install the compressor assembly with the attaching bolts.
(2) Install the compressor cover with the attaching bolts.



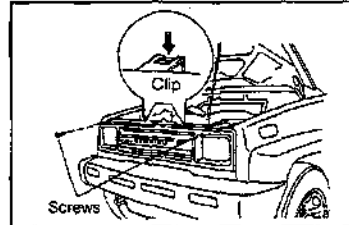
WP500-EM514

19. Installation of radiator
(1) Install the radiator with the four attaching bolts.



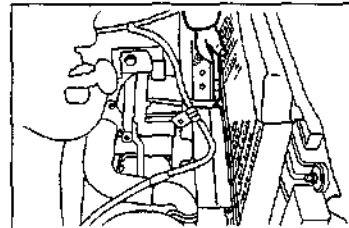
WP500-EM515

- (2) Install the radiator grille.



WP500-EM516

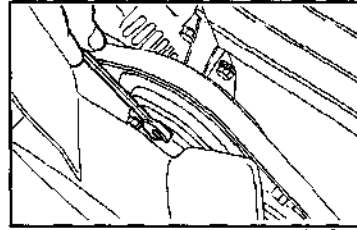
- (3) Install the oil cooler hose to the radiator.



WP500-EM530

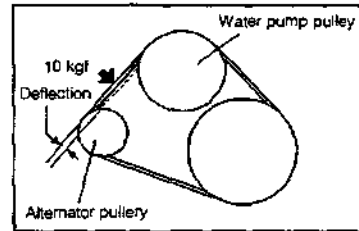
ENGINE MECHANICALS

- (4) Connect the fluid coupling with the fan by means of the four attaching bolts. Then, connect the fluid coupling with fan together with the fan shroud.
Tightening Torque: 9.8 - 17.7 N·m (1.0 - 1.8 kgf-m)



WFE0-04517

- (5) Install the V ribbed belt.
(6) Perform the adjustment in such a way that the deflection at the midpoint between the water pump pulley and the alternator pulley becomes the specified value when a force of 10 kg (22 lb) is applied to the midpoint.
Specified Belt Deflection
New Belt: 4.0 - 5.0 mm
Used Belt: 5.0 - 6.0 mm

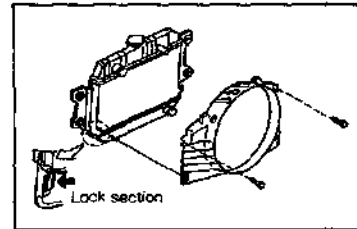


WFE0-04518

NOTE:

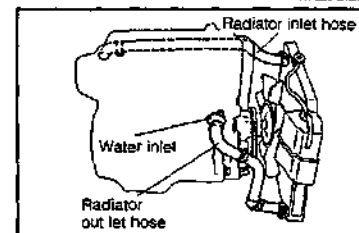
- "New belt" refers to a belt which has been used less than 5 minutes on a running engine.
- "Used 5 belt" refers to a belt which has been used on a running engine 5 minutes or more.

- (7) Insert the lock section of the fan shroud to the radiator. Then, tighten the two attaching bolts at the radiator upper side.



WFE0-04520

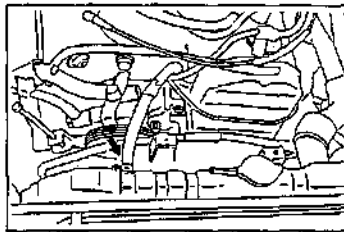
- (8) Connect the radiator hose No.1 to the radiator upper tank. Tighten the two clamps and two attaching bolts.
(9) Connect the radiator outlet hose to the center connection.



WFE0-04521

ENGINE MECHANICALS

- (10) Connect the air breather hose from the radiator upper tank.



WPFB0-EM632

20. Installation of air cleaner and air cleaner hose assembly

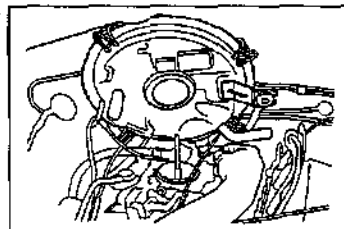
[HD-C Engine]

- (1) Install the air cleaner assembly with the attaching bolt of the air cleaner bracket and wing nut.

WPFB0-EM635

- (2) Connect the following hoses to the air cleaner.

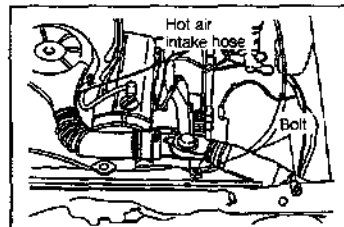
- ① ITC vacuum hoses
- ② PCV hose
- ③ Vacuum hose to BVS



WPFB0-EM636

- (3) Connect the vacuum motor hose and hot air intake hose.

- (4) Connect the air cleaner hose to the air cleaner case with the two bolts.

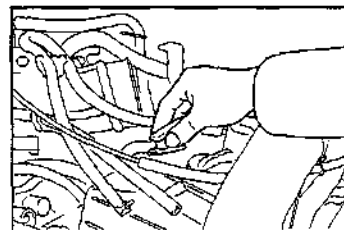


WPFB0-EM637

- (5) Connect the plug wires to the spark plugs.

NOTE:

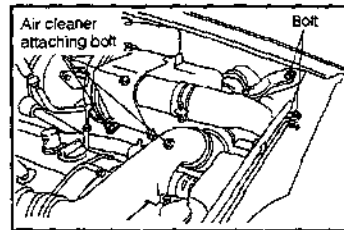
- Make sure that the spark plug wire is connected securely to each spark plug.
- Care should be exercised not to damage the spark plug wire rubber grommet with the spark plug tube.



WPFB0-EM638

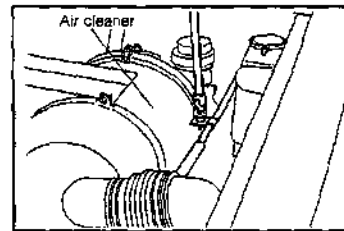
[HD-E Engine]

- (1) Place the air cleaner assembly. Then, tighten the three air cleaner attaching bolts.
- (2) Connect the bolts provided at the left fender panel and radiator support.
- (3) Connect the clamp for clutch cable at the air cleaner.



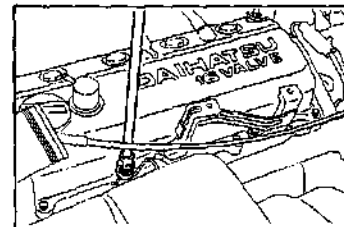
WPB0-EN519

- (4) Connect the intake air hose to the throttle body. Tighten the clamp for the intake air hose.



WPB0-EN520

- (5) Tighten the air chamber bracket tightening bolts and clamp bolt. Clamp the accelerator cable.
Tightening Torque: 3.0 - 4.9 N·m (0.3 - 0.5 kgf·m)

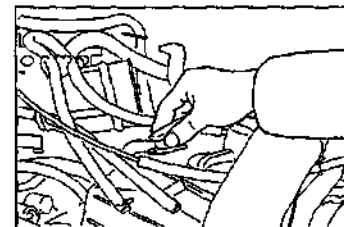


WPB0-EN521

- (6) Connect the bond cable to the air chamber bracket. Tighten the attaching bolts.
(Only for the radio-equipped vehicle)
- (7) Install the plug wires to the spark plugs.

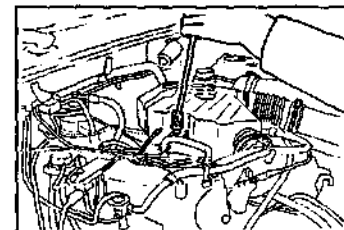
NOTE:

- Make sure that the spark plug wire is connected securely to each spark plug.
- Care should be exercised not to damage the spark plug wire rubber grommet with the spark plug tube.



WPB0-EN522

- (8) Connect the two vacuum hoses for air conditioner idle-up and for power steering.
- (9) Install the air intake chamber by tightening the two clamps and three attaching bolts.

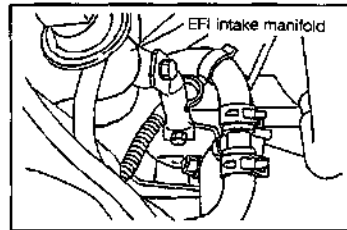


WPB0-EN523

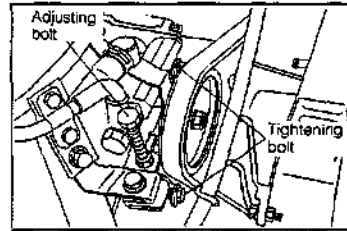
ENGINE MECHANICALS

21. Install the surge tank stay No.2 between the engine mounting bracket and the intake manifold.

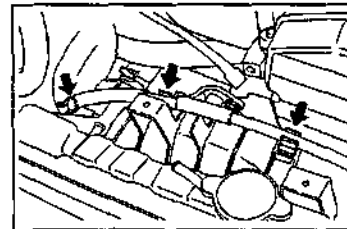
Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)



22. Install the power steering pump assembly.
23. Install the drive belt of the power steering pump.



24. Connect the clutch cable onto the fan shroud with the three clamps.
25. Install the reserve tank to the radiator.



26. Fill the engine coolant.
(See page CO-12.)
27. Fill the engine oil.
(See page LU-12.)
28. Place the battery on the battery carrier.
Then, install the battery hold-down clamp.

NOTE:










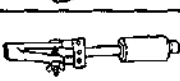



- Care must be exercised so as not to damage the battery due to excessive tightening of it.

29. Connect the wire of the positive terminal to the battery positive ⊕ terminal.
30. Connect the battery ground cable to the negative ⊖ terminal of the battery.
31. Start the engine. Ensure that the engine exhibits no leakage of cooling water or oil. Then, stop the engine.
32. Install the engine hood.
33. Connect the window screen washer hose.
34. Install the radiator grille.

WP520-EM535

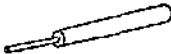










ENGINE MECHANICALS

SST (Special Service Tools)

Shape	Part No. and Name	Purpose	Remarks
	09090-04010-000 Engine sling device	Removal and installation of engine	
	09219-87202-000 Engine overhaul stand	Stand for engine overhaul	This stand is to be used in combination with engine overhaul attachment.
	09219-87701-000 Engine overhaul attachment	Attaching engine to overhaul stand (However, it is necessary to modify attachment.)	This attachment is to be used in combination with engine overhaul stand.
	09210-87701-000 Flywheel holder	Preventing crankshaft from turning	
	09609-20011-000 Steering wheel puller	Removal of crankshaft timing belt pulley	
	09636-20010-000 Upper ball joint dust cover replacer	Installation of camshaft oil seal	
	09202-87002-000 Valve cotter remover & replacer	Installation and removal of valves	
	09217-87001-000 Piston replacing guide	Guiding piston during insertion	
	09223-41010-000 Crankshaft rear oil seal replacer	Installation of crankshaft rear oil seal	
	09201-87704-000 Valve stem oil seal cover	Removal of valve stem oil seals	
	09310-87102-000 Counter shaft front bearing replacer	Installation of crankshaft front oil seal	
	09221-87704-000 Piston pin remover & replacer body	Removal and installation of piston pins	This remover & replacer body is to be used in combination with piston pin remover & replacer guide.
	09221-87705-000 Piston pin remover & replacer guide	Removal and installation of piston pins	This remover & replacer guide is to be used in combination with piston pin remover & replacer body.







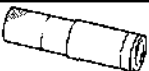


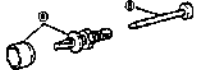


WFE00-EM036

ENGINE MECHANICALS

Shape	Part No. and Name	Purpose	Remarks
	09201-87705-000 Valve guide bush remover & replacer	Removal and installation of valve guide bushes	
	09991-87702-000 Engine control system inspection sub harness	Shorting terminal T Actuating fuel pump, etc.	Only for HD-E engine
	09842-87204-000 EFC-II computer check sub harness	Inspection of computer input/output voltage	General specification
	09842-87704-000 EFC computer check sub harness	Inspection of computer input/output voltage	US specification
	09842-30070-000 EFI inspection wire F	Inspection of fuel injectors	Only for HD-E engine
	09268-87701-000 EFI fuel pressure gauge	Inspection of fuel pressure	Only for HD-E engine
	09283-87703-000 Pressure regulator adpater	* Inspection of injectors * Inspection of pressure regulator * Inspection of fuel pressure	Only for HD-E engine
	09268-87702-000 Injection measuring tool set	* Inspection of injectors * Inspection of pressure regulator * Inspection of fuel pressure	Only for HD-E engine
	09301-87601-000 Clutch guide tool	Assembling clutch	
	09258-00030-000 Plug set	Plugging rubber hoses	
	09660-11011-000 Carburetor screwdriver set	Overhaul of carburetor	Only for HD-C engine
	09358-87702-000 Transfer replacer	Press-fitting of rubber grommets	

WFB20-64637

ENGINE MECHANICALS

Shape	Parts No. and Name	Purpose	Remarks
	09268-87704-000 Oil cooler set bolt box wrench	Removal and installation of oil cooler (only for oil cooler-equipped vehicle)	Only for oil cooler-equipped vehicle
	09032-00100-000 Oil pan seal cutter	Removal of oil pan	
	09226-87201-000 Oil filter wrench	Removal and installation of oil filter	
	09243-00020-000 Idle adjust wrench	Adjustment of idle mixture adjusting screw	Only for HD-C engine
	09240-00020-000 Wire gauge set	Adjustment of carburetor	Only for HD-C engine
	09240-00014-000 Carburetor adjusting gauge set	Adjustment of carburetor	Only for HD-C engine
	09268-87703-000 Plug wrench	Removal and installation of spark plugs	
	09991-87703-000 Tacho pulse pick-up wire	Connecting engine tachometer	
	09990-87702-000 Engine oil pressure gauge	Measurement of engine oil pressure	
	09286-87602-000 Crankshaft rear end bearing remover	Removal of crankshaft rear end bearing	
	09286-87603-000 Crankshaft rear end bearing replacer	Installation of crankshaft rear end bearing	
	09278-87201-000 Tool timing belt pulley holding	Preventing the crankshaft timing pulley from turning	

WP80-EM538

ENGINE MECHANICALS

TIGHTENING TORQUE FOR MAIN COMPONENTS

1. When you want to find out a suitable tightening torque for a bolt, first determine the strength division of the said bolt, using the table below. Then, locate suitable tightening torque in the tightening torque table described later.
2. As for the tightening torque for a nut, find out suitable tightening torque in the same way as with the paragraph 1 above, based on the mating bolt.
3. Tightening torque posted in the workshop manual is a standard value for steel fasteners. It is, therefore, necessary to modify these tightening torque when you tighten fasteners made of materials other than steel.

This rule also applies to such instances where bolts are undergoing heat or other stress, such as vibratory loads and so forth.

WPB30-029

METHOD TO IDENTIFY STRENGTH DIVISION OF BOLTS

1. Identification Method by Checking Bolts Themselves

	Configuration and how to determine strength division		Strength division		Configuration and how to determine strength division		Strength division
Hexagon bolt		Bolt having an embossed or stamped figure at its head section	4 = 4T 5 = 5T 6 = 6T 7 = 7T	Welded bolt			4T
		No mark	4T	Stud bolt		No mark	4T
		Bolt having two embossed lines at its head section	5T 6T			Bolt having about 2 mm deep recess at one end or both ends	6T
		Bolt having three embossed lines at its head section	7T				

WPB30-0540

2. Identification Method by Part Numbers

Hexagon Bolt Part number example 9 1 1 1 1 - 4 0 6 2 0 		Stud Bolt Part number example 9 1 1 1 1 - 4 0 6 2 0 	
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WPB30-0541

TIGHTENING TORQUE TABLE FOR GENERAL STANDARD BOLTS & NUTS**NOTE:**

The table below indicates the tightening torques for those standard bolts and nuts which are not posted in the tightening torque table.

Category	Nominal diameter mm	Pitch mm	Standard tightening torque					
			Target value			Tightening range		
			N·m	kgf·m	ft·lb	N·m	kgf·m	ft·lb
4T (Bolt having a mark of "4" at its head section) Example of part number (91000 - 4000)	6	1.0	5.39 [5.88]	0.55 [0.60]	3.98 [4.34]	4.31 - 6.47 [4.71 - 7.06]	0.44 - 0.66 [0.48 - 0.72]	3.18 - 4.77 [3.47 - 5.21]
	8	1.25	12.75 [14.22]	1.30 [1.45]	9.40 [10.49]	10.2 - 15.3 [11.36 - 17.06]	1.04 - 1.56 [1.16 - 1.74]	7.52 - 11.28 [8.39 - 12.99]
	10	1.25	25.50 [28.44]	2.6 [2.90]	18.81 [20.98]	20.4 - 30.6 [22.75 - 34.13]	2.08 - 3.12 [2.32 - 3.48]	15.04 - 22.57 [16.78 - 25.17]
	12	1.25	47.07 [52.96]	4.8 [5.4]	34.72 [39.06]	37.66 - 56.49 [42.36 - 63.55]	3.84 - 5.76 [4.32 - 6.48]	27.77 - 41.66 [31.25 - 46.67]
5T (Bolt having a mark of "5" at its head section) Example of part number (91000 - 5000)	6	1.0	6.37 [7.35]	0.65 [0.75]	4.70 [5.42]	5.1 - 7.65 [5.68 - 8.83]	0.52 - 0.78 [0.6 - 0.9]	3.76 - 5.64 [4.34 - 6.51]
	8	1.25	15.69 [17.15]	1.60 [1.75]	11.57 [12.66]	12.55 - 18.83 [13.73 - 184.66]	1.28 - 1.92 [1.40 - 2.10]	9.26 - 13.88 [10.13 - 15.19]
	10	1.25	32.36 [35.30]	3.3 [3.6]	23.87 [26.04]	25.89 - 38.83 [28.24 - 42.36]	2.64 - 3.96 [2.88 - 4.32]	19.1 - 28.64 [20.83 - 31.25]
	12	1.25	58.84 [65.70]	6.0 [6.7]	43.4 [48.46]	47.07 - 70.61 [52.56 - 78.85]	4.80 - 7.20 [5.36 - 8.04]	34.72 - 52.06 [38.77 - 58.15]
6T (Bolt having a mark of "6" at its head section) Example of part number (91000 - 6000)	6	1.0	7.85 [8.83]	0.8 [0.9]	5.79 [6.51]	6.28 - 9.41 [7.06 - 10.59]	0.64 - 0.96 [0.72 - 1.08]	4.63 - 6.94 [5.21 - 7.81]
	8	1.25	19.12 [20.59]	1.95 [2.10]	14.10 [15.19]	15.3 - 22.95 [16.48 - 24.71]	1.58 - 2.34 [1.68 - 2.52]	11.28 - 16.93 [12.15 - 18.23]
	10	1.25	39.23 [43.15]	4.00 [4.40]	28.93 [31.83]	31.38 - 47.97 [34.52 - 51.78]	3.20 - 4.80 [3.52 - 5.28]	23.15 - 34.72 [25.46 - 38.19]
	12	1.25	71.59 [79.43]	7.30 [8.10]	52.80 [58.59]	57.27 - 85.91 [63.55 - 95.32]	5.84 - 8.76 [6.48 - 9.72]	42.24 - 63.36 [46.87 - 70.30]
7T (Bolt having a mark of "7" at its head section) Example of part number (91000 - 7000)	6	1.0	10.79 [11.76]	1.10 [1.20]	7.96 [8.68]	8.63 - 12.94 [9.41 - 14.12]	0.88 - 1.32 [0.96 - 1.44]	6.37 - 9.55 [6.94 - 10.42]
	8	1.25	25.5 [28.44]	2.60 [2.90]	18.81 [20.98]	20.4 - 30.6 [22.75 - 34.13]	2.08 - 3.12 [2.32 - 3.48]	15.04 - 22.57 [16.78 - 25.17]
	10	1.25	51.98 [57.86]	5.30 [5.90]	38.33 [42.67]	41.58 - 62.37 [46.29 - 69.43]	4.24 - 6.36 [4.72 - 7.06]	30.67 - 47.95 [34.14 - 51.21]
	12	1.25	95.12 [109.97]	9.70 [10.50]	70.16 [75.94]	78.1 - 114.15 [82.38 - 123.56]	7.76 - 11.64 [8.40 - 12.60]	56.13 - 84.19 [60.76 - 81.14]
Pipe tapered thread	PT6/1	*0.9071	16.67	1.7	12.3	11.76 - 21.57	1.2 - 2.2	8.67 - 15.91
	PT1/4	*1.3368	24.52	2.5	18.08	19.61 - 29.42	2.0 - 3.0	14.46 - 21.67
	PT3/8	*1.3368	29.42	3.0	21.7	24.52 - 34.32	2.5 - 3.5	18.08 - 25.32
	PT1/2	*1.8143	29.42	3.0	21.7	24.52 - 34.42	2.5 - 3.5	18.08 - 25.32

Numerals in [] denote those for flange bolts.
The asterisk mark (*) represents pitch conversion value.

WP200-EM564

ENGINE MECHANICALS

TIGHTENING TORQUE

Tightening component	Tightening torque			Remark
	N·m	kgf·m	ft·lb	
Cylinder head x Spark plug	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9	Dry
Cylinder head x Cylinder head cover	2.9 - 4.9	0.3 - 0.5	2.2 - 3.6	Dry
Cylinder head x Rocker shaft M10 Bolt	28.4 - 38.3	2.9 - 3.7	21.0 - 26.8	Dry
M8 Bolt	12.7 - 16.7	1.3 - 1.7	9.4 - 12.3	Dry
Cylinder head x Cylinder block	58.8 - 86.8	6.0 - 6.8	43.4 - 49.2	Wet
Cylinder head x Water temperature sensor (HD-E engine only)	24.5 - 34.3	2.5 - 3.5	18.1 - 25.3	Dry
Cylinder head x BVSX (HD-C engine only)	24.5 - 34.3	2.5 - 3.5	18.1 - 25.3	Dry
Cylinder head x Water temperature sender gauge	11.8 - 19.5	1.2 - 2.0	8.7 - 14.5	Dry
Cylinder head x Distributor	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9	Dry
Cylinder head x Exhaust manifold	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5	Dry
Cylinder head x Intake manifold	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9	Dry
Cylinder head x Fuel pump (HD-C engine only)	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9	Dry
Cylinder block x Water inlet	5.9 - 8.8	0.6 - 0.9	4.3 - 6.5	Dry
Cylinder block x Crankshaft main bearing cap	29.4 - 53.9	4.5 - 5.5	32.5 - 39.8	Wet
Cylinder block x Oil pump	5.9 - 8.8	0.6 - 0.9	4.3 - 6.5	Dry
Cylinder block x Rear oil seal retainer	5.9 - 8.8	0.6 - 0.9	4.3 - 6.5	Dry
Cylinder block x Water pump	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9	Dry
Cylinder block x Engine mounting bracket	39.2 - 53.9	4.0 - 5.5	28.9 - 39.8	Dry
Cylinder block x Transmission	49.0 - 68.6	5.0 - 7.0	36.2 - 50.6	Dry
Cylinder block x Oil cooler pipe	24.5 - 34.3	2.5 - 3.5	18.1 - 25.3	Dry
Surge tank x Intake air temperature sensor	29.4 - 39.2	3.0 - 4.0	21.7 - 28.9	Dry
Surge tank x Gas filter	11.8 - 19.6	1.2 - 2.0	8.7 - 14.5	Dry
Surge tank x Throttle body	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9	Dry
Crankshaft x Flywheel	78.4 - 98.0	8.0 - 10.0	57.9 - 72.0	Dry non-reusable.
Crankshaft x Crankshaft timing belt pulley	88.2 - 98.0	9.0 - 10.0	65.1 - 72.0	Dry
Intake manifold x Delivery pipe (HD-E engine only)	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9	Dry
Intake manifold x Carburetor (HD-C engine only)	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9	Dry
Exhaust manifold x Exhaust pipe	34.3 - 49.0	3.5 - 5.0	25.3 - 36.2	Dry
Exhaust pipe clamp	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5	Dry
Engine mounting bracket x Engine mounting (bolt)	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5	Dry
Engine mounting bracket x Engine mounting (nut)	29.4 - 44.1	3.5 - 5.5	25.3 - 39.8	Dry

WPB0-BK543

ENGINE MECHANICALS

Tightening component	Tightening torque			Remark
	N·m	kgf·m	ft·lb	
Oil pump body x Oil cooler	24.5 - 34.3	2.5 - 3.5	18.1 - 25.3	Dry
Oil pump x Oil pressure switch	11.8 - 19.6	1.2 - 2.0	8.7 - 14.5	Dry
Oil pan	6.9 - 11.8	0.7 - 1.2	5.1 - 8.7	Dry
Oil pan x Drain plug	19.6 - 29.4	2.0 - 3.0	14.5 - 21.7	Dry
Oil pump body x Oil pump cover	7.6 - 12.7	0.8 - 1.3	5.8 - 9.4	Dry
Oil level gauge guide	18.6 - 30.4	1.9 - 3.1	13.7 - 22.4	Dry
Surge tank stay No. 1	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9	Dry
Surge tank stay No. 2	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5	Dry
Surge tank stay No. 3	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9	Dry
Camshaft x Camshaft timing belt pulley	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9	Dry
Timing belt cover	2.0 - 3.9	0.2 - 0.4	1.4 - 2.9	Dry
Timing belt tensioner	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5	Dry
Crankshaft timing belt pulley x Crankshaft pulley	19.6 - 29.4	2.0 - 3.0	14.5 - 21.5	Dry
Fluid coupling x Water pump pulley x Water pump	9.8 - 19.6	1.0 - 1.8	7.2 - 13.0	Dry
Cooling fan x Fluid coupling	4.9 - 5.9	0.5 - 0.6	3.6 - 4.3	Dry
Fuel filter x Fuel hose No. 1	34.3 - 44.1	3.5 - 4.5	25.3 - 32.5	Dry
Fuel filter x Fuel pipe	34.3 - 44.1	3.5 - 4.5	25.3 - 32.5	Dry
Fuel hose No. 1 x Delivery pipe	34.3 - 44.1	3.5 - 4.5	25.3 - 32.5	Dry
Connecting rod x Connecting rod cap	34.3 - 44.1	3.5 - 4.5	25.3 - 32.5	Wet
Clutch cover x Fly wheel	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9	Dry
Transmission x Starter motor	49.0 - 68.6	5.0 - 7.0	36.2 - 50.6	Dry
Front pipe x Rear pipe	36.3 - 51.0	3.7 - 5.2	26.8 - 37.6	Dry
Fuel pump x Fuel pipe	34.3 - 43.1	3.5 - 4.4	25.3 - 31.8	Dry

WP20-5454

ENGINE MECHANICALS

ENGINE SPECIFICATIONS

Item		Engine type		HD-C	HD-E
Engine proper	Type			Petrol, 4-cycle	Petrol, 4-cycle
	Mounting location			Front	Front
	Number of cylinders and arrangement			4-cylinder-in-line, mounted longitudinally	4-cylinder-in-line, mounted longitudinally
	Combustion chamber type			Pent roof type	Pent roof type
	Valve mechanism			Belt-driven, SOHC	Belt-driven, SOHC
	Bore x stroke	mm		78 x 87.6	76 x 87.6
	Compression ratio			9.5 ± 0.3	9.5 ± 0.3
	Compression pressure	MPa (kgf/cm ²) - (rpm)		1373 (14.0) - 300	1373 (14.0) - 300
	Maximum output	SAE net	kW/rpm	General specifications	63/6000
		EEC	kW/rpm	Australian specifications	—
		EEC DIN	kW/rpm	ECE & EEC specifications	70/5700
	Maximum torque	SAE net	kW/rpm	General specifications	128/3500
		EEC	kW/rpm	Australian specifications	—
		EEC DIN	kW/rpm	ECE & EEC specifications	128/4800
	Engine dimensions (Length x width x height)	mm		*693 x 586 x 685	683 x 537 x 673
	Service engine weight	kg		96	95
	Number of piston rings	Compression ring		2	2
		Oil ring		1	1
	Valve timing	Intake	Open	2° BTDC	2° BTDC
			Close	48° ABDC	48° ABDC
		Exhaust	Open	43° BBDC	43° BBDC
			Close	1° ATDC	1° ATDC
	Valve clearance (HOT)	mm		Intake	0.25
				Exhaust	0.33
	Idling speed	rpm		850 ± 50	850 ± 50
	Blow-by gas recirculating system			Closed type	Closed type
Lubricating System	Lubricating method			Fully-forced feed method	Fully-forced feed method
	Oil Pump type			Trochoid type	Trochoid type
	Oil filter type			Full-flow filter type, filter paper type	Full-flow filter type, filter paper type
	Lubrication oil capacity	dm ³		Whole	3.8
				When only oil is changed	3.3
				When oil and oil filter are changed	3.5
Cooling System	Cooling method			V-belt driven type	V-belt driven type
	Radiator type			Corrugation type forced circulation	Corrugation type forced circulation
	Coolant capacity (Vehicle with front heater)		dm ³	5.5 (excluding 1.0 dm ³ in reserve tank)	5.5 (excluding 1.0 dm ³ in reserve tank)
	Water pump type			Centrifugal type, "V" belt-driven tank	Centrifugal type, "V" belt-driven tank
	Thermostat type			Wax pellet type	Wax pellet type
Air cleaner	Type			Filter unwoven fabric type	Filter paper type
	Number			1	1

* For GCC specifications: 693 x 602 x 685

WP590-EM545

ENGINE MECHANICALS

Item			Engine type	HD-C	HD-E		
Fuel System	Fuel tank	Capacity	liter	60	60		
		Location	*	Underneath rear seat floor	Underneath rear seat floor		
	Fuel pipe material		Rubber and steel tube	Rubber and steel tube			
	Fuel pump type		Diaphragm type	Electromotor type			
	Fuel filter type		Filter paper type	Filter paper type			
	Carburetor	Manufacturer		Aisan industry	—		
		Type		Down draft, 2-barrel type	—		
		Venturi diameter	mm	21, 28	—		
		Choke valve type		Wax type automatic choke	—		
	Fuel injection device		—	Electronic type			
	Injection nozzle or injector	Type of nozzle retainer		—	With cushion rubber type		
		Nozzle type		—	Electronically-controlled throttle type		
		Injection pressure	kPa (kgf/cm ²)	—	250 (2.55)		
Engine electrical system	Ignition system	Voltage		V	12 [Negative ground]	12 [Negative ground]	
		Type			Battery ignition type	Battery ignition type	
		Ignition timing		°/rpm	B.T.D.C. 3 ± 2/850 ± 50	B.T.D.C. 3 ± 2/850 ± 50	
		Firing order			1-3-4-2	1-3-4-2	
		Distributor	Distributor type		Full-transistorized type	Full-transistorized type	
			Breaker type		—	—	
			Performance of timing advancing mechanism	Centrifugal type	0°/600 rpm 15°/3000 rpm	0°/600 rpm 12°/3000 rpm	
				Vacuum type	0°/-13.3 kPa (-100 mmHg) 15°/-53.3 kPa (-400 mmHg)	0°/-20.0 kPa (-150 mmHg) 10°/-65.0 kPa (-420 mmHg)	
		Spark plug	Manufacturer		CHAMPION	NIPPONDENSO	NGK
			Type		RC9YC4	K20PR-U11	8KR6E-11
			Thread		M14 x 1.25	M14 x 1.25	M14 x 1.25
			Spark plug gap		mm	1.0 - 1.1	1.0 - 1.1
	Battery	Type	General specifications		36B20R (*55B24R)	36B20R (*55B24R)	
			ECE & EEC specifications		36B20R (*55B24R)	36B20R (*55B24R)	
			Australian specifications		36B20R	36B20R	
		Capacity	General specifications		28 (*36)	28 (*36)	
			ECE & EEC specifications		28 (*36)	28 (*36)	
			Australian specifications		28	28	

WFE01-EM-646

ENGINE MECHANICALS

SERVICE SPECIFICATIONS TUNE-UP

Drive belt deflection when pressed with a force of 98N (10 kgf)			
Alternator	New belt	4 - 5 mm	
	Used belt	5 - 6 mm	
Coolant capacity w/heatex [Excluding 1.0 dm ³ for reserve tank]		5.5 dm ³ [5.8 dm ³ for tropical specifications]	
Engine oil capacity			
Whole amount		3.8 dm ³	
When only oil is changed	Full level	3.3 dm ³	
	Low level	2.3 dm ³	
When oil and filter are changed		3.5 dm ³	
		NOTE: For the oil cooler-equipped engine, add 79 cm ³ for whole amount.	
Valve clearances (hot)			
	Intake	0.25 ± 0.05 mm	
	Exhaust	0.33 ± 0.05 mm	
[Reference (cold)]			
	Intake	0.18 mm	
	Exhaust	0.25 mm	
Spark plugs			
Manufacturer	NIPPONDENSO	NGK	CHAMPION
Type	K20PR - U11 K22PR - U11	BKR6E - 11 BKR7E - 11	RC9YC4 RC7YC4
Thread	M14 x 1.25		
Spark plug gap	mm	1.0 - 1.1	
Ignition timing		B.T.D.C. 3 ± 2°/100 rpm or less (However, engine revolution must be stable.)	
Idle speed			
Engine type		HD-C	HD-E
Idle speed	rpm	850 ± 50	850 ± 50
Fast idle speed adjustment (HD-C)		Full position	1300 - 2000 rpm
Throttle positioner touch revolution (rpm)			
HD-C	HD-E (General)	HD-E (US)	
1500 ± 50 rpm	1800 ± 50 rpm	1600 ± 100 rpm	
Throttle positioner operating time		HD-C	0.5 - 5.0 seconds
		HD-E	0.5 - 5.0 seconds
Compression pressure at 3000 rpm		Standard	1373 kPa (14.0 kgf/cm ²)
		Minimum	1030 kPa (10.5 kgf/cm ²)
		Difference between cylinders	147 kPa (1.5 kgf/cm ²)

WFE90-19547

ENGINE MECHANICALS

ENGINE MECHANICALS

Timing belt pulley	Wear limit	Camshaft	119.80 mm
		Crankshaft	59.37 mm
Timing belt tension spring		Free length	46.5 mm
		Installation load	
Camshaft	Oil clearance (cylinder head-to-camshaft)		0.035 - 0.076 mm
	Maximum limit		0.17 mm
	Thrust clearance		0.1 - 0.25 mm
	Maximum limit		0.46 mm
	Journal diameter		
	Fuel pump cam diameter	Minimum	42.65 mm
	Fuel pump cam stroke	Standard	5.0 mm
		Minimum	4.8 mm
	Valve cam lobe height		
	Intake	Standard	33.06 - 33.28 mm
		Minimum	32.9 mm
	Exhaust	Standard	33.00 - 33.20 mm
		Minimum	32.85 mm
	Maximum circle runout		0.03 mm
Cylinder head	Warpage	Cylinder block side	0.10 mm
		Intake manifold side	0.10 mm
		Exhaust manifold side	0.10 mm
	Valve seat angle	Intake	30 - 45 - 70°
		Exhaust	20 - 45 - 70°
	Valve contacting angle		45°
	Valve seat contacting width		
		Standard	1.4 mm
		Allowance	1.2 - 1.6 mm
	Maximum valve seat recession		0.5 mm
Valves	Valve stem diameter	Intake valve	6.560 - 6.580 mm
		Exhaust valve	6.555 - 6.575 mm
	Valve length	Intake valve	112.8 mm
		Exhaust valve	114.5 mm
	Valve face angle		45.5°
	Valve stock thickness (Minimum)		
		Intake	0.8 mm
		Exhaust	1.0 mm
	Valve stem oil clearance		
	Intake	Standard	0.020 - 0.060 mm
		Maximum	0.090 mm
	Exhaust	Standard	0.025 - 0.065 mm
		Maximum	0.090 mm

W/FER0-6x548

ENGINE MECHANICALS

Valve springs	Free length	Standard	45.2 - 46.0 mm	
		Minimum	44.3 mm	
	Installed tension at 38.0 mm		258.9 N (26.4 kgf)	
	Maximum out-of-squareness		1.6 mm	
Valve rocker arm and valve rocker shaft	Oil clearance	Standard	0.012 - 0.053 mm	
		Maximum	0.08 mm	
	Valve rocker arm bore diameter		19.500 - 19.521	
	Valve rocker shaft outer diameter		19.468 - 19.488 mm	
Valve rocker arm spacer	Free width		22.00 mm	
Exhaust manifold	Warpage		0.1 mm	
Intake manifold	Warpage	Cylinder head side	0.1 mm	
Cylinder block	Maximum cylinder head surface warpage		0.1 mm	
	Cylinder bore diameter	Standard	76.000 - 76.030 mm	
		O/S 0.25	76.250 - 76.280 mm	
	Bore honing angle		35 ± 5°	
	Coarse degree		1 - 4 Z	
Piston, piston pin and piston rings	Piston-to-cylinder bore clearance	Standard	0.025 - 0.045 mm	
		Maximum limit	0.11 mm	
	Piston ring groove-to-piston ring side clearance	Standard	No. 1	0.03 - 0.07 mm
			No. 2	0.02 - 0.06 mm
		Maximum		0.12 mm
		Piston ring thickness	No. 1	1.17 - 1.19 mm
		Standard	No. 2	1.47 - 1.49 mm
	Piston, piston pin and piston rings	Piston ring end gap	Standard	No. 1
			No. 2	0.35 - 0.50 mm
			0.1	0.20 - 0.70 mm
Maximum		No. 1		0.7 mm
		No. 2		0.8 mm
		0.1		1.0 mm
Piston pin-to-connecting rod interference fit				0.012 - 0.044 mm
Piston-to-piston pin clearance				0.005 - 0.011 mm
Flywheel	Runout	Maximum	0.1 mm	
Connecting rod	Big end thrust clearance	Standard	0.15 - 0.4 mm	
		Maximum	0.45 mm	
	Maximum bend		0.05 mm	
	Maximum twist		0.05 mm	

WFB0-BV540

ENGINE MECHANICALS

Crankshaft	Crankpin journal oil clearance	0.020 - 0.044 mm
	Main journal oil clearance	0.024 - 0.042 mm
	Crankpin journal diameter	44.976 - 45.000 mm
	Main journal diameter	49.976 - 50.000 mm
	Thrust clearance Standard	0.02 - 0.22 mm
	Maximum limit	0.30 mm
Thermostat valve (HD-C)	Runout Maximum	0.06 mm
	Operating temperature ON	63°C or more
	OFF	55°C or less

WP230-SV250

ENGINE MECHANICALS

FUEL SYSTEM

Carburetor	Float level	Dimension assumed by its own weight	8 mm
	Lip dimension		1.6 mm
	Throttle valve closed angle		
	Primary		9°
	Secondary		20°
	Throttle valve fully opened angle		
	Primary		90°
	Secondary		80°
	Kick-up angle		23°
	Secondary touch angle		50°
Fuel pump (FD-C)	• Opening degree of throttle valve at a time when it is set to idling state by means of throttle adjust screw		11.4°
	• Opening degree of throttle valve at a time when throttle positioner is operating		16.0°
	Number of backing-off of idle mixture adjusting screw		4 1/2 rev
	Solenoid valve resistance		80 - 100 Ω
	Outer vent resistance		30 - 45 Ω
	Suction force at 300 rpm		13.3 kPa (100 mm Hg) or more
	Push rod length	Standard	87.95 - 88.25 mm
		Minimum	87.000 mm
	Push rod stroke	Standard	5.0 mm
		Minimum	4.8 mm

WP290-34551

LUBRICATION SYSTEM

Oil pump	Compression spring free length		57 mm
	Body clearance		0.20 - 0.28 mm
	Tip clearance		0.16 - 0.24 mm
	Side clearance		0.035 - 0.085 mm
	Oil pressure	idling	19.6 kPa (0.2 kgf/cm ²) or more
		3000 rpm	24.5 - 490.4 kPa (0.25 - 5.0 kgf/cm ²)

WP290-34552

ENGINE MECHANICALS

COOLING SYSTEM

Radiator cap	Relief valve opening pressure	
	Standard	73.6 - 103.0 kPa (0.75 - 1.05 kg/cm ²)
	Minimum	58.8 kPa (0.6 kg/cm ²)
Thermostat	Valve opening temperature	
	General specifications	82 - 86°C
	ECE & EEC specifications	78 - 80°C
	Valve lift	
	General specifications	8.5 mm or more at 98°C
	ECE & EEC specifications	8.5 mm or more at 91°C

WPB30-2WMS3

IGNITION SYSTEM

Ignition timing	No sub vacuum timing advance takes place. Engine revolution must be stable at 1000 rpm or less	BTDC $3 \pm 2^\circ$
High-tension cord	Resistance	Maximum
		15 k Ω per cord
Distributor	Air gap between signal rotor and signal generator	0.2 - 0.4 mm
Ignition coil	Primary coil	1.35 - 1.65 Ω at 20°C
	Secondary coil	22 - 30 k Ω at 20°C

WPB30-2WMS4

ENGINE MECHANICALS

EFI SYSTEM (General specifications)

Fuel pressure regulator	Fuel pressure at No. vacuum	225 - 275 kPa (2.3 - 2.8 kgf/cm ²)
Injector	Resistance at 20°C (approx.)	11.0 - 15.0 Ω
	Injection amount (approx.)	152 - 168 cm ³ /60 seconds at 20°C
	Difference between each injector	5 cm ³ or less
	Fuel leakage	Less than one drop of fuel per minute
EFI main relay injector relay	Between terminals ① - ② ③ - ④	60 - 65 Ω Infinity
Fuel pump relay	Between terminals ① - ② ③ - ④	70 - 90 Ω Infinity
Idle-up VSV	Resistance	30 - 50 Ω at 20°C
Throttle position sensor	Resistance	
	Between terminals ① - ② Throttle valve closed fully	0.2 Ω or less at 20°C
	Throttle valve opened fully	10 kΩ or more at 20°C
	Between terminals bH - bA Throttle valve closed fully	10 kΩ or more at 20°C
	Throttle valve opened fully	5 Ω or less at 20°C
Fuel pump	Fuel flow amount	235 cm ³ or more/15 seconds
Water temperature sensor Intake air temperature sensor	Cooling water temperature	Resistance
	80°C	0.322 ± 0.1 kΩ
	60°C	0.584 ± 0.2 kΩ
	40°C	1.14 ± 0.3 kΩ
	20°C	2.45 ± 0.5 kΩ
	0°C	5.88 ± 1.5 kΩ
	-20°C	16.2 ± 3.2 kΩ
Pressure sensor Output between SST terminals ① - ② (ground) (When engine is stopped.)		
Measuring point	Atmospheric pressure kPa (mm Hg)	Voltage V
Altitude (height above sea level) m		
0	101.3 (760)	3.2 - 4.0
500	95.5 (716)	3.1 - 3.8
1000	89.9 (674)	3.0 - 3.6

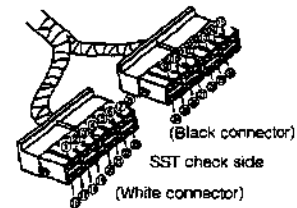
WFE90-EM556

ECU CONNECTORS (General specifications)

No.	Contents of connection	No.	Contents of connection
1	Power ground	15	Cooling water temperature sensor
2	Injector	16	Power ground
3	Battery +B (Main relay)	17	Injector
4	Battery +B (Back-up)	18	Battery +B (Main relay)
5	Idle-up VSV	19	Check engine lamp
6	Feedback check terminal	20	Fuel pump relay
7	Ignition coil (negative)	21	Engine ground
8	Starter switch	22	Pressure sensor ground
9	Test terminal	23	Air conditioner magnet clutch
10	Idle switch	26	Vehicle speed sensor
11	Electric load signal	28	Power switch
12	Sensor power supply (approx. 5V)	29	Oxygen sensor
13	Pressure sensor	30	Sensor ground
14	Intake air temperature sensor		

WP200-2K056

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
30	29	28	27	26	25	24	23	22	21	20	19	18	17	16

ECU side

ENGINE MECHANICALS

VOLTAGES AT ECU WIRING CONNECTORS (General specifications)

Terminals	STD voltage or resistance	Conditions	Remedies
(1) - (21)	Less than 1 Ω	Ignition switch OFF.	Proceed to flow chart (2).
(2) - (21)	Less than 1V	Ignition switch OFF (after more than one minute).	Check power supply.
	About battery voltage	Ignition switch ON.	
(3) - (21)	Less than 0.1V	Ignition switch OFF (after more than ten seconds).	Check power supply.
	About battery voltage	Ignition switch ON.	
(4) - (21)	About battery voltage	At all times (Measured voltage is lower than specified voltage only during starting period.)	Check power supply.
(5) - (21)	About battery voltage	Engine fully warmed up. All accessory switches turned OFF.	Check power supply.
	Less than 3V	Idle-up VSV ON.	Check idle-up VSV control.
(6) - (21)	4.5 - 5.5V	Ignition switch ON. T-terminal shorted with ground terminal. Throttle valve fully closed.	Proceed to flow chart (2).
	Less than 1V		Check diagnosis code.
	0 - 4.5 to 5.5V (Measured voltage varies)	Ignition switch ON. T-terminal shorted with ground terminal. Engine revolution speed builds at 3000 rpm after it has fully warmed up.	Oxygen sensor system.
(7) - (21)	Less than 0.1V	Ignition switch OFF.	Check power supply.
	About battery voltage	Ignition switch ON.	
(8) - (21)	Less than 0.1V	Ignition switch OFF.	Check power supply.
	More than 6V	When ignition switch is set to ST position.	
(9) - (21)	Less than 0.1V	Ignition switch OFF.	Check T-terminal wiring.
	About battery voltage	Ignition switch ON.	
(10) - (21)	Less than 0.5V	Ignition switch ON. Throttle valve fully closed.	Throttle position sensor system.
	About battery voltage	Ignition switch ON. Throttle valve fully opened.	
(11) - (21)	Less than 0.1V	Ignition switch ON. Headlamp switch and/or defogger switch OFF.	Check idle-up VSV control.
	More than 9V	Ignition switch ON. Headlamp switch and/or defogger switch ON.	
(12) - (22)	Less than 0.1V	Ignition switch OFF.	Check VCC wiring.
	4.5 - 5.5V	Ignition switch ON.	
(13) - (22)	3.2 - 4.0V	Ignition switch ON. Atmospheric pressure is 101.3 kPa (760 mmHg).	Check pressure sensor.
(14) - (30)	1.5 - 3.0V	Ignition switch ON. Air temperature inside surge tank: 20°C	Check intake air temperature sensor.
(15) - (30)	0.40 - 0.65V	Ignition switch ON. After engine has been warmed up fully. (Cooling water temperature: 80 - 90°C.	Check cooling water temperature sensor.
(16) - (1)	Less than 1 Ω	Ignition switch OFF.	Proceed to flow chart (2).
(17) - (21)	Less than 1V	Ignition switch OFF (after more than one minute).	Check/repair injector power supply.
	About battery voltage	Ignition switch ON.	

WFER0-EM557

ENGINE MECHANICALS

Terminals	STD voltage or resistance	Conditions	Remedies
(18) - (21)	Less than 0.1V	Ignition switch OFF.	Check/repair ECU power supply.
	About battery voltage	Ignition switch ON.	
(19) - (21)	Less than 3V	Ignition switch ON. (Check engine lamp illuminated.)	Check power supply for check engine lamp.
	About battery voltage	Engine is rotating. (Check engine lamp not illuminated).	
(20) - (21)	Less than 1V	Ignition switch ON. Fuel pump is operating.	Check/repair fuel pump power supply.
	About battery voltage	Ignition switch ON. Fuel pump is stopped.	
(21) - Engine ground	Less than 0.2Ω	Ignition switch OFF.	Check ground wiring.
(22) - (21)	Less than 0.5Ω	Ignition switch OFF.	Replace ECU.
(23) - (21)	About battery voltage	Engine is rotating. Air conditioner compressor is rotating. (Genuine air conditioner-equipped vehicle.)	Check air conditioner wiring.
(26) - (21)	0 to Approx. battery voltage	Ignition switch ON. When vehicle is moved. (Measured voltage changes 4 times for movement of 1.5 m.)	Check speed sensor.
(28) - (21)	About battery voltage	Ignition switch ON. Throttle valve fully closed.	Check throttle position sensor.
	Less than 0.5V	Ignition switch ON. Throttle valve fully opened.	
(29) - (21)	Less than 0.1V	Ignition switch ON (after more than 60 seconds).	Check oxygen sensor.
	Voltage varies within 0 - 1.0V.	After engine has warmed up fully. When engine revolution is held at 3000 rpm for more than two minutes.	Check fuel system.
(30) - (21)	Less than 1Ω	Ignition switch ON.	Proceed to flow chart (2).

WFE30-EM558

ENGINE MECHANICALS

EFI SYSTEM (U.S. specifications)

Fuel pressure regulator	Fuel pressure at No. vacuum	225 - 275 kPa (2.3 - 2.8 kgf/cm ²)
Injector	Resistance at 20°C (approx.)	11.0 - 15.0 Ω
	Injection amount (approx.)	152 - 168 cm ³ /60 seconds at 20°C
	Difference between each injector	5 cm ³ or less
	Fuel leakage	Less than one drop of fuel per minute
EFI main relay injector relay	Between terminals ① - ② ③ - ④	60 - 85 Ω Infinity
Fuel pump relay	Between terminals ① - ② ③ - ④	70 - 90 Ω Infinity
Idle-up VSV	Resistance	30 - 50 Ω at 20°C
Throttle position sensor	Resistance Between terminals ① - ③ Throttle valve closed fully	0.2 Ω or less at 20°C
	Throttle valve opened fully	10 kΩ or more at 20°C
	Between terminals ② - ③ Throttle valve closed fully	10 kΩ or more at 20°C
	Throttle valve opened fully	5 Ω or less at 20°C
Fuel pump	Fuel flow amount	235 cm ³ or more/15 seconds
Water temperature sensor Intake air temperature sensor	Cooling water temperature	Resistance
	80°C	0.322 ± 0.1 kΩ
	60°C	0.584 ± 0.2 kΩ
	40°C	1.14 ± 0.3 kΩ
	20°C	2.45 ± 0.5 kΩ
	0°C	5.88 ± 1.5 kΩ
	-20°C	16.2 ± 3.2 kΩ
Pressure sensor Output between SST terminals ③ - ④ (ground) (When engine is stopped.)		
Measuring point	Atmospheric pressure kPa (mmHg)	Voltage V
Altitude (height above sea level) m		
0	101.3 (760)	3.2 - 4.0
500	95.5 (716)	3.1 - 3.8
1000	89.9 (674)	3.0 - 3.6

WFF20-EM550

ECU CONNECTORS (U.S. specifications)

The figure below shows the arrangement of the ECU connector terminals.

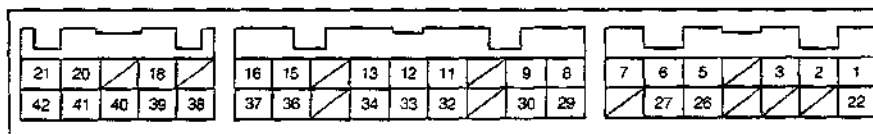
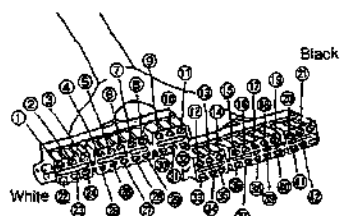
ECU side**SST side**

Table Showing ECU Connections (US Specification)

WF620-54/560

Terminal code	Contents of connection	Terminal code	Contents of connection
1	Main relay (Power supply)	22	Main relay (Power supply)
2	Battery (Backup power supply)	23	
3	Ignition coil primary voltage	24	
4		25	
5	Pressure sensor power supply	26	Oxygen sensor
6	Pressure sensor	27	Intake air temperature sensor
7	Cooling water temperature sensor	28	
8	Vehicle speed sensor	29	Operation system ground (Engine)
9	Electrical load (Headlamp and defogger)	30	Electrical load (Blower fan)
10		31	
11	Check connector (Test terminal)	32	Throttle position switch (Power switch)
12	Throttle position switch (Idle switch)	33	Stop lamp
13	Starter	34	Air conditioner magnet switch
14		35	
15	Oxygen sensor feedback check terminal	36	Operation system ground
16	Check engine lamp	37	Fuel pump relay
17		38	Pressure VSV
18	EGR VSV	39	System ground
19		40	Idle speed control VSV
20	Injector	41	Injector
21	Actuator drive ground (Engine)	42	Actuator drive ground (Engine)

WF620-54/561

ENGINE MECHANICALS

Voltages at ECU connectors

Terminals	STD voltage or resistance	Condition		Remedies
① — ②	About battery voltage	Ignition switch ON		Check power supply.
② — ③	About battery voltage	At all time		Check power supply.
③ — ④	About battery voltage	Ignition switch ON	When engine is stopped:	Check power supply.
⑤ — ⑥	4.5 - 5.5 V	Ignition switch ON		Check power supply.
⑥ — ⑦	3.2 - 4.0 V	Ignition switch ON	When atmospheric pressure of 101.3 kPa (760 mmHg) exists.	Check pressure sensor.
⑦ — ⑧	0.4 - 0.65 V	Ignition switch ON	When cooling water temperature is 80°C:	Check water temperature sensor.
⑦ — ⑨	0.322 ± 0.1 W	When cooling water temperature is 60°C		
⑧ — ⑩	0 - About battery voltage	Ignition switch ON	Measured voltage changes when vehicle is moved 1.5 m.	Check speed sensor.
⑩ — ⑪	Less than 5.0 V	Ignition switch ON	When defogger and headlamp switches are turned OFF:	Check TSC VSV.
	About battery voltage	Ignition switch ON	When defogger and/or headlamp switches are turned ON:	
⑪ — ⑫	About battery voltage	Ignition switch ON	When test terminal of check connector is not connected with ground terminal:	Check T-terminal wiring.
	Less than 1.0 V	Ignition switch ON	When test terminal of check connector is connected with ground terminal:	
⑫ — ⑬	Less than 5.0 V	Ignition switch ON	Throttle valve fully closed	Check throttle position system.
	About battery voltage	Ignition switch ON	Throttle valve fully opened	
⑬ — ⑭	Less than 29 Ω	Throttle valve fully closed		
	More than 1000 Ω	Throttle valve fully opened		
⑭ — ⑮	0 V	Ignition switch ON		Check power supply.
	More than 6 V	When ignition switch is set to ST position:		
⑮ — ⑯	Measured voltage changes at a point between 0 - 5.0 V.	After warming up engine completely, connect test terminal of check connector with ground terminal. Hold engine revolution speed at 3000 rpm for two minutes.		Check fuel system.
⑰ — ⑱	Less than 3.0 V	Ignition switch ON	<ul style="list-style-type: none">• Engine is stopped.• When check engine lamp is illuminated:	Check power supply for engine lamp.
	About battery voltage	Ignition switch ON	<ul style="list-style-type: none">• After engine starts:• When check engine lamp is extinguished:	

WP80-EM662

ENGINE MECHANICALS

Terminals	STD voltage or resistance	Condition		Remedies
① — ②	About battery voltage	Ignition switch ON	<ul style="list-style-type: none">After engine starts:Cooling water temperature is below 40°C.	Check power supply.
	Less than 3.0 V	Ignition switch ON	<ul style="list-style-type: none">After engine starts:Cooling water temperature is above 41°C.	Check ESV wiring.
② — ③	Less than 1.0 V	At least 30 seconds have elapsed after turning OFF ignition switch.		Check power supply.
	About battery voltage	Ignition switch ON	<ul style="list-style-type: none">Engine is stopped.	
③ — ④	Less than 0.01 V	Ignition switch ON		Proceed to flow chart (2).
④ — ⑤	About battery voltage	Ignition switch ON		Check power supply.
⑤ — ⑥	Change in output voltage	Ignition switch ON	After warming up engine completely, hold engine revolution speed at 3000 rpm for two minutes.	Check fuel system.
⑥ — ⑦	1.5 - 3.0 V	Ignition switch ON	Air temperature inside intake manifold is 20°C.	Check intake air temperature sensor.
⑦ — ⑧	$2.45 \pm 0.5 \Omega$	When air temperature inside intake manifold is 20°C:		
⑧ — ⑨	Less than 0.1 V	Ignition switch ON		Check ground wiring.
⑨ — ⑩	About battery voltage	Ignition switch ON	<ul style="list-style-type: none">Blower fan switch turned OFF	Check ISC.
	Less than 2.0 V	Ignition switch ON	When blower fan switch turned ON:	
⑩ — ⑪	About battery voltage	Ignition switch ON	Throttle valve fully closed	Check throttle system.
	Less than 5.0 V	Ignition switch ON	Throttle valve fully opened	
⑪ — ⑫	More than 1000 Ω	Throttle valve fully closed		
	Less than 29 Ω	Throttle valve fully opened		
⑫ — ⑬	Less than 1 V	Ignition switch ON	When brake pedal is not depressed:	Check brake wiring.
	About battery voltage	At all time	When brake pedal is depressed:	

WFE30-BM563

ENGINE MECHANICALS

Terminals	STD Voltage or resistance	Condition		Remedies
② — ③	Less than 1 V	Ignition switch ON	When compressor magnet switch of air conditioner is turned OFF:	Check air conditioner idle-up VSV.
	About battery voltage	Ignition switch ON	When compressor magnet switch of air conditioner is turned ON:	
⑤ — ⑥	Less than 0.1 V	Ignition switch ON		Check ground wiring.
⑦ — ⑧	About battery voltage	Ignition switch ON	When fuel pump is stopped:	Check or repair pump power supply.
	Less than 2.0 V	Ignition switch ON	When fuel pump is operating:	
⑨ — ⑩	About battery voltage	Ignition switch ON	When pressure VSV is turned OFF:	Check pressure VSV.
	Less than 3.0 V	Ignition switch ON	For 0.5 second immediately after engine starts	
⑫ — Engine ground	Less than 0.1 V	Ignition switch ON		Check ground wiring.
⑬ — ⑭	Less than 3.0 V	Ignition switch ON	Engine is stopped.	Check ISC VSV.
	About battery voltage	Ignition switch ON	When test terminal of check connector is connected with ground terminal:	
⑪ — ⑫	Less than 1.0 V	At least 30 seconds have elapsed after turning OFF ignition switch.		Check power supply.
	About battery voltage	Ignition switch ON	Engine is stopped.	
⑬ — ⑭	Less than 0.1 V	Ignition switch ON		Check ground wiring.

WVE20-04504

DAIHATSU

F300

[HD-Engine]

EMISSION CONTROL SYSTEM

[HD-C Engine]

PURPOSE OF SYSTEM	EC- 2
COMPONENT LAYOUT & SCHEMATIC DIAGRAM	EC- 3
POSITIVE CRANKCASE VENTILATION (PCV)	EC- 4
FUEL EVAPORATIVE EMISSION CONTROL SYSTEM	
(GCC specifications only)	EC- 5

[HD-E Engine]

PURPOSE OF SYSTEMS	EC-13
COMPONENT LAYOUT & SCHEMATIC DIAGRAM	
(General Specification)	EC-14
(US Specification)	EC-15
POSITIVE CRANKCASE VENTILATION SYSTEM (PCV)	EC-16
FUEL EVAPORATIVE EMISSION CONTROL	
(EVAP) SYSTEM	EC-17
THROTTLE POSITIONER (TP) SYSTEM	EC-21
EXHAUST GAS RECIRCULATION (EGR) SYSTEM	
(US Specification Only)	EC-22
THREE-WAY CATALYST (TWC) SYSTEM	EC-26
SST (Special Service Tools)	EC-29
TIGHTENING TORQUES	EC-29
SERVICE SPECIFICATION	EC-29

WPER0-EC001

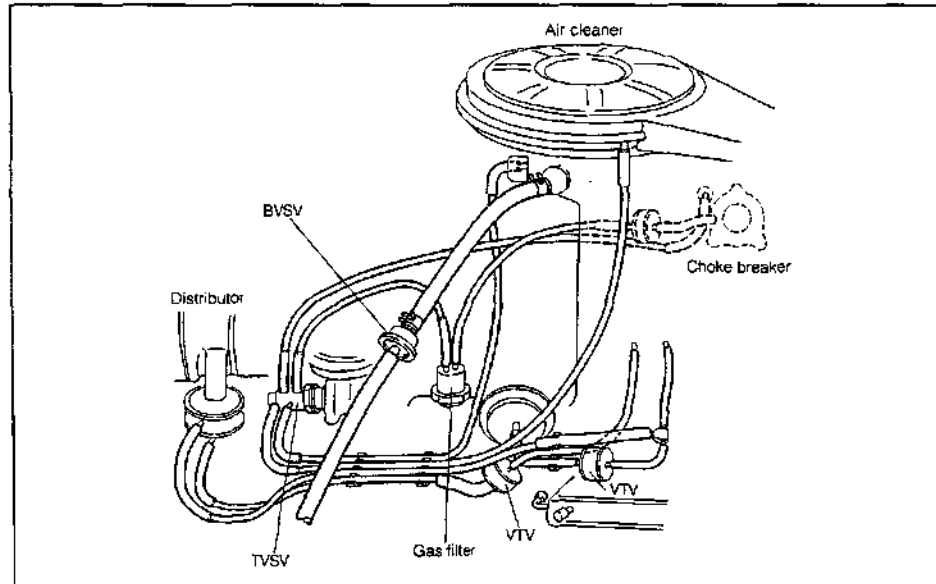
EMISSION CONTROL SYSTEM

[HD-C Engine] PURPOSE OF SYSTEM

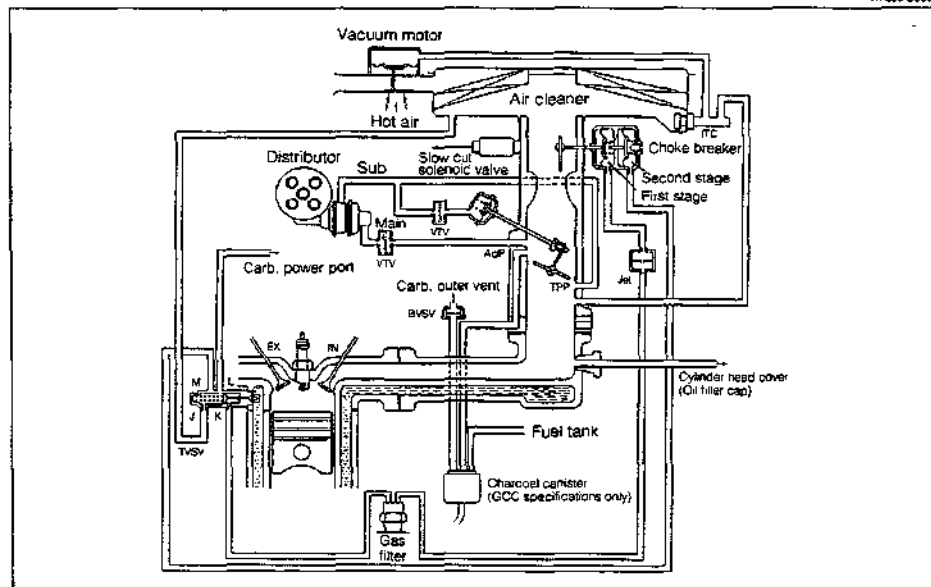
System	Abbreviation	PURPOSE
Positive crank case ventilation	PCV	Reduction of blow-by gas (HC emission)
Spark delay system	SD	Reduction of HC and NOx
Choke breaker system	C/B	Reduction of HC and CO
Throttle positioner system	TP	Reduction of HC and CO
Fuel evaporative emission control system	EVAP	Reduction of evaporative HC emission

WPE90-EC002

COMPONENT LAYOUT & SCHEMATIC DIAGRAM



WP80-EC003



WP80-EC004

EMISSION CONTROL SYSTEM

POSITIVE CRANKCASE VENTILATION (PCV)

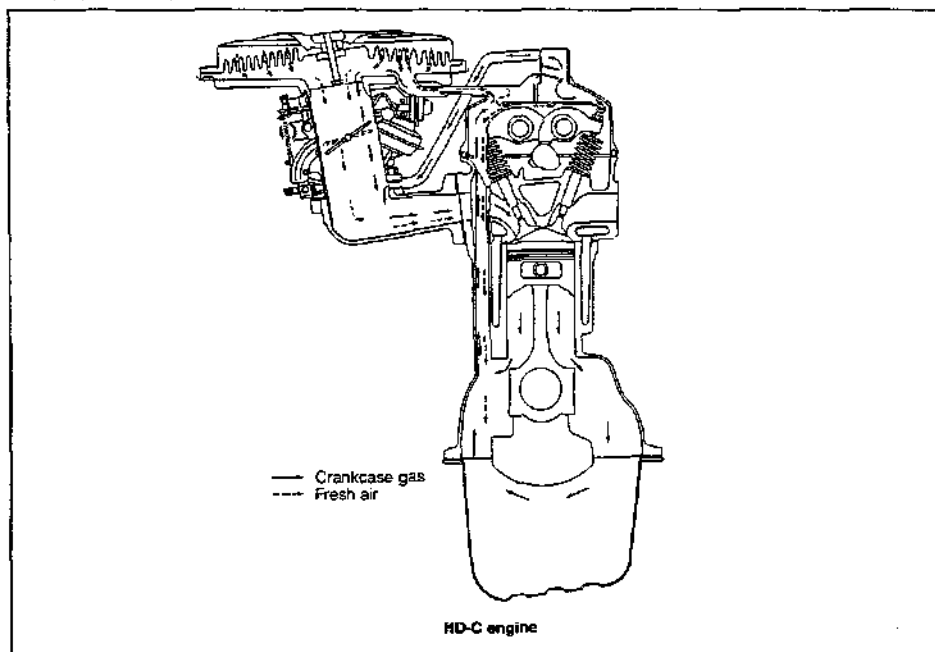
To combat air-pollution problems, the engine is equipped with a sealed type positive crankcase ventilation system in order to prevent blow-by gases generated inside the crankcase from being released into the atmosphere.

The blow-by gases generated inside the crankcase flow into the cylinder head side through the gas passages of the cylinder block.

When the throttle valve opening degree is small, first the oil in the blow-by gas is separated by the oil separator provided at the cylinder head cover. Then, the blow-by gases flow from the carburetor heat insulator section to the intake manifold. Thus, the gases are sucked into the cylinder and burned again.

At this time, fresh air flows from the upstream of the throttle valve into the cylinder head cover. The air flow rate is restricted by a jet located at the cylinder head cover, thus stabilizing the engine idling.

When the throttle valve opening degree is great and/or a large amount of blow-by gases are generated, the blow-by gases flow through both the upstream and the downstream of the throttle valve and are sucked into the combustion chamber.

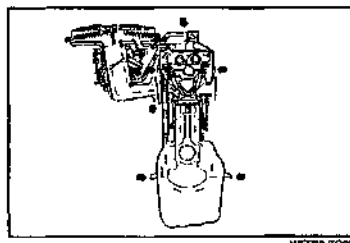


INSPECTION OF PCV HOSE & CONNECTION

Visual inspection of hoses and connection

Check the hoses for improper connections, cracks, leak or damage.

Replace or repair any part which exhibits defects.



EC-4

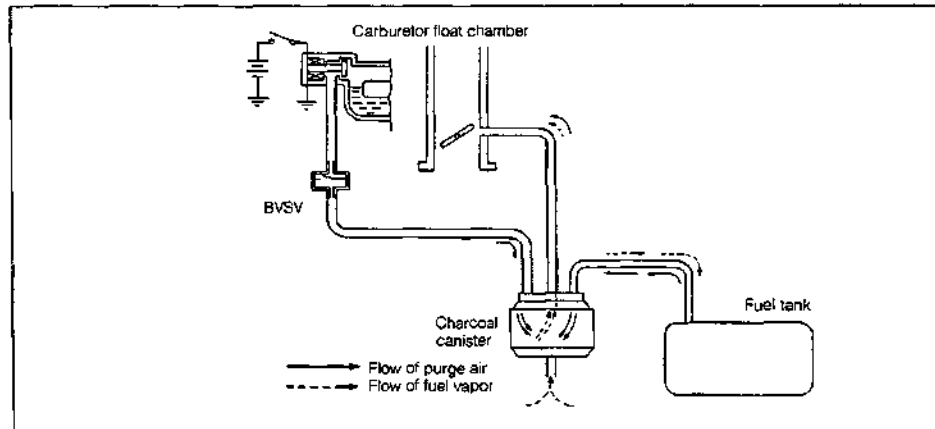
FUEL EVAPORATIVE EMISSION CONTROL SYSTEM (GCC specifications only)

The fuel evaporative emission control system prevents the fuel evaporative emission generated inside the fuel tank or the float chamber of the carburetor from being discharged to the atmosphere.

As the temperature rises, the pressure of the fuel evaporative emission generated in the fuel tank increases while the engine is stopped. When this pressure rise exceeds a certain level, the check valve at the positive pressure side is raised and the evaporative emission is absorbed into the activated carbon in a charcoal canister.

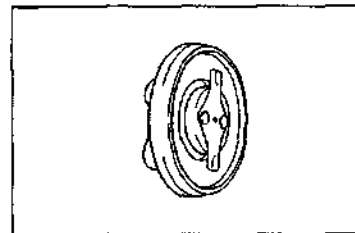
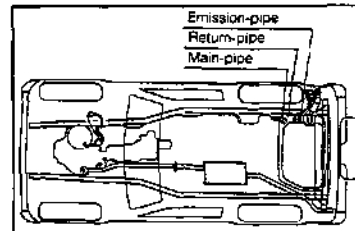
When the engine starts running, the check valve at the negative pressure side opens so that any evaporative emission stored in the canister may be sent to the combustion chamber to be burnt there.

On the other hand, the fuel evaporative emission generated in the float chamber of the carburetor is sent into the charcoal canister when the BVSV exceeds the set temperature (65°C).



Inspection of fuel vapor lines, fuel tank & filler cap

1. Visual inspection of fuel vapor line and connections
Check the line and connections for loose connections, kinks or damage.
2. Visual inspection of fuel tank
Check the fuel tank for deformation, cracks or fuel leakage.
3. Visual inspection of fuel filler cap
Check the cap and gasket for damage or deformation.
Replace the cap, if necessary.



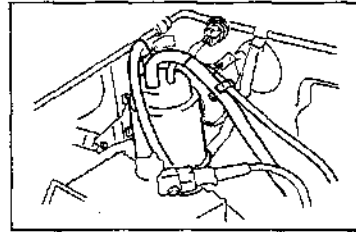
EMISSION CONTROL SYSTEM

Inspection of charcoal canister (GCC specification only)

1. Disconnect the rubber hoses and remove the charcoal canister.

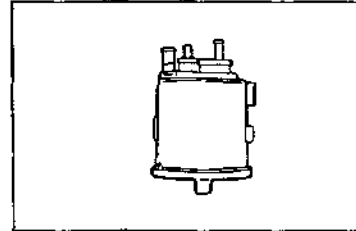
NOTE:

- Put a tag on each of the rubber hoses so that they may be reconnected correctly to the original positions.



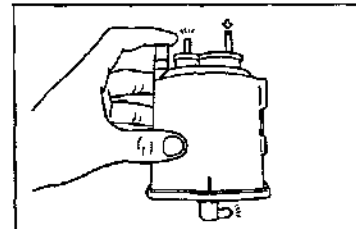
WFE90-EC010

2. Visual inspection of charcoal canister case
Visually inspect the charcoal canister case for cracks or damage.



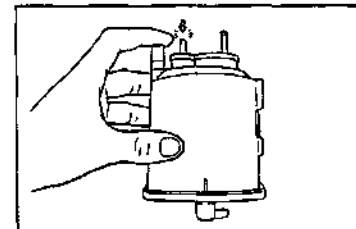
WFE90-EC011

3. Check of canister for restriction
(1) With the pipe at the BVS side plugged with your finger, apply compressed air from the pipe at the fuel tank side. Ensure that air leaks from the other pipe.



WFE90-EC012

- (2) Apply compressed air from the purge side. Ensure that no air continuity exists.
If the check results are unsatisfactory, replace the charcoal canister.

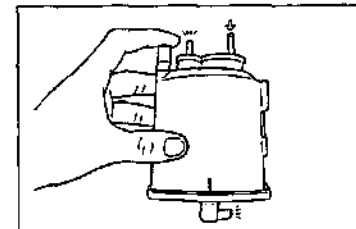


WFE90-EC013

4. Cleaning of filter in canister
Clean the filter by blowing compressed air of 294 kPa (3 kgf/cm²) into the tank pipe while holding the other upper canister pipe closed.

NOTE:

- Do not attempt to wash the canister.
- No activated carbon should come out during the test.

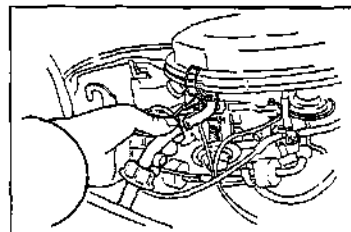


WFE90-EC014

5. Install the charcoal canister and reconnect the rubber hose.

Inspection of outer vent valve

1. Disconnect the rubber hose at the BVSV side.

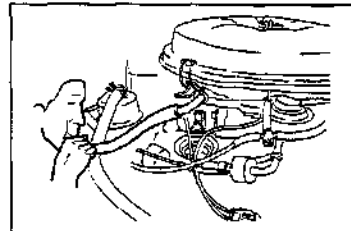


WP690-EC015

2. With the ignition key switch turned ON, blow air into the outer vent valve. Ensure that no air continuity exists. If air continuity exists, check to see if any abnormality is present in the electric circuit of the outer vent valve. Then, replace the outer vent valve, as required.

CAUTION:

- Never inhale the air during the continuity inspection.



WP690-EC016

3. With the ignition key switch turned OFF, blow air into the outer vent valve. Ensure that air continuity exists. If no air continuity exists, check to see if any abnormality is present in the electric circuit of the outer vent valve. Then, replace the outer vent valve, as required.

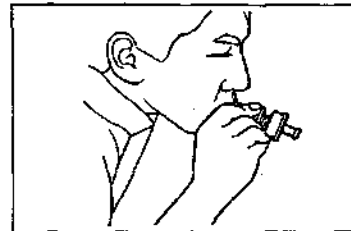
CAUTION:

- Never inhale the air during the continuity inspection.

4. Connect the rubber hose to the BVSV. Attach the hose bands.

Inspection of BVSV

1. Remove the BVSV.
2. Check the air continuity of the BVSV under the following ambient air temperature conditions.
Below 50°C ... No air continuity exists.
Above 65°C ... Air continuity exists.
3. Install the BVSV on the carburetor.

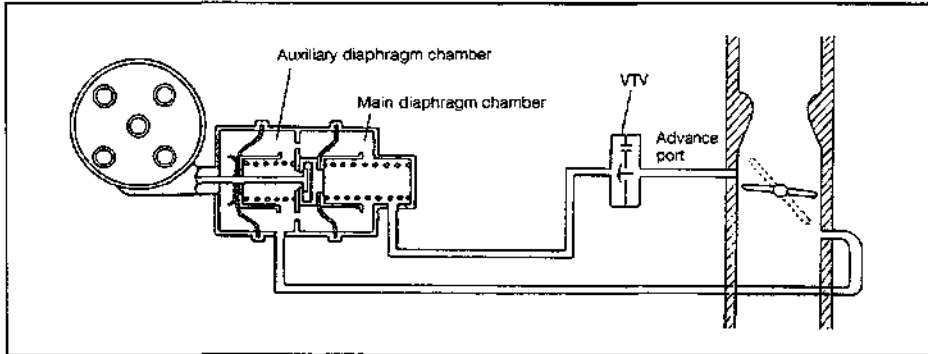


WP690-EC018

EMISSION CONTROL SYSTEM

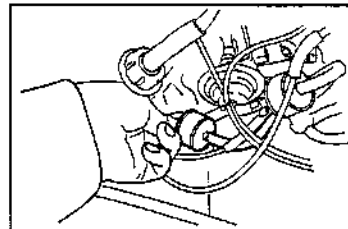
SPARK DELAY SYSTEM

During an acceleration period, this system reduces the HC and NOx emissions generated during the transient period by retarding the ignition advance timing temporarily. This is accomplished by means of the VTV which retards the application of a negative pressure being applied to the main diaphragm of the distributor vacuum advancer through the carburetor advance port.



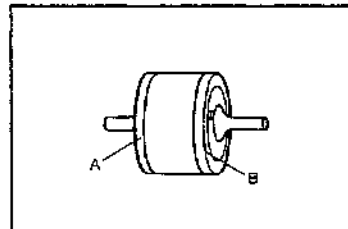
Unit inspection of spark delay system

1. Remove the VTV from engine.

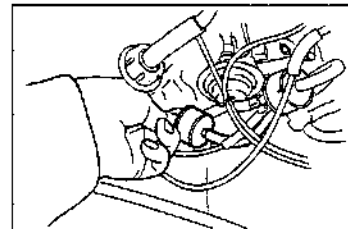


2. Inspection of VTV

- (1) Blow your breath into the VTV carburetor side (side B). Ensure that the air passes through without restriction. If significant restriction exists, replace the VTV.
- (2) Blow your breath into the VTV distributor side (side A). Ensure that there is restriction. If no restriction exists, replace the VTV.



3. Install the VTV to the engine.



CHOKE BREAKER SYSTEM

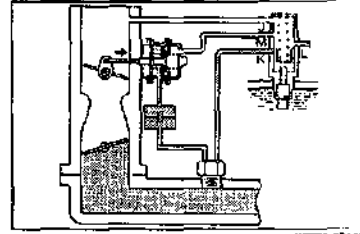
This system opens the choke valve during a period immediately after starting so as to reduce the HC and CO emissions.

Operation

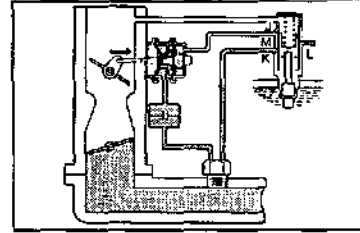
During a period immediately after starting, negative pressure is applied gradually to the first stage of the choke breaker diaphragm. Consequently, the choke valve is opened slightly. When the water temperature is low, the atmosphere is applied to the second stage of the choke breaker diaphragm via the TVSV. Thus, the second diaphragm remains inoperative.

When the temperature reaches a certain level as the cooling water temperature rises, the negative pressure of the intake manifold starts to be applied to the second stage of the choke breaker diaphragm via the TVSV.

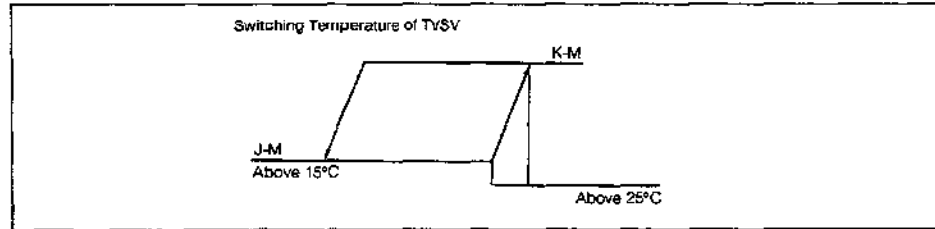
As a result, the choke valve opens further, thereby preventing the air-to-fuel ratio from becoming too rich.



WFE90-EC0023



WFE90-EC0024

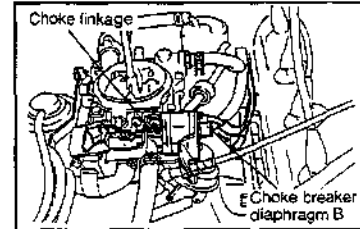


WFE90-EC0025

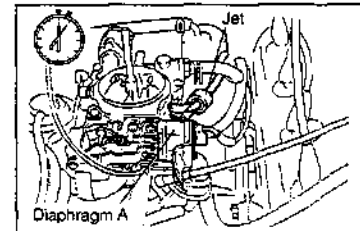
Inspection of choke breaker system

1. Inspection of TVSV with cold engine
 - (1) Start the engine.
 - (2) With the coolant temperature below 15°C, disconnect the vacuum hose from choke breaker diaphragm B and check that the choke linkage does not move.
 - (3) Reconnect the vacuum hose to diaphragm B.
2. Inspection of jet and diaphragm A
 - (1) Disconnect the vacuum hose from the choke breaker diaphragm A and check linkage moves.
 - (2) Reconnect the vacuum hose to diaphragm A and check that the choke linkage moves within the specified time after reconnecting the hose.

Specified Time: 1 - 5 seconds



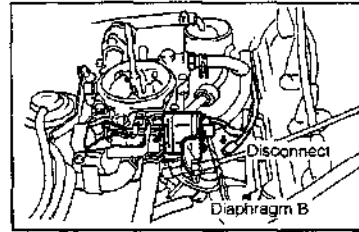
WFE90-EC0026



WFE90-EC0027

MISSION CONTROL SYSTEM

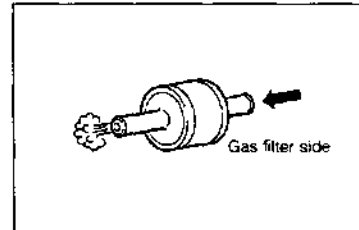
4. Inspection of TVSV and diaphragm B with warm engine
 - (1) After warming up the engine, disconnect the vacuum hose from diaphragm B and check that the choke linkage returns.
 - (2) Reconnect the vacuum hose to diaphragm B.
 If no problem is found with this inspection, the system is okay; otherwise inspect each part.



WFEB0-EC028

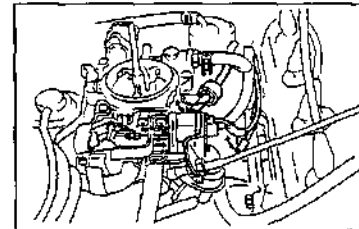
Unit inspection of choke breaker

1. Inspection of jet
 - (1) Check the jet by blowing air from each side.
 - (2) Ensure that there is no restriction if the air blows from the gas filter side.



WFEB0-EC029

2. Inspection of choke breaker diaphragms
 - (1) Check that choke linkage moves in accordance with applied vacuum.

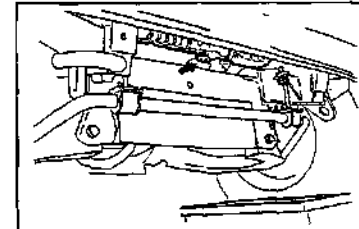


WFEB0-EC030

3. Inspection of TVSV
 - (1) Drain the cooling water from radiator into a suitable container.
 - (2) Disconnect the vacuum hose from the TVSV, and remove the TVSV.

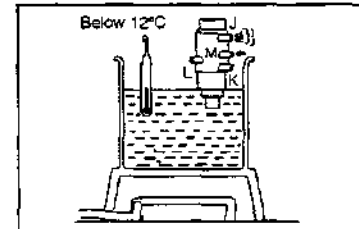
NOTE:

- Be very careful not to damage the TVSV by hitting it to the by-pass pipe.



WFEB0-EC031

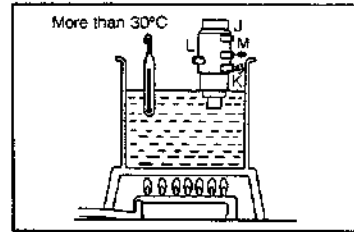
- (3) Cool the TVSV thermo sensing section to below 12°C, and check that air flows from pipe M to pipe J.



WFEB0-EC032

EMISSION CONTROL SYSTEM

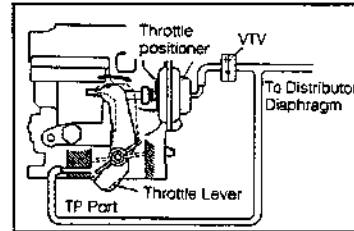
- (4) Heat the TVSV more than 30°C, and check that air flows from pipe M to pipe K.



THROTTLE POSITIONER (TP) SYSTEM

Operation

For the purpose of reducing the CO and HC emissions, the throttle positioner prevents the throttle valve from being closed suddenly during the engine braking period, utilizing a negative pressure generated in the intake manifold.



Inspection of throttle positioner system

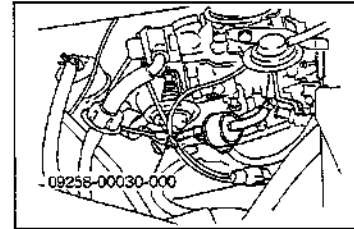
1. Warm up the engine.
2. Disconnect the vacuum hose from the throttle positioner. Plug the hole, using the following SST.

SST: 09258-00030-000

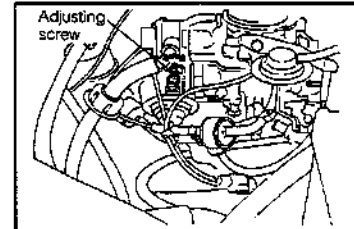
NOTE:

- At this time, be sure that the throttle positioner shaft is stretched fully.

3. Check that touch revolution speed is set.
Touch Revolution Speed: 1500 ± 50 rpm



4. If not at specified speed adjust with throttle positioner adjusting screw.



5. Hold the engine revolution speed at about 2500 rpm at least five seconds by opening the throttle valve. Then, release the throttle lever. Check that the time required for the engine revolution speed to drop from 1500 to 1200 rpm conforms to the specified value.

Specified Time: 0.5 - 5 seconds

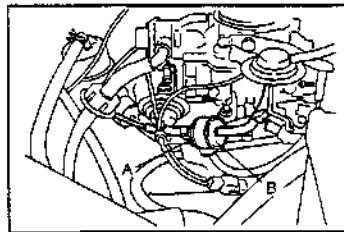
If the time will not conform to the specification, check the direction of the VTV. Then, proceed to check the VTV.

WPB0-EC037

EMISSION CONTROL SYSTEM

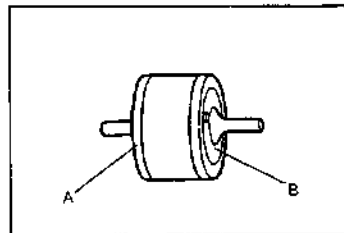
Inspection of VTV

1. Remove the VTV. Blow your breath into the VTV from the carburetor side (side B). Ensure that the air passes through without restriction.
If significant restriction exists, replace the VTV.



WPB90-EC0368

2. Blow your breath into the VTV from the throttle positioner side (side A). Ensure that there is restriction.
If no restriction exists, replace the VTV.



WPB90-EC0339

**[HD-E Engine]
PURPOSE OF SYSTEMS**

System	Abbreviation	Purpose
Positive crankcase ventilation	PCV	Reduction of blow-by gas (HC emission)
Fuel evaporative emission control	EVA ^P	Reduction of evaporative HC emission
Throttle positioner	TP	Reduction of HC and CO emissions
Exhaust gas recirculation	EGR	Reduction of NOx emission
Three-way catalyst (Catalyst provided at under floor.)	TWC	Reduction of HC, CO and NOx emissions
Electronic fuel injection*	EFI	Regulation of all engine conditions for reduction of exhaust emissions

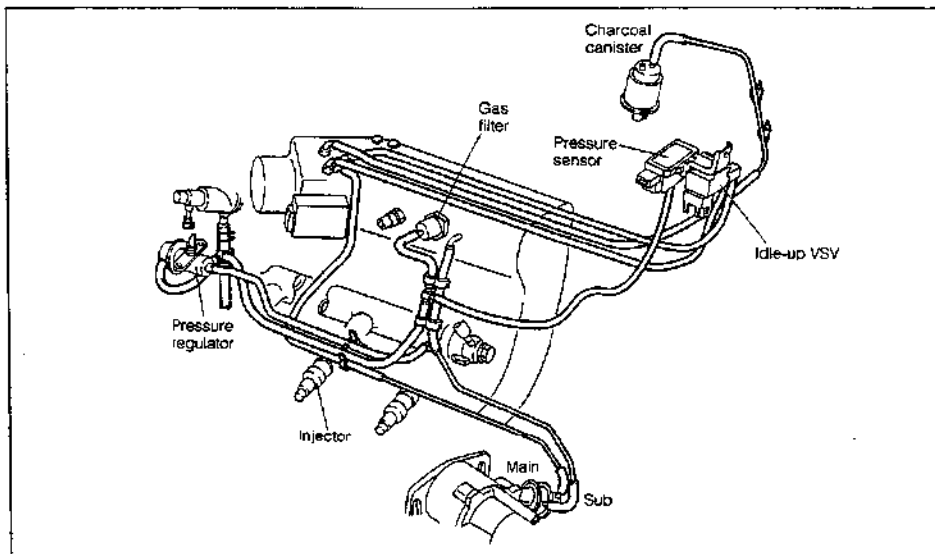
* For inspection and repairs of the EFI system, refer to the EFI section.

WFE50-EC040

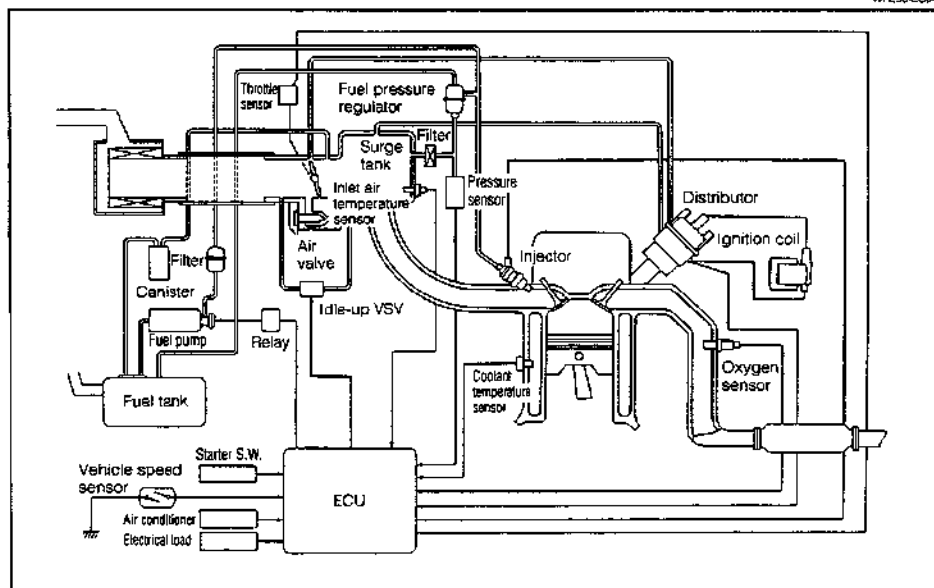
EMISSION CONTROL SYSTEM

COMPONENT LAYOUT & SCHEMATIC DIAGRAM

(General Specification)



WP89Q-EC041



WP89Q-EC042

(US Specification)



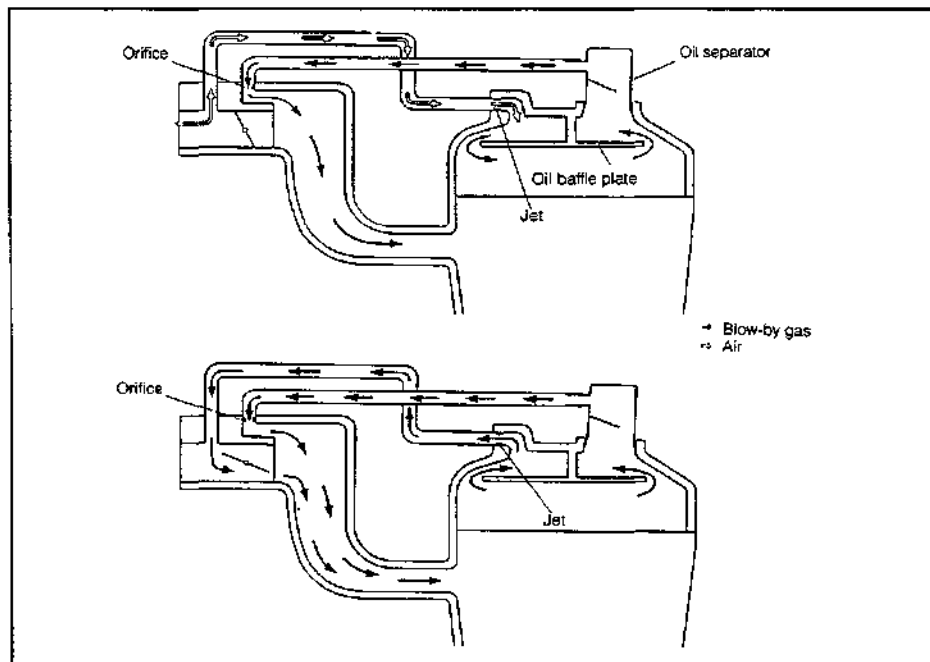
EMISSION CONTROL SYSTEM

POSITIVE CRANKCASE VENTILATION SYSTEM (PCV)

To combat air-pollution problems, the engine is equipped with a sealed type positive crankcase ventilation system in order to prevent blow-by gases generated inside the crankcase from being released into the atmosphere.

The blow-by gases generated inside the crankcase flow into the cylinder side through the gas path of the cylinder block. When the opening degree of the throttle valve is small, oil in the blow-by gases is separated by the oil separator provided at the cylinder head cover. Then, the blow-by gases are sucked into the cylinders from the throttle body to be burnt again.

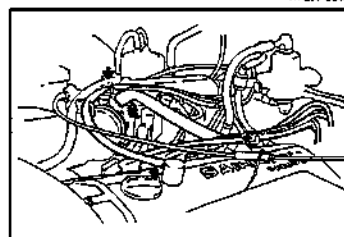
Fresh air enters the cylinder head cover from the upstream path of the throttle valve. At this time, the air flow rate is regulated by a jet provided at the cylinder head cover, thus stabilizing the engine idling. When the opening degree of the throttle valve is large and/or when a large amount of blow-by gases are generated, the blow-by gases are sucked into the combustion chambers both through the upstream path and the downstream path of the throttle valve.



INSPECTION OF PCV HOSE & CONNECTION

Visual inspection of hoses and connections check the hoses and connections for cracks, leakage or damage.

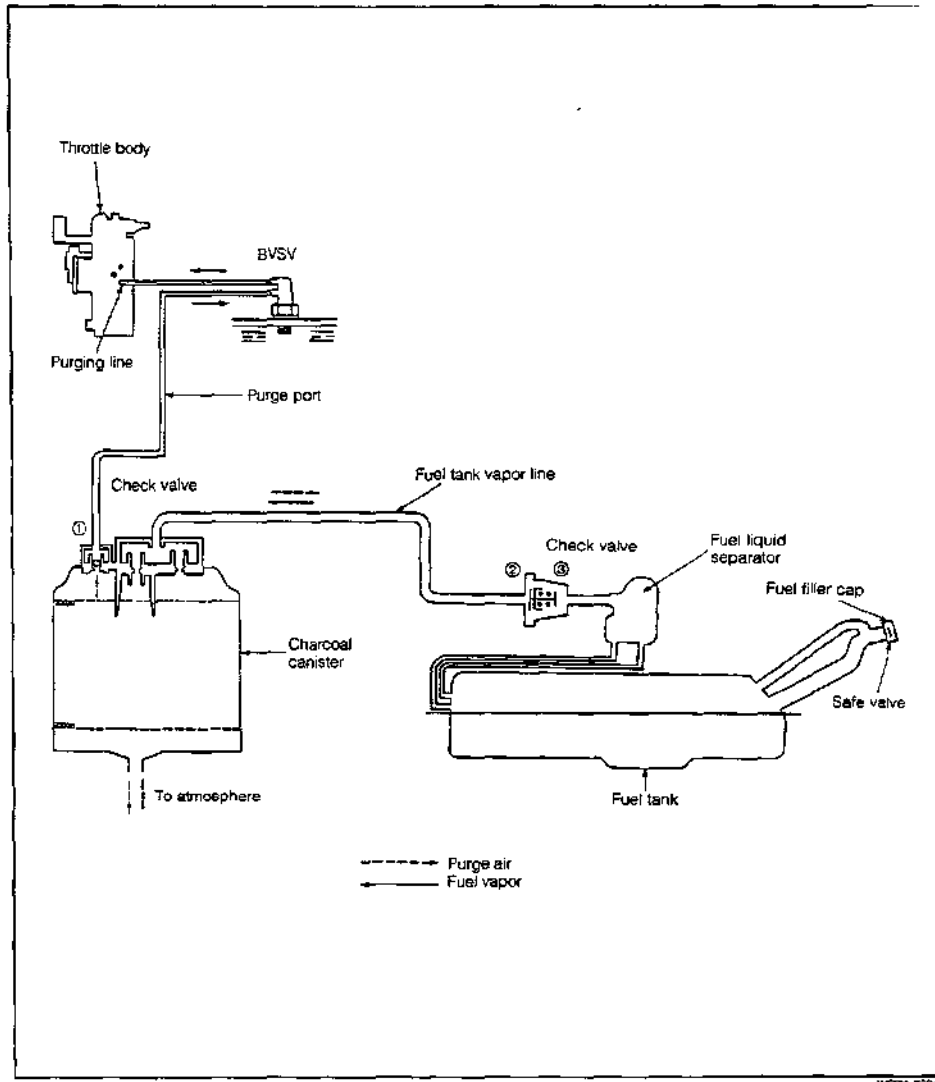
If any parts exhibit fault, replace or repair them, as required.



FUEL EVAPORATIVE EMISSION CONTROL (EVAP) SYSTEM

The fuel evaporative emission control system employs the charcoal canister type. Pressure created by evaporating fuel drives the vapors into the charcoal canister which uses activated carbon to absorb HC emission.

The separated HC emission is drawn into the throttle body to be burnt together with mixture in the combustion chamber when the BVSV opens according to the engine coolant temperature.



EMISSION CONTROL SYSTEM

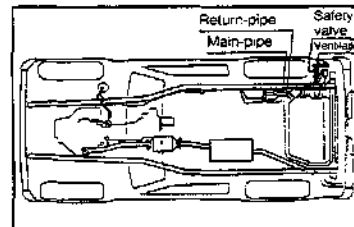
Coolant temp. or tank pressure	BVS	Throttle valve opening position	*Check valve			Fuel filler cap check valve	Evaporated fuel (HC)
			(1)	(2)	(3)		
Below 45°C	CLOSED	—	—	—	—	—	HC from fuel tank is absorbed by canister
Above 66°C	OPEN	Positioned below purge port	CLOSED	—	—	—	HC from canister is sucked into engine
		Positioned above purge port	OPEN	—	—	—	HC from fuel tank is absorbed by canister
High pressure in fuel tank	—	—	—	OPEN	CLOSED	CLOSED	HC from fuel tank is absorbed by canister
High vacuum in fuel tank	—	—	—	CLOSED	OPEN	CLOSED (OPEN when exces- sive high vacuum)	(Air is led into fuel tank)

*: (1)...Charcoal canister, (2)...Safety valve positive side, (3)...Safety valve negative side

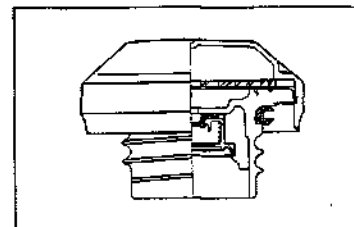
WFE90-EC048

INSPECTION OF FUEL VAPOR LINES, FUEL TANK, FILLER CAP & SAFETY VALVE

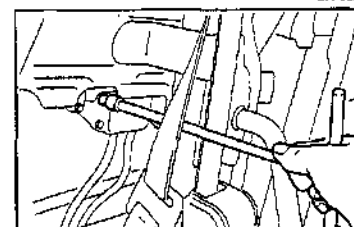
- Visual inspection of fuel vapor lines and connections
Check the lines and connections for loose connections, kinks or damage.
- Visual inspection of fuel tank
Check the fuel tank for deformation, cracks or fuel leakage.
- Visual inspection of fuel filler cap
Check the cap and gasket for damage or deformation.
Repair or replace the gasket and/or cap, if necessary.
- Inspection of safety valve
 - Remove the quarter trim RH by detaching the eleven clips.
 - Detach the safety valve together with fuel separator.
 - Disconnect the hoses from the safety valve.



WFE90-EC049

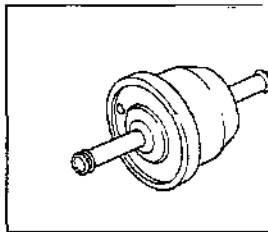


WFE90-EC050



WFE90-EC051

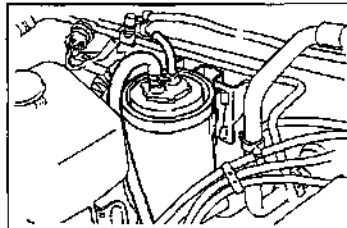
- (4) Ensure that there exists resistance when you blow your breath lightly from the side A. Also, ensure that the resistance no longer exists when you blow your breath strongly.
- (5) Ensure that there exists resistance when you suck air lightly from the side B. Also, ensure that the resistance no longer exists when you suck air strongly.



WPED-EC006

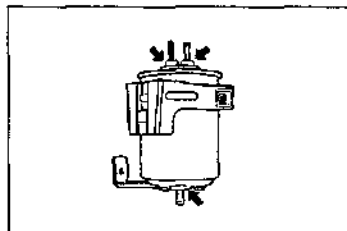
INSPECTION OF CHARCOAL CANISTER

1. Disconnect the rubber hoses and remove the charcoal canister



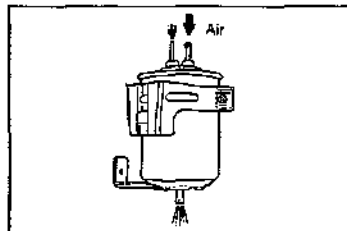
WPED-EC003

2. Visual inspection of charcoal canister case
Visually inspect the charcoal canister case for cracks or damage.



WPED-EC004

3. Check of filter for restriction
 - (1) Blow low pressure compressed air into the tank pipe. Ensure that air flows without resistance from the other pipe.
 - (2) Blow air into the purge pipe. Ensure that no air flows from the other pipe.
Replace the charcoal canister, if it exhibits any defect.



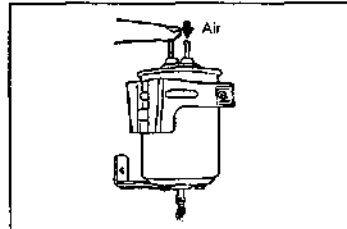
WPED-EC005

4. Cleaning of filter in canister
Clean the filter by blowing compressed air of 294 kPa (3 kgf/cm²) into the tank pipe while holding the other upper canister pipe closed.

NOTE:

- Do not attempt to wash the canister.
- No activated carbon should come out during the test.

5. Install the charcoal canister and reconnect the rubber hose.



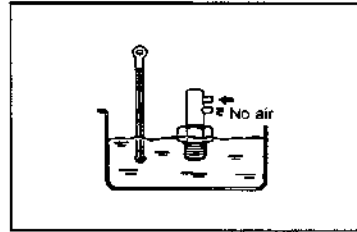
WPED-EC006

EMISSION CONTROL SYSTEM

INSPECTION OF BVSV

Checking of BVSV by blowing air into pipe

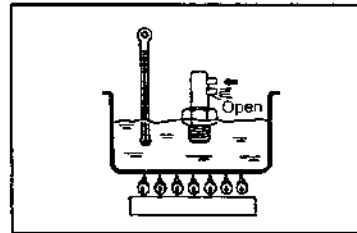
1. Drain the coolant from the radiator into a suitable container.
2. Remove the BVSV.
3. Cool the BVSV to below 45°C
4. Ensure that no air continuity exists. If air continuity exists, replace the BVSV.



WP690-EC057

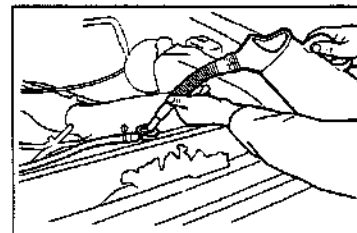
5. Heat the BVSV to above 66°C, using hot water.
6. Ensure that air continuity exists.
If no air continuity exists, replace the BVSV.
7. Apply liquid sealer to the threaded portion of the BVSV.
Reinstall the BVSV.

Tightening Torque: 24.5 - 34.3 N·m (2.5 - 3.5 kgf·m)



WP690-EC058

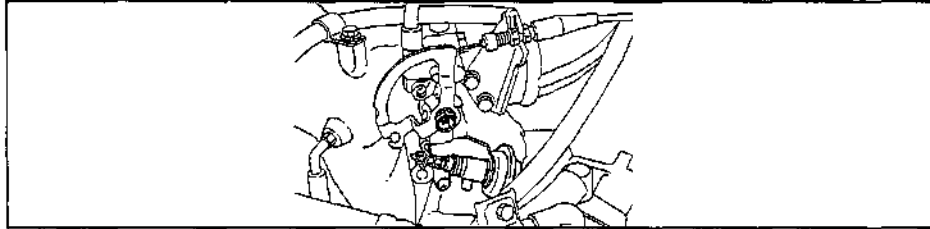
8. Fill the coolant to the radiator.
(See page CO-12.)
9. Start the engine. Check the coolant level.
If the coolant level is low, add the coolant.
10. Check the water leakage and/or air leakage.



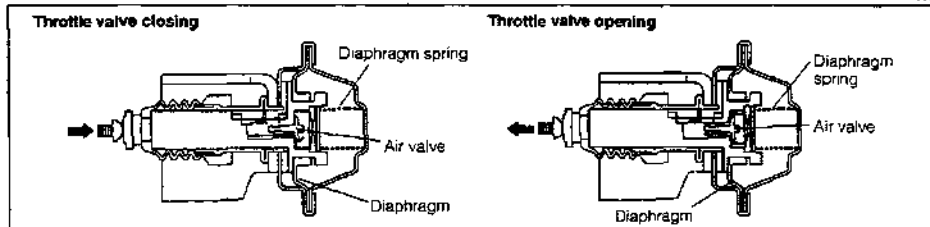
WP690-EC059

THROTTLE POSITIONER (TP) SYSTEM

This system prevents the throttle valve from suddenly closing, thus reducing the CO and HC emissions.



WFE90-EC000



WFE90-EC061

Conditions	TP diaphragm	Throttle valve
Idling	Pushed in by return force of throttle valve	Idle speed position
Normal driving	Pushed out by diaphragm spring	Opened position
Deceleration	* Pushed in by return force of throttle valve	Slightly opens and then slowly closes to the idle position.

* At this point, the function of the air valve provided inside the throttle positioner diaphragm prevents the throttle valve from being closed suddenly.

WFE90-EC062

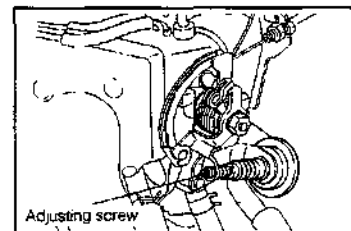
INSPECTION OF THROTTLE POSITIONER (TP) SYSTEM

1. Warm up the engine.
2. Check the idle speed. Adjust the speed, if necessary.
3. Check of TP setting speed
 - (1) Raise the engine speed to approximately 3000 rpm.
 - (2) Close the throttle valve slowly.
 - (3) Observe the engine speed at a time when the dashpot lever comes in contact with the throttle lever.

Engine Speed:

General Spc: 1800 ± 100 rpm

US Spc: 1600 ± 100 rpm



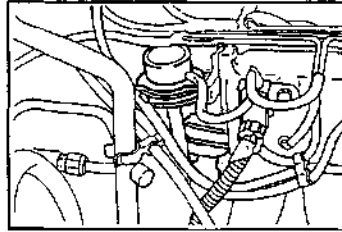
WFE90-EC063

If the engine speed does not conform to the specification, perform adjustment by turning the TP adjusting screw.

EMISSION CONTROL SYSTEM

EXHAUST GAS RECIRCULATION (EGR) SYSTEM (US Specification Only)

The EGR system recirculates the exhaust gas into the intake manifold in an optimum amount according to driving conditions and coolant temperature. Thus, this system retards the combustion, resulting in reduced amount of NOx emission.



WFE90-5C004

Coolant temperature	EVS	Throttle valve opening angle	EGR vacuum modulator	EGR valve	Exhaust gas
Below 39°C	Closed	—	—	Closed	Not recirculated
Above 40°C	Closed	Positioned below EGR port	Opens passage to atmosphere	Closed	Not recirculated
		* Positioned between EGR port	Opens passage to atmosphere	Closed	Not recirculated
		** Positioned above EGR port	Closed passage to atmosphere	Open	Recirculated
			Closed passage to atmosphere	Open	Recirculate volume increase

REMARKS:

* At this stage, the EGR valve repeats its opening/closing as described below, depending upon the throttle valve opening and exhaust gas pressure.

Exhaust gas pressure drops. → Modulator opens. → EGR valve closes.

↑

EGR valve opens.

← Modulator opens.

↓

Exhaust gas pressure increases.

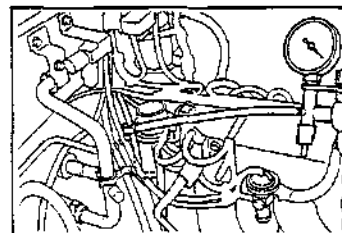
** At this stage, the EGR valve remains open because of a negative pressure being applied to the EGR port, even when the modulator opens to the atmosphere.

WFE90-5C005

INSPECTION OF EGR SYSTEM

1. Preparation

Using a three-way connector, connect a vacuum gauge to the hose between the EGR valve and the EGR vacuum modulator.

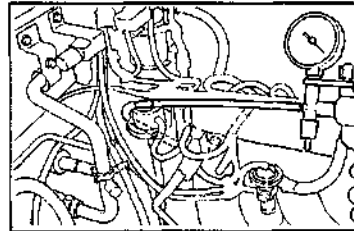


WFE90-5C006

2. Check of EGR valve seating
Start the engine. Ensure that the engine starts and runs smoothly at the idle speed.
If the engine will not idle smoothly, perform the unit inspection of the EGR valve.
3. Check of EGR VSV with engine in cold state
Ensure that no vacuum is applied to the vacuum gauge even if the engine is raced when the coolant temperature is below 39°C.
If a negative pressure is applied to the vacuum gauge, check the EGR VSV and/or the water temperature sensor.
4. Check of EGR VSV with engine in hot state
 - (1) Warm up the engine.
 - (2) Run the engine at a speed of about 3000 rpm. Ensure that a negative pressure is applied to the vacuum gauge.

WFE90-EC007

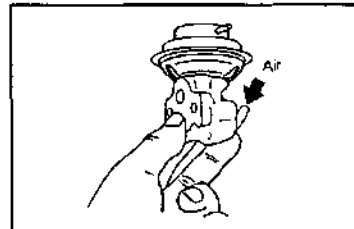
5. Check of EGR valve
 - (1) Connect a MityVac directly to the EGR valve.
 - (2) Apply a negative pressure to the EGR valve while the engine is idling. Ensure that the engine runs roughly or stalls.
 - (3) Reconnect the vacuum hoses to original location.
 If no problem is found during this inspection, the system is functioning properly. If any problem is found, check and remedy the part concerned.



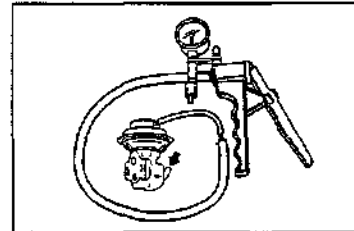
WFE90-EC008

INSPECTION OF EGR VALVE

1. Remove the EGR valve.
2. Check of EGR valve
 - (1) Blow air into the EGR valve through its pipe section with the bypass hole of the EGR valve plugged by your finger, as indicated in the right figure. Under this state, ensure that no air continuity is present.
If air continuity exists, replace the EGR valve.
 - (2) Apply a negative pressure of 20.0 kPa (150 mmHg) to the EGR valve.
Under this setting, blow air into the EGR valve through its pipe section with the bypass hole of the EGR valve plugged by your finger, as indicated in the right figure. Ensure that air continuity exists.
If no air continuity exists, replace the EGR valve.
3. Install the EGR valve on the intake manifold with a new gasket interposed. Connect the rubber hose.



WFE90-EC009

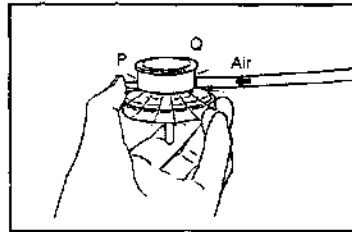


WFE90-EC010

EMISSION CONTROL SYSTEM

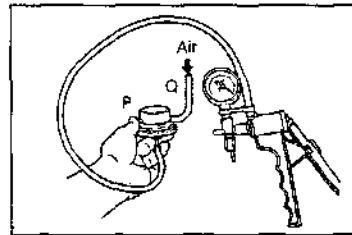
INSPECTION OF EGR VACUUM MODULATOR

1. Remove the EGR vacuum modulator.
2. Plug the port P with your finger. Blow air into the port Q. Ensure that air continuity exists. If no air continuity exists, replace the modulator.



WFE80-EC071

3. Apply a pressure 49.0 kPa (0.2 kgf/cm²) to the pressure discharge port of the modulator, using a MityVac. Under this setting, blow air into the modulator through the port Q with the port P plugged by your finger. Ensure that no air continuity exists. If air continuity exists, replace the modulator.



WFE80-EC072

INSPECTION OF EGR VSV

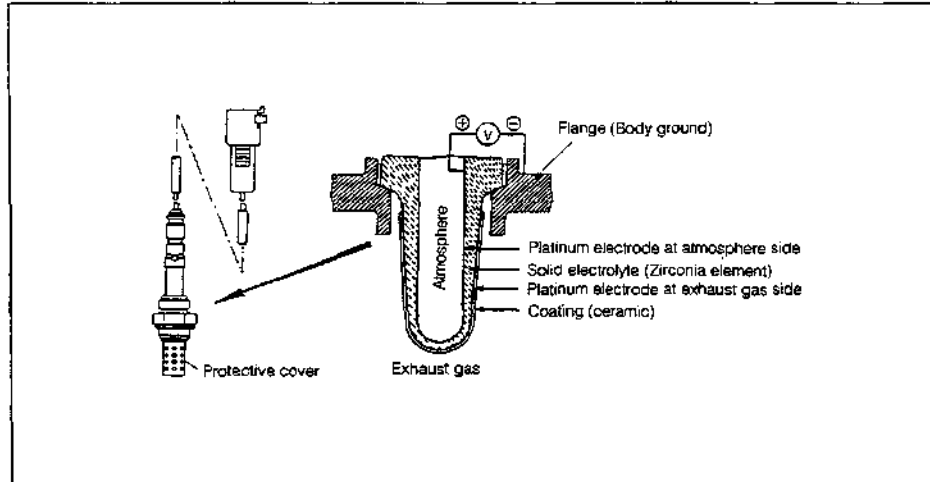
(See page EF-181.)

WFE80-EC073

OXYGEN SENSOR

The oxygen sensor is a compact sensor installed at the exhaust pipe or exhaust manifold, which detects the oxygen concentration (air-to-fuel ratio). When the air-to-fuel ratio is greater (leaner) than the stoichiometric air-to-fuel ratio, there exists excessive amount of air compared with the amount of air required for the fuel to be burnt. Hence, oxygen remains in the exhaust gas. Conversely, when the air-to-fuel ratio is smaller (richer) than the stoichiometric air-to-fuel ratio, no oxygen remains in the exhaust gas. It is, therefore, possible to know whether the actual air-to-fuel ratio is richer or leaner than the stoichiometric air-to-fuel ratio by detecting the oxygen concentration in the exhaust gas.

The oxygen sensor is so constructed that both sides of a measuring-tube-shaped solid electrolyte (Zirconia element) are coated with thin films of platinum.

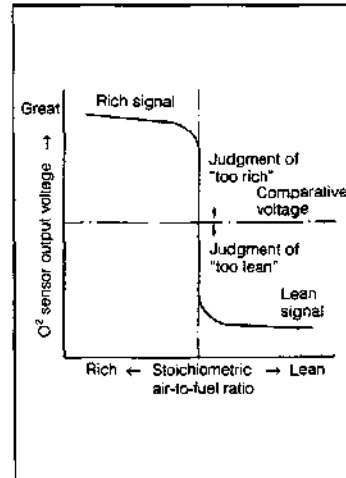


WP290-EC074

The Zirconia element has such characteristics that an electromotive force is generated when the oxygen concentration differs between both sides of the element. Furthermore, when the temperature of the oxygen sensor is high, its electromotive force changes suddenly in the neighborhood of the stoichiometric air-to-fuel ratio due to platinum catalysis. (See the right figure.)

The exterior of the oxygen sensor is exposed to the exhaust gas, whereas the interior is introduced with the atmosphere. Utilizing the aforesaid characteristics, the oxygen sensor accurately detects whether the oxygen concentration, i.e. the air-to-fuel ratio, is richer or leaner than the stoichiometric air-to-fuel ratio. When the air-to-fuel ratio is richer than the stoichiometric air-to-fuel ratio, the electromotive force of the oxygen sensor becomes high, thus sending a rich signal to the computer. Conversely, when the air-to-fuel ratio is leaner than the stoichiometric air-to-fuel ratio, the electromotive force of the oxygen sensor becomes low, thus sending a lean signal to the computer.

The oxygen sensor begins its operation when the temperature rises above about 400°C.

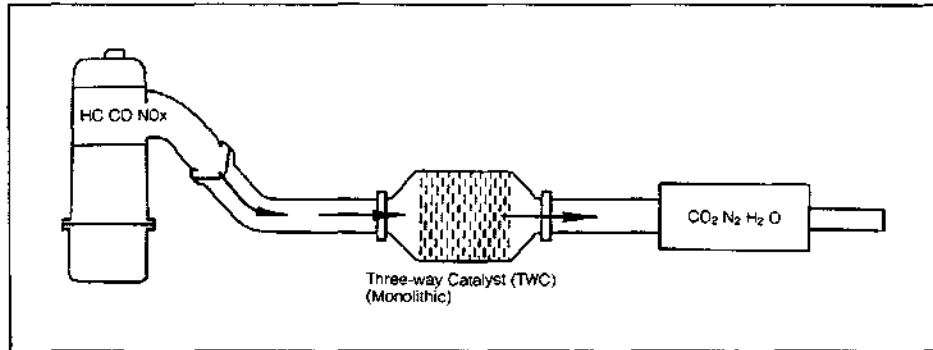


WP290-EC075

EMISSION CONTROL SYSTEM

THREE-WAY CATALYST (TWC) SYSTEM

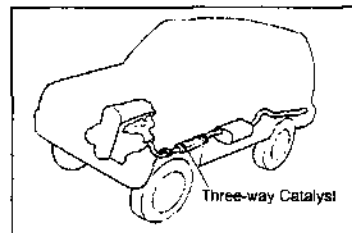
If this three-way catalyst, the oxidation of carbon monoxide (CO) and the reduction of nitrogen oxides (NOx) contained in exhaust gas can take place simultaneously. Thus, the three-way catalyst purifies the exhaust gas by converting its harmful components gas into harmless carbon dioxide (CO₂), water vapor (H₂O) and nitrogen (N₂).



Exhaust gas component	TWC	Exhaust gas
HC, CO and NOx	Oxidation and reduction	CO ₂ , H ₂ O and N ₂

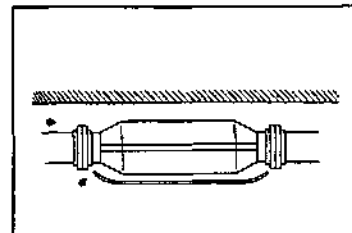
INSPECTION OF EXHAUST PIPE ASSEMBLY

1. Check the connections for looseness or damage.
2. Check the clamps for weakness, bend or damage.



INSPECTION OF HEAT INSULATOR

1. Check heat insulator for damage.
2. Check for adequate clearance between the three-way catalyst and heat insulator.

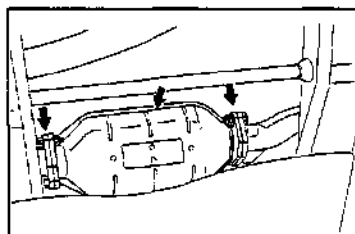


EMISSION CONTROL SYSTEM

THREE-WAY CATALYST

INSPECTION

1. Check the connections for looseness or damage.
2. Check the three-way catalyst for dents or damage.



WPB30-EC080

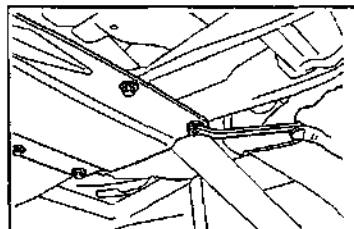
REMOVAL

WARNING:
Do not perform any operation while the exhaust pipe is still hot.

1. Jack up the vehicle and support it with safety stands.

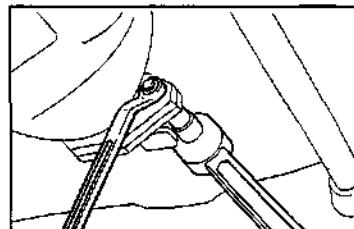
WPB30-EC081

2. Remove the transmission undercover, by removing the eight attaching bolts.



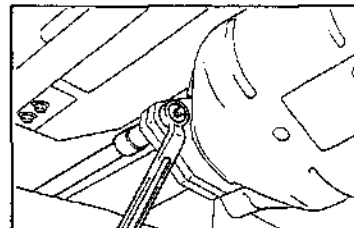
WPB30-EC082

3. Separate the tail pipe assembly from the three-way catalyst assembly by removing the two bolts and nuts.



WPB30-EC083

4. Separate the three-way catalyst assembly from the front exhaust pipe assembly by removing the two bolts and nuts.
5. Remove the three-way catalyst while pushing the tail pipe assembly rearward.

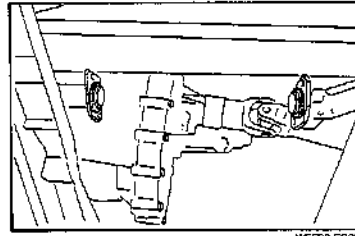


WPB30-EC084

EMISSION CONTROL SYSTEM

INSTALLATION

1. Install a new gasket to the front exhaust pipe and tail pipe.

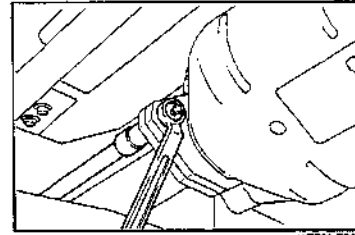


2. Install the three-way catalyst assembly to the front exhaust pipe assembly.

Tightening Torque:
36.3 - 51.0 N-m (3.7 - 5.2 kgf-m)

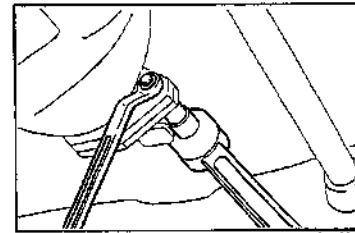
NOTE:

- Make sure that the front mark is located at front side.

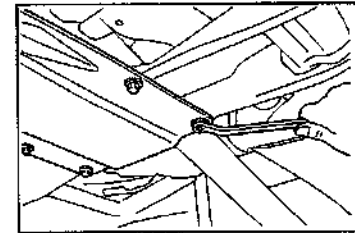


3. Tighten the attaching bolts and nuts for the three-way catalyst at the tail pipe side.


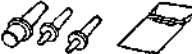
Tightening Torque:
36.3 - 51.0 N-m (3.7 - 5.2 kgf-m)



4. Install the transmission under cover by attaching the eight bolts.



SST (Special Service Tools)

Shape	Part No. and Name	Purpose	Remarks
	*1 09991-87703-000 Tacho pulse pick-up wire	Connecting engine tachometer	
	09258-00030-000 Plug set	Plugging rubber hoses.	

WFE90-EC088

TIGHTENING TORQUES

Tightening component	Tightening torque			Remark
	N·m	kgf·m	ft·lb	
Cylinder head x TVSV (HD-C engine only)	24.5 - 34.3	2.5 - 3.5	18.1 - 25.3	Dry
Cylinder head x Exhaust manifold	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5	Dry
Exhaust manifold x Exhaust pipe	34.3 - 49.0	3.5 - 5.0	25.3 - 36.2	Dry
Exhaust manifold clamp	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5	Dry
Exhaust pipe front x Exhaust pipe rear	36.3 - 51.0	3.7 - 5.2	26.8 - 37.6	Dry
Exhaust pipe support	9.8 - 15.7	1.0 - 1.6	7.2 - 11.6	Dry

WFE90-EC090

SERVICE SPECIFICATION

Ignition timing	HD-C HD-E (General) HD-E (US. spec)	B.T.D.C. $3 \pm 2^\circ/850 \pm 50$ rpm " /1000 rpm or less (However, engine revolution must be stable.)
Idle speed		
Engine type	HD-C	HD-E
Idle speed	850 \pm 50 rpm	850 \pm 50 rpm
Fast idle speed adjustment (HD-C)		
Full position		1300 - 2000 rpm
Throttle positioner touch revolution		
HD-C	HD-E	
1500 \pm 50 rpm	1800 \pm 100 rpm (General spec.) 1600 \pm 100 rpm (US spec.)	
Throttle positioner operating time		
HD-C		0.5 - 5.0 seconds
HD-E		0.5 - 5.0 seconds
Compression pressure at 300 rpm		
Standard		1373 kPa (14.0 kgf/cm ²)
Minimum		1030 kPa (10.5 kgf/cm ²)
Difference between cylinders		147 kPa (1.5 kgf/cm ²)

WFE90-EC091

DAIHATSU

F300

EFI SYSTEM

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INSPECTION PRECAUTIONS	EF- 6
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DIAGNOSIS SYSTEM	EF- 27
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VOLT/OHMMETER	EF- 32
ELECTRONIC CONTROL SYSTEM	EF- 51
FUEL SYSTEM	EF- 75
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ELECTRONIC CONTROL SYSTEM	EF-160
FUEL SYSTEM	EF-198
AIR INDUCTION SYSTEM	EF-220

WPE30-6F001

EFI SYSTEM

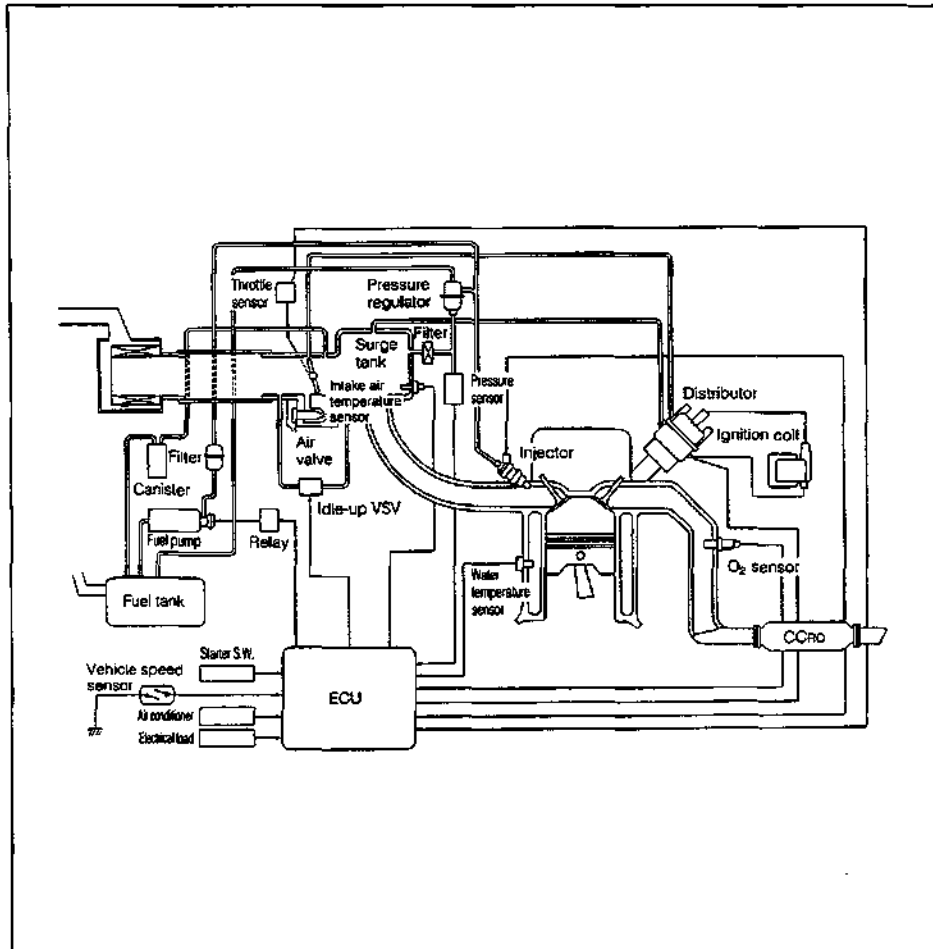
INTRODUCTION (General Specification)

The EFI system consists of the following three systems; fuel system, intake system and control system. The electronic control system unit (ECU) incorporating a microcomputer controls the EFI system, based on signals inputted from the various sensors.

Besides this function, the ECU controls various functions such as the fuel pump control, idle up VSV control, injector control, self diagnosis function and fail-safe function.

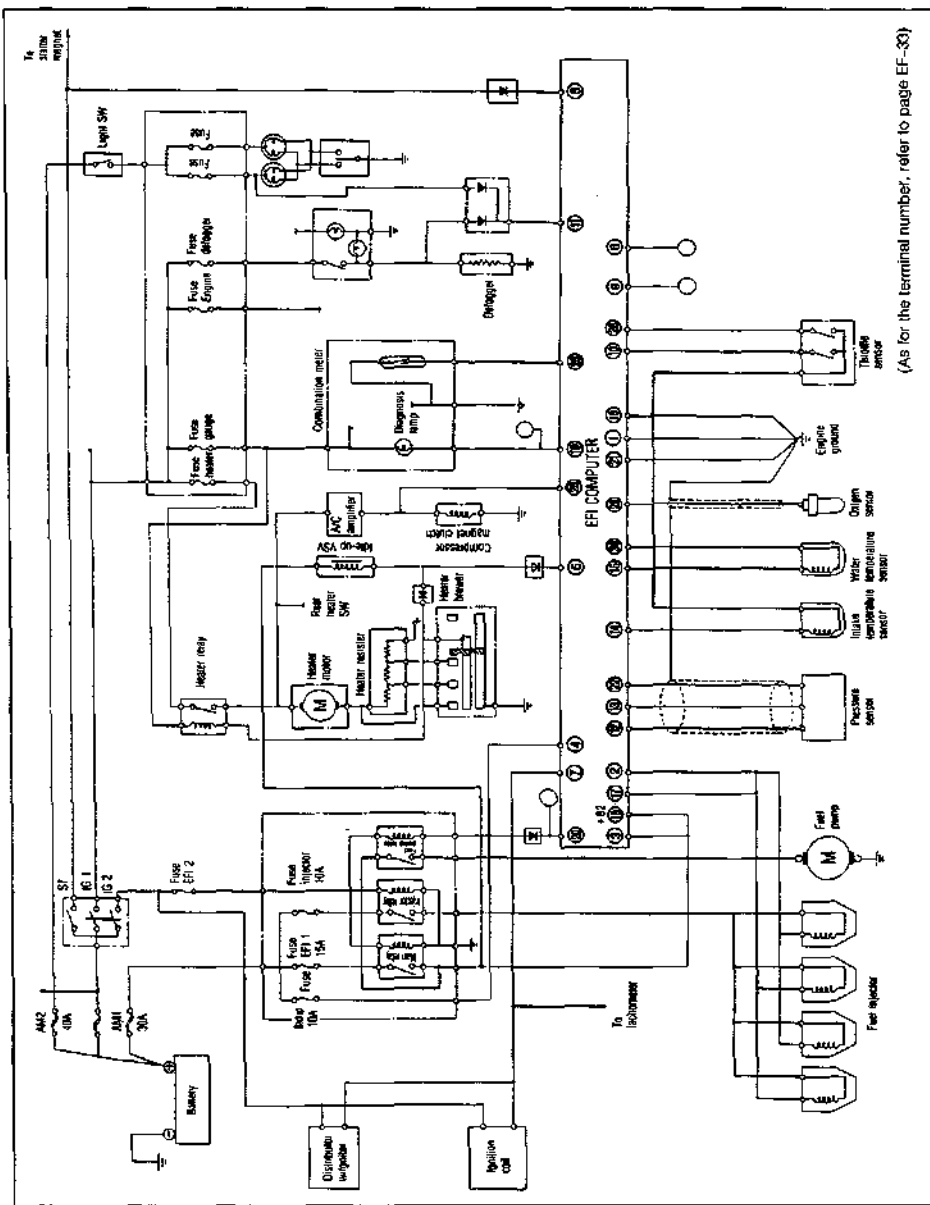
WFES0-EP002

SCHEMATIC DIAGRAM



WFES0-EP003

SYSTEM CIRCUIT



(As for the terminal number, refer to page EF-30)

W720-87004

EFI SYSTEM

FUEL SYSTEM

The fuel system is a system which supplies the injectors with fuel necessary for combustion. This system is composed of the fuel pump, fuel pipes, fuel filter, pressure regulator, fuel delivery pipe and injectors. Fuel sucked up from the fuel tank by means of the fuel pump is sent under a pressurized condition to the fuel delivery pipe through the fuel filter. The pressure regulator mounted at the delivery pipe keeps the fuel pressure at a value about 250 kPa (2.55 kgf/cm²) higher than the intake manifold inner pressure. Such difference between the intake manifold inner pressure and the fuel line inner pressure prevents any variation in the fuel injection rate of each injector.

Any excess fuel returns to the fuel tank through the pressure regulator. This makes it possible for the fuel at a comparatively low temperature in the fuel tank to be supplied into the fuel line, thus preventing percolation. The fuel pump is driven by the ECU.

WFE80-EP005

INTAKE SYSTEM

The intake system is a system which supplies air necessary for combustion with each cylinder.

Air sucked from the cool air intake of a comparatively low temperature is sucked into the surge tank through the air cleaner, and air chamber depending upon the opening degree of the throttle valve. Then, the air goes through the intake manifold into each cylinder.

WFE80-EP006

CONTROL SYSTEM

The control system is a system which controls the fuel amount, using the ECU, by detecting the engine conditions and vehicle running conditions, based on signals inputted from the various sensors to the ECU.

Fuel pump control (FC)

This system controls the fuel pump operation. This system drives the fuel pump for two seconds when the ignition key switch is turned ON and/or the ignition signal is inputted. It also drives the fuel pump when the starter switch is turned ON.

Idle-up VSV control

This is a system which actuates the idle-up VSV when the engine is cold (i.e. the cooling water temperature is below 70°C) or when heavy electric loads (e.g. heater blower, defogger, headlamps) are applied, thus maintaining a proper engine revolutionary speed.

WFE80-EP007

SELF DIAGNOSIS FUNCTION

If signals inputted from main sensor systems to the ECU do not conform to the specified values memorized in the ECU, this malfunction is memorized.

(There are some items which are not memorized.)

Since the memorized malfunction code is retained by the back-up power supply from the battery, the code remains memorized when the ignition key switch is turned OFF.

The memorized malfunction code can be reset by cutting off the power supply to the ECU.

When any malfunction concerned with the important items occurs, the check engine lamp provided inside the combination meter is turned ON, thereby warning the driver of such malfunction. The check engine lamp remains illuminated as long as the malfunction concerned with the important item persists. However, if the encountered malfunction takes place temporarily and the normal state is restored, the check engine lamp goes out. In this case, however, the malfunction that has once occurred is memorized to the ECU, using the pertinent code number.

To indicate the malfunction code during the inspection, short the test terminal of the check connector located at the fender panel right side of the engine compartment with the ground terminal. The check engine lamp inside the combination meter flashes as many times as the number of the corresponding malfunction code. With the aid of the diagnosis code, the checking operator can perform trouble shooting efficiently.

WFE80-EP008

FAIL-SAFE FUNCTION

In the event that any abnormality takes place in the signals inputted from the important sensors to the ECU and the control can no longer be continued based on the inputted data, an evacuation running is made possible using the data memorized in the ECU in advance. This function is called "fail-safe function."

Moreover, in the event that any abnormality occurs in the microcomputer in the ECU, the backup circuit makes it possible for the vehicle to perform an evacuation running, based on the data memorized in the ECU in advance.

In either case, it is not possible to expect normal running performance under such evacuation running.

WFE80-6P009

EFI SYSTEM

PRECAUTION

1. The engine control system has self diagnosis function. The ECU memorizes all malfunction codes which have occurred in the past and/or are occurring at present.
The memorized malfunction codes are erased when the battery ground cable is disconnected from the battery terminal. Hence, prior to starting any repairs, be sure to check to see if any malfunction code has been memorized.
2. When performing operations on the fuel system or its related operation, never smoke and keep away any fire.
3. Before disconnecting the fuel line, be sure to disconnect the battery ground cable from the negative terminal of the battery.
4. The fuel line is pressurized to a pressure about 250.1 kPa (2.55 kgf/cm²) higher than the pressure inside the surge tank. Therefore, when disconnecting the fuel line, be sure to loose the fuel line slowly and prevent the fuel from splashing with a cloth or the like.
5. Do not allow gasoline to get to any parts made of rubber, leather and resin and/or to the electric parts.
6. When cleaning the engine compartment with water, make sure that no water gets to the electrical system.
7. Ensure that the battery voltage should be 11 volts or more, before performing the inspection.

WFE00-EP010

INSPECTION PRECAUTIONS

Maintenance precautions

1. Ensure that the engine is correctly tuned up.

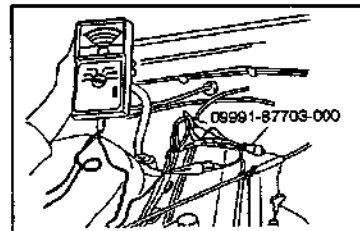
WFE00-EP011

2. Precautions during gauge connection
 - (1) To connect the tachometer, connect the following SST between the distributor connector and the distributor connector of the engine wire.
SST: 09991-87703-000

- (2) Connect the measuring terminal of the tachometer to the measuring terminal of the SST.

NOTE:

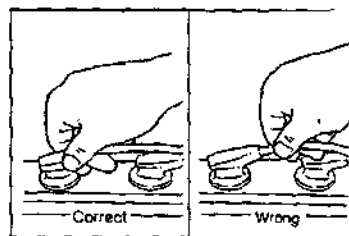
- This does not apply if your tachometer is a pick-up type.
- (3) Use the battery as power source for a timing light, tachometer and so forth.
 - (4) Never allow the tachometer terminal to touch the ground, for it could result in damage to the ignitor and/or ignition coil.
 - (5) Some kinds of tachometers may not be suited for the ignition system of the vehicle. Therefore, ensure that your tachometer is compatible with the ignition system of the vehicle.



WFE00-EP012

3. If engine misfire takes place, the following measures should be taken.

- (1) Ensure that the battery terminals and so forth are connected properly.
- (2) Ensure that spark plug wires are connected properly while handle the spark plug wires carefully.
- (3) After completion of repairs, ensure that the ignition coil terminals and other ignition system wire are reconnected securely.



WP20-GP01

4. Precautions during oxygen sensor handling

- (1) Do not drop the oxygen sensor allow it to hit other objects.
- (2) Do not immerse the sensor in water or do not cool it by water.

5. Do not open the cover of the ECU proper.

(Failure to observe this caution could cause ECU malfunction.)

6. Do not touch the screws of the bracket installed on the ECU proper.

(Failure to observe this caution could cause ECU malfunction.)

WP20-GP014

When the vehicle is equipped with wireless installation (HAM, CB, etc.)

The ECU has been so designed that it is resistant to external influence.

However, if a vehicle is equipped with a CB wireless installation and so forth (even if its output is only 10 W), it may affect the ECU adversely. Therefore, observe the following precautions.

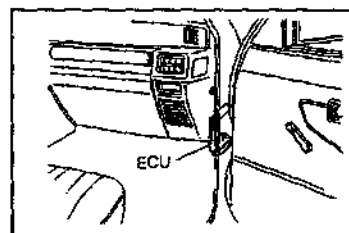
1. Install an antenna at a place as far away as possible from the ECU.

The ECU is installed at the cowl side panel in front of the passenger's seat. Therefore, the antenna should be installed at the rear of the vehicle.

2. The antenna cord should be kept at least 20 cm away from the engine wire. Never wind the antenna with the engine wire with tapes.

3. Adjust the antenna output correctly.

4. Never install a wireless installation with a high output on the vehicle.

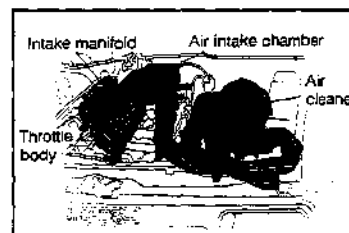


WP20-GP015

Air induction system

1. Unless all of the oil level gauge, oil filler cap, PCV hose and so forth are installed securely, the engine tune-up can not be performed properly.

2. If air leakage (air admission) is present between the throttle body and the cylinder head, the engine revolution speed can not be adjusted.

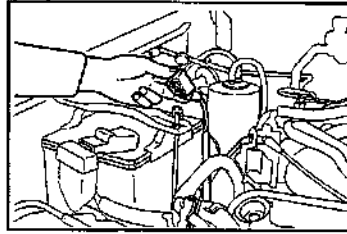


WP20-GP016

EFI SYSTEM

Electronic control system

1. Before disconnecting or reconnecting the connector of the sensor system of the EFI system, be sure to turn OFF the ignition switch and all accessory switches. Also, disconnect the battery ground cable from the battery negative terminal. Failure to observe this caution could cause ECU malfunction.



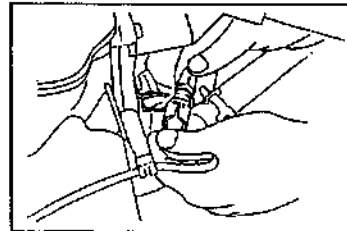
2. Before disconnecting or reconnecting the connector of the ECU proper of the EFI system, be sure to turn OFF the ignition switch and all accessory switches. Also, disconnect the battery ground cable from the battery negative terminal. Failure to observe this caution could cause ECU malfunction.
3. Be sure to keep the number of disconnection/reconnection of the connector of the EFI system at a minimum level.
4. When installing the battery, care must be exercised not to mistake the battery polarity.
5. Never apply strong impacts to the EFI parts. Pay utmost attention during the installation/removal. Especially, special caution must be exercised as to the handling of the ECU.
6. When the voltage or resistance of the ECU is measured during the check, never touch terminals other than the specified terminals. Failure to observe this caution could cause ECU malfunction.
7. Never open the cover of the ECU proper.
8. When the system is checked on a rainy day, be very careful not to allow water to get into connectors and/or terminals.
Also, when the engine compartment is washed, prevent water from being splashed to the EFI-related parts and wiring connectors.
9. EFI parts should be replaced as an assembly.

WFE90-EF018

10. When disconnecting or reconnecting the wiring connector, care must be exercised as to the following points.
 - (1) Carefully observe the shape of the lock prior to the disconnecting/connection.
 - (2) Release the lock. Disconnect the connector.

NOTE:

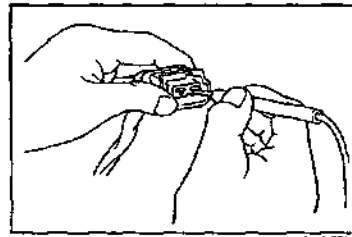
- When disconnecting the connector, be sure to hold the connector body, do not to pull the wire.



- (3) Insert the connector, until the lock is engaged completely.
- (4) Be sure to keep the number of disconnection/reconnection of the connector at a minimum level.

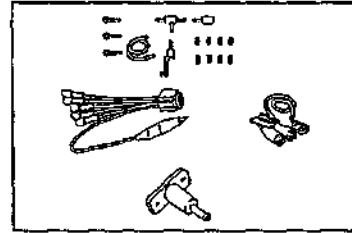
WFE90-EF020

11. When checks are performed at the connector-side terminals, using a circuit tester, care must be exercised as to the following point.
Never apply such a force to the connector terminal that can deform the terminal.



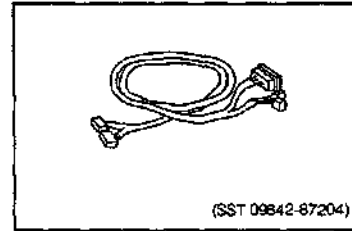
12. When checking the fuel system, such as the injectors, pressure regulator and fuel pressures, use the following SSTs.

SSTs: 09268-87702-000
09283-87703-000
09991-87702-000
09268-87701-000
09842-30070-000



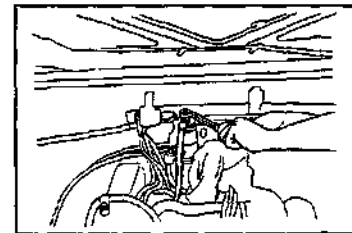
13. When measuring the voltage or resistance of each system, use the following SST.

SST: 09842-87204-000



Fuel system

1. The fuel line at the high-pressure side is pressurized to a fuel pressure of about 250 kPa (2.55 kgf/cm²). Therefore, a large amount of gasoline flows out when parts of the fuel line is disconnected. Hence, take the following counter-measures.
 - (1) Place a suitable container, close or the like under the disconnecting connection.
 - (2) Loosen the connection slowly, while preventing the fuel from splashing, using a suitable cloth or the like.
 - (3) Disconnect the connection.
 - (4) Plug the disconnected connection with a rubber plug or the like so that no dust may enter into the fuel line.



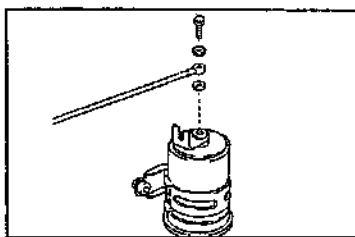
EFI SYSTEM

2. When connecting the flare nut or union bolt of the high-pressure pipe, observe the following instructions.

[Union bolt type at the fuel filter]

- (1) Always use new gaskets.
- (2) First, tighten the union bolt with your fingers.
- (3) Next, tighten the union bolt to the specified torque.

Tightening Torque: 34.3 - 44.1 N·m (3.5 - 4.5 kgf·m)



WF20-EP025

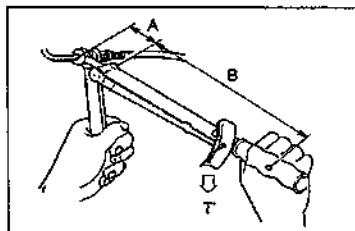
[Flare nut type at the fuel line]

- (1) Coat the flare nut with a thin film of engine oil. Tighten the flare nut fully with your fingers.
- (2) Tighten the flare nut to the specified torque.

Tightening Torque T:

34.3 - 44.1 N·m (3.5 - 4.5 kgf·m)

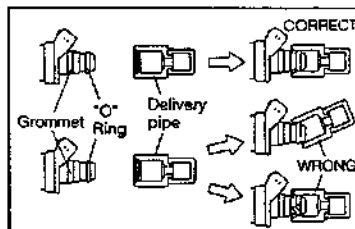
$$T' = \frac{B}{A+B} \times T$$



WF20-EP026

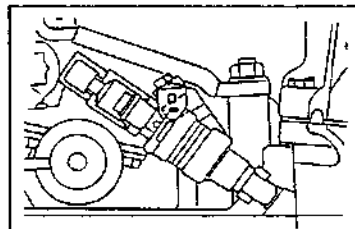
3. When removing/installing the injector, observe the following instructions.

- (1) Do not reuse the "O" ring.
- (2) When installing the "O" ring to the injector, be careful not to damage the "O" ring.
- (3) When connecting the injector to the delivery pipe, apply silicon oil to the "O" ring of the injector in advance. (Never use engine oil, gear oil and so forth.)
- (4) When connecting the injector to the delivery pipe, be very careful not to damage the "O" ring of the injector.



WF20-EP027

4. Install the injector to the delivery pipe and cylinder head, as shown in the figure.



WF20-EP028

5. After completion of checks or repairs of the fuel system, be sure that no fuel leakage is present in the fuel system, following the procedure given below.

- (1) Detach the check terminal cap.
- (2) Short the fuel pump terminal (white/black) with the ground terminal (black) of the check connector, using the following SST.

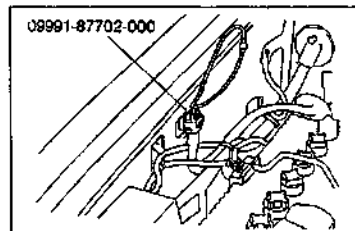
SST: 09991-87702-000

NOTE:

- The check connector is located at the right side fender panel of the engine compartment.

CAUTION:

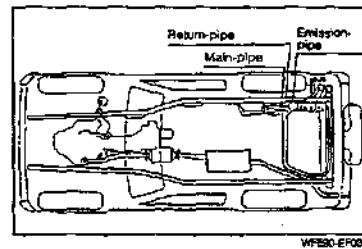
- As for the terminals other than those specified, never allow them to be connected or shorted.



WF20-EP029

EFI SYSTEM

- (3) Turn ON the ignition switch. (with the engine in a stopped state)
At this time, a fuel pressure of 250 kPa (2.55 kgf/cm²) is being applied to the fuel line.
Under this conditions, check the fuel line system for evidence of leakage.
If any leakage is present at the fuel line system, repair leaky points. Recheck the system for leakage.
- (4) Stop the engine.
- (5) Remove the SST from the check terminal.
- (6) Connect the check terminal cap to the check terminal.



EFI SYSTEM

TROUBLE SHOOTING

TROUBLE SHOOTING HINTS

1. In most cases, engine troubles are attributable to systems other than the EFI system.

Prior to starting the trouble shooting for the EFI system, check other systems.

- (1) Power supply
 - Battery voltage
 - Fuse blown
 - Fusible link blown
- (2) Body ground
- (3) Fuel supply
 - Fuel leakage
 - Fuel filter clogged
 - Fuel pump malfunctioning
- (4) Ignition system
 - Spark plugs faulty
 - Spark plug wires faulty
 - Distributor and ignitor faulty
 - Ignition coil faulty
- (5) Air induction system
 - Air leakage
- (6) Others
 - Ignition timing adjusted improperly
 - Idle speed adjusted improperly
 - Idle-up VSV malfunctioning

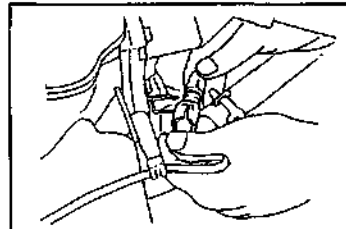
WFE90-EP001

2. Most of troubles related to the EFI system are merely caused by poor wire connections.

Ensure that connectors are connected securely.

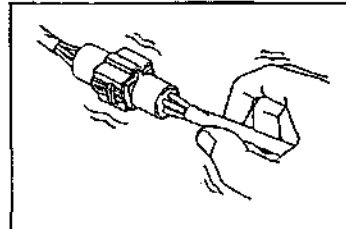
Check connectors, being careful as to the following points.

- (1) Visually inspect that terminals are not bent.
- (2) Ensure that connectors are securely connected and locked.



WFE90-EP002

- (3) Check to see if the malfunction phenomenon takes place when applying light vibration to the connector or the wire connected to the connector.

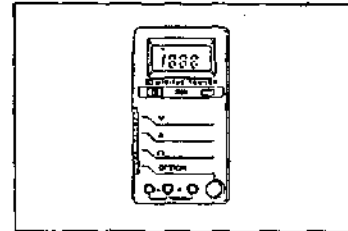


WFE90-EP003

3. Prior to replacing the ECU, thoroughly perform the trouble shooting for possible items other than the ECU. The ECU is a reliable, but an expensive part. Even when the ECU has been replaced according to the check results of the trouble shooting and the relevant malfunction has been remedied, be sure to reinstall the old ECU so as to confirm that the malfunction was obviously caused by the faulty ECU.

WFE00-EP034

4. For the trouble shooting, use a volt/ohmmeter whose internal resistance is 10 k Ω /V or more. Use of a volt/ohmmeter whose internal resistance is less than 10 k Ω /V may cause an ECU malfunction or wrong diagnosis. Furthermore, be sure to employ a meter whose resolution is 0.1V or more, 0.5 Ω or more and whose accuracy is $\pm 2\%$ or more.



WFSW00-EP034

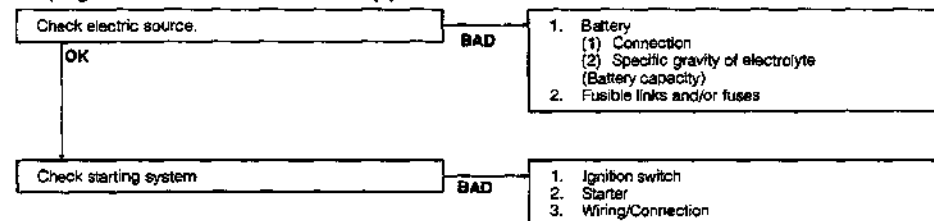
5. In this trouble shooting, no consideration has been made to any displacement of timing belt teeth. Hence, if the trouble persists even after the trouble shooting has been carried out, check to see if the timing belt has skipped a tooth.

WFE00-EP035

TRUBLE SHOOTING PROCEDURE

- ① Symptom Engine will not start.

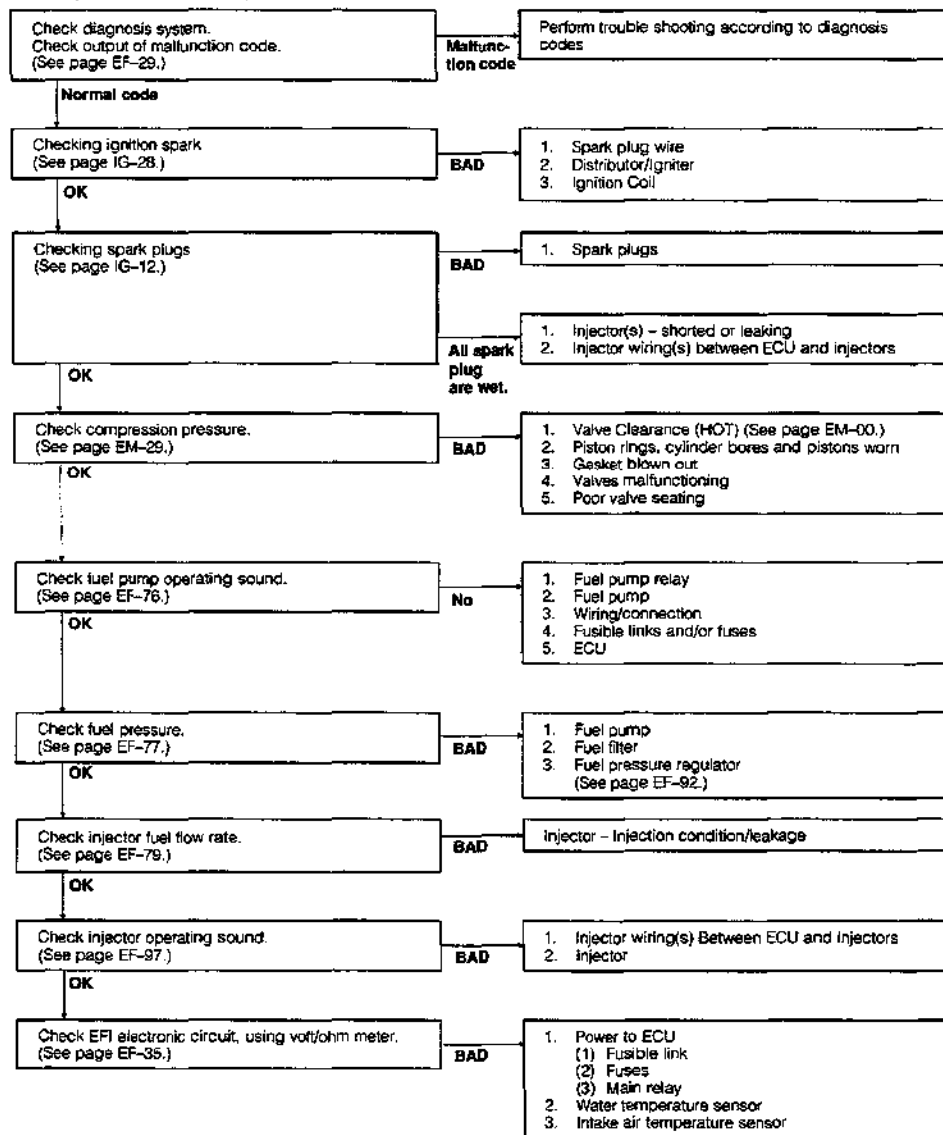
(Engine will not crank or cranks slowly.)



WFE00-EP036

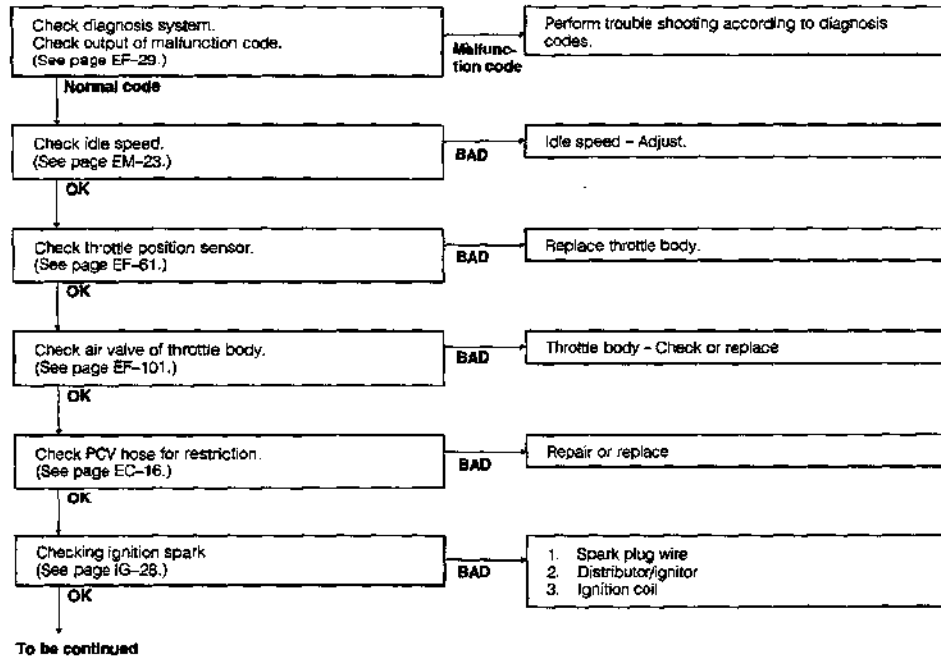
EFI SYSTEM

② Symptom Engine will not start.
(Engine cranks normally.)



WPE00-EF036

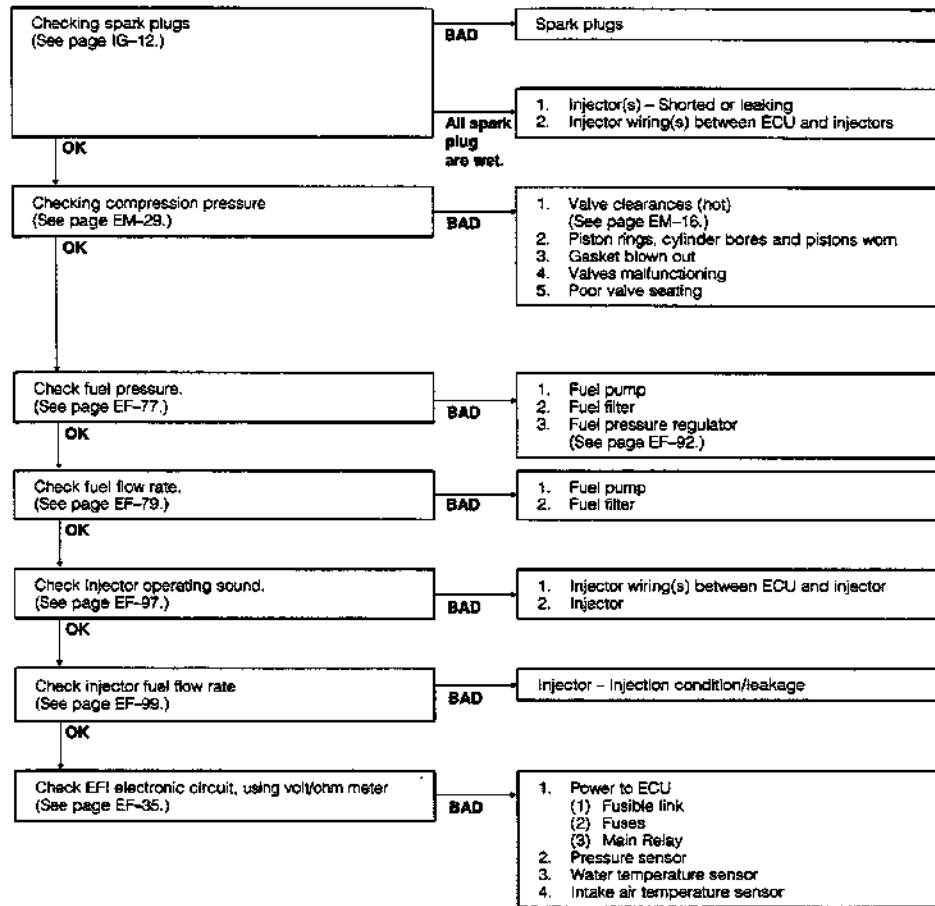
3 Symptom Engine stalls immediately after starting.



WFE90-67039

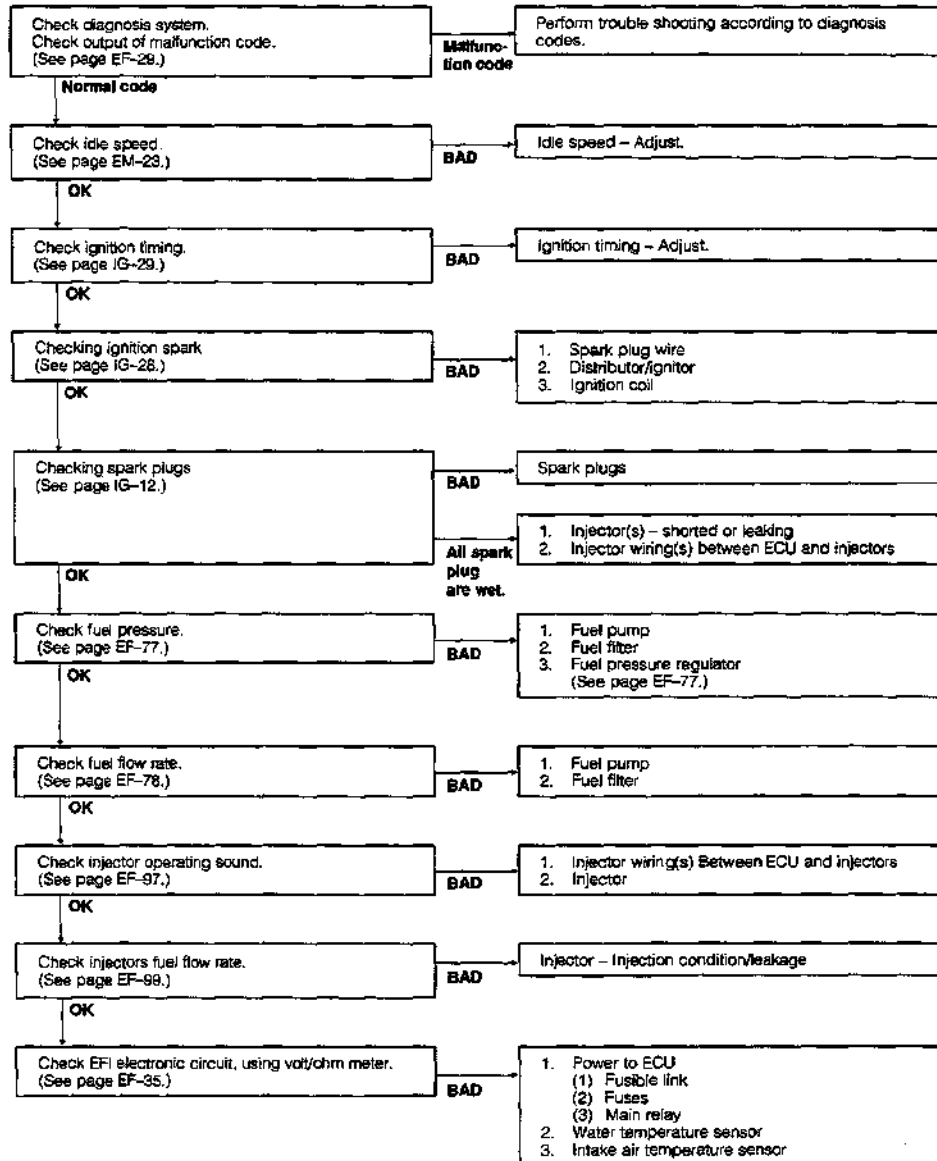
EFI SYSTEM

(Cont'd)



WF290-EP040

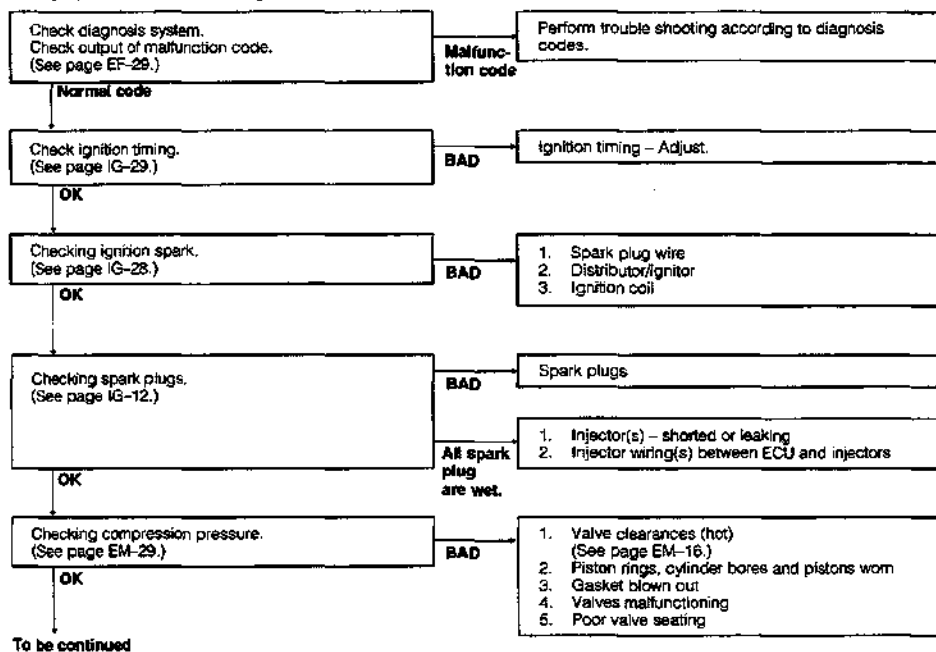
4 Symptom Engine often stalls.



WF200-EFI-041

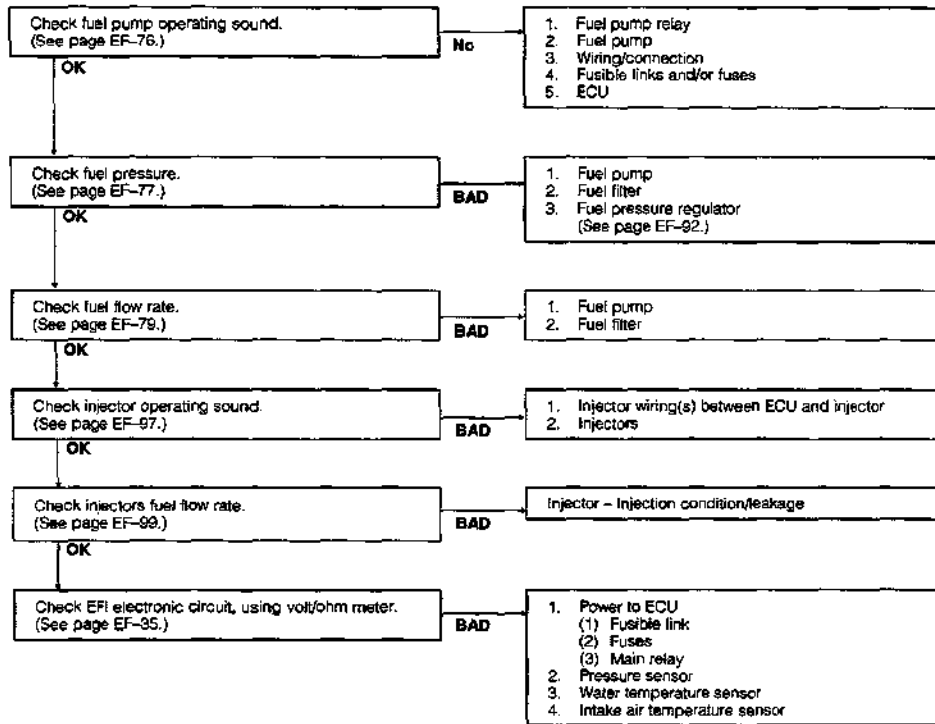
EFI SYSTEM

5 Symptom Hard starting



WFE00-2F042

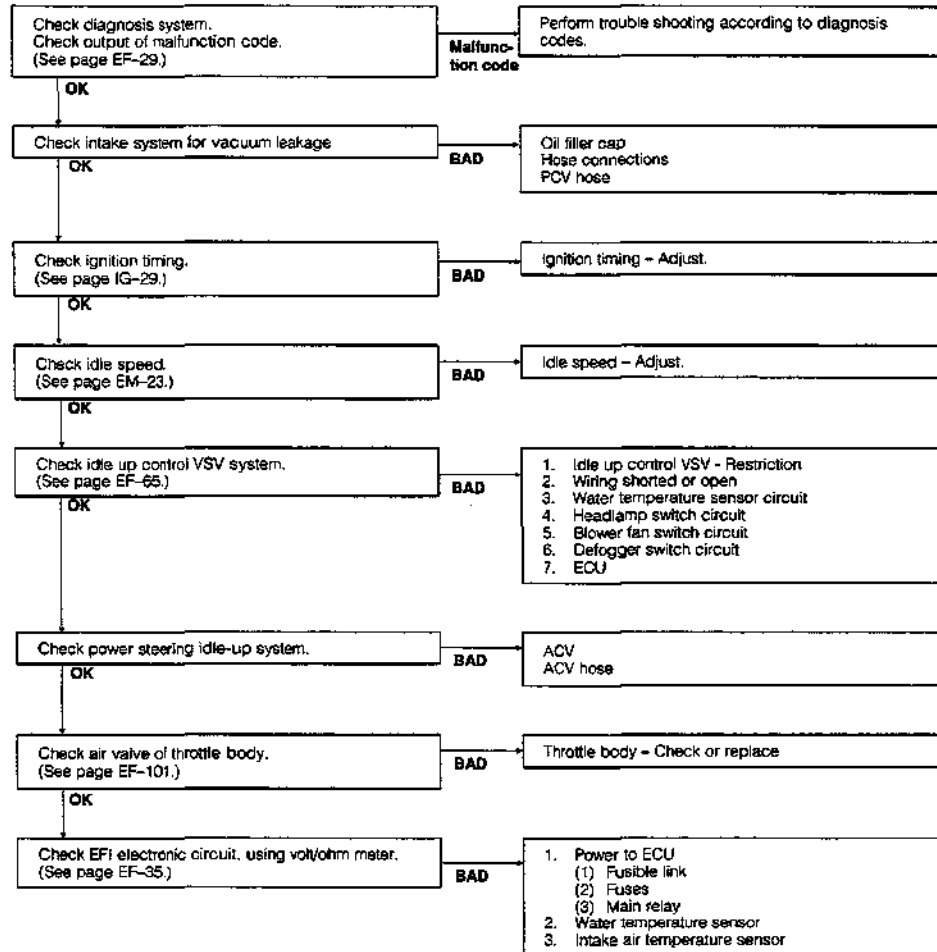
(Cont'd)



WFE30-EF043

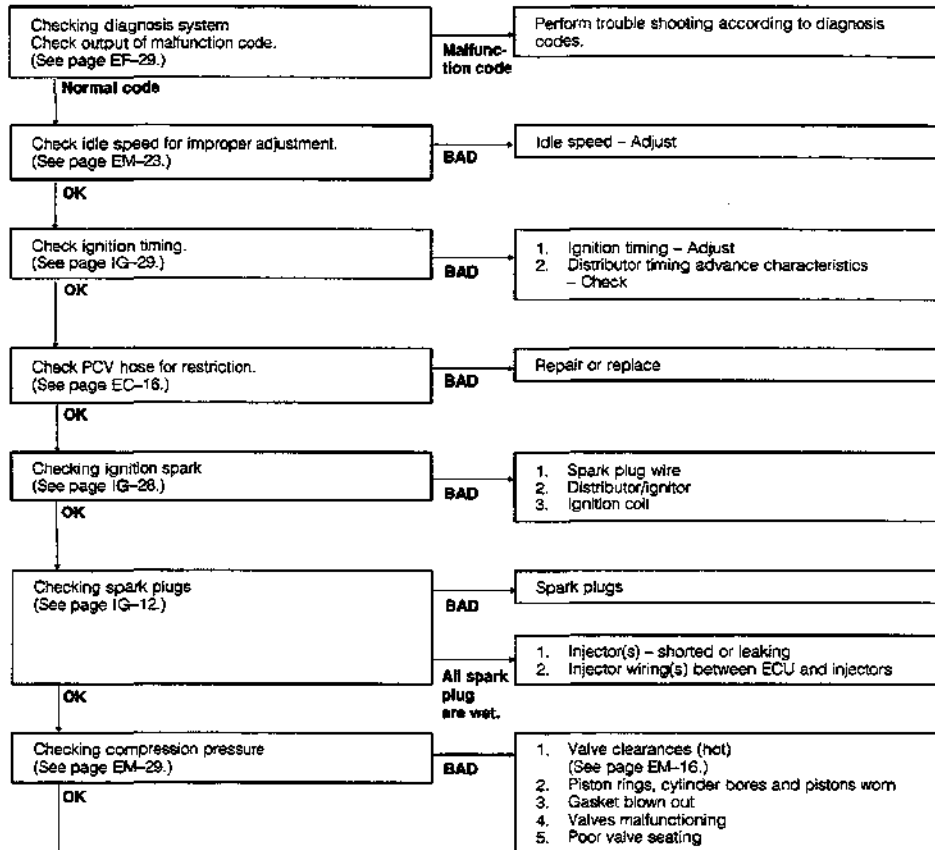
EFI SYSTEM

⑥ Symptom Engine idle speed too high



WFEB0-BF044

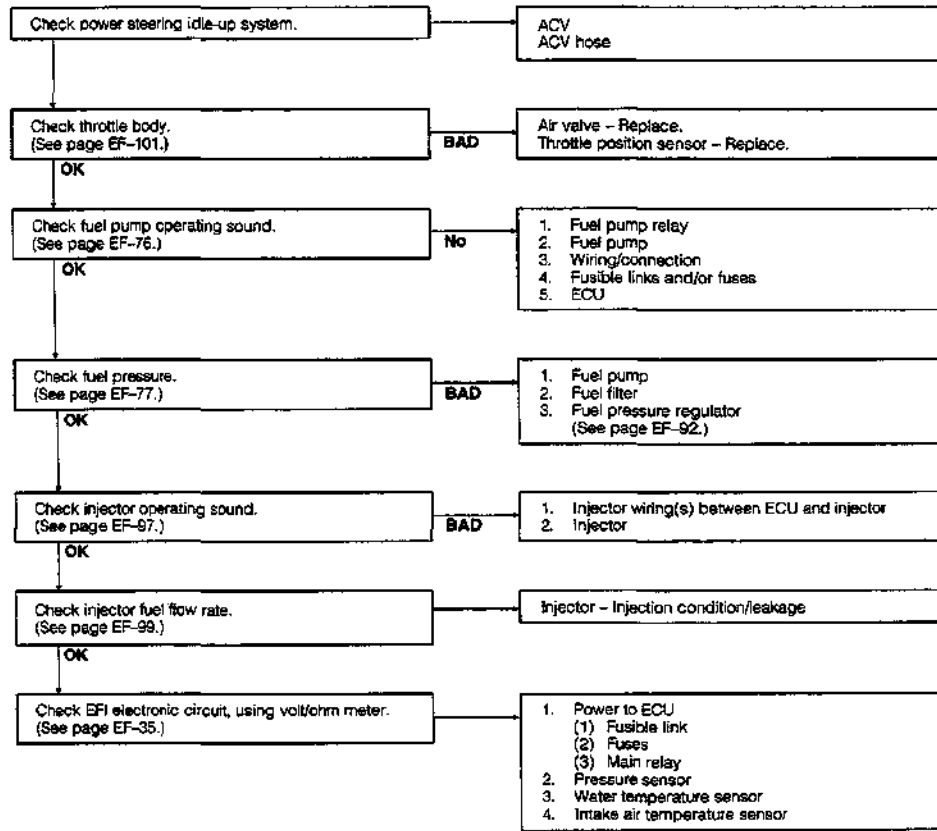
7 Symptom Engine idle speed too low and/or rough idling



WFE20-EFO-15

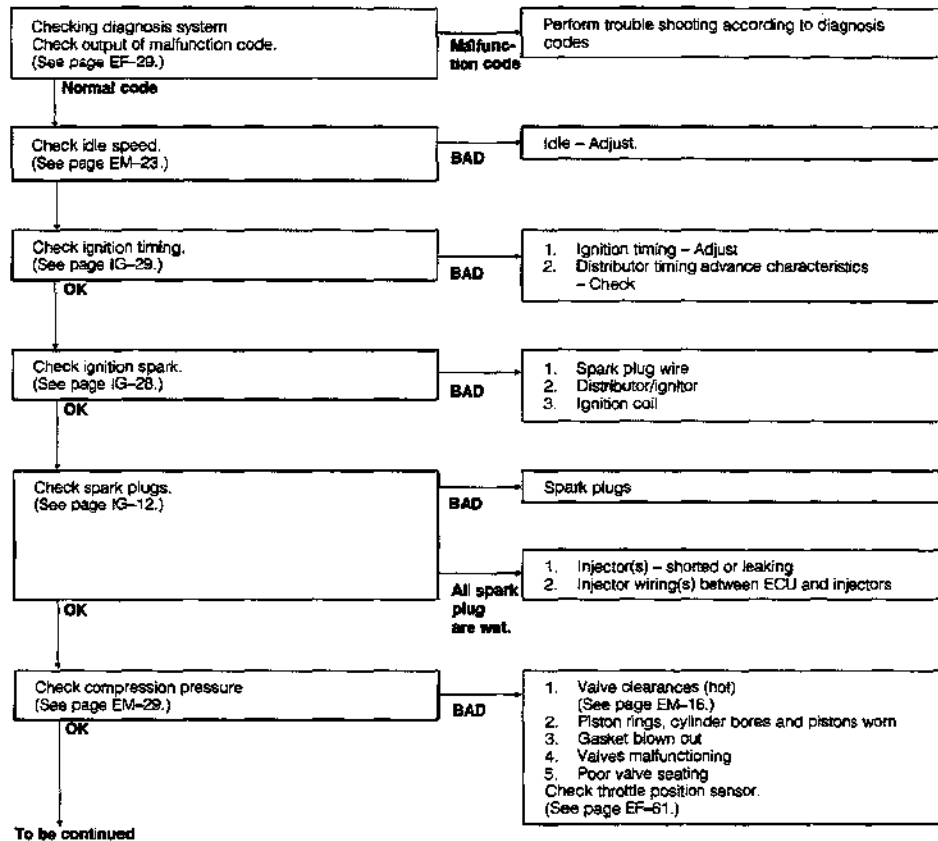
EFI SYSTEM

(Cont'd)



WFE80-EF046

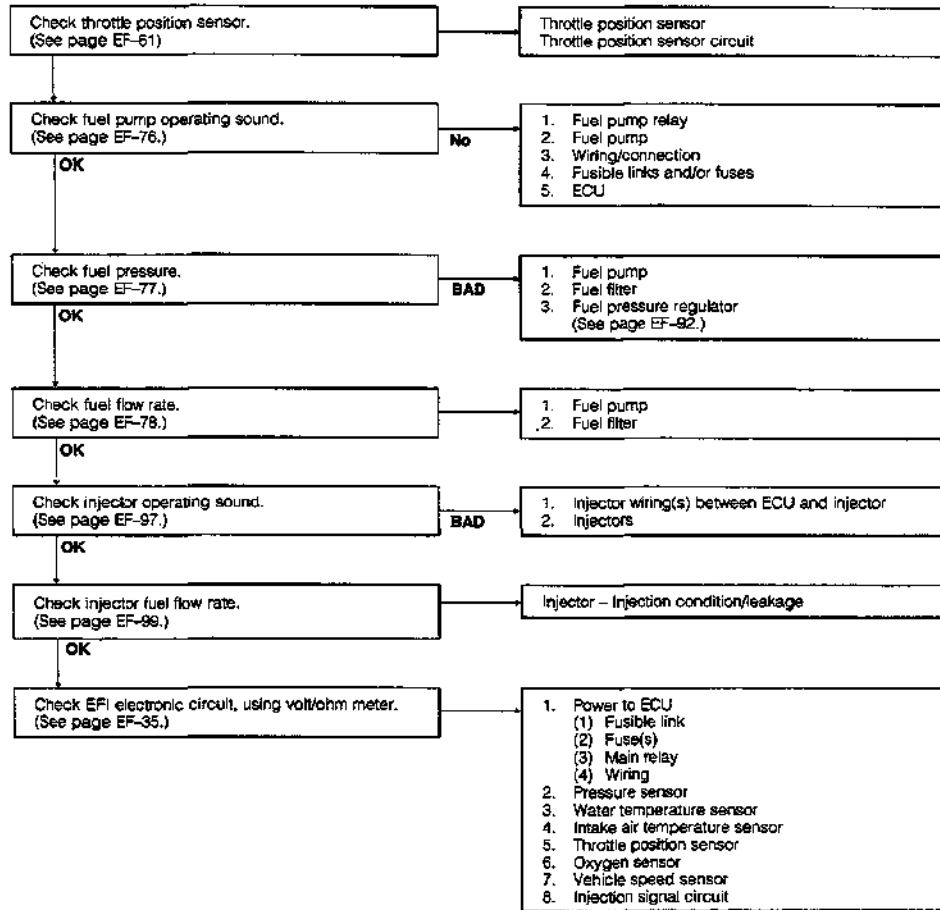
8] Symptom Poor driveability



WFE90-EP047

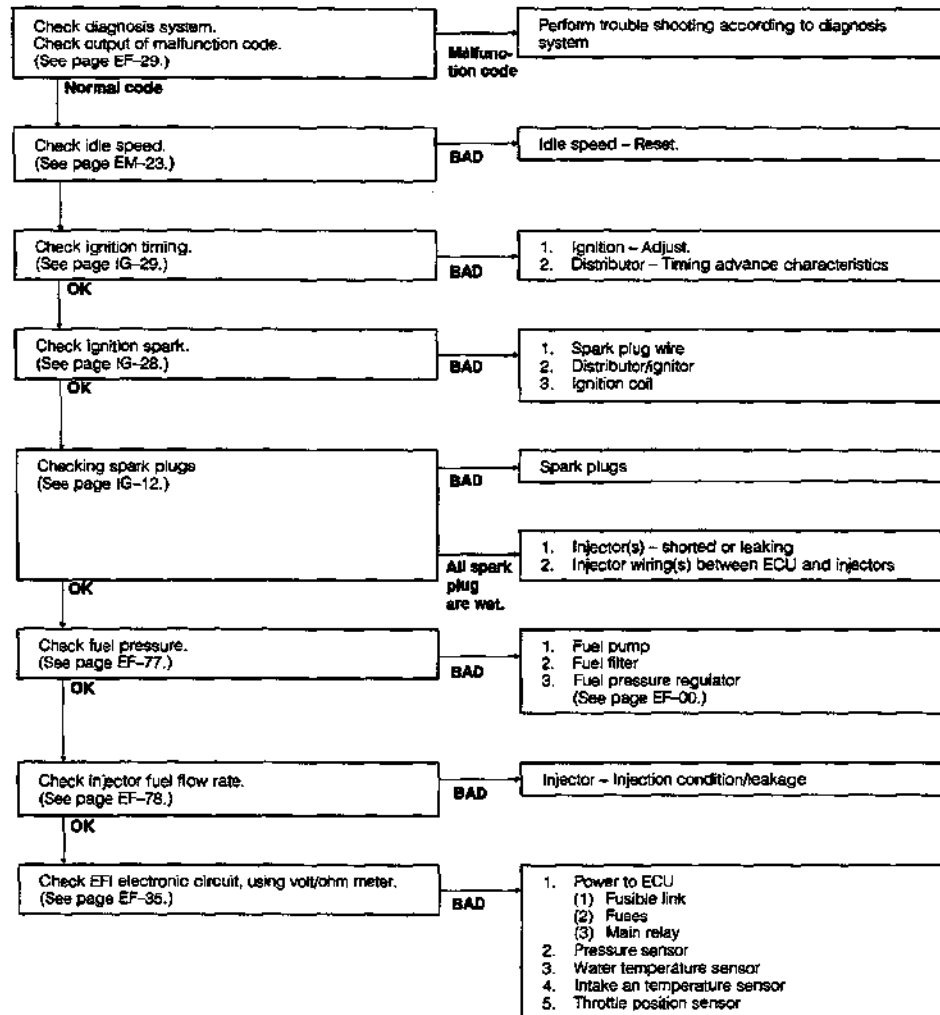
EFI SYSTEM

(Cont'd)



W/PB20-EF046

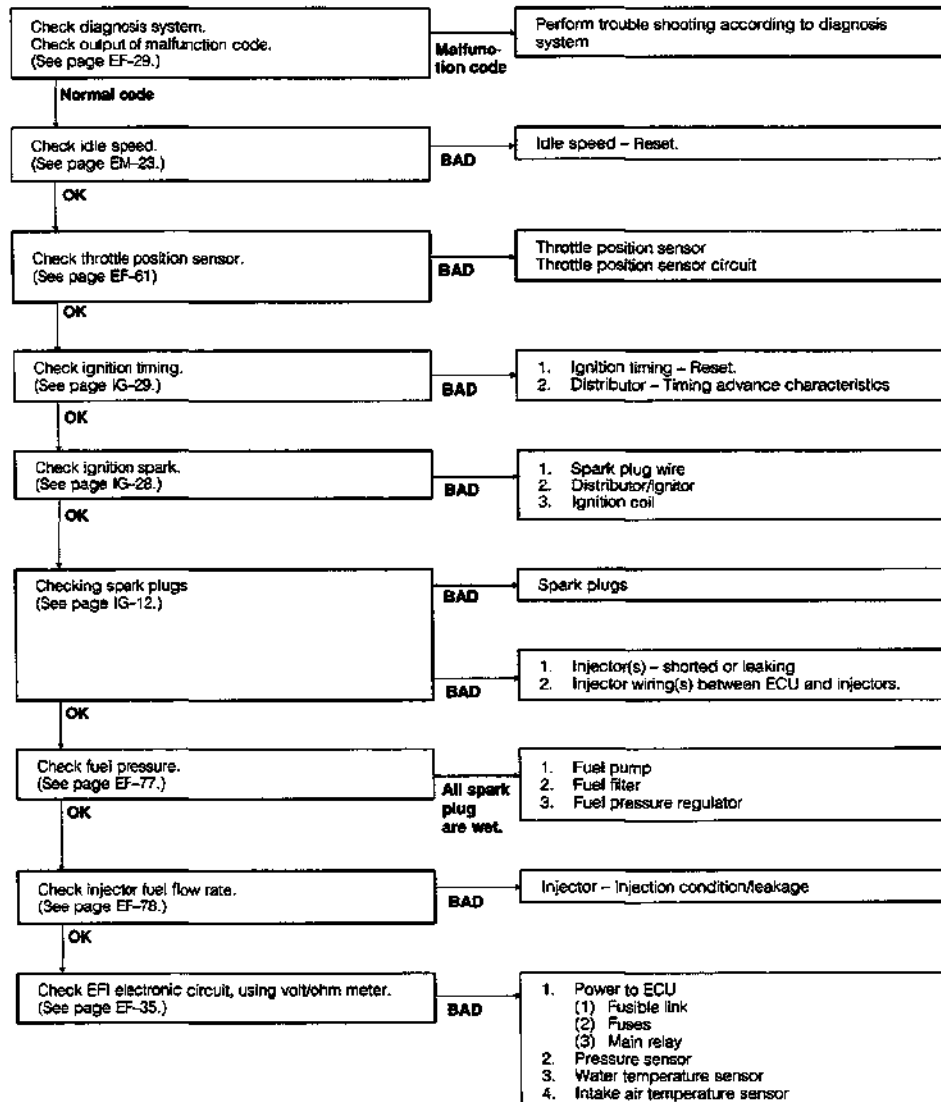
8 Symptom Backfire (Lean fuel mixture)



WFE00-0F04

EFI SYSTEM

29 Symptom Afterfire (Rich mixture - Misfire)



WFE3-EP050

DIAGNOSIS SYSTEM

DESCRIPTION

A self-diagnosis system is built in the ECU. If any abnormality should occur in the signal systems of various sensors, the self-diagnosis system memorizes the malfunction code number in the ECU. In respect to important abnormalities, the check engine lamp at the instrument panel goes on, thus warning the driver of the abnormality.

When the abnormality is cleared, the check engine lamp goes out.

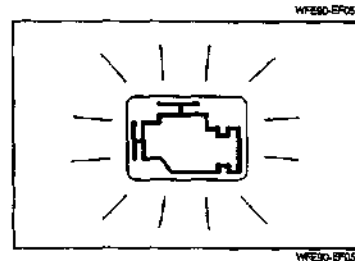
When the Test terminal of the check terminal is shorted with the ground terminal, the malfunction code number that has been memorized in the ECU will be indicated in a form of flashing of the check engine lamp in the instrument panel.

This memorized malfunction code number is erased when the battery ground cable is disconnected from the negative (-) terminal of the battery, or when the back-up fuse in the relay block assembly is disconnected with the ignition key switch turned OFF.

Check of "CHECK ENGINE" warning light

1. When the ignition switch is turned ON, the check engine lamp goes on.
(Engine is under a stopped state.)
If not, see page EF-31.
2. When the engine starts, the check engine lamp goes off.

If the check engine lamp remains illuminated, it indicates that the diagnosis system has detected system malfunctions.



Output of diagnosis codes

1. Initial conditions
 - (1) Battery voltage of 11 volts or more
 - (2) Throttle valve fully closed
 - (3) All accessory switches turned OFF
2. Short the Test terminal of the check terminal with the ground terminal, using the following SST.
SST: 09991-87702-000

NOTE:

- The check terminal is located at the right side fender panel of the engine compartment for LHD vehicles and left side fender panel of the engine compartment for RHD vehicles.

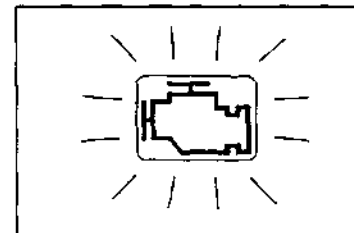
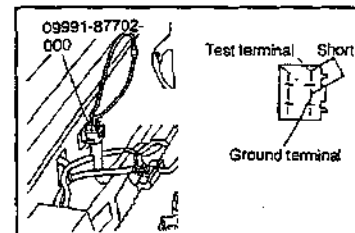
CAUTION:

- Care must be exercised to ensure that no connection is made on terminals except for those specified.

3. Set the ignition switch to ON position. At this time, be careful not to start the engine.
4. Read the diagnosis code by observing the flashing number of the check engine lamp.

NOTE:

- If the check engine lamp fails to flash, it is likely that the ECU is malfunctioning. Hence, proceed to inspection of diagnosis system circuit.



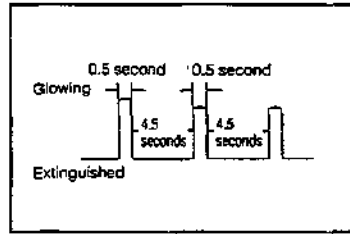
EFI SYSTEM

Output form of diagnosis code

(1) Indication of normal code number

(Code number 1 – normal function)

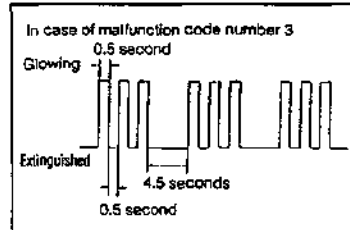
The check engine lamp glows for 0.5 second, 4.5 seconds later after the ignition key switch has been turned ON. After a lapse of 4.5 seconds, the check engine lamp again glows for 0.5 second. Then, this pattern will be repeated.



(2) Indication of malfunction code number

- When a single malfunction code is indicated:

The check engine lamp repeats glowing the same times as the number of the malfunction code at intervals of 0.5 second, 4.5 seconds later after the ignition key switch is turned ON. After a lapse of 4.5 seconds, the check engine lamp again repeats glowing the same times as the number of the malfunction code at intervals of 0.5 second. Then, this pattern will be repeated.

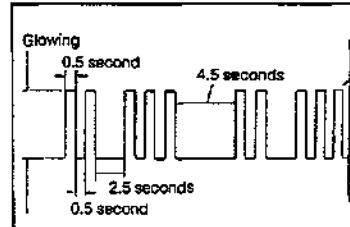


- When plural malfunction code numbers are indicated:

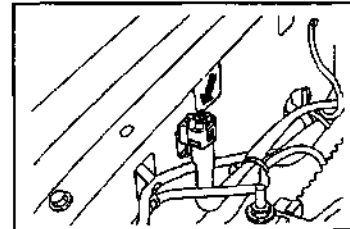
The check engine lamp repeats glowing the same times as the number of the first malfunction code at intervals of 0.5 second, 4.5 seconds later after the ignition key switch is turned ON. After a lapse of 2.5 seconds, the check engine lamp repeats glowing the same times as the number of the next malfunction code at intervals of 0.5 second.

The memorized code numbers are indicated in the sequence of code number, starting from a smaller number.

The indication of the malfunction codes is repeated 4.5 seconds later after the memorized code numbers have been indicated.



- After the diagnosis codes have been read, remove the SST from the check terminal.
- Install the cap on the check terminal.

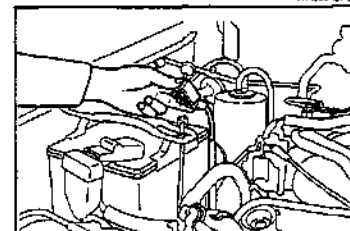


Cancelling diagnosis code


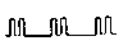
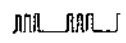







To erase the diagnosis codes memorized in the ECU after malfunctions have been repaired, disconnect the battery ground cable from the negative (-) terminal of the battery. For at least 10 seconds with the ignition switch turned OFF. [When ambient temperature is about 20°C.]

NOTE:

- When disconnecting the fuse, be sure to use a fuse puller. The fuse puller is located at the upper section of the block in the vehicle interior.



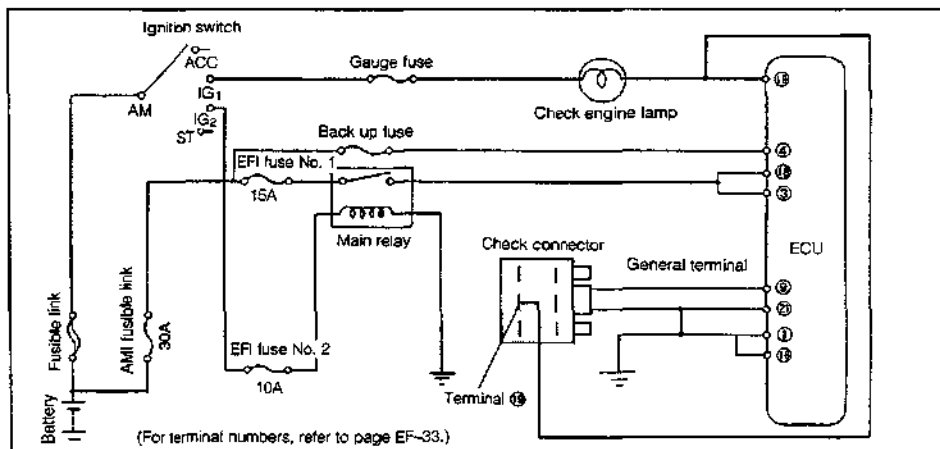
DIAGNOSIS CODE

Code No.	Number of glowing of check engine lamp	Diagnosis item	Diagnosis contents	Trouble area
1		Normal	—	—
2		Pressure sensor	When the input signal from the pressure sensor deviates from the specified value:	<ul style="list-style-type: none"> • Pressure sensor • Pressure sensor circuit • ECU
3		Ignition signal	When the ignition signal fails to be inputted:	<ul style="list-style-type: none"> • Distributor • Ignitor • Ignition coil • Ignition system circuit • ECU
4		Water temperature sensor	When the input signal from the water temperature sensor deviates from the specified value:	<ul style="list-style-type: none"> • Water temperature sensor • Water temperature sensor circuit • ECU
5		Oxygen sensor signal	When the input signal from the oxygen sensor fails to be inputted under the certain conditions:	<ul style="list-style-type: none"> • Oxygen sensor • Oxygen sensor circuit • ECU
7		Throttle position sensor	When both idle switch and power switch enter "ON" conditions:	<ul style="list-style-type: none"> • Throttle position sensor • Throttle position sensor circuit • ECU
8		Intake air temperature sensor	When the input signal from the intake air temperature sensor deviates from the specified value:	<ul style="list-style-type: none"> • Intake air temperature sensor • Intake air temperature sensor circuit • ECU
9		Vehicle speed sensor	When the input signal from the vehicle speed sensor fails to be inputted under the certain conditions:	<ul style="list-style-type: none"> • Vehicle speed sensor • Vehicle speed sensor circuit • ECU
10		Starter signal	When the input signal from the starter fails to be inputted, until the certain conditions are satisfied: However, it should be noted that this code may be memorized when vehicle is started by being pushed.	<ul style="list-style-type: none"> • Starter • Starter circuit • ECU
11		Switch signal	When even if one of the following conditions is satisfied with the test terminal shorted with the ground terminal: • when idle switch is turned OFF.	<ul style="list-style-type: none"> • Throttle position sensor • Throttle position sensor circuit • ECU • Air conditioner switch circuit

W290-EP01

EFI SYSTEM

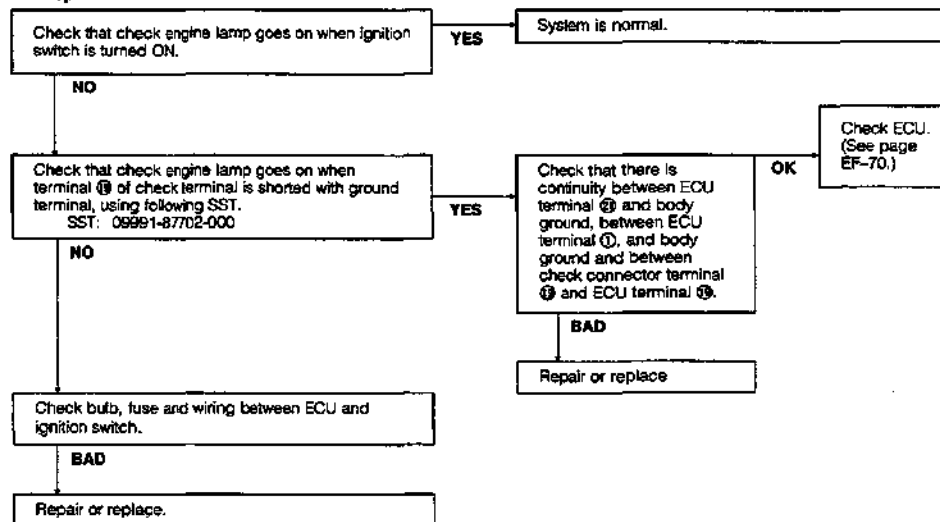
Inspection of diagnosis system circuit



WFE00-EP066

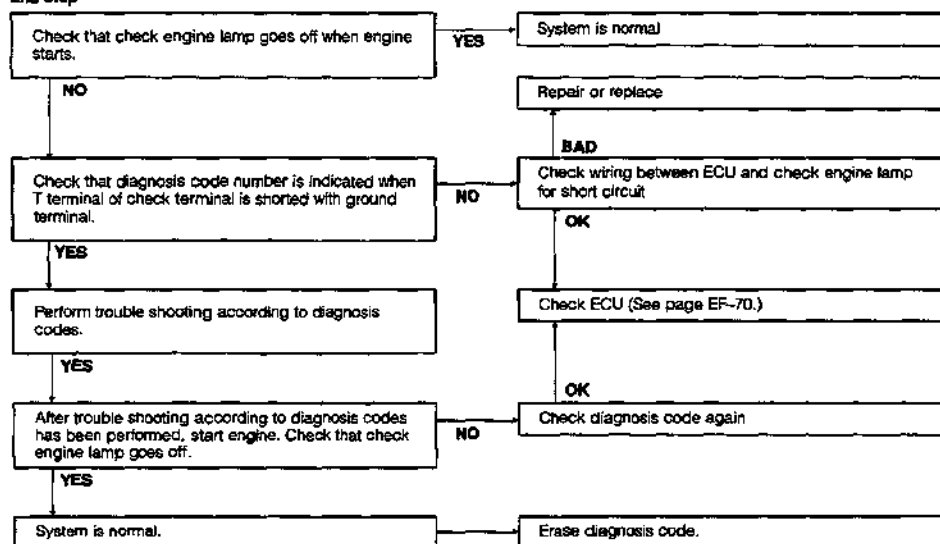
If the SST (09842-87204-000) has not been installed yet, install the SST, referring to the section under "Preparation of Trouble-shooting" at page EF-32.

1st step



WFE00-EP063

2nd step



WFE20-GF064

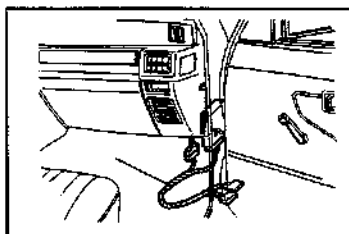
EFI SYSTEM

TROUBLE SHOOTING WITH VOLT/OHMMETER

PREPARATION OF TROUBLE SHOOTING

1. Disconnect the battery ground cable from the negative (-) terminal of the battery.
2. Remove the ECU cover.
3. Disconnect the engine harness from ECU.
4. Connect the following SST between the engine wire and the ECU.

SST: 09842-87204-000



5. Reconnect the battery ground cable to the negative (-) terminal of the battery.

CAUTION:

- After completion of the inspection, before the SST is removed, be sure to disconnect the battery ground cable from the negative (-) terminal of the battery.
- After the engine harness has been connected to the ECU, reconnect the battery ground cable to the negative (-) terminal of the battery.
- Before using the SST, be sure to check to see if short or open wire exists between the terminals.

WFED0-6F065

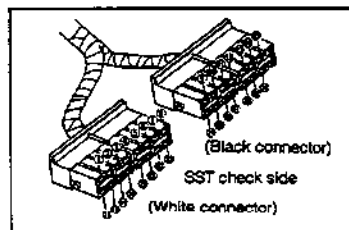
CHECK PROCEDURE FOR EFI SYSTEM

NOTE:

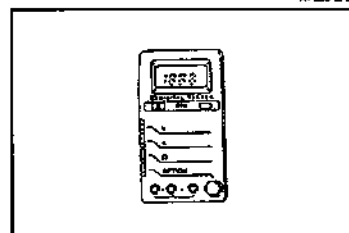
1. The EFI circuit can be checked by measuring the resistance and voltage at the SST terminals.
2. The voltage check should be conducted under a condition where all connectors are connected.
3. Prior to the check, ensure that the battery voltage is 11V or more when the ignition switch is turned ON.
4. If any problem is encountered during this check, see the section under "Trouble Shooting for EFI Electronic Circuit with Volt/Ohmmeter."

CAUTION:

- For the trouble shooting, use a volt/ohmmeter whose internal impedance is more than 10 k Ω /V. Use of a volt/ohmmeter whose internal resistance is 10 k Ω /V or less may cause ECU malfunction and/or misjudgment.
- No terminal except for the specified terminal should be connected. Failure to observe this caution may cause ECU malfunction.



WFED0-6F067



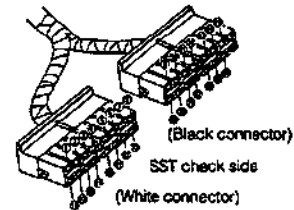
WFED0-6F066

ECU CONNECTORS

No.	Contents of connection	No.	Contents of connection
1	Power ground	15	Cooling water temperature sensor
2	Injector	16	Power ground
3	Battery +B (Main relay)	17	Injector
4	Battery +B (Back-up)	18	Battery +B (Main relay)
5	Idle-up VSV	19	Check engine lamp
6	Feedback check terminal	20	Fuel pump relay
7	Ignition coil (negative)	21	Engine ground
8	Starter switch	22	Pressure sensor ground
9	Test terminal	23	Air conditioner magnet clutch
10	Idle switch	26	Vehicle speed sensor
11	Electric load signal	28	Power switch
12	Sensor power supply	29	Oxygen sensor
13	Pressure sensor	30	Sensor ground
14	Intake air temperature sensor		

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
30	29	28	27	26	25	24	23	22	21	20	19	18	17	16

ECU side



WF50-6F000

EFI SYSTEM

Voltage at ECU wiring connectors

No.	Terminal code (SST terminal)	STD voltage (V)	Conditions		See page
1	④ - ⑫ Negative	Approx battery voltage	All time		EF-36
	③ - ⑥		Ignition switch ON		EF-37
	⑪ - ⑬		Ignition switch ON		EF-37
2	⑫ - ⑭	4.5 - 5.5	Ignition switch ON		EF-38
	⑬ - ⑮	3.2 - 4.0	Ignition switch ON	When atmospheric pressure is 101.3 kPa (760 mmHg)	EF-38
3	⑦ - ⑩	Approx battery voltage	Ignition switch ON		EF-40
4	⑮ - ⑯	0.40 - 0.65	Ignition switch ON	After engine has fully warmed up Cooling water temperature: 80 - 90°C	EF-41
5	⑫ - ⑮	Voltage changes more than 8 times within 10 seconds	Ignition switch ON	When engine speed is held at for two minutes after engine has fully warmed up:	EF-42
7	⑮ - ⑰	Approx battery voltage	Ignition switch ON	Throttle valve fully closed	EF-43
		Less than 1V	Ignition switch ON	Throttle valve fully opened	
	⑮ - ⑱	Less than 1V	Ignition switch ON	Throttle valve fully closed	
		Approx battery voltage	Ignition switch ON	Throttle valve fully opened	
8	⑬ - ⑮	0.9 - 3.0	Ignition switch ON	Air temperature inside surge tank: 20°C	EF-46
9	⑮ - ⑰	0 - Approx battery voltage	Ignition switch ON	When vehicle is moved: (Voltage changes 4 times while vehicle moves 1.5m)	EF-47
10	⑮ - ⑰	6 - 15	When ignition switch is set to ST position:		EF-48
11	⑮ - ⑰	Approx battery voltage	Ignition switch ON	When engine rotating, air conditioner switch turned ON and compressor operating:	EF-49
	⑮ - ⑱	Less than 1.0V	Ignition switch ON	Throttle valve fully closed	EF-49
		Approx battery voltage	Ignition switch ON	Throttle valve fully opened	EF-49

WRE30-EP070

TROUBLE SHOOTING EFI ELECTRONIC CIRCUIT WITH VOLT/OHMMETER**NOTE:**

The trouble shooting procedures described in this section are ones designed for the inspection for each system. Hence, they may differ from actual trouble shooting procedure.

However, it is advisable that the basic approach to trouble shooting is based on the procedure described in this manual.

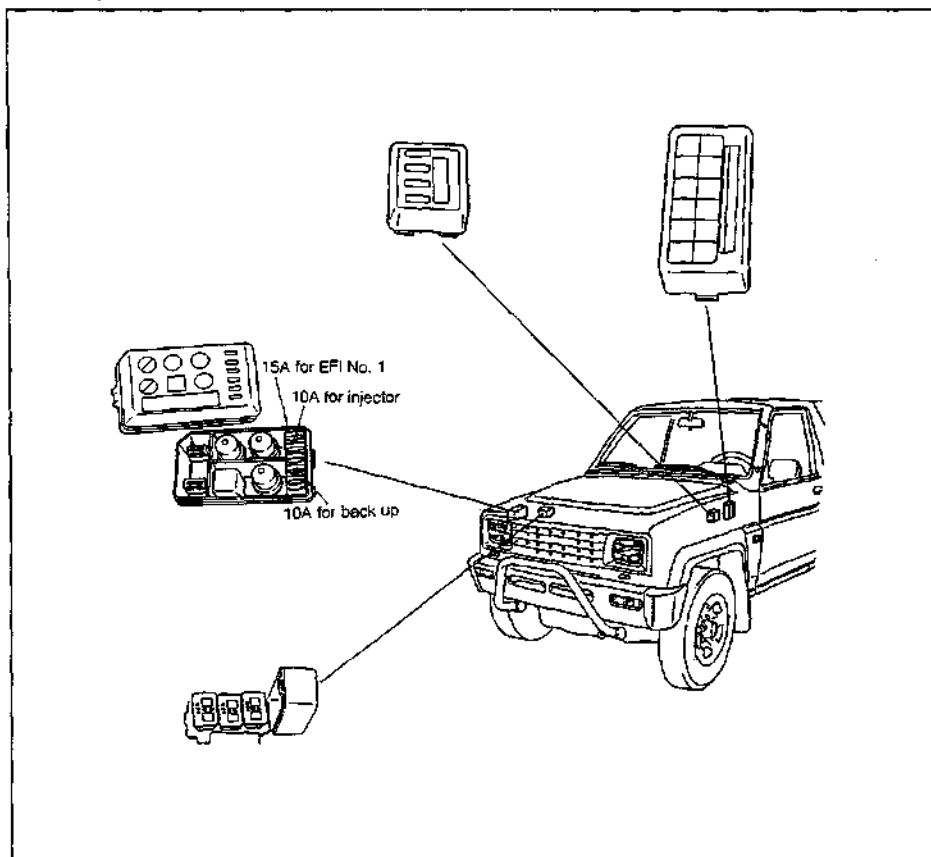
Before you start the inspection, it is a best practice to first make simple checks of the fuses, fusible links and conditions of the connectors.

The following trouble shooting procedure has been prepared on the assumption that troubles are caused by short circuits or open circuits of external components of the computer or short circuits inside the computer.

If engine malfunctions persist even when the terminal voltages of the ECU connectors are normal, the ECU may be faulty. Try the trouble shooting using a new ECU.

However, even when the trouble is solved after the ECU has been replaced, it is imperative to confirm that the trouble was actually attributed to the old ECU by installing the old ECU again.

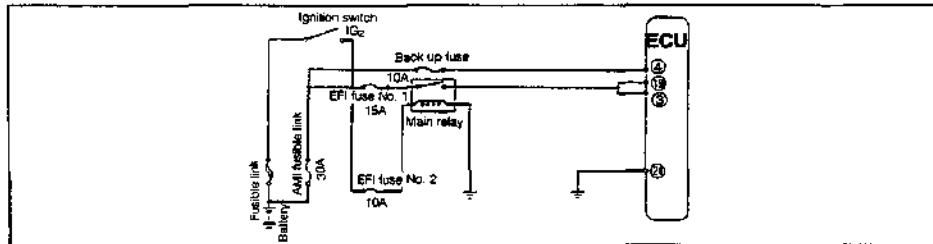
When you perform the inspection of wirings, see the section under "Harness & Wiring Diagram."



EFI SYSTEM

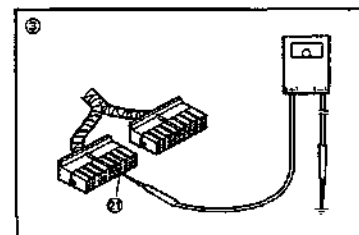
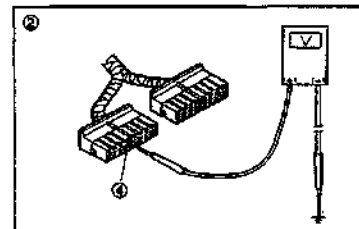
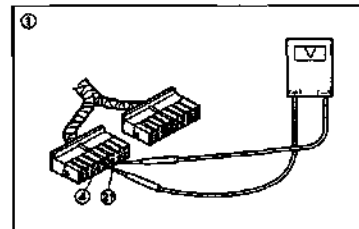
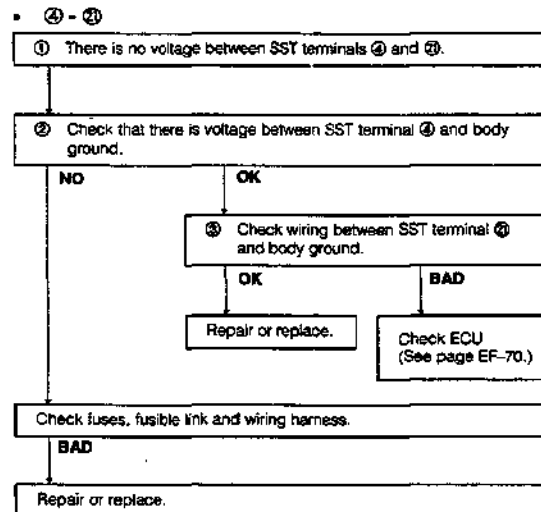
No.	Terminals	Trouble	Conditions	STD voltage
1	④ - ⑤	No specified voltage	At all times (But, voltage drops during engine starting period.)	Approx battery voltage
	⑤ - ⑥	No specified voltage	Ignition switch ON	Approx battery voltage
	⑤ - ⑦			

WP80-EP072



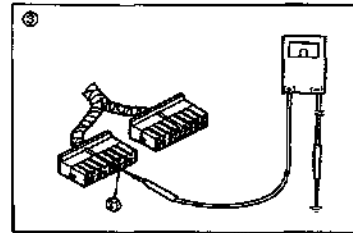
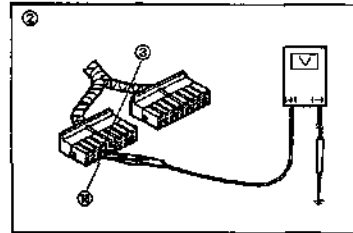
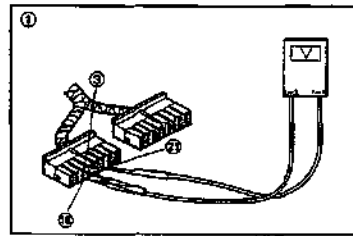
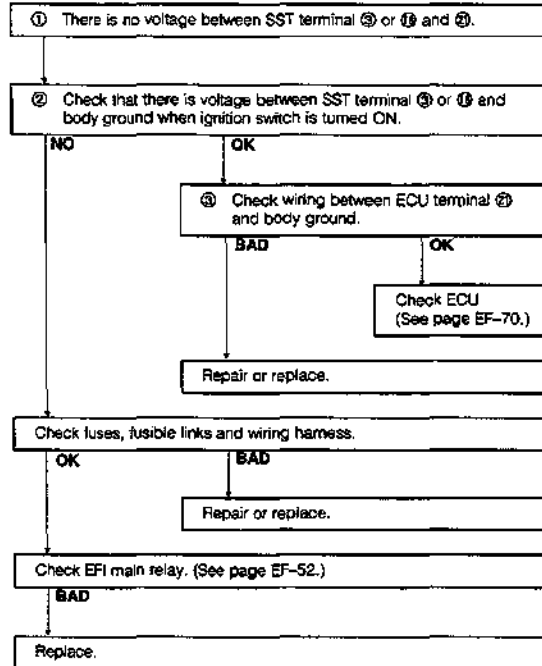
If the SST (09842-87204-000) has not been installed yet, install the SST, referring to the section under "Preparation of Trouble-shooting" at page EF-32.

WP80-EP073



WP80-EP074

• ③ or ⑬ - ⑭

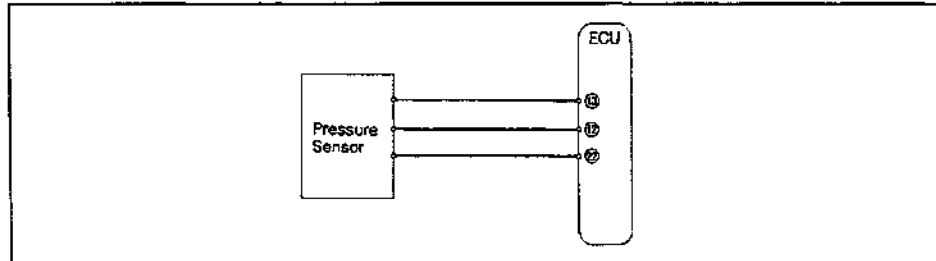


WFE80-6775

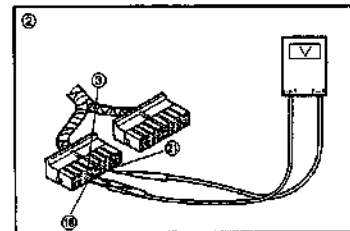
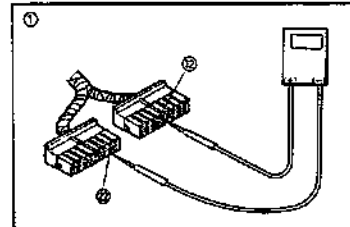
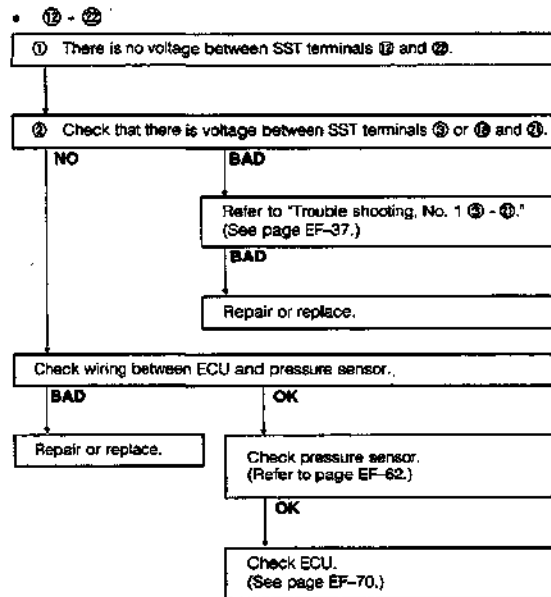
EFI SYSTEM

No.	Terminals	Trouble	Conditions	STD voltage
2	⑬ - ⑭	No specified voltage	Ignition switch ON	4.5 - 5.5
	⑬ - ⑮		Ignition switch ON At time of atmospheric pressure of 101.3 kPa (760 mmHg)	3.2 - 4.0

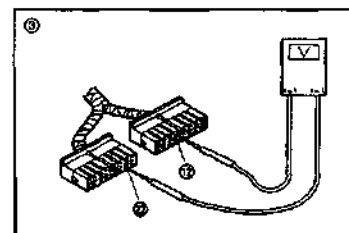
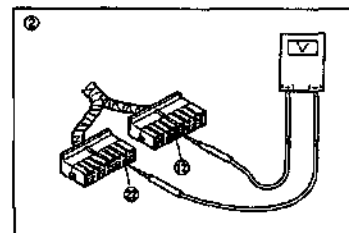
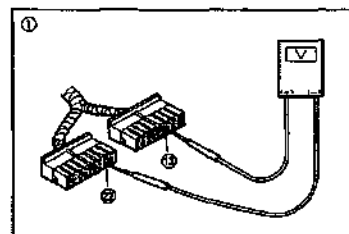
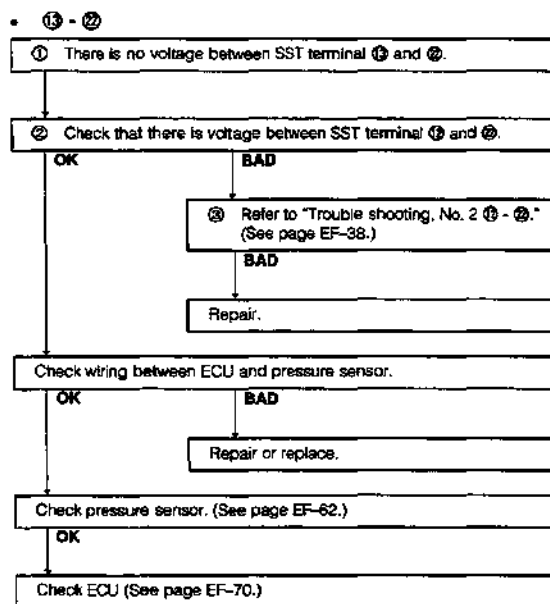
WFE90-EP076



If the SST (09842-87204-000) has not been installed yet, install the SST, referring to the section under "Preparation of Trouble-shooting" at page EF-32.



WFE90-EP078

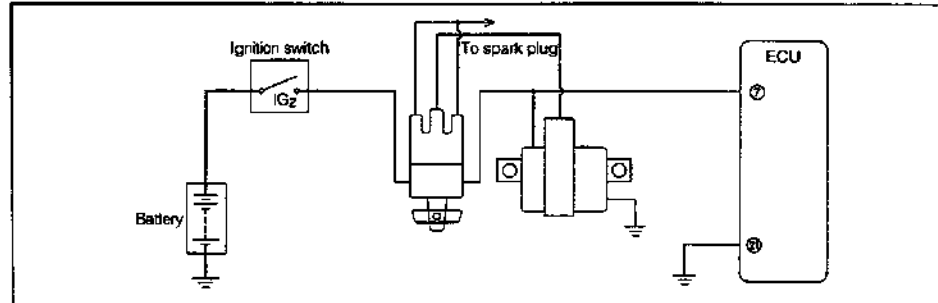


WFE90-EF0/9

EFI SYSTEM

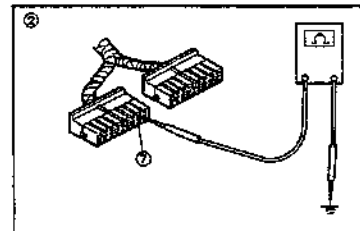
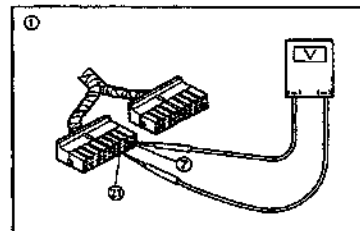
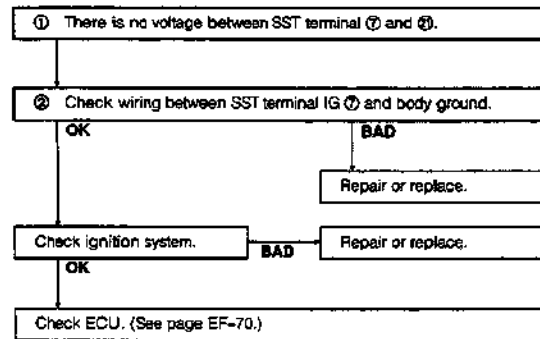
No.	Terminals	Trouble	Conditions	STD voltage
3	⑦ - ⑧ Ground	No specified voltage	Ignition switch ON	Approx battery voltage

WFEB0-EF000



If the SST (09842-87204-000) has not been installed yet, install the SST, referring to the section under "Preparation of Trouble-shooting" at page EF-32.

WFEB0-EF001

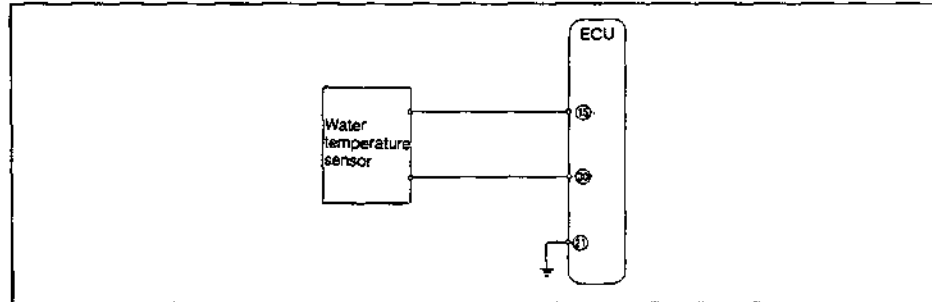


WFEB0-EF002

EFI SYSTEM

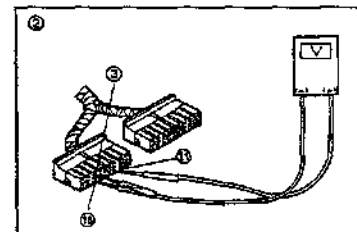
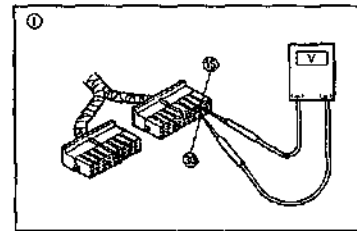
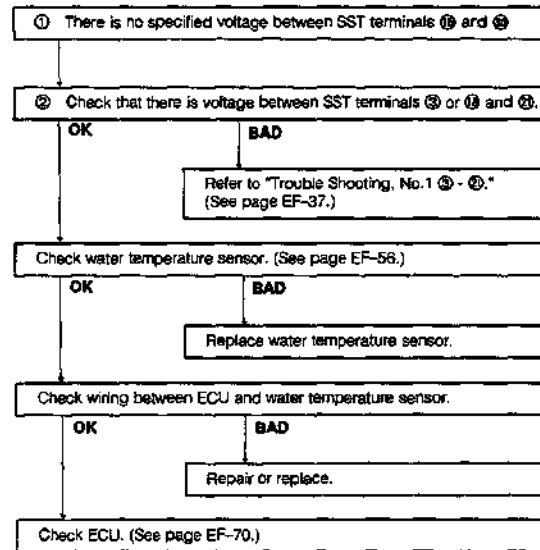
No.	Terminals	Trouble	Conditions	STD voltage
4	⑬ - ⑭	No specified voltage	Ignition switch ON Coolant temperature 80 - 90°C	0.40 - 0.65

WP830-EF088



If the SST (09842-87204-000) has not been installed yet, install the SST, referring to the section under "Preparation of Trouble-shooting" at page EF-32.

WP830-EF088

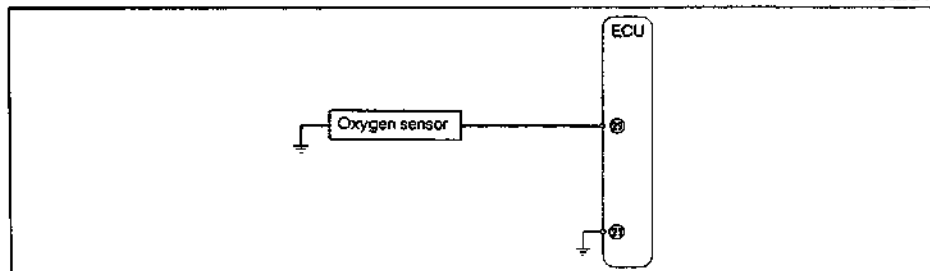


WP830-EF088

EFI SYSTEM

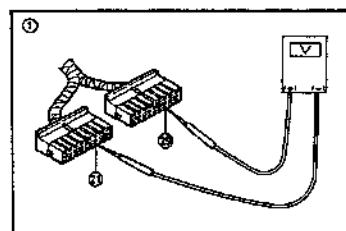
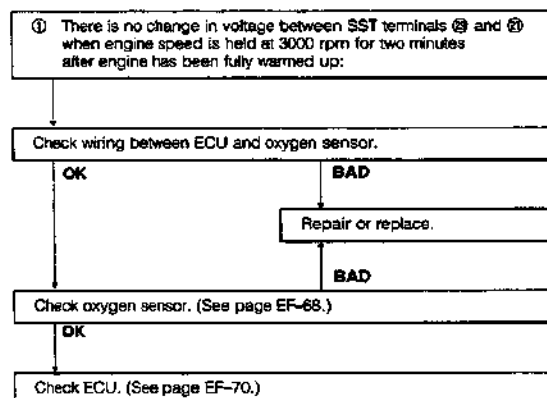
No.	Terminals	Trouble	Conditions	STD voltage
5	③ - ②	No voltage changes	Ignition switch ON When engine speed is held at 3000 rpm for two minutes after engine has been fully warmed up:	Voltage changes more than 8 times within 10 seconds.

WFE80-EP046



If the SST (09842-87204-000) has not been installed yet, install the SST, referring to the section under "Preparation of Trouble-shooting" at page EF-32.

WFE80-EP047

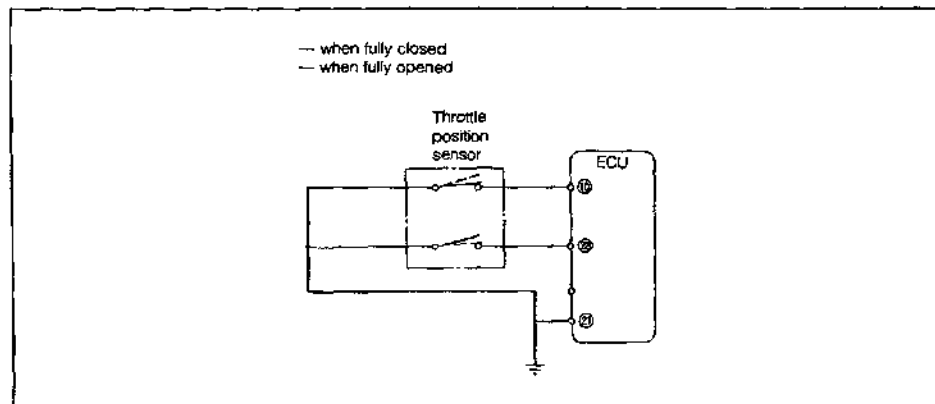


WFE80-EP048

EFI SYSTEM

No.	Terminals	Trouble	Condition		STD voltage
7	⑩ ~ ⑪ Ground	More than 5 V	Ignition switch ON	Throttle valve fully closed	Less than 0.5 V
		No specified voltage	Ignition switch ON	Throttle valve fully opened	Approx. battery voltage
	⑫ ~ ⑬ Ground	No specified voltage	Ignition switch ON	Throttle valve fully closed	Approx. battery voltage
		More than 5 V	Ignition switch ON	Throttle valve fully opened	Less than 0.5 V

WFE80-EFC68

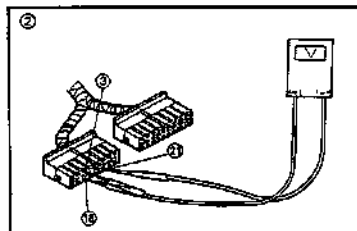
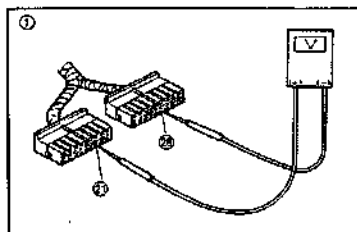
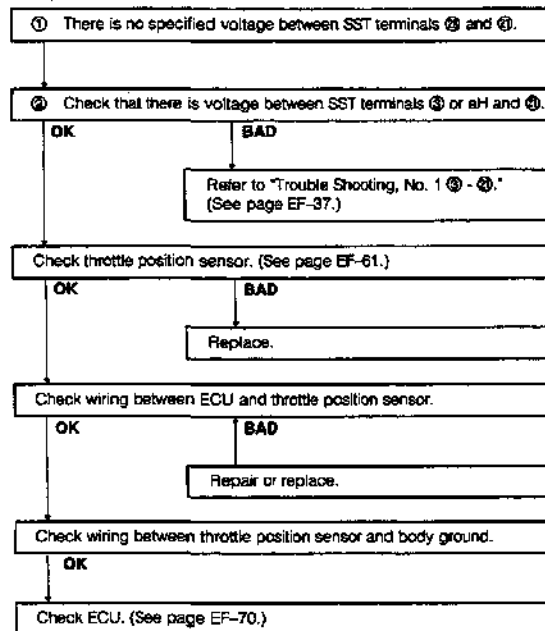


If the SST (09842-87204-000) has not been installed yet, install the SST, referring to the section under "Preparation of Trouble-shooting" at page EF-32.

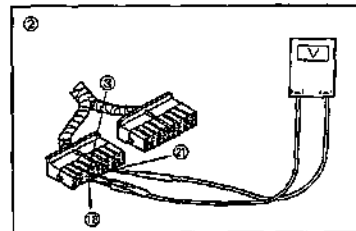
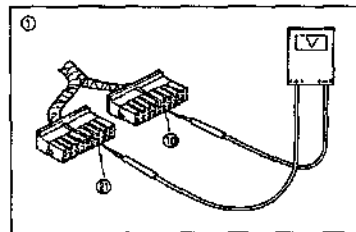
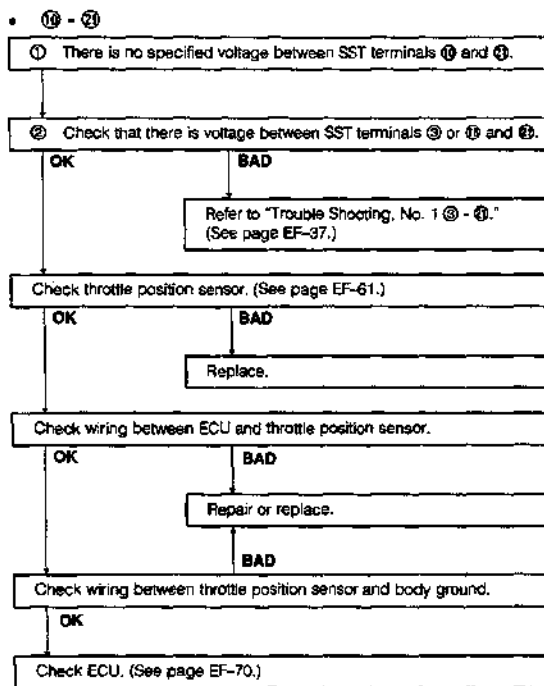
WFE80-EFC68

EFI SYSTEM

• ② - ①



WPB0-EF001

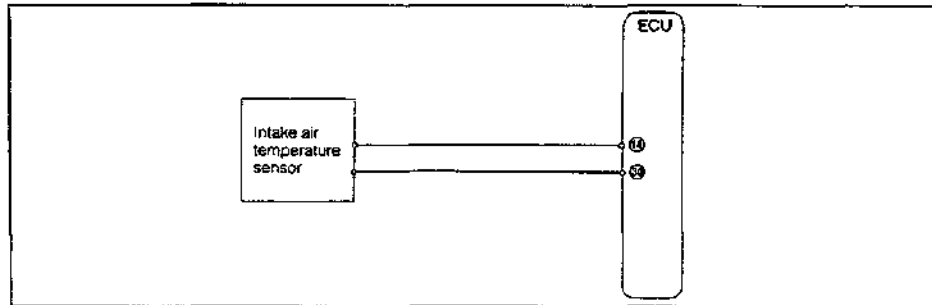


WFB90-5R002

EFI SYSTEM

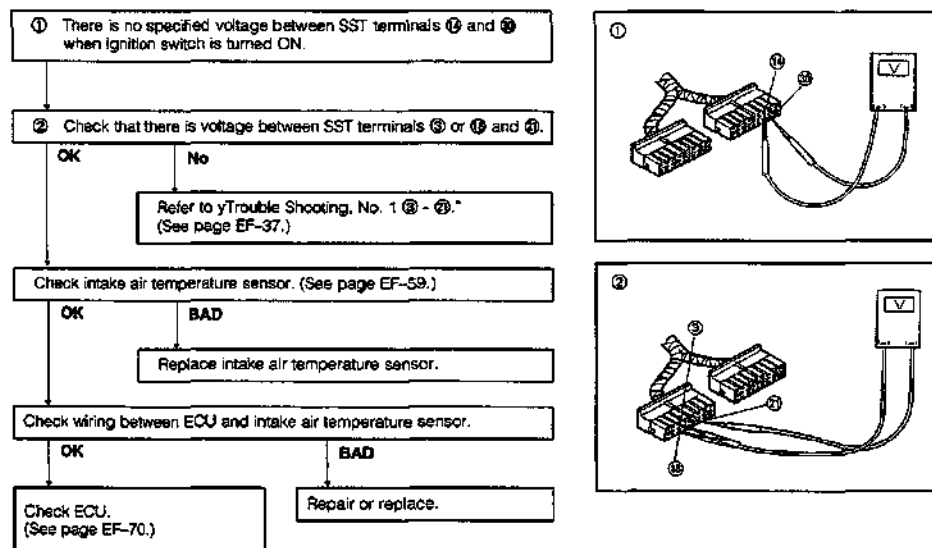
No.	Terminals	Trouble	Conditions		STD voltage
8	⑬ - ⑭	No specified voltage	Ignition switch ON	Air temperature inside surge tank 20°C	1.5 - 3.0

WP550-EP035



If the SST (09842-87204-000) has not been installed yet, install the SST, referring to the section under "Preparation of Trouble-shooting" at page EF-32.

WP550-EP034

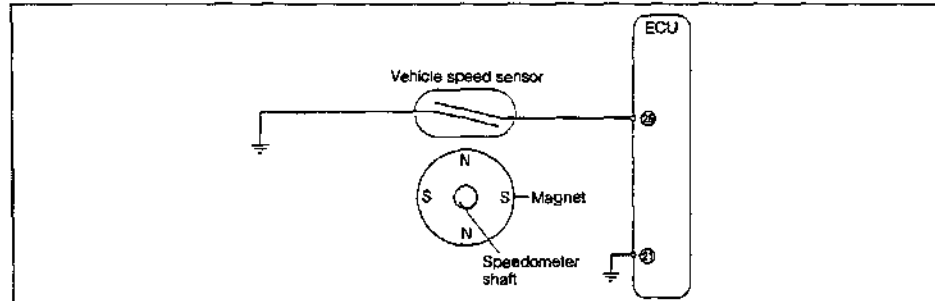


WP550-EP035

EFI SYSTEM

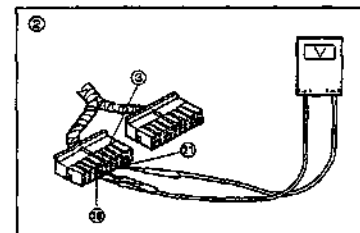
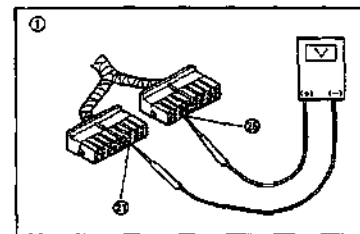
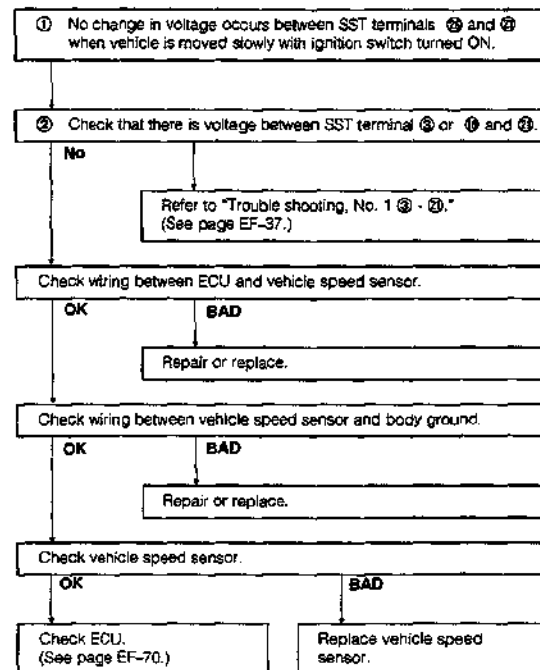
No.	Terminals	Trouble	Conditions	STD voltage
9	③ - ②	No voltage changes	Ignition switch ON When vehicle is moved slowly:	0 - Approx battery voltage

WFE20-EP096



If the SST (09842-87204-000) has not been installed yet, install the SST, referring to the section under "Preparation of Trouble-shooting" at page EF-32.

WFE20-EP097

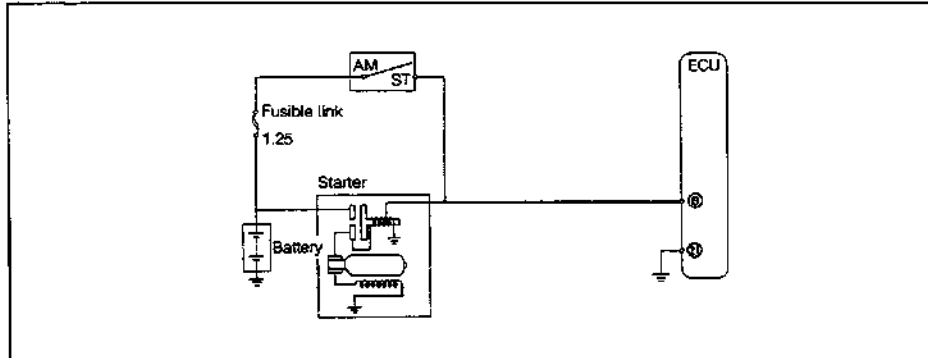


WFE20-EP098

EFI SYSTEM

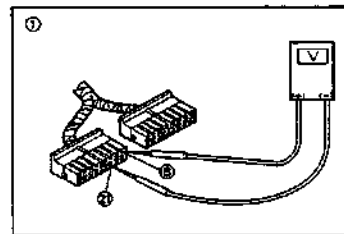
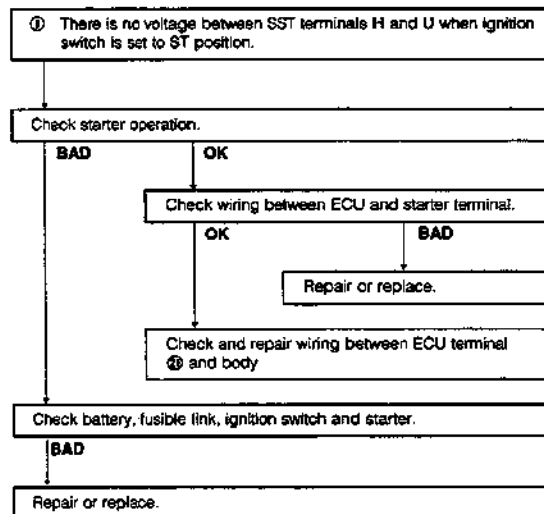
No.	Terminals	Trouble	Conditions	STD voltage
10	⑩ - ⑪	No specified voltage	Ignition switch ST position	More than 6V

WPE90-0708



If the SST (09842-87204-000) has not been installed yet, install the SST, referring to the section under "Preparation of Trouble-shooting" at page EF-32.

WPE90-07100



WPE90-07101

EFI SYSTEM

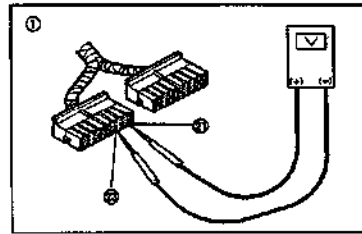
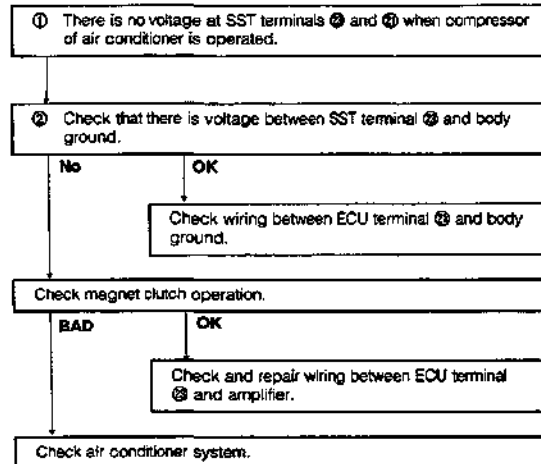
WFO-102



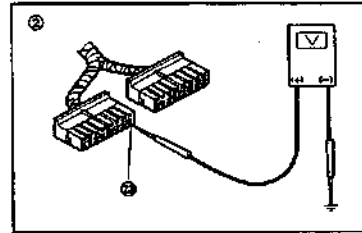
If the SST (09842-87204-000) has not been installed yet, install the SST, referring to the section under "Preparation of Trouble-shooting" at page EF-32.

EFI SYSTEM

• ② - ③

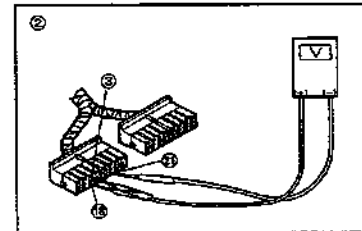
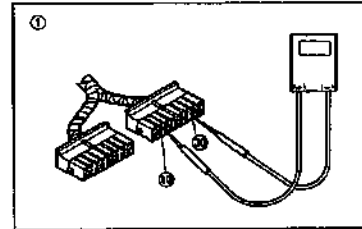
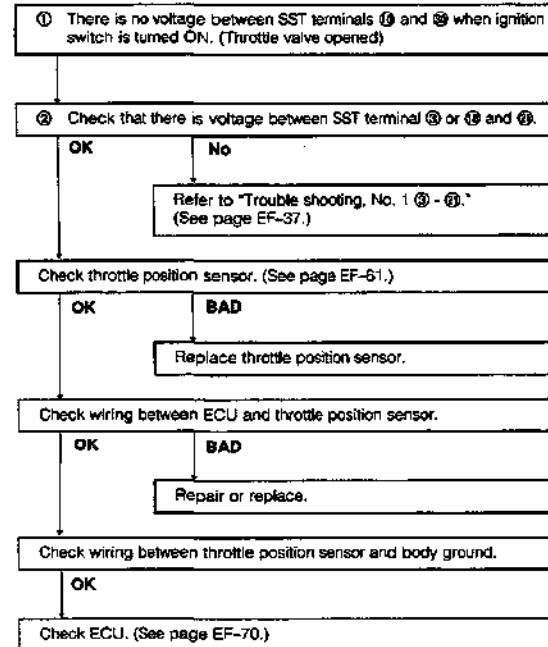


WPED0-EF104



WPED0-EF105

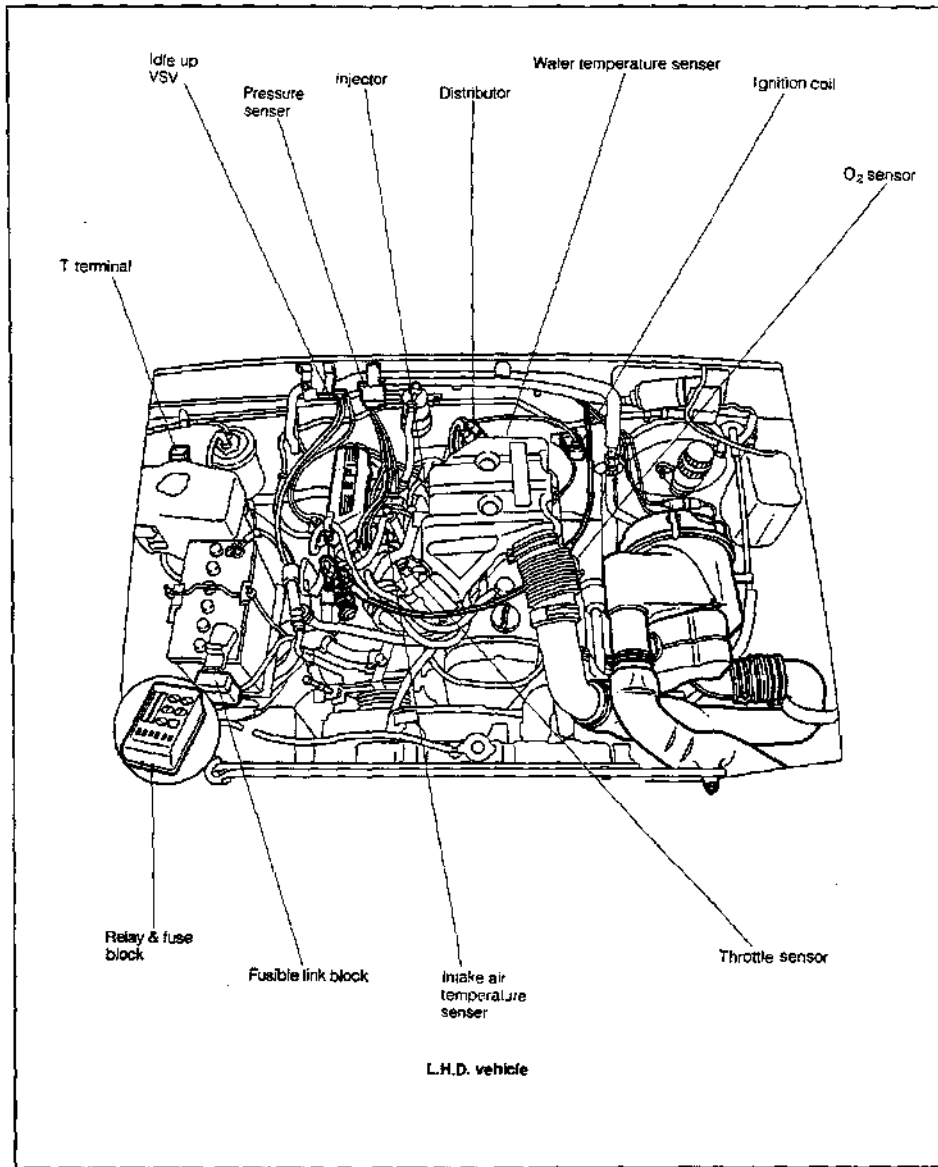
• ③ - ④



WPED0-EF106

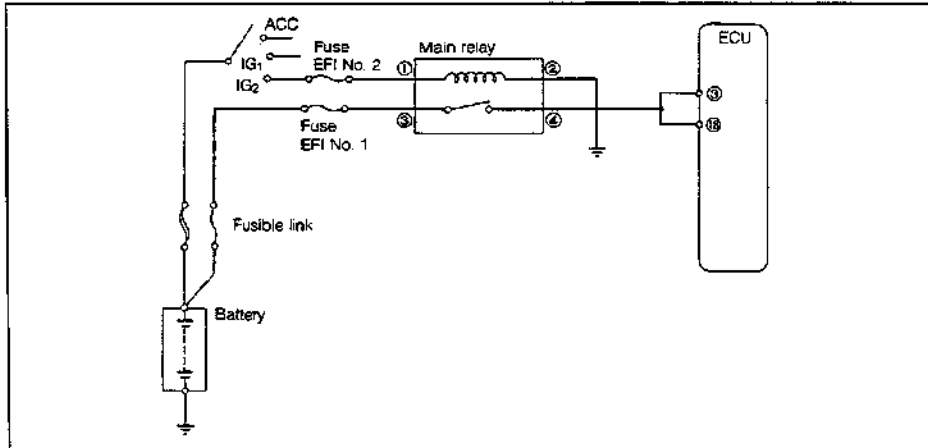
ELECTRONIC CONTROL SYSTEM

LOCATION OF ELECTRONIC CONTROL PARTS



EFI SYSTEM

MAIN RELAY



WPES0-EP108

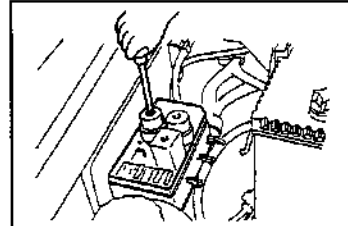
Inspection of EFI main relay

1. Check of main relay operation

Turn ON the ignition switch. Check to see if you can hear a relay operating sound or if you can feel operating vibrations when a screwdriver or the like is brought into contact with the relay.

CAUTION:

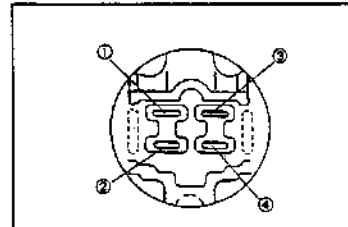
- The relay may become very hot during the operation. Hence, do not touch the relay by your hand.



WPES0-EP109

2. Inspection of relay continuity

- Remove the main relay from relay box.
- Check that there is continuity between the terminals ① and ②.
- Check that there is no continuity between the terminals ③ and ④.
- Check that there is no continuity between the terminals ① and ③ and also between the terminals ① and ④.
- Check that there is no continuity between the terminals ② and ③ and also between the terminals ② and ④.

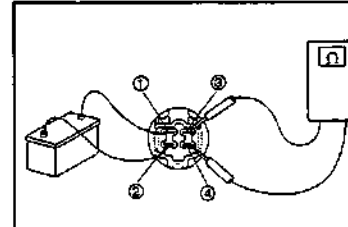


WPES0-EP110

If the continuity test results do not conform to specifications, replace the relay.

3. Inspection of relay operation

- Apply the battery voltage across the terminals ① and ②.
- Check that there is continuity between the terminals ③ and ④.



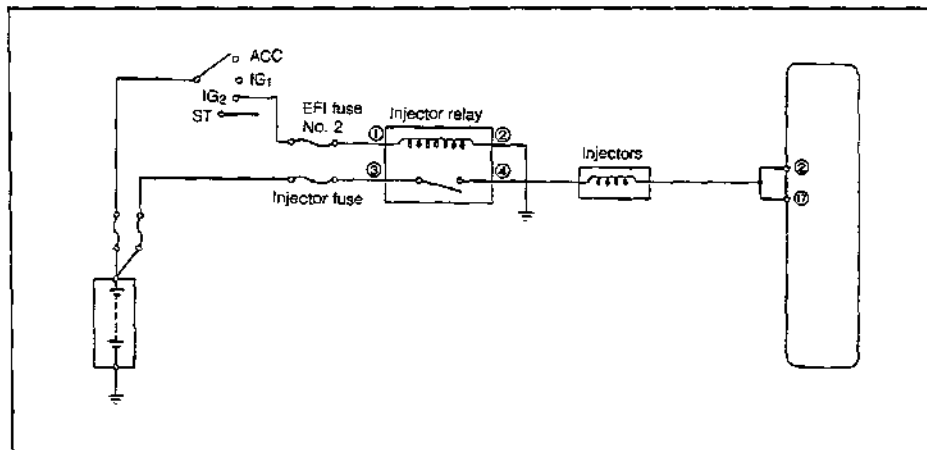
WPES0-EP111

If the operation test results do not conform to specifications, replace the relay.

4. If the main relay persists to be inoperative after the checks 1 through 3 have been performed satisfactorily, check the following items.
 - (1) Fusible links
 - (2) Ignition switch
 - (3) Fuses
 - (4) Wiring and wiring connector
5. Install the main relay to the relay box. Attach the cover.

INJECTOR RELAY

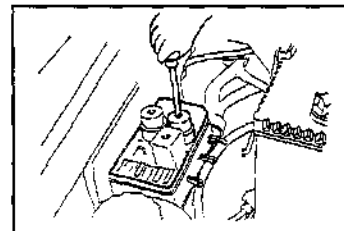
WP800-EF112



WP800-EF113

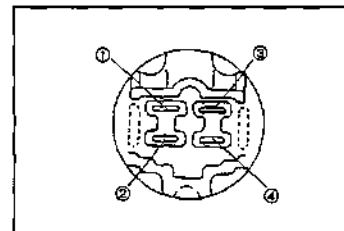
Inspection of injector relay

1. Check of injector relay operation
Turn ON the ignition switch. Check to see if you can hear a relay operating sound or if you can feel operating vibrations when a screwdriver or the like is brought into contact with the relay.
CAUTION:
 - The relay may become very hot during the operation. Hence, do not touch the relay by your hand.



WP800-EF114

2. Inspection of relay continuity
(1) Remove the injector relay from the relay box.
Check that there is continuity between the terminals ① and ②.

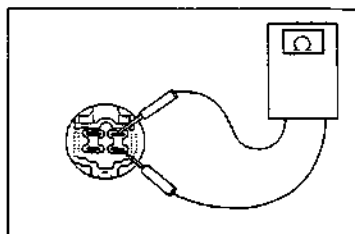


WP800-EF115

EFI SYSTEM

- Check that there is no continuity between the terminals ③ and ④.
- Check that there is no continuity between the terminals ① and ③ and also between the terminals ① and ④.
- Check that there is no continuity between the terminals ② and ③ and also between the terminals ② and ④.

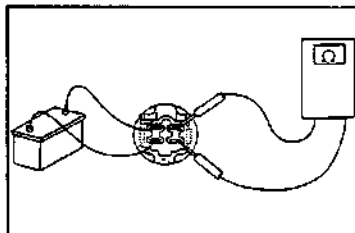
If the continuity test results do not conform to specifications, replace the relay.



WFE20-EF115

3. Inspection of relay operation
 - (1) Apply the battery voltage across the terminals ① and ②.
 - (2) Check that there is continuity between the terminals ③ and ④.

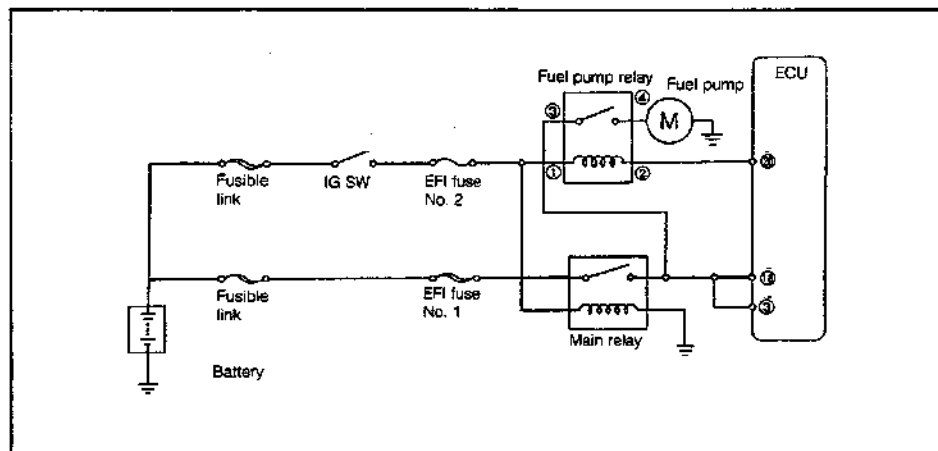
If the operation test results do not conform to specifications, replace the relay.



WFE20-EF117

4. If the injector relay persists to be inoperative after the checks 1 through 3 have been performed satisfactorily, check the following items.
 - (1) Fusible links
 - (2) Fuses
 - (3) Ignition switch
 - (4) Wiring and wiring connector
5. Install the injector relay to the relay box. Attach the cover.

FUEL PUMP RELAY



WFE20-EF116

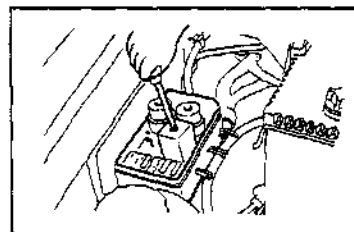
Inspection of fuel pump relay

1. Check of fuel pump relay operation

When the ignition switch is set to the ON position, check to see if the relay emits an operating sound. Or check to see if you will feel an operating vibration with a screwdriver or the like placed on the relay.

CAUTION:

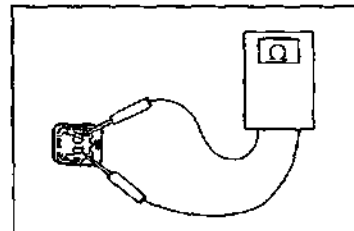
- The relay may become very hot during the operation. Hence, do not touch the relay by your hand.



WF230-EF119

2. Inspection of relay continuity

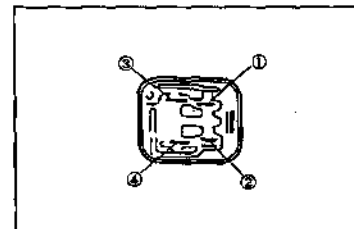
- Check that there is continuity between the terminals ① and ②.
- Check that there is no continuity between the terminals ③ and ④.



WF230-EF120

- Check that there is no continuity between the terminals ① and ③ and also between the terminals ① and ④.
- Check that there is no continuity between the terminals ② and ③ and also between the terminals ② and ④.

If the continuity test results do not conform to specifications, replace the relay.

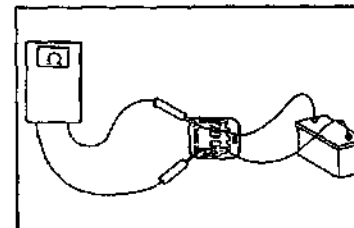


WF230-EF121

3. Inspection of relay operation

- Apply the battery voltage across the terminals ① and ②.
- Check that there is continuity between the terminals ③ and ④.

If the operation test results do not conform to specifications, replace the relay.



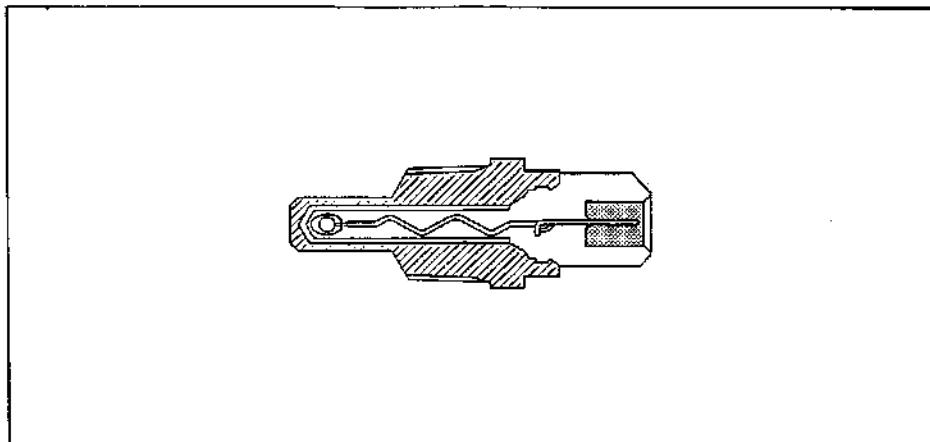
4. If the fuel pump relay persists to be inoperative after the checks 1 through 3 have been performed satisfactorily, check the following items.

- Fusible links
- Ignition switch
- Fuses
- Main relay
- Wiring and wiring connector
- ECU

WF230-EF122

EFI SYSTEM

WATER TEMPERATURE SENSOR



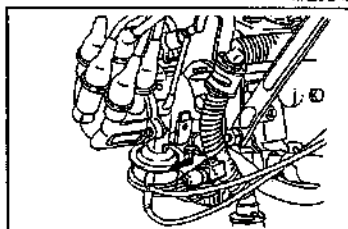
INSPECTION OF WATER TEMPERATURE SENSOR

Measurement of resistance of water temperature sensor

1. Disconnect the connector.

NOTE:

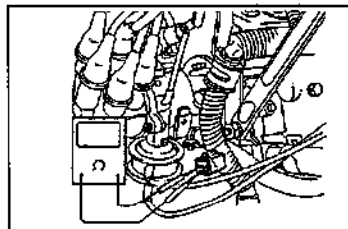
- Be sure to un-lock the lock of connector, when disconnect or connect the connector.



2. Start the engine. Read the resistance at the time when the engine is warmed up fully.

Resistance: $0.32 \pm 0.1 \text{ k}\Omega$ at 80°C

If the measured resistance will not conform to the specification, remove the water temperature sensor and perform the unit inspection.

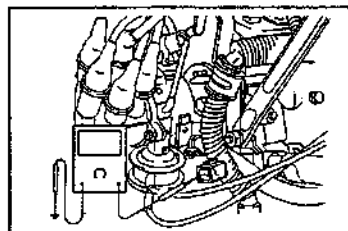


3. Check that there is no continuity between each terminal of the water temperature sensor and the body.

If there is continuity, replace the water temperature sensor.

NOTE:

- Before the water temperature sensor is removed, drain the coolant.
- After completion of the sensor replacement, refill the coolant.



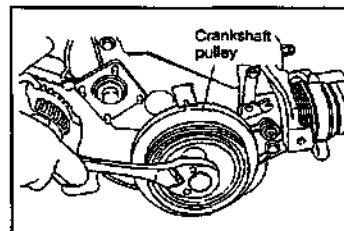
Water temperature sensor removal and unit test

1. Disconnect the ground cable terminal from the negative (-) terminal of the battery.
2. Drain the cooling water.

WPB0-EF127

3. Distributor removal

- (1) Turn the crankshaft, until the mark on the crankshaft timing belt pulley is aligned with the indicator mark on the timing belt cover. Ensure that the rocker arms of the cylinder No.1 at the timing belt side are in a free state. If the rocker arms are not in a free state, turn the crankshaft one more complete turn 360°.

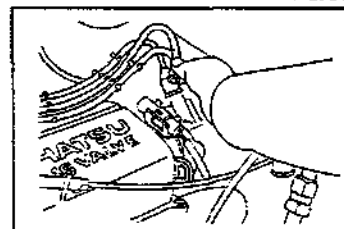


WPB0-EF128

- (2) Remove the spark plug wires from the distributor cap.

NOTE:

- Be sure to remove the spark plug wire by holding the rubber grommet. Never pull out the cord section.



WPB0-EF129

- (3) Disconnect the distributor connector.
- (4) Disconnect the vacuum hoses from the vacuum advance.
- (5) Remove the distributor by removing the distributor set bolts.

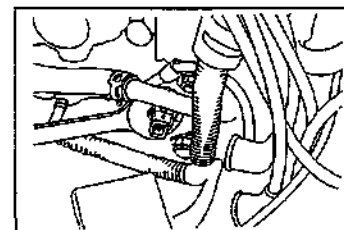
NOTE:

- Since the oil flows out during the removal, place a suitable cloth underneath the distributor.

WPB0-EF130

4. Removal of water temperature sensor

- (1) Remove the water temperature sensor connector.
- (2) Remove the water temperature sensor.



WPB0-EF131

EFI SYSTEM

5. Unit check

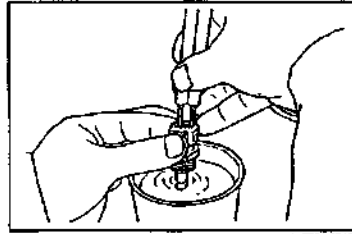
- (1) Immerse the heat sensing section of the water temperature sensor in water. Raise the water temperature gradually. Check to see if the resistance varies within the specified values in accordance with the table below.

Specifications

Water temperature °C	Resistance (kΩ)
80	0.322 ± 0.1
60	0.584 ± 0.2
40	1.140 ± 0.3
20	2.450 ± 0.5

If the resistance will not conform to the specifications, replace the water temperature sensor.

- (2) Check that there is no continuity between each terminal of the water temperature sensor and sensor body. If there is continuity, replace the intake air temperature sensor.



WFE90-EF132

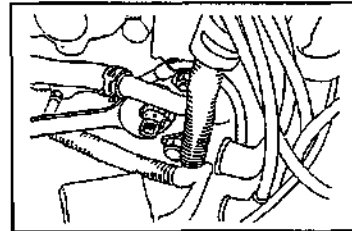
6. Installation of water temperature sensor

- (1) Wind sealing tape to the water temperature sensor switch and install it to the cylinder. Connect the connector.

Tightening Torque: 24.5 - 34.3 N·m (2.5 - 3.5 kgf·m)

NOTE:

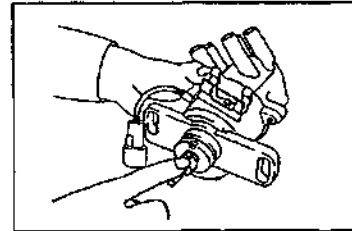
- The new sensor is coated with sealer. Hence, when the sensor is replaced with a new one, first remove the sealer thoroughly. Then, wind the seal tape. Also, be sure to clean the threaded holes at the cylinder head side.



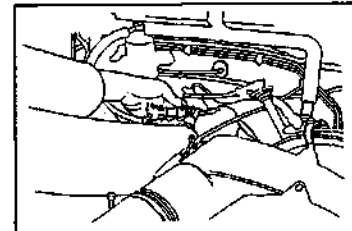
WFE90-EF133

(2) Distributor installation

- ① Replace the distributor "O" ring with a new part.
- ② With the coupling cut-out section of the distributor aligned with the cut-out section of the distributor body, insert the distributor into the cylinder head. At this time, ensure that the distributor attaching bolt hole of the cylinder head comes at the center of the elongated hole for the distributor bolt. Then, torque the distributor set bolt.
- ③ Connect the vacuum hoses to the vacuum advance.
- ④ Connect the distributor connector. Install the connector to the clamp.
- ⑤ Connect the high-tension cords to the distributor cap.



WFE90-EF134

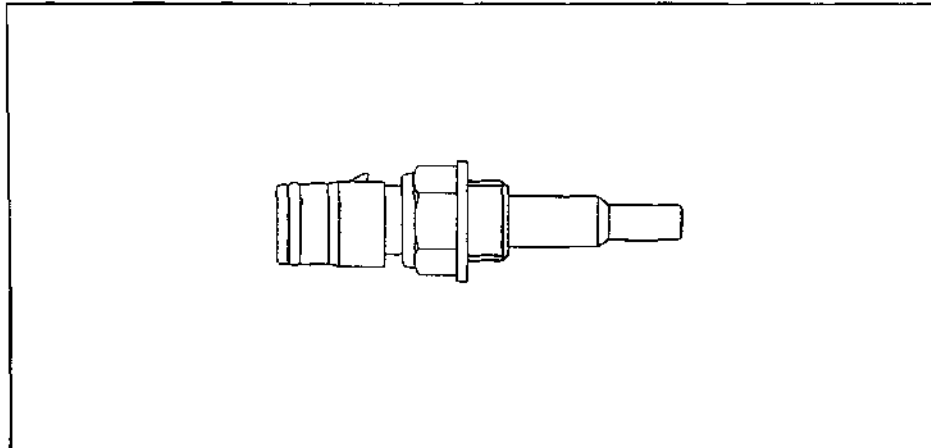


WFE90-EF135

- (3) Connect the ground cable terminal to the battery negative (-) terminal.
- (4) Fill cooling water.
- (5) Adjust the ignition timing.
- (6) Start the engine. Ensure that no water or oil leakage is present.
- (7) Check the oil level.

WP690-EF135

INTAKE AIR TEMPERATURE SENSOR



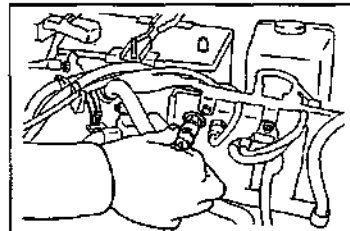
WP690-EF137

INSPECTION OF INTAKE AIR TEMPERATURE SENSOR Measurement of resistance of intake air temperature sensor

1. Disconnect the connector.

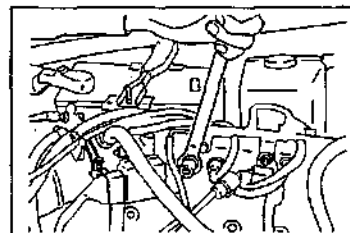
NOTE:

- Do not pull out the lead wire. While holding the connector section, unlock the lock and pull out the connector.



WP690-EF138

2. Remove the intake air temperature sensor.



WP690-EF139

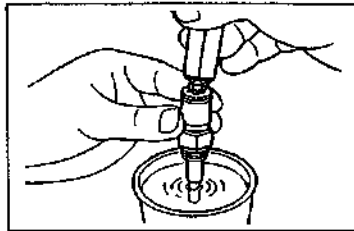
EFI SYSTEM

3. Immerse the heat sensing section of the intake air temperature sensor in water. Raise the water temperature gradually. Check to see if the resistance varies within the specified values in accordance with the table.
If the measured resistance will not conform to the specifications, replace the intake air temperature sensor.

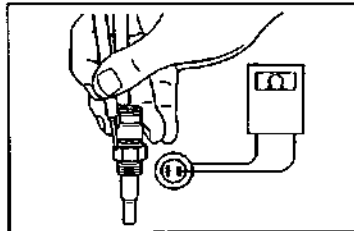
Specifications

Water temperature °C	Resistance (k Ω)
60	0.584 ± 0.2
40	1.140 ± 0.3
20	2.450 ± 0.5

4. Check that there is no continuity between each terminal of the intake air temperature sensor and the sensor body. If there is continuity, replace the intake air temperature sensor.



WPB90-EF140

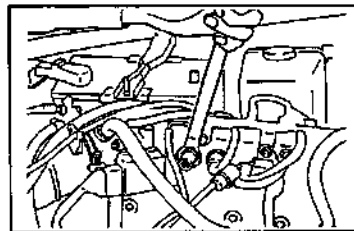


WPB90-EF141

5. Install the intake air temperature sensor to the surge tank with a new gasket interposed.

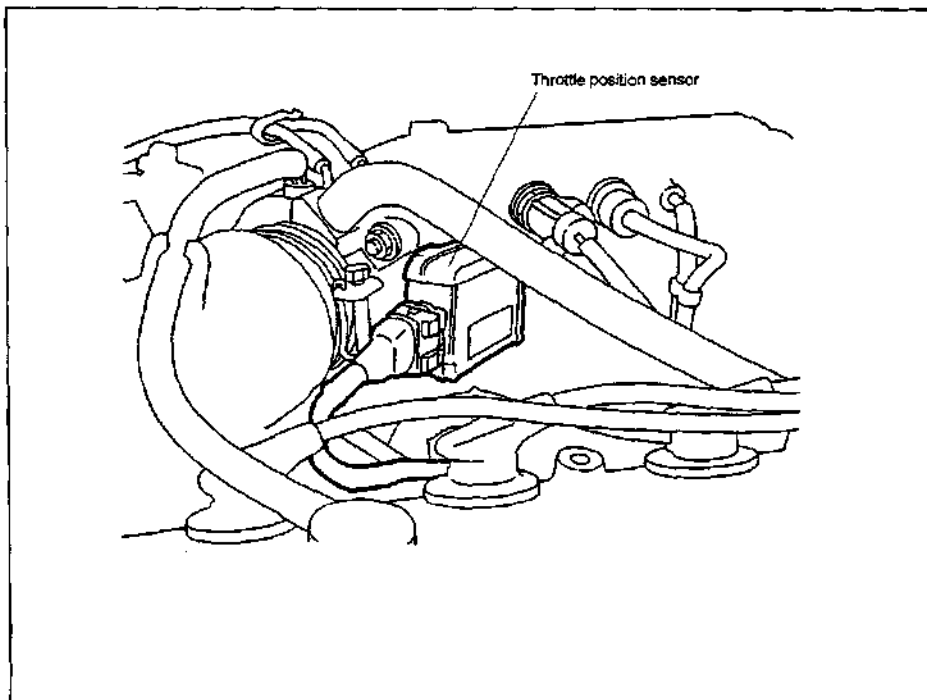
Tightening Torque: 29.4 - 39.2 N·m (3.0 - 4.0 kgf·m)

6. Connect the intake air temperature sensor connector.



WPB90-EF142

THROTTLE POSITION SENSOR

**Inspection of throttle position sensor**

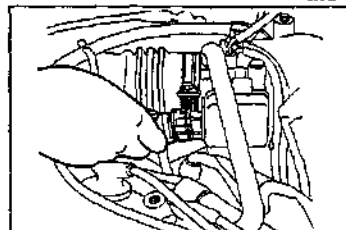
1. Remove the air chamber (See page EM-17.)
2. Unlock the throttle position sensor connector and disconnect it.
CAUTION:
 - When disconnecting the connector, care must be exercised to ensure that no excessive load is applied to the throttle position sensor.
3. Measure the resistance between the terminals of the throttle position sensor.
(1) Measure the resistance between ① and ② under the following conditions.

Throttle valve closed fully	29 kΩ or less at 20°C
Throttle valve opened fully	1000 kΩ or more

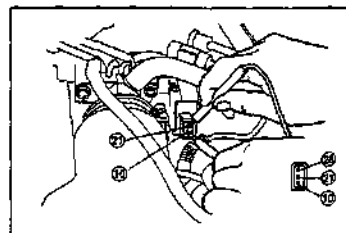
If the measured resistance does not conform to the specification, replace the throttle body.

CAUTION:

- Be very careful not to damage the terminal.



WPESQ-EF144



WPESQ-EF145

EFI SYSTEM

- (2) Measure the resistance between ② and ③ under the following conditions.

Throttle valve closed fully	1000 kΩ or more
Throttle valve opened fully	29 kΩ or less

If the measured resistance does not conform to the specification, replace the throttle body.

CAUTION:

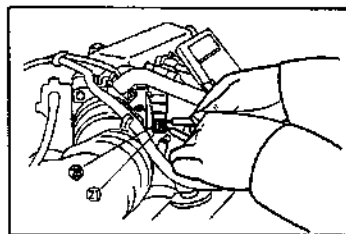
- Be very careful not to damage the terminal.

4. Connect the throttle position sensor connector.

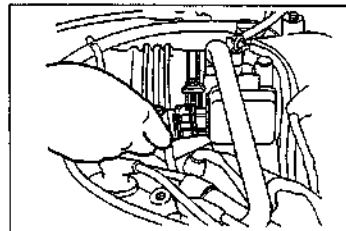
CAUTION:

- When connecting the connector, care must be exercised to ensure that no excessive load is applied to the throttle position sensor.

5. Install the air chamber (See page EM-22.)

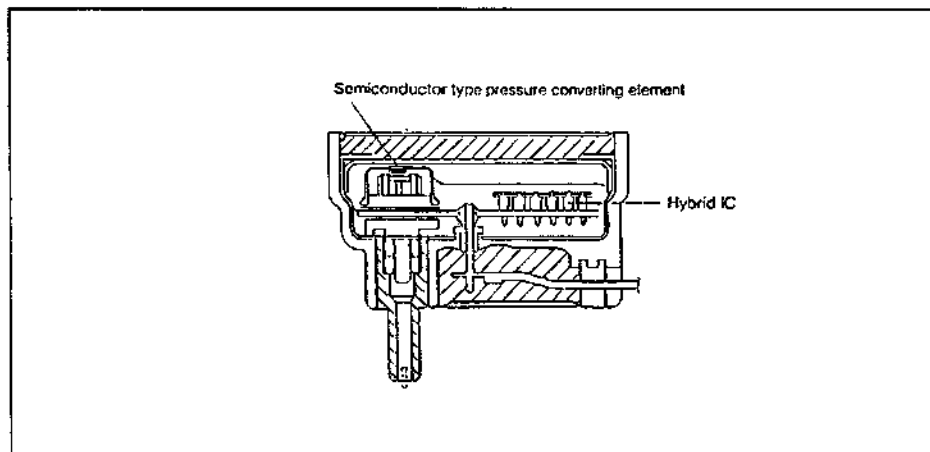


WFE00-EF146



WFE00-EF147

PRESSURE SENSOR

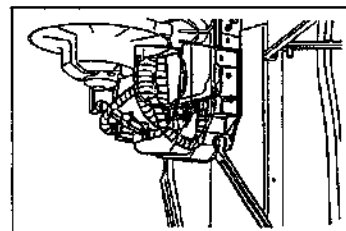


WFE00-EF148

INSPECTION OF PRESSURE SENSOR

Measurement of output voltage of pressure sensor

1. Connection of SST
 - (1) Disconnect the ground cable terminal from the negative (-) terminal of the battery.
 - (2) Remove the ECU cover.



WFE00-EF149

- (3) Connect the following SST between the ECU and the engine wire.
SST: 09842-87204-000

NOTE:

- Before the SST is installed, be sure to perform continuity and short tests between the SST terminals.

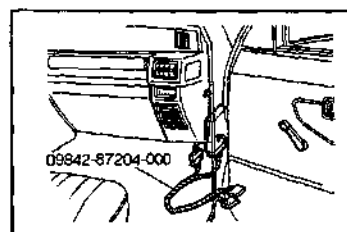
- (4) Reconnect the ground cable terminal to the negative (-) terminal of the battery.

2. Check of output of pressure sensor

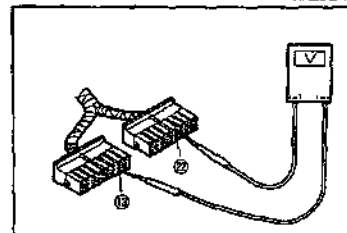
- (1) Measure the voltage between the SST terminals ⑬ and ⑭ when the ignition switch is turned ON.

Specified Value

Measuring point Altitude (height above sea level) m	Atmospheric pressure kPa (mmHg)	Voltage V
0	101.3 (760)	3.2 - 4.0
500	95.5 (716)	3.1 - 3.8
1000	89.9 (674)	3.0 - 3.6



WPB0-EF150



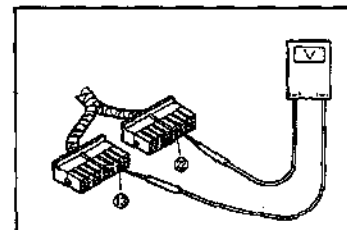
WPB0-EF151

If the measured voltage does not conform to the specification, measure the voltage between the SST terminals ⑬ and ⑭. Ensure that the measured voltage is within a range of 4.5 to 5.5 volts. Then, proceed to replace the pressure sensor.

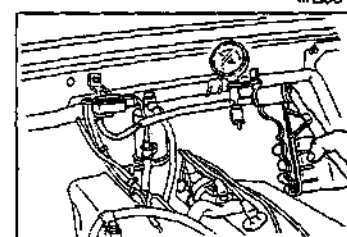
When the pressure sensor is replaced, it is necessary to replace the gas filter, too.

If the measured voltage between the SST terminals ⑬ and ⑭ does not conform to the specification, check the wiring between the ECU and the pressure sensor. If there is no trouble with the wiring, check the ECU.

- (2) Disconnect the rubber hose connected to the pressure sensor. Apply a negative pressure of 26.7 kPa (200 mmHg) to the pressure sensor, using a MityVac. Check that the measured voltage between the SST terminals ⑬ and ⑭ drops by 0.65 - 0.95, compared with the voltage measured in the step (1).



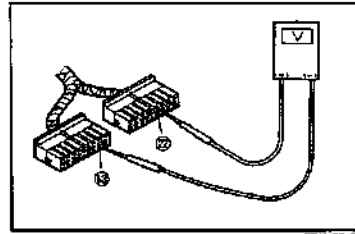
WPB0-EF152



WPB0-EF153

EFI SYSTEM

If the measured voltage fails to drop by the specified value, replace the pressure sensor.
When the pressure sensor is replaced, it is necessary to replace the gas filter, too.



WFE00-EF154

- (3) Remove the MityVac from the pressure sensor.
- (4) Connect the rubber hose disconnected in the step (2) to the pressure sensor.

3. SST removal

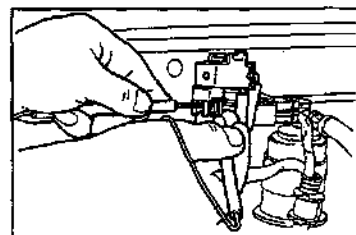
- (1) Disconnect the ground cable terminal from the negative (-) terminal of the battery.
- (2) Remove the SST by disconnecting the ECU and engine wire connectors of the SST.
- (3) Connect the engine wire to the ECU.
- (4) Install the glove compartment box to the instrument panel.
- (5) Reconnect the ground cable terminal to the negative (-) terminal of the battery.

WFE00-EF155



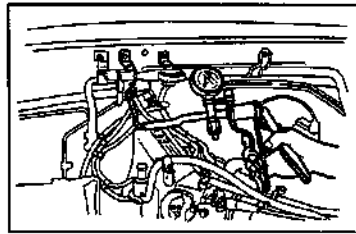
2. Measure the resistance between the idle-up VSV terminals.

If the resistance will not conform to the specification, replace the idle-up VSV.



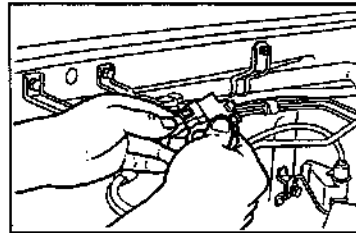
EFI SYSTEM

3. Disconnect the rubber hose connected to the idle-up VSV and connect a MityVac or a vacuum pump. Apply a negative pressure of 13.3 kPa (100 mmHg). If no negative pressure is applied, replace the idle-up VSV.



WPED0-07100

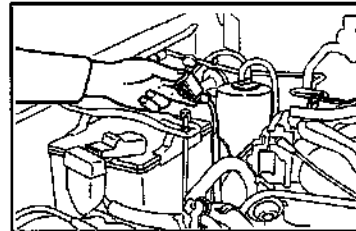
4. Connect the idle-up VSV connector and turn ON the ignition key switch. Check to see if the negative pressure applied in the step 3 becomes zero. During this check, a voltage should be applied to the connector side.
5. Connect the disconnected rubber hose to the idle-up VSV. Attach the idle-up VSV to the bracket.



WPED0-07101

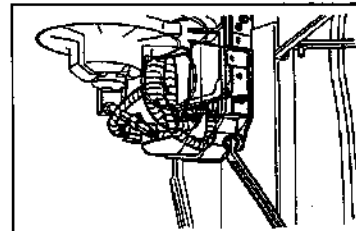
Check of idle-up vsv control

1. Disconnect the ground cable terminal from the negative (-) terminal of the battery.



WPED0-07102

2. Remove the ECU cover.



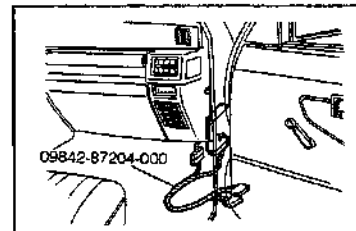
WPED0-07103

3. Connect the following SST between the ECU and the engine wire.

SST: 09842-87204-000

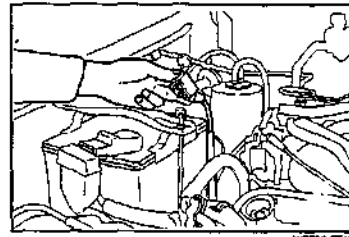
NOTE:

- Before the SST is installed, be sure to perform continuity and short tests between SST terminals.



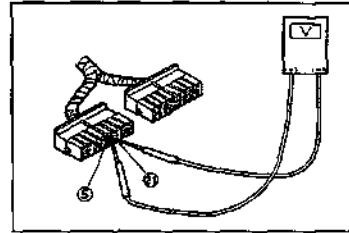
WPED0-07104

4. Reconnect the ground cable terminal to the negative (-) terminal of the battery.



WP290-EF105

5. With the engine running, measure the voltage across the SST terminals ⑤ and ⑥.



WP290-EF106

No.	Condition	Measured voltage
1	Engine has warmed up fully after starting.	Less than 3V
2	Defogger ON	
3	Headlamps ON	
4	Blower fan motor operating	

The measurement should not be performed when plural conditions of those described above are met concurrently.

If the check results will not conform to the requirements given in the table above, check and repair the following sections.

WP290-EF107

No.	Check item
1	Check water temperature sensor-related parts. (See page EF-56.) Check ECU. (See page EF-70.)
2, 3	Check to see if battery voltage is applied to between SST terminals ① and ② when defogger switch and/or headlamp switch is turned ON. If battery voltage is applied, check ECU. If no battery voltage is applied, check wiring from ECU ① terminal to defogger switch and/or headlamp switch.
4	Check and repair wiring between blower fan motor switch and idle-up VSV.

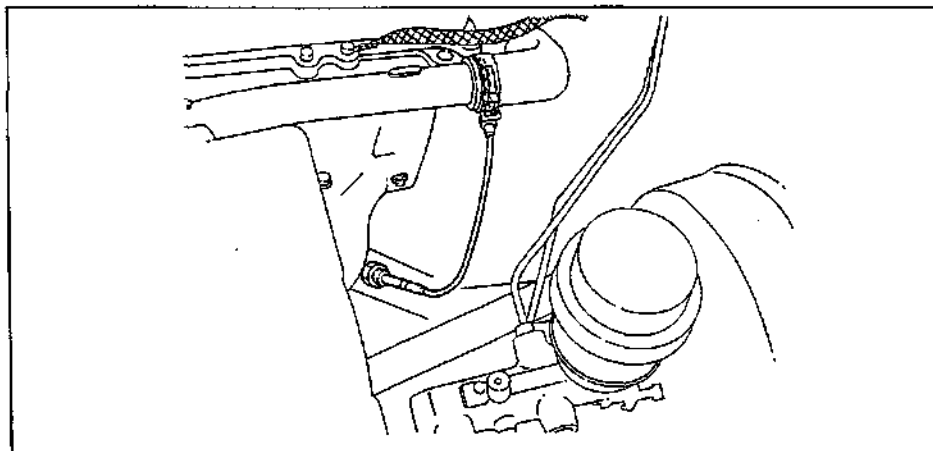
WP290-EF108

6. SST removal
- (1) Disconnect the ground cable terminal from the negative (-) terminal of the battery.
 - (2) Remove the SST by disconnecting the ECU and engine wire connectors of the SST.
 - (3) Connect the engine wire to the ECU.
 - (4) Install the ECU cover.
 - (5) Reconnect the ground cable terminal to the negative (-) terminal of the battery.

WP290-EF109

EFI SYSTEM

OXYGEN SENSOR

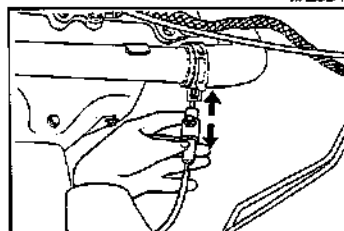


Inspection of oxygen sensor

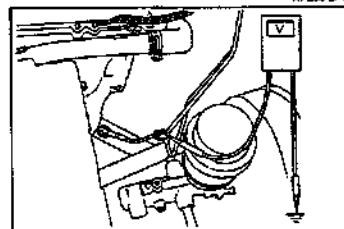
1. Unit inspection of oxygen sensor



- (1) Disconnect the oxygen sensor connector.

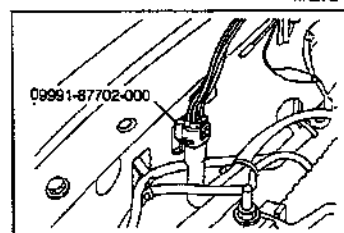


- (2) Start and warm up the engine completely.
- (3) Connect a voltmeter to the connector of the oxygen sensor.
- (4) Depress the accelerator pedal. At this time, ensure that the reading of the voltmeter is 0.45 V or more. Replace the oxygen sensor with a new part if the reading is not 0.45 V or more.
- (5) Remove the voltmeter from the oxygen sensor connector. Reconnect the connector. Install the connector to the clamp.

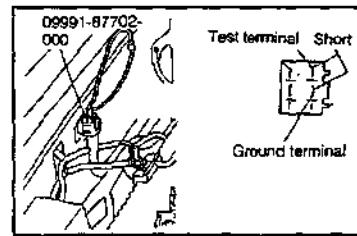


2. System inspection of oxygen sensor

- (1) Remove the cap of the check connector. Connect the following SST to the check connector.
SST: 09991-87702-000

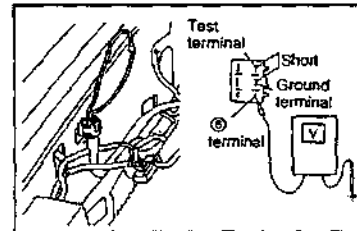


- (2) Start and warm up the engine completely.
- (3) Connect the test terminal (brown) of the SST to the ground terminal (black).



WF20-EF174

- (4) Connect a voltmeter to the output terminal (green) of the SST.

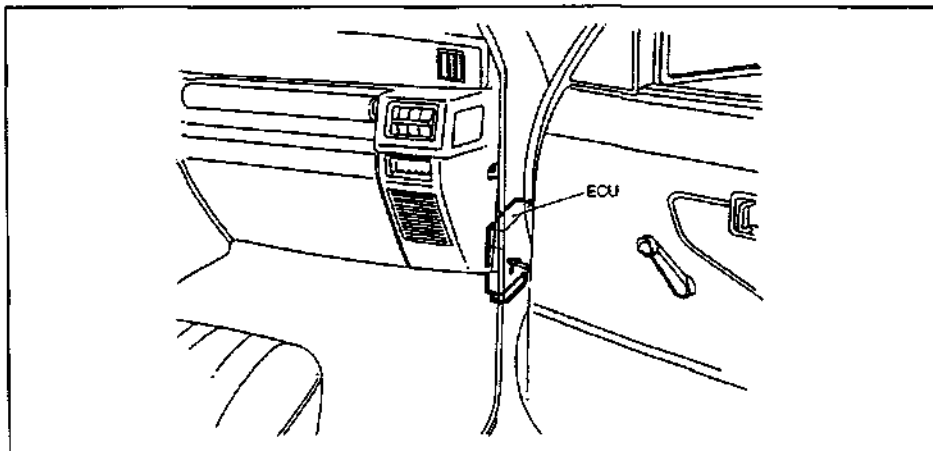


WF20-EF175

- (5) Hold the engine speed at 3000 rpm.
- (6) After a lapse of 2 minutes, ensure that the reading of the voltmeter connected in the step (4) changes eight times or more for 10 seconds.
If the change in voltage fails to occur eight times or more, check the diagnosis code. Replace the oxygen sensor if no malfunction code is memorized.
- (7) Stop the engine.
- (8) Remove the SST which was connected to the check connector. Attach the cap to the check connector.

EFI SYSTEM

ELECTRONIC CONTROL UNIT (ECU)



WFE90-EF176

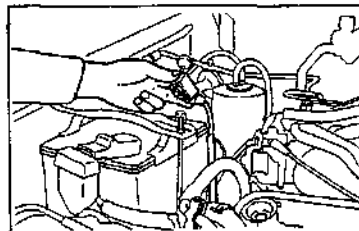
Inspection of ECU

1. Measurement of ECU input/output voltage

NOTE:

- The wiring circuit of the EFI can be checked by measuring the voltage and resistance at the ECU connector terminals.
- The measurement of voltage should be conducted while all of the connectors are connected.
- Make sure that the battery voltage is 11 V or more when the ignition switch is turned ON.

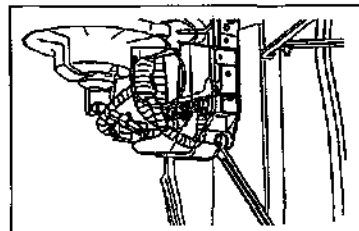
- (1) Disconnect the battery ground cable from the negative terminal (-) of the battery.



WFE90-EF177

WFE90-EF178

- (2) Remove the ECU cover.

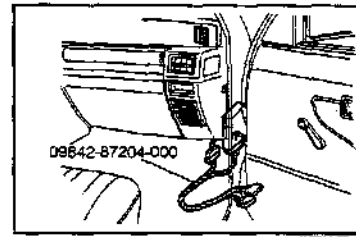


WFE90-EF179

- (3) Connect the following SST between the ECU and the engine wire.
SST: 09842-87204-000

NOTE:

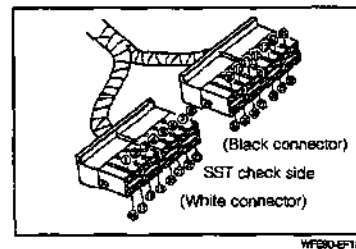
- Before the SST is connected, make sure that no open wire and/or no short exists between the SST terminals.



- (4) Connect the battery ground cable to the negative (-) terminal of the battery.
- (5) Measure the voltage between the terminals under each condition shown in the table below.
- Replace the ECU if the engine shows abnormality despite the fact that all measured results are normal.
- If the measured results are abnormal, check the malfunctioning system. Repair or replace the malfunctioning part.
- Replace the ECU if no abnormality exists in the wiring system.

NOTE:

- The measurement should be carried out at the measuring terminals of the SST.



EFI SYSTEM

Voltage or resistance at ECU wiring connectors

Terminals	STD voltage or resistance	Conditions	Remedies
① - ②	Less than 1Ω	Ignition switch OFF	Proceed to flow chart ②.
② - ③	Less than 1V	Ignition switch OFF (after more than one minute)	Check power supply.
	Approx battery voltage	Ignition switch ON	
③ - ④	Less than 0.1V	Ignition switch OFF (after more than ten seconds)	Check power supply.
	Approx battery voltage	Ignition switch ON	
④ - ⑤	Approx battery voltage	At all times (Measured voltage is lower than specified voltage only at during starting period.)	Check power supply.
⑤ - ⑥	Approx battery voltage	Engine fully warmed up. All accessory switches turned OFF.	Check power supply.
	Less than 3V	Idle-up VSV ON	Check idle-up VSV control.
⑥ - ⑦	4.5 - 5.5V	Ignition switch ON. Terminal T shorted with ground terminal. Throttle valve fully closed.	Proceed to flow chart ②.
	Less than 1V		Check diagnosis code.
	0 - 4.5 to 5.5V (Measured voltage varies.)	Ignition switch ON. Terminal T shorted with ground terminal. Engine revolution speed held at 3000 rpm after it has fully warmed up.	Oxygen sensor system
⑦ - ⑧	Less than 0.1V	Ignition switch OFF	Check power supply.
	Approx battery voltage	Ignition switch ON	
⑧ - ⑨	Less than 0.1V	Ignition switch OFF	Check power supply.
	More than 6v	When ignition switch is set to ST position	
⑨ - ⑩	Less than 0.1V	Ignition switch OFF	Check T-terminal wiring.
	Approx battery voltage	Ignition switch ON	
⑩ - ⑪	Less than 0.5V	Ignition switch ON. Throttle valve fully closed.	Throttle position sensor system.
	Approx battery voltage	Ignition switch ON. Throttle valve fully opened.	
⑪ - ⑫	Less than 0.1V	Ignition switch ON. Headlamp switch and/or defogger switch OFF.	Check idle-up VSV control.
	Approx battery voltage	Ignition switch ON. Headlamp switch and/or defogger switch ON.	
⑫ - ⑬	Less than 0.1V	Ignition switch OFF	Check VCC wiring.
	4.5 - 5.5V	Ignition switch ON	
⑬ - ⑭	3.2 - 4.0V	Ignition switch ON. Atmospheric pressure is 101.3 kPa (760 mmHg).	Check pressure sensor.
⑭ - ⑮	1.5 - 3.0V	Ignition switch ON. Air temperature inside surge tank: 20°C	Check intake air temperature sensor.
⑮ - ⑯	0.4 - 0.65V	Ignition switch ON. After engine has been warmed up fully. (Cooling water temperature: 80 - 90°C)	Check cooling water temperature sensor.

WFE0-EP182

EFI SYSTEM

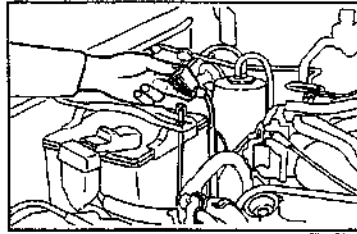
Terminals	STD voltage or resistance	Conditions	Remedies
① - ①	Less than 1Ω	Ignition switch OFF	Proceed to flow chart ②.
① - ②	Less than 1V	Ignition switch OFF (after more than one minute)	Check/repair injector power supply.
	Approx battery voltage	Ignition switch ON	
① - ③	Less than 0.1V	Ignition switch OFF	Check and repair ECU power supply.
	Approx battery voltage	Ignition switch ON	
① - ④	Less than 3V	Ignition switch ON (Check engine lamp illuminated.)	Check power supply for check engine lamp.
	Approx battery voltage	Engine is rotating. (Check engine lamp not illuminated.)	
② - ②	Less than 1V	Ignition switch ON. Fuel pump is operating.	Check/repair fuel pump power supply.
	Approx battery voltage	Ignition switch ON. Fuel pump is stopped.	
① - Engine ground	Less than 0.2Ω	Ignition switch OFF	Check ground wiring.
② - ②	Less than 0.2Ω	Ignition switch OFF	Replace ECU.
② - ③	Approx battery voltage	Engine is rotating. Air conditioner compressor is rotating. (Genuine air conditioner-equipped vehicle)	Check air conditioner wiring.
③ - ③	0-Approx battery voltage	Ignition switch ON When vehicle is moved. (Measured voltage changes four times for movement of 1.5m.)	Check speed sensor.
③ - ④	4.5 - 5.5V	Ignition switch ON. Throttle valve fully closed.	Check throttle position sensor.
	Less than 0.5V	Ignition switch ON. Throttle valve fully opened.	
④ - ④	Less than 0.1V	Ignition switch ON (after more than 60 seconds)	Check oxygen sensor.
	Voltage varies within 0 - 1.0V	After engine has warmed up fully. When engine revolution is held at 3000 rpm for more than two minutes:	Check fuel system.
④ - ⑤	Less than 1Ω	Ignition switch ON	Proceed to flow chart ③.

WFE0-EF123

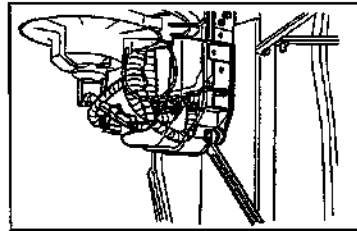
EFI SYSTEM

ECU replacement

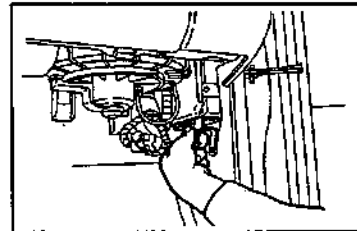
1. Disconnect the ground cable terminal from the negative (-) terminal of the battery.



2. Remove the ECU cover.



3. Disconnect the engine wire connector from the ECU.

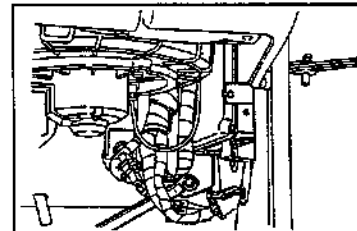


4. Remove the ECU from the cowl panel by removing the attaching screws.

5. Install a new ECU to the cowl panel.

CAUTION:

- Do not touch with the bracket screws mounted on the ECU proper. This tampering will cause an ECU malfunction.

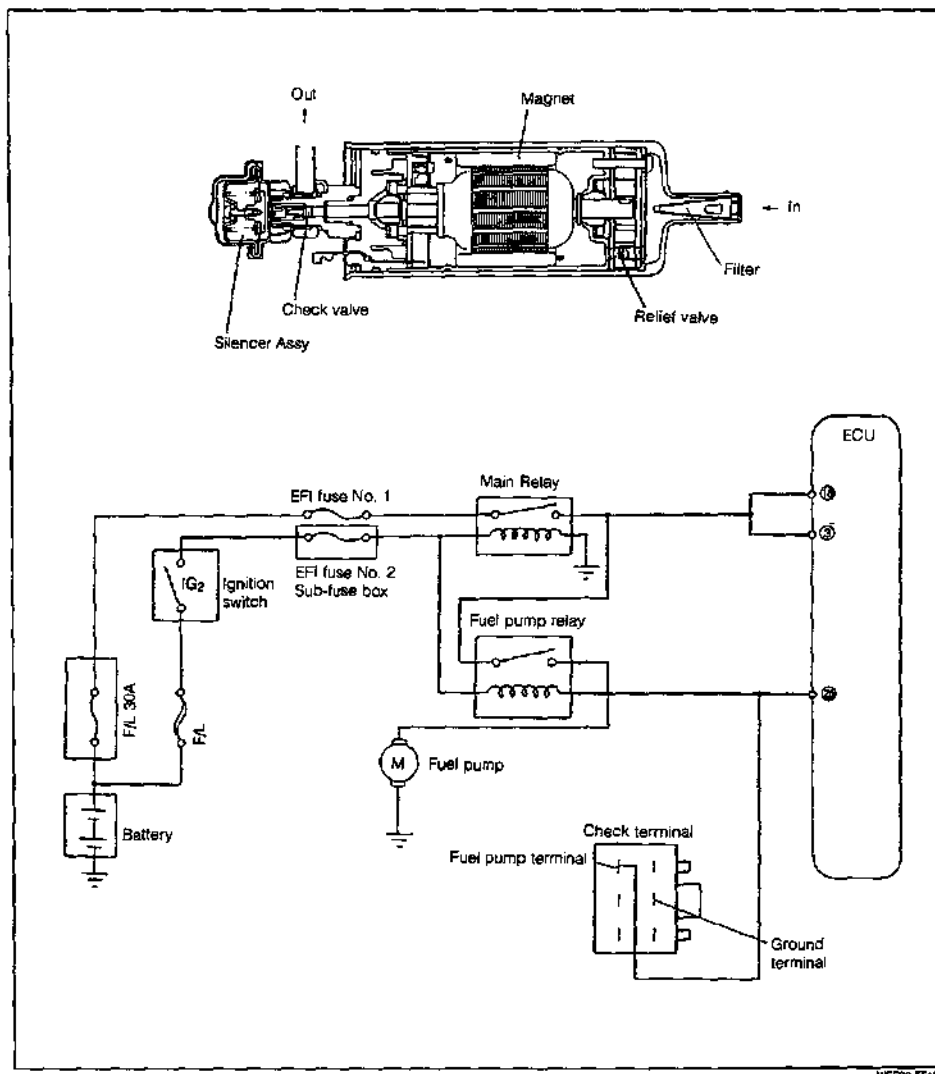


6. Connect the engine wire connector to the ECU.
7. Install the ECU cover on the cowl panel.
8. Connect the ground cable terminal to the negative (-) terminal of the battery.

WFE90-EF168

FUEL SYSTEM**FUEL PUMP****WARNING**

When working on the fuel system, never smoke nor allow any open flame to be brought near the working site.



WPBEO-EF188

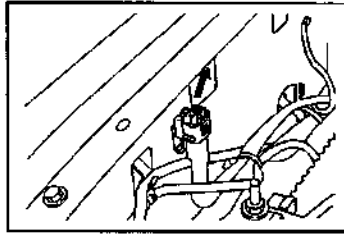
EFI SYSTEM

IN-VEHICLE INSPECTION

Check of fuel pump operation

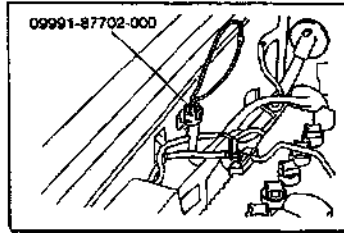
1. Connection of SST (09991-87702-000)

- (1) Detach the check connector cap.



WPB0-EF190

- (2) Connect the SST to the check connector. Connect the SST terminal F (white/black) to the ground terminal (black).



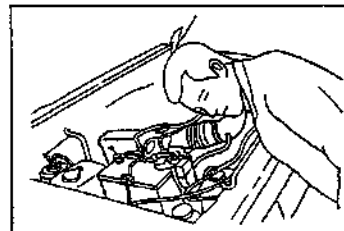
WPB0-EF191

2. Check of fuel flowing sound

- (1) Turn ON the ignition key switch.

WPB0-EF192

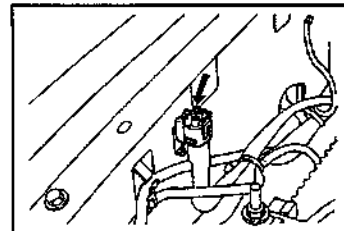
- (2) Check to see if you can hear fuel flowing sound around the pressure regulator.
- (3) If you can hear no fuel flowing sound, check the following parts. Repair them, as required.
 - Fusible links
 - Fuses
 - Main relay
 - Fuel pump
 - Wiring and wiring connections



WPB0-EF193

3. SST Removal

- (1) Turn OFF the ignition switch.
- (2) Remove the SST from the check connector.
- (3) Attach the cap on the check connector.



WPB0-EF194

Check of fuel pressure

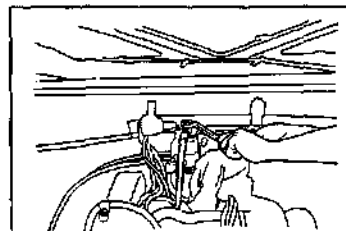
1. Ensure that the battery voltage is 12 volts or more.
2. Disconnect the ground cable terminal from the negative (-) terminal of the battery.
3. Place a suitable container or cloth, etc. under the fuel filter.

WPB90-EF195

4. Loosen the union bolt gradually.

CAUTION:

- The fuel pressure at the inside of the fuel line is approximately 250 kPa (2.55 kgf/cm²) higher than the atmospheric pressure. Hence, be sure to gradually loosen the union bolt so as to prevent fuel from splashing. Since the fuel will flow out, be certain to place a suitable container or cloth, etc. under the fuel filter so that no fuel may get to the resin or rubber parts of the vehicle.

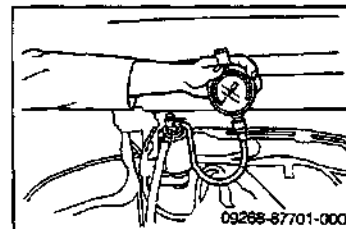


WPB90-EF196

5. Install the SST (fuel pressure gauge) between the fuel hose No. 1 and the fuel filter by means of the union bolt with a new gasket interposed.

SST: 09268-87701-000

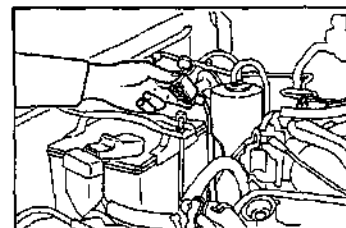
Tightening Torque: 34.3 - 44.1 N·m (3.5 - 4.5 kgf·m)



09268-87701-000

WPB90-EF197

6. Reconnect the ground cable terminal to the negative (-) terminal of the battery.

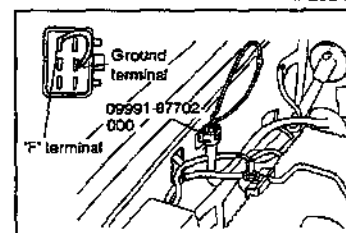


WPB90-EF198

7. Connection of SST (09991-87702-000)

- (1) Remove the cap on the check terminal.
- (2) Connect the SST to the check connector.
- (3) Connect the SST terminal fuel pump (white/black) to the ground terminal (black).

8. Turn ON the ignition switch.



09991-87702-000

WPB90-EF199

EFI SYSTEM

9. Check to see if the fuel pressure conforms to the specified pressure.

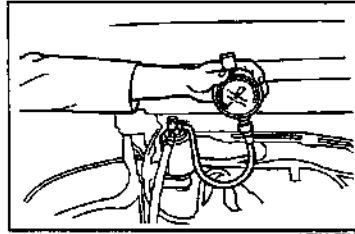
Specified Fuel Pressure:
225.6 - 274.6 kPa (2.3 - 2.8 kgf/cm²)

If the fuel pressure is higher than the specified pressure, check and/or repair the following items.

- (1) Fuel return hose and/or pipe for restriction or damage.
- (2) Rubber hose connected between pressure regulator and surge tank for restriction.
- (3) If the check results of (1) and (2) are satisfactory, replace the pressure regulator.

If the fuel pressure is lower than the specified pressure, check and/or repair the following items.

- (1) Fuel hose and/or pipe for restriction or damage or leakage.
- (2) Fuel filter for restriction.
- (3) Check fuel flow rate.
- (4) Pressure regulator.



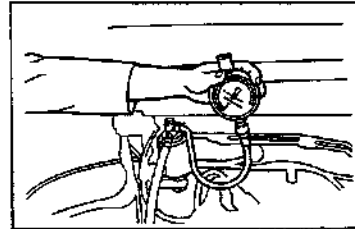
WPREO-EF200

10. Turn OFF the ignition switch. After a lapse of three minutes, check to see if the fuel pressure is the specified pressure or more.

Specified Fuel Pressure:
176.5 kPa (1.8 kgf/cm²) or more

If the fuel pressure is lower than the specified pressure, check and/or repair the following items.

- (1) Injector
- (2) Pressure regulator
- (3) Fuel hose and/or pipe for damage or leakage.



WPREO-EF200

11. SST removal

- (1) Turn OFF the ignition key switch.
- (2) Disconnect the ground cable terminal from the negative terminal (-) of the battery.
- (3) Loosen the fuel filter union bolt gradually.

CAUTION:

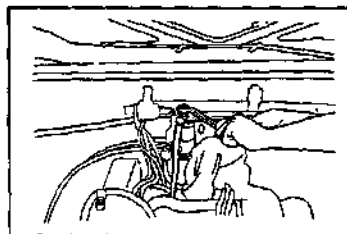
- The fuel pressure at the inside of the fuel line is approximately 255.8 kPa (2.5 atm), higher than the atmospheric pressure. Hence, be sure to gradually loosen the union bolt so as to prevent fuel from splashing. Since the fuel will flow out, be certain to place a suitable container or cloth, etc. under the fuel filter so that no fuel may get to the resin or rubber parts of the vehicle.

- (4) Remove the SST (fuel pressure gauge).

SST: 09268-87701-000

WPREO-EF202

- (5) Install the fuel hose No. 1 to the fuel filter by means of the union bolt with a new gasket interposed.
Tightening Torque: 34.3 - 44.1 N·m (3.5 - 4.5 kgf·m)



WPB90-EF203

- (6) Remove the SST from the check connector.
SST: 09991-87702-000
- (7) Attach the cap on the check connector.
- (8) Reconnect the ground cable terminal to the negative (-) terminal of the battery.



WPB90-EF204

12. Check of fuel leakage
Start the engine. Check to see if any fuel leakage is present.
Repair any defective part if the fuel leakage exists.

WPB90-EF205

Check of fuel flow rate

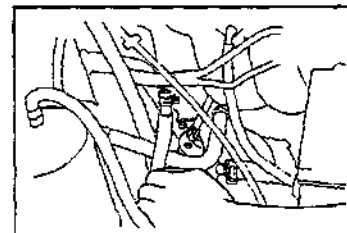
1. Ensure that the battery voltage is 12 volts or more.
2. Disconnect the ground cable terminal from the negative (-) terminal of the battery.
3. Place a suitable container or cloth, etc. under the pressure regulator.

WPB90-EF206

4. Disconnect the fuel return hose connected to the pressure regulator.

CAUTION:

- Since the fuel will flow out, be certain to place a suitable container or cloth, etc. under the pressure regulator so that no fuel may get to the alternator.
- Release the inner pressure of the fuel tank by removing the fuel filler cap in advance.



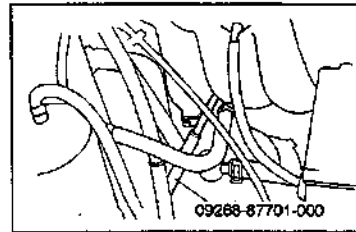
WPB90-EF207

EFI SYSTEM

5. Connect a suitable fuel hose (about 2 meter long) to the pressure regulator.

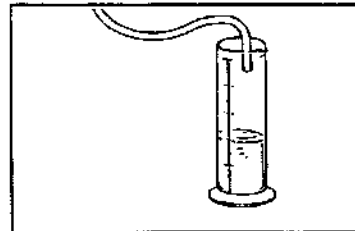
Reference:

- This fuel hose is included in the SST (09268-87702-000).

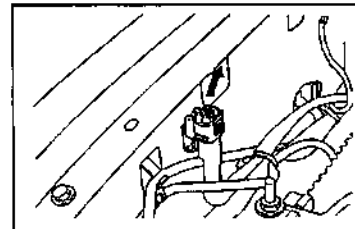


WP80-EF208

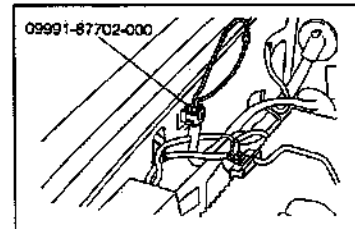
6. Insert one end of the fuel hose in a measuring cylinder.



7. Detach the check connector cap.



8. Connect the SST (09991-87702-000) to the check connector. Connect the SST terminal F (White/Black) to the ground terminal (Black).
9. Connect the ground cable terminal to the negative (-) terminal of the battery.
10. Turn ON the ignition switch for 15 seconds. Then, turn OFF the switch.



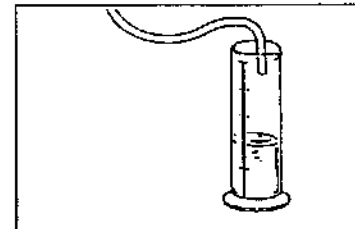
WP80-EF211

11. Measure the amount of fuel collected in the measuring cylinder.

Specified Amount of Fuel: 235 cm³ or more

If the fuel amount is less than the specified amount, check the fuel filter.

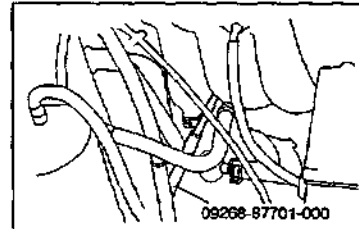
12. Disconnect the ground cable terminal from the negative (-) terminal of the battery.



13. Remove the SST (09991-87702-000) from the check connector.
14. Attach the cap on the check connector.

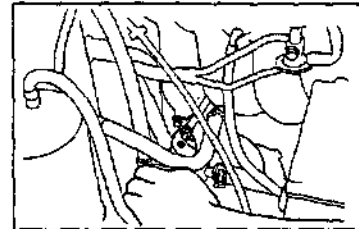
WP80-6F213

15. Disconnect the fuel hose connected to the pressure regulator.



WP80-6F214

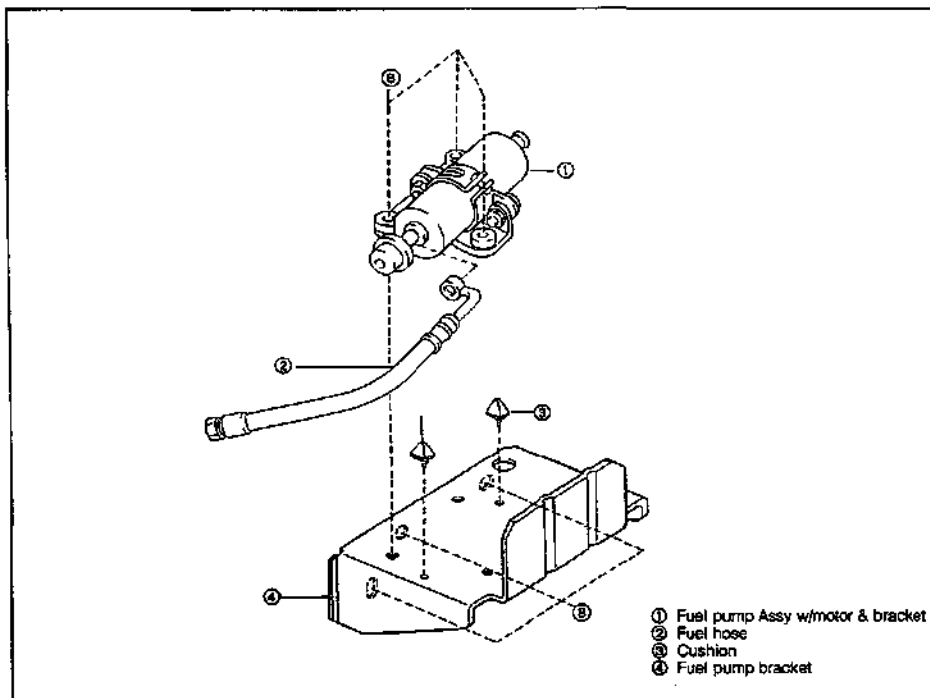
16. Connect the fuel return hose to the pressure regulator. Attach the new clips.
17. Reconnect the ground cable terminal to the negative (-) terminal of the battery.
18. Start the engine. Check to see if any fuel leakage is present. Repair any defective part if fuel leakage exists.



WP80-6F215

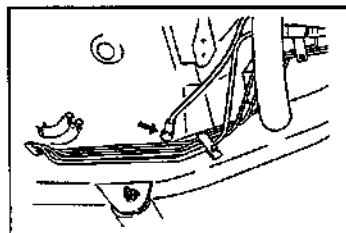
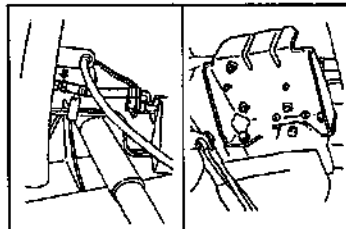
EFI SYSTEM

REMOVAL OF FUEL PUMP

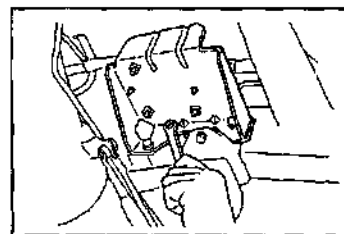


WARNING:
When working on the fuel system, never smoke nor allow any open flame to be brought near the working site.

1. Disconnect the fuel hose front side from the fuel pump.
CAUTION:
 - Since the fuel will flow out, be certain to place a suitable container or cloth, etc. under the fuel pump.
2. Disconnect the fuel pump coupler.



3. Detach the fuel pump bracket by removing the three bolts.
4. Detach the fuel pump bracket from fuel pump by removing the three bolts.
5. Remove the fuel pump by disconnecting the fuel hose rear side.



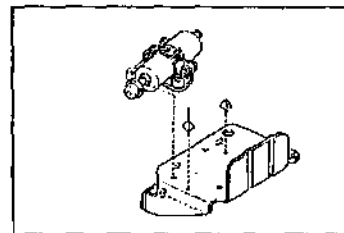
WP590-EF219

INSTALLATION OF FUEL PUMP

1. Connect the fuel hose rear side to the fuel pump.

NOTE:

- Ensure that the fuel filter is installed at the fuel pump unit port.
- Ensure that the hose clamp is securely installed

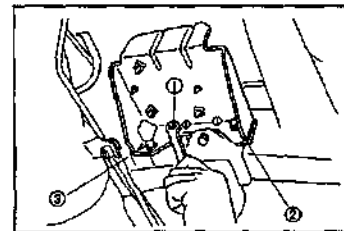


WP590-EF220

2. Install the fuel pump bracket to the fuel pump by tighten the three bolts.

NOTE:

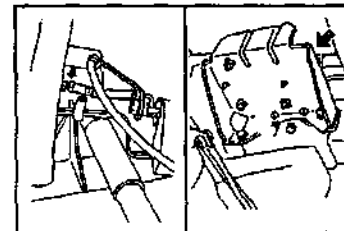
- Ensure that the two cushions are installed as correct position.



WP590-EF221

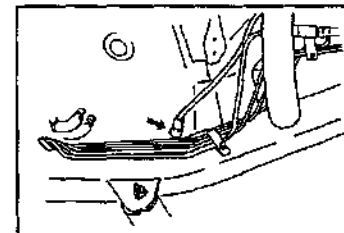
3. Installation of bracket
 - (1) Temporarily tighten bolt No. ①.
 - (2) Tighten the bolt No. ② and No. ③.
 - (3) Securely tighten the bolt No. ①.

4. Connect the fuel hose front and rear side to the fuel pump.
Tightening Torque: 34.3 - 44.1 N·m (3.5 - 4.5 kgf·m)



WP590-EF222

5. Connect the fuel pump coupler.
NOTE:
 - Ensure that the lead wire is clamped at two position.

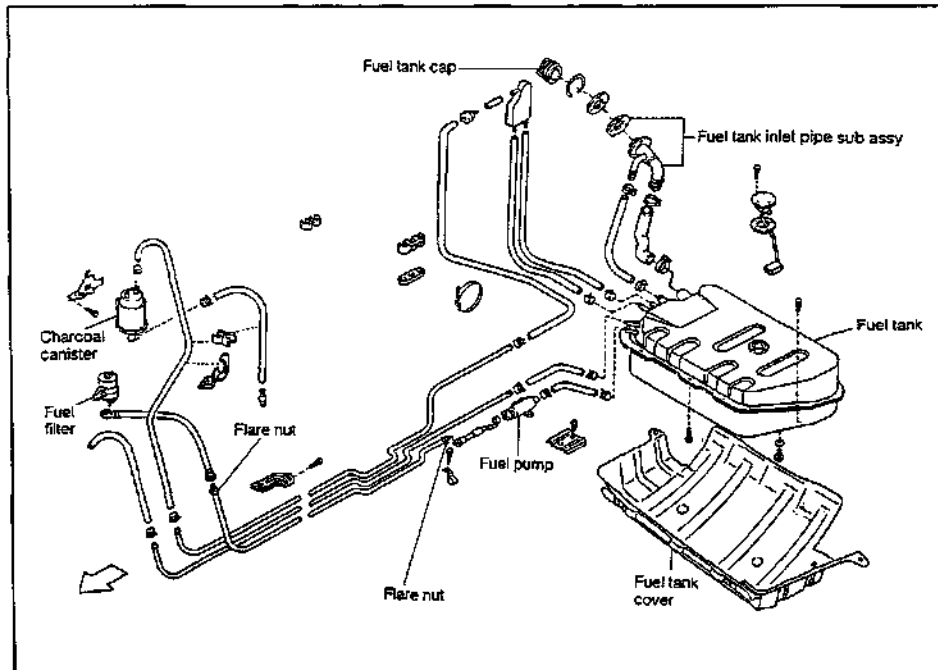


WP590-EF223

EFI SYSTEM

FUEL TANK AND LINE

COMPONENTS



WP80-EF24

PRECAUTIONS

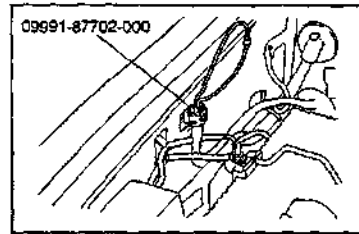
1. Always use a new gasket and hose band (clip) when replacing the fuel tank or components.
2. Each part should be tightened securely to the specified torque.

WARNING:
Always keep fire away from the working site.

WP80-EF25

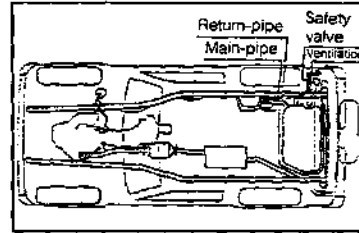
INSPECTION OF FUEL LINES AND CONNECTIONS

1. Connect the following SST to the check connector. Short the terminal F (White/Black) to the ground terminal (Black).
SST: 09991-87702-000



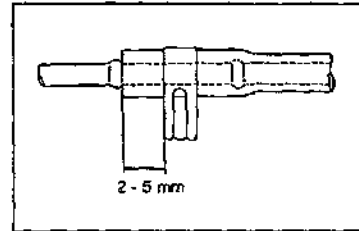
WPB0-EP226

2. Turn ON the ignition switch.
3. Check the fuel lines and connections for cracks, leakage or deformation.
If any crack, leakage or deformation is present, replace or repair the part concerned.
4. Turn OFF the ignition switch. Remove the SST from the check terminal. Attach the cap to the check terminal.
5. Check the fuel tank for deformation, cracks or fuel leakage.
If the fuel tank exhibits any defect, repair or replace the fuel tank.



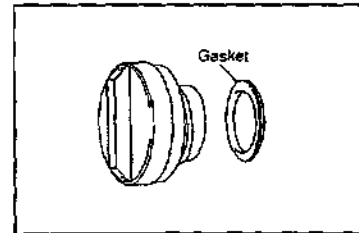
WPB0-EP227

6. Check the filler neck for damage or fuel leakage.
If the filler neck exhibits any defect, repair or replace the filler neck.
7. Check to see if the hose and tube connections are installed as shown in the right figure.
If any problem is found, repair or replace the parts, as required.



WPB0-EP228

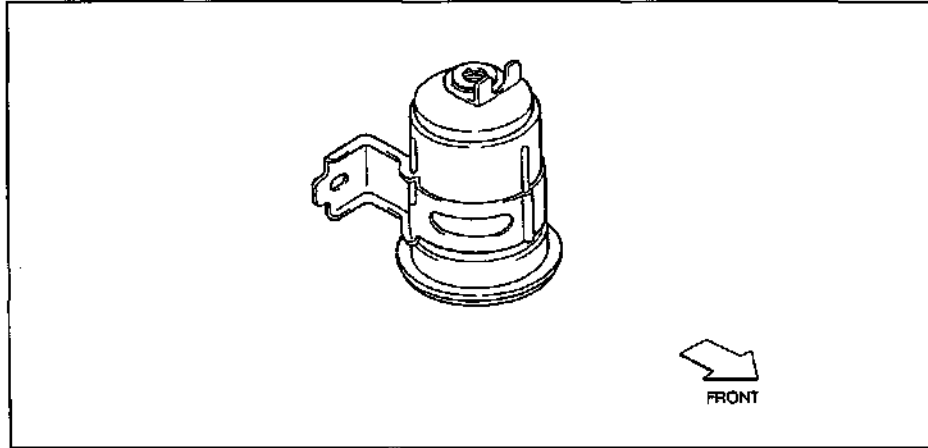
8. Check to see if the fuel tank cap and gasket exhibits damage.
Replace the gasket if it is damaged. Also, replace the fuel tank cap if it exhibits damage.



WPB0-EP229

EFI SYSTEM

FUEL FILTER ELEMENT



WFE90-6F230

CHECK OF FUEL FILTER ELEMENT

1. Disconnect the ground cable terminal from the negative (-) terminal of the battery.

WFE90-6F231

2. Disconnect the fuel return hose connected to the pressure regulator. Connect a suitable fuel hose (about 2 meter long) to the pressure regulator.

REFERENCE:

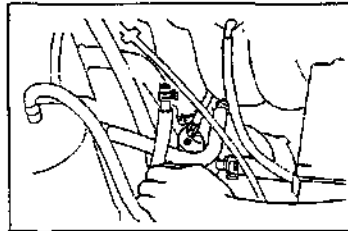
- This fuel hose is included in the SST (09268-87702-000).

NOTE:

- Before the fuel return hose is disconnected, be sure to release the inner pressure of the fuel tank by detaching the fuel filler cap.

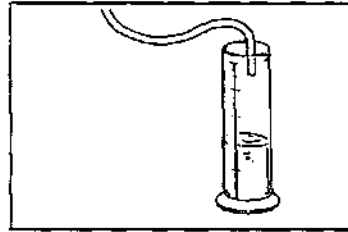
CAUTION:

- Since the fuel will flow out, be certain to place a suitable container or cloth, etc. under the pressure regulator so as to prevent fuel splashing.



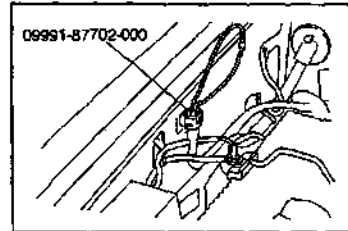
WFE90-6F232

3. Insert one end of the fuel hose in a measuring cylinder.



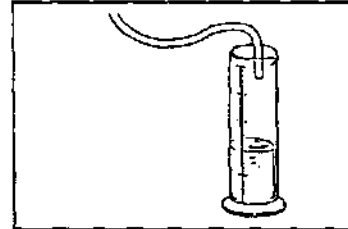
WFE90-EF223

4. Connection of SST (09991-87702-000)
 - (1) Detach the cap from the check connector.
 - (2) Connect the SST to the check connector.
 - (3) Short the SST terminal F (White/Black) to the ground terminal (Black).
5. Connect the ground cable terminal to the negative (-) terminal of the battery.
6. Turn ON the ignition switch for 15 seconds. Then, turn OFF the switch.



WFE90-EF224

7. Measure the amount of fuel collected in the measuring cylinder. Check to see if the measured amount conforms to the specification.
 Specified Amount of Fuel: 235 cm³ or more



WFE90-EF225

NOTE:

- If it becomes necessary to bleed air, be sure to conduct the measurement at least twice.

If the fuel amount conforms to the specification, perform the operation, starting from the step 18 onward.
 If the fuel amount is less than the specified amount, perform the operation, starting from the step 8 onward.

8. Disconnect the ground cable terminal from the negative (-) terminal of the battery.

WFE90-EF226

EFI SYSTEM

9. Loosen the union bolt gradually.

CAUTION:

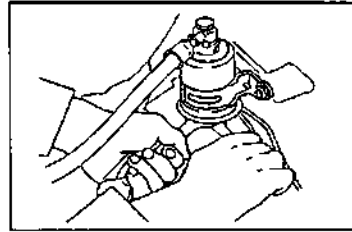
- The fuel pressure at the inside of the fuel line is approximately 250 kPa (2.55 kgf/cm²) higher than the atmospheric pressure. Hence, be sure to gradually loosen the flare nut and use a cloth, etc. so as to prevent fuel from splashing.

Since the fuel will flow out, be certain to place a suitable container or cloth, etc. under the fuel filter so that no fuel may get to the resin or rubber parts or electrical parts of the vehicle.

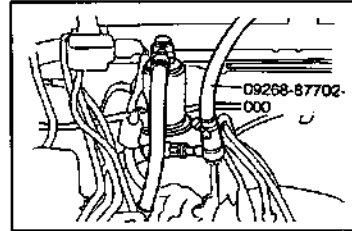
10. Connect a suitable fuel hose (about 2 meter long) to the fuel pipe.

REFERENCE:

- This fuel hose is included in the SST (09268-87702-000).

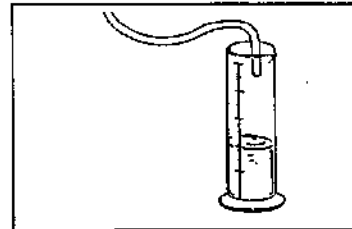


WFE90-EF237



WFE90-EF238

11. Insert one end of the fuel hose in a measuring cylinder.



12. Reconnect the ground cable terminal to the negative (-) terminal of the battery.
13. Turn ON the ignition switch for 15 seconds. Then, turn OFF the switch.

WFE90-EF239

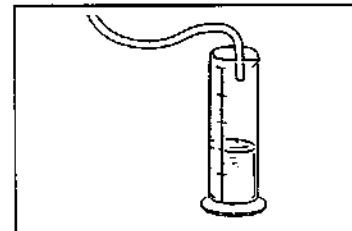
14. Measure the amount of fuel collected in the measuring cylinder.

Specified Amount of Fuel: 235 cm³ or more

If the fuel amount conforms to the specification, replace the fuel filter.

If the fuel amount is less than the specified amount, check the fuel pump filter for restriction. Then, replace the fuel pump as required.

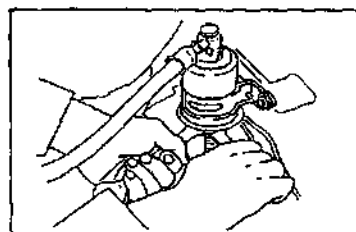
15. Disconnect the ground cable terminal from the negative (-) terminal of the battery.



WFE90-EF240

16. Install the fuel hose to fuel filter by means of the union bolt with a new gasket interposed.

Tightening Torque: 34.3 - 44.1 N·m (3.5 - 4.5 kgf·m)



WP241-EF241

17. Disconnect the fuel hose connected to the pressure regulator.

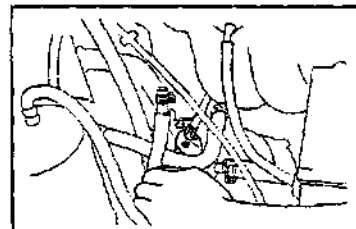
18. Connection of fuel hose to fuel pipe No. 2.

(1) Insert the fuel return hose to the fuel pipe No. 2 until second spool of fuel pipe.

(2) Securely clamp the fuel hose at 2 - 5 mm from fuel return hose end with new clip.

NOTE:

- Install the fuel return hose in parallel with chassis frame.



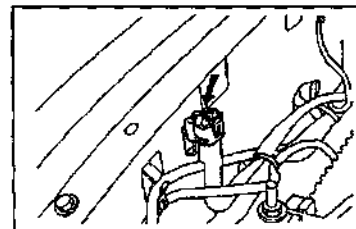
WP242-EF242

19. Remove the SST from the check connector.

20. Attach the cap on the check connector.

21. Reconnect the ground cable terminal to the negative (-) terminal of the battery.

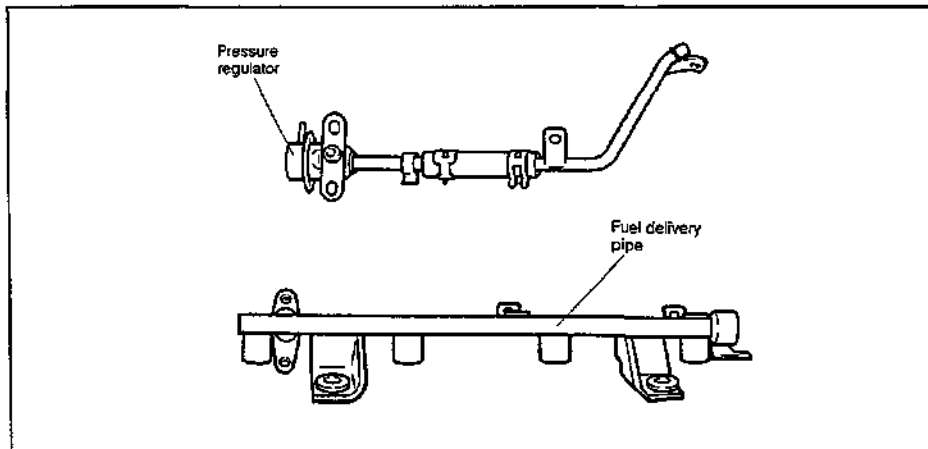
22. Start the engine. Check to see if any fuel leakage is present. Repair any defective part if fuel leakage exists.



WP243-EF243

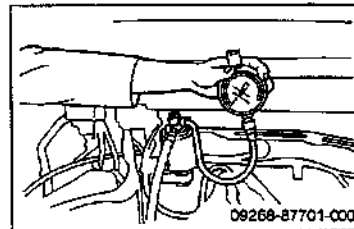
EFI SYSTEM

PRESSURE REGULATOR



IN-VEHICLE INSPECTION

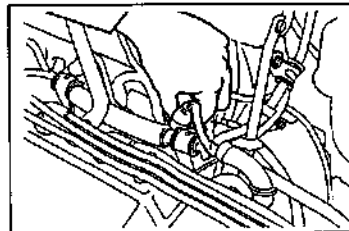
Check the fuel pressure.



REMOVAL OF PRESSURE REGULATOR

1. Disconnect the ground cable terminal from the negative (-) terminal of the battery.
2. Remove the air chamber assembly (See page EM-17.)

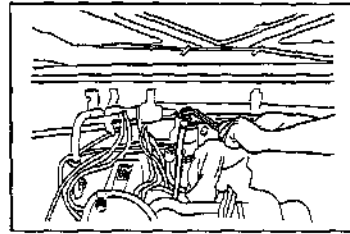
3. Disconnect the injector connector from each injector.



4. Disconnect the fuel hose No. 1 at the delivery pipe side.

CAUTION:

- The fuel pressure at the inside of the fuel line is approximately 250 kPa (2.55 kg/cm²) higher than the atmospheric pressure. Hence, be sure to gradually loosen the union bolt so as to prevent fuel from splashing. Since the fuel will flow out, be certain to place a suitable container or cloth, etc. under the fuel filter so that no fuel may get to the resin or rubber parts of the vehicle.

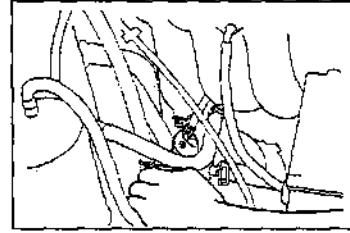


WFE90-EF246

5. Disconnect the fuel return hose from the pressure regulator.

CAUTION:

- Since the fuel will flow out, be certain to place a suitable container or cloth, etc. under the connection so as to prevent fuel from splashing.

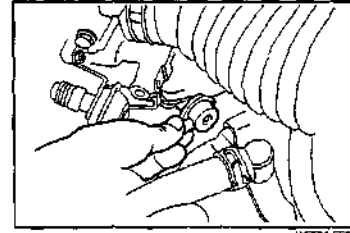


WFE90-EF249

NOTE:

- Before the fuel return hose is disconnected, be sure to release the inner pressure of the fuel tank by detaching the fuel filler cap.

6. Disconnect the vacuum hose from the vacuum pipe.

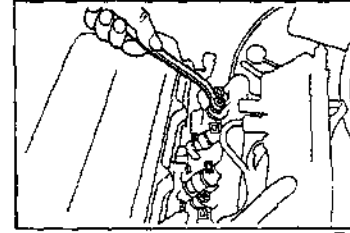


WFE90-EF250

7. Remove the delivery pipe by removing the delivery pipe attaching nuts.

CAUTION:

- Be certain to place a suitable cloth, etc. under the delivery pipe so that no fuel gets to the the electrical equipment, such as the alternator and starter, wiring and rubber and plastic parts.
- Be very careful not to drop the injectors.



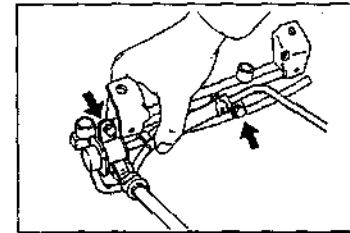
WFE90-EF251

NOTE:

- Leave the injector at the intake manifold side.

8. Disconnect the vacuum hose from the pressure regulator.

9. Remove the pressure regulator from the delivery pipe.



WFE90-EF252

EFI SYSTEM

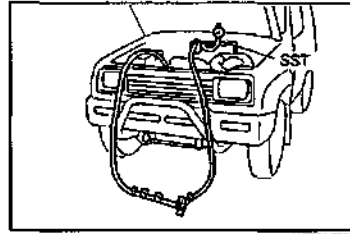
Inspection of Pressure Regulator

1. Using the following SSTs, connect the pressure regulator, as indicated in the figure.

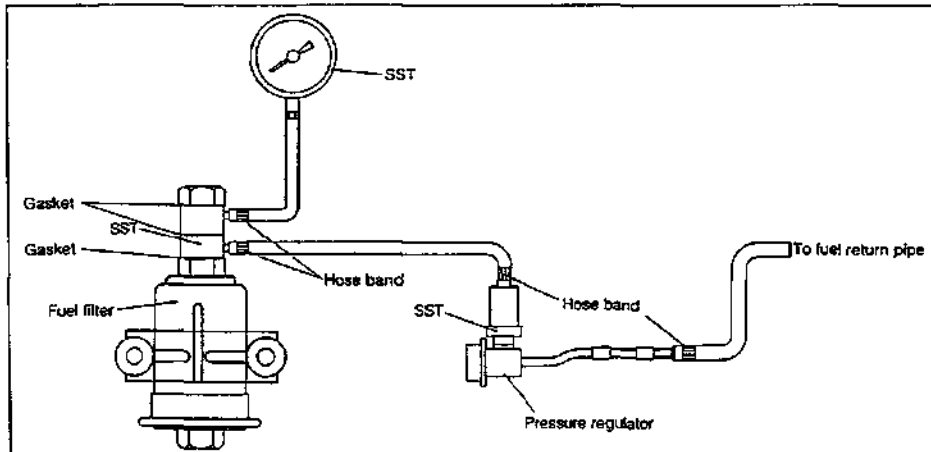
SSTs: 09268-87701-000
09268-87702-000
09283-87703-000

NOTE:

- When connecting the pressure regulator, install a new gasket to the union bolt connection and a new "O" ring to the "O" ring seal section. Also, attach hose bands to the hose connections.

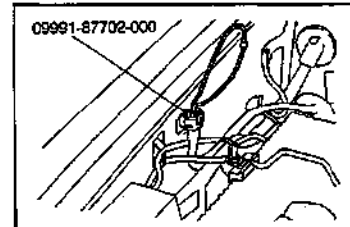


WFES0-27253



WFES0-27254

2. Connect the ground cable terminal to the negative (-) terminal of the battery.
3. Connection of SST (09991-87702-000)
 - (1) Detach the cap from the check connector.
 - (2) Connect the SST to the check connector.
 - (3) Connect the fuel pump terminal (White/Black) with the ground terminal (Black).
4. Turn ON the ignition switch.



WFES0-27255

5. Check to see if the fuel pressure conforms to the specification.

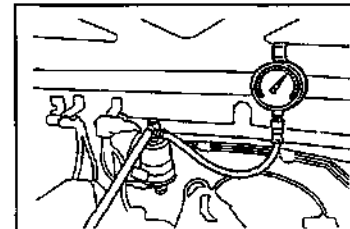
Specified Fuel Pressure:

225.6 - 274.6 kPa (2.3 - 2.8 kgf/cm²)

If the fuel pressure fails to conform to the specification, replace the pressure regulator.

NOTE:

- At this stage, ensure that the fuel pump complies with the fuel flow rate requirements.

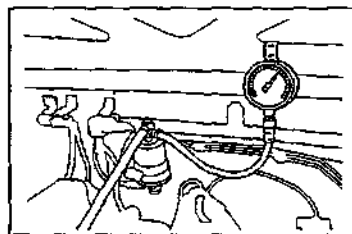


WFES0-27256

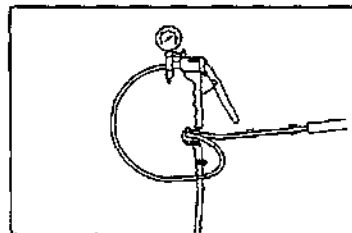
6. Turn OFF the ignition switch. After a lapse of three minutes, check to see if the fuel pressure is the specified pressure or more.

Specified Fuel Pressure:
176.5 kPa (1.8 kgf/cm²) or more

If the fuel pressure fails to conform to the specification, again perform the operations described in the step 17 afterward.



7. Connect a suitable hose to the vacuum hose pipe of the pressure regulator. Connect a MityVac to the other end of the hose.

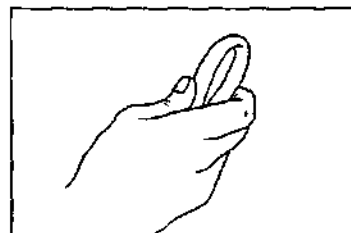


8. Turn ON the ignition switch.
9. While observing the fuel pressure, apply a negative pressure, using the MityVac. At this time, ensure that the fuel pressure drops corresponding to the applied negative pressure. Replace the pressure regulator if the fuel pressure will not decrease.

10. Turn OFF the ignition switch.
11. Remove the MityVac and hose from the pressure regulator.
12. Disconnect the ground cable terminal to the negative (-) terminal of the battery.
13. Remove the SSTs from the respective parts.
14. Install the cap to the check connector. Proceed to assembly of the pressure regulator.

WFE20-EP259

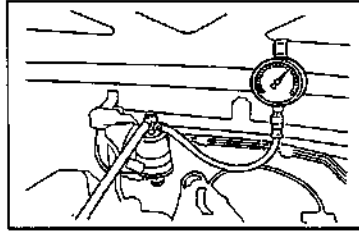
15. Turn OFF the ignition switch after turning ON the ignition switch temporarily.
16. Immediately after the operation described in the step 15, stop the flowing of the fuel by bending the fuel hose between the fuel filter and the pressure regulator. Read the fuel pressure under this condition.



WFE20-EP260

EFI SYSTEM

17. After holding the fuel hose in a bent state for 3 minutes, check that the pressure has dropped compared with that measured in the step 6.
Replace the fuel pump if the pressure has dropped.
Replace the pressure regulator if the pressure will not drop.

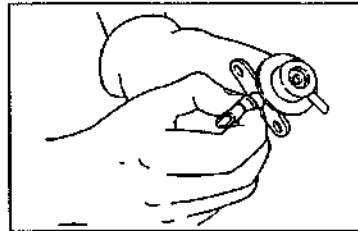


18. Disconnect the ground cable terminal from the negative (-) terminal of the battery.
19. Remove the SSTs from the respective parts.
20. Install the cap to the check connector.

WFE90-EF251

ASSEMBLY OF PRESSURE REGULATOR

1. Replace the pressure regulator "O" ring with a new part.



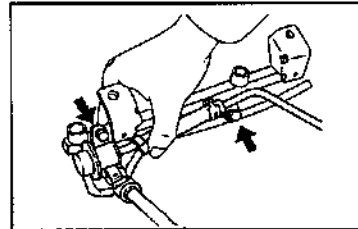
WFE90-EF262

2. Apply silicon oil to the "O" ring of the pressure regulator. Install the "O" ring to the delivery pipe and tighten the attaching bolts.

Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)

CAUTION:

- Be very careful not to damage the "O" ring. Failure to observe this caution may cause fuel leakage.

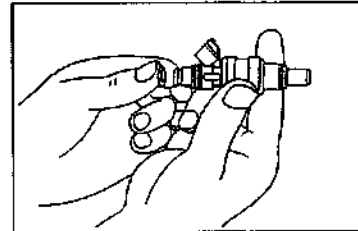


WFE90-EF263

3. Replace the injector "O" ring with a new part.

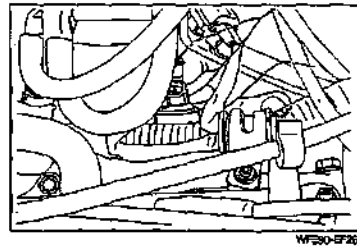
NOTE:

- Visually inspect the grommets and insulators of the injectors for any evidence of damage. Replace any defective parts if they exhibit damage before replacing the "O" ring.
- Be very careful to avoid damaging the "O" ring.



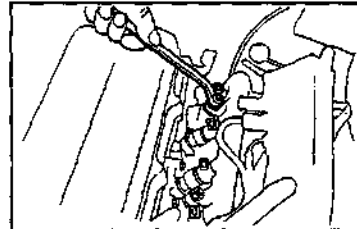
WFE90-EF264

4. Install the injector to the intake manifold.



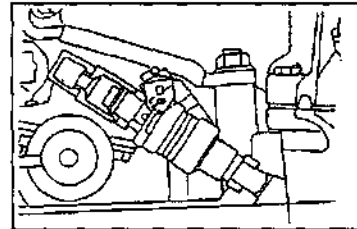
5. Apply silicon oil to the "O" ring of the injector. Install the delivery pipe.

Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)



NOTE:

- Be very careful not to damage the injector "O" ring during the installation.
- When connecting the delivery pipe and injector, make sure that they are installed straight, not in a tilted state.



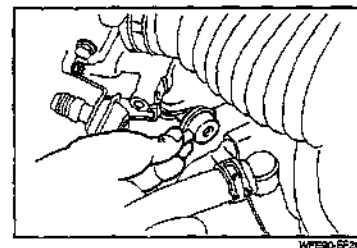
6. Ensure that the injector can rotate by your hand. If the injector can not be rotated smoothly, most likely the injector is installed in a tilted state. It is, therefore, necessary to reassemble the injector using a new injector "O" rings.

CAUTION:

- Never push the injector toward the insulator side or the grommet side. Failure to observe this caution will cause fuel leakage.

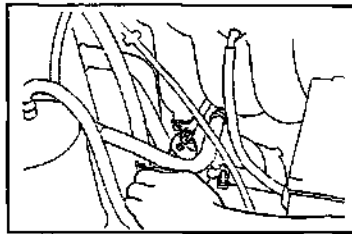


7. Connect the rubber hose to the vacuum pipe.



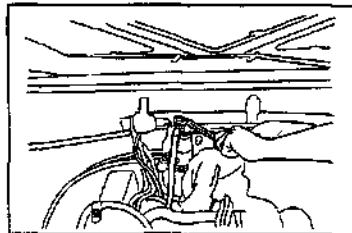
EFI SYSTEM

8. Connect the fuel return hose to the pressure regulator.
Attach new hose clamps.



9. Install the fuel hose No.1 to the delivery pipe with a new gasket interposed.

Tightening Torque: 34.3 - 44.1 N·m (3.5 - 4.5 kgf·m)



10. Connect the injector wiring connectors to the injector.
11. Connect the ground cable terminal to the negative (-) terminal of the battery.
12. Turn ON and OFF the ignition switch at intervals of 2 or 3 seconds, until air is expelled from the pressure regulator section.

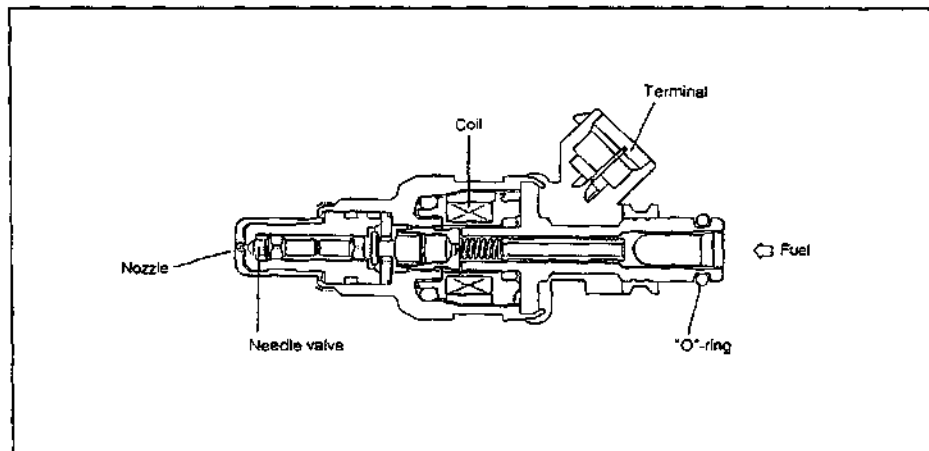
NOTE:

- If air remains inside the piping, you will hear a different sound from the fuel flowing sound.
- Usually the air bleeding can be performed by repeating turning ON/OFF the ignition switch four or five times.

13. Ensure that no fuel leakage exists.
Repair the leaky point if fuel leakage is present.
14. Start the engine. Again, check for fuel leakage.
Repair the leaky point if fuel leakage is present.
15. Install the air chamber assembly (See page EM-22.)

WFE90-07272

INJECTORS



IN-VEHICLE INSPECTION

1. Remove the air chamber assembly. (See page EM-17.)
2. Check of injector operation
 - (1) Using a sound scope, check to see if each injector emits an operating sound when the engine is being started or cranked.
 - (2) If a sound scope is not available, apply a screwdriver or the like to the injector and check to see if you can feel an operating vibration.

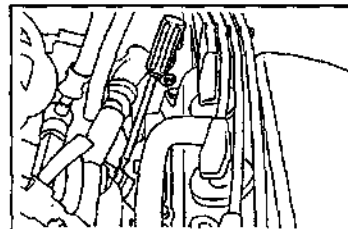
If the injector emits no operating sound or emits an abnormal sound, check the wiring, wiring connector or injector.

3. Measurement of resistance of injector
 - (1) Disconnect the injector connector of the engine wire.

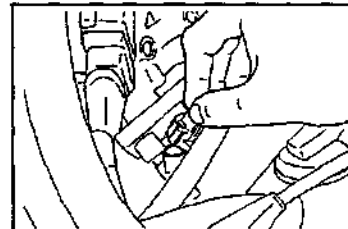
- (2) Measure the resistance between the terminals of each injector.
Specified Resistance: 11 - 17Ω

If the resistance between the terminals is not within the specification, replace the injector.

- (3) Connect the injector connector of the engine wire to the injector.



WFES0-EF274



WFES0-EF275



WFES0-EF276

EFI SYSTEM

REMOVAL OF INJECTOR

1. Remove the pressure regulator.
2. Remove the injector.

NOTE:

- Do not remove the injector cover.

WFEN0-EP277

INSPECTION OF INJECTOR

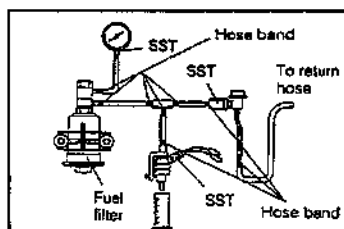
1. Using the following SSTs, connect the injector, as indicated in the figure. Insert the injector in the measuring cylinder.

SST: (1) 09268-87701-000
(2) 09283-87703-000
(3) 09268-87702-000
(4) 09842-30070-000

WFEN0-EP278

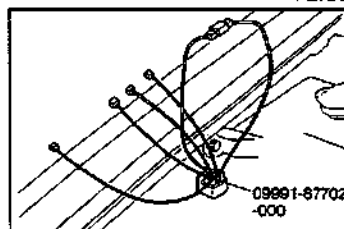
NOTE:

- Install a new gasket to the union bolt connection.
- Install a new "O" ring to the "O" ring seal section.
- Attach the hose bands to the rubber hose connections.
- Attach a suitable vinyl hose to the tip-end of the injector so as to prevent fuel from splashing.
- Remove the injector grommet. Check to see if the injector grommet exhibits any damage.



WFEN0-EP279

2. Remove the check connector cap.
3. Connect the SST to the check connector.
SST: 09991-87702-000
4. Connect the terminal F (white/black) of the check connector to the ground terminal (black).



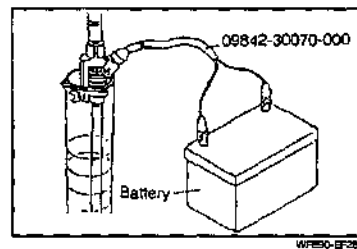
WFEN0-EP280

5. Connect the ground cable terminal to the negative (-) terminal of the battery.
6. Turn ON the ignition switch.

WFEN0-EP281

EFI SYSTEM

7. Perform energizing for 15 seconds by means of the SST (09842-30070-000).
8. Measure the amount of fuel collected in the measuring cylinder.
specified pressure.
Specified Amount of Fuel: Approx. $45 \pm 5 \text{ cm}^3$
Variation between Each Injector: 5 cm^3 or less



WPB90-EF282

NOTE:

- Conduct the measurement two or three times for each injector.
- Before the injector is pulled out, make certain to turn OFF the ignition key.
- When removing the injector, use a suitable cloth or the like so as to prevent fuel from splashing.
- Prior to the test, perform air bleeding for the fuel hose.

If the amount of fuel fails to conform to the specification, replace the injector.

9. Leakage check
With the SST (09842-30070-000) in not energized state, turn ON the ignition key switch. Check any fuel leakage from the injector nozzle.

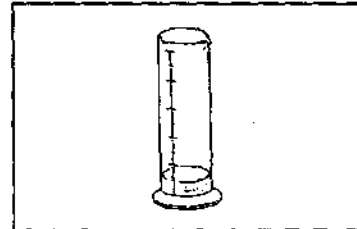
Fuel Leakage:

Less Than One Drop of Fuel per Minute

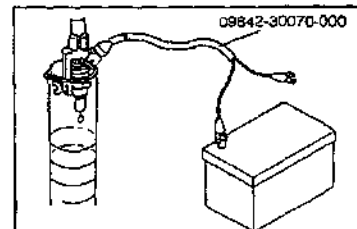
If the leakage exceeds the specified value, replace the injector.

NOTE:

- Prior to the test, remove the vinyl hose that was attached on the injector.



WPB90-EF283



WPB90-EF284

10. Turn OFF the ignition key.
11. Disconnect the ground cable terminal from the negative (-) terminal of the battery.
12. Disconnect the SST.

NOTE:

- Care must be exercised as to fuel splashing and fuel flowing.

WPB90-EF285

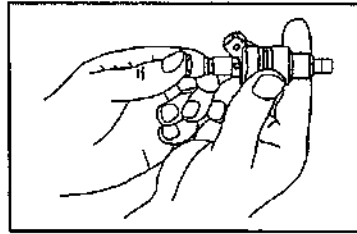
INSTALLATION OF INJECTOR

1. Check the insulator and grommet of each injector for damage.
Replace the insulator and/or grommet if damage exists.
2. Install the insulator on the manifold section.

WPB90-EF286

EFI SYSTEM

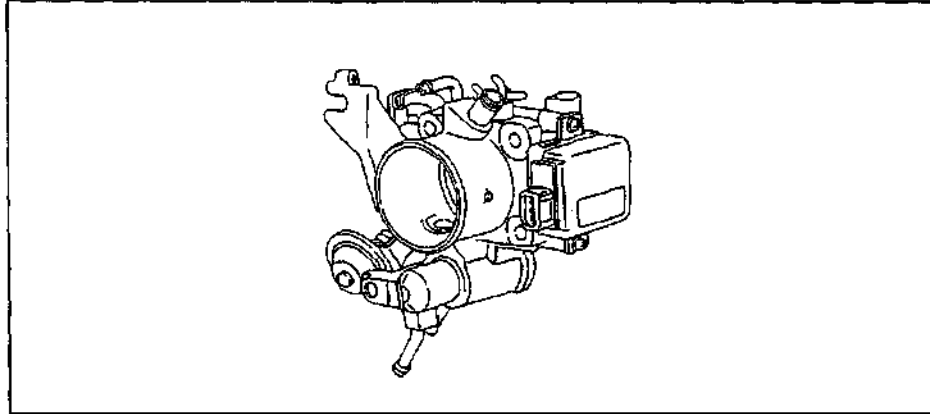
3. Install the grommet on the injection.
4. Replace the injector "O" ring with a new part.
NOTE:
 - Be very careful to avoid damaging the "O" ring.
5. Insert the injector into the insulator.
6. Install the delivery pipe.
7. Install the air chamber assembly (See page EM-22.)



WFE0-EP287

AIR INDUCTION SYSTEM

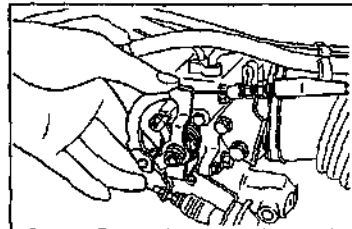
THROTTLE BODY



IN-VEHICLE INSPECTION

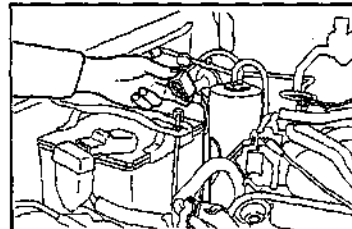
Check of throttle body

1. Ensure that the throttle linkage operates smoothly.
Replace the throttle body if the throttle lever fails to operate smoothly.
2. Check the throttle positioner sensor.
3. Check the throttle positioner.

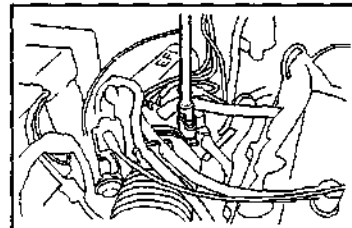


Removal of throttle body

1. Disconnect the ground cable terminal from the negative (-) terminal of the battery.
2. Drain the coolant. (See page CO-12.)
3. Disconnect the hose for air conditioner and power steering idle-up from the air chamber.

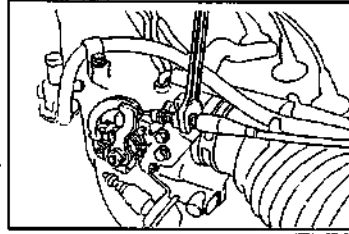


4. Disconnect the air cleaner hose from the throttle body.



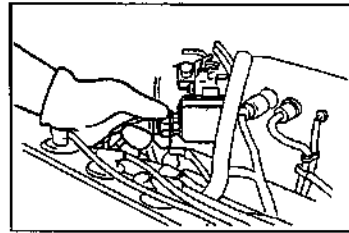
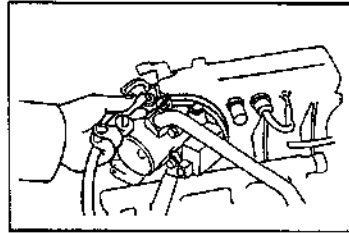
EFI SYSTEM

5. Disconnect the accelerator cable.



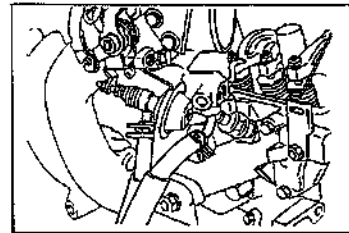
6. Disconnect the vacuum hoses from the throttle body.
NOTE:

- Prior to the disconnection, put a tag on each vacuum hose so that the original installation position may be known readily during the installation.

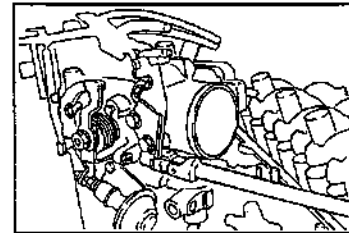


7. Disconnect the water hoses from the throttle body.
NOTE:

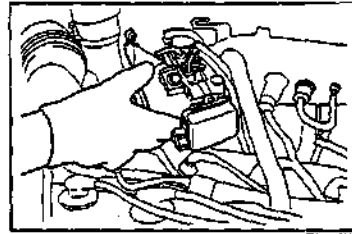
- Using a suitable cloth, take a precautionary measure so that no water gets to the electrical equipment of the vehicle.
- Be sure to plug the disconnected water hoses by suitable plug to prevent the water from flowing out.



8. Removal of throttle body
(1) Remove the attaching bolts and nuts of the surge tank stay No. 1.



- (2) Remove the attaching bolts and nuts of the throttle body.
- (3) Remove the throttle body.



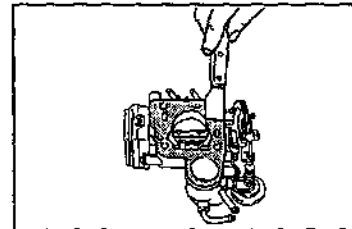
WP230-EF229

Inspection of throttle body

1. Cleaning of throttle body prior to inspection
 - (1) Clean the cast part with a soft brush, a wet cloth or the like.

WP230-EF228

- (2) Remove the gasket material from the surge tank attaching surface of the throttle body.



WP230-EF228

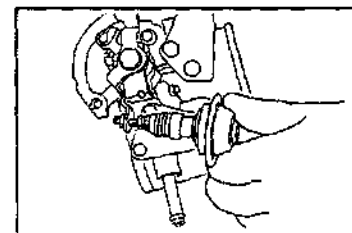
- (3) Clean all passages by blowing compressed air.

WARNING
Be sure to protect your eyes, wearing goggles.



WP230-EF300

2. Check of throttle valve
 - (1) Check that the throttle lever is in full contact with the dashpot.
 - (2) When the throttle lever is opened, check to see if the dashpot lever comes out.



WP230-EF301

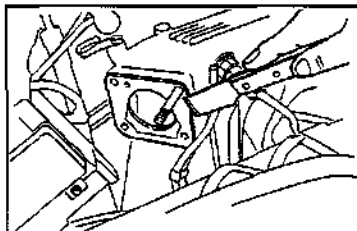
EFI SYSTEM

- (3) Check the throttle position sensor.
Replace the throttle body if it exhibits any defect.

WPB0-EP302

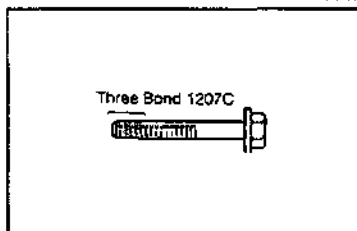
Installation of throttle body

1. Remove any gasket material from the throttle body attaching surface of the surge tank.



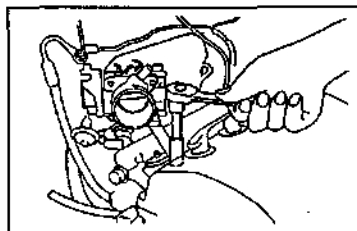
WPB0-EP303

2. Install the throttle body on the surge tank with a new gasket interposed. Attach the surge tank stay No. 1.
3. Apply a seal bond (Three Bond 1207C) to the threaded portions of the throttle body tightening bolts.



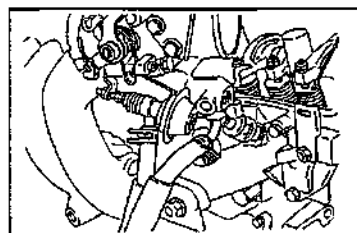
WPB0-EP304

4. Tighten the attaching bolts and nuts of the throttle body and surge tank stay No. 1.
Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)



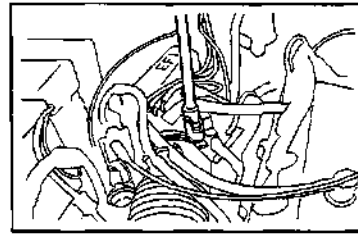
WPB0-EP305

5. Connect the water hoses to the throttle body. Attach the hose clips.

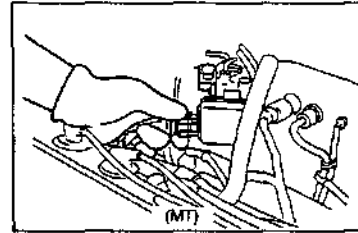


WPB0-EP306

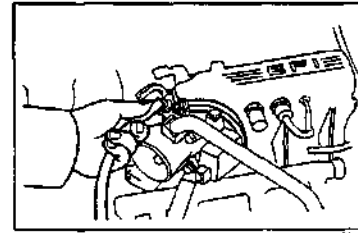
6. Connect the air cleaner hose to the throttle body.



7. Connect the throttle position sensor connector.



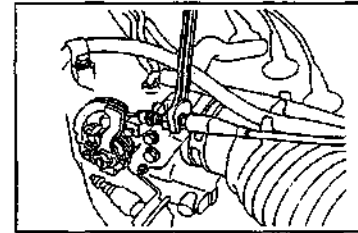
8. Connect the vacuum hoses to the throttle body.



9. Connect the air chamber hose to the throttle body and air chamber.

NOTE:

- Be sure to align the mating marks between the throttle body and air chamber hose, and the air chamber hose and the air chamber.
- Be sure to clamp the air chamber hose bands.

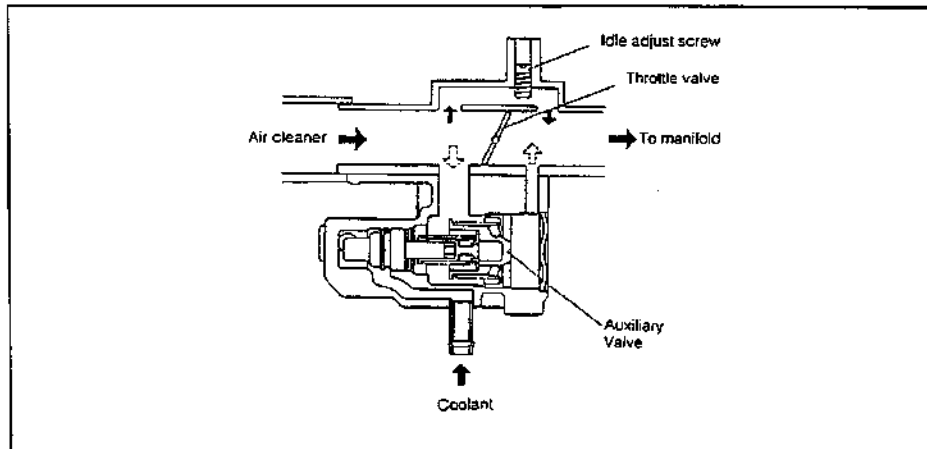


10. Fill coolant.
 11. Connect the ground cable terminal to the negative (-) terminal of the battery.
 12. Start the engine. Recheck the engine for water leakage. Repair the leaky point if water leakage exists.

WFE90-EP311

EFI SYSTEM

AUXILIARY AIR VALVE

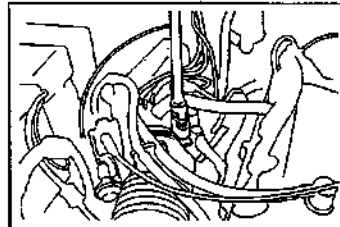


WF200-EP312

IN-VEHICLE INSPECTION

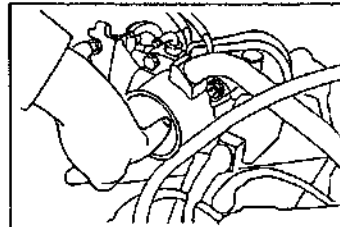
Check operation

1. Disconnect the air chamber hose from the throttle body.



WF200-EP313

2. Start the engine. Check that there is air continuity at the auxiliary air valve port under the following conditions. Perform the check, following the procedures given below.
When the cooling water temperature is below 40°C, apply your finger to the auxiliary air valve port. Ensure that the engine speed drops.
When the cooling water temperature is above 70°C, apply your finger to the auxiliary air valve port. Ensure that the engine speed does not change.
If the auxiliary air valve exhibits any malfunction, replace the throttle body.



WF200-EP314

Removal of auxiliary air valve

Remove the throttle body.

(See page EF-101.)

WF200-EP315

Installation of auxiliary air valve

Installation of throttle body

(See page EF-104.)

WF200-EP316

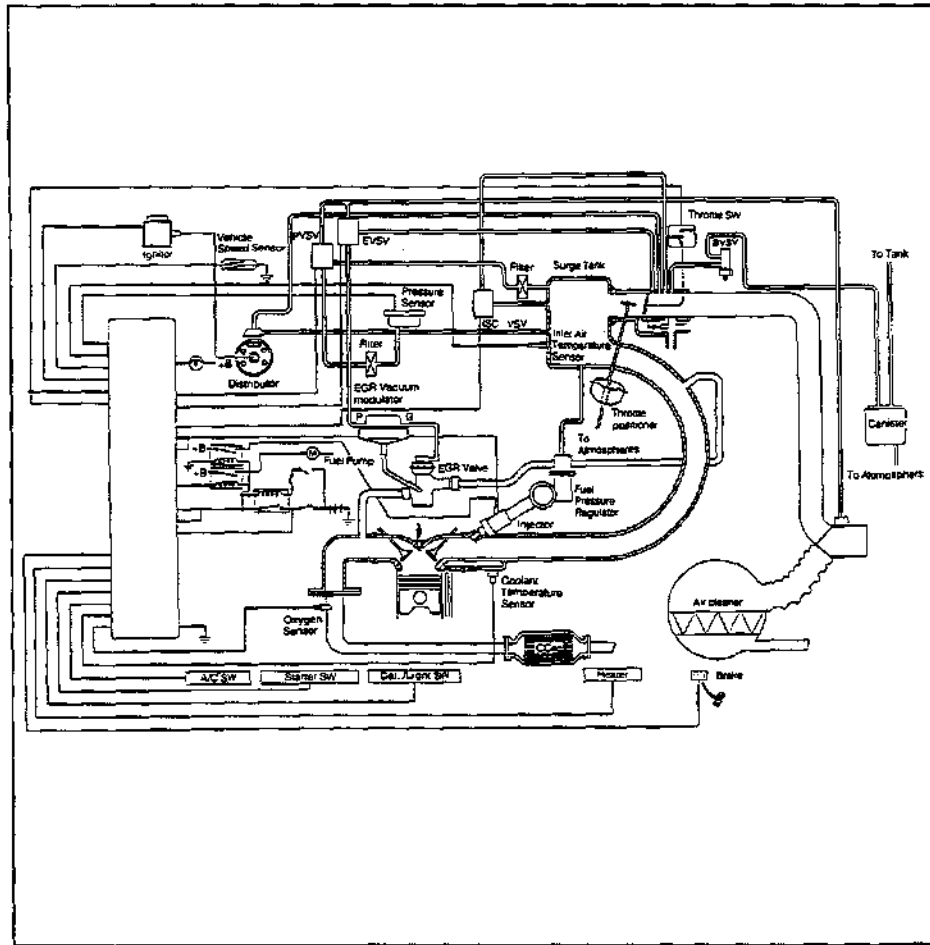
INTRODUCTION (US. Specification)

The EFI system consists of the following three systems; fuel system, intake system and control system. The electronic control unit (ECU) incorporating a microcomputer controls the EFI system, based on signals inputted from the various sensors.

Besides this function, the ECU controls various functions such as the fuel pump control, idle speed VSV control (ISC), exhaust gas recirculating (EGR) VSV control, barometric VSV (PVSV) control, self diagnosis function and fail-safe function.

WJ180-ER17

SYSTEMATIC DIAGRAM



WJ180-ER18

EFI SYSTEM

FUEL SYSTEM

The fuel system is a system which supplies the injectors with fuel necessary for combustion. This system is composed of the fuel pump, fuel pipes, fuel filter, pressure regulator, fuel delivery pipe and injectors.

Fuel sucked up from the fuel tank by means of the fuel pump is sent under a pressurized condition to the fuel delivery pipe through the fuel filter. The pressure regulator mounted at the delivery pipe keeps the fuel pressure at a value about 250 kPa (2.55 kgf/cm²) higher than the intake manifold inner pressure. Such difference between the intake manifold inner pressure and the fuel line inner pressure prevents any variation in the fuel injection rate of each injector.

Any excess fuel returns to the fuel tank through the pressure regulator. This makes it possible for the fuel at a comparatively low temperature in the fuel tank to be supplied into the fuel line, thus preventing percolation. The fuel pump is driven by the ECU.

WFE00-EP319

INTAKE SYSTEM

The intake system is a system which supplies air necessary for combustion with each cylinder.

Air sucked from the cool air intake of a comparatively low temperature is sucked into the surge tank through the air cleaner and air chamber, depending upon the opening degree of the throttle valve.

Then, the air goes through the intake manifold into each cylinder.

WFE00-EP320

CONTROL SYSTEM

The control system is a system which controls the fuel amount, using the ECU, by detecting the engine conditions and vehicle running conditions, based on signals inputted from the various sensors to the ECU.

Fuel pump control (FC)

This system controls the fuel pump operation. This system drives the fuel pump for two seconds when the ignition key switch is turned ON and/or the ignition signal is inputted. It also drives the fuel pump when the starter switch is turned ON.

Idle speed control (ISC)

For stabilized idle speed, this system regulates the air flow rate to the engine in such a way that the idle speed may become the target idle speed that has been memorized in the ECU in advance.

Exhaust gas recirculation (EGR) VSV control

When the cooling water temperature exceeds the specified level, this system makes the EGR in an operable condition by turning ON the EGR VSV.

Barometric VSV (PVSV) control

This system controls the PVSV whereby the pressure being applied to the pressure sensor is switched temporarily from the intake manifold inner pressure to the atmospheric pressure.

WFE00-EP321

SELF DIAGNOSIS FUNCTION

If signals inputted from main sensor systems to the ECU do not conform to the specified values memorized in the ECU, this malfunction is memorized.

(There are some items which are not memorized.)

Since the memorized malfunction code is retained by the back-up power supply from the battery, the code remains memorized when the ignition key switch is turned OFF.

The memorized malfunction code can be reset by cutting off the power supply to the ECU.

When any malfunction concerned with the important items occurs, the check engine lamp provided inside the combination meter is turned ON, thereby warning the driver of such malfunction. The check engine lamp remains illuminated as long as the malfunction concerned with the important item persists. However, if the encountered malfunction takes place temporarily and the normal state is restored, the check engine lamp goes out. In this case, however, the malfunction that has once occurred is memorized to the ECU, using the pertinent code number.

There are thirteen malfunction codes including the item showing the normal state.

To indicate the malfunction code during the inspection, short the test terminal of the check connector located at the fender panel right side of the engine compartment with the ground terminal. The check engine lamp inside the combination meter flashes as many times as the number of the corresponding malfunction code. With the aid of the diagnosis code, the checking operator can perform trouble shooting efficiently.

WFE50B7622

FAIL-SAFE FUNCTION

In the event that any abnormality takes place in the signals inputted from the important sensors to the ECU and the control can no longer be continued based on the inputted data, an evacuation running is made possible using the data memorized in the ECU in advance. This function is called "fail-safe function."

Moreover, in the event that any abnormality occurs in the microcomputer in the ECU, the backup circuit makes it possible for the vehicle to perform an evacuation running, based on the data memorized in the ECU in advance.

In either case, it is not possible to expect normal running performance under such evacuation running.

WFE50-8F622

EFI SYSTEM

PRECAUTION

1. The engine control system has self diagnosis function. The ECU memorizes all malfunction codes which have occurred in the past and/or are occurring at present.
The memorized malfunction codes are erased when the battery ground cable is disconnected from the battery terminal. Hence, prior to starting any repairs, be sure to check to see if any malfunction code has been memorized.
(See page EF-136.)
2. When performing operations on the fuel system or its related operation, never smoke and keep away any fire.
3. Before disconnecting the fuel line, be sure to disconnect the battery ground cable from the negative terminal of the battery.
4. The fuel line is pressurized to a pressure about 250 kPa (2.55 kgf/cm²) higher than the pressure inside the surge tank. Therefore, when disconnecting the fuel line, be sure to loose the fuel line slowly and prevent the fuel from splashing with a cloth or the like.
5. Do not allow gasoline to get to any parts made of rubber, leather and resin and/or to the electric parts.
6. When cleaning the engine compartment with water, make sure that no water gets to the electrical system.
7. Ensure that the battery voltage should be 11 volts or more, before performing the inspection.

WFE90-EF300

INSPECTION PRECAUTIONS

Maintenance precautions

1. Ensure that the engine is correctly tuned up.

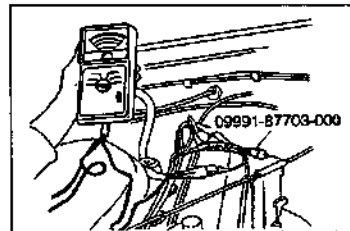
WFE90-EF301

2. Precautions during gauge connection:
 - (1) To connect the tachometer, connect the following SST between the distributor connector and the distributor connector of the engine wire.
SST: 09991-87703-000

- (2) Connect the measuring terminal of the tachometer to the measuring terminal of the SST.

NOTE:

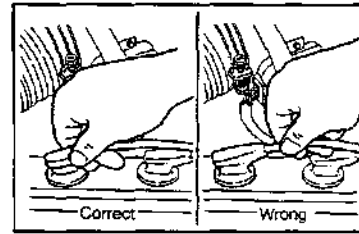
- This does not apply if your tachometer is a pick-up type.
- (3) Use the battery as power source for a timing light, tachometer and so forth.
 - (4) Never allow the tachometer terminal to touch the ground, for it could result in damage to the ignitor and/or ignition coil.
 - (5) Some kinds of tachometers may not be suited for the ignition system of the vehicle. Therefore, ensure that your tachometer is compatible with the ignition system of the vehicle.



WFE90-EF302

3. If engine misfire takes place, the following measures should be taken.

- (1) Ensure that the battery terminals and so forth are connected properly
- (2) Ensure that the spark plug wires are connected properly while handle the spark plug wires carefully.
- (3) After completion of repairs, ensure that the ignition coil terminals and other ignition system wire are reconnected securely.



WF290-5F503

4. Precautions during oxygen sensor handling

- (1) Do not drop the oxygen sensor or allow it to hit other objects.
- (2) Do not immerse the sensor in water or do not cool it by water.

5. Do not open the cover of the ECU proper.

(Failure to observe this caution could cause ECU malfunction.)

6. Do not touch the screws of the bracket installed on the ECU proper.

(Failure to observe this caution could cause ECU malfunction.)

WF290-5F504

When the vehicle is equipped with wireless installation (HAM, CB, etc.)

The ECU has been so designed that it is resistant to external influence.

However, if a vehicle is equipped with a CB wireless installation and so forth (even if its output is only 10 W), it may affect the ECU adversely. Therefore, observe the following precautions.

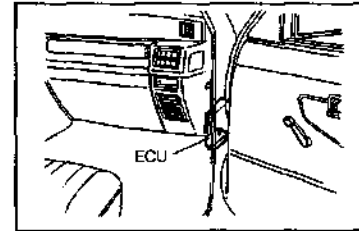
1. Install an antenna at a place as far away as possible from the ECU.

The ECU is installed at the cowl side panel in front of the passenger's seat. Therefore, the antenna should be installed at the rear of the vehicle.

2. The antenna cord should be kept at least 20 cm away from the engine wire. Never wind the antenna with the engine wire with tapes.

3. Adjust the antenna output correctly.

4. Never install a wireless installation with a high output on the vehicle.

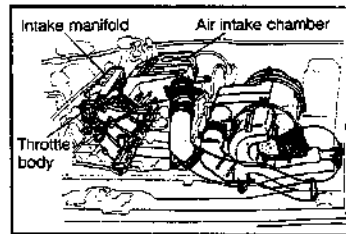


WF290-5F505

EFI SYSTEM

Air induction system

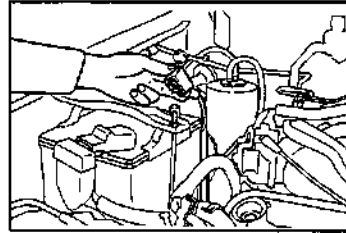
1. Unless all of the oil level gauge, oil filler cap, PCV hose and so forth are installed securely, the engine tune-up can not be performed properly.
2. If air leakage (air admission) is present between the throttle body and the cylinder head, the engine revolution speed can not be adjusted.



WPB0-EP506

Electronic control system

1. Before disconnecting or reconnecting the connector of the sensor system of the EFI system, be sure to turn OFF the ignition switch and all accessory switches. Also, disconnect the battery ground cable from the battery negative terminal. Failure to observe this caution could cause ECU malfunction.
2. Before disconnecting or reconnecting the connector of the ECU proper of the EFI system, be sure to turn OFF the ignition switch and all accessory switches. Also, disconnect the battery ground cable from the battery negative terminal. Failure to observe this caution could cause ECU malfunction.
3. Be sure to keep the number of disconnection/reconnection of the connector of the EFI system at a minimum level.
4. When installing the battery, care must be exercised not to mistake the battery polarity.
5. Never apply strong impacts to the EFI parts. Pay utmost attention during the installation/removal. Especially, special caution must be exercised as to the handling of the ECU.
6. When the voltage or resistance of the ECU is measured during the check, never touch terminals other than the specified terminals. Failure to observe this caution could cause ECU malfunction.
7. Never open the cover of the ECU proper.
8. When the system is checked on a rainy day, be very careful not to allow water to get into connectors and/or terminals.
Also, when the engine compartment is washed, prevent water from being splashed to the EFI-related parts and wiring connectors.
9. EFI parts should be replaced as an assembly.



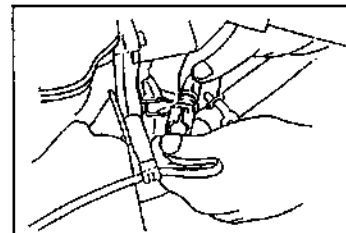
WPB0-EP507

10. When disconnecting or reconnecting the wiring connector, care must be exercised as to the following points.

- (1) Carefully observe the shape of the lock prior to the disconnecting/connection.
- (2) Release the lock. Disconnect the connector.

NOTE:

- When disconnecting the connector, be sure to hold the connector body, do not to pull the wire.

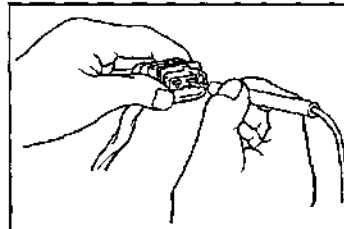


WPB0-EP509

- (3) Insert the connector, until the lock is engaged completely.
- (4) Be sure to keep the number of disconnection/reconnection of the connector at a minimum level.

WFE90-EP510

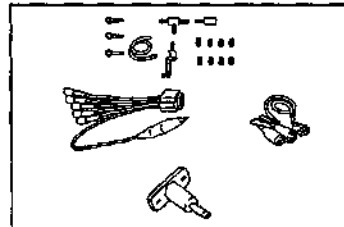
11. When checks are performed at the connector-side terminals, using a circuit tester, care must be exercised as to the following point.
Never apply such a force to the connector terminal that can deform the terminal.



WFE90-EP511

12. When checking the fuel system, such as the injectors, pressure regulator and fuel pressures, use the following SSTs.

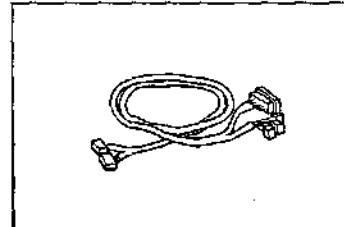
SSTs: 09268-87702-000
09283-87703-000
09991-87702-000
09268-87701-000
09842-30070-000



WFE90-EP512

13. When measuring the voltage or resistance of each system, use the following SST.

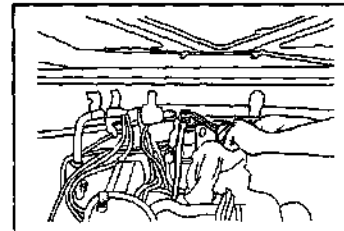
SST: 09842-87704-000



WFE90-EP513

Fuel system

1. The fuel line at the high-pressure side is pressurized to a fuel pressure of about 250 kPa (2.55 kgf/cm²). Therefore, a large amount of gasoline flows out when parts of the fuel line is disconnected. Hence, take the following countermeasures.
 - (1) Place a suitable container, close or the like under the disconnecting connection.
 - (2) Loosen the connection slowly, while preventing the fuel from splashing, using a suitable cloth or the like.
 - (3) Disconnect the connection.
 - (4) Plug the disconnected connection with a rubber plug or the like so that no dust may enter into the fuel line.



WFE90-EP514

EFI SYSTEM

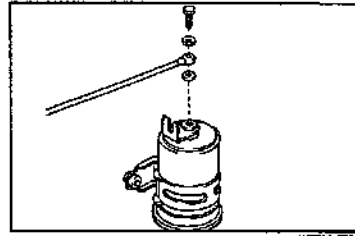
2. When connecting the flare nut or union bolt of the high-pressure pipe, observe the following instructions.

[Union bolt type]

- (1) Always use new gaskets.
- (2) First, tighten the union bolt with your fingers.
- (3) Next, tighten the union bolt to the specified torque.

Tightening Torque:

34.3 - 44.1 N·m (3.5 - 4.5 kgf·m)



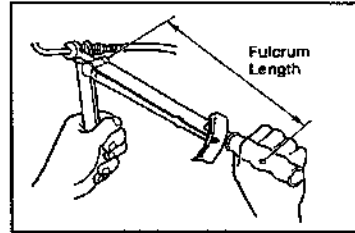
WPED0-8F516

[Flare nut type]

- (1) Coat the flare nut with a thin film of engine oil. Tighten the flare nut fully with your fingers.
- (2) Tighten the flare nut to the specified torque.

Tightening Torque:

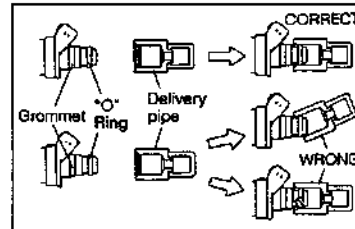
34.3 - 44.1 N·m (3.5 - 4.5 kgf·m)



WPED0-8F516

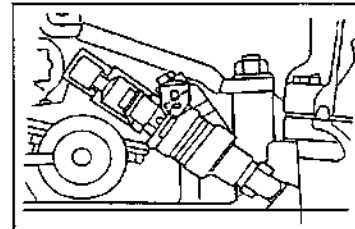
3. When removing/installing the injector, observe the following instructions.

- (1) Do not reuse the "O" ring.
- (2) When installing the "O" ring to the injector, be careful not to damage the "O" ring.
- (3) When connecting the injector to the delivery pipe, apply silicon oil to the "O" ring of the injector in advance. (Never use engine oil, gear oil and so forth.)
- (4) When connecting the injector to the delivery pipe, be very careful not to damage the "O" ring of the injector.



WPED0-8F517

4. Install the injector to the delivery pipe and cylinder head, as shown in the figure.



WPED0-8F518

5. After completion of checks or repairs of the fuel system, be sure that no fuel leakage is present in the fuel system, following the procedure given below.

- (1) Detach the check terminal cap.
- (2) Short the fuel pump terminal (white/black) with the ground terminal (black) of the check connector, using the following SST.

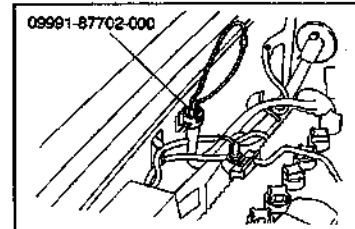
SST: 09991-87702-000

NOTE:

- The check connector is located at the right side fender panel of the engine compartment.

CAUTION:

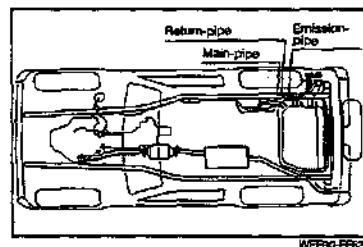
- As for the terminals other than those specified, never allow them to be connected or shorted.



WPED0-8F519

EFI SYSTEM

- (3) Turn ON the ignition switch. (with the engine in a stopped state)
At this time, a fuel pressure of 250 kPa (2.55 kgf-m) is being applied to the fuel line.
Under this conditions, check the fuel line system for evidence of leakage.
If any leakage is present at the fuel line system, repair leaky points. Recheck the system for leakage.
- (4) Stop the engine.
- (5) Remove the SST from the check terminal.
- (6) Connect the check terminal cap to the check terminal.



EFI SYSTEM

TROUBLE SHOOTING

TROUBLE SHOOTING HINTS

1. In most cases, engine troubles are attributable to systems other than the EFI system.
Prior to starting the trouble shooting for the EFI system, check other systems.

- (1) Power supply
 - Battery voltage
 - Fuse blown
 - Fusible link blown
- (2) Body ground
- (3) Fuel supply
 - Fuel leakage
 - Fuel filter clogged
 - Fuel pump malfunctioning
- (4) Ignition system
 - Spark plugs faulty
 - Spark plug wires faulty
 - Distributor and ignitor faulty
 - Ignition coil faulty
- (5) Air induction system
 - Air leakage
- (6) Others
 - Ignition timing adjusted improperly
 - Idle speed adjusted improperly
 - Idle speed control VSV malfunctioning
 - EGR valve malfunctioning
 - etc.

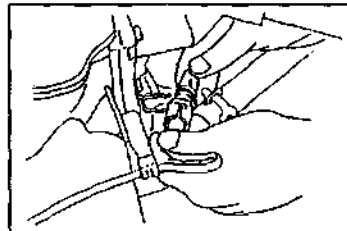
WP550-EF521

2. Most of troubles related to the EFI system are merely caused by poor wire connections.

Ensure that connectors are connected securely.

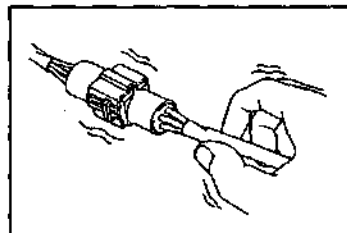
Check connectors, being careful as to the following points.

- (1) Visually inspect that terminals are not bent.
- (2) Ensure that connectors are securely connected and locked.



WP550-EF522

- (3) Check to see if the malfunction phenomenon takes place when applying light vibration to the connector or the wire connected to the connector.

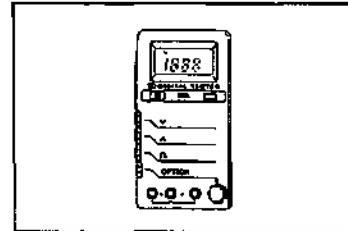


WP550-EF523

3. Prior to replacing the ECU, thoroughly perform the trouble shooting for possible items other than the ECU. The ECU is a reliable, but an expensive part. Even when the ECU has been replaced according to the check results of the trouble shooting and the relevant malfunction has been remedied, be sure to reinstall the old ECU so as to confirm that the malfunction was obviously caused by the faulty ECU.

WP690-EF624

4. For the trouble shooting, use a volt/ohmmeter whose internal resistance is 10 k Ω /V or more. Use of a volt/ohmmeter whose internal resistance is less than 10 k Ω /V may cause an ECU malfunction or wrong diagnosis. Furthermore, be sure to employ a meter whose resolution is 0.1V or more, 0.5 Ω or more and whose accuracy is $\pm 2\%$ or more.



WP690-EF625

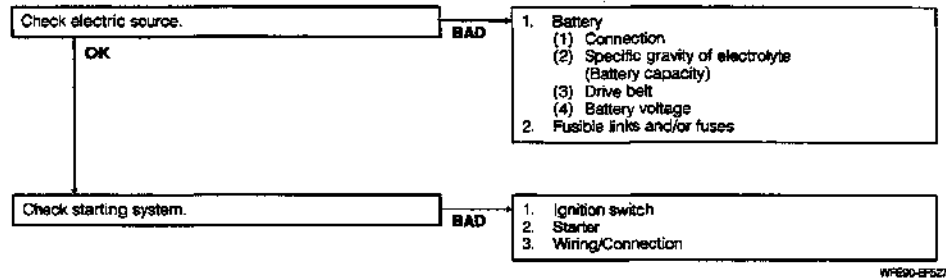
5. In this trouble shooting, no consideration has been made to any displacement of timing belt teeth. Hence, if the trouble persists even after the trouble shooting has been carried out, check to see if the timing belt has skipped a tooth.

WP690-EF626

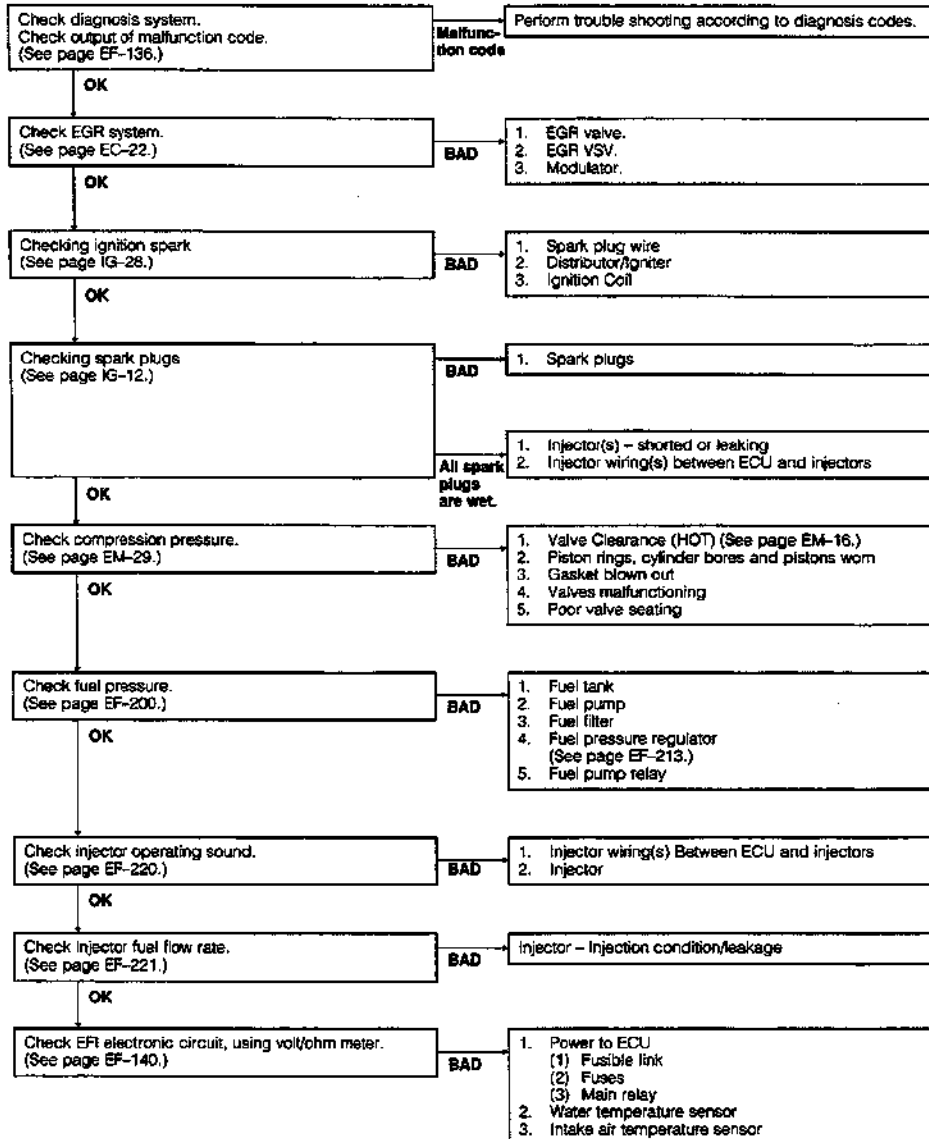
EFI SYSTEM

TROUBLE SHOOTING PROCEDURE

1 Symptom Engine will not start.
(Engine will not crank or cranks slowly.)



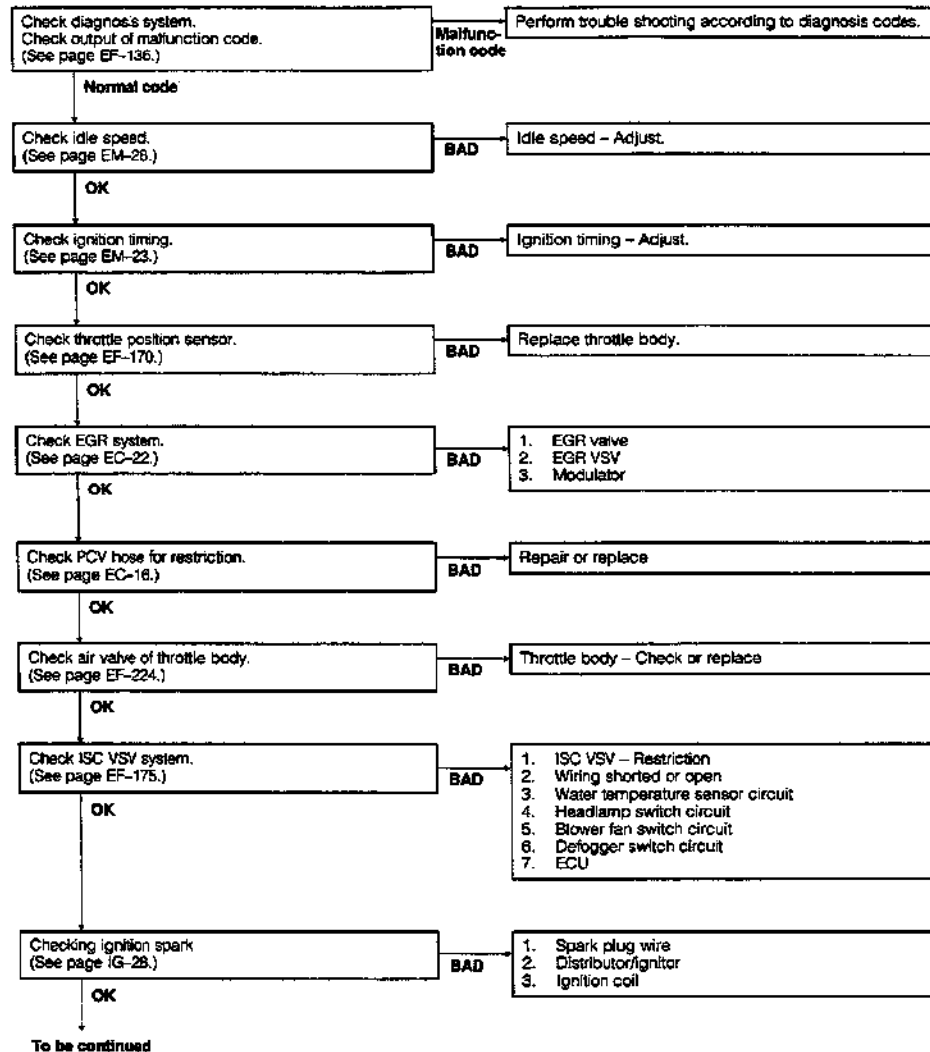
2 Symptom Engine will not start. (Engine cranks normally.)



WFE30-EFS30

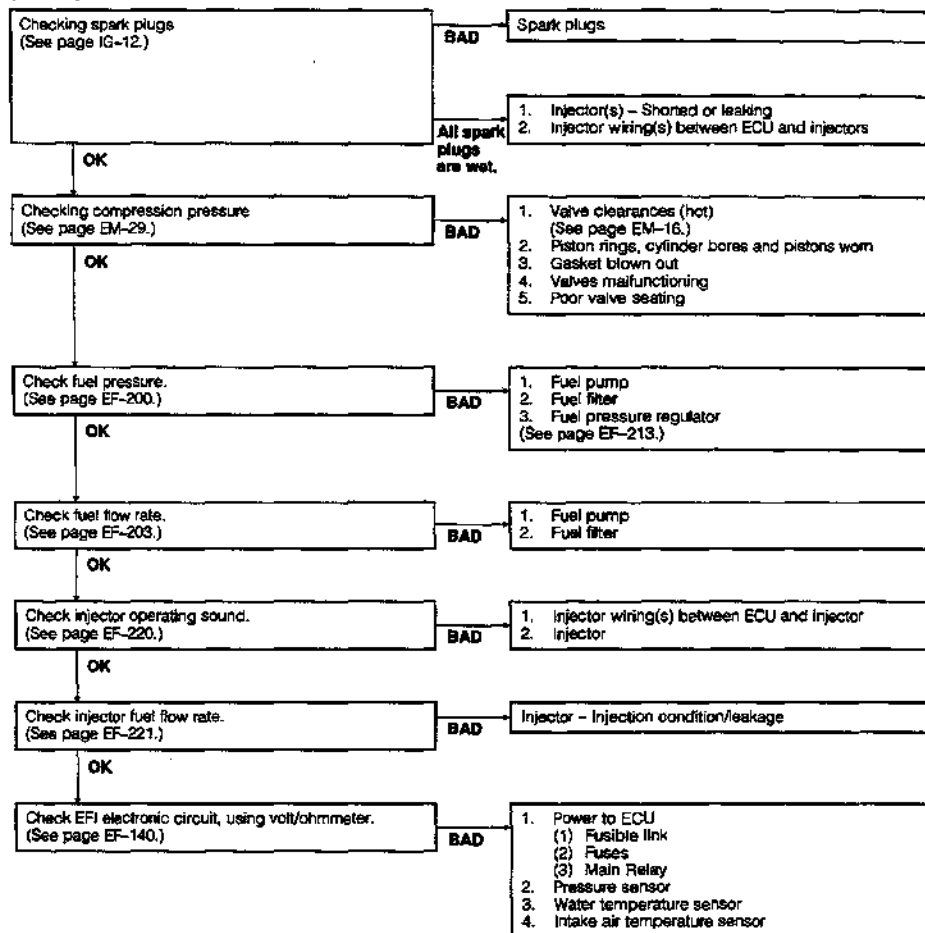
EFI SYSTEM

③ Symptom Engine stalls immediately after starting.



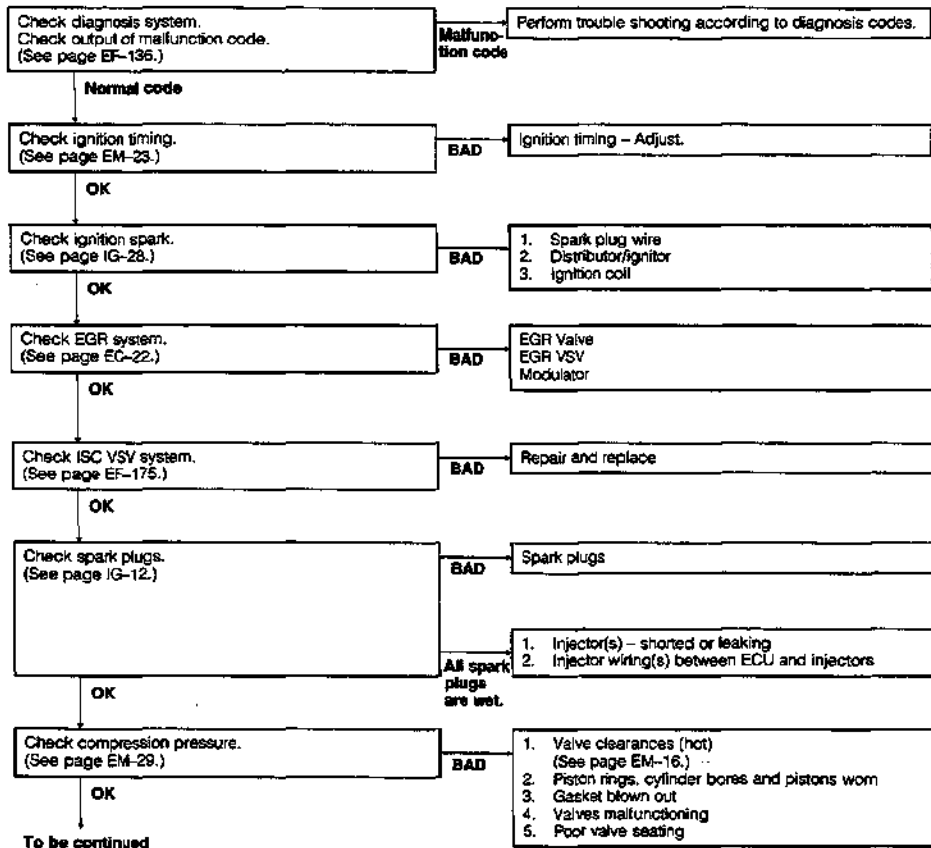
WFE90/EF529

(Cont'd)



W7090-EP530

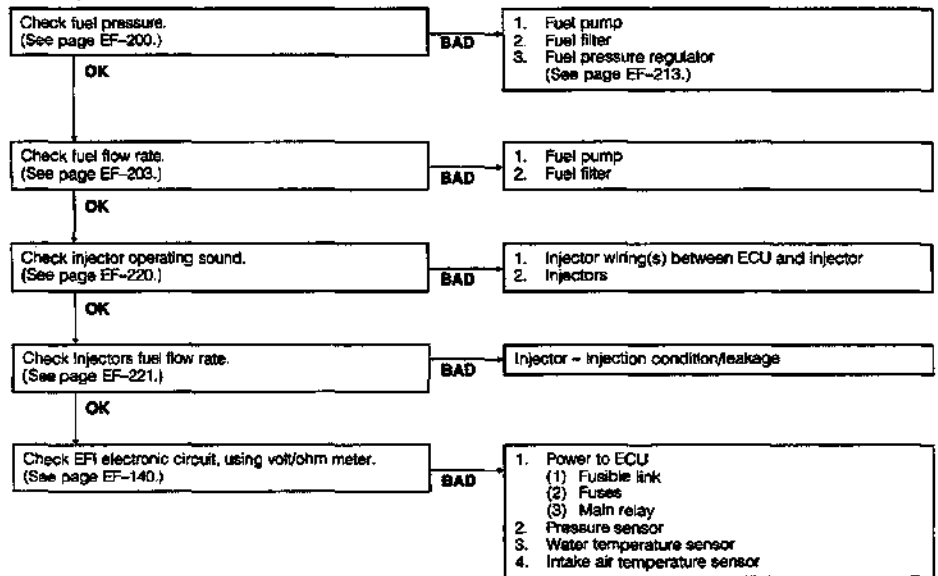
5 Symptom Hard starting



WFE90-EF532

EFI SYSTEM

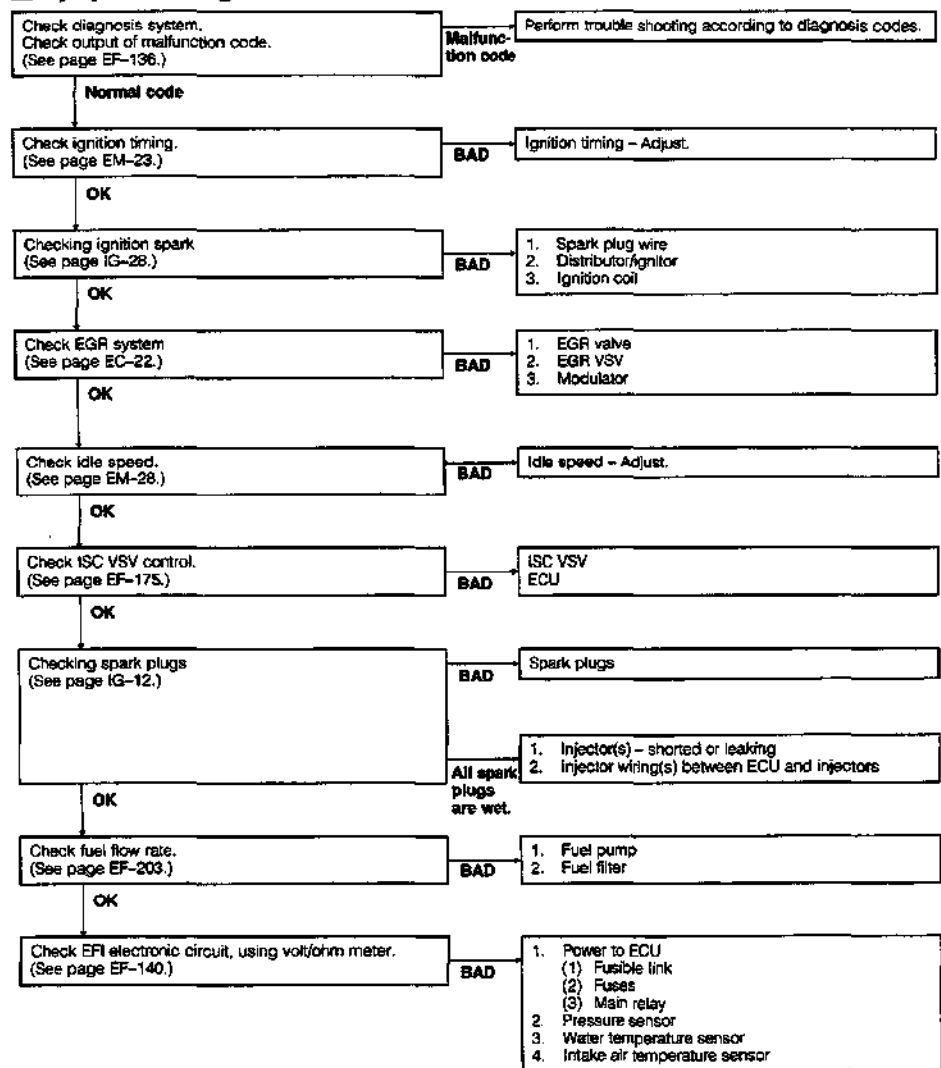
(Cont'd)



WP690-EF533

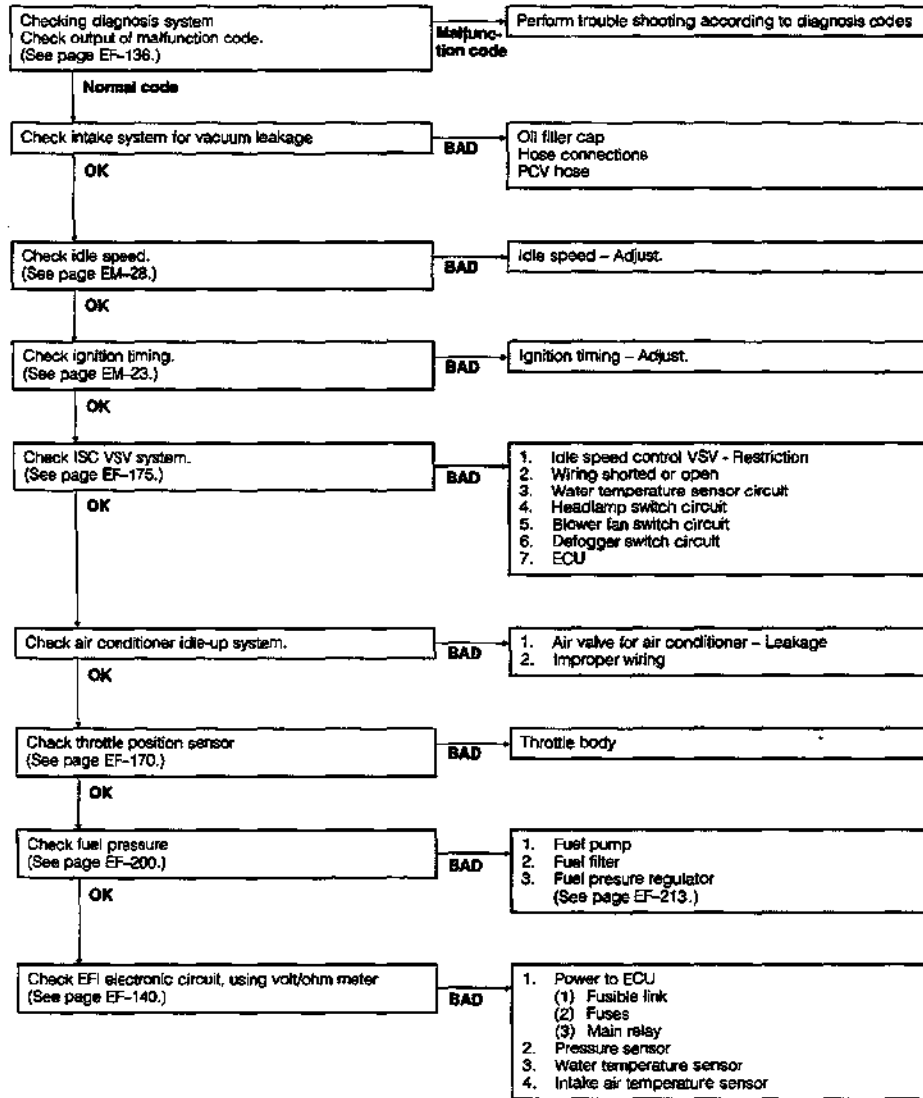
EFI SYSTEM

4 Symptom Engine often stalls.



WFE90-EP531

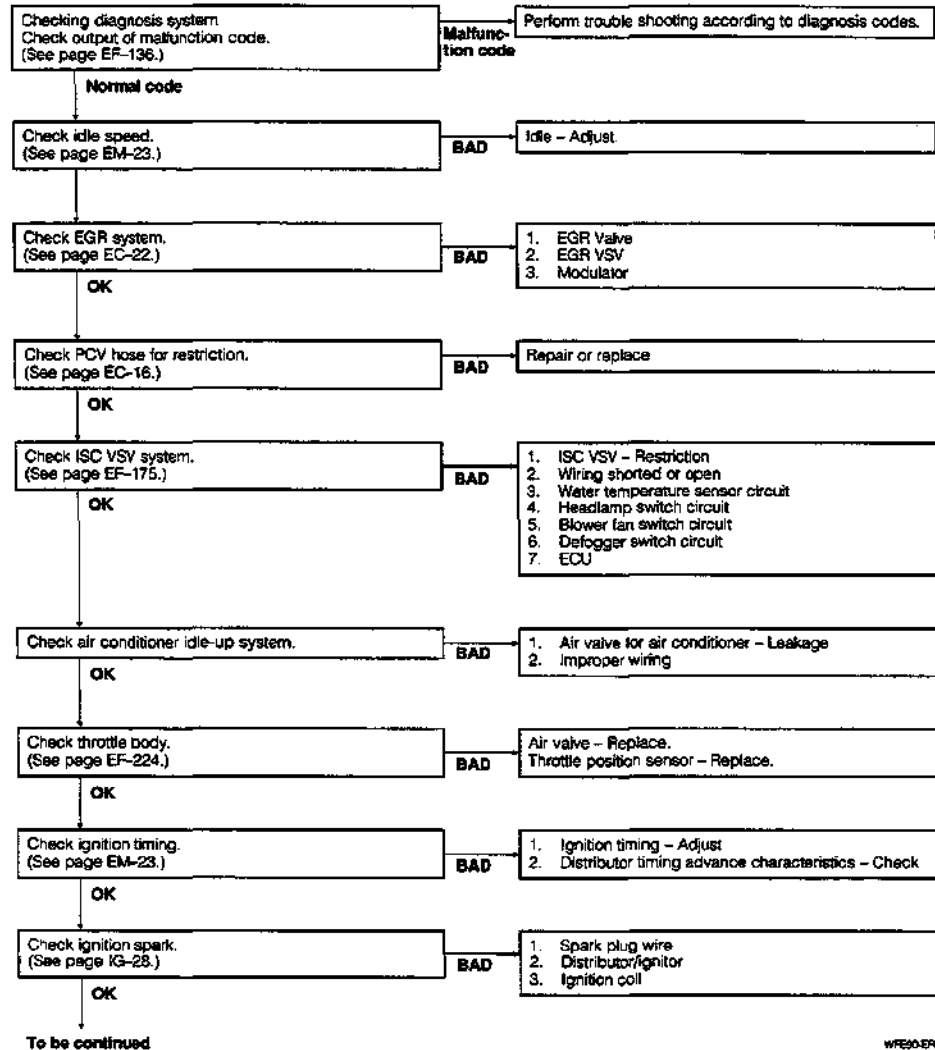
6 Symptom Engine idle speed too high



WFB0-BF34

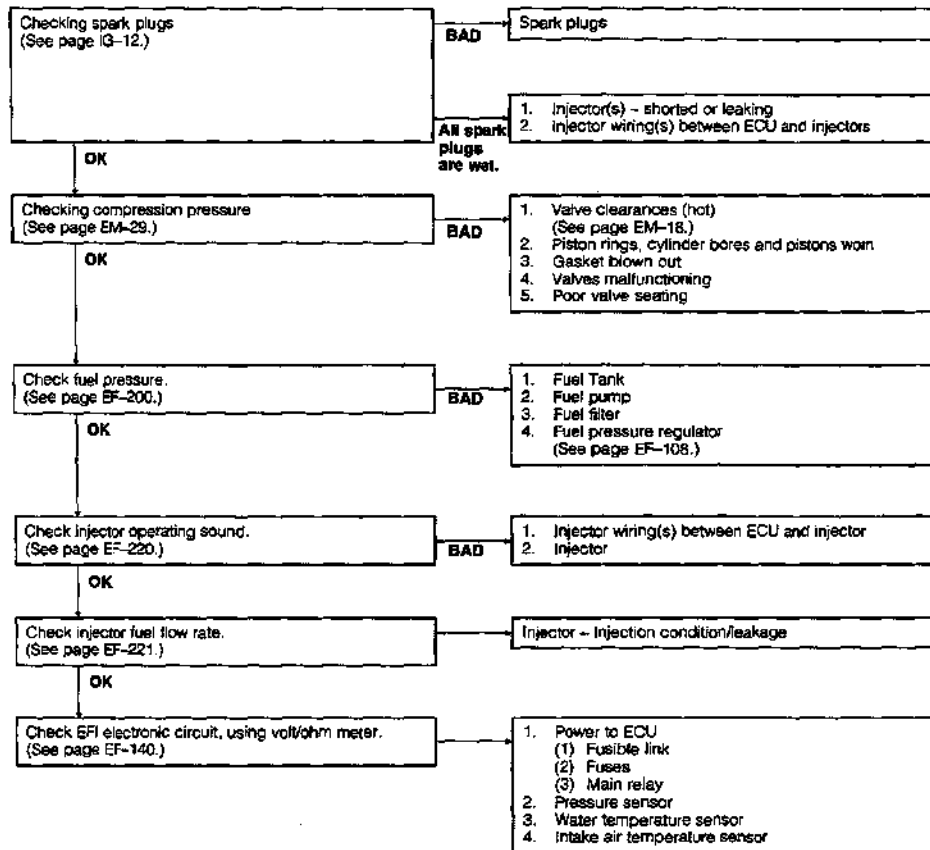
EFI SYSTEM

7 Symptom Engine idle speed too low and/or rough idling



WFE90-EP635

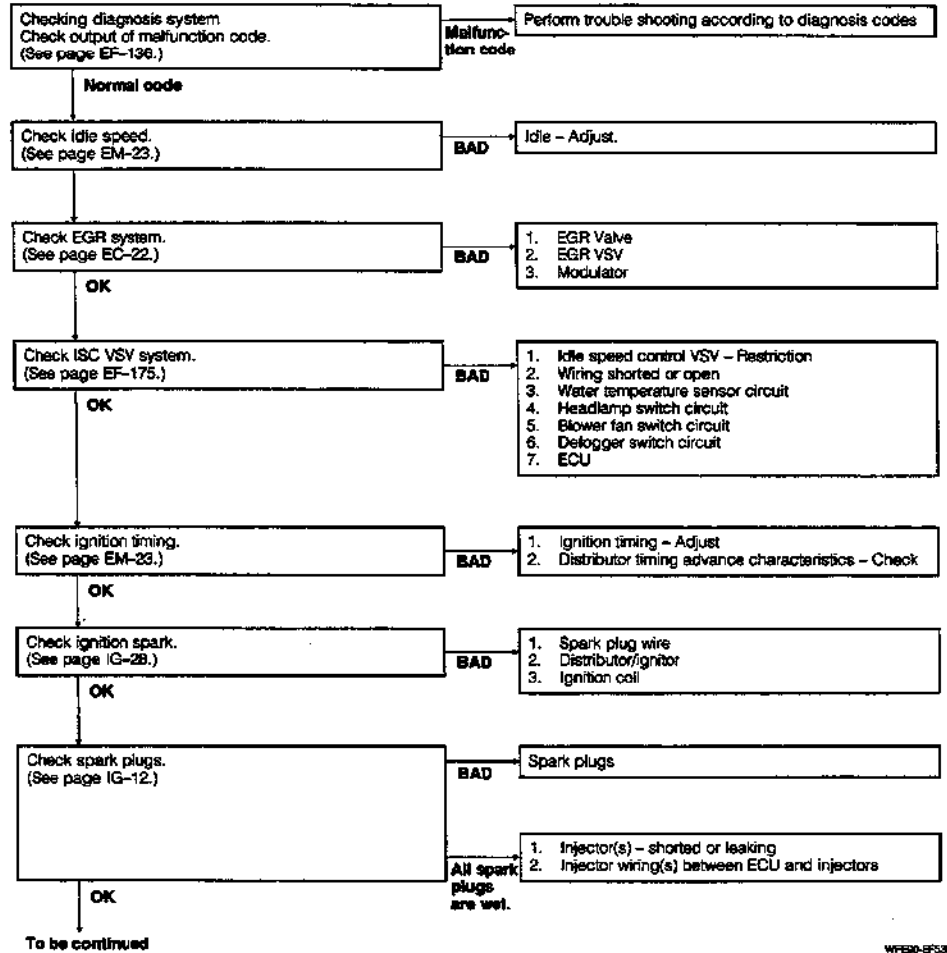
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WP690-07335

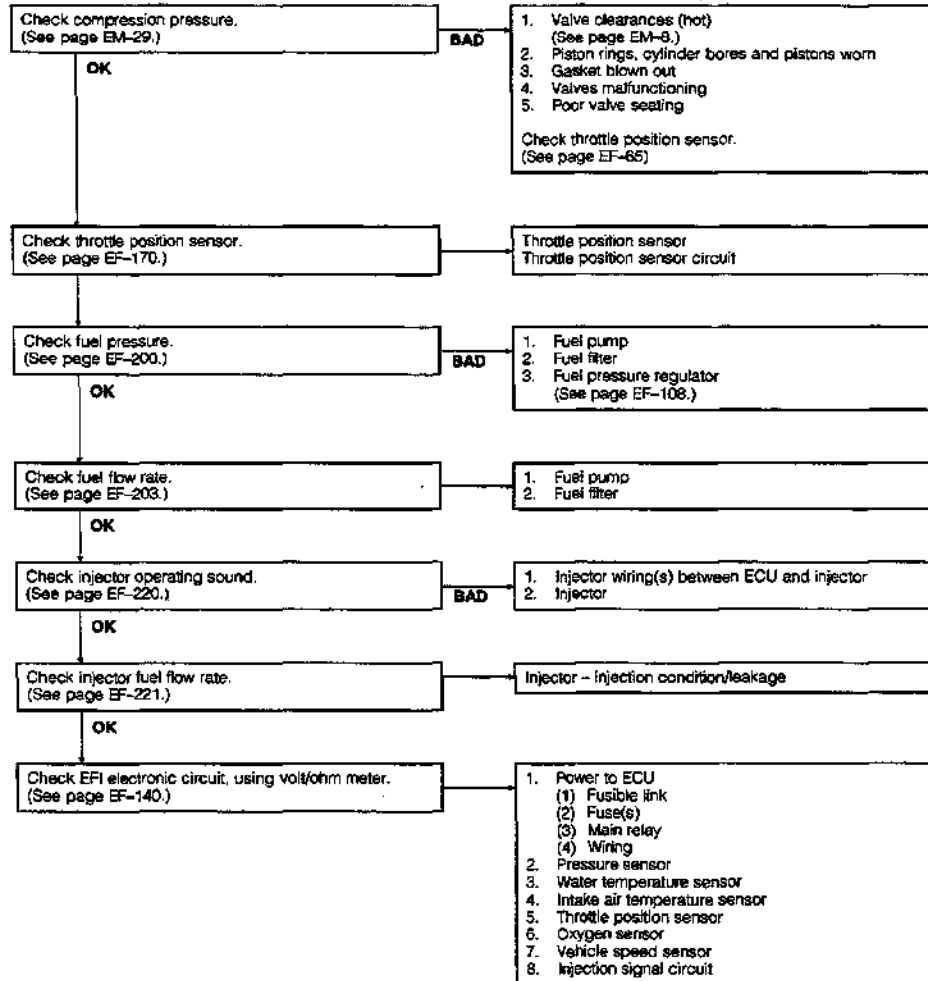
EFI SYSTEM

2 Symptom Poor driveability



WFE20-EFS36

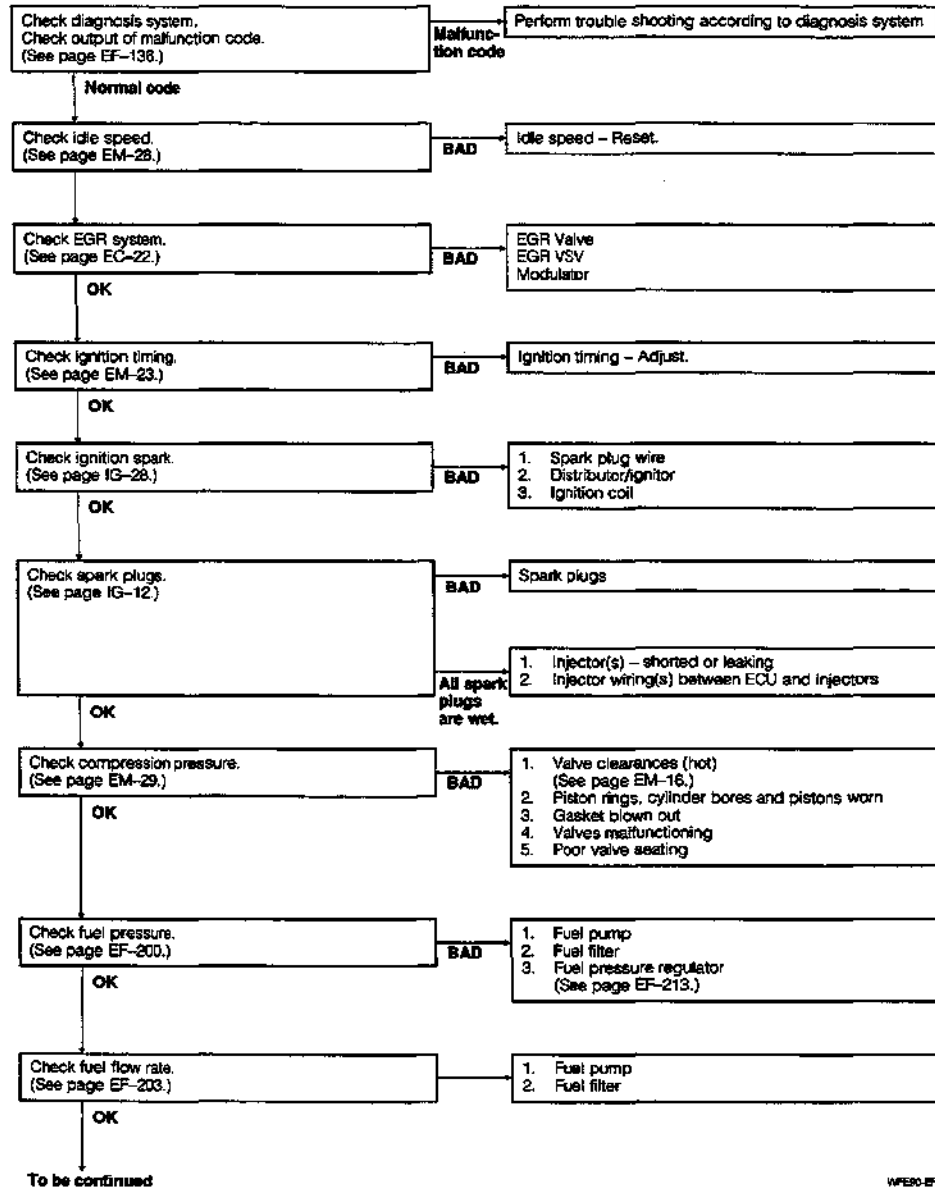
(Cont'd)



WPED-EP537

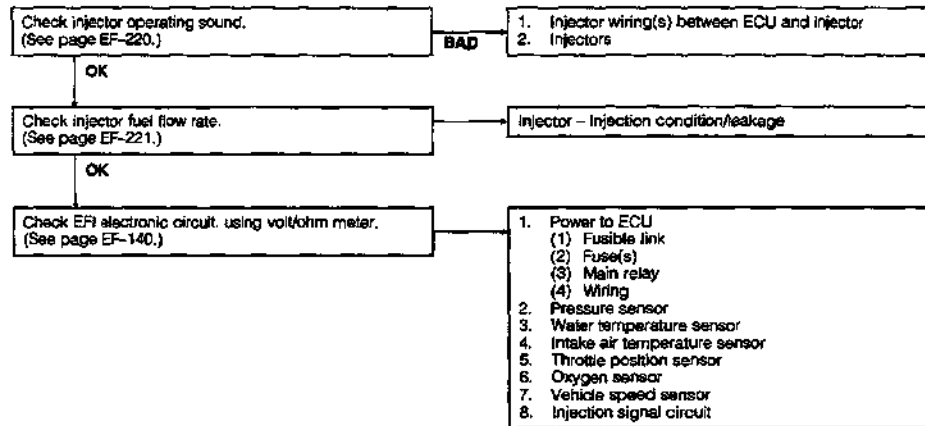
EFI SYSTEM

9 Symptom Backfire (Lean fuel mixture)



WP590-EF308

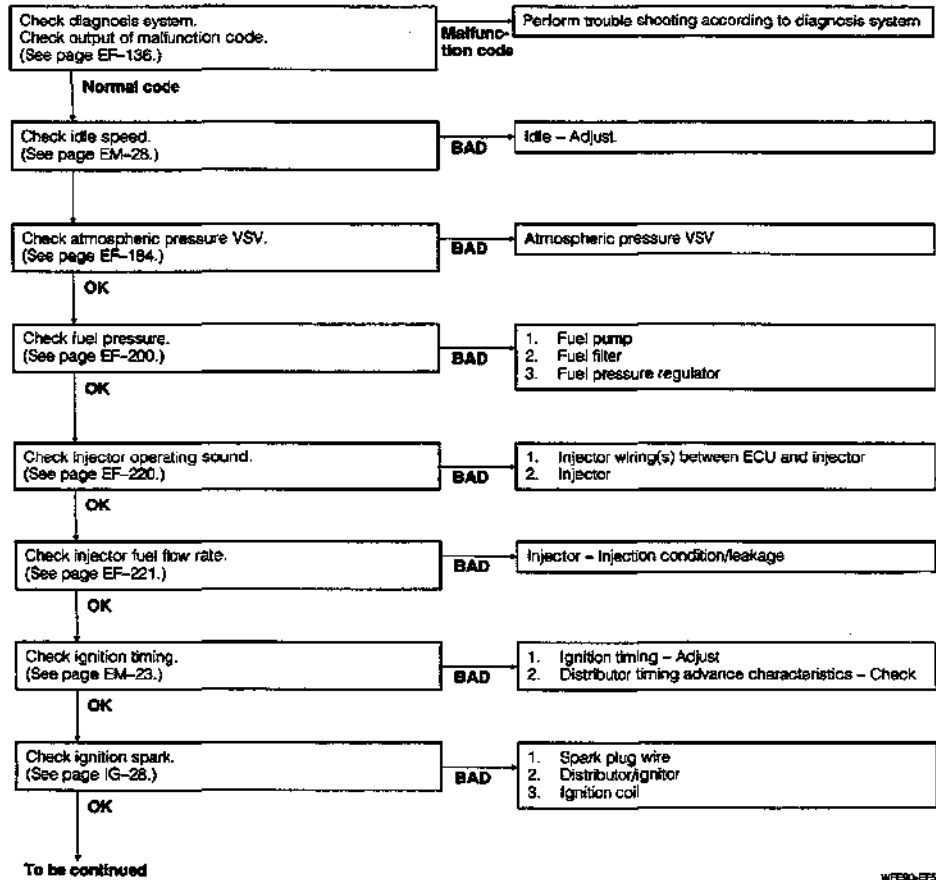
(Cont'd)



WFA20-EP540

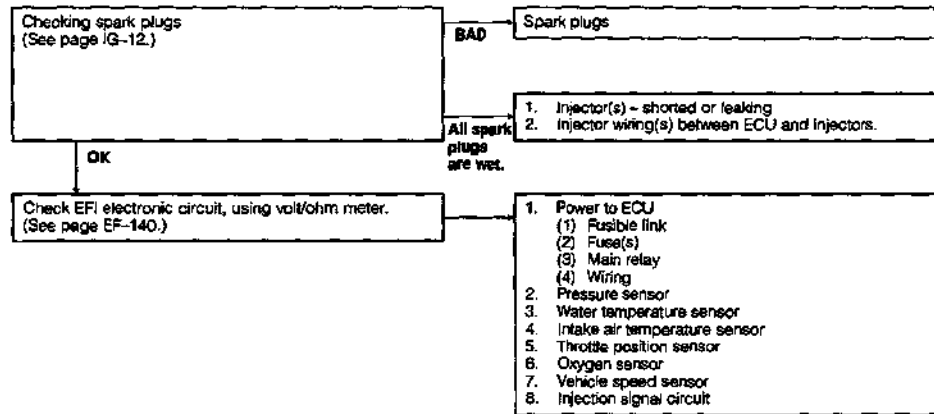
EFI SYSTEM

19 Symptom Afterfire (Rich mixture - Misfire)



WFE90-EF541

(Cont'd)



WP890-EP543

EFI SYSTEM

DIAGNOSIS SYSTEM

DESCRIPTION

A self-diagnosis system is built in the ECU. If any abnormality should occur in the signal systems of various sensors, the self-diagnosis system memorizes the malfunction code number in the ECU. In respect to important abnormalities, the check engine lamp at the instrument panel goes on, thus warning the driver of the abnormality.

When the abnormality is cleared, the check engine lamp goes out.

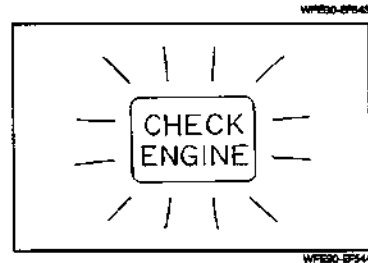
When the Test terminal of the check terminal is shorted with the ground terminal, the malfunction code number that has been memorized in the ECU will be indicated in a form of flashing of the check engine lamp in the instrument panel.

This memorized malfunction code number is erased when the battery ground cable is disconnected from the negative (-) terminal of the battery, or when the back-up fuse in the relay block assembly is disconnected with the ignition key switch turned OFF.

Check of "Check Engine" Warning Light

1. When the ignition switch is turned ON, the check engine lamp goes on.
(Engine is under a stopped state.)
If not, see page EF-138.
2. When the engine starts, the check engine lamp goes off.

If the check engine lamp remains illuminated, it indicates that the diagnosis system has detected system malfunctions.



Output of Diagnosis Codes

1. Initial conditions
 - (1) Battery voltage of 11 volts or more
 - (2) Throttle valve fully closed
 - (3) All accessory switches turned OFF
2. Short the Test terminal of the check terminal with the ground terminal, using the following SST.
SST: 09991-87702-000

NOTE:

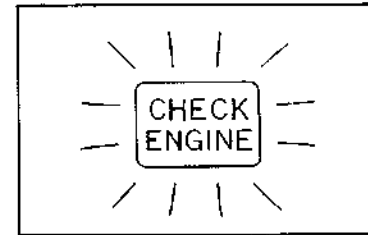
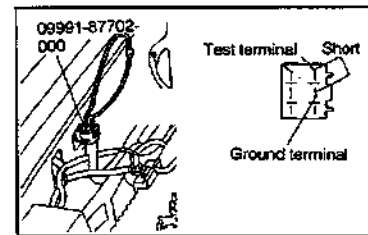
- The check terminal is located at the right side fender panel of the engine compartment.

CAUTION:

- Care must be exercised to ensure that no connection is made on terminals except for those specified.
3. Set the Ignition switch to ON position. At this time, be careful not to start the engine.
 4. Read the diagnosis code by observing the flashing number of the check engine lamp.

NOTE:

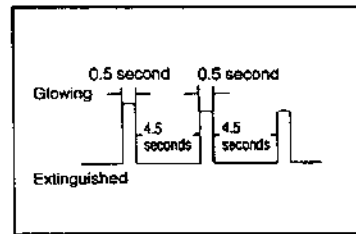
- If the check engine lamp fails to flash, it is likely that the ECU is malfunctioning. Hence, proceed to inspection of diagnosis system circuit.



Output form of diagnosis code

(1) Indication of normal code number
(Code number 1 – normal function)

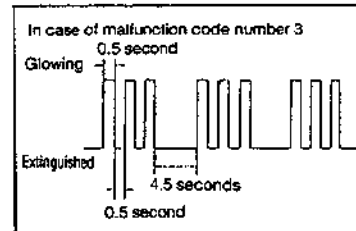
The check engine lamp glows for 0.5 second, 4.5 seconds later after the ignition key switch has been turned ON. After a lapse of 4.5 seconds, the check engine lamp again glows for 0.5 second. Then, this pattern will be repeated.



(2) Indication of malfunction code number

• When a single malfunction code is indicated:

The check engine lamp repeats glowing the same times as the number of the malfunction code at intervals of 0.5 second, 4.5 seconds later after the ignition key switch is turned ON. After a lapse of 4.5 seconds, the check engine lamp again repeats glowing the same times as the number of the malfunction code at intervals of 0.5 second. Then, this pattern will be repeated.

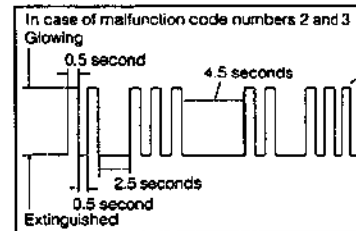


• When plural malfunction code numbers are indicated:

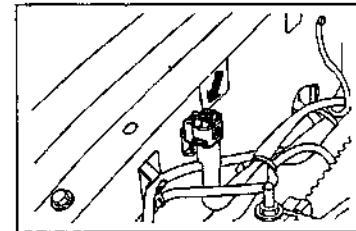
The check engine lamp repeats glowing the same times as the number of the first malfunction code at intervals of 0.5 second, 4.5 seconds later after the ignition key switch is turned ON. After a lapse of 2.5 seconds, the check engine lamp repeats glowing the same times as the number of the next malfunction code at intervals of 0.5 second.

The memorized code numbers are indicated in the sequence of code number, starting from a smaller number.

The indication of the malfunction codes is repeated 4.5 seconds later after the memorized code numbers have been indicated.

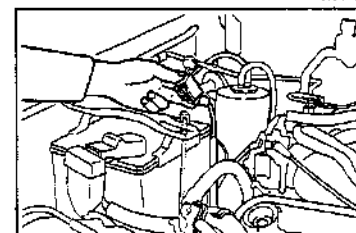


5. After the diagnosis codes have been read, remove the SST from the check terminal.
6. Install the cap on the check terminal.




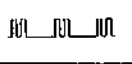


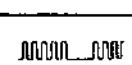


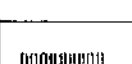
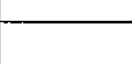
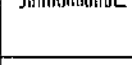

Cancelling Diagnosis Code

To erase the diagnosis codes memorized in the ECU after malfunctions have been repaired, disconnect the battery ground cable from the negative (-) terminal of the battery. For at least 10 seconds with the ignition switch turned OFF. [When ambient temperature is about 20°C.]





EFI SYSTEM

DIAGNOSIS CODE

Code No.	Number of glowing of check engine lamp	Diagnosis item	Diagnosis contents	Trouble area	Reference page
1		Normal	—	—	—
2		Pressure sensor	When the input signal from the pressure sensor deviates from the specified value:	<ul style="list-style-type: none"> Pressure sensor Pressure sensor circuit ECU 	EF-172 EF-147
3		Ignition signal	When the ignition signal fails to be inputted:	<ul style="list-style-type: none"> Distributor Ignitor Ignition coil Ignition system circuit ECU 	IG- 15 IG- 3 EF-149
4		Water temperature sensor	When the input signal from the water temperature sensor deviates from the specified value:	<ul style="list-style-type: none"> Water temperature sensor Water temperature sensor circuit ECU 	EF-165 EF-150
5		Oxygen sensor signal	When the input signal from the oxygen sensor fails to be inputted under the certain conditions:	<ul style="list-style-type: none"> Oxygen sensor Oxygen sensor circuit ECU 	EF-187 EF-151
7		Throttle position sensor	When both idle switch and power switch enter "ON" conditions:	<ul style="list-style-type: none"> Throttle position sensor Throttle position sensor circuit ECU 	EF-170 EF-152
8		Intake air temperature sensor	When the input signal from the intake air temperature sensor deviates from the specified value:	<ul style="list-style-type: none"> Intake air temperature sensor Intake air temperature sensor circuit ECU 	EF-168 EF-155
9		Vehicle speed sensor	When the input signal from the vehicle speed sensor fails to be inputted under the certain conditions:	<ul style="list-style-type: none"> Vehicle speed sensor Vehicle speed sensor circuit ECU 	EF-156
10		Starter signal	When the input signal from the starter fails to be inputted, until the certain conditions are satisfied: However, it should be noted that this code may be memorized when vehicle is started by being pushed.	<ul style="list-style-type: none"> Starter Starter circuit ECU 	EF-157
11		Switch signal	When even one of the following conditions is satisfied with the test terminal shorted with the ground terminal: <ul style="list-style-type: none"> when the air conditioner is functioning. when idle switch is turned OFF. 	<ul style="list-style-type: none"> Air conditioner system Throttle position sensor Throttle position sensor circuit ECU 	EF-170 EF-158
12		EGR control system	When it is judged that the EGR control system is not functioning normally under the certain conditions:	<ul style="list-style-type: none"> EGR valve Modulator EGR VSV Water temperature sensor 	EF-161 EF-165

WVEB0-EP525

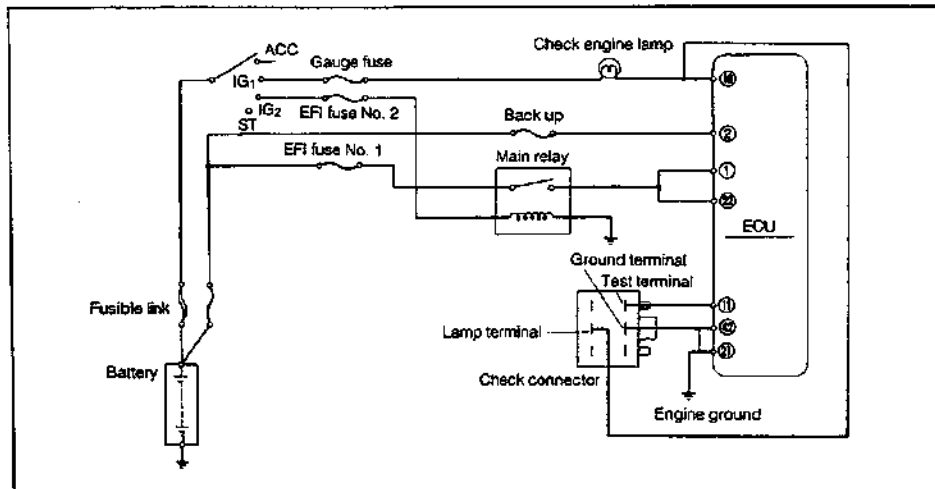
EFI SYSTEM

Code No.	Number of glowing of check engine lamp	Diagnosis item	Diagnosis contents	Trouble area	Reference page
15		Air-to-fuel ratio (rich fail)	When the feedback function performs reduction compensation beyond the specified level:	<ul style="list-style-type: none"> • Injector circuit • Injector • Fuel pressure • Pressure regulator • Pressure sensor • Water temperature sensor • Water temperature sensor circuit • Intake air temperature sensor • Intake air temperature sensor circuit 	EF-220 EF-231 EF-172 EF-165 EF-150 EF-168 EF-155
16		Air-to-fuel ratio (lean fail)	When the feedback function performs increase compensation below the specified level:	<ul style="list-style-type: none"> • Injector circuit • Injector • ECU • Fuel pressure • Pressure regulator • Pressure sensor • Water temperature sensor • Water temperature sensor circuit • Intake air temperature sensor • Intake air temperature 	EF-220 EF-189 EF-231 EF-165 EF-150 EF-168 EF-155

WFE90-67354

EFI SYSTEM

INSPECTION OF DIAGNOSIS SYSTEM CIRCUIT

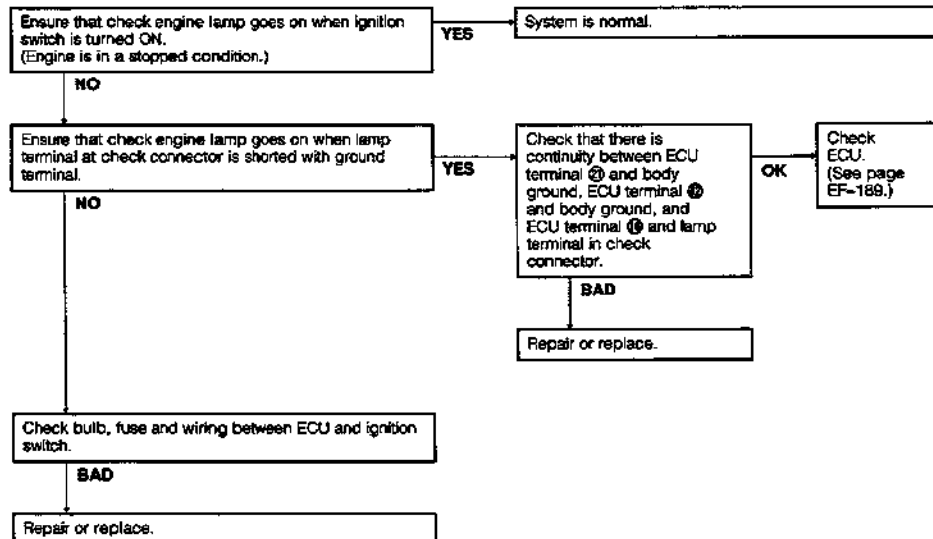


NOTE:

- When checking continuity between terminals, first install the SST (09842-87704-000). Then, check continuity between the SST terminals. (See page EF-141.)

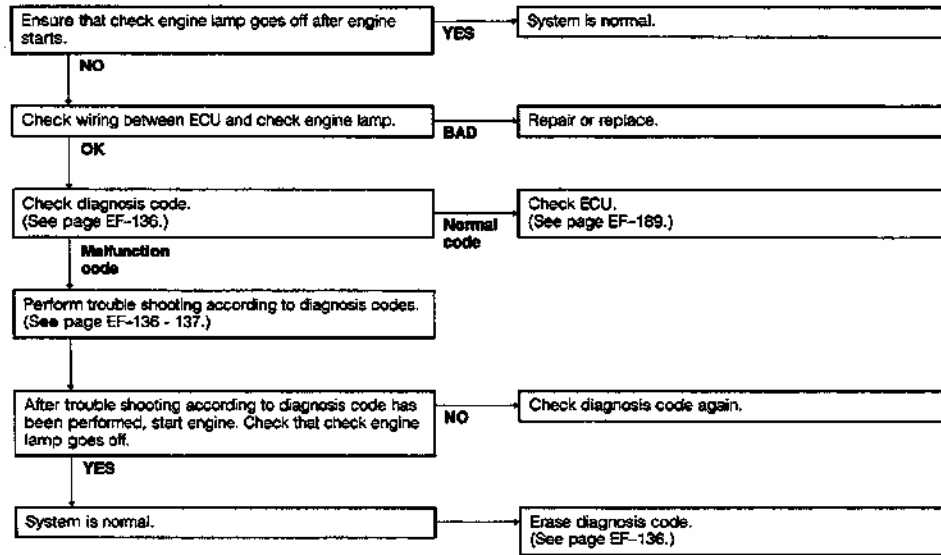
WFE00-6P565

1st step



WFE00-6P566

2nd step



WFE20-EF557

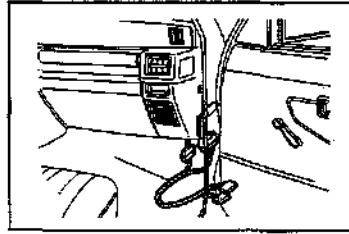
EFI SYSTEM

TROUBLE SHOOTING WITH VOLT/OHMMETER

PREPARATION OF TROUBLE SHOOTING

1. Disconnect the battery ground cable from the negative (-) terminal of the battery.
2. Remove the ECU cover.
3. Disconnect the engine harness from ECU.
4. Connect the following SST between the engine wire and the ECU.

SST: 09842-87704-000



5. Reconnect the battery ground cable to the negative (-) terminal of the battery.

CAUTION:

- After completion of the inspection, before the SST is removed, be sure to disconnect the battery ground cable from the negative (-) terminal of the battery.
- After the engine harness has been connected to the ECU, reconnect the battery ground cable to the negative (-) terminal of the battery.
- Before using the SST, be sure to check to see if short or open wire exists between the terminals.

WFE90-07358

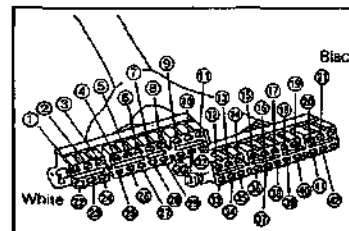
CHECK PROCEDURE FOR EFI SYSTEM

NOTE:

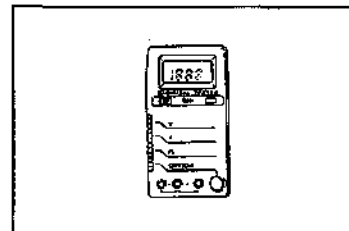
1. The EFI circuit can be checked by measuring the resistance and voltage at the SST terminals.
2. The voltage check should be conducted under a condition where all connectors are connected.
3. Prior to the check, ensure that the battery voltage is 11V or more when the ignition switch is turned ON.
4. If any problem is encountered during this check, see the section under "Trouble Shooting for EFI Electronic Circuit with Volt/Ohmmeter."

CAUTION:

- For the trouble shooting, use a volt/ohmmeter whose internal impedance is more than 10 k Ω /V. Use of a volt/ohmmeter whose internal resistance is 10 k Ω /V or less may cause ECU malfunction and/or misjudgment.
- No terminal except for the specified terminal should be connected. Failure to observe this caution may cause ECU malfunction.



WFE90-07358



WFE90-07360

ECU CONNECTORS

The figure below shows the arrangement of the ECU connector terminals.

ECU side

21	20		18	
42	41	40	39	38

16	15		13	12	11		9	8
37	36		34	33	32		30	29

7	6	5		3	2	1
	27	26				22

SST side

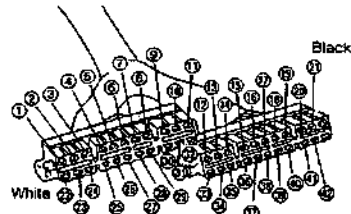


Table Showing ECU Connections

Terminal code	Contents of connection	Terminal code	Contents of connection
1	Main relay (Power supply)	22	Main relay (Power supply)
2	Battery (Backup power supply)	23	
3	Ignition coil primary voltage	24	
4		25	
5	Pressure sensor power supply	26	Oxygen sensor
6	Pressure sensor	27	Intake air temperature sensor
7	Cooling water temperature sensor	28	
8	Vehicle speed sensor	29	Operation system ground (Engine)
9	Electrical load (Headlamp and defogger)	30	Electrical load (Blower fan)
10		31	
11	Check connector (Test terminal)	32	Throttle position switch (Power switch)
12	Throttle position switch (Idle switch)	33	Stop lamp
13	Starter	34	Air conditioner magnet switch
14		35	
15	Oxygen sensor feedback check terminal	36	Operation system ground
16	Check engine lamp	37	Fuel pump relay
17		38	Pressure VSV
18	EGR VSV	39	System ground
19		40	Idle speed control VSV
20	Injector	41	Injector
21	Actuator drive ground (Engine)	42	Actuator drive ground (Engine)

EFI SYSTEM

Voltage at ECU wiring connectors

Measure voltage between SST terminals shown in the table below.

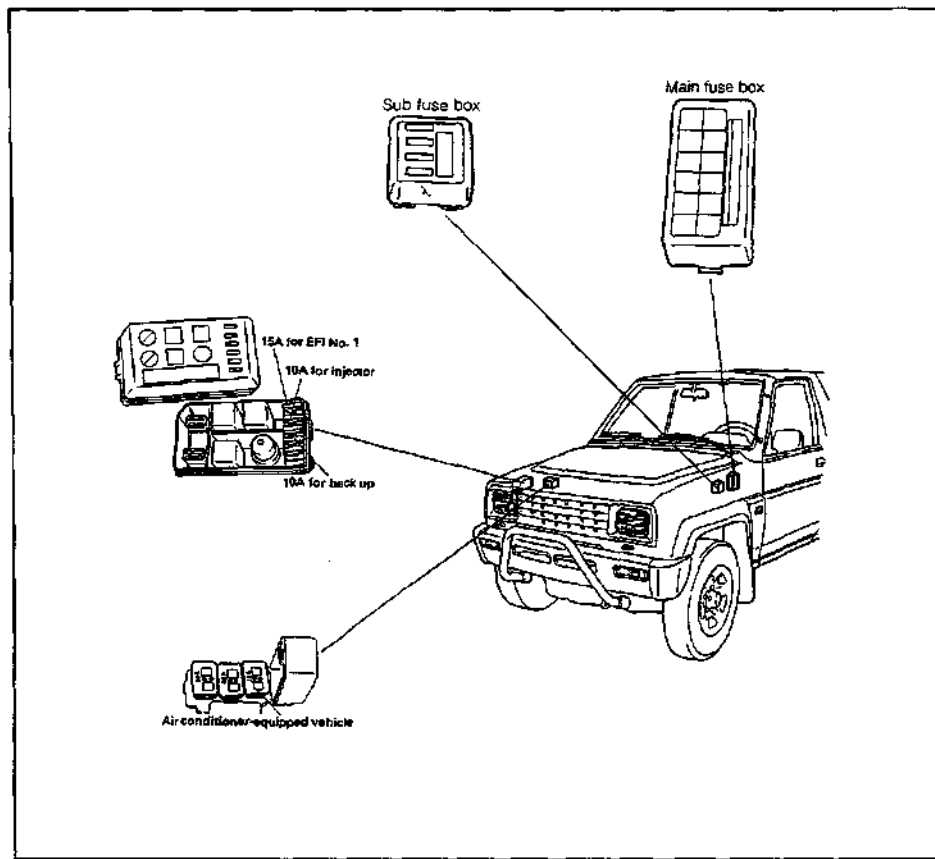
No.	Terminals	STD voltage	Condition		See page
1	① — ② Ground	Approx. battery voltage	Ignition switch ON		EF-144
	② — ③ Ground		At all time		
	③ — ④ Ground				
2	⑤ — ⑥ Ground	4.5 - 5.5 V	Ignition switch ON		EF-147
	⑥ — ⑦ Ground	3.2 - 4.0 V	Ignition switch ON	Atmospheric pressure 101.3 kPa (760 mmHg)	
3	⑧ — ⑨ Ground	Approx. battery voltage	Ignition switch ON	Engine at stopped state	EF-149
4	⑩ — ⑪ Ground	0.4 - 0.65 V	Ignition switch ON	When cooling water temperature is 80°C	EF-150
5	⑫ — ⑬ Ground	Voltage changes more than 8 times within 10 seconds.	Ignition switch ON	When engine speed is held at 3000 rpm for two minutes after engine has been fully warmed up.	EF-151
7	⑭ — ⑮ Ground	Less than 5V	Ignition switch ON	Throttle valve fully closed	EF-152
		Approx. battery voltage	Ignition switch ON	Throttle valve fully opened	
	⑯ — ⑰ Ground	Approx. battery voltage	Ignition switch ON	Throttle valve fully opened	
		Less than 5 V	Ignition switch ON	Throttle valve fully closed	
8	⑱ — ⑲ Ground	1.5 - 3.0 V	Ignition switch ON	When air temperature inside intake manifold is 20°C	EF-155
9	⑳ — ㉑ Ground	0 - Approx. battery voltage	Ignition switch ON	Voltages change takes place 4 times when vehicle is moved 1.5 m	EF-156
10	㉒ — ㉓ Ground	More than 6 V	When ignition switch is set to ST position:		EF-157
11	㉔ — ㉕ Ground	Approx. battery voltage	When engine is operating and compressor magnet clutch of air condition is energized:		EF-158
	㉖ — ㉗ Ground	Less than 5V	Ignition switch ON	Throttle valve fully closed	
		Approx. battery voltage		Throttle valve fully opened	
12	㉘ — ㉙	Approx. battery voltage	Ignition switch ON	When engine is operating and cooling water temperature is 40°C or below:	
		Less than 3V	Ignition switch ON	When engine is operating and cooling water temperature is 40°C or more:	

WFE00-57563

TROUBLE SHOOTING EFI ELECTRONIC CIRCUIT WITH VOLT/OHM MERTER

NOTE:

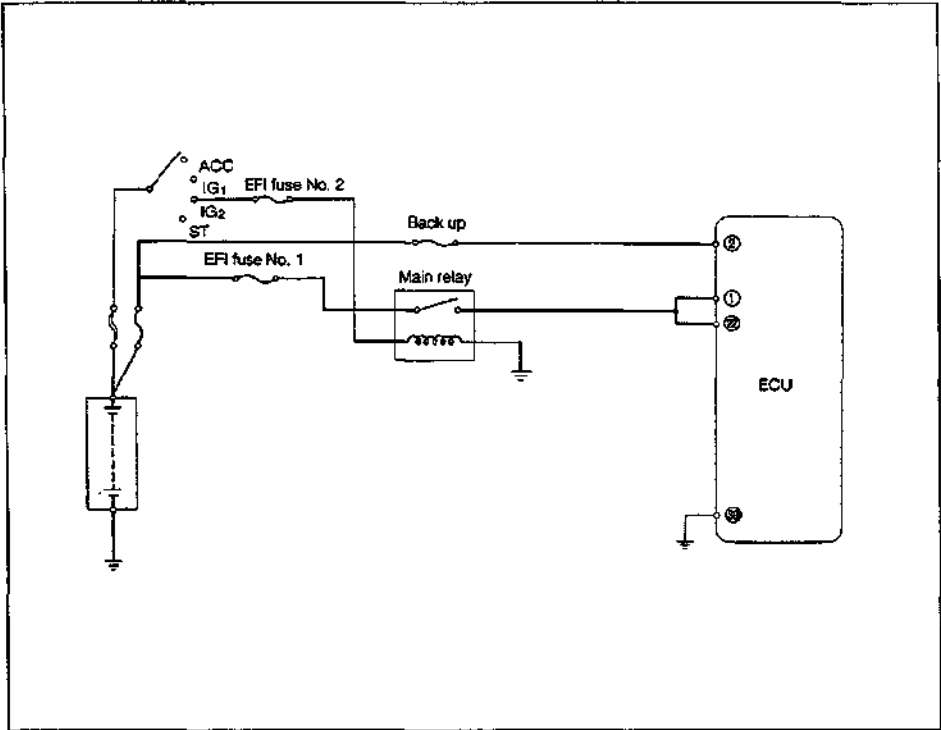
- The trouble shooting procedures described in this section are ones designed for the inspection for each system. Hence, they may differ from actual trouble shooting procedure.
- However, it is advisable that the basic approach to trouble shooting is based on the procedure described in this manual.
- Before you start the inspection, it is a best practice to first make simple checks of the fuses, fusible links and conditions of the connectors.
- The following trouble shooting procedure has been prepared on the assumption that troubles are caused by short circuits or open circuits of external components of the computer or short circuits inside the computer.
- If engine malfunctions persist even when the terminal voltages of the ECU connectors are normal, the ECU may be faulty. Try the trouble shooting using a new ECU.
- However, even when the trouble is solved after the ECU has been replaced, it is imperative to confirm that the trouble was actually attributed to the old ECU by installing the old ECU again.
- When you perform the inspection of wirings, see the section under "Harness & Wiring Diagram."



EFI SYSTEM

No.	Terminals	Trouble	Condition	STD voltage
1	① — ② Ground	No standard voltage	Ignition switch ON	Approx. battery voltage
	② — ③ Ground			
	② — ④ Ground		At all time (But, voltage drops during engine starting period)	

WFB90-EF565



If the SST (09842-87704-000) has not been installed yet, install the SST, referring to the section under "Preparation of Trouble-shooting" at page EF-141.

WFB90-EF565

① or ② — ③

[1] There is no specified voltage between SST terminals ① or ② and ③.

[2] Check that there is specified voltage between SST terminal ① or ② and body ground when ignition switch is turned ON.

NO

YES

Check between ECU terminal ② and body ground.

YES

Repair or replace.

Check fuses, fusible link and wiring harness.

OK

BAD

Repair or replace.

Check ignition switch.

OK

BAD

Repair or replace.

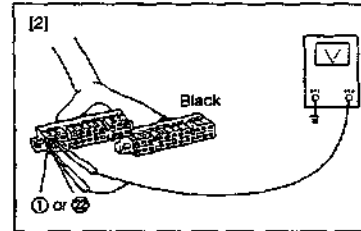
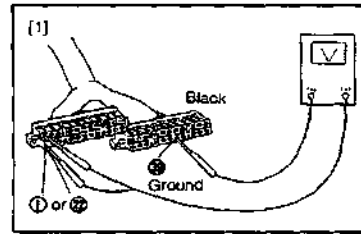
Check EFI main relay. (See page EF-161.)

OK

BAD

Repair or replace.

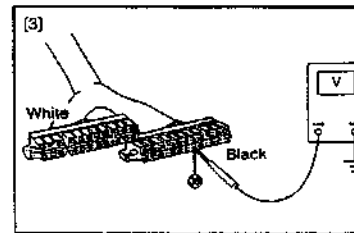
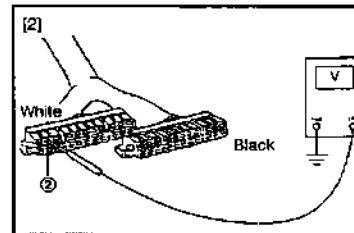
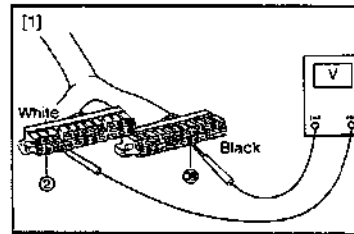
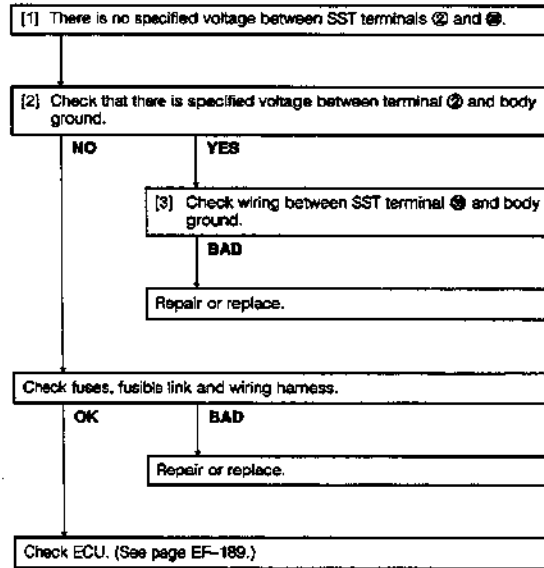
Check ECU. (See page EF-189.)



WFS0-EF67

EFI SYSTEM

② — ⑤

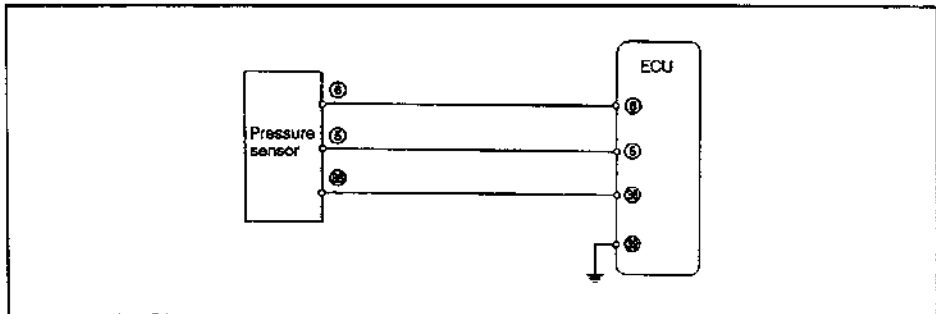


WFE30-EF368

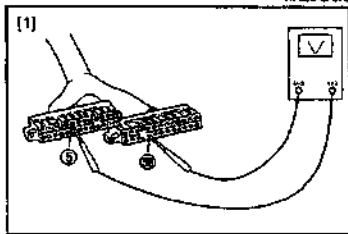
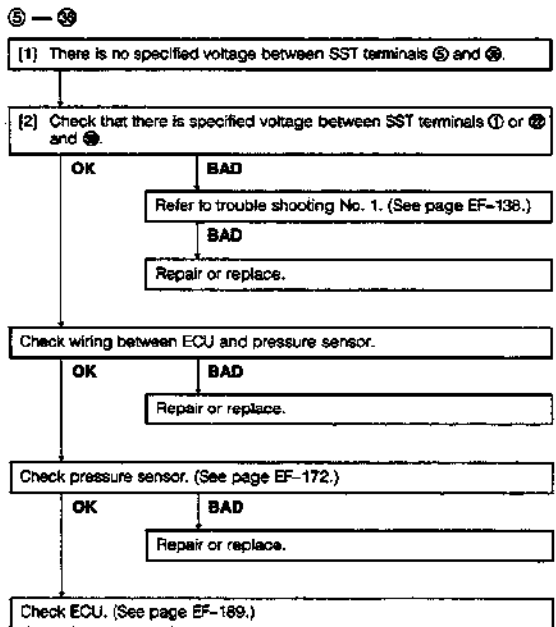
EFI SYSTEM

No.	Terminals	Trouble	Condition		STD voltage
2	⑤ — ⑥ Ground	No voltage	Ignition switch ON		4.5 - 5.5 V
	⑥ — ⑦ Ground	No standard voltage	Ignition switch ON	When atmospheric pressure of 101.3 kPa (760 mmHg) exists:	3.2 - 4.0 V

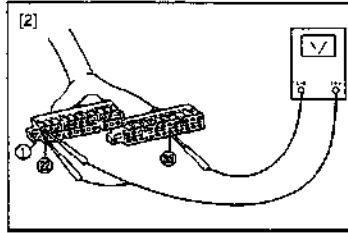
WF890-EF569



If the SST (09842-87704-000) has not been installed yet, install the SST, referring to the section under "Preparation of Trouble-shooting" at page EF-141.



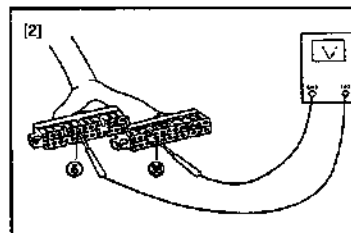
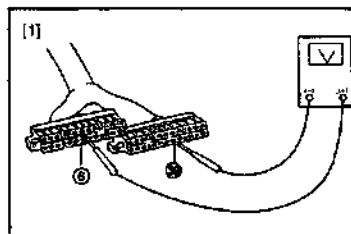
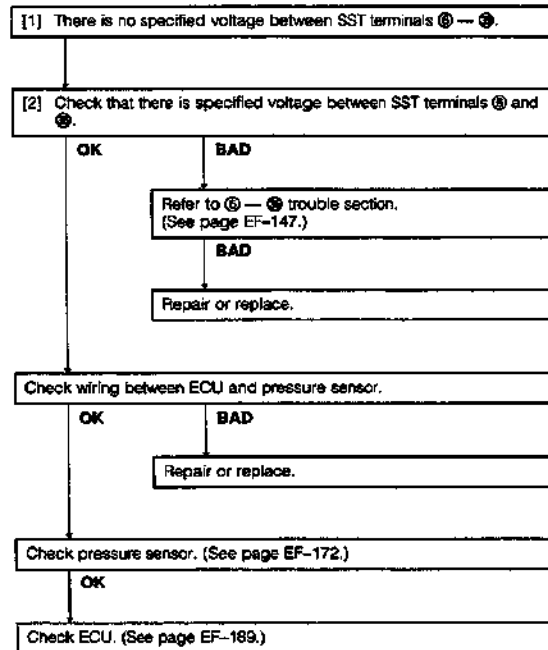
WF890-EF570



WF890-EF571

EFI SYSTEM

⑥ — ⑨

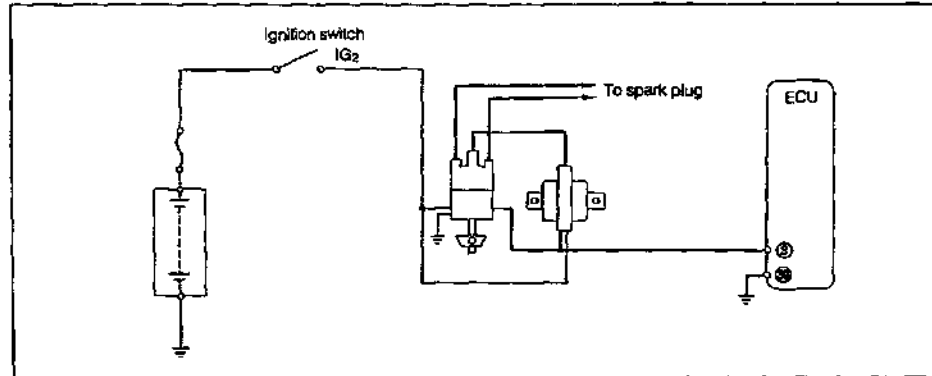


WFE00-EP572

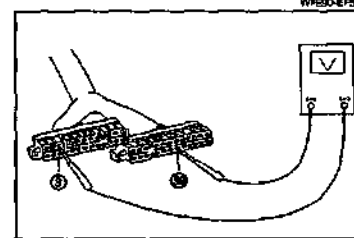
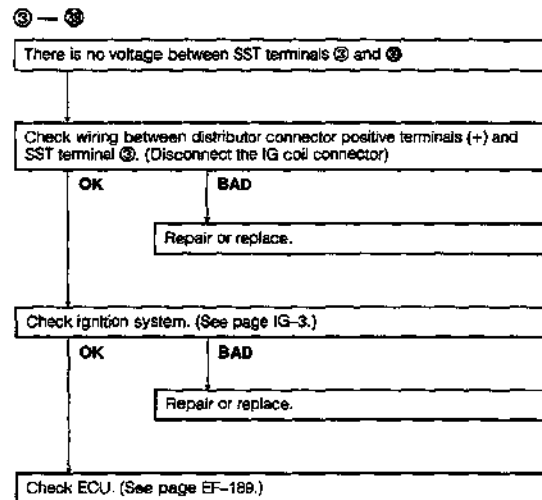
EFI SYSTEM

No.	Terminals	Trouble	Condition	STD voltage
3	③ — ④	No voltage	Ignition switch ON (Engine stopped state)	Approx. battery voltage

WFE50-EF573



If the SST (09842-87704-000) has not been installed yet, install the SST, referring to the section under "Preparation of Trouble-shooting" at page EF-141.

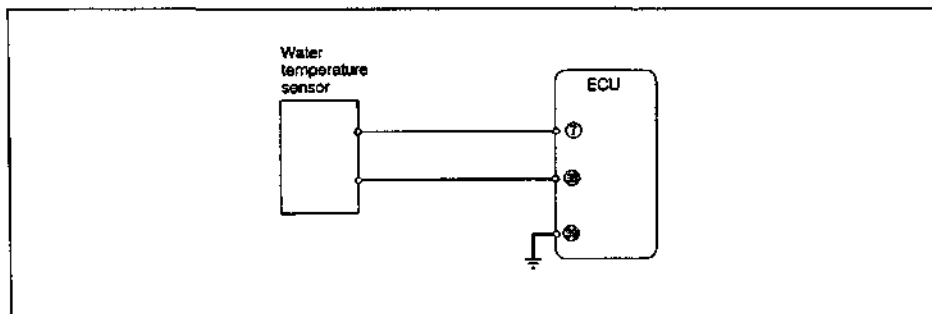


WFE50-EF575

EFI SYSTEM

No.	Terminals	Trouble	Condition		STD voltage
4	① — ③ Ground	No specified voltage	Ignition switch ON	When cooling water temperature is 80°C	0.4 - 0.65 V

WPB0-EP576



If the SST (09842-87704-000) has not been installed yet, install the SST, referring to the section under "Preparation of Trouble-shooting" at page EF-141.

[1] There is no specified voltage between SST terminals ① and ③.

[2] Check that there is voltage between SST terminals ① or ② and ③ when ignition switch is turned ON.

OK

BAD

Refer to (① or ② — ③) trouble section No. 1.
(See page EF-145.)

Check wiring between ECU and water temperature sensor.

OK

BAD

Repair or replace.

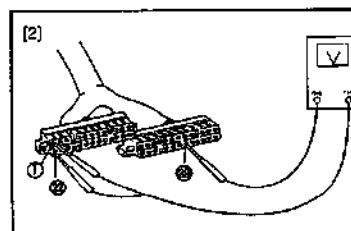
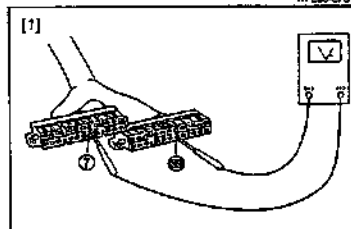
Check water temperature sensor. (See page EF-165.)

OK

BAD

Replace water temperature sensor.

Check ECU. (See page EF-189.)

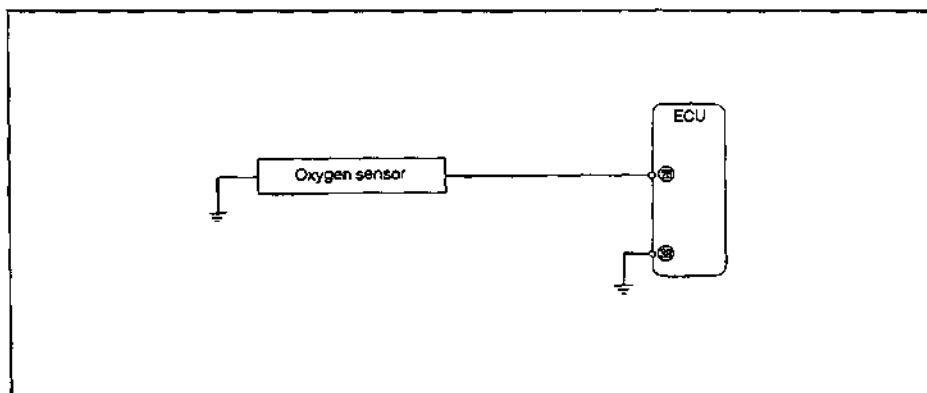


WPB0-EP575

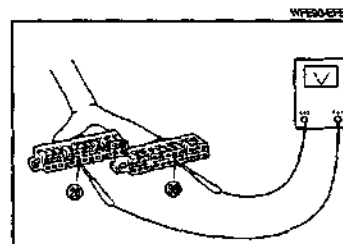
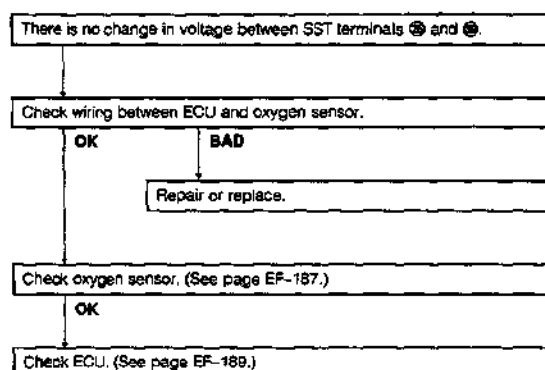
EFI SYSTEM

No.	Terminals	Trouble	Condition	STD voltage
5	② — ③ Ground	No voltage change	Ignition switch ON When engine revolution speed is held at 3000 rpm after having warmed up engine fully:	Voltage changes more than 8 times within 10 seconds.

WP200-EF179



If the SST (09842-87704-000) has not been installed yet, install the SST, referring to the section under "Preparation of Trouble-shooting" at page EF-141.

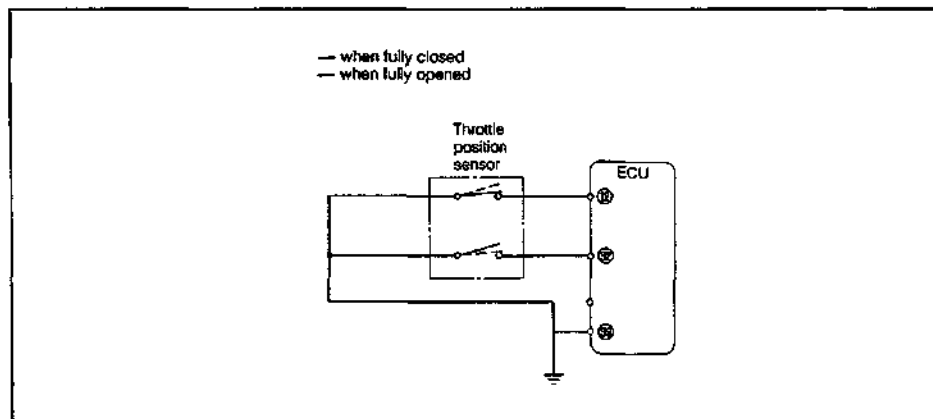


WP200-EF181

EFI SYSTEM

No.	Terminals	Trouble	Condition		STD voltage
7	① — ② Ground	More than 5 V	Ignition switch ON	Throttle valve fully closed	Less than 5 V
		No voltage	Ignition switch ON	Throttle valve fully opened	Approx. battery voltage
	③ — ④ Ground	No voltage	Ignition switch ON	Throttle valve fully closed	Approx. battery voltage
		More than 5 V	Ignition switch ON	Throttle valve fully opened	Less than 5 V

WFE90-EP682



If the SST (09842-87704-000) has not been installed yet, install the SST, referring to the section under "Preparation of Trouble-shooting" at page EF-141.

WFE90-EP683

⑫ — ⑬

[1] There is no specified voltage between SST terminals ⑬ and ⑭.

[2] Check that there is voltage between SST terminals ① or ② and ③ when ignition switch is turned ON.

OK

BAD

Refer to ① or ② and ③ trouble section No. 1.
(See page EF-145.)

Check throttle position sensor. (See page EF-170.)

OK

BAD

Replace.

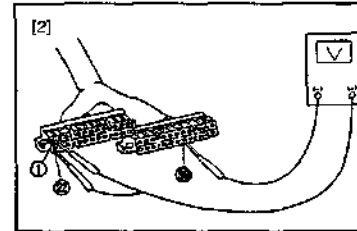
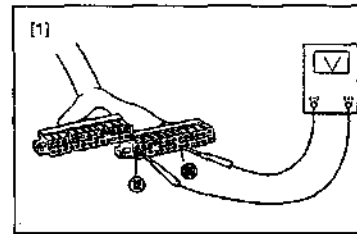
Check wiring between ECU and throttle position sensor.

OK

BAD

Repair or replace.

Check ECU (See page EF-189.)



WFE00-6P584

EFI SYSTEM

② — ③

[1] There is no specified voltage between SST terminals ② and ③.

[2] Check that there is voltage between SST terminals ① or ② and ③ when ignition switch is turned ON.

OK

BAD

Refer to ① or ② and ③ trouble section No. 1.
(See page EF-145.)

Check throttle position sensor. (See page EF-170.)

OK

BAD

Replace.

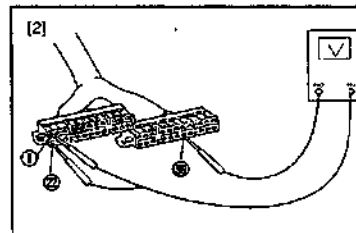
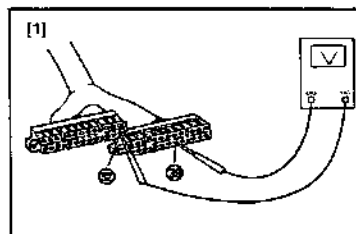
Check wiring between ECU and throttle position sensor.

OK

BAD

Repair or replace.

Check ECU. (See page EF-189.)

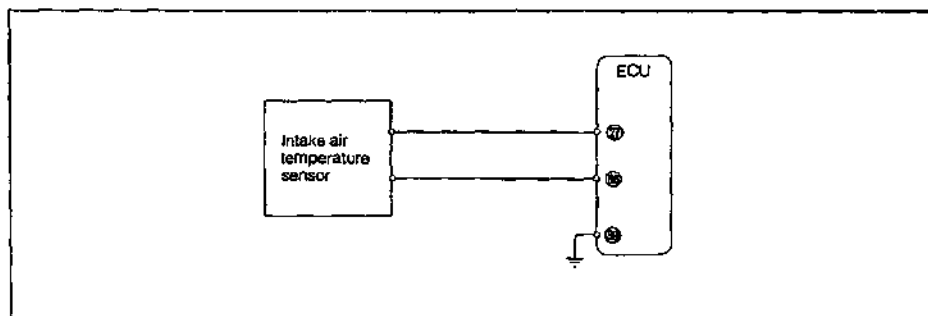


WPES0-EP585

EFI SYSTEM

No.	Terminals	Trouble	Condition	STD voltage
8	② — ③ Ground	No specified voltage	Ignition switch ON When air temperature inside intake manifold is 20°C	1.5 - 3.0 V

WP80-67586



If the SST (09842-87704-000) has not been installed yet, install the SST, referring to the section under "Preparation of Trouble-shooting" at page EF-141.

WP80-67587

[1] There is no specified voltage between SST terminals ② and ③.

[2] Check that there is voltage between SST terminals ① or ② and ③ when ignition switch is turned ON.

OK

BAD

Refer to ① or ② and ③ trouble section No. 1.
(See page EF-145.)

Check intake air temperature sensor. (See page EF-188.)

OK

BAD

Replace intake air temperature sensor.

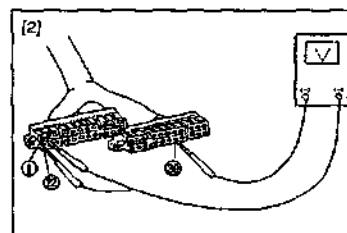
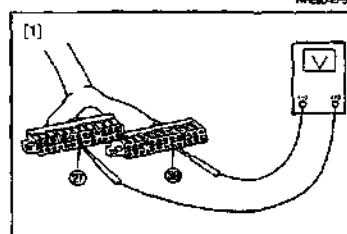
Check wiring between ECU and Intake air temperature sensor.

OK

BAD

Repair or replace.

Check ECU. (See page EF-189.)

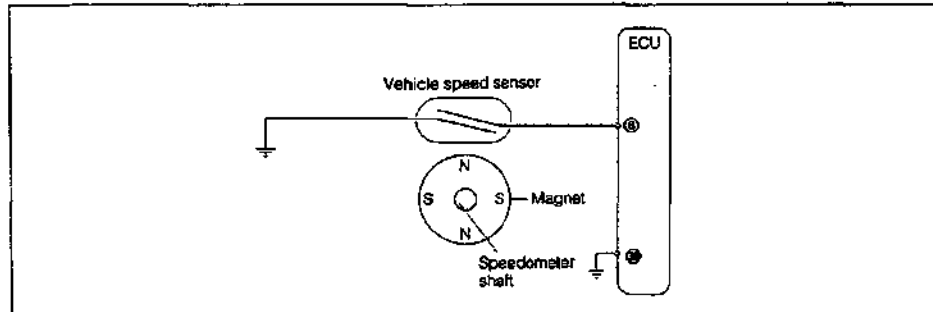


WP80-67588

EFI SYSTEM

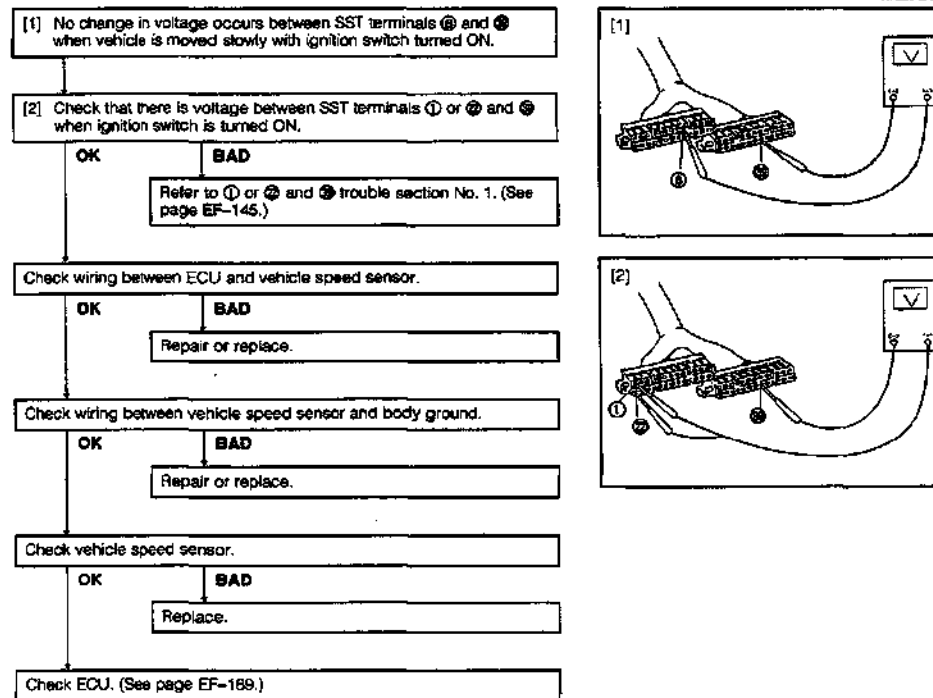
No.	Terminals	Trouble	Condition	STD voltage
9	③ — ④ Ground	No voltage changes	Ignition switch ON When vehicle is moved slowly:	0 - Approx. battery voltage

WPB0-EP599



If the SST (09842-87704-000) has not been installed yet, install the SST, referring to the section under "Preparation of Trouble-shooting" at page EF-141.

WPB0-EP599

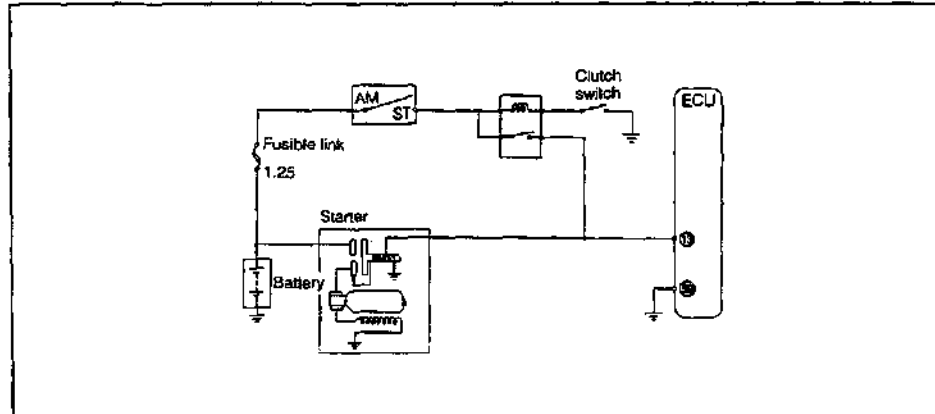


WPB0-EP599

EFI SYSTEM

No.	Terminals	Trouble	Condition	STD voltage
10	③ — ⑤ Ground	No voltage	Ignition switch set to ST position	More than 6 V

WP80-EP82



If the SST (09842-87704-000) has not been installed yet, install the SST, referring to the section under "Preparation of Trouble-shooting" at page EF-141.

There is no voltage between SST terminals ③ and ⑤ when ignition switch is set to ST position.

Check starter operation.

BAD

OK

Check wiring between ECU and starter terminals.

BAD

Repair or replace.

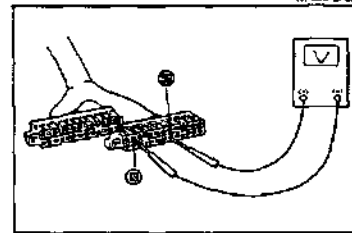
Check battery, fusible link, ignition switch, starter, starter relay and shift position switch or clutch switch.

OK

BAD

Repair or replace.

Check ECU. (See page EF-189.)



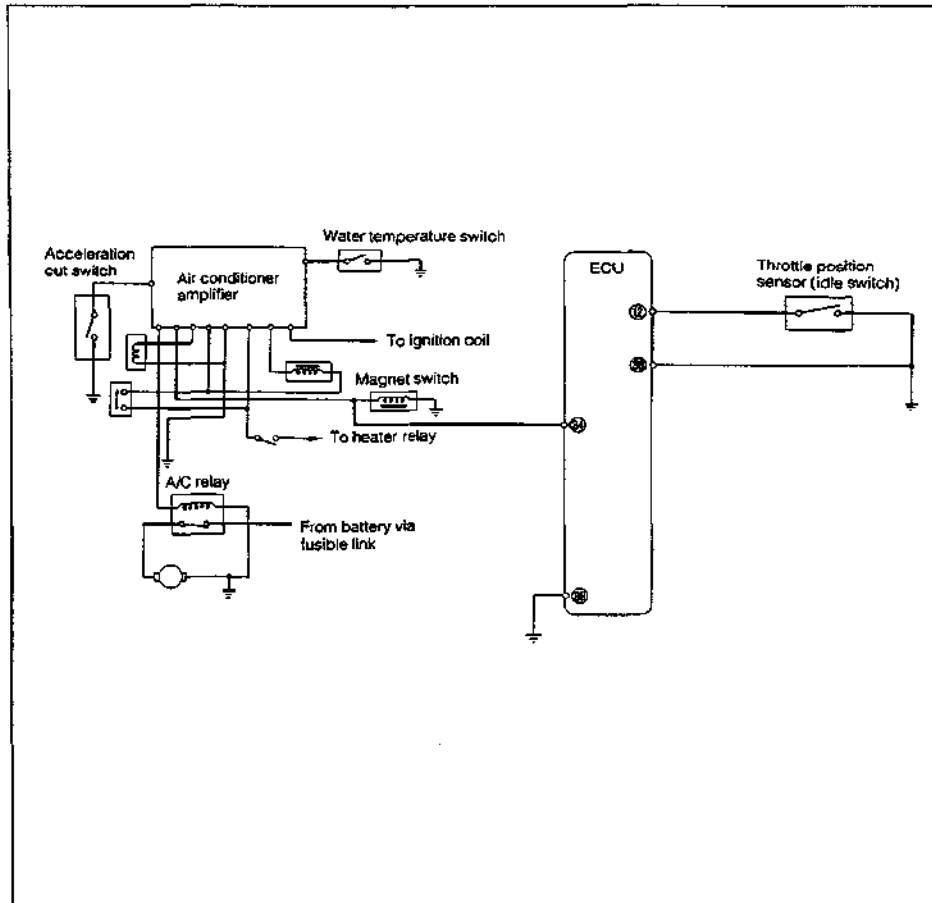
WP80-EP82

WP80-EP84

EFI SYSTEM

No.	Terminals	Trouble	Condition	STD voltage
11	⑫ — ⑬ Ground	No voltage	When engine is operating and compressor magnet clutch of air conditioner is energized:	Approx. battery voltage
	⑫ — ⑬ Ground	More than 5 V		Less than 5 V
		No voltage	Throttle valve fully opened	Approx. battery voltage

WFE90-6F965



If the SST (09842-87704-000) has not been installed yet, install the SST, referring to the section under "Preparation of Trouble-shooting" at page EF-141.

WFE90-6F966

②-⑤

There is no specified voltage between SST terminals ② and ⑤ when magnet clutch is operated.

Check magnet clutch operation.

BAD

OK

Check wiring between ECU terminal ② and air conditioner amplifier terminal.

BAD

Check air conditioner system.

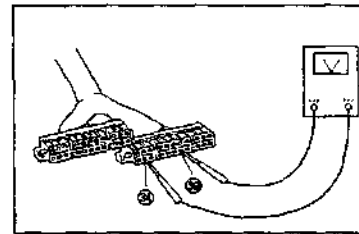
OK

BAD

Repair.

Repair or replace.

Check ECU. (See page EF-189.)



②-⑤

[1] There is no specified voltage between SST terminals ② and ⑤.

[2] Check that there is voltage between SST terminals ① or ② and ⑤ when ignition switch is turned ON.

OK

BAD

Refer to ① or ② and ⑤ trouble section No. 1. (See page EF-145.)

Check throttle position sensor. (See page EF-170.)

OK

BAD

Replace throttle position sensor.

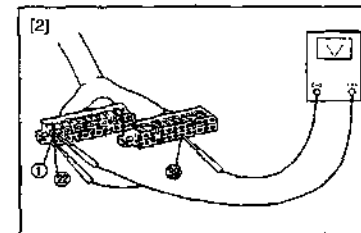
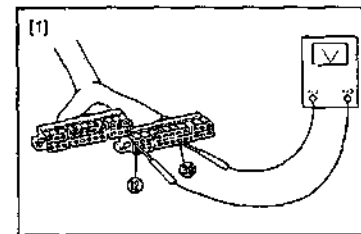
Check wiring between throttle position sensor and body ground.

OK

BAD

Repair or replace.

Check ECU. (See page EF-189.)



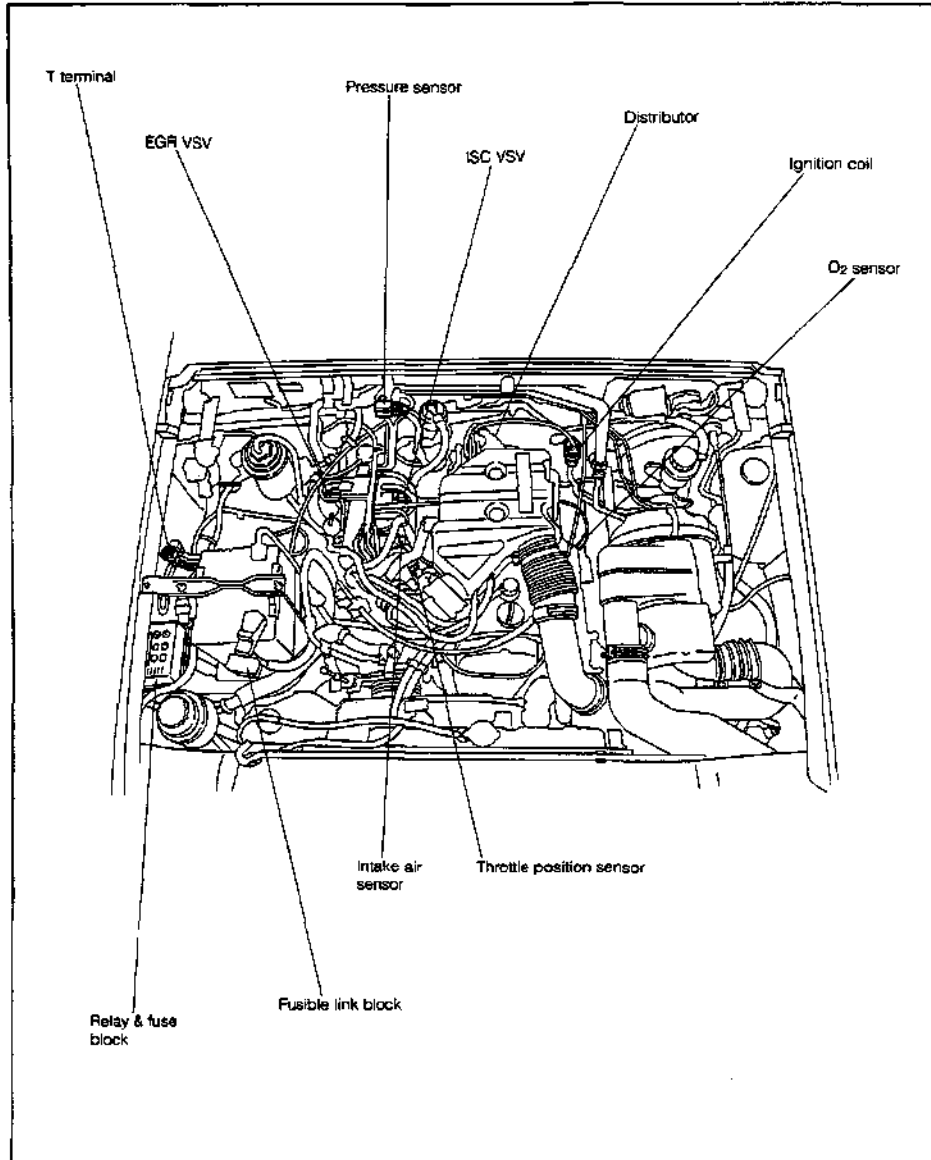
WF530-EF587

WF530-EF588

EFI SYSTEM

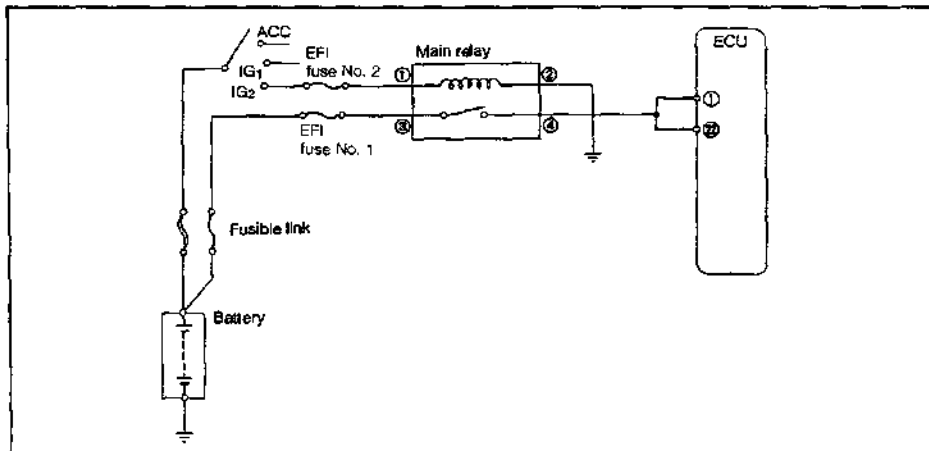
ELECTRONIC CONTROL SYSTEM

LOCATION OF ELECTRONIC CONTROL PARTS



WPB90-EF530

MAIN RELAY



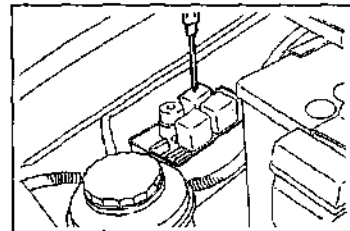
Inspection of EFI main relay

1. Check of main relay operation

Turn ON the ignition switch. Check to see if you can hear a relay operating sound or if you can feel operating vibrations when a screwdriver or the like is brought into contact with the relay.

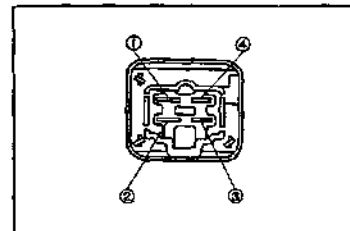
CAUTION:

- The relay may become very hot during the operation. Hence, do not touch the relay by your hand.



2. Inspection of relay continuity

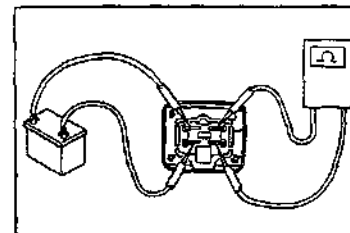
- (1) Remove the main relay from relay box.
- (2) Check that there is continuity between the terminals ① and ②.
- (3) Check that there is no continuity between the terminals ③ and ④.
- (4) Check that there is no continuity between the terminals ① and ③ and also between the terminals ① and ④.
- (5) Check that there is no continuity between the terminals ② and ③ and also between the terminals ② and ④.



If the continuity test results do not conform to specifications, replace the relay.

3. Inspection of relay operation

- (1) Apply the battery voltage across the terminals ① and ②.
- (2) Check that there is continuity between the terminals ③ and ④.



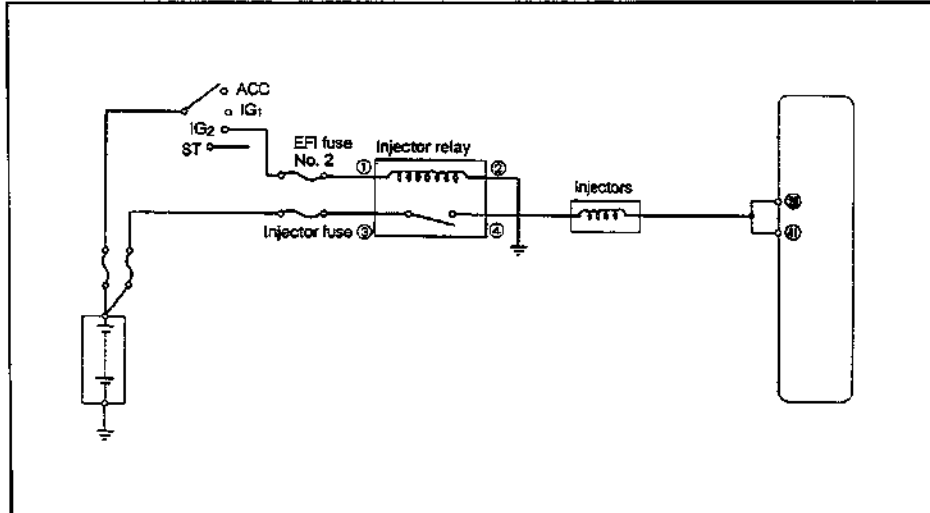
If the operation test results do not conform to specifications, replace the relay.

EFI SYSTEM

4. If the main relay persists to be inoperative after the checks 1 through 3 have been performed satisfactorily, check the following items.
 - (1) Fusible links
 - (2) Ignition switch
 - (3) Fuses
 - (4) Wiring and wiring connector
5. Install the main relay to the relay box. Attach the cover.

INJECTOR RELAY

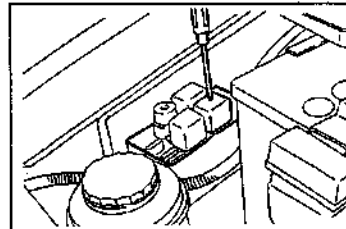
WFE90-EP804



WFE90-EP806

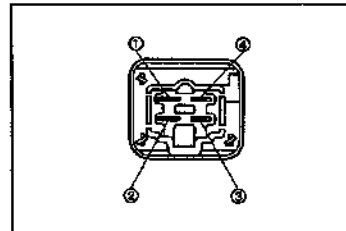
Inspection of injector relay

1. Check of injector relay operation
Turn ON the ignition switch. Check to see if you can hear a relay operating sound or if you can feel operating vibrations when a screwdriver or the like is brought into contact with the relay.
CAUTION:
 - The relay may become very hot during the operation. Hence, do not touch the relay by your hand.



WFE90-EP808

2. Inspection of relay continuity
(1) Remove the injector relay from the relay box.
Check that there is continuity between the terminals ① and ②.



WFE90-EP807

- Check that there is no continuity between the terminals ③ and ④.
- Check that there is no continuity between the terminals ① and ③ and also between the terminals ① and ④.
- Check that there is no continuity between the terminals ② and ③ and also between the terminals ② and ④.

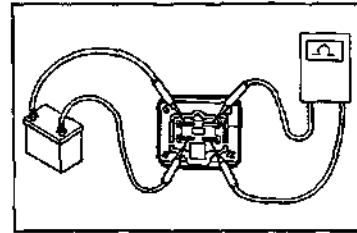
If the continuity test results do not conform to specifications, replace the relay.

WP230-EP508

3. Inspection of relay operation
 - (1) Apply the battery voltage across the terminals ① and ②.
 - (2) Check that there is continuity between the terminals ③ and ④.

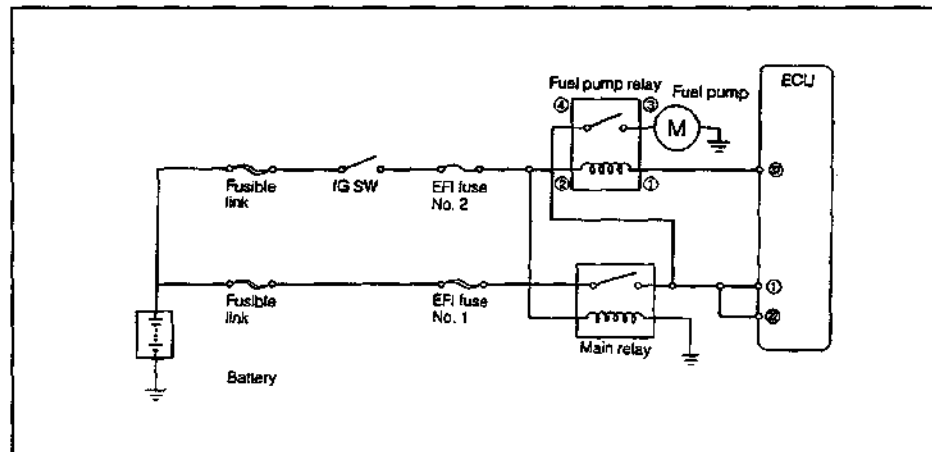
If the operation test results do not conform to specifications, replace the relay.

4. If the injector relay persists to be inoperative after the checks 1 through 3 have been performed satisfactorily, check the following items.
 - (1) Fusible links
 - (2) Fuses
 - (3) Ignition switch
 - (4) Wiring and wiring connector
5. Install the injector relay to the relay box. Attach the cover.



WP230-EP509

FUEL PUMP RELAY



WP230-EP610

EFI SYSTEM

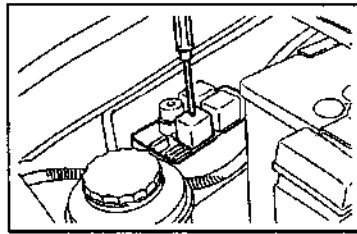
Inspection of Fuel Pump Relay

1. Check of fuel pump relay operation

When the ignition switch is set to the ON position, check to see if the relay emits an operating sound. Or check to see if you will feel an operating vibration with a screwdriver or the like placed on the relay.

CAUTION:

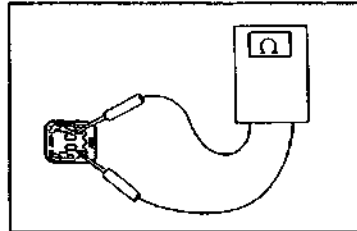
- The relay may become very hot during the operation. Hence, do not touch the relay by your hand.



WFES0-EP611

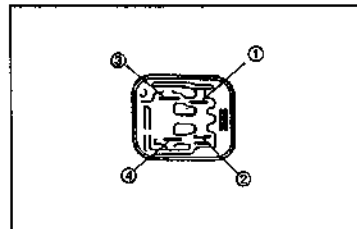
2. Inspection of relay continuity

- (1) Check that there is continuity between the terminals ① and ②.
- (2) Check that there is no continuity between the terminals ③ and ④.



WFES0-EP612

- (3) Check that there is no continuity between the terminals ① and ③ and also between the terminals ① and ④.
- (4) Check that there is no continuity between the terminals ② and ③ and also between the terminals ② and ④.

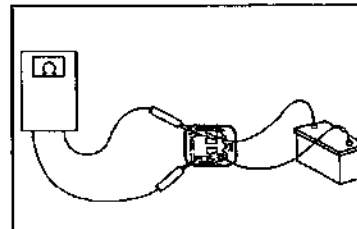


WFES0-EP613

If the continuity test results do not conform to specifications, replace the relay.

3. Inspection of relay operation

- (1) Apply the battery voltage across the terminals ① and ②.
- (2) Check that there is continuity between the terminals ③ and ④.



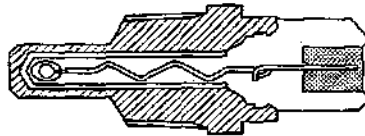
If the operation test results do not conform to specifications, replace the relay.

4. If the fuel pump relay persists to be inoperative after the checks 1 through 3 have been performed satisfactorily, check the following items.

- (1) Fusible links
- (2) Ignition switch
- (3) Fuses
- (4) Main relay (See page EF-161.)
- (5) Wiring and wiring connector
- (6) ECU (See page EF-189.)

WFES0-EP614

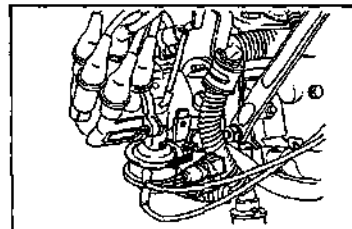
WATER TEMPERATURE SENSOR


Inspection of Water Temperature Sensor
Measurement of resistance of water temperature sensor

1. Disconnect the connector.

NOTE:

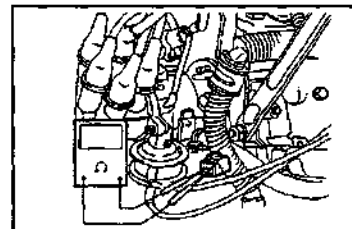
- Be sure to un-lock the lock of connector, when disconnect or connect the connector.



2. Start the engine. Read the resistance at the time when the engine is warmed up fully.

Resistance: $0.32 \pm 0.1 \text{ k}\Omega$

If the measured resistance will not conform to the specification, remove the water temperature sensor and perform the unit inspection.

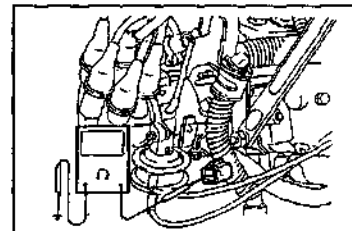


3. Check that there is no continuity between each terminal of the water temperature sensor and the body.

If there is continuity, replace the water temperature sensor.

NOTE:

- Before the water temperature sensor is removed, drain the coolant. (See page CO-12.)
- After completion of the sensor replacement, refill the coolant. (See page CO-13.)



EFI SYSTEM

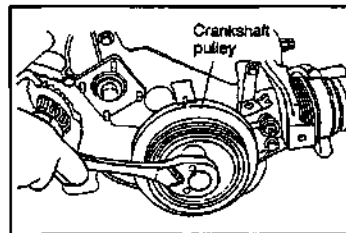
Water temperature sensor removal and unit test

1. Disconnect the ground cable terminal from the negative (-) terminal of the battery.
2. Drain the cooling water. (See page CO-12.)

WFE90-EF519

3. Distributor removal

- (1) Turn the crankshaft, until the mark on the crankshaft timing belt pulley is aligned with the indicator mark on the timing belt cover. Ensure that the rocker arms of the cylinder No.1 at the timing belt side are in a free state. If the rocker arms are not in a free state, turn the crankshaft one more complete turn 360°.

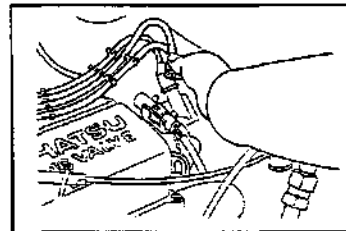


WFE90-EF520

- (2) Remove the spark plug wires from the distributor cap.

NOTE:

- Be sure to remove the spark plug wire by holding the rubber grommet. Never pull out the cord section.



- (3) Disconnect the distributor connector.
- (4) Disconnect the vacuum hoses from the vacuum advance.
- (5) Remove the distributor by removing the distributor set bolts.

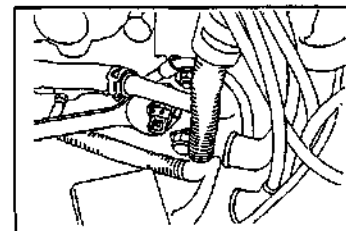
NOTE:

- Since the oil flows out during the removal, place a suitable cloth underneath the distributor.

WFE90-EF521

4. Removal of water temperature sensor

- (1) Remove the water temperature sensor connector.
- (2) Remove the water temperature sensor.



WFE90-EF522

5. Unit check

- (1) Immerse the heat sensing section of the water temperature sensor in water. Raise the water temperature gradually. Check to see if the resistance varies within the specified values in accordance with the table below.

Specifications

Water temperature °C	Resistance (kΩ)
80	0.322 ± 0.1
60	0.584 ± 0.2
40	1.140 ± 0.3
20	2.450 ± 0.5
0	5.88 ± 1.5
-20	16.2 ± 3.2

If the resistance will not conform to the specifications, replace the water temperature sensor.

- (2) Check that there is no continuity between each terminal of the water temperature sensor and sensor body. If there is continuity, replace the intake air temperature sensor.

6. Installation of water temperature sensor

- (1) Wind sealing tape to the water temperature sensor switch and install it to the cylinder. Connect the connector.

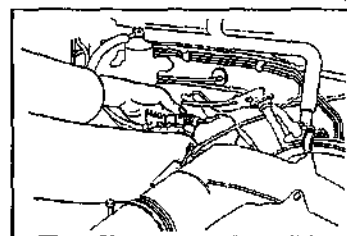
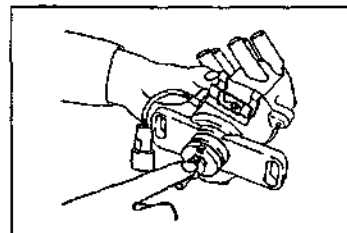
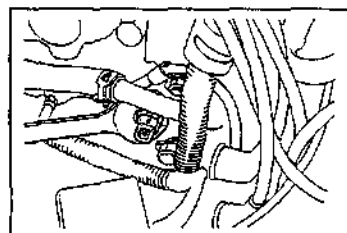
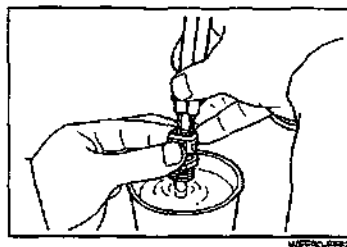
Tightening Torque: 24.4 - 34.3 N·m (2.5 - 3.5 kgf-m)

NOTE:

- The new sensor is coated with sealer. Hence, when the sensor is replaced with a new one, first remove the sealer thoroughly. Then, wind the seal tape. Also, be sure to clean the threaded holes at the cylinder head side.

- (2) Distributor installation (See page IG-27.)

- ① Replace the distributor "O" ring with a new part.
- ② With the coupling cut-out section of the distributor aligned with the cut-out section of the distributor body, insert the distributor into the cylinder head. At this time, ensure that the distributor attaching bolt hole of the cylinder head comes at the center of the elongated hole for the distributor bolt. Then, torque the distributor set bolt.
- ③ Connect the vacuum hoses to the vacuum advancer.
- ④ Connect the distributor connector. Install the connector to the clamp.
- ⑤ Connect the high-tension cords to the distributor cap.

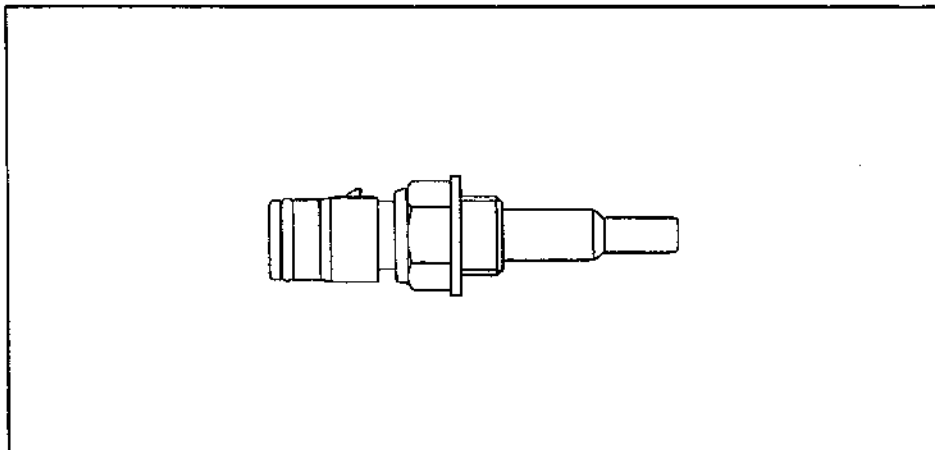


EFI SYSTEM

- (3) Connect the ground cable terminal to the battery negative (-) terminal.
- (4) Fill cooling water. (See page CO-13.)
- (5) Adjust the ignition timing. (See page EM-23.)
- (6) Start the engine. Ensure that no water or oil leakage is present.
- (7) Check the oil level. (See page LU-9.)

WFE90-EP627

INTAKE AIR TEMPERATURE SENSOR



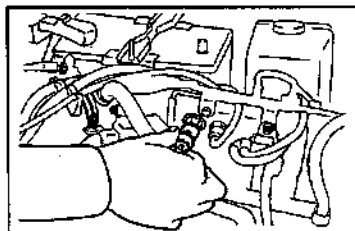
WFE90-EP628

Inspection of Intake Air Temperature Sensor Measurement of resistance of intake air temperature sensor

1. Disconnect the connector.

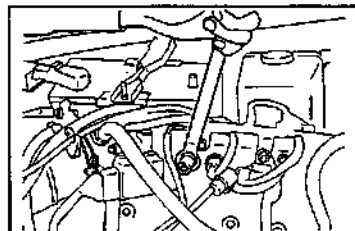
NOTE:

- Do not pull out the lead wire. While holding the connector section, unlock the lock and pull out the connector.



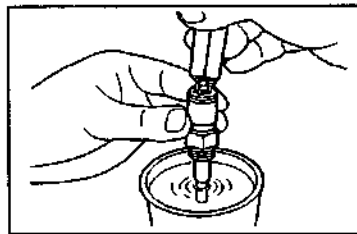
WFE90-EP629

2. Remove the intake air temperature sensor.



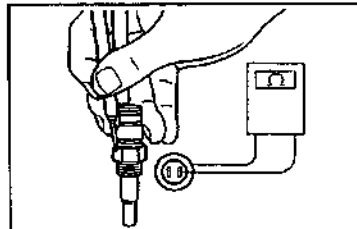
WFE90-EP630

3. Immerse the heat sensing section of the intake air temperature sensor in water. Raise the water temperature gradually. Check to see if the resistance varies within the specified values in accordance with the table in the preceding page. If the measured resistance will not conform to the specifications, replace the intake air temperature sensor.



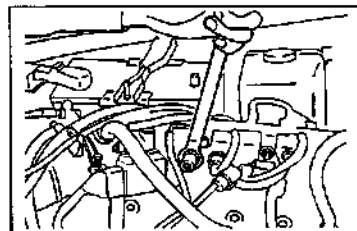
WP520-EP501

4. Check that there is no continuity between each terminal of the intake air temperature sensor and the sensor body. If there is continuity, replace the intake air temperature sensor.



WP520-EP502

5. Install the intake air temperature sensor to the surge tank with a new gasket interposed.
Tightening Torque: 29.4 - 39.2 N·m (3.0 - 4.0 kgf·m)

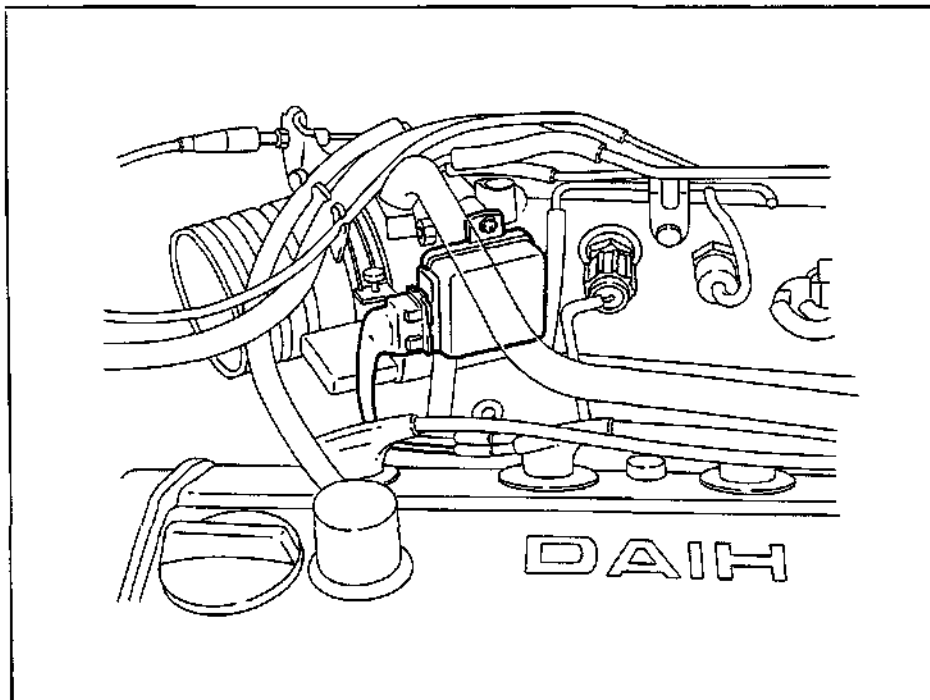


WP520-EP503

6. Connect the intake air temperature sensor connector.

EFI SYSTEM

THROTTLE POSITION SENSOR



Inspection of throttle position sensor

1. Remove the air chamber. (See page EM-17.)
2. Unlock the throttle position sensor connector and disconnect it.

CAUTION:

- When disconnecting the connector, care must be exercised to ensure that no excessive load is applied to the throttle position sensor.

3. Measure the resistance between the terminals of the throttle position sensor.

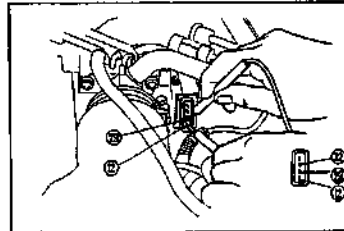
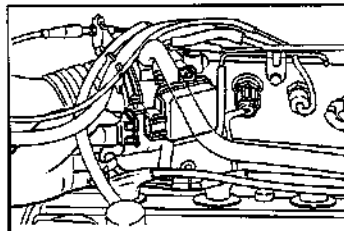
(1) Measure the resistance between ① and ② under the following conditions.

Throttle valve closed fully	29 kΩ or less at 20°C
Throttle valve opened fully	1000 kΩ or more

If the measured resistance does not conform to the specification, replace the throttle body. (See page EF-224.)

CAUTION:

- Be very careful not to damage the terminal.



- (2) Measure the resistance between ② and ③ under the following conditions.

Throttle valve closed fully	1000 kΩ or more
Throttle valve opened fully	29 kΩ or less

If the measured resistance does not conform to the specification, replace the throttle body. (See page EF-224.)

CAUTION:

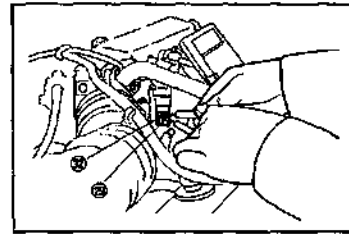
- Be very careful not to damage the terminal.

4. Connect the throttle position sensor connector.

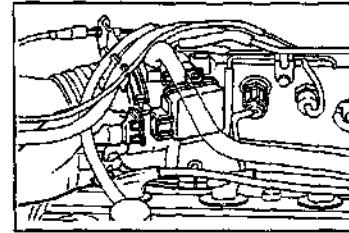
CAUTION:

- When connecting the connector, care must be exercised to ensure that no excessive load is applied to the throttle position sensor.

5. Install the air chamber. (See page EM-22.)



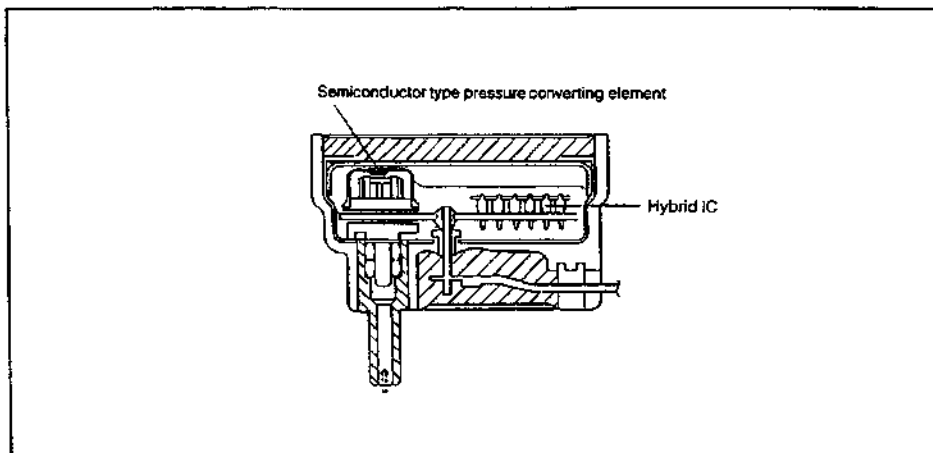
WPED-EP667



WPED-EP630

EFI SYSTEM

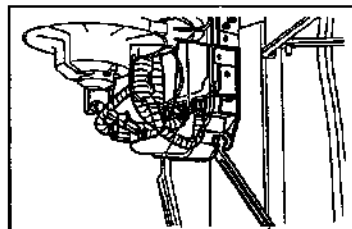
PRESSURE SENSOR



Inspection of Pressure Sensor

Measurement of output voltage of pressure sensor

1. Connection of SST
 - (1) Disconnect the ground cable terminal from the negative (-) terminal of the battery.
 - (2) Remove the ECU cover.

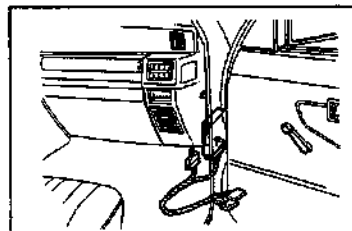


- (3) Connect the following SST between the ECU and the engine wire.
SST: 09842-87704-000

NOTE:

- Before the SST is installed, be sure to perform continuity and short tests between the SST terminals.

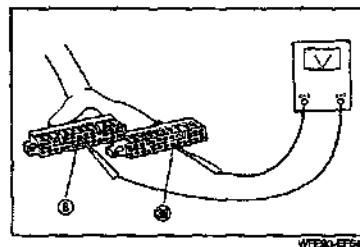
- (4) Reconnect the ground cable terminal to the negative (-) terminal of the battery.



2. Check of output of pressure sensor
 (1) Measure the voltage between the SST terminals ⑤ and ⑥ when the ignition switch is turned ON.

Specified Value

Measuring point	Atmospheric pressure	Voltage V
Altitude (height above sea level) m	kPa (mmHg)	
0	101.3 kPa (760 mmHg)	3.2 - 4.0
500	95.5 kPa (716 mmHg)	3.1 - 3.8
1000	89.9 kPa (674 mmHg)	3.0 - 3.6



If the measured voltage does not conform to the specification, measure the voltage between the SST terminals ⑤ and ⑥. Ensure that the measured voltage is within a range of 4.5 to 5.5 volts. Then, proceed to replace the pressure sensor.

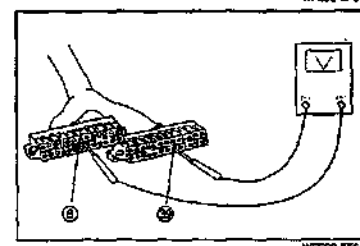
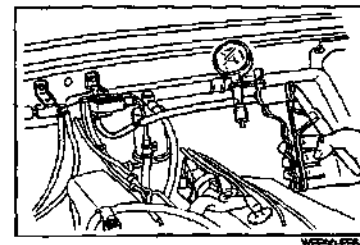
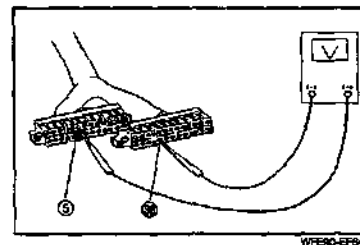
When the pressure sensor is replaced, it is necessary to replace the gas filter, too.

If the measured voltage between the SST terminals ⑤ and ⑥ does not conform to the specification, check the wiring between the ECU and the pressure sensor. If there is no trouble with the wiring, check the ECU. (See page EF-189.)

- (2) Disconnect the rubber hose connected to the pressure sensor. Apply a negative pressure of 26.7 kPa (200 mmHg) to the pressure sensor, using a MityVac. Check that the measured voltage between the SST terminals ⑤ and ⑥ drops by 0.65 - 0.95, compared with the voltage measured in the step (1).

If the measured voltage fails to drop by the specified value, replace the pressure sensor.

When the pressure sensor is replaced, it is necessary to replace the gas filter, too.



EFI SYSTEM

- (3) Remove the MityVac from the pressure sensor.
- (4) Connect the rubber hose disconnected in the step (2) to the pressure sensor.

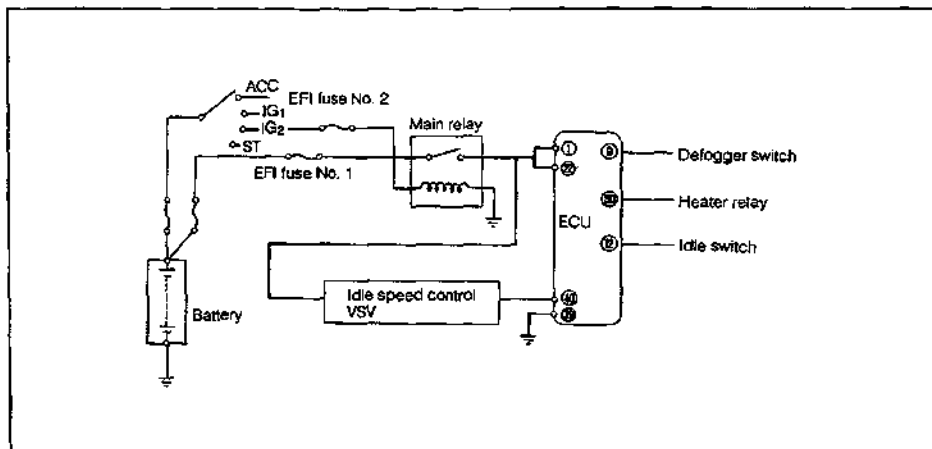
WP820-EP646

3. SST removal

- (1) Disconnect the ground cable terminal from the negative (-) terminal of the battery.
- (2) Remove the SST by disconnecting the ECU and engine wire connectors of the SST.
- (3) Connect the engine wire to the ECU.
- (4) Install the glove compartment box to the instrument panel.
- (5) Reconnect the ground cable terminal to the negative (-) terminal of the battery.

WP820-EP647

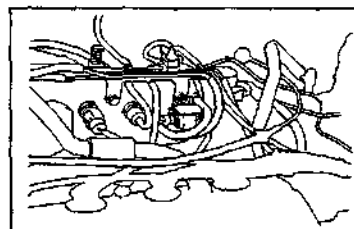
IDLE SPEED CONTROL VSV



Inspection of idle speed control VSV

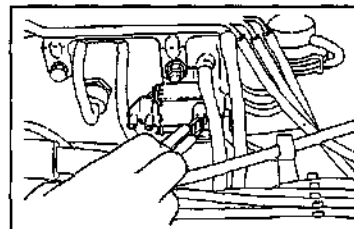
1. Unit inspection of idle speed control VSV

- (1) With the ignition switch turned OFF, disconnect the connector and vacuum hoses which are connected to the idle speed control VSV.

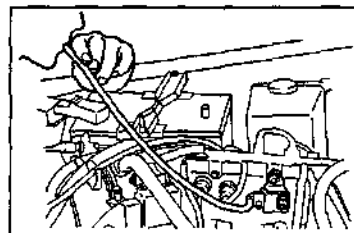


- (2) Check that the resistance between the terminals of the VSV conforms to the specification.
Specified Resistance: 10 - 50 Ω

Replace the VSV with a new part if the resistance does not conform to the specification.

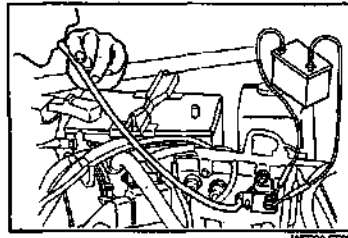


- (3) Connect a suitable rubber hose to the VSV. Ensure that you feel resistance while blowing your breath. Replace the VSV with a new part if you feel no resistance while blowing your breath.

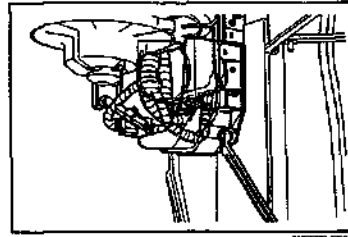


EFI SYSTEM

- (4) Apply the battery voltage to the idle speed control VSV as shown in the right figure.
- (5) Connect a suitable rubber hose to the idle speed control VSV. Ensure that air continuity exists. Replace the VSV with a new part if no air continuity exists.
- (6) Remove the battery voltage from the VSV.
- (7) Connect the disconnected vacuum hoses and connector to the VSV.



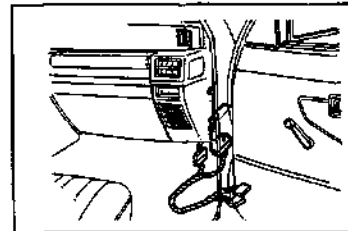
2. Measurement of operation voltage of idle speed control VSV
 - (1) Disconnect the battery ground cable from the negative (-) terminal of the battery.
 - (2) Remove the ECU cover.



- (3) Connect the following SST between the ECU and the engine wire.
SST: 09842-87704-000

NOTE:

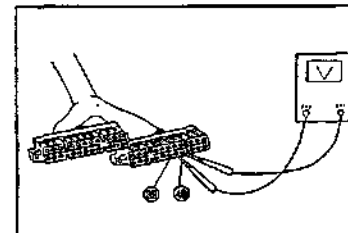
- Before connecting the SST, ensure that no open wire or short exists between the terminals.



- (4) Reconnect the battery ground cable to the negative (-) terminal of the battery.
- (5) Turn ON the ignition switch.

- (6) Ensure that the voltage between the SST terminals ④ and ⑤ (negative) is less than the specified voltage.
Specified Voltage: 3 V or less

Check the ECU if the measured voltage exceeds the specified voltage. (See page EF-189.)



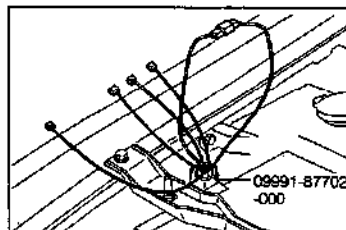
- (7) Remove the cap of the check connector. Connect the following SST.

SST: 09991-87702-000

NOTE:

- Before connecting the SST, ensure that no open wire or short exists in each wiring.

- (8) Connect the test terminal (Brown) with the ground terminal (Black).

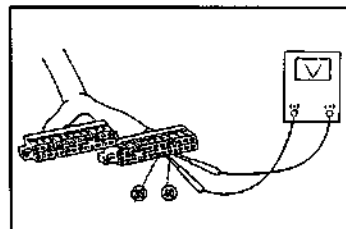


WPBX-82866

- (9) Ensure that the voltage between the SST terminals ⑨ and ⑩ (negative) is approximately the battery voltage.
Specified Voltage: Approximately battery voltage

Check the wiring from the battery to the ECU terminal ⑩ if the measured voltage is less than the specified voltage.

If no abnormality exists in the wiring, check the ECU.
(See page EF-189.)



- (10) Turn OFF the ignition switch.
(11) Remove the SST from the check connector.
(12) Attach the cap to the check connector.
(13) Disconnect the battery ground cable from the negative (-) terminal of the battery.
(14) Remove the SST by disconnecting the ECU and engine wire connectors of the SST.
(15) Reconnect the engine wire to the ECU.
(16) Install the ECU cover to the cowl panel.
(17) Reconnect the ground cable terminal to the negative (-) terminal of the battery.

WPBX-82867

EFI SYSTEM

System inspection of idle speed control VSV

1. Setting conditions prior to check
 - (1) Start and warm up the engine.
 - (2) Turn OFF all accessory switches.
 - (3) Move the shift lever to the neutral position.
 - (4) On the vehicle equipped with power steering, set the steering wheel to the straight-ahead condition.
 - (5) Ensure that the intake or exhaust system exhibits no air and/or gas leakage.
 - (6) Ensure that the air cleaner filter element is installed.
 - (7) Ensure that all vacuum hoses and pipes are connected correctly.

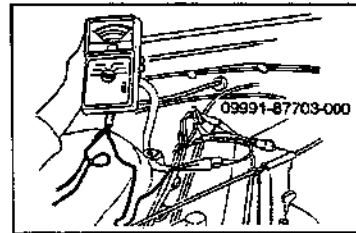
WFE90-EP026

2. Connecting tachometer to engine
Connect the measuring terminal of a tachometer to the engine.

NOTE:

- In case where your tachometer is to be connected to the negative (-) terminal of the ignition coil, connect the following SST, which is to be connected to the distributor connector, between the distributor and the engine wire. Then, connect the tachometer as shown in the right figure.

SST: 09991-87703-000

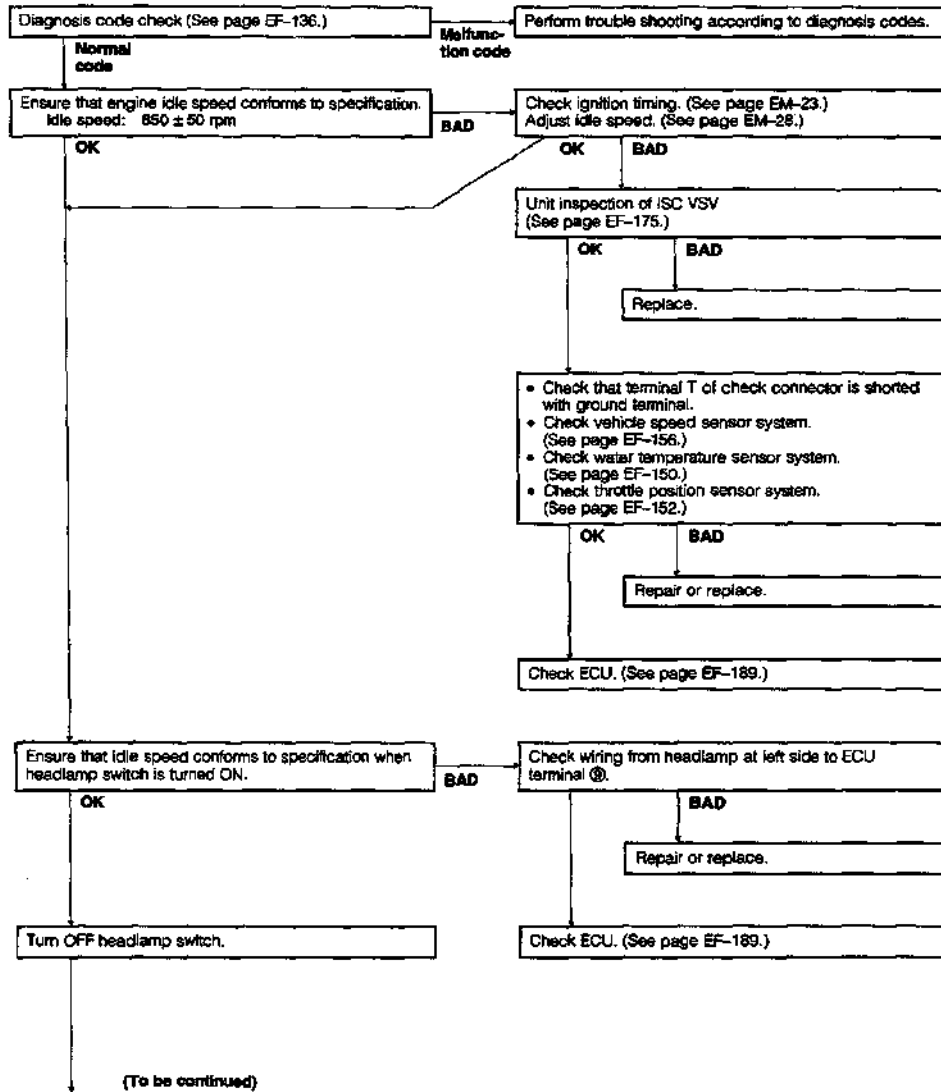


WFE90-EP026

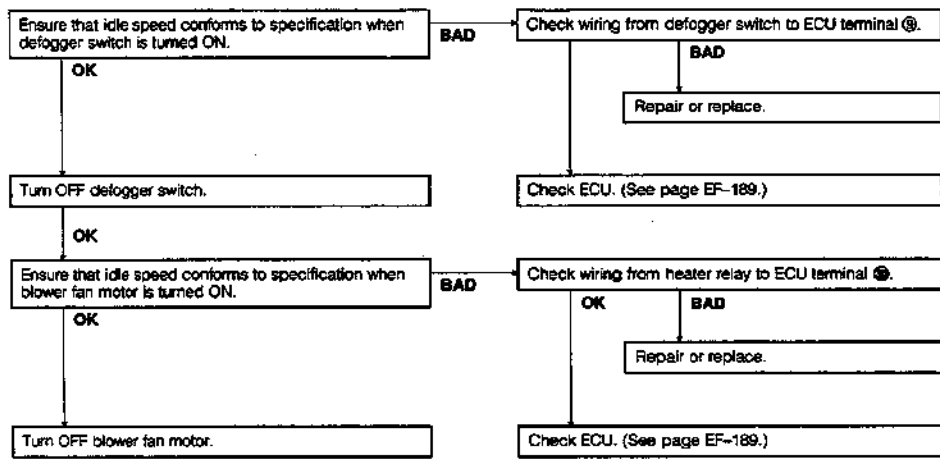
CAUTION:

- Never allow the tachometer terminal to touch the ground terminal as it could result in damage of the ignitor and/or the ignition coil.
- As some tachometers are not compatible with this ignition system, it is imperative to confirm the compatibility of your meter before it is used.

3. Perform the inspection according to the following flow chart.

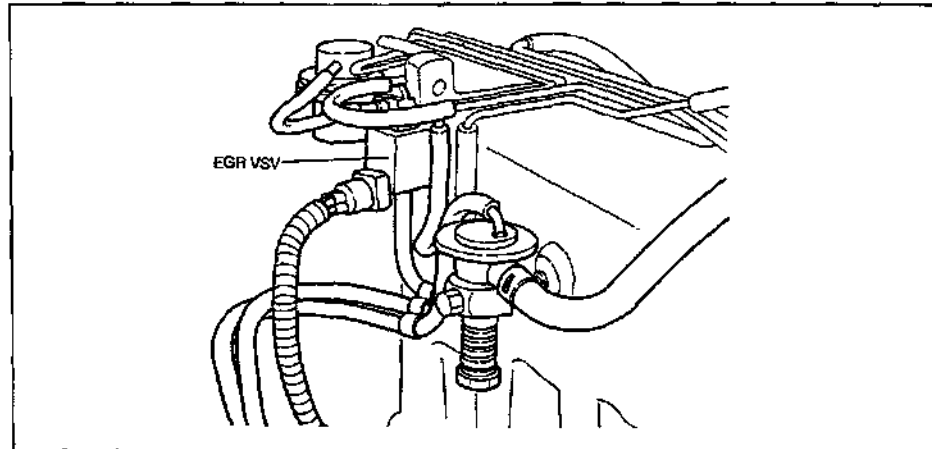


EFI SYSTEM



WFE00-6F000

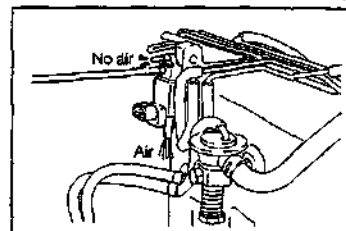
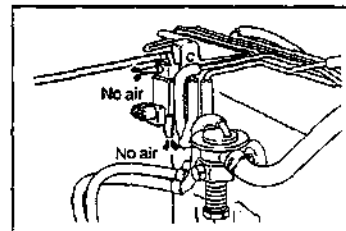
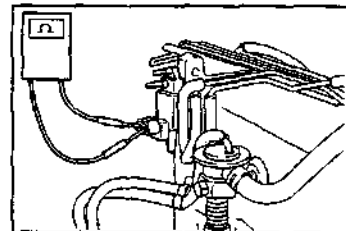
EGR VSV

**Inspection of EGR VSV****1. Unit inspection of EGR VSV**

- (1) With the ignition switch turned OFF, disconnect the connector and vacuum hoses which have been connected to the EGR VSV.
- (2) Check that the resistance between the terminals of the VSV conforms to the specification.
Specified Resistance: 20 - 60 Ω

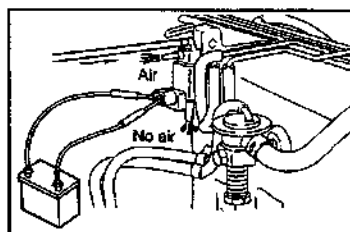
Replace the VSV with a new part if the resistance does not conform to the specification.

- (3) Connect a suitable rubber hose to the VSV as shown in the right figure. Ensure that no air continuity exists.
Replace the VSV with a new part if air continuity exists.



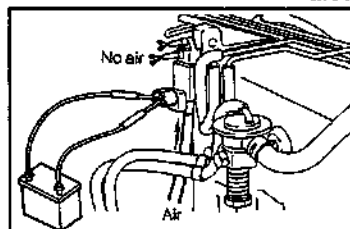
EFI SYSTEM

- (5) Apply the battery voltage to the EGR VSV as shown in the right figure.
- (6) Connect a suitable rubber hose to the EGR VSV as shown in the right figure. Ensure that air continuity exists. Replace the VSV with a new part if no air continuity exists.



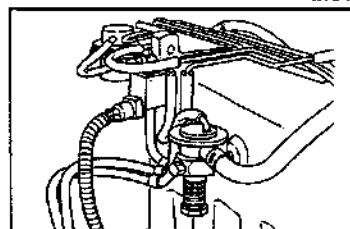
WPB00-EP006

- (7) Connect a suitable rubber hose to the EGR VSV as shown in the right figure. Ensure that no air continuity exists. Replace the VSV with a new part if air continuity exists.



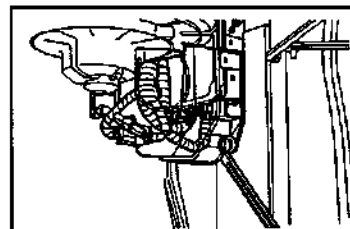
WPB00-EP006

- (8) Disconnect the battery voltage from the VSV.
- (9) Connect the disconnected vacuum hoses and connector to the VSV.



WPB00-EP006

2. Measurement of operation voltage of EGR VSV
 - (1) Disconnect the battery ground cable from the negative (-) terminal of the battery.
 - (2) Remove the ECU cover.



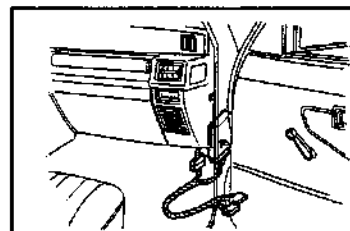
WPB00-EP006

- (3) Connect the following SST between the ECU and the engine wire.
SST: 09842-87704-000

NOTE:

- Before connecting the SST, ensure that no open wire or short exists between the terminals.

- (4) Reconnect the battery ground cable to the negative (-) terminal of the battery.

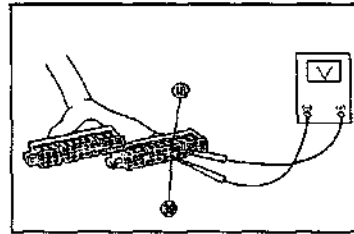


WPB00-EP006

- (5) Start the engine. Ensure that the specified voltage is applied between the SST terminals ⑬ and ⑭ (negative) when the cooling water temperature is below 40 °C.
Specified Voltage: About battery voltage

Check the wiring from the battery to the ECU terminal ⑬ if the measured value is less than the specified voltage.

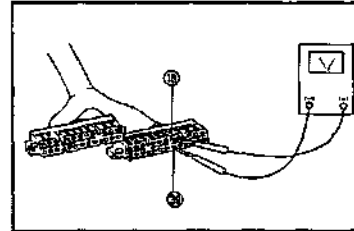
If no abnormality exists in the wiring, proceed to the ECU check. (See page EF-189.)



WFE00-EF670

- (6) Warm up the engine until the cooling water temperature becomes above 40 °C.
 (7) Ensure that the specified voltage is applied between the SST terminals ⑬ and ⑭ (negative).
Specified Voltage: 3 V or less

If the measured value exceeds the specified voltage, Proceed to the ECU check. (See page EF-189.)

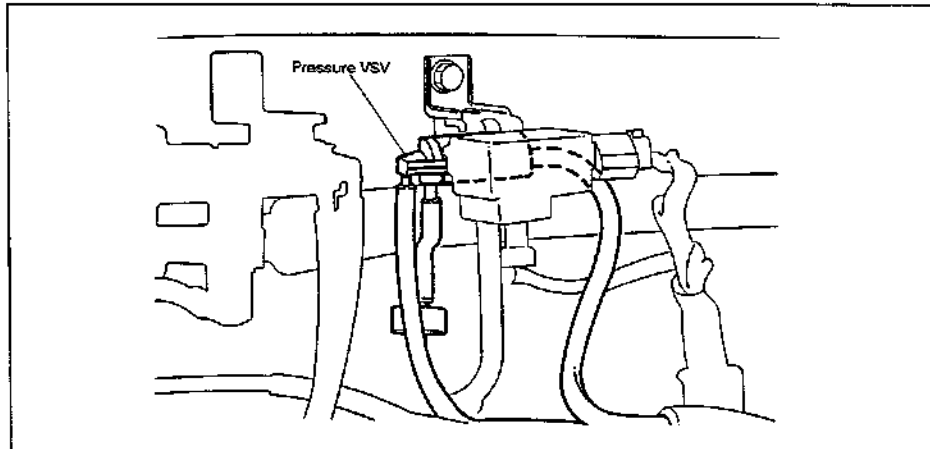


WFE00-EF671

- (8) Turn OFF the ignition switch.
 (9) Disconnect the battery ground cable from the negative (-) terminal of the battery.
 (10) Remove the SST by disconnecting the ECU and engine wire connectors of the SST.
 (11) Connect the engine wire to the ECU.
 (12) Install the ECU cover to the coul panel.
 (13) Reconnect the ground cable terminal to the negative (-) terminal of the battery.

EFI SYSTEM

PRESSURE VSV

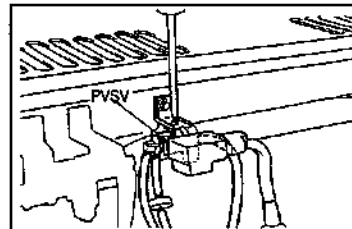


WPES0-EP672

INSPECTION OF PRESSURE VSV

1. Unit inspection of pressure VSV

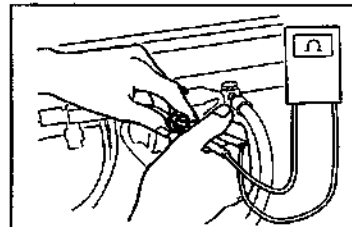
- (1) Detach the pressure VSV from the bracket, disconnect the connector and vacuum hoses that have been connected to the pressure VSV.



WPES0-EP673

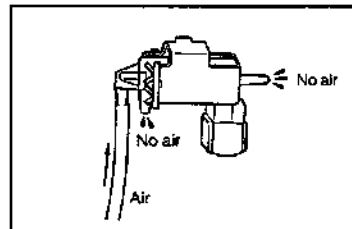
- (2) Check that the resistance between the terminals of the VSV conforms to the specification.
Specified Resistance: 20 - 60 Ω

Replace the VSV with a new part if the resistance does not conform to the specification.



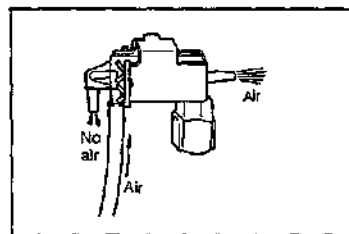
WPES0-EP674

- (3) Connect a suitable rubber hose to the VSV as shown in the right figure. Ensure that no air continuity exists. Replace the VSV with a new part if air continuity exists.



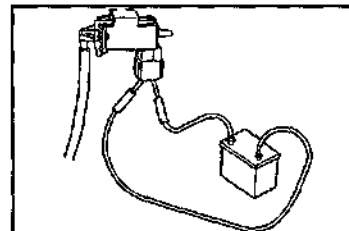
WPES0-EP675

- (4) Connect a suitable rubber hose to the VSV as shown in the right figure. Ensure that air continuity exists. Replace the VSV with a new part if no air continuity exists.



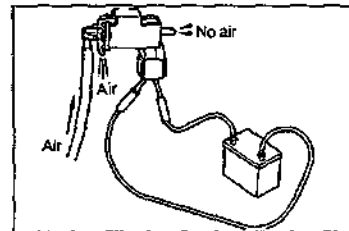
WFES0-EP676

- (5) Apply the battery voltage to the pressure VSV as shown in the right figure.



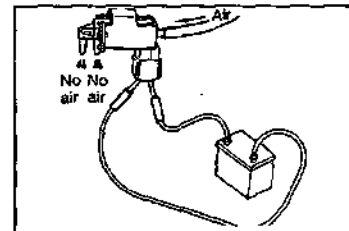
WFES0-EP677

- (6) Connect a suitable rubber hose to the pressure VSV as shown in the right figure. Ensure that air continuity exists. Replace the VSV with a new part if no air continuity exists.



WFES0-EP678

- (7) Connect a suitable rubber hose to the pressure VSV as shown in the right figure. Ensure that no air continuity exists. Replace the VSV with a new part if air continuity exists.

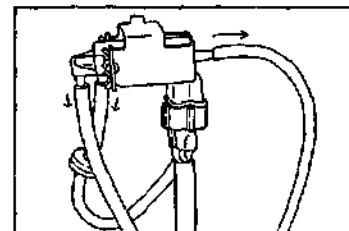


WFES0-EP679

- (8) Remove the battery voltage being applied to the VSV.
(9) Connect the disconnected vacuum hoses and connector.

2. Inspection of pressure VSV system

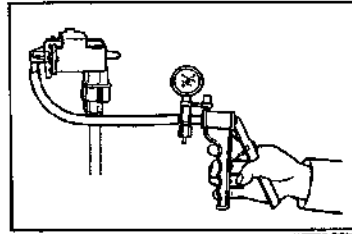
- (1) With the ignition switch turned OFF, disconnect the vacuum hoses which have been connected to the pressure VSV.



WFES0-EP680

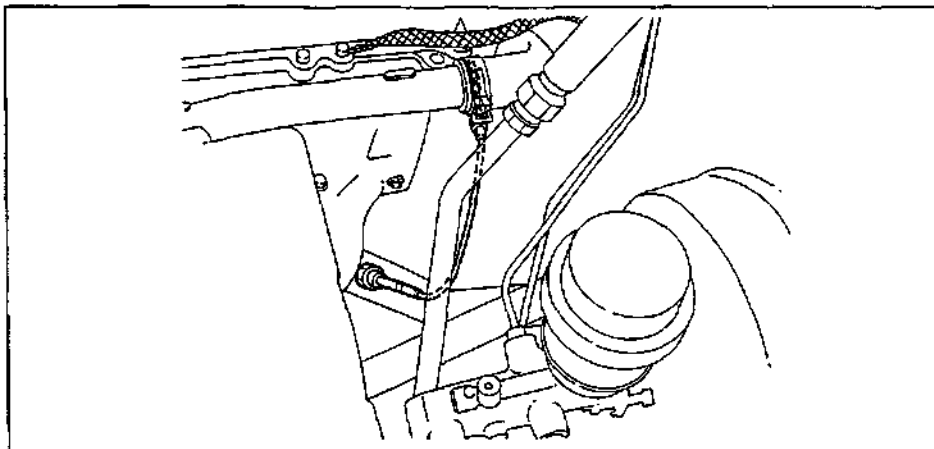
EFI SYSTEM

- (2) Connect a MityVac as shown in the right figure.
Apply a negative pressure of 26.7 kPa (200 mmHg).
- (3) Ensure that the negative pressure which was applied in the step (2) becomes zero when the ignition switch turned ON.
Check the wiring from the battery to the ECU terminal ⑨ if the negative pressure does not become zero.
If no abnormality exists in the wiring, proceed to the ECU check. (See page EF-189.)
- (4) Remove the MityVac. Connect the vacuum hose to the pressure VSV.



WF200-67001

OXYGEN SENSOR



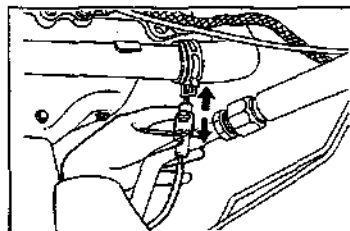
Inspection of oxygen sensor

1. Unit inspection of oxygen sensor

- (1) Disconnect the oxygen sensor connector.

WARNING:

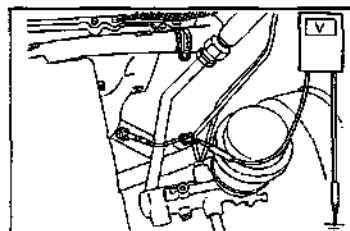
Do not attempt this operation unless the engine has been cooled.



- (2) Start and warm up the engine completely.
- (3) Connect a voltmeter to the connector of the oxygen sensor.
- (4) Depress the accelerator pedal. At this time, ensure that the reading of the voltmeter is 0.45 V or more. Replace the oxygen sensor with a new part if the reading is not 0.45 V or more.
- (5) Remove the voltmeter from the oxygen sensor connector. Reconnect the connector. Install the connector to the clamp.

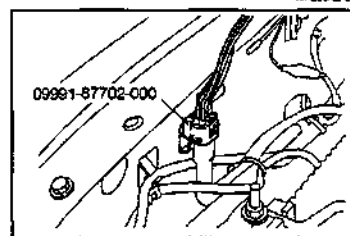
WARNING:

Be careful not to scold your hand.



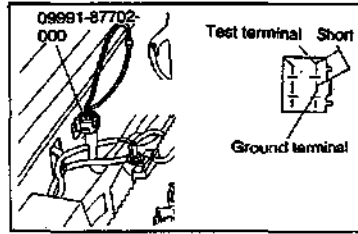
2. System inspection of oxygen sensor

- (1) Remove the cap of the check connector. Connect the following SST to the check connector.
SST: 09991-87702-000



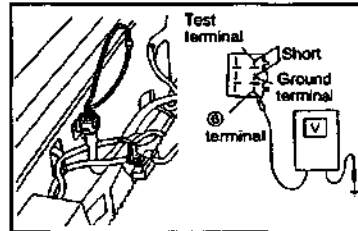
EFI SYSTEM

- (2) Start and warm up the engine completely.
- (3) Connect the test terminal (brown) of the SST to the ground terminal (black).



WFE20-6P66

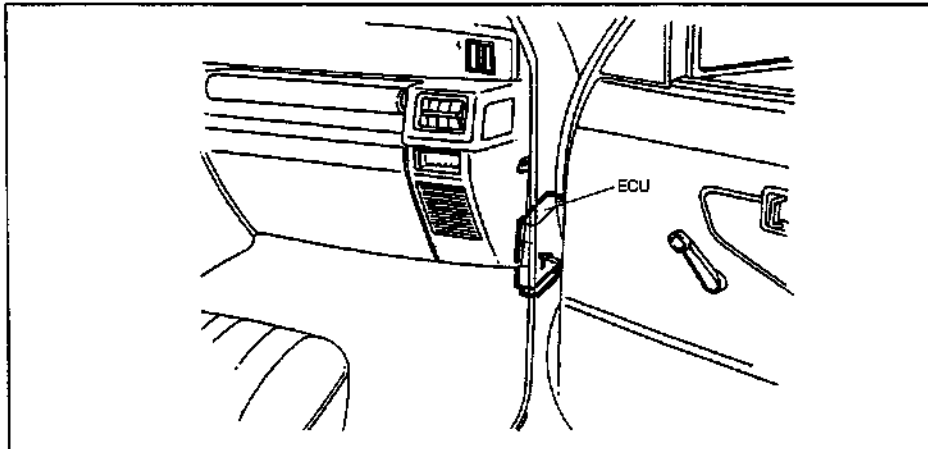
- (4) Connect a voltmeter to the output terminal (green) of the SST.



WFE20-6P67

- (5) Hold the engine speed at 3000 rpm.
- (6) After a lapse of 2 minutes, ensure that the reading of the voltmeter connected in the step (4) changes eight times or more for 10 seconds.
If the change in voltage fails to occur eight times or more, check the diagnosis code. Replace the oxygen sensor if no malfunction code is memorized.
- (7) Stop the engine.
- (8) Remove the SST which was connected to the check connector. Attach the cap to the check connector.

ELECTRONIC CONTROL UNIT (ECU)



WFEB0-EP685

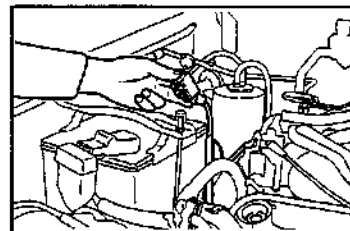
INSPECTION OF ECU

1. Measurement of ECU input/output voltage

NOTE:

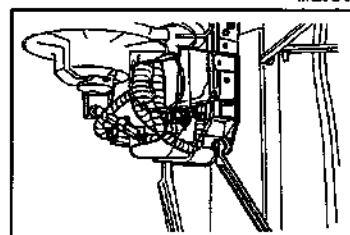
- The wiring circuit of the EFI can be checked by measuring the voltage and resistance at the ECU connector terminals.
- The measurement of voltage should be conducted while all of the connectors are connected.
- Make sure that the battery voltage is 11 V or more when the ignition switch is turned ON.

- (1) Disconnect the battery ground cable from the negative terminal (-) of the battery.



WFEB0-EP689

- (2) Remove the ECU cover.



WFEB0-EP690

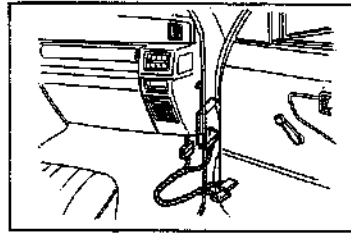
WFEB0-EP691

EFI SYSTEM

- (3) Connect the following SST between the ECU and the engine wire.
SST: 09842-87704-000

NOTE:

- Before the SST is connected, make sure that no open wire and/or no short exists between the SST terminals.

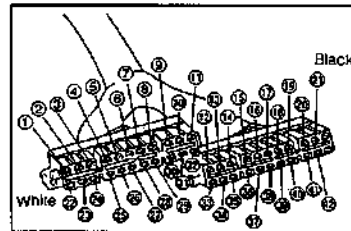


WFEB0-EP002

- (4) Connect the battery ground cable to the negative (-) terminal of the battery.
- (5) Measure the voltage between the terminals under each condition shown in the table below.
Replace the ECU if the engine shows abnormality despite the fact that all measured results are normal.
If the measured results are abnormal, check the malfunctioning system. Repair or replace the malfunctioning part.
Replace the ECU if no abnormality exists in the wiring system.

NOTE:

- The measurement should be carried out at the measuring terminals of the SST.



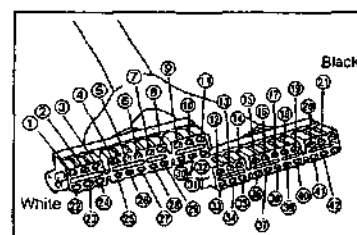
WFEB0-EP003

Table Showing ECU Connections

Terminal code	Contents of connection	Terminal code	Contents of connection
1	Main relay (Power supply)	22	Main relay (Power supply)
2	Battery (Backup power supply)	23	
3	Ignition coil primary voltage	24	
4		25	
5	Pressure sensor power supply	26	Oxygen sensor
6	Pressure sensor	27	Intake air temperature sensor
7	Cooling water temperature sensor	28	
8	Vehicle speed sensor	29	Operation system ground (Engine)
9	Electrical load (Headlamp and defogger)	30	Electrical load (Blower fan)
10		31	
11	Check connector (Test terminal)	32	Throttle position switch (Power switch)
12	Throttle position switch (Idle switch)	33	Stop lamp
13	Starter	34	Air conditioner magnet switch
14		35	
15	Oxygen sensor feedback check terminal	36	Operation system ground
16	Check engine lamp	37	Fuel pump relay
17		38	Pressure VSV
18	EGR VSV	39	System ground
19		40	Idle speed control VSV
20	Injector	41	Injector
21	Actuator drive ground (Engine)	42	Actuator drive ground (Engine)

WFT30-6P04

21	20	18	16	15	13	12	11	9	8	7	6	5	3	2	1
42	41	40	39	38	37	36	34	33	32	30	29	27	26	24	22



EFI SYSTEM

Voltages at ECU connectors

Terminals	STD Voltage	Condition		See page
① — ②	Approx. battery voltage	Ignition switch ON		EF-145
② — ③	Approx. battery voltage	At all time		EF-146
③ — ④	Approx. battery voltage	Ignition switch ON	When engine is stopped:	EF-149
⑤ — ⑥	4.5 - 5.5 V	Ignition switch ON		EF-147
⑤ — ⑦	3.2 - 4.0 V	Ignition switch ON	When atmospheric pressure of 101.3 kPa (760 mmHg) exists.	EF-148
⑦ — ⑧	0.4 - 0.65 V	Ignition switch ON	When cooling water temperature is 80°C:	EF-150
⑧ — ⑨	0 - Approx. battery voltage	Ignition switch ON	Measured voltage changes when vehicle is moved 1.5 m.	EF-156
⑨ — ⑩	Less than 5.0 V	Ignition switch ON	When defogger and headlamp switches are turned OFF:	—
	Approx. battery voltage	Ignition switch ON	When defogger and/or headlamp switches are turned ON:	
⑪ — ⑫	Approx. battery voltage	Ignition switch ON	When test terminal of check connector is not connected with ground terminal:	—
	Less than 1.0 V	Ignition switch ON	When test terminal of check connector is connected with ground terminal:	---
⑬ — ⑭	Less than 5.0 V	Ignition switch ON	Throttle valve fully closed	EF-153
	Approx. battery voltage	Ignition switch ON	Throttle valve fully opened	
⑮ — ⑯	0 V	Ignition switch ON		EF-157
	More than 6 V	When ignition switch is set to ST position:		
⑰ — ⑱	Measured voltage changes at a point between 0 - 5.0 V.	After warming up engine completely, connect test terminal of check connector with ground terminal. Hold engine revolution speed at 3000 rpm for two minutes.		EF-157
⑲ — ⑳	Less than 3.0 V	Ignition switch ON	<ul style="list-style-type: none">• Engine is stopped.• When check engine lamp is illuminated:	—
	Approx. battery voltage	Ignition switch ON	<ul style="list-style-type: none">• After engine starts:• When check engine lamp is extinguished:	

WFS0-EP006

EFI SYSTEM

Terminals	STD Voltage	Condition		See page
⑫ — ⑬	Approx. battery voltage	Ignition switch ON	<ul style="list-style-type: none"> After engine starts: Cooling water temperature is below 40°C. 	EF-181
	Less than 3.0 V	Ignition switch ON	<ul style="list-style-type: none"> After engine starts: Cooling water temperature is above 41°C. 	
⑭ — ⑮	Less than 1.0 V	At least 30 seconds have elapsed after turning OFF ignition switch.		EF-220
	Approx. battery voltage	Ignition switch ON	<ul style="list-style-type: none"> Engine is stopped. 	
⑯ — ⑰	Less than 0.01 V	Ignition switch ON		—
⑱ — ⑲	Approx. battery voltage	Ignition switch ON		EF-145
⑳ — ㉑	Change in output voltage	Ignition switch ON	After warming up engine completely, hold engine revolution speed at 3000 rpm for two minutes.	EF-151
㉒ — ㉓	1.5 - 3.0 V	Ignition switch ON	Air temperature inside intake manifold is 20°C.	EF-155
㉔ — ㉕	Less than 0.1 V	Ignition switch ON		—
㉖ — ㉗	Approx. battery voltage	Ignition switch ON	<ul style="list-style-type: none"> Blower fan switch turned OFF 	—
	Less than 2.0 V	Ignition switch ON	When blower fan switch turned ON:	
㉘ — ㉙	Approx. battery voltage	Ignition switch ON	Throttle valve fully closed	EF-154
	Less than 5.0 V	Ignition switch ON	Throttle valve fully opened	
㉚ — ㉛	Less than 1 V	Ignition switch ON	When brake pedal is not depressed:	—
	Approx. battery voltage	At all time	When brake pedal is depressed:	—

WFE00-0P006

EFI SYSTEM

Terminals	STD Voltage	Condition		See page
② — ②	Less than 1 V	Ignition switch ON	When compressor magnet switch of air conditioner is turned OFF.	EF-159
	Approx. battery voltage	Ignition switch ON	When compressor magnet switch of air conditioner is turned ON.	
② — ②	Less than 0.1 V	Ignition switch ON		—
② — ②	Approx. battery voltage	Ignition switch ON	When fuel pump is stopped.	EF-163
	Less than 2.0 V	Ignition switch ON	When fuel pump is operating.	
② — ②	Approx. battery voltage	Ignition switch ON	When pressure VSV is turned OFF.	EF-184
	Less than 3.0 V	Ignition switch ON	For 0.5 second immediately after engine starts	
② — Engine ground	Less than 0.1 V	Ignition switch ON		—
② — ②	Less than 3.0 V	Ignition switch ON	Engine is stopped.	EF-175
	Approx. battery voltage	Ignition switch ON	When test terminal of check connector is connected with ground terminal.	
① — ②	Less than 1.0 V	At least 30 seconds have elapsed after turning OFF ignition switch.		EF-220
	Approx. battery voltage	Ignition switch ON	Engine is stopped.	
② — ②	Less than 0.1 V	Ignition switch ON		—

- (6) Turn OFF the ignition switch.
- (7) Disconnect the battery ground cable from the negative (-) terminal of the battery.
- (8) Remove the SST by disconnecting the ECU and engine wire connectors of the SST.
- (9) Reconnect the engine wire to the ECU.
- (10) Install the ECU cover to the cowl panel.
- (11) Reconnect the ground cable terminal to the negative (-) terminal of the battery.

WFE90-EF697

2. Measurement of resistance of sensor circuits

CAUTION:

- Be sure to conduct the voltage measurement at the SST terminals.
- The resistance measurement should be conducted with the connector of the ECU disconnected.

- (1) Disconnect the battery ground cable from the negative (–) terminal of the battery.
- (2) Remove the ECU cover.
- (3) Disconnect the engine wire connectors of the ECU.
- (4) Connect the following SST to the engine wire connectors.

SST: 09842-87704-000

NOTE:

- Do not connect the SST to the ECU side.

- (5) Measure the resistance between the terminals shown in the table under each condition.

Replace the ECU if the engine is abnormal despite the fact that the measurement results are normal. If the measurement results are abnormal, check the malfunctioning system. Repair or replace the malfunctioning part.

NOTE:

- As for the ECU terminal connection table, refer to page EF-141.

WFE90-EF066

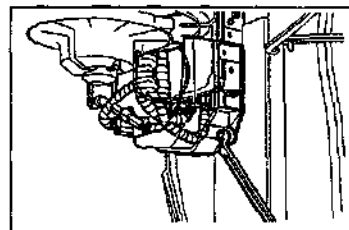
Terminals	STD Resistance kΩ	Condition	See page
① – ②	0.322 ± 0.1	When cooling water temperature is 80°C.	EF-165
⑩ – ⑪	Less than 29	Throttle valve fully closed	EF-170
	More than 1000	Throttle valve fully opened	
⑫ – ⑬	2.45 ± 0.5	When air temperature inside intake manifold is 20°C.	EF-168
⑭ – ⑮	More than 1000	Throttle valve fully closed	EF-170
	Less than 29	Throttle valve fully opened	

- (6) Disconnect the SST connectors from the engine wire.
- (7) Connect the engine wire connectors to the ECU.
- (8) Install the ECU cover to cowl panel.
- (9) Reconnect the ground cable terminal to the negative (–) terminal of the battery.

WFE90-EF099

REMOVAL/INSTALLATION OF ECU

1. Disconnect the battery ground cable from the negative (–) terminal of the battery.
2. Remove the ECU cover.
3. Disconnect the engine wire connectors from the ECU.



WFE90-EF700

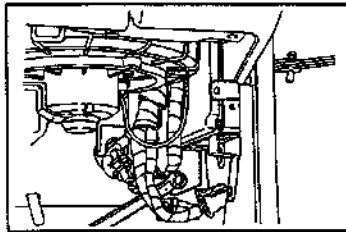
EFI SYSTEM

4. Remove the ECU from the instrument panel by removing the attaching screws.

5. Install a new ECU to the instrument panel.

CAUTION:

- Do not touch the bracket screws mounted on the ECU proper.
This tampering will cause an ECU malfunction.



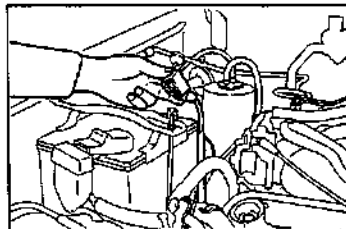
6. Connect the engine wire connectors to the ECU.
7. Install the ECU cover to the cowl panel.
8. Connect the ground cable terminal to the negative (-) terminal of the battery.

WFE80-87701

FUEL CUT RPM

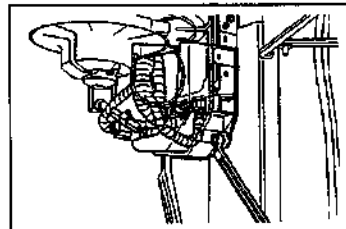
INSPECTION OF FUEL CUT RPM

1. Disconnect the battery ground cable from the negative (-) terminal of the battery.



WFE80-87702

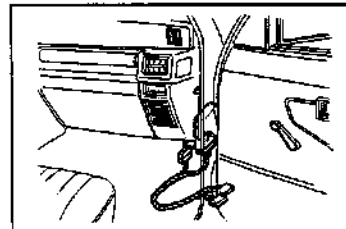
2. Remove the ECU cover.



WFE80-87703

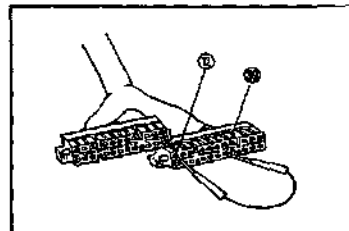
3. Connect the following SST between the ECU and the engine harness.

SST: 09842-87704-000



WFE80-87704

4. Connect the SST terminals ⑫ and ⑬.



5. Connect the battery ground cable to the negative (-) terminal of the battery.
6. Start and warm up the engine fully.

WP200-EF705

7. After the engine has been warmed up completely, increase the engine revolution speed gradually. Ensure that the change in the engine revolution speed occurs between the fuel cut revolution speed and the fuel return revolution speed.

Fuel cut revolution speed (rpm)	AC OFF	1650
	AC ON	2300
Fuel return revolution speed (rpm)	AC OFF	1300
	AC ON	1600

WP200-EF706

8. Turn OFF the ignition switch.
9. Disconnect the battery ground cable from the negative (-) terminal of the battery.
10. Remove the SST by disconnecting the ECU and engine wire connectors of the SST.
11. Reconnect the engine wire to the ECU.
12. Install the ECU cover to the cowl panel.
13. Reconnect the ground cable terminal to the negative (-) terminal of the battery.

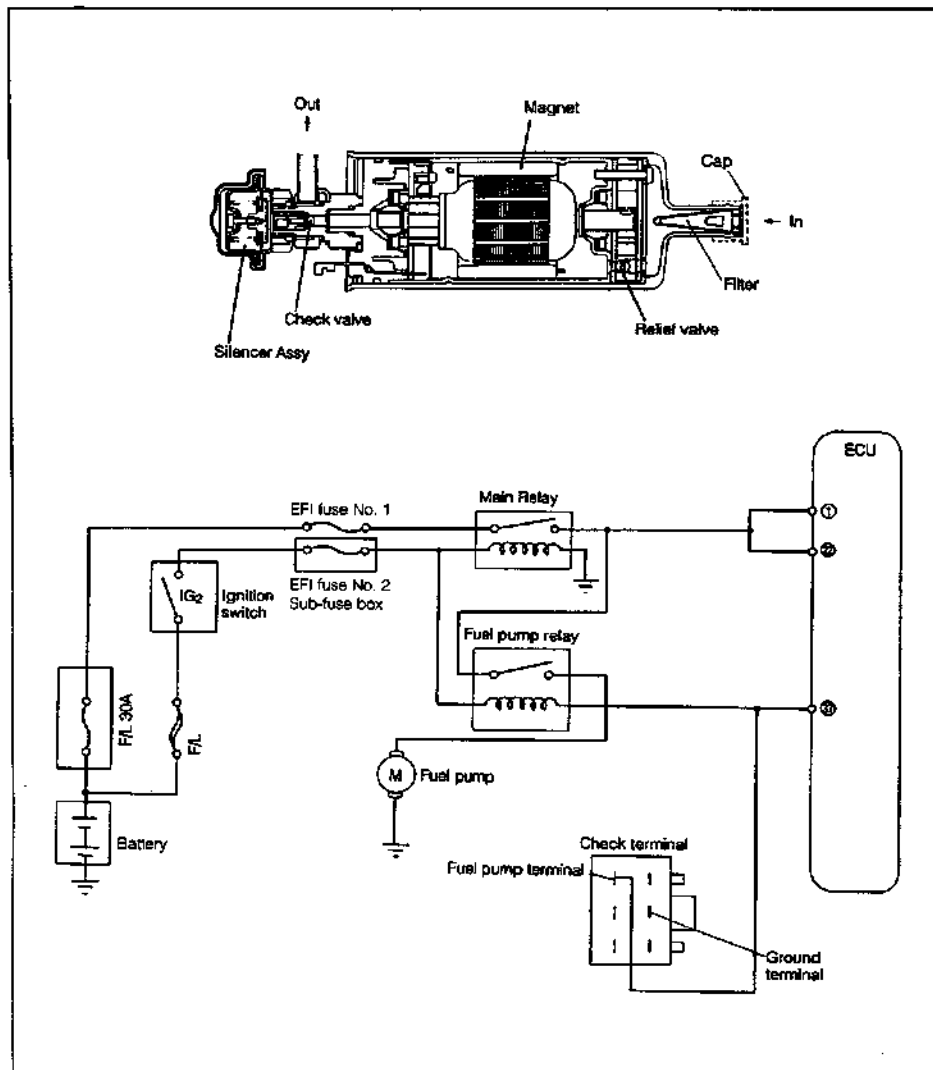
WP200-GT07

EFI SYSTEM

FUEL SYSTEM

FUEL PUMP

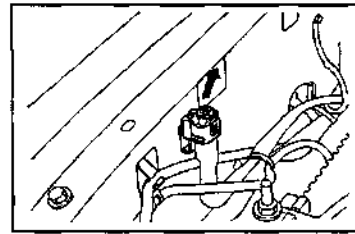
WARNING:
When working on the fuel system, never smoke and allow any open flame to be brought near the working site.



IN-VEHICLE INSPECTION

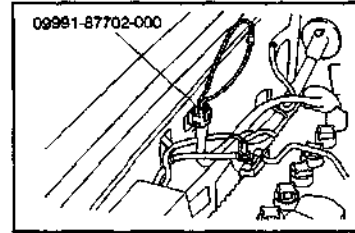
Check of fuel pump operation

1. Connection of SST (09991-87702-000)
 - (1) Detach the check connector cap.



WP830-EF709

- (2) Connect the SST to the check connector. Connect the SST terminal F (white/black) to the ground terminal (black).

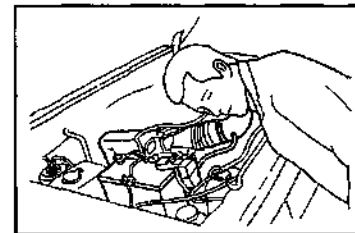


WP830-EF710

2. Check of fuel flowing sound
 - (1) Turn ON the ignition key switch.

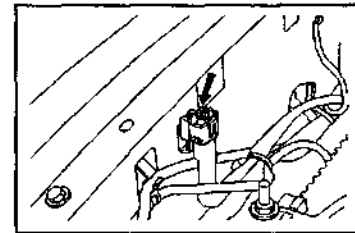
WP830-EF711

- (2) Check to see if you can hear fuel flowing sound around the pressure regulator.
 - (3) If you can hear no fuel flowing sound, check the following parts. Repair them, as required.
 - Fusible links
 - Fuses
 - Main relay
 - Fuel pump
 - Wiring and wiring connections



WP830-EF712

3. SST Removal
 - (1) Turn OFF the ignition switch.
 - (2) Remove the SST from the check connector.
 - (3) Attach the cap on the check connector.



WP830-EF713

EFI SYSTEM

Check of fuel pressure

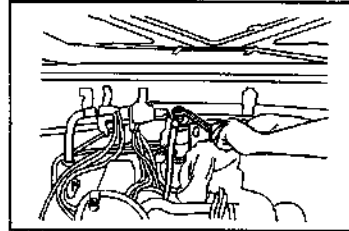
1. Ensure that the battery voltage is 12 volts or more.
2. Disconnect the ground cable terminal from the negative (-) terminal of the battery.
3. Place a suitable container or cloth, etc. under the fuel filter.

WPB0-B714

4. Loosen the union bolt gradually.

CAUTION:

- The fuel pressure at the inside of the fuel line is approximately 250 kPa (2.55 kgf/cm²) higher than the atmospheric pressure. Hence, be sure to gradually loosen the union bolt so as to prevent fuel from splashing. Since the fuel will flow out, be certain to place a suitable container or cloth, etc. under the fuel filter so that no fuel may get to the resin or rubber parts of the vehicle.

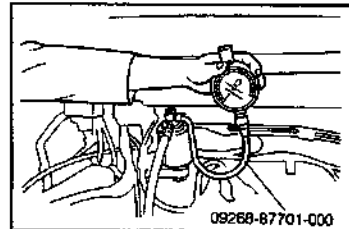


WPB0-B715

5. Install the SST (fuel pressure gauge) between the fuel hose No. 1 and the fuel filter by means of the union bolt with a new gasket interposed.

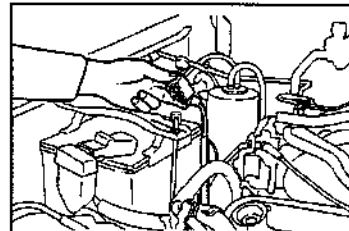
SST: 09268-87701-000

Tightening Torque: 34.3 - 44.1 N·m (3.5 - 4.5 kgf·m)



WPB0-B716

6. Reconnect the ground cable terminal to the negative (-) terminal of the battery.

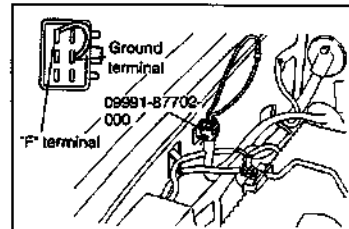


WPB0-B717

7. Connection of SST (09991-87702-000)

- (1) Remove the cap on the check terminal.
- (2) Connect the SST to the check connector.
- (3) Connect the SST terminal fuel pump (white/black) to the ground terminal (black).

8. Turn ON the ignition switch.



WPB0-B718

9. Check to see if the fuel pressure conforms to the specified pressure.

Specified Fuel Pressure:

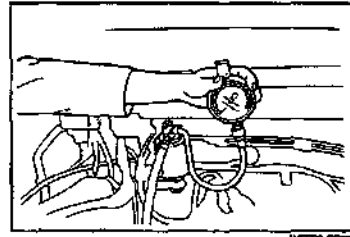
225.6 - 274.6 kPa (2.3 - 2.8 kgf/cm²)

If the fuel pressure is higher than the specified pressure, check and/or repair the following items.

- (1) Fuel return hose and/or pipe for restriction or damage.
- (2) Rubber hose connected between pressure regulator and surge tank for restriction.
- (3) If the check results of (1) and (2) are satisfactory, replace the pressure regulator. (See page EF-213.)

If the fuel pressure is lower than the specified pressure, check and/or repair the following items.

- (1) Fuel hose and/or pipe for restriction or damage or leakage.
- (2) Fuel filter for restriction. (See page EF-209.)
- (3) Check fuel flow rate. (See page EF-203.)
- (4) Pressure regulator. (See page EF-213.)



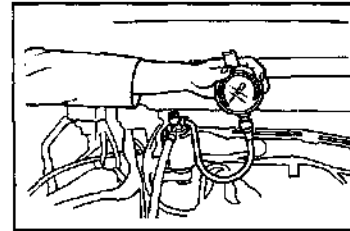
WF20-6719

10. Turn OFF the ignition switch. After a lapse of three minutes, check to see if the fuel pressure is the specified pressure or more.

Specified Fuel Pressure: 176.5 kPa (1.8 kgf/cm²)

If the fuel pressure is lower than the specified pressure, check and/or repair the following items.

- (1) Injector (See page EF-220.)
- (2) Pressure regulator (See page EF-213.)
- (3) Fuel hose and/or pipe for damage or leakage.



WF20-6720

11. SST removal

- (1) Turn OFF the ignition key switch.
- (2) Disconnect the ground cable terminal from the negative terminal (-) of the battery.
- (3) Loosen the fuel filter union bolt gradually.

CAUTION:

- The fuel pressure at the inside of the fuel line is approximately 253 kPa (2.5 atm) higher than the atmospheric pressure. Hence, be sure to gradually loosen the union bolt so as to prevent fuel from splashing. Since the fuel will flow out, be certain to place a suitable container or cloth, etc. under the fuel filter so that no fuel may get to the resin or rubber parts of the vehicle.

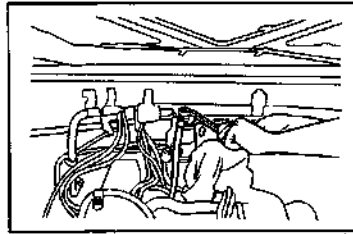
- (4) Remove the SST (fuel pressure gauge).

SST: 09268-87701-000

WF20-6721

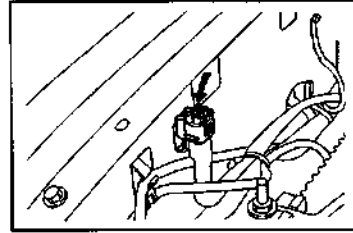
EFI SYSTEM

- (5) Install the fuel hose No. 1 to the fuel filter by means of the union bolt with a new gasket interposed.
Tightening Torque: 34.3 - 44.1 N·m (3.5 - 4.5 kgf·m)



WPESG-5712

- (6) Remove the SST from the check connector.
SST: 09991-87702-000
- (7) Attach the cap on the check connector.
- (8) Reconnect the ground cable terminal to the negative (-) terminal of the battery.



WPESG-5713

12. Check of fuel leakage
Start the engine. Check to see if any fuel leakage is present.
Repair any defective part if the fuel leakage exists.

WPESG-5724

Check of fuel flow rate

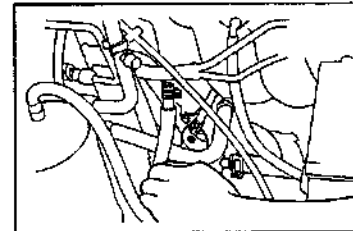
1. Ensure that the battery voltage is 12 volts or more.
2. Disconnect the ground cable terminal from the negative (-) terminal of the battery.
3. Place a suitable container or cloth, etc. under the pressure regulator.

WPESG-5725

4. Disconnect the fuel return hose connected to the pressure regulator.

CAUTION:

- Since the fuel will flow out, be certain to place a suitable container or cloth, etc. under the pressure regulator so that no fuel may get to the alternator.
- Release the inner pressure of the fuel tank by removing the fuel filler cap in advance.

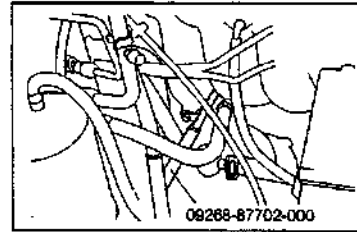


WPESG-5726

5. Connect a suitable fuel hose (about 2 meter long) to the pressure regulator.

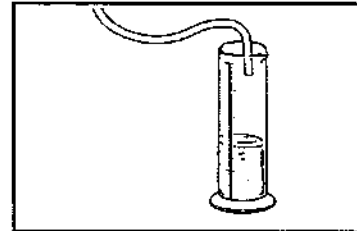
REFERENCE:

- This fuel hose is included in the SST (09268-87702-000).



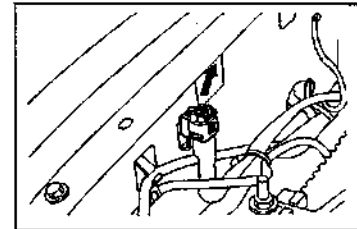
WFE20-EF727

6. Insert one end of the fuel hose in a measuring cylinder.



WFE20-EF728

7. Detach the check connector cap.

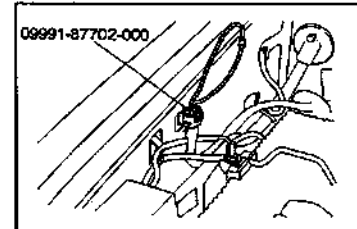


WFE20-EF729

8. Connect the SST (09991-87702-000) to the check connector. Connect the SST terminal F (White/Black) to the ground terminal (Black).

9. Connect the ground cable terminal to the negative (-) terminal of the battery.

10. Turn ON the ignition switch for 15 seconds. Then, turn OFF the switch.



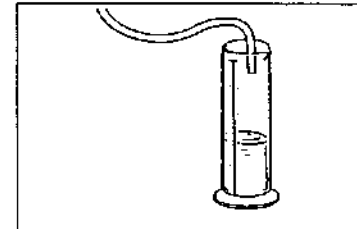
WFE20-EF730

11. Measure the amount of fuel collected in the measuring cylinder.

Specified Amount of Fuel: 235 cm³ or more

If the fuel amount is less than the specified amount, check the fuel filter.

12. Disconnect the ground cable terminal from the negative (-) terminal of the battery.



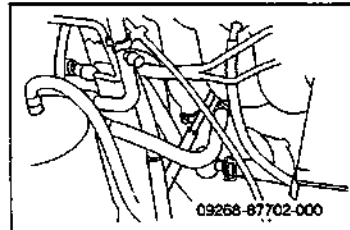
WFE20-EF731

EFI SYSTEM

13. Remove the SST (09991-87702-000) from the check connector.
14. Attach the cap on the check connector.

WPB0-5732

15. Disconnect the fuel hose connected to the pressure regulator.

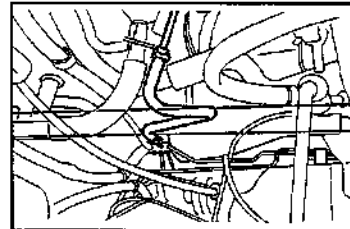


WPB0-5733

16. Connection of fuel return hose to the fuel pipe No. 2.
 - (1) Insert the fuel return hose to the fuel pipe No. 2 until second spool of fuel pipe.
 - (2) Securely clamp the fuel hose at 2 - 5 mm from fuel return hose end, with new clip.

NOTE:

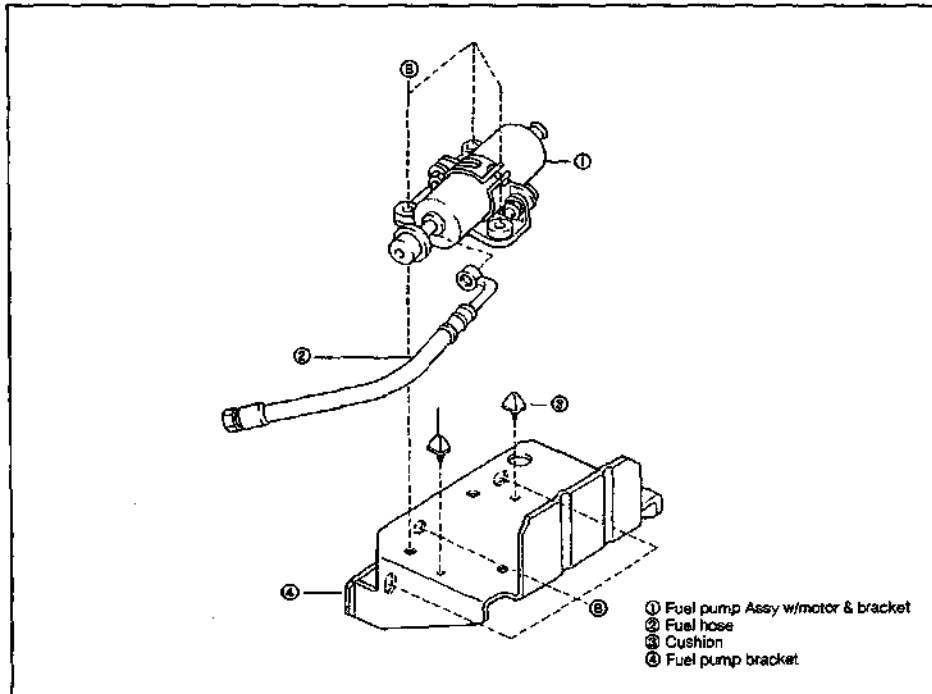
- Install the fuel return hose in parallel with chassis frame.



WPB0-5734

17. Reconnect the ground cable terminal to the negative (-) terminal of the battery.
18. Start the engine. Check to see if any fuel leakage is present. Repair any defective part if fuel leakage exists.

REMOVAL OF FUEL PUMP



WARNING:

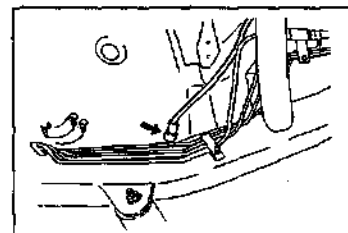
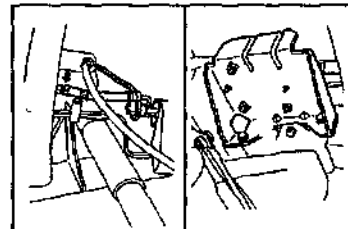
- When working on the fuel system, never smoke nor allow any open flames to be brought near the working site.

1. Disconnect the fuel hose front side from the fuel pump.

CAUTION:

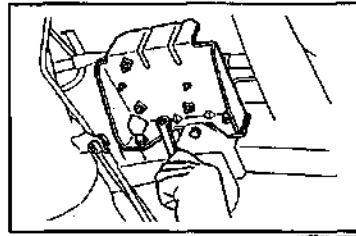
- Since the fuel will flow out, be certain to place a suitable container or cloth, etc. under the fuel pump.

2. Disconnect the fuel pump coupler.



EFI SYSTEM

3. Detach the fuel pump bracket by removing the three bolts.
4. Detach the fuel pump bracket from fuel pump by removing the three bolts.
5. Remove the fuel pump by disconnecting the fuel hose rear side.



WPB90-EF738

INSTALLATION OF FUEL PUMP

1. Connect the fuel hose rear side to the fuel pump.

NOTE:

- Ensure that the filter is installed at the fuel pump inlet port.
- Ensure that the hose clamp is securely installed.

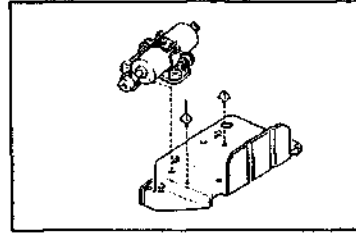
2. Install the fuel pump bracket to the fuel pump by tighten the three bolts.

NOTE:

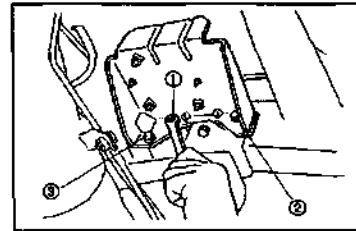
- Ensure that the two cushions are installed as correct position.

3. Installation of bracket

- (1) Temporarily tighten bolt No. 1.
- (2) Tighten the bolt No. ② and No. ③.
- (3) Securely tighten the bolt No. 1.

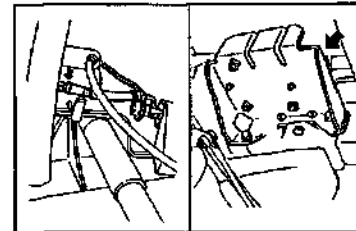


WPB90-EF739



WPB90-EF740

4. Connect the fuel hose front side to the fuel pump.
Tightening Torque: 34.3 - 44.1 N-m (3.5 - 4.5 kgf-m)

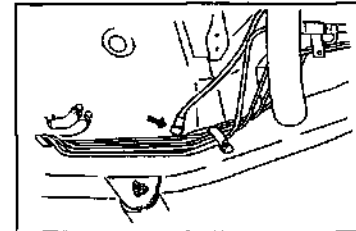


WPB90-EF741

5. Connect the fuel pump coupler.

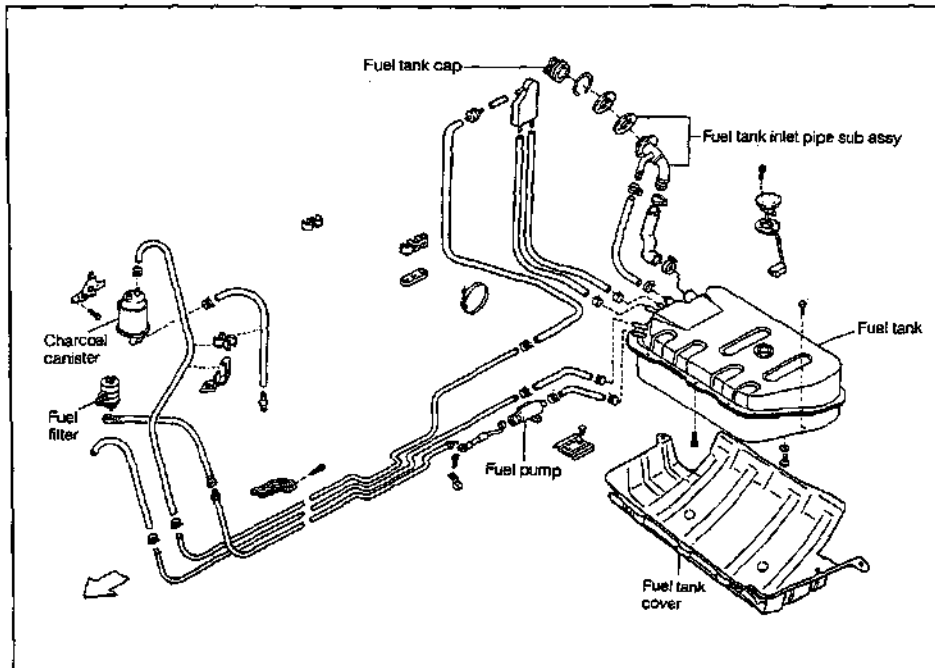
NOTE:

- Ensure that the lead wire is clamped at two position.



WPB90-EF742

FUEL TANK AND LINE COMPONENTS



PRECAUTIONS

1. Always use a new gasket and hose band (clip) when replacing the fuel tank or components.
2. Each part should be tightened securely to the specified torque.

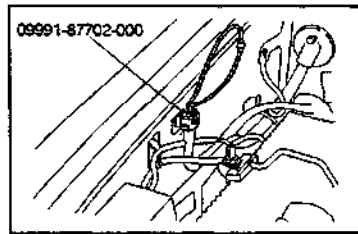
WARNING
Always keep fire away from the working site.

WPS0-6744

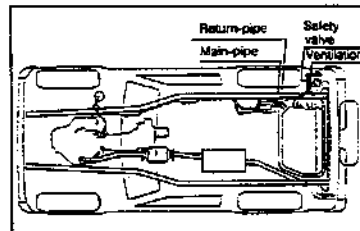
EFI SYSTEM

INSPECTION OF FUEL LINES AND CONNECTIONS

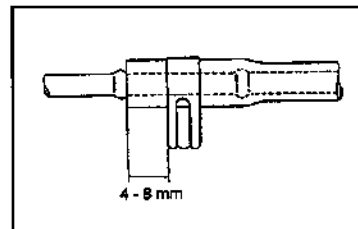
1. Connect the following SST to the check connector. Short the terminal F (White/Black) to the ground terminal (Black).
SST: 09991-87702-000
2. Turn ON the ignition switch.
3. Check the fuel lines and connections for cracks, leakage or deformation.
If any crack, leakage or deformation is present, replace or repair the part concerned.
4. Turn OFF the ignition switch. Remove the SST from the check terminal. Attach the cap to the check terminal.
5. Check the fuel tank for deformation, cracks or fuel leakage.
If the fuel tank exhibits any defect, repair or replace the fuel tank.
6. Check the filler neck for damage or fuel leakage.
If the filler neck exhibits any defect, repair or replace the filler neck.
7. Check to see if the hose and tube connections are installed as shown in the right figure.
If any problem is found, repair or replace the parts, as required.
8. Check to see if the fuel tank cap and gasket exhibits damage.
Replace the gasket if it is damaged. Also, replace the fuel tank cap if it exhibits damage.



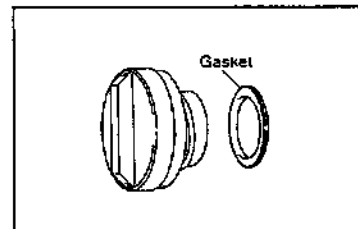
WPB0-0746



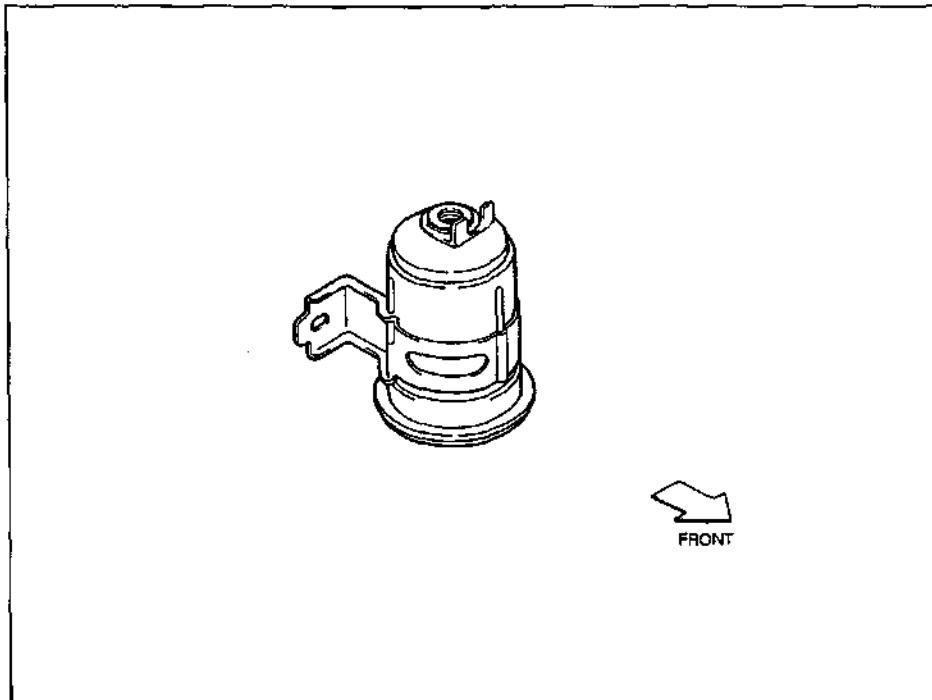
WPB0-0746



WPB0-0746



WPB0-0746

FUEL FILTER ELEMENT

WFE90-27749

CHECK OF FUEL FILTER ELEMENT

1. Disconnect the ground cable terminal from the negative (-) terminal of the battery.
2. Disconnect the fuel return hose connected to the pressure regulator. Connect a suitable fuel hose (about 2 meter long) to the pressure regulator.

WFE90-27750

REFERENCE:

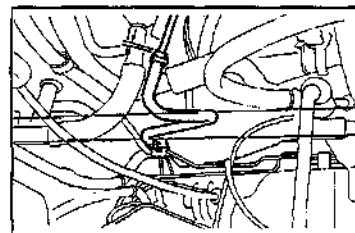
- This fuel hose is included in the SST (09258-87702-000).

NOTE:

- Before the fuel return hose is disconnected, be sure to release the inner pressure of the fuel tank by detaching the fuel filler cap.

CAUTION:

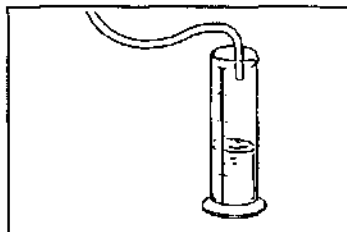
- Since the fuel will flow out, be certain to place a suitable container or cloth, etc. under the pressure regulator so as to prevent fuel splashing.



WFE90-27751

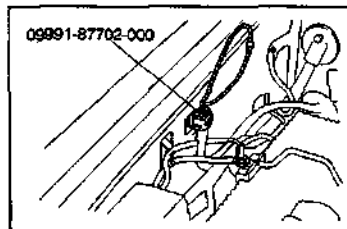
EFI SYSTEM

3. Insert one end of the fuel hose in a measuring cylinder.



WFE00-EF752

4. Connection of SST (09991-87702-000)
 - (1) Detach the cap from the check connector.
 - (2) Connect the SST to the check connector.
 - (3) Short the SST terminal F (White/Black) to the ground terminal (Black).
5. Connect the ground cable terminal to the negative (-) terminal of the battery.
6. Turn ON the ignition switch for 15 seconds. Then, turn OFF the switch.



WFE00-EF753

7. Measure the amount of fuel collected in the measuring cylinder. Check to see if the measured amount conforms to the specification.

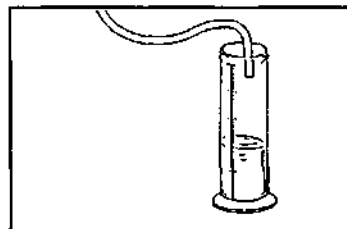
Specified Amount of Fuel: 235 cm³ or more

NOTE:

- If it becomes necessary to bleed air, be sure to conduct the measurement at least twice.

If the fuel amount conforms to the specification, perform the operation, starting from the step 18 onward.

If the fuel amount is less than the specified amount, perform the operation, starting from the step 8 onward.



WFE00-EF754

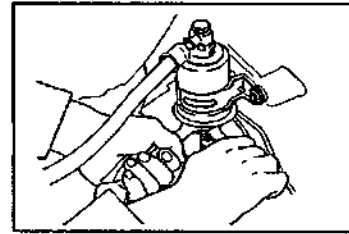
8. Disconnect the ground cable terminal from the negative (-) terminal of the battery.

WFE00-EF755

9. Loosen the union bolt gradually.

CAUTION:

- The fuel pressure at the inside of the fuel line is approximately 250 kPa (2.55 kgf/cm²) higher than the atmospheric pressure. Hence, be sure to gradually loosen the flare nut and use a cloth, etc. so as to prevent fuel from splashing.
- Since the fuel will flow out, be certain to place a suitable container or cloth, etc. under the fuel filter so that no fuel may get to the resin or rubber parts or electrical parts of the vehicle.

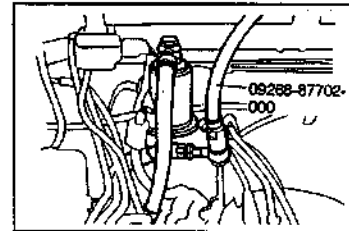


WFE9D-EF756

10. Connect a suitable fuel hose (about 2 meter long) to the fuel pipe.

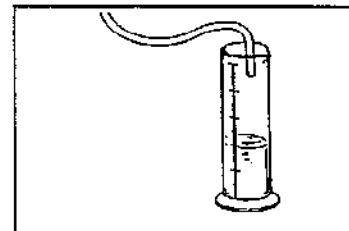
Reference:

- This fuel hose is included in the SST (09268-87702-000).



WFE9D-EF757

11. Insert one end of the fuel hose in a measuring cylinder.



12. Reconnect the ground cable terminal to the negative (-) terminal of the battery.

13. Turn ON the ignition switch for 15 seconds. Then, turn OFF the switch.

WFE9D-EF758

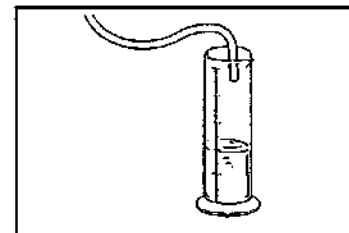
14. Measure the amount of fuel collected in the measuring cylinder.

Specified Amount of Fuel: 235 cm³ or more

If the fuel amount conforms to the specification, replace the fuel filter.

If the fuel amount is less than the specified amount, check the fuel pump filter for restriction. Then, replace the fuel pump as required. (See page EF-210.)

15. Disconnect the ground cable terminal from the negative (-) terminal of the battery.



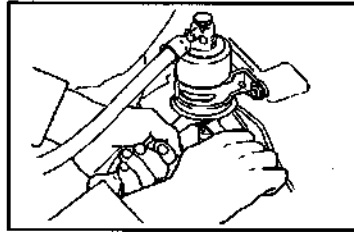
WFE9D-EF759

EFI SYSTEM

16. Coat the flare nut with a thin film of engine oil. Screw in the flare nut into the fuel filter fully by your hand.

17. Tighten the union bolt.

Tightening Torque: 34.3 - 44.1 N·m (3.5 - 4.5 kgf·m)



WFE90-EF760

18. Disconnect the fuel hose connected to the pressure regulator.

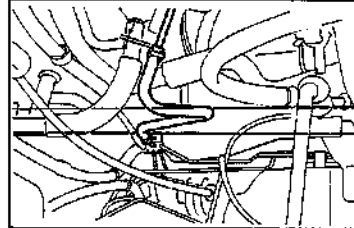
19. Connection of fuel return hose to fuel pipe No. 2.

(1) Insert the fuel return hose to the fuel pipe No. 2 until second spool of fuel pipe.

(2) Securely clamp the fuel hose at 2 - 5 mm from fuel return hose end, with new clip.

NOTE:

- Install the fuel return hose in parallel with chassis frame.



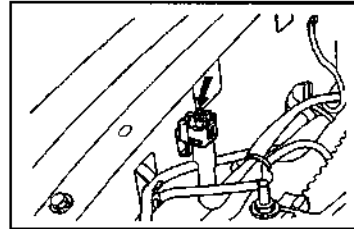
WFE90-EF761

20. Remove the SST from the check connector.

21. Attach the cap on the check connector.

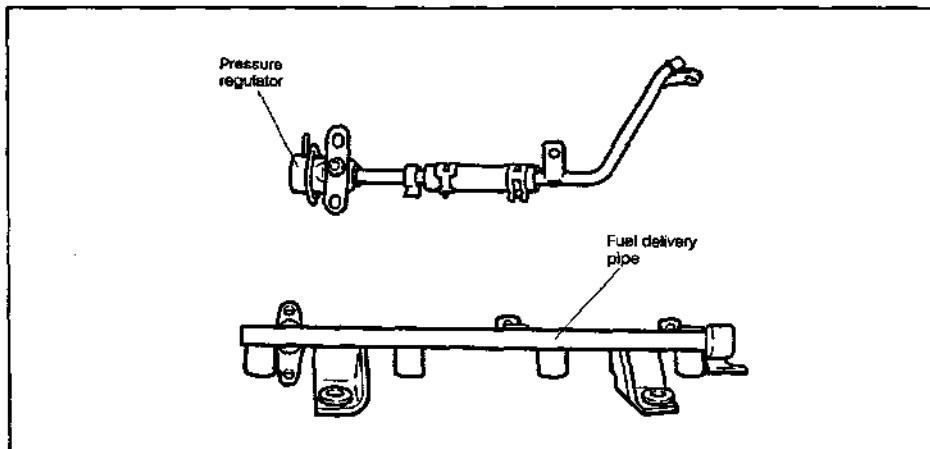
22. Reconnect the ground cable terminal to the negative (-) terminal of the battery.

23. Start the engine. Check to see if any fuel leakage is present. Repair any defective part if fuel leakage exists.



WFE90-EF762

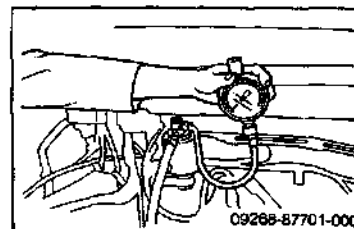
PRESSURE REGULATOR



WFE90-EF763

IN-VEHICLE INSPECTION

Check the fuel pressure. (See page EF-200.)



09269-8770 1-000

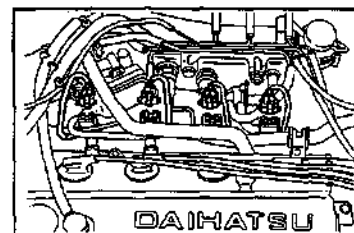
WFE90-EF764

REMOVAL OF PRESSURE REGULATOR

1. Disconnect the ground cable terminal from the negative (-) terminal of the battery.
2. Remove the air chamber assembly. (See page EM-17.)

WFE90-EF765

3. Disconnect the injector connector from each injector.



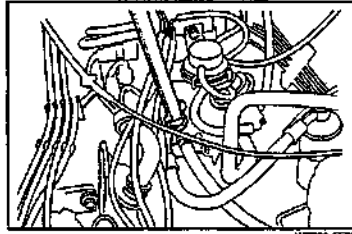
WFE90-EF766

EFI SYSTEM

4. Disconnect the fuel hose No. 1 at the delivery pipe side.

CAUTION:

- The fuel pressure at the inside of the fuel line is approximately 250 kPa (2.55 kgf/cm²) higher than the atmospheric pressure. Hence, be sure to gradually loosen the union bolt so as to prevent fuel from splashing. Since the fuel will flow out, be certain to place a suitable container or cloth, etc. under the fuel filter so that no fuel may get to the resin or rubber parts of the vehicle.



WPB30-EF765

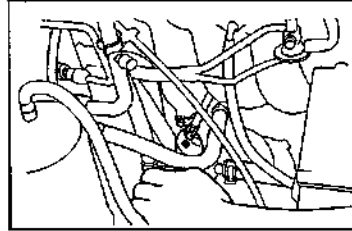
5. Disconnect the fuel return hose from the pressure regulator.

CAUTION:

- Since the fuel will flow out, be certain to place a suitable container or cloth, etc. under the connection so as to prevent fuel from splashing.

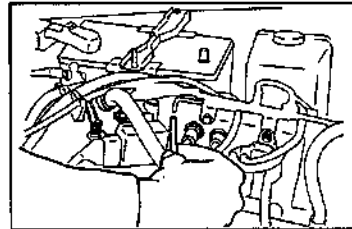
NOTE:

- Before the fuel return hose is disconnected, be sure to release the inner pressure of the fuel tank by detaching the fuel filler cap.



WPB30-EF766

6. Disconnect the vacuum hose from the vacuum pipe.



WPB30-EF768

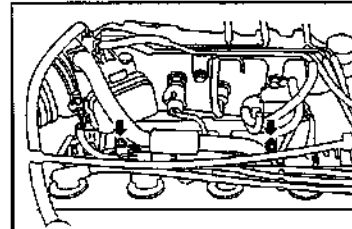
7. Remove the delivery pipe by removing the delivery pipe attaching nuts.

CAUTION:

- Be certain to place a suitable cloth, etc. under the delivery pipe so that no fuel gets to the electrical equipment, such as the alternator and starter, wiring and rubber and plastic parts.
- Be very careful not to drop the injectors.

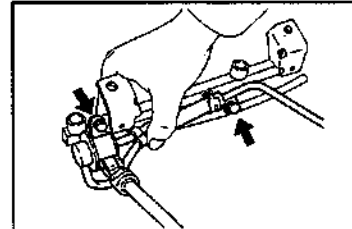
NOTE:

- Leave the injector at the intake manifold side.



WPB30-EF770

8. Disconnect the vacuum hose from the pressure regulator.
9. Remove the pressure regulator from the delivery pipe.



WPB30-EF771

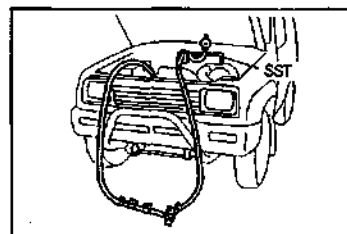
Inspection of Pressure Regulator

1. Using the following SSTs, connect the pressure regulator, as indicated in the figure.

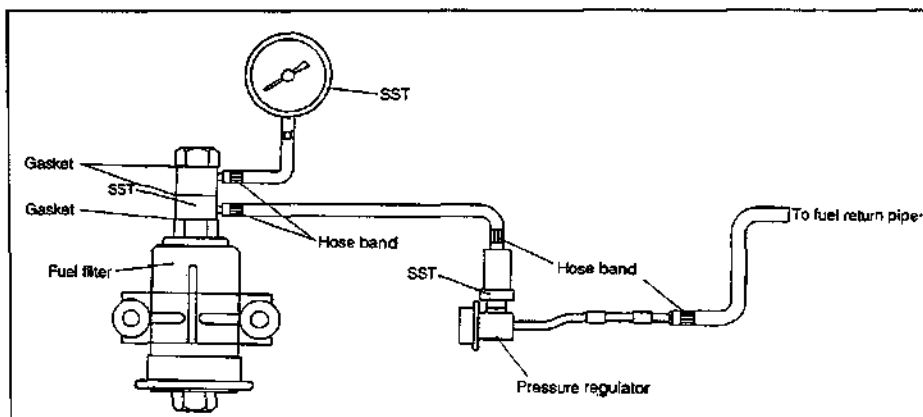
SSTs: 09268-87701-000
09268-87702-000
09283-87703-000

NOTE:

- When connecting the pressure regulator, install a new gasket to the union bolt connection and a new "O" ring to the "O" ring seal section. Also, attach hose bands to the hose connections.

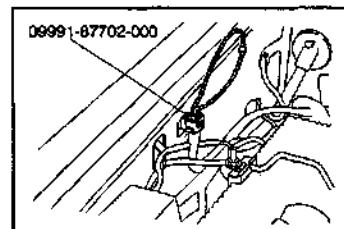


WPB00-EF772



WPB00-EF773

2. Connect the ground cable terminal to the negative (-) terminal of the battery.
3. Connection of SST (09991-87702-000)
 - (1) Detach the cap from the check connector.
 - (2) Connect the SST to the check connector.
 - (3) Connect the fuel pump terminal (White/Black) with the ground terminal (Black).
4. Turn ON the ignition switch.



WPB00-EF774

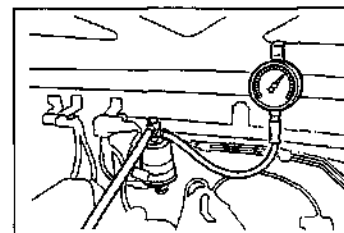
5. Check to see if the fuel pressure conforms to the specification.

Specified Fuel Pressure:
225.6 - 274.6 kPa (2.3 - 2.8 kgf/cm²)

If the fuel pressure fails to conform to the specification, replace the pressure regulator.

NOTE:

- At this stage, ensure that the fuel pump complies with the fuel flow rate requirements.



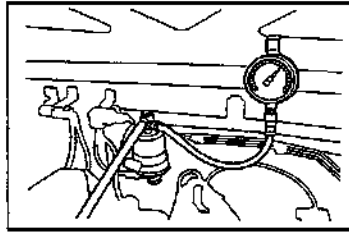
WPB00-EF775

EFI SYSTEM

6. Turn OFF the ignition switch. After a lapse of three minutes, check to see if the fuel pressure is the specified pressure or more.

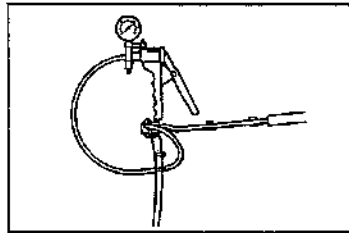
Specified Fuel Pressure:
176.5 kPa (1.8 kgf/cm²) or more

If the fuel pressure fails to conform to the specification, perform the operations described in the step 16 afterward.



WPES0-EF776

7. Connect a suitable hose to the vacuum hose pipe of the pressure regulator. Connect a MityVac to the other end of the hose.



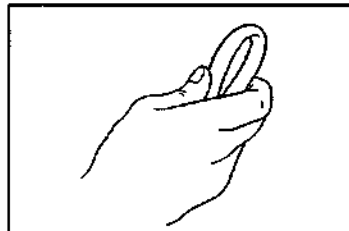
WPES0-EF777

8. Turn ON the ignition switch.
 9. While observing the fuel pressure, apply a negative pressure, using the MityVac. At this time, ensure that the fuel pressure drops corresponding to the applied negative pressure.
- Replace the pressure regulator if the fuel pressure will not decrease.

10. Turn OFF the ignition switch.
 11. Remove the MityVac and hose from the pressure regulator.
 12. Disconnect the ground cable terminal to the negative (-) terminal of the battery.
 13. Remove the SSTs from the respective parts.
 14. Install the cap to the check connector.
- Proceed to assembly of the pressure regulator.

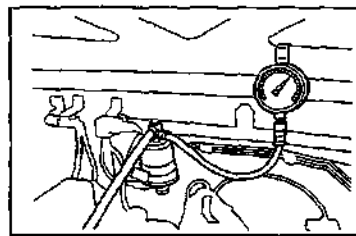
WPES0-EF778

15. Turn OFF the ignition switch after turning ON the ignition switch temporarily.
16. Immediately after the operation described in the step 15, stop the flowing of the fuel by bending the fuel hose between the fuel filter and the pressure regulator. Read the fuel pressure under this condition.



WPES0-EF779

17. After holding the fuel hose in a bent state for 3 minutes, check that the pressure has dropped compared with that measured in the step 6.
Replace the fuel pump if the pressure has dropped.
Replace the pressure regulator if the pressure will not drop.

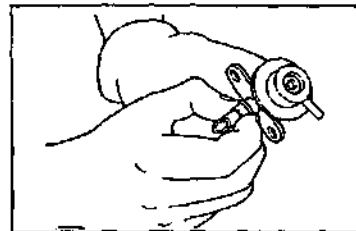


18. Disconnect the ground cable terminal from the negative terminal of the battery.
19. Remove the SSTs from the respective parts.
20. Install the cap to the check connector.

WPBX0-BP760

ASSEMBLY OF PRESSURE REGULATOR

1. Replace the pressure regulator "O" ring with a new part.



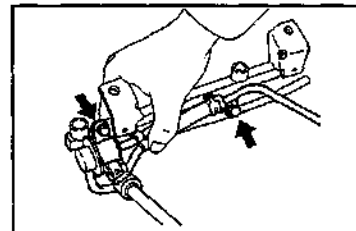
WPBX0-EF761

2. Apply silicon oil to the "O" ring of the pressure regulator. Install the "O" ring to the delivery pipe and tighten the attaching bolts.

Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)

CAUTION:

- Be very careful not to damage the "O" ring. Failure to observe this caution may cause fuel leakage.

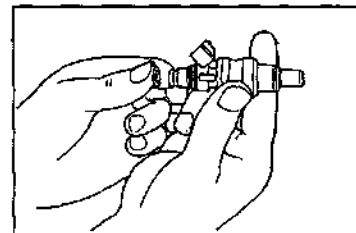


WPBX0-BP762

3. Replace the injector "O" ring with a new part.

NOTE:

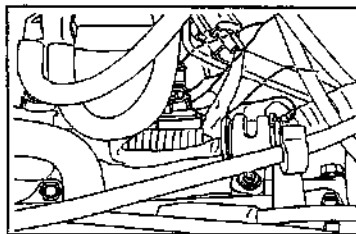
- Visually inspect the grommets and insulators of the injectors for any evidence of damage. Replace any defective parts if they exhibit damage before replacing the "O" ring.
- Be very careful to avoid damaging the "O" ring.



WPBX0-EF763

EFI SYSTEM

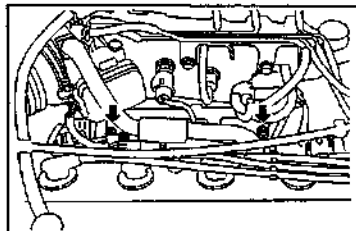
4. Install the injector to the intake manifold.



WPES0-EF764

5. Apply silicon oil to the "O" ring of the injector. Install the delivery pipe.

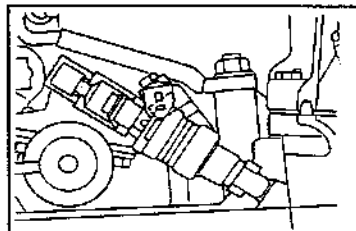
Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)



WPES0-EF765

NOTE:

- Be very careful not to damage the injector "O" ring during the installation.
- When connecting the delivery pipe and injector, make sure that they are installed straight, not in a tilted state.

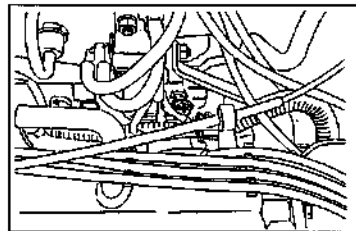


WPES0-EF766

6. Ensure that the injector can rotate by your hand.
If the injector can not be rotated smoothly, most likely the injector is installed in a tilted state. It is, therefore, necessary to reassemble the injector using a new injector "O" rings.

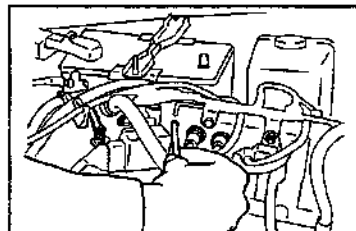
CAUTION:

- Never push the injector toward the insulator side or the grommet side. Failure to observe this caution will cause fuel leakage.



WPES0-EF767

7. Connect the rubber hose to the vacuum pipe.

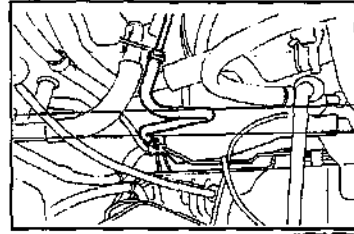


WPES0-EF768

8. Connection of fuel return hose to fuel pipe No. 2.
- (1) Install the fuel return hose to the fuel pipe No. 2 until second spool of fuel pipe.
 - (2) Securely clamp the fuel hose at 2 - 5 mm from full return hose end, with new clamp.

NOTE:

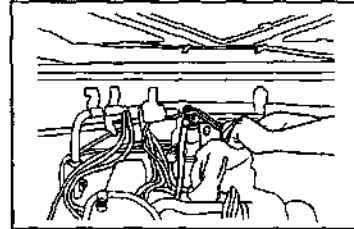
- Install the fuel return hose in parallel with chassis frame.



WFE90-EF780

9. Install the fuel hose No.1 to the delivery pipe with a new gasket interposed.

Tightening Torque: 34.3 - 44.1 N·m (3.5 - 4.5 kgf·m)



10. Connect the injector wiring connectors to the injector.
11. Connect the ground cable terminal to the negative (-) terminal of the battery.
12. Turn ON and OFF the ignition switch at intervals of 2 or 3 seconds, until air is expelled from the pressure regulator section.

NOTE:

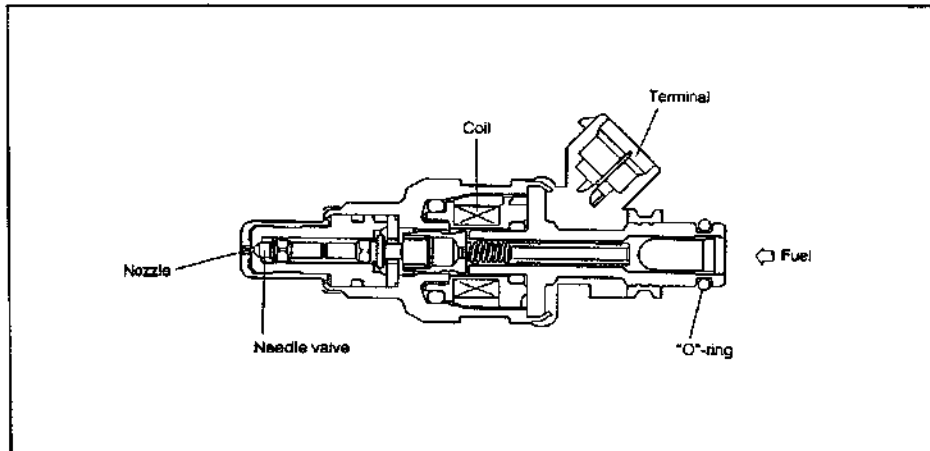
- If air remains inside the piping, you will hear a different sound from the fuel flowing sound.
- Usually the air bleeding can be performed by repeating turning ON/OFF the ignition switch four or five times.

13. Ensure that no fuel leakage exists.
Repair the leaky point if fuel leakage is present.
14. Start the engine. Again, check for fuel leakage.
Repair the leaky point if fuel leakage is present.
15. Install the air chamber assembly. (See page EM-22.)

WFE90-EF780

EFI SYSTEM

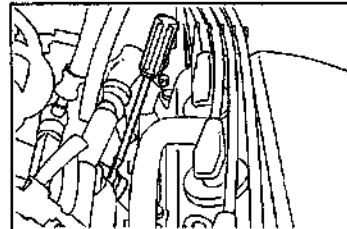
INJECTORS



WFE90-6F701

IN-VEHICLE INSPECTION

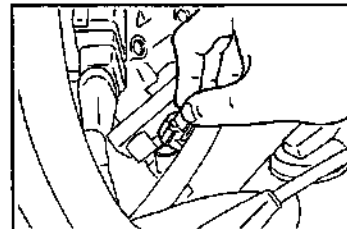
1. Remove the air chamber assembly.
(See page EM-17.)
2. Check of injector operation
 - (1) Using a sound scope, check to see if each injector emits an operating sound when the engine is being started or cranked.
 - (2) If a sound scope is not available, apply a screwdriver or the like to the injector and check to see if you can feel an operating vibration.



WFE90-6F702

If the injector emits no operating sound or emits an abnormal sound, check the wiring, wiring connector or injector.

3. Measurement of resistance of injector
 - (1) Disconnect the injector connector of the engine wire.

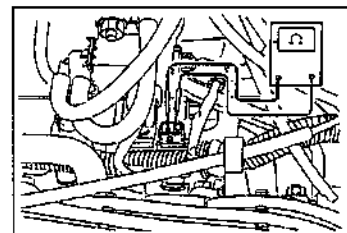


WFE90-6F703

- (2) Measure the resistance between the terminals of each injector.
Specified Resistance: 11 - 17 Ω

If the resistance between the terminals is not within the specification, replace the injector.

- (3) Connect the injector connector of the engine wire to the injector.



WFE90-6F704

REMOVAL OF INJECTOR

1. Remove the pressure regulator. (See page EF-215.)
2. Remove the injector.

NOTE:

- Do not remove the injector cover.

WF80-6776

INSPECTION OF INJECTOR

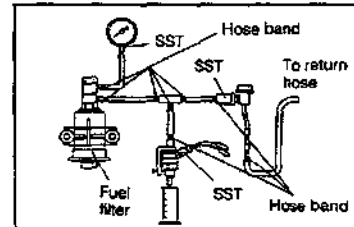
1. Using the following SSTs, connect the injector, as indicated in the figure. Insert the injector in the measuring cylinder.

SSTs: (1) 09268-87701-000
(2) 09283-87703-000
(3) 09268-87702-000
(4) 09842-30070-000

WF80-6776

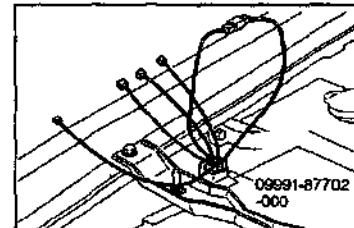
NOTE:

- Install a new gasket to the union bolt connection.
- Install a new "O" ring to the "O" ring seal section.
- Attach the hose bands to the rubber hose connections.
- Attach a suitable vinyl hose to the tip-end of the injector so as to prevent fuel from splashing.
- Remove the injector grommet. Check to see if the injector grommet exhibits any damage.



WF80-6777

2. Remove the check connector cap.
3. Connect the SST to the check connector.
SST: 09991-87702-000
4. Connect the terminal F (white/black) of the check connector to the ground terminal (black).

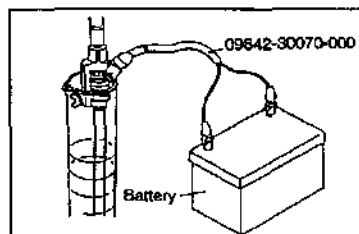


5. Connect the ground cable terminal to the negative (-) terminal of the battery.
6. Turn ON the ignition switch.

WF80-6778

EFI SYSTEM

7. Perform energizing for 15 seconds by means of the SST (09842-30070-000).
8. Measure the amount of fuel collected in the measuring cylinder.
specified pressure.
Specified Amount of Fuel: Approx. $45 \pm 5 \text{ cm}^3$
Variation between Each Injector: 5 cm^3 or less

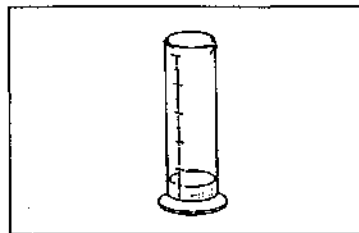


WP800-EF700

NOTE:

- Conduct the measurement two or three times for each injector.
- Before the injector is pulled out, make certain to turn OFF the ignition key.
- When removing the injector, use a suitable cloth or the like so as to prevent fuel from splashing.
- Prior to the test, perform air bleeding for the fuel hose.

If the amount of fuel fails to conform to the specification, replace the injector.



WP800-EF800

9. Leakage check

With the SST (09842-30070-000) in not energized state, turn ON the ignition key switch. Check any fuel leakage from the injector nozzle.

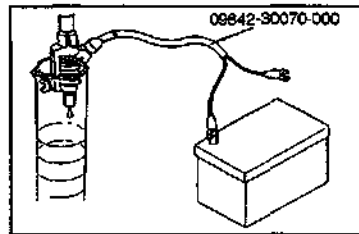
Fuel Leakage:

Less Than One Drop of Fuel per Minute

If the leakage exceeds the specified value, replace the injector.

NOTE:

- Prior to the test, remove the vinyl hose that was attached on the injector.



WP800-EF801

10. Turn OFF the ignition key.
11. Disconnect the ground cable terminal from the negative (-) terminal of the battery.
12. Disconnect the SST.

NOTE:

- Care must be exercised as to fuel splashing and fuel flowing.

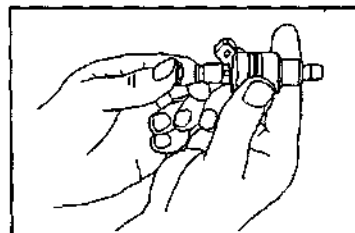
INSTALLATION OF INJECTOR

1. Check the insulator and grommet of each injector for damage.
Replace the insulator and/or grommet if damage exists.
2. Install the insulator on the manifold section.

WFE30-EF102

3. Install the grommet on the injection.
4. Replace the injector "O" ring with a new part.
NOTE:
 - Be very careful to avoid damaging the "O" ring.

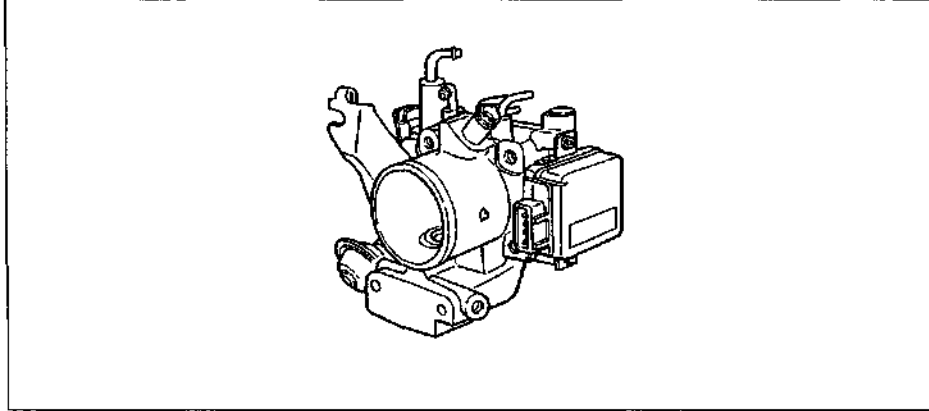
5. Insert the injector into the insulator.
6. Install the delivery pipe. (See page EF-217.)
7. Install the air chamber assembly. (See page EM-22.)



WFE30-EF303

EFI SYSTEM

AIR INDUCTION SYSTEM THROTTLE BODY

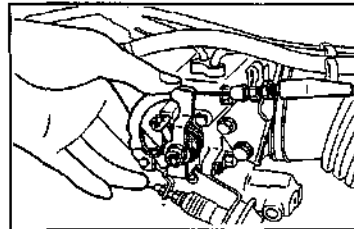


WPB90-EF804

IN-VEHICLE INSPECTION

Check of throttle body

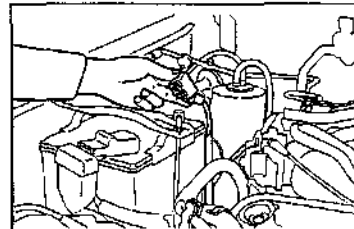
1. Ensure that the throttle linkage operates smoothly.
Replace the throttle body if the throttle lever fails to operate smoothly.
2. Check the throttle position sensor.
(See page EF-170.)
3. Check the throttle positioner.
(See page EC-21.)



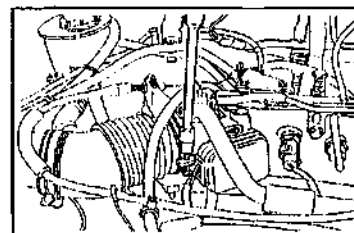
WPB90-EF805

Removal of throttle body

1. Disconnect the ground cable terminal from the negative (-) terminal of the battery.
2. Drain the coolant. (See page CO-12.)
3. Disconnect the hose for air conditioner and power steering idle-up from the air chamber.
4. Disconnect the air chamber hose from the throttle body.

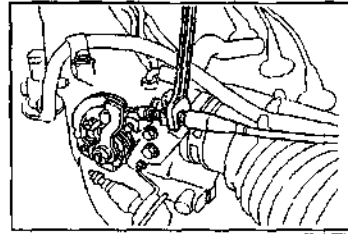


WPB90-EF806



WPB90-EF807

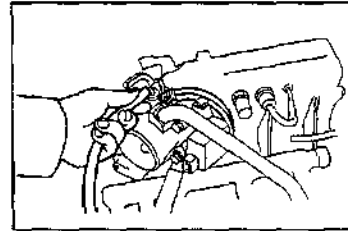
5. Disconnect the accelerator cable.



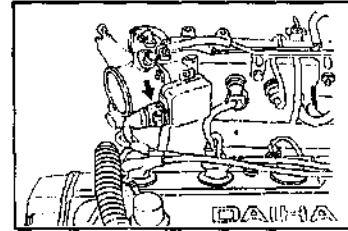
6. Disconnect the vacuum hoses from the throttle body.

NOTE:

- Prior to the disconnection, put a tag on each vacuum hose so that the original installation position may be known readily during the installation.



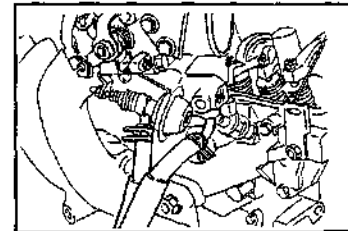
7. Disconnect the connector of the throttle position sensor.



8. Disconnect the water hoses from the throttle body.

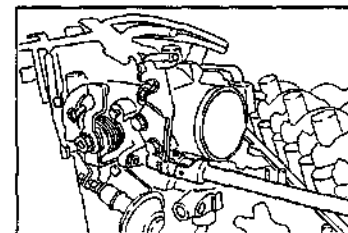
NOTE:

- Using a suitable cloth, take a precautionary measure so that no water gets to the electrical equipment of the vehicle.
- Be sure to plug the disconnected water hoses by suitable plug to prevent the water from flowing out.



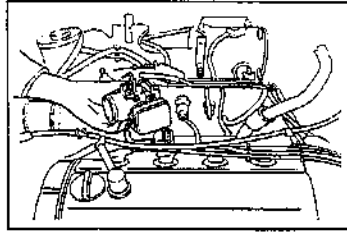
9. Removal of throttle body

- (1) Remove the attaching bolts and nuts of the surge tank stay No. 1.



EFI SYSTEM

- (2) Remove the attaching bolts and nuts of the throttle body.
- (3) Remove the throttle body.



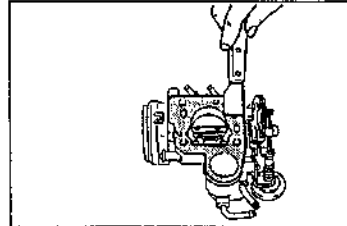
WF80-EP813

Inspection of throttle body

1. Cleaning of throttle body prior to inspection
 - (1) Clean the cast part with a soft brush, a wet cloth or the like.

WF80-EP814

- (2) Remove the gasket material from the surge tank attaching surface of the throttle body.

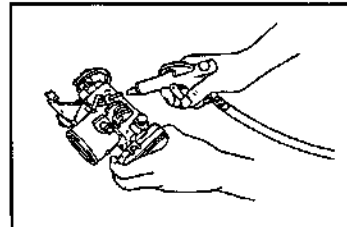


WF80-EP815

- (3) Clean all passages by blowing compressed air.

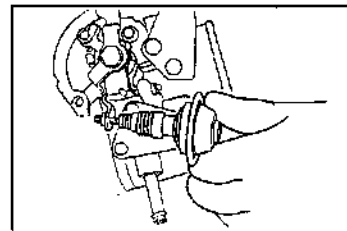
WARNING

- Be sure to protect your eyes, wearing goggles.



WF80-EP816

2. Check of throttle valve
 - (1) Check that the throttle lever is in full contact with the dashpot.
 - (2) When the throttle lever is opened, check to see if the dashpot lever comes out.



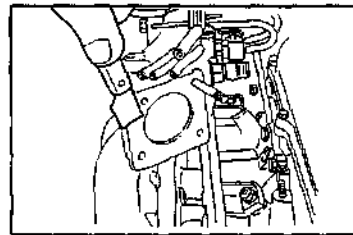
WF80-EP817

- (3) Check the throttle position sensor
(See page EF-170.)
Replace the throttle body if it exhibits any defect.

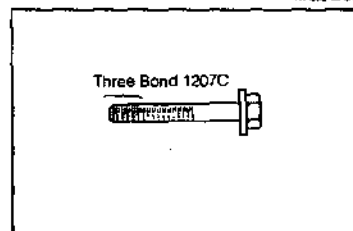
WP230-07815

Installation of throttle body

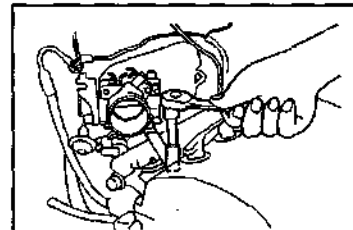
1. Remove any gasket material from the throttle body attaching surface of the surge tank.
2. Install the throttle body on the surge tank with a new gasket interposed. Attach the surge tank stay No. 1.
3. Apply a seal bond (Three Bond 1207C) to the threaded portions of the throttle body tightening bolts.
4. Tighten the attaching bolts and nuts of the throttle body and surge tank stay No. 1.
Tightening Torque: 14.7 - 21.6 N-m (1.5 - 2.2 kgf-m)
5. Connect the water hoses to the throttle body. Attach the hose clips.



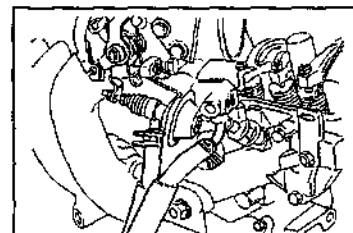
WP230-07815



WP230-07822



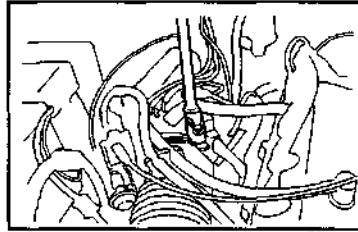
WP230-07821



WP230-07822

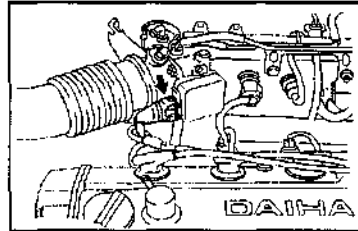
EFI SYSTEM

6. Connect the vacuum hose to the throttle body.



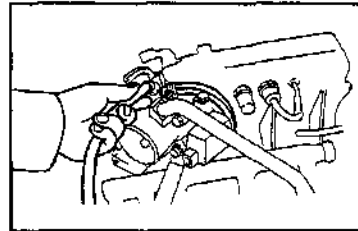
WP50-5F625

7. Connect the throttle position sensor connector.



WP50-5F624

8. Connect the vacuum hoses to the throttle body.

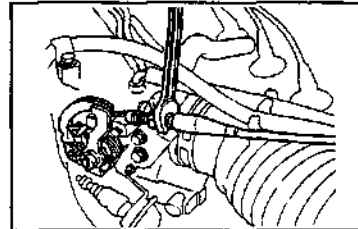


WP50-5F625

9. Connect the accelerator cable to the throttle body. Perform the adjustment so that the play in the axial direction may become 3 to 8 mm.
10. Connect the air chamber hose to the throttle body and the air chamber.

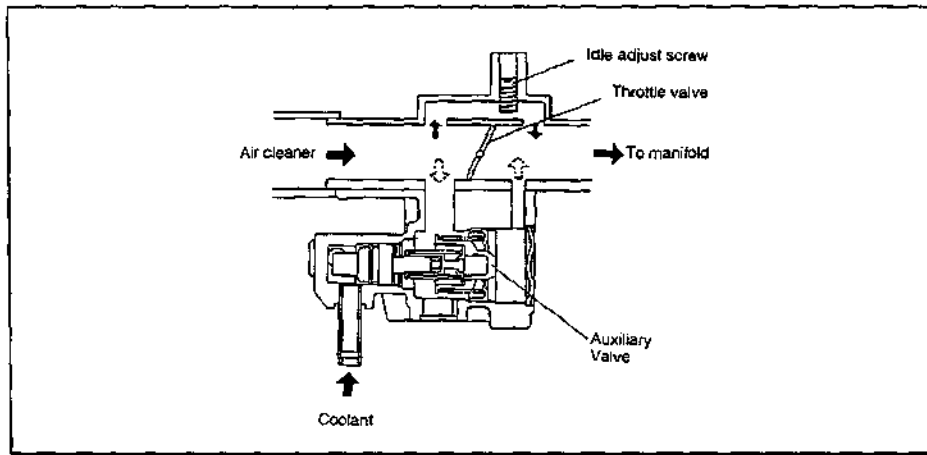
NOTE:

- Be sure to align the mating marks between the throttle body and air chamber hose, and the air chamber hose and air chamber.
- Be sure to clamp the air chamber hose bands.



WP50-5F626

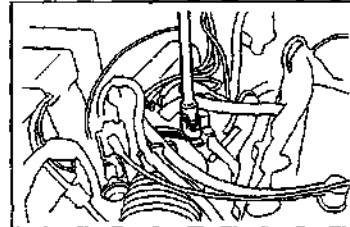
11. Fill coolant.
(See page CO-13.)
12. Connect the ground cable terminal to the negative (-) terminal of the battery.
13. Start the engine. Recheck the engine for water leakage. Repair the leaky point if water leakage exists.

AUXILIARY AIR VALVE

WP230-EP627

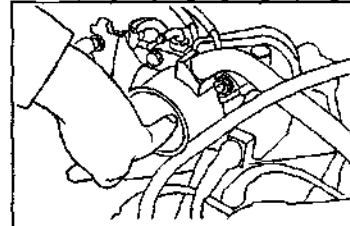
IN-VEHICLE INSPECTION**Check operation**

1. Disconnect the air chamber hose from the throttle body.



WP230-EP628

2. Start the engine. Check that there is air continuity at the auxiliary air valve port under the following conditions. Perform the check, following the procedures given below. When the cooling water temperature is below 40°C, apply your finger to the auxiliary air valve port. Ensure that the engine speed drops. When the cooling water temperature is above 70°C, apply your finger to the auxiliary air valve port. Ensure that the engine speed does not change. If the auxiliary air valve exhibits any malfunction, replace the throttle body.



WP230-EP629

Removal of auxiliary air valve

Remove the throttle body.
(See page EF-224.)

WP230-EP630









Installation of auxiliary air valve

Installation of throttle body
(See page EF-227.)

WP230-EP631

EFI SYSTEM

SSTs

Shape	Part No. and Name	Purpose	Remarks
	09991-87702-000 Engine control system inspection sub harness	Shorting terminal T Actuating fuel pump, etc.	
	09842-87204-000 EFC-II computer check sub harness	Inspection of computer input/output voltage	General specification
	09842-87704-000 EFC computer check sub harness	Inspection of computer input/output voltage	US specification
	09842-30070-000 EFI inspection wire F	Inspection of fuel injectors	
	09268-87701-000 EFI fuel pressure gauge	Inspection of fuel pressure	
	09283-87703-000 Pressure regulator adapter	Inspection of injectors Inspection of pressure regulator Inspection of fuel pressure	
	09268-87702-000 Injection measuring tool set	Inspection of injectors Inspection of pressure regulator Inspection of fuel pressure	
	09268-87703-000 Plug wrench	Removal and installation of spark plugs	
	09991-87703-000 Tacho pulse pick-up wire	Connecting engine tachometer	

WFE90-4F832

TIGHTENING TORQUE

Tightening component	Tightening torque			Remarks
	N·m	kgf·m	ft·lb	
Cylinder head x Spark plug	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9	
x Water temperature sensor	24.5 - 34.3	2.5 - 3.5	18.1 - 25.3	
x Distributor attach bolt	14.5 - 21.6	1.5 - 2.2	10.8 - 15.9	
Surge tank x Intake air temperature sensor	29.4 - 39.2	3.0 - 4.0	21.7 - 28.9	
x Gas filter	11.8 - 19.6	1.2 - 2.0	8.7 - 14.5	
x Throttle body	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9	
Surge tank x Stay No. 1	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9	
No. 2	29.4 - 44.1	3.0 - 4.5	21.7 - 32.5	
No. 3	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9	
Fuel filter x Fuel hose No. 1	34.3 - 44.1	3.5 - 4.5	25.3 - 32.5	
x Fuel pipe	34.3 - 44.1	3.5 - 4.5	25.3 - 32.5	
Delivery pipe x Fuel pipe No. 1	34.3 - 44.1	3.5 - 4.5	25.3 - 32.5	
x Intake manifold	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9	

WFE90-07535

EFI SYSTEM

EFI SYSTEM

Fuel pressure regulator	Fuel pressure at No. vacuum	225 - 275 kPa (2.3 - 2.8 kg/cm ²)															
Injector	Resistance at 20°C (approx.) Injection amount (approx.) Difference between each injector Fuel leakage	11.0 - 15.0 Ω 152 - 168 cm ³ /60 seconds at 20°C 5 cm ³ or less Less than one drop of fuel per minute															
EFI main relay Injector relay	Between terminals ① - ② ③ - ④	60 - 85 Ω Infinity															
Fuel pump relay	Between terminals ① - ② ③ - ④	70 - 90 Ω Infinity															
Idle-up VSV	Resistance	30 - 50 Ω at 20°C															
Throttle position sensor	Resistance Between terminals ① - ② (General) ③ - ④ (US) Throttle valve closed fully Throttle valve opened fully Between terminals ⑤ - ⑥ (General) ⑦ - ⑧ (US) Throttle valve closed fully Throttle valve opened fully	0.2 Ω or less at 20°C 10 kΩ or more at 20°C 10 kΩ or more at 20°C 5 Ω or less at 20°C															
Fuel pump	Fuel flow amount	235 cm ³ or more/15 seconds															
Water temperature sensor Intake air temperature sensor	Cooling water temperature	Resistance															
	80°C	0.322 ± 0.1 kΩ															
	60°C	0.584 ± 0.2 kΩ															
	40°C	1.14 ± 0.3 kΩ															
	20°C	2.45 ± 0.5 kΩ															
	0°C	5.88 ± 1.5 kΩ															
	-20°C	16.2 ± 3.2 kΩ															
Pressure sensor Output between SST terminals ① - ② (ground) (When engine is stopped.)																	
<table border="1"> <thead> <tr> <th>Measuring point</th><th>Atmospheric pressure kPa (mmHg)</th><th>Voltage V</th></tr> </thead> <tbody> <tr> <td>Altitude (height above sea level) m</td><td></td><td></td></tr> <tr> <td>0</td><td>101.3 (760)</td><td>3.3 - 3.9</td></tr> <tr> <td>500</td><td>95.5 (716)</td><td>3.2 - 3.8</td></tr> <tr> <td>1000</td><td>89.9 (674)</td><td>3.0 - 3.6</td></tr> </tbody> </table>			Measuring point	Atmospheric pressure kPa (mmHg)	Voltage V	Altitude (height above sea level) m			0	101.3 (760)	3.3 - 3.9	500	95.5 (716)	3.2 - 3.8	1000	89.9 (674)	3.0 - 3.6
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500	95.5 (716)	3.2 - 3.8															
1000	89.9 (674)	3.0 - 3.6															

WFE0-EP034

VOLTAGES AT ECU CONNECTORS (General specification)

Terminals	STD voltage or resistance	Conditions	Remedies
(1) - (21)	Less than 1 Ω	Ignition switch OFF.	Proceed to flow chart (2).
(2) - (21)	Less than 1 V	Ignition switch OFF (after more than one minute).	Check power supply.
	Approx. battery voltage	Ignition switch ON.	
(3) - (21)	Less than 0.1 V	Ignition switch OFF (after more than ten seconds).	Check power supply.
	Approx. battery voltage	Ignition switch ON.	
(4) - (21)	Approx. battery voltage	At all times. (Measured voltage is lower than specified voltage only at during starting period.)	Check power supply.
(5) - (21)	Approx. battery voltage	Engine fully warmed up. All accessory switches turned OFF.	Check power supply.
	Less than 3 V	Idle-up VSV ON.	Check idle-up VSV control.
(6) - (21)	4.5 - 5.5 V	Ignition switch ON. T-terminal shorted with ground terminal. Throttle valve fully closed.	Proceed to flow chart (2).
	Less than 1 V		Check diagnosis code.
	0 - 4.5 to 5.5 V (Measured voltage varies)	Ignition switch ON. T-terminal shorted with ground terminal. Engine revolution speed build at 3000 rpm after it has fully warmed up.	Oxygen sensor system.
(7) - (21)	Less than 0.1 V	Ignition switch OFF.	Check power supply.
	Approx. battery voltage	Ignition switch ON.	
(8) - (21)	Less than 0.1 V	Ignition switch OFF.	Check power supply.
	More than 6 V	When ignition switch is set to ST position.	
(9) - (21)	Less than 0.1 V	Ignition switch OFF.	Check T-terminal wiring.
	Approx. battery voltage	Ignition switch ON.	
(10) - (21)	Less than 0.5 V	Ignition switch ON. Throttle valve fully closed.	Throttle position sensor system.
	Approx. battery voltage	Ignition switch ON. Throttle valve fully opened.	
(11) - (21)	Less than 0.1 V	Ignition switch ON. Headlamp switch and/or defogger switch OFF.	Check idle-up VSV control.
	More than 9 V	Ignition switch ON. Headlamp switch and/or defogger switch ON.	
(12) - (22)	Less than 0.1 V	Ignition switch OFF.	Check VCC wiring.
	4.5 - 5.5 V	Ignition switch ON.	
(13) - (22)	3.2 - 4.0 V	Ignition switch ON. Atmospheric pressure is 101.3 kPa (760 mmHg)	Check pressure sensor.
(14) - (30)	1.5 - 3.0 V	Ignition switch ON. Air temperature inside surge tank: 20°C.	Check intake air temperature sensor.
(15) - (30)	0.40 - 0.65 V	Ignition switch ON. After engine has been warmed up fully. Cooling water temperature: 80 - 90°C.	Check cooling water temperature sensor.
(16) - (1)	Less than 1 Ω	Ignition switch OFF.	Proceed to flow chart (2).
(17) - (21)	Less than 1 V	Ignition switch OFF (after more than one minute).	Check/repair injector power supply.
	Approx. battery voltage	Ignition switch ON.	

WFE90-5-905

EFI SYSTEM

Terminals	STD voltage or resistance	Conditions	Remedies
(18) - (21)	Less than 0.1 V	Ignition switch OFF.	Check/repair ECU power supply.
	Approx. battery voltage	Ignition switch ON.	
(19) - (21)	Less than 3 V	Ignition switch ON. (Check engine lamp illuminated.)	Check power supply for check engine lamp.
	Approx. battery voltage	Engine is rotating. (Check engine lamp not illuminated.)	
(20) - (21)	Less than 1 V	Ignition switch ON. Fuel pump is operating.	Check/repair fuel pump power supply.
	Approx. battery voltage	Ignition switch ON. Fuel pump is stopped.	
(21) - Engine ground	Less than 0.2 Ω	Ignition switch OFF.	Check ground wiring.
(22) - (21)	Less than 0.5 Ω	Ignition switch OFF.	Replace ECU.
(23) - (21)	Approx. battery voltage	Engine is rotating. Air conditioner compressor is rotating. (Genuine air conditioner-equipped vehicle.)	Check air conditioner wiring.
(25) - (21)	0 to Approx. battery voltage	Ignition switch ON. When vehicle is moved. (Measured voltage changes four times for movement of 1.5 m.)	Check speed sensor
(28) - (21)	Approx. battery voltage	Ignition switch ON. Throttle valve fully closed.	Check throttle position sensor.
	Less than 0.5 V	Ignition switch ON. Throttle valve fully opened.	
(29) - (21)	Less than 0.1 V	Ignition switch ON. (after more than 60 seconds.)	Check oxygen sensor.
	Voltage varies within 0 - 1.0 V	After engine has warmed up fully. When engine revolution is held as 3000 rpm for more than two minutes.	Check fuel system.
(30) - (21)	Less than 1 Ω	Ignition switch ON.	Proceed to flow chart (2).

WFA00-0F000

VOLTAGES AT ECU CONNECTORS (US specification)

Terminals	STD Voltage	Condition		See page
① — ②	Approx. battery voltage	Ignition switch ON		EF-145
② — ③	Approx. battery voltage	At all time		EF-146
③ — ④	Approx. battery voltage	Ignition switch ON	When engine is stopped:	EF-149
⑤ — ⑥	4.5 - 5.5 V	Ignition switch ON		EF-147
⑤ — ⑦	3.2 - 4.0 V	Ignition switch ON	When atmospheric pressure of 101.3 kPa (760 mmHg) exists.	EF-148
⑦ — ⑧	0.4 - 0.65 V	Ignition switch ON	When cooling water temperature is 80°C:	EF-150
⑧ — ⑨	0 - Approx. battery voltage	Ignition switch ON	Measured voltage changes when vehicle is moved 1.5 m.	EF-156
⑨ — ⑩	Less than 5.0 V	Ignition switch ON	When defogger and headlamp switches are turned OFF:	—
	Approx. battery voltage	Ignition switch ON	When defogger and/or headlamp switches are turned ON:	
⑪ — ⑫	Approx. battery voltage	Ignition switch ON	When test terminal of check connector is not connected with ground terminal:	—
	Less than 1.0 V	Ignition switch ON	When test terminal of check connector is connected with ground terminal:	—
⑫ — ⑬	Less than 5.0 V	Ignition switch ON	Throttle valve fully closed	EF-153
	Approx. battery voltage	Ignition switch ON	Throttle valve fully opened	
⑬ — ⑭	0 V	Ignition switch ON		EF-157
	More than 5 V	When ignition switch is set to ST position:		
⑮ — ⑯	Measured voltage changes at a point between 0 - 5.0 V.	After warming up engine completely, connect test terminal of check connector with ground terminal. Hold engine revolution speed at 3000 rpm for two minutes.		EF-187
⑰ — ⑱	Less than 3.0 V	Ignition switch ON	• Engine is stopped. • When check engine lamp is illuminated:	—
	Approx. battery voltage	Ignition switch ON	• After engine starts: • When check engine lamp is extinguished:	
⑲ — ⑳	Approx. battery voltage	Ignition switch ON	• After engine starts; • Cooling water temperature is below 40°C.	EF-181
	Less than 3.0 V	Ignition switch ON	• After engine starts; • Cooling water temperature is above 41°C.	
㉑ — ㉒	Less than 1.0 V	At least 30 seconds have elapsed after turning OFF ignition switch.		EF-220
	Approx. battery voltage	Ignition switch ON	• Engine is stopped.	
㉓ — ㉔	Less than 0.01 V	Ignition switch ON		—
㉕ — ㉖	Approx. battery voltage	Ignition switch ON		EF-145

EFI SYSTEM

Terminals	STD Voltage	Condition		See page
② — ③	Change in output voltage	Ignition switch ON	After warming up engine completely, hold engine revolution speed at 3000 rpm for two minutes.	EF-151
② — ③	1.5 - 3.0 V	Ignition switch ON	Air temperature inside intake manifold is 20°C:	EF-155
② — ③	Less than 0.1 V	Ignition switch ON		—
③ — ④	Approx. battery voltage	Ignition switch ON	• Blower fan switch turned OFF	—
	Less than 2.0 V	Ignition switch ON	When blower fan switch turned ON:	
③ — ④	Approx. battery voltage	Ignition switch ON	Throttle valve fully closed	EF-154
	Less than 5.0 V	Ignition switch ON	Throttle valve fully opened	
③ — ④	Less than 1 V	Ignition switch ON	When brake pedal is not depressed:	—
	Approx. battery voltage	At all time	When brake pedal is depressed:	—
③ — ④	Less than 1 V	Ignition switch ON	When compressor magnet switch of air conditioner is turned OFF:	EF-159
	Approx. battery voltage	Ignition ON	When compressor magnet switch of air conditioner is turned ON:	
③ — ④	Less than 0.1 V	Ignition switch ON		—
④ — ⑤	Approx. battery voltage	Ignition switch ON	When fuel pump is stopped:	EF-163
	Less than 2.0 V	Ignition switch ON	When fuel pump is operating:	
④ — ⑤	Approx. battery voltage	Ignition switch ON	When pressure VSV is turned OFF:	EF-184
	Less than 3.0 V	Ignition switch ON	For 0.5 second immediately after engine starts	
⑤ — Engine ground	Less than 0.1 V	Ignition switch ON		—
⑤ — ⑥	Less than 3.0 V	Ignition switch ON	Engine is stopped.	EF-175
	Approx. battery voltage	Ignition switch ON	When test terminal of check connector is connected with ground terminal:	
⑥ — ⑦	Less than 1.0 V	At least 30 seconds have elapsed after turning OFF ignition switch.		EF-220
	Approx. battery voltage	Ignition switch ON	Engine is stopped.	
⑦ — ⑧	Less than 0.1 V	Ignition switch ON		—

WFE90-EP899

DAIHATSU

F300

[HD-Engine]

FUEL SYSTEM

PRECAUTIONS	FU- 2
TROUBLE SHOOTING	FU- 2
FUEL SYSTEM OUTLINE	FU- 4
IN-VEHICLE INSPECTION	FU-10
CARBURETOR	FU-13
FUEL PUMP	FU-35
FUEL FILTER	FU-39
SST [Special Service Tools]	FU-40
TIGHTENING TORQUE	FU-40
SPECIFICATIONS	FU-41

WF300-FU001

FUEL SYSTEM

PRECAUTIONS

1. Before working on the fuel system, be sure to disconnect the ground cable from the negative (-) terminal of the battery.
2. When working on the fuel system, never allow any naked fire to be brought near the working site. Also, never smoke cigarette or the like.
3. Do not allow the fuel to get to any parts made of rubber or resin.
4. Do not work on the fuel system of more than one vehicle at the same time.
5. Be certain to keep each part of the fuel system from contamination.
6. Be very careful not to allow any dirt or the like be mixed into the fuel system during the servicing operation.
7. Make sure to keep the working site clean. Also, be sure not to loose any part, specifically small parts.
8. Never loose nor mix up those pins, clips and springs with each other.

WF290-FU200

TROUBLE SHOOTING

Problem	Possible cause	Remedy	Page
Engine will not start/hard to start (Only case where cranking by starter motor is normal)	Carburetor problems		
	• Choke operation	Check choke system	FU-10
	• Needle valve sticking or clogged	Check float and needle	FU-22
	• Vacuum hose disconnected or damage		EC- 3
	• Fuel cut solenoid valve not open	Check fuel cut solenoid valve	FU-10, FU-23
Rough idle or stalls	• Outer vent valve not open	Check outer vent valve	FU-11, FU-23
	Carburetor problems		
	• Idle speed incorrect	Adjust idle speed	EM-23
	• Slow jet clogged		FU-23
	• Idle mixture incorrect	Adjust idle mixture	EM-23
	• Fuel cut solenoid valve not open	Check fuel cut solenoid valve	FU-10, FU-23
	• Fast idle speed setting incorrect (Cold engine)	Adjust fast idle speed	EM-24
	• Choke valve open (Cold engine)	Check choke system	FU-10, FU-23
	• Fuel pump faulty		FU-35
	• Fuel filter clogged		FU-39
	• Fuel line clogged		
	• Fuel line bent or kinked		
Engine hesitates/poor acceleration	Carburetor problems		
	• Float level too low	Adjust float level	FU-28
	• Accelerator pump faulty		FU-10
	• Power valve faulty	Check power valve	FU-23
	• Power piston faulty	Check power piston	FU-22
	• Choke valve closed (hot engine)	Check choke system	FU-10
	• Choke valve stuck open (cold engine)		

WF290-FU100

FUEL SYSTEM

Problem	Possible cause	Remedy	Page
Engine hesitates/poor acceleration	• Fuel line clogged	Check fuel line	FU-35
	• Fuel pump faulty	Check fuel pump	FU-39
	• Fuel filter clogged	Replace fuel filter	
	• Fuel line bent or kinked	Replace fuel line	
Engine dieseling (Runs after ignition switch is turned off)	Carburetor problems		FU-10
	• Linkage sticking	Adjust idle speed	EM-23
	• Idle speed out of adjustment	Check fuel cut solenoid valve	FU-10, FU-23
Poor fuel mileage	Carburetor problems		FU-10
	• Choke faulty	Check choke system	EM-23
	• Idle speed too high	Adjust idle speed	FU-22, 23
	• Power valve always open	Check power piston and valve	EM-25
	• Idle mixture incorrect	Adjust idle mixture	
	Fuel leak	Repair as necessary	
Unpleasant odor	Outer vent valve always open	Check outer vent valve	FU-11, FU-23

WPSO-FU101

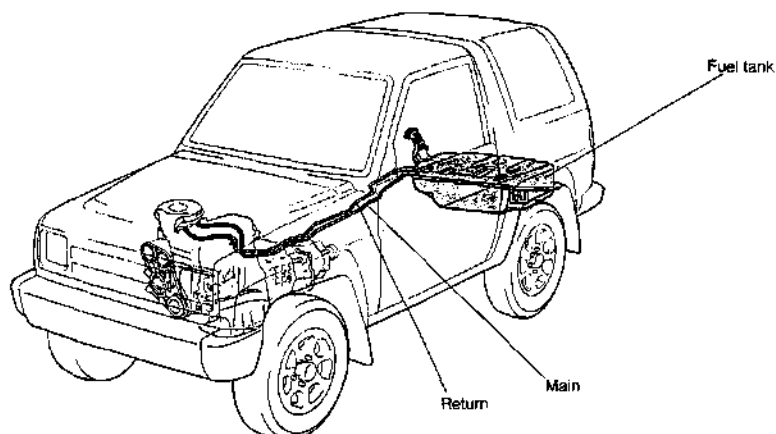
FUEL SYSTEM

FUEL SYSTEM OUTLINE

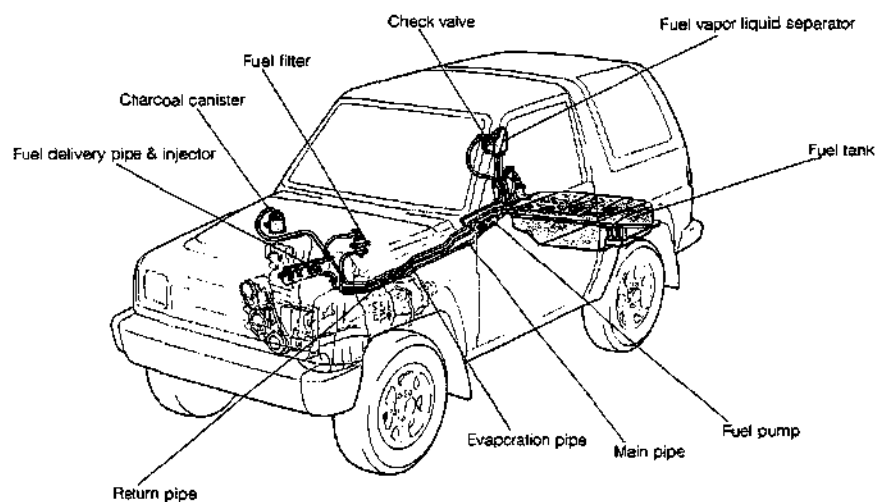
No modification has been made on the fuel system.

On Type HD-E engine, the installation method has been changed to a two-point support so as to reduce the vibration of the fuel pump bracket.

HD-C (Typical Example of R.H.D. Vehicle)



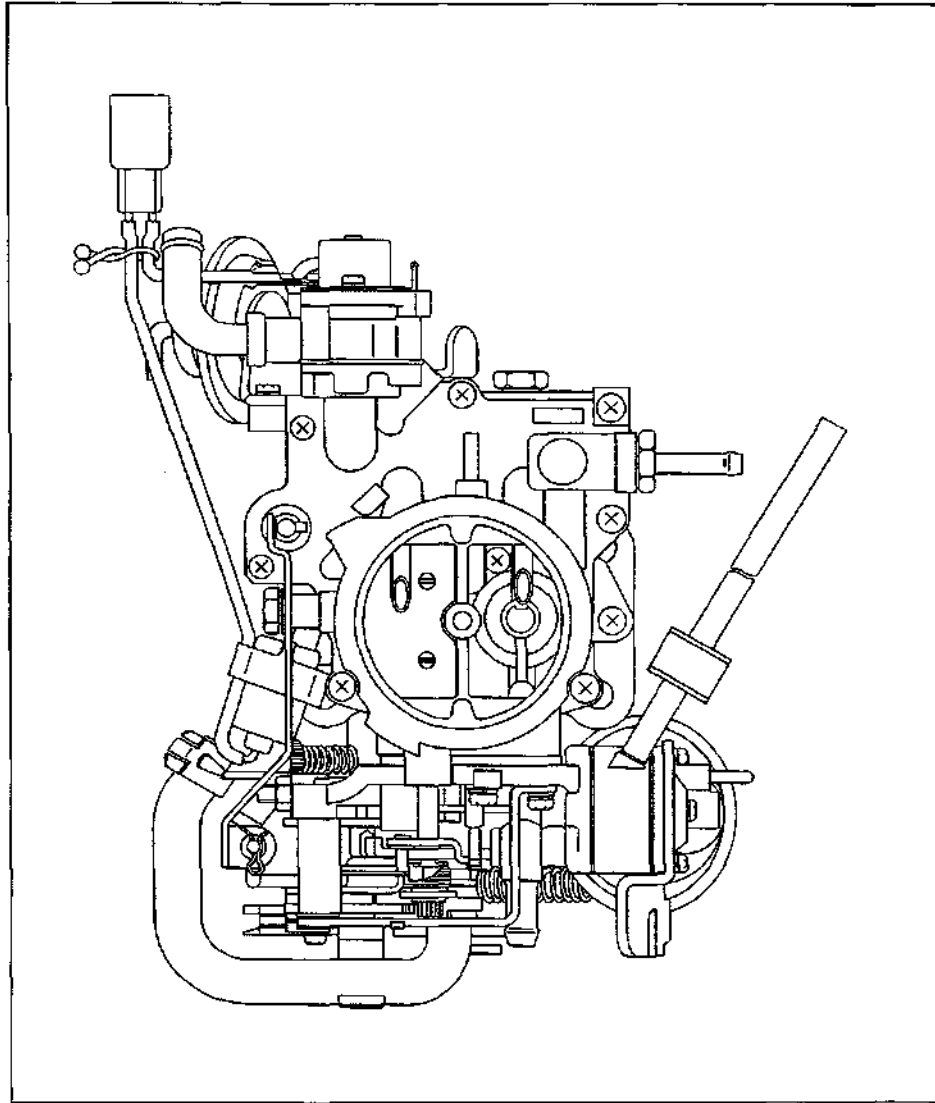
HD-E (Typical Example of L.H.D. Vehicle)



WFE90-FU002

CARBURETOR

The carburetor is a two-barrel, down-draft type. It is equipped with an automatic choke and an outer vent. The automatic choke employs a hot-water circulation method and a wax type. The automatic choke regulates the opening degree of the throttle valve in accordance with the engine warming-up condition. For easy starting during high-temperature operation and stable idling, the carburetor adopts the outer vent.



W/260-FU.000

FU-5

FUEL SYSTEM

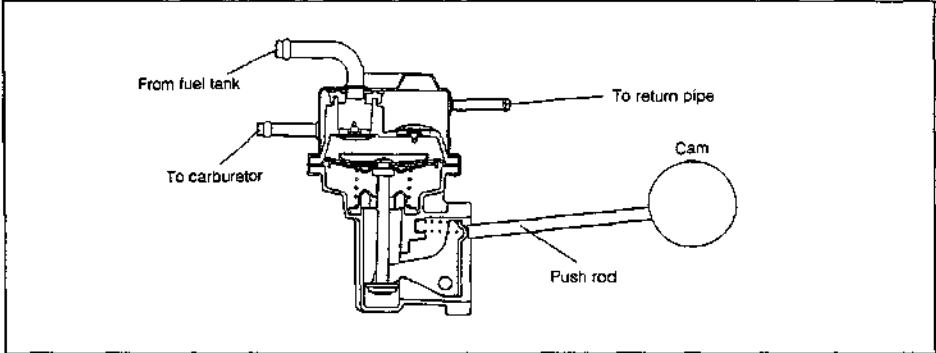
Carburetor specifications

Item			Down flow, Two-barrel
Type			
Air horn inner diameter	mm		58
Throttle bore diameter	Primary	mm	28
	Secondary	mm	32
Large venturi diameter	Primary	mm	21
	Secondary	mm	28
Small venturi diameter	Primary	mm	9
	Secondary	mm	8
Main nozzle diameter	Primary	mm	2.0
	Secondary	mm	2.2
Main jet diameter	Primary	mm	0.98
	Secondary	mm	1.74
Slow jet diameter	Primary	mm	0.49
	Secondary	mm	0.66
Main air bleed	Primary	mm	0.60
	Secondary	mm	No.1 0.80 No.2 0.60
Slow air bleed	Primary	mm	No.1 1.50 No.2 1.50 No.3 1.00
	Secondary	mm	0.65
Power jet diameter	mm		0.50
Pump jet diameter	mm		0.40
Power piston function (starting) vacuum	kPa (mmHg)		21.3 ± 2.7 (160 ± 20)
Accelerating pump stroke	mm		4.0
Economizer jet diameter	mm		1.20
Fuel level (measured from top surface of body)	mm		22 ± 1
Float adjustment values	Float descent position (clearance between needle valve and float lip)	mm	1.6
First throttle valve	Fully-closed-fully-opened angle	deg	9 - 90
	Secondary valve operation-starting angle	deg	50 ± 1
Secondary throttle valve	Fully-closed-fully-opened angle	deg	20 - 80
Choke valve	Fully-closed-fully-opened angle	deg	20 - 90
Fast idle	Angle of primary throttle valve at time when choke valve opens fully	deg	18.0 ± 1
Choke Breaker	Angle of choke valve at time when choke breaker is functioning	deg	1st stage 20 ± 1 2nd stage 27 ± 2
Throttle positioner	Angle of primary throttle valve at time when throttle positioner is functioning	deg	16 ± 1

WP590-FL004

FUEL PUMP (HD-C Engine)

This nondisassembling type fuel pump is mounted at the right rear section of the cylinder head. The fuel pump is driven via a push rod by the fuel pump driving cam provided at the rear section of the camshaft. Furthermore, the fuel pump is equipped with a return pipe which contributes to stable idle operation during hot operation. (Prevention of vapor lock)



WPB9-FU005

Fuel pump specifications

Item		Specifications
Delivery rate	cm ³ /min	800 or more (Cam revolution speed: 3,000 rpm)
Delivery pressure	kPa (kg/cm ²)	19.6 - 29.4 (0.20 - 0.30)
Fuel inlet negative pressure	kPa (mmHg)	-40 (-300) or below

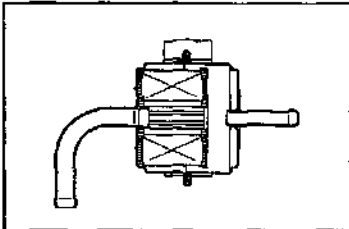
WPB9-FU006

FUEL FILTER (HD-C Engine)

The fuel filter is installed at the right fender section inside the engine compartment.

Filter specifications

Item		Specifications
Type		Throw-away type
Filtering area	cm ²	130
Rated flow rate	dm ³ /min	1.0

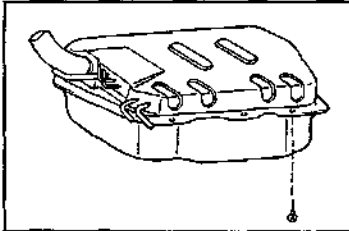


WPB9-FU007

FUEL TANK

The fuel tank is mounted on the chassis frame section at the rear section of the vehicle.

Fuel Tank Capacity: 60 dm³



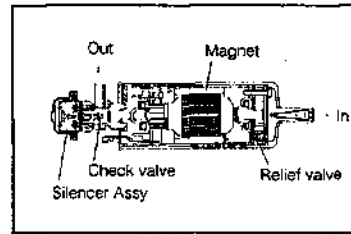
WPB9-FU008

FUEL SYSTEM

FUEL PUMP (HD-E Engine)

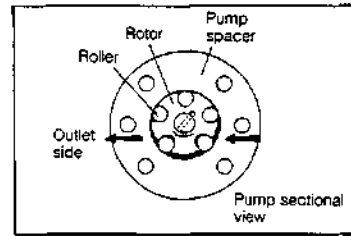
The fuel pump is used to suck fuel from the fuel tank so that the fuel may be sent to the injectors under a pressurized condition. The fuel pump is an in-line type which is provided in close proximity of the fuel tank.

The fuel pump is composed of a pump section, a motor section, a relief valve, a check valve and so forth, as shown in the right figure.



Forced feed of fuel

The pump section consists of a rotor, a pump spacer and a rotor. When the rotor starts to turn, the roller moves along with the spacer inner wall owing a centrifugal force. As the volume enclosed by these parts varies, the fuel is sucked into the pump. Then, the sucked fuel flows through the motor housing. Finally, it is delivered to the outlet side under a pressurized state.



Relief valve

If the pressure at the outlet side abnormally rises due to some reasons, such as restriction of the fuel filter, this relief valve opens at a pressure of 343 - 490 kPa (3.5 - 5.0 kgf/cm²). In this way, trouble resulting from an excessive pressure rise can be prevented.

Check valve

After the engine has stopped, the check valve prevents any drop in the residual pressure in the fuel line, thus assuring easy engine starting.

Silencer assembly

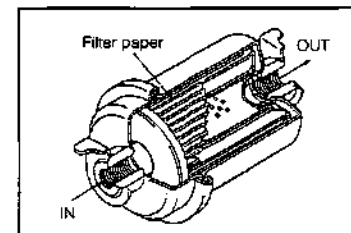
The silencer absorbs any pulsations generated in the pump. Moreover, its diaphragm serves as a silencer to reduce the noise level.

FUEL FILTER (HD-E Engine)

The fuel filter is located in the fuel line between the fuel pump and the injectors. The fuel filter is a vortex type which features an excellent pressure-resistant property and a large filtering area and yet a compact design. It is installed at the dash panel inside the engine compartment.

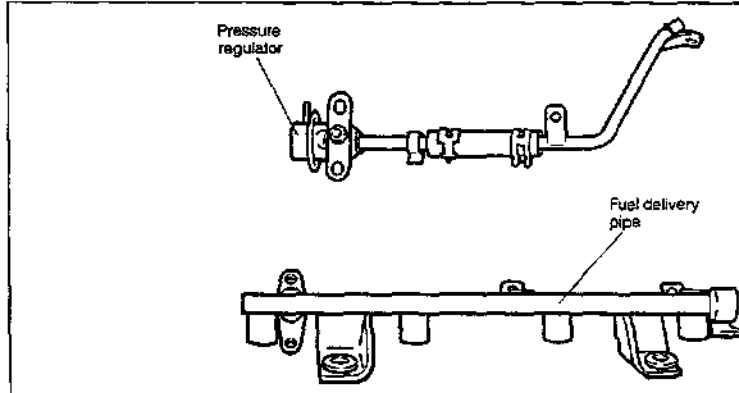
Specifications

Filtering area	cm ²	1500
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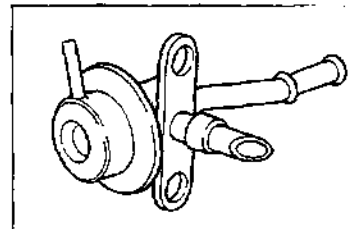


FUEL DELIVERY PIPE (HD-E Engine)

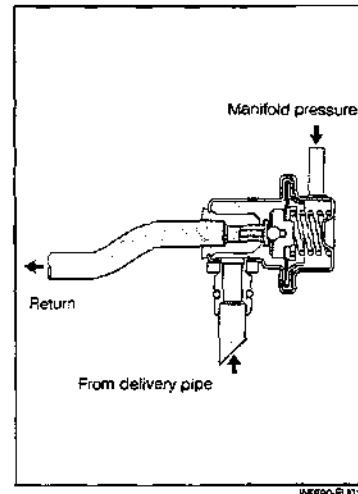
The fuel delivery pipe distributes high-pressure fuel to each injector. Furthermore, a pressure regulator is provided at the end of the delivery pipe.

**PRESSURE REGULATOR (HD-E Engine)**

The pressure regulator adjusts the fuel pressure being applied to the injectors. The difference in pressure between those points before and after the injector must be kept always at a constant level. To accomplish this, the spring chamber of the pressure regulator is connected to the intake manifold. Thus, the fuel pressure is always maintained at a pressure 250 kPa (2.55 kgf/cm²) higher than the intake manifold inner pressure.

**Operation**

When the difference in pressure between the fuel pressure and the manifold inner pressure exceeds 250 kPa (2.55 kgf/cm²), the diaphragm is pushed upward. As a result any excess fuel is returned to fuel tank through the return pipe.



FUEL SYSTEM

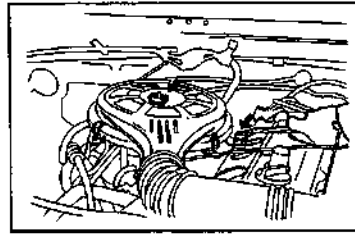
IN-VEHICLE INSPECTION [HD-C Engine]

1. Removal of air cleaner

NOTE:

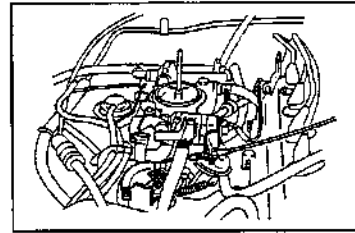
- Before starting the engine, plug the ITC valve hoses, etc. to prevent rough idling.

- (1) Remove the three bolts securing the air cleaner and air intake hose.
- (2) Remove the wing nut located at the center of the air cleaner. Remove the air cleaner and air intake hose subassembly.



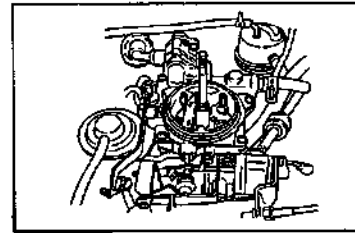
2. Inspection of carburetor and linkage

- (1) Ensure that each screw plug is installed correctly.
- (2) Check each linkage for evidence of excessive wear. Also, check to see if any snap ring is missing.
- (3) With the acceleration pedal fully depressed, check to see if the throttle valve opens fully.



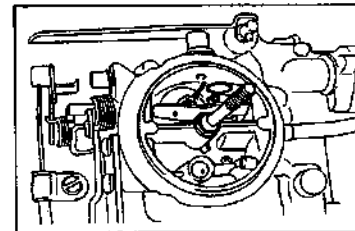
3. Inspection of choke system

Check that choke valve is completely closed when engine is cold.
Then, start the engine, check that choke valve is gradually opened in accordance with the warming-up condition of the engine.



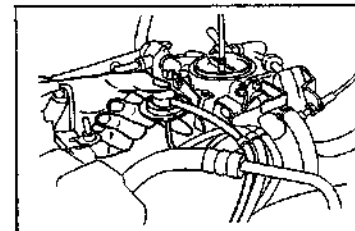
4. Inspection of acceleration pump

Check to see if the fuel spurts out from the acceleration nozzle when throttle valve is opened quickly.



5. Inspection of solenoid valve

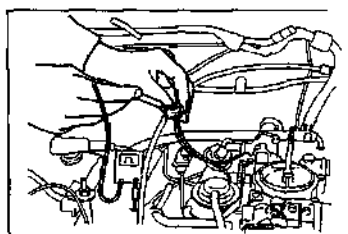
- (1) Check to see if you can feel the operation of the solenoid valve when the ignition switch is turned ON/OFF. If the solenoid valve remains inoperative, check the power supply for the solenoid valve. Then, proceed to the check described in the step (2) next page.



FUEL SYSTEM

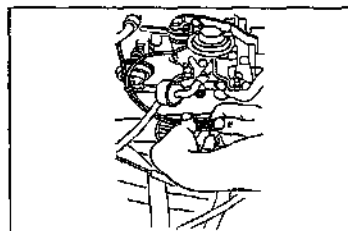
- (2) Disconnect the connector from the carburetor. Check to see if the resistance between the solenoid valve terminal and the carburetor proper conforms to the specification.
Specified Resistance: 80 - 100Ω at 20°C

If the resistance fails to conform to the specification, replace the solenoid valve.



WP80-FU017

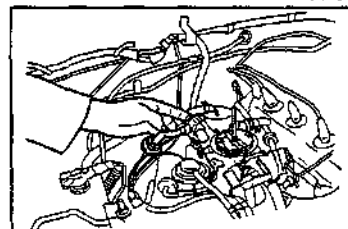
- (3) Reconnect the connector.



WP80-FU018

6. Inspection of outer vent valve

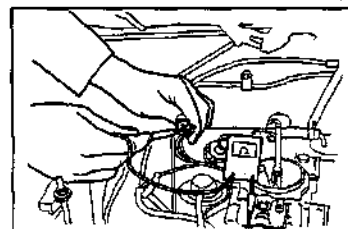
- (1) Check to see if you can feel the operation of the outer vent valve when the ignition switch is turned ON/OFF. If the outer vent valve remains inoperative, check the power supply for the outer vent valve. Then, proceed to the check described in the step (2) below.



WP80-FU019

- (2) Disconnect the connector from the carburetor. Check to see if the resistance between the outer vent valve terminal and the carburetor proper conforms to the specification.
Specified Resistance: 30 - 40Ω at 20°C

If the resistance fails to conform to the specification, replace the outer vent valve.



WP80-FU020

- (3) Reconnect the outer vent valve connector.
- (4) Disconnect the outer vent hose from the BVS. Turn ON the ignition key switch.

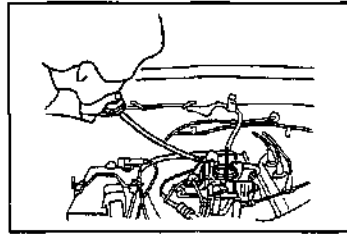
WP80-FU021

FUEL SYSTEM

- (5) Blow air from the outer vent hose. Ensure that no air continuity exists.
If air continuity exists, replace the outer vent valve.

WARNING

• Be very careful not to inhale the air.

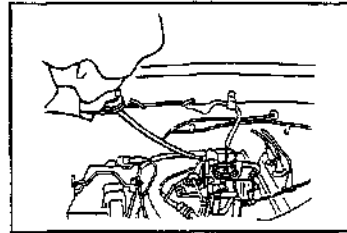


WPES0-FU203

- (6) Turn OFF the ignition key switch.
(7) Blow air from the outer vent hose. Ensure that air continuity exists.
If no air continuity exists, replace the outer vent valve.

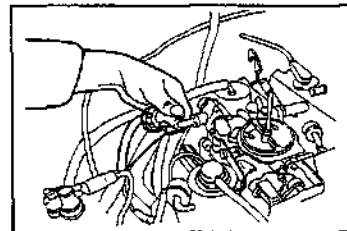
WARNING

• Be very careful not to inhale the air.



WPES0-FU204

- (8) Connect the outer vent hose to the BVSV.

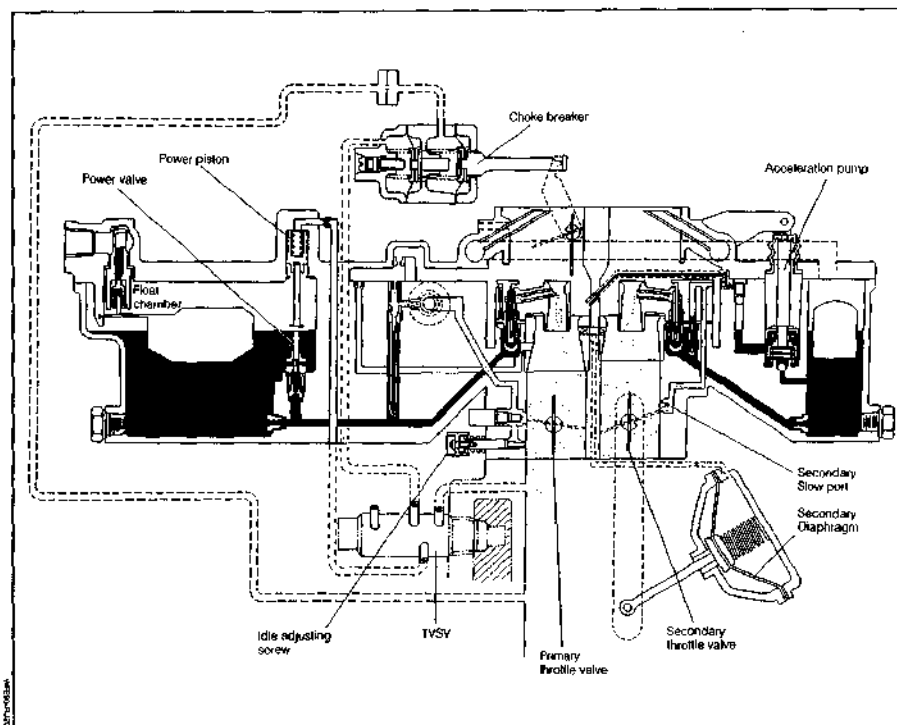


WPES0-FU205

7. Inspection of choke breaker
(See page FU-6.)
8. Inspection of throttle positioner
(See page EC-11.)

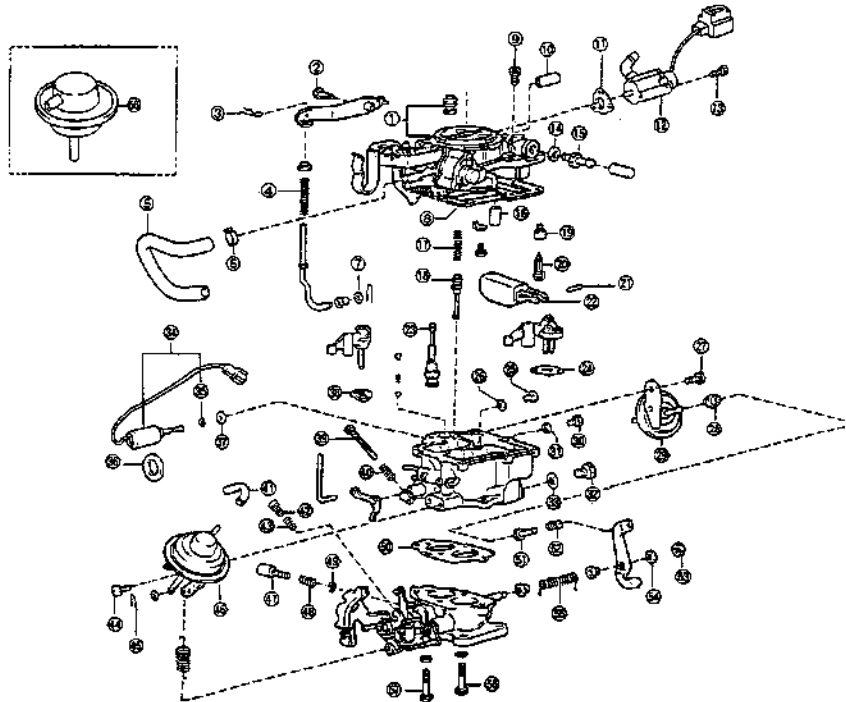
WPES0-FU019

FUEL SYSTEM

[illegible]

FUEL SYSTEM

COMPONENTS



- ① Air horn
- ② Pump arm set screw
- ③ Clip
- ④ Spring
- ⑤ Hose No. 2
- ⑥ Clip
- ⑦ Washer
- ⑧ Gasket
- ⑨ Bolt
- ⑩ Hose
- ⑪ Gasket
- ⑫ Outer vent valve
- ⑬ Bolt
- ⑭ Washer
- ⑮ Union nipple
- ⑯ Vacuum hose No. 2
- ⑰ Spring
- ⑱ Power piston
- ⑲ Needle valve seat
- ⑳ Needle valve

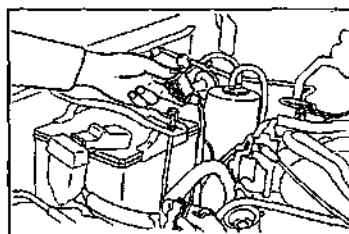
- ㉑ Float lever pin
- ㉒ Float assembly
- ㉓ Pump plunger
- ㉔ Venturi gasket No. 2
- ㉕ Main jet
- ㉖ Main jet gasket
- ㉗ Bolt
- ㉘ Boot
- ㉙ Positioner
- ㉚ 2nd main jet
- ㉛ 2nd main jet gasket
- ㉜ Main passage plug
- ㉝ Main passage plug gasket
- ㉞ solenoid valve
- ㉟ O ring
- ㊱ Solenoid valve wire clamp
- ㊲ Solenoid valve gasket
- ㊳ Venturi gasket
- ㊴ Throttle adjusting screw
- ㊵ Spring

- ㊶ Vacuum hose
- ㊷ Screw
- ㊸ Throttle adjusting spring
- ㊹ Diaphragm housing set screw
- ㊺ Snap ring No. 1
- ㊻ Diaphragm sub assembly
- ㊼ Idle mixture adjusting screw
- ㊽ Idle adjusting spring
- ㊾ Washer
- ㊿ Body flange gasket
- 1 Adjusting screw
- 2 Adjusting screw spring
- 3 Throttle lever set screw
- 4 Lock washer
- 5 Return spring
- 6 Set screw
- 7 Set screw
- 8 Diaphragm

WF290-FU/020

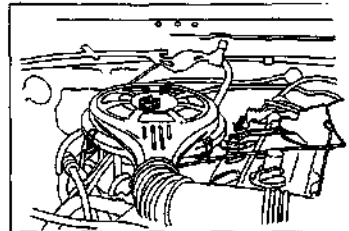
REMOVAL OF CARBURETOR

1. Disconnect the ground cable terminal from the negative (-) terminal of the battery.
2. Drain the coolant. (See page CO-12.)



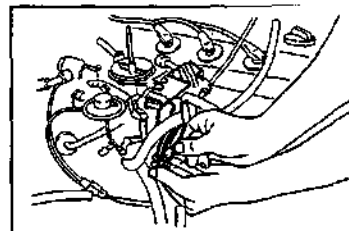
WP520-FU02

3. Removal of air cleaner
 - (1) Remove the three bolts securing the air cleaner and air intake hose.
 - (2) Remove the wing nut located at the center of the air cleaner. Remove the air cleaner and air intake hose subassembly.



WP520-FU03

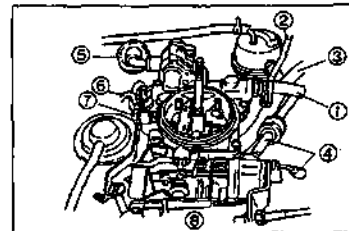
4. Disconnect the accelerator cable from the carburetor.



WP520-FU07

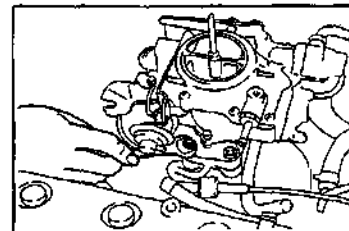
5. Remove the following hoses from the carburetor:

- ① Fuel inlet hose
- ② ITC vacuum hose
- ③ PCV gas hose
- ④ Choke breaker vacuum hose
- ⑤ Outer vent hose
- ⑥ Throttle positioner vacuum hose
- ⑦ Vacuum hose to distributor
- ⑧ Coolant circulating hoses



WP520-FU08

6. Disconnect the solenoid valve outer vent valve connector.
7. Remove the four attaching nuts of the carburetor. Remove the carburetor.



WP520-FU09

FUEL SYSTEM

DISASSEMBLY OF CARBURETOR

NOTE:

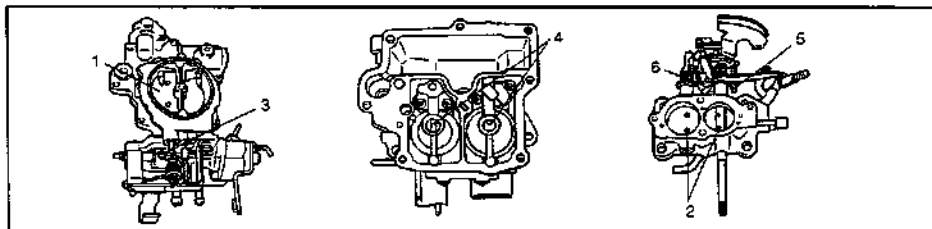
- The following operations have been arranged in such a way that checks are performed for a certain single unit alone at a time. This will avoid any occurrence of wrong assembling of similar subassemblies which would likely occur when operations were carried out concurrently.
 - (1) Be sure to arrange the disassembled parts in order that reassembling may be performed readily.
 - (2) Do not mix up those balls, clips, springs and so forth.
 - (3) Be sure to employ the following SST, a set of screw-drivers for carburetor use.

SST: 09860-11011-000

WP820-FU022

Do not disassemble the following sections.

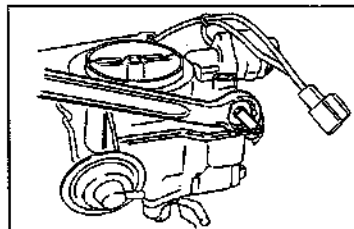
- Choke valve set screw
- Throttle valve set screw
- Automatic choke mechanism
- Small venturis
- Fast idle adjust screw
- Acceleration lever, link connecting nut



WP820-FU010

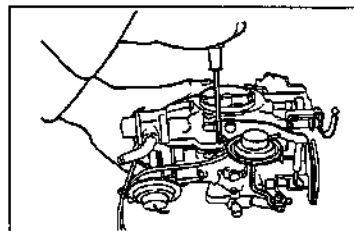
Disassembly of air horn

- Remove the air cleaner set bolt.
- Removal of air horn assembly
 - (1) Remove the fuel inlet union and gasket.



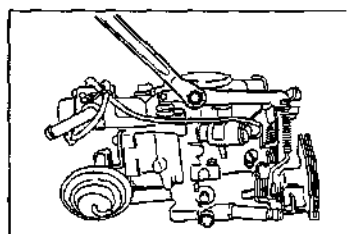
WP820-FU105

- (2) Remove the idle-up actuator for power steering.
(only for power steering equipped vehicle)



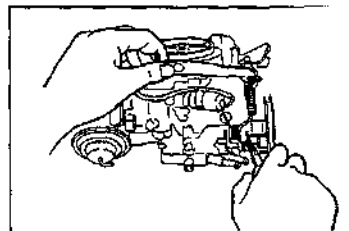
WP820-FU011

(3) Remove the accelerator pump arm set screw.



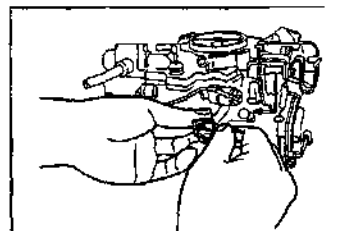
WPED-FU2

(4) Remove the accelerator pump rod and lever.



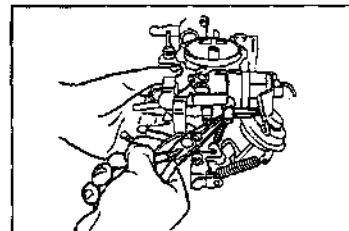
WPED-FU213

3. Disconnect the outer vent valve connector from the socket.



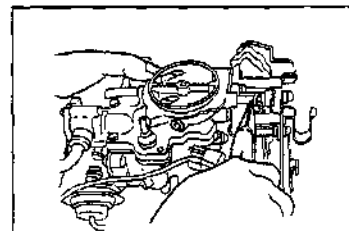
WPED-FU214

4. Remove the spring from the carburetor.



WPED-FU215

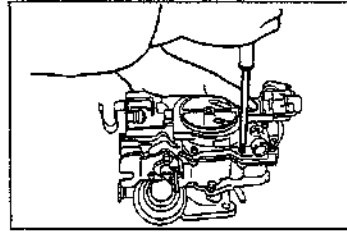
5. Disconnect the choke lever linkage at the upper side.



WPED-FU216

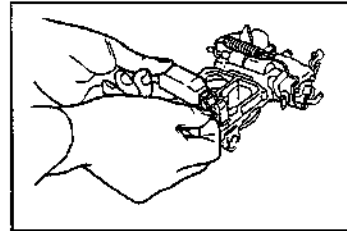
FUEL SYSTEM

6. Remove the seven screws (five screws in the case of idle-up actuator equipped model) and disassemble the air horn assembly.



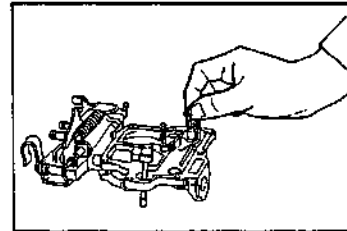
WPES0-FU023

7. Remove the float.



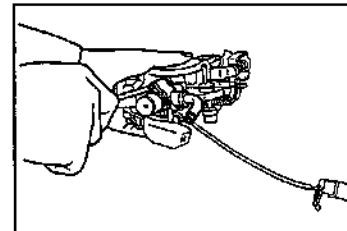
WPES0-FU024

8. Remove the needle valve.



WPES0-FU025

9. Remove the outer vent valve assembly by removing the three screws.



WPES0-FU026

10. Remove the needle seat of the float valve, using the SST.
11. Loosen the screws that retain the lock plate.
Remove the power piston.

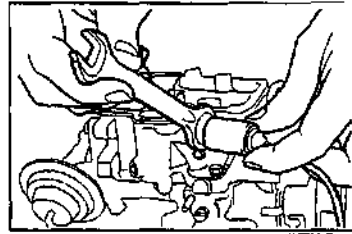
NOTE:

- Care must be exercised not to allow the power piston spring located under the power piston to jump out.

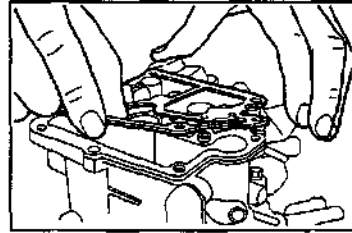
WPES0-FU027

Disassembly of carburetor body & flange

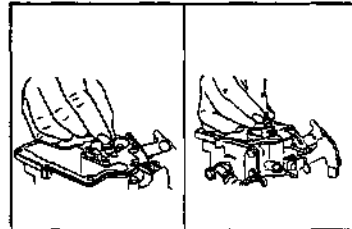
1. Remove the solenoid valve wire clamp.
2. Remove the solenoid valve.



3. Remove the gasket.



4. Remove the discharge weight, spring and ball.
5. Remove the acceleration pump return spring.

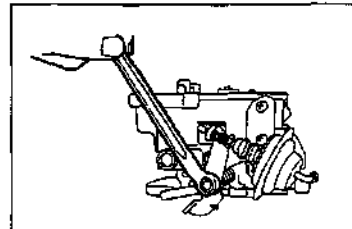


6. Removal of throttle positioner

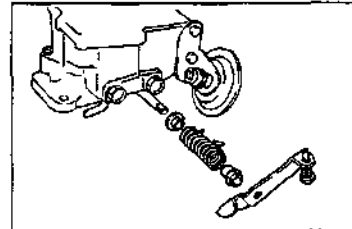
- (1) Remove the throttle lever set nut.

NOTE:

- Be sure to hold the throttle lever firmly during this operation so as to prevent deformation of the throttle shaft and breakage of the throttle valve.

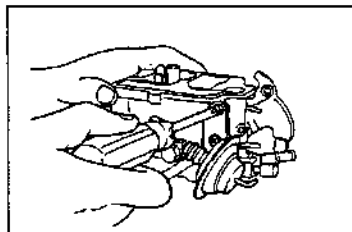


- (2) Remove the throttle positioner lever.
- (3) Remove the collars and spring.



FUEL SYSTEM

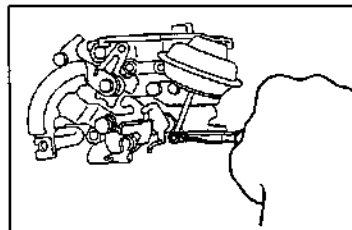
- (4) Remove the throttle positioner.



WP890-FU220

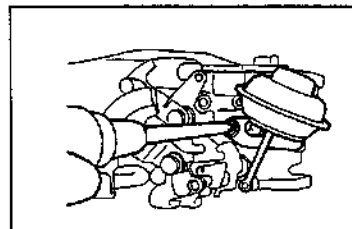
7. Removal of secondary throttle valve diaphragm

- (1) Remove the spring.
(2) Remove the pin. Disconnect the link.



WP890-FU221

- (3) Remove the secondary throttle valve.
(4) Remove the rubber hose.

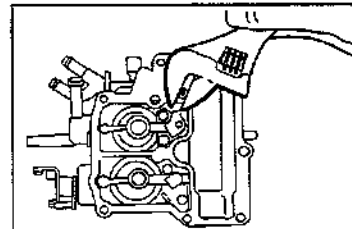


WP890-FU222

8. Remove the slow jet.

NOTE:

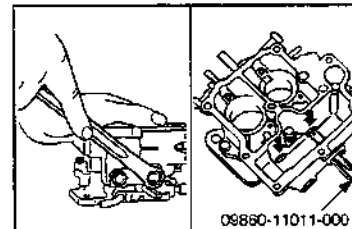
- Never reuse the "O" ring.



WP890-FU226

9. Remove the main passage plugs. Remove the primary and secondary main jets, using the SST.

SST: 09860-11011-000

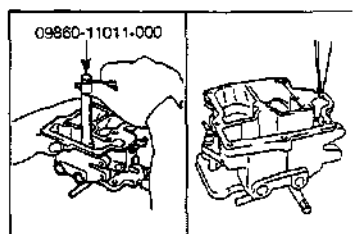


09860-11011-000

WP890-FU000

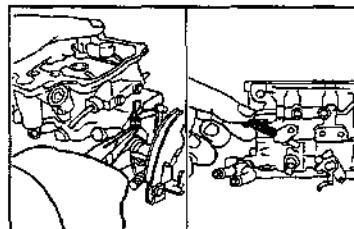
FUEL SYSTEM

10. Remove the power valve, using the SST.
11. Remove the acceleration pump check ball retainer and ball.
SST: 09860-11011-000



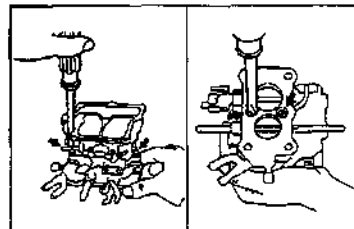
WF50-FU031

12. Remove the auto choke linkage.
13. Remove the throttle adjusting screw.



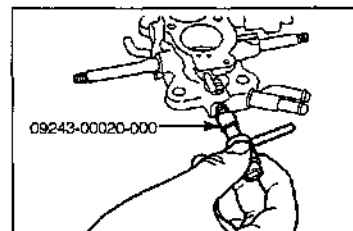
WF50-FU024

14. Disassembly of the carburetor body and flange.
 - (1) Remove the attaching bolts.
 - (2) Disassemble the carburetor body and flange.



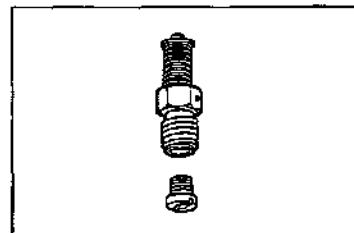
WF50-FU032

15. Remove the idle mixture adjusting screw, using the SST.
SST: 09243-00020-000



WF50-FU033

16. Remove the power jet from the power valve.



WF50-FU025

FUEL SYSTEM

CLEANING OF EACH PARTS

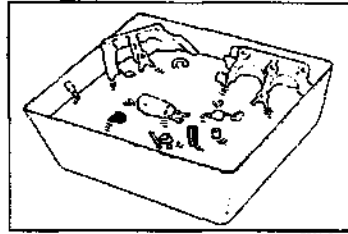
1. Clean the carburetor parts except for the diaphragms and electrical parts, using carburetor cleaner and a soft brush.
2. Remove carbon deposits by means of a soft brush.
3. Clean each of the jets and nozzles, using compressed air.

NOTE:

- Never clean the jets or orifices with a piece of wire or a drill.
- This could enlarge the openings and result in poor fuel mileage.

WARNING:

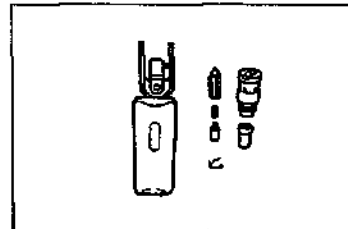
- Be sure to protect your eyes with safety goggles when using compressed air.



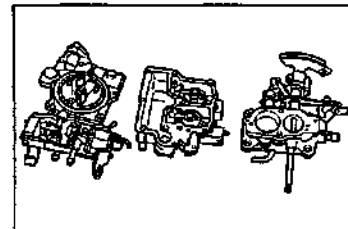
WPB30-FU126

INSPECTION OF CARBURETOR

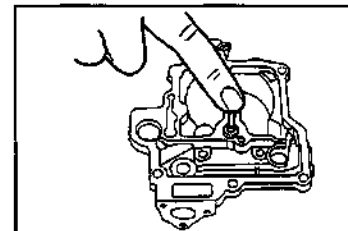
1. Inspection of float and needle valve
 - (1) Inspect the float lever pin for scratches excessive wear, and damage.
 - (2) Inspect the float for broken lip or damage.
 - (3) Inspect the valve and plunger for wear or damage.
 - (4) Inspect the spring for deformation.
 - (5) Inspect the strainer for breakage, restriction or damage.
 - (6) Inspect the valve seat for wear or damage.
2. Inspection of air horn, body and flange
 - (1) Check each part for cracks, wear or damage.
 - (2) Check to see if each valve functions smoothly.
 - (3) Check each air passage for restriction.Replace any defective part, as required.
3. Inspection of power piston
Check to see if the power piston functions smoothly.



WPB30-FU111



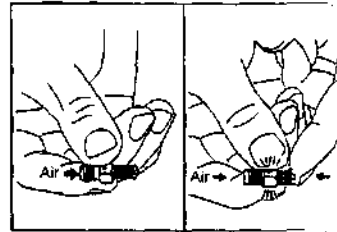
WPB30-FU112



WPB30-FU113

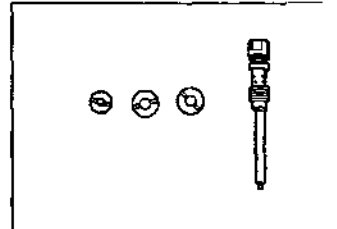
FUEL SYSTEM

4. Inspection of power valve
Ensure that air continuity exists when the valve is pushed. Also, ensure that no air continuity exists when the valve is not pushed.



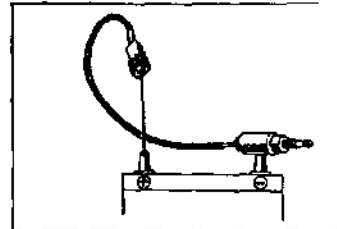
WPED0-FU1

5. Inspection of jets
Check each jet for restriction or damage.



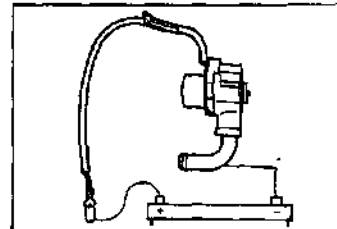
WPED0-FU11

6. Inspection of solenoid valve
Ensure that the valve is opened when the solenoid valve is energized. Also, ensure that the valve is closed when the solenoid valve is not energized.



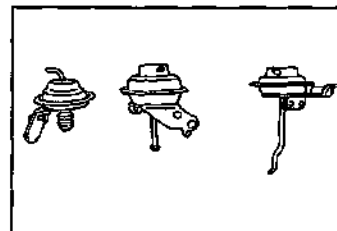
WPED0-FU12

7. Inspection of outer vent valve
Ensure that the valve is closed when the solenoid valve is energized. Also, ensure that the valve is opened when the solenoid valve is not energized.



WPED0-FU17

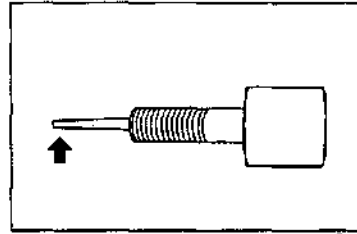
8. Inspection of each diaphragm
Ensure that the rod is drawn into the diaphragm chamber when a negative pressure is applied to each diaphragm.



WPED0-FU18

FUEL SYSTEM

3. Inspection of idle mixture adjusting screw
Check to see if any damage or wear is present at the tip end of the adjusting screw.



WPES0-FU119

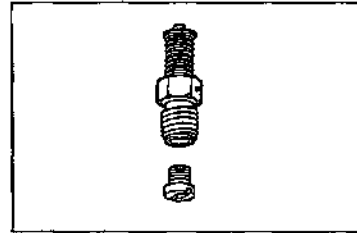
ASSEMBLY OF CARBURETOR

NOTE:

- Be sure to use new gaskets and "O" rings.

Assembly of carburetor body & flange

1. Install the power jet in the power valve, using the SST.
SST: 09860-11011-000

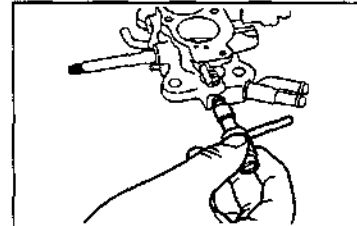


WPES0-FU004

2. Screw in the idle mixture adjusting screw fully into the flange, using the SST. Then, back off the adjusting screw four turns.

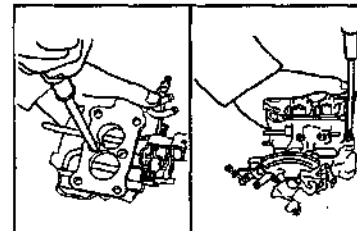
NOTE:

- Care must be exercised to ensure that no damage may be made to the tip-end of the adjusting screw by tightening the idle mixture adjusting screw excessively.
SST: 09243-00020-000



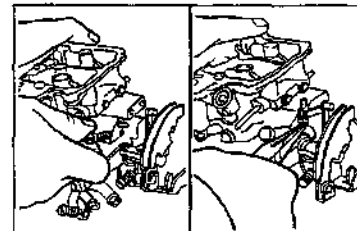
WPES0-FU035

3. Assembly of carburetor body and flange
Install the throttle body with a new gasket interposed.



WPES0-FU227

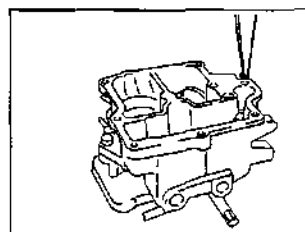
4. Install the throttle adjusting screw.
5. Install the auto choke linkage.



WPES0-FU228

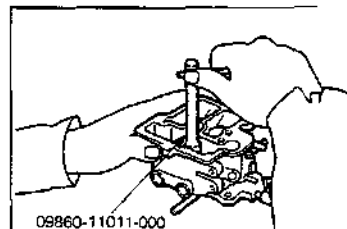
FUEL SYSTEM

6. Install the check ball retainer with the acceleration pump check ball inserted in place.



WP80-R-222

7. Install the power valve, using the SST.
SST: 09860-11011-000

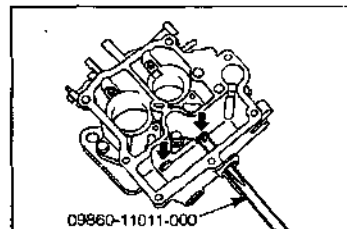


09860-11011-000

WP80-R-036

8. Install the primary and secondary main jets, using the SST.
NOTE:

- Be sure to use new gaskets.
- SST: 09860-11011-000



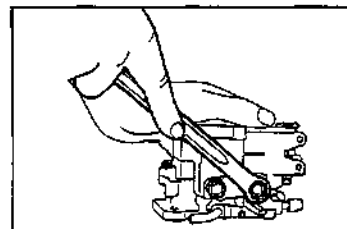
09860-11011-000

WP80-R-037

9. Install the main passage plug.

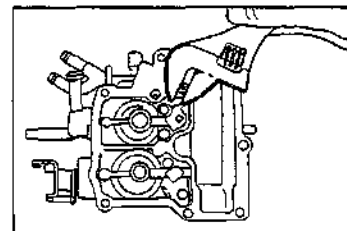
NOTE:

- Be sure to use a new gasket.



WP80-R-038

10. Install the slow jet, with a new "O" ring.

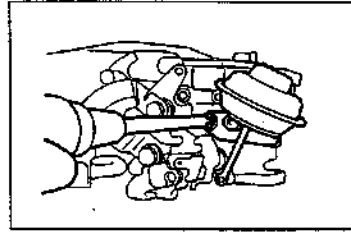


WP80-R-039

FUEL SYSTEM

11. Installation of secondary throttle diaphragm

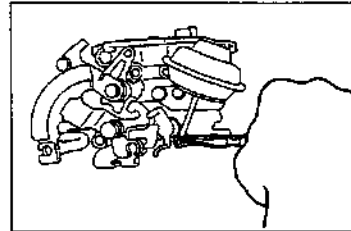
- (1) Connect the rubber hose to the diaphragm.
- (2) Install the diaphragm to the carburetor body.
- (3) Install the rubber hose to the carburetor body.



WP290-FU232

12. Connect the diaphragm rod and install the washer snap ring.

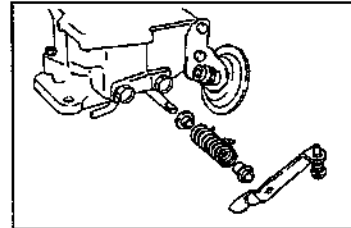
13. Install the snap ring.



WP290-FU233

14. Installation of the throttle positioner

- (1) Install the collar, throttle return spring and thrust washer onto the throttle shaft.



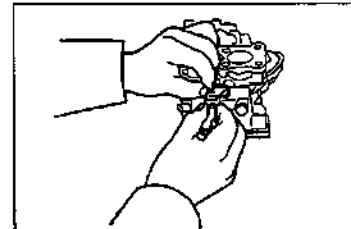
WP290-FU234

- (2) While installing the dashpot lever on the throttle shaft, attach the return spring to the dashpot lever.

- (3) Install the spring washer and tighten the nut.

NOTE:

- Be very careful not to damage the throttle valve when tightening the nut.

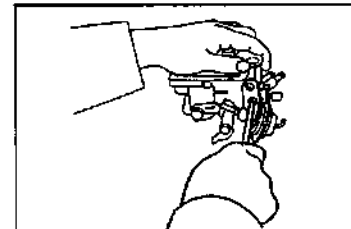


WP290-FU235

- (4) Install the throttle positioner.

NOTE:

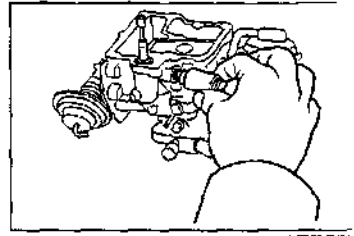
- Be careful not to damage the rubber boot section during the installation.



WP290-FU236

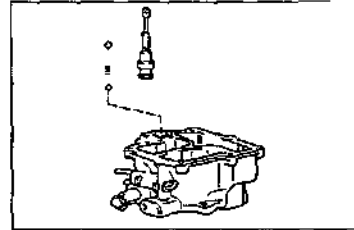
FUEL SYSTEM

15. Install the solenoid valve.
16. Install the solenoid valve wire clamp in place.



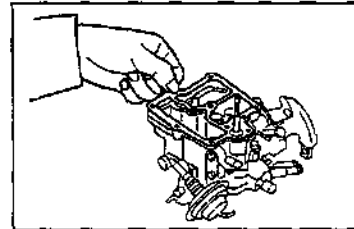
WF830-FU04

17. Assembly of the acceleration pump
 - (1) Install the return spring for the acceleration pump.
 - (2) Install the ball, spring and discharge weight.
 - (3) Assemble the acceleration pump to the carburetor.



WF830-FU041

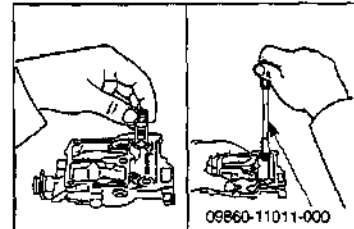
18. Install the gasket.



WF830-FU042

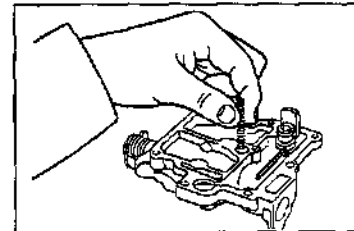
ASSEMBLY OF AIR HORN

1. Install the needle valve seat to the air horn with a new gasket interposed, using the SST.
SST: 09860-11011-000



WF830-FU043

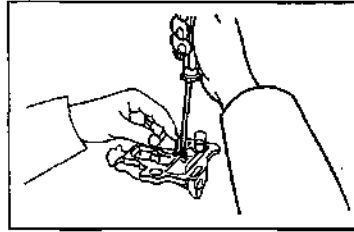
2. Insert the power piston spring into the air horn.



WF830-FU043

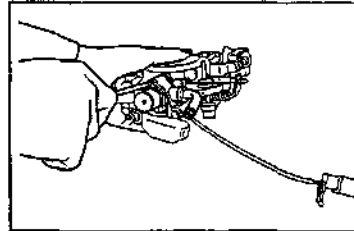
FUEL SYSTEM

3. While inserting the power piston into the air horn, install the lock plate.



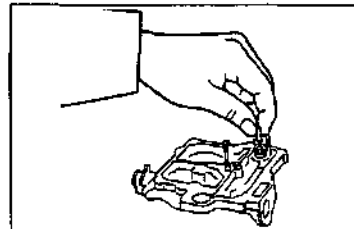
WPB90-FU044

4. Install the outer vent valve assembly onto air horn.
5. Tighten the three screws of air horn.



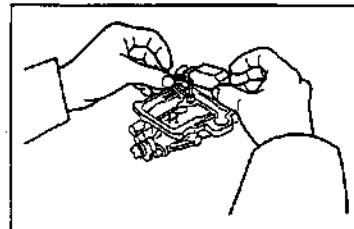
WPB90-FU045

6. Remove the snap pin for pulling-off needle valve use. Insert the snap pin into the valve seat.



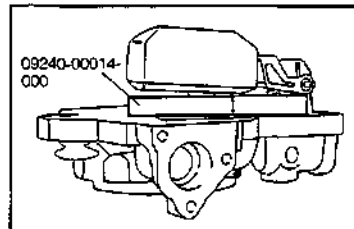
WPB90-FU046

7. Install the float.



WPB90-FU047

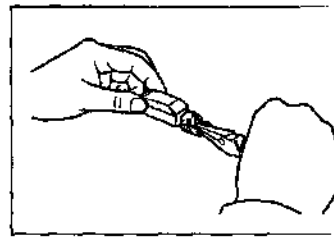
8. Adjustment of float level
(1) Check the dimension under the float's own weight, using the following SST.
Dimension under Float's Own Weight: 8 mm
SST: 09240-00014-000



WPB90-FU048

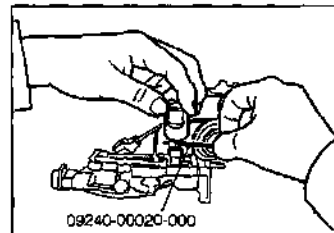
FUEL SYST:

Adjust the dimension under the float's own weight by bending the lip section of the float if the measured value fails to conform to the specified value.



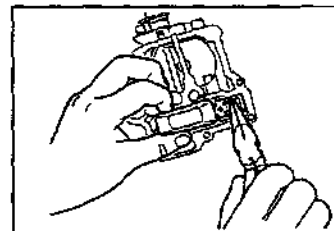
WFES04L

- (2) Check the lip dimension using the following SST.
Lip Dimension: 1.6 mm
SST: 09240-00020-000



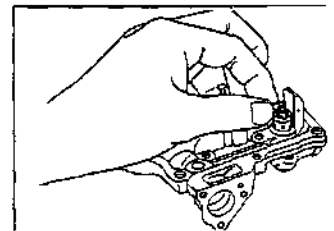
WFES04P

Adjust the lip dimension by bending the lever of the float if the measured value fails to conform to the specified value.



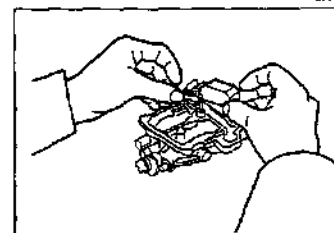
WFES04R

- (3) Remove the float. Install the snap pin for pulling-off use to the needle valve.



WFES04R2

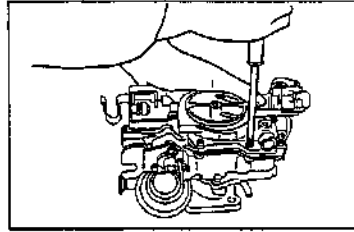
- (4) Install the float.



WFES04R3

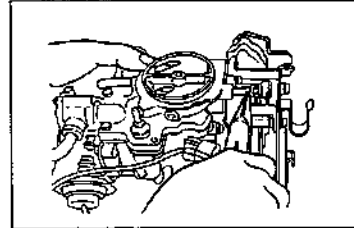
FUEL SYSTEM

9. Install the air horn assembly onto the carburetor body.
10. Tighten the seven screws (five screws in case of the idle-up actuator equipped model) of the air horn.



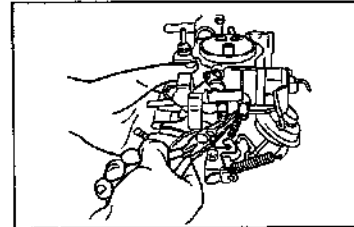
WPB30-FU049

11. Connect the choke lever linkage at the upper side.



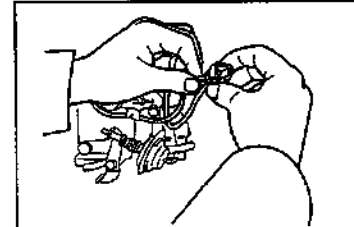
WPB30-FU050

12. Install the spring to the carburetor.



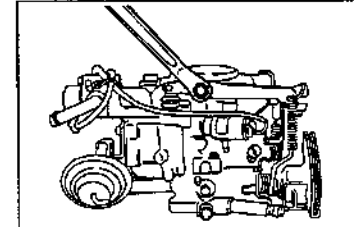
WPB30-FU051

13. Connect the outer vent terminal to the connector.



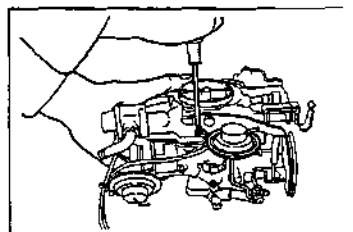
WPB30-FU052

14. Install the accelerator pump and lever.
Tighten the accelerator pump arm set screw.



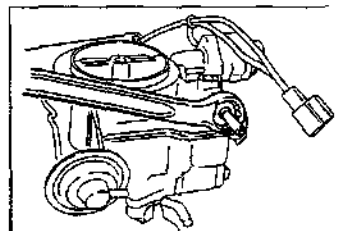
WPB30-FU053

15. Install the idle-up actuator to the carburetor.
(only for the power steering-equipped vehicle)



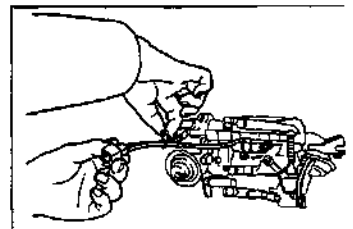
WP80-FU05

16. Install the gasket and fuel inlet union.
17. Install the air cleaner set bolt.



WP80-FU06

18. Attach the harness clamp.

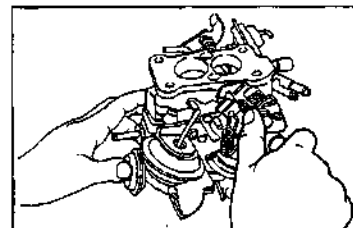


WP80-FU07

ADJUSTMENT OF CARBURETOR

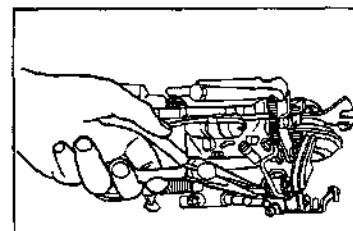
1. Inspection of throttle valve opening angle
 - (1) Visually inspect the valve opening angle when the primary throttle valve is opened fully.

Full Opening Angle: $90 \pm 1^\circ$



WP80-FU08

Adjust the opening angle by bending the throttle lever stopper if the measured value fails to conform to the specified value.

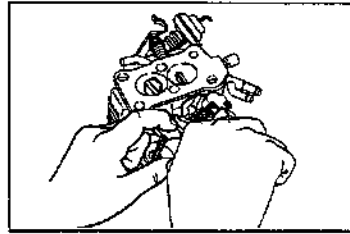


WP80-FU09

FUEL SYSTEM

- (2) Visually inspect the valve opening angle when the secondary throttle valve is opened fully.
Full Opening Angle: $80 \pm 1^\circ$

Adjust the opening angle by bending the throttle lever stopper if the measured value fails to conform to the specified value.

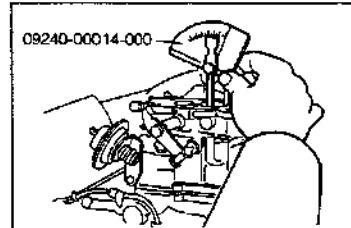


WPFB0-FU055

2. Inspection of kick-up opening angle
Measure the opening angle of the secondary valve when the primary throttle valve is opened fully, using the following SST.

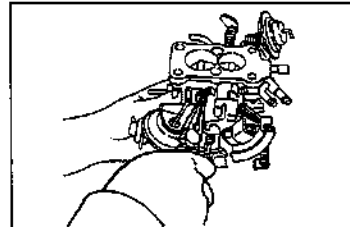
SST: 09240-00014-000

Kick-Up Opening Angle: $23 \pm 1^\circ$



WPFB0-FU059

Adjust the kick up opening angle by bending the secondary throttle lever if the measured value fails to conform to the specified value.

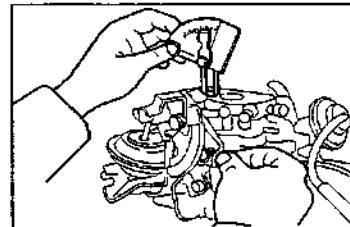


WPFB0-FU062

3. Adjust the throttle adjusting screw so that the throttle valve opening angle may become $11.4 \pm 1^\circ$.

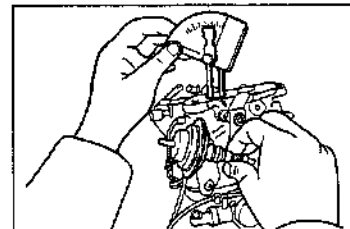
NOTE:

- Be sure to apply a negative pressure to the throttle positioner so as to keep it in an operating state.



WPFB0-FU060

4. Under the condition that a negative pressure is not applied to the throttle positioner, adjust the opening angle of the throttle valve to about $16 \pm 1^\circ$.



WPFB0-FU061

5. Ensure that each part operates smoothly.
6. Install the air cleaner set bolt.

INSTALLATION OF CARBURETOR

1. Inspection of heat insulator
Visually inspect the gasket surface of the heat insulator. Replace the heat insulator if it exhibits damage.
2. Install the carburetor to the intake manifold with the heat insulator interposed. Tighten the four attaching nuts to the specified torque.

Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)

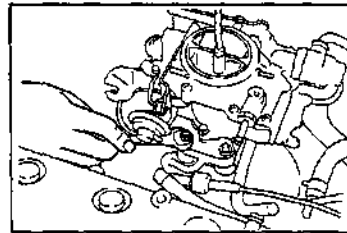
3. Connect the outer vent valve connector of the solenoid valve and the throttle position sensor connector.
4. Connect the following hoses to the carburetor.
 - ① Fuel inlet hose
 - ② ITC vacuum hose
 - ③ PCV gas hose
 - ④ Choke breaker vacuum hose
 - ⑤ Outer vent hose
 - ⑥ Throttle position vacuum hose
 - ⑦ Vacuum hose to distributor

- ⑧ Coolant circulating hoses

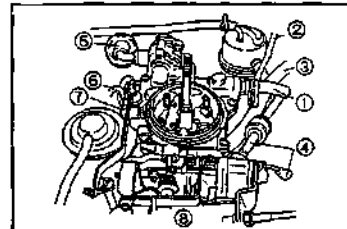
NOTE:

- Ensure that the hose clamp is installed at correct position as indicated at right figure.

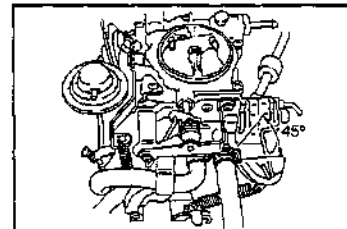
5. Connect the accelerator cable to the carburetor. Adjust the axial play of the accelerator cable to 3 - 8 mm.



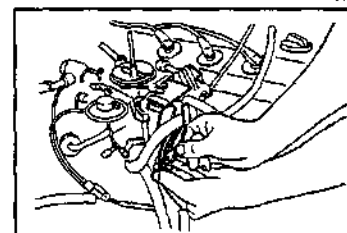
WF80-FU062



WF80-FU120



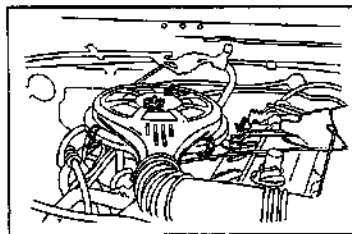
WF80-FU063



WF80-FU064

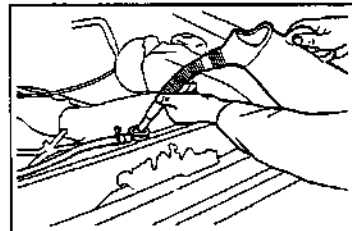
FUEL SYSTEM

6. Installation of the air cleaner
 - (1) Place the air cleaner and air intake hose subassembly.
 - (2) Connect the wing nut located at the center of the air cleaner.
 - (3) Connect the three bolts securing the air cleaner and air intake hose.



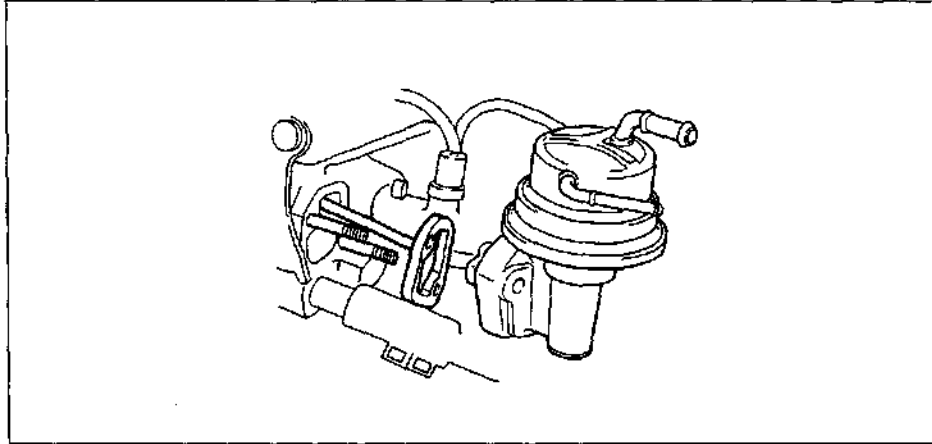
WPB90-FU121

7. Fill coolant.
(See page CO-13.)
8. Connect the ground cable to the negative (-) terminal of the battery.
9. Tune up the engine.



WPB90-FU105

FUEL PUMP



REMOVAL OF FUEL PUMP

1. Disconnect the fuel hoses from the fuel pump.

NOTE:

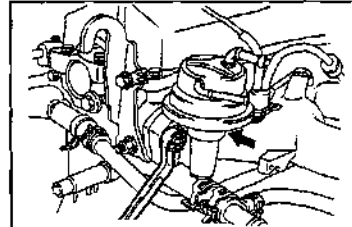
- Plug the disconnected hose so that no fuel will flow out.
- Release the inner pressure of the fuel tank by removing the fuel filler cap in advance.
- Since the fuel will flow out, be certain to place a suitable container or cloth, etc. under the fuel pump.



2. Remove the fuel pump by removing the attaching nuts.

NOTE:

- Since the engine oil will flow out, be certain to place a suitable container or cloth so that no engine oil may splash on the starter and so forth.



3. Remove the insulator.

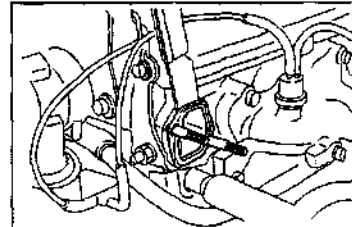
NOTE:

- Never reuse the insulator.

4. Cut the gasket along the intake manifold. Remove any gasket material remaining on the fuel pump installation section, using a gasket scraper.

NOTE:

- This cutting of the gasket is required only when the gasket used at the assembly line in the manufacturer has been installed.
- Be very careful not to damage the gasket installation surface during the operations.



FUEL SYSTEM

INSPECTION

1. Inspection of fuel pump

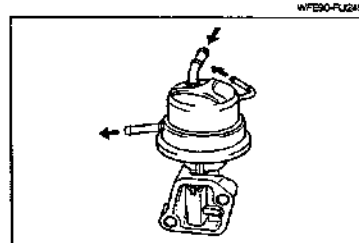
CAUTION:

- Prior to the check, fill a small amount of fuel into the fuel pump. Thus, the inspection should be performed under a condition that the valve is wet. When the valve is dry, the following inspection can not be performed correctly.

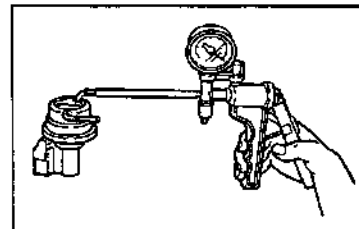
WARNING:

- Never work on the fuel system in proximity of a fire.
- Never allow any fire to be brought near the working site.

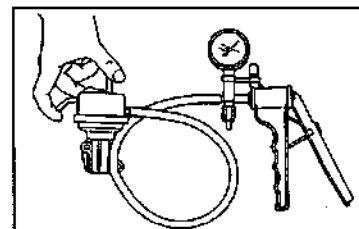
- (1) Blow air from the inlet side of the fuel pump. Ensure that air continuity exists.
Replace the fuel pump if no air continuity exists.



- (2) Install a MityVac to the inlet side of the fuel pump and apply a negative pressure. Ensure that the applied pressure is retained.
Replace the fuel pump if the pressure is not retained.



- (3) Plug the inlet pipe and return pipe of the fuel pump. Install a MityVac to the outlet pipe and apply a negative pressure. Ensure that the applied pressure is retained.
Replace the fuel pump if the pressure is not retained.

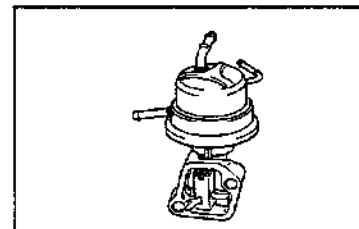


- (4) Visually inspect the push rod-contact-surface of the fuel pump.

NOTE:

- When the contact surface is not a mirror-like surface, it means that the contact surface is worn out.

Replace the fuel pump if the contact surface exhibits wear.



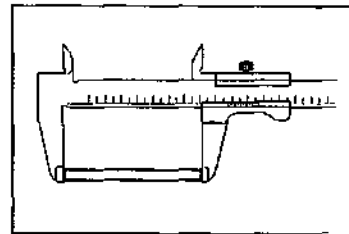
2. Inspection of fuel pump push rod
Ensure that the overall length of the push rod is the specified value or more.

Minimum Length: 87.00 mm

Reference

STD: 87.95 - 88.25 mm

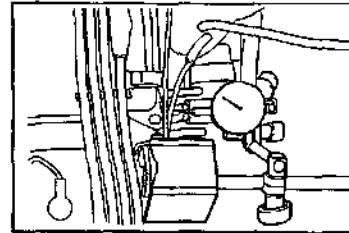
Replace the push rod if its overall length is less than the specified value.



4. Checking fuel pump cam for wear
 - (1) Insert the push rod of the fuel pump into the cylinder head. Set a dial gauge.
 - (2) Turn the crankshaft two turns. Measure the stroke of the push rod of the fuel pump. Ensure that the stroke is the specified value or more.

Minimum Stroke: 4.8 mm

Replace the camshaft if the stroke is less than the specified value.

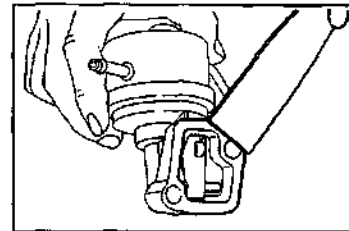


INSTALLATION OF FUEL PUMP

1. Remove any remaining gasket material from the insulator installation surface of the fuel pump, using a gasket scraper.

NOTE:

- Be very careful not to damage the gasket contact surface.

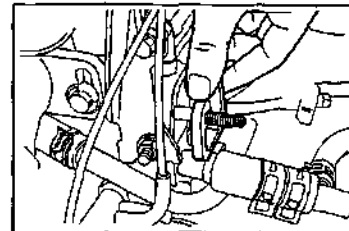


2. Wipe off any oil from the fuel pump installation surface of the cylinder head.

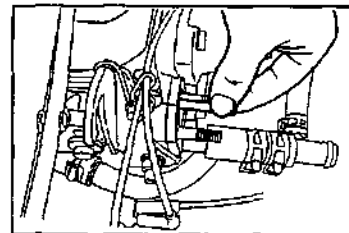
3. Install a new insulator to the cylinder head.

NOTE:

- Never reuse the insulator.

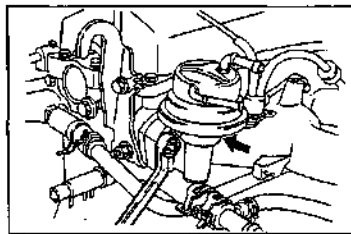


4. Insert the fuel pump push rod into the cylinder head.

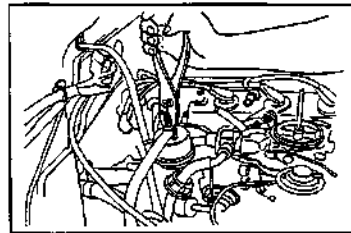


FUEL SYSTEM

5. Install the fuel pump to the cylinder head.
Tighten the attaching nuts.
Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)



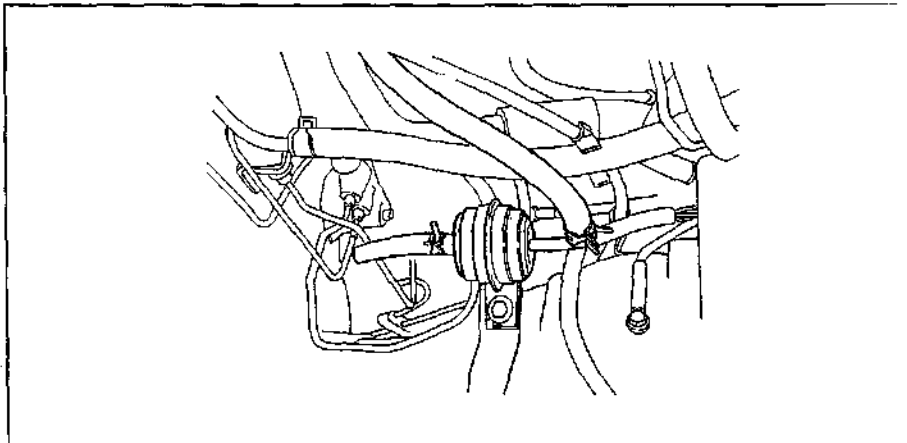
6. Connect the fuel hose to the fuel pump.
Attach the hose bands.



7. Start the engine. Ensure that the engine exhibits no fuel leakage.
Repair any leaky points, as required.

WF690-FU071

FUEL FILTER



REPLACEMENT OF FUEL FILTER

WARNING

- Never work on the fuel system in proximity of a fire.
- Never allow any fire to be brought near the working site.

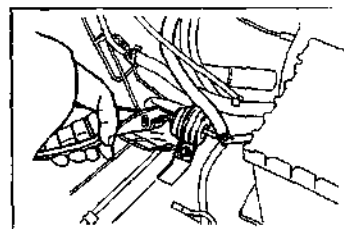
1. Disconnect the fuel hose from the fuel filter.

NOTE:

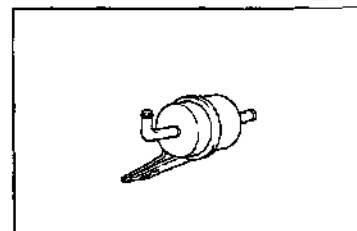
- Plug the disconnected hose so that no fuel may flow out.
- Release the inner pressure of the fuel tank by removing the fuel filler cap in advance.

2. Remove the fuel filter by removing the attaching bolt.
3. Install a new fuel filter. Tighten the attaching bolts.

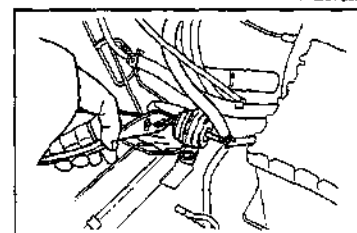
4. Connect the fuel hose to the fuel filter. Attach the hose bands.
5. Start the engine. Ensure that the engine exhibits no fuel leakage. Repair any leaky points, as required.



WF50-FU126



WF50-FU127

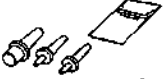






WF50-FU254

WF50-FU255

FUEL SYSTEM

SST [Special Service Tools]

Shapes	Part No. and Name	Purpose	Remarks
	09258-00030-000 Plug set	Plugging rubber hoses	
	09860-11011-000 Carburetor screwdriver set	Overhaul of carburetor	
	09243-00020-000 Idle adjust wrench	Adjustment of idle mixture adjusting screw	
	09240-00020-000 Wire gauge set	Adjustment of carburetor	
	09240-00014-000 Carburetor adjusting gauge set	Adjustment of carburetor	

WFE90-FU073

TIGHTENING TORQUE

Tightening component	Tightening torque			Remark
	N·m	kgf·m	ft·lb	
Cylinder head x Fuel pump	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9	Dry
Intake manifold x Carburetor	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9	Dry

WFE90-FU074

FUEL SYSTEM

SPECIFICATIONS

Carburetor	Float level	Dimension assumed by its own weight	8 mm
		Lip dimension	1.6 mm
	Throttle valve closed angle		
		Primary	9°
		Secondary	20°
	Throttle valve fully opened angle		
		Primary	90 ± 1°
		Secondary	80 ± 1°
	Kick-up angle		
			23 ± 1°
	Secondary touch angle		
			50 ± 1°
	Throttle opening angle		
			11.4 ± 1°
Fuel pump (HD-C)	Throttle positioner operating angle		
			16 ± 1°
	Number of backing-off of idle mixture adjusting screw		
			4 1/2 rev
	Solenoid valve resistance		
			80 - 100 Ω
	Outer vent resistance		
			80 - 45 Ω
Fuel pump (HD-C)	Suction force at 3,000 rpm		
			19.6 - 29.4 kPa (0.20 - 0.30 kgf/cm ²)
	Push rod length	Standard	87.95 - 88.25 mm
		Minimum	87.000 mm
	Push rod stroke	Standard	5.0 mm
		Minimum	4.8 mm

WF890-FU075

Item		Engine type	HD-C	HD-E
Fuel System	Fuel tank	Capacity	60	60
		Location	Underneath rear seat floor	Underneath rear seat floor
	Fuel pipe material		Rubber and steel tube	Rubber and steel tube
	Fuel pump type		Diaphragm type	Electromotor type
	Fuel filter type		Filter paper type	Filter paper type
	Carburetor	Manufacturer	Aisan Industry	—
		Type	Down draft, 2-barrel type	—
		Venturi diameter	mm	Primary: 21, Secondary: 28
		Choke valve type	Wax type auto choke	—
	Fuel injection device		—	Electronic type
	Injection nozzle or injector	Type of nozzle retainer	—	With cushion rubber type
		Nozzle type	—	Electronic controlled throttle type
		Injection pressure	kPa (kgf/cm ²)	250 (2.55)

WF890-FU076

DAIHATSU

F300

[HD Engine]

COOLING SYSTEM

TROUBLE SHOOTING	CO- 2
PRECAUTIONS	CO- 2
COOLING SYSTEM OUTLINE	CO- 3
RADIATOR	CO- 6
FAN-EQUIPPED FLUID COUPLING	CO- 8
CHECK & CHANGE OF ENGINE	CO-12
COOLANT	CO-12
WATER PUMP	CO-14
THERMOSTAT	CO-17
RADIATOR	CO-18
TIGHTENING TORQUE	CO-25
SERVICE SPECIFICATION	CO-25

WF30-CO01

COOLING SYSTEM

TROUBLE SHOOTING

Problem	Possible cause	Remedies	Page
Engine overheats	Poor quality coolant	Replenish coolant.	CO-12
	Water pump drive belt loose or missing	Adjust or replace belt.	
	Dirt, leaves or insects on radiator	Clean radiator.	CO-12
	Leaky hoses, water pump, thermostat housing, radiator, heater, core plugs or head gasket	Repair as necessary.	
	Thermostat faulty	Check thermostat.	CO-17
	Ignition timing retarded	Set timing.	EM-23
	Radiator hose plugged or deteriorated	Replace hose.	
	Water pump faulty	Replace water pump.	CO-14
	Radiator plugged or cap faulty	Check radiator.	CO-19
	Cylinder head or block cracked or plugged	Repair as necessary.	

WP80-C0002

PRECAUTIONS

- As regards water to be used as cooling water, use soft water which does not contain salts of minerals, calcium, magnesium and so forth.
- If the coolant gets to the vehicle body, immediately flush away the coolant using water.
- Never open the radiator cap when the cooling water is hot.

WARNING:
The radiator is under a pressurized condition when the cooling water is hot. Therefore, the radiator cap should be removed after the engine has cooled down to avoid the possibility of coolant being ejected.

WP80-C0003

COOLING SYSTEM

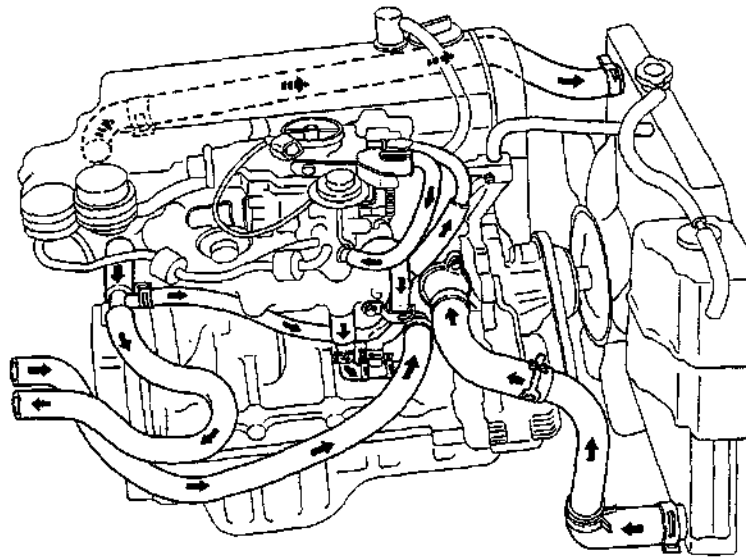
COOLING SYSTEM OUTLINE

The cooling system is a water-cooled, forced-circulation type. Furthermore, it employs a fluid coupling fan. The cooling system employs a bottom by-pass type in which the thermostat equipped with a by-pass valve is provided at the inlet side.

The cooling system is composed of the radiator, water pump, thermostat, cylinder head, water jackets of cylinder block, water hoses and their connecting parts.

The total capacity of the cooling water is approximately 6.5 dm³ (including one liter for the reserve tank.)

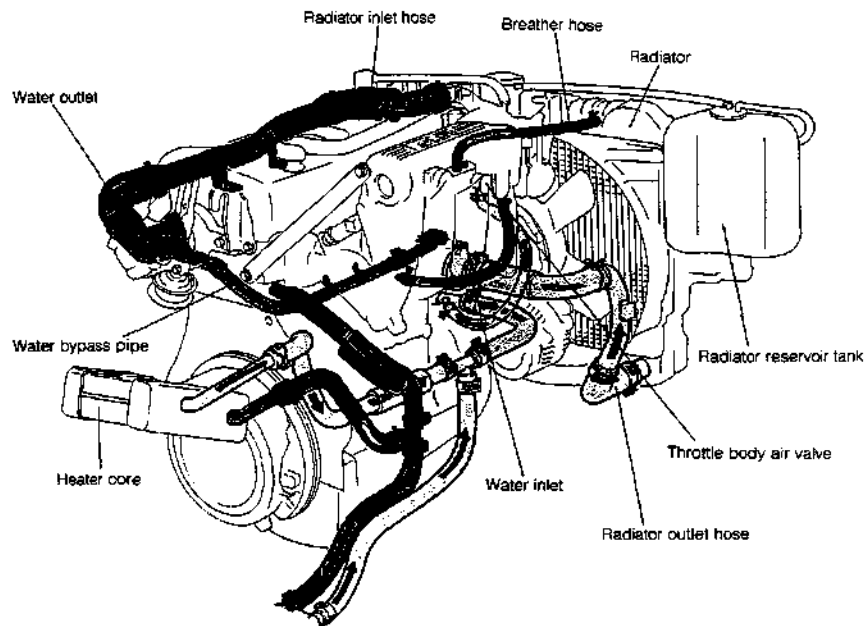
[HD-C Engine]



WP590-C0004

COOLING SYSTEM

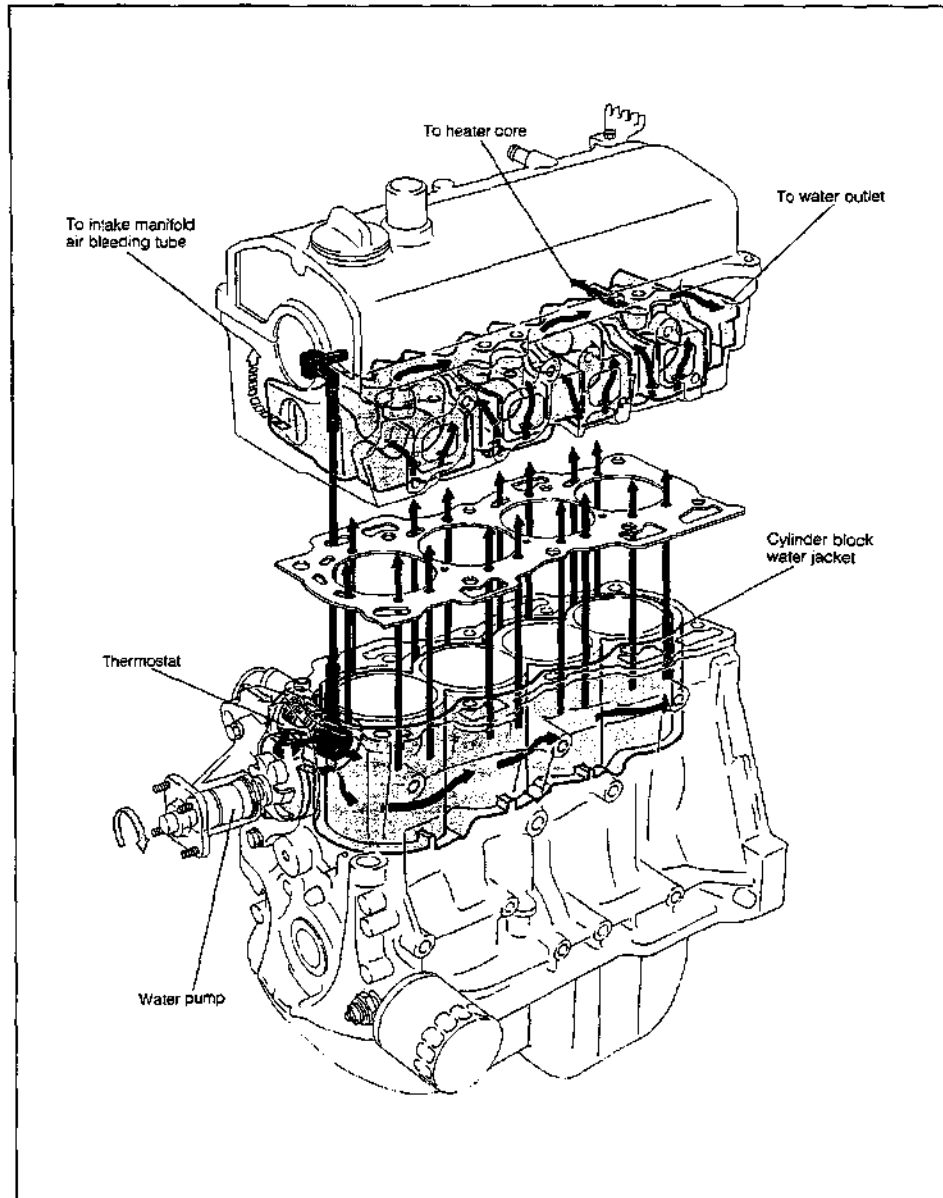
[HD-E Engine]



WP690-C0005

COOLING SYSTEM

SCHEMATIC DIAGRAM OF COOLING SYSTEM PASSAGE INSIDE ENGINE

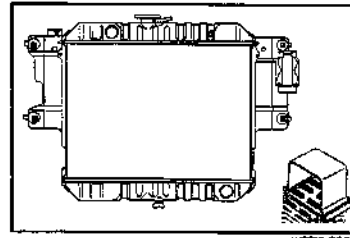


WFE90-C0006

COOLING SYSTEM

RADIATOR

The radiator core adopts a corrugated fin type double core.



WPB9-C0007

Radiator specification

Item		Specification	
		General	Tropical & US. spc
Radiator water capacity	dm ³	2.1	2.1
Heat radiating rate	KJ/h (kcal/h)	144445 (34500)	133954 (32000)
Core dimensions (width x height x thickness)	mm	488 x 350 x 32	488 x 350 x 32

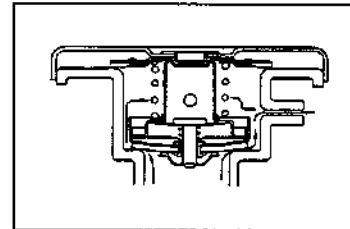
WPB9-C0008

RADIATOR CAP

A pressure type radiator cap is installed at the upper part of the radiator.

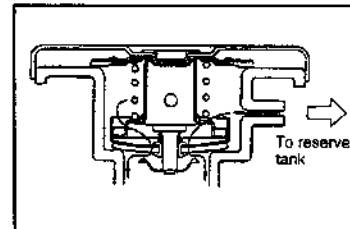
The radiator cap has two valves: a pressure regulating valve and a negative pressure valve.

When the pressure of the cooling system exceeds a specified limit, the rising pressure opens the pressure regulating valve of the radiator cap. As a result, the coolant in the radiator flows to the reserve tank.



WPB9-C0009

On the other hand, the negative pressure valve opens when the inner pressure drops below the atmospheric pressure due to a dropped water temperature after the engine has stopped. Thus, the coolant returns from the reserve tank to the radiator.



WPB9-C0010

Radiator cap specifications

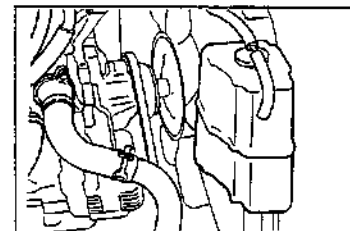
Item		Specifications
Radiator cap opening pressure	kPa (kgf/cm ²)	8.83 (0.9)

RADIATOR RESERVE TANK

A reserve tank with an overflow hose is employed. The radiator reserve tank is attached to the radiator side bracket.

Specifications

Total capacity		dm ³	1.8 or more
Cooling water capacity	dm ³	F level	1.0
		L level	0.15



WPB9-C0011

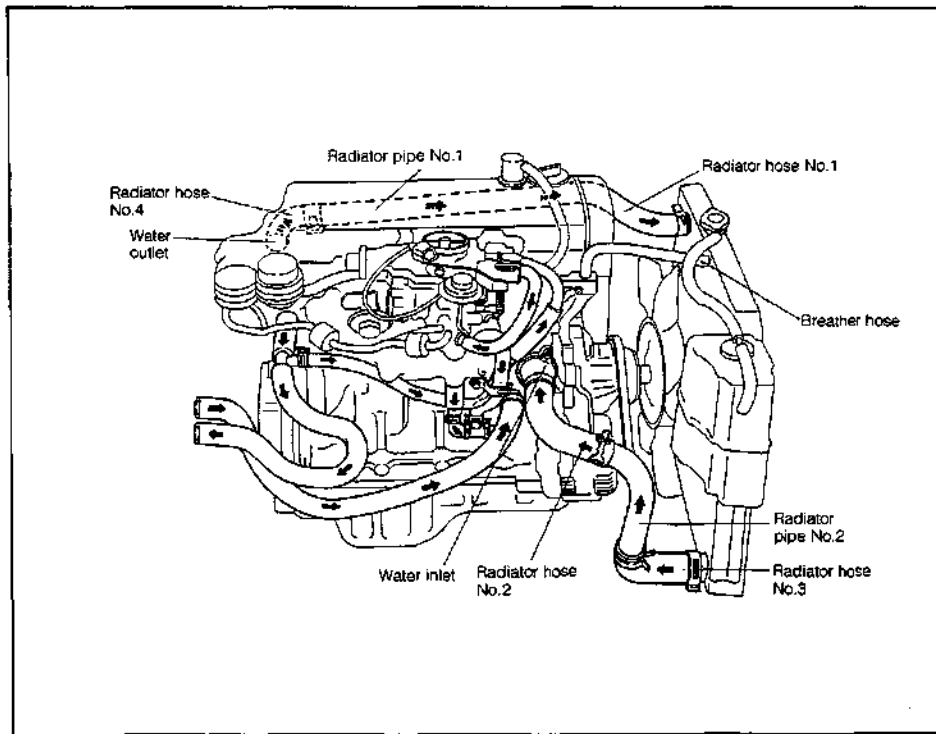
COOLING SYSTEM

RADIATOR HOSES & PIPES

These components come in four radiator hoses and two radiator pipe subassemblies.

Radiator hose	No.1	Radiator pipe No.1 to radiator upper tank
	No.2	Radiator pipe No.2 to inlet of cylinder block section
	No.3	Radiator lower tank to radiator pipe No.2
	No.4	Outlet at rear of cylinder head to radiator pipe No.1
Radiator pipe	No.1	Radiator hose No.4 to radiator hose No.1
	No.2	Radiator hose No.3 to radiator hose No.2

WFB90-CO012



WFB90-CO013

COOLING SYSTEM

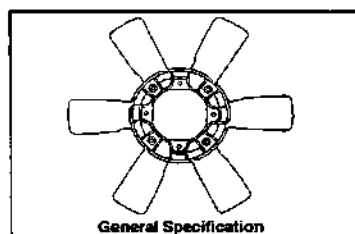
FAN-EQUIPPED FLUID COUPLING

The fan-equipped fluid coupling with a temperature control device is employed in order that the noise level may be reduced.

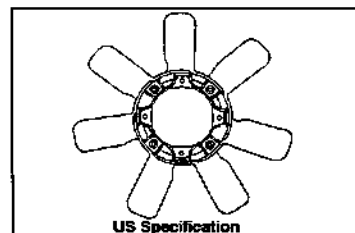
Furthermore, the drop in engine output due to the installation of cooling fan has been kept to a minimum level.

1. COOLING FAN

The fan made of propylene comes in two kinds: One is a six-blade fan and the other is a seven-blade fan.



WFE90-CC014



WFE90-CC015

Specifications

		General	Tropical & the U.S.
Fan outer diameter	mm	360	360
Number of blades		6	7
Type		Axial flow	←
Air flow rate	m ³ /sec	0.36 at 1000 rpm	0.41 at 1000 rpm
		0.75 at 2000 rpm	0.86 at 2000 rpm

2. FLUID COUPLING WITH FAN

The fluid coupling employs a two-stage temperature control type.

The fluid coupling is available in three kinds. The optimum fluid coupling can be selected and installed in accordance with the vehicle specifications.

WFE90-CC016

WFE90-CC017

Specifications

Item		Specifications		
		General	The U.S.	Tropical
Fluid coupling outer diameter	mm	127	136	136
Fan revolution speed (when engine revolution speed is 4000 rpm)	rpm	900 at 55°C	1300 at 70°C	1300 at 55°C
		2250 at 70°C	2500 at 80°C	3750 at 65°C
Cooling fan outer diameter x Number of blade	mm	360 x 6	360 x 7	360 x 7

WFE90-CC018

COOLING SYSTEM

Operation of coupling fan

During cold operation (Below about 55°C)

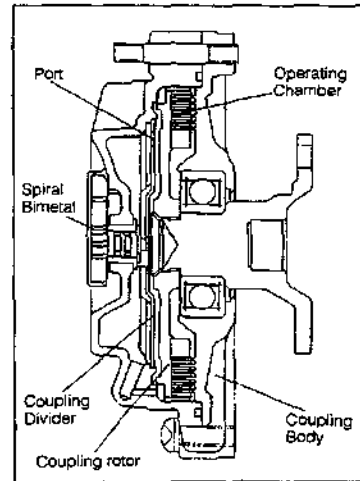
When the cooling water temperature is low, the port is closed by the coupling divider. Consequently, the silicon oil will not move into the operating chamber. Hence, the coupling body remains at its low speed operation.

During hot operation

(Above about 70°C; above about 65°C on tropical specifications)

When the spiral bimetal detects the temperature of the air passing through the radiator, this rotates the coupling divider integral with the bimetal shaft. As a result, the silicon oil flowing out from the port enters into the operating chamber, thus pushing the coupling rotor. Consequently, the coupling body is rotated.

As is explained above, the revolution speed of the coupling fan is switched over two stages. In this way, the output loss due to the cooling fan has been kept at a minimum level and the fan noise level has been reduced.

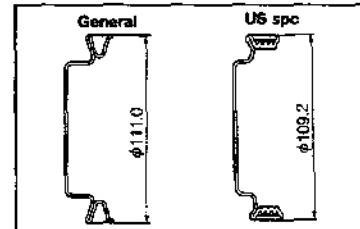


WP80-C0019

3. WATER PUMP PULLEY

The water pump pulley made of sheet metal. This pulley is attached to water pump pulley seat along with the fluid coupling by means of four nuts.

The water pump pulley equipped with two kind pulley of right figure.



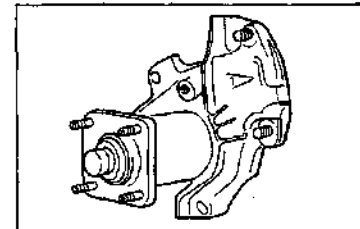
WP80-C0020

WATER PUMP

The water pump used for circulating the cooling water is installed at the front section of the cylinder block.

Specifications

Item	Specifications	
Type	Centrifugal type	
Delivery output (When shaft revolution speed is 200 rpm)	dm ³ /min	36
Rotor outer diameter	mm	62



WP80-C0021

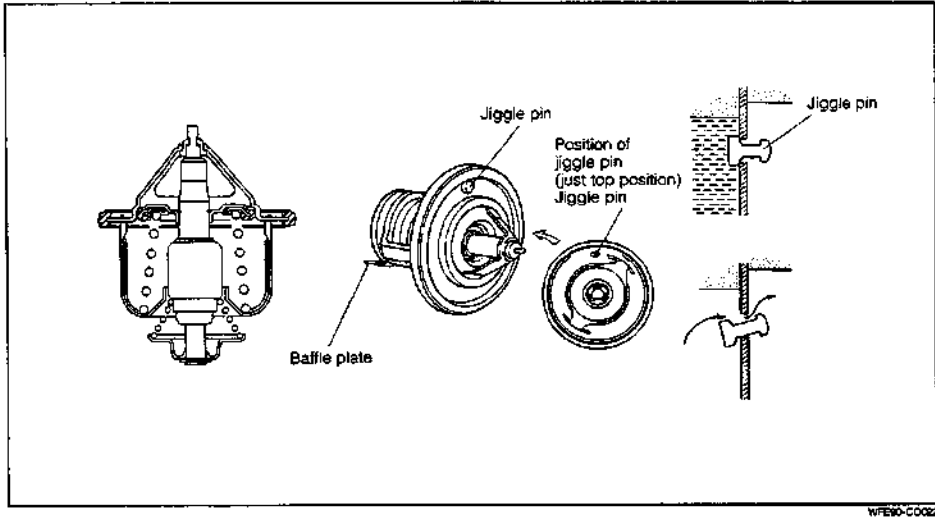
COOLING SYSTEM

THERMOSTAT

The thermostat is a wax type with a bypass valve. The thermostat helps the engine to warm up quickly by allowing the cooling water to be recirculated through the cylinder block and cylinder head without passing through the radiator.

Furthermore, the thermostat is equipped with a jiggle pin which performs the air bleeding while the engine is stopped. Also, the jiggle pin allows the temperature of the cooling water to rise quickly during the warming-up period.

Moreover, a baffle plate attached to the thermostat makes it possible to get better temperature sensing characteristics.



Thermostat specifications

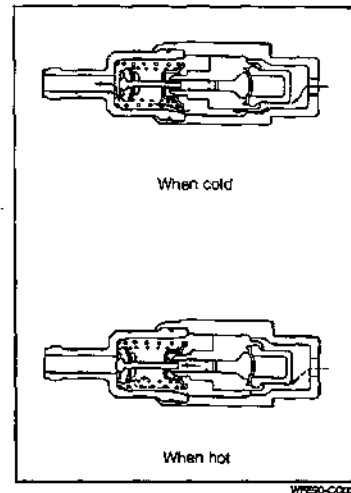
Item		Standard specifications	Cold region specifications
Type		Wax type	
Valve opening temperature	°C	78	84
Valve full opening temperature	°C	91	97

COOLING SYSTEM

Thermostat valve assembly (HD-C Engine only)

To promote atomization of the fuel, hot water is allowed to be circulated from the cylinder head to the riser section of the intake manifold during the cold operation.

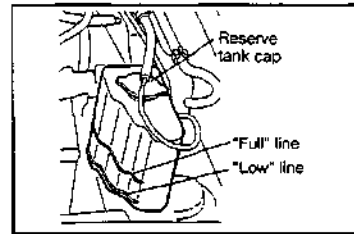
When the temperature of the recirculating water reaches about 60°C, the valve closes.



COOLING SYSTEM

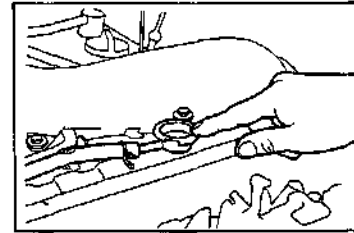
CHECK & CHANGE OF ENGINE COOLANT

1. Check of coolant level
Check to see if the coolant level is between the LOW and FULL lines of the reserve tank.
If the coolant level is near the low level or below the low level, add the coolant up to the full level.



WPB90-C0026

2. Check of coolant quality
There should not be any excessive deposits of rust or water scales around the radiator cap or the radiator filler hole. Also, the coolant should be free of oil.
Change the coolant if it is excessively dirty or the time due to change the coolant has already arrived.



WPB90-C0026

WARNING:
Never open the radiator cap when the engine is hot.

3. Change of engine coolant
(1) Remove the radiator cap.

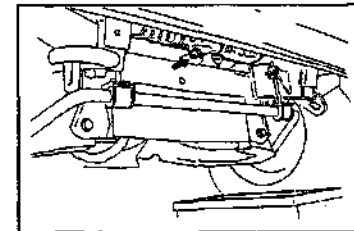
WARNING:
Never open the radiator cap and/or the drain plug when the engine is still hot. Care must be exercised to avoid getting scalded.

WPB90-C0027

- (2) Remove the engine under cover.
- (3) Place an adequate container below the radiator drain plug. Drain the coolant by removing the drain plug.
- (4) Close the drain plug.
- (5) Fill the system with water.
- (6) Start the engine, and stop it.
- (7) Repeat the steps (1) through (5) two to three times.

NOTE:

- Replace the drain plug gasket with a new one.

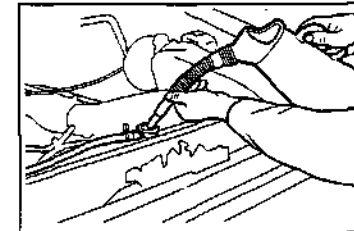


WPB90-C0028

- (8) Fill the radiator and reserve tank with antifreeze solution in accordance with the instructions of the manufacturer of the antifreeze solution.

CAUTION:

- Use a Good brand of ethylene-glycol base antifreeze solution.
Coolant Capacity (Vehicle with front heater): 5.5 dm³
[excluding 1.0 dm³ for reserve tank]



WPB90-C0029

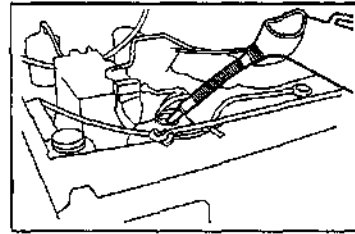
COOLING SYSTEM

- (9) Fill the system with water.
- (10) Start the engine. Check the coolant level. Add water, as required.
- (11) Tighten the radiator cap.
- (12) Warm the engine. Afterwards, allow the coolant to cool down to the atmospheric temperature. Recheck the coolant level at the reserve tank. Add coolant to the full level, as required.

If no coolant remains at all in the reserve tank, recheck the coolant level in the radiator. Replenish the radiator with water, as required. Replenish the reserve tank with coolant up to the full level.

NOTE:

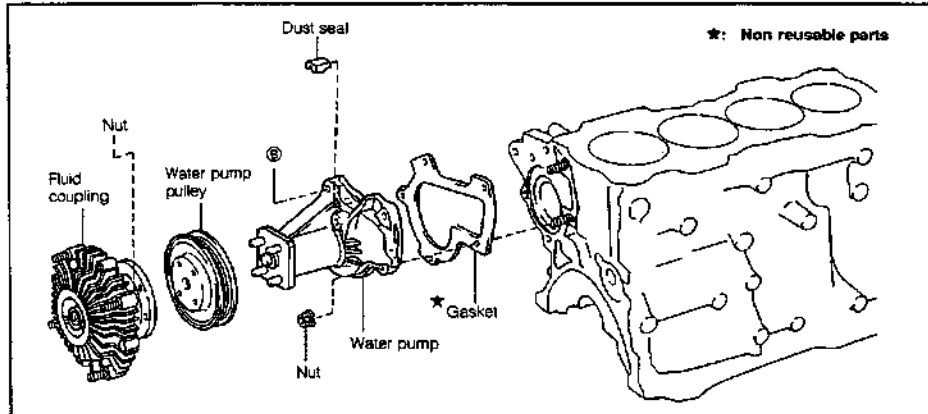
- Here, the coolant refers to the mixture of water and antifreeze that has been mixed in accordance with the instructions of the antifreeze manufacturer.



- (13) Install the engine under cover with attaching bolts.

COOLING SYSTEM

WATER PUMP COMPONENTS

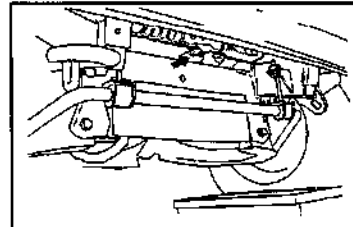


REMOVAL OF WATER PUMP

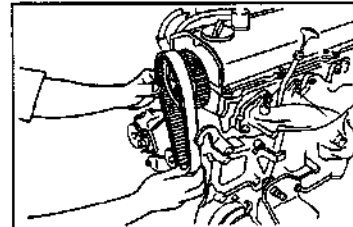
1. Disconnect the battery ground cable from the negative (-) terminal of the battery.
2. Drain the coolant. (See page CO-12.)
Open the radiator cap and drain plug, and allow the coolant to drain into a clean container.

WARNING:

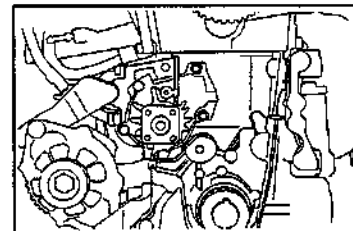
- Never open the radiator cap and/or drain plug when the engine is hot.



3. Remove the timing belt.
(See pages EM-32.)

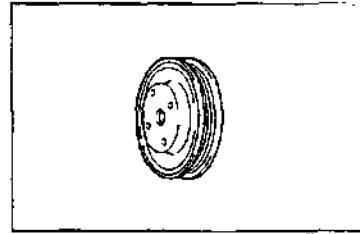


4. Remove the water pump by removing the attaching bolts and nuts of the water pump.

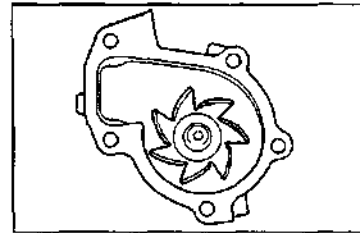


INSPECTION OF WATER PUMP-RELATED PARTS

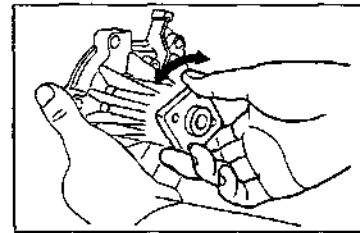
1. Check the water pump pulley for damage or deformation.
Replace the water pump pulley if it exhibits damage or deformation.
2. Visually inspect the water pump rotor for damage or deformation.
Replace the water pump if the water pump rotor exhibits damage or deformation.
3. Ensure that the water pump rotates smoothly by hand.
Replace the water pump if it will not rotate smoothly.
4. Check the water pump cover section of the cylinder block for damage or wear.
Replace the cylinder block if the water pump cover section exhibits damage or wear.



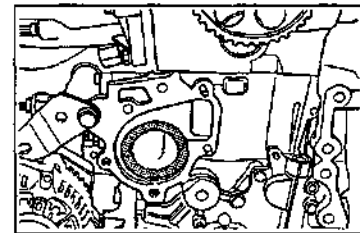
WP50-C0035



WP50-C0036



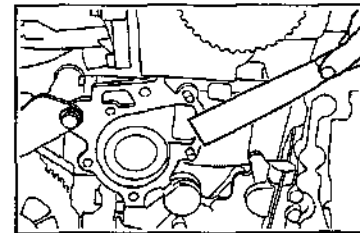
WP50-C0037



WP50-C0038

INSTALLATION OF WATER PUMP

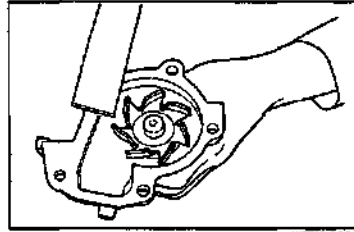
1. Remove the gasket material from the water pump installing surface of the cylinder block, using a gasket scraper.



WP50-C0039

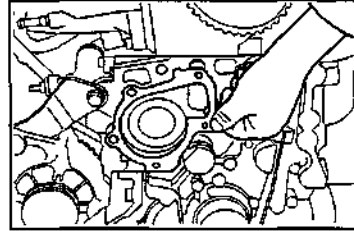
COOLING SYSTEM

2. Remove the gasket material from the water pump, using a gasket scraper.



WPB0-C0040

3. Install a new gasket to the cylinder block.



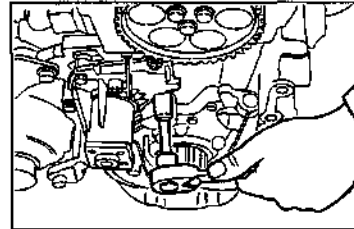
WPB0-C0041

4. Install the water pump to the cylinder block. Tighten the attaching bolts and nuts evenly over two or three stages to the specified torque.

Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)

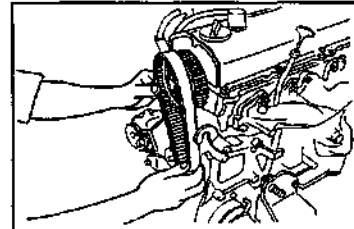
NOTE:

- After tightening bolts, ensure that the water pump rotates smoothly by hand.



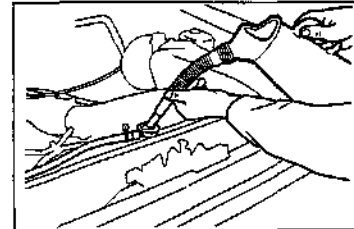
WPB0-C0042

5. Install the timing belt.
(See page EM-32.)



WPB0-C0043

6. Fill coolant.
(See page CO-12.)
7. Connect the battery ground cable to negative (-) terminal of the battery.



WPB0-C0044

THERMOSTAT

REMOVAL OF THERMOSTAT

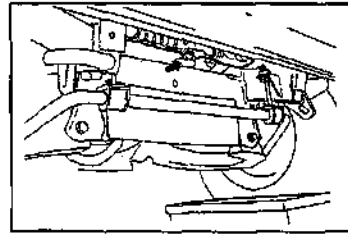
1. Disconnect the battery ground cable from the negative (-) terminal of the battery.
2. Drain the coolant
(See page CO-12).

WARNING:

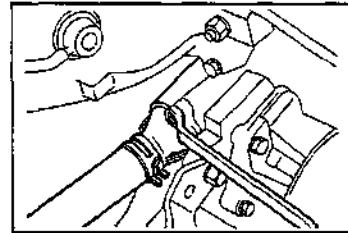
- Never open the radiator cap and/or drain plug when the coolant is hot.

3. Remove the power steering vane pump assembly.
(See page EM-35).
4. Remove the radiator hose No. 2 from the water inlet.
CAUTION:
 - Cover the alternator to prevent entering the cooling water to the alternator.

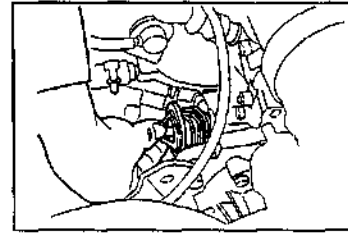
5. Remove the thermostat by removing the water inlet.



WP290-C0045



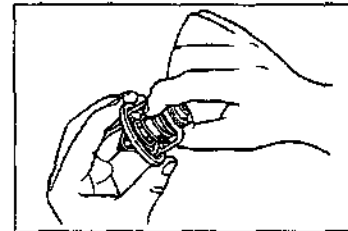
WP290-C0046



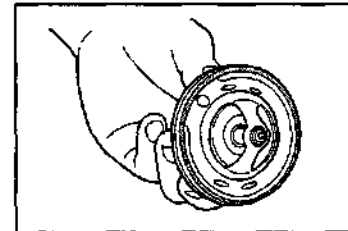
WP290-C0047

INSPECTION OF THERMOSTAT

1. Ensure that the thermostat valve is closed completely at room temperature 20°C and the spring has no play.
Replace the thermostat if the valve is open or the spring has a play.
2. Check the rubber grommet of the thermostat for damage or crack.
Replace the thermostat if the rubber grommet exhibits damage or crack.



WP290-C0048



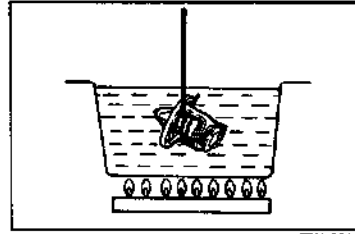
WP290-C0049

COOLING SYSTEM

- Immerse the thermostat in water, and check the valve opening temperature by heating the water gradually.

Specifications	Valve opening temperature °C	Valve lift
Standard specifications	76 - 80	8.5 mm or more at 91°C
Cold area specifications	82 - 86	8.5 mm or more at 97°C

Replace the thermostat if the valve operation fails to conform to the specifications.



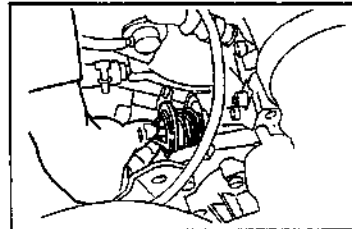
WFE90-CO050

INSTALLATION OF THERMOSTAT

- Assemble the thermostat in such a way that the jiggle pin comes exactly at the top of the engine.

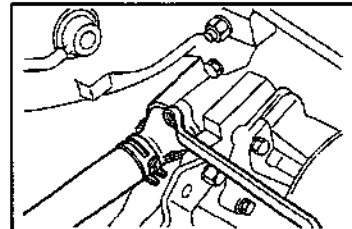
NOTE:

- The thermostat should be installed in such a way the jiggle pin may face upward. Failure to observe this caution may cause engine malfunction.



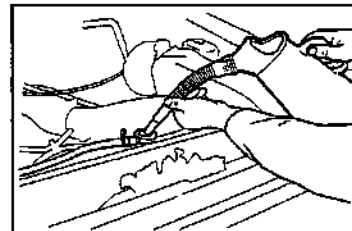
WFE90-CO051

- Install the water inlet.
Tightening Torque: 5.9 - 8.8 N·m (0.6 - 0.9 kgf·m)
- Install the power steering vane pump assembly into position.
(See page EM-35.)



WFE90-CO052

- Fill coolant.
(See page CO-12.)
- Connect the battery ground cable to the negative (-) terminal of the battery.
- Start the engine and check it for leakage. Repair the leaky point if the leakage exists.



WFE90-CO053

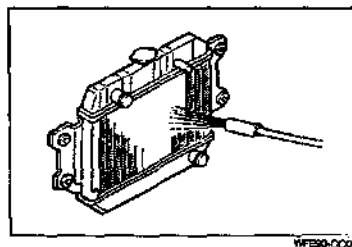
RADIATOR

CLEANING OF RADIATOR

Using water or steam cleaner, remove mud and dirt from the radiator core.

CAUTION:

- When using a high pressure type cleaner, be careful not to deform radiator core fins.
- Keep a distance of more than 40 - 50 cm between the radiator core and cleaner nozzle when the cleaner nozzle pressure is 2942 - 3433 kPa (30 - 35 kgf/cm²). Also, the injection angle of pressurized water should be right angles to the radiator.



WPB0-C006

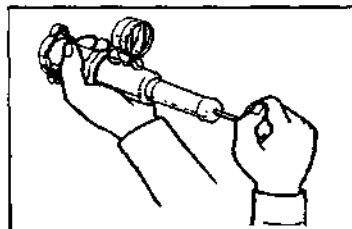
INSPECTION OF RADIATOR

1. Check of radiator cap

- (1) Check the radiator cap by means of a radiator cap tester to see if the relief valve opens at a pressure of 73.6 - 103.0 kPa (0.75 - 1.05 kgf/cm²). If the radiator cap does not conform to the specification, replace the radiator cap.

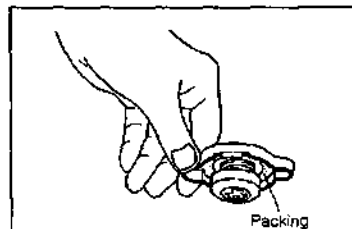
WARNING:

Never open the radiator cap when the engine is hot.



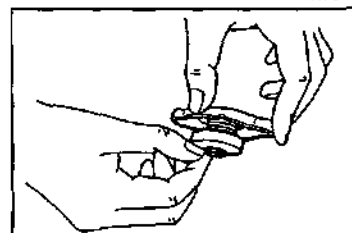
WPB0-C006

- (2) Check the seal packing of the radiator cap for damage. Replace the radiator cap with a new one, if any damage exists.



WPB0-C006

- (3) Lift the valve at the vacuum side with your fingers. Ensure that the valve is functioning properly. Replace the radiator cap with a new one, if the valve fails to function.



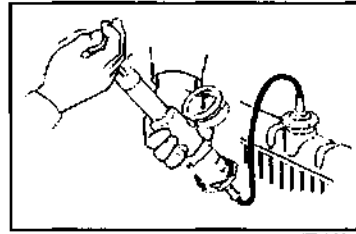
WPB0-C006

COOLING SYSTEM

2. Check of cooling system for leakage
 - (1) Fill the radiator with coolant. Attach a radiator cap tester.
 - (2) Warm up the engine.
 - (3) Apply a pressure of 117.7 kPa (1.2 kgf/cm²) to the cooling system by means of a radiator tester.
If the pressure drops, check the hoses, radiator, water pump and heater for evidence of leakage.
If no external leakage is found, check the heater core, cylinder block, cylinder head, oil cooler and throttle body for evidence of leakage.
Check the hoses for deterioration, cracks, bulge or damage.
Replace the defective part(s) if necessary.
 - (4) Remove the radiator cap tester from the radiator.

WARNING:

- Never remove the radiator cap tester when the coolant temperature is high.



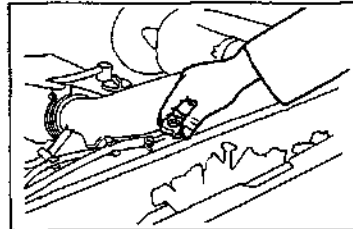
WPB30-C0056

REMOVAL OF RADIATOR

1. Disconnect the ground cable terminal from the negative (-) terminal of the battery.
2. Drain the coolant as follows:
 - (1) Remove the radiator cap.

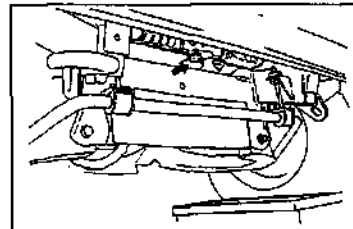
WARNING:

- Never open the radiator cap and/or drain cap when the coolant is hot.



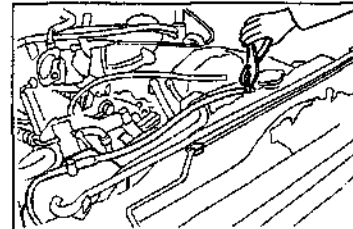
WPB30-C0058

- (2) Remove the engine under cover.
 - (3) Place a suitable container below the radiator drain plug.
Drain the coolant by removing the drain plug.
 - (4) Tighten the drain plug.



WPB30-C0060

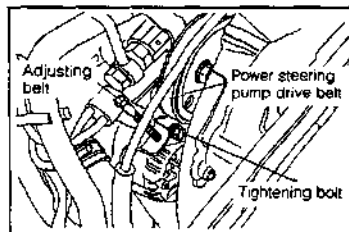
3. Removal of radiator
 - (1) Disconnect the radiator reserve tank hose from the radiator.
 - (2) Pull up the radiator reserve tank together with hose.



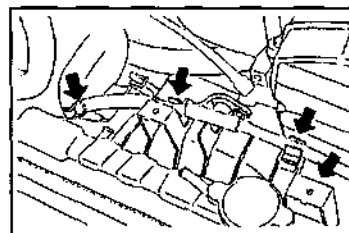
WPB30-C0061

COOLING SYSTEM

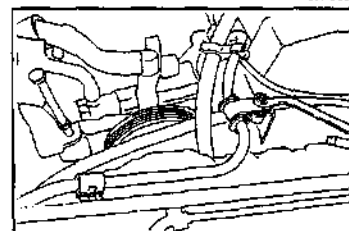
- (3) Loosen the adjusting bolt and two tightening bolts.
Temporarily detach the power steering pump.



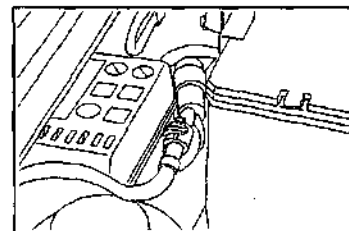
- (4) Remove the three clamps for clutch cable provide on fan shroud.
(5) Remove the aircleaner attaching bolt provide on fan shroud.



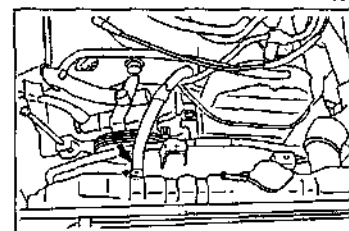
- (6) Remove the clamping bolt and detach the clamp with lock. (HD-E Engine)



- (7) Disconnect the main relay wire connector at the relay box side. (HD-E Engine)



- (8) Disconnect the air breather hose from the radiator upper tank.

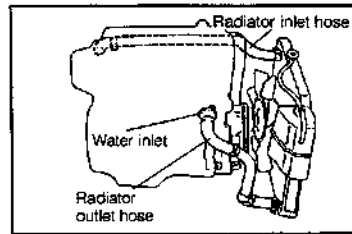


COOLING SYSTEM

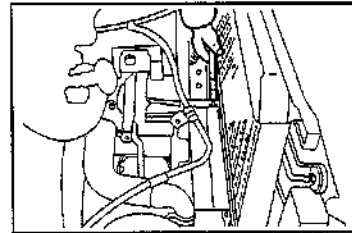
- (9) Remove the radiator inlet hose by disconnecting the radiator and water outlet side clamps.
- (10) Disconnect the radiator outlet hose at the center connection.

CAUTION:

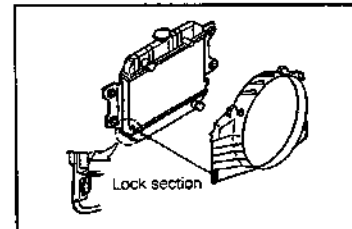
- When disconnecting the radiator outlet hose, take measures to prevent the coolant from entering the alternator.



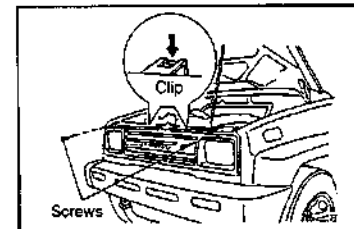
- (11) Disconnect the oil cooler hose from the radiator.
(Oil cooler equipped vehicle only)



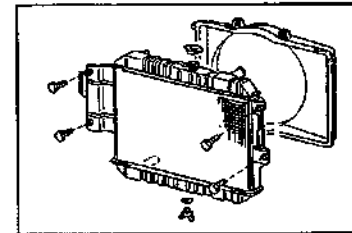
- (12) Remove the two attaching bolts of the fan shroud. Then, disconnect the lock section of the fan shroud from the radiator.



- (13) Remove the radiator grille.



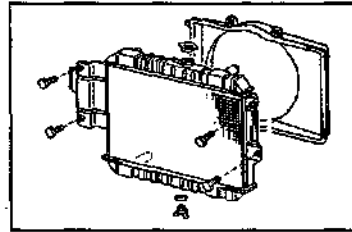
- (14) Remove the radiator by removing the four attaching bolts.



INSTALLATION OF RADIATOR

1. Radiator installation

- (1) Place the radiator fan shroud to the cooling fan side.
- (2) Install the radiator in the engine compartment. Then, tighten the four attaching bolts.

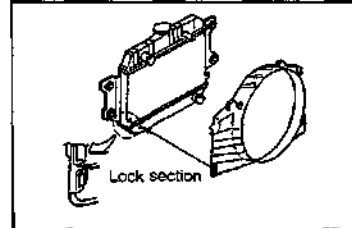


WPB90-C0072

- (3) Install the radiator fan shroud with two attaching bolts.

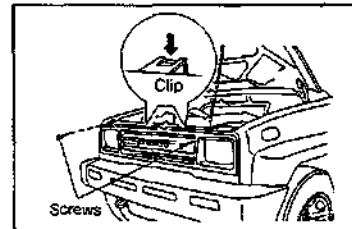
NOTE:

- Before attaching the fan shroud to the radiator, insert the lock section of the fan shroud to the lower section of the radiator.



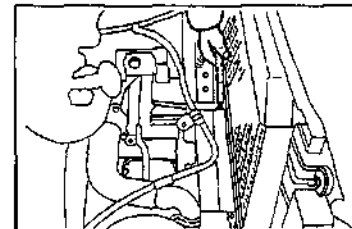
WPB90-C0073

- (4) Install the radiator grille.



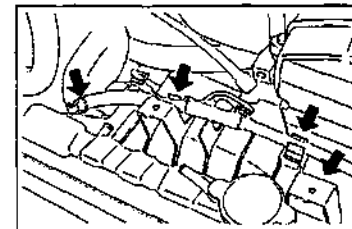
WPB90-C0074

- (5) Install the oil cooler hoses from the radiator. (Oil cooler equipped vehicle only)



WPB90-C0075

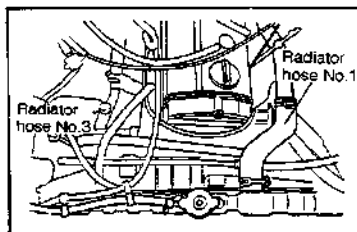
- (6) Clamp the clutch cable on the fan shroud with the two clamps.
- (7) Tighten the air cleaner hose attaching bolt of fan shroud.



WPB90-C0076

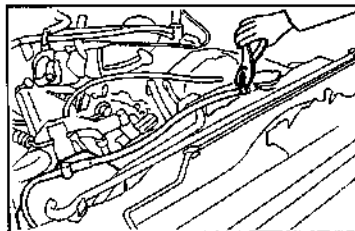
COOLING SYSTEM

- (8) Connect the radiator hose No. 1 and breather hose to the radiator upper tank.
- (9) Connect the radiator hose No. 3 and oil cooler hose to the radiator lower tank.



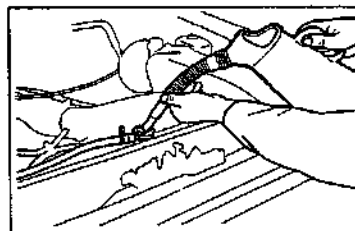
WPB30-CO077

- (10) Install the reserve tank to the radiator.
- (11) Connect the radiator reserve tank hose to the radiator.



WPB30-CO078

- 2. Fill the coolant.
(See page CO-3.)
- 3. Connect the battery ground cable to the negative (-) terminal of the battery.
- 4. Start the engine and check it for leakage.
Repair the leaky point if leakage exists.



WPB30-CO079

COOLING SYSTEM

TIGHTENING TORQUE

Tightening component	Tightening Torque			Remark
	N·m	kgf·m	ft·lb	
Cylinder head x Water temperature sensor (HD-E engine only)	24.5 - 34.3	2.5 - 3.5	18.1 - 23.5	Dry
Cylinder head x Water temperature sender gauge	11.8 - 19.6	1.2 - 2.0	10.8 - 15.9	Dry
Cylinder block x Water inlet	5.9 - 8.8	0.6 - 0.9	4.3 - 6.5	Dry
Cylinder block x Water pump	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9	Dry
Fluid coupling x Water pump pulley x Water pump	9.8 - 17.6	1.0 - 1.8	7.2 - 13.0	Dry
Cooling fan x Fluid coupling	4.9 - 5.9	0.5 - 0.6	3.6 - 4.3	Dry

WP820-CO080

SERVICE SPECIFICATION

Coolant capacity w/heater (Excluding 1.0 dm ³ for reserve tank)		5.5 dm ³ [5.8 dm ³ for tropical specifications]
Radiator cap	Relief valve opening pressure	
	Standard Minimum	73.5 - 103.0 kPa (0.75 - 1.05 kgf/cm ²) 58.8 kPa (0.6 kgf/cm ²)
Thermostat	Valve opening temperature	
	General specifications ECE & EEC specifications	76 - 86°C 82 - 86°C
	Valve lift	
	General specifications ECE & EEC specifications	8.5 mm or more at 91°C 8.5 mm or more at 97°C

WP820-CO081

DAIHATSU

F300

[HD-Engine]

LUBRICATION SYSTEM

TRUBLE SHOOTING	LU- 2
LUBRICATION SYSTEM OUTLINE	LU- 3
LUBRICATION ROUTES	LU- 4
OIL PRESSURE CHECK	LU- 9
ENGINE OIL CHANGE & OIL FILTER	
REPLACEMENT	LU-11
OIL COOLER	LU-13
SST [Special Service Tools]	LU-17
TIGHTENING TORQUE	LU-17
SERVICE SPECIFICATION	LU-17

WF390-LU001

LUBRICATION SYSTEM

TROUBLE SHOOTING

Problem	Possible causes	Remedies	Page
Oil leakage	Cylinder head, cylinder block, oil cooler or oil pump body damaged or cracked Oil seal faulty Gasket faulty	Repair, if necessary. Replace oil seal. Replace gasket.	
Low oil pressure	Oil leakage Relief valve faulty Oil pump faulty Poor quality engine oil Crankshaft bearing faulty Connecting rod bearing faulty Oil filter clogged Check oil level	Repair, as necessary. Replace relief valve. Repair oil pump. Change engine oil Replace bearing. Replace bearing. Replace oil filter. Low oil level	EM-143 EM-143 LU-11 EM-128 EM-131 LU-11 LU-9
High oil pressure	Relief valve faulty	Replace relief valve.	EM-143

WP590-LU002

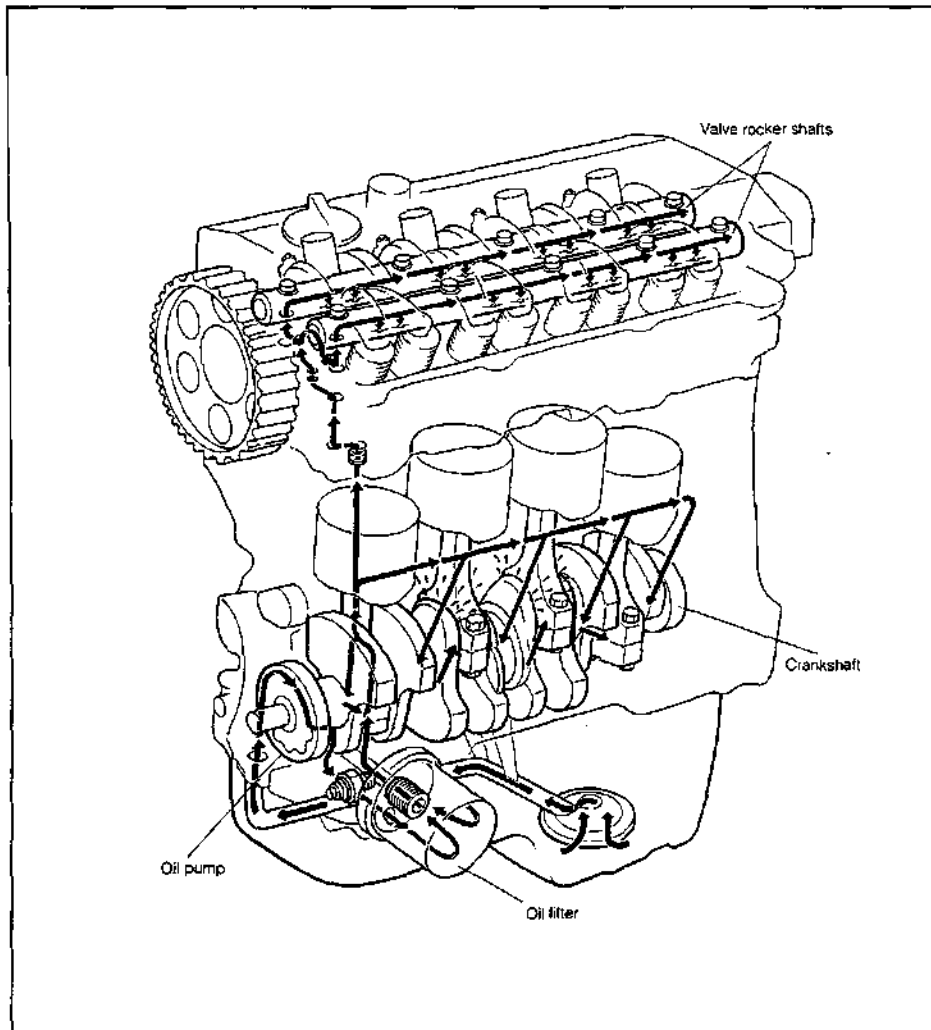
LUBRICATION SYSTEM OUTLINE

The lubrication system employs a fully-forced feed, filtering method.

The oil stored in the oil pan is sucked by an oil pump which is directly driven by the crankshaft. Then, the thus-sucked oil flows through an oil pump strainer and is filtered at an oil filter. After having passed through the passages of the cylinder block, it will be divided into two streams so as to lubricate various sections.

One stream of the lubrication oil performs lubrication of various sections of the crankshaft and connecting rod- and piston-related parts. The other stream of the lubrication, oil rises to the cylinder head section.

Then, it performs lubrication of the camshaft and valve rocker shaft-related parts.



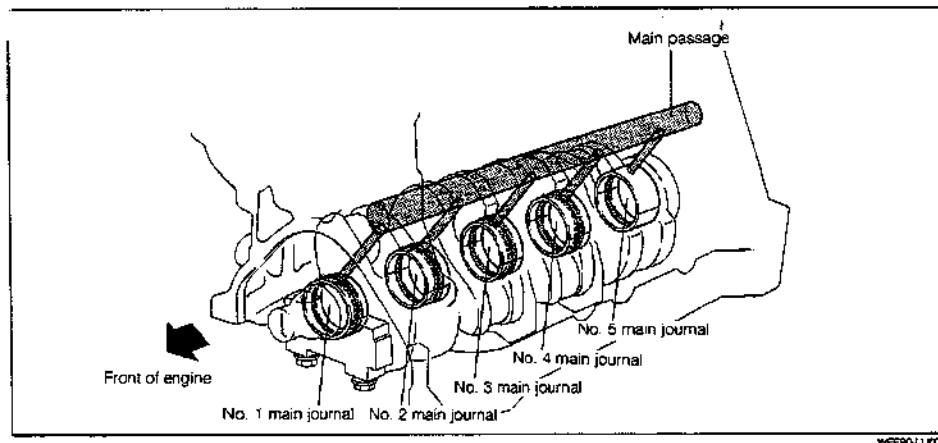
WF280-LU008

LUBRICATION SYSTEM

LUBRICATION ROUTES

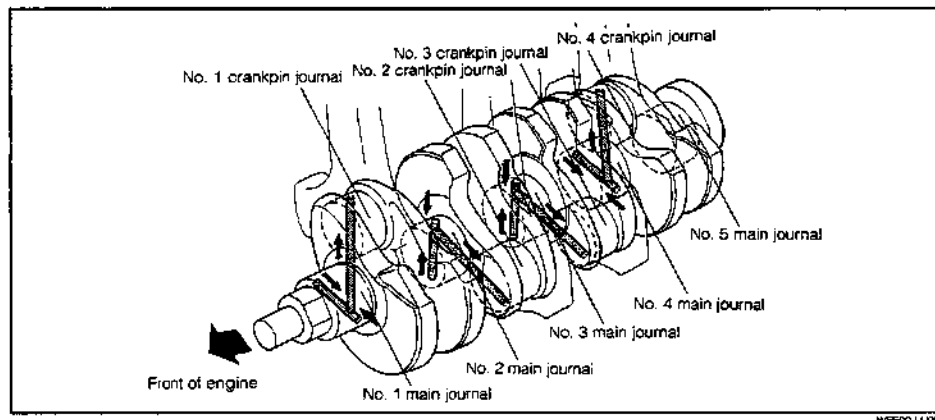
1. Crankshaft main journal sections

The oil which has been sent from the main passage provided inside the cylinder block to each crankshaft main journal under a pressurized state will be supplied to the crankshaft main journal sections through the bearing holes, via the oil grooves of the crankshaft main journal sections at the cylinder block side and the oil grooves of the crankshaft bearing caps. (However, in the case of the No. 5 main journal, no oil groove is provided both at the cylinder block side and at the crankshaft bearing cap side.) The thus-furnished oil is filled at the inner grooves of the bearings so as to lubricate the crankshaft main journal sections.



2. Crankpin journal sections

The oil which has been sent to each crankshaft main journal under a pressurized state will be sent to each crankpin journal via the inner passages of the crankshaft. Consequently, the lubrication takes place not only for the crankshaft main journal sections, but also for the crankpin journal sections. The inner passage of the crankshaft is connected from the No. 1 main journal to the No. 1 crankpin journal; from the No. 2 main journal to the No. 2 crankpin journal; from the No. 3 main journal to the No. 3 crankpin journal; and from the No. 4 main journal to the No. 4 crankpin journal, respectively.

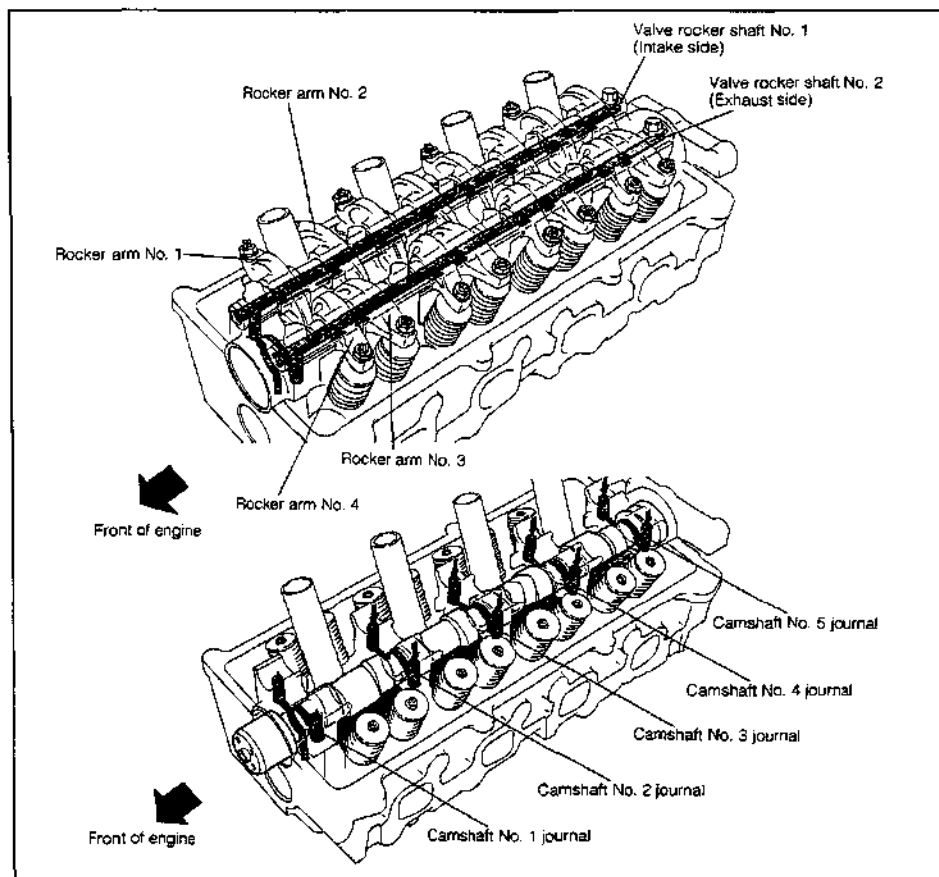


3. Cylinder head section

The oil fed from the cylinder block under a pressurized condition is filled in the groove of the camshaft bearing cap. Thus, the lubrication for the camshaft No. 1 journal takes place. Then, this oil travels upward around the camshaft journal No. 1 and oil passage provided beside rocker shaft attaching bolts, thus being supplied forcibly into the inner passage of the rocker shaft. As a result, the oil flows through the oil passage leading to the rocker arms, thereby lubricating the rocker arm sliding sections. To distribute the lubrication oil properly over the sliding surfaces, grooves are provided at the oil outlet of the rocker arm sliding surfaces of the rocker shaft.

For the lubrication for the No. 2 through No. 5 journal sections of the camshaft, the oil from the inner passage of the rocker shaft travels downward around the bolts, in the opposite way as with the lubrication from the No. 1 journal. Thus, the oil filled at the bearing cap groove will lubricate the aforesaid journal sections.

As regards the lubrication for the cam lobe surfaces, the oil which has lubricated the camshaft journal and rocker arm sliding sections will drop from both sides of the lubricating sections and it collects at the oil well provided at the cylinder head. Consequently, the camshaft lobe surfaces are lubricated by this oil bath lubrication which occurs each time the camshaft lobes dip into the oil well.



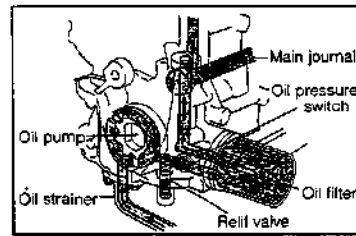
WFE90-LU005

LUBRICATION SYSTEM

1. OIL PUMP

The oil pump is a trochoid type. This oil pump mounted at the front section of the engine is driven directly by the crankshaft. The oil pump is provided with a relief valve which starts functioning when the oil pressure rises excessively. Moreover, the oil pump is equipped with an oil pressure switch which lights the warning lamp when the oil pressure drops abnormally.

The relief valve detects the oil pressure at a point before the oil passes through the oil filter, whereas the oil pressure switch detects the oil pressure at a point after the oil passes through the oil filter.



WP290-LU007

Oil pump specifications

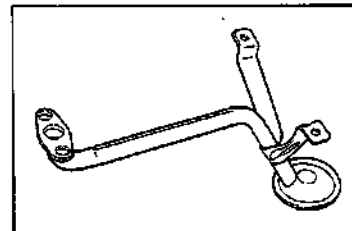
Item		Specifications
Type		Trochoid
Delivery output (at time of 5000 rpm 294 kPa (3 kgf/cm ²))		dm ³ /min 30 or more at time of oil temperature 60°C
Relief valve opening pressure (at time of 2000 rpm)		kPa (kgf/cm ²) 441.3 (4.5) at time of oil temperature 60°C
Number of teeth	Inner rotor	9
	Outer rotor	10

WP290-LU008

OIL STRAINER

The oil strainer filtrates any dirt or foreign objects in the oil sucked from the oil pan.

The oil strainer bracket is supported at the journal No. 3 section of the crankshaft.

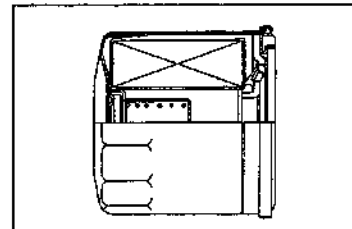


WP290-LU009

OIL FILTER

The oil filter is a cartridge type which has a built-in bypass valve. This oil filter features a compact size and light weight.

Item	Specifications	
	NIPPONDENSO	Tokyo Roki
Filtering area	cm ² 700	800
By-pass valve opening pressure	kPa (kgf/cm ²) 98.1 ± 19.6 (1 ± 0.2)	98.1 ± 19.6 (1 ± 0.2)

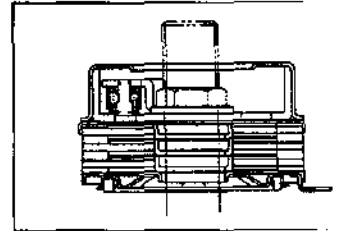
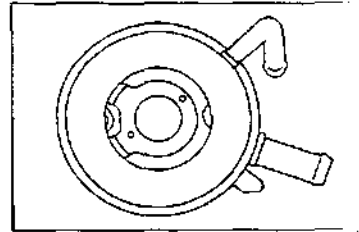


WP290-LU010

LUBRICATION SYSTEM

2. OIL COOLER

To prevent excessive temperature rise of the engine oil, an oil cooler is provided at the oil filter section so that an optimum temperature may be maintained at all times. The oil cooler incorporates a bypass valve for the oil cooler.

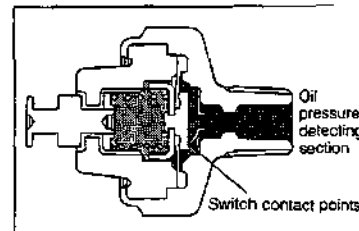


3. OIL PRESSURE SWITCH

The oil pressure switch is mounted on the oil pump body.

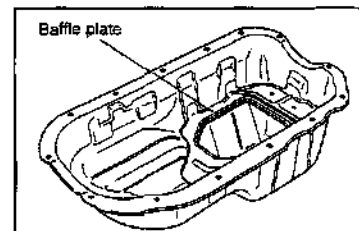
Specifications

Item	Specifications
Operating pressure	kPa (kgf/cm ²) 19.6 (0.2)



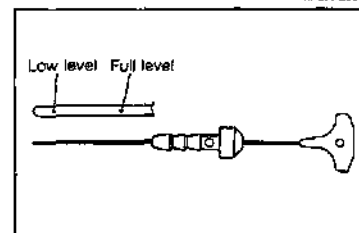
4. OIL PAN

An oil pan made of steel sheet is employed. The oil pan is provided with a baffle plate.



5. OIL LEVEL GAUGE

The oil level gauge of a saber type is located at the exhaust side of the engine.



LUBRICATION SYSTEM

6. ENGINE OIL

Oil capacity

Item		Oil capacity
Oil capacity (whole)	dm ³	3.8
Full level	dm ³	3.3
Low level	dm ³	2.3

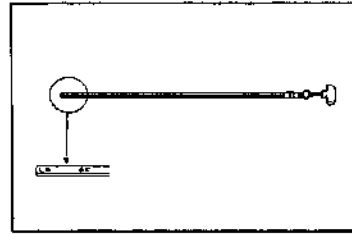
Recommended Oil

API classification: SF, SG

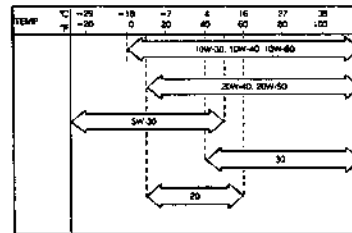
SAE: 10W-30

Engine Oil & Oil Filter Change Intervals (Normal condition)

Engine oil	Every 10,000 km or every 0.5 year
Oil filter	Every 10,000 km



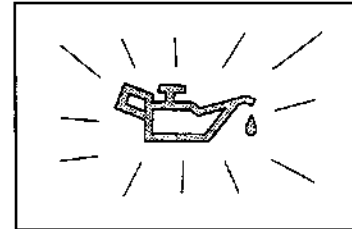
WPB0-LU016



WPB0-LU017

7. OIL PRESSURE WARNING DEVICE

If the oil pressure detected by the oil pressure switch is lower than 19.6 kPa (0.2 kgf/cm²), the warning lamp provided inside the combination meter goes on, thus telling the driver of the abnormality.

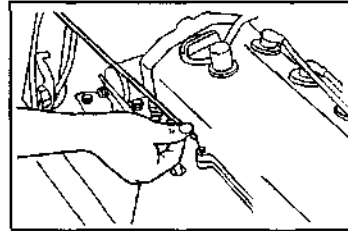


WPB0-LU018

OIL PRESSURE CHECK

1. Oil quality check

Check the oil for deterioration, ingress of water, discoloring or dilution.
If oil quality is poor, change the oil.
Use API grade SG or SF multigrade viscosity, fuel-efficient oil. (See page LU-8.)



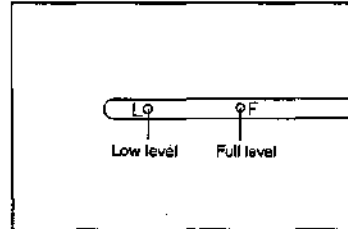
WPB90-LU018

2. Oil level check

The oil level should be between the L and F levels on the dipstick.
If the level is low, check to see if any oil leakage is present.
Add oil to the F level.

NOTE:

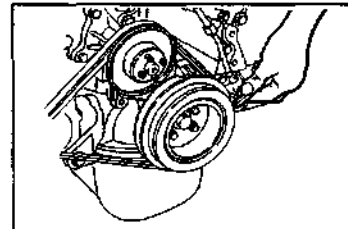
- The amount of oil between the [L] level and the [F] equals to one liter.



WPB90-LU020

3. Oil pressure check

- Remove the air cleaner and air cleaner hose assembly.
(Only HD-E Engine)
- Disconnect the connector of oil pressure switch.

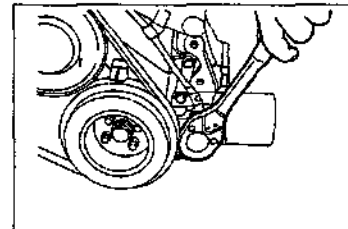


WPB90-LU021

- Remove the oil pressure switch.

NOTE:

- Use a hexagonal long box wrench for the removal.



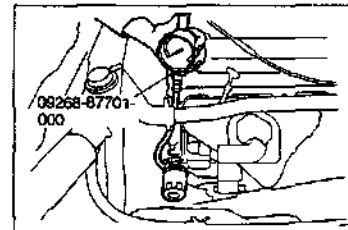
WPB90-LU022

- Install the oil pressure gauge.

NOTE:

- The pressure gauge is available as a SST.
SST: 09268-87701-000

- Install the air cleaner and air cleaner hose assembly.
(Only HD-E Engine)



WPB90-LU023

LUBRICATION SYSTEM

- (6) Starting engine
Start the engine and warm it to the normal operating temperature.
At Idle Speed: More than 19.6 kPa (0.2 kgf/cm²)
At 3000 rpm: 245.2 - 490.4 kPa (2.5 - 5.0 kgf/cm²)

If the measured value fails to conform to the specified value, check and repair the oil pump.
(See page EM-146.)

- (7) Stop the engine.
(8) Remove the air cleaner and air cleaner hose assembly.

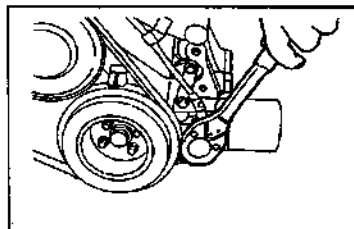
WP690-LU024

- (9) Remove the oil pressure gauge.
(10) Clean the threaded portion of the oil pressure switch.
Wind seal tape around the threaded portion. Install the oil pressure switch in the oil pump.
Tightening Torque: 11.8 - 19.6 N·m (1.2 - 2.0 kgf-m)

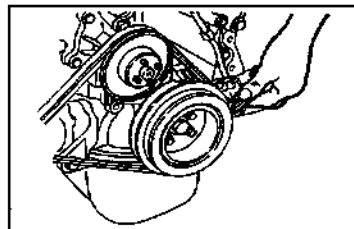
NOTE:

- Use a hexagonal long box wrench for the installation.
- The new oil pressure switch is coated with sealing materials.

- (11) Connect the connector of the oil pressure switch.
(12) Install the air cleaner and air cleaner hose assembly.
(13) Start the engine and check it for oil leakage.
Repair the leaky point if oil leakage exists.



WP690-LU025



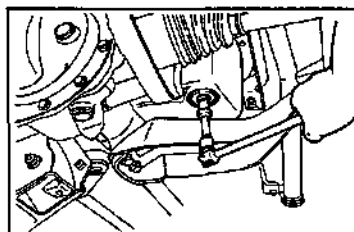
WP690-LU026

ENGINE OIL CHANGE & OIL FILTER REPLACEMENT

1. Drain the engine oil as follows:
 - (1) Place a suitable container under the oil drain plug.
 - (2) Remove the engine under cover.
 - (3) Drain the oil by removing the oil drain plug.

WARNING

- When the oil is still hot, care must be exercised to avoid getting scalded.



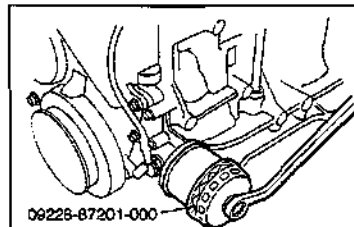
WPB9-LU027

2. Oil filter replacement
 - (1) Remove the oil filter element, using the following SST.

SST: 09228-87201-000

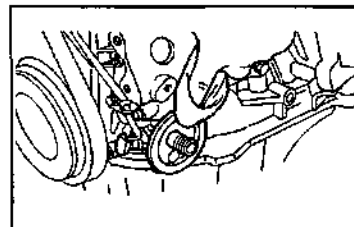
NOTE:

- Place a suitable container under the oil filter because the engine oil flows out.



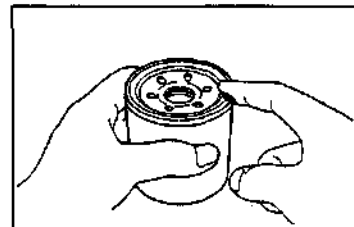
WPB9-LU028

- (2) Inspect and clean the oil filter installation surface.



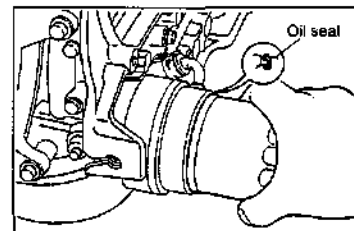
WPB9-LU029

- (3) Thinly apply engine oil to the "O" ring of a new oil filter.



WPB9-LU030

- (4) Screw in the oil filter by hand, until the "O" ring of the oil filter contacts the oil filter installing surface.

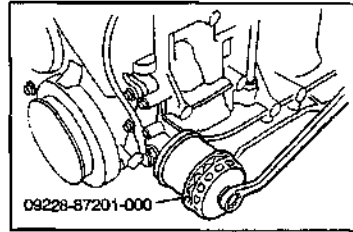


WPB9-LU031

LUBRICATION SYSTEM

- (5) Tighten the oil filter three fourths to one complete turn, using the following SST.

SST: 09228-87201-000



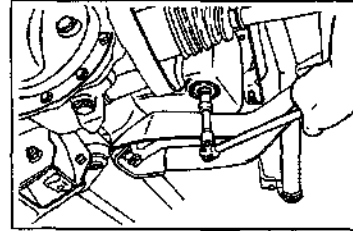
WPB90-LU032

3. Filling engine oil

- (1) Clean the oil drain plug. Install it with a new gasket interposed.

NOTE:

- Remove any remaining gasket material from the oil pan, using a gasket scraper.
- Tightening Torque: 19.6 - 29.4 N·m (2.0 - 3.0 kgf·m)



WPB90-LU033

- (2) Fill the engine with engine oil.

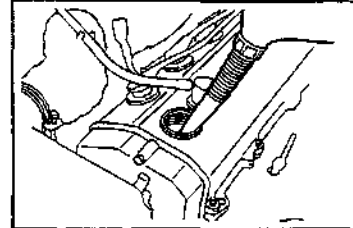
The oil should be API grade SG or SF multigrade viscosity, fuel-efficient oil.

Oil Capacity

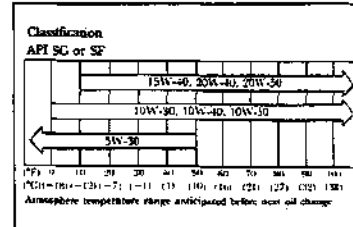
When only engine oil is changed: 3.3 dm³

When engine oil is changed and oil filter is replaced: 3.5 dm³

After engine has been overhauled or when engine oil has been drained completely from engine: 3.8 dm³

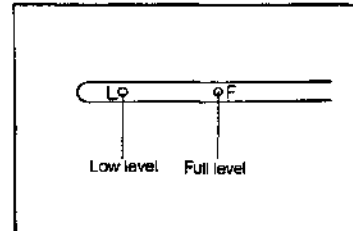


WPB90-LU034



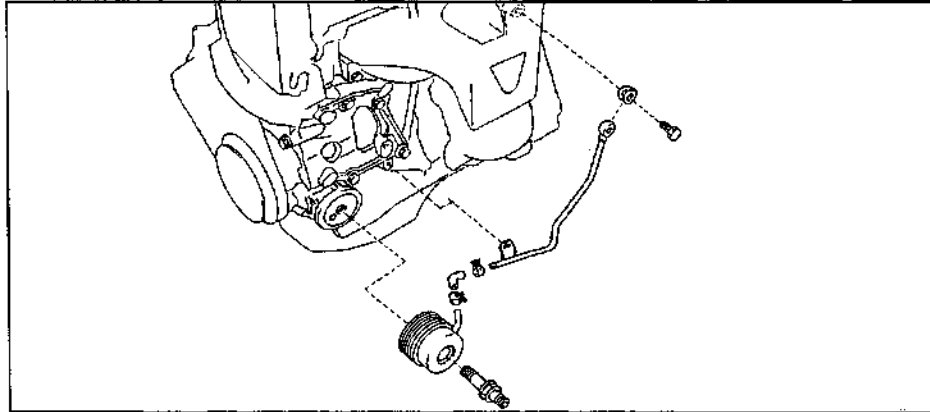
WPB90-LU035

- (3) Start the engine and check it for leakage. Repair the leaky point if oil leakage exists.
- (4) Stop the engine. After a lapse of two or three minutes, check the oil level. If oil level is less than the full level, replenish the oil to the full level.
- (5) Install the engine under cover.



WPB90-LU036

OIL COOLER COMPONENTS

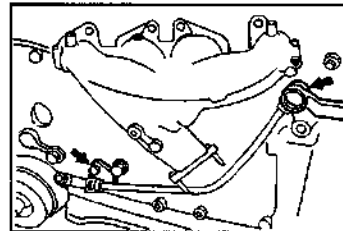


REMOVAL OF OIL COOLER

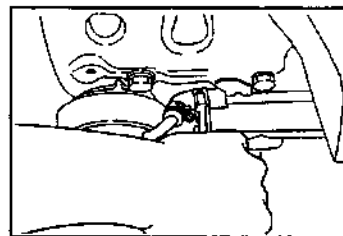
1. Disconnect the battery ground cable from the negative (-) terminal of the battery.
2. Drain the coolant. (See page CO-3.)
3. Remove the air cleaner and the air cleaner hose assembly.
4. Remove the oil filter. (See page LU-4.)
5. Disconnect the oil cooler hose at the radiator side.

WP520-LU038

6. Disconnect the oil cooler pipe from the cylinder block.



7. Remove the oil cooler pipe from the hose by sliding the hose bands.

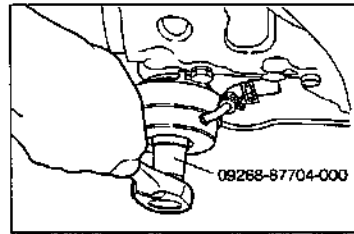


LUBRICATION SYSTEM

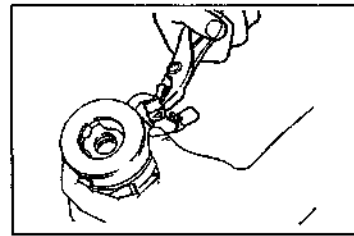
8. Remove the oil cooler, using the following SST.
SST: 09268-87704-000

NOTE:

- Place a suitable container below the oil cooler attaching section so as to receive any oil and water flowing from the oil cooler.

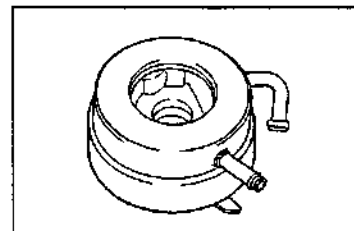


9. Disconnect the water hose from the oil cooler.

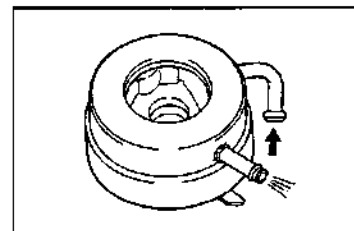


INSPECTION OF OIL COOLER

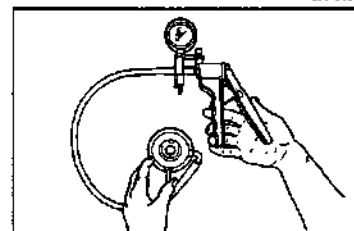
1. Check the oil cooler for damage.
Replace the oil cooler if the oil cooler exhibits damage.



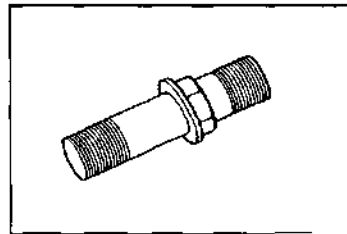
2. Blow air from one end of the oil cooler pipe.
Ensure that air continuity exists.



3. With one end of the oil cooler pipe plugged with your finger, apply a negative pressure of 13.3 kPa (100 mmHg) to the other end, using a MityVac or a vacuum pump. Ensure that the applied negative pressure is retained.
If the negative pressure is not kept, replace the oil cooler.

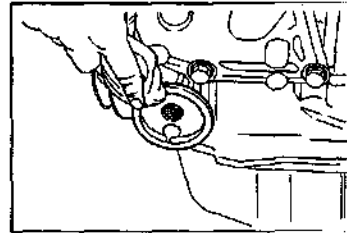


4. Check the oil cooler set bolt for damage.
Replace the oil cooler set bolt if it exhibits damage.

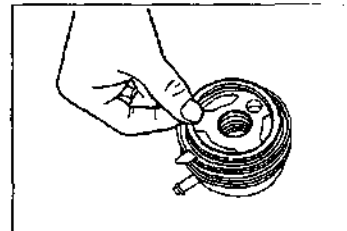


INSTALLATION OF OIL COOLER

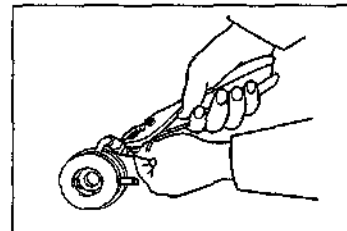
1. Clean the oil cooler attaching surface of the oil pump.



2. Install the new "O" ring on the cooler.



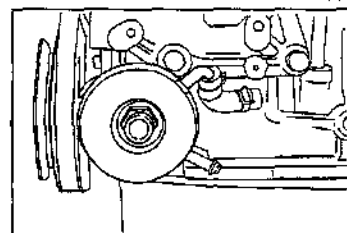
3. Connect the water hose to the oil cooler. Attach the hose bands.



4. Using the set bolts, install the oil cooler by making the locating rib of the oil cooler contact with the cylinder block.

NOTE:

- Care must be exercised to ensure that the "O" ring may not be displaced during the installation.

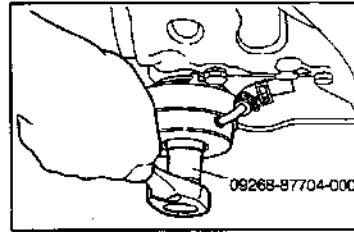


LUBRICATION SYSTEM

5. Tighten the set bolt to the specified torque, using the following SST.

SST: 09268-87704-000

Tightening Torque: 24.5 - 34.3 N·m (2.5 - 3.5 kgf·m)

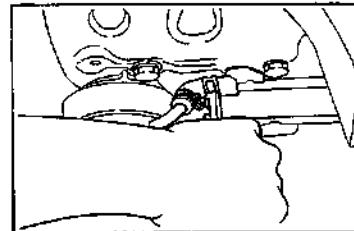


WF820-LU051

6. Connect the oil cooler inlet pipe to the oil cooler hose that has been installed on the oil cooler.

NOTE:

- Install the oil cooler pipe, by taking into consideration an angle at which it is mounted on the cylinder block.



WF820-LU052

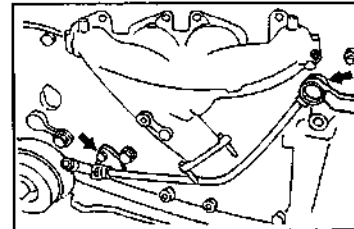
7. Install the oil cooler pipe on the cylinder block with a new gasket interposed.

Tightening Torque (Union bolt):

24.5 - 34.3 N·m (2.5 - 3.5 kgf·m)

NOTE:

- Never reuse the gasket.



WF820-LU053

8. Installation of oil filter

(1) Clean the oil filter installation surface of the oil cooler.

(2) Install the oil filter. (See page LU-11.)

9. Connect the oil cooler hose at the radiator side. Attach the hose bands.

10. Fill coolant. (See page CO-12.)

11. Install the air cleaner and air cleaner hose assembly.

12. Connect the battery ground cable to the negative (-) terminal of the battery.

13. Start the engine. Check to see if any oil leakage or fuel leakage is present.




If the engine exhibits any defect, repair it or replace the defective part, as required.

14. Stop the engine. After two or three minutes, check the engine oil level, using the oil level gauge. Replenish engine oil to the FULL level, as required. (See page LU-9.)

WF820-LU054

LUBRICATION SYSTEM

SST [Special Service Tools]

Shape	Parts No. and Name	Purpose	Remarks
	09032-00100-000 Oil pan seal cutter	Removal of oil pan	
	09268-87704-000 Oil cooler set bolt box wrench	Removal and installation of oil cooler (only for oil cooler-equipped vehicle)	Only for oil cooler-equipped vehicle
	09990-87702-000 Engine oil pressure gauge	Measurement of engine oil pressure	

WPB0-LU055

TIGHTENING TORQUE

Tightening component	Tightening torque			Remark
	N·m	kgf·m	ft·lb	
Cylinder block x Oil pump	5.9 - 8.8	0.6 - 0.9	4.3 - 6.5	Dry
" x Rear oil seal retainer	5.9 - 8.8	0.6 - 0.9	4.3 - 6.5	Dry
" x Oil cooler pipe	24.5 - 34.3	2.5 - 3.5	18.1 - 25.3	Dry
Oil pump body x Oil cooler	24.5 - 34.3	2.5 - 3.5	18.1 - 25.3	Dry
Oil pump x Oil pressure switch	11.8 - 19.6	1.2 - 2.0	8.7 - 14.5	Dry
Oil pan	6.9 - 11.8	0.7 - 1.2	8.7 - 14.5	Dry
" x Drain plug	19.6 - 29.4	2.0 - 3.0	14.5 - 21.7	Dry
Oil pump body x Oil pump cover	7.8 - 12.7	0.8 - 1.3	5.8 - 9.4	Dry
Oil level gauge guide	18.6 - 30.4	1.9 - 3.1	13.7 - 22.4	Dry

WPB0-LU056

SERVICE SPECIFICATION

Engine oil capacity		3.8 dm ³
Whole amount		3.3 dm ³
When only oil is changed		2.3 dm ³
Full level		3.5 dm ³
Low level		
When oil and filter are changed		NOTE If oil cooler equipped engine, add 79 cm ³ for whole amount.
Oil pump	Compression spring free length	57 mm
	Body clearance	0.20 - 0.28 mm
	Tip clearance	0.16 - 0.24 mm
	Side clearance	0.035 - 0.085 mm
	Oil pressure	
	Idling	19.6 kPa (0.2 kgf/cm ²) or more
	3000 rpm	245.2 - 490.4 kPa (2.5 - 5.0 kgf/cm ²)

WPB0-LU057

DAIHATSU

F300

[HD-Engine]

IGNITION SYSTEM

PRECAUTIONS	IG- 2
TROUBLE SHOOTING	IG- 2
IGNITION SYSTEM OUTLINE	IG- 3
DISTRIBUTOR	IG-15
SST [Special Service Tools]	IG-31
TIGHTENING TORQUE	IG-31
SPECIFICATION	IG-31

WF820-43001

IGNITION SYSTEM

PRECAUTIONS

1. Do not leave the ignition key switch turned ON for more than ten minutes while the engine is stopped.
2. When a tachometer is connected to the system, connect the test probe of the tachometer to the negative (-) terminal of the ignition coil.
3. As some tachometers are not compatible with this ignition system, it is recommended to confirm the compatibility of your unit before using.
4. Never allow the ignition coil terminals to touch ground. It could result in damage to the ignitor and/or the ignition coil.
5. Do not disconnect the battery cable when the engine is running.
6. Make sure that the igniter is properly grounded to the body.

TROUBLE SHOOTING

WP590-IG002

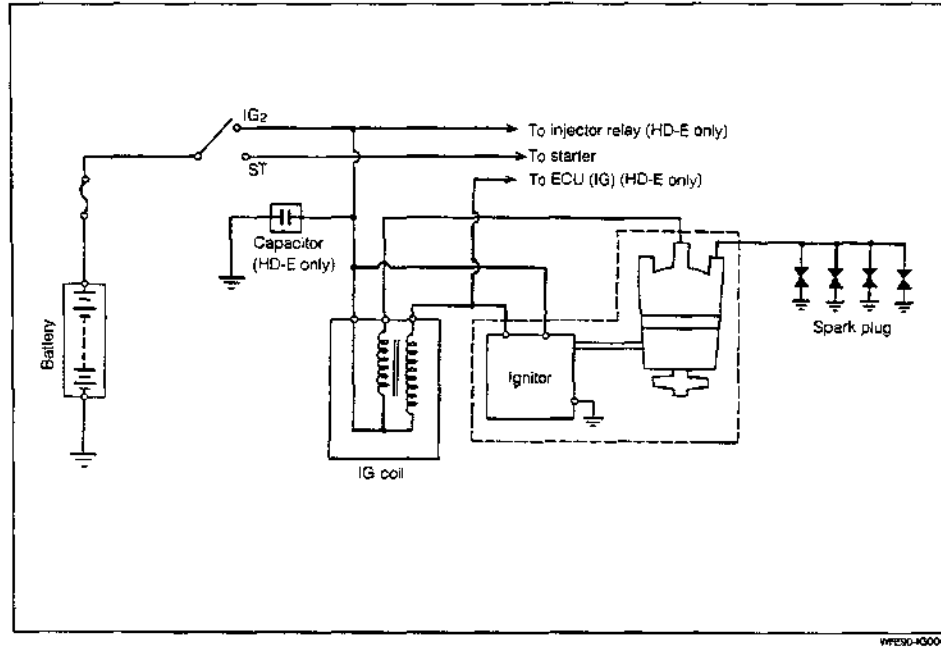
Problem	Possible causes	Remedies	Page
Engine will not start/hard to start. (Engine crank normally.)	Incorrect ignition timing	Reset timing.	IG-28
	Ignition coil faulty	Inspect coil.	IG-14
	Igniter faulty		
	Distributor faulty	Inspect distributor.	IG-16
	Spark plug wires faulty	Inspect spark plug wires.	IG-11
	Spark plugs faulty	Inspect plugs.	IG-12
Rough idle or engine stalls.	Ignition wiring disconnected or broken	Inspect wiring.	
	Spark plugs faulty	Inspect plugs.	IG-12
	Ignition wiring faulty	Inspect wiring.	
	Incorrect ignition timing	Reset timing.	IG-28
	Ignition coil faulty	Inspect coil.	IG-14
	Igniter faulty		
Engine hesitation/poor acceleration	Distributor faulty	Inspect distributor.	IG-16
	Spark plug wires faulty	Inspect spark plug wires.	IG-11
	Spark plugs faulty	Inspect plugs.	IG-12
	Ignition wiring faulty	Inspect wiring.	
Engine dieseling (Engine runs after ignition switch is turned OFF.)	Incorrect ignition timing	Reset timing.	IG-28
Muffler explosion (after fire) all the time	Incorrect ignition timing	Reset timing.	IG-28
Engine backfire	Incorrect ignition timing	Reset timing.	IG-28
Poor fuel economy	Spark plugs faulty	Inspect plugs.	IG-12
	Incorrect ignition timing	Reset timing.	IG-28
Engine overheating	Incorrect ignition timing	Reset timing.	IG-28

WP590-IG003

IGNITION SYSTEM OUTLINE

IGNITION SYSTEM CIRCUIT

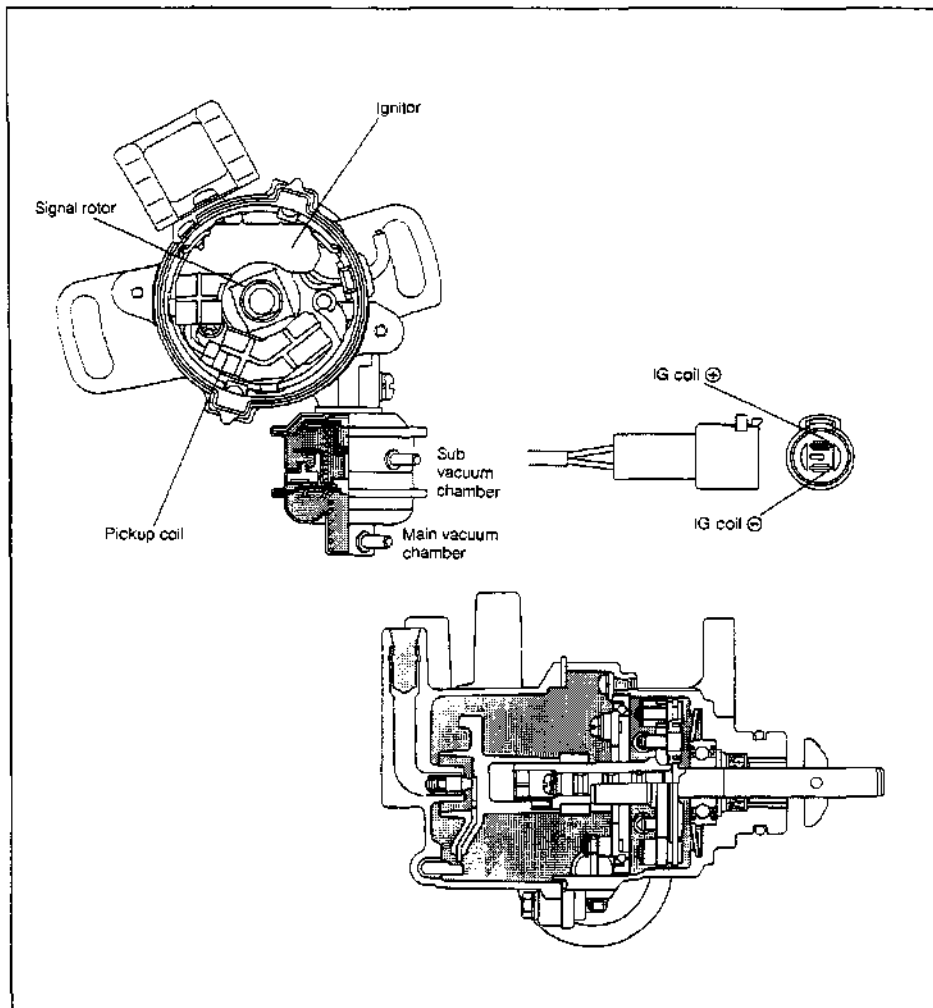
The ignition system employs a full-transistorized, battery ignition type.



IGNITION SYSTEM

DISTRIBUTOR

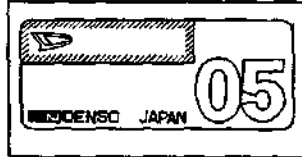
The distributor is a full-transistorized type which incorporates a signal generator and an ignitor. The signal generator consists of a signal rotor, a magnet and a pickup coil. The ignition signal is obtained electrically by the rotation of the signal rotor. This type of distributor has no contact point. Since there is no problem attributable to contact points, no maintenance is required relating to contact points. As for the timing advance device, the distributor is equipped with a two-stage vacuum timing advance device and a governor timing advance device. A high-voltage terminal is protruded laterally.



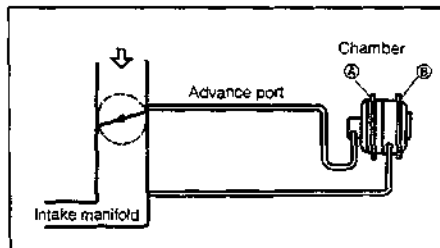
WPEB0-43005

SPECIFICATIONS

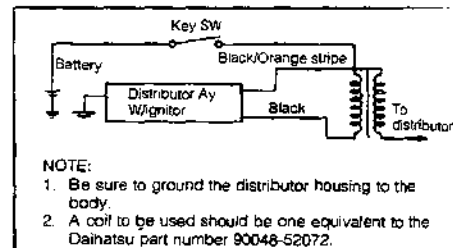
[MD-C Engine]



Vacuum controller negative pressure circuit

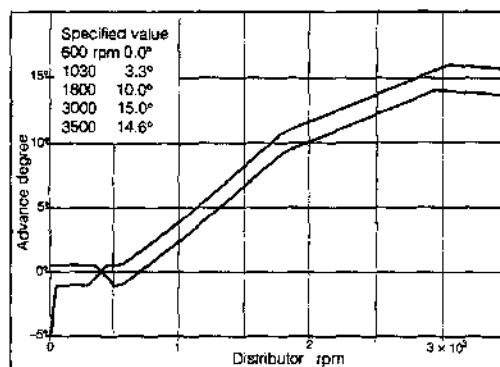


Wiring diagram

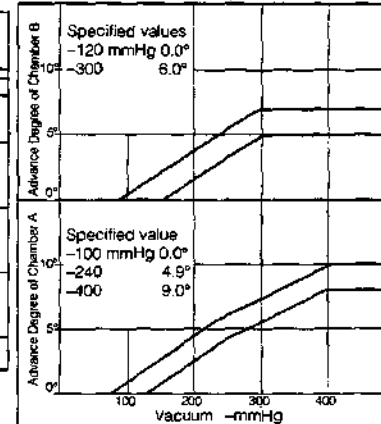


Timing advance characteristics

Governor characteristics diagram



Vacuum characteristics diagram



WPE20-43006

[HD-E Engine] (General specifications)

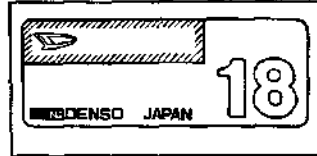


1. Be sure to ground the distributor housing to the body.
2. A coil to be used should be one equivalent to the Daihatsu part number 90048-52072.

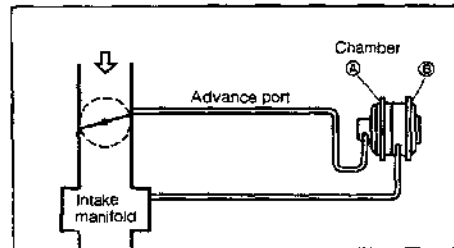
Governor characteristics diagram



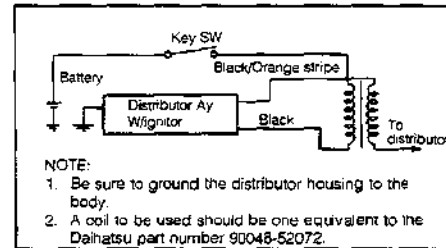
[HD-E Engine] (U.S. specifications)



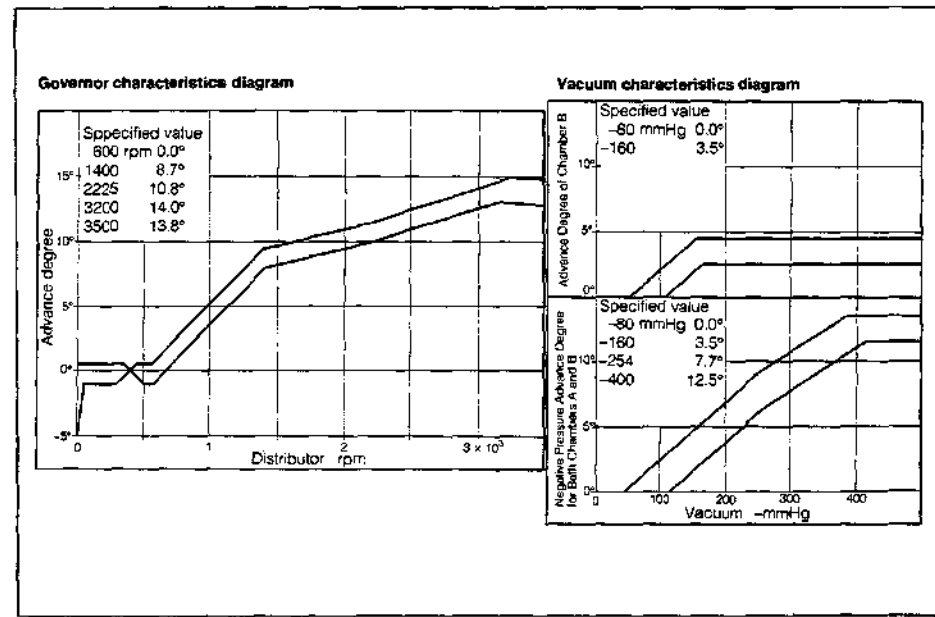
Vacuum controller negative pressure circuit



Wiring diagram



Timing advance characteristics

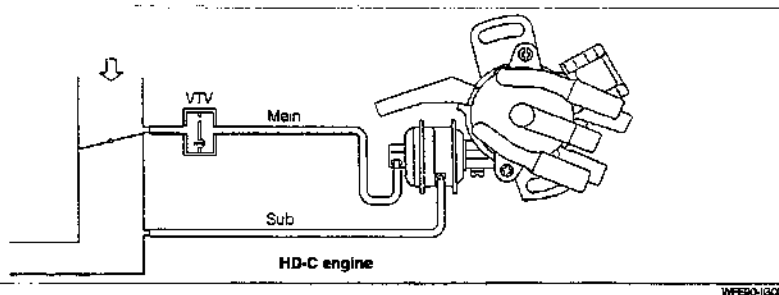


IGNITION SYSTEM

IGNITION TIMING CONTROL SYSTEM

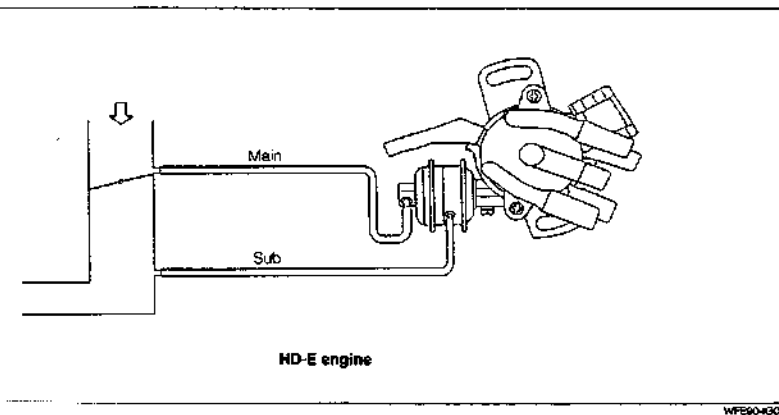
[HD-C Engine]

Sub timing advance is carried out during the idling operation so that the engine idling may be stabilized. When the engine revolution speed rises, negative pressure starts to be applied to the main diaphragm side. Thus, the ignition timing advances further to an optimum setting. In addition, a VTV provided at the main side delays the transmission of negative pressure so that the ignition timing may be retarded during the acceleration period. Consequently, the combustion temperature is lowered, thereby reducing the NOx and HC emissions.



[HD-E Engine]

Like Type HD-C engine, Type HD-E engine also employs a system which conducts a two-stage vacuum timing advance and governor timing advance.



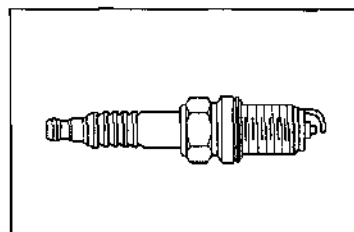
IGNITION SYSTEM

SPARK PLUG

The spark plug is a resistor-incorporated, compact spark plug whose width across flats of the hexagon section is 16 mm.

Recommended spark plugs

	HD-C · HD-E Engine		
Manufacturer	NIPPONDENSO	NGK	CHAMPION
Type	K20PR-U11	BKR6E-11	RC9YC4
	K22PR-U11	BKR7E-11	RC7YC4
Spark plug gap (mm)	1.0 - 1.1		

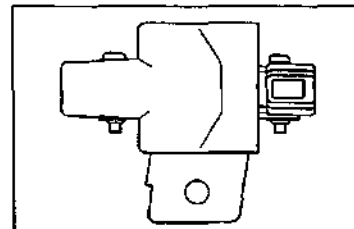


WPE90-IG011

IGNITION COIL

The ignition coil employs a closed core coil which features light weight and compact design.

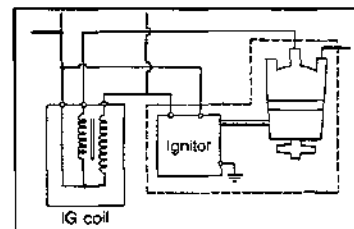
The closed core coil features high energy conversion efficiency because its magnetic flux circuit is closed owing to an iron core, thus keeping leakage flux to a minimum level.



WPE90-IG012

Ignition coil specifications

Primary Coil Resistance: 1.35 - 1.65 Ω
Secondary Coil Resistance: 22 - 30 k Ω



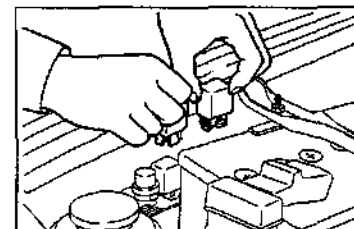
WPE90-IG013

IN-VEHICLE INSPECTION

Spark test

(Check to see if spark occurs.)

1. Turn OFF the ignition key switch.
2. Disconnect the fuel pump relay and injector relay from the relay box. (Only for HD-E Engine)



WPE90-IG014

3. Connect a timing light to the resistive cord between the distributor and the ignition coil.

WPE90-IG015

IGNITION SYSTEM

4. Ensure that the timing light flashes while the engine is being cranked by the starter motor.

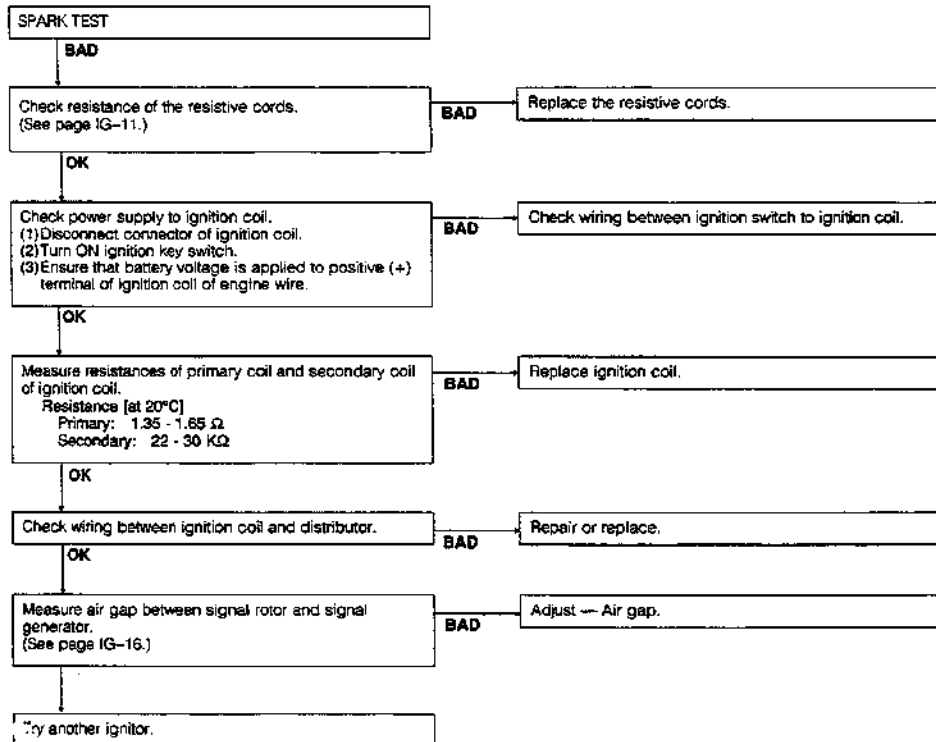
If the timing light flashes, check the resistive cords and spark plug.

If the timing light will not flash, perform the check according to the chart given below.

NOTE:

- After completion of the inspection, reconnect the fuel pump relay and injector relay to the relay box.

WPE90-IG016



WPE90-IG017

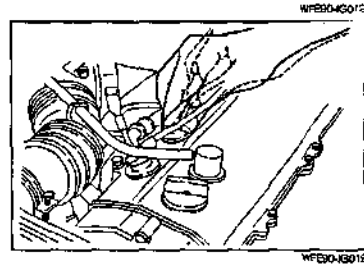
INSPECTION OF SPARK PLUG WIRE

1. Remove the air intake chamber.
(HD-E Engine only)
(See page EM-17.)

2. Carefully remove the spark plug wires from the spark plugs and ignition coil by holding their rubber boots.

CAUTION:

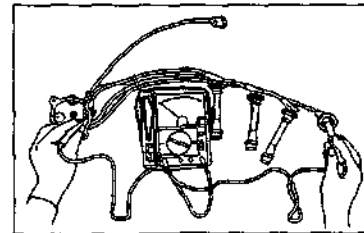
- Do not hold the cord portion or bend the cord. Otherwise, the conductor inside the cord may be damaged.



3. Disconnect the distributor connector from the connector clamp.
4. Remove the distributor cap.

WFE00-IG020

5. Inspection of resistance of spark plug wire and distributor cap terminal
Maximum Resistance: 15 kΩ

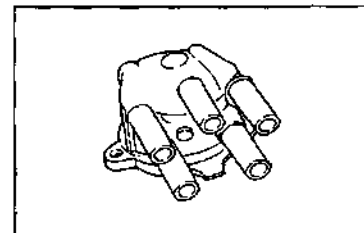


If the resistance exceeds the maximum limit, check the distributor cap terminals.
Replace the spark plug wire and/or distributor cap, as required.

6. Install the distributor cap with distributor cap gasket interposed.

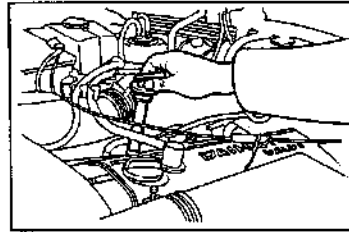
NOTE:

- If the distributor gasket is damaged, replace it with a new one.



IGNITION SYSTEM

7. Connect the spark plug wires to the spark plugs and ignition coil.
8. Install the air intake chamber.
(HD-E engine only)



WP80-IG005

INSPECTION OF SPARK PLUG

1. Carefully remove the spark plug wire from the spark plugs by holding their rubber boots.
2. Inspection of electrode
 - (1) When a megger (Insulation resistance meter) is used:
Measure the insulation resistance of the spark plug.
Minimum Insulation Resistance: 15 MΩ

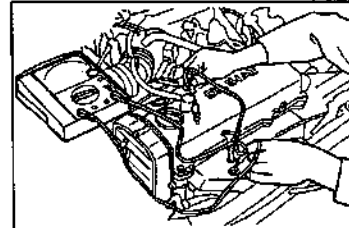
If the measured insulation resistance is less than 15 MΩ, proceed to the step 3.

- (2) When a megger is not available:
 - ① Start the engine. Warm up the engine completely.
 - ② Race the engine at 4000 rpm for five seconds.
 - ③ Remove the spark plug, using the following SST.

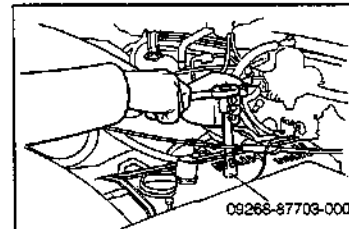
SST: 09268-87703-000

WARNING

- Since the spark plugs are hot, care must be exercised to avoid getting scalded.



WP80-IG004

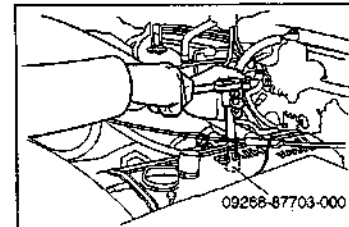


09268-87703-000

WP80-IG005

- ④ Visually inspect the spark plug.
If the electrode is dry: Satisfactory
If the electrode is wet: Proceed to the step 4.

3. Removal of spark plug
Remove the spark plug, using the following SST.
SST: 09268-87703-000



09268-87703-000

WP80-IG006

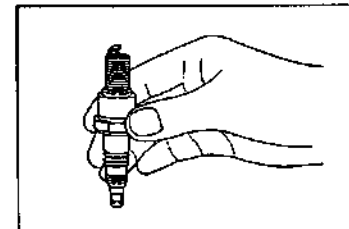
4. Visual inspection of spark plug
Visually inspect the spark plug for electrode wear, thread or insulator damage.
Replace the spark plug if it exhibits damage.

Recommended Spark Plug

CHAMPION	NIPPONDENSO	NGK
RC9YC4	K20PR-U11	BKR6E-11
RC7YC4	K22PR-U11	BKR7E-11

NOTE:

- All four spark plugs should have the same heat range and be ones manufactured by the same manufacturer.

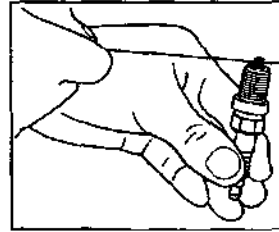


WP80-IG007

IGNITION SYSTEM

5. Inspection of electrode gap
Measure the electrode gap, using a plug gap gauge.
Electrode Gap: 1.0 - 1.1 mm

If the electrode gap of a used spark plug is not within the specification, replace the spark plug with a new one.
If the electrode gap of a new spark plug is not within the specification, adjust the gap by bending the base of the ground electrode, being careful not to touch the tip.

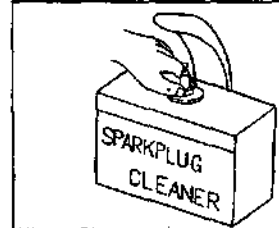


WFE00-6002

6. Cleaning of spark plug
If the electrode has traces of wet carbon, dry the electrode and clean it with a spark plug cleaner.
Air Pressure: Not to exceed 588.4 kPa (6 kgf/cm²)
Duration: Less than 20 seconds

NOTE:

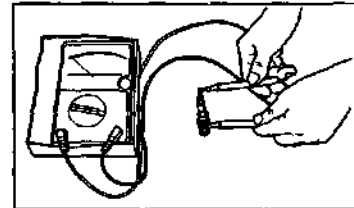
- If there are traces of oil, remove it with gasoline before the spark plug is cleaned by the spark plug cleaner.



WFE00-6003

7. Inspection of spark plug insulation resistance
More than 20 MΩ

If the insulation resistance is less than the specified value, replace the spark plug.

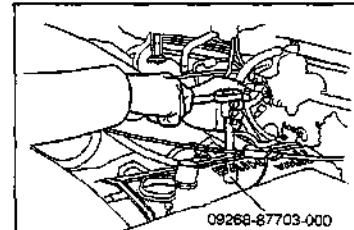


WFE00-6004

8. Installation of spark plug
Install the spark plugs. Tighten them to the specified torque, using the following SST.
SST: 09268-87703-000
Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf·m)

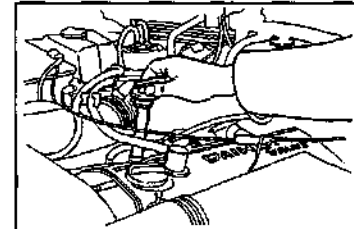
NOTE:

- Since the insulator strength of a small spark plug is comparatively smaller than that of regular spark plugs, when tightening, be sure to use the tool exclusively used for this application. Also, when tightening, never use the wrench in a crooked way.



WFE00-6005

9. Connect the spark plug wire to the spark plug.



WFE00-6006

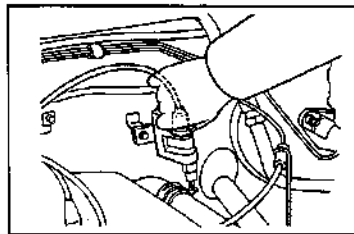
IGNITION SYSTEM

INSPECTION OF IGNITION COIL

1. Disconnect the resistive cord from the ignition coil.

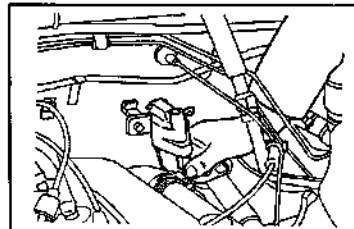
NOTE:

- Do not hold the cord portion during disconnection. Be sure to disconnect the cord by holding the rubber boot.



WF290-K3035

2. Disconnect the cowl wire connector from the ignition coil.



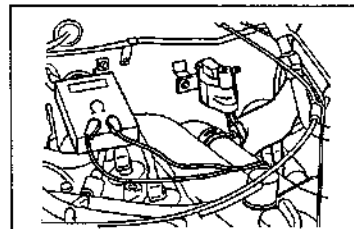
WF290-K3034

3. Check of primary coil resistance

Measure the resistance of the primary coil across the ignition coil terminals, as shown in the right figure.

Primary Coil Resistance at 20°C: 1.35 - 1.65 Ω

If the measured value fails to conform to the specification, replace the ignition coil.



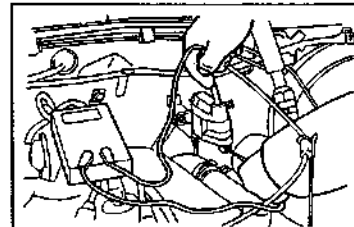
WF290-K3035

4. Check of secondary coil resistance

Measure the resistance of the secondary coil between the positive (+) terminal of the ignition coil and the resistive cord terminal, as shown in the right figure.

Secondary Coil Resistance at 20°C: 22 - 30 k Ω

If the measured value fails to conform to the specification, replace the ignition coil.



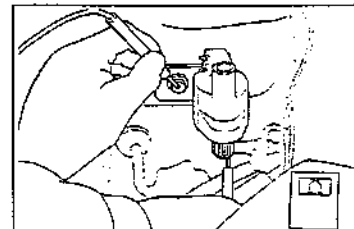
WF290-K3036

5. Check of insulation resistance

Measure the insulation resistance between positive (+) terminal of the ignition coil and coil case.

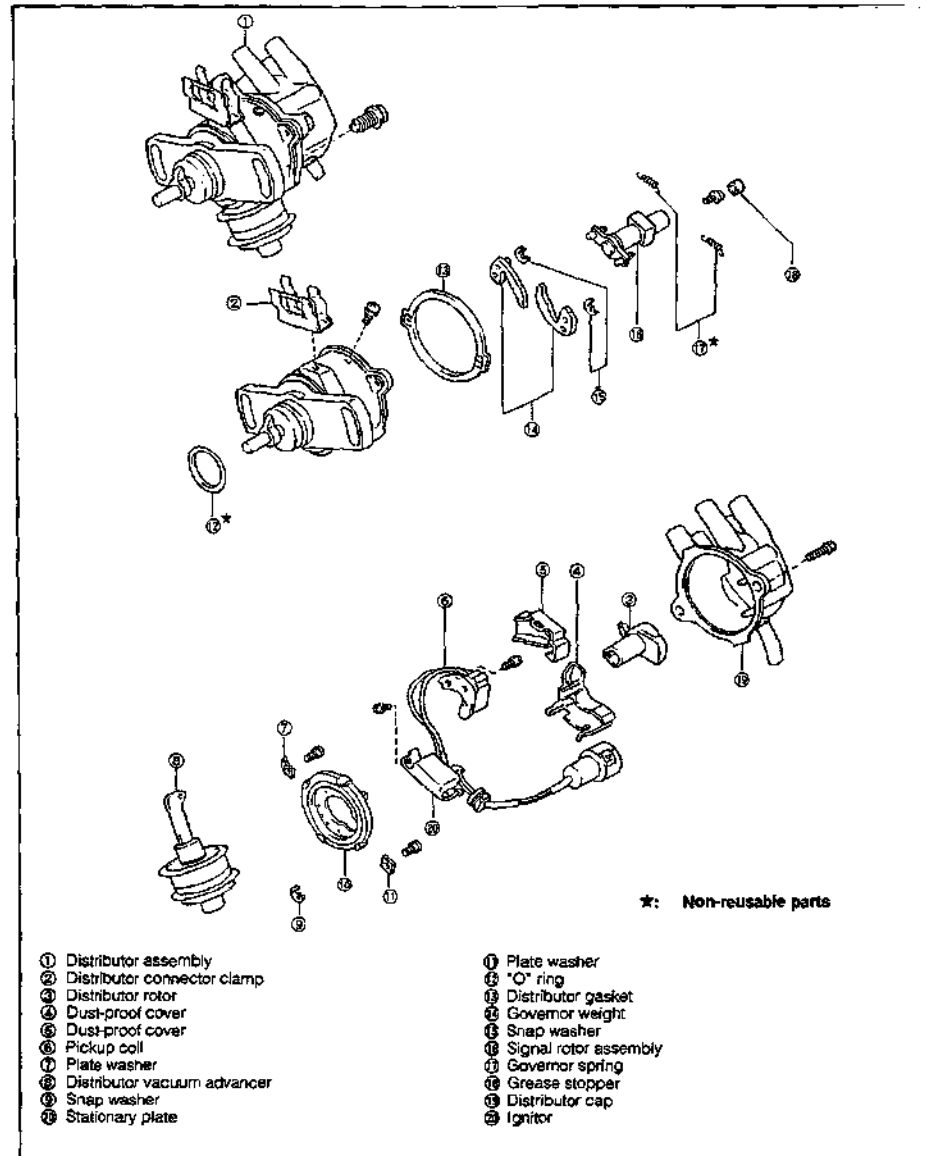
**Insulation Resistance: More than 1000 k Ω
(Infinity)**

If the measured value fails to conform to the specification, replace the ignition coil.



WF290-K3114

DISTRIBUTOR COMPONENTS

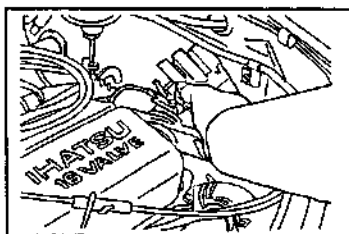


IGNITION SYSTEM

INSPECTION OF DISTRIBUTOR

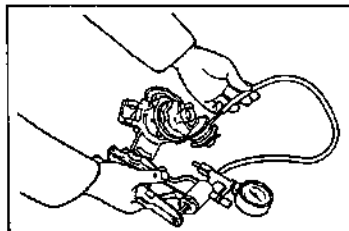
Check and adjustment of air gap

1. Remove the spark plug wires from the distributor cap.
2. Remove the distributor. (See page IG-18.)
3. Remove the distributor cap.



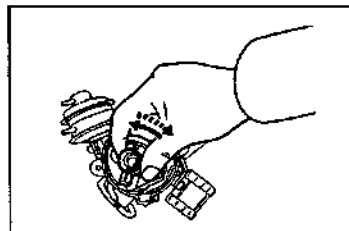
WFE90-IG036

4. Check of vacuum advancer
Apply a negative pressure of more than 20 kPa (150 mmHg).
Ensure that vacuum advancer operates.
Repair or replace the vacuum advancer, as required, if it will not operate.



WFE90-IG040

5. Check of governor advancer
 - (1) Turn the rotor counterclockwise and release it. Ensure that the rotor returns clockwise rapidly.
Repair or replace the rotor, as required, if it will not return to the original position.
 - (2) Check the rotor for excessive play.
6. Pull out the rotor.

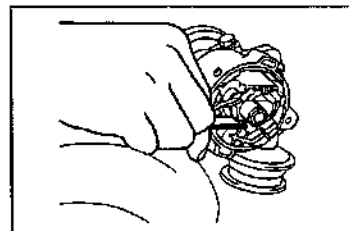


WFE90-IG041

7. Turn the crankshaft until the signal generator faces toward the signal rotor.
8. At all four points check to see if the air gap between the signal generator and the signal rotor conforms to the specified value.

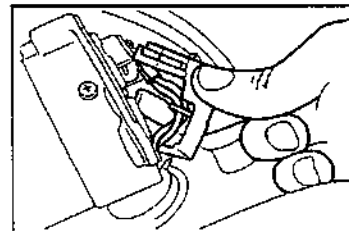
Specified Gap: 0.2 - 0.4 mm

If the air gap fails to conform to the specified value, adjust the air gap.



WFE90-IG042

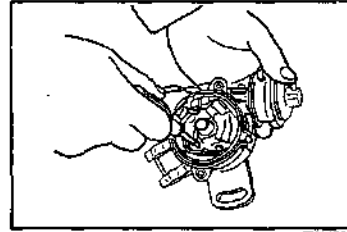
9. Adjustment of air gap
 - (1) Remove the lock, being very careful not to damage the ignitor dust-proof cover. Then, pull out the wire from the signal generator, making sure that no damage is made to the wire.
 - (2) From the dust-proof cover, remove the wire lid from the signal generator. Be very careful not to damage the wire.



WFE90-IG043

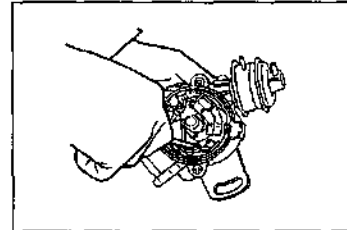
IGNITION SYSTEM

- (3) Loosen the attaching screws of the signal generator.
- (4) Adjust the air gap between the signal generator and the signal rotor to the specified value.



WFEB0-IG044

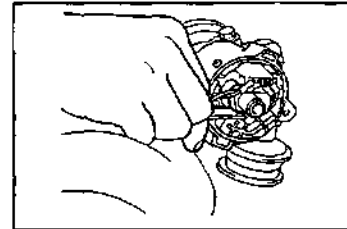
- (5) Tighten the attaching screws of the signal generator.
Tightening Torque: 1.2 - 2.0 N·m (12 - 21 kgf-cm)



WFEB0-IG045

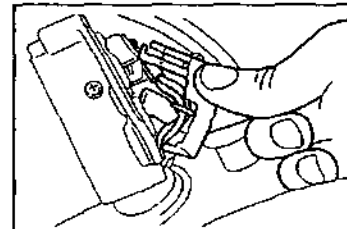
- (6) Check the air gap.
Specified Value: 0.2 - 0.4 mm

If the air gap fails to conform to the specified value, adjust the air gap again.



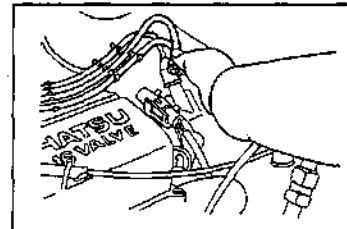
WFEB0-IG046

10. Install the wire from the signal generator to dust proof cover.
11. Install the dust proof cover to the ignitor.
12. Install the rotor.
13. Check the distributor cap gasket for cracks or damage.
If it exhibits cracks or damage, replace the gasket with new one.



WFEB0-IG047

14. Install the distributor cap gasket and distributor cap.
15. Install the distributor to the cylinder head.
(See page IG-27.)
16. Connect the distributor connector.
17. Connect the resistive cord to the distributor cap.
18. Perform the ignition timing adjustment.
(See page IG-28.)

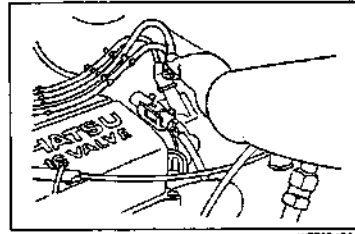


WFEB0-IG048

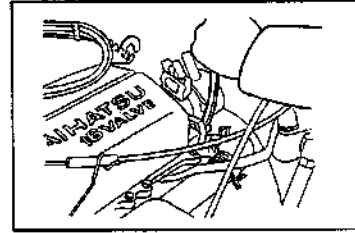
IGNITION SYSTEM

REMOVAL OF DISTRIBUTOR

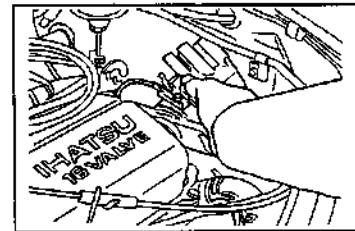
1. Disconnect the battery ground cable from the negative (-) terminal of the battery.
2. Disconnect the spark plug wires from the distributor cap.
NOTE:
 - Do not hold the cord during disconnection. Be sure to disconnect the cord by holding the rubber boot.



3. Disconnect the distributor connector.
4. Disconnect the vacuum advancer hoses.
NOTE:
 - Prior to the disconnection, put a tag so that the original installation position may be identified readily.
5. Remove the distributor set bolt.

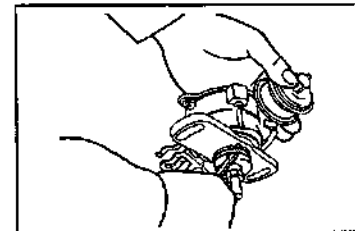


6. Pull out the distributor from the cylinder head.
NOTE:
 - Since the engine oil flows out, insert a suitable cloth under the distributor connecting section.

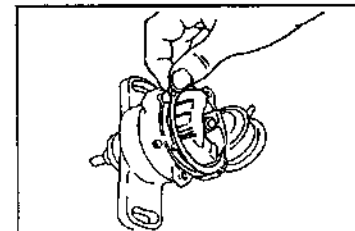


DISASSEMBLY OF DISTRIBUTOR

1. Remove the "O" ring from the distributor housing.
2. Remove the distributor cap from the distributor housing.

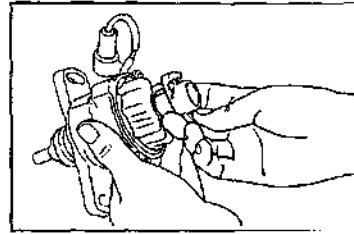


3. Remove the distributor cap gasket.

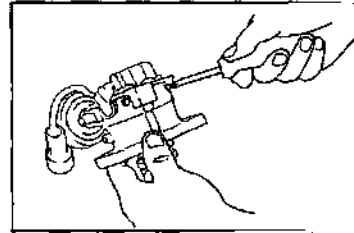


IGNITION SYSTEM

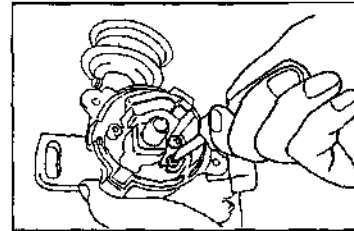
4. Remove the rotor.



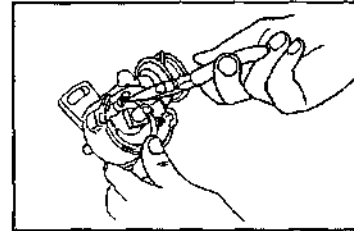
5. Remove the ignitor by removing the two attaching screws.
CAUTION:
• Be very careful not to damage the wire.



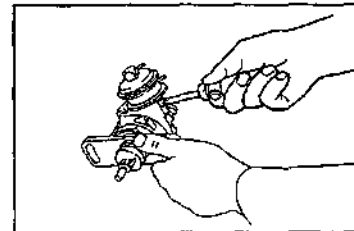
6. Remove the signal generator by removing the two attaching screws.



7. Remove the snap washer of the vacuum advancer.

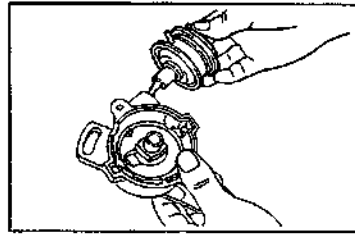


8. Remove the attaching screw of the vacuum advancer.

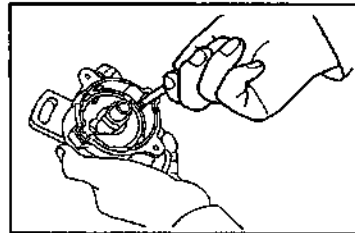


IGNITION SYSTEM

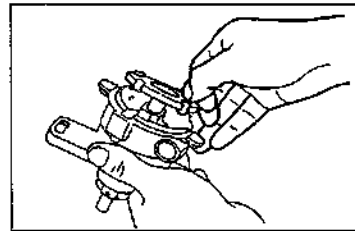
9. Remove the vacuum advancer from the pin of the stationary plate.
Pull out the vacuum advancer from the distributor housing.



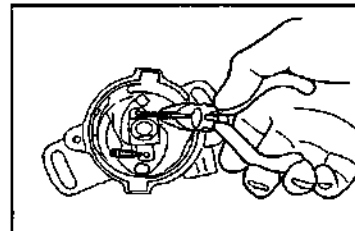
10. Remove the two attaching screws and plate of the distributor stationary plate.



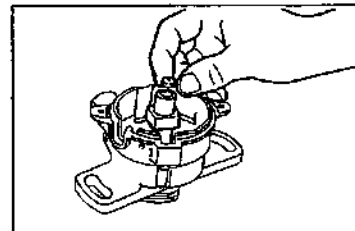
11. Remove the stationary plate from the distributor housing.



12. Remove the governor springs.

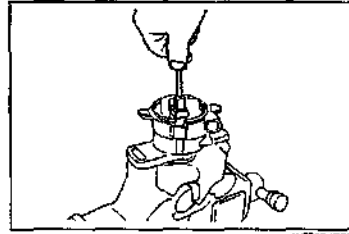


13. Removal of signal rotor assembly
(1) Remove the grease stopper.



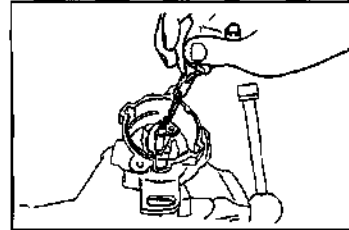
IGNITION SYSTEM

- (2) Remove the attaching screw of the signal rotor assembly.
- (3) Remove the signal rotor assembly.



WPES0-IG004

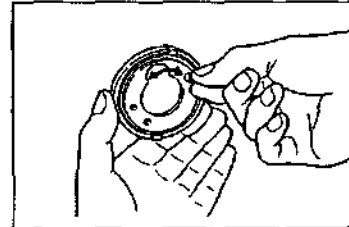
14. Remove the snap washer of the governor weight.
Remove the governor weight.



WPES0-IG005

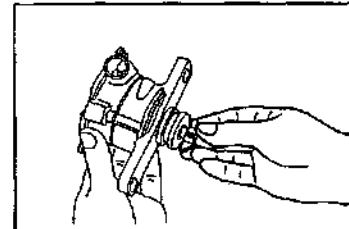
INSPECTION OF DISTRIBUTOR COMPONENTS

1. Inspect the stationary plate.
Check to see if the stationary inner plate rotates on the outer plate smoothly.
If the inner plate will not rotate smoothly, replace the stationary plate.



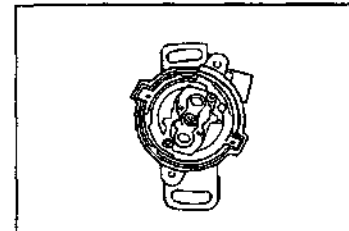
WPES0-IG006

2. Inspection of distributor housing
 - (1) Check to see if the governor shaft rotates smoothly.
If it will not rotate smoothly, replace the distributor housing.



WPES0-IG007

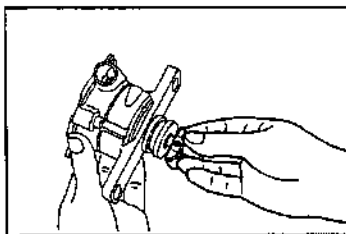
- (2) Check the sliding section of the governor weight for wear or damage.
Replace the distributor housing if it exhibits wear or damage.



WPES0-IG008

IGNITION SYSTEM

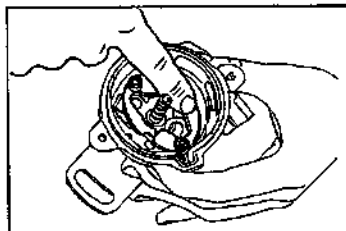
- (3) Check the coupling section of the governor shaft for wear or damage. Also, check to see if any excessive play is present in the turning direction. Replace the distributor housing if it exhibits wear, damage and/or excessive play in the turning direction.



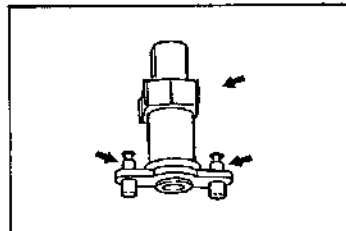
3. Inspection of governor weight for damage or wear
 (1) Visually inspect the governor weight for damage or wear. Replace the governor weight if it exhibits damage or wear.



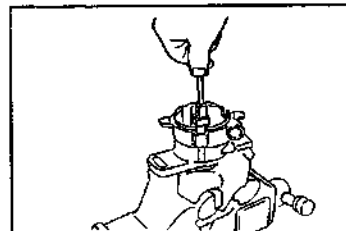
- (2) Install the governor weight to the governor shaft. Check to see if any excessive play is present. If excessive play is present, replace the governor weight and/or distributor housing, as required.



4. Inspection of signal rotor assembly
 (1) Visually inspect the signal rotor for damage. Replace the signal rotor assembly if it exhibits damage.
 (2) Check the pin section of the signal rotor assembly for wear or damage. Replace the signal rotor assembly if the pin section exhibits wear or damage.



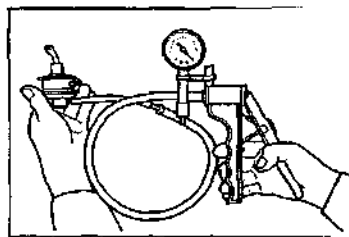
- (3) Install the signal rotor assembly to the governor shaft temporarily. Check to see if the signal rotor is tilted. Replace the signal rotor assembly and/or distributor housing if it is tilted.



IGNITION SYSTEM

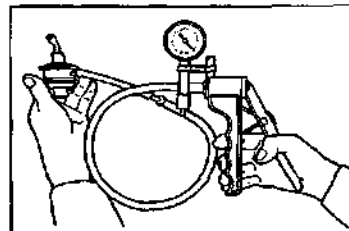
5. Inspection of vacuum advancer

- (1) Gradually apply a negative pressure to the main diaphragm of the vacuum advancer. Ensure that the rod of the vacuum advancer is drawn into the diaphragm room side, corresponding to the negative pressure. Replace the vacuum advancer if the rod will not be drawn.



WPES0-460

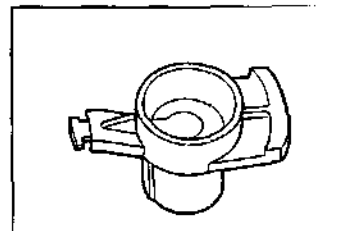
- (2) Gradually apply a negative pressure to the sub diaphragm of the vacuum advancer. Ensure that the rod of the vacuum advancer is drawn into the diaphragm room side, corresponding to the negative pressure. Replace the vacuum advancer if the rod will not be drawn.



WPES0-430

6. Inspection of rotor

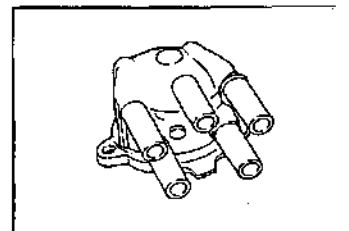
- Check the center carbon contacting surface and electrode for damage, such as wear, electrolytic corrosion and cracks. If the surface or electrode exhibits damage, replace the rotor, as required.



WPES0-460

7. Inspection of distributor cap

- Check the distributor cap for cracks. Also, check the electrode and center carbon for damage, such as wear. Replace the distributor cap if the cap, electrode or carbon exhibits damage.



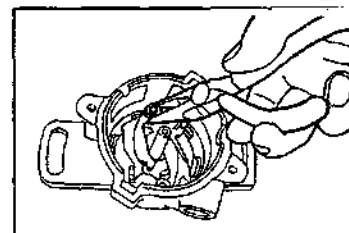
WPES0-430

ASSEMBLY OF DISTRIBUTOR

1. Install the governor weight to the distributor housing. Install the snap washer.

NOTE:

- Thinly apply high-temperature grease to the sliding section.

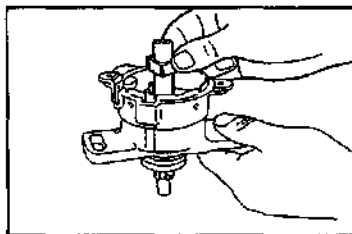


WPES0-43078

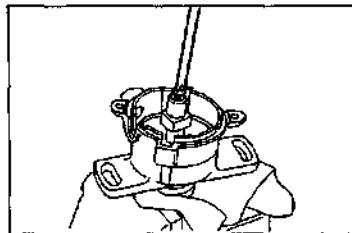
IGNITION SYSTEM

2. Installation of signal rotor assembly

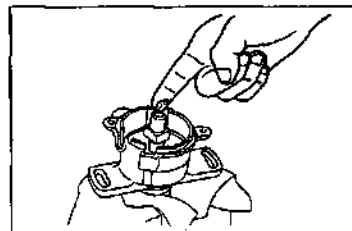
- (1) Thinly apply high-temperature grease to the sliding section of the signal rotor assembly. Install the signal rotor assembly to the distributor housing.



- (2) Tighten the attaching screw.



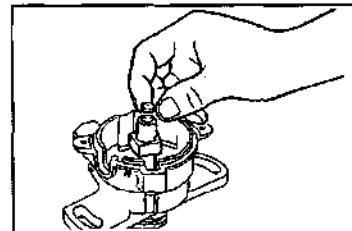
- (3) Pack high-temperature grease in the signal rotor assembly.



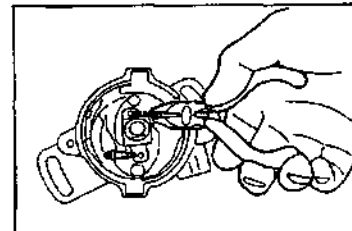
- (4) Press the grease stopper by your hand.

NOTE:

- Wipe off any excess grease which has oozed out.

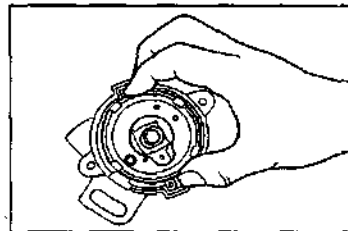


3. Install the new governor spring to the distributor.



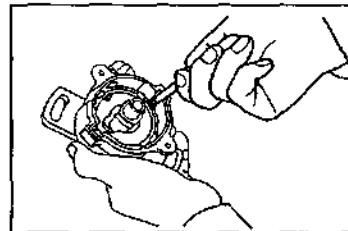
IGNITION SYSTEM

4. Assemble the stationary plate, lining up the cut-out section of the distributor housing.



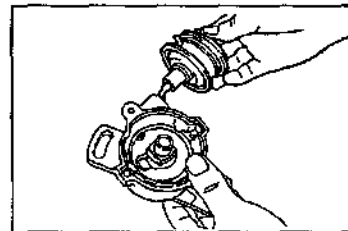
WPB30-IG004

5. Secure the stationary plate installation seat and stationary plate with the screws.



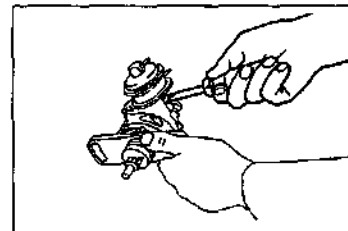
WPB30-IG005

6. Insert the vacuum advancer into the distributor housing. Connect it to the pin of the stationary inner plate.



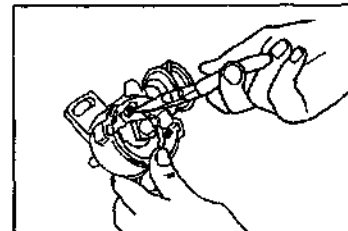
WPB30-IG006

7. Align the screw hole of the vacuum advancer with the screw hole of the distributor housing. Install and tighten the attaching screw.



WPB30-IG007

8. Attach the snap washer of the vacuum advancer.

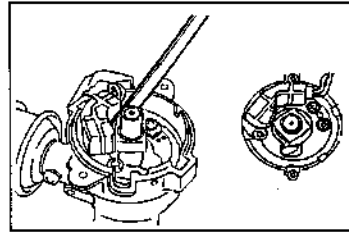


WPB30-IG008

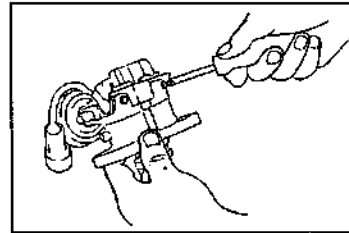
IGNITION SYSTEM

9. Installation of signal generator

Install the signal generator to the stationary plate. Adjust the air gap in such a way that the air gap in relation to the signal rotor is 0.2 - 0.4 mm.



10. Install the ignitor to the distributor with the screw.

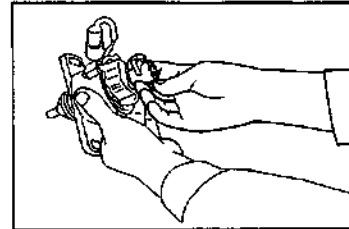


11. Attach the rotor.

12. Install a distributor cap gasket to distributor body.

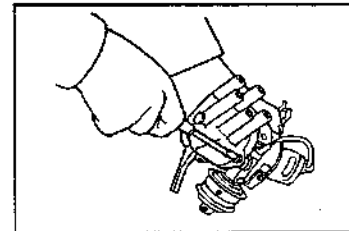
NOTE:

- If the gasket is damaged, replace it with a new one.



13. Install the distributor cap to the distributor housing.

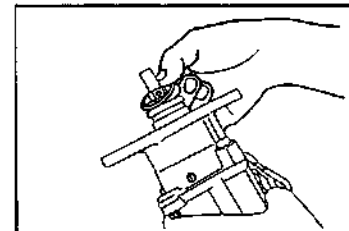
Also, tighten the clamp of the distributor connector, too, at the vacuum advancer side of the distributor cap attaching screw.



14. Install a new "O" ring to the distributor housing.

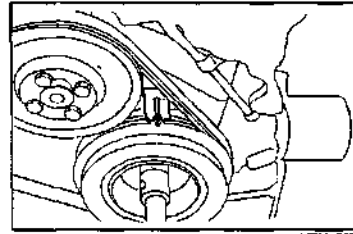
NOTE:

- Be very careful not to damage the "O" ring.
- When the distributor is pulled from the cylinder head once, be sure to replace the "O" ring with a new one.



INSTALLATION OF DISTRIBUTOR

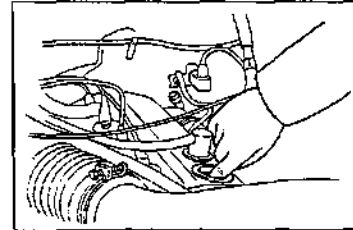
1. Turn the crankshaft, until the No.1 cylinder (at the timing belt side) comes at the top dead center at the end of the compression stroke.
Under this conditions, the crankshaft timing marks should be aligned and the valve rocker arms should be inoperative (the rocker arms actuated by the camshaft are not pushing down the valves).



WFE0-IG004

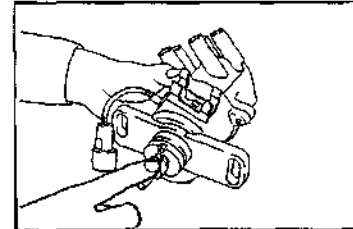
NOTE:

- Ensure that the No.1 rocker arms are not operating. This check can be performed by moving the rocker arms with your fingers after removing the oil filler cap.



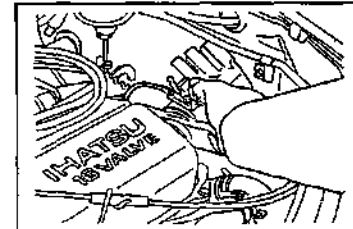
WFE0-IG005

2. Align the cut-out section of the distributor housing with the cut-out section of the coupling.



WFE0-IG006

3. Insert the distributor into the cylinder head. At this time, ensure that the distributor attaching hole of the cylinder head comes at the center of the elongated hole for the distributor bolt.

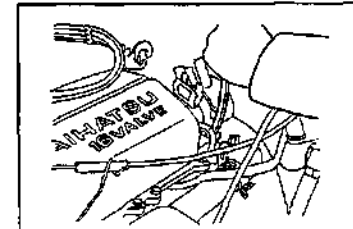


WFE0-IG007

4. Tighten the distributor two attaching bolts temporarily.

NOTE:

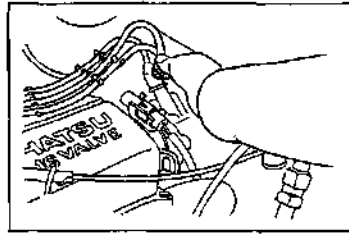
- The final tightening should be performed after the check and adjustment of the ignition timing have been completed.



WFE0-IG008

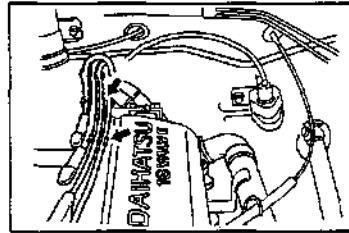
IGNITION SYSTEM

5. Connect the vacuum advancer hoses.
6. Connect the distributor connector. Install it to the clamp.
7. Connect the spark plug wires to the distributor cap.



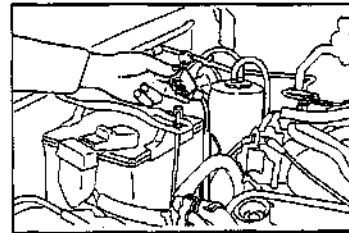
WP590-IG009

8. Install the clamp to the spark plug wire.



WP590-IG100

9. Connect the ground cable terminal to the negative (-) terminal of the battery.



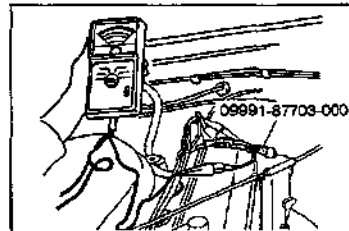
WP590-IG101

10. Check and adjustment of ignition timing
 - (1) Start the engine. Warm up the engine.
 - (2) Connection of tachometer and timing light
 - ① Connect the cable for measuring tachometer use to the following SST.

SST: 09991-87703-000

CAUTION:

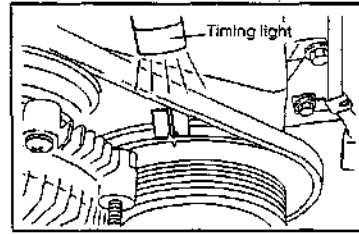
- Never allow the tachometer terminal to touch ground. It could result in damage to ignitor and/or ignition coil.
- As some tachometers are not compatible with this ignition system, it is recommended to confirm the compatibility of your unit before using.



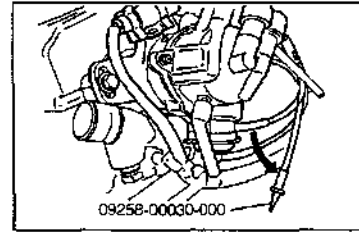
WP590-IG102

IGNITION SYSTEM

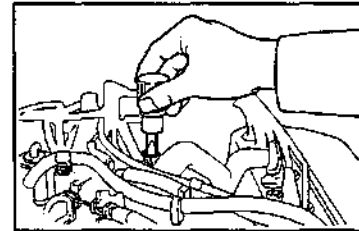
- ② Connect the timing light to spark plug wire of the No. 1 cylinder (at the timing belt side).



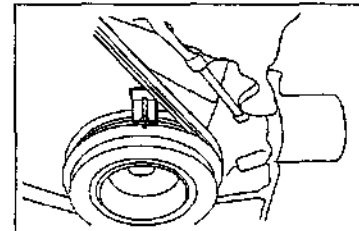
- (3) Disconnect the vacuum hose at the sub side of the vacuum advancer of the distributor. Plug the disconnected vacuum hose, using the following SST.
- SST: 09258-00030-000



- (4) Ensure that the engine revolution is under 1000 rpm and stable.
If the engine revolution exceeds 1000 rpm or is unstable, adjust the engine idle speed.



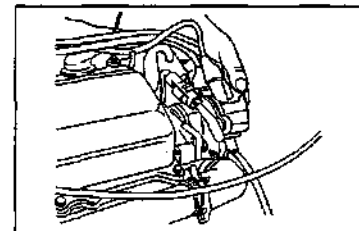
- (5) Check to see if the ignition timing mark of the crankshaft pulley is aligned with the indicator of the timing belt cover.
Tighten the distributor attaching bolts to the specified torque if the ignition timing mark is aligned with the indicator.



- (6) Loosen the distributor attaching bolts. Adjust the distributor installation position, until the ignition timing mark of the crankshaft pulley is aligned with the indicator of the timing belt cover.

Reference

- If the distributor is turned clockwise, the timing will be advanced. Conversely, if the distributor is turned counterclockwise, the timing will be retarded.

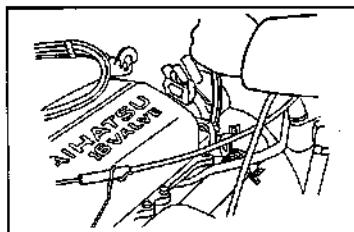


IGNITION SYSTEM

- (7) Tighten the distributor attaching bolts to the specified torque, making sure that the ignition timing is not disturbed.

Tightening Torque: 14.7 - 21.6 N·m (1.5 - 2.2 kgf-m)

11. Connect the vacuum hose at the sub side of the vacuum advancer to the vacuum advancer.



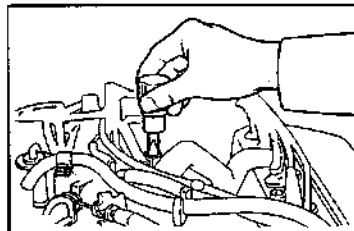
WPB50-4G108

12. Adjust the engine idle speed.

(See page EM-23.)

13. Check the oil level.





(See page LU-9.)



WPB50-4G109

IGNITION SYSTEM

SST [Special Service Tools]

Shape	Part No. and Name	Purpose	Remarks
	09266-87703-000 Plug wrench	Removal and installation of spark plugs	
	09991-87703-000 Tacho pulse pickup wire	Connecting engine tachometer	
	09991-87702-000 Engine control system inspection sub harness	<ul style="list-style-type: none"> Shorting terminal T Actuating fuel pump etc. 	Only HD-E engine
	08258-00030-000 Plug set	Plugging rubber hoses	

WP890-IG110

TIGHTENING TORQUE

Tightening component	Tightening torque			Remarks
	N·m	kgf·m	ft·lb	
Cylinder head × Spark plug	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9	Dry
Cylinder head × Distributor	14.7 - 21.6	1.5 - 2.2	10.8 - 15.9	Dry

WP890-IG111

SPECIFICATION

Spark plugs	Manufacture	NIPPONDENSO	NGK	CHAMPION
	Type	K20PR-U11 K22PR-U11	BKR6E-11 BKR7E-11	RC9YC4 RC7YC4
	Thread	M14 × 1.25		
	Spark plug gap mm	1.0 - 1.1		
Ignition timing	No sub vacuum timing advance takes place. (Engine revolution must be stable at 1000 rpm or less.)		BTDC 3 ± 2°	
Spark plug wire	Resistance	Maximum	15 kΩ per cord	
Distributor	Air gap between signal rotor and signal generator		0.2 - 0.4 mm	
Ignition coil	Primary coil		1.35 - 1.65 Ω at 20°C	
	Secondary coil		22 - 30 kΩ at 20°C	

WP890-IG112