Daihatsu
Hijet Piaggio Porter
Workshop Manual 1.3 16v

Manual Transmission
GI = General Information
CL= Clutch
MT= Manual Transmition
EM= Engine Mechanical
EF= EFI System
EC= Emission Control System
LU= Lubrication System
CO= Cooling System
IG= Ignition System
ST= Starting System
CH= Charging System

Chassis
GI= General Information
MA= Maintainance
PR= Propeller Shaft
DF= Differential
FS= Front Axle & Suspension
RS= Rear Axle & Suspension
BR= Brake
SR= Steering
BO= Body
BE= Body Electrical System
HW= Harness & Wiring Diagram

2010

DAIHATSU

HIJET

Manual Transmission

Service manual

DAIHATSU MOTOR CO., LTD.

NO.9118-SE

Pt No. 22200.00000.190

DAIHATSU

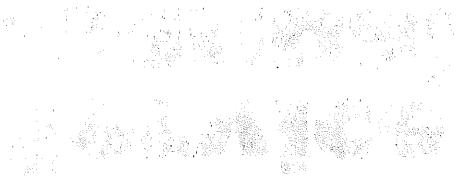
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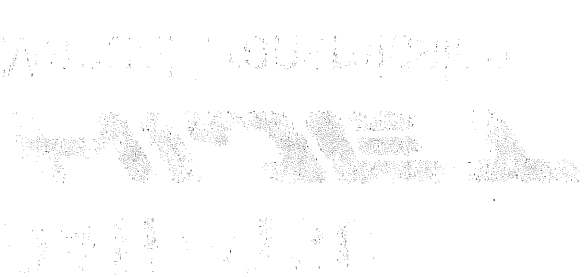
Manual Transmission

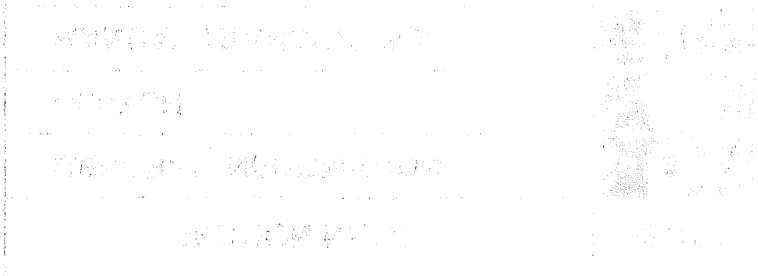
Service manual

SECTION INDEX

SECTION NAME	SECTION
GENERAL INFORMATION	GI
CLUTCH	CL
MANUAL TRANSMISSION	MT







GENERAL INFORMATION

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PGI00001-00000

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 the 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 the 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 from 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 the radiator fan blades! The electric cooling fan is mounted on the radiator and can start to operate at anytime by a rise in coolant temperature or turning ON of the air conditioner switch in the case of vehicles equipped with an air conditioner. The electric cooling fan is also mounted on the condenser for air conditioner and starts to operate anytime when the air conditioner switch is turned "ON". For this reason care should be taken to ensure that the electric cooling fan motor is completely disconnected when working under the hood.

The UNITS used in this manual are showed as the SI UNIT (International System of Unit).

"Example"
24.5 - 34.3 N·m

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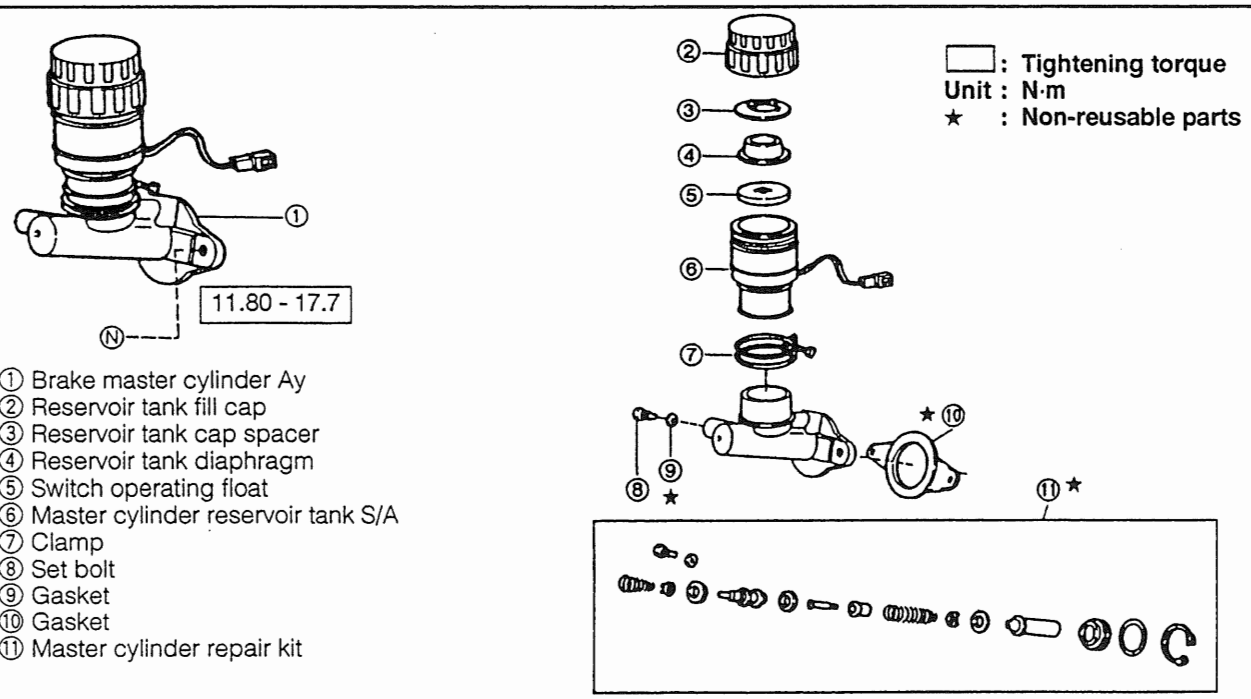
HOW TO USE THIS MANUAL

CONTENTS OF EXPLANATION

1. Schematic Diagram of Components

(1) The schematic diagram of components that appears at the beginning of each section describes the nomenclature and installed conditions of each component. Furthermore the tightening torque is posted in the figure.
(2) Those parts whose reuse is not permitted bear a "★" mark for an identification purpose. Be certain to replace these parts with new ones during the assembly.
(3) During the assembly, be sure to apply grease to those parts indicated by the mark in the figure.

(Example)



① Brake master cylinder Ay
② Reservoir tank fill cap
③ Reservoir tank cap spacer
④ Reservoir tank diaphragm
⑤ Switch operating float
⑥ Master cylinder reservoir tank S/A
⑦ Clamp
⑧ Set bolt
⑨ Gasket
⑩ Gasket
⑪ Master cylinder repair kit

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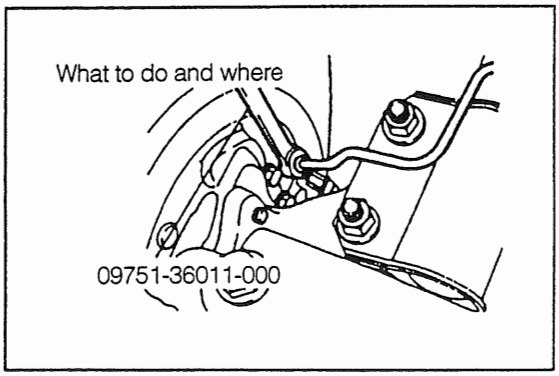
2. Servicing Procedure

(1) In principle, the servicing procedure is described in the following sequence given below: Removal → Inspection → Installation, and Disassembly → Inspection → Assembly.
(2) The explanation covers detailed servicing methods, specifications and notes.
(3) The main point of each item explains the servicing section and servicing procedure, using illustrations.

(Example)

What to do / How to do it

3. Brake tube installation
   (1) Install the brake tube to the wheel cylinder temporarily by hands.
   (2) Tighten the brake tube to the wheel cylinder, using the following SST.
   SST: 09751-36011-000



PGI00004-00002

(4) The inspection in this manual describes only checking operation. Therefore, if you find any malfunction, replace any defective parts with new ones.

3. SST

For those operations which require the use of any SST, the SST numbers concerned are given in bold letters.

4. Service Specifications

Service specifications are indicated in bold letters or enclosed by heavy lines. Be certain to confirm the specifications concerned.

5. Tightening Torque

For those operations which require the control of tightening torque, the relevant tightening torque is given in bold letters. Be certain to confirm the tightening torque concerned.

6. Definitions of Terms

Specified Value ..... A value which represents the allowable range during the inspection and adjustment.

Limit ..... A maximum or a minimum limit which the value should not exceed or fall below.

PGI00005-00000

ABBREVIATION CODES

The abbreviation codes that appear in this service manual stand for the following, respectively.

Abbreviation code	Original word	Meaning
A/C	Air Conditioner	Refers to air conditioner.
A/T, AT	Automatic Transmission	Refers to automatic transmission
A/Y or Ay	Assembly	Refers to an assembled component comprising more than two single parts or sub-assembly parts.
API	American Petroleum Institute	The standards set forth by the American Petroleum Institute (abbreviated as API Classification) have been employed to evaluate and classify properties of various oils. Engine oils for gasoline engines are classified as SD, SE, SF and so on, whereas engine oils for diesel engines are classified as CC, CD and so on.
ECU	Electronic Control Unit	Refers to electronic control unit.
EFI	Electronic Fuel Injection	Refers to electronic fuel injection.
F/L	Fusible Link	Refers to fusible link.
L.H.D.	Left-Hand Drive	Left-hand drive vehicle.
LH	Left Hand	Refers to left side.
M/T, MT	Manual Transmission	Refers to manual transmission.
MP	Multipurpose	Means that the following item has multi-purposes.
O/S	Oversize	In instances where fitting becomes too loose due to wear resulting from use for a long period of time or due to frequent removal/installation operations, if the fitting part (e.g. piston) is replaced with a part having larger dimensions, the other mating part may be put into use again. "Oversized" parts denote those parts having larger dimensions compared with the standard parts.
PR	Ply Rating	Represents strength of tires. The larger the ply rating number, the stronger the tire strength.
R.H.D.	Right-Hand Drive	Right hand drive vehicle
RH	Right Hand	Refers to right side.
S/A	Sub-Assembly	Refers to a component comprising more than two single parts which are welded, staked, or studded to each other to form a single component.
SAE	Society of Automotive Engineers	For example, automotive oils are designated as SAE so and so number. These designation numbers have been set forth by the Society of Automotive Engineers in the United States of America (SAE). The larger the SAE number, the higher the oil viscosity. Conversely, the smaller the SAE number, the lower the oil viscosity.
SST	Special Service Tool	Refers to a tool designed for a specific purpose.
STD	Standard	When referring to automotive parts, "standard" represents those parts which have been installed originally by the manufacturer and which have standard dimensions.
T	Torque	Refers to tightening torque.
U/S	Under Size	In the same manner as with the "oversized" parts, if fitting part (e.g. bush and bearing) is replaced with a part having smaller bore dimensions, the other mating part may be put into use again. "Under sized" parts denote those parts having smaller dimensions compared with standard parts.
VSV	Vacuum Switching Valve	Refers to vacuum switching valve.
W/	With	Denotes that the following part is attached.
ETR	Electronic Tuning Radio	Radio which incorporates variable capacitance, etc. which varies the value according to an applied voltage or current.

PGI00006-00000

The abbreviation codes that appear in the figure stand for the following, respectively.

Ⓑ	Bolt	Ⓢ	Screw
Ⓝ	Nut	Ⓦ	Washer

PGI00007-00000

GENERAL SERVICE INSTRUCTION

1. Use fender covers, seat covers and floor sheets so that the vehicle may not get dirty or be scratched.

2. Jacking up
   (1) When only the front section or rear section of the vehicle is jacked up, be sure to place chocks at the wheels so as to insure safe operations.
   (2) When the vehicle has been jacked up, be sure to support the vehicle at the specified section using safety stands. (See page GI-9)

3. Handling instructions related to battery.
   (1) Before you start performing the electrical works, make certain to disconnect the battery ground cable terminal from the negative (–) terminal of the battery.
   NOTE:
   - Before disconnecting the battery ground cable terminal from the negative (–) terminal of the battery, be sure to read out the diagnosis code of the EFI, when necessary.
   - After reconnecting the battery ground cable terminal to the negative terminal of the battery, be sure to reset the watch or radio, if the vehicle is equipped with such equipment.

   (2) When it becomes necessary to disconnect the battery power supply for the purpose of carrying out checks or repairs, always disconnect the battery ground cable terminal from the negative terminal of the battery first.
   (3) To avoid damaging battery plates, after the terminal nut has been loosened, pull out the battery ground cable terminal straight upward, rather than turning or prying the terminal.
   NOTE:
   - Be sure to employ a battery terminal puller (commercially available) to remove the battery ground cable terminal from the negative terminal of the battery, if encountered any difficulty.

   (4) Clean the battery terminal posts or battery ground terminals, using a cloth. Never use a file or other adhesive agents.
   (5) When connecting the battery ground cable terminal to the battery, first the battery ground cable terminal should be fitted onto the battery post with the attaching nut in a loose state.
   Then, tighten the nut. Never tap the terminal onto the battery post, using a hammer or spanner wrench or the like.
   (6) As for the cover at the positive (+) terminal side, be sure to install it at the correct position.

4. Repairs of fuel system
   (1) The EFI equipped vehicles employ a high fuel pressure. Therefore, the following notes should be observed.
      ① Be sure to prevent the fuel from splashing with a cloth or the like, when the union bolt or other connected section of the fuel line is loosened or slackened.
   (2) When connecting/disconnecting the fuel line.
      ① Tighten each connecting section to the specified torque.
      ② Attach new specified clips to each connecting section.
      ③ Be certain to place a suitable container or a cloth, etc. under the connected section of the fuel line before disconnecting the fuel line.
      ④ Before the fuel line is disconnected, be sure to release the inner pressure of the fuel tank by detaching the fuel filler cap.
      ⑤ Be sure to follow the instruction mentioned in the main text when disconnect or connect the quick type connectors.
   (3) Never work near open flames.

5. For increased work efficiency and improved accuracy, be sure to utilize SSTs (Special Service Tools) effectively.

HANDLING INSTRUCTIONS ON CATALYTIC CONVERTER

WARNING:

- When a great amount of unburnt gas is admitted into the catalytic converter, overheating is prone to occur, resulting in a fire hazard.
  To avoid such trouble in advance, be certain to observe the following precautions. Also, be sure to explain such precautions to your customers.

1. Use only unleaded gasoline.

2. Avoid idling the engine for a prolonged length of time.
   Do not run the engine continuously at idle speed for more than 20 minutes.
   WARNING:
   - Immediately check and repair the vehicle if the fast idle speed or idle speed is unstable or the system exhibits malfunction. Failure to observe this warning may result in a fire hazard.

3. Be sure to observe the following points when performing the spark jump tests.
   (1) The spark jump test must be limited to cases where such test is absolutely necessary. Also, be sure to finish the test in the shortest possible time.
   (2) Be sure to shut off the fuel supply when performing the spark jump test in advance.

4. Do not run the engine when the fuel tank becomes nearly empty.
   Failure to observe this caution will cause misfiring. Also, it will apply excessive load to the catalytic converter, even leading to catalyst damage.

5. Do not dispose of the waste catalyst along with parts contaminated with gasoline or oil.

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JACKING POINTS AND SUPPORTING POINTS OF SAFETY STANDS

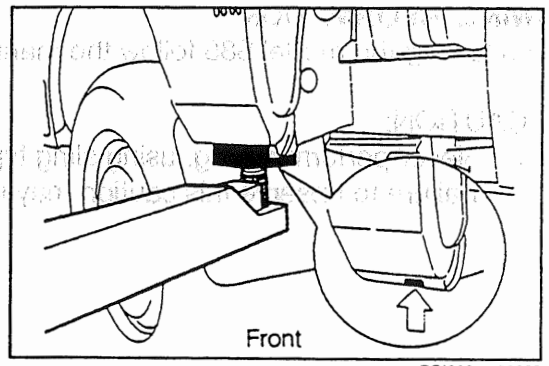
JACKING POINTS AND SUPPORTING POINTS FOR SAFETY STANDS

Front side: Support the vehicle at the body under the center pillar.

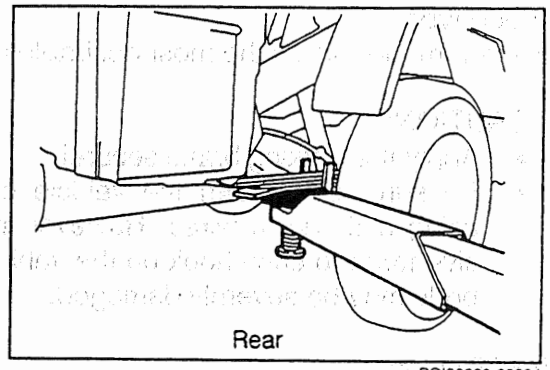
Rear side: Support the vehicle at the leaf spring.

CAUTION:

- Never support the vehicle at the body.



PGI00010-00003

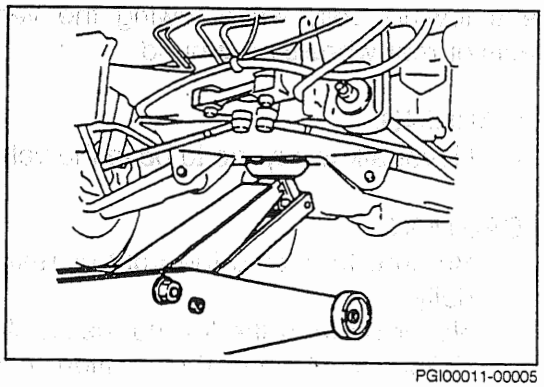


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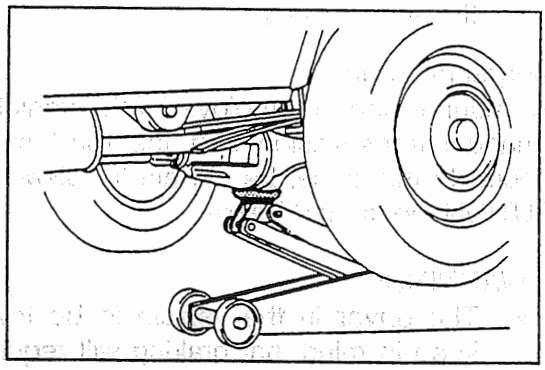
JACKING POINTS FOR GARAGE JACK

Front side: Support the vehicle at the front suspension cross member.

Rear side: Support the vehicle at the differential.



PGI00011-00005



PGI00000-00006

TOWING INFORMATION

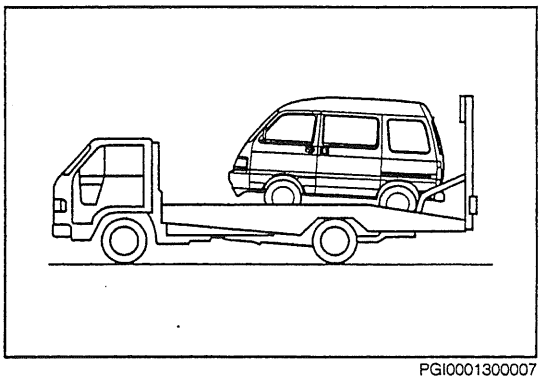
When towing the model S85 follow the manner mentioned below.

CAUTION:
- Never perform towing, using sling type equipment.
  Failure to observe this caution may lead to severe damage on the vehicle body.

PGI00012-00000

Flat bed type
We recommend this as the most desirable method.

CAUTION:
- Apply the parking brake securely.
- Be sure to tie-down the vehicle body to the carrier, using a tie-down wires. However, never apply excessive force to each hook on the vehicle body, for vehicle body may be severely damaged.

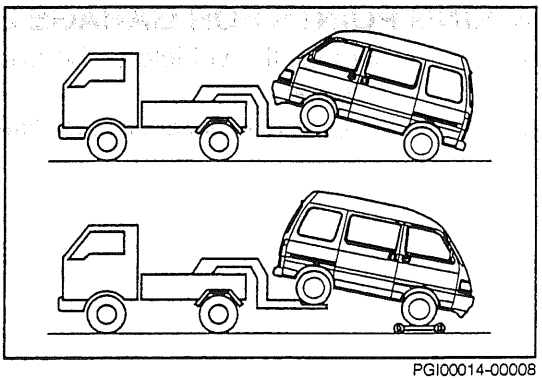


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Wheel lift type
Use a towing dolly when towing the vehicle with the front wheels or rear wheels on ground.

WARNING:
- Never allow anyone to be in the vehicle being towed.

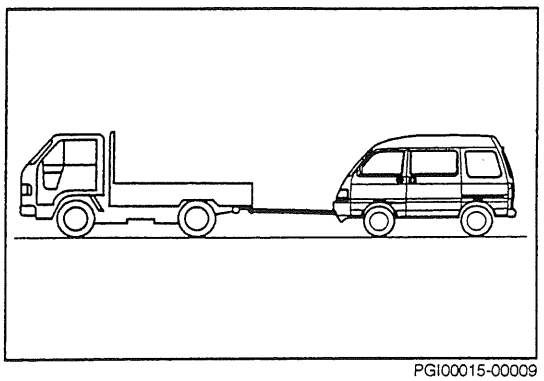
CAUTION:
- Be sure to secure the front or rear tires on the towing dolly.
- Never perform the towing, using sling type equipment. Failure to observe this caution may severely damage the vehicle body.



PGI00014-00008

Emergency towing
This manner can be employed if the vehicle is equipped with a manual transmission and the road surface is hard and smooth. In this case, be certain to follow the WARNING and CAUTION mentioned below.

WARNING:
- The driver in the vehicle to be towed should always keep in mind that braking will require more force than usual when the engine is stopped, because the brake booster is not functioning when the engine is stopped.



PGI00015-00009

- Never tow the vehicle at speed more than 30 km/h.
- Turn the ignition switch of the vehicle to be towed in the "ACC" position during the towing. Never pull out the key or turn the ignition switch to the "LOCK" position during the towing. Failure to observe this warning will loose controllability, causing an accident.
- Never tow the vehicle in this manner unless the wheels, axles, drive train, steering, and brakes are in a good condition.

CAUTION:
- Never tow an automatic transmission vehicle in this manner. Be sure to always use a towing dolly.
- Always pull the hook in a straight-ahead direction to prevent it from being damaged. Never pull it from side or in a vertical direction. Also, never pull it sharply.
- Never connect the towing rope, cable or such to the parts other than the hooks provided on the vehicle shell. Connection of the towing rope, cable or such to other pants than hooks may damage these components
- Ensure that the hooks are installed on the vehicle shell securely before towing.

1. Attach a sturdy rope, towing strap or cable to the towing hook.
2. A driver must ride in the vehicle being towed and control it.
3. Release the parking brake and shift the shift lever of manual transmission to the neutral position.
4. Select the center differential lock switch in the free position.
   NOTE:
   - If you cannot start the engine, ensure that the center differential lock mechanism is free by jacking up one of the wheels and making sure that the wheel turns freely.
     Even if the indicator lamp in the combination meter shows that the differential lock is free, there is the possibility that it is not free actually.
5. Set the ignition switch to the "ACC" position.
6. Perform the towing.

PGI00016-00000

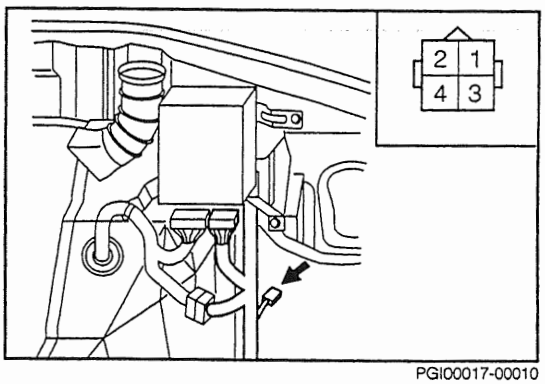
DIAGNOSIS CONNECTOR

LHD: The diagnosis connector is provided under the instrument panel at the passenger's seat side as shown.

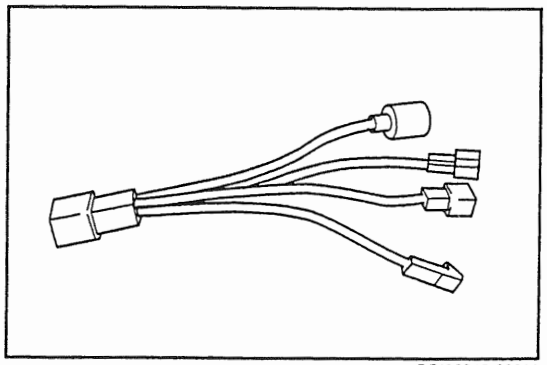
RHD: The diagnosis connector is provided under the instrument panel at the driver's seat side between the heater and the steering post.

Terminal table

No.	Name
1	VF
2	Rev
3	T
4	GND



PGI00017-00010



PGI00018-00011

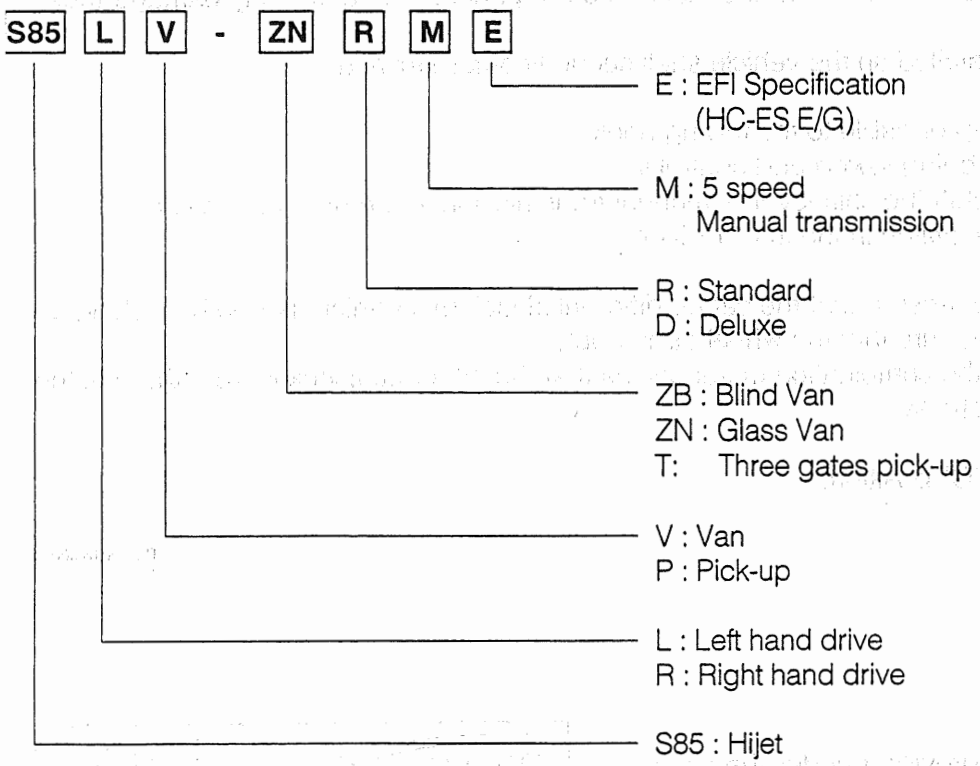
1. Be sure to connect the following SST when utilizing this connector, in order to prevent the terminals in the diagnosis connector from being damaged.
   The shape of the SST end is the same as the diagnosis connector.
   SST: 09991-87501-000

VEHICLE MODELS

Model code	Engine	Drive wheel
S85RP-TRME S85LP-TRME S85RV-ZBRME S85LV-ZBRME S85RV-ZNDME S85LV-ZNDME	HC-ES	Rear, 2-wheel drive

PGI00019-00000

EXPLANATION OF VEHICLE MODEL CODE



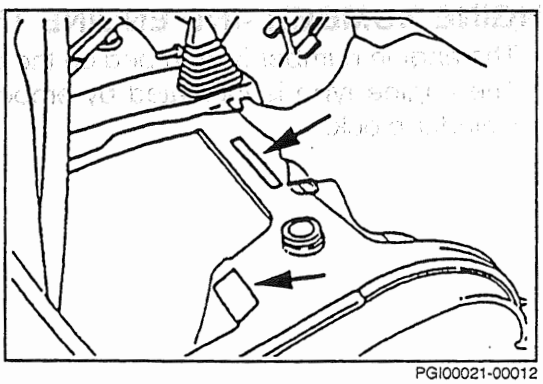
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CHASSIS SERIAL NUMBER & MANUFACTURER'S PLATE

CHASSIS NUMBER & MANUFACTURER'S PLATE

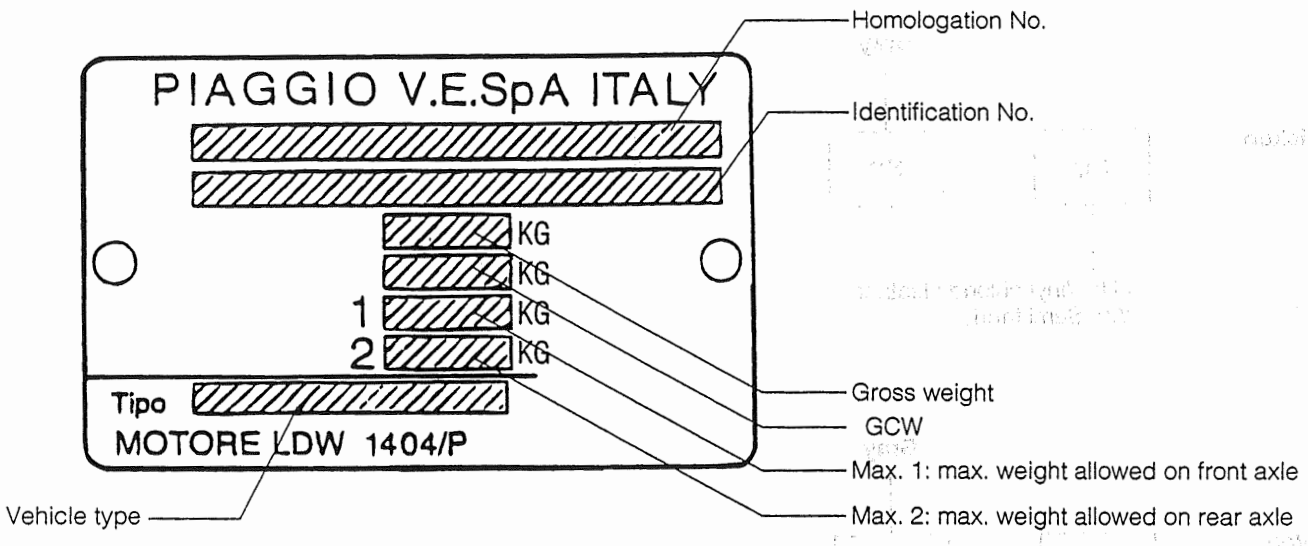
1. Location

The chassis number is stamped on the front floor panel. The manufacturer's plate is attached on the cowl panel at the right side in the engine compartment.



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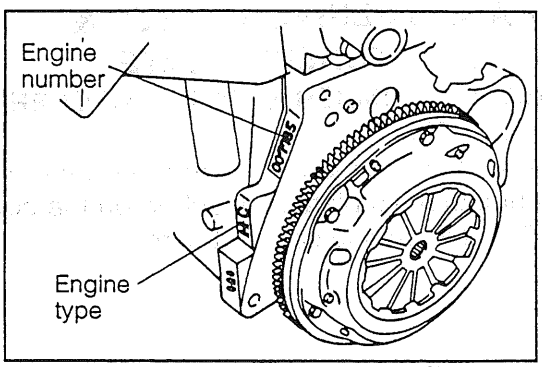
2. Contents of manufacturer's plate



PGI00022-00013

ENGINE NUMBER AND ENGINE TYPE

- The engine number is stamped on the cylinder block.
- The engine type is indicated by embossed letters on the cylinder block.



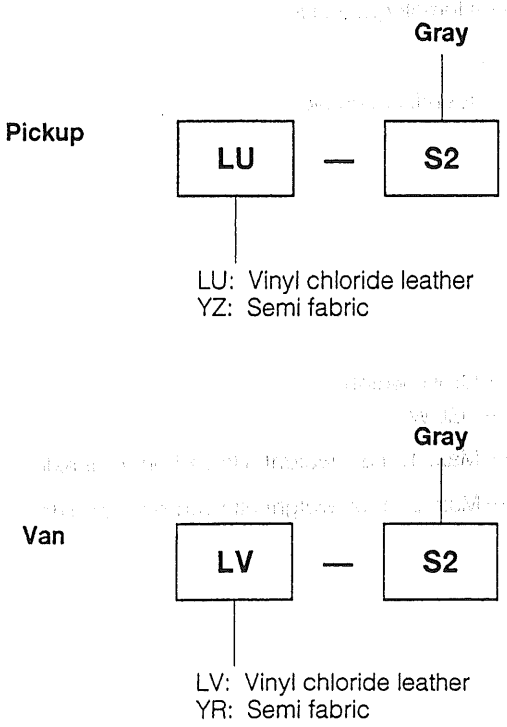
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BODY COLOR INFORMATION

Color code	Color	VAN	Pickup
W10	White	●	●
B24	Blue	●	●
R16	Red	●	●
G15	Green Metallic	●	—
S13	Dark gray Metallic	●	—
A01	Dark Blue	●	●

PGI00024-00000

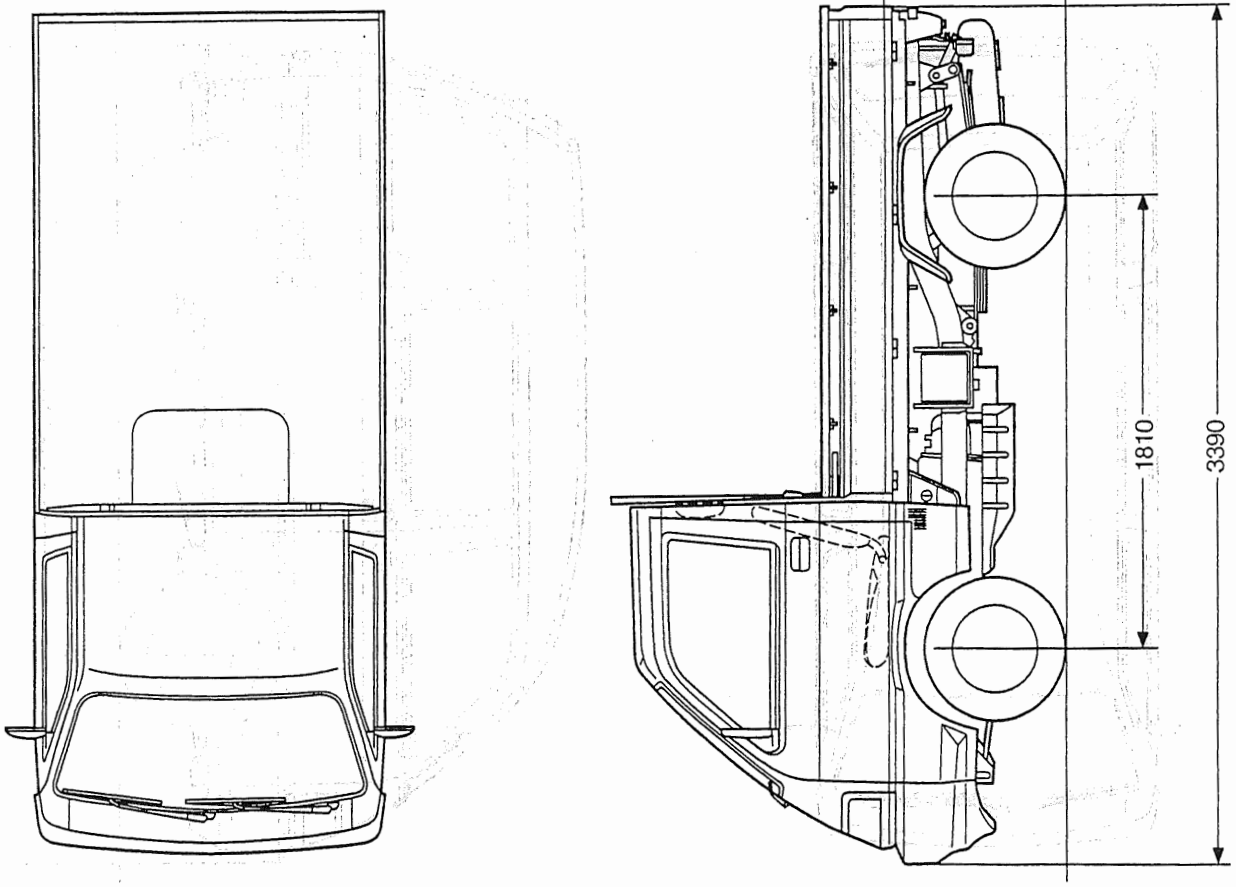
TRIM CODE

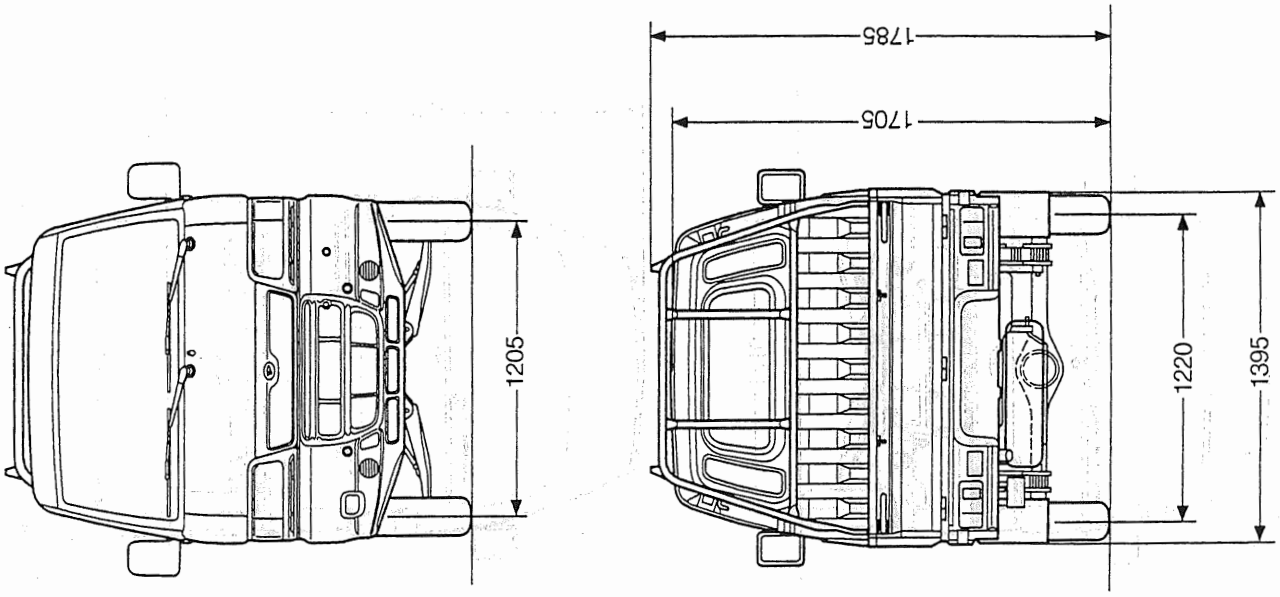


PGI00025-00000

VEHICLE 4-PLANE DIAGRAMS

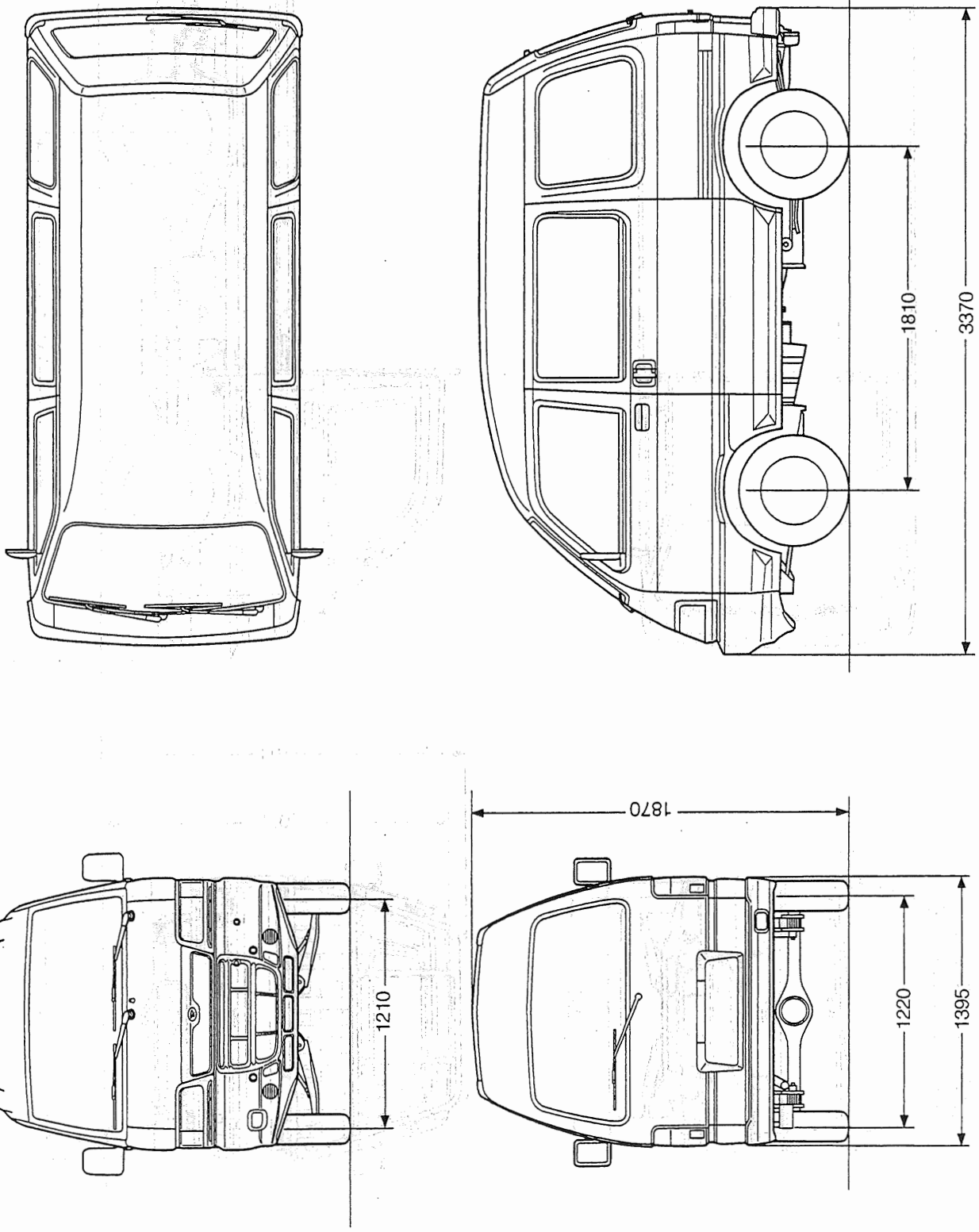
Pickup





PGI00026-00015

Van



PGI00027-00016

SERVICE SPECIFICATION

Item				Engine type	HC-ES E/G
Engine proper	Type				Petrol, Water cooled, 4-cycle
	Cylinder No. and arrangement				4-cylinder-in-line, Mounted longitudinally
	Combustion chamber type				Pent roof type
	Valve mechanism				Belt-driven, SOHC
	Bore × stroke			(mm)	76.0 × 71.4
	Compression ratio				9.5 ± 0.3
	Compression pressure			(kPa/rpm)	1373 / 300
	Maximum output			(KW/rpm)	48.0 / 4800
	Maximum torque			(N·m/rpm)	99 / 2800
	Engine dimensions (Length-Width-height)			(mm)	553 × 466 × 725
	Service weight			(kg)	91.5
	Valve timing (°)	Intake	Open		BTDC 1
			Close		ABDC 39
		Exhaust	Open		BBDC 42
			Close		ATDC2
	Valve clearance	(mm)	Intake		0.25 ± 0.05 [HOT]
			Exhaust		0.33 ± 0.05 [HOT]
	Idle speed			(rpm)	850 ± 50
	Blow-by Gas recirculation system				Closed type
Lubricating system	Lubricating method				Fully-forced feed method
	Oil pump				Trochoid type
	Lubricant capacity			(1)	4.2
Cooling system	Cooling method				V-belt driven type
	Radiator type				Fin & Tube
	Coolant capacity (Including the heater and reserve tank)			(1)	5.7
	Water pump type				Centrifugal type, belt-driven type
	Thermostat				Wax pellet type
Air cleaner	Type				Dry filter paper type
	Number				1
Fuel system	Fuel tank	Capacity		(1)	35: Pick, 33: Van
		Location	Pickup		Under cargo platform at rear side of rear axle
			Van		Under cargo platform at rear side, midpoint between front and rear axle
	Fuel pipe material				Rubber and tube
	Fuel pump type				Electromotor type
	Fuel filter type				Filter paper type
	EFI system	Type			Speed density type
		Manufacture	ECU		DENSO
			Injector		DENSO
			Pressure sensor		DENSO
			Oxygen sensor		DENSO
			Throttle body		DENSO

Item				Engine type: HC-ES E/G	
Engine electrical system	Ignition system	Voltage		12 [Negative ground]	
		Type		Full transistorized type (ESA) battery ignition type	
		Ignition timing (°)		BTDC 3 ± 2 with check terminal connected with ground terminal	
		Firing order		1-3-4-2	
		Spark plug	Manufacture	NGK	DENSO
			Type	BKUR6EK BKUR7EK	K20TNR-S K22TNR-S
			Spark plug gap (mm)	0.9 - 1.0	0.9 - 1.0
			Thread	M14S × 1.25	
	Battery	Type		230E2SM	190E2SM
		Capacity AH		48 (20 HR) 40 (5 HR)	40 (20 HR) 34 (5 HR)
	Alternator	Type		3-phase alternating current commuting type	
		Output (V-A)		12 - 50	
		Regulator type		Contact pointless type (IC regulator type)	
	Starter	Type		Conventional type	
		Output (V-kW)		12 - 0.9	
	Radio noise suppressing device			Resistive cord	

PGI00028-00000

POWER TRAIN SPECIFICATION

Clutch	Mechanism from engine to transmission			Engine-clutch-transmission
	Type			Dry-single disc diaphragm
	Facing	Dimension [Outer Dia. × inner Dia.]	(mm)	190 × 132
		Facing area	(mm^2)	14,670
		Material		Non-asbestos
Transmission	Type	Forward		Constant-mesh type
		Reverse		Selective sliding type
	Gear ratio (tooth No.) Reduction gear ratio: 27/22	1st gear		3.769 (43/14 × 27/22)
		2nd gear		2.045 (35/21 × 27/22)
		3rd gear		1.376 (37/33 × 27/22)
		4th gear		1.000 (–)
		5th gear		0.838 (28/41 × 27/22)
		reverse		4.128 (37/26 × 26/11 × 27/22)
Differential gear	Type			Conventional
	Gear ratio			4.444 (40/9)
Running system	Front axle	Toe-in	(mm)	$2.0\ ^{+1.5}_{-1.0}$
		Camber angle		$1°23'\ ^{+40}_{-50}$ (Pick) $1.0\ ^{+40'}_{-50'}$ (Van)
		Caster angle		3°13′ ± 1° (Pick) 3°02′ ± 1° (Van)
		King pin angle		10°49′ ± 1° (Pick) 11°25′ ± 1° (Van)
	Rear axle type			Semi-floating type
Steering	Wheel	Outer diameter	(mm)	370
		Maximum lock to lock turns		4.1
	Gear	Type		Rack and pinion
		Gear ratio		∞
	Turning angle	Inner angle	(°)	36.0
		Outer angle	(°)	34.8
Brake	Type	Front		Disc
		Rear		Drum
	Master cylinder inner diameter		(mm)	19.05
	Wheel cylinder inner diameter (mm)	Front		51.10
		Rear		17.46
	Parking brake system			Mechanical hand operation which applies rear wheels

Suspension	Suspension type		Front	Independent, McPherson strut
			Rear	Rigid axle
	Spring type		Front	Coil spring
			Rear	Semi-elliptical leaf spring
	Main spring dimensions	Front (mm)	Pickup	11.1 × 74.8 × 275 - 7.11
			Van	10.9 × 85.0 × 262 - 6.11
		Rear (mm)	Pickup	1000 × 50 × (7 - 9) - 1, 870 × 50 × 7 - 1
			Van	1000 × 50 × 7 - 1, 850 × 50 × 7 - 1
	Auxiliary spring dimensions	Rear (mm)	Pickup	740 × 50 × 11 - 1 460 × 50 × 11 - 1
			Van	690 × 50 × 9 - 1 460 × 50 × 9 - 1
	Shock absorber type			Double-acting telescopic type
Occupant protective device	Front seat belt			3 point ELR
Grass	Front windshield grass		Kind	Laminated
			Thickness (mm)	5.3

PGI00029-00000

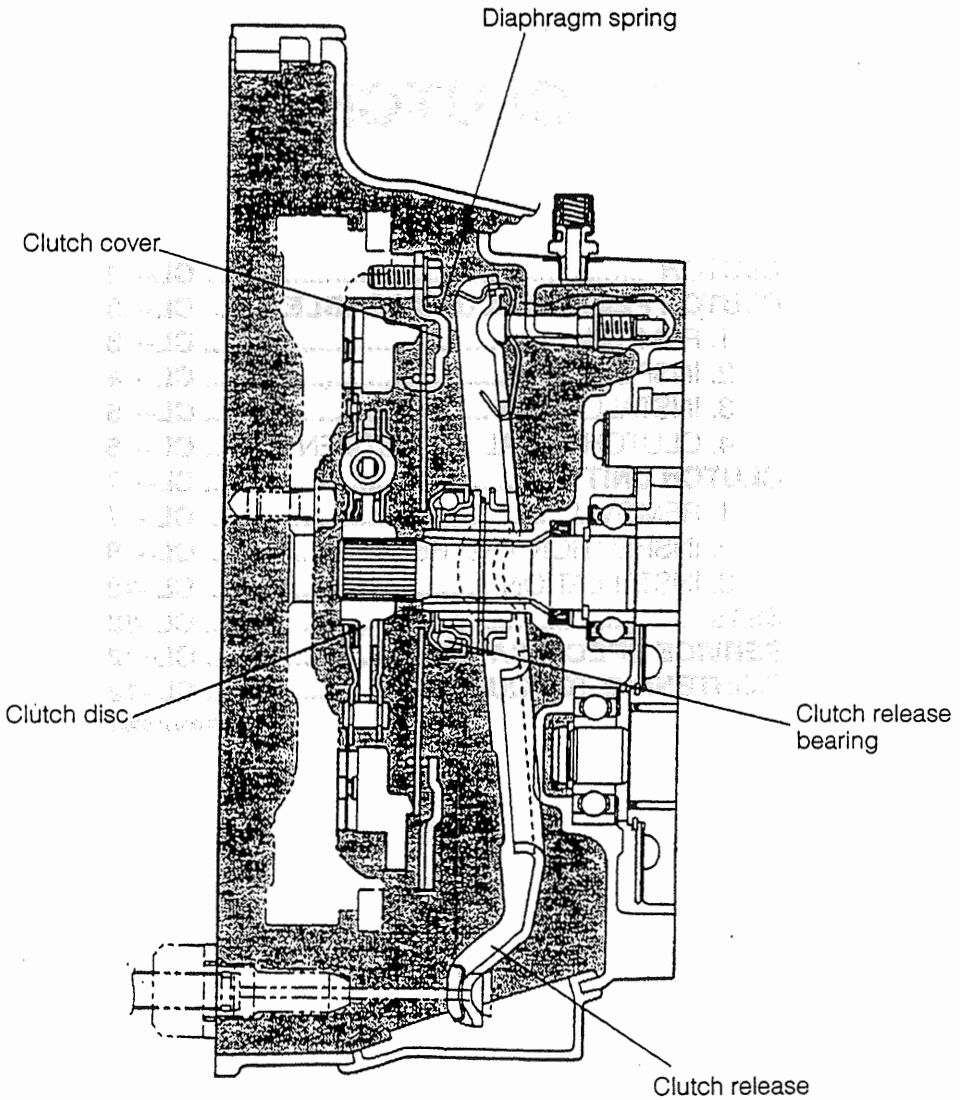
CLUTCH

CLUTCH ..... **CL– 2**
CLUTCH PEDAL & CLUTCH CABLE ..... **CL– 3**
1. REMOVAL ..... **CL– 3**
2. INSPECTION ..... **CL– 4**
3. INSTALLATION ..... **CL– 5**
4. CLUTCH PEDAL ADJUSTMENT ..... **CL– 5**
CLUTCH UNIT ..... **CL– 7**
1. REMOVAL ..... **CL– 7**
2. INSPECTION AND REPAIRS ..... **CL– 8**
3. INSTALLATION **CL–10**
SSTs **CL–12**
SERVICE SPECIFICATIONS **CL–12**
TIGHTENING TORQUE **CL–12**

PCL00001-00000

CLUTCH

With regard to the basic construction of the transmission and clutch for the new Hijet, no change has been made from the current Hijet. While maintaining the hitherto-employed serviceability and durability, enhancement has been made to meet the increased output of the engine as a result of the change (increased engine displacement) in the engine to be mounted.
As a result of the increased output of the engine, the specifications of the clutch and clutch cover have been altered from those of the current Hijet.

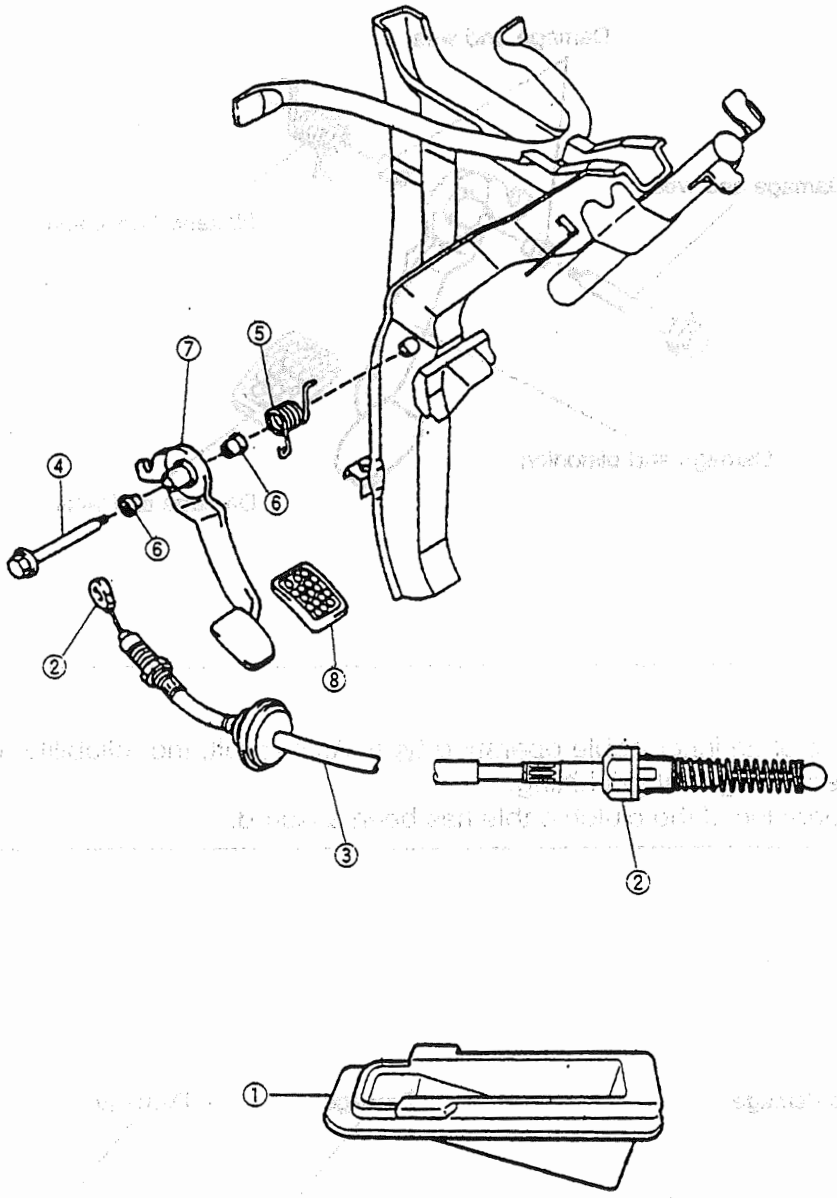


PCL00002-00001

CLUTCH PEDAL & CLUTCH CABLE

1. REMOVAL

Remove the parts in the numerical order shown in the figure below.



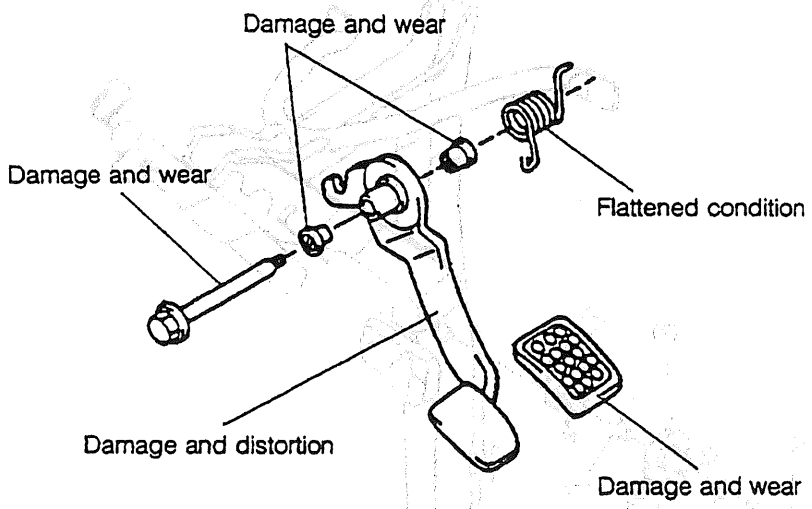
① Cover
② Clutch cable adjusting nut
③ Clutch cable end hanger
④ Clutch release cable subassembly
⑤ Pedal shaft
⑥ Spring
⑦ Bush
⑧ Clutch pedal subassembly
⑨ Clutch pedal pad

PCL00003-00002

2. INSPECTION

nspect the following parts. Replace any parts which exhibit defects.

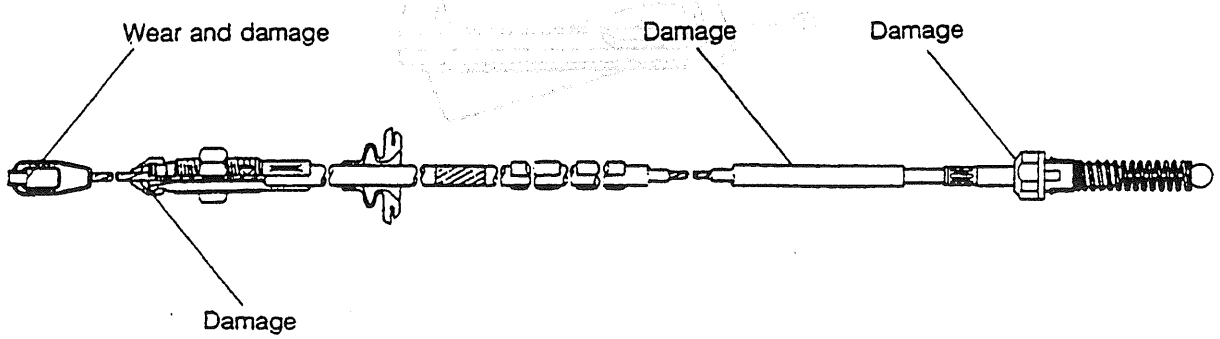
1) Clutch pedal



PCL00004-00003

2) Clutch cable

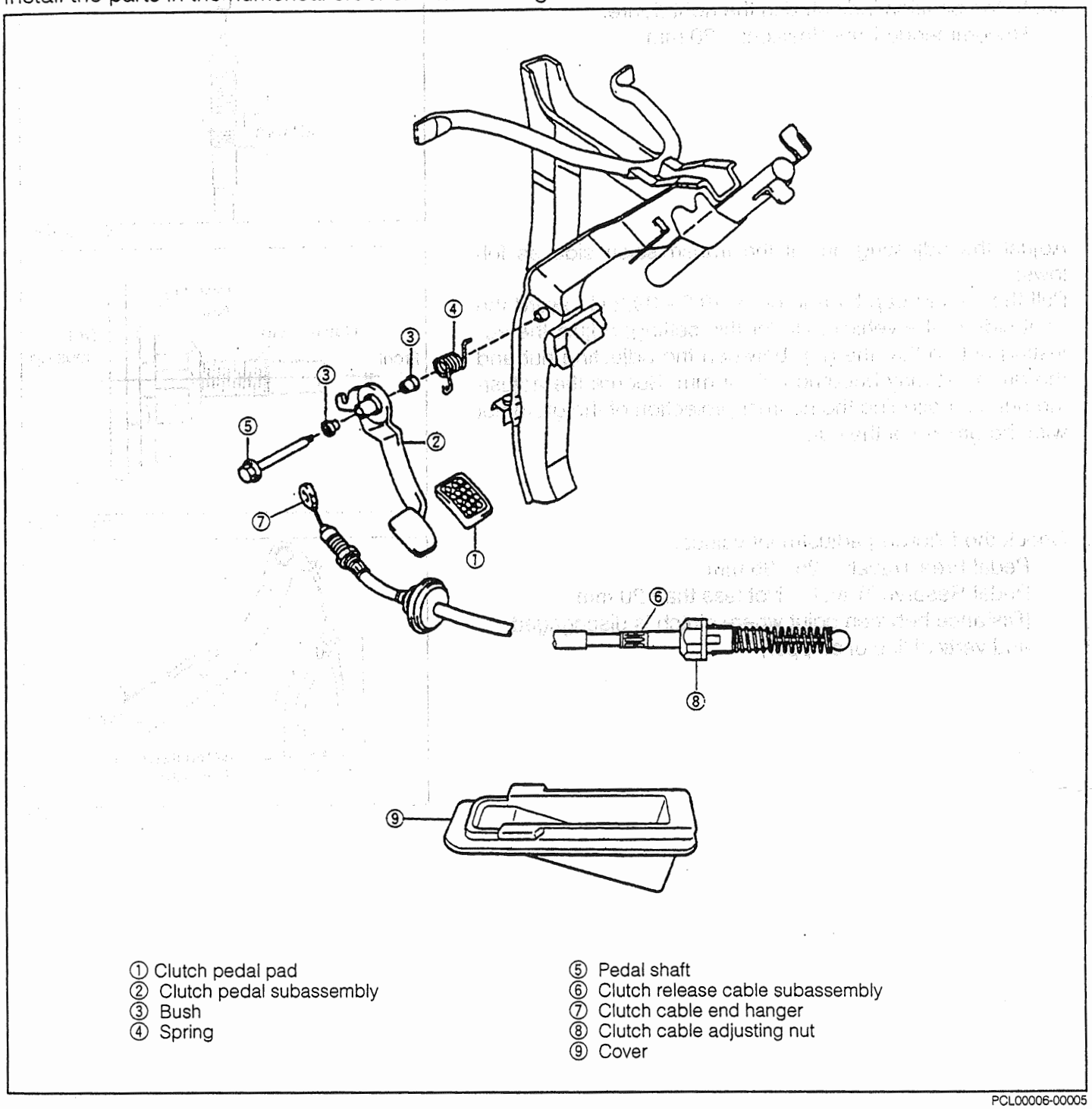
The new clutch cable is of an inner cable operating type. As a result, the reliability has been improved due to enhanced protection against grit hitting.
Furthermore, easier operation of the clutch cable has been assured.



PCL00005-00004

3. INSTALLATION

Install the parts in the numerical order shown in the figure below.



① Clutch pedal pad
② Clutch pedal subassembly
③ Bush
④ Spring
⑤ Pedal shaft
⑥ Clutch release cable subassembly
⑦ Clutch cable end hanger
⑧ Clutch cable adjusting nut
⑨ Cover

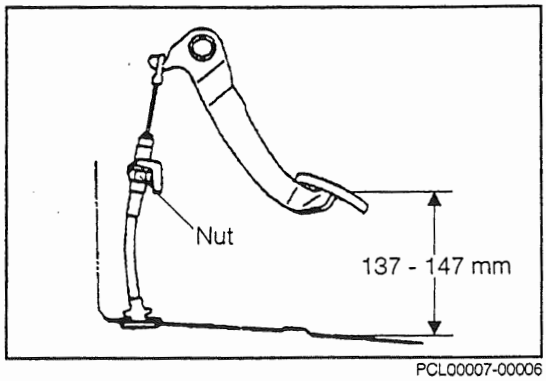
PCL00006-00005

4. CLUTCH PEDAL ADJUSTMENT

Pedal installation height

Adjust the distance between the floor and the pedal pad upper surface's center to the specified value by means of the outer cable adjusting nut.

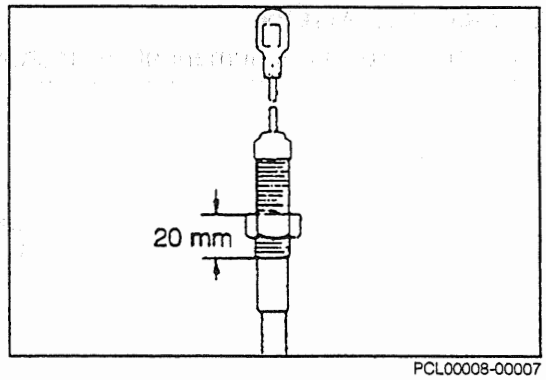
Pedal Installation Height: 137 - 147 mm



PCL00007-00006

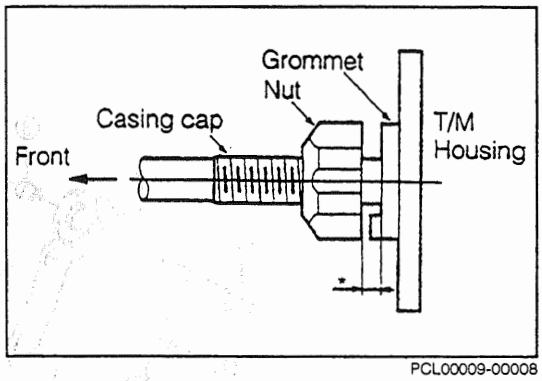
Pedal free travel & reserve travel

1. Pull the outer cable downward. Then, turn the adjusting nut to the position indicated in the right figure.
   Recommended Nut Position: 20 mm



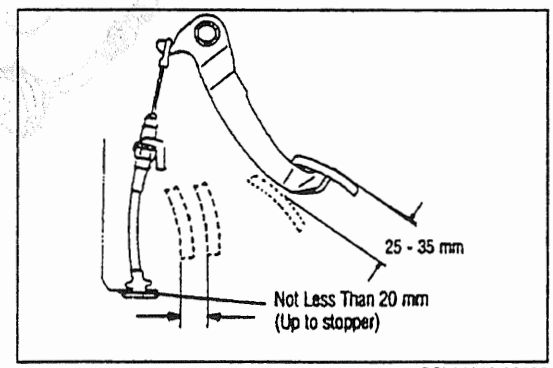
PCL00008-00007

2. Adjust the adjusting nut at the transmission side as follows:
   Pull the casing cap by a force of 19.6 - 39.2 N toward the front side of the vehicle. Under this setting, adjust the adjusting nut so that the gap between the adjusting nut and the grommet may become 2.5 - 4 mm. Secure the adjusting nut after aligning the nearest projection of the grommet with the groove of the nut.



PCL00009-00008

3. Check the following adjustment values.
   Pedal Free Travel: 25 - 35 mm
   Pedal Reserve Travel: Not less than 20 mm
   [Distance between point where clutch is disengaged and vertical line of stopper]

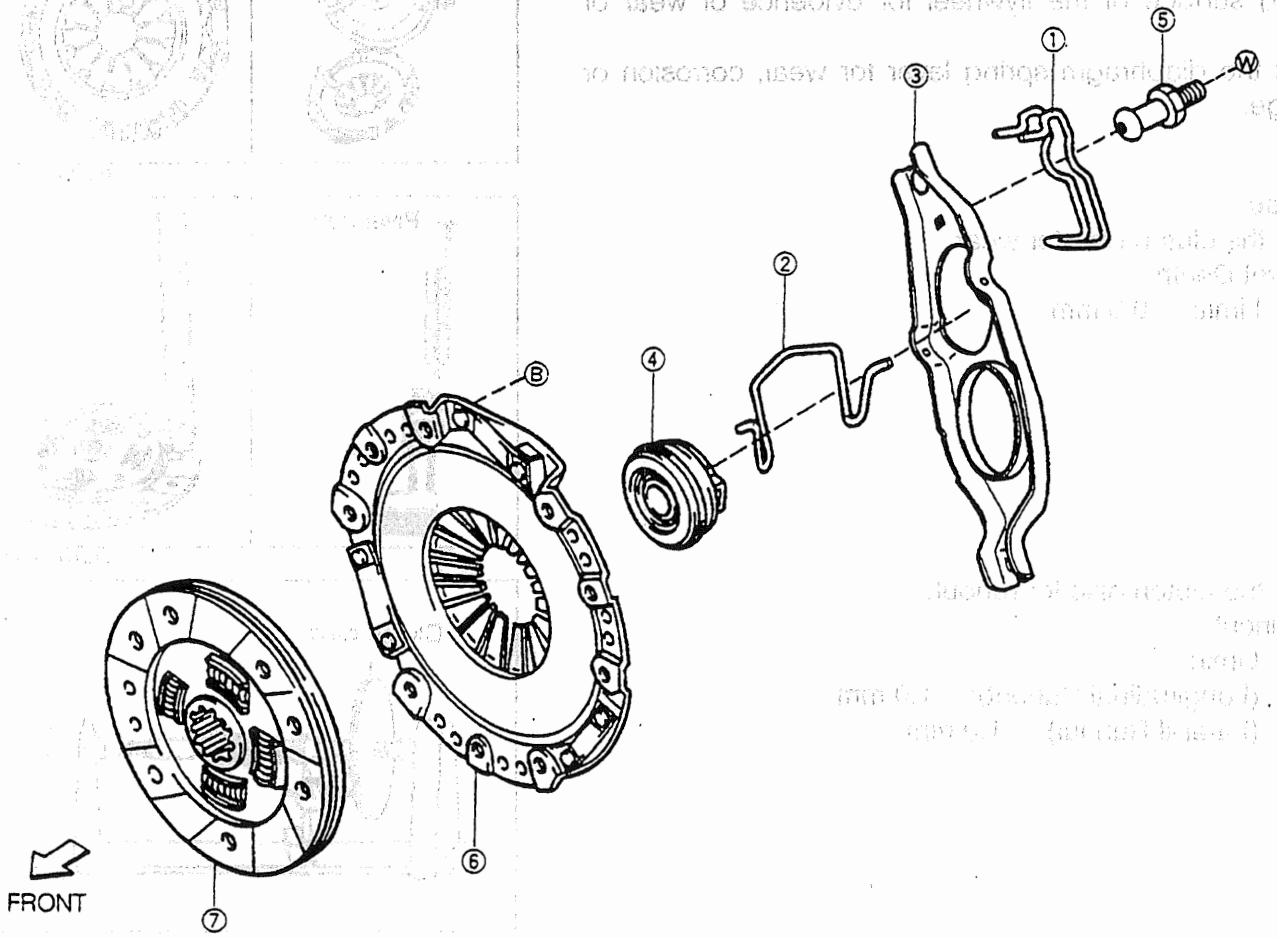


PCL00010-00009

CLUTCH UNIT

1. REMOVAL

Remove the parts in the numerical order shown in the figure below.



① Anti-rattle spring
② Release bearing hub clip
③ Clutch release fork
④ Clutch release bearing hub
⑤ Clutch release fork support
⑥ Clutch cover assembly
⑦ Clutch disc assembly

PCL00011-00010

Remove the transmission assembly from the vehicle.
(Refer to the MT section.)

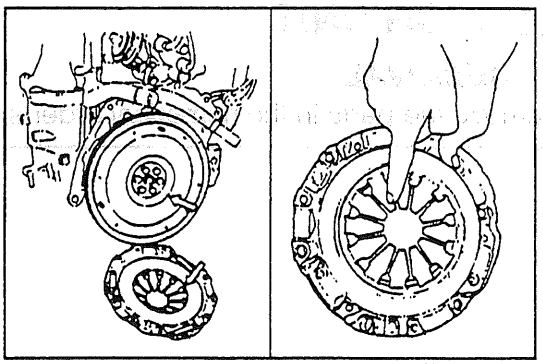
PCL00012-00000

2. INSPECTION AND REPAIRS

Clutch cover and diaphragm spring

Inspect the following parts. Replace any parts which exhibit defects.

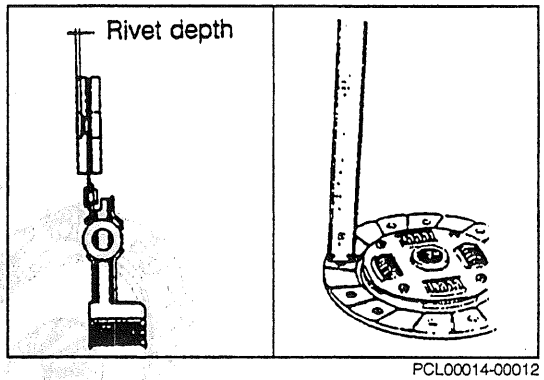
1. Check the clutch pressure plate and the clutch disc contracting surface of the flywheel for evidence of wear or burns.
2. Check the diaphragm spring lever for wear, corrosion or damage.



PCL00013-00011

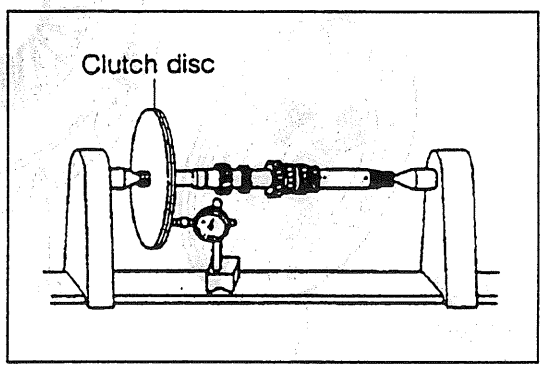
Clutch disc

1. Check the clutch disc for wear.
   Rivet Depth
   Limit: 0.3 mm



PCL00014-00012

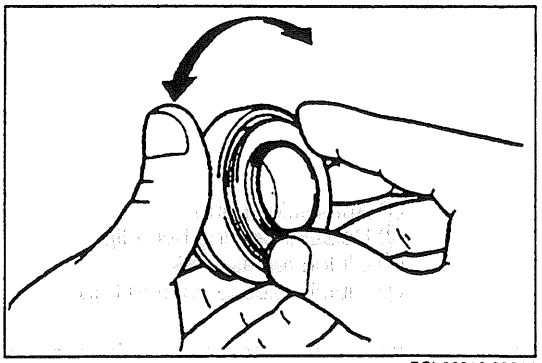
2. Check the clutch disc for runout.
   Runout
   Limit:
   (Longitudinal Runout): 1.0 mm
   (Lateral Runout): 1.0 mm



PCL00015-00013

Release bearing

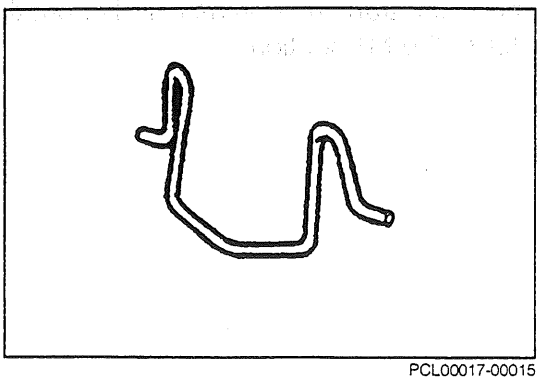
1. Checking of release bearing for smooth turning. Turn the release bearing while applying a force to the bearing by your hand in the thrust direction. Ensure that you feel no abnormal stiffness or binding.
2. Check the release bearing hub for damage or wear. Also, check to see if any damage or wear is present at the clip contact surface and the housing sliding section.



PCL00016-00014

Release bearing hub clip

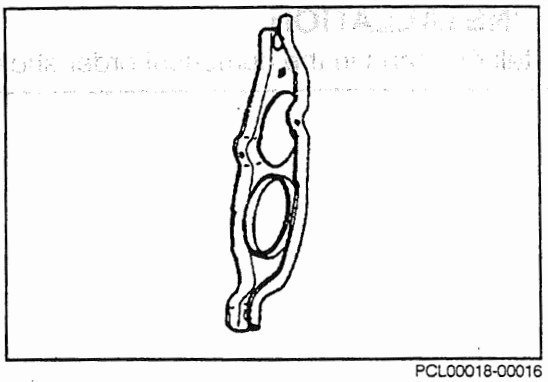
1. Check for wear or damage.



PCL00017-00015

Clutch release fork

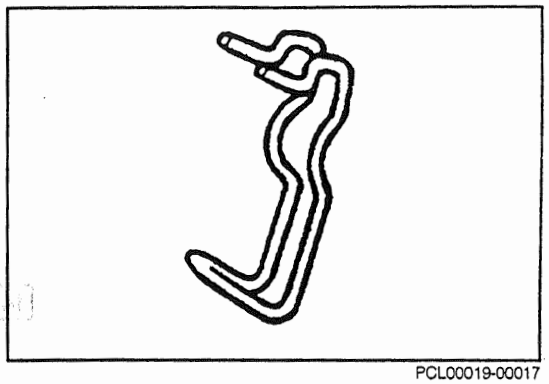
1. Check for wear or damage.



PCL00018-00016

Anti-rattle spring

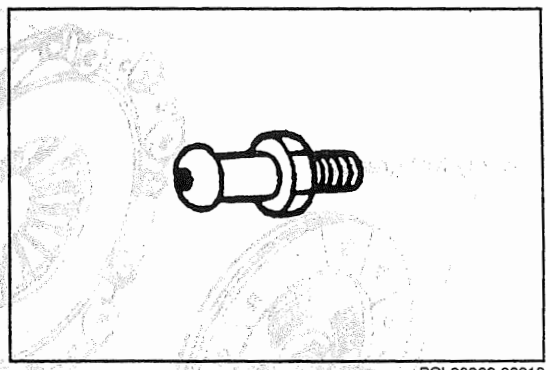
1. Check for wear or damage.



PCL00019-00017

Clutch release fork support

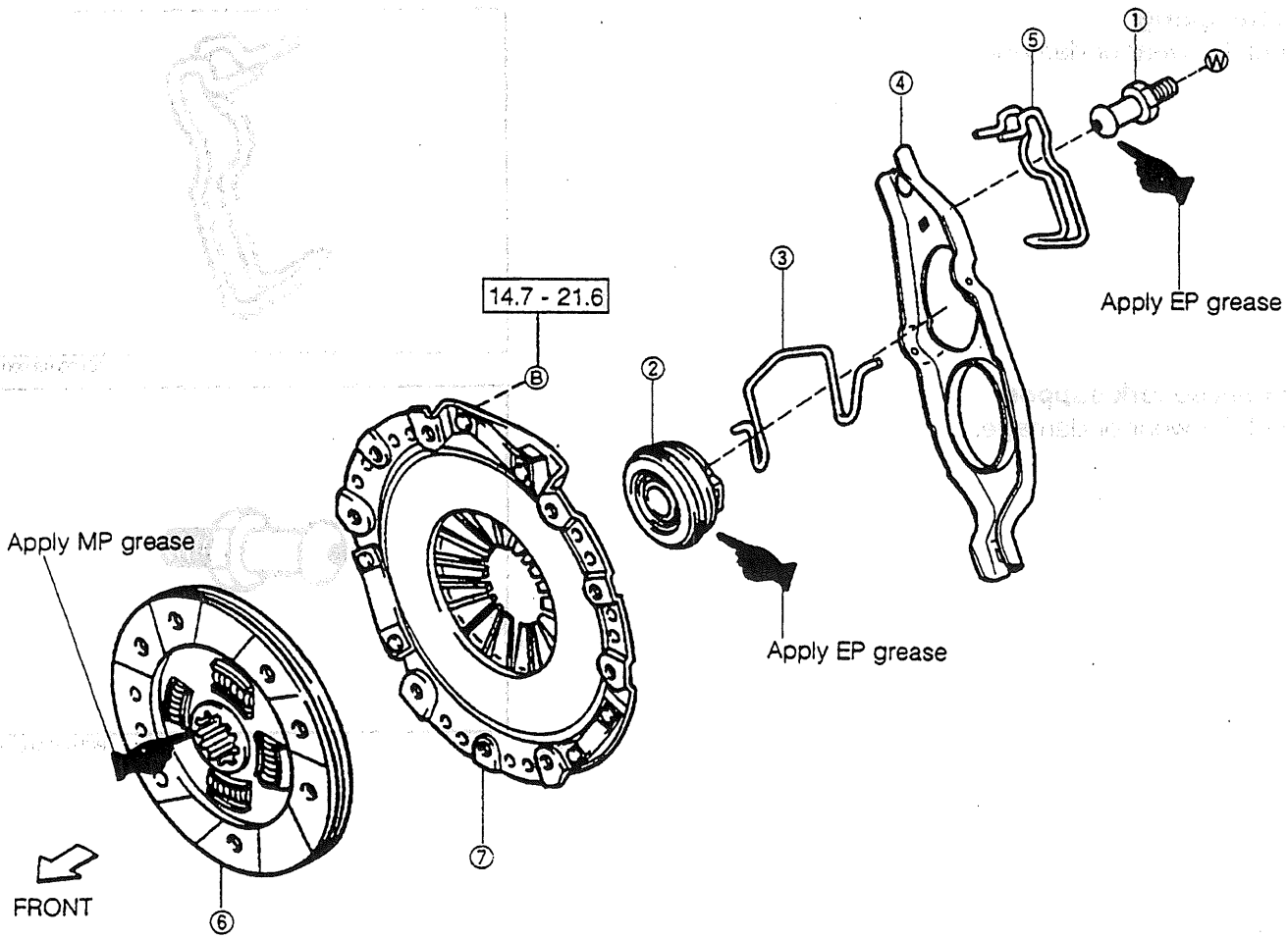
1. Check for wear or damage.



PCL00020-00018

3. INSTALLATION

Install the parts in the numerical order shown in the figure below



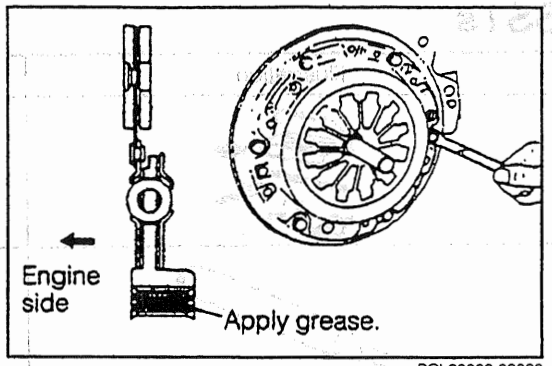
□ : Tightening torque
Unit : N·m
★ : Non-reusable parts

① Clutch release fork support
② Clutch release bearing hub
③ Release bearing hub clip
④ Clutch release fork
⑤ Anti-rattle spring
⑥ Clutch disc assembly
⑦ Clutch cover assembly

PCL00021-00019

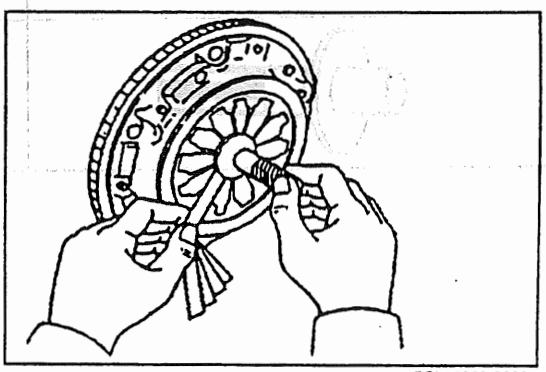
1. Install the clutch disc and clutch cover, using the following SST given below.
   SST: 09301-87702-000

   NOTE:
   - Be certain to tighten the bolts evenly, starting with those bolts provided near the locating pin.
   - Apply a long-life chassis grease to the clutch disc splined section.

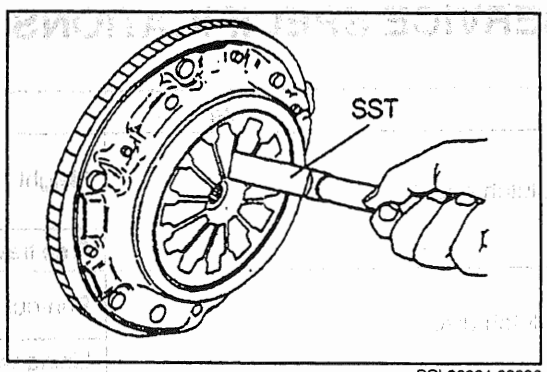


PCL00022-00020

2. Check the diaphragm spring tips for deviation in height with a thickness gauge and the following SST given below.
   SST: 09302-87702-000
   Deviation in Height
   Limit: 0.7 mm


PCL00023-00021

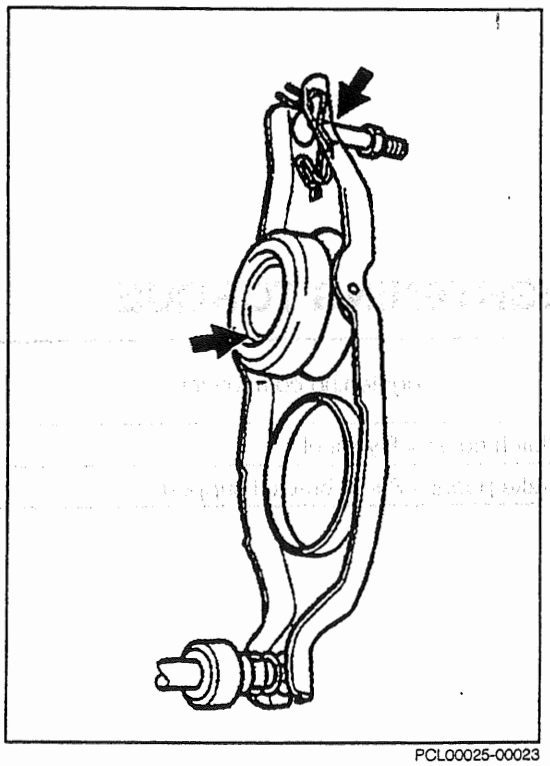
3. If the deviation in height exceeds the specified limit, adjust the diaphragm spring tips with the following SST given below.
   SST: 09333-00013-000



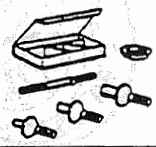
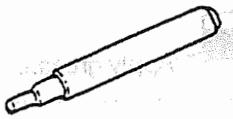
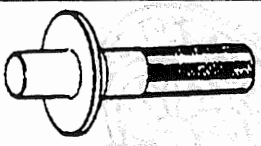
PCL00024-00022

4. Install the release lever fork.
   NOTE:
   - Apply the EP grease to the release bearing hub and fork contact surface.
   - Apply the EP grease to the release bearing fork and support contact surface.

5. Install the transmission assembly to the vehicle.


PCL00025-00023

SSTs

Illustration	Too No.	Too name
	09333-00013-000	Clutch diaphragm spring aligner tool set
	09301-87702-000	Clutch guide tool
	09302-87702-000	Clutch diaphragm spring height gauge No. 4

PCL00026-00024

SERVICE SPECIFICATIONS

Unit: mm

Item		Specified value	Allowable limit	Remarks
Clutch pedal	Height	137 - 147	—	Distance from upper surface of pedal to floor
	Free travel	25 - 35	—	
Clutch disc	Run-out	—	Longitudinal: 1.0 mm Lateral: 1.0 mm	
	Lining wear	—	0.3	Rivet depth

PCL00027-00000

TIGHTENING TORQUE

Tightening component	Tightening torque	
	N·m	kg-m
Clutch cover × Flywheel	14.8 - 21.5	1.5 - 2.2
Brake pedal × Pedal bracket support	14.7 - 21.6	1.5 - 2.2

PCL00028-00000

MANUAL TRANSMISSION

PRECAUTIONS: ..... **MT– 2**
TRANSMISSION ..... **MT– 4**
COMPONENTS (PART 1) ..... **MT– 4**
NOTICE PRIOR TO OPERATION ..... **MT– 5**
TRANSMISSION ..... **MT– 5**
COMPONENTS (PART 1) ..... **MT– 5**
COMPONENTS (PART 2) ..... **MT– 6**
COMPONENTS (PART 2) ..... **MT– 7**
IN-VEHICLE REPAIRS ..... **MT– 9**
DISASSEMBLY ..... **MT– 9**
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PMT00001-00000

PRECAUTIONS:

Before you start the disassembly and installation of a transmission unit that has been newly employed this time, observe the following precautions given below:

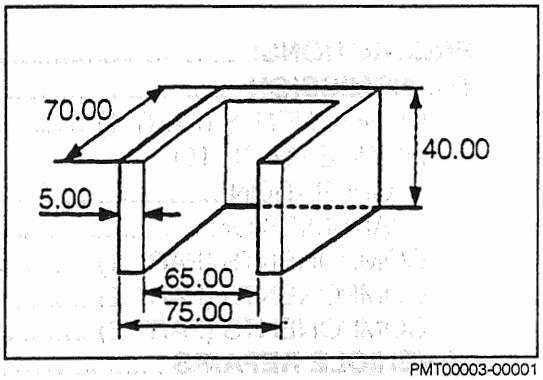
- It is advisable to prepare the following articles as auxiliary tools so that the parts may not be damaged during disassembly and installation operations.
- The removal procedure for the transmission has been omitted because the said removal procedure is virtually the same as that of the hitherto-employed transmission.
- It is advisable to perform the disassembling operation while conducting checks and confirmation (e.g. shift feeling and excessive play, etc.) that can be carried out only in an assembled state.
- It is advisable to confirm the tightened torque when the bolts of the principal sections are loosened. By conducting this confirmation, the cause for the problems that have necessitated the disassembling (e.g. oil leakage, abnormal noise, etc.) may be detected.
- As regards those sections whose measurement and confirmation of accuracy can be conducted easier in an assembled state (e.g. the assembly of the shift fork and hub, the thrust clearance of each gear, etc.), it is advisable that such measurement is conducted also during disassembling.

PMT00002-00000

Tool to be used at sub-gear side

For Removal & installation of conical spring washer	
Overall width	75.00 mm
Overall length	70.00 mm
Inner overall width	65.00 mm
Height	40.00 mm
Thickness	5.00 mm

- The right illustration shows the section corresponding to 09351-32070-000 of the components of SST No. 09350-32014-000.

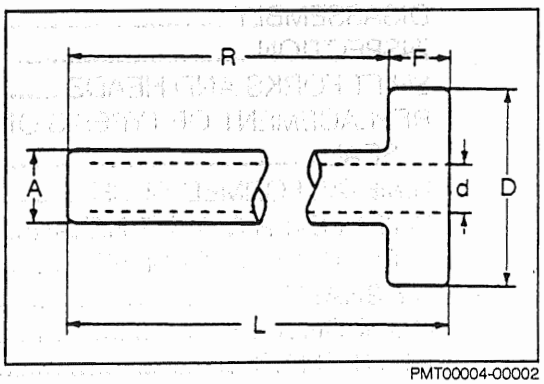


PMT00003-00001

Tool to be used at input and countershaft sides

D	d	F	L	R	A
80.00	36.00	15.00	200.00	185.00	42.00

The right illustration shows a sketch of SST No. 09310-87302-000.

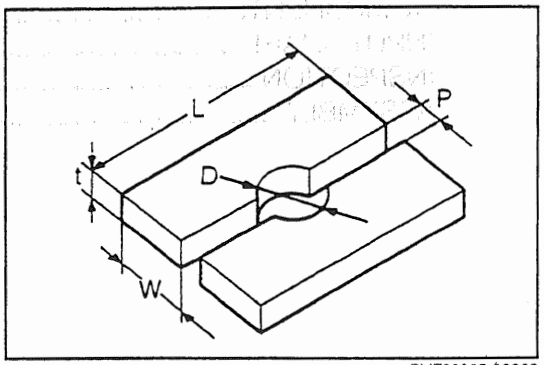


PMT00004-00002

Tool to be used at input and countershaft sides for synchronizer

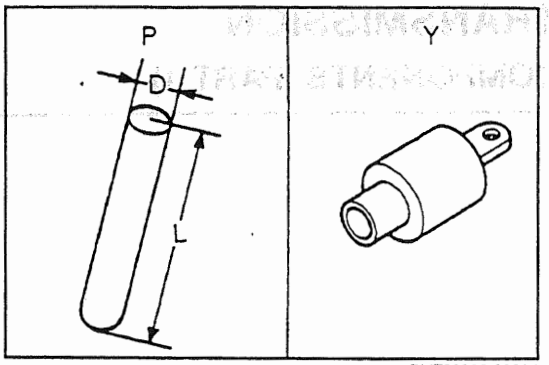
t	L	W	P and D
8.00	250.00	75.00	Make sure that outer diameter D is 55 mm with a 10 mm thickness interposed at section P.

The right illustration shows a simplified sketch of SST No. 09334-87301-000.



PMT00005-00003

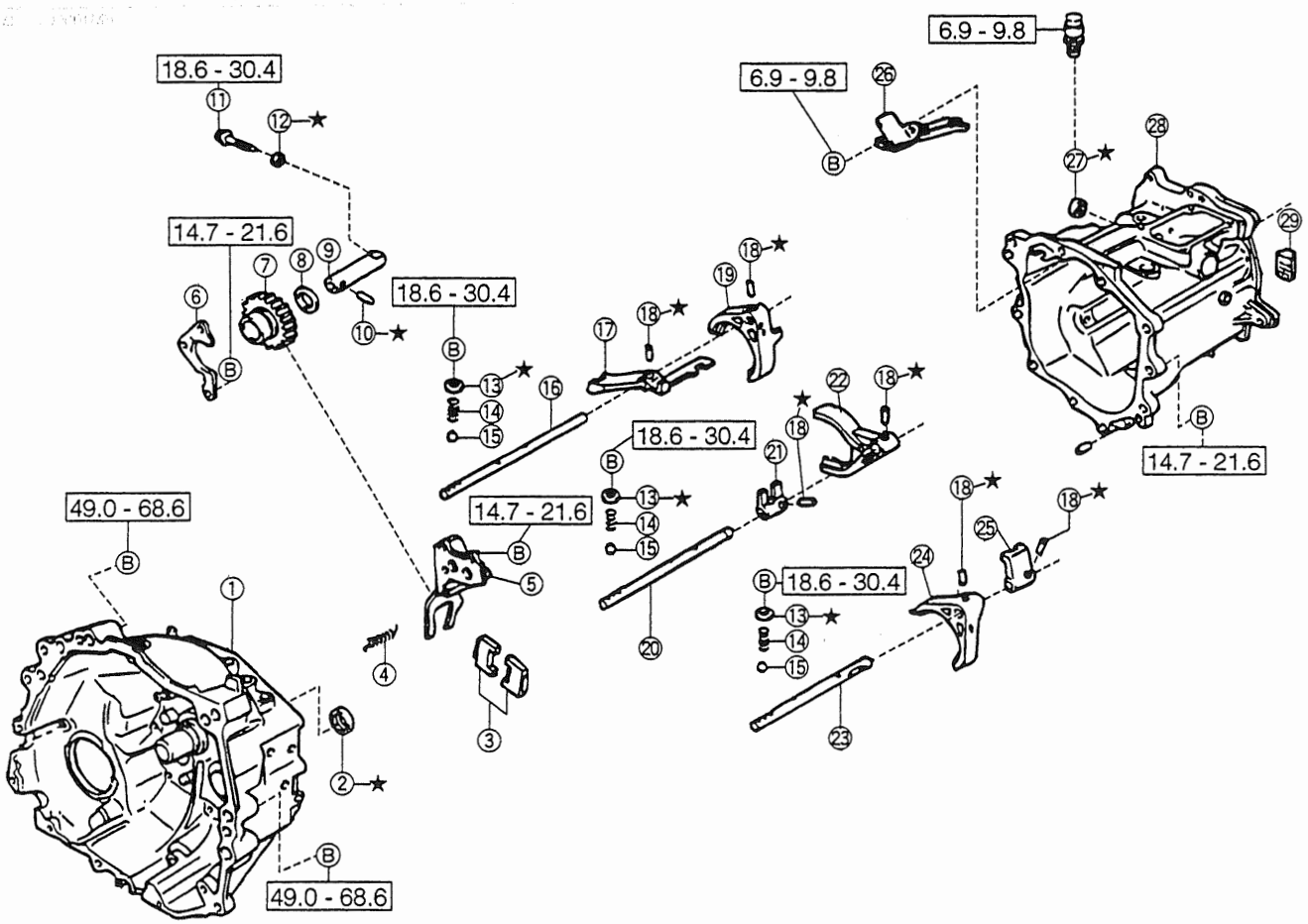
- "P" is used as a guide when driving a shift fork slotted spring pin into position.
  D = 4.00 mm L = 50.00 mm
- "Y" is used when the assembly of the transmission is checked by turning the output shaft manually. The part Y is inserted into the yoke at the forward end of the propeller shaft when the output shaft is turned.



PMT00006-00004

TRANSMISSION

COMPONENTS (PART 1)



① Clutch housing
★② Type S oil seal
③ Shift interlock plate
④ Tension spring
⑤ Reverse shift arm
⑥ Input shaft bearing lock plate
⑦ Reverse idler gear
⑧ Reverse idler gear thrust washer
★⑨ Reverse idler gear shaft
⑩ Slotted spring pin
⑪ Hexagon bolt
★⑫ Gasket
★⑬ Gasket
⑭ Compression spring
⑮ Ball
⑯ 5th & reverse shift fork shaft
⑰ 5th & reverse shift head
★⑱ Slotted spring pin
⑲ 5th shift fork
⑳ 3rd & 4th shift fork shaft
㉑ 3rd & 4th shift head
㉒ 3rd & 4th shift fork
㉓ 1st & 2nd shift fork shaft
㉔ 1st & 2nd shift fork
㉕ 1st & 2nd shift head
㉖ Oil receiver pipe
★㉗ Tight plug
㉘ Transmission case
㉙ Transmission magnet

NOTICE PRIOR TO OPERATION

This section summarizes the main points of each section of the configuration drawings posted on those pages previous to MT–4, MT–6, MT–14 and MT–22. The description is so arranged that the removal and installation may readily be understandable when the configuration drawings are referred to the contents posted at the lower section of the page.
For more details, refer to the relevant pages.

PMT00008-00000

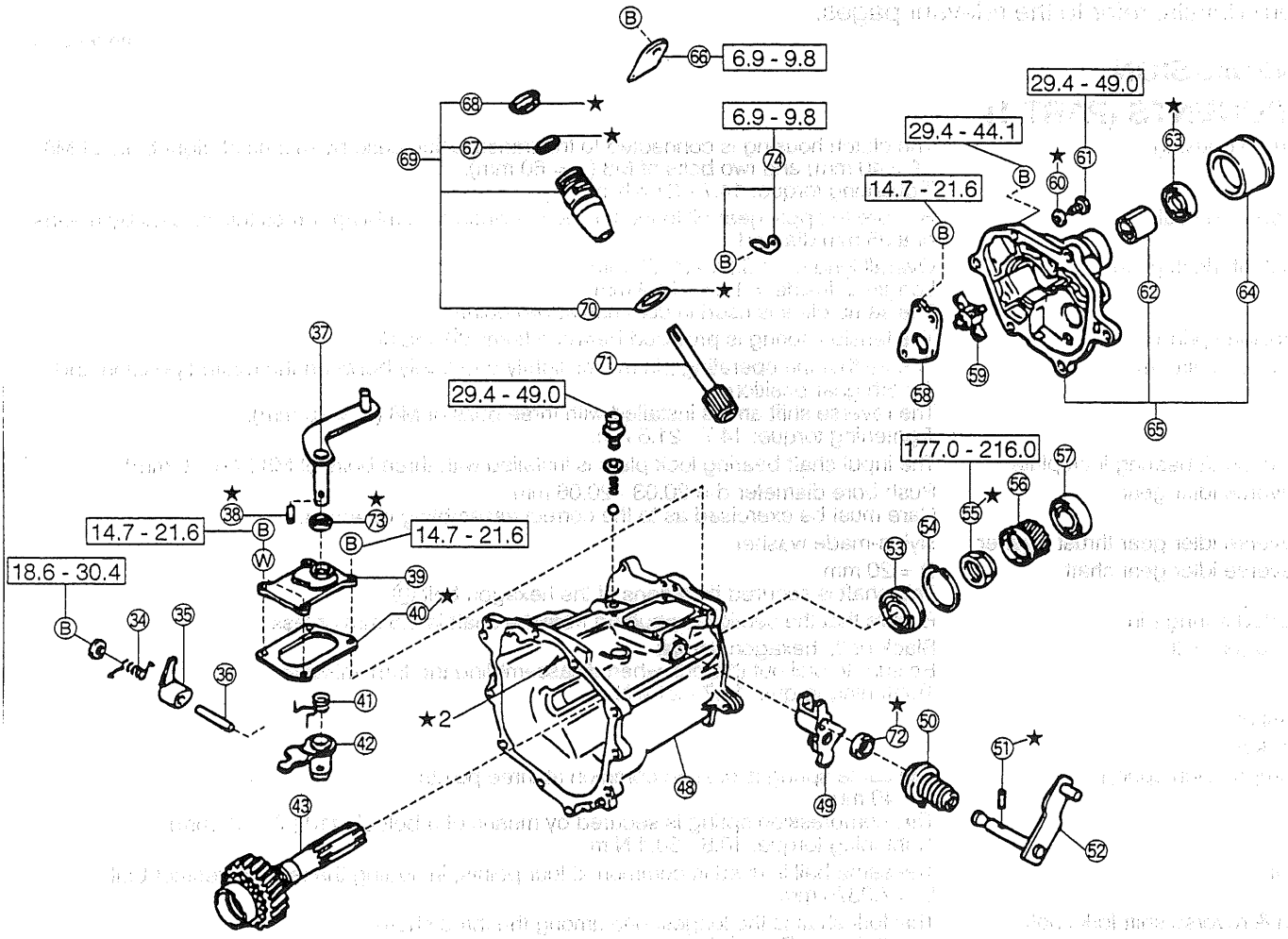
TRANSMISSION COMPONENTS (PART 1)

① Clutch housing	The clutch housing is connected to the transmission case by means of eight bolts of M8 (ℓ = 40 mm) and two bolts of M8 (ℓ = 60 mm). Tightening torque: 14.7 - 21.6 N·m
★② Type S oil seal	Be sure to apply gear oil to the lip section when assembling. Press this oil seal by means of a 35 mm dia. rod.
③ Shift interlock plate	Overall length = 23.25 - 23.55 mm Length at inside = 17.7 - 17.9 mm The same plate is used in common at two points.
④ Tension spring	The tension spring is provided between Items ⑤ and ⑥.
⑤ Reverse shift arm	Ensure that the operating pin moves lightly and freely between the neutral position and the 5th gear position. The reverse shift arm is installed with three bolts of M8 (ℓ = 20 mm). Tightening torque: 14.7 - 21.6 N·m
⑥ Input shaft bearing lock plate	The input shaft bearing lock plate is installed with three bolts of M8 (ℓ = 20 mm).
⑦ Reverse idler gear	Bush bore diameter d = 20.03 - 20.06 mm Care must be exercised as to the correct assembling direction.
⑧ Reverse idler gear thrust washer	Nylon-made washer
⑨ Reverse idler gear shaft	D = 20 mm This shaft is secured by means of the hexagon bolt ⑪.
★⑩ Slotted spring pin	Ensure that the section protruding from the shaft is 2.5 mm or less.
⑪ Hexagon bolt	Black bolt, hexagon socket Be sure to pull out this bolt when disassembling the transmission. Tightening torque: 14.7 - 21.6 N·m
★⑫ Gasket	
⑬ Gasket	
⑭ Compression spring	The same spring is used in common at three points. L = 40 mm This compression spring is secured by means of a bolt of M10 (ℓ = 19 mm). Tightening torque: 18.6 - 30.4 N·m
⑮ Ball	The same ball is used in common at four points, including the reverse restrict ball. D = 7.9375 mm
⑯ 5th & reverse shift fork shaft	This fork shaft is the longest one among the three shafts. L = 265 mm, D = 13.0 mm
⑰ 5th & reverse shift head	Width contacting with inner lever: 12.1 - 12.2 mm Width contacting with reverse shift arm pin: 15.0 - 15.043 mm
★⑱ Slotted spring pin	The same pin is used in common at six points. D = 5 mm, L = 23 mm
⑲ 5th shift fork	Thickness of rib section contacting with hub sleeve: 6.7 - 6.9 mm
⑳ 3rd & 4th shift fork shaft	This shaft has the middle length among three shafts. L = 259 mm, D = 13.0 mm
㉑ 3rd & 4th shift head	Groove width at section contacting with shift inner lever: 12.1 - 12.2 mm
㉒ 3rd & 4th shift fork	Thickness of rib section contacting with hub sleeve: 6.7 - 6.9 mm
㉓ 1st & 2nd shift fork shaft	This fork shaft is the shortest one among the three shafts. L = 224 mm, D = 13.0 mm
㉔ 1st & 2nd shift fork	Thickness of section contacting with hub sleeve: 9.7 - 9.9 mm (Only the 1st & 2nd shift fork is wider than other shift forks.)
㉕ 1st & 2nd shift head	Groove width at section contacting with shift inner lever: 12.1 - 12.2 mm
㉖ Oil receiver pipe	This pipe is installed at the inside of the transmission case by means of one bolt of M6 (ℓ = 16 mm).
★㉗ Tight plug	This plug is not required to remove, unless exceptional situation, such as oil leakage, occurs.
㉘ Transmission case	The clutch housing is connected to the transmission case with 10 bolts. Tightening torque: 14.7 - 21.6 N·m The extension housing is connected to the transmission case with 6 bolts. Tightening torque: 29.4 - 44.1 N·m
㉙ Transmission magnet	This magnet is not secured with a bolt.

PMT00009-00000

COMPONENTS (PART 2)

□ : Tightening torque
Unit : N·m
★ : Non-reusable parts



㉞ Torsion spring
㉟ Reverse restrict cam
㊱ Reverse restrict shaft
㊲ Select lever subassembly
★㊳ Grooved pin
㊴ Control shaft cover
★㊵ Transmission case cover gasket
㊶ Torsion spring
㊷ Select inner lever
㊸ Output shaft
㊹ Reverse restrict pin holder
★㊺ Gasket
㊻ Compression spring
㊼ Ball
㊽ Transmission case
㊾ Shift inner lever
㊿ Control shaft boot
★(51) Grooved pin
(52) Shift lever shaft subassembly
(53) Radial ball bearing (for center)
(54) Hole snap ring
★(55) Lock nut
(56) Speedometer drive gear
(57) Radial ball bearing (rear)
(58) Rear bearing retainer
(59) Oil slinger
★(60) Gasket
(61) Filler plug
(62) Bimetal formed bush
★(63) Type T oil seal
(64) Extension housing dust deflector
(65) Extension housing subassembly
(66) Speedometer sleeve lock plate
★(67) Type V oil seal
★(68) Dust seal
(69) Speedometer shaft assembly
★(70) O-ring
(71) Speedometer driven gear subassembly
★(72) Type T oil seal
★(73) Type K oil seal
(74) Oil guide plate

COMPONENTS (PART 2)

㉞ Torsion spring	Pay special attention to the assembling direction in the same way as with Item ㉟.
㉟ Reverse restrict cam	Pay special attention to the assembling direction during disassembly and-assembly, for the reverse restrict cam has the correct assembling direction to be observed.
㊱ Reverse restrict shaft	D = 8 mm, L = 7.15 mm
㊲ Select lever subassembly	Pay special attention to the assembling direction of the lever when Items ㊶ and ㊷ are assembled.
★㊳ Grooved pin	D = 6 mm, L = 22 mm Drive this pin into position from the side where no groove is provided.
㊴ Control shaft cover	The transmission case cover is installed with a total of four bolts; three bolts of M8 (ℓ = 28 mm) and a reamer bolt (olive green) of M8 (ℓ = 19 mm), with Item ㊵ interposed.
★㊵ Transmission case cover gasket	(Non-asbestos)
㊶ Torsion spring	Pay special attention to the up-and-down direction of the spring during assembly.
㊷ Select inner lever	Width of section contacting with shift head: 14.88 - 14.98 mm
㊸ Output shaft	This shaft corresponds to the 4th gear.
㊹ Reverse restrict pin holder	Tightening torque: 29.4 - 49.0 N·m
★㊺ Gasket	
㊻ Compression spring	Free length: 24.00 mm Length as installed: 17.00 mm
㊼ Ball	The same ball is used in common at four points, including the shift fork ball.
㊽ Transmission case	Description is made in the "Components (part 1)." Apply Three Bond® 1216 to the mating sections with the clutch housing and extension housing.
㊾ Shift inner lever	Width of section contacting with shift head: 11.88 - 11.98 mm Width of section contacting with select inner lever: 15.1 - 15.2 mm
㊿ Control shaft boot	Install this boot in such a way that the air bleeding section faces downward.
★(51) Grooved pin	D = 6 mm, L = 24 mm
(52) Shift lever shaft subassembly	Pay special attention to the assembling direction of the lever during assembly.
(53) Radial ball bearing	Press this bearing with the side having a seal facing backward.
(54) Hole snap ring	This ring can be reused.
★(55) Lock nut	Width across flats of lock nut: 38 mm Tightening torque: 177.0 - 216.0 N·m Be sure to stake the lock nut after tightening.
(56) Speedometer drive gear	Nylon-made Pay special attention to the press-fitting dimension. For the installation procedure, refer to the next Item (57).
(57) Radial ball bearing	Press this bearing with the side having a seal facing backward. Utmost care must be exercised when pressing the bearing. Measure the dimension at the time when the bearing lightly comes in contact with the speedometer gear. At this time, ensure that the measured dimension from the edge of the output shaft is 93.0 mm.
(58) Rear bearing retainer	This retainer is installed with three bolts of M8 (ℓ = 20 mm). Tightening torque: 14.7 - 21.6 N·m
(59) Oil slinger	Nylon-made (This slinger is also called the 5th gear oil slinger.)
★(60) Gasket	
(61) Filler plug	The plug at the upper side is used both for oil filling and for oil level check. (The capacity is 1.0 - 1.1 liter when the oil is filled until it starts overflowing.) The plug at the lower side is used for oil draining. Tightening torque: 29.4 - 49.0 N·m
(62) Bimetal formed bush	In cases where only the bush is replaced, care must be exercised so that the joint section may be 120° spaced from the oil groove.
★(63) Type T oil seal	The seal inclination at the time of press-fitting should be 1° or less. Apply MP grease to the lip section.
(64) Extension housing dust deflector	Pay special attention as to the handling of this deflector, for it is easy to deform.
(65) Extension housing subassembly	This is handled as a subassembly on which Items (62) and (64) are assembled. The extension housing subassembly is installed with six bolts of M10 (ℓ = 35 mm). Of these six bolts, one bolt is tightened together with the engine mount bracket. Tightening torque: 29.4 - 49.0 N·m
(66) Speedometer sleeve lock plate	Install this lock plate with a bolt of M6 (ℓ = 16 mm). Tightening torque: 6.9 - 9.8 N·m

★⑥⑦	Type V oil seal	
★⑥⑧	Dust seal	Before replacing these parts with new ones, measure the press-fitting position from the upper surface of Item ⑥⑨ in advance. Then, press new parts to the same depth.
⑥⑨	Speedometer shaft sleeve assembly	Install this assembly with Item ⑥⑥ interposed. Items ⑥⑦ to ⑦① are handled normally as a set.
★⑦⓪	O-ring	Assemble this O-ring into the outer groove of Item ⑥⑨.
⑦①	Speedometer driven gear subassembly	Nylon-made
	Transmission oil	Filling capacity: 1.0 - 1.1 liter Place the vehicle on a level floor and fill the oil to the lower edge of the plug ⑥①. SAE 75W-90 or 80 W-90 API GL-3
★⑦②	Type T oil seal	The protruding dimension should be observed strictly at the time of installation to be 5 ± 0.3 mm.
★⑦③	Type K oil seal	The seal inclination at the time of press-fitting should be 1° or less. Apply MP grease to the lip section.
⑦④	Oil guide plate	This plate is installed at the inside of transmission case. Tightening torque: 6.9 - 9.8 N·m

PMT00011-00000

IN-VEHICLE REPAIRS

1. Speedometer gear sleeve assembly
2. Extension housing oil seal and extension housing subassembly
3. Oil slinger and bearing retainer
4. Speedometer drive gear, radial ball bearing and transmission magnet
5. Check that continuity exists at the backup lamp switch with the reverse gear engaged.

PMT00012-00000

DISASSEMBLY

Disassembly of shift and select lever related parts

NOTE:
- After the sifting feeling and continuity for the reverse backup lamp switch have been checked.

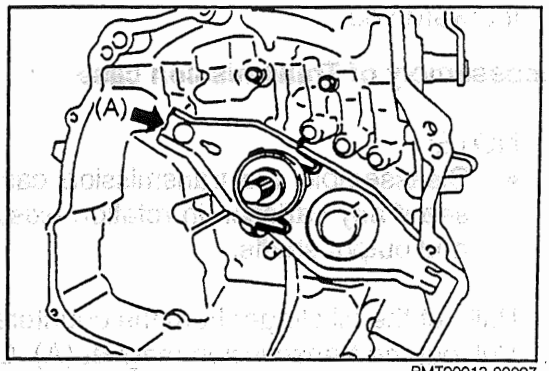
1. Remove the clutch-related parts.
   (Detach the engagement of the spring (A).)
2. Stand the transmission case assembly in such a way that it faces toward the clutch housing lower side.
3. Remove the control shaft cover with gasket {(C) bolt is used for the reamer bolt}.
4. Remove the compression spring and ball of the reverse restrict pin holder with the gasket.

   NOTE:
   - Disassemble the control shaft cover, as required.
   - Prior to the disassembly, drive out the grooved pin of the shift lever shaft.
5. Remove the compression spring and ball by removing the reverse restrict pin holder (B) with the gasket.
6. Remove the hexagon bolt (A) of the reverse idler gear shaft with the gasket.

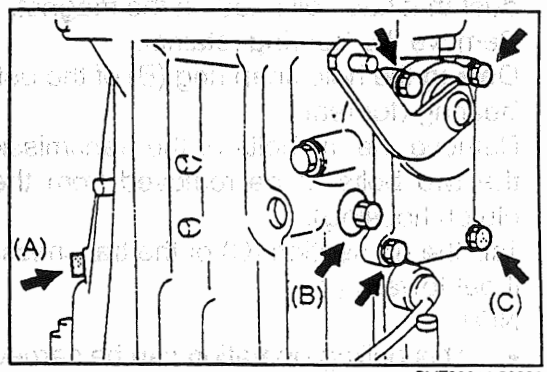
   NOTE:
   - This hexagon bolt is for securing the reverse idle shaft. Hence, be sure to remove this bolt before the transmission is disassembled.
7. Pull out the shift lever subassembly and shift inner lever by driving out the grooved pin.
8. Remove the reverse restrict cam (A), torsion spring (B) and reverse restrict shaft (C) by removing the hexagon bolt with the gasket.

   NOTE:
   - The reverse restrict cam (A) has the correct assembling direction to be observed during assembly. Therefore, when disassembling the reverse restrict cam, make sure to remember the assembling direction in order that the part may be assembled correctly.
9. Remove the backup lamp switch assembly with the gasket.

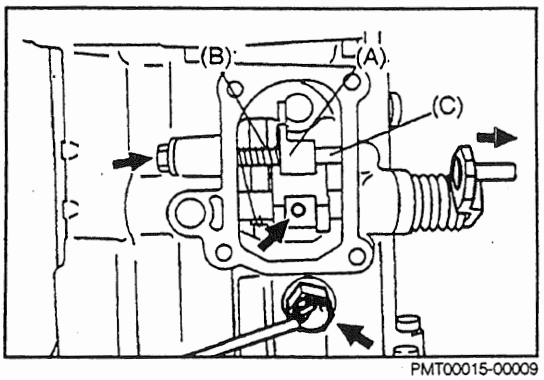
   NOTE:
   - Do not reuse the gasket removed above.



PMT00013-00007



PMT00014-00008

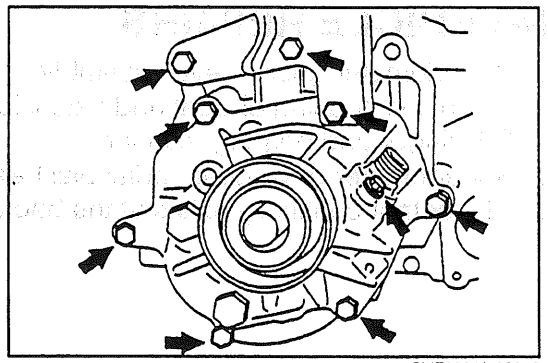


PMT00015-00009

Removal of extension housing

NOTE:
- Remove the extension housing and output shaft only after checks have been made for oil leakage at the rear side or deformation, etc. of the dust reflector.

1. Remove the speedometer shaft sleeve subassembly.
2. Remove the eight bolts of the extension housing together with the engine rear mounting bracket.
3. Tap the rib section of the extension housing. Then, pull out it toward you.

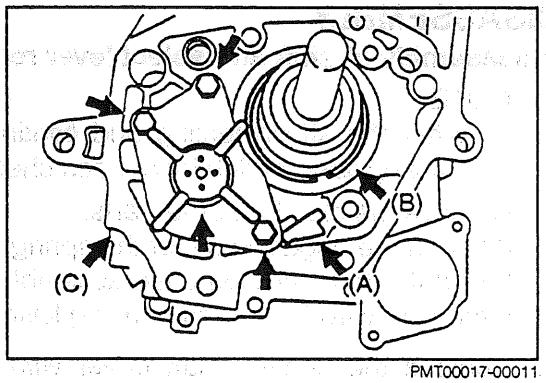

PMT00016-00010

Disassembly of Transmission case

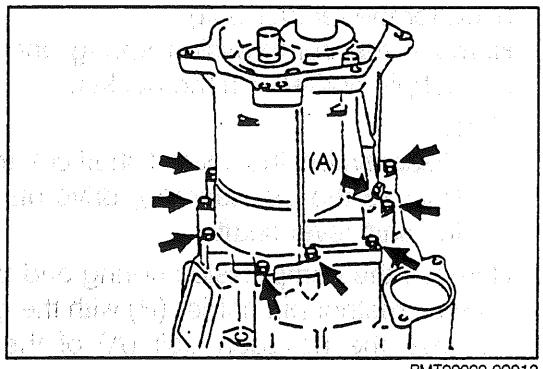
NOTE:
- Disassemble the transmission case after checking to see if any variation in rotation exists between the input and output shafts.

1. Pull out the oil slinger from the countershaft.
2. Pull out the transmission magnet (A). Check the amount of dust that has collected on the magnet.
3. Remove the bearing retainer.
4. Detach the hole snap ring (B) of the output shaft radial ball bearing (for rear).
5. Remove the 10 bolts of the transmission case, (including the two bolts to be removed from the lower side of the clutch housing).
6. Tap the rib section (C) of the transmission case. Then, pull it out toward you.

NOTE:
- This pulling operation can be carried out also by means of the SST (09306-87602-000).



PMT00017-00011



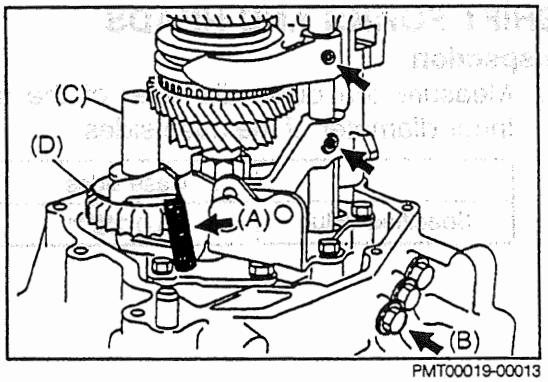
PMT00000-00012

Removal of shift fork

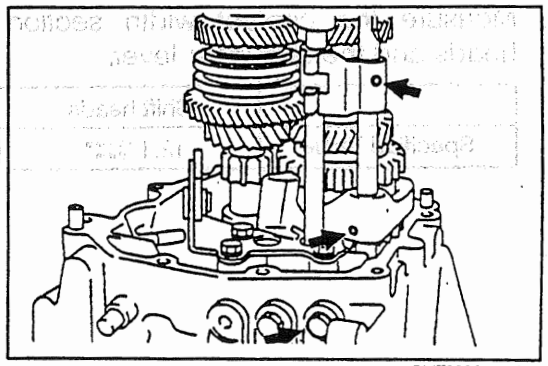
NOTE:
- Check the movement of reverse shift arm and contact width between the shift fork and the rib sleeve.
- Make sure that the shift fork is removed only after the gear concerned is placed in neutral.

PMT00018-00000

1. Detach the tension spring (A).
2. Remove the compression spring and ball by removing the hexagon bolt with the gasket (B).
3. Remove the 5th & reverse shift fork shaft by removing the slotted spring pin of the shift fork and shift head.
   NOTE:
   - When the slotted spring pin is driven out, a measure to sustain the reaction force for pulling out should be taken at the opposite side.
4. Pull out reverse idler gear shaft (C), thrust washer and reverse gear (D).
5. Remove the 1st & 2nd shift fork shaft and the 3rd & 4th shift fork shaft progressively, following the procedure described in the steps 1 through 3 above.



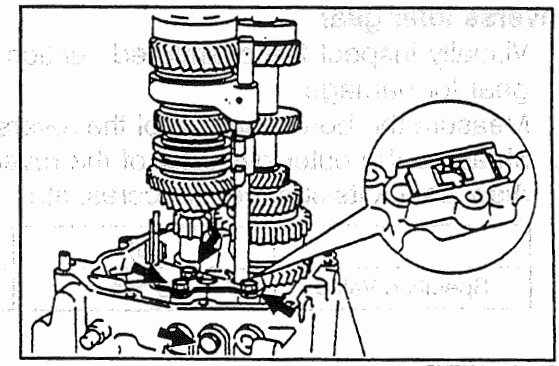
PMT00019-00013


PMT00020-00014

Removal of input shaft and counter shaft

NOTE:
- Confirm that each gear can be engaged properly.

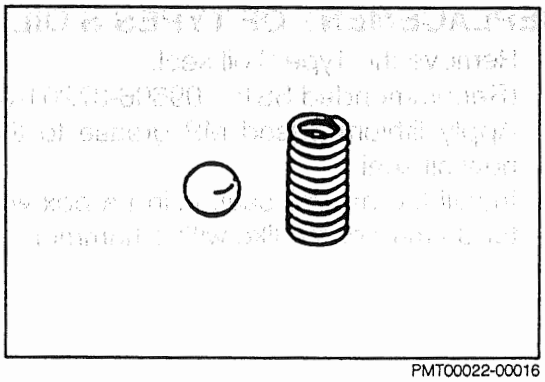
1. Pull out the output shaft assembly with the needle roller bearing and synchronizer ring.
2. Remove the reverse shift arm by removing the three bolts.
3. Remove the input shaft bearing lock plate by removing the three bolts.
4. While holding both the input shaft and countershaft assembly by your hands, pull out them in such a way that they face toward the upper side.


PMT00021-00015

INSPECTION

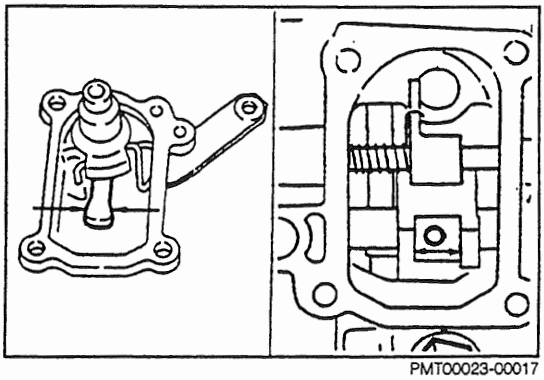
1. Measure the free length of the compression spring for shift fork shafts and reverse restrict pin.

	For shift fork shafts	For reverse restrict pin
Free length	40 mm	24 mm
Load as installed: N	47.33 N	28.83 N
Height as installed	30 mm	17 mm


PMT00022-00016

2. Visually inspect the balls for deformation or scratches.
3. Measure the contact width section between the select inner lever shaft and shift heads.

	Select inner lever	Shift inner lever heads
Specified Value	15 $^{-0.02\ mm}_{-0.12\ mm}$	15 $^{+0.2\ mm}_{+0.1\ mm}$

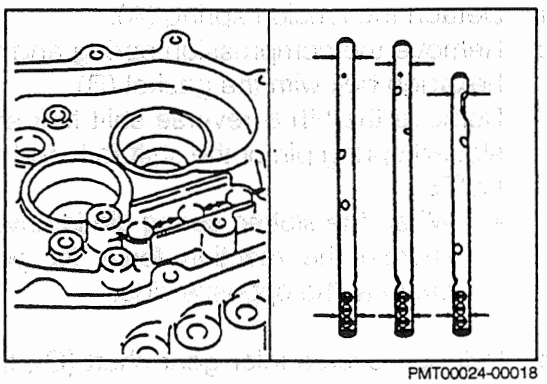

PMT00023-00017

SHIFT FORKS AND HEADS

Inspection

1. Measure the outer diameter of the shift fork shafts and inner diameter of the case sides.

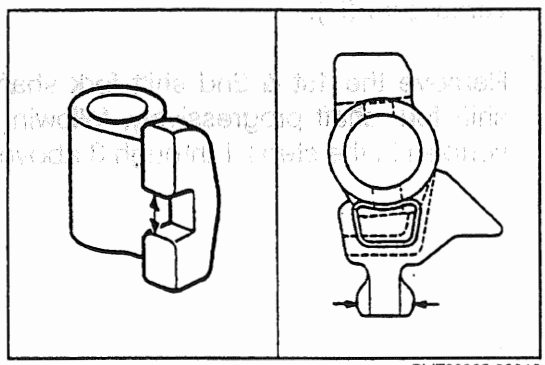
	Case sides	Shaft sides
Specified Value	13.0 $^{+0.043\ mm}_{+0\ mm}$	13.0 $^{-0.05\ mm}_{-0.07\ mm}$



PMT00024-00018

2. Measure the contact width section between the shift heads and the shift inner lever.

	Shift heads	Shift inner lever
Specified Value	12.1 $^{+0.1\ mm}_{+0\ mm}$	12 $^{-0.02\ mm}_{-0.12\ mm}$

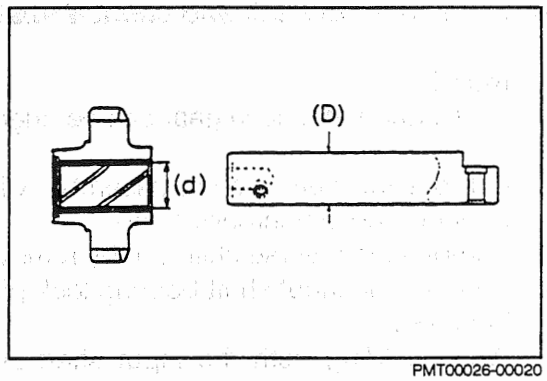


PMT00025-00019

Reverse idler gear

1. Visually inspect the chamfered section of the reverse idle gear for damage.
2. Measure the bore diameter of the reverse idle gear bush.
3. Measure the outer diameter of the reverse idle gear shaft. Also, check its surface for scores, etc.

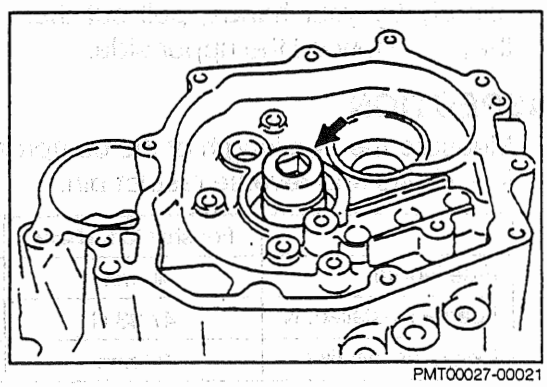
	(d)	(D)
Specified Value	20 $^{+0.061}_{+0.032}$	20.0 $^{+0}_{-0.013}$



PMT00026-00020

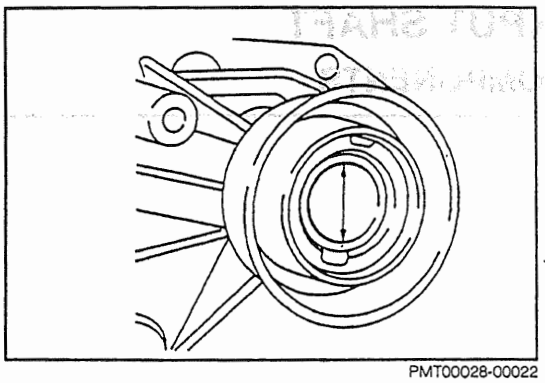
REPLACEMENT OF TYPES S OIL SEAL

1. Remove the Type S oil seal.
   (Recommended SST: 09606-87201-000)
2. Apply lithium based MP grease to the lip section of the new oil seal.
3. Install the new oil seal, using a box wrench (outed diameter 35 mm) or the like with a hammer.



PMT00027-00021

BIMETAL FORMED BUSH


PMT00028-00022

1. Removed the oil seal.
   (Recommended SST: 09308-00010-000)
2. Visually inspect the inner surface of the bimetal formed bush for discoloration or scratch.
3. Measure the inner diameter of the bimetal formed bush.
   Specified Value: $30.0\ ^{+0.021}_{0}$ mm

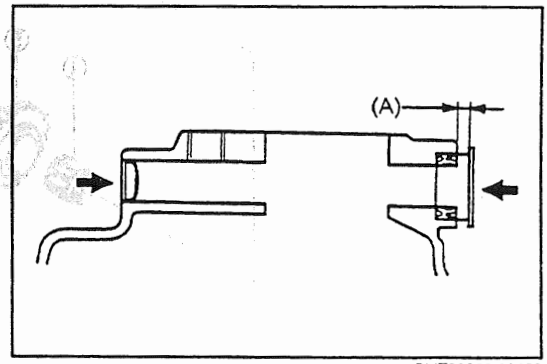
   CAUTION:
   - The bore diameter of the bimetal formed bush has been machined, if the part exceeds the allowable limit, it would cause oil leakage. Therefore, be certain to replace the bimetal formed bush as the extension housing subassembly.

4. Apply lithium based MP grease to the lip section of the new oil seal.
5. Install the new oil seal.

SHIFT LEVER & SHIFT RELATED PARTS REPLACEMENT

Removal

1. Remove the select lever boot.
2. Remove the tight plug (if necessary).
3. Remove the Type T oil seal.
   NOTE:
   - Do not reuse the removed tight plug and oil seal.



PMT00029-00023

Installation

1. Install the new tight plug as shown in the right figure.
2. Install the new Type T oil seal as shown in the right figure.
3. Ensure that the protrusion section (A) of the Type T oil seal conforms to the specified value.
   Specified Value: 5 ± 0.3 mm

   CAUTION:
   - If the protrusion section (A) exceeds the specification above (i.e. above 5.3 mm), it would cause oil leakage.

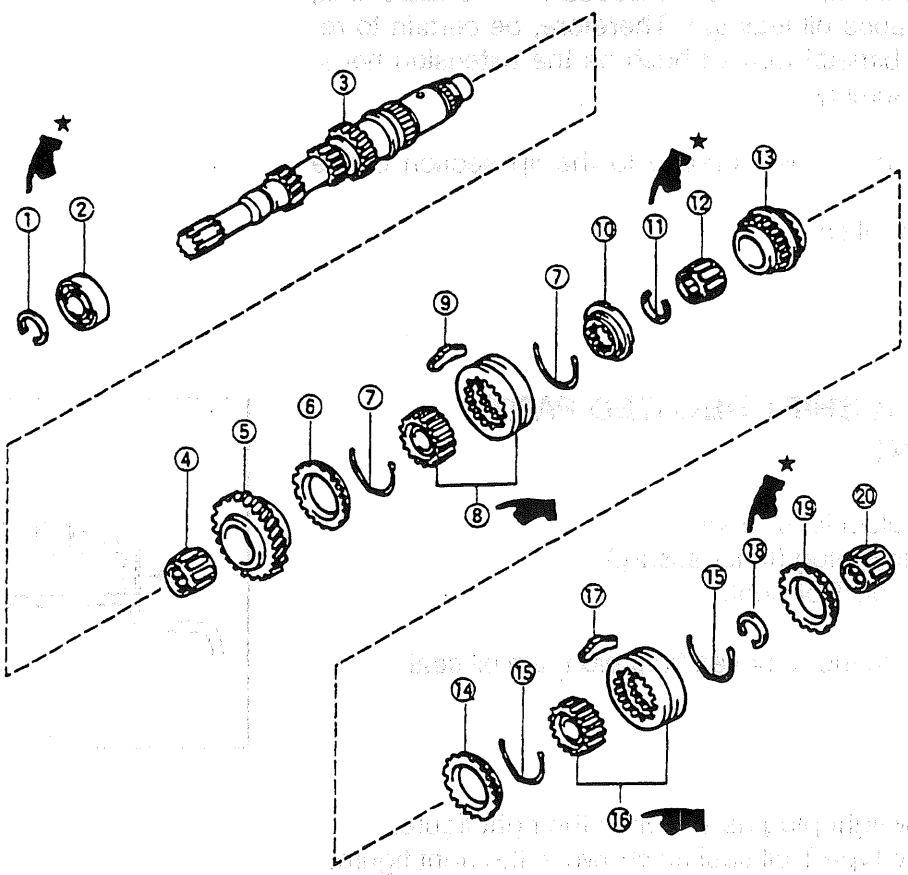
4. Check that continuity exists at the backup lamp switch assembly.

PMT00030-00024

INPUT SHAFT

COMPONENTS

★ : Non-reusable parts
☛ : Selection parts



★① Shaft snap ring
② Radial ball bearing (front)
③ Input shaft
④ Needle roller bearing
⑤ 5th gear
⑥ Synchronizer ring No. 1
⑦ Synchromesh shifting key spring
⑧ Synchronizer No. 3 hub assembly
⑨ Synchromesh shifting key
⑩ Transmission hub sleeve stopper
★⑪ Shaft snap ring
⑫ Needle roller bearing
⑬ 3rd gear
⑭ Synchronizer ring No. 1
⑮ Synchromesh shifting key spring
⑯ Synchronizer No. 2 hub assembly
⑰ Synchromesh shifting key
★⑱ Shaft snap ring
⑲ Synchronizer ring No. 1
⑳ Split type needle roller bearing

INPUT SHAFT COMPONENTS

★① Shaft snap ring	This is shared in common with the snap ring of Item ⑱.Thickness selection type snap ring
② Radial ball bearing	Assemble the bearing so that the side having a seal comes at the front.
③ Input shaft	Needle roller bearing rotating section: D = 31.971 - 31.991 mm, two points Needle roller bearing rear end section: D = 19.966 - 19.984 mm
④ Split type needle roller bearing	The opening width of mating ends of the bearing should not exceed the shaft diameter + 5 mm during installation and removal. The opening end should not exceed 37 mm. *-1
⑤ 5th gear	Bore diameter: 37.00 - 37.025 mm Width: 27.82 - 27.88 mm Thrust end play: 0.1 - 0.4 mm
⑥ Synchronizer ring No. 1	Items ⑥, ⑭ and ⑲ are used in common. Clearance between the gear and the synchronizer ring: 0.95 - 1.35 mm
⑦ Synchromesh shifting key spring	Items ⑦ and ⑮ are used in common. Make sure that no mating end of the spring comes in the same direction in assembly.
⑧ Synchronizer No. 3 hub assembly	Thickness at boss section: 12.37 - 12.43 mm The sleeve is shared in common with Item ⑯. However, be very careful not to mix the sleeve with others, for the hub and sleeve are assembled as a set. Assemble the hub in such a way that the oil-groove side of the hub comes at the front, namely the 5th gear side. The sleeve has no correct assembling direction to be observed. However, be sure to align the missing teeth provided at three points when the hub and sleeve are assembled.
⑨ Synchromesh shifting key	Items ⑨ and ⑰ are used in common. Therefore, a total of six pieces are used in common. Thickness: 4.6 - 4.8 mm
⑩ Transmission hub sleeve stopper	Thickness: 7.19 - 7.25 mm Assemble this retainer in such a way that the flat surface comes at the front; the oil-groove side comes at the rear.
★⑪ Shaft snap ring	This is shared in common with Item ㉓ of the countershaft. Thickness selection type
⑫ Needle roller bearing	This is shared in common with Item ⑦ of the countershaft.
⑬ 3rd gear	Bore diameter: 37.00 - 37.025 mm Width: 37.95 - 37.98 mm Number of gear teeth: 32 Outer diameter: 61 Thrust end play: 0.1 - 0.52 mm
⑭ Synchronizer ring No. 1	Items ⑥, ⑭ and ⑲ are used in common. Clearance between the gear and the synchronizer ring: 0.95 - 1.35 mm *-2
⑮ Synchromesh shifting key spring	Items ⑦ and ⑮ are used in common. Make sure that no mating end of the spring comes in the same direction in assembly.
⑯ Synchronizer No. 2 hub assembly	Thickness at boss section: 18.52 - 18.58 mm Assemble the hub in such a way that the oil-groove side of the hub comes at the front, namely the 3rd gear side. Be sure to align the missing teeth provided at three points when the hub and sleeve are assembled. The sleeve has no correct assembling direction to be observed. Width of shift fork groove: 7.05 - 7.12 mm
⑰ Synchromesh shifting key	Items ⑨ and ⑰ are used in common. Therefore, a total of six pieces are used in common. Thickness: 4.6 - 4.8 mm
★⑱ Shaft snap ring	This is shared in common with the snap ring of Item ①. Thickness selection type
⑲ Synchronizer ring No. 1	Items ⑥, ⑭ and ⑲ are used in common. Refer to Items ⑥ and ⑭.
⑳ Needle roller bearing	This needle roller bearing is located between the input shaft and the output shaft.

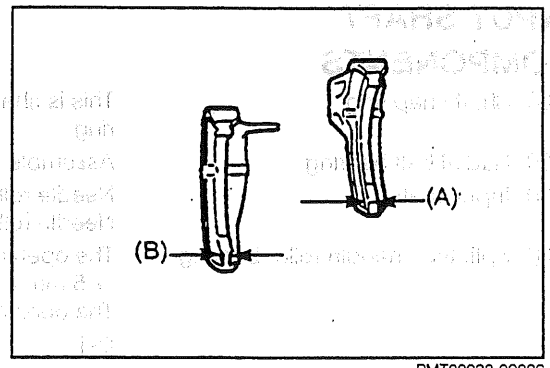
*-1 When the snap ring ⑪ is removed, those parts ④ to ⑩ can be removed collectively.
*-2 When the snap ring ⑱ is removed, those parts ⑫ to ⑰ can be removed collectively.

INPUT SHAFT

INSPECTION PRIOR TO OPERATION

1. Measure the contact section of the shift forks for 3rd gear (A), 5th gear (B) and with the hub sleeves.

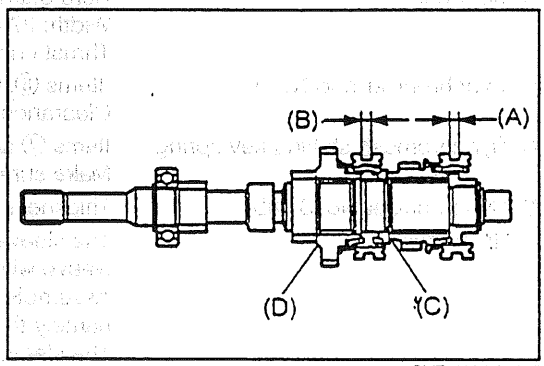
	3rd gear (A) and 5th gear (B)	
	Fork	Hub sleeve
Specified Value	7 $^{-0.1\ mm}_{-0.3\ mm}$	7 $^{+0.12\ mm}_{+0.05\ mm}$
Allowable Limit	6.6 mm	7.2 mm



PMT00033-00026

2. Measure and record the thrust clearance for 3rd gear (C) and 5th gear (D), using a feeler gauge.

	(C)	(D)
Specified Value	0.10 - 0.52 mm	0.10 - 0.40 mm

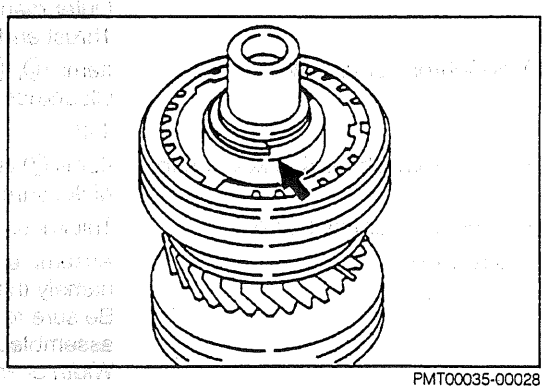


PMT00034-00027

NOTE:
- Ensure that the thrust clearance is measured at several points.
- If the measured thrust clearance fails to conform to the specification above, proceed to disassemble the input shaft assembly.

DISASSEMBLY

1. Using soft jaws, clamp the input shaft assembly in a vice so as to avoid the damage in the spline section.
2. Remove the selection type shaft snap ring at the rear side.
3. For reference at the time of installation, measure and record the removed shaft snap ring.

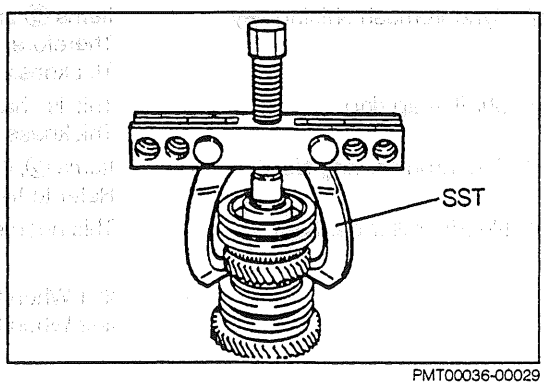

PMT00035-00028

4. Remove the following parts, using the following SST.
   SST: 09950-20017-000

NOTE:
- The following parts can be removed by driving out the input shaft by means of a press, with the 3rd gear section sustained by the SST (09334-87301-000)

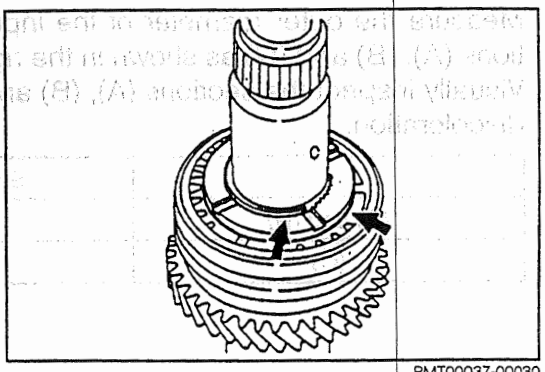
(1) Synchronizer No. 2 hub assembly
(2) Synchronizer ring No. 1
(3) 3rd gear

5. Remove the needle roller bearing.



PMT00036-00029

6. Remove the selection type shaft snap ring.
7. For reference at the time of installation, measure and record the removed shaft snap ring.
8. Remove the transmission hub sleeve stopper.

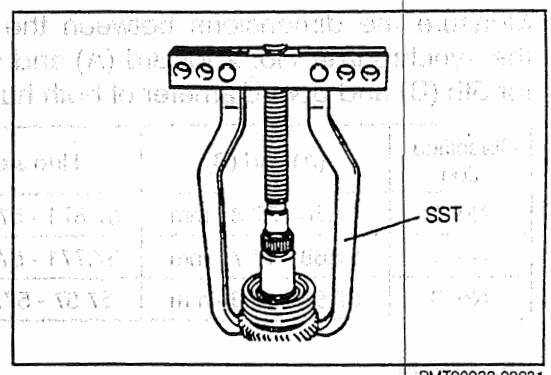


PMT00037-00030

9. Remove the following parts, using the following SST.
   SST: 09950-20017-000

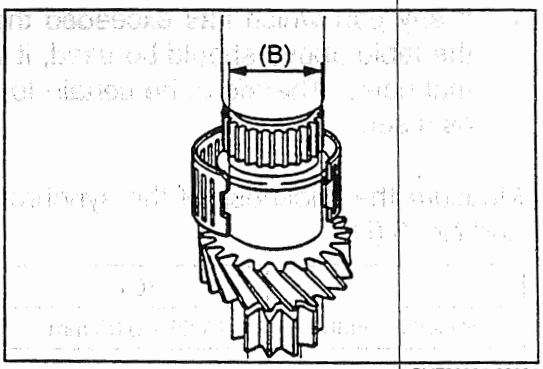
   NOTE:
   - The following parts can be removed by driving out the input shaft by means of a press, with the 5th gear section sustained by the SST (09334-87301-000).

   (1) Synchronizer No. 3 hub assembly
   (2) Synchronizer ring No. 1
   (3) 5th gear



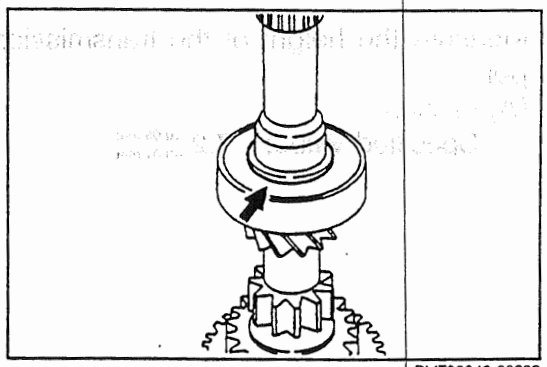
PMT00038-00031

10. Remove the split type needle roller bearing.
    CAUTION:
    - When the split type needle roller bearing is removed, make sure that the gap (B) at the opening of the needle roller bearing will not exceed the outer diameter of the input shaft by more than 5 mm.



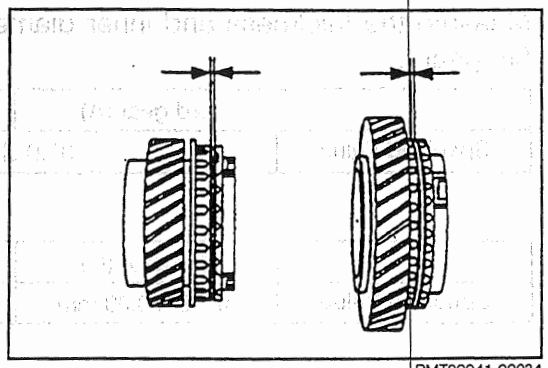
PMT00039-00032

11. Remove the selection type shaft snap ring.
12. Measure and record the thickness of the removed snap ring for the reference of installation.
13. Remove the radial ball bearing at the front side, using the following SST.
    SST: 09950-20017-000


PMT00040-00033

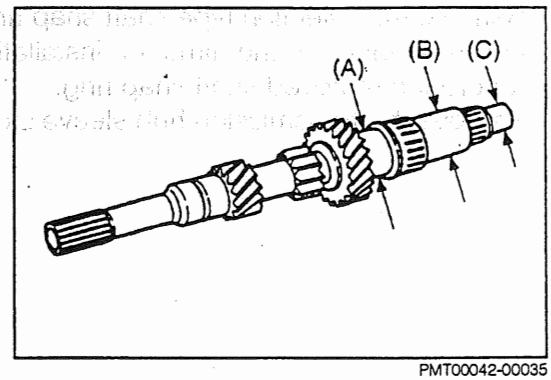
INSPECTION

1. Check the clearance between the gear tapered section and the synchronizer rings.
   Specified Value: 0.95 - 1.35 mm


PMT00041-00034

2. Measure the outer diameter of the input shaft at the sections (A), (B) and (C) as shown in the right figure.
3. Visually inspect the sections (A), (B) and (C) for scratch or discoloration.

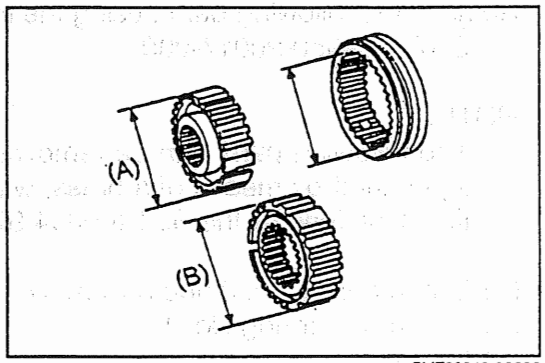
	Specified Value
(A) and (B)	32 $^{-0.009\ mm}_{-0.029\ mm}$
(C)	20 $^{-0.016\ mm}_{-0.034\ mm}$



PMT00042-00035

4. Measure the dimensions between the outer diameter of the synchronizer No. 2 for 3rd (A) and synchronizer No. 3 for 5th (B) and bore diameter of both hub sleeves.

Classification	(A) and (B)	Hub sleeve	Identification
No. 2	57.78 - 57.84 mm	57.871 - 57.97 mm	Yellow
No. 1	57.68 - 57.74 mm	57.771 - 57.87 mm	None
No. 3	57.58 - 57.64 mm	57.67 - 57.77 mm	White

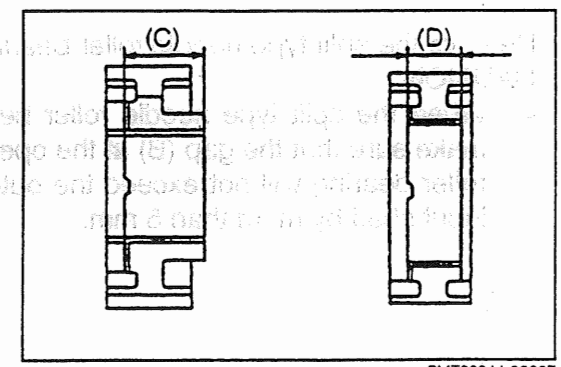


PMT00043-00036

CAUTION:
- If any part which has exceeded the value specified in the table above should be used, it would cause abnormal noise. Therefore, be certain to replace those parts as a set.

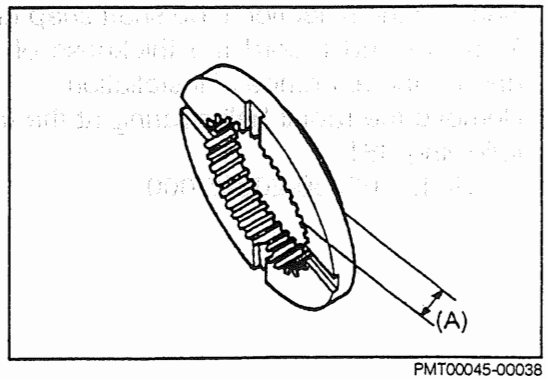
5. Measure the thickness of the synchronizer hub No. 2 (C) and No. 3 (D).

	(C)	(D)
Specified Value	18.55 ± 0.03 mm	12.4 ± 0.03 mm



PMT00044-00037

6. Measure the height of the transmission hub sleeve stopper.
(A) section:
Specified Value: 7.2 $^{+0.05\ mm}_{-0.01\ mm}$

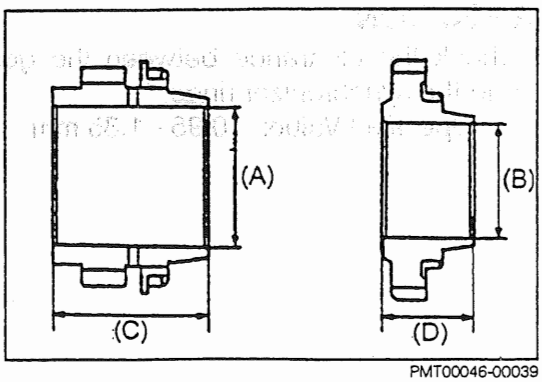


PMT00045-00038

7. Measure the thickness and inner diameter of the 3rd and 5th gears.

	3rd gear (A)	5th gear (B)
Specified Value	37.0 $^{+0.025\ mm}_{+0\ mm}$	

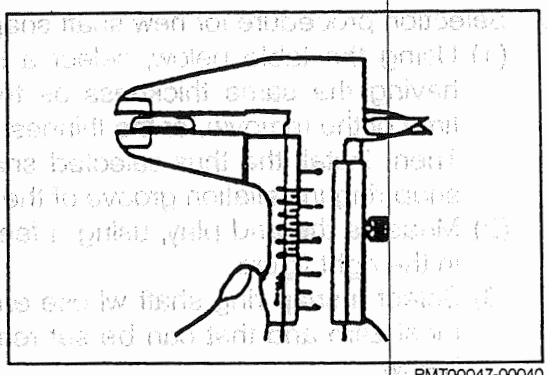
	3rd gear (C)	5th gear (D)
Specified Value	37.95 ± 0.03 mm	27.85 ± 0.03 mm



PMT00046-00039

8. Measure the height of the synchromesh shifting key.
   Specified Value: $5^{-0.2\ mm}_{-0.4\ mm}$
   NOTE:
   - All of the six shifting keys assembled in the input shaft are common parts.

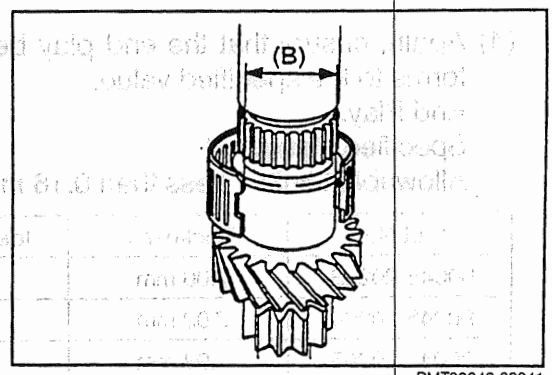
9. Visually inspect the synchromesh shifting key spring for wear or damage.


PMT00047-00040

ASSEMBLY

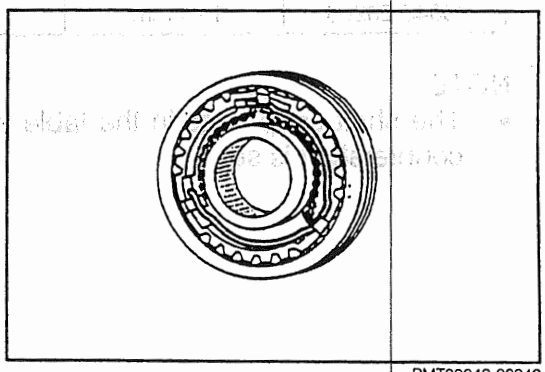
NOTE:
- Be sure to apply gear oil to the relevant parts at every process.
- Never reuse those parts bearing an asterisked mark posted at the pages MT–14 and 15.

1. Install the split type needle roller bearing and apply gear oil to it.
   CAUTION:
   - When the split type needle roller bearing is installed, make sure that the gap (B) at the opening of the needle roller bearing does not exceed the outer diameter of the input shaft by more than 5 mm.

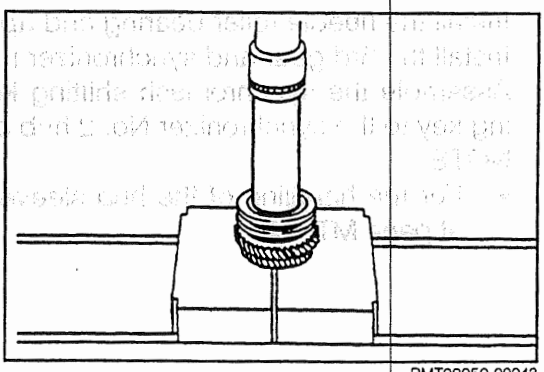


PMT00048-00041

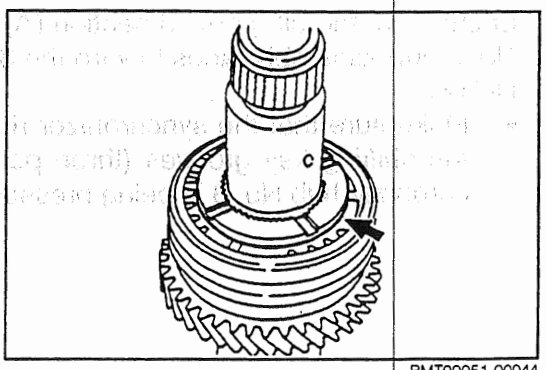
2. Install the 5th gear and synchronizer ring to the input shaft.
3. Assemble the synchromesh shifting key and key spring to the hub as shown in the illustration.
   NOTE:
   - Make sure that no opening end of the shifting key spring comes in the same direction in assembly.
   - Be sure to align the missing teeth provided at three points when the hub and sleeve are assembled.
   - The same hub sleeve is used for both the 3rd gear and 4th gear. However, the hub differs in shape between the 3rd gear and the 4th gear.


PMT00049-00042

4. Ensure that the grooved section in the protrusion position of the synchronizer No. 3 hub faces toward the front (i.e. the 5th gear) side and press them.
   NOTE:
   - Make sure that the synchronizer rings are aligned with the shifting key grooves (three points), while the synchronizer No. 3 hub is being pressed.

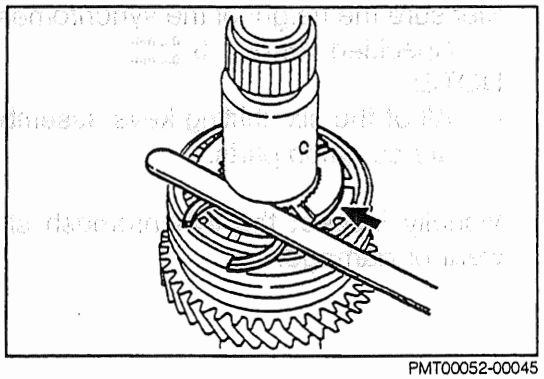

PMT00050-00043

5. Install the transmission hub sleeve stopper.
   NOTE:
   - Ensure that the oil groove section of the 5th shifting key retainer faces toward the 3rd gear side.



PMT00051-00044

6. Selection procedure for new shaft snap ring
   (1) Using the table below, select a new shaft snap ring having the same thickness as that measured at the time of the removal, or the thinnest shaft snap ring. Then, install the thus-selected snap ring on the shaft snap ring installation groove of the input shaft.
   (2) Measure the end play, using a feeler gauge as shown in the right figure.
   (3) Select a snap ring shaft whose end play is zero or almost zero and that can be set readily, using the table below.



PMT00052-00045

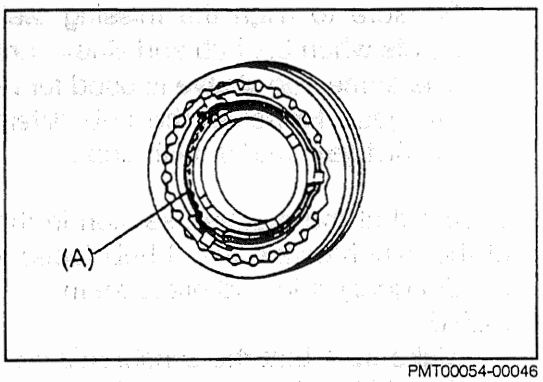
   (4) Again, ensure that the end play between the 5th shifting key retainer and the shaft snap ring conforms to the specified value.
   End Play:
   Specified Value: 0
   Allowable Limit: Less than 0.16 mm

Part No.	Thickness	Identification	Part No.	Thickness	Identification
90045-20263	2.06 mm	None	90045-20267	1.90 mm	Brown
90045-20264	2.02 mm	Brown	90045-20268	1.86 mm	Blue
90045-20265	1.98 mm	Blue	90045-20269	1.82 mm	None
90045-20266	1.94 mm	None	90045-20270	2.10 mm	Brown

NOTE:
- The shaft snap rings in the table above are the common parts as those used when the hub of the countershaft is set.

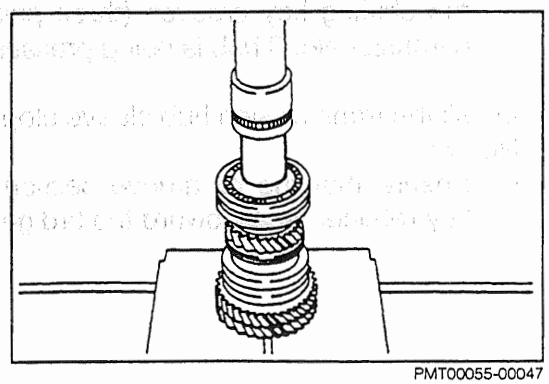
PMT00053-00000

7. Install the needle roller bearing and apply gear oil.
8. Install the 3rd gear and synchronizer ring.
9. Assemble the synchromesh shifting key spring and shifting key to the synchronizer No. 2 hub assembly.
   NOTE:
   - For the handling of the hub sleeve, refer to the step 3 at page MT–19.



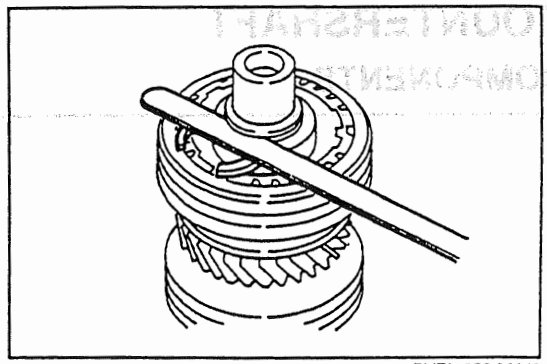
PMT00054-00046

0. Ensure that the oil grooved section (A) of the synchronizer No. 2 hub assembly faces toward the 3rd gear side.
   NOTE:
   - Make sure that the synchronizer rings are aligned with the shifting key grooves (three points), while the synchronizer hub No. 3 is being pressed.



PMT00055-00047

11. Selection procedure for new shaft snap ring
    (1) For the selection procedure of the shaft snap ring, refer to the step 6 at page MT–20.



PMT00056-00048

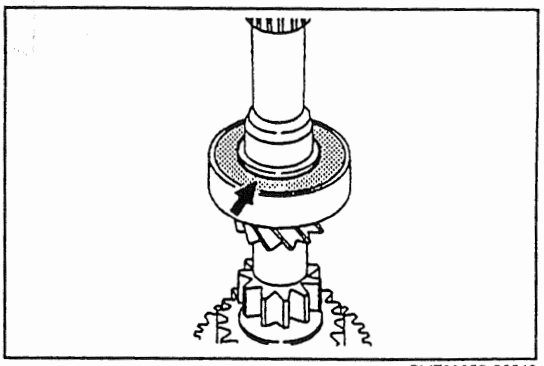
    (2) Again, ensure that the end play between the hub and the shaft snap ring conforms to the specified value.
    End Play:
    Specified Value: 0
    Allowable Limit: Less than 0.16 mm

Part No.	Thickness	Identification	Part No.	Thickness	Identification
90045-20271	2.06 mm	None	90045-20275	1.90 mm	Brown
90045-20272	2.02 mm	Brown	90045-20276	1.86 mm	Blue
90045-20273	1.98 mm	Blue	90045-20277	1.82 mm	None
90045-20274	1.94 mm	None	90045-20278	1.78 mm	Brown

NOTE:
- The shaft snap rings in the table above are the common parts as those used at the front bearing section of the input shaft.

PMT00057-00000

12. Press the radial ball bearing.
    NOTE:
    - Make sure that the radial ball bearing having a seal faces toward the front.
    - Be very careful not to drop and disassemble the synchronizer ring and hub sleeve, while the radial ball bearing is being pressed.
    - The assembling operation of the radial ball bearing may be conducted first.



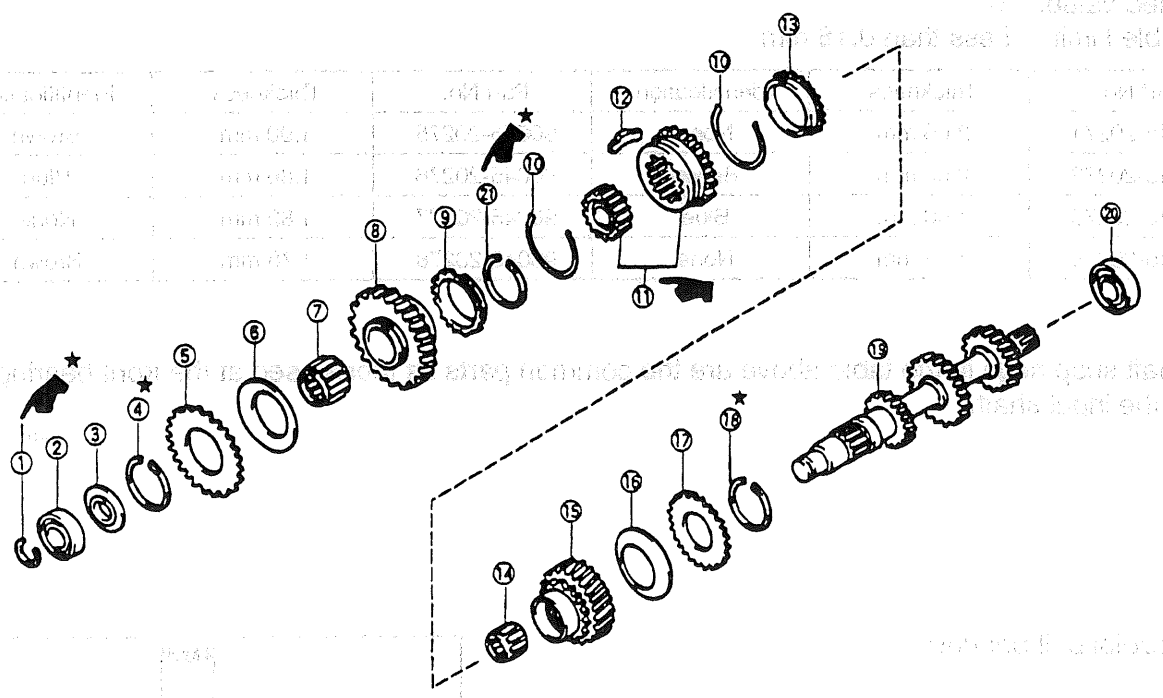
PMT00058-00049

13. In the same manner of the step 11 above, install the selection type shaft snap ring.

COUNTERSHAFT

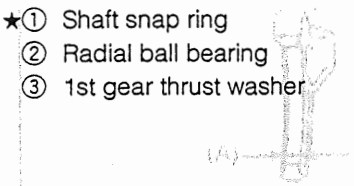
COMPONENTS

★ : Non-reusable parts
☛ : Selection parts



★① Shaft snap ring
② Radial ball bearing
③ 1st gear thrust washer
★④ Shaft snap ring
⑤ 1st sub-gear
⑥ Conical spring washer
⑦ Needle roller bearing
⑧ 1st gear
⑨ Synchronizer ring No. 2
⑩ Synchromesh shifting key spring
⑪ Synchronizer No. 1 hub assembly
⑫ Synchromesh shifting key
⑬ Synchronizer ring No. 3
⑭ Split type needle roller bearing
⑮ 2nd gear
⑯ Conical spring washer
⑰ 2nd sub-gear
★⑱ Shaft snap ring
⑲ Counter gear
⑳ Radial ball bearing
★㉑ Shaft snap ring

COUNTERSHAFT COMPONENTS



★① Shaft snap ring	Thickness selection type
② Radial ball bearing	Bearing without seal
③ 1st gear thrust washer	Thickness = 3.97 - 4.03 mm Assemble the washer in such a way that the protruding side comes at the front; the oil-groove side comes at the 1st gear side. Thrust end play of 1st gear = 0.1 - 0.52 mm
★④ Shaft snap ring	✻-1
⑤ 1st sub-gear	Items ④and ⑱ are used in common. Items ④ to ⑧ are normally handled as assembled parts.
⑥ Conical spring washer	items ⑥ and ⑯ are used in common.
⑦ Needle roller bearing	This bearing is shared in common with Item ⑫ of the input shaft.
⑧ 1st gear	inner diameter: 37.00 - 37.025 mm Effective thickness: 27.31 - 27.37 mm Clearance with synchronizer ring: 0.95 - 1.35 mm Limit: 0.9 mm
⑨ Synchronizer ring No. 2	Synchronizer ring No. 2 Not interchangeable with Item ⑬. To distinguish this from Item ⑬, missing teeth are provided at three points.
⑩ Synchromesh shifting key spring	Make sure that no mating end comes in the same direction in assembly.
⑪ Synchronizer No. 1 hub assembly	The hub and sleeve (reverse gear) are assembled as a set. Effective hub width: 26.97 - 27.03 mm Assemble the hub assembly so that the side having a larger boss protruding dimension comes at the front. As for the sleeve (reverse gear), make sure that the shift fork groove comes at the front side. Shift fork groove width: 10.05 - 10.12 mm
	✻-2
⑫ Synchromesh shifting key	Thickness = 5.0 - 5.2 mm, Composed of 3 pieces.
⑬ Synchronizer ring No. 3	Not interchangeable with Item ⑨.
⑭ Split type needle roller bearing	This is shared in common with Item ④ of the input shaft. The opening width of mating ends should not exceed 37 mm during installation and removal.
⑮ 2nd gear	Inner diameter: 37.00 - 37.025 mm Effective thickness: 36.27 - 36.33 mm Clearance with synchronizer ring: 0.95 - 1.35 mm Limit: 0.9 mm Thrust clearance: 0.1 - 0.4 mm
⑯ Conical spring washer	Items ⑥ and ⑯ are used in common. Assemble each part to the 2nd gear in such a way that the portion having a wider spring diameter comes at the sub-gear side.
⑰ 2nd sub-gear	Items ⑮ to ⑰ are serviced as assembled parts together with the ring ⑱.
★⑱ Shaft snap ring	Items ④and ⑱ are used in common.
⑲ Counter gear	Outer diameter of roller bearing rotating section: 31.971 - 31.991 mm
⑳ Radial ball bearing	Assemble the bearing so that the side having a seal comes at the rear.
★㉑ Shaft snap ring	This is used in common with Item ⑪ of the input shaft. Thickness selection type.

✻-1 When the snap ring ① is removed, those parts up to ⑧ can be removed collectively.
✻-2 When the snap ring ㉒ is removed, those parts ⑩ to ⑱ can be removed collectively.

PMT00060-00000

COUNTERSHAFT

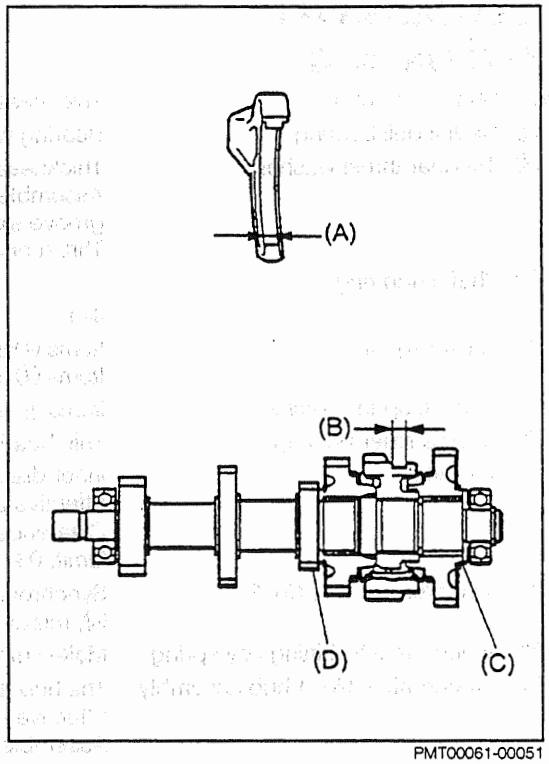
INSPECTION PRIOR TO OPERATION

1. Measure the contact width section of the synchronizer No.1 hub assembly (B) with the 1st & 2nd shift fork (A).

	(A)	(B)
Specified Value	10 $^{-0.1\ mm}_{-0.3\ mm}$	10 $^{+0.12\ mm}_{+0.05\ mm}$
Allowable Limit	9.6 mm	10.2 mm

2. Measure and record the thrust clearance for 1st gear (C) and 2nd gear (D) as shown in the right figure.
   NOTE:
   - Prior to disassembling, make sure to measure the thrust clearance at several points.
   - If the measured thrust clearance exceeds the specified value in the table below, proceed to disassemble the countershaft.

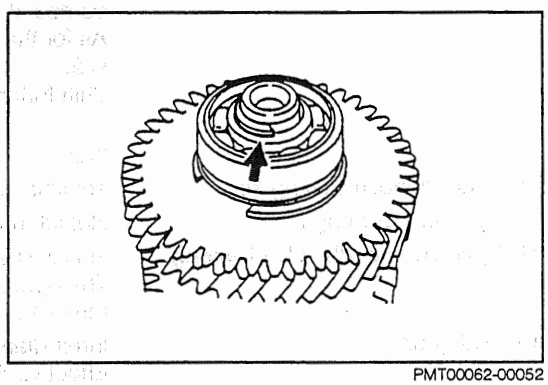
	1st gear (C)	2nd gear (D)
Specified Value	0.10 - 0.52 mm	0.10 - 0.40 mm



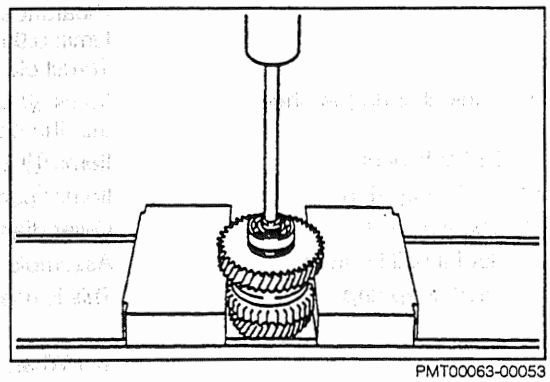
PMT00061-00051

DISASSEMBLY

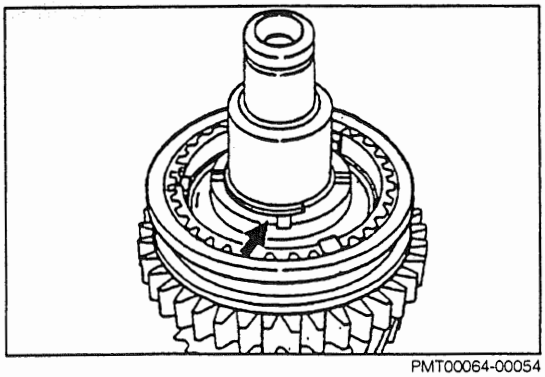
1. Using soft jaws, clamp the spline section of the countershaft assembly in a vice so as to avoid damage.
2. Remove the selection type shaft snap ring.
3. For reference at the time of installation, measure and record the removed selection type shaft snap ring.


PMT00062-00052

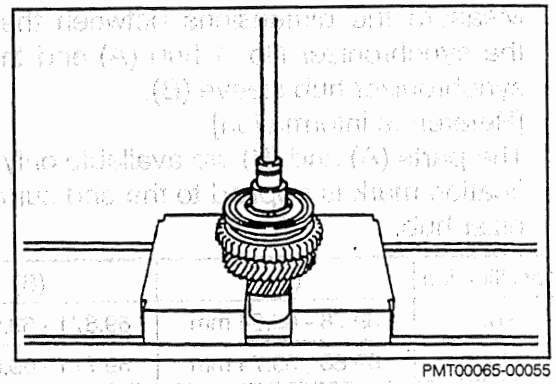
4. Remove the following parts by pressing the countershaft by means of a suitable rod.
   (1) Radial ball bearing
   (2) 1st gear thrust washer
   (3) 1st gear
   (4) Synchronizer ring No. 2
   (5) Needle roller bearing
   NOTE:
   - The parts described above can be removed by pressing the countershaft, while the 1st gear is supported by means of the anvil (09334-87301-000).


PMT00063-00053

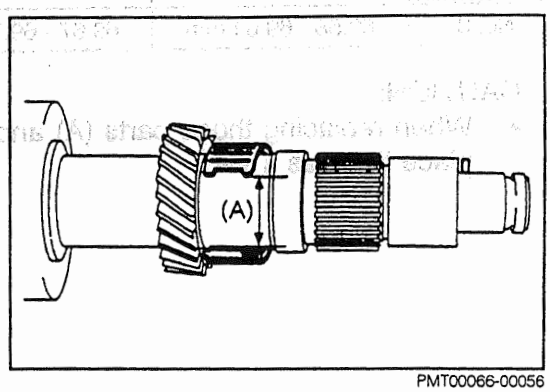
5. Remove the selection type shaft snap ring.
6. For reference at the time of installation, measure and record the removed selection type shaft snap ring.


PMT00064-00054

7. Remove the following parts.
   (1) Synchronizer No. 1 hub assembly
   (2) Synchronizer ring No. 3
   (3) 2nd gear with sub-gear
   NOTE:
   - The parts described above can be removed by pressing the countershaft, while the 2nd gear (sub-gear surface) is supported by means of the anvil (09334-87301-000).


PMT00065-00055

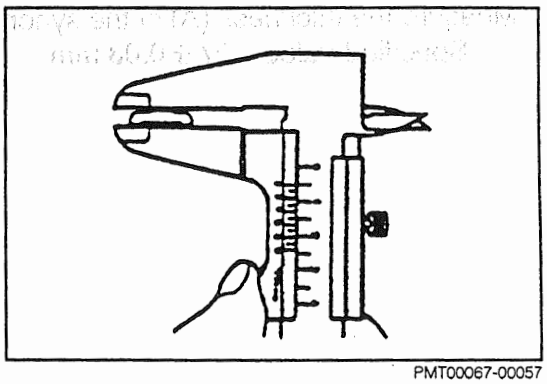
8. Remove the split type needle roller bearing.
   CAUTION:
   - When the split type needle roller bearing is removed, make sure that the gap (A) at the opening of the needle roller bearing does not exceed the outer diameter of the countershaft by more than 5 mm. Failure to observe this caution would cause abnormal noise from the transmission.



PMT00066-00056

INSPECTION

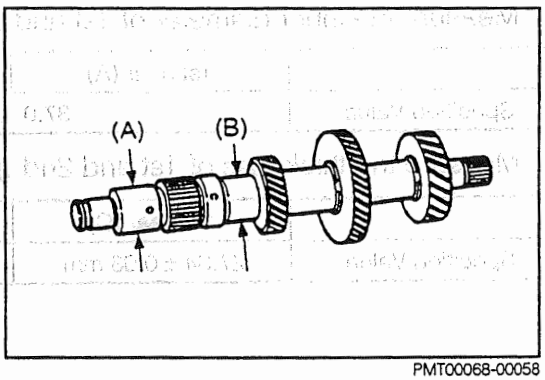
1. Measure the height of the synchromesh shifting spring keys.
   Specified Value: 5.1 ± 0.1 mm


PMT00067-00057

2. Visually inspect the spring for synchromesh shifting key spring for damage or distortion.

3. Measure the outer diameter of the countershaft at the sections (A) and (B).

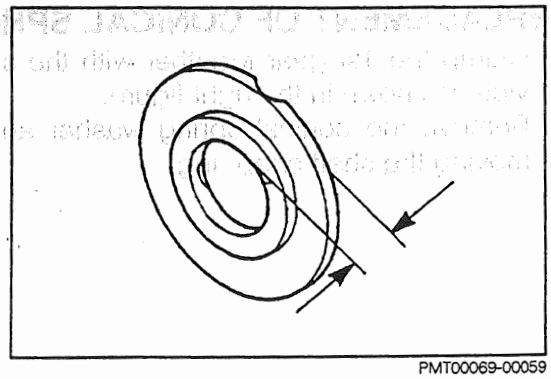
	(A)	(B)
Specified Value	32 $^{-0.009\ mm}_{-0.029\ mm}$	



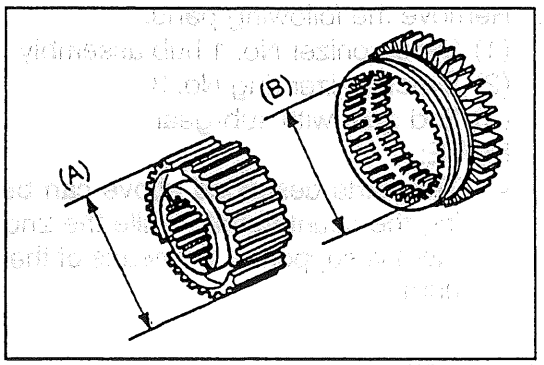
PMT00068-00058

4. Visually inspect the sections (A) and (B) for discoloration and scratches.

5. Measure the thickness of the 1st gear thrust washer.
   Specified Value: 4 ± 0.03 mm


PMT00069-00059

6. Measure the dimensions between the outer diameter of the synchronizer No. 1 hub (A) and the bore diameter of synchronizer hub sleeve (B).
   [Reference information]
   The parts (A) and (B) are available only as a set. An identification mark is applied to the end surface of the synchronizer hub.

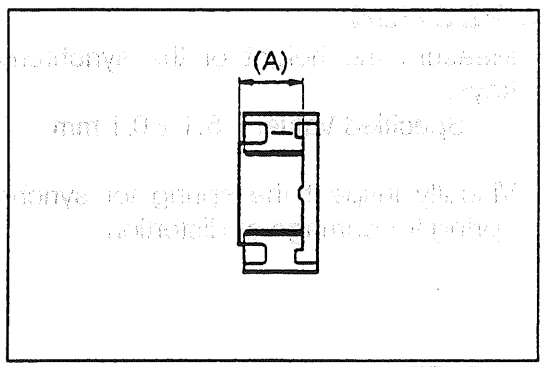


PMT00070-00060

Classification	(A)	(B)	Identification
No. 2	69.78 - 69.84 mm	69.871 - 69.97 mm	Yellow
No. 1	69.68 - 69.74 mm	69.771 - 69.87 mm	None
No. 3	69.58 - 69.64 mm	69.67 - 69.77 mm	White

CAUTION:
- When replacing those parts (A) and (B), be sure to replace them as a set.

7. Measure the thickness (A) of the synchronizer No. 1 hub.
   Specified Value 27 ± 0.03 mm



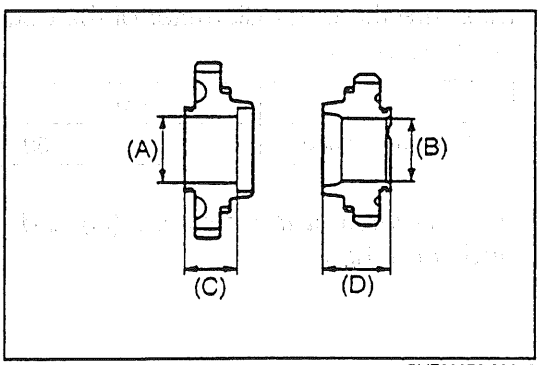
PMT00071-00061

8. Measure the inner diameter of 1st and 2nd gear.

	1st gear (A)	2nd gear (B)
Specified Value	37.0 $^{+0.025\ mm}_{+0\ mm}$	

9. Measure the thickness of 1st and 2nd gear.

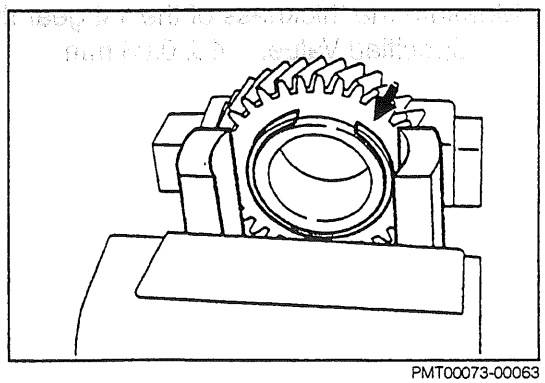
	1st gear (C)	2nd gear (D)
Specified Value	27.34 ± 0.03 mm	36.30 ± 0.03 mm



PMT00072-00062

REPLACEMENT OF CONICAL SPRING WASHER

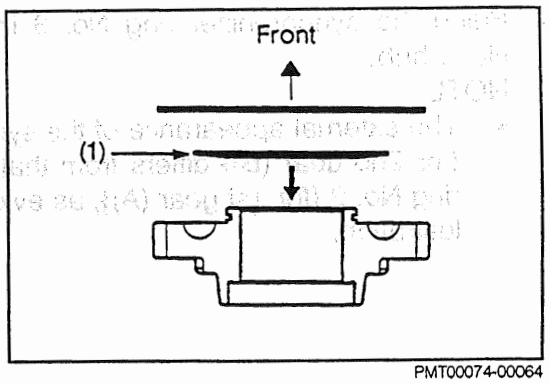
1. Clamp the 1st gear together with the square bracket in a vice as shown in the right figure.
2. Remove the conical spring washer and sub-gear by removing the shaft snap ring.


PMT00073-00063

INSPECTION

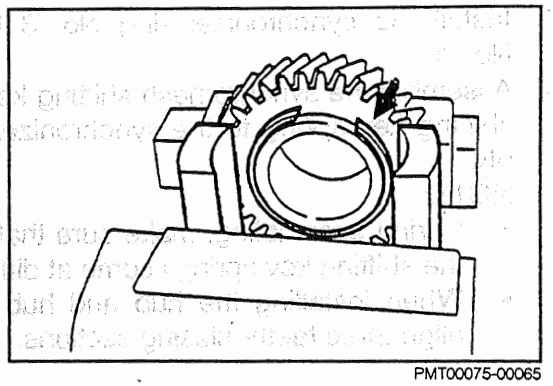
1. Measure the height of the conical spring washer.
   Specified Value: 2.01 mm
   Allowable Limit: 1.04 mm

2. Place the new conical spring washer (1) and sub-gear on the 1st gear.
3. Ensure that the expanded side of the conical spring washer faces toward the sub-gear side as shown in the right figure.

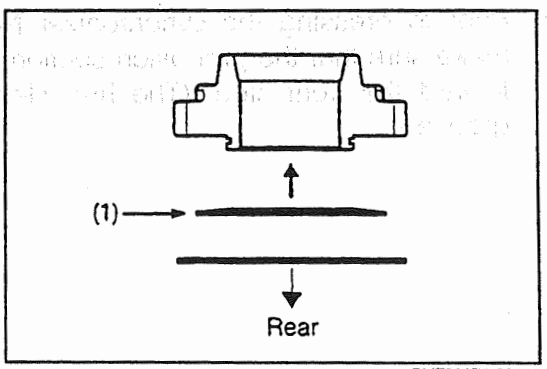


PMT00074-00064

4. Install the new shaft snap ring by pressing the conical spring washer, using a square bracket.
   NOTE:
   - As for the dimension of the square size bracket, refer to page MT–2.


PMT00075-00065

5. In the same manner of the operation stated above, replace the conical spring washer for the 2nd sub-gear.
6. Ensure that the expanded side of the conical spring washer for gear No. 2 (1) faces toward the sub-gear side as shown in the right figure.

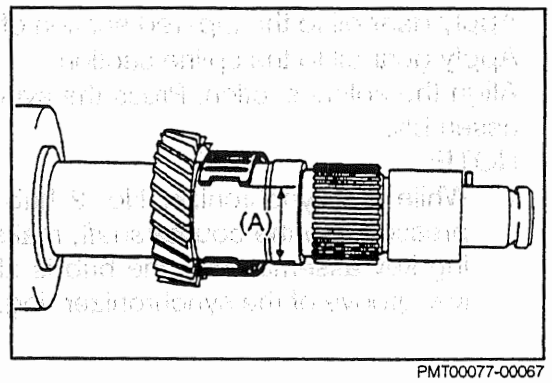


PMT00076-00066

ASSEMBLY

- When assembling the countershaft, apply gear oil at each step and assemble each part.
- As for those parts which bear the "★" marks at pages MT–22 and MT–23, never reuse them.

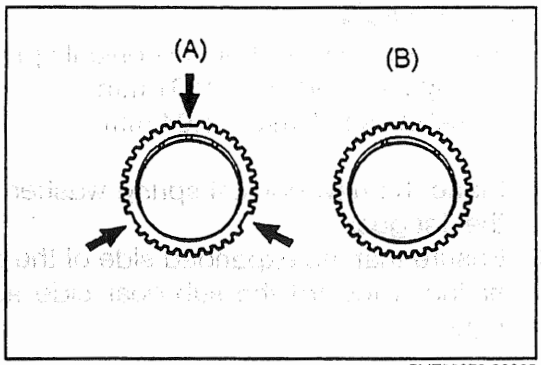
1. Install the split type needle roller bearing.
   CAUTION:
   - When the split type needle roller bearing is installed, make sure that the gap (A) at the opening of the needle roller bearing will not exceed the outer diameter of the countershaft by more than 5 mm.



PMT00077-00067

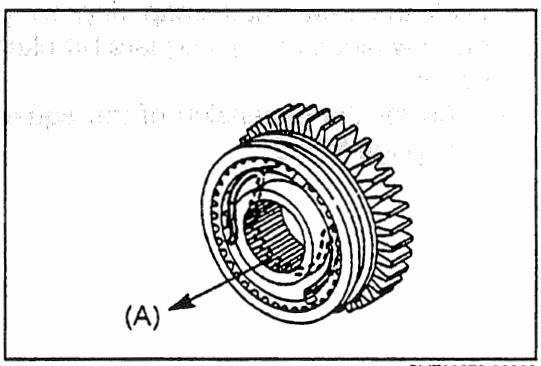
2. Apply gear oil to the outer periphery of the split type needle roller bearing and install the 2nd gear to the countershaft.

3. Place the synchronizer ring No. 3 into the synchronizer No. 1 hub.
   NOTE:
   - The external appearance of the synchronizer ring No. 3 {for 2nd gear (B)} differs from that of the synchronizer ring No. 2 {for 1st gear (A)}, as evident from the right illustration.



PMT00078-00068

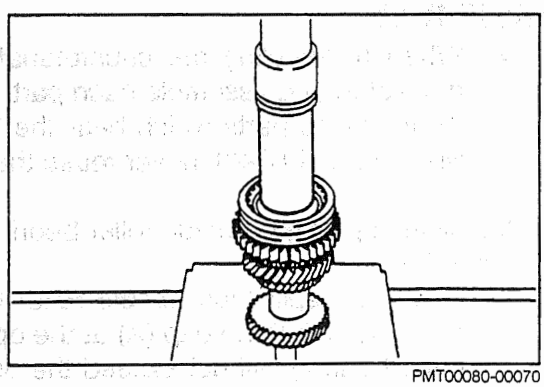
4. Install the synchronizer ring No. 3 to the synchronizer No. 1.
5. Assemble the synchromesh shifting key and synchromesh shifting key spring to the synchronizer No. 1 hub assembly.
   NOTE:
   - During assembling, make sure that the mating ends of the shifting key springs come at different positions.
   - When installing the hub and hub sleeve, be sure to align three teeth-missing sections.



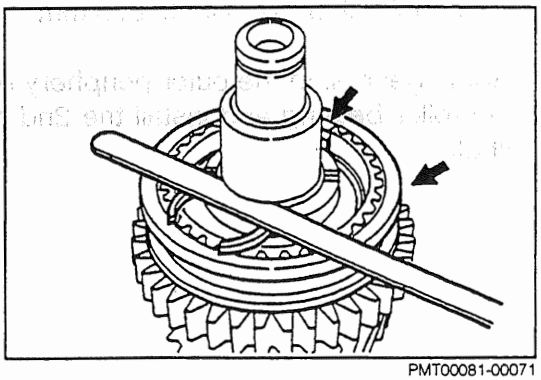
PMT00079-00069

6. Prior to pressing the synchronizer No. 1 hub assembly, make sure that the protrusion section (A) of the hub faces toward the front side. (The hub sleeve has a shift fork groove.)

7. Apply gear oil to the tapered section of the 2nd gear.
8. Apply gear oil to the spline section.
9. Align the spline section. Press the synchronizer No. 2 hub assembly.
   NOTE:
   - While the synchronizer No. 2 hub assembly is being pressed into the countershaft, make sure that the shifting key assembled to the hub is aligned with the shift key groove of the synchronizer ring.


PMT00080-00070

10. Selection sequence of new shaft snap ring.
    (1) Using the table below, select a new shaft snap ring having the same thickness as that measured at the time of removal, or the thinnest shaft snap ring.
    Then, install the thus-selected shaft snap ring on the shaft snap ring installation groove of the countershaft.
    (2) Measure the end play, using a feeler gauge as shown in the right figure.
    (3) Select a snap ring shaft whose end play is zero or almost zero and that can be set readily, using the table below. Then, proceed to install it.


PMT00081-00071

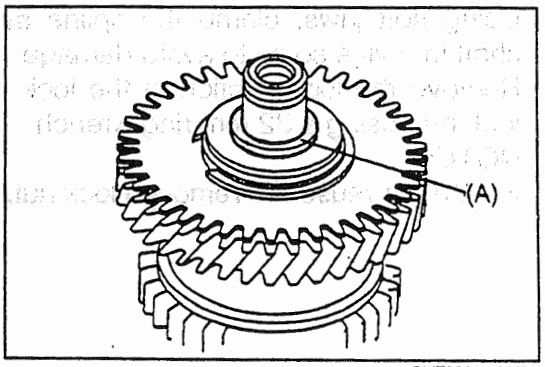
(4) Again, ensure that the end play comforms to the specified value.
End Play:
Specified Value: 0
Allowable Limit: Less than 0.16 mm

Part No.	Thickness	Identification	Part No.	Thickness	Identification
90045-20263	2.06 mm	None	90045-20267	1.90 mm	Brown
90045-20264	2.02 mm	Brown	90045-20268	1.86 mm	Blue
90045-20265	1.98 mm	Blue	90045-20269	1.82 mm	None
90045-20266	1.94 mm	None	90045-20270	2.10 mm	Brown

NOTE:
- The snap ring shafts in the table above are the same as those used when the hub of the input shaft is set.

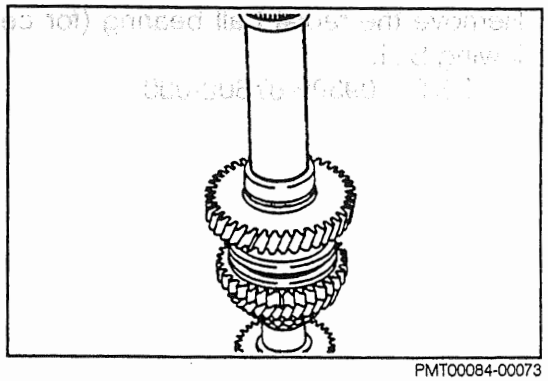
PMT00082-00000

11. Install the needle roller bearing. Apply gear oil to the outer periphery of the needle roller bearing.
12. Place the synchronizer ring No. 2 (the ring having missing teeth).
13. Install the 1st gear with the sub-gear assembled.
14. Install the 1st gear thrust washer.
NOTE:
- Ensure that the protrusion section (A) of the 1st gear thrust washer faces toward the front side.



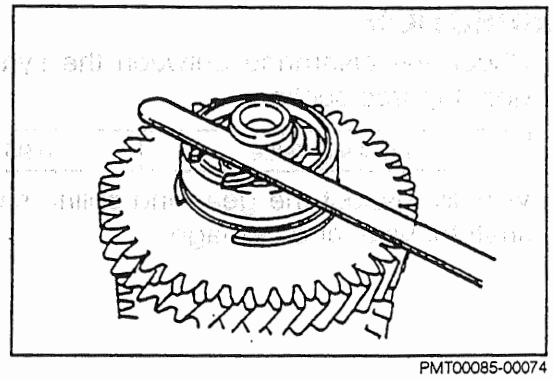
PMT00083-00072

15. Press the radial ball bearing. (This bearing has no seal.)



PMT00084-00073

16. Selection sequence of new shaft snap ring
(1) For the selection procedure of the shaft snap ring, refer to the step 10 at page MT-28.



PMT00085-00074

(2) Ensure that the end play conforms to the specified value.
End Play:
Specified Value: 0
Allowable Limit: Less than 0.16 mm

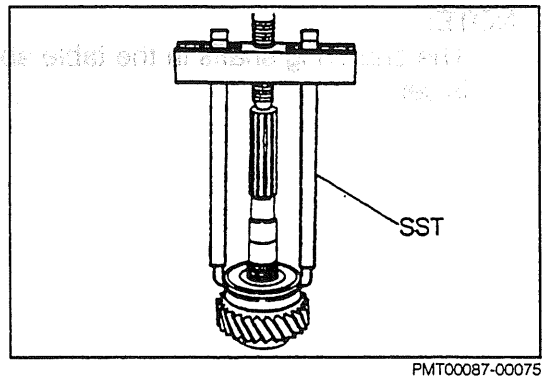
Part No.	Thickness	Identification	Part No.	Thickness	Identification
90045-20279	2.06 mm	None	90045-20283	1.90 mm	Brown
90045-20280	2.02 mm	Brown	90045-20284	1.86 mm	Blue
90045-20281	1.98 mm	Blue	90045-20285	1.82 mm	None
90045-20282	1.94 mm	None	90045-20286	1.78 mm	Brown

PMT00086-00000

OUTPUT SHAFT

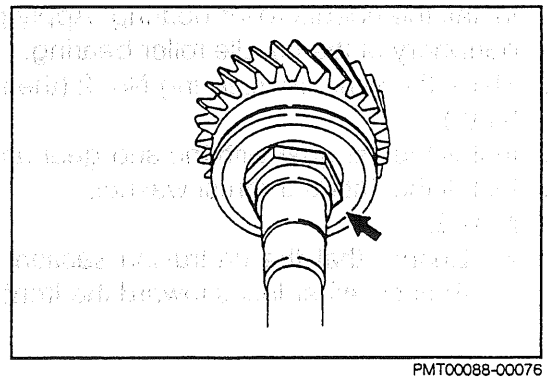
DISASSEMBLY

1. Remove the radial ball bearing (for rear), using the following SST.
   SST: 09306-87602-000



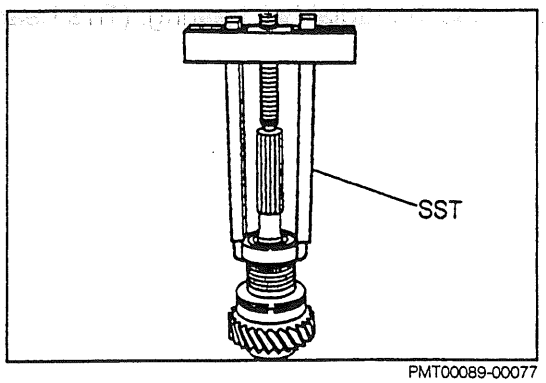
PMT00087-00075

2. Pull out the speedometer drive gear.
3. Using soft jaws, clamp the spline section of the output shaft in a vice so as to avoid damage.
4. Remove the lock section of the lock nut and remove the lock nut, using a 32 mm ring wrench.
   NOTE:
   - Do not reuse the removed lock nut.



PMT00088-00076

6. Remove the radial ball bearing (for center), using the following SST.
   SST: 09306-87602-000



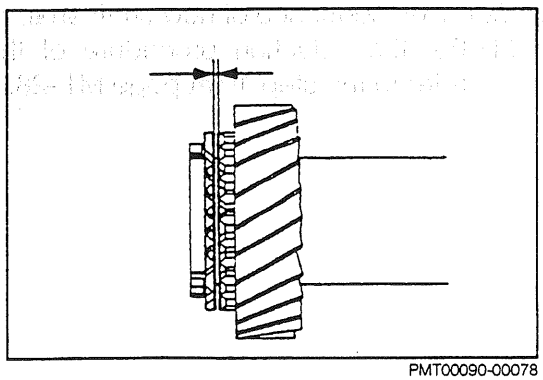
PMT00089-00077

INSPECTION

1. Check the clearance between the synchronizer ring and gear tapered section.

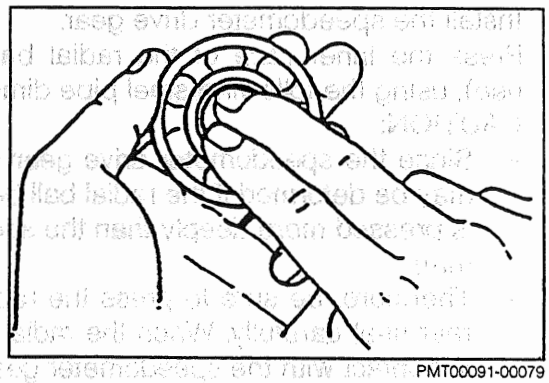
Specified Value	0.95 mm - 1.35 mm

2. Visually inspect the gear and spline section of the output shaft for wear and damage.



PMT00090-00078

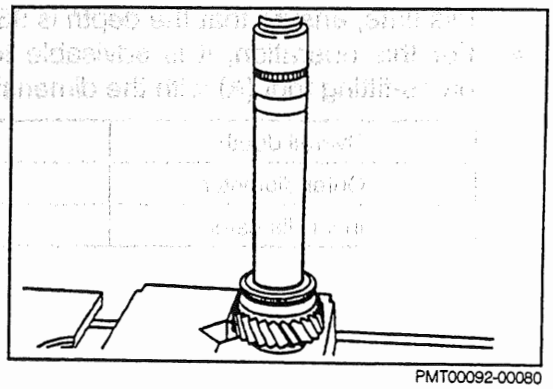
3. When you rotate the rear and center of the radial ball bearing inner race with your fingers, as shown in the right figure, they should be rotated smoothly without any bindings.


PMT00091-00079

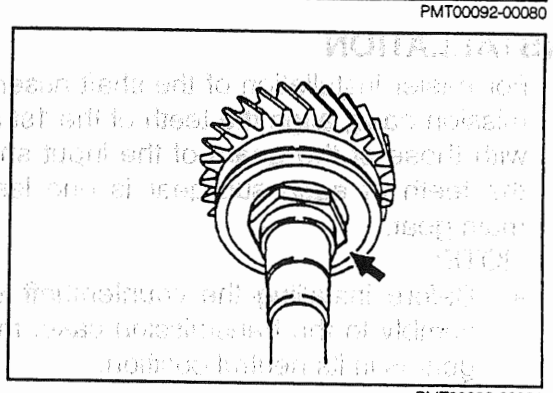
ASSEMBLY

1. Press the inner race of the radial ball bearing.
   - Ensure that the retaining section (Namely, the side having the seal should face toward the rear side.) of the radial ball bearing faces toward the rear side.

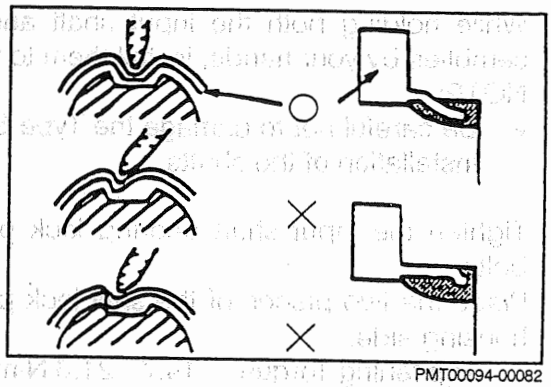
   NOTE:
   - The radial ball bearing can be pressed by using either the SST (09310-87302-000) or a pipe with which the inner race can be pressed.


PMT00092-00080

2. Insert a 32 mm torque header into the output shaft.
3. Using soft jaws, clamp the spline section of the output shaft in a vice so as to avoid damage.
4. Tighten the new lock nut with the torque wrench.
   Tightening Torque: 177.0 - 216.0 N·m

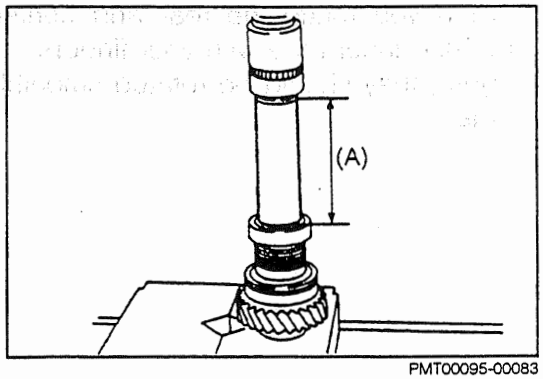

PMT00093-00081

5. Stake the new lock nut.
   NOTE:
   - When staking the new lock nut, point a suitable staking tool toward the output shaft axis center to lock securely, as shown in the right upper figure.
   - Poor staking, such as shown in the right middle and lower figures, may cause loosening of the lock nut.


PMT00094-00082

6. Install the speedometer drive gear.
7. Press the inner race of the radial ball bearing (for rear use), using the following steel pipe dimension.
   CAUTION:
   - Since the speedometer drive gear is made of nylon, it may be deformed if the radial ball bearing (for rear use) is pressed more deeply than the specified depth (93.00 mm).
   - Therefore, be sure to press the radial ball bearing (for rear use) carefully. When the radial ball bearing comes in contact with the speedometer gear, stop pressing. At this time, ensure that the depth is 93.00 mm.
   - For this operation, it is advisable to use the following press-fitting tool (A) with the dimensions given below.

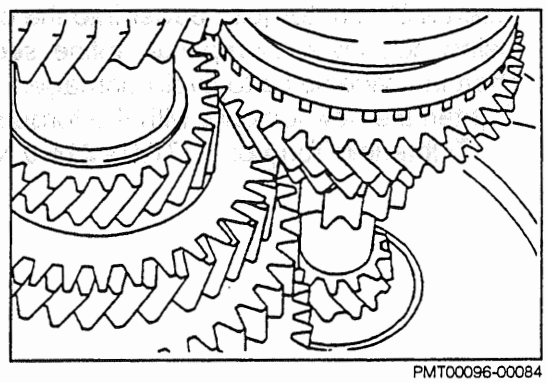
Overall depth	93.00 mm
Outer diameter	35.00 mm
Inner diameter	25.00 mm



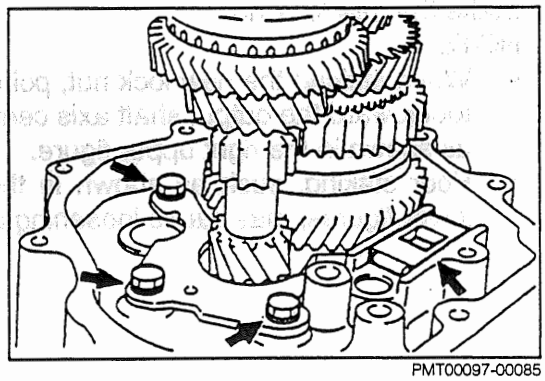
PMT00095-00083

NSTALLATION

1. For easier installation of the shaft assemblies to the transmission case, align the teeth of the 1st and 2nd sub-gears with those of the gears of the input shaft. The number of the teeth of each sub-gear is one less than that of the main gear.
   NOTE:
   - Before installing the countershaft and input shaft assembly to the transmission case, make sure that each gear is in its neutral position.

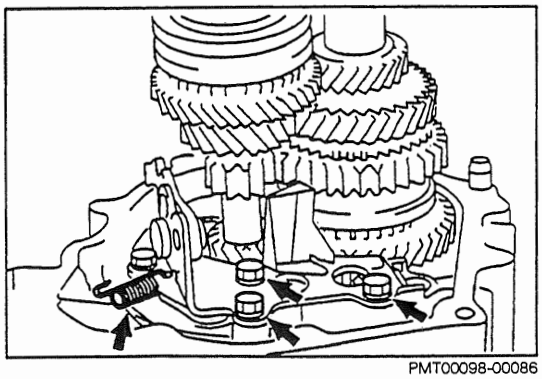

PMT00096-00084

2. While holding both the input shaft and countershaft assemblies by your hands, install them to the clutch housing.
   NOTE:
   - Be careful not to damage the Type S oil seal during the installation of the shafts.

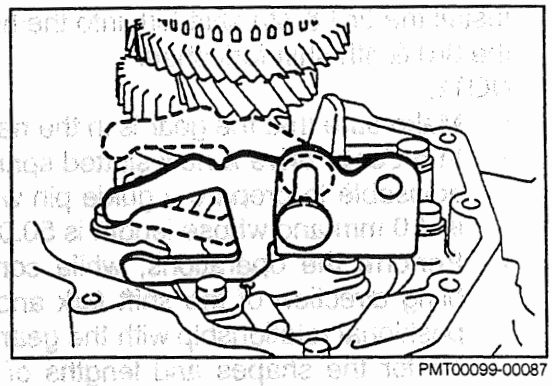

PMT00097-00085

3. Tighten the input shaft bearing lock plate with the three bolts.
4. Place the two pieces of the shift lock plates on the clutch housing side.
   Tightening Torque: 14.7 - 21.6 N·m

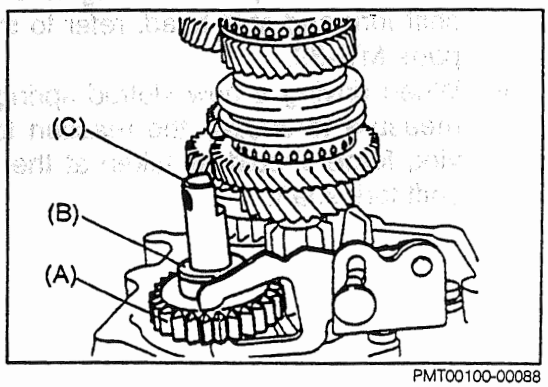
5. Attach the tension spring to the input shaft bearing lock plate.
6. Tighten the reverse shift arm with the three bolts.
   Tightening Torque: 14.7 - 21.6 N·m


PMT00098-00086

7. Movement of reverse shift arm check
   (1) Pull up the reverse shift arm pin with your fingers.
   (2) Ensure that the reverse shift arm pin drops smoothly by its own weight when you release it.


PMT00099-00087

8. Install the reverse idler gear (A), shaft (C) and thrust washer (B) as shown in the right figure.
   NOTE:
   - When installing, install the knock pin for use in preventing rotation of the idler gear shaft to the groove section at the clutch housing side.
   - Make sure that the gear chamfer and thrust washer (nylon) face upward (i.e. rear side).

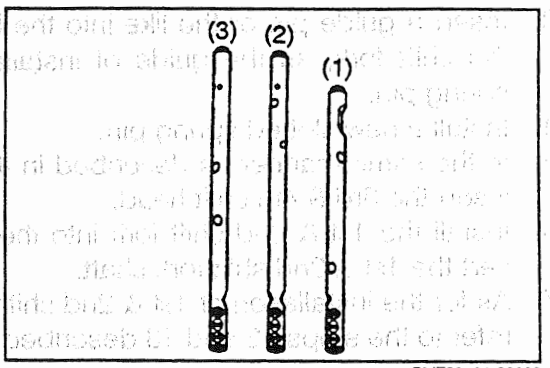


PMT00100-00088

Confirmation of length/shape of shift fork and shift fork shaft

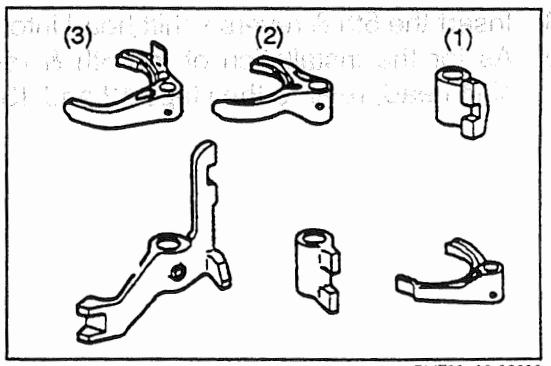
9. The following three shift fork shafts differ in the overall length, as shown in the right figure.
   NOTE:
   - Be very careful not to make any wrong installation of these shift fork shafts.

	Shift fork shafts	Overall Length
(1)	1st & 2nd	224.00 mm
(2)	3rd & 4th	259.00 mm
(3)	5th & Reverse	265.00 mm



PMT00101-00089

10. The shift forks and shift heads differ in the external view, as shown in the right figure. Hence, be very careful not to make any wrong installation of these shift forks and shift heads.
    (1) 1st & 2nd
    (2) 3rd & 4th
    (3) 5th & Reverse
    NOTE:
    - It is advisable to install the shift fork shaft and fork temporarily and confirm that the combination and direction are right. Then, proceed to the operation.

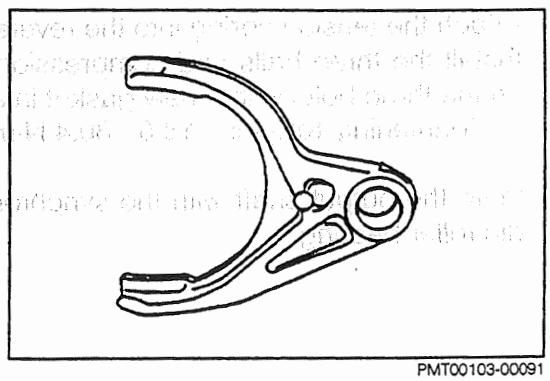


PMT00102-00090

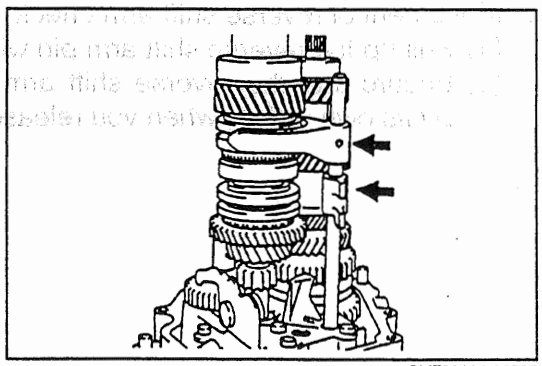
Installation to shift fork and shift fork shaft

- Apply gear oil to the required points. Perform the operations, following the procedure given below.

11. Temporarily drive a new slotted spring pin into all of the shift forks and heads so that the slotted spring pin may be driven easily during installation.

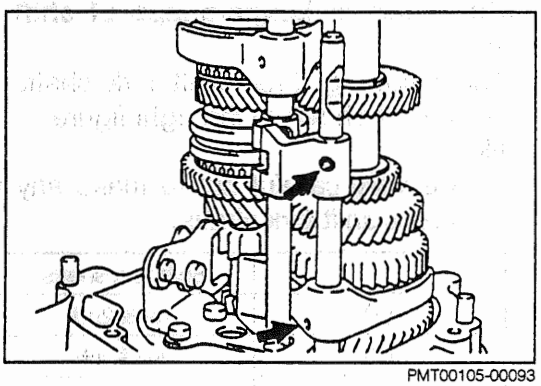

PMT00103-00091

12. Install the 3rd & 4th shift fork into the hub sleeve and insert the 3rd & 4th shift fork shaft.
    NOTE:
    - Make sure that the gear is in the neutral position.
    - In order to drive a new slotted spring pin smoothly, it is advisable to prepare a guide pin whose outer diameter is 4.0 mm and whose length is 50.00 mm.
    - Perform the operations, while confirming the assembling direction of the shift fork and shift head and the positional relationship with the gears.
    - As for the shapes and lengths of the shift fork shaft, shift fork and shift head, refer to the steps 9 and 10 at page MT-39.
    - When driving a new slotted spring pin into position, a measure to sustain the reaction force against the driving force should be taken at the opposite side of the shift fork shaft.



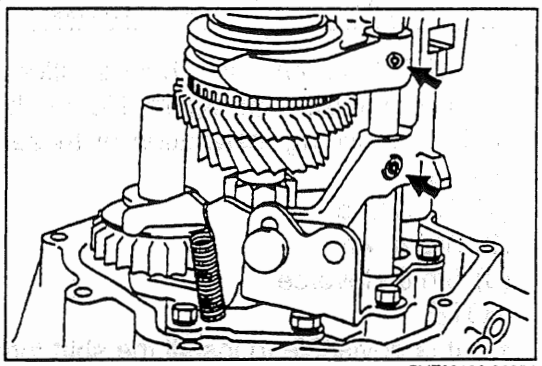
PMT00104-00092

13. Insert a guide pin or the like into the back side groove of the shift fork, as the guide of installation for the slotted spring pin.
14. Install a new slotted spring pin.
15. In the same manner as described in the steps 12 and 13, insert the 3rd & 4th shift head.
16. Install the 1st & 2nd shift fork into the hub sleeve and insert the 1st & 2nd shift fork shaft.
17. As for the installation of 1st & 2nd shift fork and shift head, refer to the steps 12 and 13 described above.



PMT00105-00093

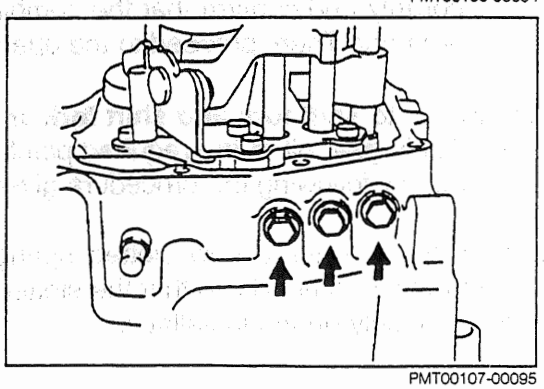
18. Insert the 5th & reverse shift head into the shift fork shaft.
19. As for the installation of the 5th & reverse shift fork and shift head, refer to the steps 12 and 13 described above.



PMT00106-00094

0. Attach the tension spring into the reverse shift arm.
1. Install the three balls and compression springs and tighten the three bolts with a new gasket interposed.
   Tightening Torque: 18.6 - 30.4 N·m

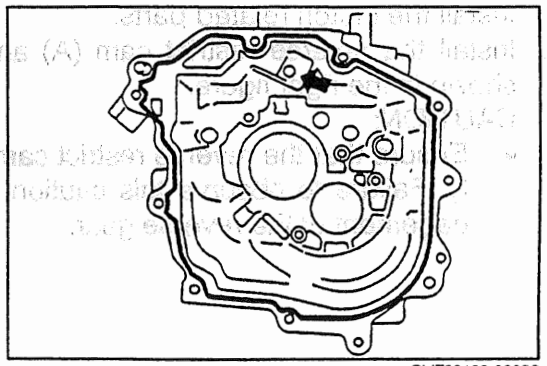
2. Plate the output shift shaft with the synchronizer ring and needle roller bearing.



PMT00107-00095

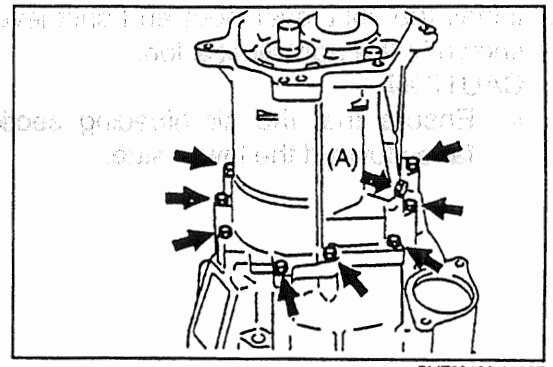
23. Clean the contact surface between the clutch housing and the transmission case side, using solvent or the like.
NOTE:
- Make sure that the oil receiver pipe is securely installed (tightened) to the inside of the transmission case.

24. Apply the following bond to the transmission case surface as shown in the right figure.
Specified Bond: Three bond® 1216
[Reference information]
Nozzle Inner Diameter: 0.9 mm


PMT00108-00096

25. Quickly install the transmission case.
26. Tighten the ten bolts between the transmission case side and the clutch housing side.
Tightening Torque: 14.7 - 21.6 N·m

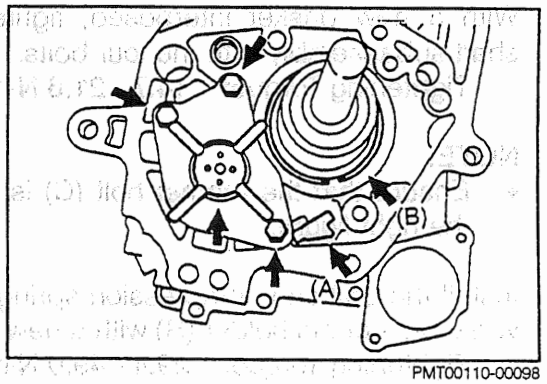
27. With the new gasket interposed, tighten the hexagon bolt (A) for reverse idler gear shaft.
Tightening Torque: 18.6 - 30.4 N·m



PMT00109-00097

28. Tighten the rear bearing retainer with the three bolts.
Tightening Torque: 14.7 - 21.6 N·m

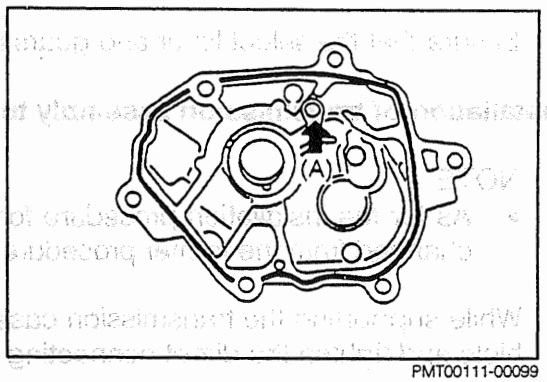
29. Place the transmission magnet (A) and snap ring hole (B).
30. Install the oil slinger into the countershaft.



PMT00110-00098

31. Clean the contacting surface between the transmission case and extension housing side, using solvent or the like.
NOTE:
- Make sure that the oil receiver pipe is installed (tightened) securely to the inside of the extension housing.

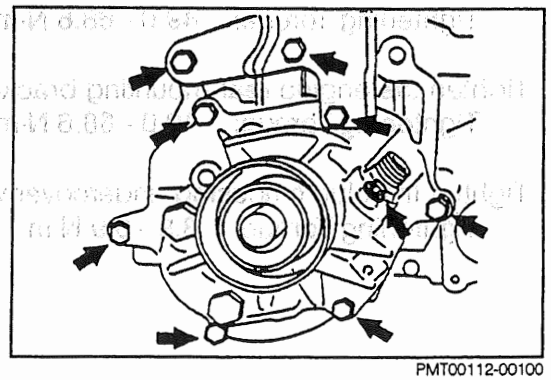
32. Apply the following bond to the extension housing surface as shown in the right figure.
Specified Bond: Three Bond® 1216
[Reference information]
Nozzle Inner Diameter: 0.9 mm



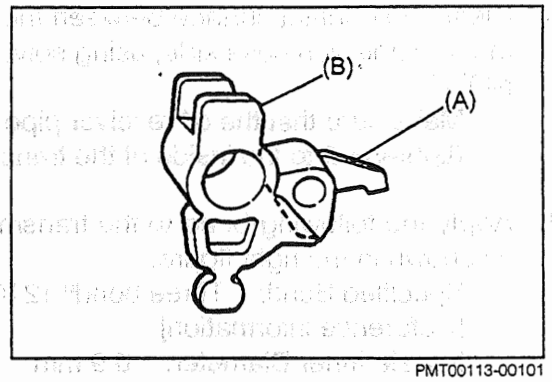
PMT00111-00099

33. Quickly install the extension housing together with engine rear mounting bracket. Then, tighten it with the eight bolts.
Tightening Torque: 29.4 - 44.1 N·m

34. Install the speedometer sleeve shaft gear assembly.
35. Tighten the speedometer gear lock plate with the bolt.
Tightening Torque: 6.9 - 9.8 N·m

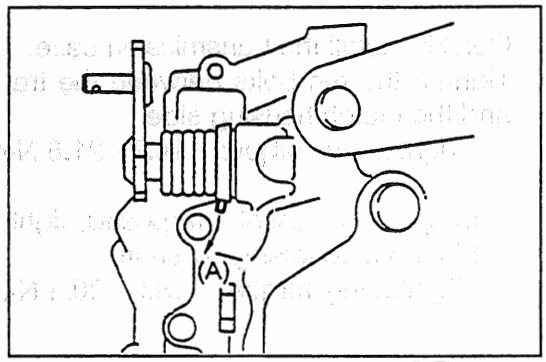

PMT00112-00100

6. Install the clutch related parts.
7. Install the reverse restrict cam (A) and shift lever (B) as shown in the right figure.
   CAUTION:
   - Ensure that the reverse restrict cam is installed correctly. Failure to observe this caution would cause disengagement of the reverse gear.



PMT00113-00101

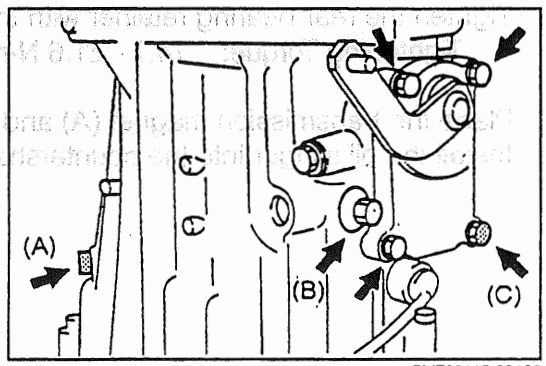
8. Install the shift lever boot and shift lever shaft correctly as shown in the right illustration.
   CAUTION:
   - Ensure that the air bleeding section (A) of the boot faces toward the lower side.



PMT00114-00102

9. With a new gasket interposed, tighten the select lever shaft subassembly with the four bolts.
   Tightening Torque: 14.7 - 21.6 N·m

   NOTE:
   - Ensure that the reamer bolt (C) is placed as shown in the right figure.



PMT00115-00103

10. Install the ball and compression spring and tighten the reverse restrict pin holder (B) with a new gasket interposed.
    Tightening Torque: 29.4 - 49.0 N·m

11. Ensure that the select lever and gears move smoothly.

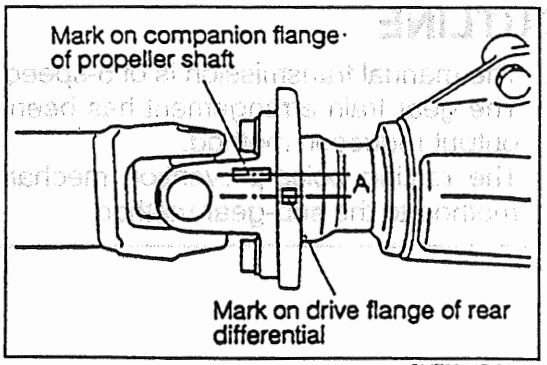
Installation of transmission assembly to the vehicle

NOTE:
- As for the installation procedure for the transmission assembly to the vehicle, few points have been changed from the former procedure. Therefore, only main points are summarized as follows.

1. While supporting the transmission case assembly with a transmission jack or the like, install it to the vehicle and tighten the direct connecting bolts.
   Tightening Torque: 49.0 - 68.6 N·m
2. Tighten the engine rear mounting bracket to the frame with the bolt.
   Tightening Torque: 49.0 - 68.6 N·m
3. Tighten the clutch housing undercover with the bolts.
   Tightening Torque: 3.9 - 6.9 N·m

PMT00116-00000

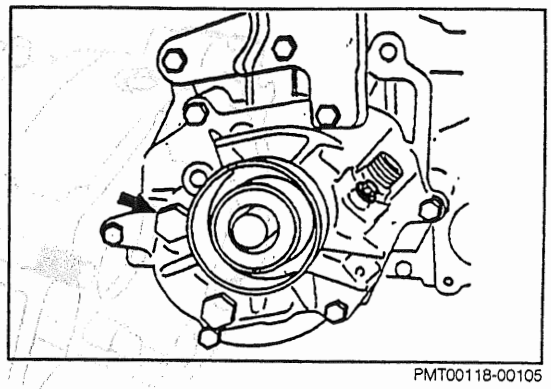
4. Connect the companion flange to the drive pinion flange at a position where the mark on the companion flange of the propeller shaft approaches the mark on the drive flange of the rear differential most closely (i.e. at a position where the dimension A becomes the minimum).
5. Tighten the four bolts of the propeller shaft.
   Tightening Torque: 39.2 - 53.9 N·m



PMT00117-00104

6. Remove the filler plug with the gasket.
   NOTE:
   - Do not reuse the removed gasket.

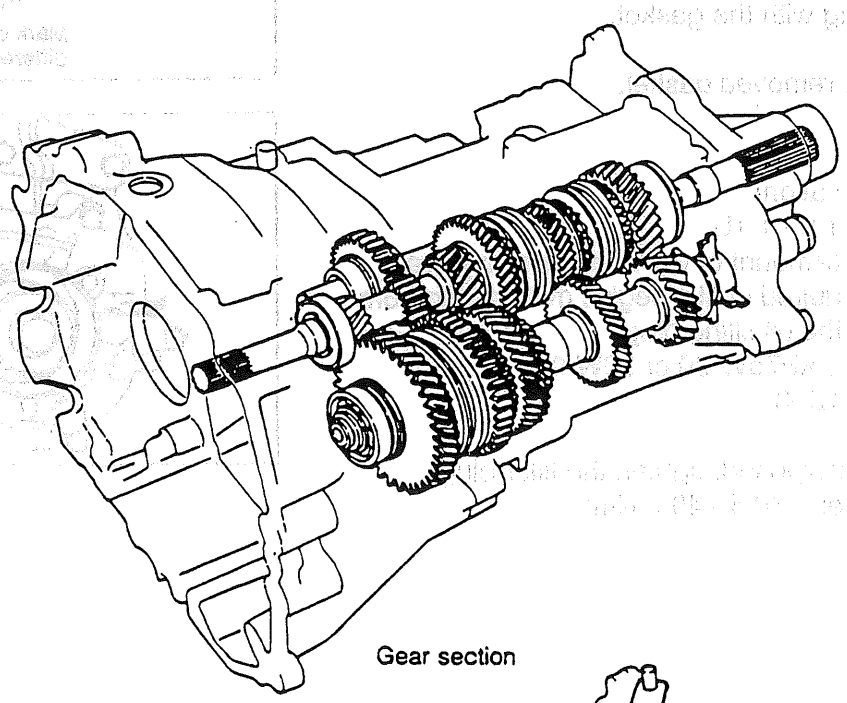
7. Fill new gear oil.
   [Reference information]
   Filling Amount 1.0 - 1.1L
   (Amount of the transmission oil required until it begins overflowing from the oil filling plug)
   Oil to be used: SAE75W-90 or 80W-90
   Oil Grade: API GL-3


PMT00118-00105

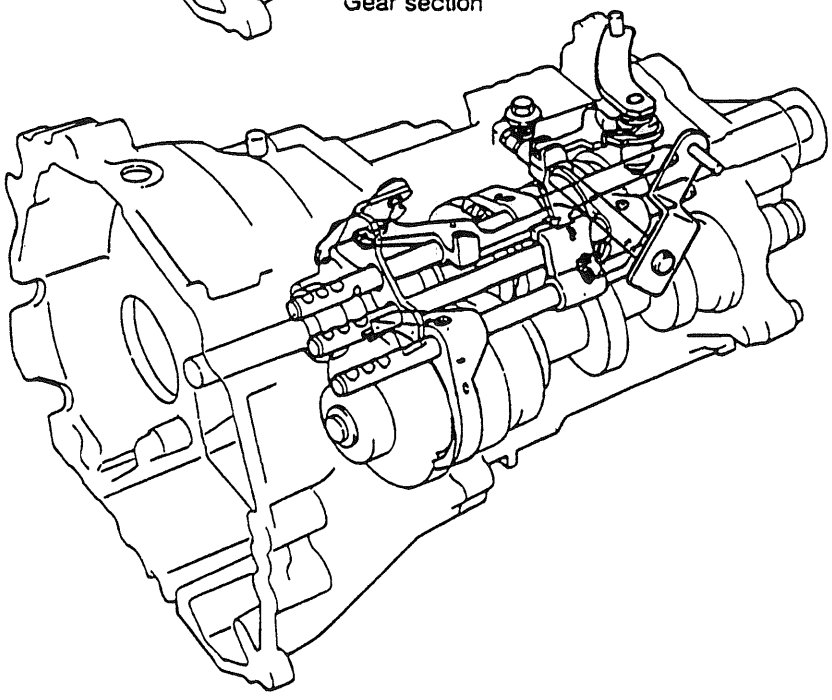
8. With a new gasket interposed, tighten the filler plug.
   Tightening Torque: 30.4 - 49.0 N·m

OUTLINE

1. The manual transmission is of 5-speed type on all models.
2. The gear train arrangement has been changed from the conventional primary reduction method to the output reduction method.
3. The rattling noise-prevention mechanism has been changed from the conventional friction damper method to the sub-gear method.



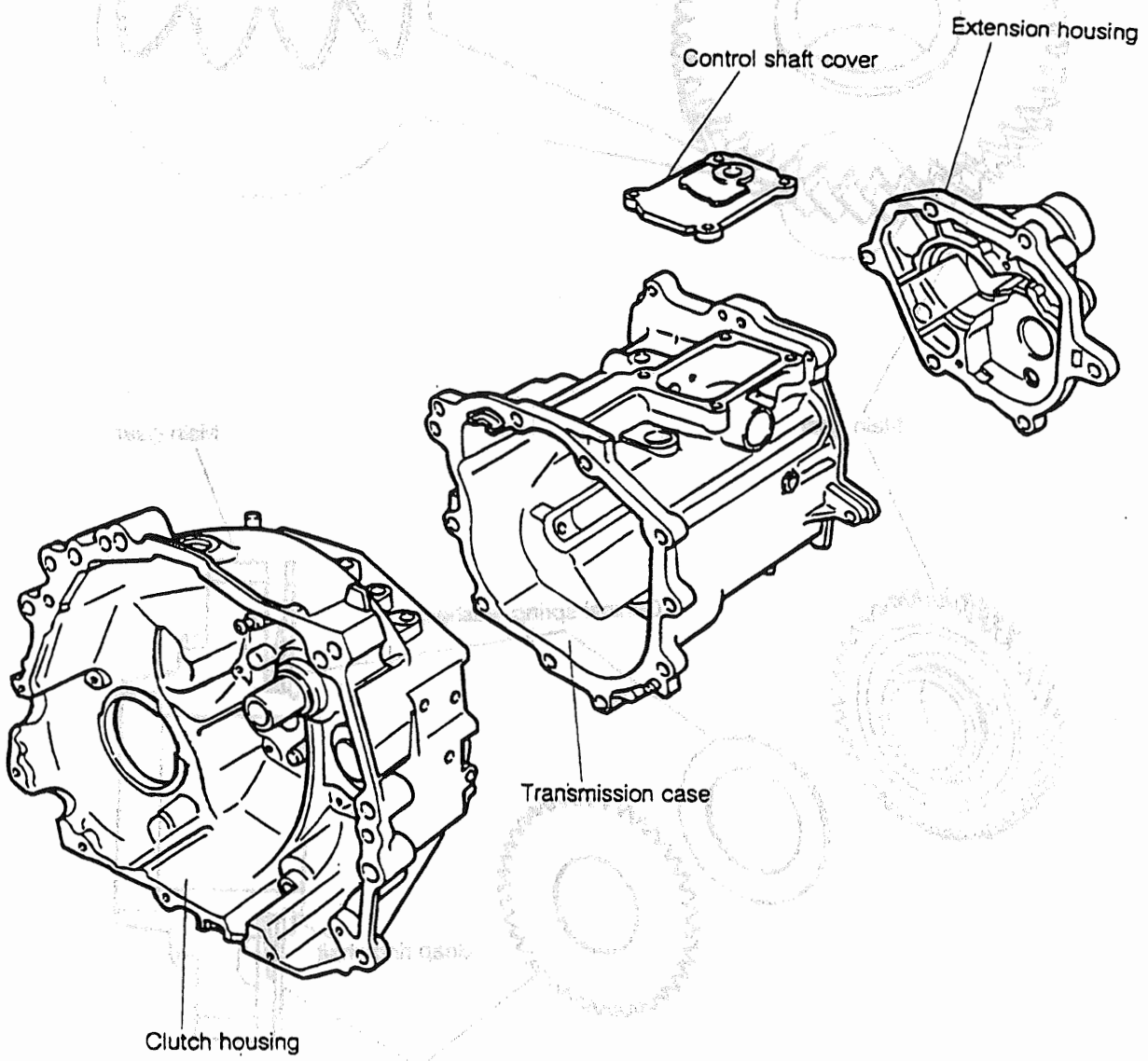
Gear section



Shift fork & shaft section

TRANSMISSION CASE & COVER

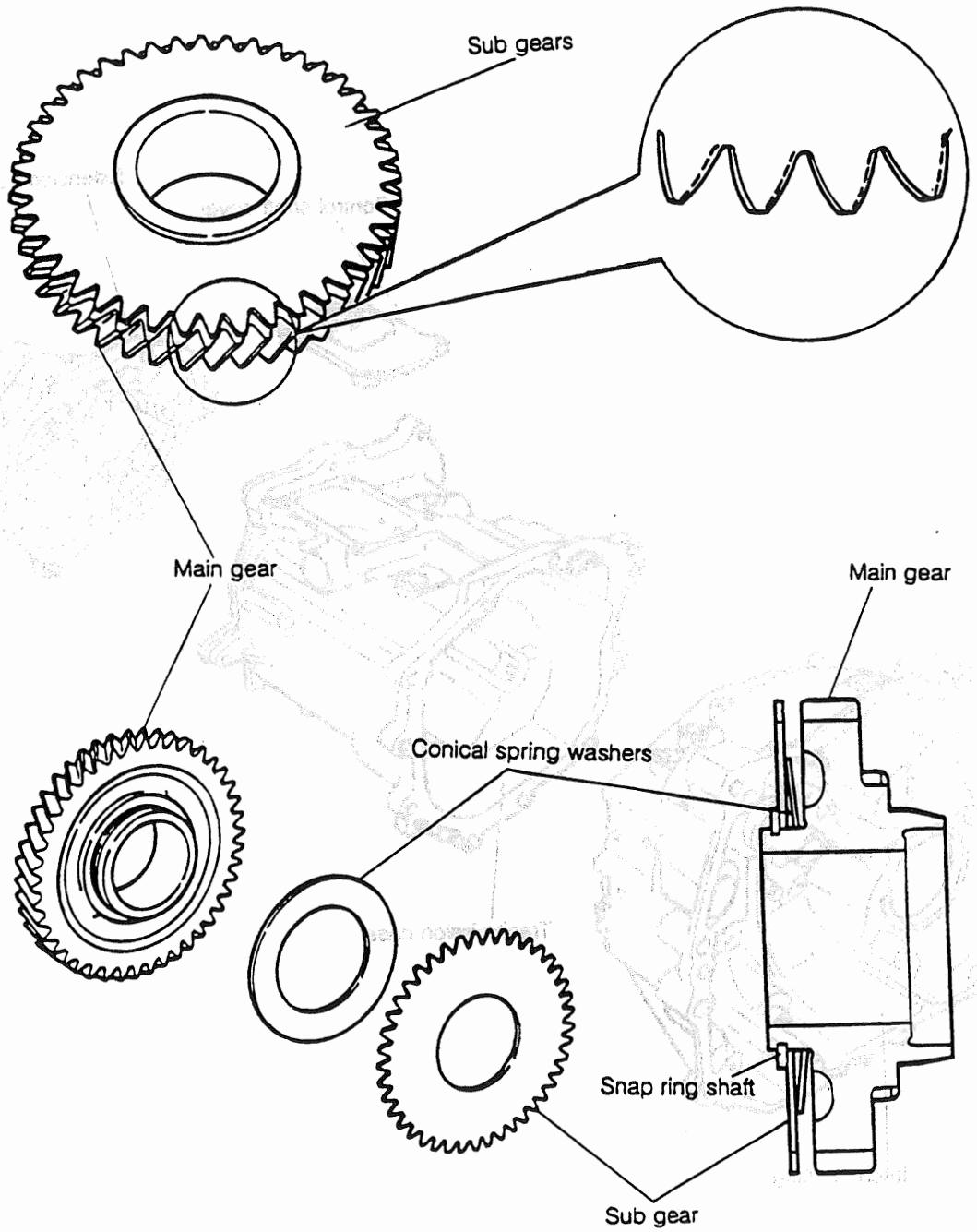
1. For reduced number of transmission case parts, the dividing method of the transmission case has been changed. At the same time, the reliability regarding the prevention of oil leakage has been enhanced by reducing the potential oil leakage sections.
2. For improved rigidity, the shape of the cross-section of the transmission has been changed from the conventional U shape to the cylindrical shape.
3. For reduced weight, each housing is made of aluminum die casting. In addition, ribs are arranged effectively in each housing to achieve a compact design and reduced weight.



PMT00120-00107

SUB-GEAR

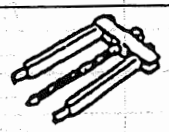
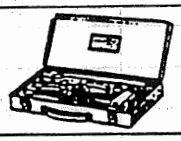
1. The number of the gear teeth of the sub-gear is one less than that of the main gear, thus dislocating the phase of the tooth shape compared with the main gear. This makes it possible to remove the gear backlash under the state of meshing with the drive gear. Moreover, a conical spring provided between the sub-gear and main gear prevents a tapping noise on the gear teeth surface caused by change in engine revolution speed, thus contributing to quiet rotation.
2. The sub-gear is provided for the 1st and 2nd gears of the counter gear shaft.



PMT00121-00108

APPENDIX

SST

	Part Number	Part Name
	09306-87602-000	Puller counter gear front bearing
	09950-20017-000	Universal puller

PMT00122-00109

SERVICE SPECIFICATIONS

Unit: mm

			Specified Value	Allowable Limit
Free length of compression spring for reverse restrict pin	Free length		24.00	—
	Load as installed: N (kgf)		28.83 (2.43)	—
	Height as installed:		17.00	—
Free length of compression spring for shift fork shaft	Free length		40.00	—
	Load as installed: N (kgf)		47.33 (4.83)	—
	Height as installed:		30.00	—
Diameter	Outer	Reverse idler gear shaft	$20.0\ ^{+0}_{-0.013}$	—
	Inner	Reverse idler shaft	$20.0\ ^{+0.061}_{+0.032}$	—
Dimensions	Outer	Select inner lever	$15.0\ ^{-0.02}_{-0.12}$	—
	Inner	Shift inner lever	$15.0\ ^{+0.1}_{+0.2}$	—
	Outer	Shift fork shafts	$13.0\ ^{-0.05}_{-0.07}$	—
	Inner	Case sides	$13.0\ ^{+0.043}_{+0}$	—
	Outer	Shift inner lever	$12.0\ ^{-0.02}_{-0.12}$	—
	Inner	Shift heads	$12.1\ ^{+0.1}_{+0}$	—
	Outer	Reverse restrict shaft	$8\ ^{-0.065}_{-0.090}$	—
	Inner	Reverse restrict cam	$8\ ^{+0.16}_{+0.07}$	—
Clearance between synchronizer ring and gear			0.9 - 1.4	0.5

PMT00123-00000

AT THE COUNTER SHAFT SIDE

Unit: mm

				Specified Value	Allowable Limit
Contact width section between shift forks and synchronizer No. 2 & No. 3 hub sleeves		Shift forks	3rd & 5th	$7^{-0.1}_{-0.3}$	6.6
		Hub sleeves	3rd & 5th	$7^{+0.12}_{+0.05}$	7.2
Thrust clearance			3rd	0.10 - 0.52	—
			5th	0.10 - 0.40	—
Clearance between synchronizer rings and gears				0.95 - 1.35	0.90
Outer diameter of input shaft			(A) and (B)	$32^{-0.009}_{-0.029}$	—
			(C)	$20^{-0.016}_{-0.034}$	—
Dimensions	Outer diameter of hubs	Classification	Identification	—	—
		No. 2	Yellow	57.78 - 57.84	—
		No. 1	None	57.68 - 57.74	—
		No. 3	White	57.58 - 57.64	—
	Inner diameter of hub sleeves	No. 2	Yellow	57.871 - 57.97	—
		No. 1	None	57.771 - 57.87	—
		No. 3	White	57.67 - 57.77	—
Thickness of synchronizer hubs			No. 2	18.55 ± 0.03	—
			No. 3	12.40 ± 0.03	—
Thickness of transmission hub sleeve stopper				$7.2^{+0.05}_{-0.01}$	—
Dimensions		Inner diameter	3rd and 5th gears	$37.0^{+0.025}_{+0}$	—
		Thickness	3rd gear	37.95 ± 0.03	—
			5th gear	27.85 ± 0.03	—
Height of synchromesh shifting key				$5^{-0.2}_{-0.4}$	—
End play between the snap ring shaft and input shaft				0	Less than 0.16

PMT00124-00000

AT THE COUNTER SHAFT SIDE

Unit: mm

				Specified Value	Allowable Limit
Contact width section between the synchronizer No. 1 hub sleeve and 1st/2nd shift fork			Hub sleeve	$10^{+0.12}_{+0.05}$	10.2
			Shift fork	$10^{-0.3}_{-0.1}$	9.6
Thrust clearance between gear and counter shaft			1st	0.10 - 0.52	—
			2nd	0.10 - 0.40	—
Height of shifting key				5.1 ± 0.1	—
Outer diameter of counter shaft (A) and (B)				$32^{-0.009}_{-0.029}$	—
Thickness of 1st gear thrust washer				4 ± 0.03	—
Dimensions	Outer diameter of synchronizer No. 1 hub	Classification	Identification	—	—
		No. 2	Yellow	69.78 - 69.84	—
		No. 1	None	69.68 - 69.74	—
		No. 3	White	69.58 - 69.64	—
	Inner diameter of synchronizer No. 1 hub sleeves	No. 2	Yellow	69.871 - 69.97	—
		No. 1	None	69.771 - 69.87	—
		No. 3	White	69.67 - 69.77	—
Dimensions		Inner	1st and 2nd gear	$37.0^{+0.025}_{+0}$	—
		Thickness	1st	27.34 ± 0.03	—
			2nd	36.30 ± 0.03	—
Height of conical spring washer				2.01	1.04
End play between the snap ring shaft and counter shaft					Less than 0.16

PMT00125-00000

TIGHTENING TORQUE

Tightening components	N·m	kgf-m
Lock nut × Output shaft	177.0 - 216.0	18.0 - 22.0
Reverse restrict pin holder × Transmission case	29.4 - 49.0	3.0 - 5.0
Transmission case cover × Transmission case	14.7 - 21.6	1.5 - 2.2
Bolt for reverse restrict shaft × Transmission case	18.6 - 30.4	1.9 - 3.1
Speedometer lock plate × Extension housing	6.9 - 9.8	0.7 - 1.0
Clutch housing × Transmission case	14.7 - 21.6	1.5 - 2.2
Transmission case × Extension housing	29.4 - 44.1	3.0 - 4.5
Extension housing × Filler & Drain plugs	29.4 - 49.0	3.0 - 5.0
Input shaft bearing lock plate × Clutch housing	14.7 - 21.6	1.5 - 2.2
Reverse shift arm × Clutch housing	14.7 - 21.6	1.5 - 2.2
Bolt for shift fork shaft × Clutch housing	18.6 - 30.4	1.9 - 3.1
Rear bearing retainer × Transmission case	14.7 - 21.6	1.5 - 2.2
Engine rear mounting bracket × Extension housing	29.4 - 44.1	3.0 - 4.5
Direct connecting bolt × Transmission	49.0 - 68.6	5.0 - 7.0
Clutch housing under cover × Transmission case	3.9 - 6.9	0.4 - 0.7
Propeller shaft × Differential companion flange	39.2 - 53.9	4.0 - 5.5

PMT00126-00000



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EM

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PEM00001-00000

ENGINE TUNE-UP

NOTE:

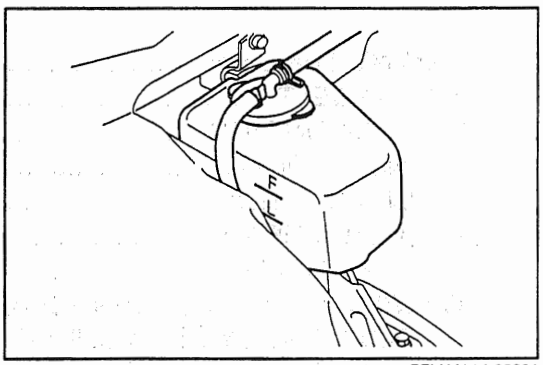
- The adjustments or checks of this section is performed normally when the engine is in a hot condition.
- "Hot engine condition" denotes a condition in which the cooling water temperature is 75 - 85°C and the engine oil temperature is above 65°C.
- Warm up the engine thoroughly. However, do not perform the adjustment while the idle-up VSV is still functioning.
- Ensure that all accessory switches are turned OFF.
- The gear shift lever is placed in the neutral range.
- Connect the engine revolution meter for measuring the engine revolution speed. If your engine revolution meter is of such a type as to be connected to the negative terminal of the ignition coil, connect the following SST to the diagnosis connector.
  SST: 09991-87501-000

- Apply the parking brake fully.
- Set the steering wheel to the straight ahead direction.
- Be sure that the removed parts for adjustment or checks should be reinstalled.

PEM00002-00000

1. Inspection of engine coolant

Check to see if coolant level is between the LOW and FULL lines of the reserve tank.
If coolant level is near the LOW level or bellow the LOW level, add the coolant up to the full level.



PEM00003-00001

WARNING:

- Never open the radiator cap when the engine is still hot.
  Failure to observe this caution will cause you to get scalded.

NOTE:

- If no coolant is present in the reserve tank or the coolant level is very low, check for water leakage, using a radiator cap tester.
- Here, the coolant refers to the coolant having an adequate freezing protection rating.

Coolant Capacity: 5.7 liters

CAUTION:

- Use a good brand of ethylene-glycol-base antifreeze solution.

NOTE:

- The amount above includes liter for reserve tank.

PEM00004-00000

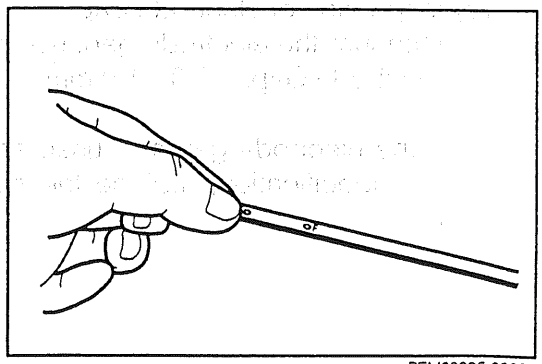
2. Inspection of engine oil

(1) Oil quality check

Check the engine oil for deterioration, ingress of water, discoloring and dilution.

NOTE:

- Park the vehicle on a level surface.
- The amount of oil between the "L" level and the "F" level equals around one liter.



PEM00005-00002

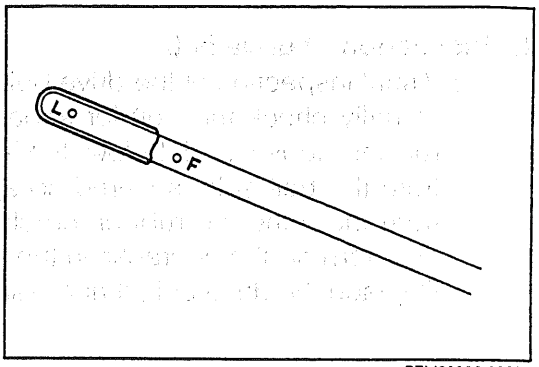
(2) Oil level check

Ensure that the engine oil level should be between the "L" and "F" level on the dipstick.

If the engine oil level is below the "L" level, replenish the specified oil to the "F" level after oil leakage has been checked.

Oil Capacity: Unit: liter

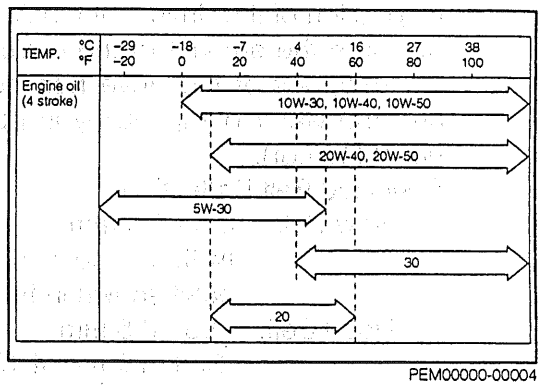
"F" level	3.5
"L" level	2.5
Oil capacity when oil filter replaced	3.7
Full capacity	4.2



PEM00006-00003

NOTE:

- Use API grade SG or higher multigrade viscosity, fuel efficient oil.
- The amount of oil between the "L" level and the "F" level equals around one liter.



PEM00000-00004

3. Inspection of spark plugs

Recommended Spark Plug:

DENSO	NGK
K20TNR-S, K22TNR-S	BKUR6EK, BKUR7EK

NOTE:

- All spark plugs should have the same heat range and be ones manufactured by the same manufacture.

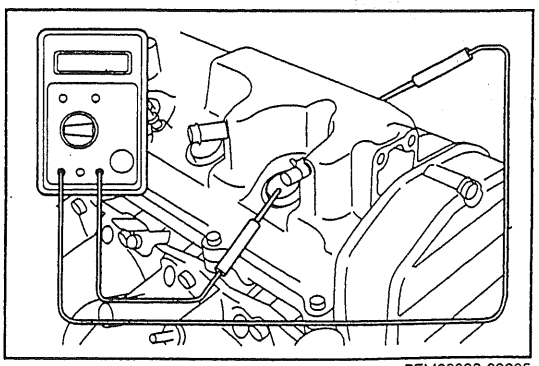
PEM00007-00000

(1) Inspection of electrode

Measure the insulation resistance of the spark plug.

Minimum Insulation Resistance: 15 MΩ

If the measured insulation resistance is less than the specified value, replace the spark plug with a new one after checking the electrode gap and cleaning the spark plug.



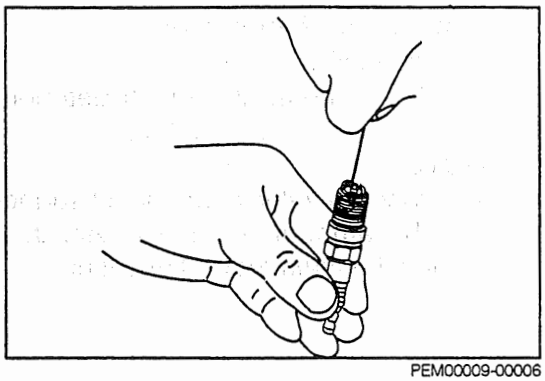
PEM00008-00005

WARNING:

- Since the spark plugs are hot, care must be exercised to avoid getting scalded.

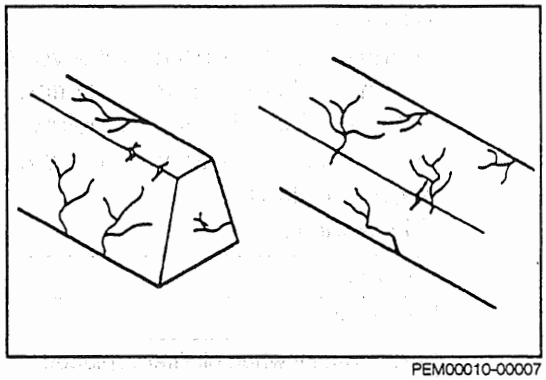
(2) Inspection of electrode gap
Measure the electrode gap, using a plug gap gauge.
Electrode Gap: 0.9 - 1.0 mm

If the electrode gap of a used spark plug is not within the specification, replace the spark plug with a new one.

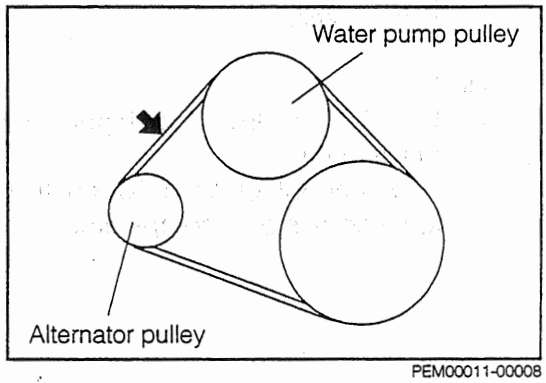

PEM00009-00006

4. Inspection of drive belt

(1) Visual inspection of the drive belt
Visually check the 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 ribs or cracks in the inner ridges of the rib.
Replace the drive belt, if necessary.


PEM00010-00007

(2) Inspection of the drive belt tension
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
New Belt: 3.5 - 5.5 mm
[with a force of 10 kg applied at the point shown in the figure.]
Used Belt: 4.5 - 6.5 mm
[with a force of 10 kg applied at the point shown in the figure.]



PEM00011-00008

If necessary, adjust the drive belt tension.

NOTE:
- "New belt" refers to a belt which has been used on a running engine for less than five minutes.
- "Used belt" refers to a belt which has been used on a running engine for more than five minutes or more.
- After installing a new belt, run the engine for about five minutes and then recheck the tension.

PEM00012-00000

5. Inspection and adjustment of valve clearances

The measurement and adjustment of valve clearance are carried out when each of the piston of the No. 1 and No. 4 cylinders is set to the top dead center at the end of compression stroke.

NOTE:

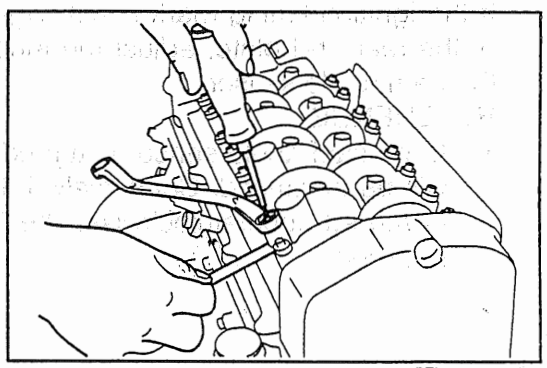
- The valve clearance adjustment is performed normally when the engine is in a hot condition.
  "Hot engine condition" denotes a condition in which the cooling water temperature is 75 - 85°C and the engine oil temperature is above 65°C.
  However, when the engine has been overhauled, it is necessary to adjust the valve clearances while the engine is cold and to readjust the valve clearance in a hot condition after warming up the engine.

PEM00013-00000

NOTE:

- The "O" mark denotes those valves that can be adjusted under that setting.

Valve Clearances (Hot)
Intake: 0.25 ± 0.05 mm
Exhaust: 0.33 ± 0.05 mm
(Reference)
Valve Clearances (Cold)
Intake: 0.18 mm
Exhaust: 0.25 mm
Tightening Torque (Lock nut): 16.7 - 22.0 N·m



PEM00014-00009

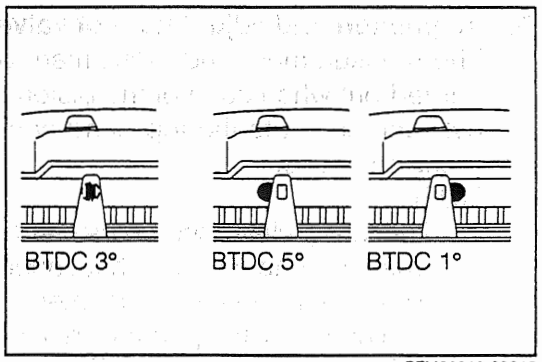
Piston positions		1	2	3	4
When valve rocker arms of No. 1 cylinder are free: (Piston of No. 1 cylinder is at top dead center under compression stroke)	Intake	○	○		
	Exhaust	○		○	
When valve rocker arms of No. 4 cylinder are free: (Piston of No. 4 cylinder is at top dead center under compression stroke)	Intake			○	○
	Exhaust		○		○

PEM00015-00000

6. Inspection and adjustment of ignition timing

Check to see if the ignition timing mark (yellow mark) of the flywheel is aligned with the indicator of the rear end plate by using a timing light under the condition that the T terminal has been connected with the ground terminal in the diagnosis connector by the following SST.

SST: 09991-87501-000



PEM00016-00010

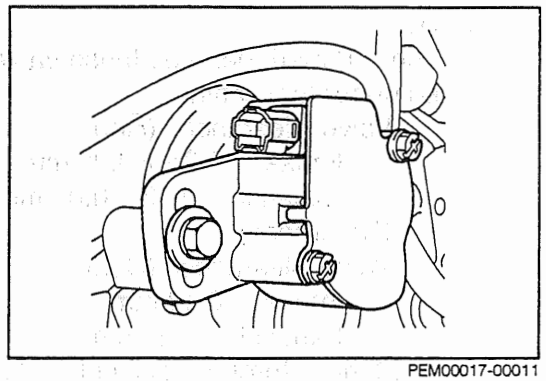
NOTE:

- The ignition timing inspection or adjustment is performed normally when the engine is in a "Hot" condition.
  The "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.
- Care must be exercised to ensure that no connection is made on terminals except for those specified.
  Even a slight contact with the other terminals will cause serious malfunction.

If the ignition timing mark is not aligned with the indicator of the rear end plate, adjust the ignition timing by turning the cam angle sensor.

REFERENCE:

- If the cam angle sensor is turned clockwise, the timing will be advanced. Conversely, if the cam angle sensor is turned counterclockwise, the ignition timing will be retarded.



PEM00017-00011

7. Inspection and adjustment of idle speed

Preparation to be made prior to idle speed adjustment.

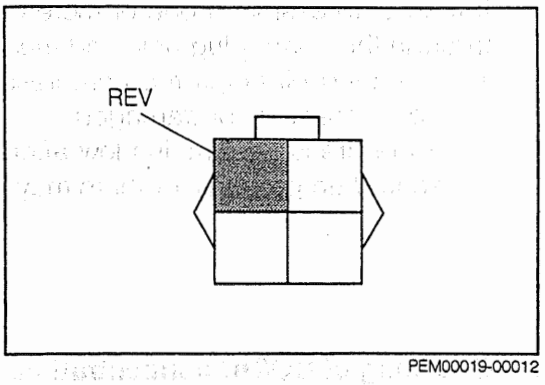
- Check and adjust the ignition timing.
- Apply the parking brake fully.
- Warm up the engine thoroughly.
- All accessory switches are turned OFF.
- The air cleaner element is installed.
- All vacuum hoses are connected.
- Ensure that the intake system exhibits no air leakage.
- Ensure that the exhaust system exhibits no air leakage.
- The shift lever is placed in the neutral range.

NOTE:

- Do not perform the engine idle speed adjustment, while the idle-up VSV is operating.
  Prior to the adjustment of the idle speed, be sure to check that the idle-up VSV is not operating.

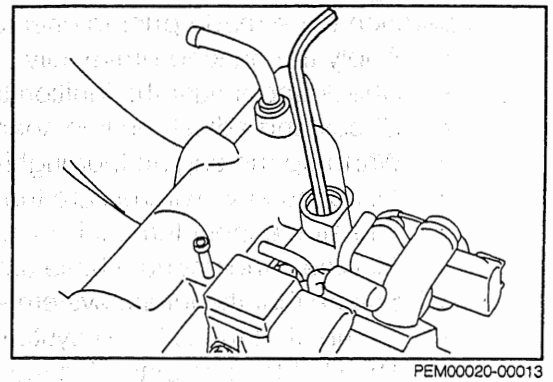
PEM00018-00000

Measure the engine idle speed, using a tachometer which is connector to the "REV" terminal of the diagnosis connector.
NOTE:
- Never allow the "REV" terminal to touch the ground. It could result in damage of the ignition system.
- As some tachometers are not compatible with this ignition system, it is recommended to confirm the compatibility with your unit before its use.
  Specified Idle Speed: 850 ± 50 rpm



PEM00019-00012

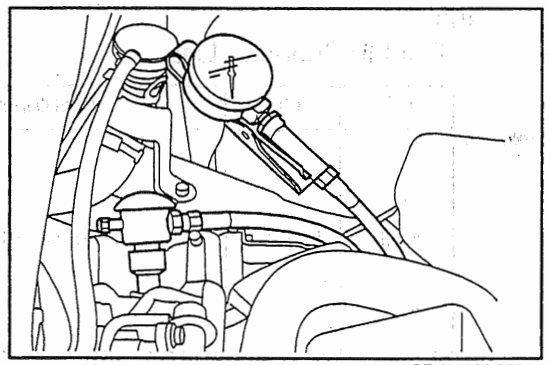
If the measured engine idle speed is not within the specified value, adjust the engine idle speed by turning the idle adjusting screw placed at the throttle body.
NOTE:
- When the idle adjusting screw is turned clockwise, the idle speed will be decreased, whereas when the idle adjusting screw is turned counterclockwise the idle speed will be increased.


PEM00020-00013

8. Compression check
NOTE:
- After completion of the engine tune-up, if the engine exhibits lock of power, excessive oil consumption or poor fuel economy, measure the cylinder compression pressure.

PEM00021-00000

Measure the cylinder compression pressure for each cylinder, using a compression gauge which is inserted into the spark plug hole.
NOTE:
- Depress the accelerator pedal fully while measuring the compression pressure.
- Always use a fully charged battery so that at least a revolution speed of 300 rpm may be attained.
  Compression Pressure:
  1373 kPa (14 kgf/cm^2)/at 300 rpm
  Minimum Pressure:
  1030 kPa (10.5 kgf/cm^2)/at 300 rpm
  Difference in Reading Between Cylinders:
  147 kPa (1.5 kgf/cm^2)/at 300 rpm


PEM00022-00014

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 measure the cylinder compression again.

- 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 has been performed, the valves may be sticking or seated un properly, or there may be leakage post the gasket.

PEM00023-00000

9. Checking of CO/HC concentrations

Preparation to be made prior to check of CO/HC concentrations.

- Apply the parking brake fully.
- Check and adjust the ignition timing.
- Check and adjust the idle speed.
- Warm up the engine thoroughly.
- All accessory switches are turned OFF.
- The air cleaner element is installed.
- All pipes and vacuum hose are connected.
- Ensure that the intake system exhibits no air leakage.
- Ensure that the exhaust system exhibits no gas leakage.
- The shift lever is placed in the neutral position.
- Position the steering wheel to the straight-ahead direction.
- Be sure to prepare the CO/HC meter by following the instruction of its manufacturer, before it is put into use.

NOTE:

- This check is used only to determine whether or not the idle HC/CO emission complies with the regulations.

Measure the HC/CO emission by inserting a sampling pipe of the HC/CO meter into the exhaust pipe.
Wait at least one minute before the measurement so as to allow the concentrations to stabilize.
Complete the measurement within three minutes.
If the HC/CO concentrations do not conform to the regulations, see the following table for possible causes.

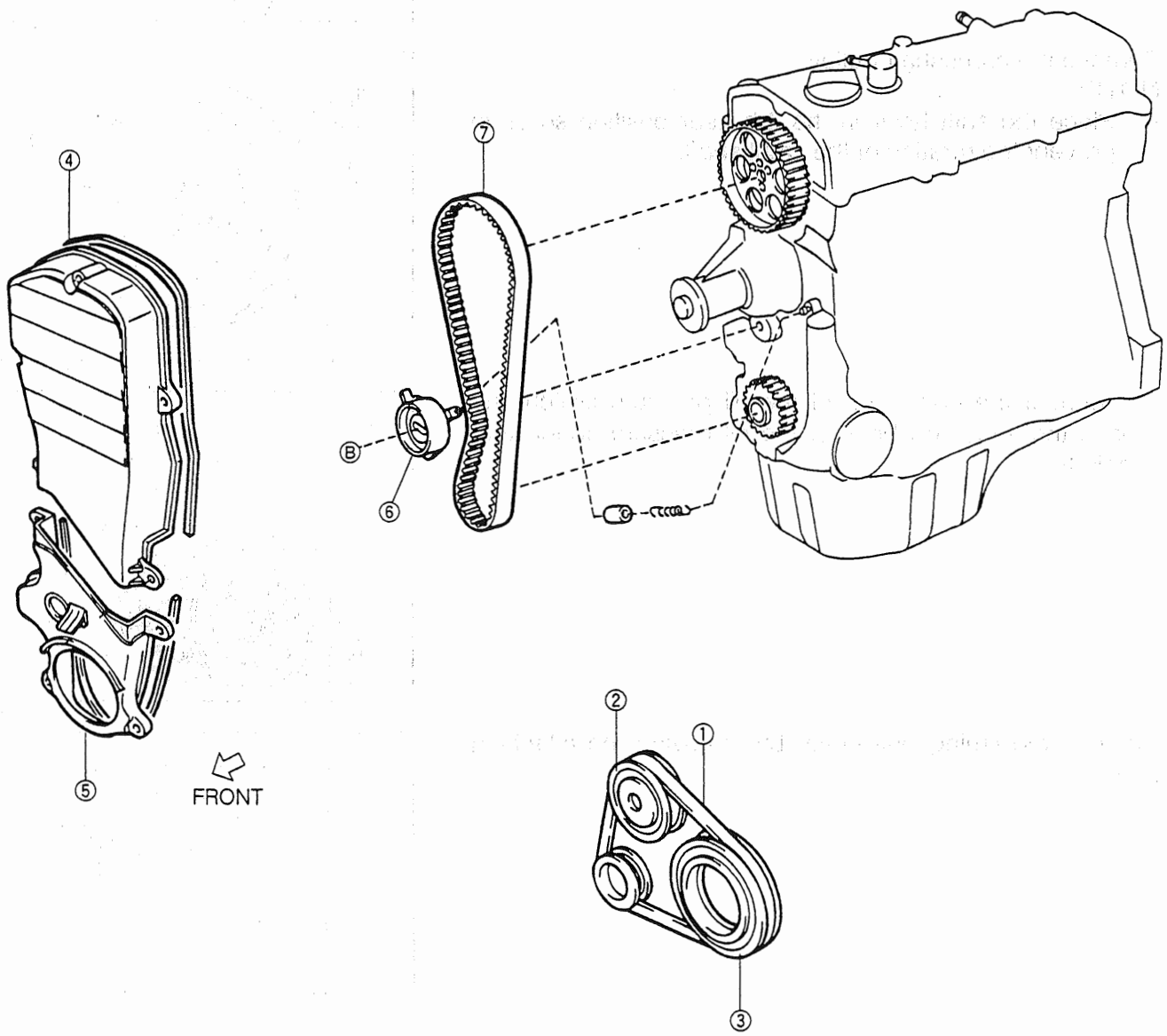
Trouble Shooting List

HC	CO	Problems	Possible causes
High	Normal	Rough idle	1. Faulty ignition • Incorrect ignition timing • Fouled, shorted or improperly gapped spark plugs • Open or crossed high tension cords 2. Incorrect valve clearance 3. Leaky exhaust valves 4. Leaky cylinder
High	Low	Rough idle (Fluctuation in HC reading)	1. Lean mixture causing misfire
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air filter 2. Faulty EFI system • Faulty pressure regulator • Clogged fuel return line • Defective water temp. sensor • Defective air temp. sensor • Faulty throttle position sensor • Faulty pressure sensor • Faulty ECU • Faulty oxygen sensor

PEM00024-00000

TIMING BELT

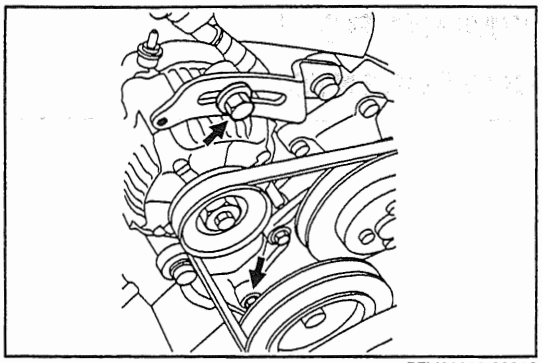
COMPONENTS



① V belt
② Water pump pulley
③ Crankshaft pulley assembly
④ Timing belt upper cover
⑤ Timing belt lower cover
⑥ Timing belt tensioner subassembly
⑦ Timing belt

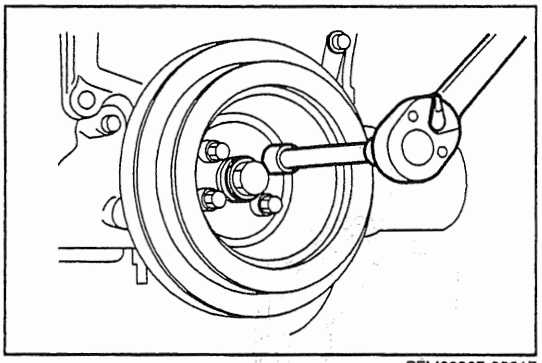
PEM00025-00015

1. Remove the water pump drive belt by loosening the alternator attaching bolts.
2. Remove the water pump drive belt.
2. Remove the water pump pulley by loosening the attaching bolts.



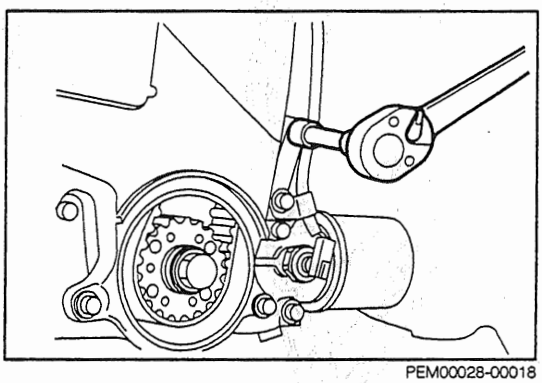
PEM00026-00016

4. Remove the crankshaft pulley.
   NOTE:
   - Place the shift lever in the 4th gear position so as to prevent the rotation of the crankshaft.



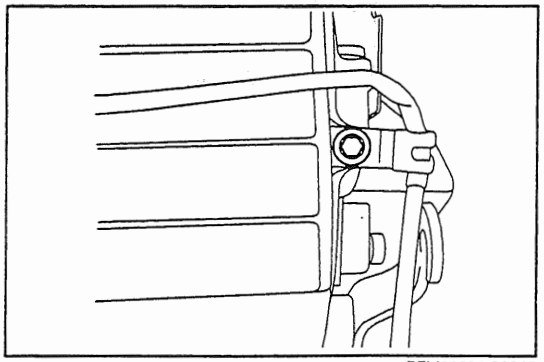
PEM00027-00017

5. Disconnect the connector of the oil pressure switch and loosen the attaching bolts of the oil pressure switch wire brackets.



PEM00028-00018

6. Remove the timing belt cover by removing the attaching bolts.

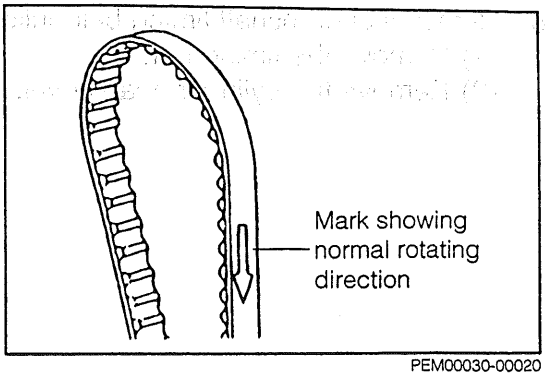


PEM00029-00019

7. 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.

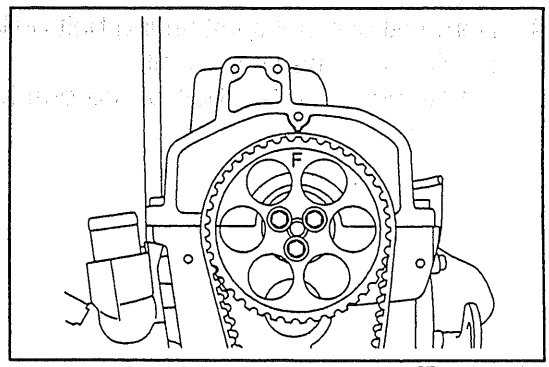


PEM00030-00020

CAUTION:

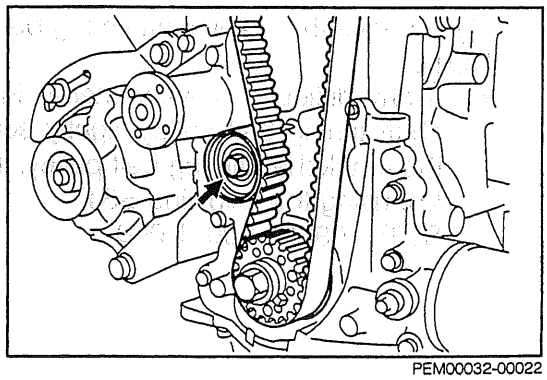
- Do not try to pry the timing belt with a screwdriver or the like during the removal or installation.
- Do not allow the belt to come into contact with oil, water or dust.
- Do not bend the belt at a sharp angle or turn the belt inside out, for it is very vulnerable to bending.
- Do not utilize the 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 crankshaft timing belt pulley is aligned with the indicator of the cylinder head cover.

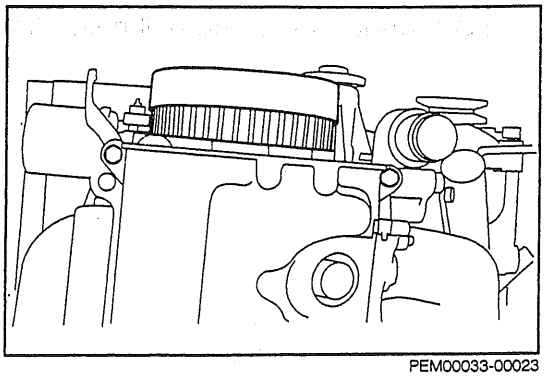


PEM00031-00021

(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.


PEM00032-00022

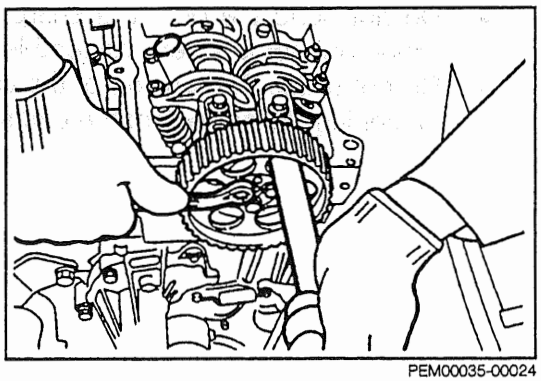
(3) Remove the timing belt.


PEM00033-00023

8. Removal of camshaft timing belt pulley
   (1) Remove the timing belt.
   (2) Remove the cylinder head cover.

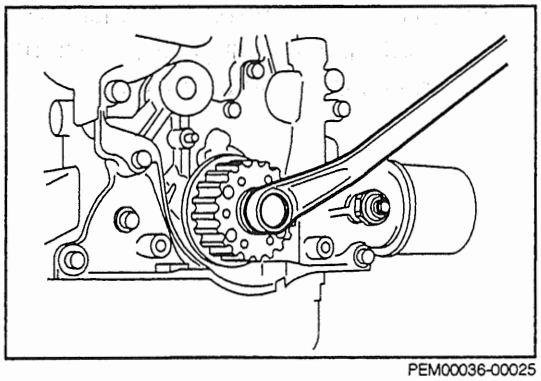
PEM00034-00000

   (3) Removal of camshaft timing belt pulley
   While preventing the camshaft timing belt pulley from turning using a suitable iron rod, remove the three attaching bolts.
   Then, remove the camshaft timing belt pulley.



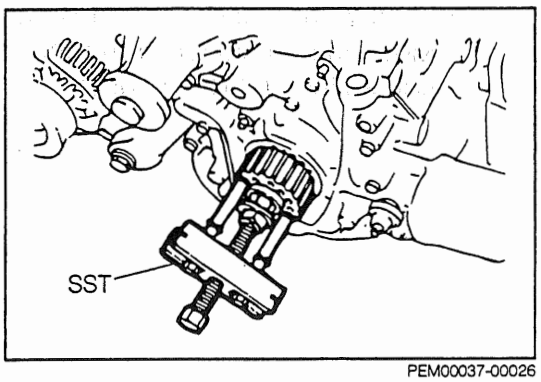
PEM00035-00024

9. Removal of crankshaft timing belt pulley
   (1) Remove the timing belt.
   (2) Remove the set bolt of the crankshaft timing belt pulley.



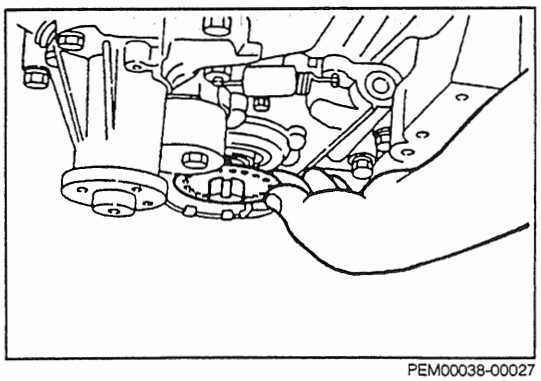
PEM00036-00025

   (3) Remove the crankshaft timing belt pulley.
   NOTE:
   • 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



PEM00037-00026

   (4) Remove the timing belt pulley flange.



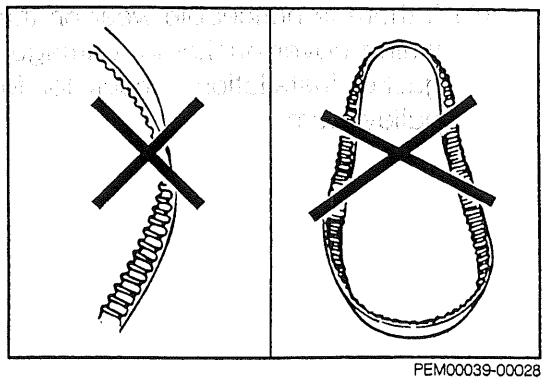
PEM00038-00027

INSPECTION

1. Inspection of timing belt

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.

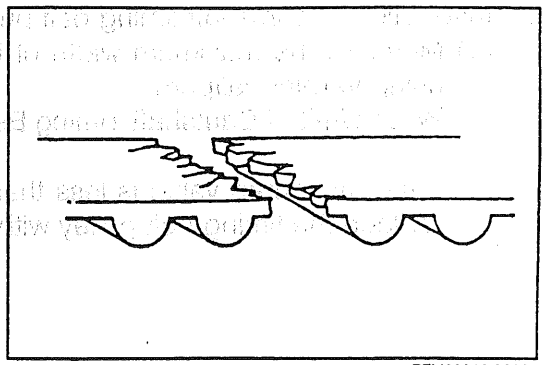


PEM00039-00028

If there are damages, as shown in the figures, check the following points and replace the timing belt, if necessary.

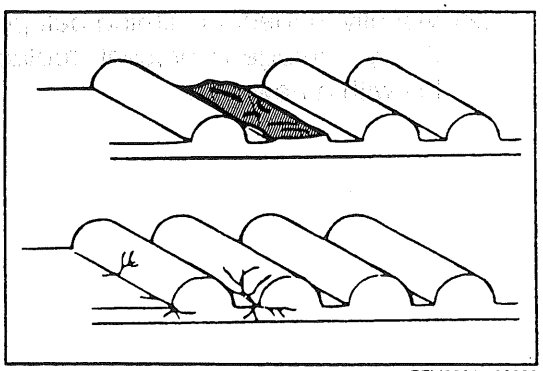
(1) Premature separation

- Check for proper installation.
- Check the timing belt cover gaskets for damage and check for correct installation.



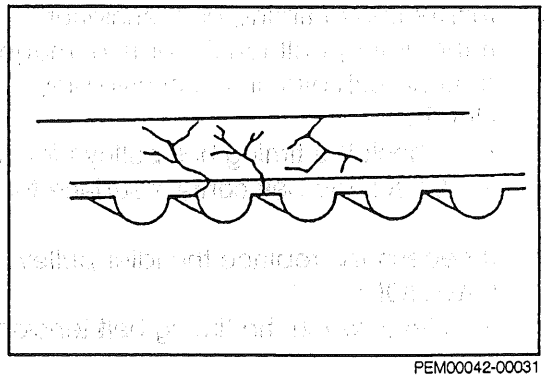
PEM00040-00029

(2) If the belt teeth are cracked or damaged, check to see if the camshaft is seized.



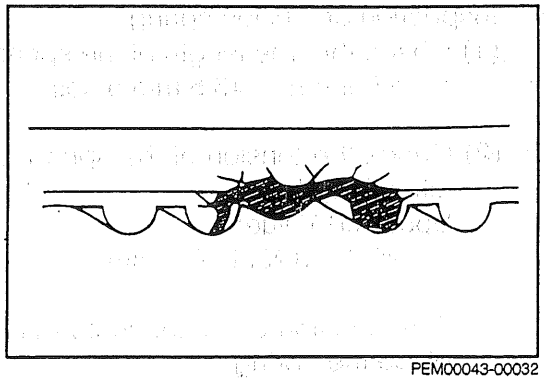
PEM00041-00030

(3) If there is noticeable wear or cracks on the belt surface, check to see if there are nicks on one side of the idler pulley lock.



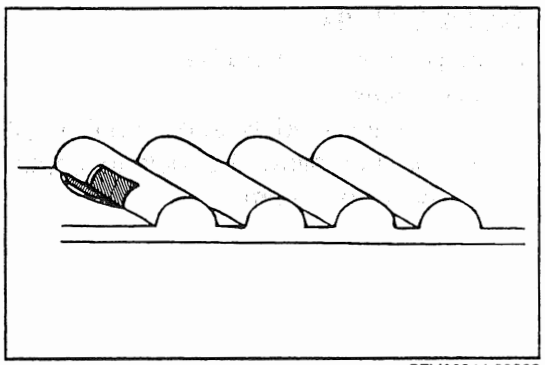
PEM00042-00031

(4) If there is wear or damage on only one side of the belt, check the pulley flange.



PEM00043-00032

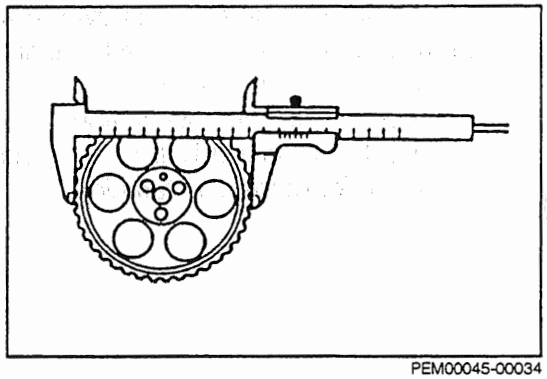
(5) If there is noticeable wear on the belt teeth, check the timing cover gasket for damage and check for correct gasket installation. Check for foreign material on the pulley teeth.



PEM00044-00033

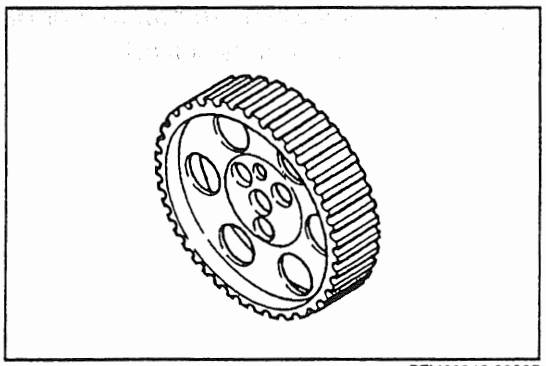
2. Inspection of camshaft timing belt pulley
(1) Measure the maximum width of the timing belt pulley, using vernier calipers.
Wear Limit of Camshaft Timing Belt Pulley: 119.8 mm

If the measured value is less than the specified value, replace the timing belt pulley with a new one.



PEM00045-00034

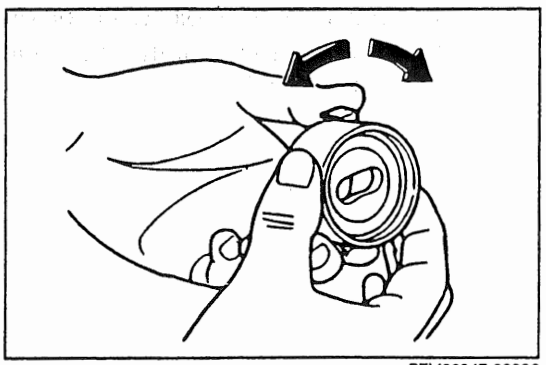
(2) Visually inspect the timing belt pulley for damage.
If any damage is present, replace the timing belt pulley with a new one.



PEM00046-00035

3. Inspection of timing belt tensioner
If the timing belt tensioner is damaged, check to see if the bearing exhibits an excessive play.
NOTE:
- Check the timing belt pulleys for smooth turning.
- Check the belt contact surface for damage.

If necessary, replace the idler pulley.
CAUTION:
- Never wash the timing belt tensioner.

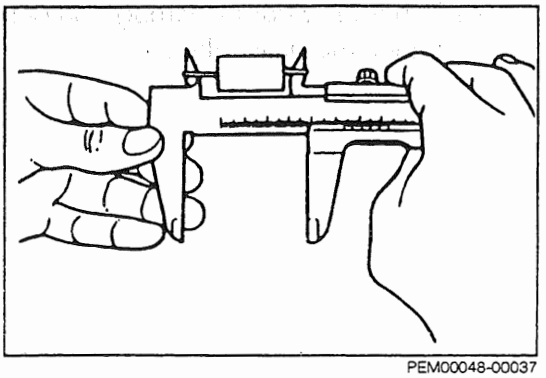


PEM00047-00036

4. Inspection of tension spring
(1) Check the free length of the spring
Free Length: 46.5 mm or less

(2) Check the tension of the spring at the specified installation length.
Specified Value:
29.4 ± 3 N at 50.9 mm

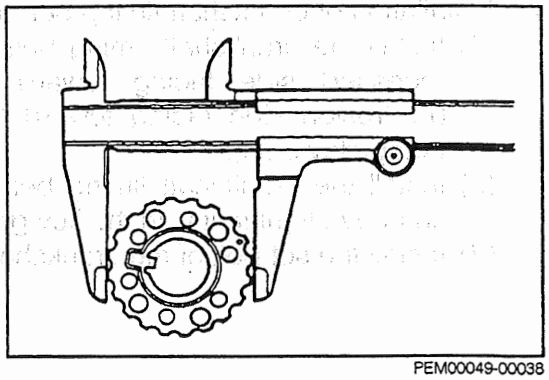
If the tension does not conform to the specification, replace the spring.



PEM00048-00037

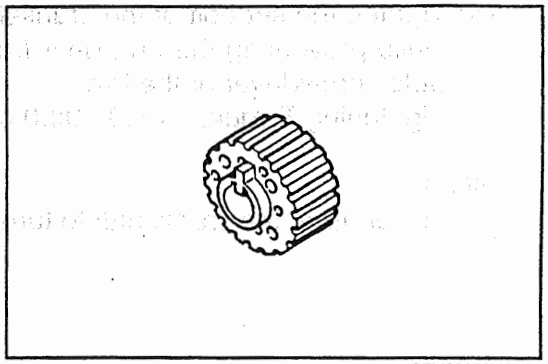
5. Inspection of crankshaft timing belt pulley and flange
   (1) Measure the maximum width of the timing belt pulley, using vernier calipers.
   Wear Limit of Crankshaft Timing Belt Pulley: 59.3 mm

   If the measured value is less than the specified value, replace the timing belt pulley with a new one.



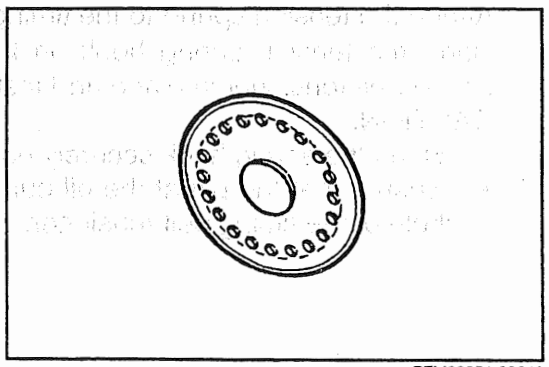
PEM00049-00038

   (2) Visually inspect the crankshaft timing belt pulley for damage. If any damage is present, replace the crankshaft timing belt pulley.



PEM00050-00039

   (3) Visually inspect the crankshaft timing belt pulley flange for bend, wear and other damage.
   If any damage is present, replace the crankshaft timing belt pulley flange.



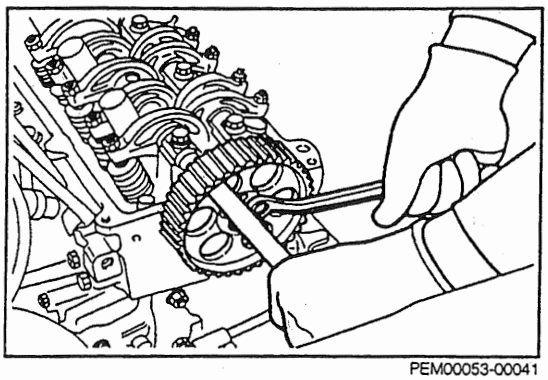
PEM00051-00040

INSTALLATION

1. 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.

PEM00052-00000

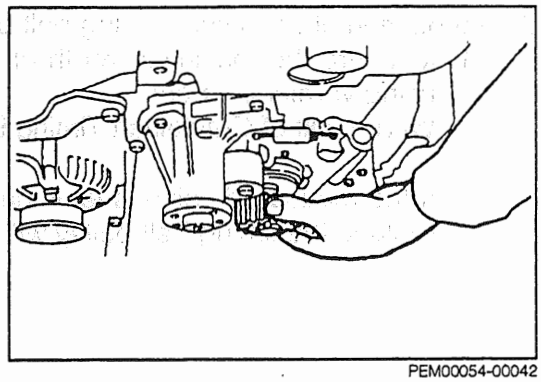
   (2) Install the attaching bolts of the camshaft timing belt pulley, while preventing the pulley from turning by inserting an iron rod into the hole of the pulley.
   Tightening Torque: 14.7 - 21.6 N·m



PEM00053-00041

   NOTE:
   - Do not turn the camshaft independently.
   - Be very careful not to damage the gasket attaching surface of the cylinder head.
   - The bolts and bolt holes should be dry during the tightening.

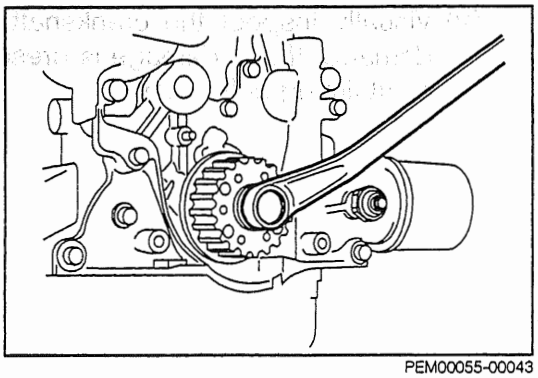
2. Installation of crankshaft timing belt pulley
   (1) Install the crankshaft timing belt pulley flange with its recessed side facing toward the oil pump side (Protrusion side facing toward the crankshaft timing belt pulley side).
   (2) Install the crankshaft timing belt pulley on the crankshaft by aligning it with the key groove.
   (3) Install the set bolt of the crankshaft timing belt pulley.



PEM00054-00042

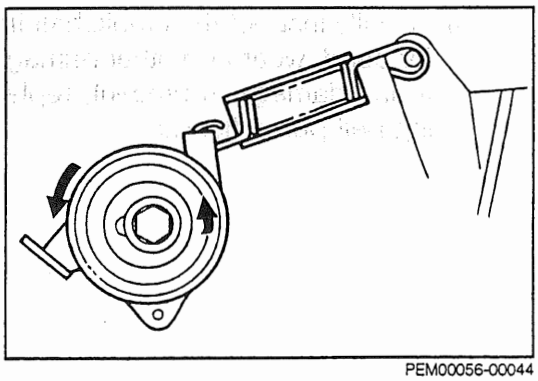
   (4) Tighten the set bolt of the crankshaft timing belt pulley, while preventing the ring gear from turning with a suitable screwdriver or the like.
   Tightening Torque: 88.3 - 98.0 N·m

NOTE:
- Never allow the crankshaft to turn.



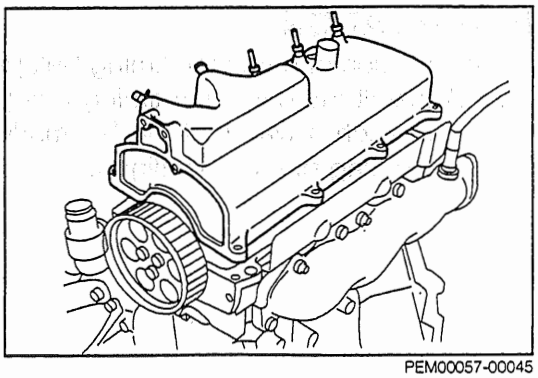
PEM00055-00043

3. 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.



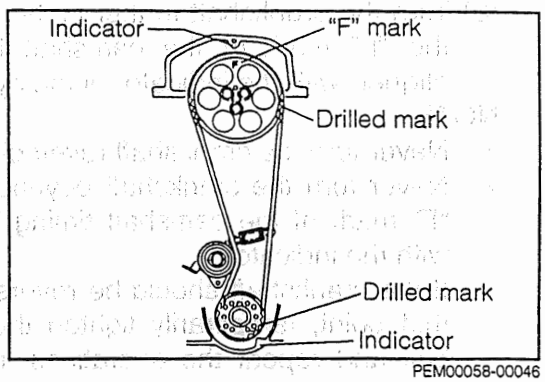
PEM00056-00044

4. Installation of timing belt
   (1) Temporarily install the cylinder head cover.



PEM00057-00045

(2) Align the drilled mark of the camshaft timing belt pulley with the top surface line of the cylinder head.
(3) Align the drilled mark of the crankshaft timing belt pulley with the indicator.
(4) Assemble the timing belt in such a way that the two mating marks on the timing belt may be aligned with the corresponding drilled marks on the crankshaft timing belt pulley and camshaft timing belt pulley.

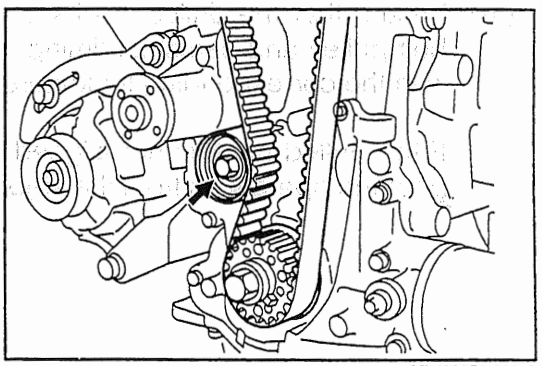


PEM00058-00046

CAUTION:
- Do not allow the belt to come into contact with oil, water or dust.
- Do not try to pry the timing belt with a screwdriver or the like.
- When the timing belt is reused, there should exist 35 teeth of the belt between the drilled marks of the crankshaft timing belt pulley and camshaft timing belt pulley.
- When the timing belt is reused, the arrow mark which was put during the disassembly comes in a rotational direction of the timing belt.

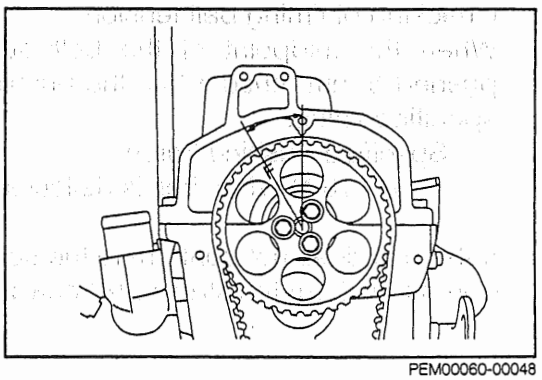
(5) Loosen the attaching bolt of the timing belt tensioner. Apply tension to the timing belt. Temporarily tighten the attaching bolt.

NOTE:
- Ensure that the belt exhibits no slack at the tension side of the belt (the side opposite to the tensioner).

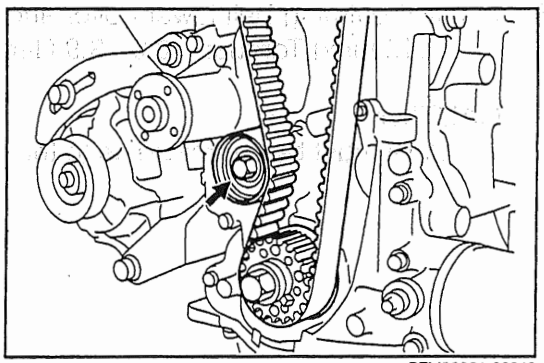

PEM00059-00047

(6) Rotate the crankshaft 1.9 turns in the normal direction 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.

NOTE:
- 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.


PEM00060-00048

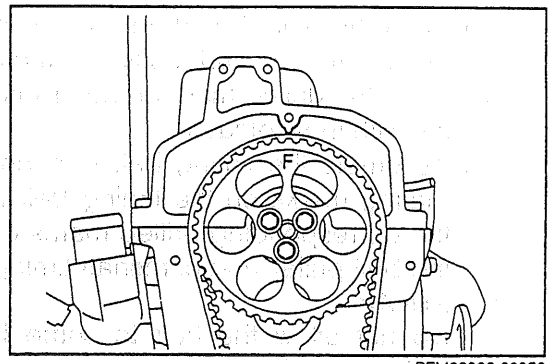
(7) Make the tensioner free by loosening the attaching bolt of the timing belt tensioner.


PEM00061-00049

(8) 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.

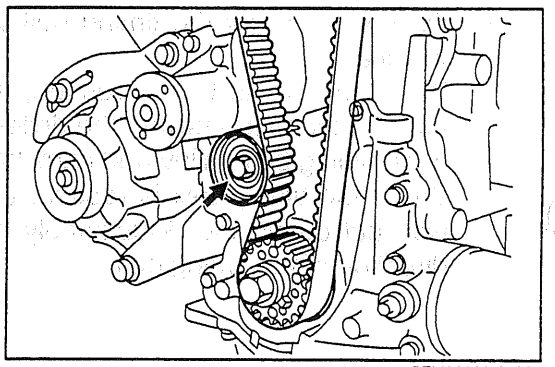
NOTE:

- 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.
- 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.



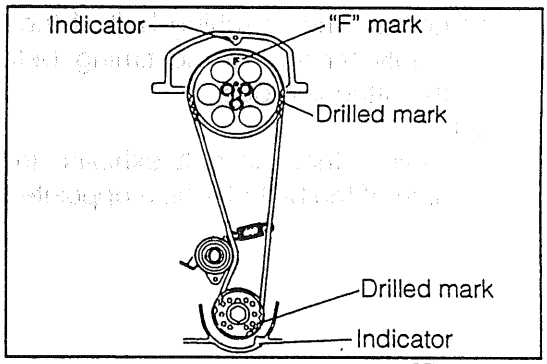
PEM00062-00050

(9) Tighten the attaching bolt of the timing belt tensioner to the specified torque.
Tightening Torque: 29.4 - 44.1 N·m


PEM00063-00051

(10) Ensure that the drilled marks of the crankshaft timing belt pulley and camshaft timing belt pulley are aligned with the corresponding indicators.

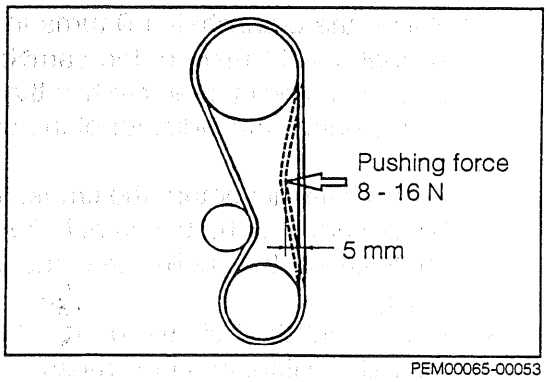
If the drilled mark is not aligned with the indicator, repeat the operations from the step (2) onward.



PEM00064-00052

5. Checking of timing belt tension
When the midpoint of the belt at the tension side is pushed 5 mm, ensure that the pushing force is within the specified value.
Specified Pushing Force:
8 - 16 N When belt is deflected 5 mm

If the belt does not conform to the specification, repeat the operations from the step 13 (4) onward.

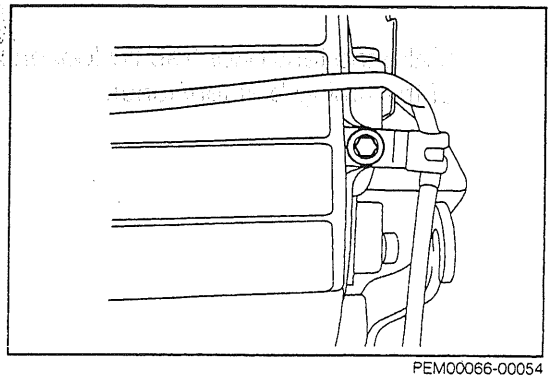


PEM00065-00053

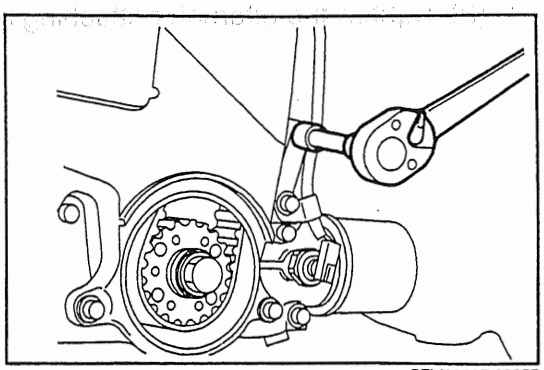
6. Install the timing belt lower cover and upper cover.
Tightening Torque: 2.0 - 3.9 N·m

CAUTION:

- Care must be exercised as to the length of each bolt.

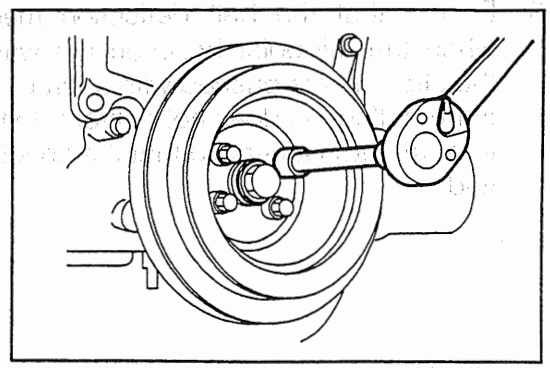

PEM00066-00054

7. Install the oil pressure switch wire and tighten the wire clamps.
8. Connect the oil pressure switch connector.

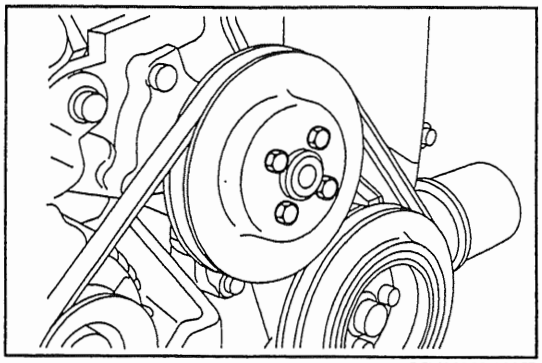

PEM00067-00055

9. Install the crankshaft pulley with the attaching bolt. Tighten the bolt to the specified torque.
   Tightening Torque: 19.6 - 29.4 N·m

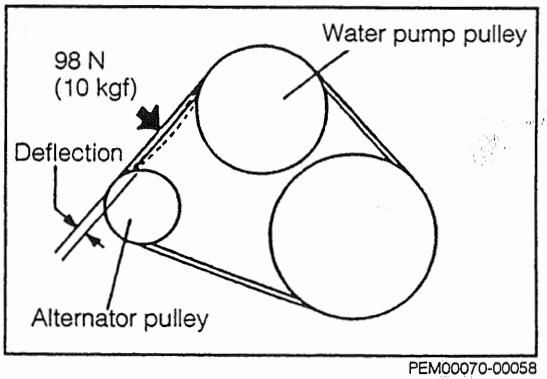
   NOTE:
   - Place the gear shift lever in the 4th gear position so as to prevent the rotation of the crankshaft.


PEM00068-00056

10. Install the water pump pulley and tighten the water pump pulley attaching bolts.
11. Install the drive belt.


PEM00069-00057

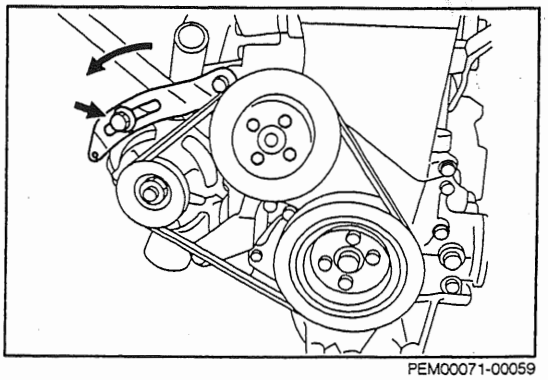
12. Tension adjustment
    (1) Screw in the adjusting bolt, until the deflection of the drive belt meets the specification when you push the midpoint of the drive belt between the water pump pulley and the alternator pulley by applying a force of 98.1 N (10 kgf).



PEM00070-00058

Specified Belt Deflection:

New Belt:	4.5 - 5.5 mm With a force of 98.1 N (10 kgf) applied to point indicated in figure
Used Belt:	4.5 - 6.5 mm With a force of 98.1 N (10 kgf) applied to point indicated in figure

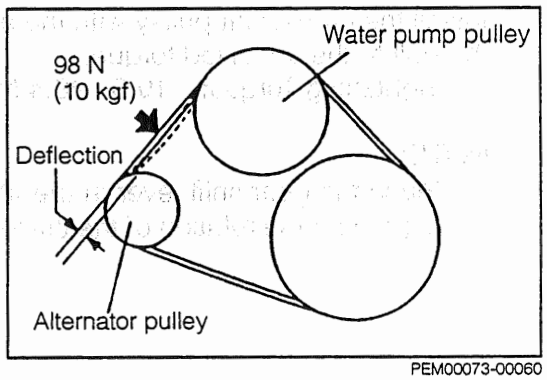

PEM00071-00059

NOTE:
- The used belt denotes a belt which has been used for more than five minutes after it was put into use.

(2) Tighten the alternator attaching bolts.

PEM00072-00000

13. Ensure that the belt deflection meets the specification when the midpoint between the water pump pulley and the alternator is pushed with a force of 98.1 N (10 kgf).
If the deflection does not conform to the specification, perform the adjustment so that the specification may be satisfied.

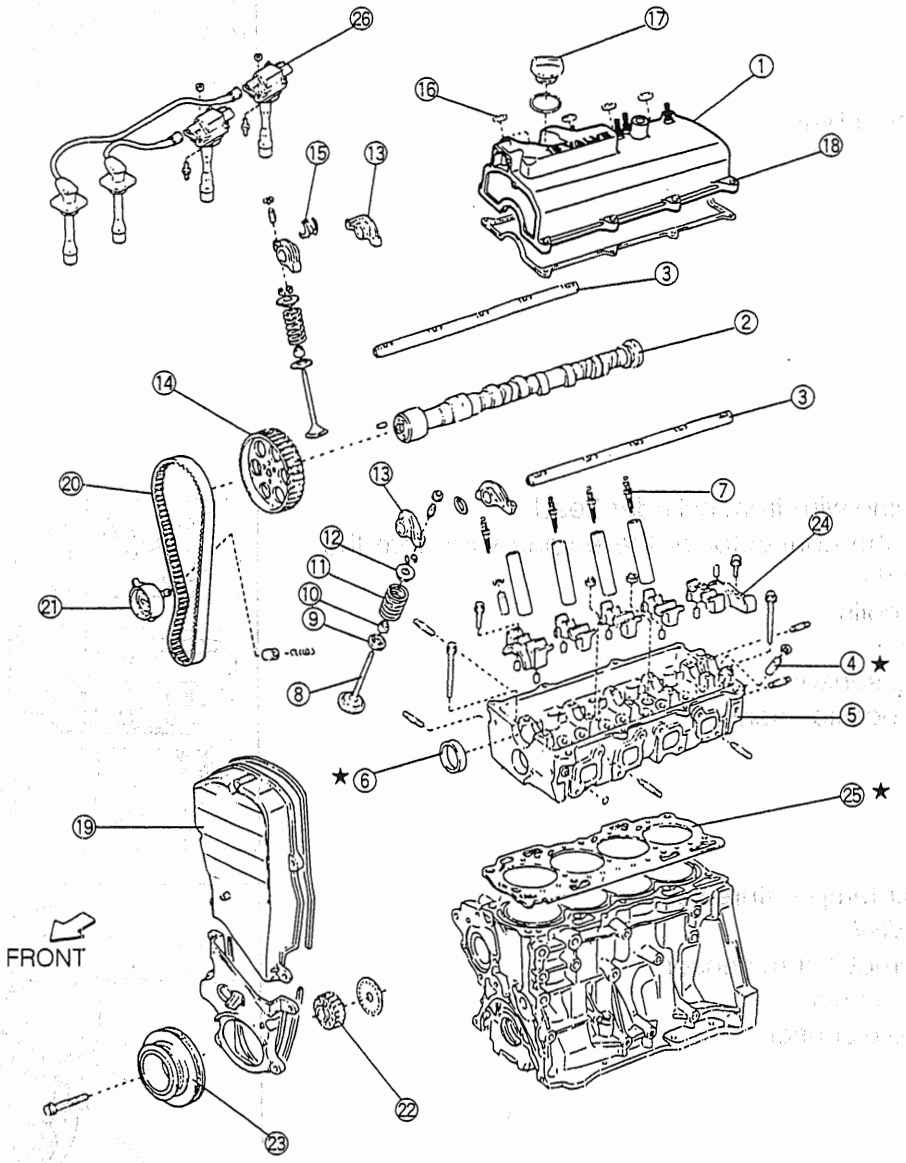


PEM00073-00060

CYLINDER HEAD

COMPONENTS

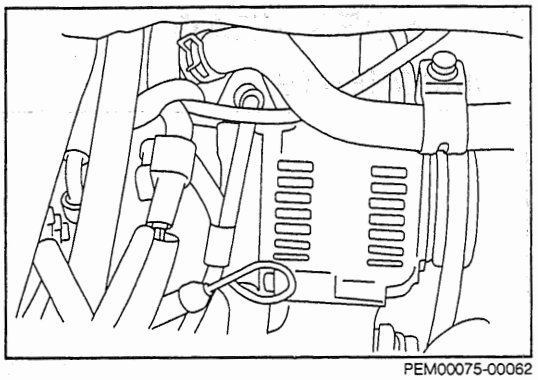
★ : Non-reusable parts



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
㉖ Ignition coil

PEM00074-00061

1. Removal of alternator
   (1) Remove the connector and the cable at the rear side of the alternator.
   (2) Remove the alternator with the belt tension adjusting bar.

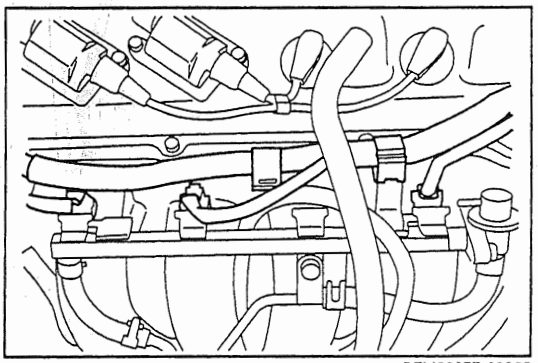


PEM00075-00062

2. Remove the timing belt.

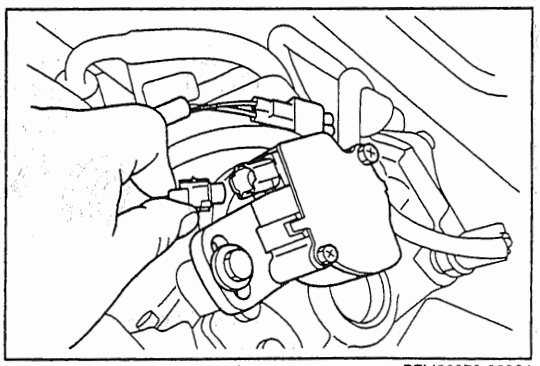
PEM00076-00000

3. Removal of engine wire from cylinder head.
   (1) Disconnect the connector of the engine wire from the following parts.
      ① Ignition coils
      ② Injectors
      ③ Pressure sensor
      ④ Throttle position sensor



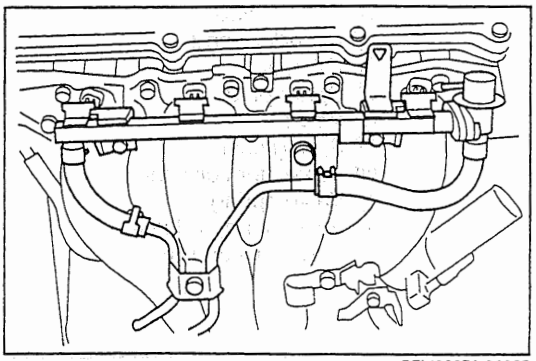
PEM00077-00063

      ⑤ Intake air temperature sensor
      ⑥ Idle-up VSV
      ⑦ Water temperature sensor
      ⑧ Oxygen sensor
      ⑨ Cam angle sensor



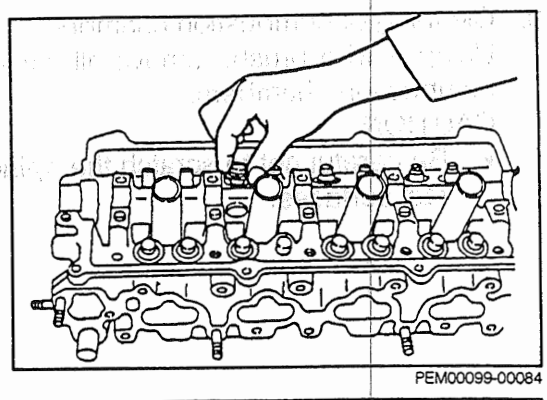
PEM00078-00064

   (2) Disconnect the harness clamps by unlocking the clamps.
   (3) Remove the engine harness from the cylinder head.

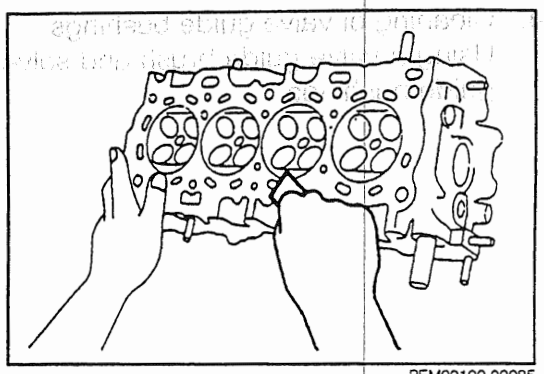


PEM00079-00065

7. Remove the valve spring seats.
   NOTE:
   - Arrange the removed parts in order so that their installing positions may be known easily.

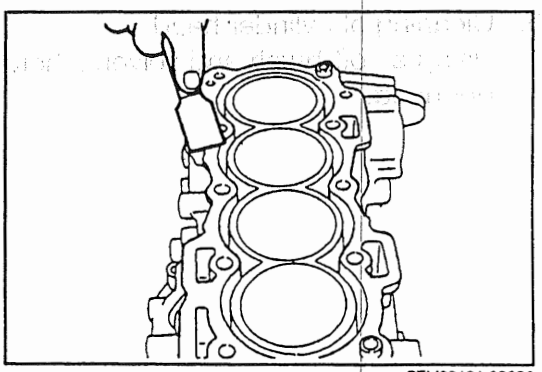

PEM00099-00084

8. Wash the disassembled parts except for electrical parts and plastic parts. Dry them by blowing compressed air.


PEM00100-00085

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, water and oil from the bolt holes.

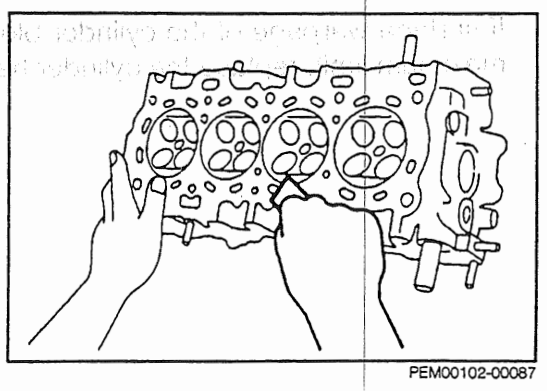

PEM00101-00086

   WARNING:
   - Protect your eyes during the cleaning operation using compressed air.

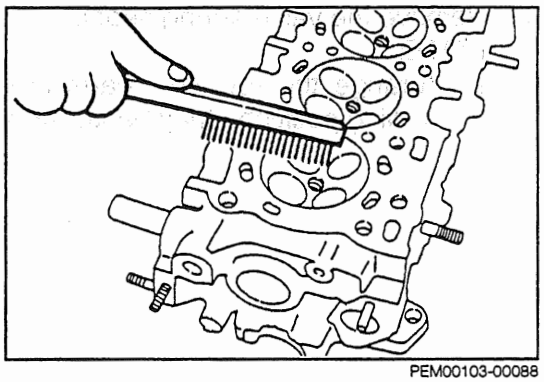
   CAUTION:
   - Do not scratch the gasket surfaces of the piston and cylinder block.

   (3) Set the piston No. 1 to the top dead center.

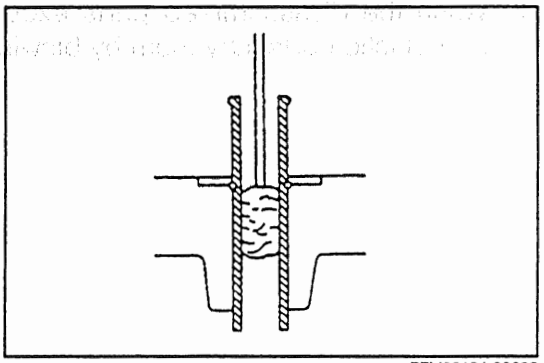
2. Removal of gasket material
   Using a gasket scraper, remove any remaining gasket material from the cylinder head and manifold surfaces.


PEM00102-00087

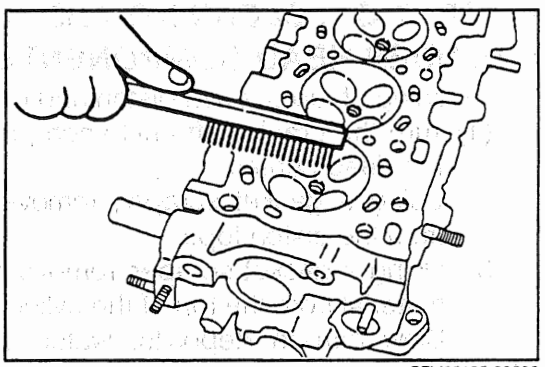
3. Cleaning of combustion chamber
   Using a wire brush, remove all carbon deposits from the combustion chambers.
   CAUTION:
   - Be careful not to scratch the cylinder head gasket contact surfaces.


PEM00103-00088

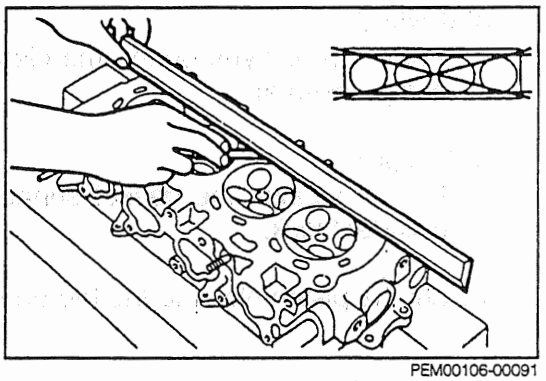
4. Cleaning of valve guide bushings
   Using a valve guide brush and solvent, clean all the valve guide bushings.


PEM00104-00089

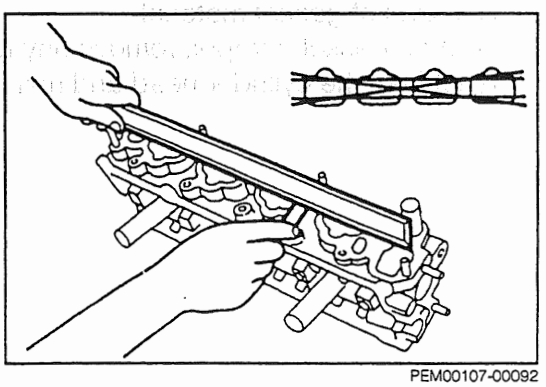
5. Cleaning of cylinder head
   Using a soft brush and solvent, thoroughly clean the cylinder head.

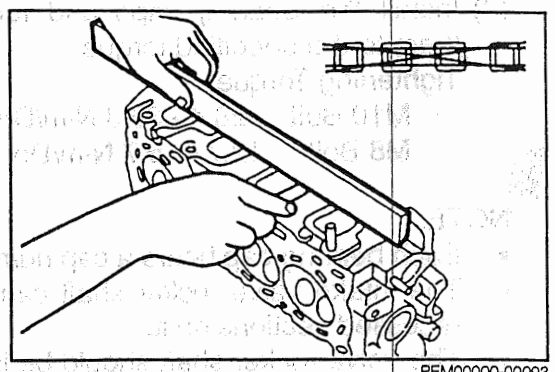

PEM00105-00090

6. Inspection of cylinder head for flatness
   Using a precision straight edge and a feeler 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

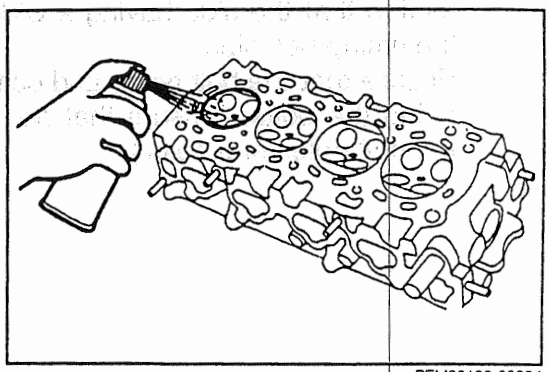

PEM00106-00091

If surface warpage of the cylinder block side exceeds the maximum limit, replace the cylinder head.


PEM00107-00092

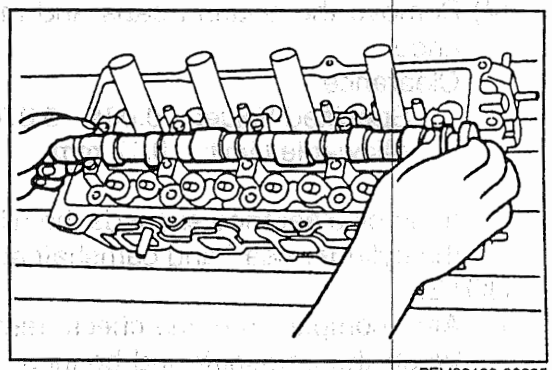

PEM00000-00093

7. Inspection of cylinder head for cracks
   Using a dye penetrant, check the combustion chamber, intake and exhaust ports, cylinder head surface and top of the cylinder head for cracks.
   If a crack is found, replace the cylinder head.

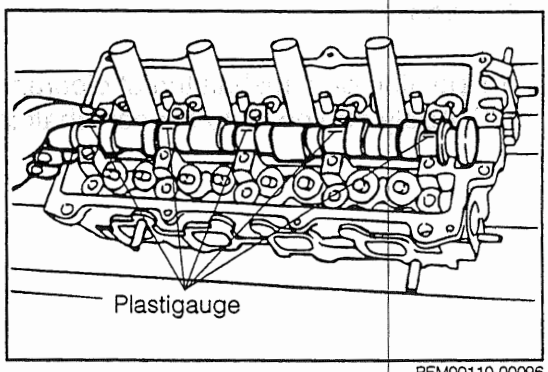

PEM00108-00094

8. Inspection of camshaft oil clearance
   NOTE:
   - Prior to this oil clearance check, the camshaft should be checked for bend in advance.

   (1) Install the camshaft to the cylinder head.

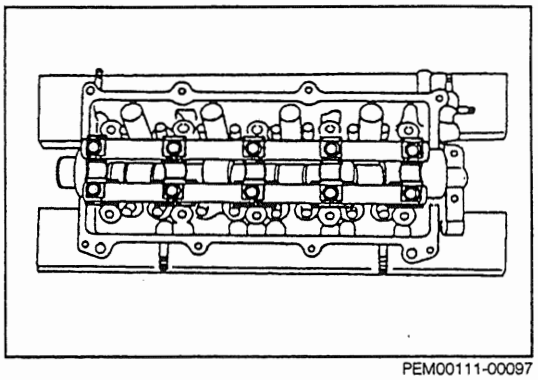

PEM00109-00095

   (2) Place a plastigage on each bearing.



PEM00110-00096

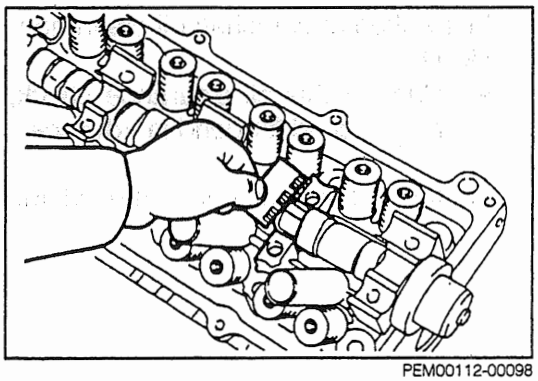
(3) Install the bearing caps and rocker shafts. Tighten them to the specified torque.
Tightening Torque
M10 Bolt: 28.4 - 36.3 N·m/Dry
M8 Bolt: 12.7 - 16.7 N·m/Dry


PEM00111-00097

NOTE:
- Each bearing cap bears a cap number.
- The intake valve rocker shaft can be identified by the recessed sections on it.
- The valve rocker shaft should be installed in such a direction that the side having a wider chamfer comes at the timing belt side.
- Ensure that the bolt holes and bolts are dry when tightening the bolts. (Ensure that no oil or the like gets to the bolt holes and bolts.)

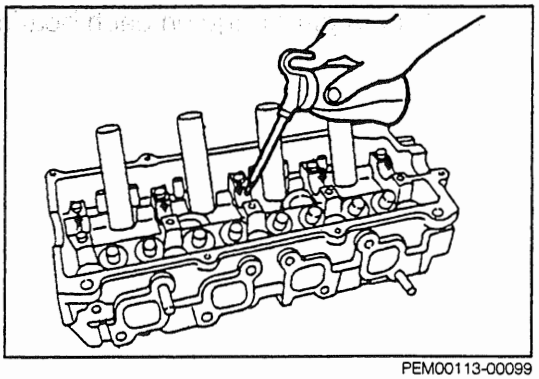
(4) Remove the bearing caps and measure the oil clearance.
Clearance
Specified Value: 0.035 - 0.076 mm
Allowable Limit: 0.17 mm

If the oil clearance exceeds the allowable limit, replace the cylinder head and camshaft as a set.

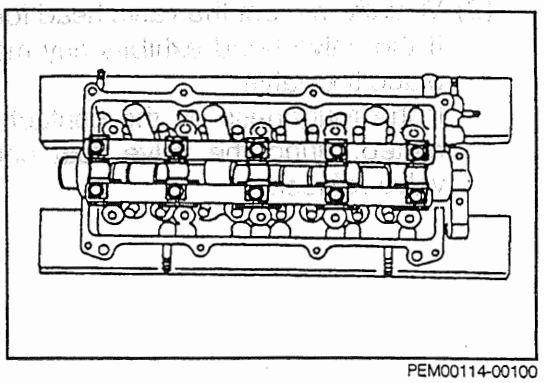

PEM00112-00098

NOTE:
- After completion of the check, remove the plastigages. Wash the camshaft and bearing caps in cleaning solvent.

9. Inspection of camshaft thrust clearance
(1) Apply engine oil to the camshaft journals.

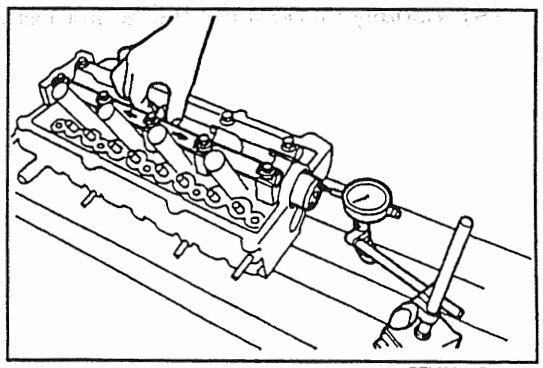

PEM00113-00099

(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/Dry
M8 Bolt: 12.7 - 16.7 N·m /Dry


PEM00114-00100

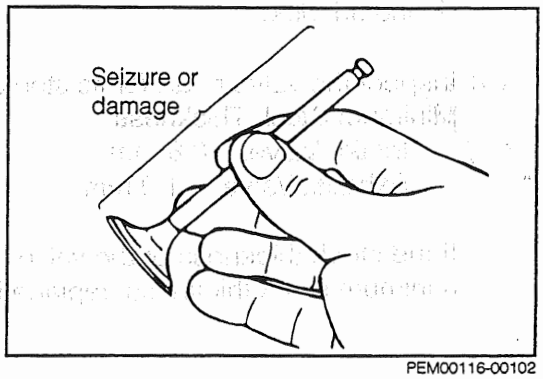
NOTE:
- Each bearing cap bears a cap number.
- The intake valve rocker shaft can be identified by the recessed sections on it.
- The valve rocker shaft should be installed in such a direction that the side having a wider chamfer comes at the timing belt side.
- Ensure that the bolt holes and bolts are dry when tightening the bolts. (Ensure that no oil or the like gets to the bolt holes and 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


PEM00115-00101

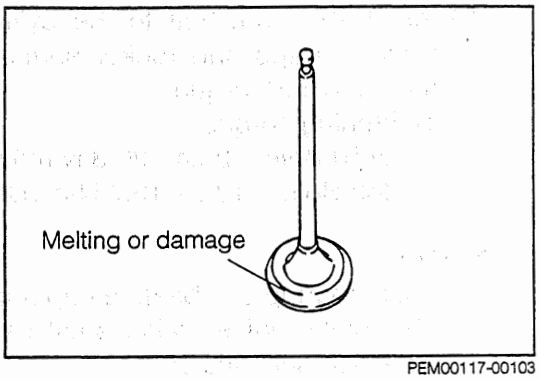
If the camshaft thrust clearance exceeds the allowable limit, replace the camshaft and cylinder head as a set.
Reference:
Cylinder Head Thrust Surface Width:
4.10 - 4.20 mm
Camshaft Thrust Surface Width:
3.95 - 4.00 mm

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 valve seat, valve stem and guide bush 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.



PEM00116-00102

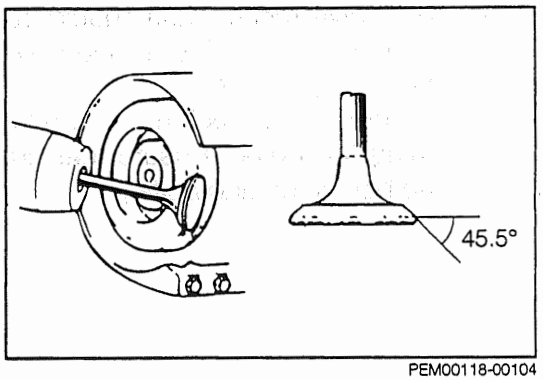
(2) Visually inspect the valve head for melting or damage.
If the valve head exhibits any melting or damage, replace the valve.
If the roughness on the contact surface can be corrected, grind the valve seat contact surface with a valve refacer.



PEM00117-00103

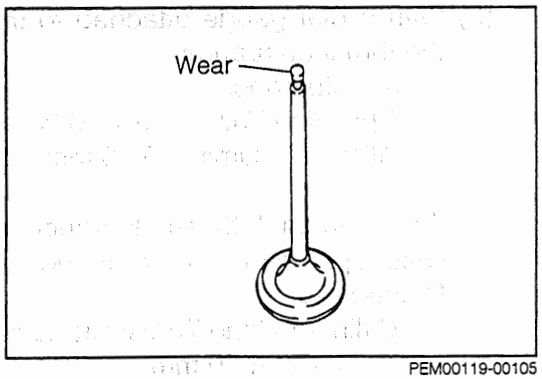
(3) Grind the valves only enough to obtain a smooth contact surface with the valve seat.
Valve Face Angle: 45.5°

NOTE:
- Make sure the valves are ground to the correct valve face angle.



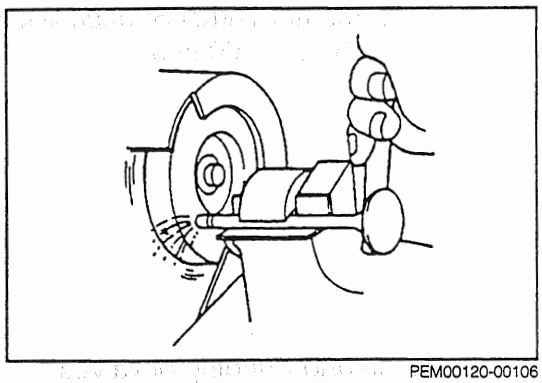
PEM00118-00104

(4) Visually inspect the valve stem end for abnormal wear.



PEM00119-00105

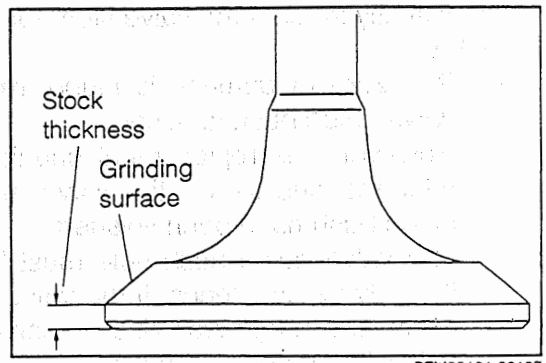
If the valve stem end exhibits abnormal wear, correct the stem end with a valve refacer. However, this correction should be made within a limit of 2 mm from that of standard length.
Reference:
Valve Length (STD)
Intake Valve: 112.8 mm
Exhaust Valve: 114.5 mm


PEM00120-00106

NOTE:
- Be very careful not to allow the valve to be overheated during grinding.

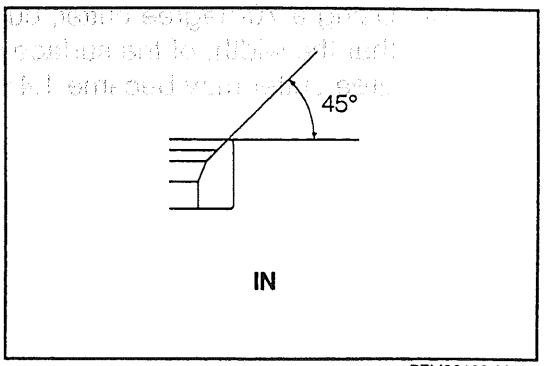
(5) Inspect the valve head for its stock thickness.
Minimum Stock Thickness
Intake Valve: 0.8 mm
Exhaust Valve: 1.0 mm

If the stock thickness of the valve head is less than the minimum stock thickness, replace it with a new one.



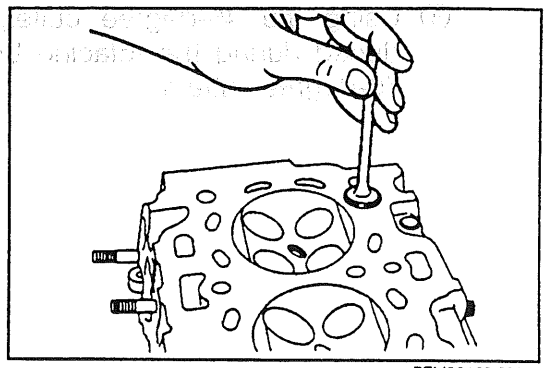
PEM00121-00107

11. Inspection and cleaning of valve seats
    (1) Using a 45-degree 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.



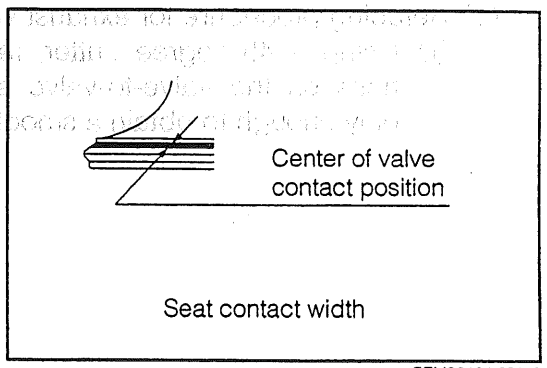
PEM00122-00108

    (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.


PEM00123-00109

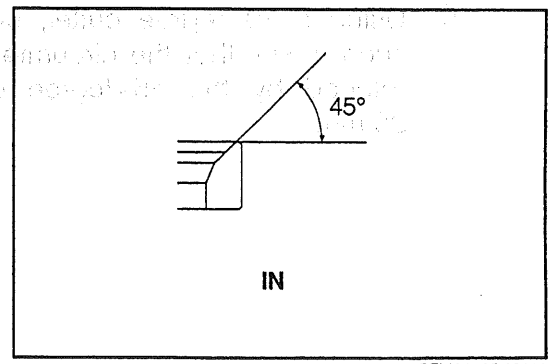
        ③ Measure the width of the contact surface of valve seat.
        Contact Surface of Valve Seat: 1.2 - 1.6 mm

        If not, reface the valve seat.



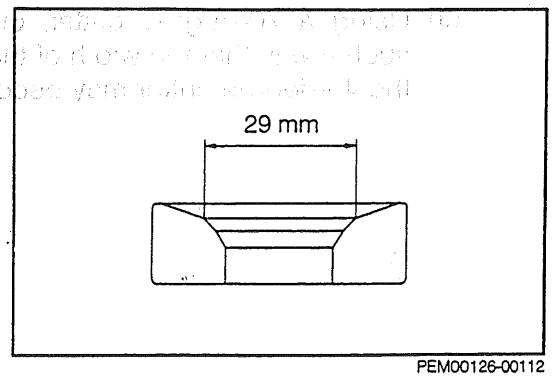
PEM00124-00110

12. Refacing of valve seat
    (1) Refacing procedure for intake valve seats
        ① Using a 45-degree cutter, recondition the roughness on the valve-to-valve seat contact surface, only enough to obtain a smooth surface.



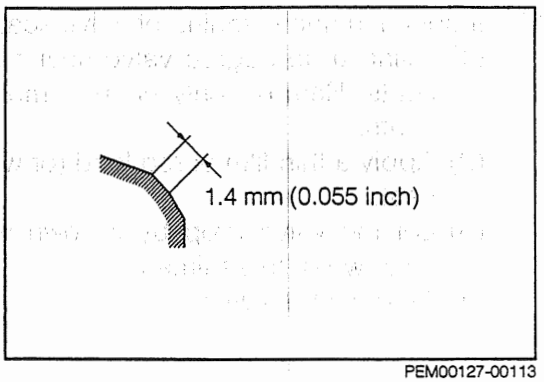
PEM00125-00111

        ② Using a 30-degree cutter, cut the valve seat in such way that the circumference of the surface refaced by the 45-degree cutter may become 29 ± 0.1 mm



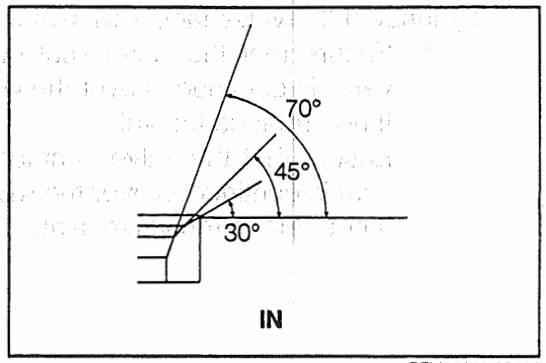
PEM00126-00112

③ Using a 70-degree cutter, cut the seat in such way that the width, of the surface refaced by the 45-degree cutter may became 1.4 mm.



PEM00127-00113

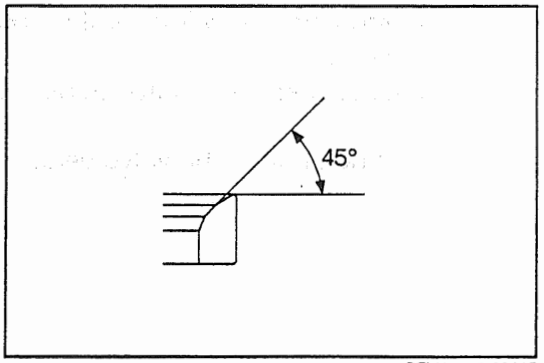
④ Using the 45-degree cutter, remove burrs produced during the refacing by the 30-degree and 70-degree cutters.



PEM00128-00114

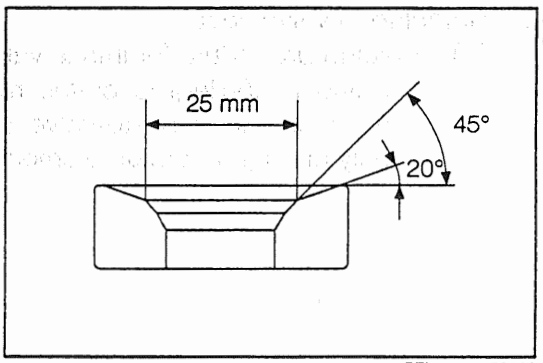
(2) Refacing procedure for exhaust valve seats

① Using a 45-degree cutter, recondition the roughness on the valve-to-valve seat contact surface, only enough to obtain a smooth surface.



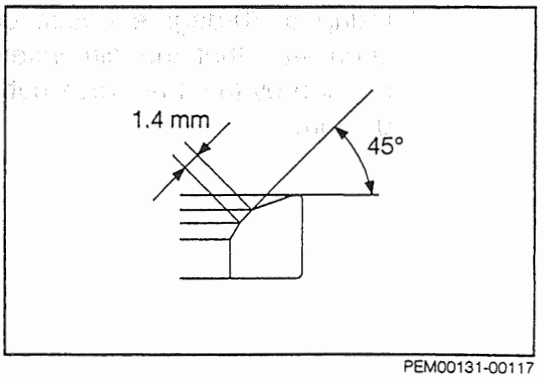
PEM00129-00115

② Using a 20-degree cutter, cut the valve seat in such a way that the circumference of the surface refaced by the 45-degree cutter may become 25 mm.



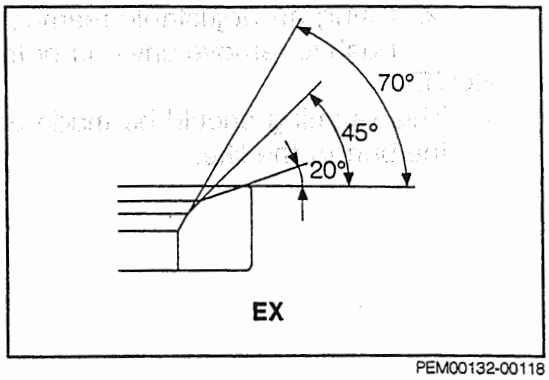
PEM00130-00116

③ Using a 70-degree cutter, cut the valve seat in such a way that the width of the surface refaced by the 45-degree cutter may become 1.4 mm.



PEM00131-00117

④ Using the 45-degree cutter, remove burrs produced during the refacing by the 20-degree and 70-degree cutters.



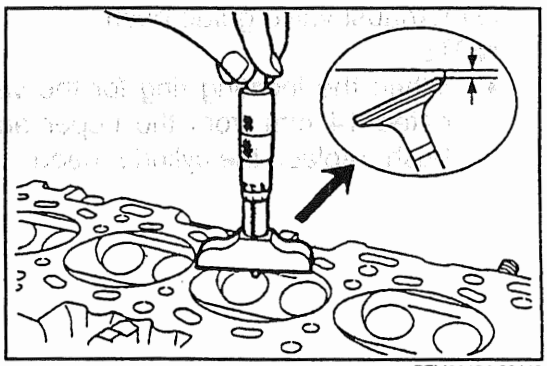
PEM00132-00118

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.

PEM00133-00000

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.

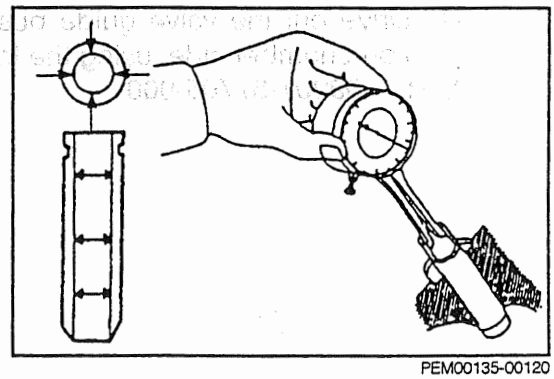
    Maximum Limit
    Intake Valve: 2.775 mm
    Exhaust Valve: 6.026 mm



PEM00134-00119

    If the recession exceeds the maximum limit, replace the cylinder head.

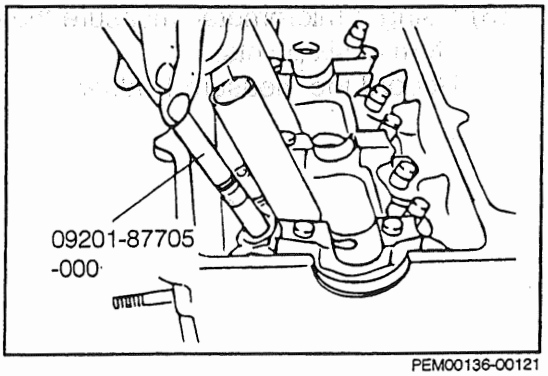
15. Inspection of valve stem-to-guide bushing oil clearance
    (1) Using a caliper gauge, measure the inner diameter of the valve guide at six points.
    Record the measured values.



PEM00135-00120

    ① Drive a new valve guide bush into position, until the snap ring contacts the cylinder head, using the following SST.

    SST: 09201-87705-000



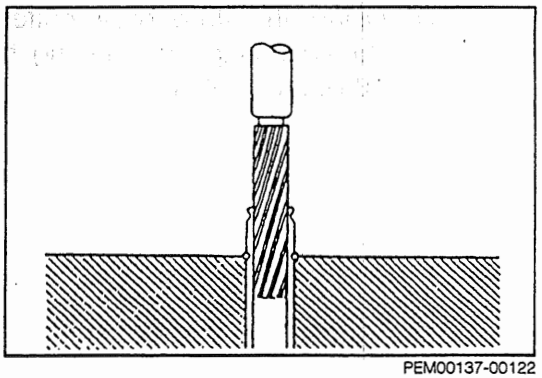
PEM00136-00121

    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.

② 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.



PEM00137-00122

③ Inspection of oil clearance

Ensure that the oil clearance meets the specifications.

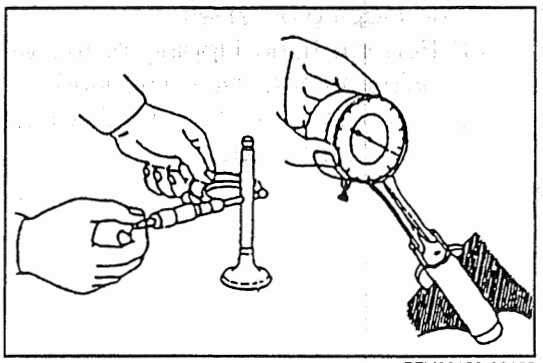
Oil Clearance

Specified Value:

Intake 0.020 - 0.055 mm

Allowable Limit:

Intake 0.08 mm

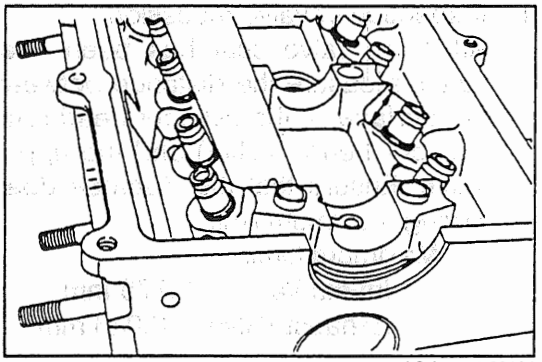


PEM00138-00123

(2) Exhaust valve guide bush

NOTE:

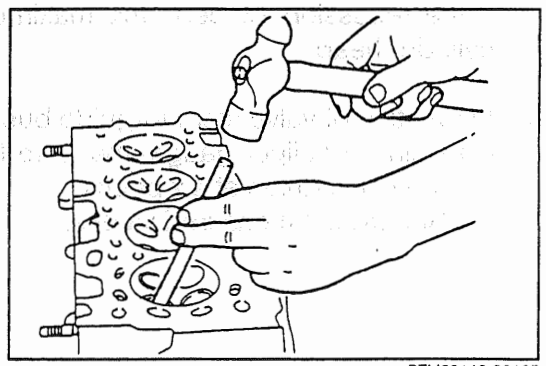
- When the locating ring for the valve guide bush is located 14 mm from the upper end of the valve guide bush, replace the cylinder head.



PEM00139-00124

① Drive out the valve guide bush from the combustion chamber side, using the following SST.

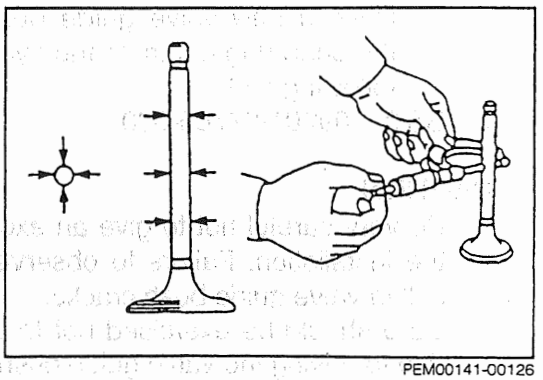
SST: 09201-87705-000



PEM00140-00125

(3) Using a micrometer, measure the diameter of the valve stem at six points.

Record the measured values.



PEM00141-00126

(4) Calculation of oil clearance
Calculate the oil clearance of each valve according to the following formula.
Oil clearance = Inner diameter of valve stem guide – Outer diameter of valve stem
Specified Oil Clearance
Intake Valve Side: 0.020 - 0.055 mm
Exhaust Valve Side: 0.025 - 0.060 mm
Allowable Limit
Intake Valve Side: 0.080 mm
Exhaust Valve Side: 0.090 mm

If the calculated oil clearance exceeds the allowable limit, replace the valve guide bush and valve as a set.

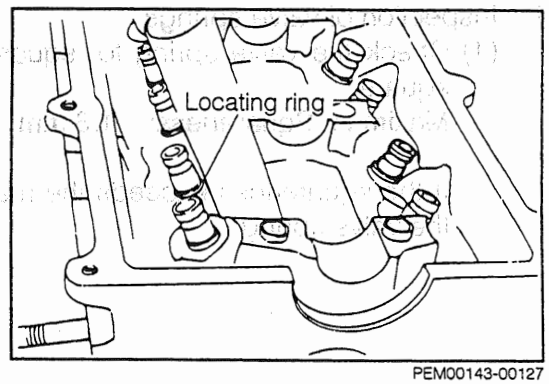
PEM00142-00000

16. Replacement of valve guide bush
CAUTION:
- Removal and installation of the valve guide bush should be carried out while the cylinder head temperature is 80°C - 100°C after heating it gradually.

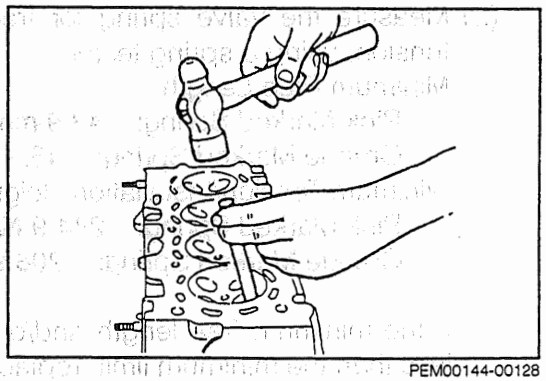
(1) Intake valve guide bush
NOTE:
- If the intake valve guide bush has been already installed with a locating ring, replace the cylinder head.

① Drive out the valve guide bush from the combustion chamber side, using the following SST.
SST: 09201-87705-000

NOTE:
- Be very careful not to tap the cylinder head.

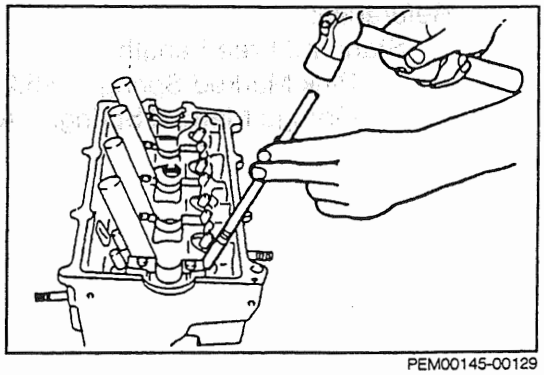


PEM00143-00127


PEM00144-00128

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

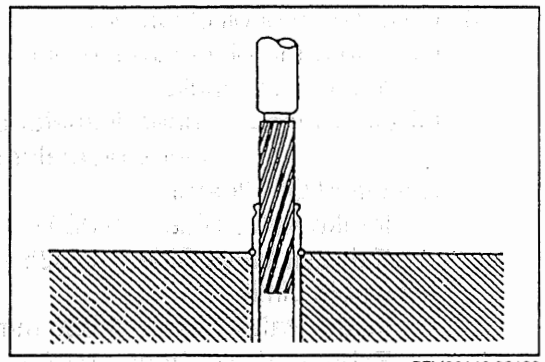
CAUTION:
- Be very careful not to give an excessive impact during the installation. Failure to observe this caution will result in valve guide bush cracks.
- Care should be exercised not to detach the snap ring due to driving the valve guide bush excessively.


PEM00145-00129

③ Using an adjustable reamer, ream the valve guide bush to remove any burr or the like.

NOTE:

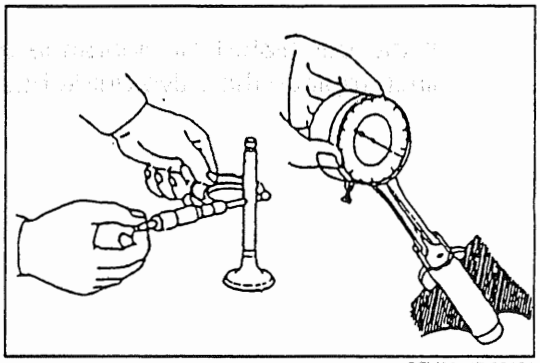
- This reaming should be made only enough to remove the burr or the like.



PEM00146-00130

④ Inspection of oil clearance
Ensure that the oil clearance meets the specifications.

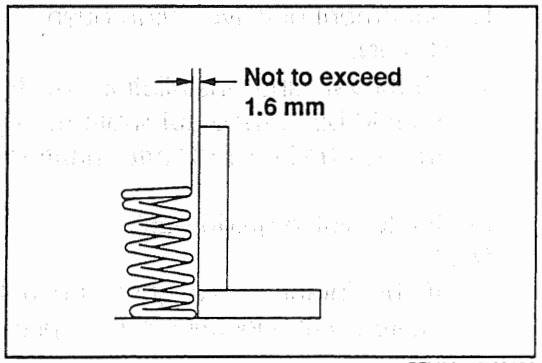
Oil Clearance
Specified Value:
Exhaust 0.025 - 0.060 mm
Allowable Limit:
Exhaust 0.09 mm



PEM00147-00131

17. Inspection of valve springs
(1) Check the valve spring for squareness, using a steel square.
Maximum Squareness: 1.6 mm

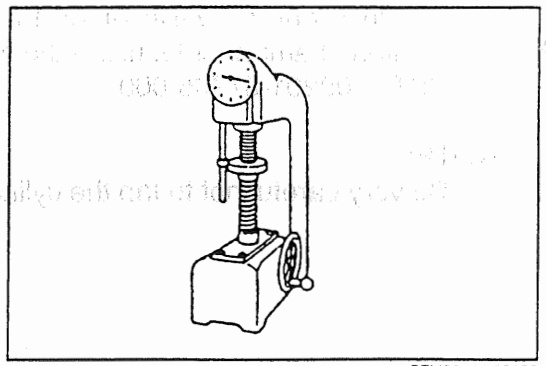
If the squareness exceeds the maximum limit, replace the valve spring.



PEM00148-00132

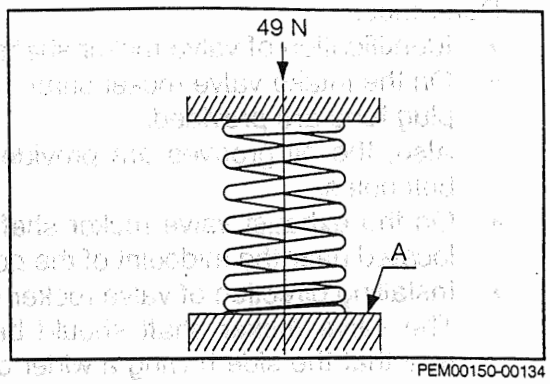
(2) Measure the valve spring for free length and spring tension, using a spring tester.
Minimum Free Length
Pink Marked Spring: 43.9 mm
Orange Marked Spring: 46.1 mm
Minimum Tension/Installation Height
Pink Marked Spring: 244.9 N/38.0 mm
Orange Marked Spring: 208.9 N/38 mm

If the minimum free length and/or minimum tension is less than the minimum limit, replace the valve spring.
Reference:
Standard Free Length
Pink Marked Spring: 45.2 ± 0.5 mm
Orange Marked Spring: About 47.4 mm



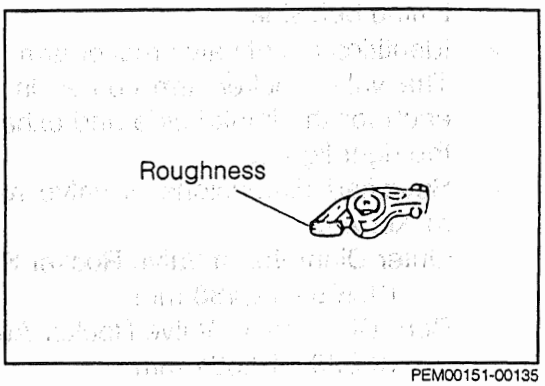
PEM00149-00133

(3) Check of valve spring edge surface for levelness
① Apply a load of 49 N to the valve spring on a spring tester.
② Under the condition ① above, insert a thickness gauge at the arrowheaded point "A" at the right figure.
Here, the thickness gauge should measure 0.07 mm in thickness and 12.5 mm in width. Ensure that the tip-end of the thickness gauge will not reach the center of the coil spring.
If the tip-end of the thickness gauge reaches the center of the coil spring, replace the coil spring with a new part.



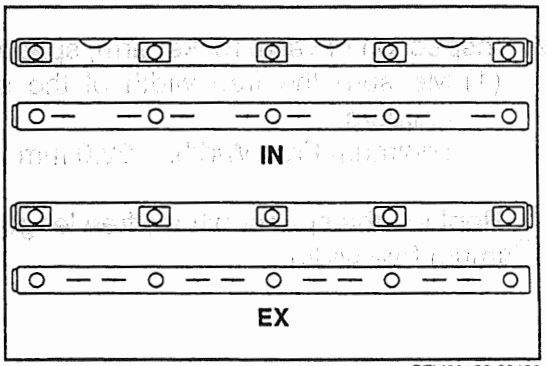
PEM00150-00134

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.
(2) If the valve rocker arm-to-cam contact surface is worn excessively, replace the rocker arm.



PEM00151-00135

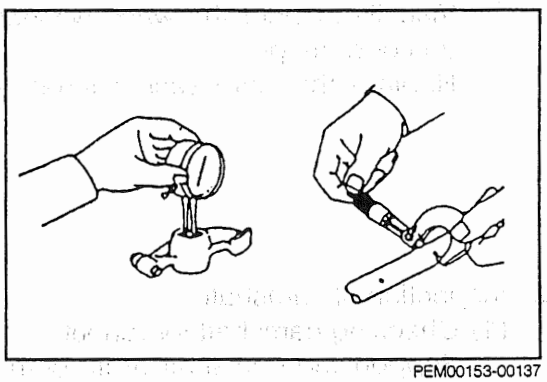
(3) Visually inspect the valve rocker shaft for cracks, seizure or wear.
Replace the valve rocker shaft, if necessary.



PEM00152-00136

(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 valve rocker shaft in two directions, 90 degrees apart from each other.
- Calculate the oil clearance by subtracting the rocker shaft diameter from the rocker arm diameter.

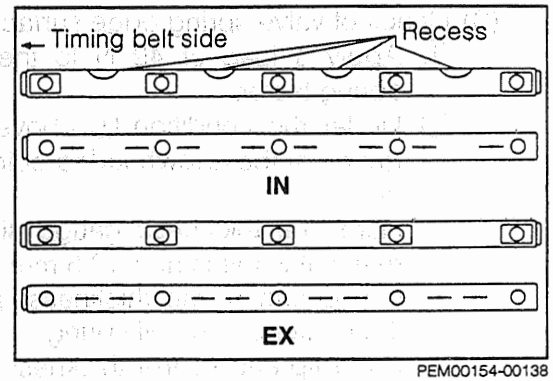
Oil Clearance
Specified Value: 0.012 - 0.053 mm
Allowable Limit: 0.08 mm


PEM00153-00137

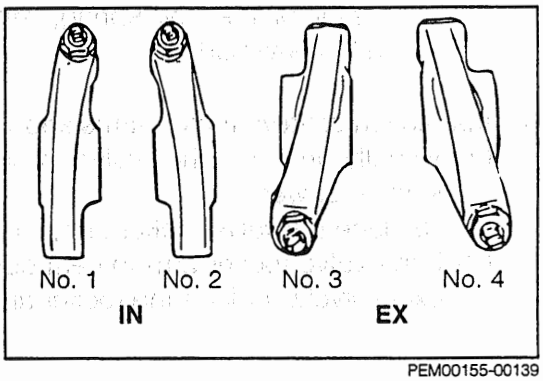
NOTE:
- The measurement of the rocker shaft outer diameter must be performed at the assembling position of each rocker shaft.

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 chamfer 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



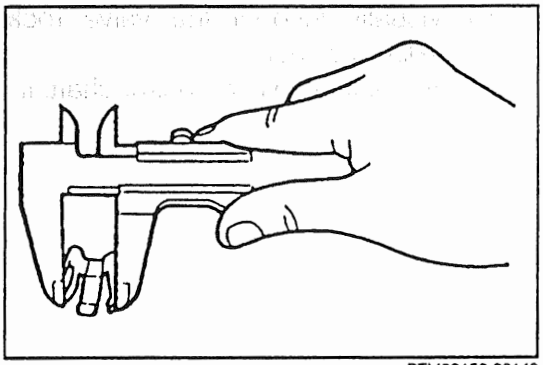
PEM00154-00138



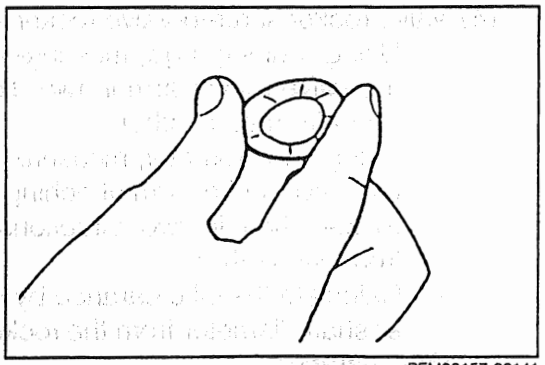
PEM00155-00139

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.

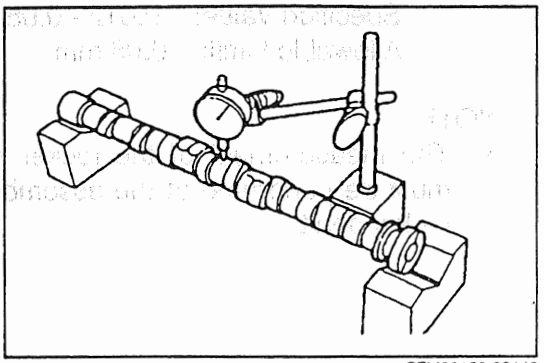

PEM00156-00140

(2) Visually inspect the wave washer for flattened condition or damage.
Replace the wave washer, if necessary.

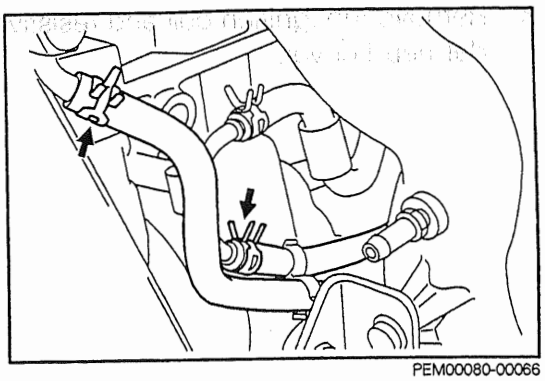

PEM00157-00141

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

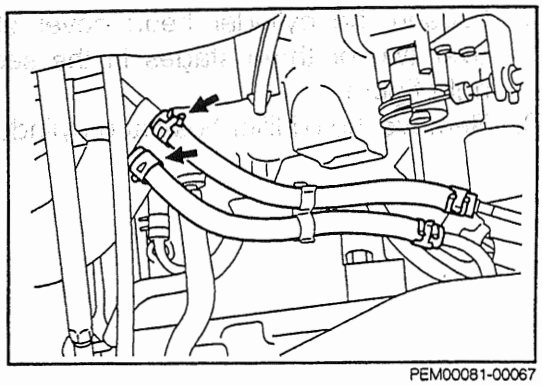
If the runout exceeds the maximum limit, replace the camshaft.


PEM00158-00142

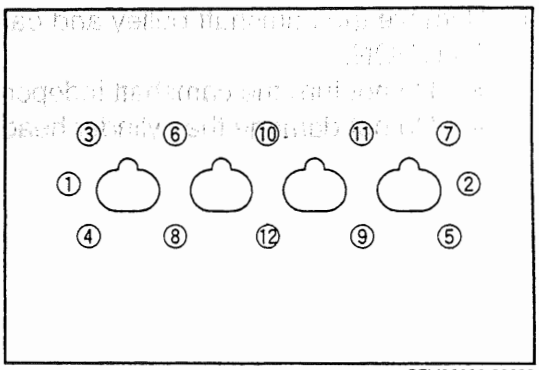
4. Drain the coolant and disconnect the water hoses


PEM00080-00066

5. Disconnect the fuel inlet hose and return hose.
   CAUTION:
   - The fuel pressure at inside of the fuel line is approximately 284 kPa higher than the atmospheric pressure.
   - Therefore, be sure to gradually pull out the rubber hose so as to prevent fuel from splashing.

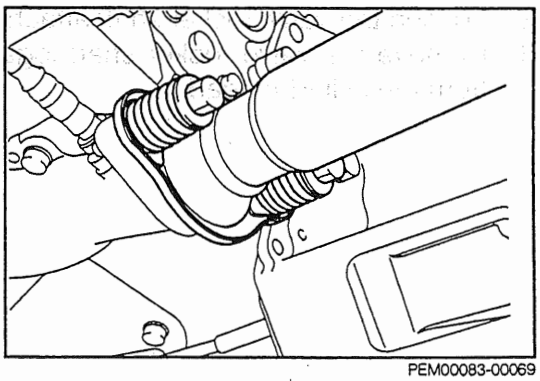

PEM00081-00067

6. Removal of intake manifold
   (1) Disconnect the blow-by hose, vacuum hoses and the accelerator cable.
   (2) Remove the intake manifold stay.
   (3) Remove the attaching bolts and nuts of the intake manifold by loosen them evenly over two or three stage, following the sequence shown in the right figure.
   (4) Slowly detach the intake manifold from the cylinder head while preventing the interference with other parts.

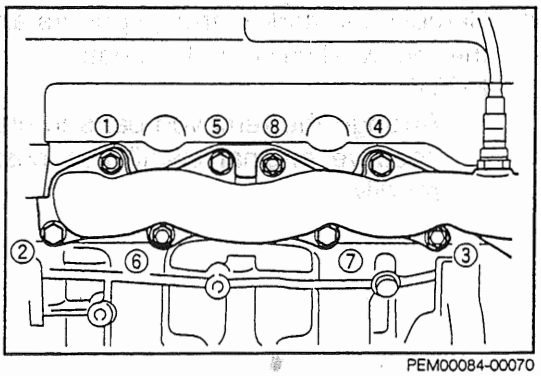


PEM00082-00068

7. Removal of exhaust manifold
   (1) Remove the front exhaust pipe from the exhaust manifold.

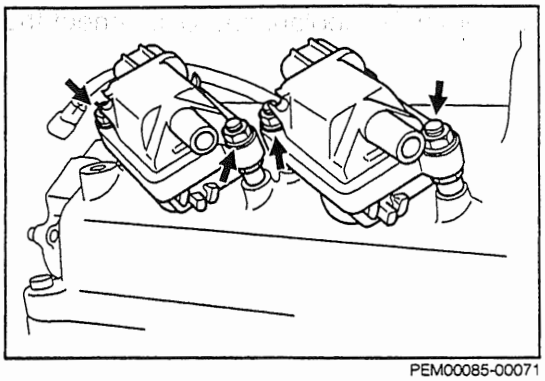

PEM00083-00069

   (2) Loosen the exhaust manifold attaching bolts and nuts evenly over two or three stages in the sequence shown in the right figure.
   (3) Remove the exhaust manifold from the cylinder head while preventing the interference with other parts.



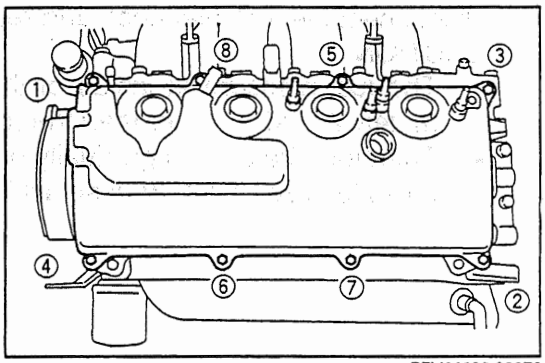
PEM00084-00070

8. Remove the ignition coil and resistive cords from the cylinder head cover.



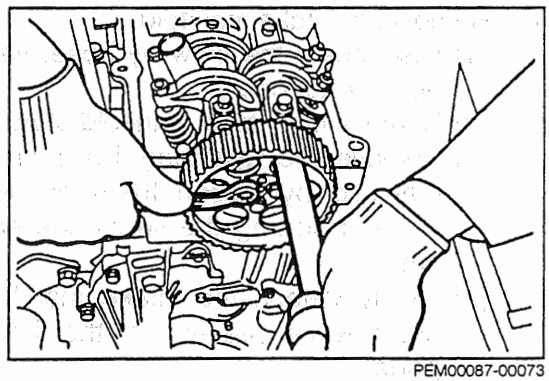
PEM00085-00071

9. Loosen the cylinder head cover attaching bolts evenly over two or three stages in the sequence shown in the right figure.
10. Remove the oil filler hose and cylinder head cover.



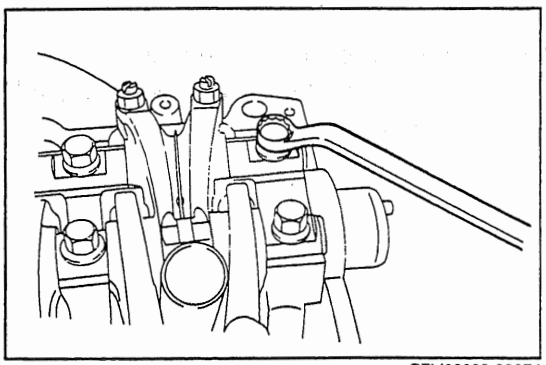
PEM00086-00072

11. Remove the camshaft pulley and cam angle sensor.
    CAUTION:
    - Do not turn the camshaft independently.
    - Do not damage the cylinder head cover gasket surface.



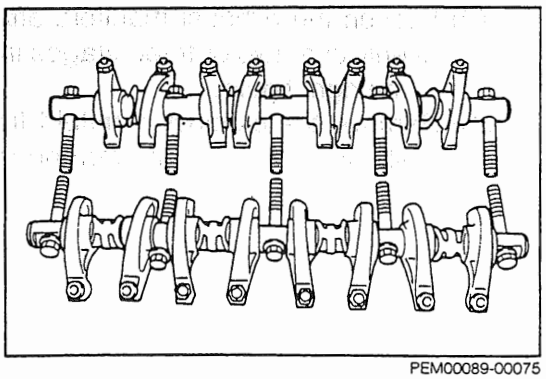
PEM00087-00073

12. Loosen the valve rocker shaft attaching bolts.
13. Remove the valve rocker shaft together with rocker arms from the cylinder head.



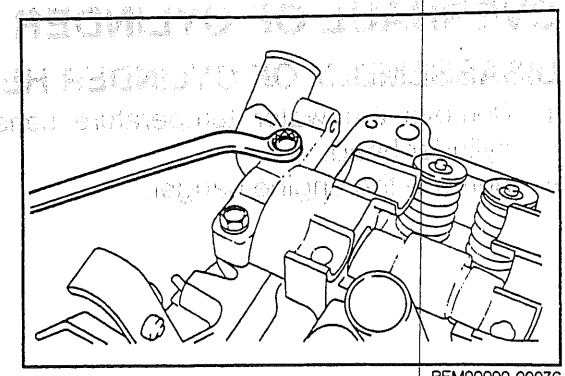
PEM00088-00074

14. Remove the rocker arms, spacers and wave washers from the removed valve rocker shaft.
    NOTE:
    - Arrange the removed parts in order to so that their respective original installation positions may be known readily.



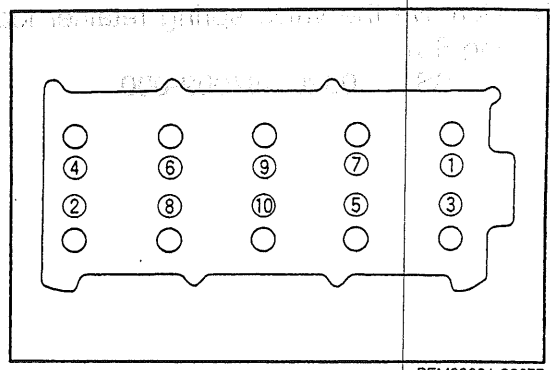
PEM00089-00075

15. Remove the camshaft bearing caps by removing the attaching bolts.
16. Remove the camshaft from the cylinder head.



PEM00090-00076

17. Loosen the cylinder head bolts evenly over two or three stages in the sequence shown in the right figure.
    NOTE:
    - Be certain to loosen the cylinder head bolts. Failure to observe this caution will cause cracks or distortion of the cylinder head, even leading to engine seizure.

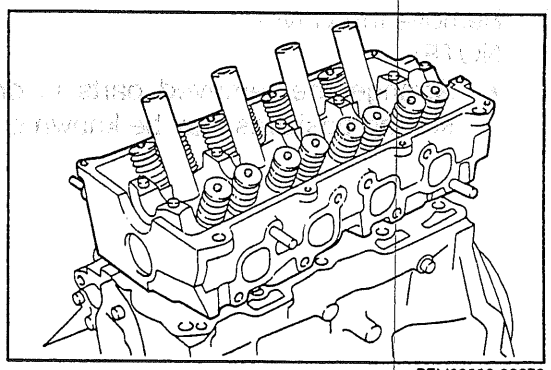


PEM00091-00077

18. Remove the cylinder head bolts.
    REFERENCE:
    - The bolts ① and ③ are shorter the other bolt
      Nominal Length of ① and ③: 110 mm
      Nominal Length of other Bolts: 155 mm

PEM00092-00000

19. Remove the cylinder head from the cylinder block.
    NOTE:
    - Place the cylinder head on two suitable wooden blocks in order that the cylinder head gasket surface may not be damaged.
    - Be careful remove the cylinder head in order that the dust seal may not be lost.

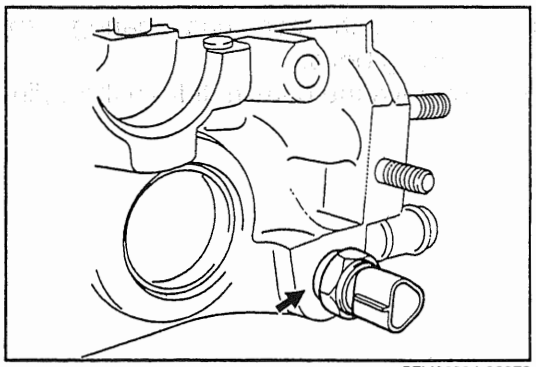


PEM00093-00078

OVERHAUL OF CYLINDER HEAD

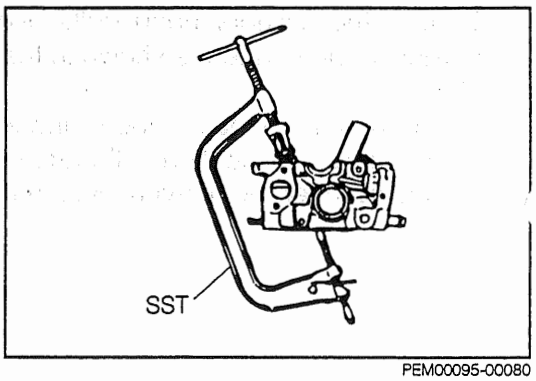
DISASSEMBLY OF CYLINDER HEAD

1. Remove the water temperature sensor gauge from the cylinder head.
2. Remove the engine hanger.



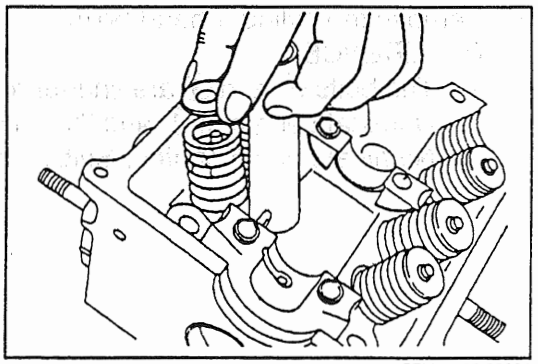
PEM00094-00079

3. Remove the valve spring retainer locks, using the following SST.
   SST: 09202-87002-000



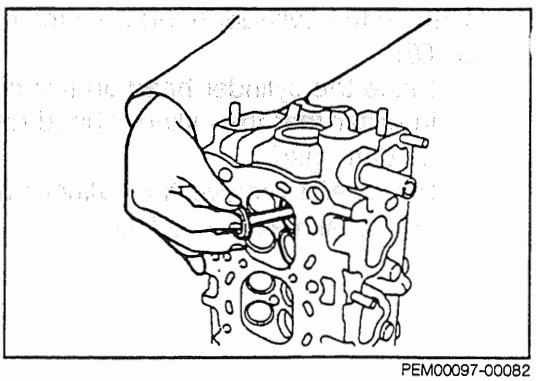
PEM00095-00080

4. Remove the valve springs.
   NOTE:
   - Arrange the removed parts in order so that their installing positions may be known easily.



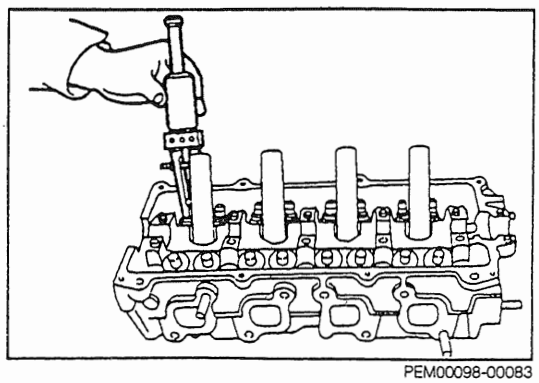
PEM00096-00081

5. Remove the valves.
   NOTE:
   - Arrange the removed parts in order so that their installing positions may be known easily.



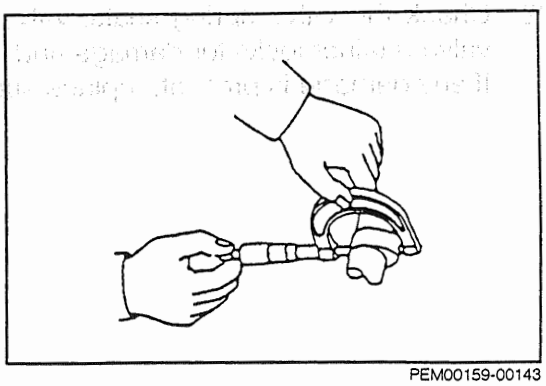
PEM00097-00082

6. Remove the valve stem oil seal by your hand or using the following SST.
   SST: 09201-87704-000

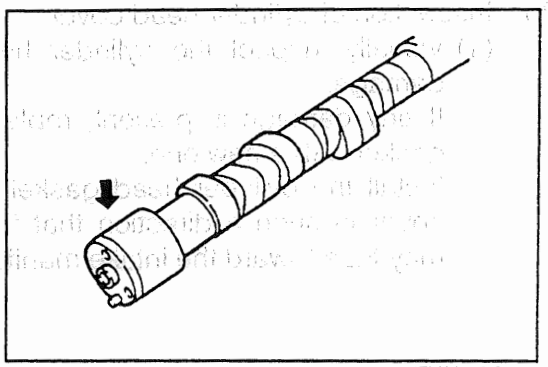


PEM00098-00083

(2) Checking of cam lobe height
Measure the cam lobe height, using a micrometer.
Specified Cam Lobe Height:
Intake: 33.434 - 33.634 mm
Exhaust: 33.17 - 33.37 mm
Minimum Limit:
Intake: 33.2 mm
Exhaust: 33.0 mm

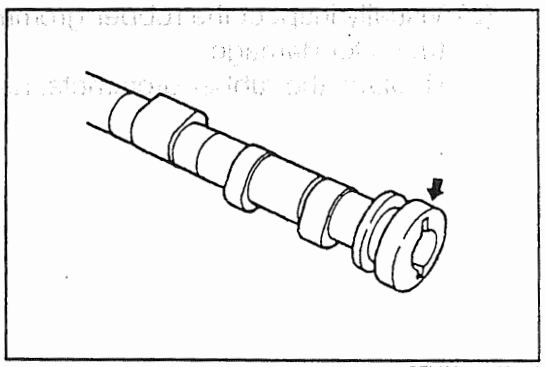

PEM00159-00143

(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.


PEM00160-00144

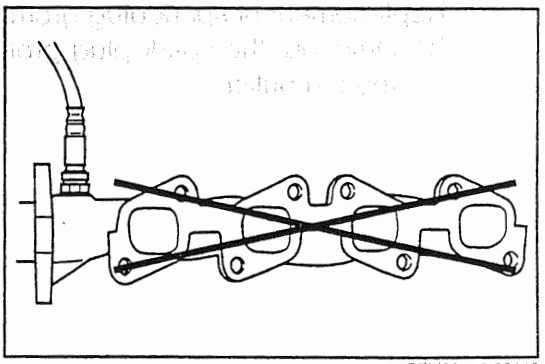
(4) Inspection of groove for driving cam angle sensor
Visually inspect to see if any damage is present at the groove for driving the cam angle sensor.
Replace the camshaft if the groove exhibits any damage.

NOTE:
- If any damage is present, check the cam angle sensor side, too.

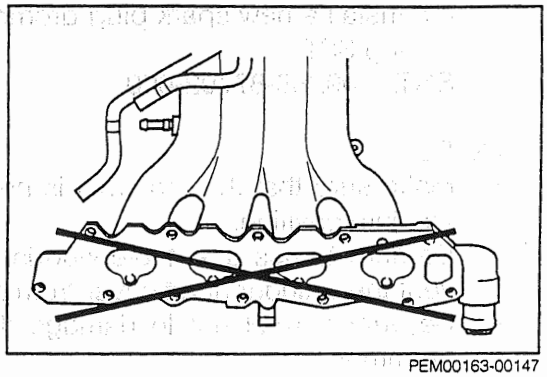

PEM00161-00145

21. Inspection of manifold and surge tank
(1) Check the cylinder head attaching surface of the exhaust manifold for warpage, using a straightedge and a thickness gauge.
Maximum Warpage Limit: 0.1 mm

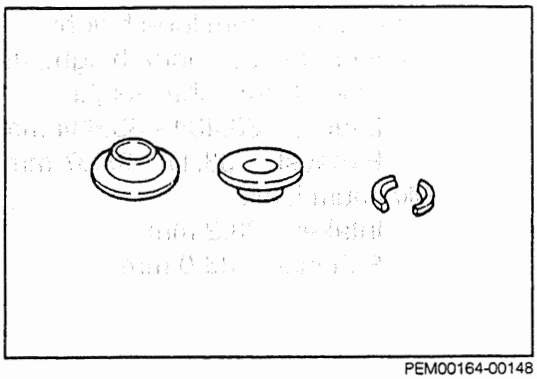
If the warpage exceeds the maximum limit, replace the exhaust manifold No. 1.


PEM00162-00146

(2) Check the contact surface of the intake manifold with the cylinder head.
Maximum Warpage: 0.1 mm


PEM00163-00147

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.

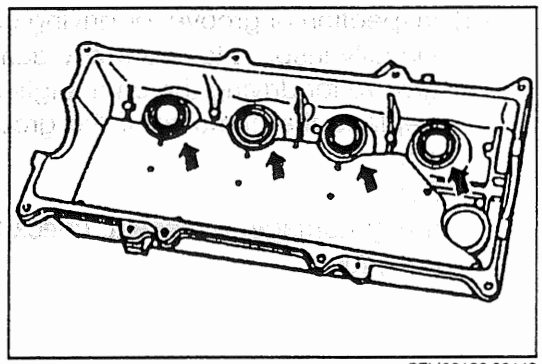


PEM00164-00148

23. Inspection of cylinder head cover
(1) Visually inspect the cylinder head cover gasket for damage.
If any damage is present, replace the cylinder head gasket with a new one.
Install the cylinder head gasket to the cylinder head cover in such a direction that the identification mark may face toward the intake manifold side.

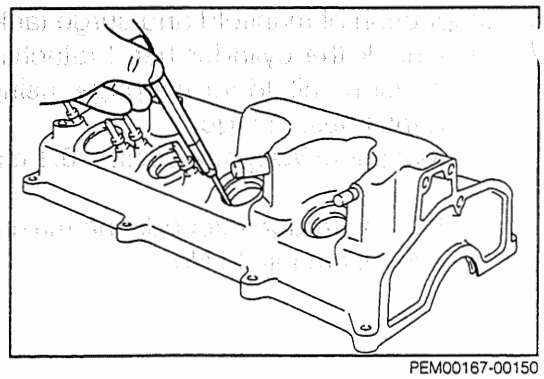
PEM00165-00000

(2) Visually inspect the rubber grommets of the spark plug tubes for damage.
Replace the rubber grommets, as required.



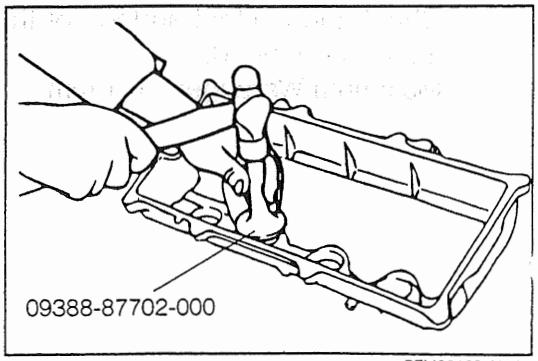
PEM00166-00149

Replacement of spark plug grommet
① Drive out the spark plug grommets, using the slotted pin puller.



PEM00167-00150

② Install a new spark plug grommet, using the following SST.
SST: 09268-87702-000



PEM00168-00151

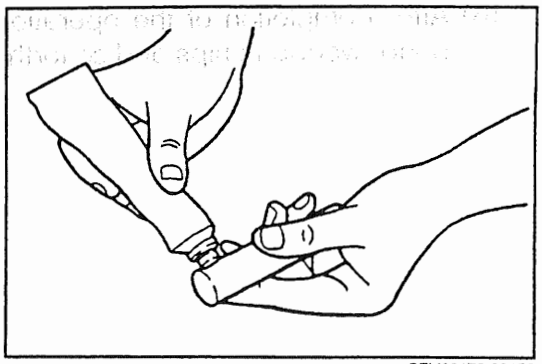
NOTE:
- Make sure that the grommet is not tilted when it is driven into position.
- Be sure to use a suitable wooden piece so as to prevent the cylinder head cover from damage.
- Be very careful not to damage the lip section of the grommet.

ASSEMBLY OF CYLINDER HEAD

NOTE:
- Thoroughly clean all parts to be assembled.
- Before installing the parts, apply new engine oil to all sliding and rotating surfaces.
- Replace all gaskets and oil seals with new ones.

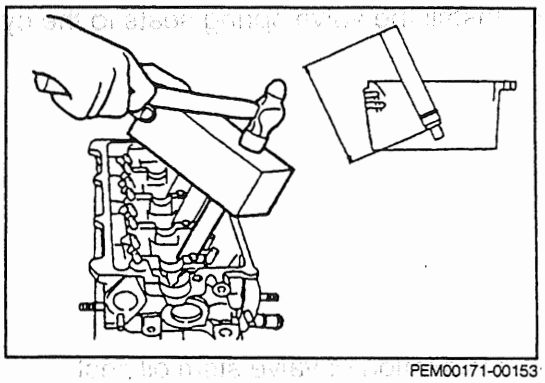
PEM00169-00000

1. Assembly of cylinder head (When a new cylinder head is installed:)
   When a 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 spark plug tubes of the cylinder head attaching surfaces.



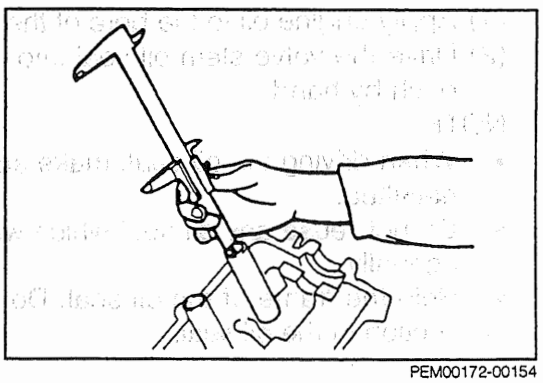
PEM00170-00152

   (3) With a wooden piece or the like placed on the upper end of the spark plug tube, drive the spark plug tube into 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.



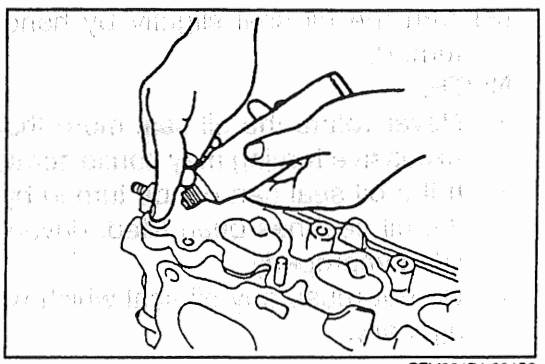
PEM00171-00153

   NOTE:
   - Be very careful not to drive the spark plug 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.



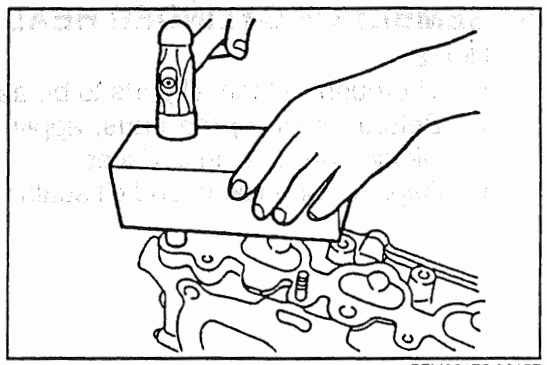
PEM00172-00154

   (4) Apply a thin film of the Three Bond 1377B to the attaching section for the heater outlet tube on the cylinder head.



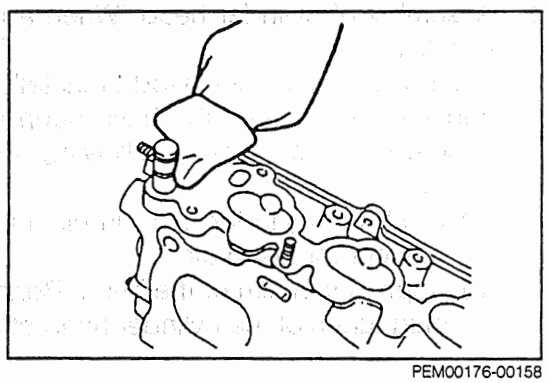
PEM00174-00156

(5) With a wooden piece interposed, drive the heater outlet tube to the point marked in Step (4).



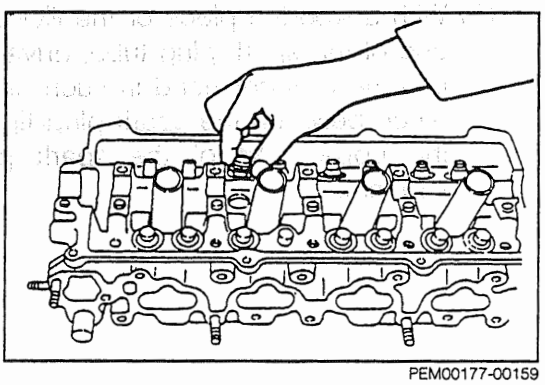
PEM00175-00157

(6) After completion of the operation, remove any oozed bond, wooden chips and so forth.



PEM00176-00158

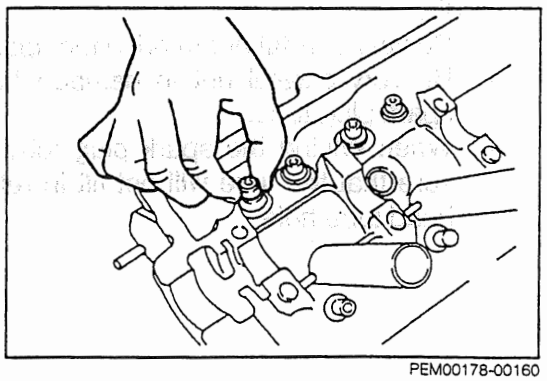
2. Install the valve spring seats to the cylinder head.



PEM00177-00159

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.

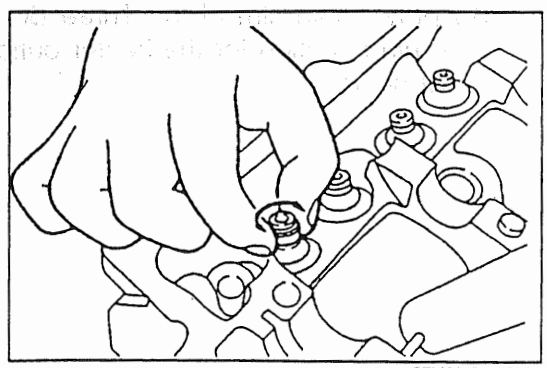
   NOTE:
   - When driving the oil seal, make sure that the oil seal is not tilted.
   - Do not reuse any oil seal which was tilted or driven diagonally.
   - Hold the frame of the oil seal. Do not touch the rubber section of the oil seal.



PEM00178-00160

   (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.

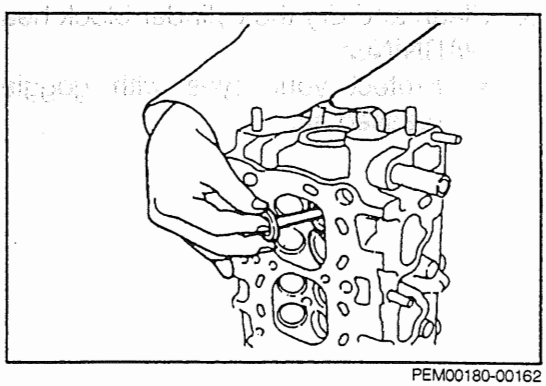


PEM00179-00161

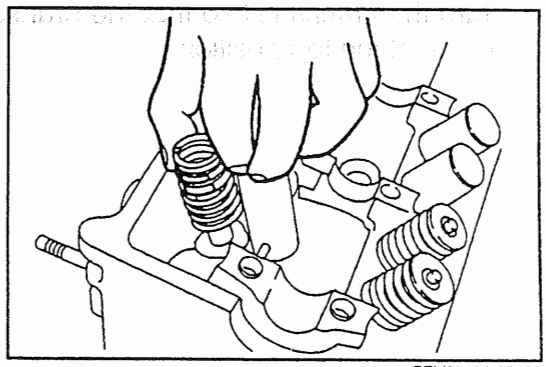
4. Apply oil to the valve stem. Install the valve to the cylinder head.
   NOTE:
   - Care must be exercised as to the installing position. Do not pull out the valve once it has been inserted.
   - If the inserted valve should be pulled out, replace the valve stem oil seal with a new one.

   Reference:
   Identification of Valves

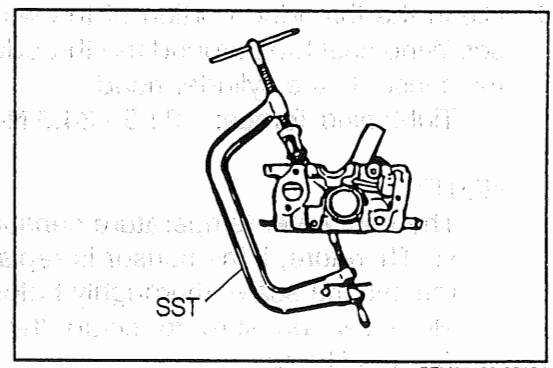
Engine	Identification No.
HC-ES	④


PEM00180-00162

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.


PEM00181-00163

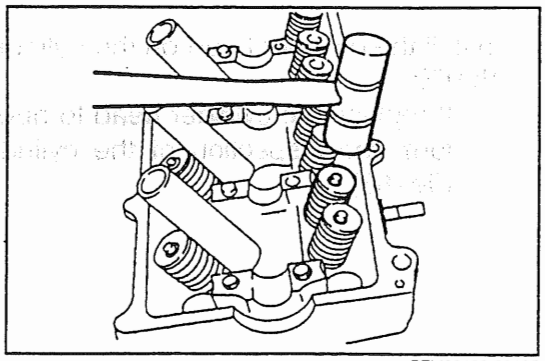
   (2) Install the valve spring retainer to the valve spring. Install the valve spring retainer locks while compressing the valve spring retainer, using the following SST.
   SST: 09202-87002-000



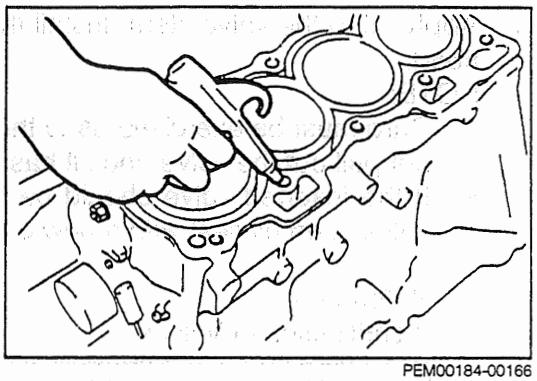
PEM00182-00164

   (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.

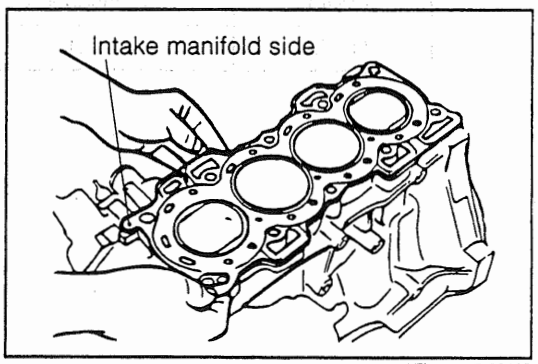
   WARNING:
   - During this operation, care must be exercised to ensure that the valve spring retainer or retainer locks may not be jumped out.
   - Protect your eyes with safety goggles during this operation.


PEM00183-00165

6. Clean and dry the cylinder block head bolt holes.
   WARNING:
   - Protect your eyes with goggles when using compressed air.

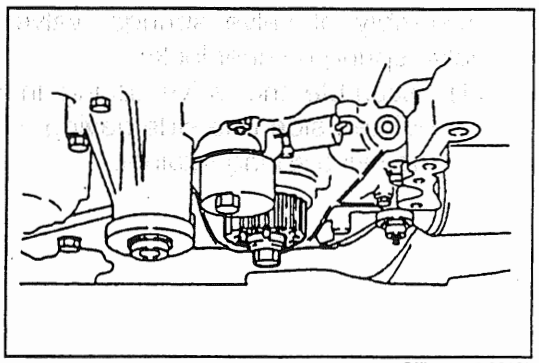

PEM00184-00166

7. Clean the cylinder block upper gasket surface. Install the cylinder head gasket, while aligning it with the pin ring for locating use.



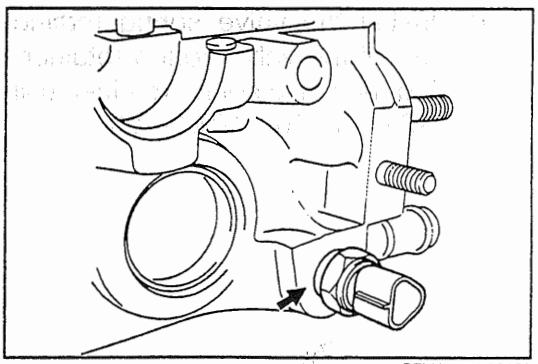
PEM00185-00167

8. Turn the crankshaft so that the crankshaft key groove may come at the top position.

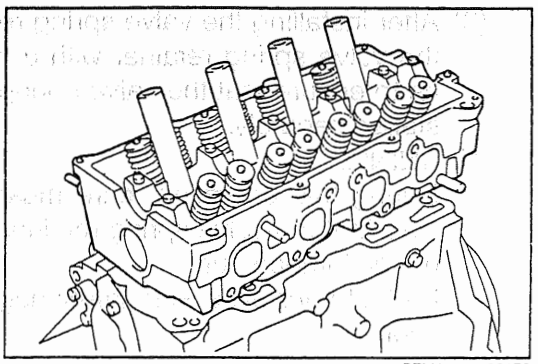

PEM00186-00168

9. 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

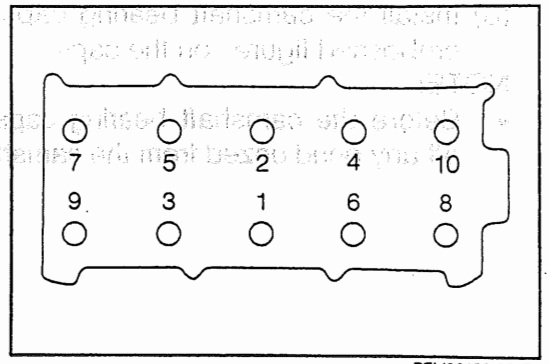
   NOTE:
   - The new water temperature sensor is coated with sealer. Therefore, if the sensor is replaced with a new one, remove the sealer thoroughly before winding seal tape. Moreover, be sure to clean the cylinder head side threaded holes.


PEM00187-00169

10. Install the cylinder head on the cylinder block.
    NOTE:
    - If replace the cylinder head to new one, be sure to perform the inspection of the cylinder block. (See page EM–68)


PEM00188-00170

11. 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

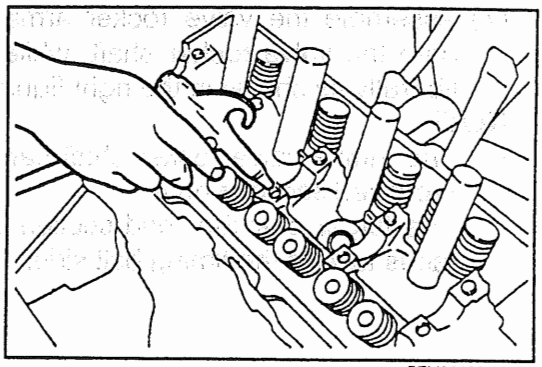


PEM00189-00171

NOTE:
- Failure to tighten the bolts evenly may cause cracks and distortion of the cylinder head, even leading to engine seizure.
- Make sure that all the bolts are torqued uniformly to a constant value, also within the specified range.

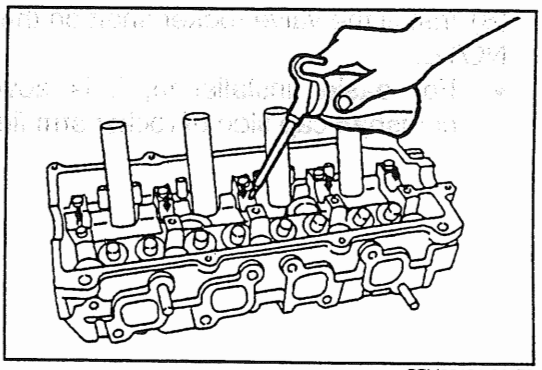
12. Installation of camshaft and rocker shafts
    (1) Wash and dry the holes for the camshaft cap attaching bolts.

WARNING:
- Protect your eyes with goggles when using compressed air.

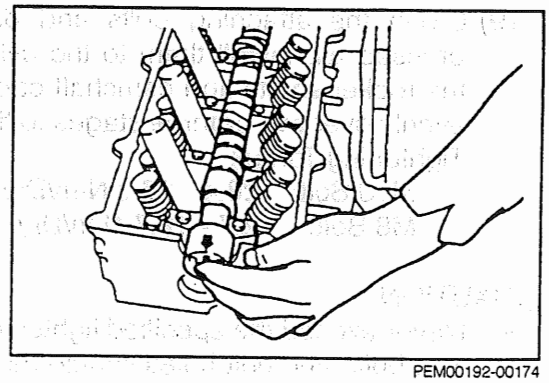

PEM00190-00172

(2) Liberally apply engine oil to the journal sections and thrust bearing sections.

NOTE:
- Be very careful not to allow any oil to flow into the bearing cap attaching holes.

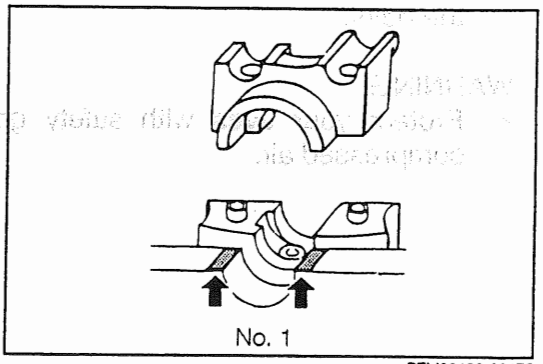

PEM00191-00173

(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.


PEM00192-00174

(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.
(5) Apply engine oil to the camshaft journal section.

NOTE:
- Be very careful not to allow any oil to flow into the bearing cap attaching holes.

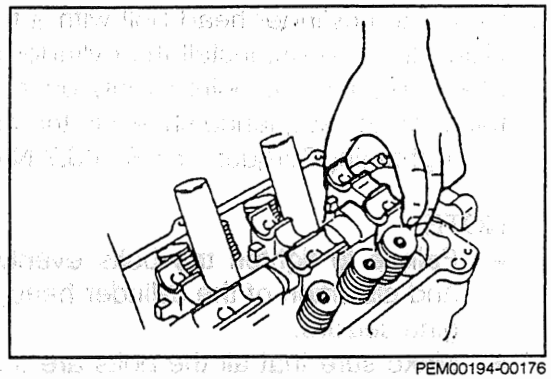


PEM00193-00175

(6) 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.

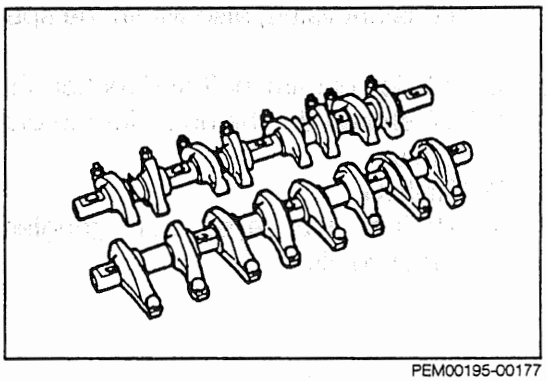


PEM00194-00176

(7) 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 on it.
- The larger chamber end section of valve rocker shaft faces toward the timing belt side.

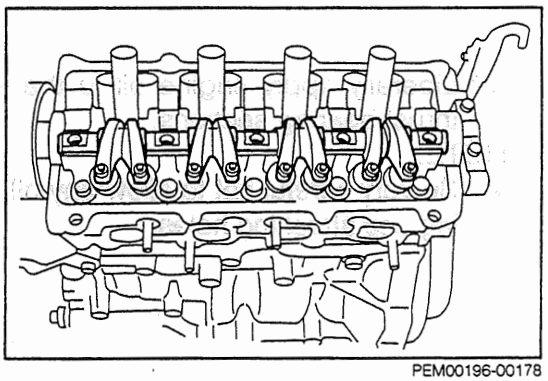


PEM00195-00177

(8) Install the valve rocker shaft on the camshaft caps.

NOTE:

- For easier installation, it is advisable to insert the camshaft cap side of rocker arm first.



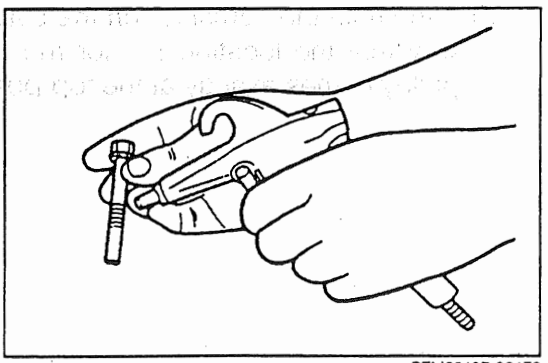
PEM00196-00178

(9) 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/Dry

M8 Bolt: 12.7 - 16.7 N·m/Dry



PEM00197-00179

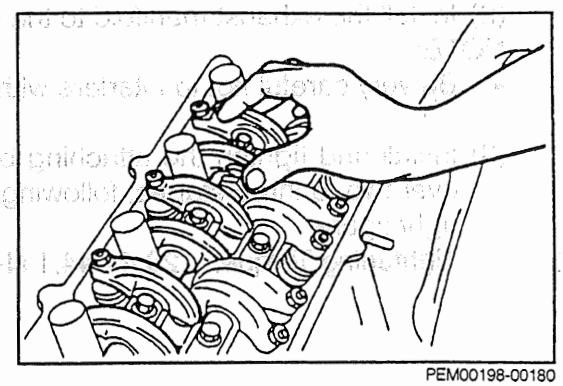
CAUTION:

- Never exceed the specified tightening torque.
- The bolts and bolt holes should be dry when tightening the bolts.

WARNING:

- Protect your eyes with safety goggles, when using compressed air.

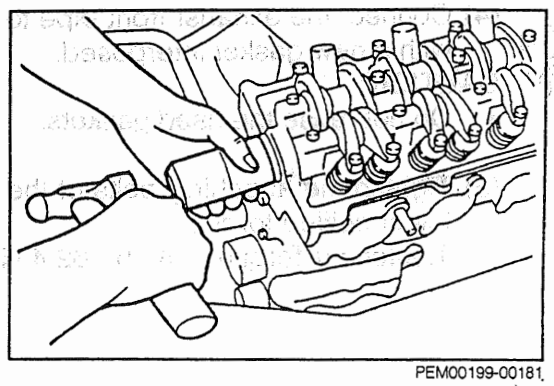
13. Install the spacers into between the intake valve rocker arms on the rocker shaft.



PEM00198-00180

14. Apply engine oil to the lip section of the type T oil seal of the camshaft.
15. Drive the oil seal into position, using the following SST.
    SST: 09636-20010-000

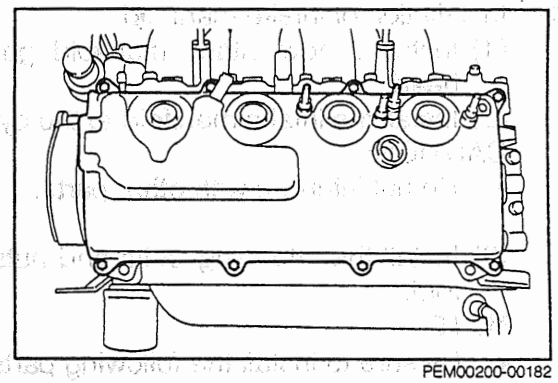
    CAUTION:
    - Be very careful not to tilt the oil seal against the attaching hole of the camshaft oil seal.



PEM00199-00181

16. Installation of the camshaft timing belt pulley.
    (Refer to the Timing Belt section of the service manual.)

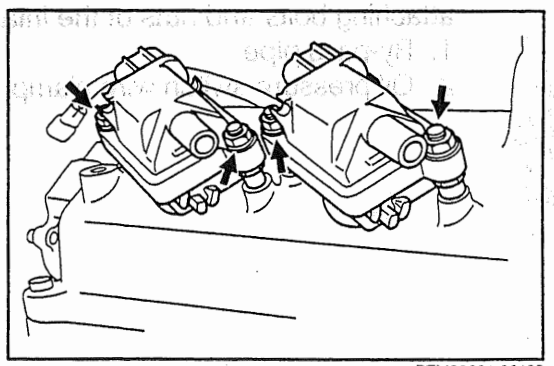
17. Adjust the valve clearance and ignition timing. (See the tune-up section)
18. Install the cylinder head cover and tighten the attaching bolts evenly two or three stages, following the sequence shown in the right figure.
    Tightening Torque: 2.9 - 4.9 N·m



PEM00200-00182

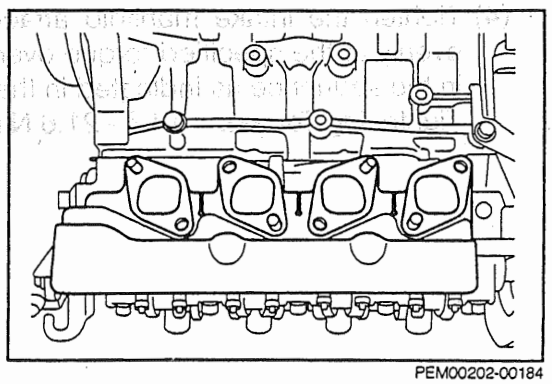
19. Connect the connector to the water temperature sensor.
20. Install the ignition coil to the cylinder head cover and tighten it.
    Tightening Torque: 2.9 - 4.9 N·m

21. Connect the resistive cords between the ignition coil and the spark plug.
    IG coil for No. 2 cylinder – No. 3 cylinder
    IG coil for No. 4 cylinder – No. 1 cylinder



PEM00201-00183

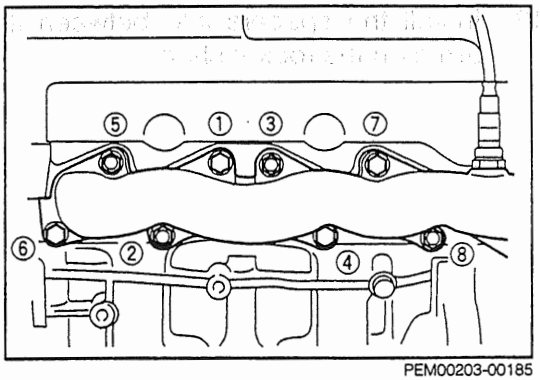
22. Installation of exhaust manifold
    (1) Install the new exhaust manifold gasket.



PEM00202-00184

(2) Install the exhaust manifold to the cylinder head.
NOTE:
- Be very careful not to interfere with other parts.

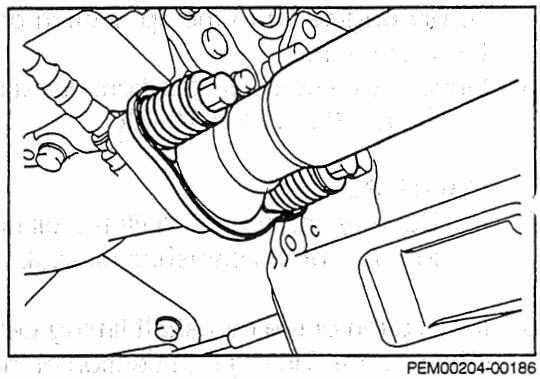
(3) Install and tighten the attaching bolts and nuts evenly over two to three stages, following the sequence in the right figure.
Tightening Torque: 29.4 - 44.1 N·m



PEM00203-00185

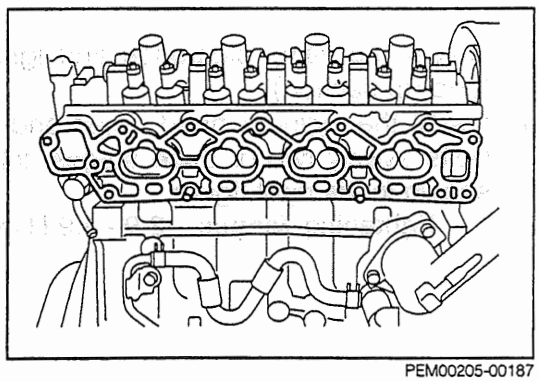
(4) Connect the exhaust front pipe to the exhaust manifold with a new gasket interposed.
CAUTION:
- Do not reuse the used gaskets.

(5) Tighten the attaching bolts of the exhaust front pipe to the specified torque.
Tightening Torque: 41.6 - 62.4 N·m

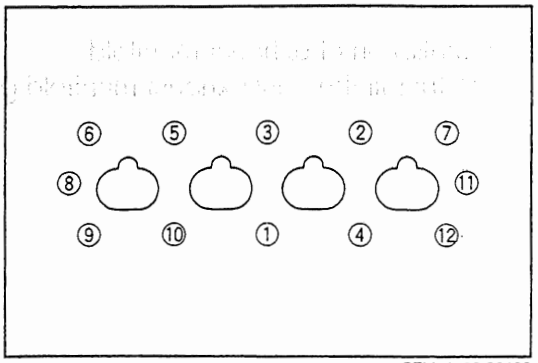

PEM00204-00186

23. Installation of intake manifold
(1) Install a new intake manifold gasket to the cylinder head.
(2) Install the intake manifold to the cylinder head.
CAUTION:
- Do not interfere with other parts.

(3) Install the attaching bolts and nuts of the intake manifold.
NOTE:
- Be sure to install the following parts interposed with the attaching bolts and nuts of the intake manifold.
  1. By-pass pipe
  2. Oil pressure switch wire clamp

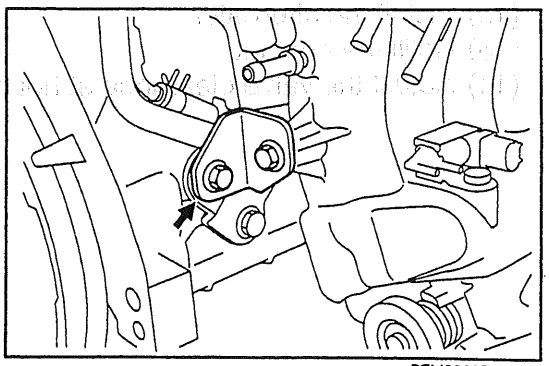

PEM00205-00187

(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 right figure.
Tightening Torque: 14.7 - 21.6 N·m



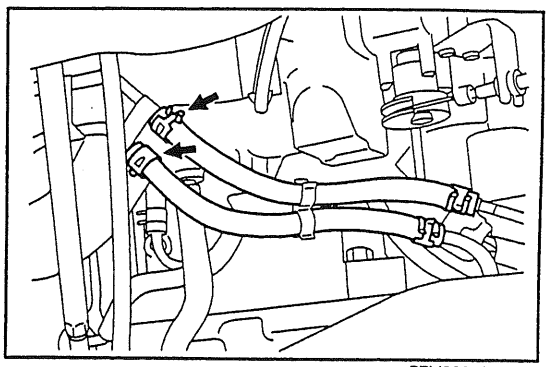
PEM00206-00188

(5) Install the intake manifold stays and tighten the attaching bolts.
(6) Install the engine wire ground terminal to the intake manifold.



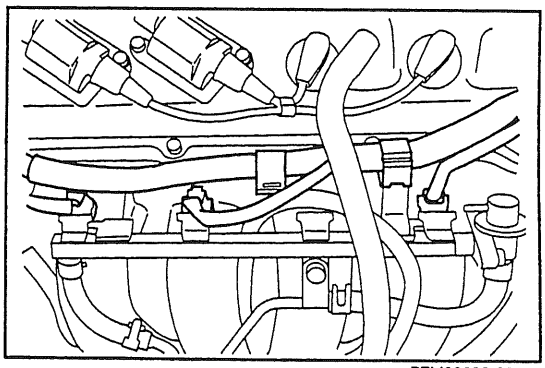
PEM00207-00189

(7) Connect the fuel inlet hose and return hose.
(8) Connect the water hose.
(9) Connect the blow-by hose, vacuum hoses and the throttle cable.



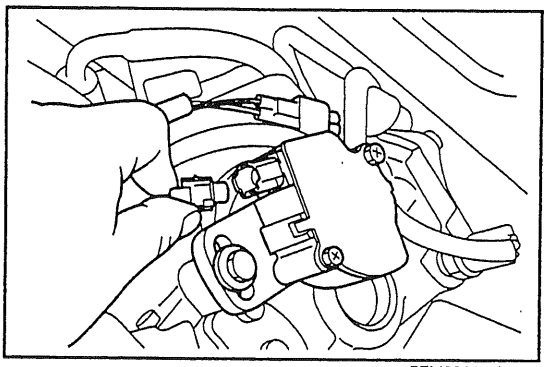
PEM00208-00190

(10) Installation of engine wire
① Connect the connector of the engine wire to the following parts.
a. Ignition coils
b. Injectors
c. Pressure sensor
d. Throttle position sensor
e. Intake air temperature sensor
f. Idle-up VSV
g. Oxygen sensor
h. Cam angle sensor



PEM00209-00191

② Install the harness clamps to each bracket.

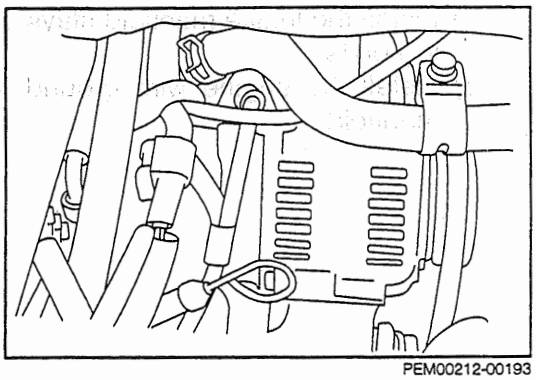


PEM00210-00192

(11) Install the timing belt.
(Refer to installation of timing belt section)

PEM00211-00000

(12) Install the alternator
(13) Refill the coolant
(14) Adjust the valve clearance at hot condition.

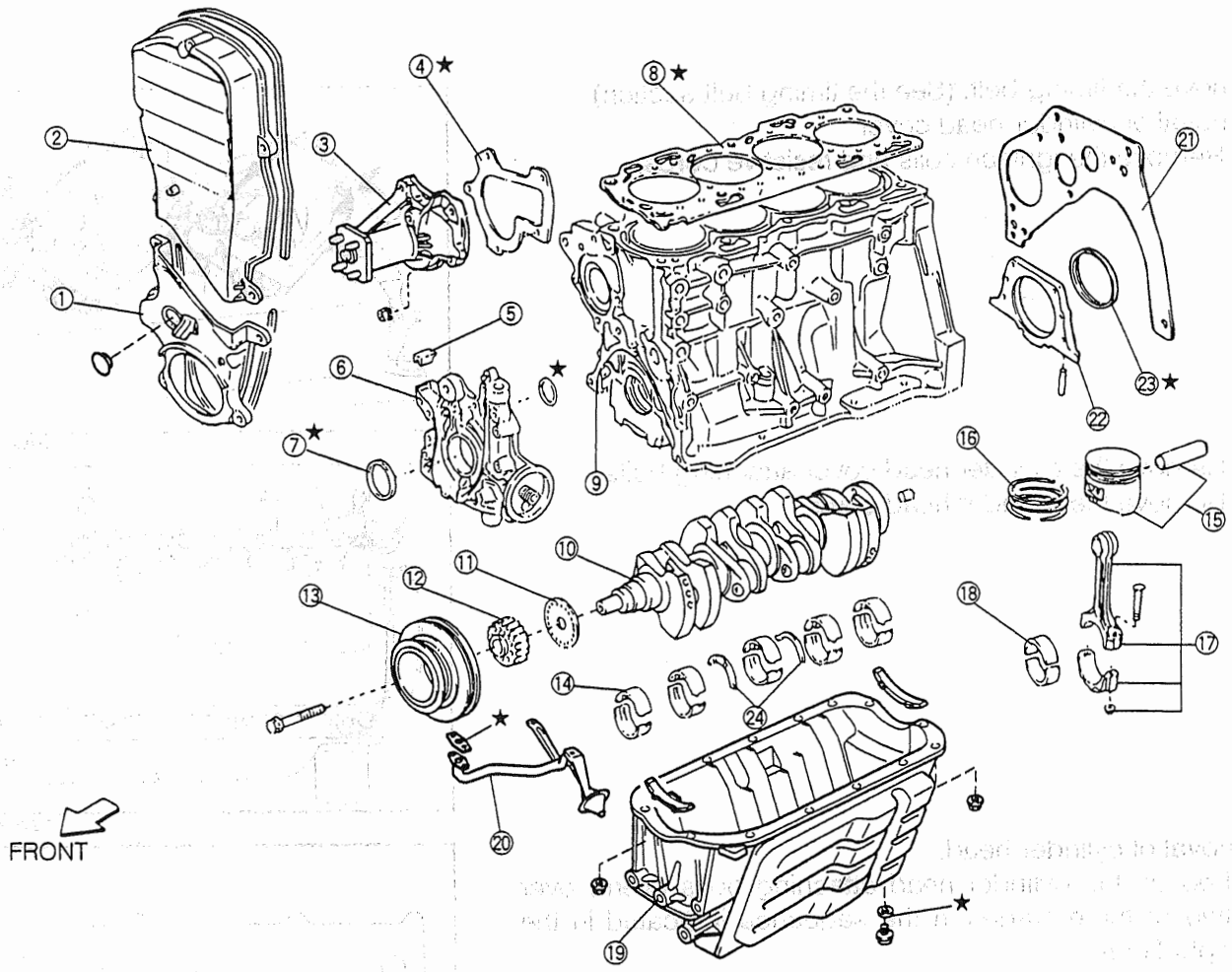


PEM00212-00193

CYLINDER BLOCK

COMPONENTS

★ : Non-reusable parts

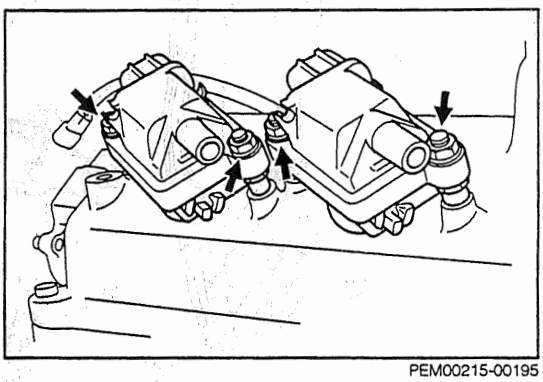


① Timing belt cover No. 1
② Timing belt cover No. 2
③ Water pump assembly
④ Water pump gasket
⑤ Dust seal
⑥ Oil pump assembly
⑦ Oil seal
⑧ Cylinder head gasket
⑨ Cylinder block
⑩ Crankshaft
⑪ Crankshaft timing belt pulley flange
⑫ Crankshaft timing belt pulley
⑬ Crankshaft pulley
⑭ Crankshaft bearing
⑮ Piston with pin
⑯ Piston ring
⑰ Connecting rod
⑱ Connecting rod bearing
⑲ Oil pan
⑳ Oil pump strainer
㉑ Rear end plate
㉒ Oil seal retainer
㉓ Oil seal
㉔ Crankshaft thrust bearing

1. Place the engine on the suitable engine stand.

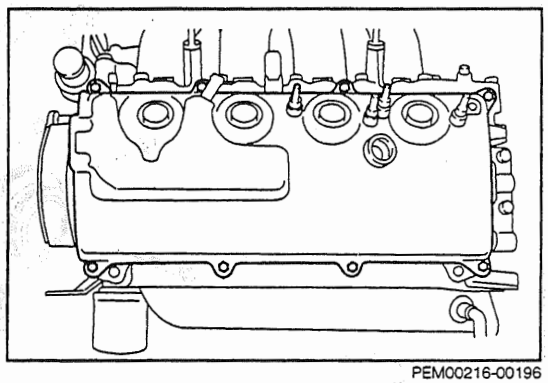
PEM00214-00000

2. Remove the timing belt. (See the timing belt section)
3. Removal of cylinder head cover.
   (1) Remove the ignition coils and resistive cords.



PEM00215-00195

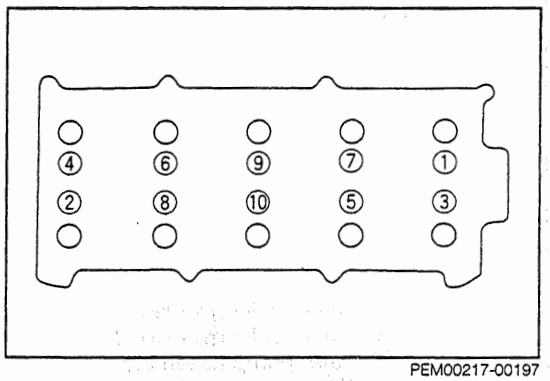
   (2) Remove the cylinder head cover attaching bolts.
   (3) Remove the cylinder head cover.



PEM00216-00196

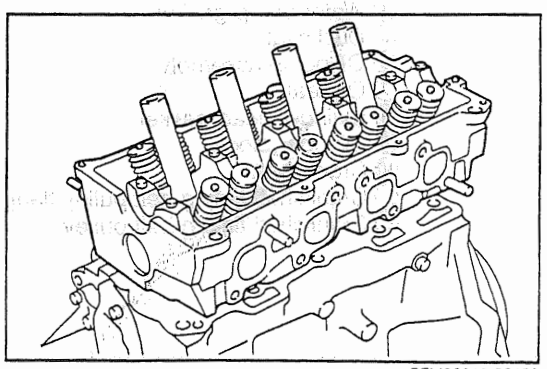
4. Removal of cylinder head.
   (1) Loosen the cylinder head attaching bolts evenly over two or three stages in the sequence indicated in the right figure.

   NOTE:
   - Be certain to loosen the cylinder head bolts evenly. Failure to observe this caution will cause cracks or distortion of the cylinder head, even leading to engine seizure.



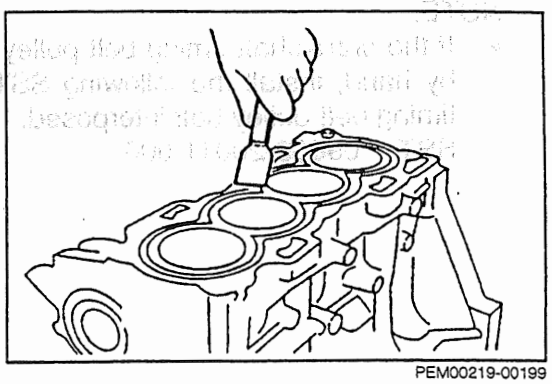
PEM00217-00197

   (2) Remove the cylinder head bolts.
   (3) Remove the cylinder head from the cylinder block.



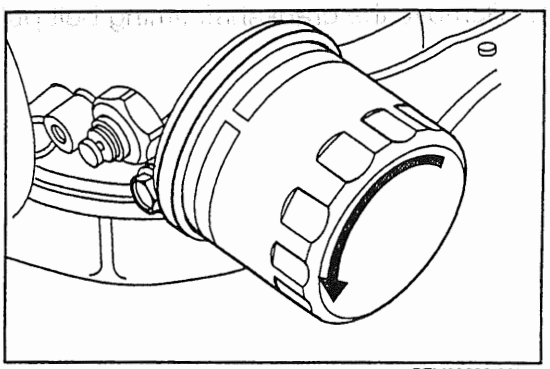
PEM00218-00198

(4) Remove the cylinder head gasket.
(5) Remove any remaining gasket material from the gasket surfaces of the cylinder head and cylinder block, using the gasket scraper.

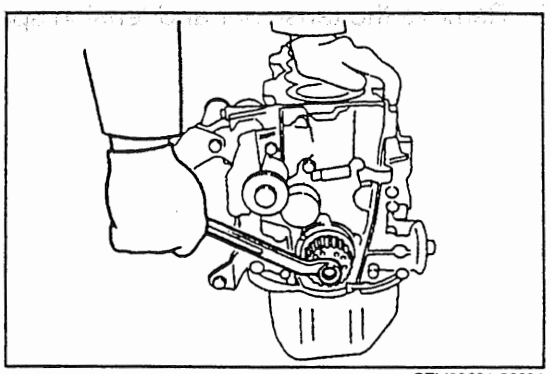

PEM00219-00199

DISASSEMBLY OF CYLINDER BLOCK

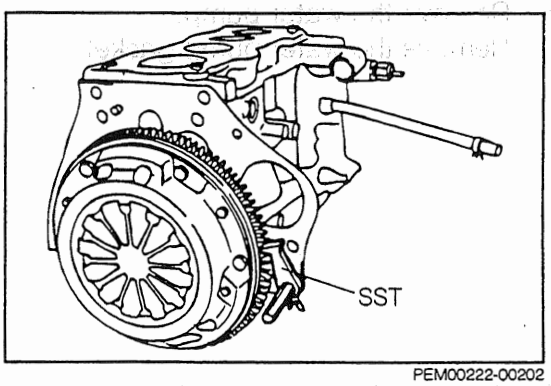
1. Remove the oil pressure switch and oil filter.


PEM00220-00200

2. Remove the crankshaft timing belt pulley bolt.

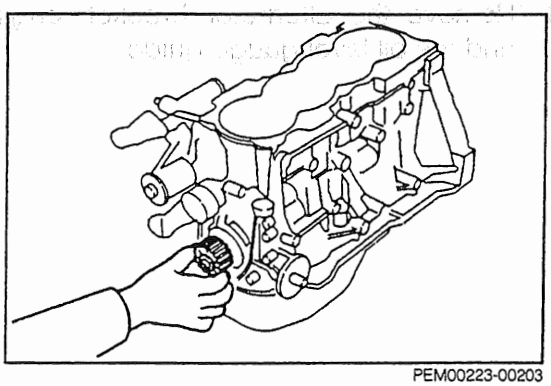

PEM00221-00201

NOTE:
- Prevent the ring gear from turning, using the following SST.
  SST: 09210-87701-000

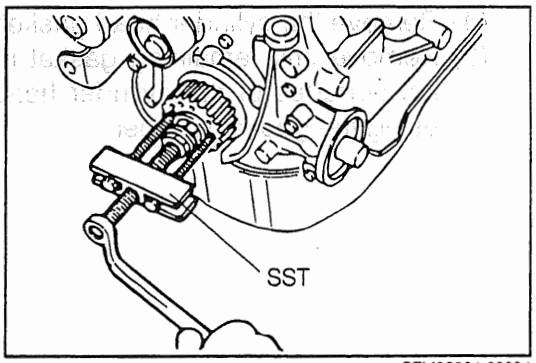


PEM00222-00202

3. Remove the crankshaft timing belt pulley.

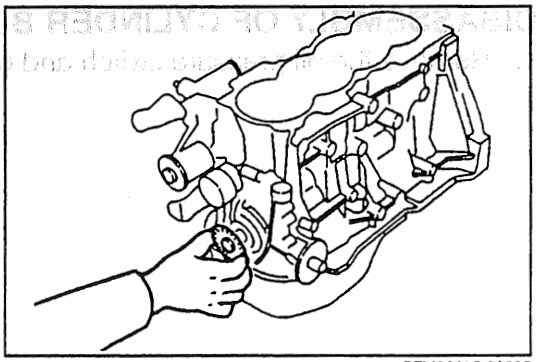

PEM00223-00203

NOTE:
- If the crankshaft timing belt pulley can not be removed by hand, install the following SST with the crankshaft timing belt pulley bolt interposed.
  SST: 09609-20011-000

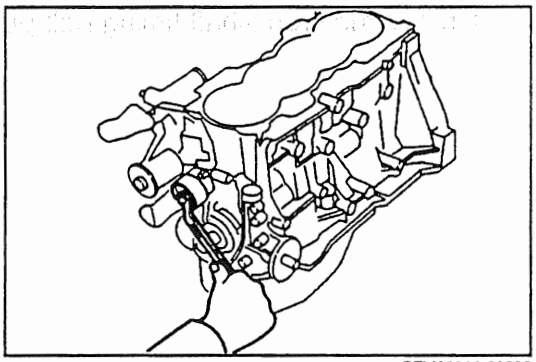


PEM00224-00204

4. Remove the crankshaft timing belt pulley flange.


PEM00225-00205

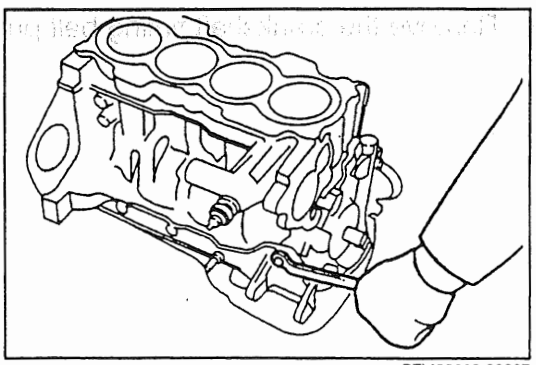
5. Remove the tensioner and tension spring.


PEM00226-00206

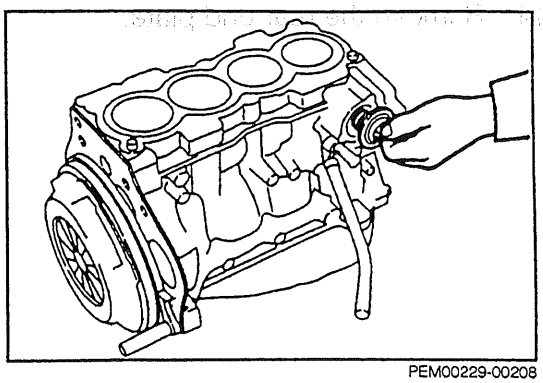
6. Remove the water pump.
7. Remove the water pump gasket.

PEM00227-00000

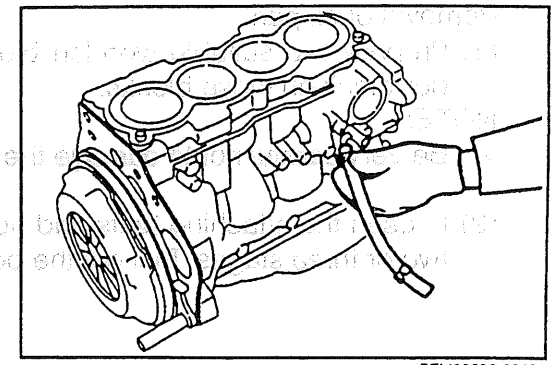
8. Remove the alternator bracket, engine support bracket and the oil level gauge guide.


PEM00228-00207

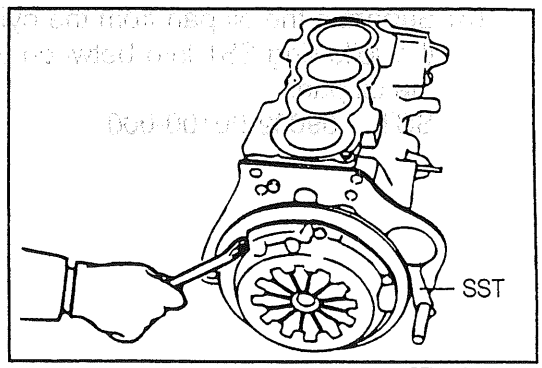
9. Remove the water inlet and thermostat.


PEM00229-00208

10. Remove the water hose for the throttle body.

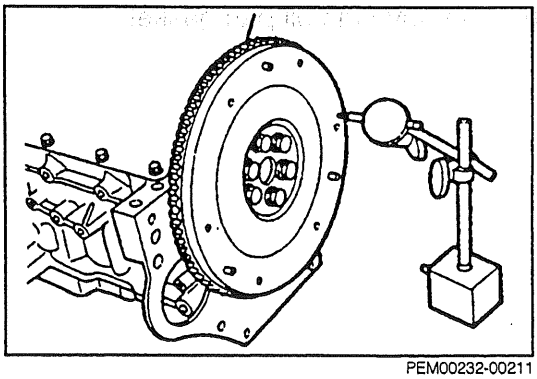

PEM00230-00209

11. Remove the pressure plate and clutch disc.
NOTE:
- Prevent the pressure plate from turning, using the following SST.
SST: 09210-87701-000

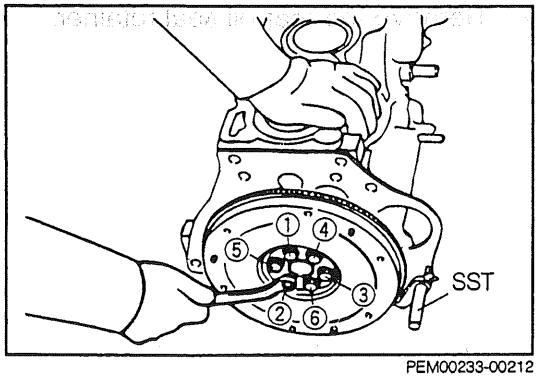


PEM00231-00210

12. Check of flywheel for runout.
NOTE:
- If the runout does not conform to the specification, confirm the tightening torque of the flywheel. Only in case that the tightening torque conforms to the specified value, replace the flywheel.
Specified Value:
Allowable Runout Limit: 0.1 mm

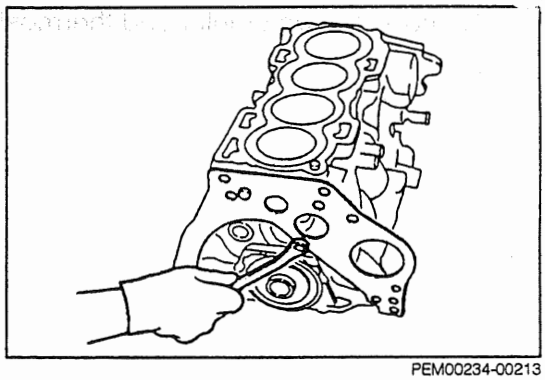

PEM00232-00211

13. 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



PEM00233-00212

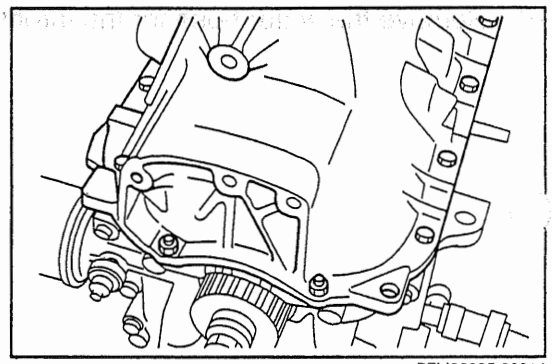
14. Remove the rear end plate.



PEM00234-00213

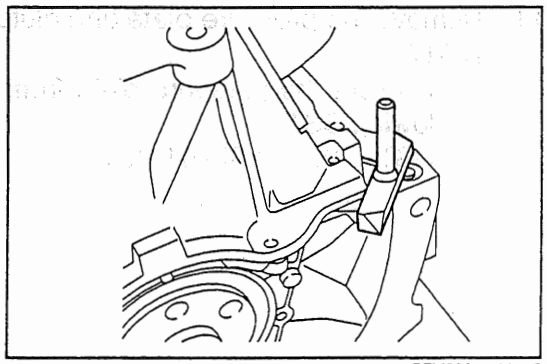
15. Removal of oil pan
    (1) Prepare two suitable wooden blocks. Place the cylinder block on those blocks.
    NOTE:
    - Be very careful not to damage the piston head.

    (2) Loosen the attaching bolts and nuts of the oil pan over two or three stages. Pull out the bolts and nuts.



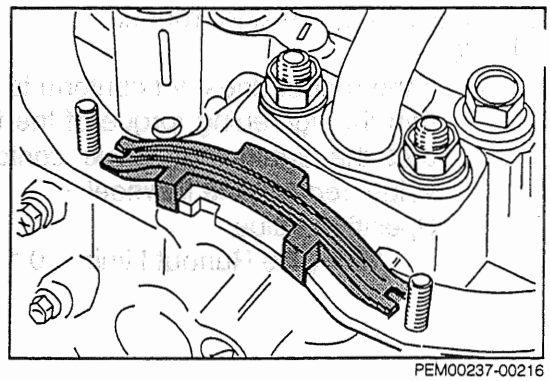
PEM00235-00214

    (3) 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



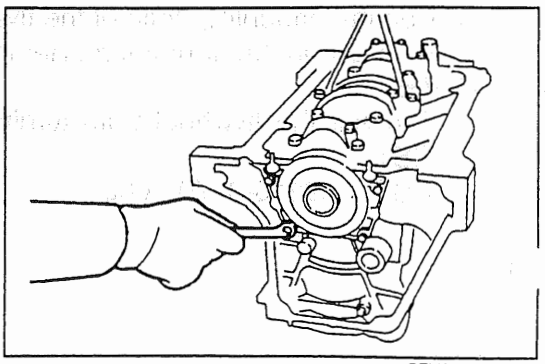
PEM00236-00215

16. Remove the oil pan gasket.



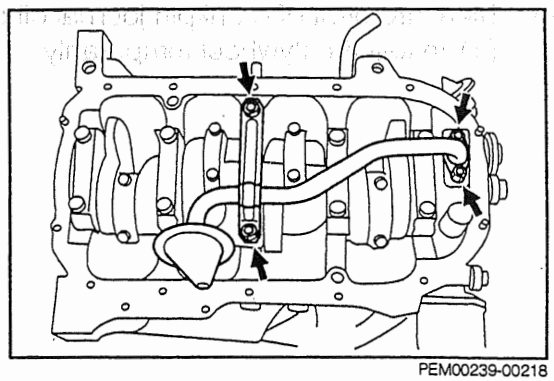
PEM00237-00216

17. Remove the rear oil seal retainer.



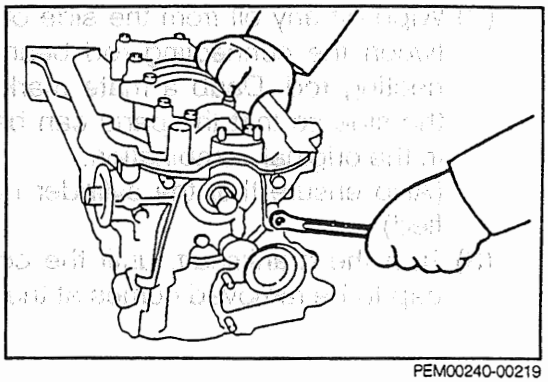
PEM00238-00217

18. Remove the oil strainer.



PEM00239-00218

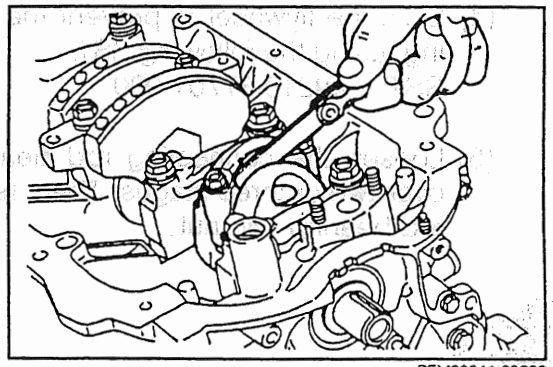
19. Remove the oil pump.



PEM00240-00219

20. 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 - 0.4 mm
Maximum: 0.45 mm

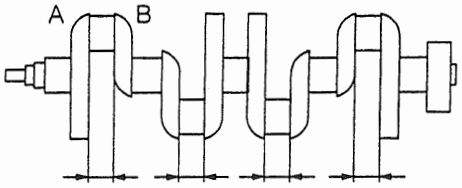


PEM00241-00220

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.

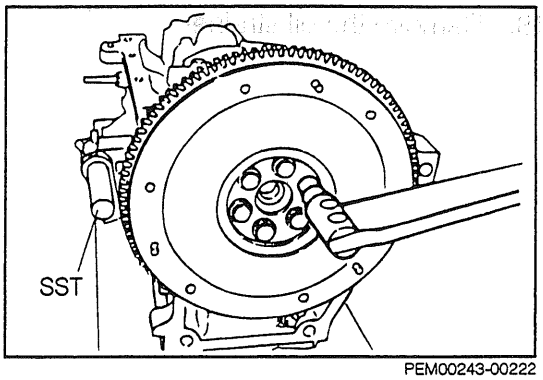
If the clearance exceeds the specified value, replace the connecting rod or the crankshaft, or both of them, referring to the width of the big end of the connecting rod in the thrust direction and the side width of the crankpin journal.

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
	Crankshaft HC-ES engine 

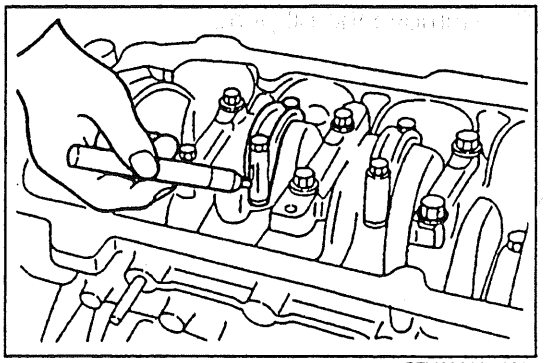
PEM00242-00221

21. Measurement of crankpin journal oil clearance
(1) Install the flywheel temporarily.



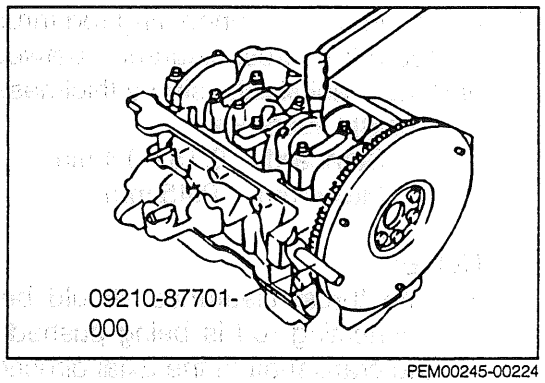
PEM00243-00222

(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.


PEM00244-00223

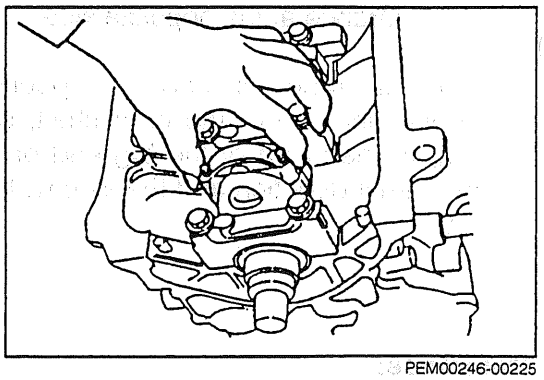
(4) Lock the flywheel to prevent the crankshaft from turning, using the following SST.
SST: 09210-87701-000

(5) Loosen the connecting rod bearing cap nuts evenly over two or three stages. Then, remove the connecting rod bearing cap nuts.

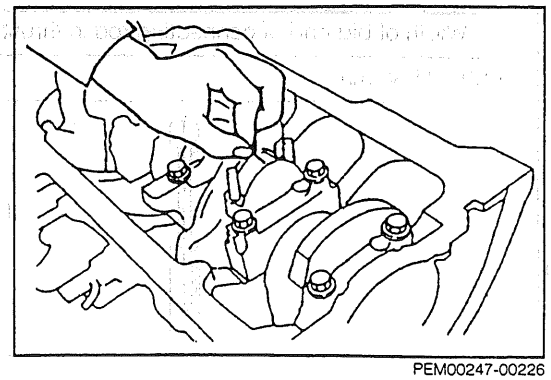


PEM00245-00224

(6) Remove the bearing cap.
NOTE:
- Replace the crankshaft if the crankpin journals exhibit damages, such as seizure.

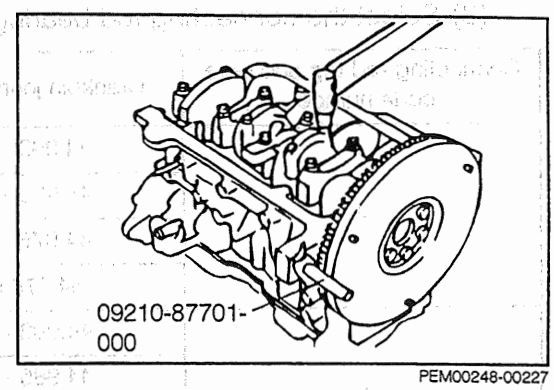

PEM00246-00225

(7) Place a plastigage on the crankpin journal.
NOTE:
- Wipe off any oil from the crankpin journal.


PEM00247-00226

(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

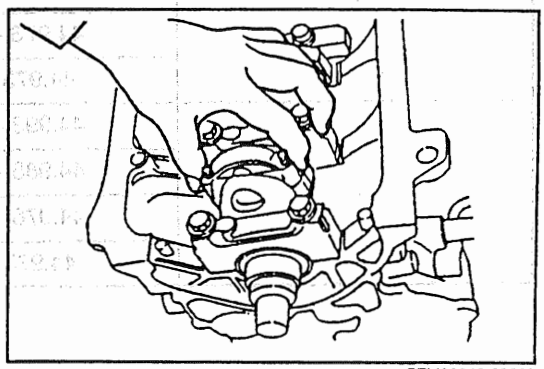
NOTE:
- When tightening of the bearing cap nuts, apply engine oil to the bearing cap nuts.
- Prevent the crankshaft from turning, using the SST.
  SST: 09210-87701-000



PEM00248-00227

(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

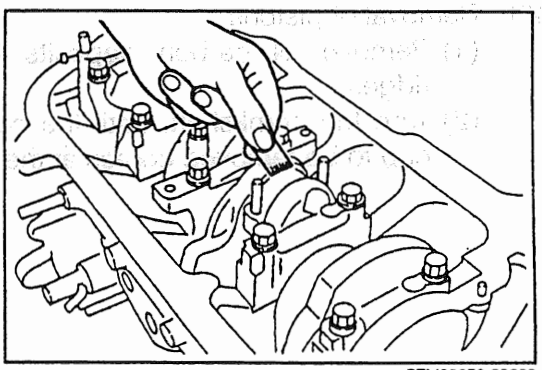

PEM00249-00228

(10) Measure the plastigage width at its widest point.
Oil Clearance: 0.020 - 0.044 mm

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.

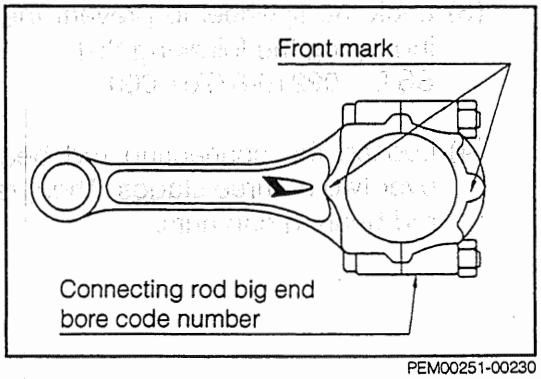

PEM00250-00229

22. Selection of connecting rod bearings

NOTE:
- The replacement of the connecting rod bearings should be performed after all inspections have been finished.

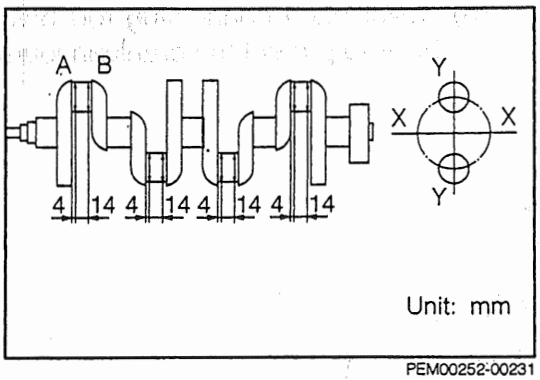
(1) Read the connecting rod big end bore code number.

NOTE:
- The connecting rod big end bore code number comes in three kinds of 4, 5 and 6.



PEM00251-00230

(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.



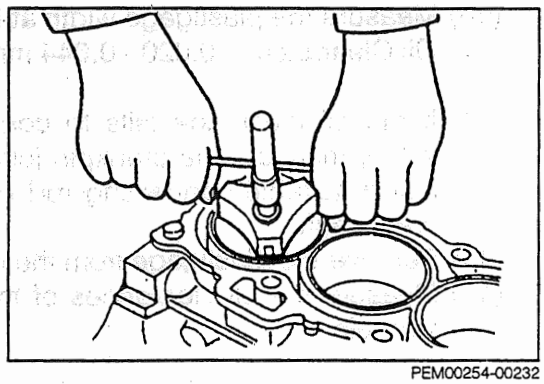
PEM00252-00231

(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	Bearing classification number	Remarks
4	44.993 - 45.000	1	—
	44.985 - 44.992	2	—
	44.976 - 44.984	3	—
	44.975 or less	—	Crankshaft replacement
5	44.993 - 45.000	2	—
	44.985 - 44.992	3	—
	44.976 - 44.984	4	—
	44.975 or less	—	Crankshaft replacement
6	44.993 - 45.000	3	—
	44.985 - 44.992	4	—
	44.976 - 44.984	5	—
	44.975 or less	—	Crankshaft replacement

PEM00253-00000

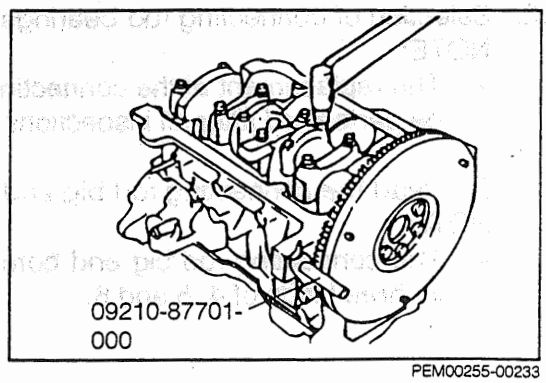
23. Removal of pistons
    (1) Remove all carbon deposits from the piston ring ridges.
    (2) Turn the crankshaft, until the connecting rod bearing cap to be removed comes at the oil pan side.



PEM00254-00232

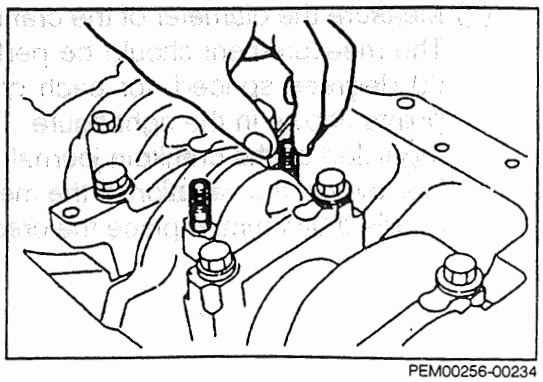
    (3) Lock the flywheel to prevent the crankshaft from turning, using the following SST.
    SST: 09210-87701-000

    (4) Loosen the connecting rod bearing cap nuts evenly over two or three stages. Then, remove the connecting rod bearing cap nuts.



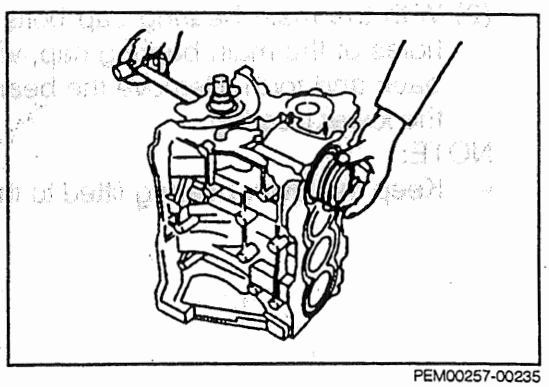
PEM00255-00233

    (5) Cover each connecting rod bolt with a short piece of hose to protect the crankpin journal from damage.



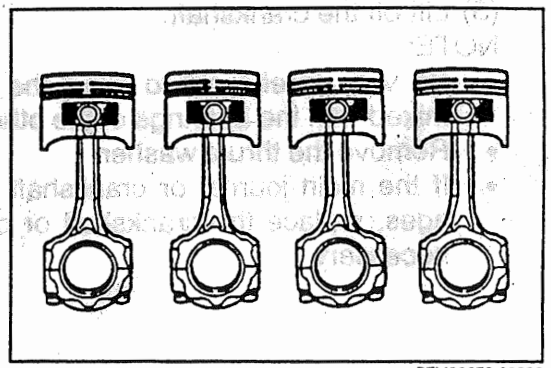
PEM00256-00234

(6) Push out the piston and connecting rod assembly and the upper bearing through the top of the cylinder block.



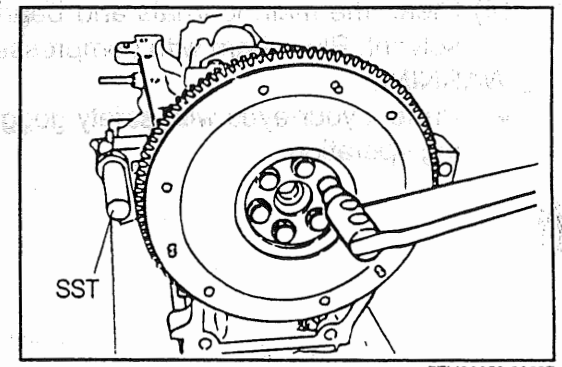
PEM00257-00235

NOTE:
- Arrange the disassembled pistons and connecting rod in order so that their installation positions may be known readily.
- Care should be exercised so as not to damage the bearings.



PEM00258-00236

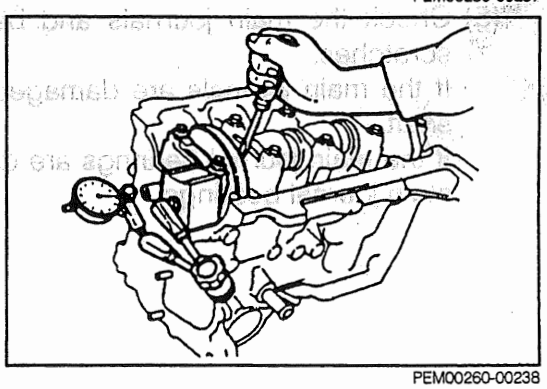
24. Remove the flywheel.
NOTE:
- Prevent the ring gear from turning with the SST.
SST: 09210-87701-000



PEM00259-00237

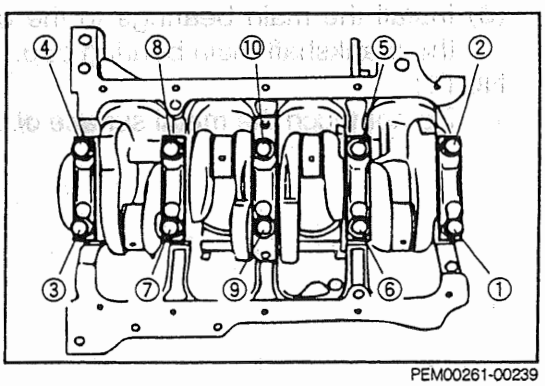
25. Check of crankshaft thrust clearance
NOTE:
- Measure the thrust clearance, using a dial gauge.
Thrust Clearance
Specified Value: 0.02 - 0.22 mm
Allowable Limit: 0.30 mm

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 23.59 mm, replace the thrust washer. If the measured value exceeds 23.59 mm, replace the crankshaft and thrust washer.



PEM00260-00238

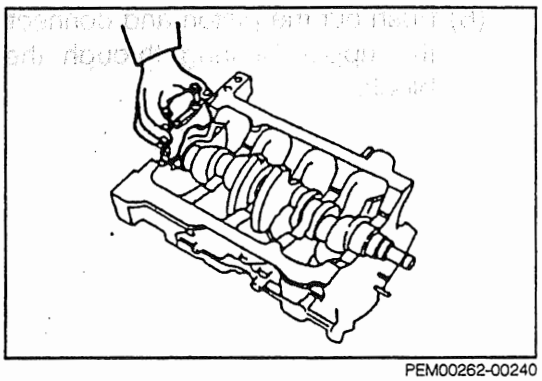
26. Check of crankshaft main journal oil clearance
(1) Gradually loosen the main bearing cap bolts over three stages in the numerical sequence shown in the figure. Remove the bearing cap bolts.



PEM00261-00239

(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.

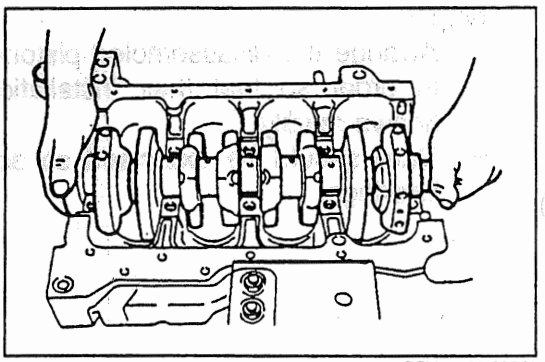
NOTE:
- Keep the lower bearing fitted to the main bearing cap.



PEM00262-00240

(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.
- If the main journal or crankshaft bearing exhibit damages, replace the crankshaft or crankshaft bearing as necessary.



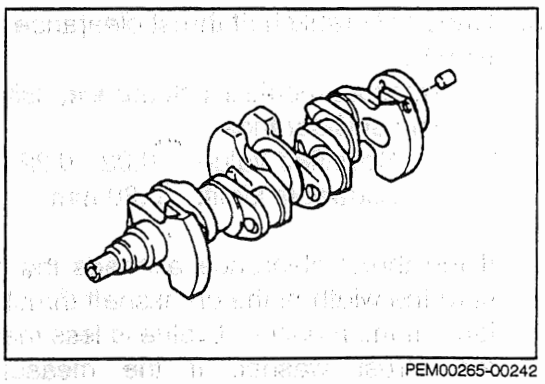
PEM00263-00241

(4) Clean the main journals and bearings, using cleaning solvent. Blow them with compressed air.

WARNING:
- Protect your eyes with safety goggles during the cleaning operation.

PEM00264-00000

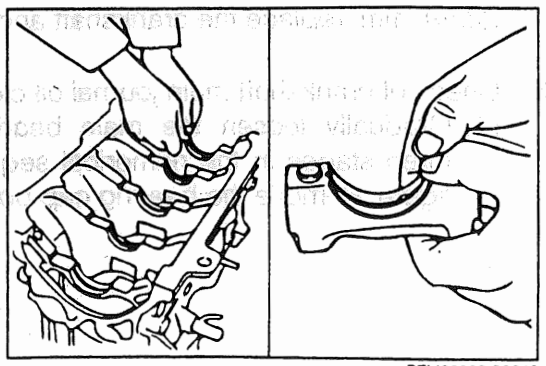
(5) Check the main journals and bearings for pitting or scratches.
If the main journals are damaged, replace the crankshaft.
If the main journal bearings are damaged, replace the main journal bearings.



PEM00265-00242

(6) Install the main bearings to the cylinder block and to the crankshaft main bearing cap.

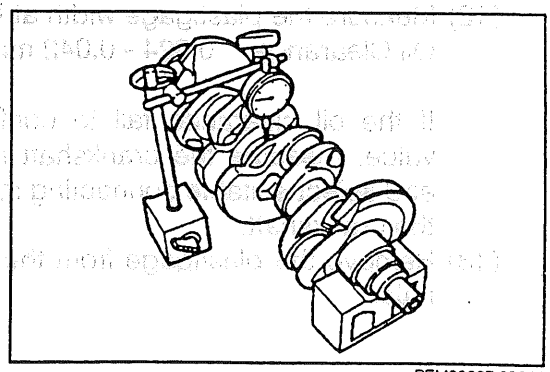
NOTE:
- Do not touch the metal surface of the bearing.



PEM00266-00243

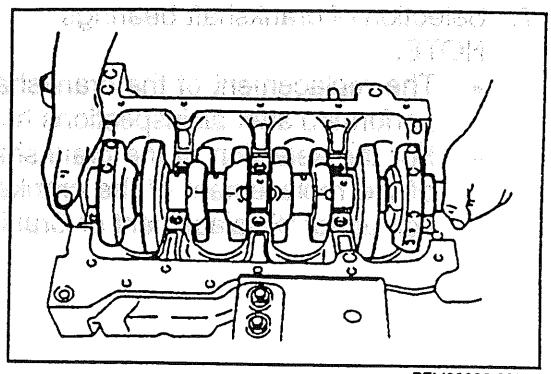
(7) Support the both ends of the crankshaft with a V-block. Measure the crankshaft runout with a dial gauge.
Allowable Limit of Runout: 0.06 mm

If the runout exceeds the allowable limit, replace the crankshaft.



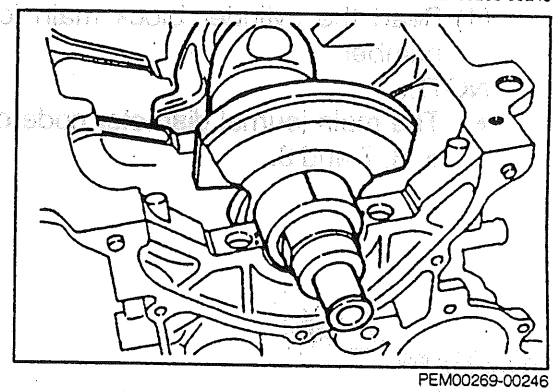
PEM00267-00244

(8) Place the crankshaft in the cylinder block.



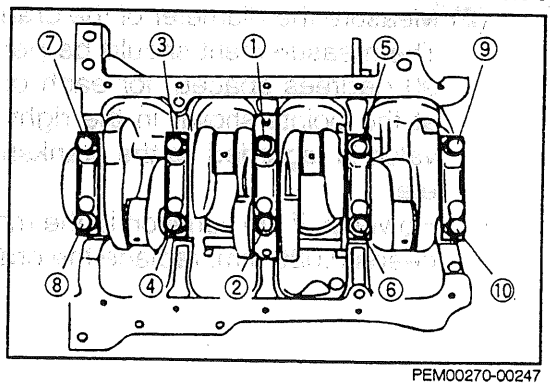
PEM00268-00245

(9) Lay a strip of plastigage across each crankshaft main journal.



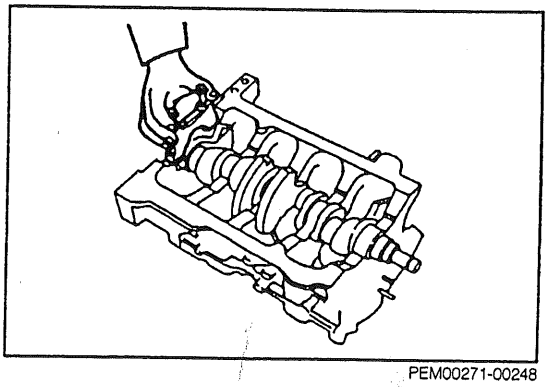
PEM00269-00246

(10) 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



PEM00270-00247

(11) Remove the main bearing caps with the lower bearings fitted on them.

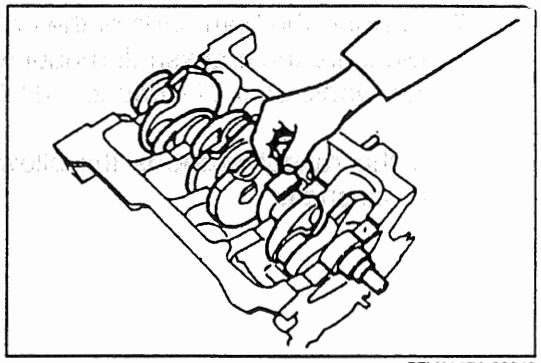


PEM00271-00248

(12) Measure the plastigage width at its widest point.
Oil Clearance: 0.024 - 0.042 mm

If the oil clearance fail to conform to the specified value, measure the crankshaft main journal diameter and select suitable connecting rod bearings or replace the crankshaft.

(13) Remove the plastigage from the crankshaft main journals.



PEM00272-00249

27. Selection of crankshaft bearings

NOTE:

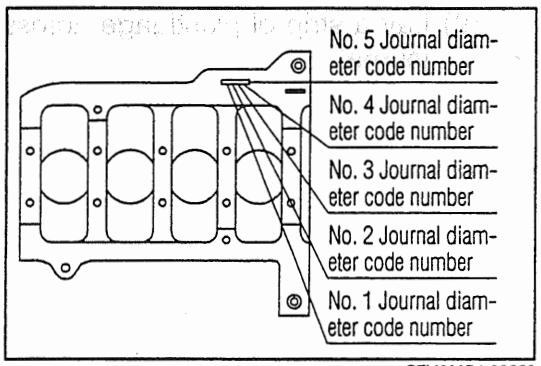
- The replacement of the crankshaft bearings should be performed after all inspections have been finished.
- For the selection of the crankshaft bearing as a result of the replacement of the crankshaft, refer to the section under "Replacement of Crankshaft."

PEM00273-00000

(1) Read the cylinder block main journal diameter code number.

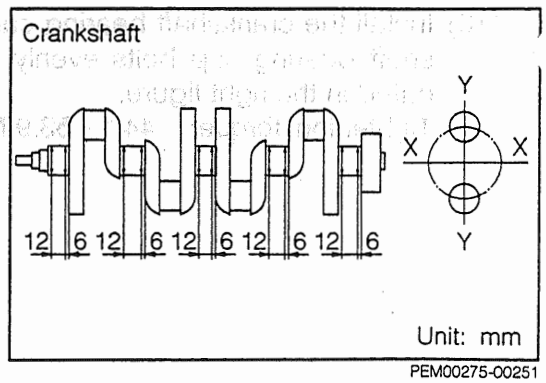
NOTE:

- The main journal diameter code comes in four kinds of 5, 6, 7 and 8.



PEM00274-00250

(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.



PEM00275-00251

(3) Select the crankshaft bearings or replace the crankshaft, based on the results of (1) and (2).

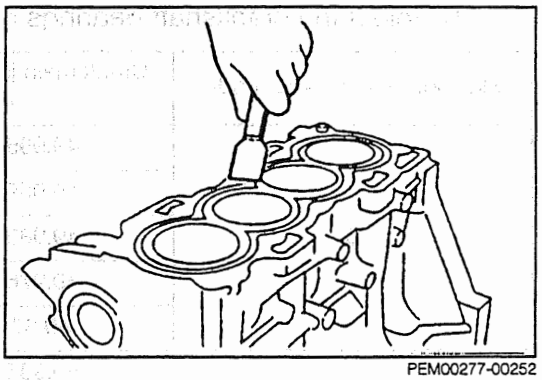
Main journal diameter code	Crank main journal diameter mm	Bearing classification number	Remarks
5	49.995 - 50.000	1	—
	49.989 - 49.994	2	—
	49.983 - 49.988	3	—
	49.976 - 49.982	4	—
	49.975 or less	—	Crankshaft replacement
6	49.995 - 50.000	2	—
	49.989 - 49.994	3	—
	49.983 - 49.988	4	—
	49.976 - 49.982	5	—
	49.975 or less	—	Crankshaft replacement
7	49.995 - 50.000	3	—
	49.989 - 49.994	4	—
	49.983 - 49.988	5	—
	49.976 - 49.982	6	—
	49.975 or less	—	Crankshaft replacement
8	49.995 - 50.000	4	—
	49.989 - 49.994	5	—
	49.983 - 49.988	6	—
	49.976 - 49.982	7	—
	49.975 or less	—	Crankshaft replacement

PEM00276-00000

INSPECTION OF EACH PART

INSPECTION OF CYLINDER BLOCK

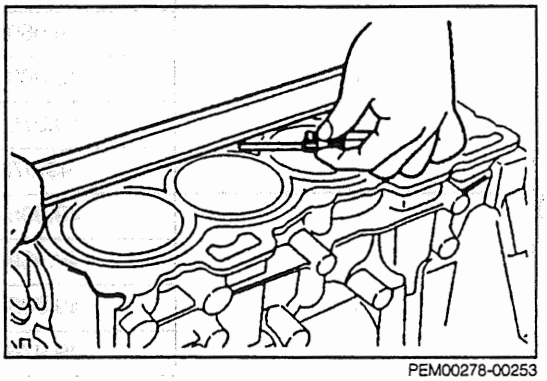
1. Removal of gasket material
   Remove all gasket materials from the cylinder block.
2. Cleaning of cylinder block
   Clean the cylinder block, using a soft brush and cleaning solvent.



PEM00277-00252

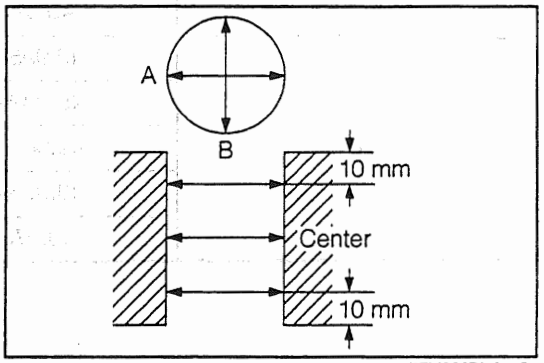
3. Inspection of top surface of cylinder block
   Using a precision straightedge and a thickness gauge, check the surface contacting the cylinder head gasket for warpage.
   Maximum Warpage: 0.10 mm

   If the warpage exceeds the allowable limit, replace the cylinder block.



PEM00278-00253

4. Inspection of cylinder bores
   (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 and/or honing for the cylinder bore in accordance with the oversized piston.
   The honing angle is 35° ± 5°. The surface coarse degree is 1 - 4Z.

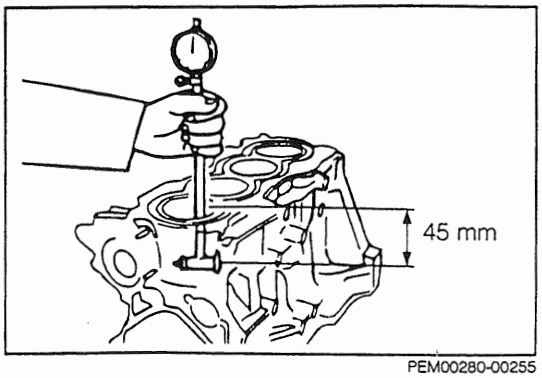


PEM00279-00254

Reference:
The table below shows the cylinder bore diameter when oversized pistons are used.
However, after the diameter of the replacement piston has been measured, perform the finishing in accordance with the piston diameter.

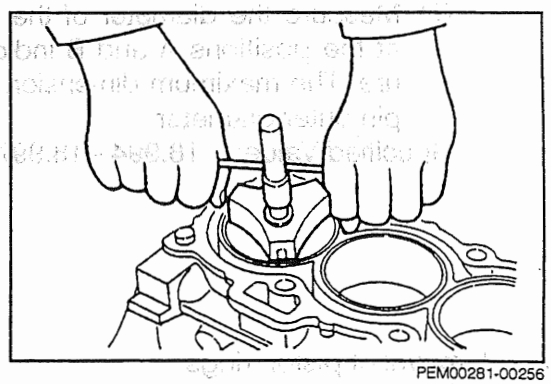
Standard	O/S 0.25
76.000 - 76.030 mm	76.250 - 76.280 mm

(2) Measure the bore diameter of each cylinder at a position shown in the right figure. The measured value is regarded as the cylinder bore diameter.



PEM00280-00255

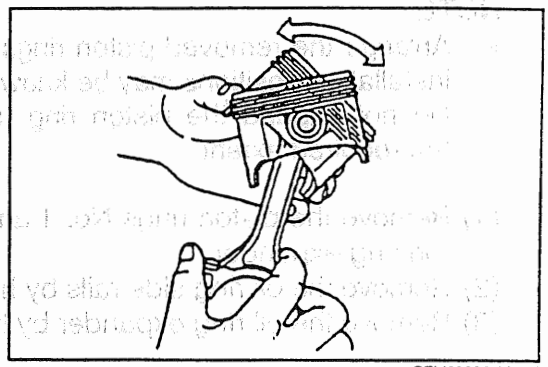
5. Removal of cylinder ridges
   If ridges are formed at the upper parts of the cylinder bores, use a ridge reamer to remove the ridges.



PEM00281-00256

INSPECTION OF PISTONS AND CONNECTING RODS

1. Inspection of fit between piston and piston pin
   Try to move the piston back and forth on the piston pin. If any movement is felt replace the piston and piston pin as a set.
   NOTE:
   - When the piston is moved back and forth on the piston pin, you may encounter hard movement. However, if the piston moves smoothly without any binding, this fitting of the piston is normal.



PEM00283-00257

Reference:

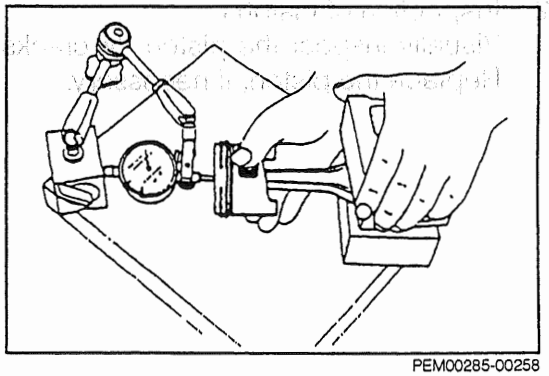
1. The oil clearance between the piston and piston pin is as follows.
   Specified Oil Clearance: 0.005 - 0.011 mm

   NOTE:
   - In the case of a piston and piston pin assembly having this degree of oil clearance, you will hardly feel excessive play when you move the piston by your hands.

PEM00284-00000

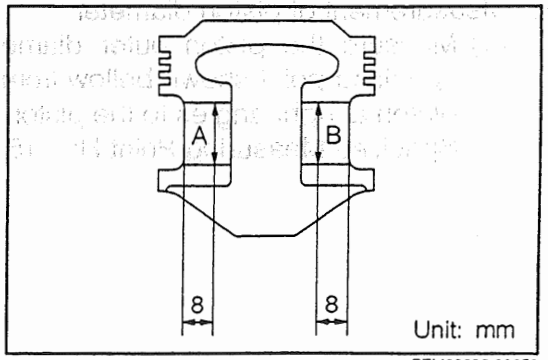
2. Measurement of oil clearance
   NOTE:
   - The oil clearance can be measured, following the procedure given below.

   (1) When measuring oil clearance without disassembling:
   Interpose the big end of the connecting rod between V-blocks on a surface plate. Measure the play while moving the piston, as indicated in the right figure.



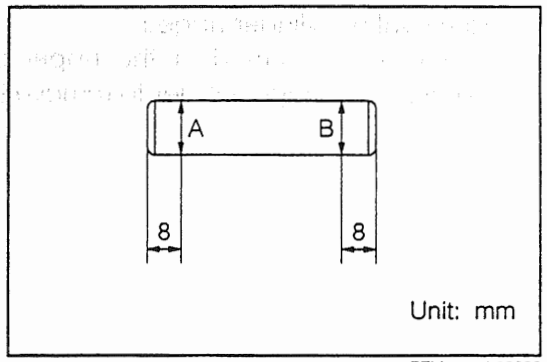
PEM00285-00258

   (2) When measuring oil clearance after disassembling:
   ① Measure the diameter of the whole circumference at the positions A and B indicated in the right figure. The minimum dimension should be the piston pin hole diameter.
   Specified Value: 19.002 - 19.005 mm



PEM00286-00259

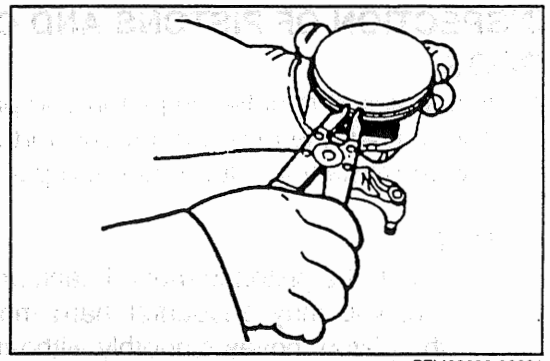
② Measure the diameter of the whole circumference at the positions A and B indicated in the right figure. The maximum dimension should be the piston pin outer diameter.
Specified Value: 18.994 - 18.997 mm



PEM00287-00260

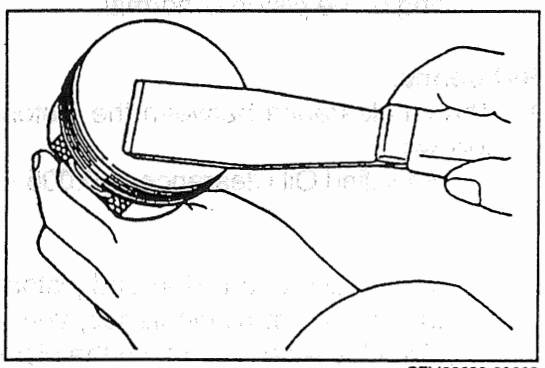
2. Removal of piston rings
NOTE:
- Arrange the removed piston rings in order so that their installation positions may be known readily.
- Do not expand the piston ring unnecessarily beyond the required extent.

(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.


PEM00288-00261

INSPECTION OF PISTONS

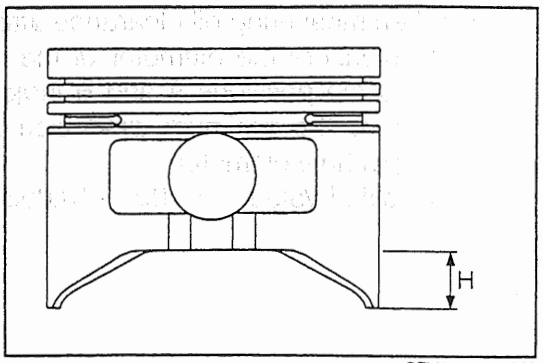
1. Cleaning of pistons
(1) Remove the carbon deposits from the piston top, using a gasket scraper or the like.
(2) Clean the piston grooves with a broken piston ring or a groove cleaning tool.
NOTE:
- Be very careful not to scratch the piston.


PEM00289-00262

2. Inspection of pistons
Visually inspect the piston for cracks, damage or seizure.
Replace the piston, if necessary.

PEM00290-00000

3. Measurement of piston diameter
(1) Measure the piston outer diameter horizontally at a specified point shown bellow from the lower end of the piston at right angles to the piston pin.
Specified Measuring Point H: 15 mm

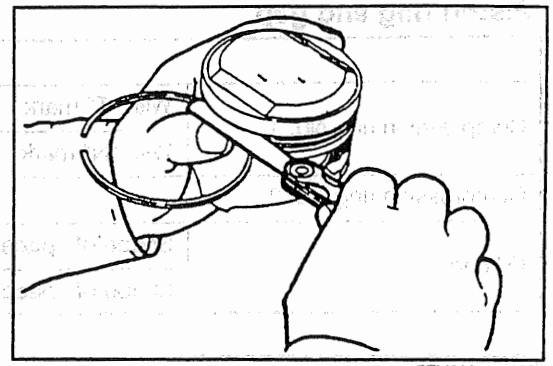


PEM00291-00263

(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 0.045 mm.
Piston-to-Cylinder Bore Clearance
Specified Value: 0.025 - 0.045 mm
Allowable Limit: 0.11 mm
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.

4. Inspection of piston ring groove side clearance
Measure the side clearances of the piston rings No. 1 and No. 2 over the entire periphery of each groove, using a thickness gauge.
The maximum measured value is regarded as the piston ring side clearance.

PEM00292-00000



PEM00293-00264

Piston ring side clearance

	Specified value mm	Allowable limit mm
Compression ring No. 1	0.03 - 0.07	0.12
Compression ring No. 2	0.02 - 0.06	

If the piston side clearance exceeds the allowable limit, measure the piston ring thickness. Referring to the piston ring standard thicknesses given below, replace the piston ring and/or piston so that the piston ring side clearance may become less than the allowable limit.

PEM00294-00000

Piston ring specified thickness

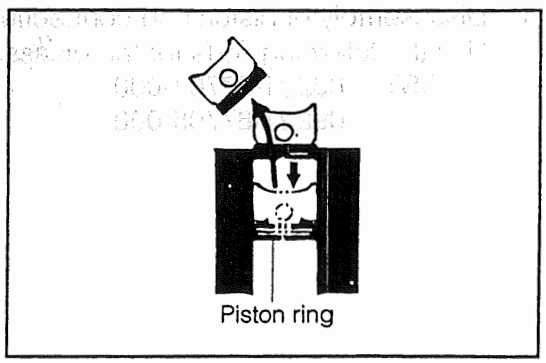
Unit: mm

Compression ring No. 1	1.17 - 1.19
Compression ring No. 2	1.47 - 1.49

NOTE:
- When replacing the piston rings, a set of piston rings for the engine should be replaced.

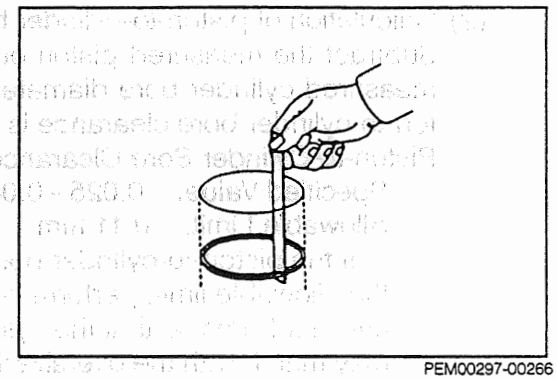
PEM00295-00000

5. 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 from the cylinder block upper surface.



PEM00296-00265

(4) Measure the piston ring end gap, using a thickness gauge or a feeler gauge.



PEM00297-00266

Piston ring end gap

		Specified value mm	Allowable limit mm
Compression ring No. 1	With "T" mark	0.27 - 0.37	0.7
	With "N" mark	0.27 - 0.40	
Compression ring No. 2		0.4 - 0.55	0.8
Oil ring	Shape of spacer A	0.2 - 0.6	1.0
	Shape of spacer B	0.15 - 0.6	

Oil ring spacer shape



Shape A



Shape B

If the piston ring end gap exceeds the allowable limit, a set of piston rings for that engine should be replaced.

PEM00298-00267

ASSEMBLY/DISASSEMBLY OF PISTON & CONNECTING ROD

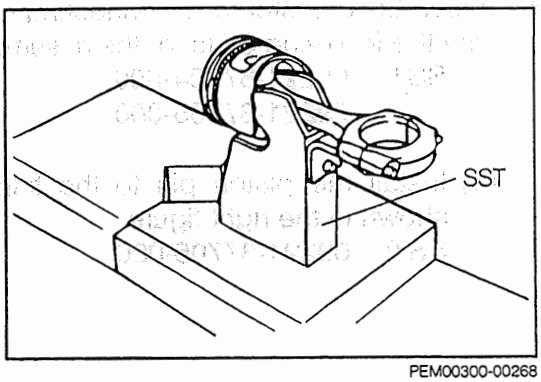
NOTE:

- The piston and piston pin are handled as a set, for their oil clearance is controlled. Therefore, when disassembling the pistons, care must be exercised so that the piston and piston pin may not be mixed with other pistons or piston pins.
- The piston disassembling should be performed only when any malfunction takes place and disassembling is required. Failure to observe this caution may loosen the interference fit between the connecting rod and the piston pin, leading to an engine damage.

1. Disassembly of piston and connecting rod
   Use the following SSTs for the disassembling operation.
   SST: 09221-87704-000
   09221-87705-000

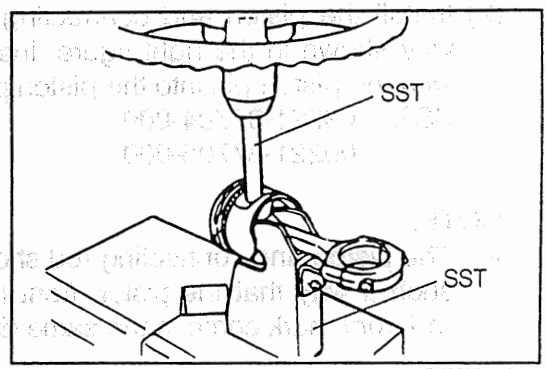
PEM00299-00000

(1) Install the connecting rod in the following SST as shown in the right figure.
SST: 09221-87704-000



PEM00300-00268

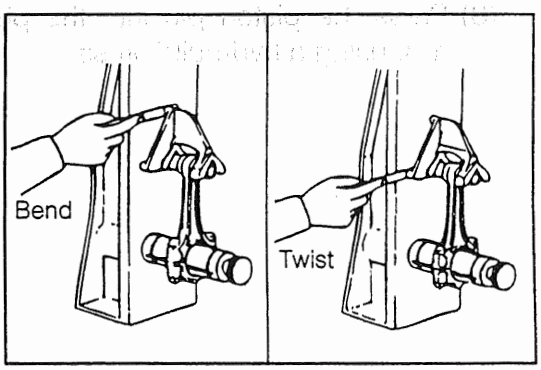
(2) Insert the longer SST into the piston pin hole. Press off the piston, using a hydraulic press.



PEM00301-00269

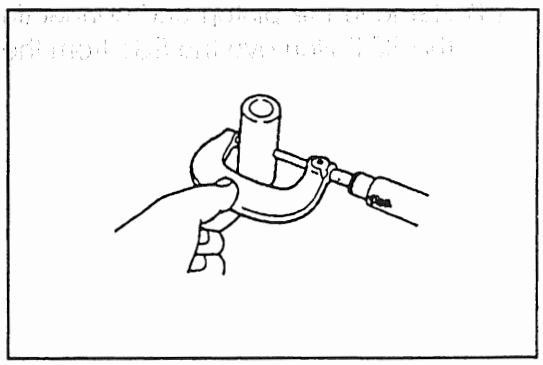
2. Inspection of connecting rods
(1) Visually inspect the connecting rods for damage or cracks.
(2) Check the connecting rod for bend and twist, using a connecting rod aligner.
Maximum Bend: 0.05 mm
Maximum Twist: 0.05 mm

If the bend and/or twist is greater than the maximum limit, replace the connecting rod assembly.



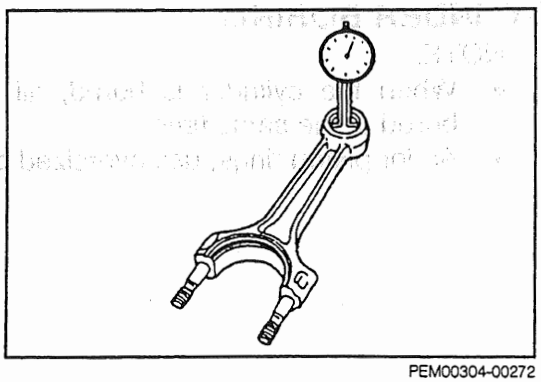
PEM00302-00270

3. Inspection of piston pin-to-connecting rod interference fit
(1) Measure the outer diameter of the piston pin contacting with the connecting rod, using a micrometer.


PEM00303-00271

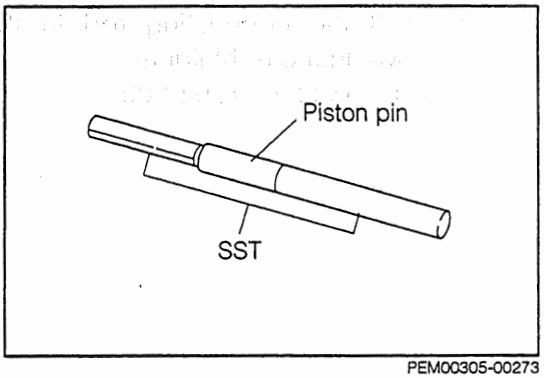
(2) Measure the inner diameter of the connecting rod, using a bore dial gauge.
(3) Determine the interference fit by subtracting the inner diameter of the connecting rod from the outer diameter of the piston pin.
Interference Fit: 0.015 - 0.044 mm

If the interference fit does not conform to the specification, replace the connecting rod.


PEM00304-00272

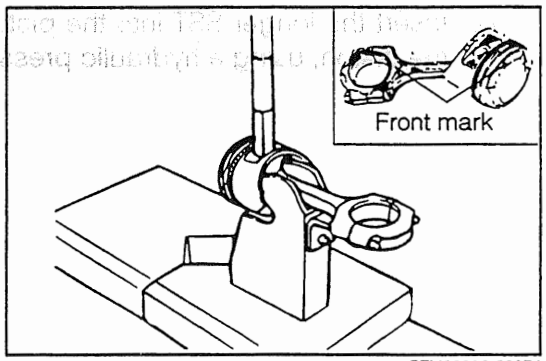
4. Assembly of piston and connecting rod
   Use the following SSTs for the assembling operation.
   SST: 09221-87704-000
   09221-87705-000

   (1) Install the piston pin to the following SST in a way shown in the right figure.
   SST: 09221-87705-000



PEM00305-00273

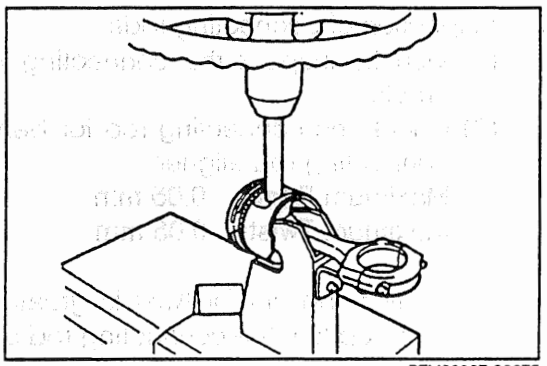
   (2) Install the piston and connecting rod in the SST in a way shown in the right figure. Insert the SST installed with the piston pin into the piston pin hole.
   SST: 09221-87704-000
   09221-87705-000



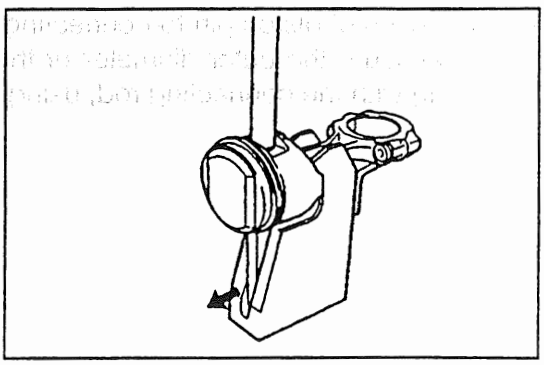
PEM00306-00274

   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.

   (3) Press the piston pin into the piston and connecting rod, using a hydraulic press.


PEM00307-00275

   (4) Remove the piston and connecting rod assembly from the SST. Remove the SST from the piston pin.

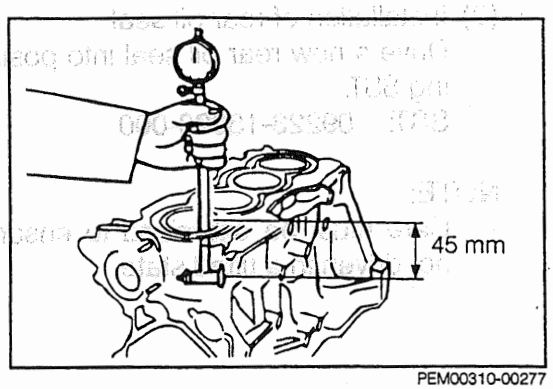

PEM00308-00276

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.

PEM00309-00000

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.



PEM00310-00277

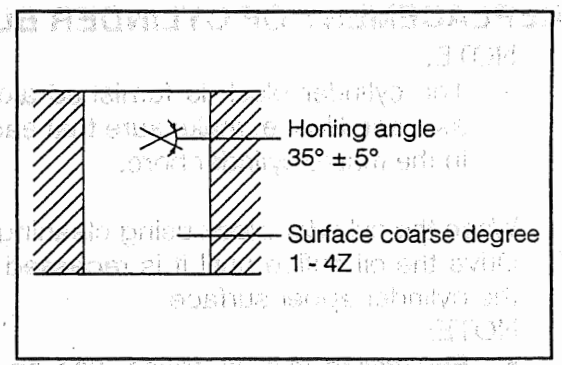
2. Determining cylinder finishing diameter
   (1) Measure the diameter of the oversized piston to be used, using a micrometer.
   NOTE:
   - The measurement should be conducted at the specified skirt section from the piston lower end.
   - Perform the measurement horizontally, not in a tilted state.

PEM00311-00000

   (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

PEM00312-00000

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° ± 5°
   Surface Coarse Degree: 1 - 4Z

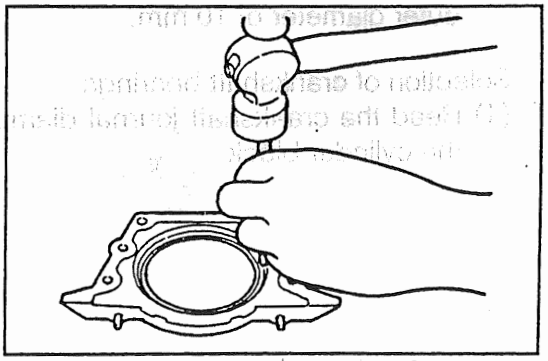


PEM00313-00278

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.

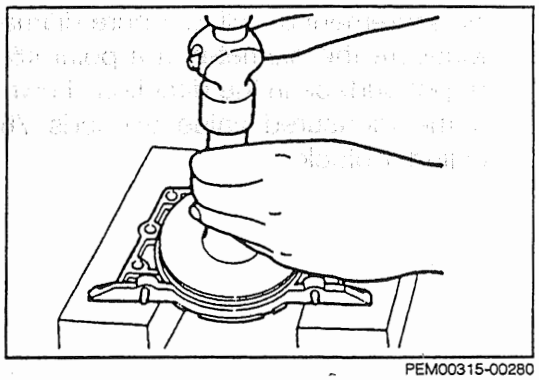
NOTE:
- Be very careful not to damage the oil seal retainer.



PEM00314-00279

(2) Installation of rear oil seal
Drive a new rear oil seal into position, using the following SST.
SST: 09223-15030-000

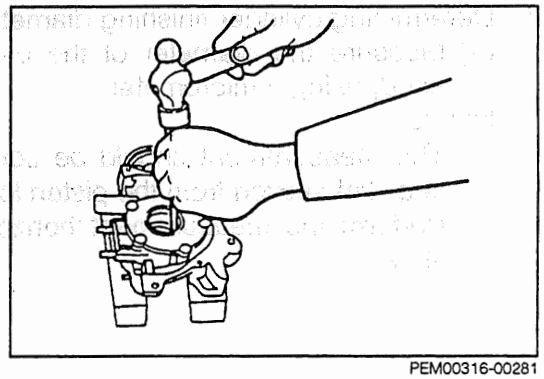
NOTE:
- Care must be exercised to ensure that the oil seal is not driven in a tilted state.


PEM00315-00280

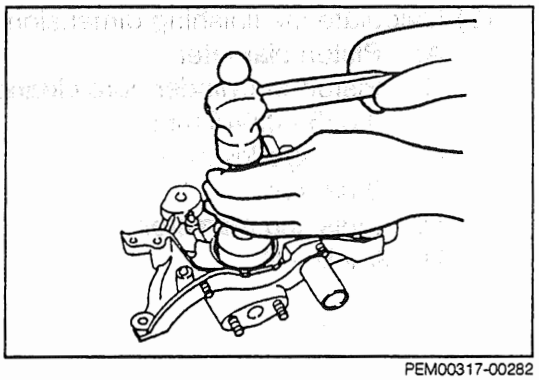
REPLACEMENT OF FRONT OIL SEAL

(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.


PEM00316-00281

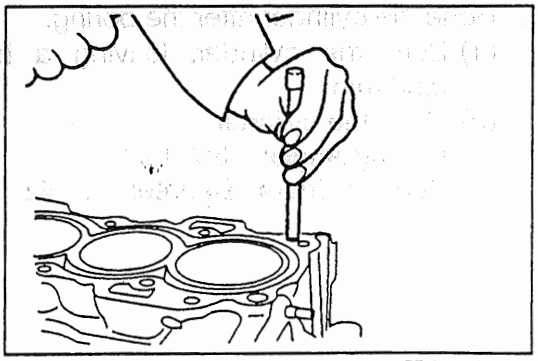
(2) Installation of front oil seal
Drive a new front oil seal into position, using the following SST.
SST: 09310-87102-000


PEM00317-00282

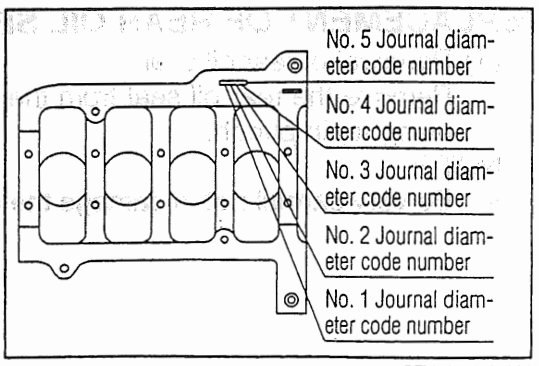
REPLACEMENT OF CYLINDER BLOCK

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.


PEM00318-00283

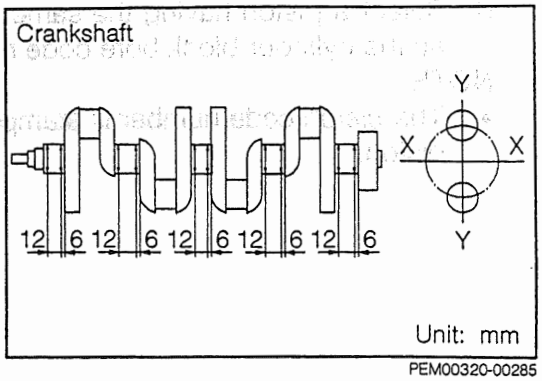
3. Selection of crankshaft bearings
   (1) Read the crankshaft journal diameter code number of the cylinder block.



PEM00319-00284

(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.

(3) Select the crankshaft bearings in accordance with the table next page.

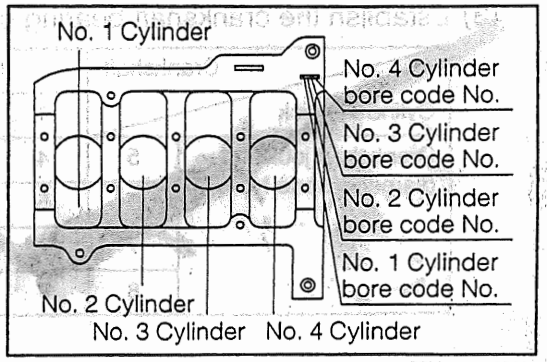


PEM00320-00285

Crankshaft jurnal hole code	Crankshaft journal diameter mm	Crankshaft bearing classification No.	Remarks
5	50.000 - 49.995	1	—
	49.994 - 49.989	2	—
	49.988 - 49.983	3	—
	49.982 - 49.976	4	—
	49.975 or less	—	Crankshaft replacement
6	50.000 - 49.995	2	—
	49.994 - 49.989	3	—
	49.988 - 49.983	4	—
	49.982 - 49.976	5	—
	49.975 or less	—	Crankshaft replacement
7	50.000 - 49.995	3	—
	49.994 - 49.989	4	—
	49.988 - 49.983	5	—
	49.982 - 49.976	6	—
	49.975 or less	—	Crankshaft replacement
8	50.000 - 49.995	4	—
	49.994 - 49.989	5	—
	49.988 - 49.983	6	—
	49.982 - 49.976	7	—
	49.975 or less	—	Crankshaft replacement

PEM00321-00000

4. Selection of pistons
(1) Read the cylinder block bore code number.

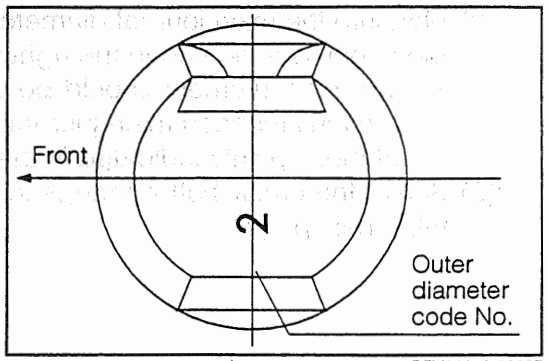


PEM00322-00286

(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.



PEM00323-00287

REPLACEMENT OF CRANKSHAFT

(Replacement of the crankshaft only)

1. Wash the crankshaft using cleaning solvent. Dry it with compressed air.

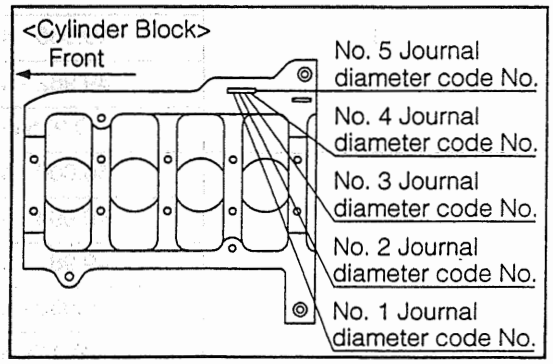
   NOTE:

   - Make sure that the oil gallery exhibits no restriction due to rust-proof oil.
   - As for the crankshaft for automatic transmission, drive the rear end bush into the rear end of the crankshaft with a brass rod so as to prevent damage to the bush.

PEM00324-00000

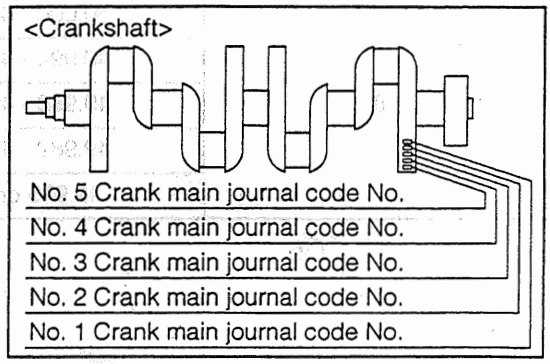
2. Selection of crankshaft bearings

   (1) Read the crankshaft journal diameter code number of the cylinder block.



PEM00325-00288

   (2) Read the crankshaft main journal diameter code number.



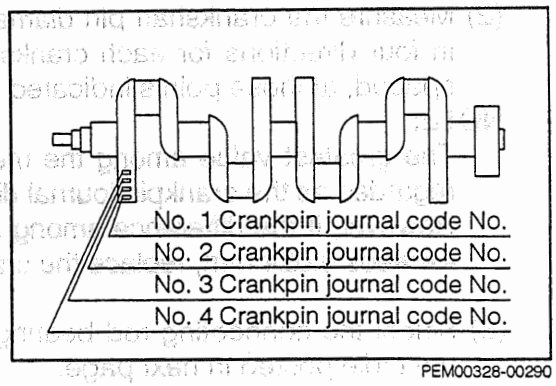
PEM00326-00289

   (3) Establish the crankshaft bearing classification number, using the table below.

Cylinder block \ Crankshaft		Crankshaft journal			
		1	2	3	4
Crankshaft journal diameter code No.	5	4	3	2	1
	6	5	4	3	2
	7	6	5	4	3
	8	7	6	5	4

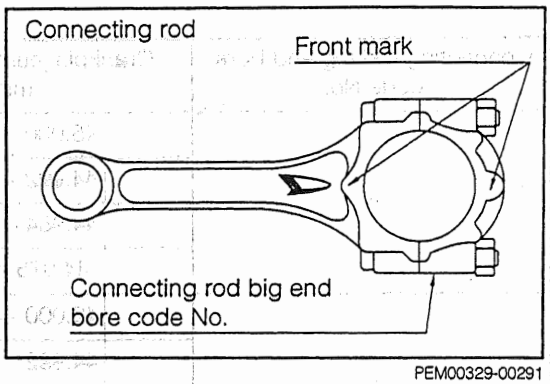
PEM00327-00000

3. Selection of connecting rod bearings
   (1) Read the crankpin journal diameter code number.



PEM00328-00290

   (2) Read the connecting rod big end bore code number.



PEM00329-00291

   (3) Establish the classification number of the connecting rod bearing, using the table below.

Connecting rod \ Crankshaft		Crankpin journal diameter code No.		
		1	2	3
Connecting rod big end bore code No.	4	3	2	1
	5	4	3	2
	6	5	4	3

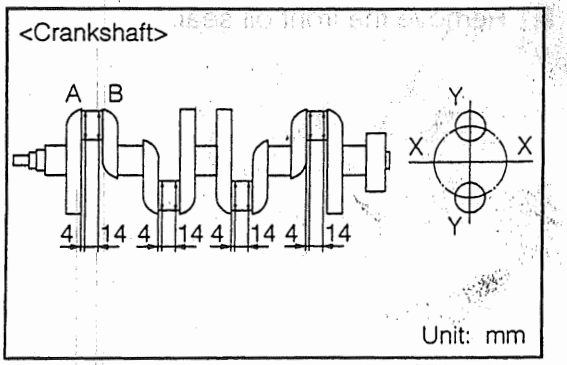
PEM00330-00000

REPLACEMENT OF CONNECTING RODS

1. Wash the connecting rods using cleaning solvent.
   WARNING:
   - Be sure to protect your eyes, wearing goggles.

PEM00331-00000

2. Selection of connecting rod bearings
   (1) Read the connecting rod big end bore code number.



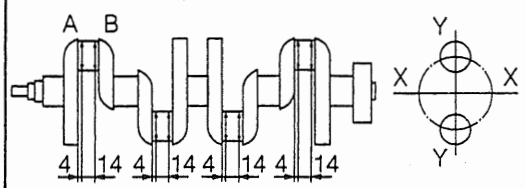
PEM00332-00292

(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 0.024 mm, replace the crankshaft.

<Crankshaft>



Unit: mm

PEM00333-00293

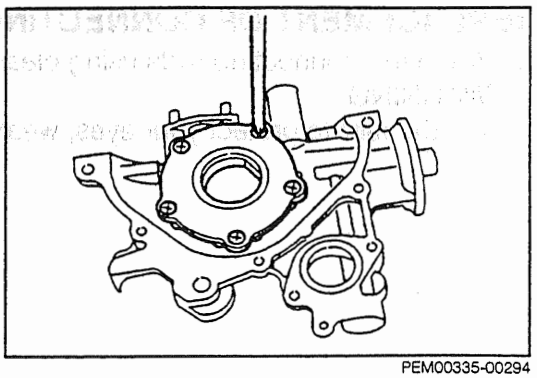
(3) Select the connecting rod bearing in accordance with the table posted in next page.

Connecting rod big end bore code No.	Crankpin journal diameter mm	Connecting rod bearing classification No.	Remarks
4	45.000 - 44.993	1	—
	44.992 - 44.985	2	—
	44.984 - 44.976	3	—
	44.975 or less	—	Crankshaft replacement
5	45.000 - 44.993	2	—
	44.992 - 44.985	3	—
	44.984 - 44.976	4	—
	44.975 or less	—	Crankshaft replacement
6	45.000 - 44.993	3	—
	44.992 - 44.985	4	—
	44.984 - 44.976	5	—
	44.975 or less	—	Crankshaft replacement

PEM00334-00000

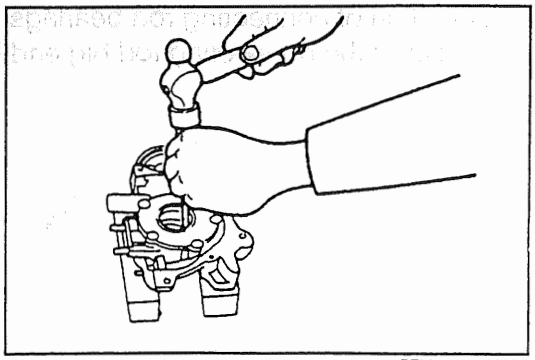
DISASSEMBLY OF OIL PUMP

1. Detach the oil pump cover.



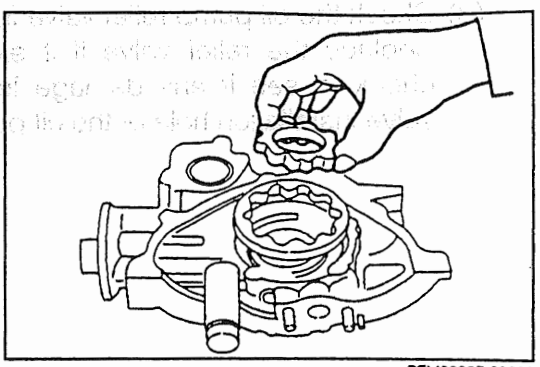
PEM00335-00294

2. Remove the front oil seal.



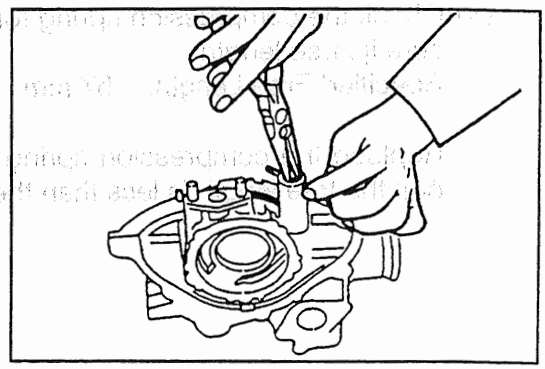
PEM00336-00295

3. Remove the oil pump rotor set.



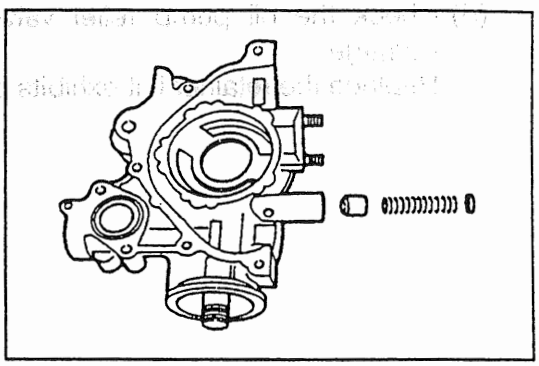
PEM00337-00296

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.



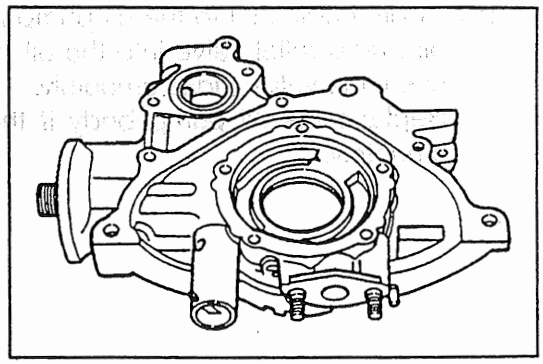
PEM00338-00297

5. Remove the oil pump relief valve spring retainer, compression spring and oil pump relief valve.
   NOTE:
   - Wash the disassembled parts in cleaning solvent.



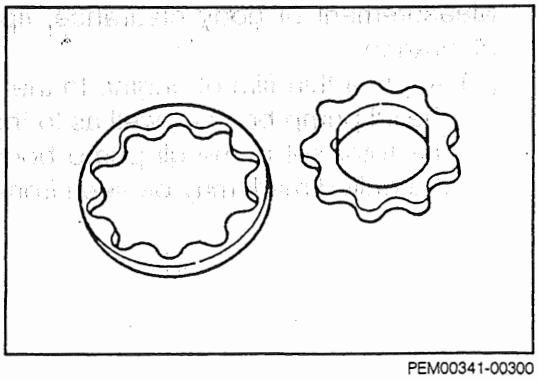
PEM00339-00298

6. Inspection of each part
   (1) Check the pump body for damage.
   Replace the pump body if it exhibits damage.



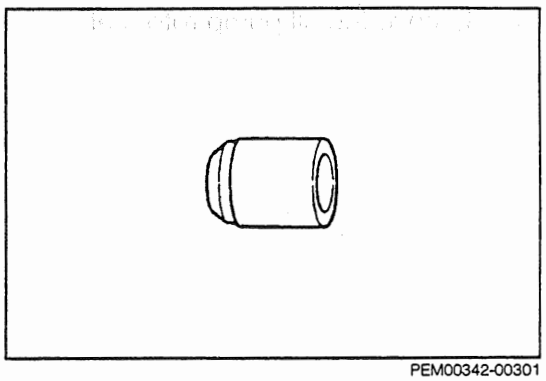
PEM00340-00299

   (2) Check the rotor set for damage.
   Replace the rotor set if it exhibits damage.



PEM00341-00300

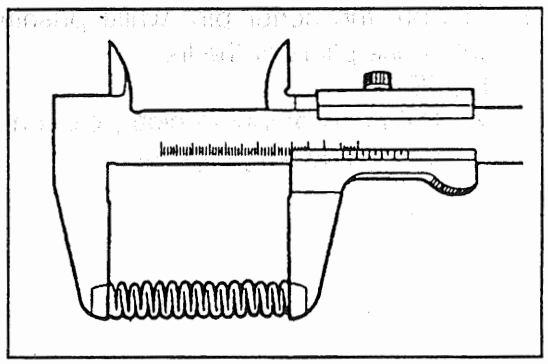
(3) Check the oil pump relief valve for damage.
Replace the relief valve if it exhibits damage. Also, check to see if any damage is present at the relief valve installation hole of the oil pump body.



PEM00342-00301

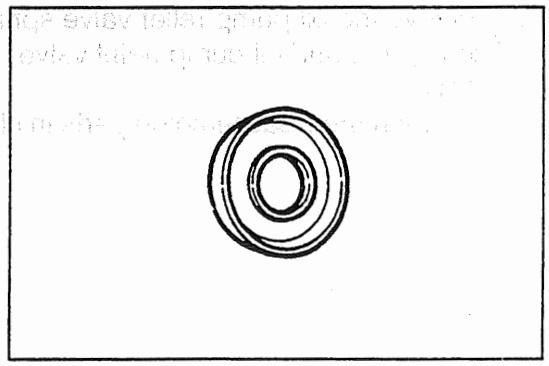
(4) Check the compression spring for damage. Also, measure its free length.
Specified Free Length: 57 mm

Replace the compression spring if it exhibits damage or if the free length is less than the specified valve.



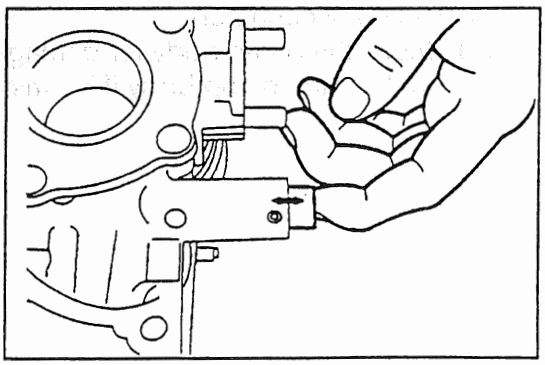
PEM00343-00302

(5) Check the oil pump relief valve spring retainer for damage.
Replace the retainer if it exhibits damage.



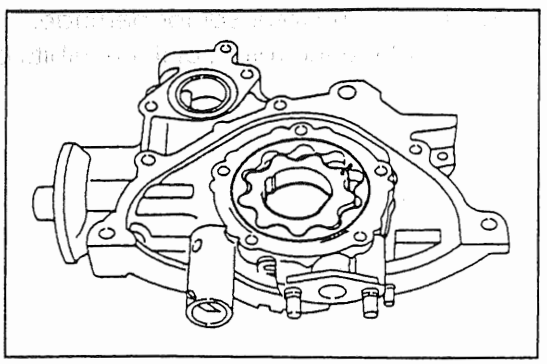
PEM00344-00303

(6) 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.



PEM00345-00304

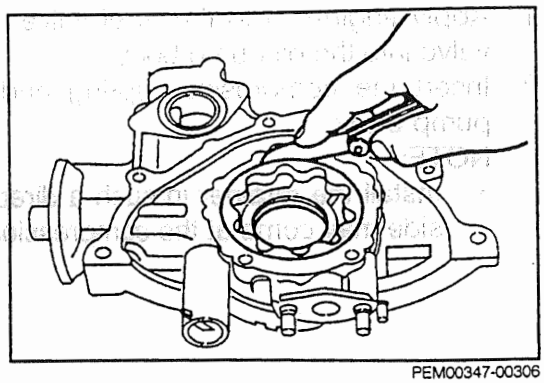
7. Measurement of body clearance, tip clearance and side clearance
(1) Apply a thin film of engine to the rotor mate surface of the oil pump body as well as to the rotor set. Assemble the rotor set in the oil pump body in such a way that the drilled mark may be seen from the outside.



PEM00346-00305

(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

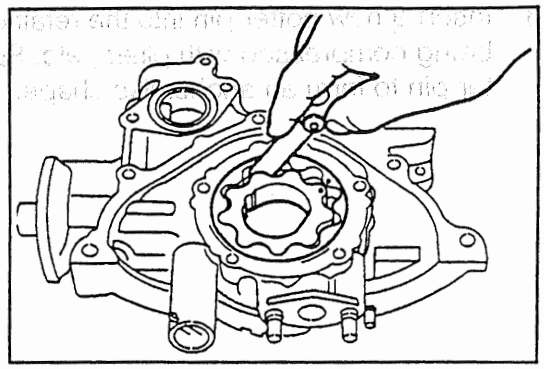
Replace the oil pump if the body clearance exceeds the specified value.



PEM00347-00306

(3) Measure the tip clearance of the rotor set, using a thickness gauge.
Tip Clearance: 0.16 - 0.24 mm

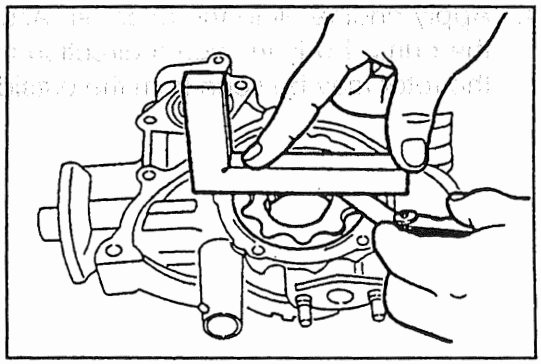
Replace the rotor set if the tip clearance exceeds the specified value.



PEM00348-00307

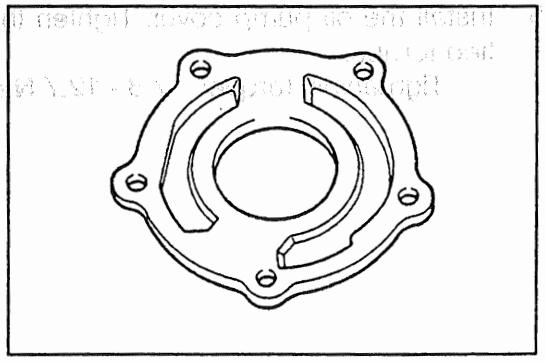
(4) Measure the side clearance between the oil pump body and the rotor set, using and a straightedge and a thickness gauge.
Side Clearance: 0.035 - 0.085 mm

Replace the oil pump if the side clearance exceeds the specified value.



PEM00349-00308

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.



PEM00350-00309

ASSEMBLY OF OIL PUMP

NOTE:

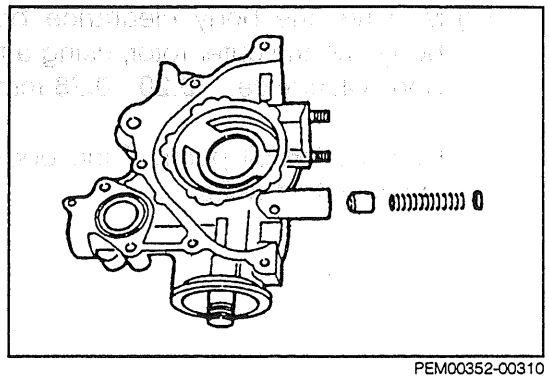
- Wash those parts to be assembled in cleaning solvent. Dry them using compressed air.

WARNING:

- When you use compressed air, be sure to protect your eyes,wearing goggles.

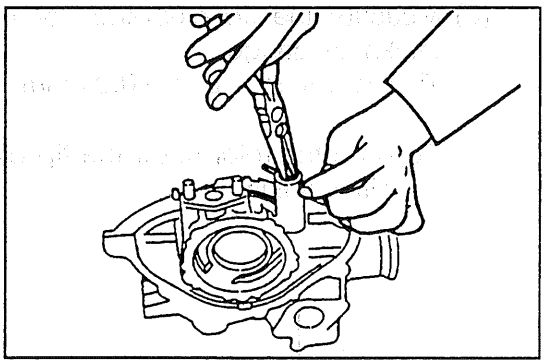
PEM00351-00000

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.



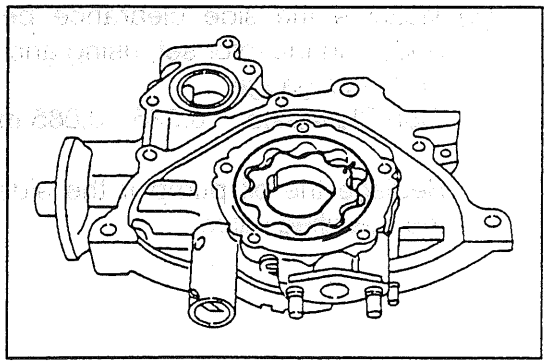
PEM00352-00310

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.



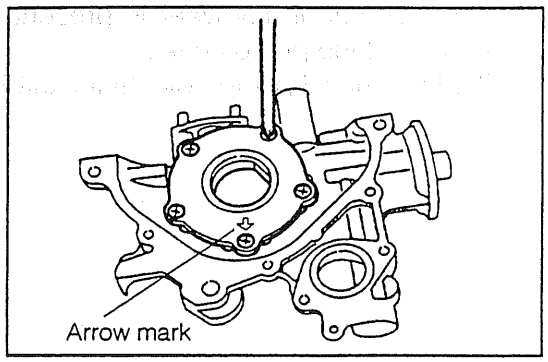
PEM00353-00311

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.



PEM00354-00312

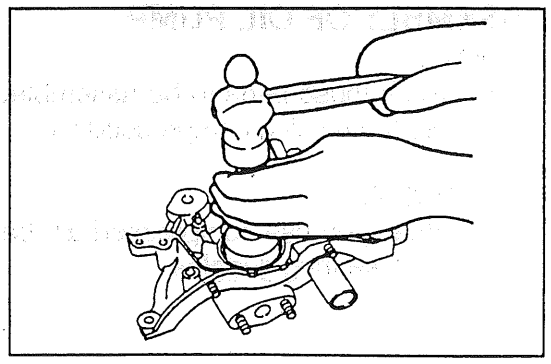
5. Install the oil pump cover. Tighten the cover to the specified torque.
   Tightening Torque: 7.8 - 12.7 N·m



PEM00355-00313

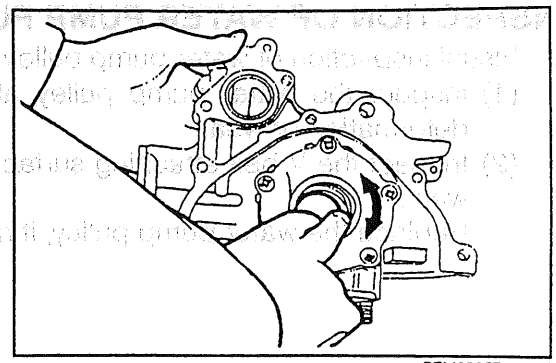
6. Drive a new oil seal into position, using the following SST.
   SST: 09310-87102-000

   NOTE:
   - Be very careful not damage the oil pump during the installation.
   - Make sure that the oil seal is not driven into position in a tilted state.



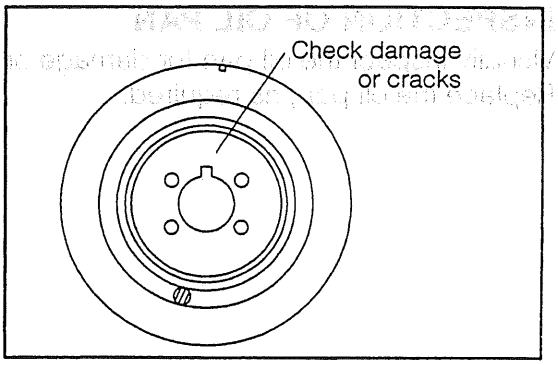
PEM00356-00314

7. Turn the rotor by hand. Ensure that the rotor turns smoothly.
   If the rotor will not turn smoothly, overhaul the oil pump.
   NOTE:
   - The oil pump performance test procedure is described in the LU section.


PEM00357-00315

INSPECTION OF CRANKSHAFT PULLEY

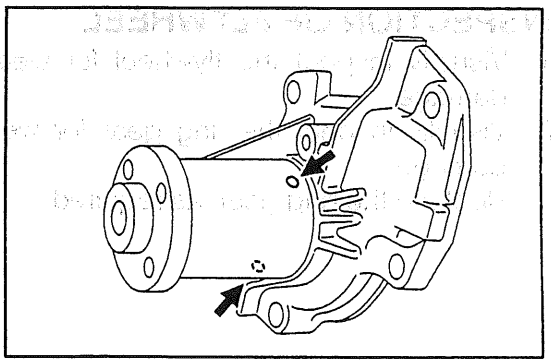
1. Visual inspection of crankshaft pulley
   (1) Check the crankshaft pulley attaching seat for deformation, wear or cracks.
   (2) Check the V-ribbed belt attaching surface for scratches, deformation or wear.
   Replace the crankshaft pulley, as required.



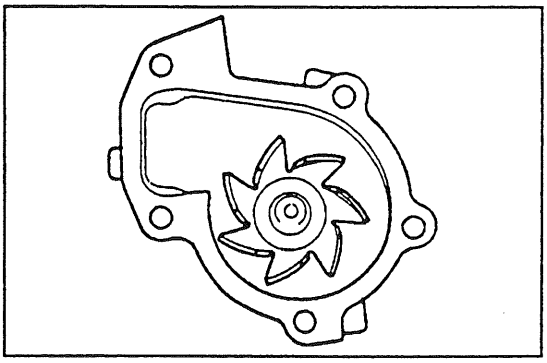
PEM00358-00316

INSPECTION OF WATER PUMP

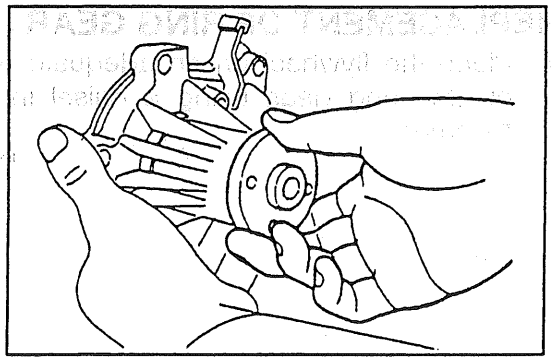
1. Visually inspect the water pump.
   (1) Mechanical seal section for evidence of water leakage
   (2) Rotary fin of water pump for scratches, deformation or cracks
   (3) Water pump attaching surface for scratches
   (4) Water pump pulley attaching seat for scratches or flattened condition
   Replace the water pump, as required.


PEM00359-00317

2. Check the water pump bearing and water pump pulley attaching section for excessive play.
   Replace the water pump, if necessary.

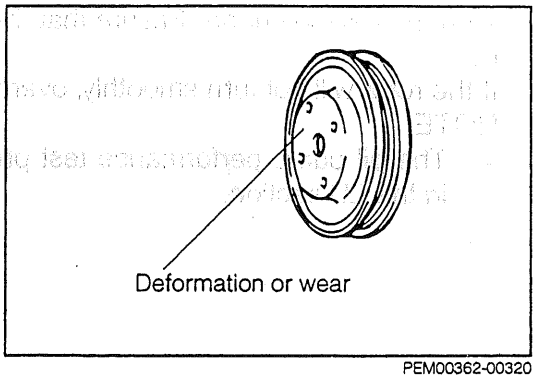

PEM00360-00318

3. Turn the water pump by hand. Ensure that the water pump turns smoothly.
   Replace the water pump, if necessary.


PEM00361-00319

INSPECTION OF WATER PUMP PULLEY

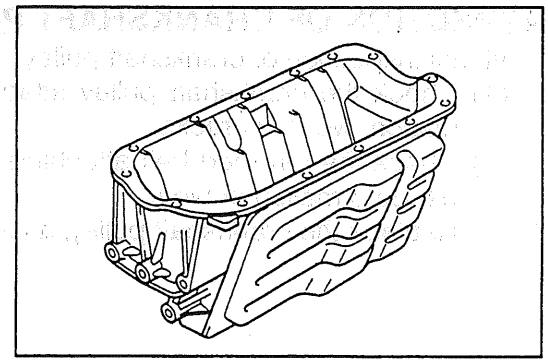
1. Visual inspection of water pump pulley
   (1) Inspect the water pump pulley attaching section for deformation or wear.
   (2) Inspect the V belt attaching surface for deformation or wear.
   Replace the water pump pulley, if necessary.



PEM00362-00320

INSPECTION OF OIL PAN

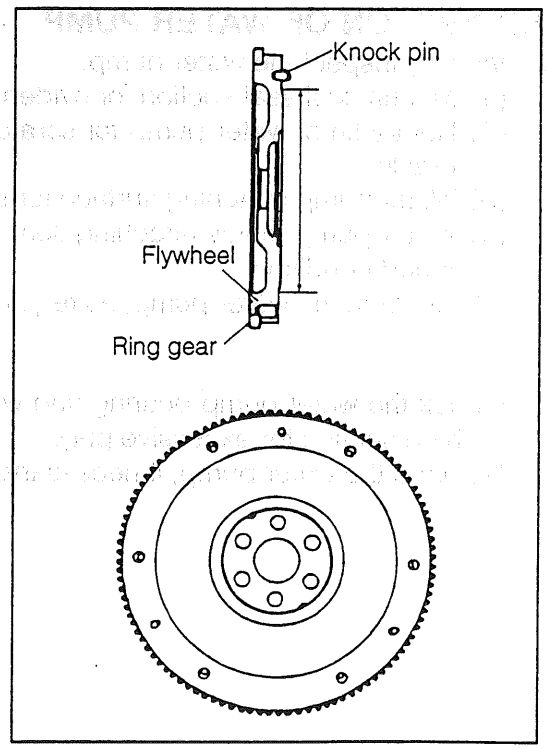
Visually inspect the oil pan for damage or cracks.
Replace the oil pan, as required.



PEM00363-00321

INSPECTION OF FLYWHEEL

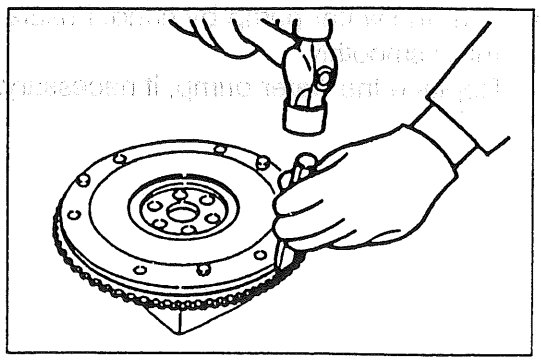
1. Visually inspect the flywheel for wear, cracks and other damage.
2. Visually inspect the ring gear for wear cracks and other damage.
   Replace the ring gear, as required.



PEM00364-00322

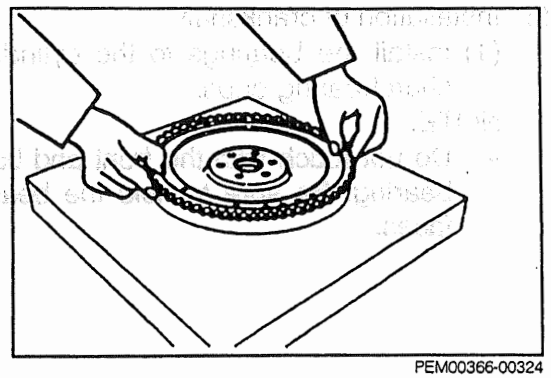
REPLACEMENT OF RING GEAR

1. Place the flywheel on an adequate wooden block. Drive out the ring gear, using a chisel in combination with a hammer.



PEM00365-00323

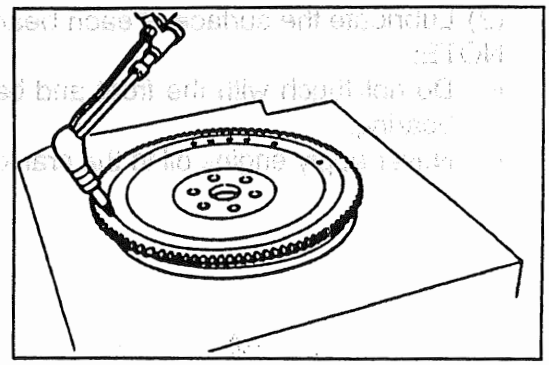
2. Place a new ring gear horizontally on the flywheel.



PEM00366-00324

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.



PEM00367-00325

ASSEMBLY OF CYLINDER BLOCK

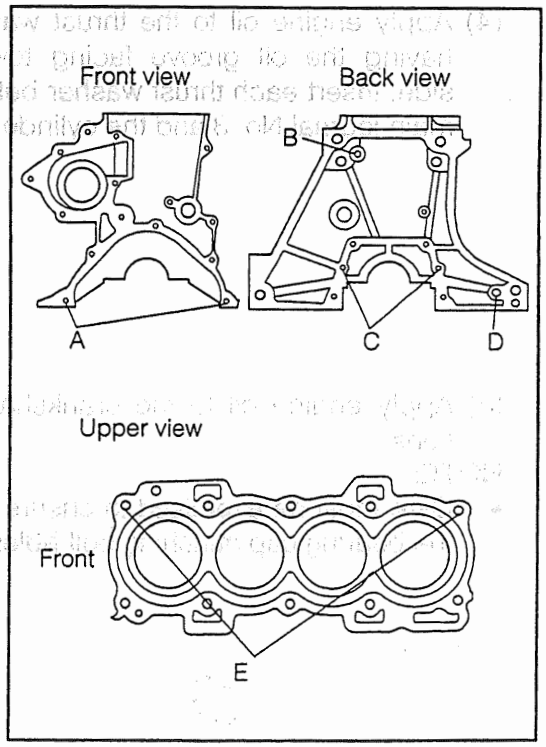
NOTE:
- As for those parts to be reassembled, wash them in cleaning solvent (excluding those parts, such as grease-sealed type bearings, dust seals and electrical parts).
- Then, dry them using compressed air.
- Remove any remaining sealer, etc. from the threaded portions of the switches and sensors.

WARNING:
- Protect your eyes with goggles when using compressed air.

PEM00368-00000

1. Ensure that the straight pins are installed at the positions of the front, rear and upper sides of the cylinder block, as indicated in the right figure. Also, ensure that the protrusion of each straight pin conforms to the specified amount given below.
   Specified Amount of Protrusions
   - A: 4 ± 0.5 mm
   - B: 8 ± 1.0 mm
   - C: 7 ± 1.0 mm
   - D: 3 ± 1.0 mm
   - E: 6.5 ± 1.0 mm

   If no straight pin is installed or its protrusion fails to conform to the specified value, replace the straight pin with a new one.



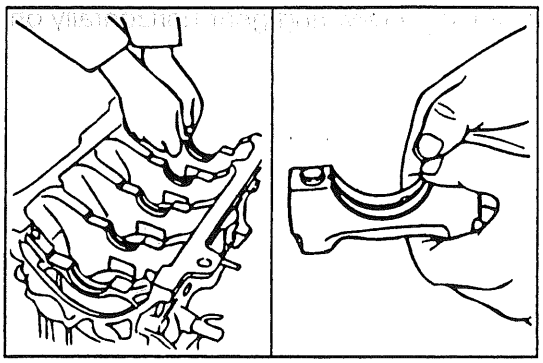
PEM00369-00326

2. 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.

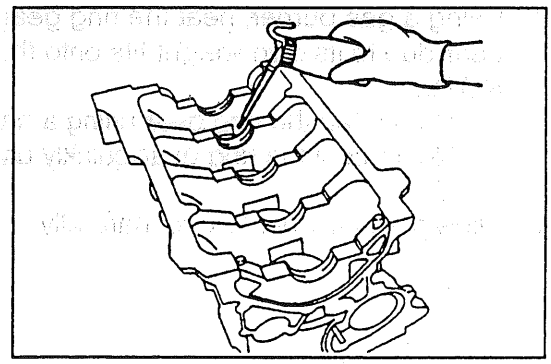


PEM00370-00327

(2) Lubricate the surface of each bearing with engine oil.

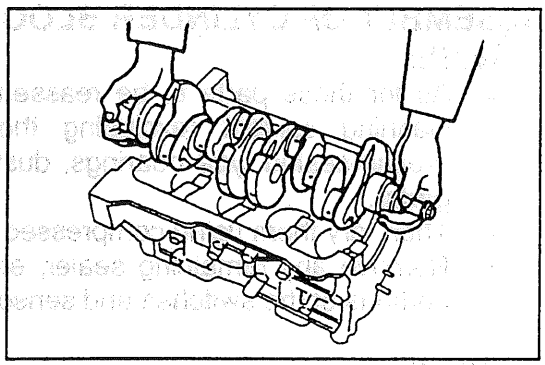
NOTE:

- Do not touch with the front and back surfaces of each bearing.
- Never apply engine oil to the crankshaft bearing caps.



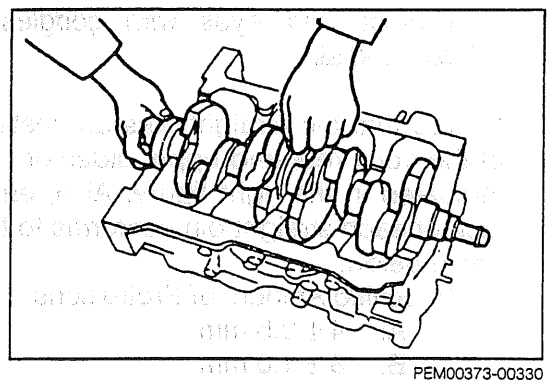
PEM00371-00328

(3) Install the crankshaft in the cylinder block.



PEM00372-00329

(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.

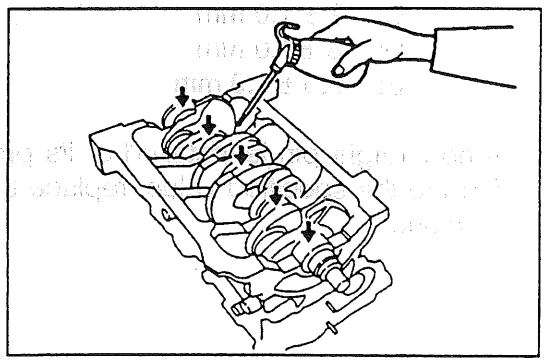


PEM00373-00330

(5) Apply engine oil to the crankshaft main journal sections.

NOTE:

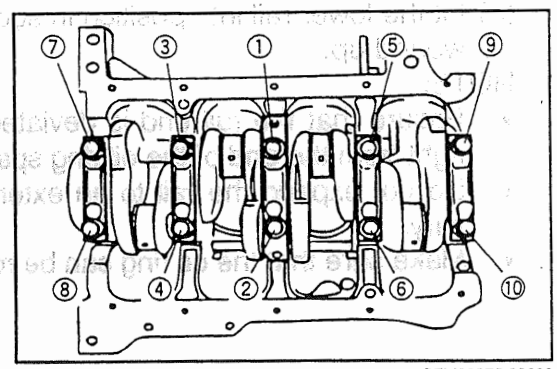
- Care must be exercised to ensure that no oil flows into the bearing cap attaching bolt holes.



PEM00374-00331

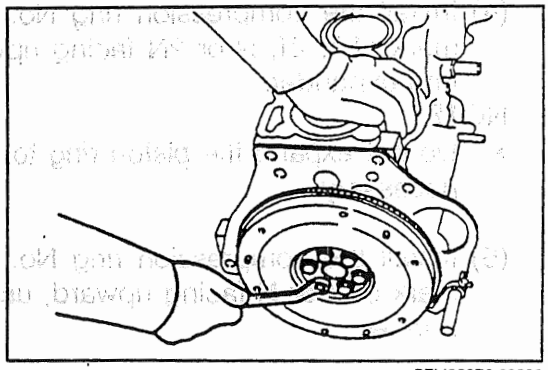
(6) Install the crankshaft bearing caps with the arrow marks facing toward the oil pump side and also in the numerical sequence.

(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

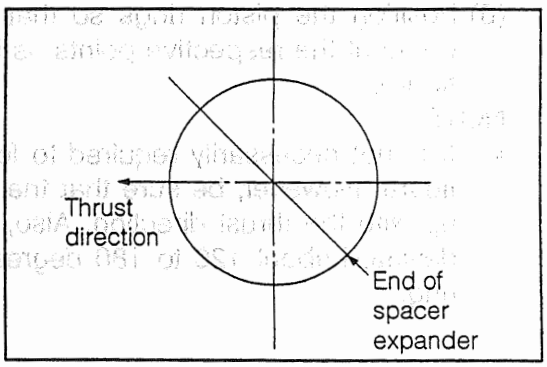


PEM00375-00332

3. 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.

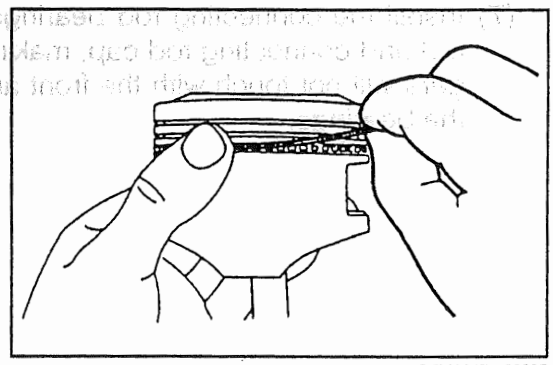

PEM00376-00333

(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.

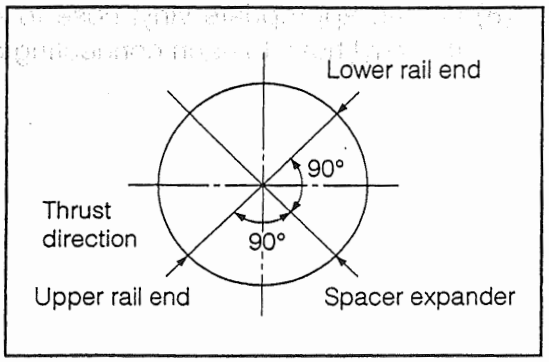


PEM00377-00334

(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.


PEM00378-00335

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.

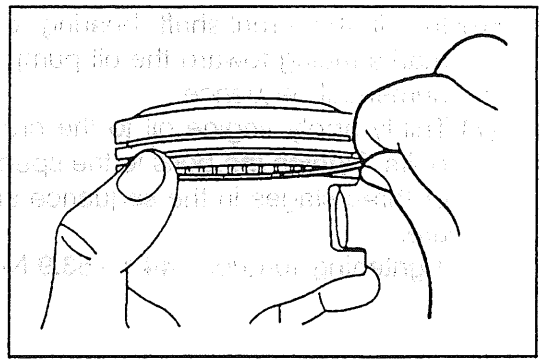


PEM00379-00336

(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.

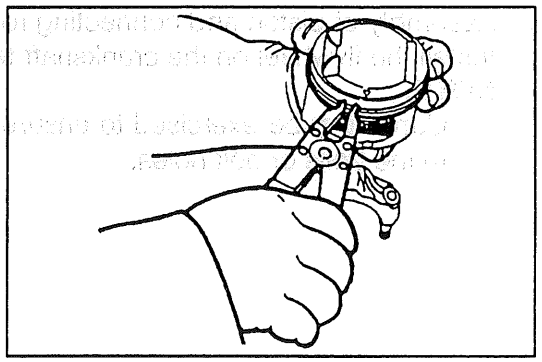


PEM00380-00337

(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.



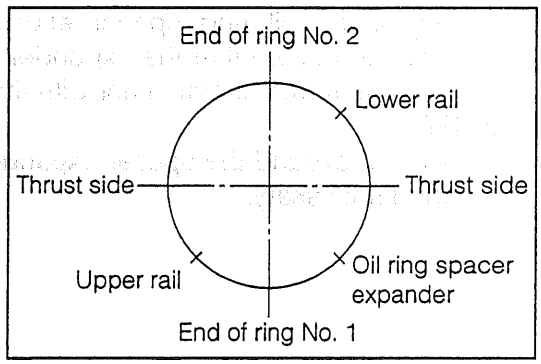
PEM00381-00338

(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.

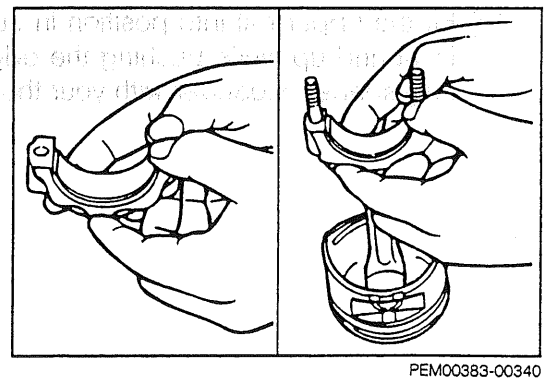
NOTE:

- 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.



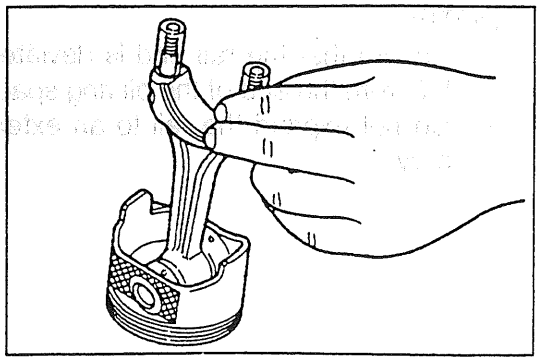
PEM00382-00339

(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.



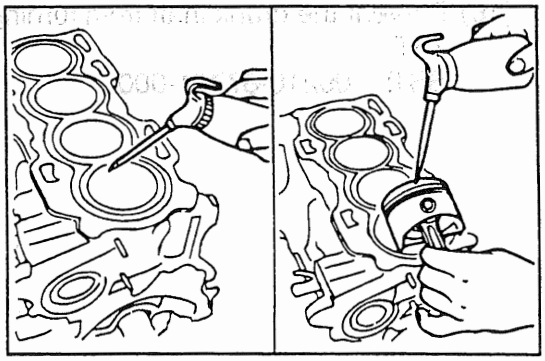
PEM00383-00340

(8) Cut an appropriate vinyl hose to a suitable length. Fit the vinyl hose to each connecting rod bolt sections.



PEM00384-00341

(9) Apply engine oil to the piston rings, piston pins, connecting rod bearings, cylinder walls and crankpin journals.



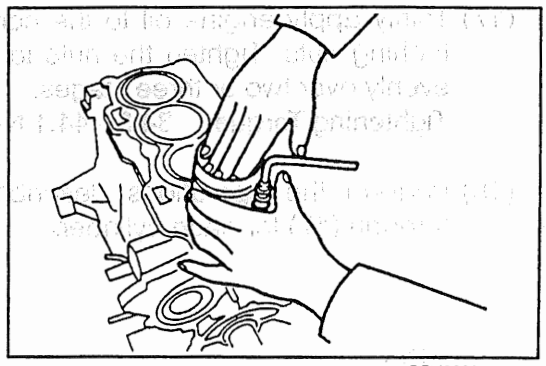
PEM00385-00342

(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.



PEM00386-00343

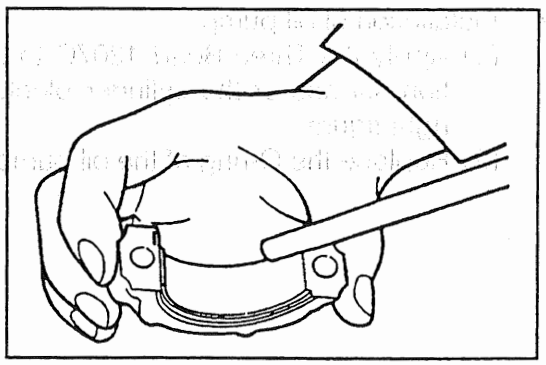
(12) Push the piston by hand until the connecting rod reaches the crankpin journal.

(13) Apply engine oil to the bearing surface of each connecting rod bearing.

NOTE:

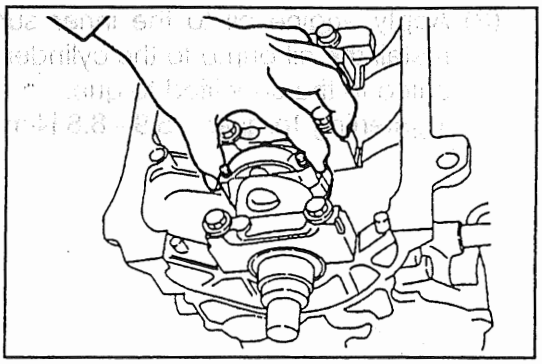
- Do not touch with the bearing front surface.

(14) Remove the vinyl hoses which were attached to the connecting rod bolt sections.



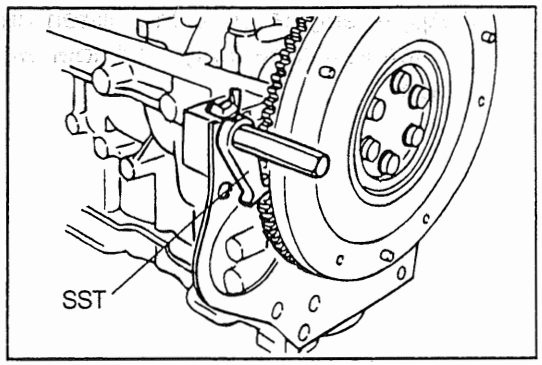
PEM00387-00344

(15) Install the connecting rod cap with the front mark facing toward the oil pump side.



PEM00388-00345

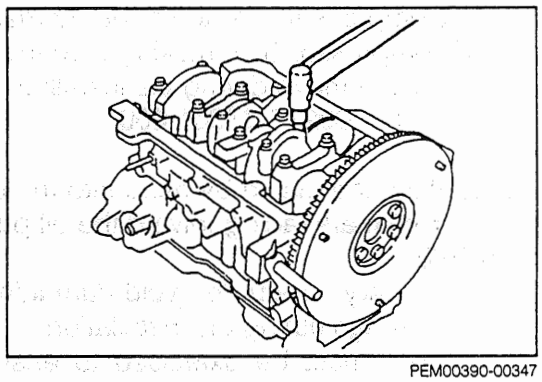
(16) Prevent the crankshaft from turning, using the following SST.
SST: 09210-87701-000



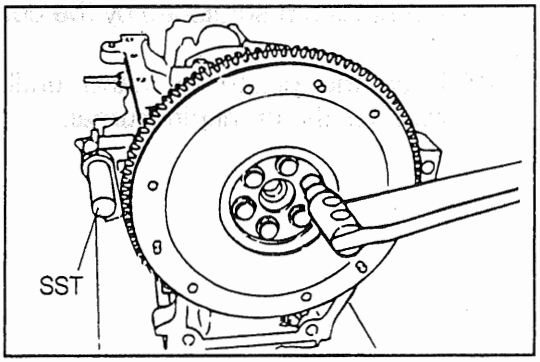
PEM00389-00346

(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

(18) Perform the operations described in the steps (1) through (17) for each cylinder.

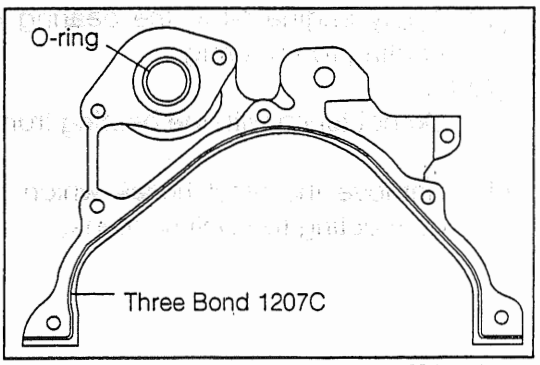

PEM00390-00347

(19) Remove the flywheel.
(20) Remove the following SST.
SST: 09210-87701-000



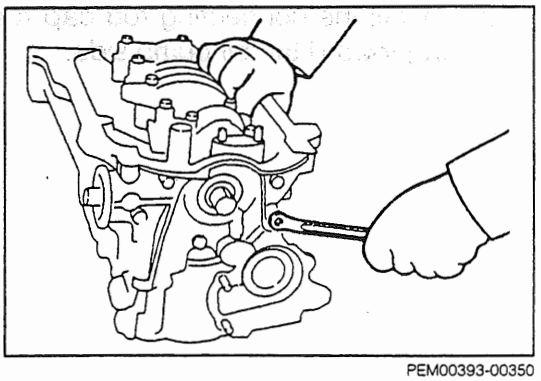
PEM00391-00348

4. 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 one.

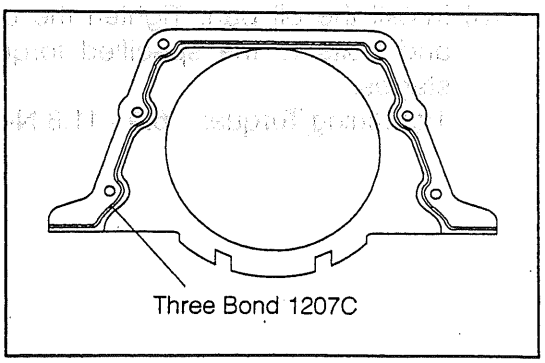


PEM00392-00349

(3) Apply engine oil to the inner surface of the oil seal. Install the oil pump to the cylinder block. Perform tightening to the specified torque.
Tightening Torque: 5.9 - 8.8 N·m

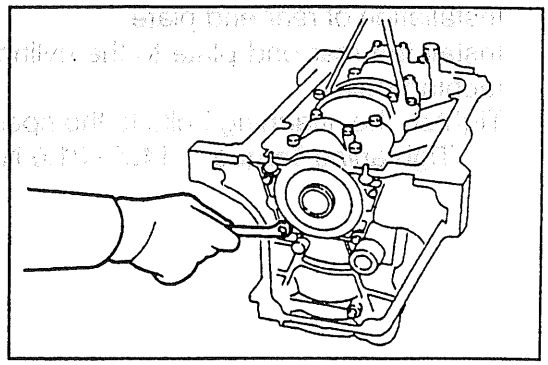

PEM00393-00350

5. 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.



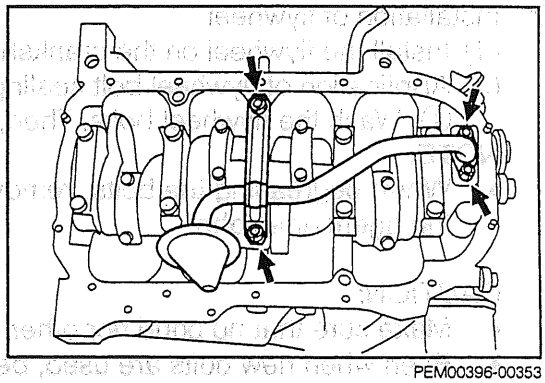
PEM00394-00351

   (2) Apply engine oil to the inner surface of the oil seal. Install the oil seal retainer to the cylinder block. Perform tightening to the specified torque.
   Tightening Torque: 5.9 - 8.8 N·m (0.6 - 0.9 kgf-m)



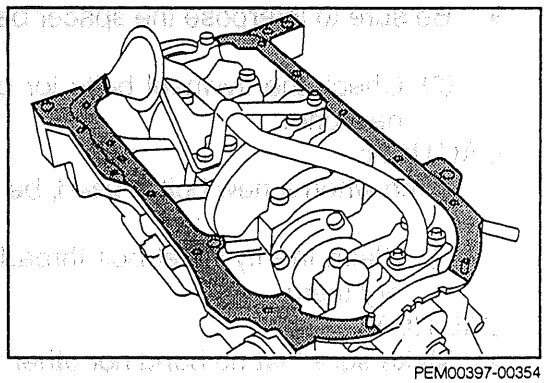
PEM00395-00352

6. Install and tighten the oil strainer with a new gasket interposed.
   Tightening Torque: 14.7 - 21.6 N·m



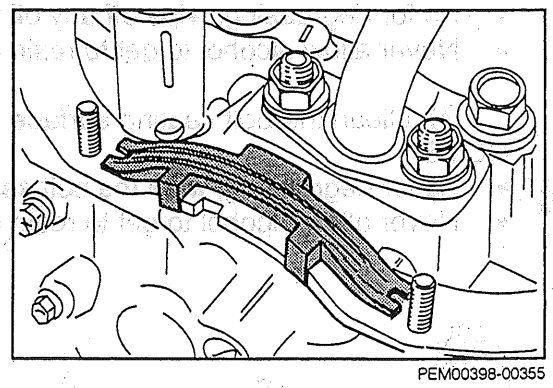
PEM00396-00353

7. 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.



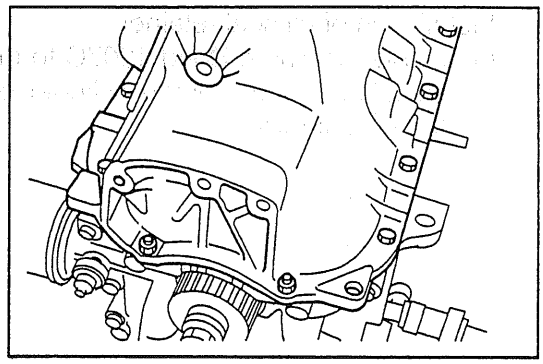
PEM00397-00354

   (2) Place the oil pan gaskets.
   NOTE:
   - Ensure that the end section of the oil pan gasket is overlapped at least 10 mm with the Three Bond 1207C.



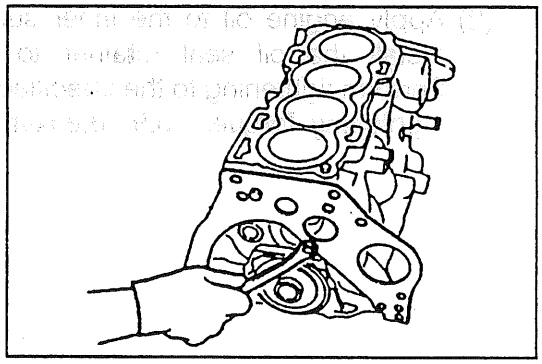
PEM00398-00355

(3) Install the oil pan. Tighten the oil pan attaching nuts and bolts to the specified torque over two or three stages.
Tightening Torque: 6.9 - 11.8 N·m



PEM00399-00356

8. Installation of rear end plate
Install the rear end plate to the cylinder block with two attaching bolts.
Tighten the attaching bolts to the specified torque.
Tightening Torque: 14.7 - 21.6 N·m



PEM00400-00357

9. Installation of flywheel
(1) Install the flywheel on the crankshaft with the spacer interposed.
(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.
- Be sure to interpose the spacer between the crankshaft and the flywheel.

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.

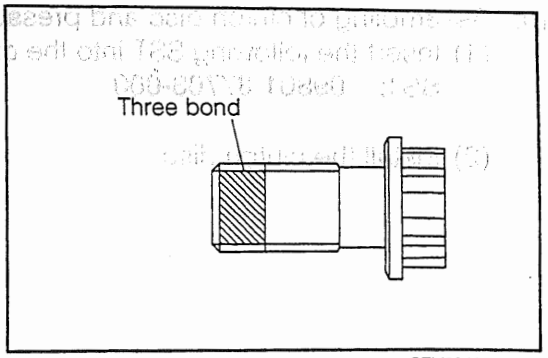
CAUTION:
- Make sure that no bond nor other foreign matter, such as dust, gets to the bolt threaded holes.
- As for degreasing, wipe off any oil from the threaded portion with a cloth damped with alcohol.
- Never allow alcohol to get to resin or rubber parts, specifically, the rear oil seal.

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.

PEM00401-00000

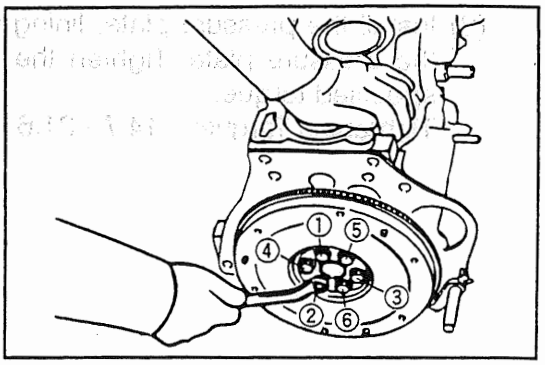
⑤ Apply two to three drops of the Three Bond 1324 to the forward end of the threaded portion of each flywheel bolt.



PEM00402-00358

CAUTION:
- If the Three Bond 1324 is applied excessively beyond the specified amount, the oil 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 to the specified torque in the sequence indicated in the right figure.
Tightening Torque: 44.1 - 63.7 N·m



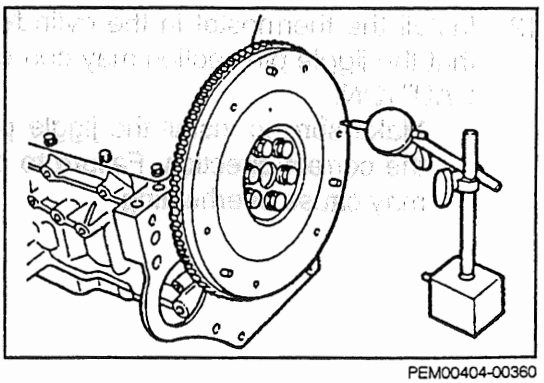
PEM00403-00359

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

(5) Measure the flywheel runout, using a dial gauge.
Allowable Runout Limit: 0.1 mm


PEM00404-00360

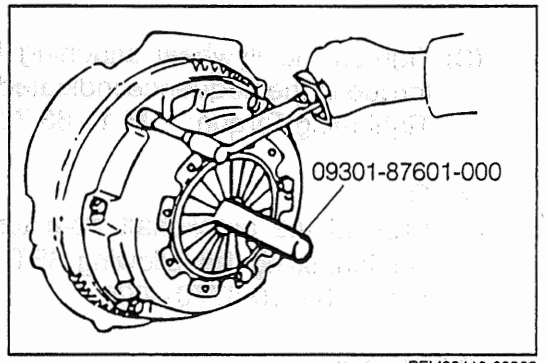
NOTE:
- Replace the flywheel if its runout exceeds the allowable limit.

10. Assembling of clutch disc and pressure plate
    (1) Insert the following SST into the crankshaft rear end.
    SST: 09301-87703-000

    (2) Install the clutch disc.

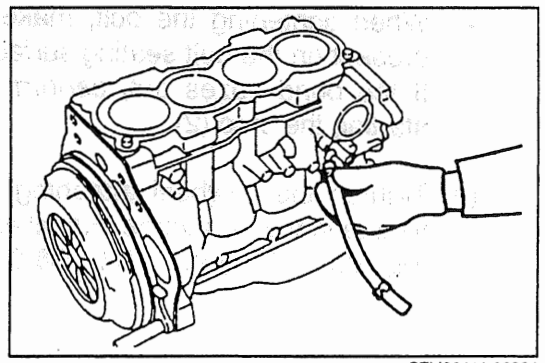
PEM00409-00000

    (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



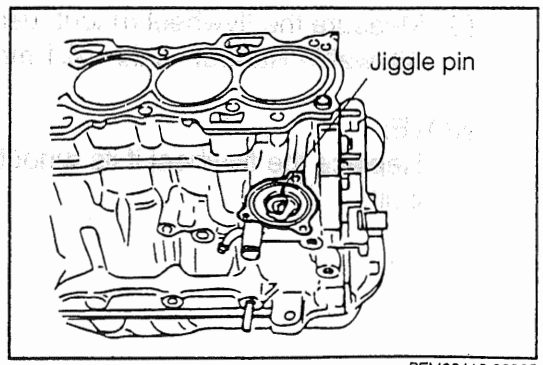
PEM00410-00363

11. Install the water hose for the throttle body use to the cylinder block. Attach the hose bands.



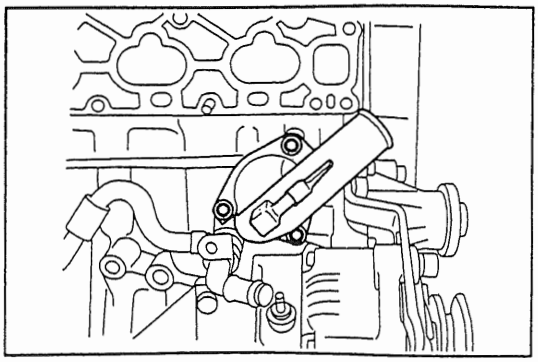
PEM00411-00364

12. 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 may cause overheating.



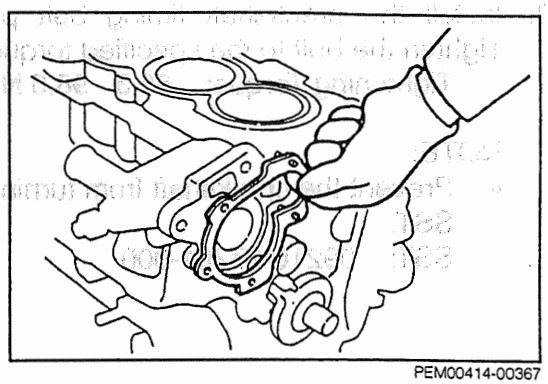
PEM00412-00365

13. Install the water inlet.
    Tightening Torque: 5.9 - 8.8 N·m



PEM00413-00366

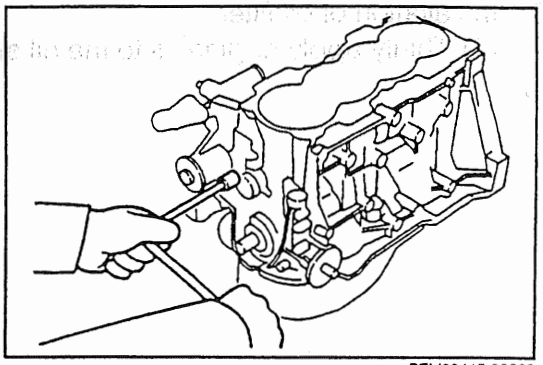
14. Installation of water pump
    (1) Install a new water pump gasket on the cylinder block.



PEM00414-00367

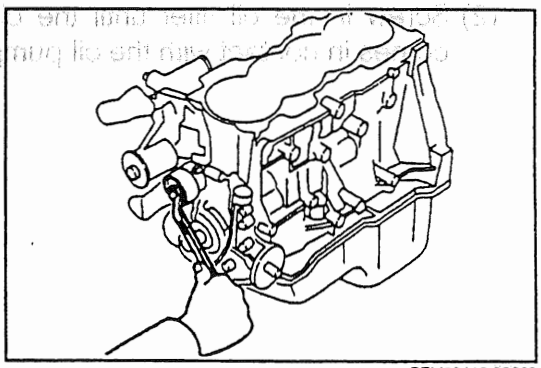
    (2) Install and tighten the water pump to the specified torque.
    Tightening Torque: 14.7 - 21.6 N·m

NOTE:
- When the stud bolts have been replaced, apply the Three Bond 1377B to the threaded portion at the cylinder block side.



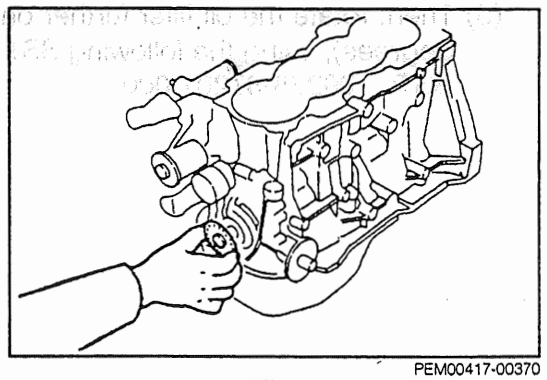
PEM00415-00368

15. 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. Push the tensioner to the alternator side as far as it will go. Tighten the tensioner temporarily.



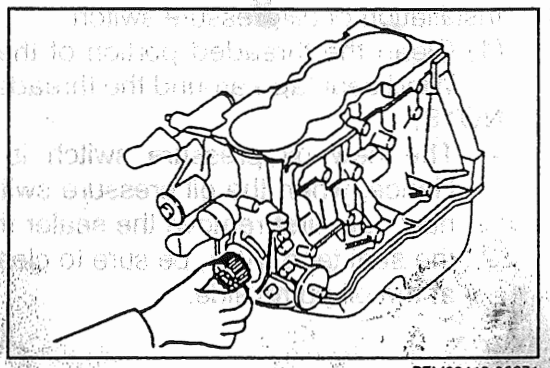
PEM00416-00369

16. Install the crankshaft pulley flange in such a way that its recessed side may come at the cylinder block side.



PEM00417-00370

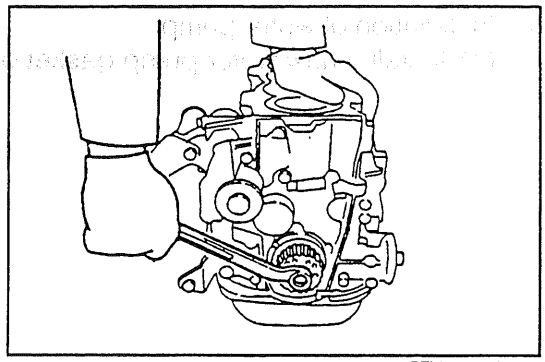
17. Install the crankshaft timing belt pulley.



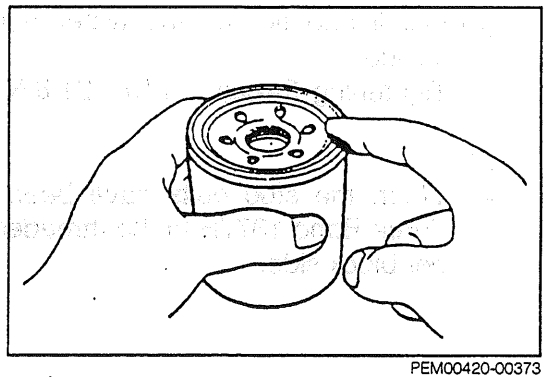
PEM00418-00371

18. Install the crankshaft timing belt pulley attaching bolt. Tighten the bolt to the specified torque.
    Tightening Torque: 88.3 - 98.0 N·m

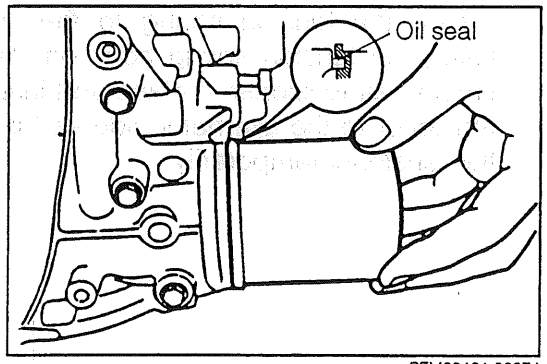
    NOTE:
    - Prevent the crankshaft from turning, using the following SST.
      SST: 09210-87701-000


PEM00419-00372

9. Installation of oil filter
   (1) Thinly apply engine oil to the oil seal of the oil filter.

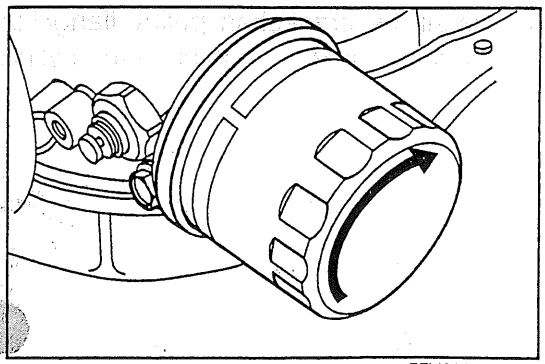

PEM00420-00373

   (2) Screw in the oil filter until the oil seal of the oil filter comes in contact with the oil pump.



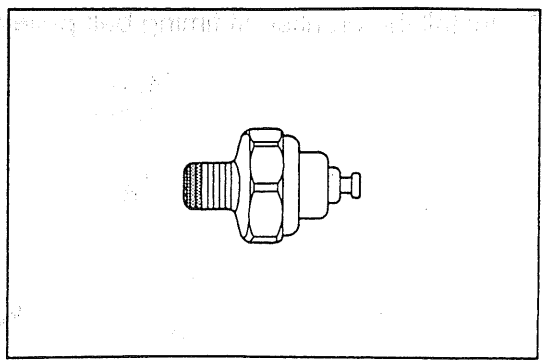
PEM00421-00374

   (3) Then, rotate the oil filter further one complete turn (360 degrees), using the following SST.
      SST: 09228-87201-000

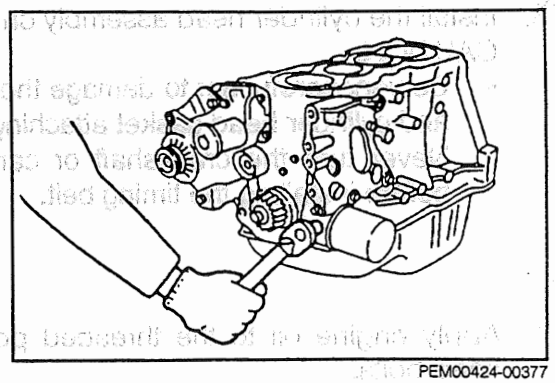

PEM00422-00375

0. Installation of oil pressure switch
   (1) Clean the threaded portion of the oil pressure switch. Wind seal tape around the threaded portion.

   NOTE:
   - The new oil pressure switch is coated with sealer. Hence, when the oil pressure switch 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 oil pump side.

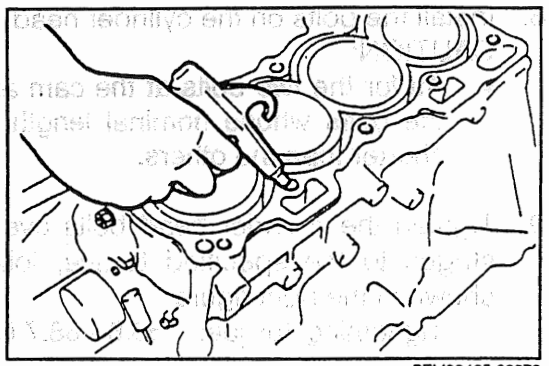

PEM00423-00376

(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

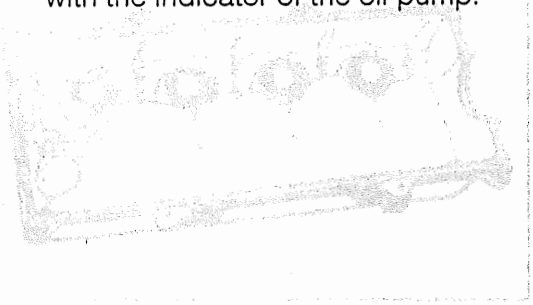

PEM00424-00377

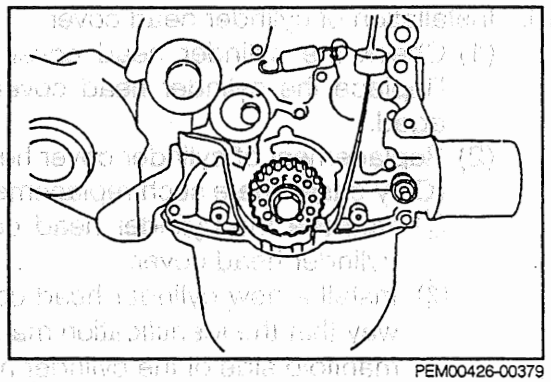
PREPARATION OF CYLINDER HEAD INSTALLATION

1. Place the cylinder block on a suitable engine stand.
2. Clean and make dry the cylinder head bolt holes.
   WARNING:
   - When you use compressed air, be sure to protect your eyes, wearing goggles.

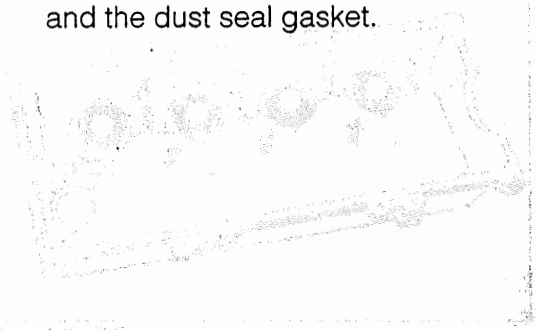

PEM00425-00378

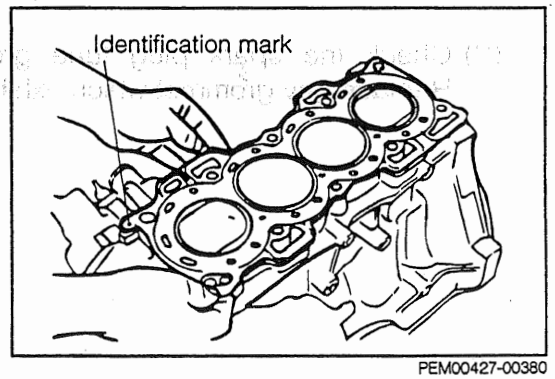
3. Align the drilled mark of the crankshaft timing belt pulley with the indicator of the oil pump.




PEM00426-00379

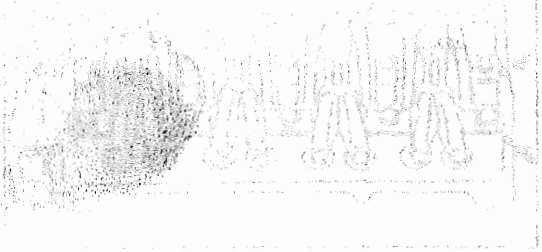
4. Place the new cylinder head gasket on the cylinder block and the dust seal gasket.

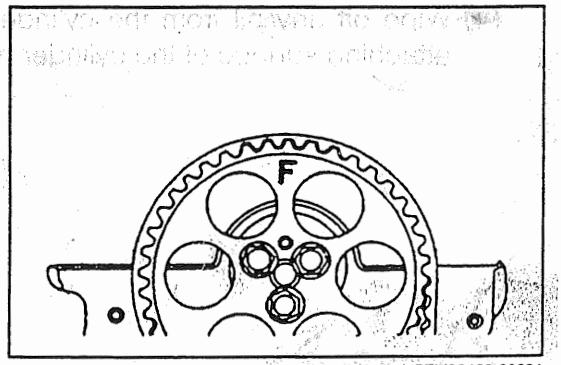




PEM00427-00380

5. Turn the crankshaft, until the "F" mark of the camshaft timing belt pulley comes exactly at the top position.





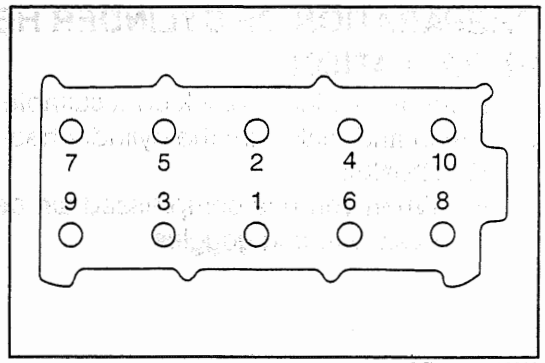
PEM00428-00381

6. Install the cylinder head assembly on the cylinder block.
   CAUTION:
   - Be very careful not to damage the cylinder head gasket and cylinder head gasket attaching surface.
   - Never turn the crankshaft or camshaft independently before installing the timing belt.

PEM00429-00000

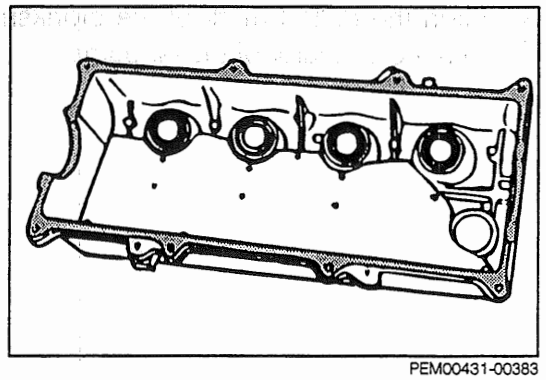
7. Apply engine oil to the threaded portion of the cylinder head bolts.
8. Install the bolts on the cylinder head.
   CAUTION:
   - As for the two bolts at the cam angle sensor side, use the bolts whose nominal length is 112 mm, which is shorter than the others.

9. 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



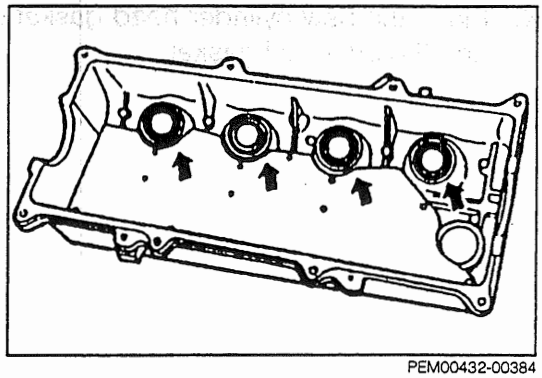
PEM00430-00382

10. 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) Replacement of cylinder cover head gasket
    (Only case where such replacement is required;)
    ① Remove the cylinder head cover gasket from the cylinder head cover.
    ② Install a new cylinder head cover gasket in such a way that the identification mark comes at the intake manifold side of the cylinder head cover.



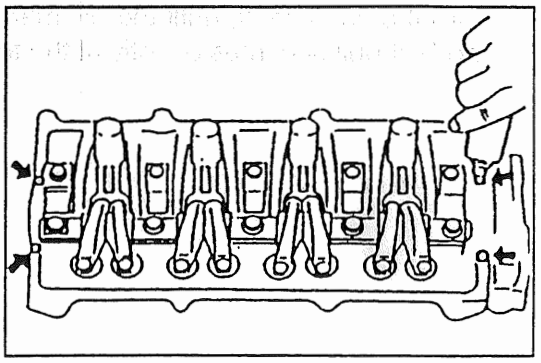
PEM00431-00383

    (3) Check the spark plug tube grommet for damage. Replace any grommet which exhibits damage.



PEM00432-00384

    (4) Wipe off any oil from the cylinder head cover gasket attaching surface of the cylinder head.



PEM00433-00385

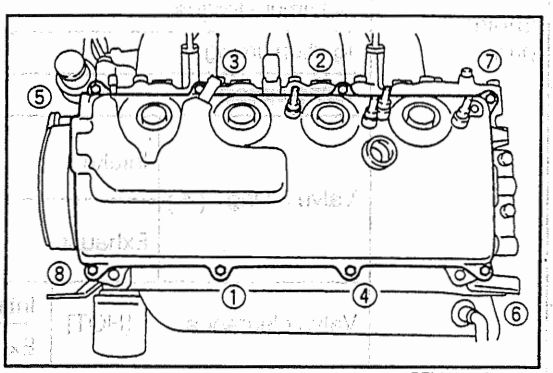
(5) Install the cylinder head cover to the cylinder head.

CAUTION:

- Be very careful not to damage the spark plug tube rubber grommet during installation.

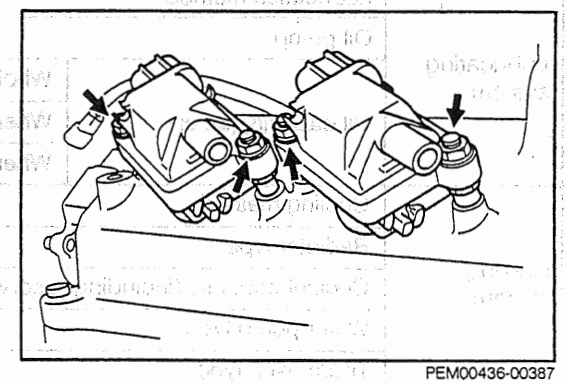
PEM00434-00000

(6) 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



PEM00435-00386

(7) Install and tighten the ignition coils to the cylinder head cover.
(8) Connect the resistive cords.



PEM00436-00387

11. Install the timing belt.
(Refer to the timing belt section)

PEM00437-00000

ENGINE SPECIFICATION

					HC - ES E/G
Engine proper	Type				Petrol, water cooled, 4-cycle
	Cylinder No. and arrangement				4-cylinder-in-line, mounted longitudinally
	Valve mechanism				Belt-driven, SOHC
	Bore × Stroke			cm	76.0 × 71.4
	Displacement			cm^3	1295
	Maximum output			kW/rpm	48.0/4800
	Maximum torque			N·m/rpm	99/2800
	Ignition timing			°	BTDC 3 ± 2
	Idling speed			rpm	850 ± 50
	Valve timing (°)	Intake	Open		BTDC 1
			Close		ABDC 39
		Exhaust	Open		BBDC 42
			Close		ATDC 2
	Valve clearance [HOT]	Intake		mm	0.25 ± 0.05
		Exhaust		mm	0.33 ± 0.05
Lubricating system	Lubrication method				Fully-forced feed method
	Oil pump				Trochoid type
	Oil capacity (letter)	Whole			4.2
		When oil is changed			3.5
		When oil and oil filter are changed			3.7
Cooling system	Cooling method				Water cooled, electromotor type
	Radiator type				Fin & Tube
	Coolant capacity (including reserve tank)			ℓ	5.7
	Water pump type				Centrifugal type, "V"belt driven type
	Thermostat type				Wax type (84°C)
Fuel system	Fuel tank	Capacity	Pick up	ℓ	35
			Van	ℓ	33
	Fuel pump type				Electromotor type
	Fuel filter type				Filter paper type
Engine electrical system	Ignition system	Type			ESA system
		Ignition timing			BTDC 3° ± 2°
		Firing order			1 - 3 - 4 - 2
		Spark plug	Manufacturer		NGK / DENSO
			Type		BKUR6EK / K20TNR-S BKUR6EK / K20TNR-S
	Alternator	Type			3-phase alternating current commuting type
		Output		V-A	12 - 50
		Regulator type			IC regulator type
	Starter	Type			Conventional type
		Output		V-kW	12 - 0.9

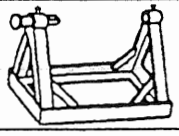
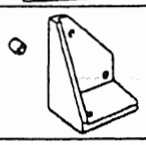
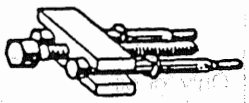
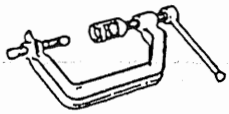
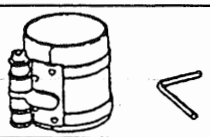
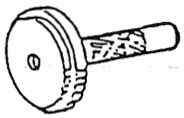
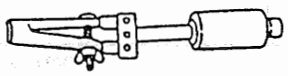
ENGINE SPECIFICATIONS

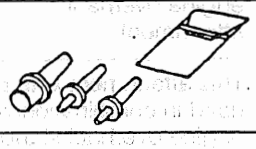
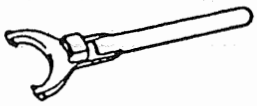
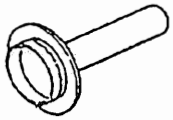
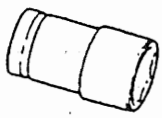
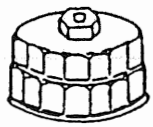
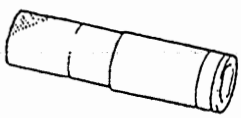
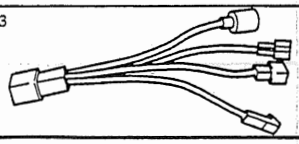
Timing pulley	STD (diameter) mm	Cam shaft		119.9.4
		Crankshaft		59.37
	Wear limit (diameter)	Cam shaft		119.8
		Crankshaft		59.3
Camshaft	Maximum circle run out mm			0.03
	Oil clearance mm	STD		0.035 - 0.076
		Maximum limit		0.17
	Thrust clearance mm	STD		0.1 - 0.25
		Maximum limit		0.45
	Cam lobe height mm	Intake	STD	33.435 - 33.634
			Maximum limit	33.2
		Exhaust	STD	33.17 - 33.37
			Maximum limit	33.0
Cylinder head	War page mm	Cylinder block side		0.10
		Intake manifold side		0.10
		Exhaust manifold side		0.10
	Valve seat angle	Intake valve		30° - 45° - 70°
		Exhaust valve		20° - 45° - 70°
Valves	Valve stem diameter mm	Intake valve		$6.6^{-0.020}_{-0.040}$
		Exhaust valve		$6.6^{-0.025}_{-0.045}$
	Valve length mm	Intake valve		112.8
		Exhaust valve		114.5
	Valve stock thickness mm	Intake valve		0.8
		Exhaust valve		1.0
	Oil clearance mm	Intake valve	STD	0.020 - 0.055
			Maximum limit	0.080
		Exhaust valve	STD	0.025 - 0.060
			Maximum limit	0.090
	Valve seat angle			45.5°
Valve springs	Free length mm		STD	45.2 ± 0.5
			Maximum limit	43.9
	Installed tension at 34.9 mm N			245
	Maximum out of secureness mm			1.6
Valve rocker arm and shaft	Valve rocker arm bore diameter mm			19.500 - 19.521
	Valve rocker shaft outer diameter mm			19.468 - 19.488
	Oil clearance mm		STD	0.015 - 0.053
			Maximum limit	0.08
Valve rocker arm spacer	Free width mm			22.00
Intake manifold	War page mm			0.1
Exhaust manifold	War page mm			0.1

Cylinder block	Cylinder bore mm		STD	76.000 - 76.030
			O/S 0.25	76.250 - 76.280
	Bore honing angle			35 ± 5°
	Coarse degree			1 - 4Z
Piston	Outer diameter mm		STD	75.965 - 75.995
			O/S 0.25	76.215 - 76.245
	Bore clearance mm		STD	0.025 - 0.045
			Maximum limit	0.11
	Piston and piston pin clearance			0.005 - 0.011
Piston ring	Thickness mm		1st	1.17 - 1.19
			2nd	1.47 - 1.49
	End gap mm	STD	1T	0.27 - 0.37
			1N	0.27 - 0.40
			2T	0.45 - 0.55
			2N	0.45 - 0.55
			Oil ring spacer	0.15 - 0.60
			Oil ring spacer	0.20 - 0.60
Piston rings	End gap mm	Maximum limit	1st	0.7
			2nd	0.8
			Oil	1.0
Piston pin	Piston pin outer diameter			18.994 - 18.997
	Piston pin to connecting rod inference fit			0.015 - 0.044
Connecting rod	Connecting rod pin diameter (STD) mm		Small end	18.953 - 18.979
			Big end	48.000 - 48.024
	Big end thrust clearance mm		STD	0.15 - 0.40
			Maximum limit	0.45
	Maximum bend mm			0.05
	Maximum twist mm			0.05
Crankshaft	Journal diameter mm		Crank pin journal	44.976 - 45.000
			Main journal	49.976 - 50.000
	Oil clearance mm	STD	Crank pin journal	0.020 - 0.044
			Main journal	0.024 - 0.042
		Maximum limit	Crank pin journal	0.050
			Main journal	0.050
	Thrust clearance mm		STD	0.02 - 0.20
			Maximum limit	0.30
	Maximum run out mm			0.06

PEM00439-00000

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.
	09219-87101-000 Engine overhaul attachment	Attaching engine to overhaul stand	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	
	09223-41020-000 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.

Shape	Part No. and Name	Purpose	Remarks
	09201-87705-000 Valve guide bush remover & replacer	Removal and installation of valve guide bushes	
	09301-87703-000 Clutch guide tool	Assembling clutch	
	09258-00030-000 Plug set	Plugging rubber hoses	
	09648-87201-000 Drive shaft replacer	Disconnecting drive shafts	
	09388-87702-000 Transfer replacer	Press-fitting of rubber grommets	
*1 	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	
	09228-87201-000 Oil filter wrench	Removal and installation of oil filter	
*2 	09268-87703-000 Plug wrench	Removal and installation of spark plugs	
*3 	09991-87501000 Wire engine control system inspection	EFI system inspection Measure engine speed	

PEM00440-00388

TIGHTENING TORQUE

Tightening component		Tightening torque	
		N·m	kgf-m
Cylinder head × Spark plug		14.7 - 21.6	1.5 - 2.2
Cylinder head × Cylinder head cover		2.9 - 4.9	0.3 - 0.5
Cylinder head × Rocker shaft (camshaft cap)	M10	28.4 - 36.3	2.9 - 3.7
	M8	12.7 - 16.7	1.3 - 1.7
Cylinder head × Cylinder block		58.8 - 66.7	6.0 - 6.8
Cylinder head × Exhaust manifold		29.4 - 44.1	3.0 - 4.5
Cylinder head × Intake manifold		14.7 - 21.6	1.5 - 2.2
Cylinder head × Water outlet		14.7 - 21.6	1.5 - 2.2
Cylinder block × Water inlet		5.9 - 8.8	0.6 - 0.9
Cylinder block × Crankshaft main bearing cap		44.1 - 53.9	4.5 - 5.5
Cylinder block × Oil pump		5.9 - 8.8	0.6 - 0.9
Cylinder block × Rear oil seal retainer		5.9 - 8.8	0.6 - 0.9
Cylinder block × Water pump		14.7 - 21.6	1.5 - 2.2
Cylinder block × Transmission		49.0 - 68.6	5.0 - 7.0
Cylinder block × Alternator bracket		34.3 - 49.0	3.5 - 5.0
Cylinder block × Rear end plate		9.8 - 14.7	1.0 - 1.5
Crankshaft × Flywheel		78.5 - 98.0	8.0 - 10.0
Crankshaft × Drive plate		78.5 - 98.0	8.0 - 10.0
Crankshaft × Crankshaft timing belt pulley		88.3 - 98.0	9.0 - 10.0
Camshaft × Camshaft timing belt pulley		14.7 - 21.6	1.5 - 2.2
Connecting rod × Connecting rod cap		34.3 - 44.1	3.5 - 4.5
Intake manifold × Delivery pipe		14.7 - 21.6	1.5 - 2.2
Exhaust manifold × Front exhaust pipe		41.6 - 62.4	4.2 - 6.4
Exhaust manifold × Oxygen sensor		29.4 - 39.2	3.0 - 4.0
Oil pump × Oil pressure switch		11.8 - 19.6	1.2 - 2.0
Oil pump body × Oil pump cover		7.8 - 12.7	0.8 - 1.3
Oil pan		6.9 - 11.8	0.7 - 1.2
Water inlet × Thermo control switch		24.5 - 34.3	2.5 - 3.5
Pressure plate		14.7 - 21.6	1.5 - 2.2

PEM00441-00000

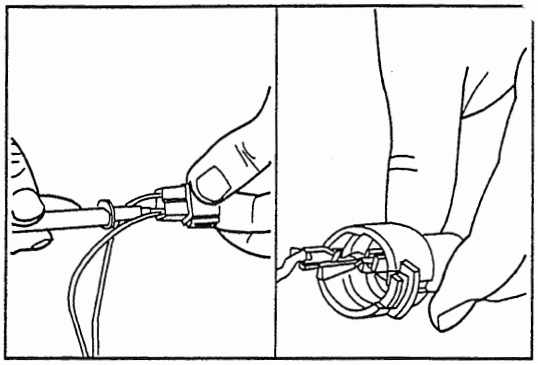
EFI SYSTEM

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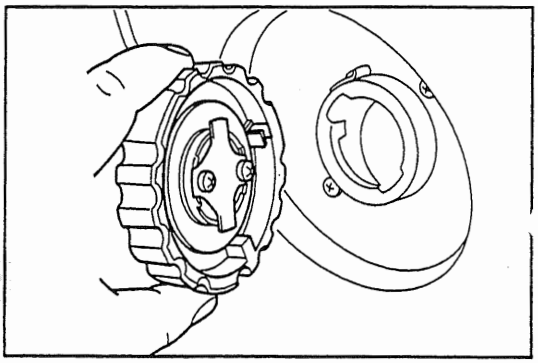
PEF00001-00000

PRECAUTIONS

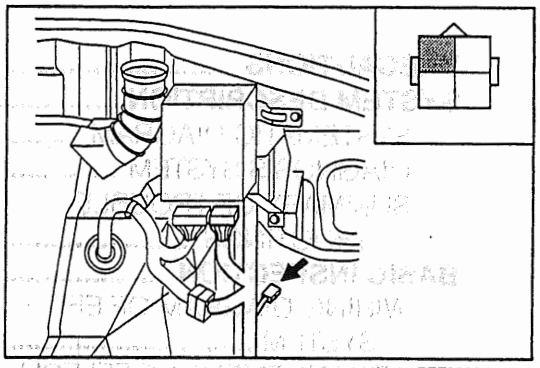
1. When resistance or voltage measurement is conducted at the connector section, insert a measuring probe from the back of the connector, being very careful not to damage the harness to terminal connections.
   In the case of water-proof type connectors, a measurement is conducted at the connector section, while the measuring probe is in contact with the terminal at the connection side of the connector. Be very careful not to apply any excessive force to the terminal at the connector side.
   As an alternative method, insert a male or femele terminal into the connector terminal or connect an adequate attachment.


PEF00002-00001

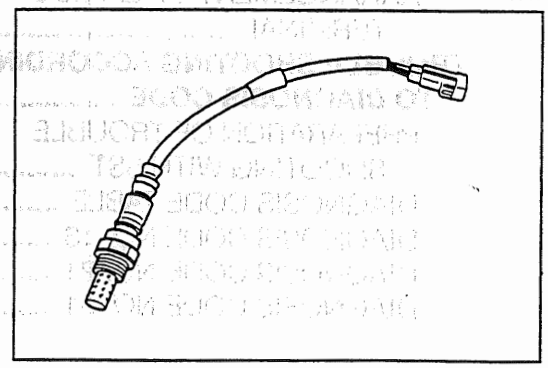
2. The fuel line at the high-pressure side is pressurized to a fuel pressure of about 284 kPa. Therefore, a large amount of gasoline flows out when parts of the fuel line are disconnected. Hence, take the following countermeasures.
   WARNING:
   - Release the inner pressure of the fuel tank by removing the fuel filler cap in advance.


PEF00003-00002

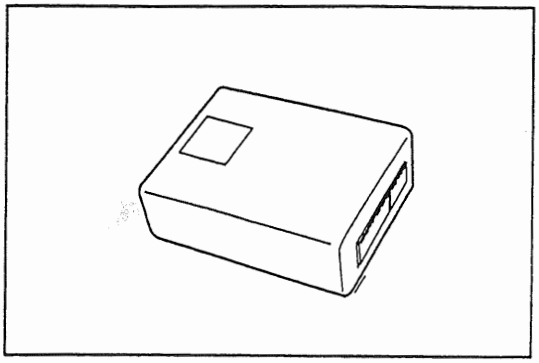
3. Tachometer connection
   Connect a tachometer probe to the measuring terminal of the diagnosis connecter.
   CAUTION:
   - This does not apply if your tachometer is a pick-up type.
   - Never allow the tachometer probe to touch the ground, for it could result in damage to the ignition coil.
   - Some 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.


PEF00004-0003

4. Precautions during oxygen sensor handling
   (1) Do not drop the oxygen sensor or hit it to 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.)

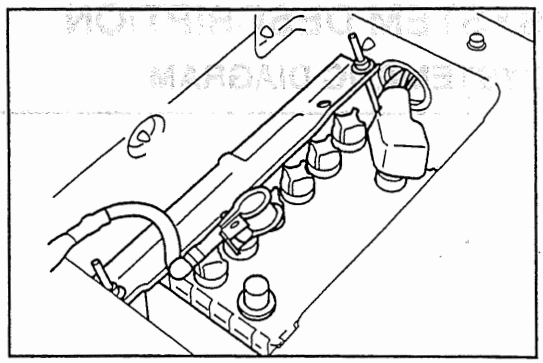

PEF00005-00004

6. 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.
7. 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.


PEF00006-00005

8. When installing the battery, care must be exercised not to mistake the battery polarity.
   CAUTION:
   - A battery of 12 volts for automotive use must be used.

9. 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.

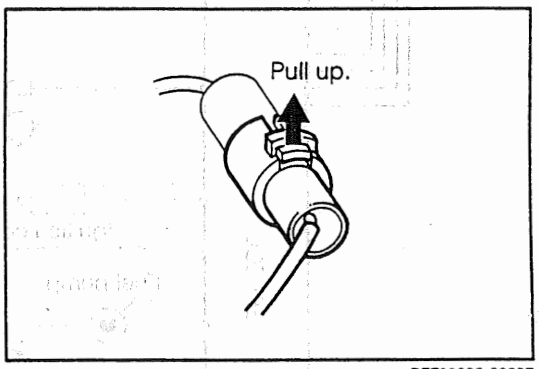


PEF00007-00006

10. When the system is checked on a rainy day, be very careful not to allow water to get to connectors and/or terminals. Also, when the engine compartment is washed, prevent water from splashing the EFI-related parts and connectors.
11. Every EFI part should be replaced as an assembly.

PEF00008-00000

12. When disconnecting or reconnecting the connector, care must be exercised as to the following points.
    (1) Carefully observe the shape of the lock prior to the disconnection/connection.
    (2) Release the lock. Then, disconnect the connector.
    NOTE:
    - When disconnecting the connector, be sure to hold the connector holder, not to pull the wire.



PEF00009-00007

    (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.

13. When the vehicle is equipped with wireless installations (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.

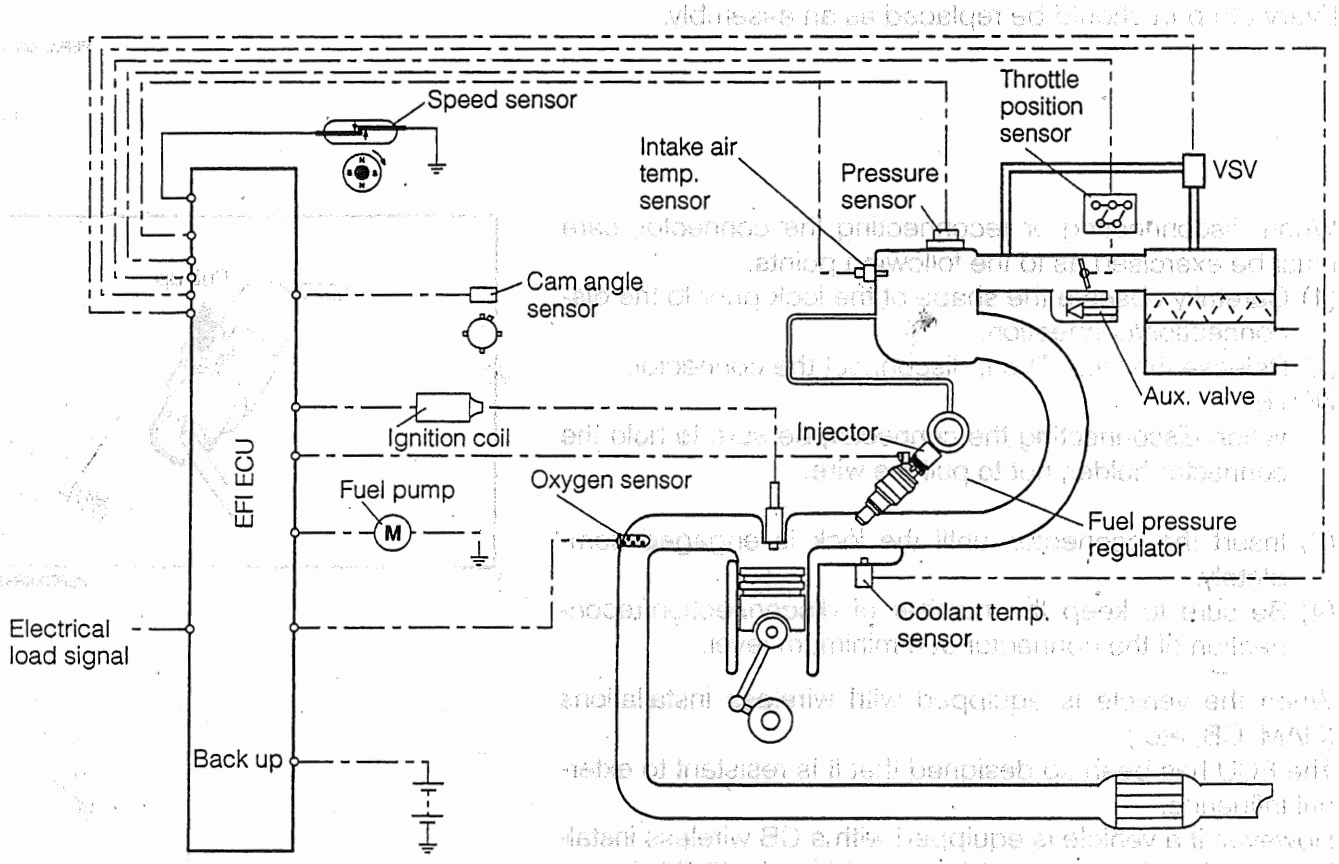
PEF00010-00000

    (1) Install an antenna at a place as far away as possible from the ECU.
    The ECU is installed under the instrument panel.
    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 cord together 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.

PEF00011-00000

SYSTEM DESCRIPTION

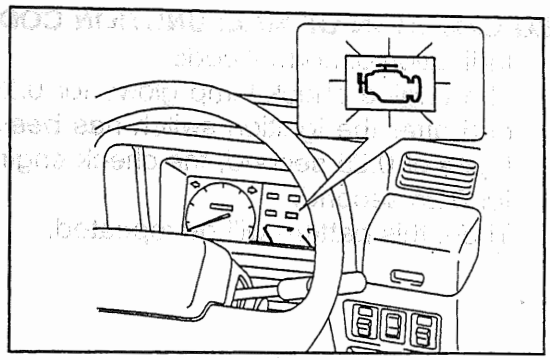
SYSTEMATIC DIAGRAM



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 diagnosis connector is connected with the earth terminal, the malfunction code number that has been memorized in the ECU will be indicated in a form of blinking of the check engine lamp in the instrument panel.


PEF00013-00009

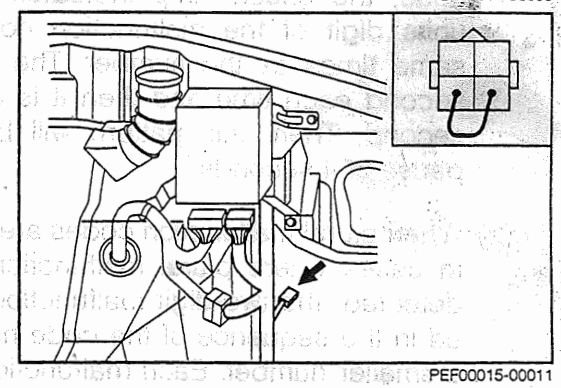
CHECK ENGINE LAMP

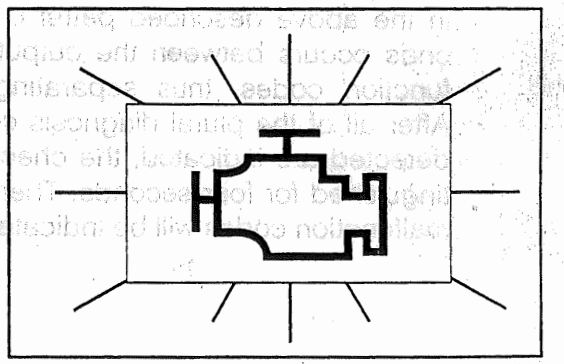
1. When the ignition switch is turned on, the check engine lamp goes on.
   (The engine is under a stopped state.)
2. When the engine starts, the check engine lamp goes off.
   If the check engine lamp remains illuminated, it indicates that the diagnosis system has detected system malfunction.

READING OUT OF MALFUNCTION CODE

1. Initial conditions
   (1) Battery voltage of 11 volts or more
   (2) Throttle valve fully closed
   (3) All accessory switches turned OFF
2. Reading out of malfunction code
   (1) Connect the terminal between the test terminal and the earth terminal with a jump wire as indicated in the illustration.
   (2) Turn the ignition switch to the "ON" position. At this time, be careful not to start the engine.
   (3) Read out the malfunction code by observing the blinking number of the check engine lamp.

BRACK & WHITE
BROWN


PEF00014-00000


PEF00015-00011

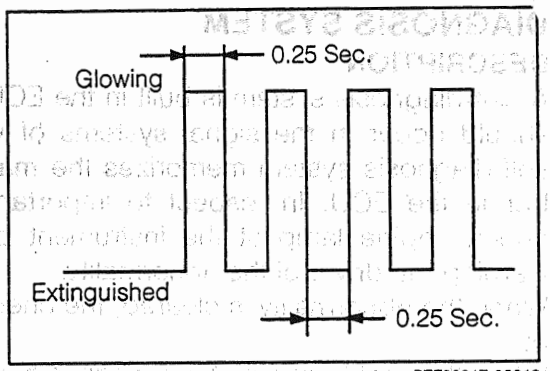
PEF00016-00012

NOTE:

- When system malfunction was detected, go to page EF–17, "TROUBLE SHOOTING ACCORDING TO DIAGNOSIS SYSTEM".
- If the check engine lamp fails to blink, it is likely that the ECU is malfunctioning. Hence, proceed to the inspection of the diagnosis system circuit.

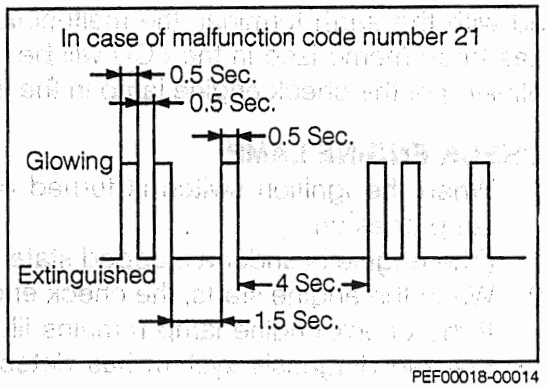
EXPLANATION OF MALFUNCTION CODES

1. Indication of normal code
   The engine check lamp glows for 0.25 second, 0.25 second after the ignition switch has been turned ON. After a lapse of 0.25 second, the check engine lamp again glows for 0.25 second.
   Then, this pattern will be repeated.



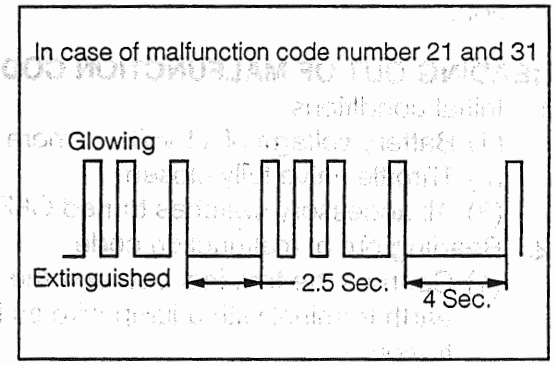
PEF00017-00013

2. Indication of malfunction code
   (1) When a single malfunction code is indicated:
   The malfunction code is composed of two digits. These two numbers are indicated by blinking of the check engine lamp. Four seconds after the ignition switch has been turned ON, the check lamp indicates first the number of the tens digit of the malfunction code by glowing the same times as the number. The lamp glows for 0.5 second each time and then it is extinguished for 0.5 second. After a pause of 1.5 seconds, the check lamp indicates the number of the units digit of the malfunction code by glowing the same times as the number. The lamp glows for 0.5 second each time and then it is extinguished for 0.5 second. Then, this pattern will be repeated after a pause of 4 seconds.



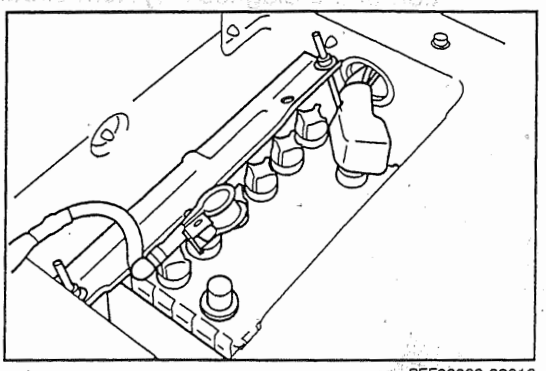
PEF00018-00014

   (2) When plural malfunction codes are indicated:
   In cases where plural malfunction codes have been detected, the two-digit malfunction codes are indicated in the sequence of the code number, starting from a smaller number. Each malfunction code is indicated in the above described pattern. A pause of 2.5 seconds occurs between the outputs of respective malfunction codes, thus separating one from another. After all of the plural diagnosis codes that have been detected are indicated, the check engine lamp is extinguished for four seconds. Then, the detected plural malfunction codes will be indicated again.



PEF00019-00015

3. Canceling of malfunction code
   To erase the malfunction 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:
   - After the malfunction codes have been read, remove the SST at the diagnosis connector.


PEF00020-00016

SUMMARY OF TROUBLE SHOOTINGS

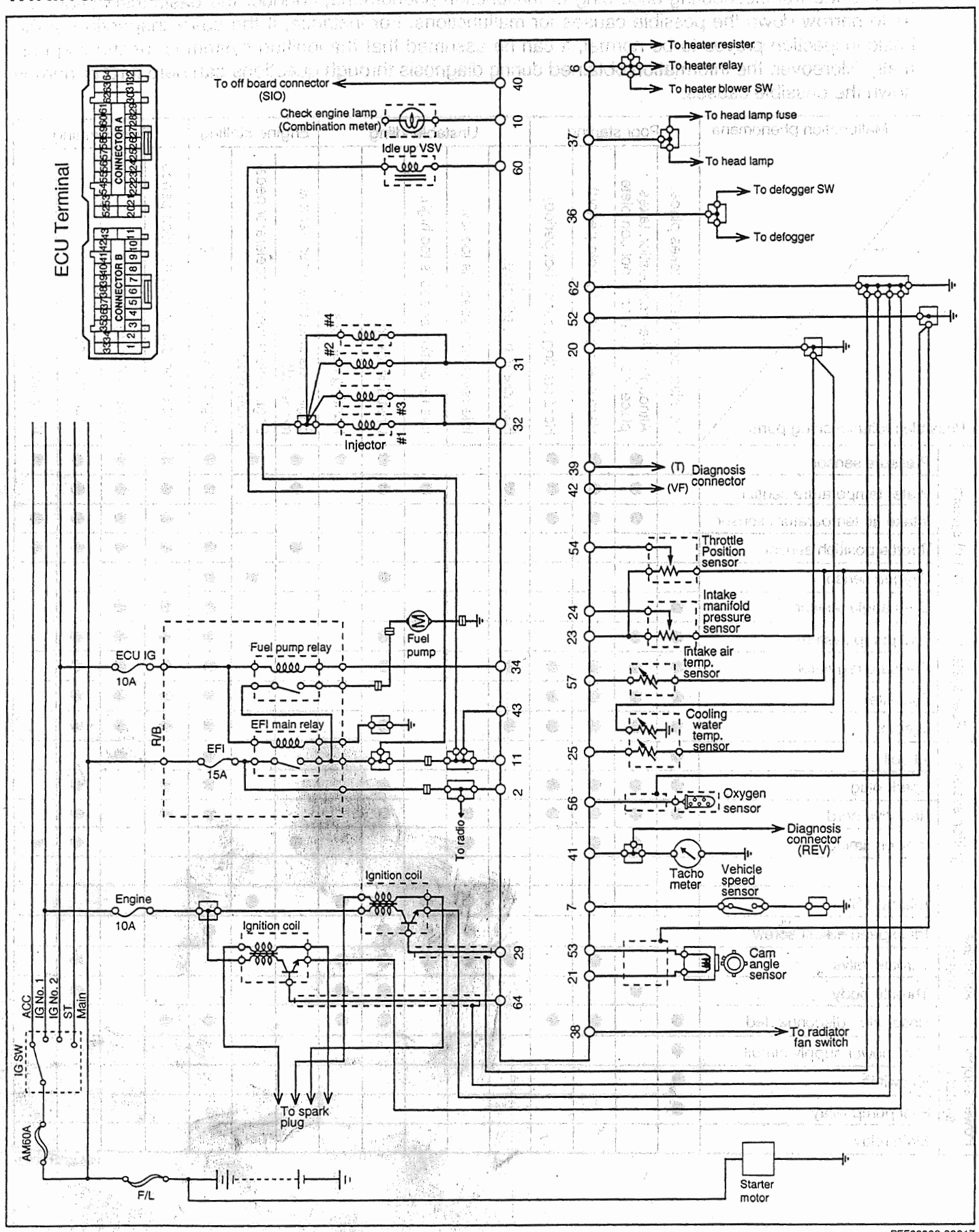
NOTE:

- Prior to the troubleshooting according to malfunction phenomena, conduct the basic inspections so as to narrow down the possible causes for malfunctions. For instance, if the spark inspection of the basic inspection proves to be normal, it can be assumed that the ignition system is functioning normally. Moreover, the information obtained during diagnosis through questions can help further narrow down the possible causes.

Possible malfunctioning parts \ Malfunction phenomena		Poor starting				Unstable idling					Engine stalling			Poor running			
		No initial combustion takes place.	Although initial combustion takes place, combustion is not complete.	Hard starting (during cold period)	Hard starting (during hot period)	Fast idle is not effective.	Idle revolution speed is too low.	Idle revolution speed is too high.	Unstable idling	Hunting during idling	Engine stalls at time when vehicle moves off.	Engine stalls when accelerator pedal is released.	Engine stalls during idling.	Hesitation during acceleration period	Hunting during running	Lack of output	Knocking
Control system	Pressure sensor		●	●	●				●	●	●	●	●	●	●	●	●
	Water temperature sensor		●	●	●	●		●	●		●		●	●	●	●	
	Intake air temperature sensor		●	●	●									●	●	●	●
	Throttle position sensor										●		●	●	●	●	●
	Oxygen sensor								●			●	●				
	Cam angle sensor	●											●	●	●		
Fuel system	Fuel pump system	●	●						●				●	●	●	●	
	Pressure regulator	●	●	●	●	●			●				●	●	●	●	
	Fuel filter	●	●	●	●								●	●	●	●	
	Injector	●	●	●	●	●			●				●	●	●	●	
Ignition system	IG coil	●											●		●		
	Spark plug	●	●	●	●				●				●	●		●	
	Resistive cord	●	●	●	●		●		●				●	●		●	
	Ignition timing		●	●			●				●					●	●
Air intake system	Idle-up VSV						●	●	●	●		●					
	Idle speed adjust screw						●	●	●				●				
	Throttle valve			●		●	●	●	●	●						●	
	Throttle body		●						●	●						●	
	Hose, etc., disconnected	●		●	●				●	●			●	●			
Power supply system	ECU power supply circuit	●															
	IG switch	●															
	Fuel pump relay	●															
	Main relay																

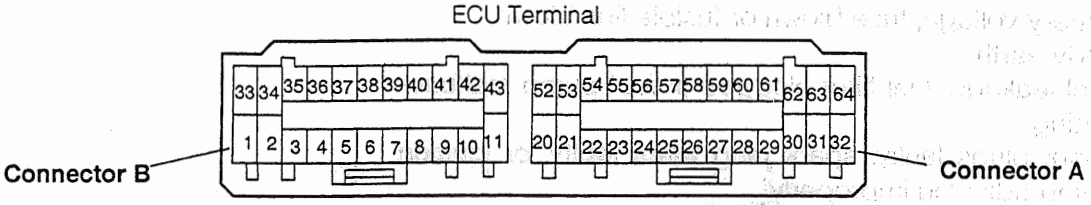
BASIC INSPECTION

WIRING DIAGRAM OF EFI SYSTEM



PEF00022-00017

ARRANGEMENT OF EFI ECU TERMINAL



CONNECTOR A

No.		Contents of connection	No.		Contents of connection
20	E1	Sensor system ground	52	E2	Sensor ground
21	N+	Cam angle sensor (+)	53	N–	Cam angle sensor
22	—		54	PSW	Throttle position sensor
23	VC	Pressure sensor power supply	55	—	
24	PIM	Pressure sensor signal	56	Ox	Oxygen sensor
25	THW	Coolant temperature sensor	57	THA	Intake air temperature sensor
26	—		58	—	
27	—		59	—	
28	—		60	VSV1	Idle up VSV (for electrical load)
29	IG2	Ignition signal (#2,#3 cylinder)	61	—	
30	—		62	E01	Power supply system ground
31	#20	Injector (#2, #4 cylinder)	63	—	
32	#10	Injector (#1, #3 cylinder)	64	IG1	Ignition signal (#1, #4 cylinder)

CONNECTOR B

No.		Contents of connection	No.		Contents of connection
1	—		33	—	
2	BAT	Battery (Back-up power supply)	34	FC1	Fuel pump relay
3	—		35	—	
4	—		36	DEF	Defogger switch
5	—		37	H/L	Headlamp switch
6	BLW	Heater blower	38	A/T	Radiator fan (Lo)
7	SPD	Vehicle speed sensor	39	T	Test terminal
8	—		40	SIO	Diagnosis tester
9	—		41	REV	Engine speed signal
10	W	Check engine lamp	42	VF	VF monitor terminal
11	+B1	Power supply	43	+B2	Power supply

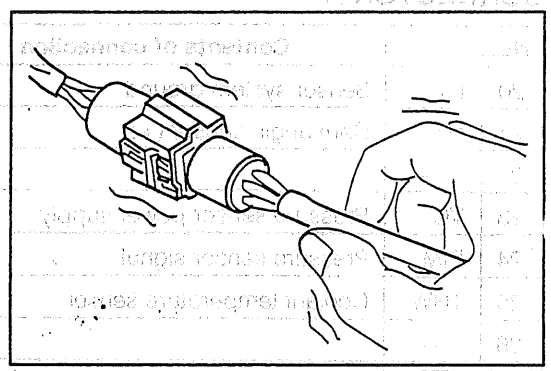
PEF00023-00018

Trouble shooting hints

1. In most cases, engine troubles are attributable to systems other than the EFI system.
   (1) Battery voltage, fuse blown or fusible link blown
   (2) Body earth
   (3) Fuel leakage, fuel filter clogged or fuel pump malfunctioning
   (4) Spark plugs faulty, spark plug wires faulty, or ignition timing adjusted improperly
   (5) Admission of air

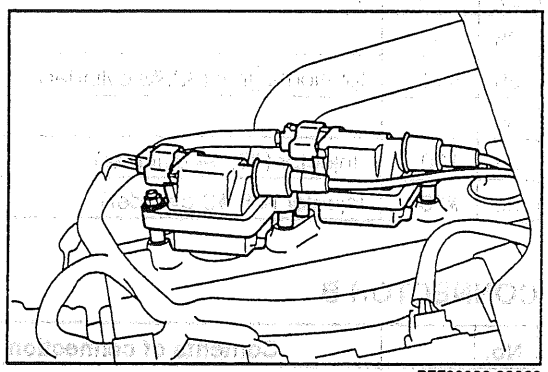
PEF00024-00000

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.
   (3) Check to see if the malfunction phenomenon takes place when applying light vibration to the connector or the wire connected to the connector.



PEF00025-00019

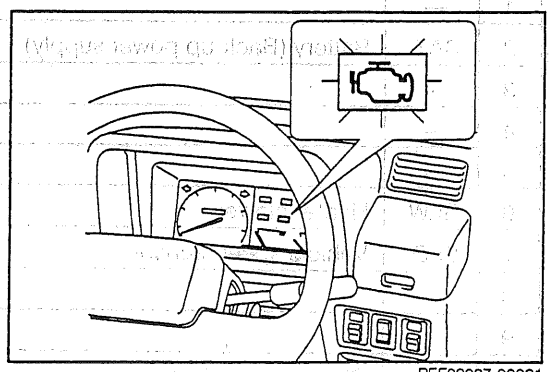
3. If engine misfire takes place, the following measures should be taken.
   (1) Ensure that the battery terminals and so forth are connected properly.
   (2) Handle the spark plug wires carefully.
   (3) After completion of repairs, ensure that the ignition coil terminals and other ignition system wire are reconnected securely.



PEF00026-00020

Check to see if diagnosis detects malfunction code.

1. Check of malfunction code
   When the engine starts, the check engine lamp in the combination meter remains illuminated. It indicates that the diagnosis has detected system malfunctions.
2. Read out the malfunction code.
   NOTE:
   - See page EF–5.
   - When system malfunction has been detected, proceed to page EF–17, "TROUBLE SHOOTING ACCORDING TO DIAGNOSIS SYSTEM".



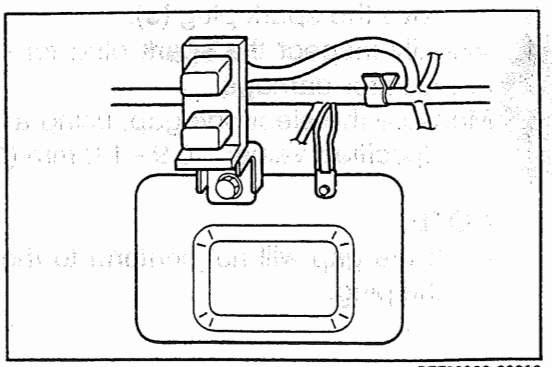
PEF00027-00021

Check of power supply circuit

1. Check the fuses and fusible link.
   If the fuses are blown out, be sure to perform the trouble shooting.

PEF00028-00000

2. Check the EFI main relay.
   (a) Turn the ignition switch to the "ON" position. Check to see if the relay emits an operating sound.

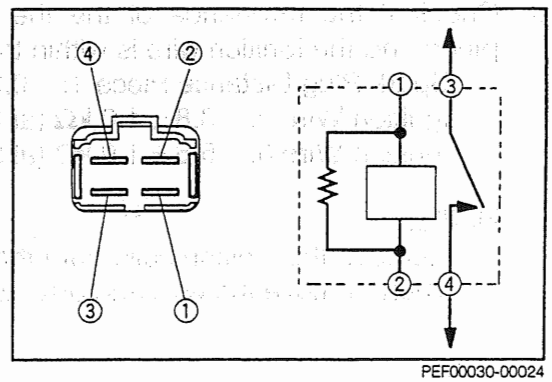


PEF00029-00023

   (b) Remove the EFI main relay from the relay box.
   Check that there is continuity between the terminals 1 and 2.
   Specified Resistance: 40 - 100 Ω

   (c) Check that there is continuity between the terminals 3 and 4 when a voltage of 12 V is applied to across the terminals 1 and 2.

NOTE:
- Even when the trouble has not been solved by repairing the relay, check the wire harness.



PEF00030-00024

3. Check the fuel pump relay.
   (a) When the ignition switch is set to the "ON" position, check to see if the relay emits an operating sound.
   (b) Remove the fuel pump relay from the relay box.
   Check that there is continuity between the terminals 1 and 2.
   Specified Resistance: 40 - 100 Ω

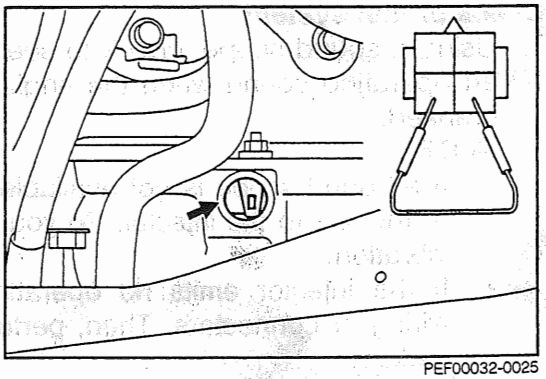
   (c) Check that there is continuity between the terminals 3 and 4 when a voltage of 12 V is applied to across the terminals 1 and 2.

PEF00031-00000

Check of ignition system

1. Connect a timing light to the ignition wire of the No. 1 cylinder.
2. Check to see if the ignition timing mark (Yellow) on the flywheel is aligned with the indicator.
   Specified Value: 3 ± 2° BTDC/ at Idle

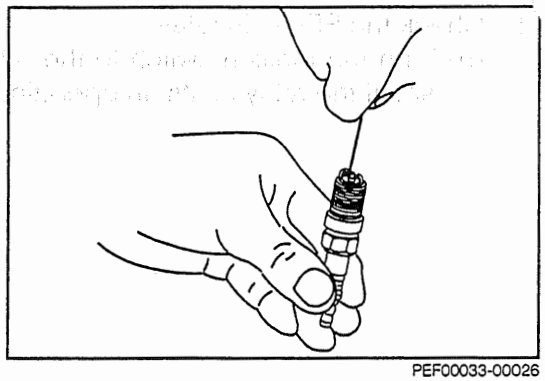
NOTE:
- Connect the test terminal and the earth terminal with a jump wire at the diagnosis connector.



PEF00032-0025

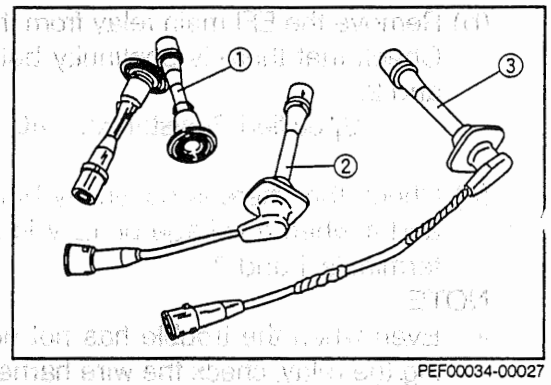
3. Remove the spark plug (s).
4. Visually inspect the spark plug for electrode wear, thread or insulator damage.
5. Measure the electrode gap, using a plug gap gauge.
   Specified Value: 0.9 - 1.0 mm (NGK, DENSO)

   NOTE:
   - If the gap will not conform to the specification, replace the plug.


PEF00033-00026

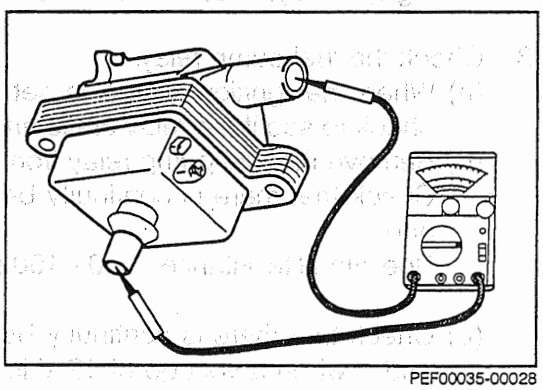
6. Check if the resistance of the the spark plug distance piece and the ignition wire is within the specification.
   Spark Plug Distance Piece 1: 0.3 Ω or less
   Ignition Wire 2: 3.8 ± 1.0 kΩ (at 20°C)
   Ignition Wire 3: 5.6 ± 1.0 kΩ (at 20°C)

   NOTE:
   - Remove the ignition coils from the cylinder head cover. Then, remove the wire and distance piece.



PEF00034-00027

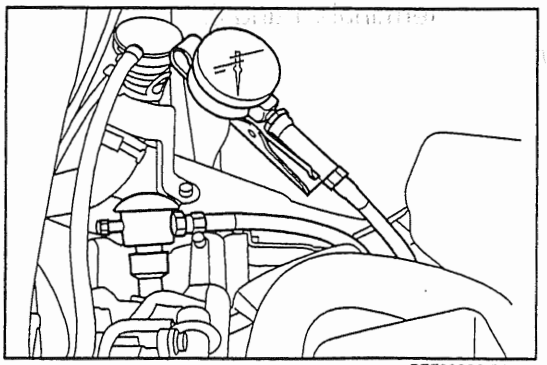
7. Check if the ignition coil resistance is within the specification.
   Secondary Coil: 13.6 ± 2.0 kΩ


PEF00035-00028

Check of compression pressure

1. Temporarily remove the main relay and fuel pump relay.
2. Insert a compression gauge into the spark plug hole.
3. Depress the accelerator pedal fully.
4. While cranking the engine, measure the compression pressure.
   Minimum Value: 1030 kPa at 300 rpm

   NOTE:
   - Always use a fully charged battery so that at least a revolution speed of 300 rpm is attained.


PEF00036-00029

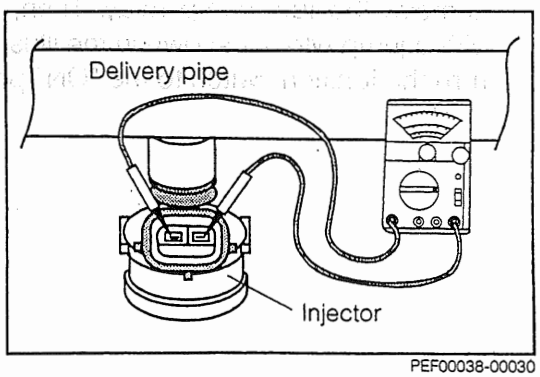
Check of fuel system

1. Using a sound scope, check to see if each injector emits an operating sound when the engine is being started or cranked.
   NOTE:
   - If a sound scope is not available, apply a screwdriver or the like to the injector. So you can feel an operating vibration.
   - If the injector emits no operating sound, check the wiring or connectors. Then, perform the following procedure.

PEF00037-00000

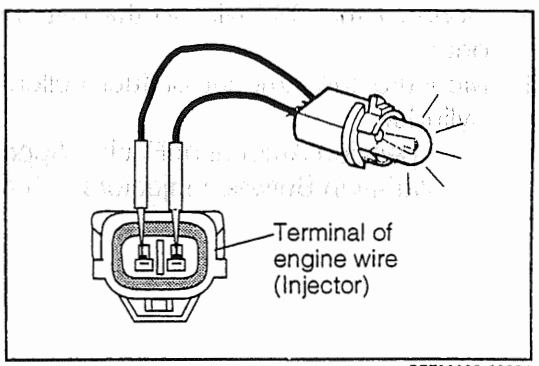
2. Disconnect the injector connector of the engine wire.
3. Measure the resistance between the terminals of each injector.
   Specified Resistance: Approx. 12.5 Ω (at 20°C)

   NOTE:
   - If the resistance is not within the specification, replace the injector.
   - If the resistance will conform to the specification, perform the following procedure.



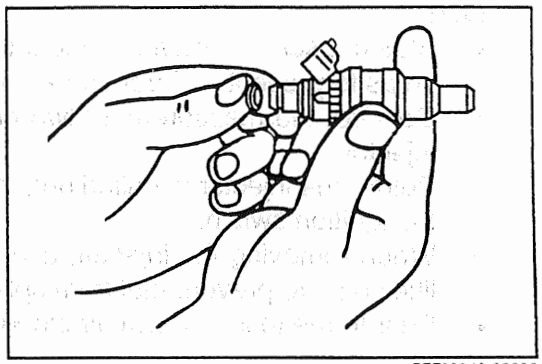
PEF00038-00030

4. Using a test lamp (12 V 6 W), check to see if the lamp will be illuminated as shown in the illustration when the engine is being started or cranked.
   If not, check the wiring harness and ECU output.

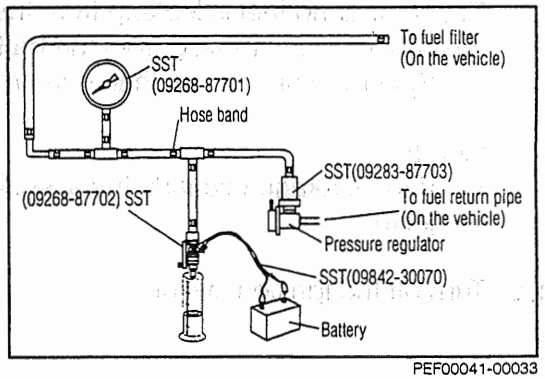


PEF00039-00031

5. Remove the fuel delivery pipe.
   Remove the injectors.
6. Remove the injector grommet and O-ring.
   NOTE:
   - Check to see if the injector grommet exhibits damage.

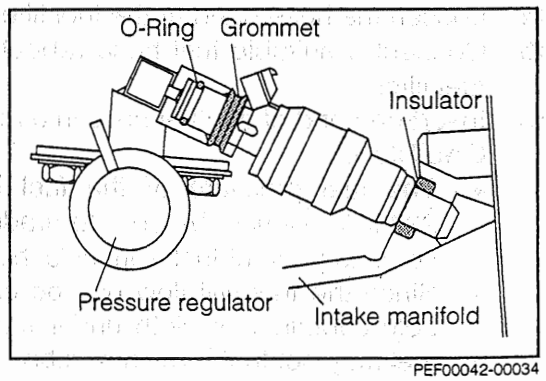

PEF00040-00032

7. Using the following SSTs, connect the injector, as indicated in the figure. Insert the injector into the measuring cylinder.
   SST:
   (1) 09268-87701-000
   (2) 09268-87702-000
   (3) 09842-30070-000



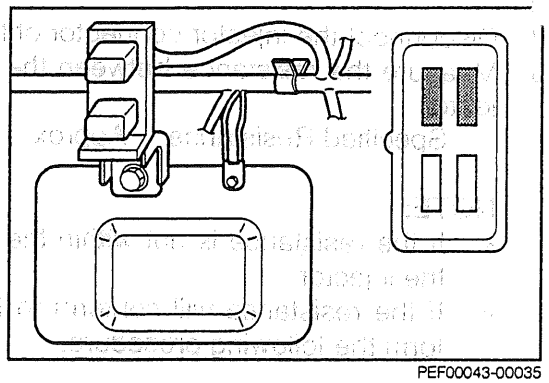
PEF00041-00033

NOTE:
- Install a new grommet to the injector.
- Install a new O-ring to the O-ring seal section.
- Attach the hose bands to the rubber hose connections.

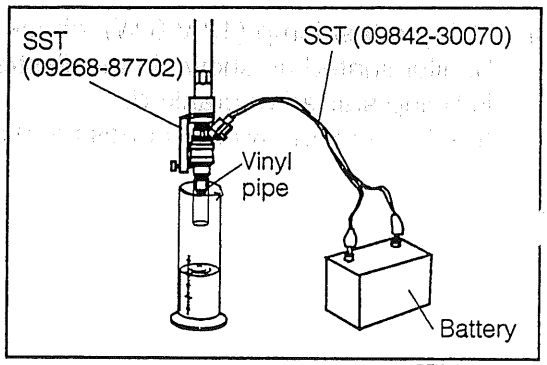


PEF00042-00034

8. Remove the fuel pump relay. Then, connect the terminal with a jump wire as shown in the illustration.
9. Turn the ignition switch to the "ON" position.


PEF00043-00035

10. Connect the SST wire to the battery terminal for 15 seconds.
11. Measure the amount of fuel collected in the measuring cylinder.
    Specified Amount of Fuel: Approx. 38 - 41 ml
    Variation Between Injectors: 5 ml or less



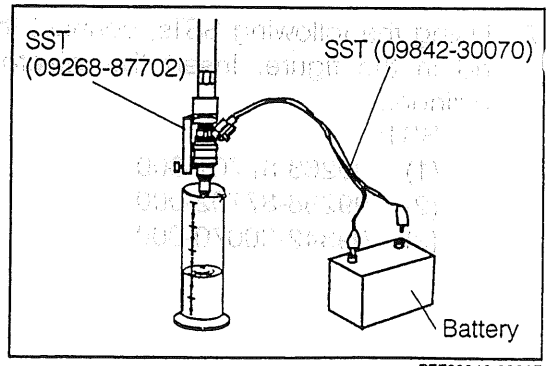
PEF00044-00036

NOTE:
- Attach a suitable vinyl hose to the tip-end of the injector so as to prevent fuel from splashing.
- Conduct the measurement two or three times for each injector.
- Before the injector is pulled out, make certain to turn off the ignition switch.
- 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.

PEF00045-00000

12. Ensure that no fuel is leaking from the injector nozzle when the SST wire is removed from the battery terminal.
    Specification: Less than one drop of fuel per minute

NOTE:
- If the leakage exceeds the specification, replace the injector.

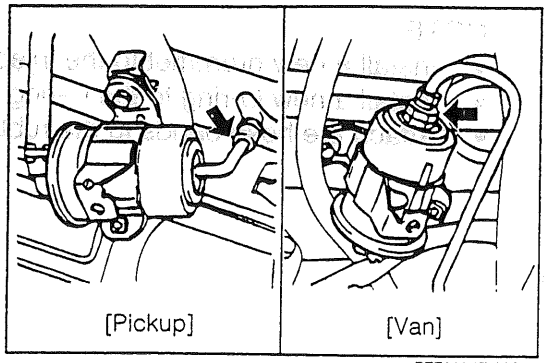


PEF00046-00037

13. Turn off the ignition switch.

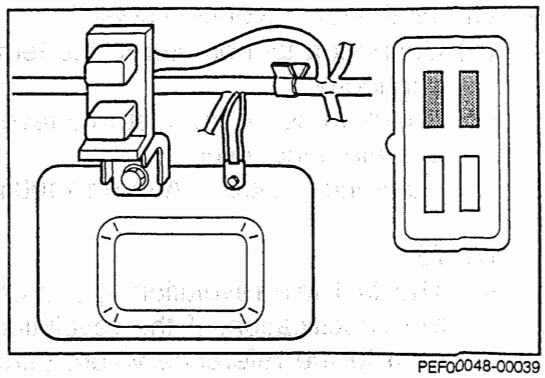
14. Loosen the hose band at the fuel filter.
15. Connect a suitable fuel hose (about 2 meter long) to the fuel filter.
16. Insert one end of the fuel hose in a measuring cylinder.

CAUTION:
- The fuel pressure of the fuel line is approximately 284 kPa. Hence, be sure to gradually remove the pipe so as to prevent fuel from splashing.
- Since the fuel will flow out, be certain to place a suitable container or cloth under the fuel filter so that no fuel may get to the resin or rubber parts of the vehicle.



PEF00047-00038

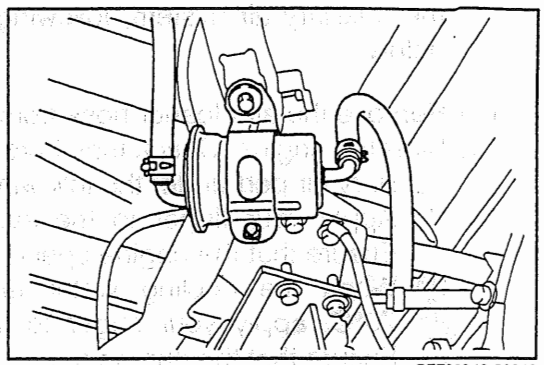
17. Remove the fuel pump relay. Then, connect the terminal with a jump wire as indicated in the illustration.
18. Turn the ignition switch to the "ON" position for 10 seconds. Then, turn off the ignition switch.



PEF00048-00039

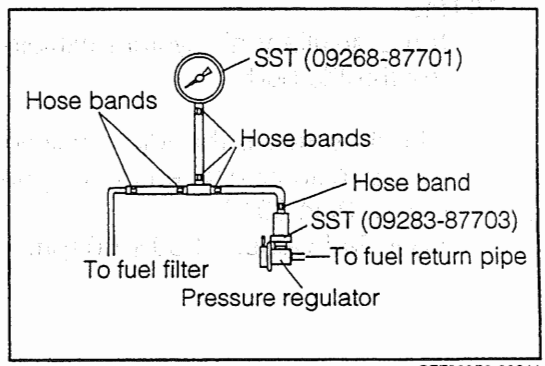
19. Measure the amount of fuel collected in the measuring cylinder.
    Specified Amount of Fuel: 140 ml or more

    NOTE:
    - Check to see if the fuel lines and filter exhibit leakage, deformation or choking.



PEF00049-00040

20. Remove the fuel pressure regulator from the fuel delivery pipe. Then, install a fuel pressure gauge between the pressure regulator and the fuel pipe from the fuel filter as shown in the illustration.
    SST: 09268-87701-000
    09283-87703-000



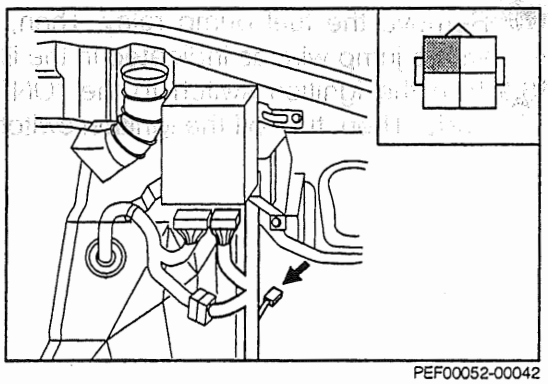
PEF00050-00041

21. Turn the ignition switch to the "ON" position.
22. Check to see if the fuel pressure conforms to the specified pressure.
    Specified Value: 284 ± 5 kPa

    NOTE:
    - If the fuel pressure is less than the specification, check the fuel pump and fuel pressure regulator.

PEF00051-00000

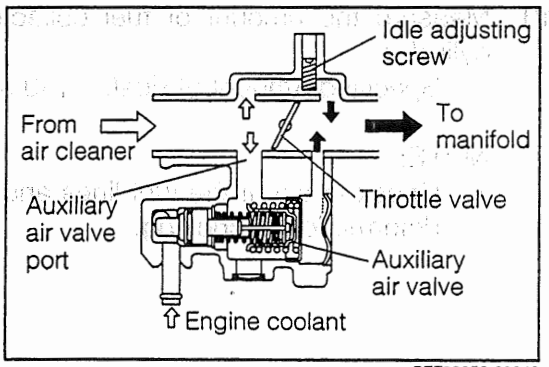
23. Check the idle revolution speed.
    (1) Connect a tachometer to the terminal of the diagnosis connector.
    (2) Check to see if the fast idle revolution speed is within the reference value.
    Reference Value: Around 1400 rpm/25°C



PEF00052-00042

NOTE:
- The fast idle revolution speed can not be adjusted to the specification. If the revolution speed will not conform to the reference value, perform the inspection of the auxiliary air system, following the procedure given below.

    (3) Remove the air cleaner hose from the throttle body.
    (4) Start the engine. Check that there is air continuity at the auxiliary air port under the following conditions.
        ① Apply your finger to the auxiliary air valve port. Ensure that the engine speed drops.
        ② When the cooling water temperature is above 70°C, apply your finger to the auxiliary air port. Ensure that the engine speed does not change.



PEF00053-00043

NOTE:
- If the auxiliary air system exhibits malfunction, replace the throttle body.

    (5) Check to see if the idle revolution speed conforms to the specification when the engine water temperature is higher than 80°C.
    Specified Value: 850 ± 50 rpm

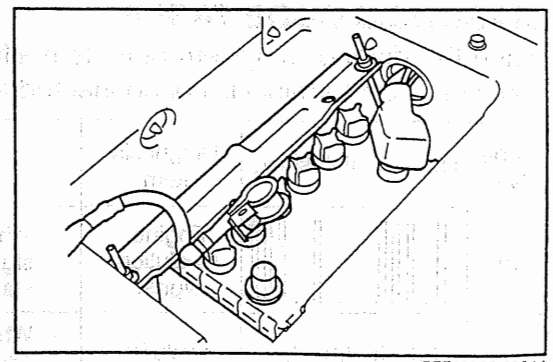
PEF00054-00000

TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE

PREPARATION OF TROUBLE SHOOTING WITH SST

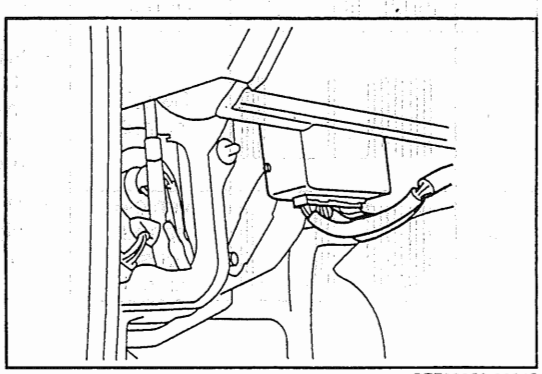
The EFI unit can be checked by measuring the resistance or voltage at the SST terminals.

1. Disconnect the battery ground cable from the negative (–) terminal of the battery.
   CAUTION:
   - Be sure to memorize the malfunction code before disconnecting the battery cable. Otherwise the malfunction code(s) will be erased by disconnecting the battery code.



PEF00055-00044

2. Disconnect the wire harness connectors from the EFI ECU connectors at the cowl side of the passenger seat.
3. Connect the following SST between the wire harness connectors and the EFI ECU connectors.
   SST: 09842-87706-000



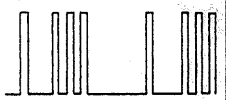
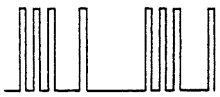
PEF00056-00045

4. Reconnect the battery ground cable to the negative (–) terminal of the battery.
   CAUTION:
   - When disconnecting or reconnecting the EFI ECU connectors, be sure to disconnect the battery ground cable from the negative (–) terminal of the battery with the ignition switch and all accessory switches in the off state.
   - When installing a new battery, care must be exercised not to mistake the battery polarity. Failure to observe this caution could cause ECU malfunction.
   - Before using the SST, be sure to check to see if short or open wire exists between the terminals of the SST.

PEF00057-00000

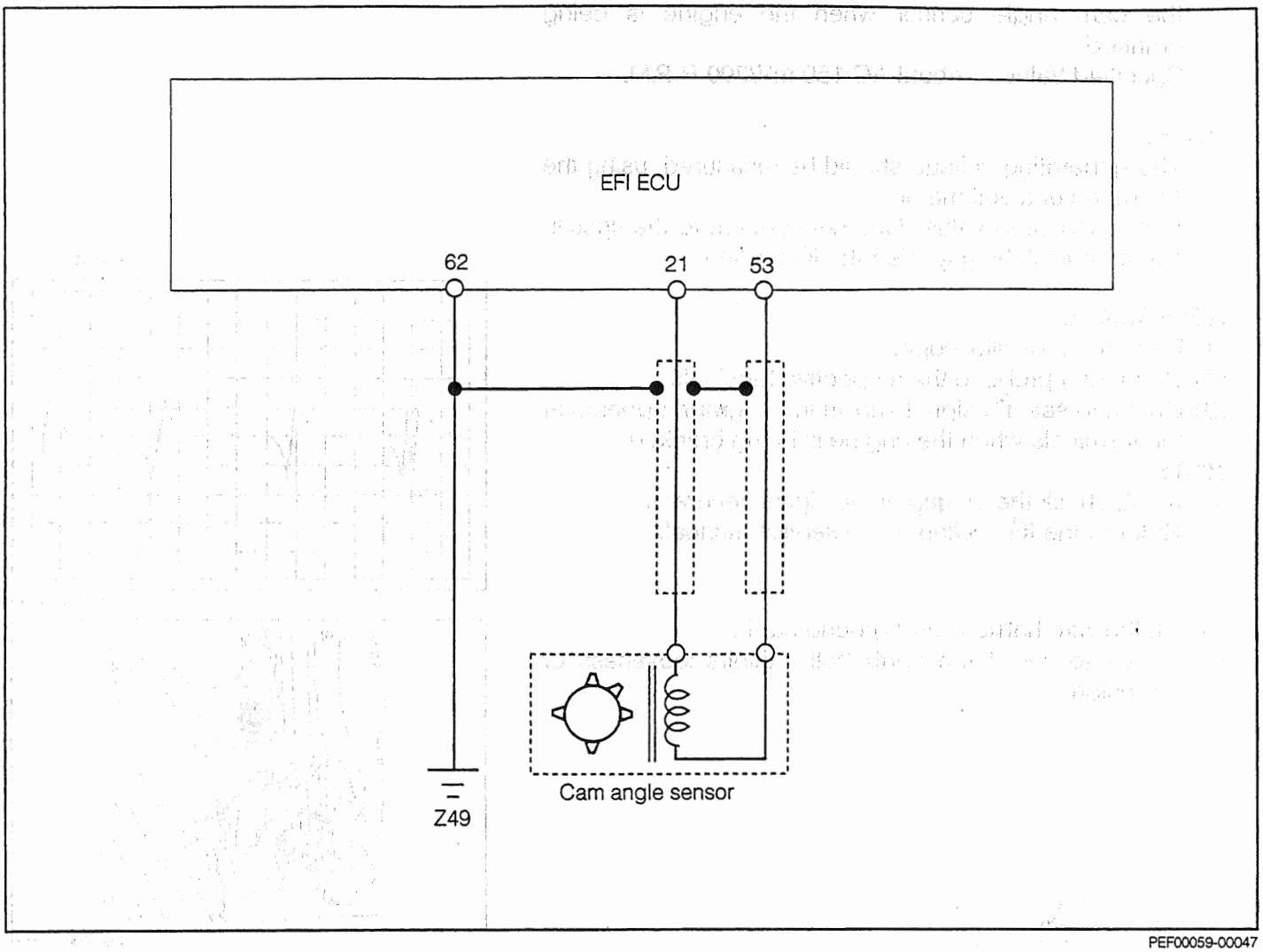
DIAGNOSIS CODE TABLE

When the diagnosis system detects malfunctions, the check engine lamp will go on even if the diagnosis connector test terminal is not connected to the earth terminal.

Code No.	Number of flashing	Diagnosis item	Diagnosis contents	Trouble area	See page
13		Engine revolution signal	• When the engine revolution signal is not inputted while the starter switch is on.	1. Cam angle sensor & circuit	EF-19
21		Oxygen sensor signal	• When the input signal from the oxygen sensor shows too lean air-to-fuel ratio under certain conditions:	1. Oxygen sensor circuit 2. Oxygen sensor	EF-21
31		Pressure sensor signal	• When the input signal from the pressure sensor becomes more than 4.9 V or less than 0.7 V.	1. Pressure sensor circuit 2. Pressure sensor	EF-24
42		Cooling water temperature signal	• When the engine cooling water temperature sensor circuit becomes open or shorted.	1. Water temp. sensor circuit 2. Water temperature sensor	EF-26
43		Intake air temp. signal	• When the intake air temperature sensor circuit becomes open or shorted.	1. Air temperature sensor circuit 2. Air temperature sensor	EF-28
51		Switch signal	• When the A/C switch is turned on, the idle switch is turned off with the test terminal of the diagnosis connector shorted. However no memorizing will take place.	1. A/C switch circuit 2. A/C switch 3. Idle switch circuit 4. Throttle position sensor	EF-30
52		Vehicle speed sensor signal	• When the vehicle speed sensor signal circuit exhibits open wire or or short circuit.	1. Vehicle speed sensor circuit 2. Vehicle speed sensor	EF-32

PEF00058-00046

DIAGNOSIS CODE NO. 13
CAM ANGLE SENSOR & CIRCUIT

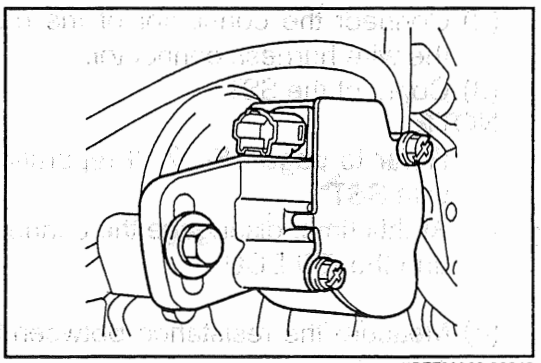


PEF00059-00047

When no cam angle sensor signal is inputted within 2 seconds while the engine is being cranked by the starter motor.

1. Check of cam angle sensor
   (1) Disconnect the connector of the cam angle sensor.
   (2) Check that there is the specified resistance between the respective terminals of the cam angle sensor.
   Specified Value: 205 - 255 Ω

NOTE:
- If the resistance will not conform to the specification, replace the signal generator. Refer to the IG section.

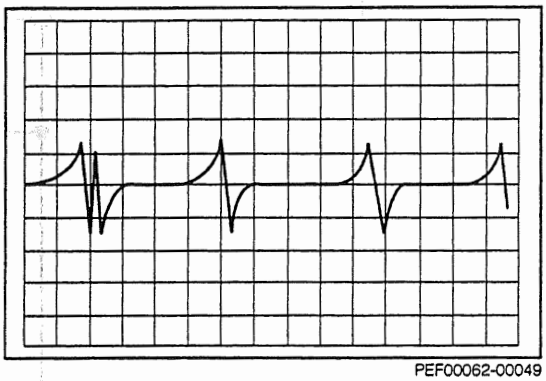


PEF00060-00048

(3) Temporarily remove the EFI main relay at the relay box.
(4) Check that there is a voltage between the terminals of the cam angle sensor when the engine is being cranked.
Specified Value: About AC 150 mV/300 R.P.M.

NOTE:
- The generating voltage should be measured, using the AC range of a volt meter.
- If the measured value does not conform to the specification, adjust the gap. See the IG section.

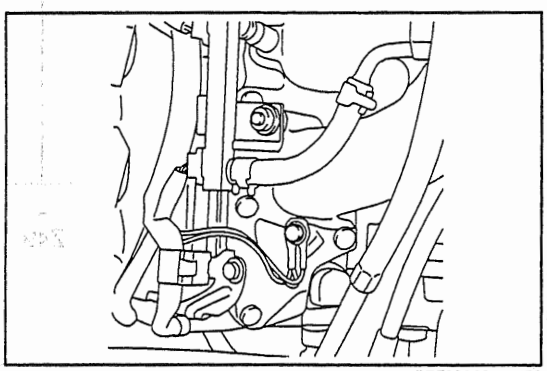
PEF00061-00000



PEF00062-00049

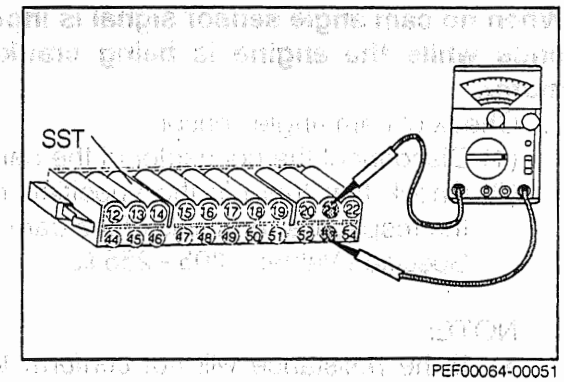
REFERENCE
(1) Prepare an oscilloscope.
(2) Connect a probe to the respective terminals.
(3) Check to see if a signal shown in the graph appears at the terminals when the engine is being cranked.
NOTE:
- If not, check the air gap of the signal generator. Refer to the IG section of the service manual.

2. Check the wire harness and ground earth.
(1) Check to see if the earth bolt exhibits looseness or corrosion.



PEF00063-00050

(2) Connect the connector of the cam angle sensor and the wire harness connector.
(3) Connect the SST.
NOTE:
- Refer to page EF–17, "Preparation of trouble shooting with SST".
- At this time, disengage the connector between the SST and the EFI ECU.



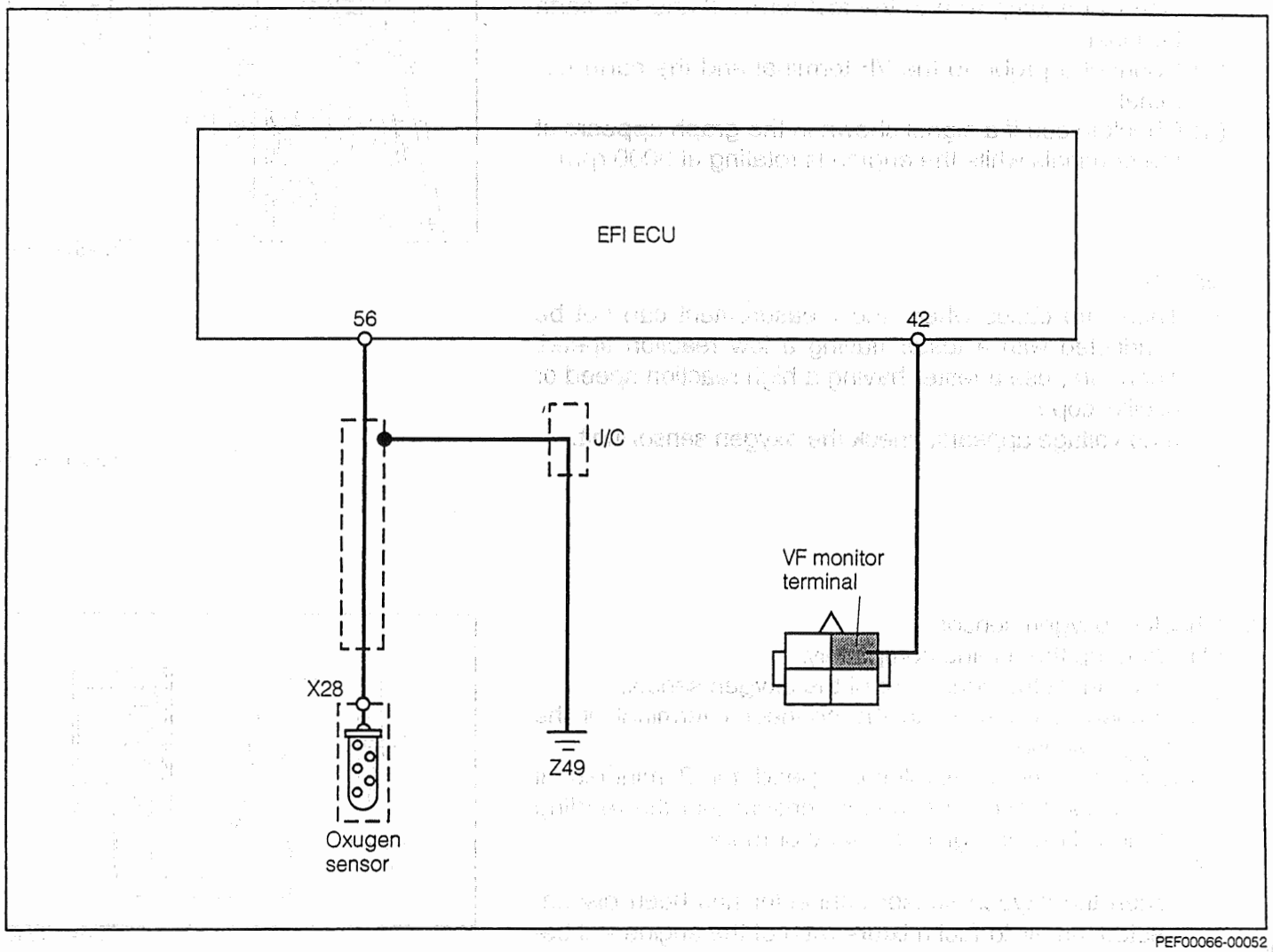
PEF00064-00051

(4) Measure the resistance between the SST terminals 21 and 53.
Specified Value: 205 - 255 Ω

NOTE:
- If the trouble has not been solved by repairing the wire harness or parts, then, proceed to page EF–34, Replacement of ECU.

PEF00065-00000

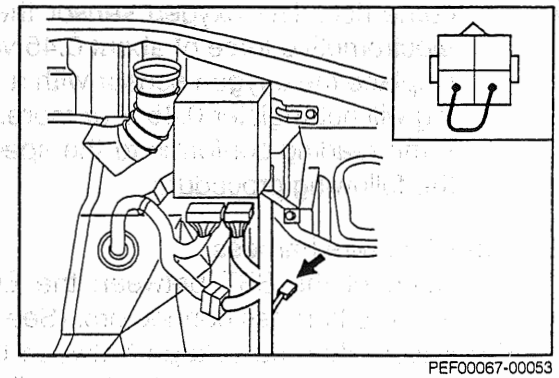
DIAGNOSIS CODE NO. 21
OXYGEN SENSOR & CIRCUIT



PEF00066-00052

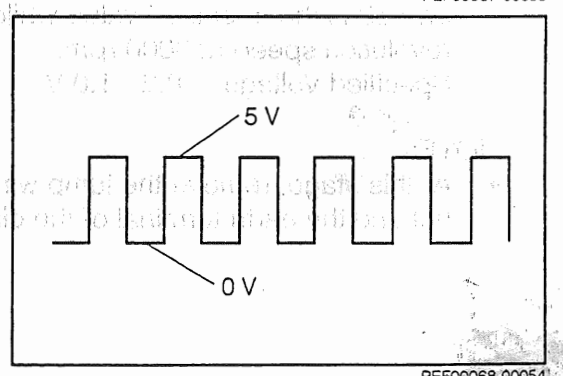
The ECU detects malfunction when the input signal from the oxygen sensor shows too lean air-to-fuel mixture continuously for 2 seconds or more when the engine revolution speed is 1500 rpm or more and the engine is in a hot condition.

1. Inspection of oxygen sensor circuit
   (1) Warm up the engine completely.
   (2) Connect the test terminal and the earth terminal with a jump wire at the diagnosis connector.
   (3) Measure the voltage between the VF terminal and the earth terminal as indicated in the illustration.
   Specified Voltage: 0 - 5 V



PEF00067-00053

   (4) While keeping the engine revolution speed at 3000 rpm for about 2 minutes, count how many times the pointer of the voltmeter swings within 10 seconds.
   8 Times or more: Normal
   0 - 7 Times: Proceed to the following steps.

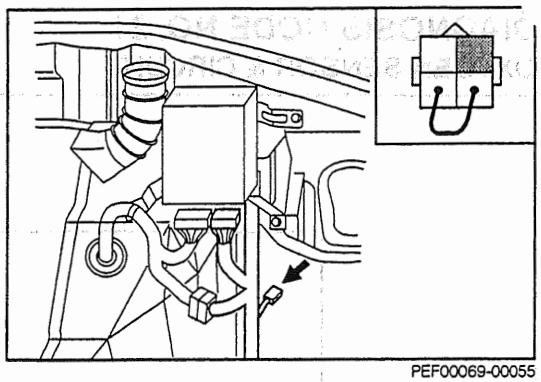


PEF00068-00054

NOTE:
- The throttle valve must be opened.

REFERENCE

(1) Prepare an oscilloscope.
(2) Connect a jump wire to the test terminal and the earth terminal.
(3) Connect a probe to the VF terminal and the earth terminal.
(4) Check to see if a signal shown in the graph appears at the terminals while the engine is rotating at 3000 rpm.



PEF00069-00055

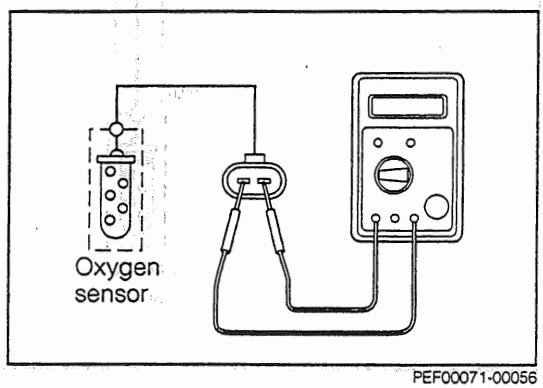
NOTE:

- There are cases where the measurement can not be conducted with a tester having a low reaction speed. Therefore, use a tester having a high reaction speed or oscilloscope.
- If no voltage appears, check the oxygen sensor unit.

PEF00070-0000

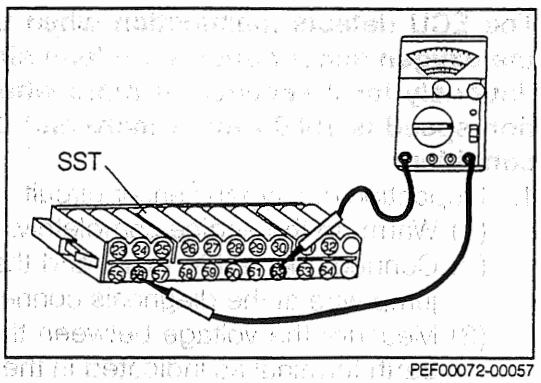
2. Check of oxygen sensor
   (1) Warm up the engine completely.
   (2) Disconnect the connector of the oxygen sensor.
   (3) Connect a voltmeter to the connector terminal of the oxygen sensor.
   (4) Hold the engine revolution speed for 2 minutes at about 3000 rpm. At this time, ensure that the reading of the voltmeter registers 0.45 V or more.

   NOTE:
   - When the oxygen sensor connector has been disconnected, an air-to-fuel mixture ratio of the engine will become rich. The oxygen sensor therefore generates an electromotive force of about 0.45 volts or more.
   - Replace the oxygen sensor with a new part, if the reading will not register 0.45 V or more.
   - If the reading conforms to the specification, proceed to the following procedure.



PEF00071-00056

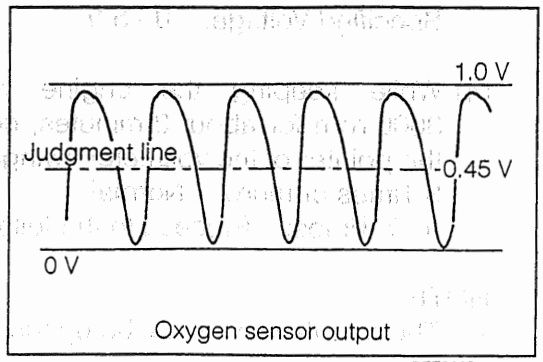
3. Check of wire harness
   (1) Connect the SST between the ECU connectors and the wire harness connectors. (See page EF-17.)
   (2) Ensure that the voltage between the SST terminals 56 and 62 is the specified value while keeping the engine revolution speed at 3000 rpm.
   Specified Voltage: 0.2 - 1.0 V



PEF00072-00057

NOTE:

- At this stage, remove the jump wire from the test terminal and the earth terminal of the diagnosis connector.



PEF00073-00058

(3) Perform the procedure given in the table, according to the measurement results.

Measured voltage	Remedy
0 V	1) Check the oxygen sensor circuit for open wire or short circuit.
The measured voltage varies mainly within a range under 0.45 V.	Remedy causes for too-lean fuel mixture. • Pressure sensor • Pressure regulator • Fuel line • Fuel filter • Fuel pump • Injector
The measured voltage varies within a range of 0 - 1.0 V, centering around 0.45 V. However, the reaction speed the is low. (The pointer of the voltmeter swings less than 8 times within 10 seconds.)	Check the ECU. (Go to page EF–36, REPLACEMENT OF ECU.)
The measured voltage varies mainly within a range above 0.45 V.	Remedy causes for too-rich fuel mixture. • Pressure sensor • Fuel line • Pressure regulator • Injector
1.0 V	Remedy causes for too-rich fuel mixture. • Pressure sensor • Fuel line • Pressure regulator • Injector
More than 1.0 V	Check the oxygen sensor circuit for short circuit with other positive line. Repair or replace the wiring harness.

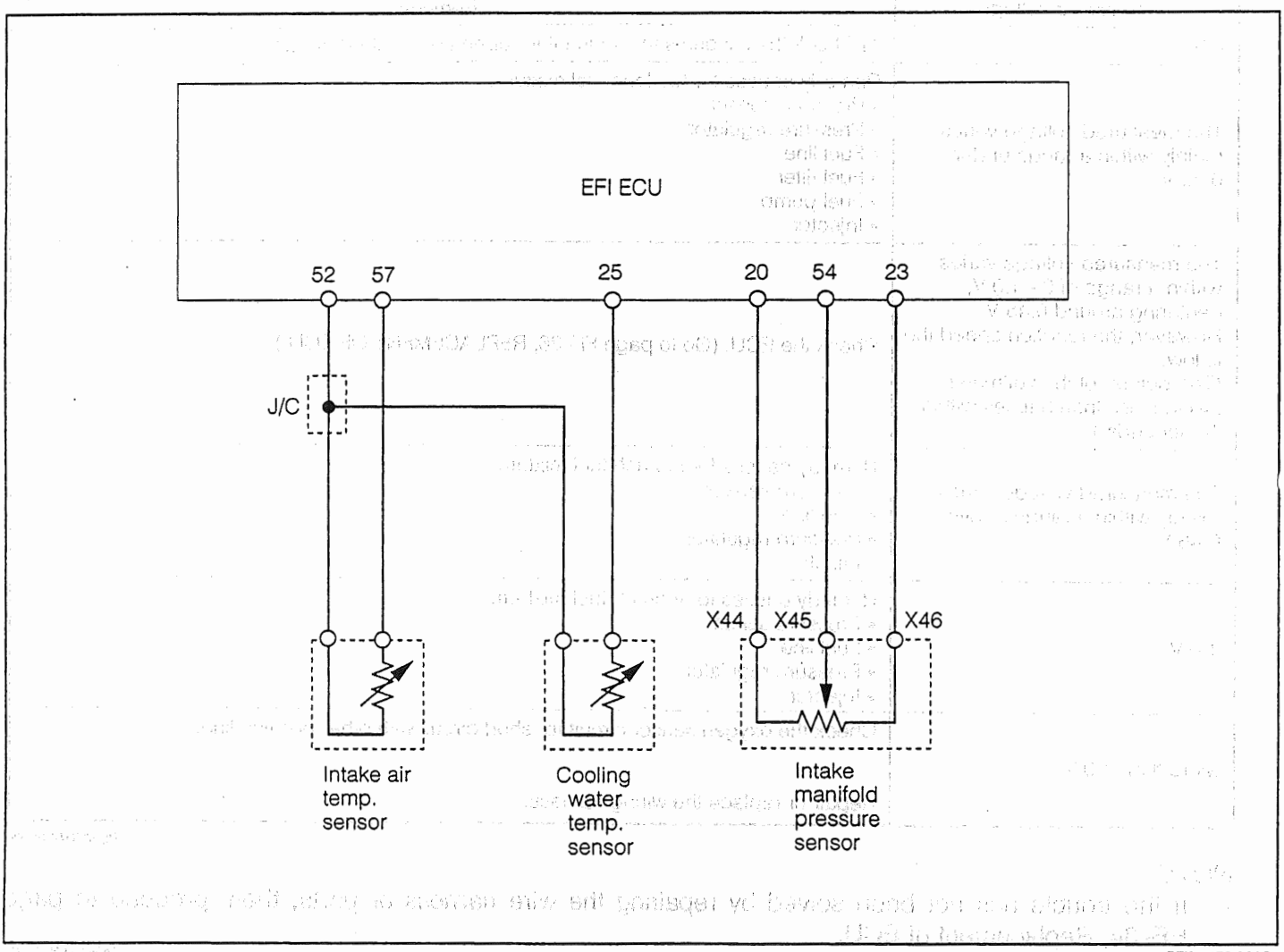
PEF00074-00000

NOTE:

- If the trouble has not been solved by repairing the wire harness or parts, then, proceed to page EF–34, Replacement of ECU.

PEF00075-00000

DIAGNOSIS CODE NO. 31
PRESSURE SENSOR & CIRCUIT



PEF00076-00059

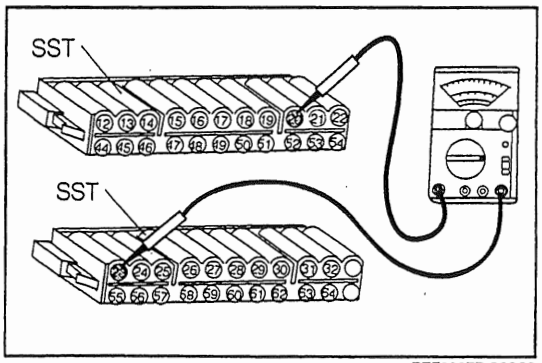
When the pressure sensor becomes open or shorted:

1. Check the pressure sensor.
   (1) Connect the SST between the ECU connectors and the wire harness connectors.
   (2) Ensure that the voltage between the SST terminals 23 and 20 is within the specified value when the ignition switch is turned to the ON position.
   Specified Value: 4.5 - 5.5 V

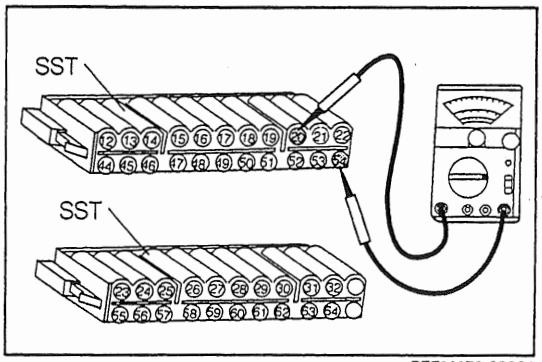
   NOTE:
   - If no voltage appears, check the ECU power supply circuit, ECU ground circuit.

   (3) Ensure that the voltage between the SST terminals 54 and 20 is within the following specified voltage when the ignition switch is turned to the ON position.

Altitude (From sea level) m	Atmospheric pressure kPa (mmHg)	Voltage
0	101.3 (760)	3.30 - 4.0 V
500	95.5 (716)	3.10 - 3.8 V
1000	89.9 (674)	2.95 - 3.65 V

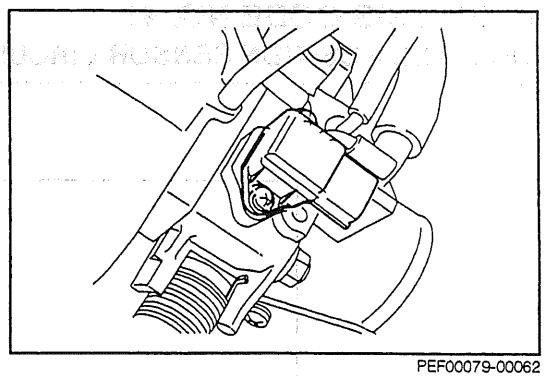


PEF00077-00060



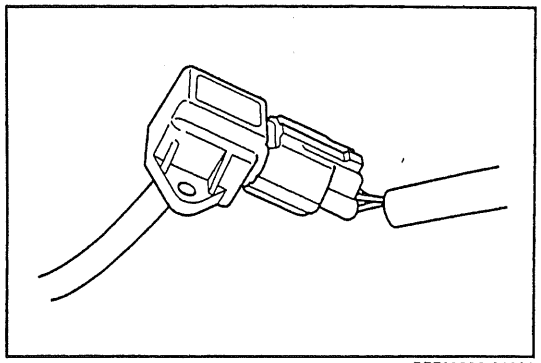
PEF00078-00061

(4) Disconnect the pressure sensor connector and remove the pressure sensor from the throttle body by loosening the two attaching bolts.



PEF00079-00062

(5) Reconnect the connector to the removed pressure sensor.
(6) Apply a negative pressure of 27 kPa to the pressure sensor, using a Mity-Vac.

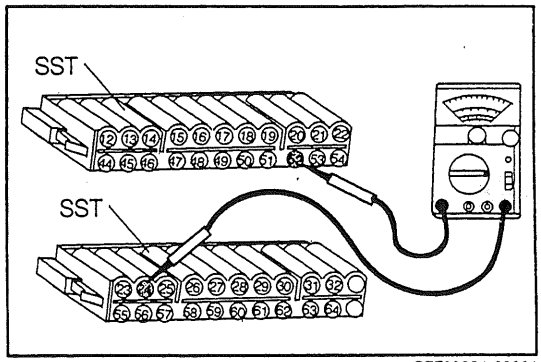


PEF00080-00063

(7) Check that the measured voltage between the SST terminals 24 and 52 drops by 0.65 to 0.95 volt.

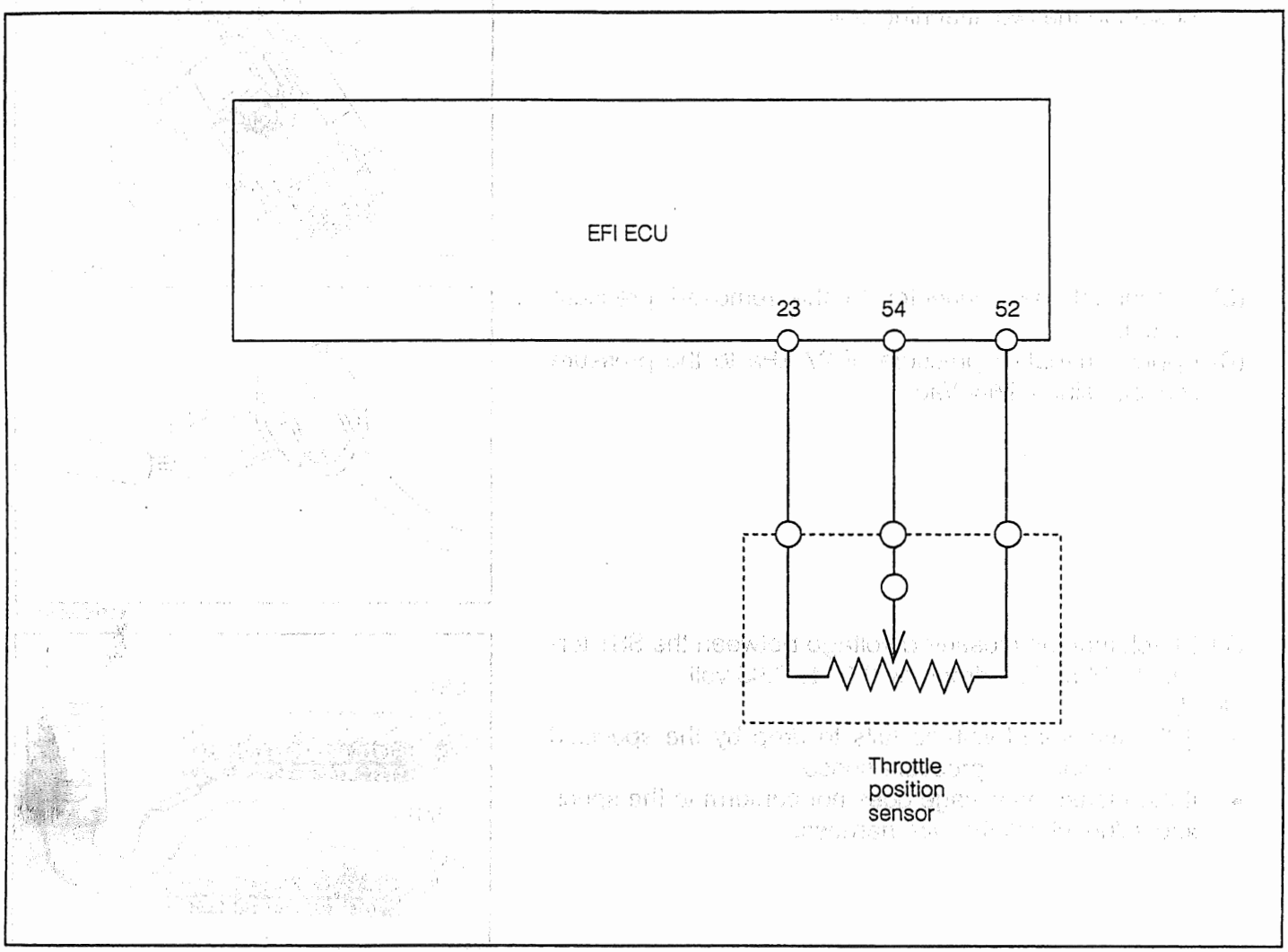
NOTE:

- If the measured voltage fails to drop by the specified value, replace the pressure sensor.
- If the measured voltage does not conform to the specified value, check the wire harness.



PEF00081-00064

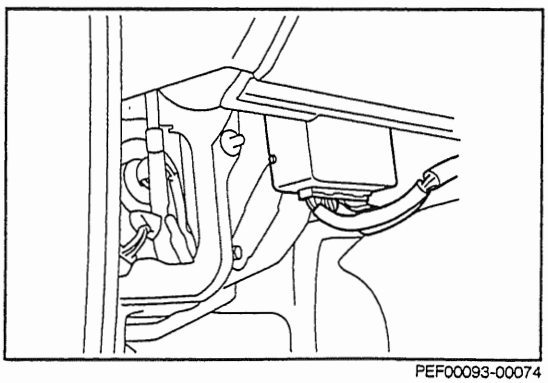
DIAGNOSIS CODE NO. 41
THROTTLE POSITION SENSOR CIRCUIT



PEF00092-00073

When the ECU detects malfunction of the throttle position sensor circuit for open or short circuit.

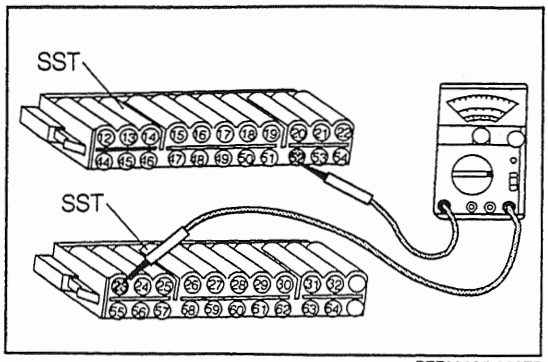
1. Check that the following wire harness connector or throttle position sensor circuits are connected properly.
2. Check of wire harness and throttle position sensor.
   (1) Connect the SST between the ECU connectors and the wire harness connectors.



PEF00093-00074

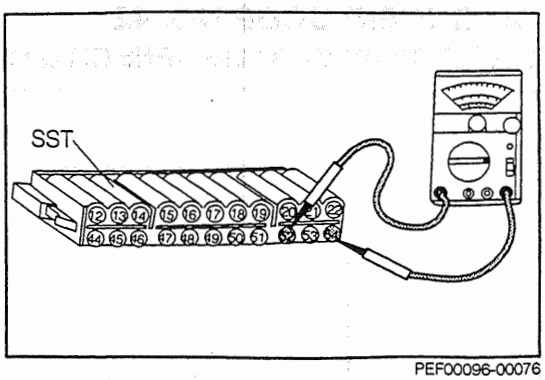
   (2) Check the voltage between the SST terminals 52 and 23 when the ignition switch is turned on.
   Specified Value: 4.5 - 5.5 V

   If no voltage appeares, check the ECU power supply circuit for open and short circuit.



PEF00095-00075

(3) Check the voltage between the SST terminals 52 and 54 when the throttle valve is fully closed and the ignition switch is turned on.
Specified Value:
When the valve fully closed: 0.4 - 0.8 V
When the valve fully opened: 3.8 - 4.4 V

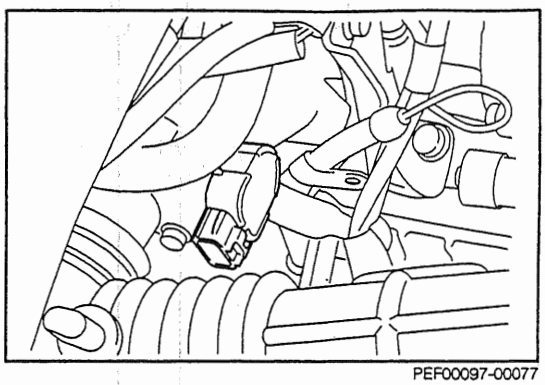


PEF00096-00076

NOTE:
- Ensure that the measurement voltage should changes smoothly from full closing to full opening the throttle valve.

(4) Turn off the ignition switch. Then, disconnect the connector of the throttle position sensor.
(5) Check the resistance between the terminals PSW and VC of the throttle position sensor.
Specified Value: 2.5 - 6.0 kΩ

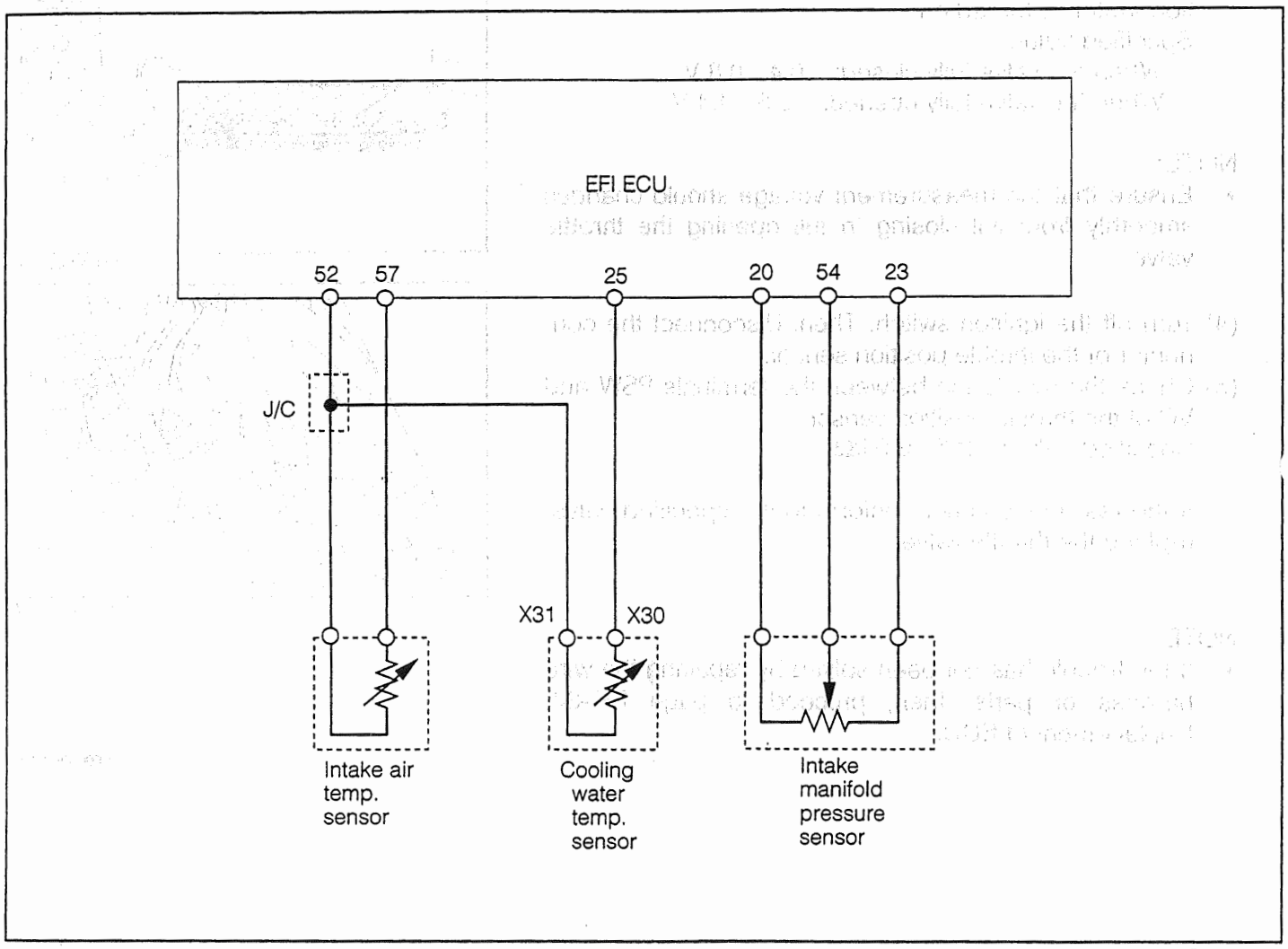
If the resistance is not conform to the specified valve, replace the throttle valve.


PEF00097-00077

NOTE:
- If the trouble has not been solved by repairing the wire harness or parts, then, proceed to page EF–34, Replacement of ECU.

PEF00098-00000

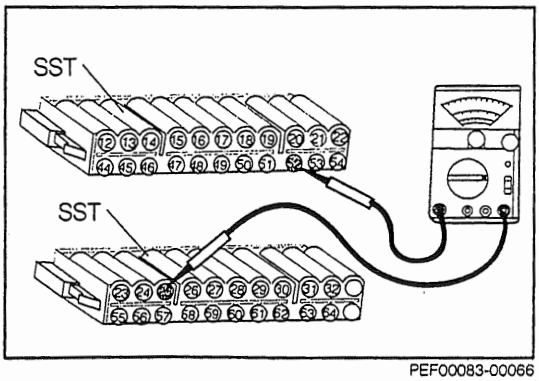
DIAGNOSIS CODE NO. 42
WATER TEMPERATURE SENSOR & CIRCUIT



PEF00082-00065

When the water temperature sensor becomes open or shorted:

1. Check to see if the connector is connected properly.
2. Check of wire harness
   (1) Connect the SST between the ECU connectors and the wire harness connectors.
   (2) Ensure that the resistance between the SST terminals 25 and 52 is within the specified value when the ignition switch is turned to the ON position.



PEF00083-00066

NOTE:

- If the measured resistance does not conform to the specifications, check the wire harness.

Measuring points Temperature °C	Resistance
20	2.450 ± 0.15
80	0.318 ± 0.01

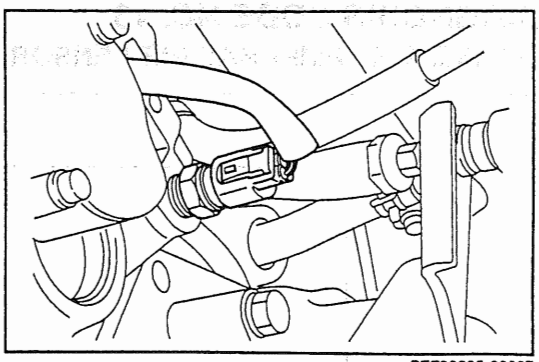
PEF00084-00000

3. Check the water temperature sensor unit.
   (1) Turn off the ignition switch.
   (2) Disconnect the connector of the water temperature sensor.
   (3) Drain the engine cooling water.
   (4) Remove the water temperature sensor unit.

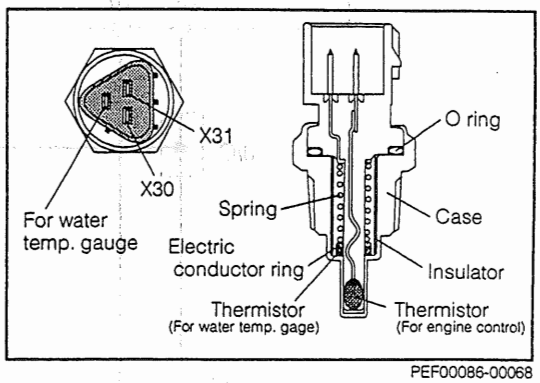
   NOTE:
   - Be certain to perform the replacement and repairs of the sensor only after the intake manifold has been removed from the cylinder head.

   (5) Check that the resistance between the terminals X30 and X31 of the water temperature sensor is within the specified value in the table. See page EF–26.

   NOTE:
   - If the trouble has not been solved by repairing the wire harness or parts, proceed to page EF–34, Replacement of ECU.

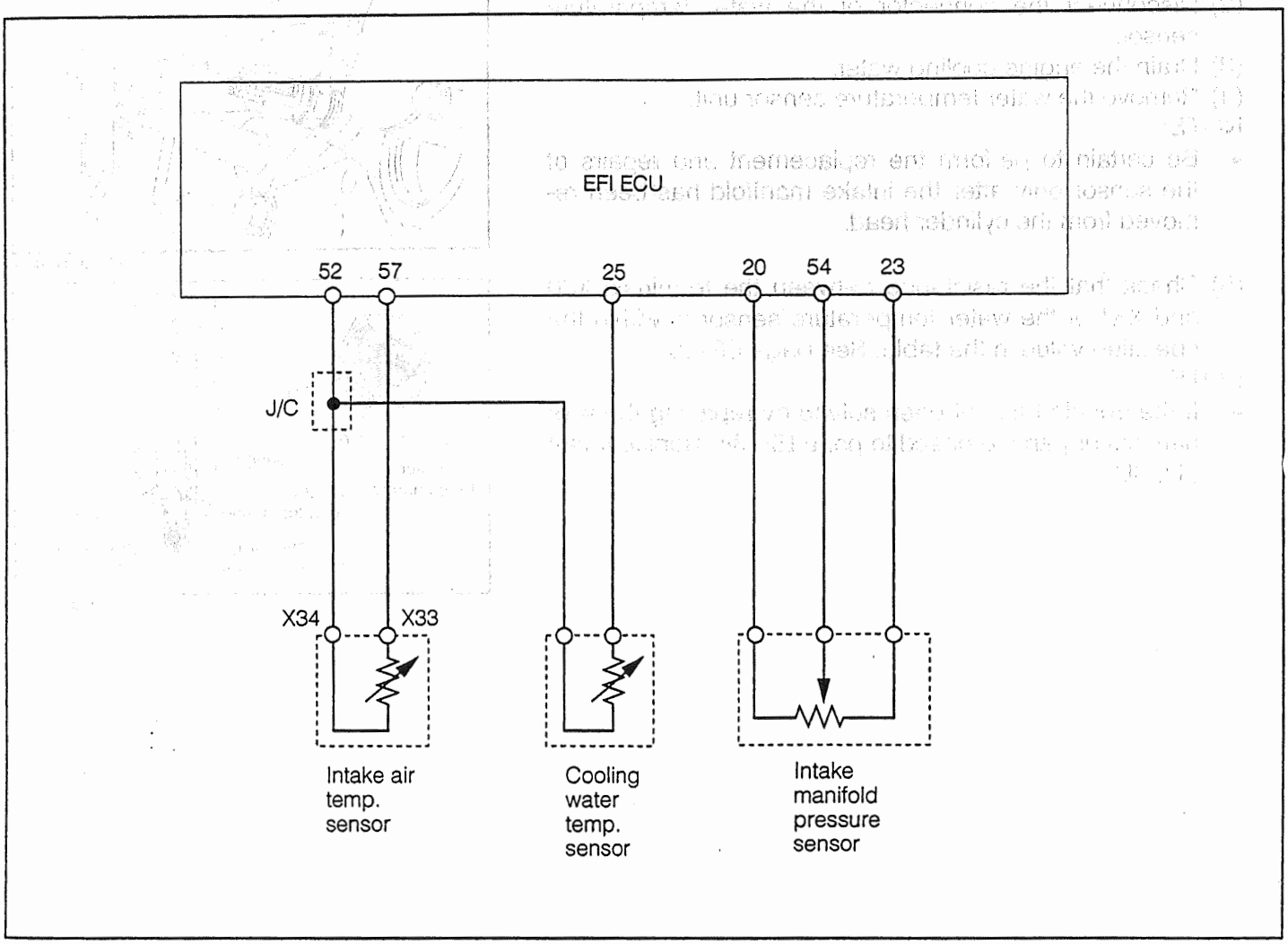


PEF00085-00067



PEF00086-00068

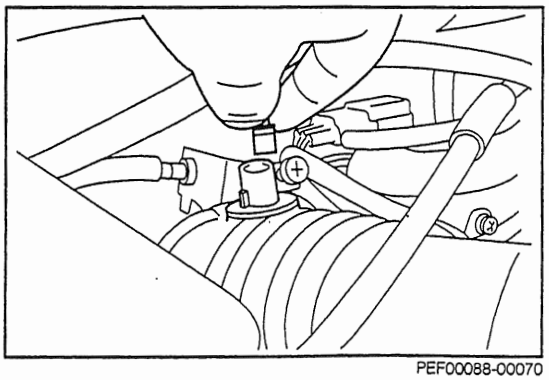
DIAGNOSIS CODE NO. 43
INTAKE AIR TEMPERATURE SENSOR & CIRCUIT



PEF00087-00069

When the pressure sensor becomes open or shorted:

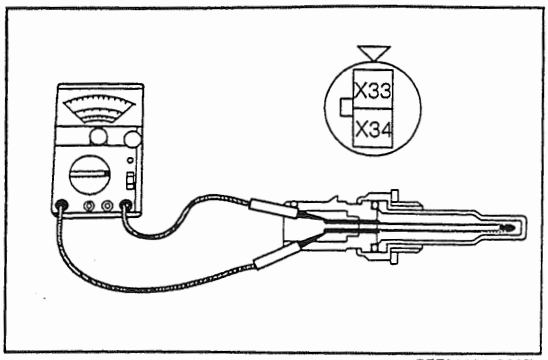
1. Check to see if the wire harness connectors are connected properly.
2. Disconnect the connector of the intake air temperature sensor.
   NOTE:
   - Before the wire harness connector is disconnected, be sure to turn off the ignition switch.



PEF00088-00070

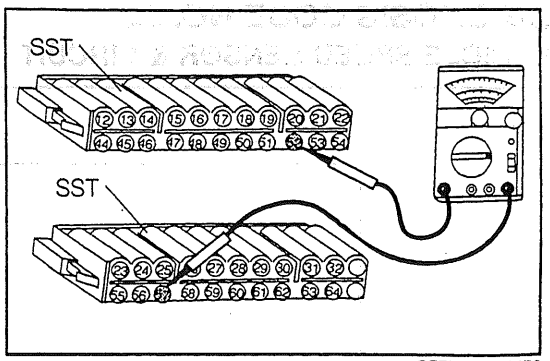
3. Check that the resistance between the terminals X33 and X34 of the intake air temperature sensor is within the specified value.

Temperature °C	Resistance kΩ
40	1.140 ± 0.3
20	2.450 ± 0.5
0	5.880 ± 1.5



PEF00089-00071

4. Check of wire harness
   (1) Connect the SST between the ECU connectors and the wire harness connectors.
   (2) Check that the voltage between the SST terminals 52 and 57 is within the specified value when the ignition switch is turned to the ON position.
   Reference: 20°C 1.8 - 2.9 V

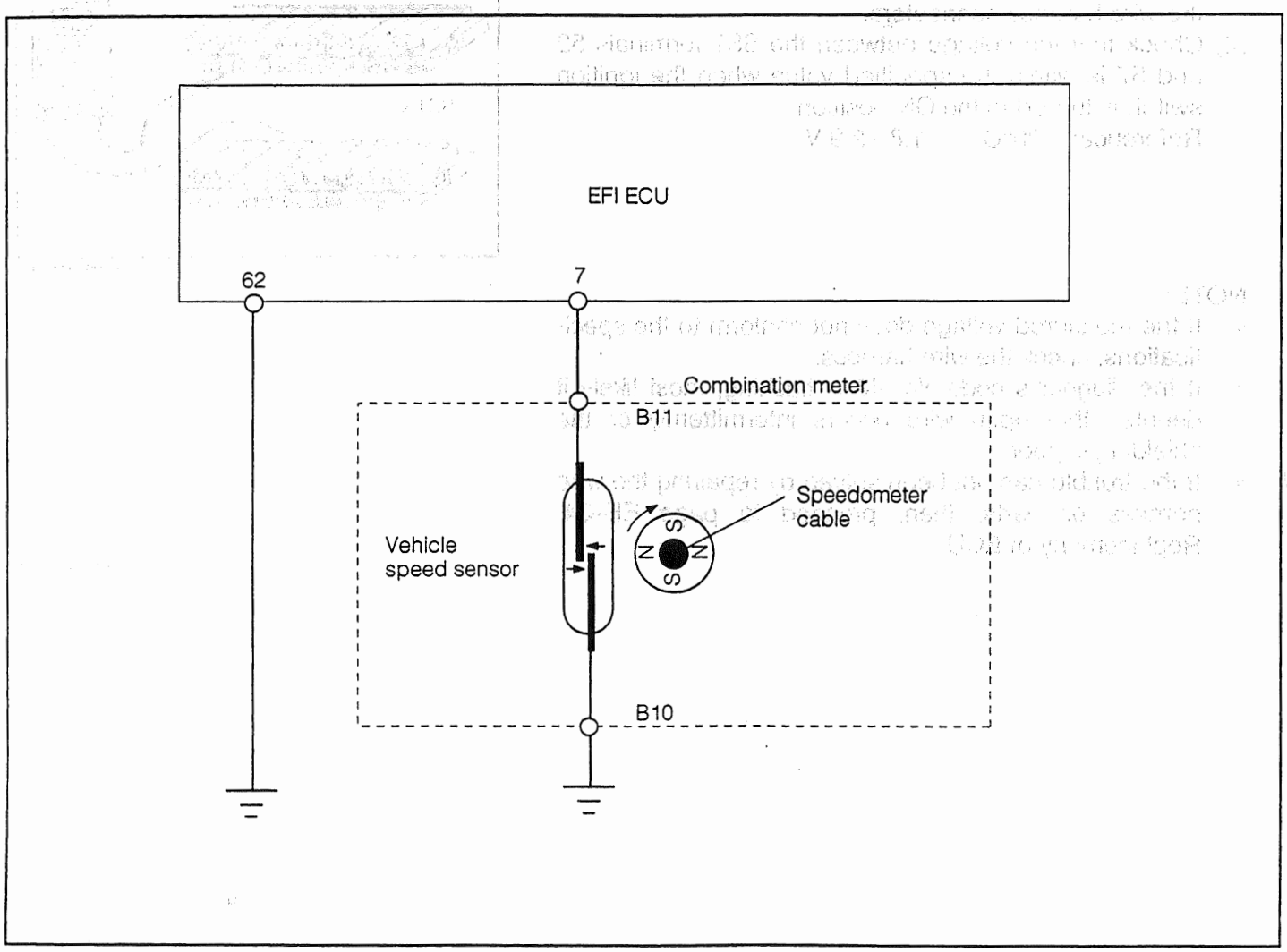


PEF00090-00072

NOTE:
- If the measured voltage does not conform to the specifications, check the wire harness.
- If the diagnosis code No. 43 is flashing, most likely it denotes that open wire occurs intermittently or the shielding is poor.
- If the trouble has not been solved by repairing the wire harness or parts, then, proceed to page EF–34, Replacemeny of ECU.

PEF00091-00000

DIAGNOSIS CODE NO. 52
VEHICLE SPEED SENSOR & CIRCUIT



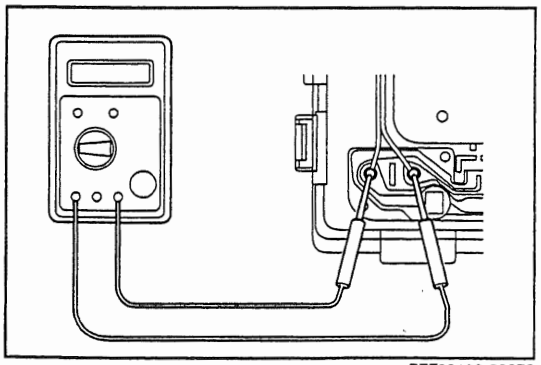
PEF00099-00078

When the pressure sensor becomes open or shorted:

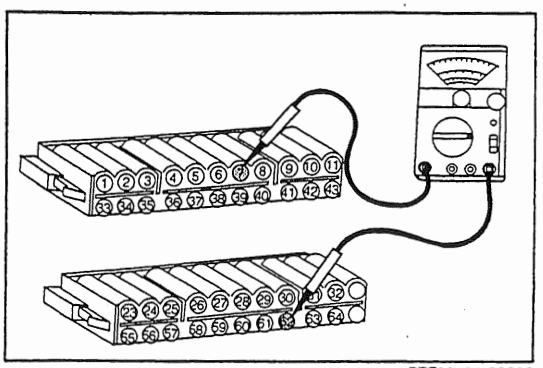
1. Check of the reed switch
   (1) Remove the combination meter.
   (2) Ensure that continuity occurs four times at the terminals B10 and B11 of the combination meter while the speedometer drive shaft completes a turn.

   NOTE:
   - The sensor has been so constructed that its rotary shaped-magnet rotates at the same revolution speed as the speedometer cable turns ON/OFF reed switch, thereby making it possible to input the vehicle speed to the computer. Four pulses are generated as the speedometer cable completes its one turn.

2. Check of wire harness
   (1) Connect the SST between the ECU connectors and the wire harness connectors.
   (2) Check that the voltage between the SST terminals 7 and 62 is within the following specified value when the vehicle moves and the ignition switch is turned to the ON position.
   Specified Value: 0 - 5 V for pulse signal



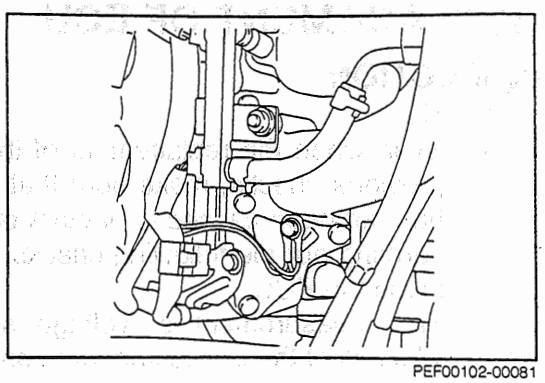
PEF00100-00079



PEF00101-00080

NOTE:

- If the measured voltage is 0 volt, check that the wire harness or connector is shorted and the ECU power supply circuit.
- If the measured voltage is still 5 volts, check that the wire harness or connector exhibits open wire.
- If the diagnosis code No. 43 is flashing, most likely it denotes that open wire occurs intermittently or the shielding is poor.
- Check to see if the earth bolt exhibits looseness or corrosion.
- If the trouble has not been solved by repairing the wire harness or parts, then, proceed to page EF–34, Replacement of ECU.



PEF00102-00081

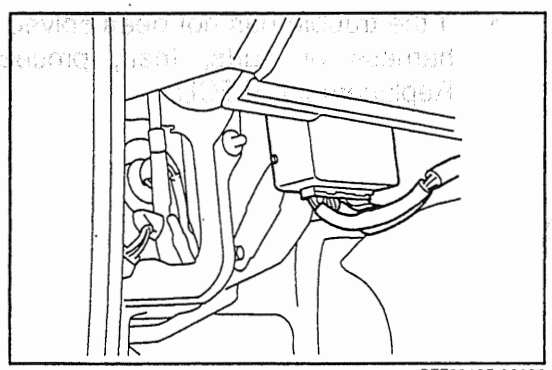
REPLACEMENT OF ECU

INSPECTION

NOTE:

- Even when the replacement of the ECU is required in previous checks, make sure that the ECU malfunction has not been caused by factors other than the ECU by carrying out the following checks. Then, proceed to replace the ECU.
- The measurement of voltage should be conducted while all of the connectors are connected.

PEF00103-00000



PEF00105-00082

1. Install the SST.
   See page EF–17, "Preparation of trouble shooting with SST".
2. Measurement of voltage or resistance
   (1) Measure the voltage or resistance between respective terminals.
   (2) Check to see if the measured voltage or resistance conforms to the specifications in accordance with the following "CHARACTERISTICS OF ECU OUTPUT" table.

CHARACTERISTICS OF ECU OUTPUT (1)

Followings are standard voltage or resistance at ECU.

Item	Terminal	Condition	Standard voltage or resistance	Remedies
Power supply	2 – 62	All times	Battery voltage	Check back-up fuse in the relay box.
	11 – 62 43 – 62	Ignition switch is turned on.	Battery voltage	Check main relay in the relay box.
Earth group	20 52 62	All times	1 Ω or less	Check ground earth of wiring harness.
Pressure sensor	23 – 20	Ignition switch is turned on.	4.5 - 5.5 V	Check ECU power supply.
	24 – 20	Ignition switch is turned on. Atmospheric pressure is 101 kPa.	3.3 - 4.0 V	Check pressure sensor.
Water temp. sensor	25 – 52	Ignition switch is turned on. After engine has warmed up fully. (Cooling water temperature is 80 - 90°C.)	0.4 - 0.65 V	Check cooling water temperature sensor.
Intake air temp. sensor	57 – 52	Ignition switch is turned on. Air temperature sensor inside the surge tank is 20 (68).	1.8 - 2.9 V	Check air temp. sensor.
Oxygen sensor	56 – 52	Engine is rotating at about 3000 r.p.m., after engine has warmed up fully.	Voltage varies within 0.2 - 1.0 V	Check oxygen sensor.
Cam angle sensor	21 – 53	While the engine is being cranked by the starter motor.	0.1 - 0.3 V (AC range)	Check crank angle sensor.
Throttle position sensor	23 – 52	Ignition switch is turned on.	4.5 - 5.5 V	Check throttle position sensor.
	54 – 52	Ignition switch is turned on. Throttle valve is fully closed.	1.0 V or less	
		Ignition switch is turned on. Throttle valve is fully opened.	3.5 - 4.1 V	
Vehicle speed sensor	7 – 62	Ignition switch is turned on. When vehicle is moved. (Measured voltage changes 4 times for movement of 1.6 m)	Change in voltage between 0.1 V and approx. 5 V	Check speed sensor.
Ignition coil drive	62 – 29 62 – 64	Ignition switch is turned on.	3 V or less	Check ignition coil.
Injector drive	31 – 62 32 – 62	Ignition switch is turned on.	Approx. battery voltage	Check injector(s).
Fuel pump drive	34 – 62	Ignition switch is turned on.	Approx. battery voltage	Check fuel pump relay. The terminal 34 is for immobilizer system.
VF monitor	42 – 62	Engine is rotating at about 3000 r.p.m. after engine has warmed up fully.	1.8 - 3.2 V	Check oxygen sensor.

PEF00106-00000

CHARACTERISTICS ECU OUTPUT (2)

Followings are standard voltage or resistance at ECU.

Item	Terminal	Condition	Standard voltage or resistance	Remedies
Electrical load	37 – 62	Headlamp switch is turned on.	0.5 V or less	Check headlamp fuse or switch.
		Headlamp switch is turned off.	4.5 - 5.5 V	
	36 – 62	Ignition switch is turned on and defogger switch is turned on.	Approx. battery voltage	Check defogger fuse or switch.
	6 – 62	Ignition switch is turned on and heater blower switch is turned on.	0.1 V or less	Check heater blower switch.
		Heater blower switch is turned off.	Approx. battery voltage	Check gauge fuse or heater blower relay.
Tachometer signal	41 – 62	Ignition switch is turned on.	0.1 V or less	Check tachometer.
		Engine is rotating at idling speed.	Approx. 6 V (AC range)	Replace ECU.
Idle-up VSV control	60 – 62	Engine is running at idling speed and headlamp switch, defogger switch or heater switch is turned on.	0.5 V or less	Check wire harness.
Test terminal	39 – 62	Ignition switch is turned on.	4.5 - 5.5 V	Check ECU.
Check engine lamp	10 – 62	Ignition switch is turned on.	0.5 V or less	Check wire harness, bulb and ECU.
		Engine is started	Approx. battery voltage	
		Ignition switch is turned on with terminal T connected to ground	Intermittent 0 - Approx. battery voltage	

PEF00107-00000

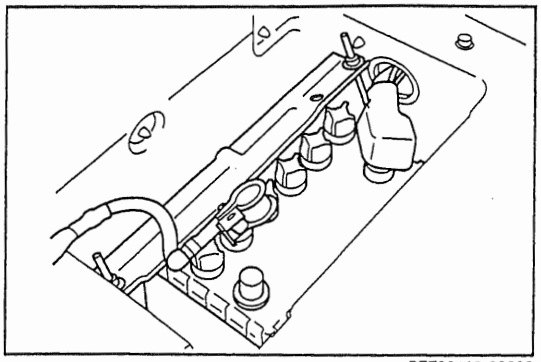
After completion of inspection

(1) Disconnect the ground cable terminal from the negative (–) terminal of the battery.
(2) Remove the SST by disconnecting its connectors from the ECU and engine wire connectors.
(3) Connect the wire harness connectors to the ECU.
(4) Reconnect the ground cable terminal to the negative (–) terminal of the battery.

PEF00108-00000

ECU REPLACEMENT

1. Disconnect the ground cable terminal from the negative (–) terminal of the battery.
2. Remove the glove compartment subassembly.



PEF00109-00083

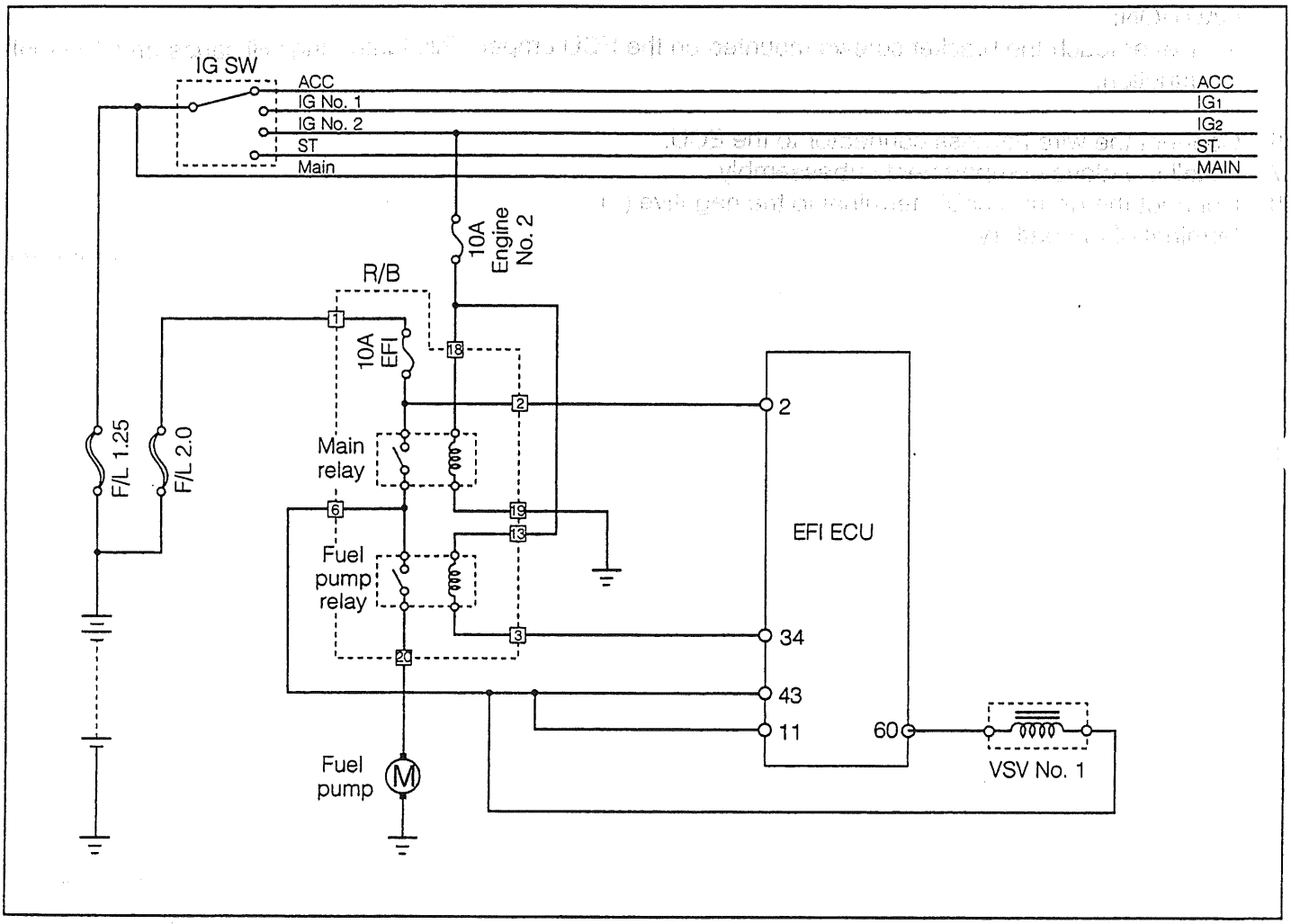
3. Disconnect the wire harness connector from the ECU.
4. Remove the ECU by removing the attaching bolts and nuts.
5. Install a new ECU.
   CAUTION:
   - Never touch the bracket screws mounted on the ECU proper. This tampering will cause an ECU malfunction.

6. Connect the wire harness connector to the ECU.
7. Install the glove compartment subassembly.
8. Connect the ground cable terminal to the negative (–) terminal of the battery.

PEF00110-00000

INSPECTION OF IDLE-UP CONTROL SYSTEM

WIRING DIAGRAM



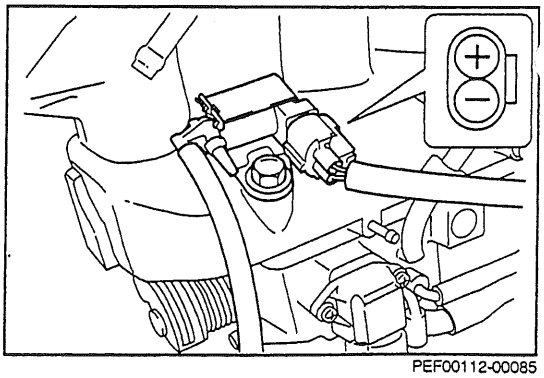
PEF00111-00084

UNIT INSPECTION

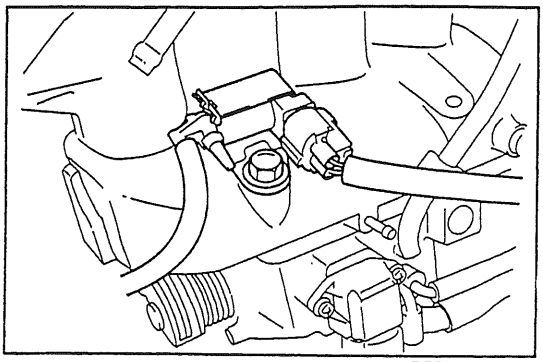
1. Disconnect the connector of the idle-up VSV.
2. Measure the resistance between the respective terminals of the VSV.
3. Ensure that the specified resistance exists between the terminals described below.
   Specified Value: $40 \pm 5\ \Omega$

   NOTE:
   - If the resistance will not conform to the specified value, replace the idle-up VSV.

4. Apply a negative pressure of 13.3 kPa (100 mmHg) to the VSV, using a MityVac or a vacuum pump.
5. Check to see if the negative pressure applied in the step 4 becomes zero when the battery voltage is applied to the terminals of the VSV.
   NOTE:
   - If not, replace the idle-up VSV.



PEF00112-00085



PEF00113-00086

SYSTEM INSPECTION

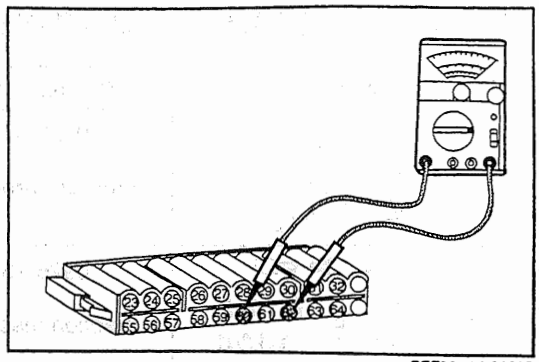
VSV No. 1

1. Connect the SST between the EFI ECU connector and the wire harness connectors. See page EF-17.
2. With the engine running, measure the voltage between the terminals 60 and 62 of the SST.

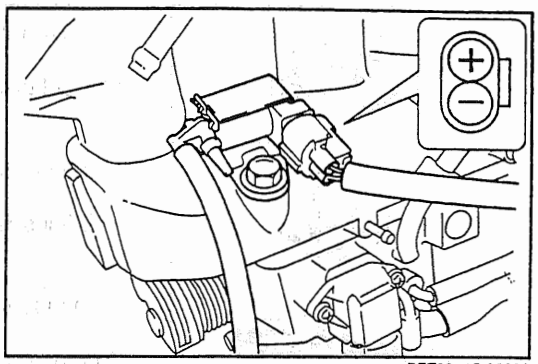
	Condition	Specified value
1	Until engine is warmed up fully after engine starting from engine cold state.	0.5 V or less
2	Defogger switch is turned on.	
3	Heater blower switch is turned on.	
4	Headlamp switch is turned on.	
5	Radiator fan is operating	

NOTE:

- The measurement should not be performed when plural conditions of those discribed above one met concurrently.
- If the check results will not conform to the requirements given in the table, check and repair those related systems.

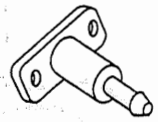
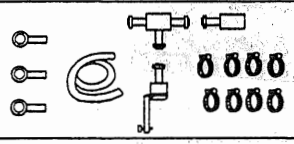
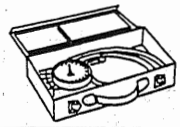
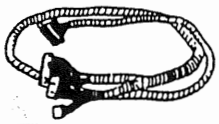


PEF00114-00087



PEF00115-00088

SST (Special Service Tools)

Shape	Part No. and name	Purpose	Remarks
	09283-87703-000 Pressure regulator adapter	* Inspection of injectors * Inspection of pressure regulator * Inspection of fuel pressure	Used in combination with 09268-87702-000
	09268-87702-000 Injection measuring tool set	* Inspection of injectors * Inspection of pressure regulator * Inspection of fuel pressure	Used in combination with 09283-87703-000
	09268-87701-000 EFI fuel pressure gauge	Inspection of fuel pressure	
	09842-30070-000 EFI inspection wire	Inspection of fuel injectors	
	09991-87501-000 Engine control system inspection wire	Measurement of engine revolution speed Shorting terminal T	
	09842-87706-000 EFI-II computer check subharness	Inspection of computer input/output voltage	

PEF00116-00089

TIGHTENING TORQUE

Tightening components	Tightening torque		Remarks
	N·m	kgf-m	
Ignition coil × Cylinder head cover	5.9 - 11.0	0.6 - 1.1	
Spark plug × Cylinder head	14.7 - 21.6	1.5 - 2.2	
Cam angle sensor × Cylinder head	14.7 - 21.6	1.5 - 2.2	
Oxygen sensor × Exhaust manifold	29.4 - 39.2	3.0 - 4.0	
Cooling water temperature sensor × Cylinder head	24.5 - 34.3	2.5 - 3.5	
Idle-up VSV × Intake manifold	14.7 - 21.6	1.5 - 2.5	
Delivery pipe × Intake manifold	14.7 - 21.6	1.5 - 2.2	

PEF00117-00000

EC

EMISSION CONTROL SYSTEM

EMISSION CONTROL SYSTEM
OUTLINE ..... **EC– 2**
PURPOSE OF SYSTEM ..... **EC– 2**
COMPONENT LAYOUT ..... **EC– 3**
THREE-WAY CATALYST ..... **EC– 4**
REPLACEMENT OF CATALYTIC CONVERTER ..... **EC– 5**
FUEL EVAPORATIVE EMISSION CONTROL SYSTEM ..... **EC– 6**
DECELERATION FUEL CUT DEVICE **EC–10**
FEEDBACK CONTROL SYSTEM **EC–10**
TIGHTENING TORQUE **EC–11**

PEC00001-00000

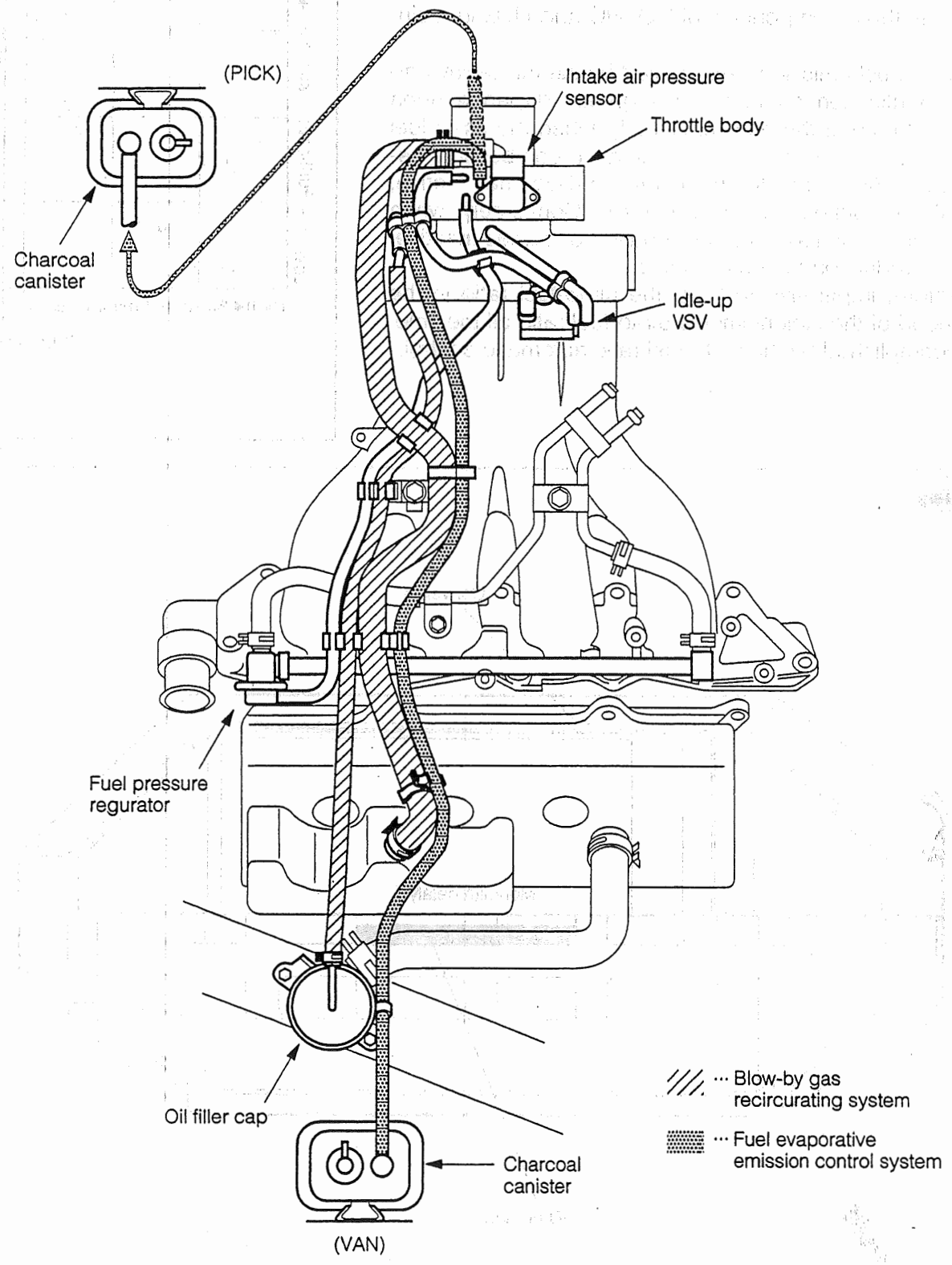
EMISSION CONTROL SYSTEM OUTLINE

PURPOSE OF SYSTEM

	Pollutants to be controlled			Functions
	HC	CO	NOx	
Blow-by gas recirculating	○	○	—	A system whereby the blow-by gas generated inside the engine is introduced to the intake manifold, instead of releasing it to the atmosphere, in order that it may be burnt again in the combustion chamber.
Three-way catalyst	○	○	○	A device whereby HC and CO contained in the exhaust gas are oxidized and NOx is deoxidized by the monolithic type catalytic converter, thereby reducing those emissions of HC, CO and NOx to be-released to the atmosphere.
Deceleration fuel cut	○	—	—	A device which prevents the fuel supply during deceleration period in order to reduce HC and CO emissions.
Fuel evaporative emission control	○	—	—	A system whereby HC emitted from the fuel tank is absorbed to a charcoal canister, thereby preventing HC from being released to the atmosphere.
Feedback control	○	○	○	The feedback control system ensures a proper air-to-fuel ratio required by the engine. Also, it ensures an optimum amount of oxygen to be contained in the exhaust gas so as to obtain high purification rate of the three-way catalyst.

PEC00002-00000

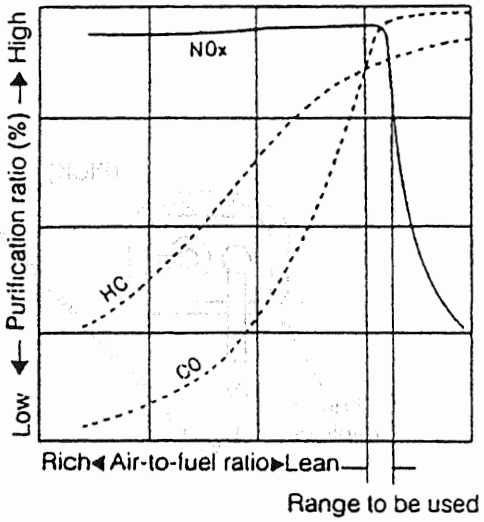
COMPONENT LAYOUT



PEC00003-00001

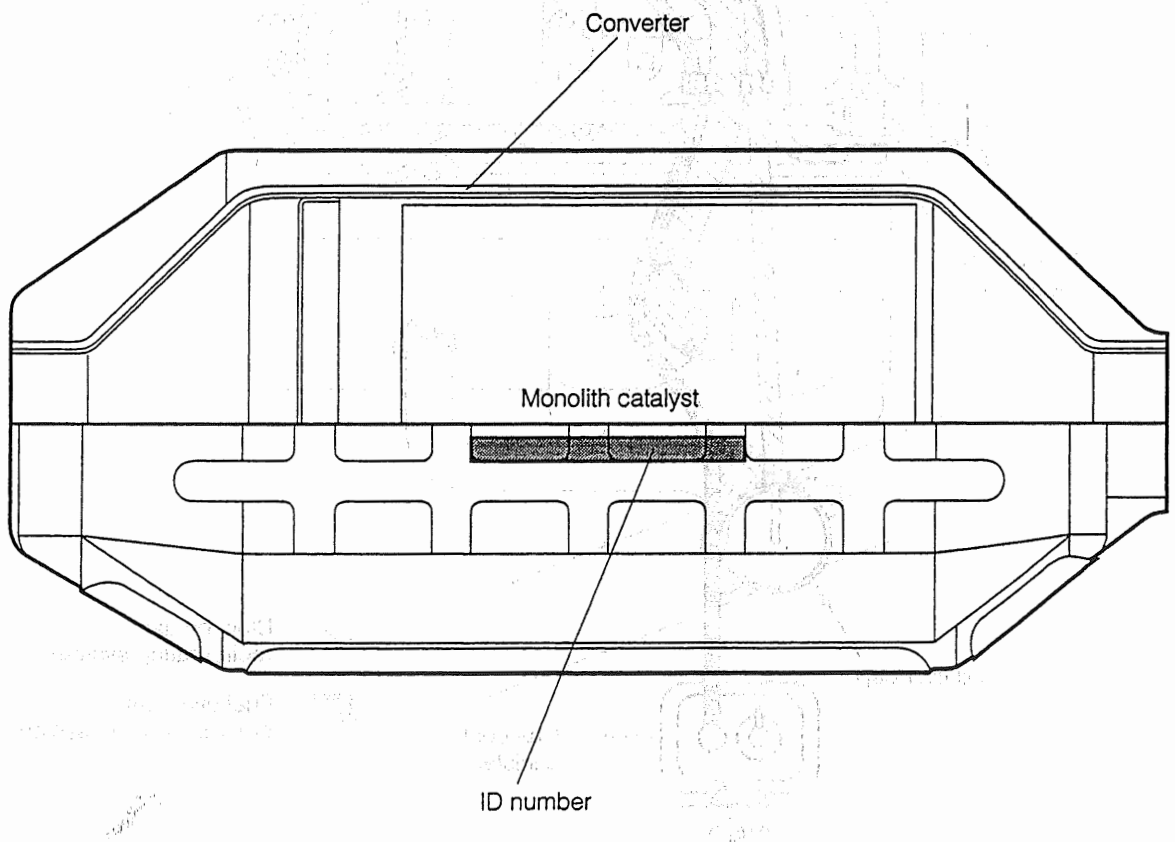
THREE-WAY CATALYST

A cylindrical monolith type three-way catalytic converter is provided under the body, between exhaust manifold and main muffler with exhaust pipe.
The three-way catalyst is a catalyst capable of processing simultaneously three components of CO, HC and NOx in a single unit.
When the exhaust emissions are purified by the three-way catalyst, the purification characteristics greatly depends upon the air-to-fuel ratio of the engine. Namely, when the air-to-fuel ratio is too lean, the oxygen amount after combustion becomes great. As a result, the oxidation becomes active, whereas the reduction becomes inactive. Conversely, when the air-to-fuel ratio is too rich, the oxidation becomes inactive, whereas the reduction becomes active.
It is, therefore, imperative to keep the air-to-fuel ratio in the neighborhood of the stoichiometric air-to-fuel ratio all the time. This is accomplished by the air-to-fuel ratio automatic control.



PEC00004-00002

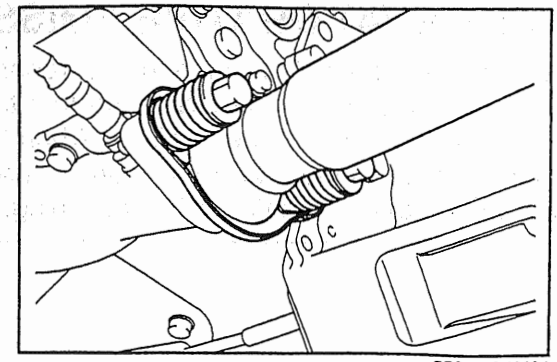
Component



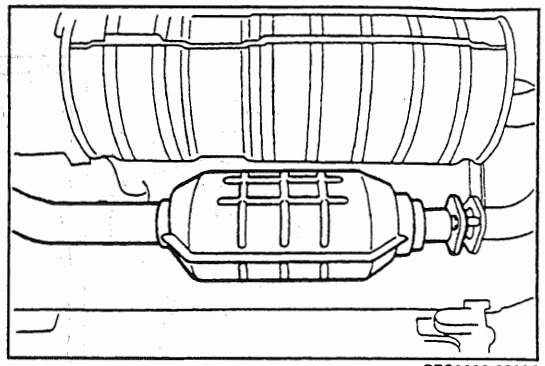
PEC00000-00003

REPLACEMENT OF CATALYTIC CONVERTER

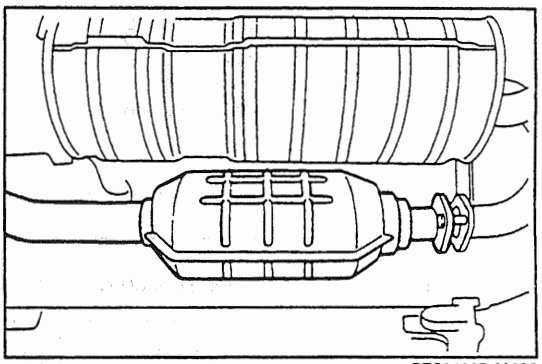
1. Remove the front pipe by loosen the front pipe attaching bolts.


PEC0005-00004

2. Remove the catalytic converter by loosen catalytic converter attaching nuts from the main muffler.

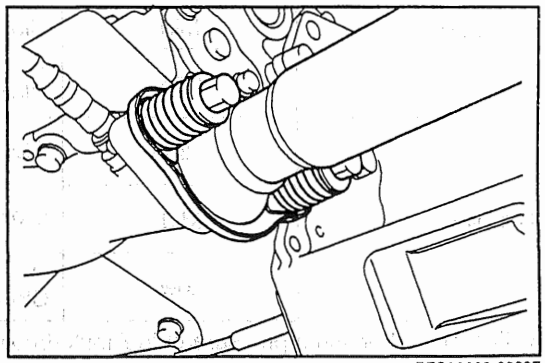

PEC0006-00005

3. Install the catalytic converter and tighten the catalytic converter attaching nuts, using a new gasket.


PEC00007-00006

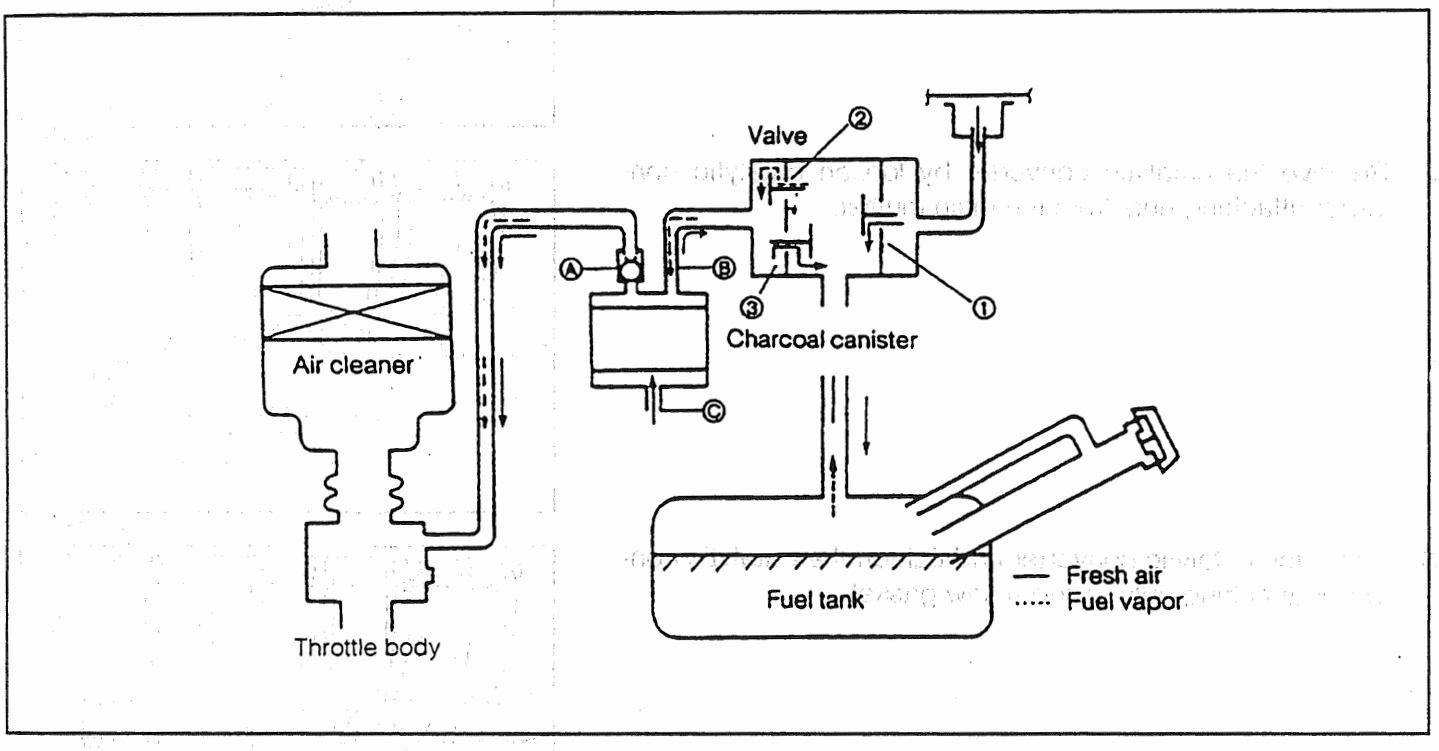
4. Tighten the catalytic converter attaching bolts and the front pipe attaching nuts to the specified torque, using new gaskets.

   Tightening Torque: 42.1 - 55.9 N·m


PEC00008-00007

FUEL EVAPORATIVE EMISSION CONTROL SYSTEM

This system serves to reduce the hydrocarbons (HC) evaporated from the fuel system to the atmosphere. In operation, the vapor formed in the fuel tank enters the charcoal canister. The charcoal absorbs the fuel vapor and stores it in the canister. When the throttle valve is opened with the engine running, the manifold vacuum acts on the check valve and causes it to open. This allow the stored fuel vapor, along with fresh air, to be led into the throttle body for burning.



Engine	Tank pressure	Valve				Evaporated fuel (HC)
		①	②	③	Ⓐ	
Stopped	High	Closed	Open	Closed	Closed	HC emission is absorbed by charcoal canister
	Mid	Closed	Closed	Closed	Closed	Charcoal canister holds HC emission
	Low	*1 Closed	Closed	Closed	Closed	Charcoal canister holds HC emission
Running	High	Closed	Open	Closed	Open	HC emission absorbed by charcoal canister is sucked into engine
	Mid	Closed	Open	Closed	Open	HC emission absorbed by charcoal canister is sucked into engine
	Low	*1 Closed	Open	Closed	Open	HC emission absorbed by charcoal canister is sucked into engine

NOTE: *1: When inner pressure of fuel tank drops abnormally, valve opens, thus preventing fuel tank damage.

PEC00009-00008

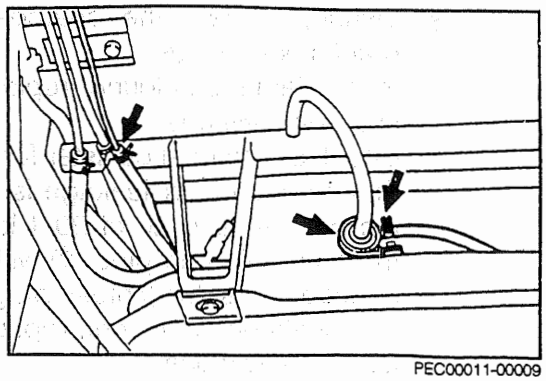
FUEL EVAPORATIVE EMISSION CONTROL DEVICE

(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.
Replace the fuel tank, if necessary.

NOTE:

- Ensure that the no restriction existing in the hose to the charcoal canister and no malfunction on the fuel filler cap.

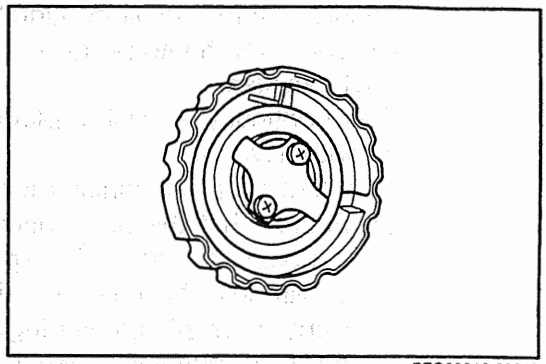


PEC00011-00009

(3) Inspection of the fuel filler cap
Check the fuel filler cap and gasket for damage or deformation.
Also check the air continuity with some resistance is existing on the fuel filler cap.
Replace the cap, if necessary.

NOTE:

- If fuel tank deformed by negative pressure, be sure to replace the fuel filler cap with new one after replacing the fuel tank.

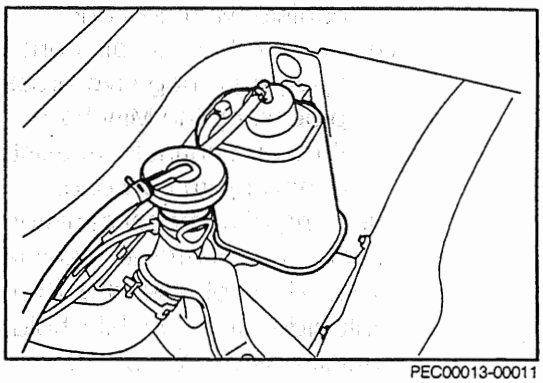


PEC00012-00010

(4) Inspection of the charcoal canister
① Detach the hose band from charcoal canister.
② Disconnect the rubber hoses from charcoal canister.

NOTE:

- Prior to disconnection of the rubber hose, put a tag on each of the rubber hoses so that they may be reconnected correctly to the original position.

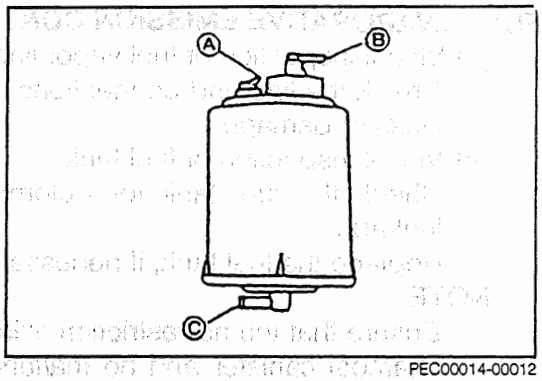


PEC00013-00011

③ Remove the charcoal canister from vehicle by pull up the charcoal canister case.

④ Visually inspect the charcoal canister case for cracks or damage.
If any damage is found, replace the charcoal canister with new one.

⑤ Check of charcoal canister for air leakage
Ensure that no air leakage is present when applying compressed air of 29.4 kPa (0.3 kgf/cm²) into the fuel tank side pipe Ⓑ with purge side Ⓐ and atmosphere side Ⓒ pipes plugged.
If air leakage is present, replace the charcoal canister with new one.



PEC00014-00012

⑥ Ensure that the no air continuity is exist when blowing your breath into purge side Ⓐ pipe of the charcoal canister.
If air continuity is exist, replace the charcoal canister with new one.

⑦ Check of charcoal canister for restriction.
a) Ensure that the air continuity is existing to the atmosphere side Ⓒ pipe, when blow your breath into the fuel tank side pipe Ⓑ while the purge side Ⓐ pipe is plugged.
If no air continuity is exist, replace the charcoal canister with new one.
b) Ensure that the air continuity is existing when applying a negative pressure to the purge side pipe Ⓐ by the Mity Vac.
If no air continuity is exist, replace the charcoal canister with new one.

⑧ Cleaning of charcoal canister
Clean the charcoal canister by blowing compressed air of 294 kPa (3.0 kg/cm²) into the fuel tank side pipe Ⓑ while holding the purge side of canister pipes Ⓐ closed.

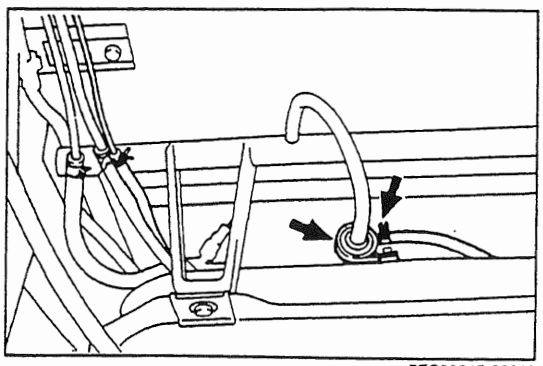
NOTE:
- Do not attempt to wash the charcoal canister.
- Activated carbon should not come out during the test.
  If activated carbon comes out replace the charcoal canister.

⑨ Install the charcoal canister to vehicle.
⑩ Reconnect the rubber hoses and attach the new hose band.

(5) Inspection of evapo purge control valve
① Disconnect the rubber hoses from evapo purge control valve.

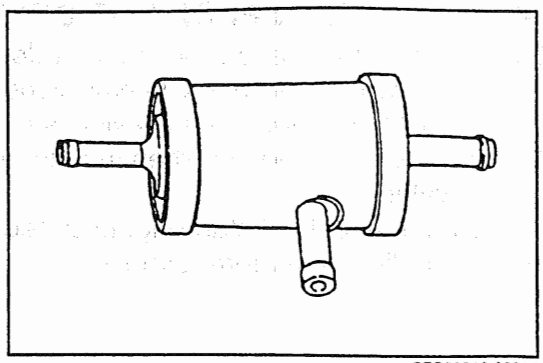
NOTE:
- Prior to disconnection of rubber hoses, put a tag on each of rubber hoses so that they may be reconnected correctly to original position.

② Remove the evapo purge control valve from the fuel tank by remove the attaching bolt.

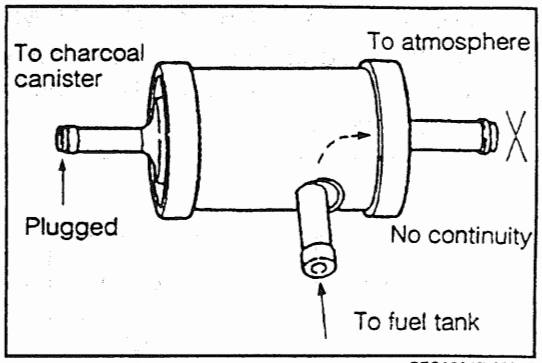

PEC00015-00013

③ Visually inspect the evapo purge control valve for cracks or damage.
If any damage is found, replace the evapo purge control valve with new one.

④ Check of the evapo purge control valve for air leakage.
Ensure that no air leakage is present when applying compressed air of 29.4 kPa (0.3 kgf/cm²) into the fuel tank side pipe with charcoal canister side pipe and atmosphere side pipes are plugged.
If air leakage is present, replace the evapo purge control valve with new one.

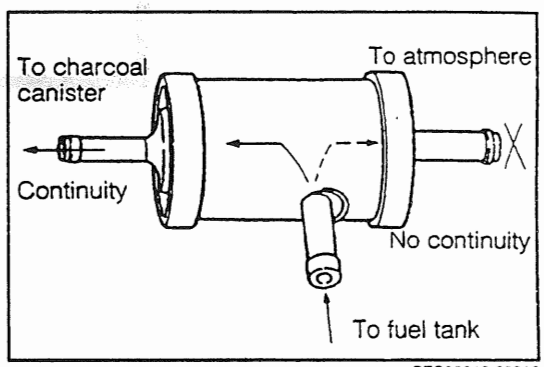

PEC00016-00014

⑤ Check of the evapo purge control valve for restriction
a) Ensure that no air continuity is existing to the atmosphere side pipe, when blow your breath into the fuel tank side pipe while the charcoal canister side pipe is plugged.



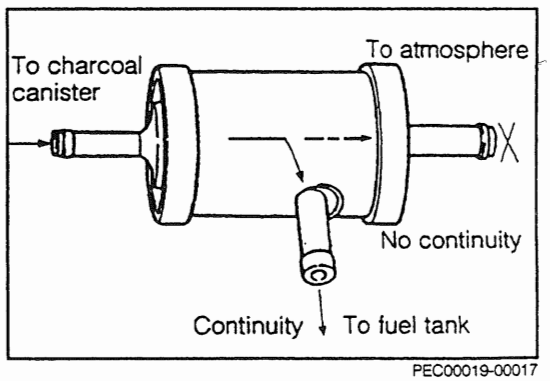
PEC00017-00015

b) Ensure that the air continuity is existing to the charcoal canister side pipe, when blow your breath into the fuel tank side pipe.
c) Ensure that the air continuity is existing when applying a negative pressure to the charcoal canister side pipe by the Mity Vac.
If no air continuity is exist, replace the evapo purge control valve with new one.



PEC00018-00016

⑥ Install the evapo purge control valve to the upper side of fuel tank.
⑦ Reconnect the rubber hoses and attach the new hose band.



PEC00019-00017

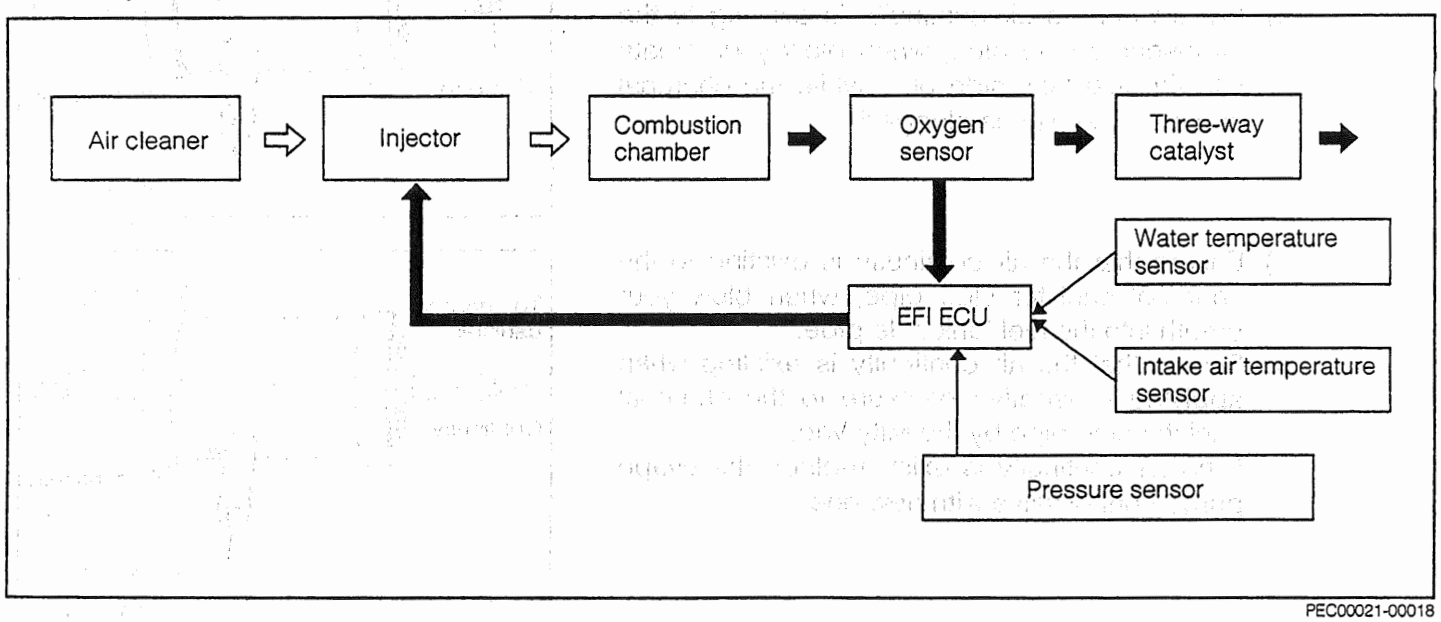
DECELERATION FUEL CUT DEVICE

The deceleration fuel cut device is a device which prevents the fuel supply during the deceleration period in order to reduce HC and CO emissions and prevents the catalytic converter overheating.
On Type HC–ES engine, this device is controlled according to the program inputted to the EFI ECU.
This control is carried out when the throttle valve is fully closed and the engine revolution speed exceeds the set value.
Moreover, the fuel cut start engine speed and return engine speed have been set in accordance with the engine cooling water temperature.

PEC00020-00000

FEEDBACK CONTROL SYSTEM

The feedback control systems ensures a proper air-to-fuel ratio required by the engine. Also, it ensures an optimum amount of oxygen to be contained in the exhaust gas so as to obtain high purification rate of the three-way catalyst.



PEC00021-00018

TIGHTENING TORQUE

Tightening components	Tightening torque		
	N·m	kgf-m	ft-lb
Exhaust manifold × Oxygen sensor	29.4 - 39.2	3.0 - 4.0	21.7 - 28.9
Exhaust pipe × Catalytic converter	41.2 - 55.9	4.2 - 5.7	30.4 - 41.2
Fuel tank × Evapo purge control value stay	3.9 - 6.9	0.4 - 0.7	2.9 - 5.1
Cylinder head × Coolant temperature sensor	24.5 - 34.3	2.5 - 3.5	18.1 - 25.3

PEC00022-00000



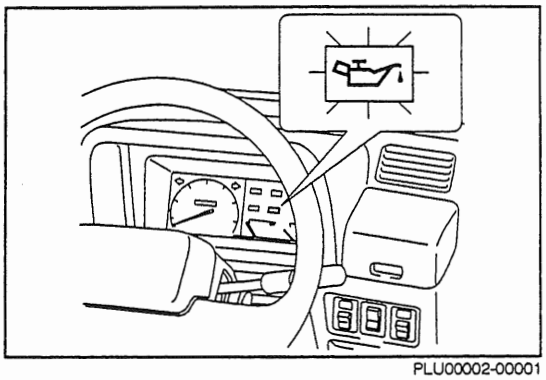
LUBRICATION SYSTEM

OIL PRESSURE WARNING ..... **LU– 2**
OIL PRESSURE CHECK ..... **LU– 2**
OIL PUMP ..... **LU– 3**
COMPONENTS ..... **LU– 3**
REMOVAL ..... **LU– 3**
DISASSEMBLY ..... **LU– 4**
ASSEMBLY ..... **LU– 6**
INSTALLATION ..... **LU– 8**
TIGHTENING TORQUE **LU–10**

PLU00001-00000

OIL PRESSURE WARNING

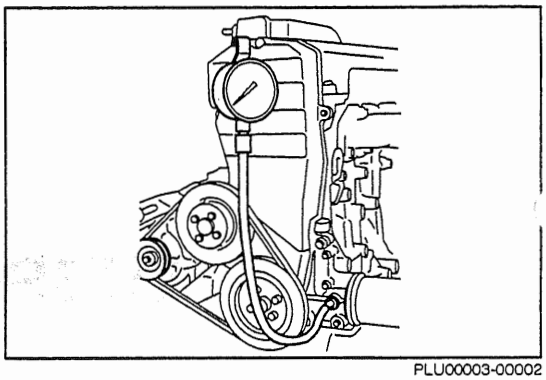
1. Check to see if the oil pressure warning will be illuminated when the ignition switch is turned on.
   NOTE:
   - If the warning lamp will not go on, check to see if the bulb in the combination meter is burnt out.
     (Refer to the BE section of the service manual.)
   - If the warning lamp is illuminated when the engine has started, perform the following checks.
     (In advance, be sure to check that the engine oil is at a sufficient level and the oil filter condition.)



PLU00002-00001

OIL PRESSURE CHECK

1. Remove the engine undercover. (Only for Van)
2. Disconnect the oil pressure switch connector.
3. Remove the oil pressure switch.
   NOTE:
   - Use a hexagonal long box wrench for removal.



PLU00003-00002

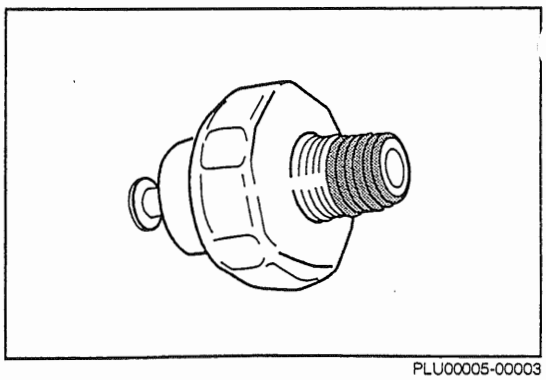
4. Install a suitable oil pressure gauge.
5. Measuring of oil pressure
   Start the engine and warm it up to the normal operating temperature.
   Ensure that the oil pressure is within the specification.
   Specified Oil Pressure
   At Idle Speed: 200 kPa or more
   At 3000 rpm: 245 - 490 kPa

   NOTE:
   - If the measured value fails to conform to the specified value, check and repair the oil pump.

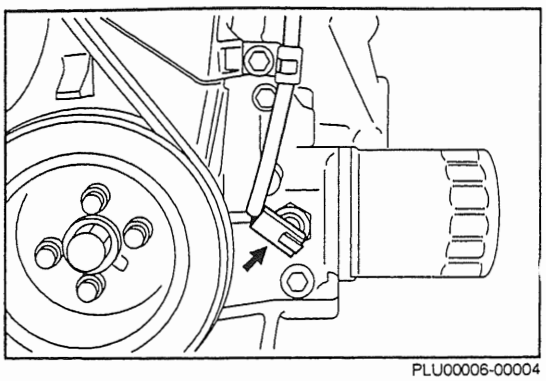
PLU00004-00000

6. Stop the engine.
7. Remove the oil pressure gauge.
8. Clean the threaded portion of the oil pressure switch.
9. Wind seal tape around the threaded portion of the oil pressure switch.
10. Install the oil pressure switch to the oil pump.
    Tightening Torque: 11.8 - 19.6 N·m

    NOTE:
    - Use a hexagon long box wrench for the installation of the oil pressure switch.
    - The new oil pressure switch is coated with sealer.
    - Therefore, when replacing the oil pressure switch with the new one, remove the sealer thoroughly before winding seal tape.
    - Be sure to clean the hole threads at the oil pump side before installation of the oil pressure switch.



PLU00005-00003

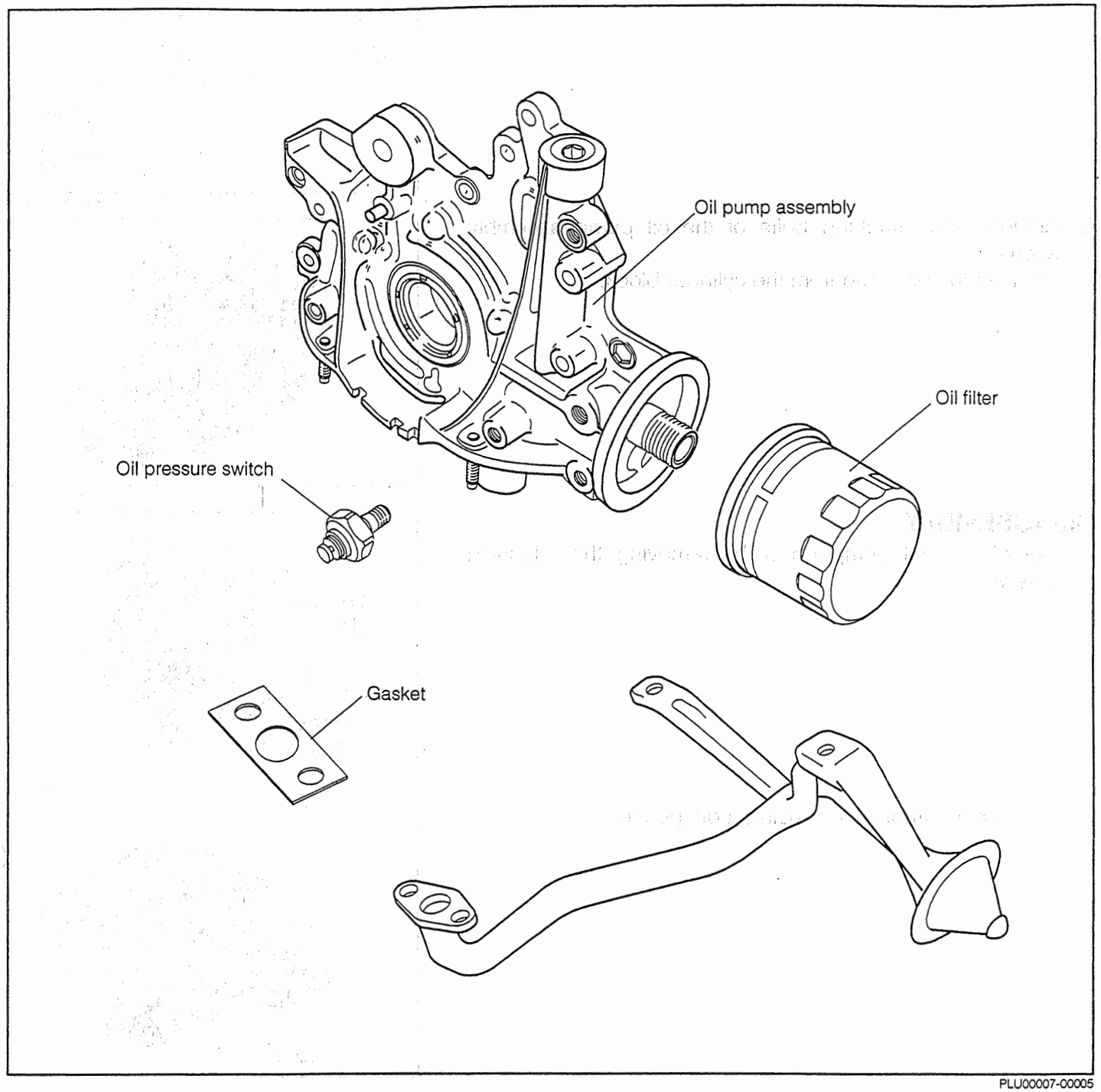


PLU00006-00004

11. Connect the connector of the engine wire to the oil pressure switch.
12. Start the engine and check it for oil leakage.

OIL PUMP

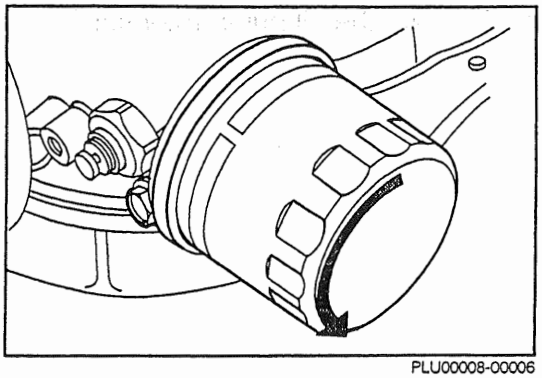
COMPONENTS



PLU00007-00005

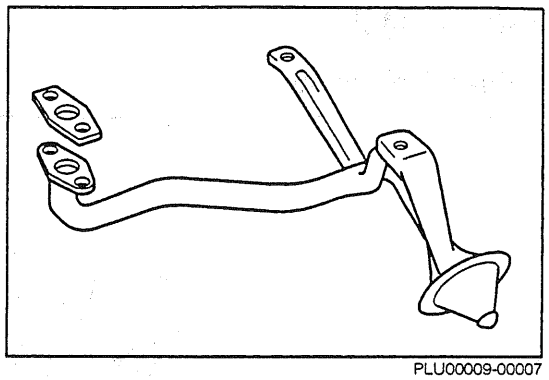
REMOVAL

1. Install the engine unit to the suitable engine stand.
2. Remove the oil filter element.
3. Remove the attaching bolts and nuts of the oil pan.
4. Separate the oil pan from the cylinder block.



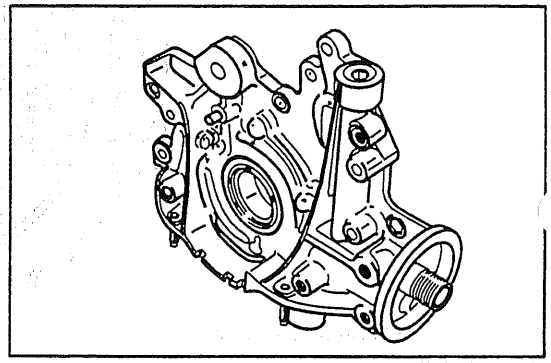
PLU00008-00006

5. Remove the oil strainer by removing the attaching bolts.



PLU00009-00007

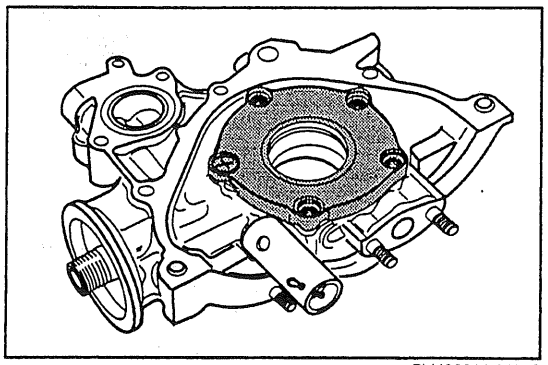
6. Remove the attaching bolts of the oil pump assembly evenly.
7. Remove the oil pump from the cylinder block.



PLU00010-00008

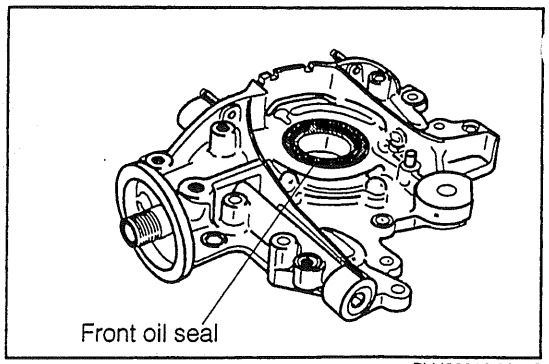
DISASSEMBLY

1. Detach the oil pump cover by removing the attaching screws.



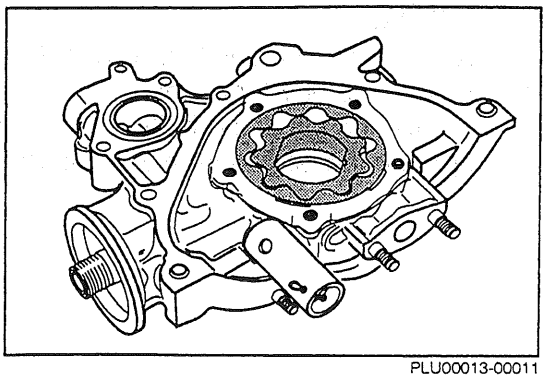
PLU00011-00009

2. Remove the front oil seal using a pin punch.



PLU00012-00010

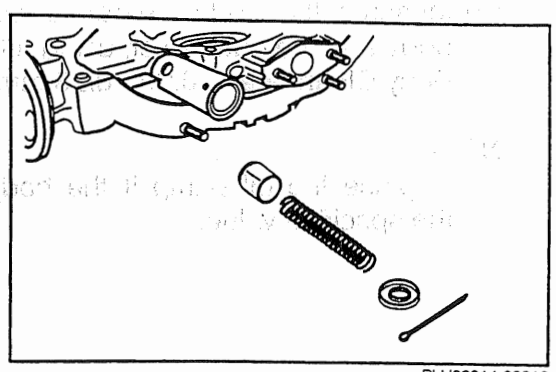
3. Remove the oil pump rotor set.



PLU00013-00011

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.

5. Remove the oil pump relief valve spring retainer, compression spring and oil pump relief valve.



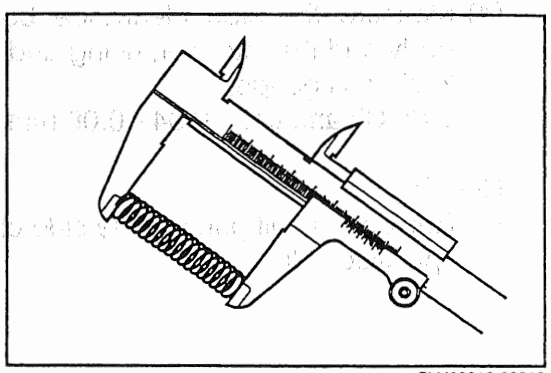
PLU00014-00012

6. Inspection of each part
   (1) Wash the disassembled parts in cleaning solvent.
   (2) Check the pump body for damage.
   (3) Check the rotor set for damage.
   (4) Check the oil pump relief valve for damage.
   (5) Check the oil pump relief valve spring retainer for damage.
   NOTE:
   - Replace the each parts if it exhibits damage.

PLU00015-00000

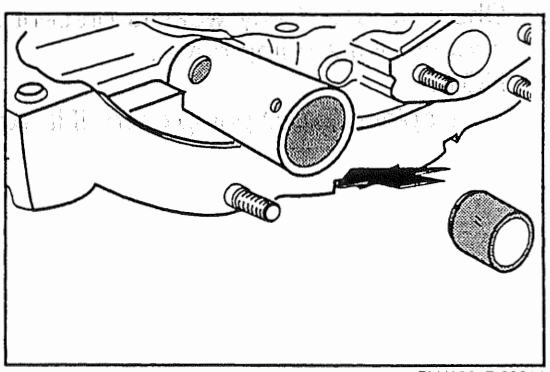
   (6) Check the compression spring for damage. Also, measure its free length.
   Specified Free Length: 57 mm

   NOTE:
   - Replace the compression spring if it exhibits damage or the free length is less than the specified value.



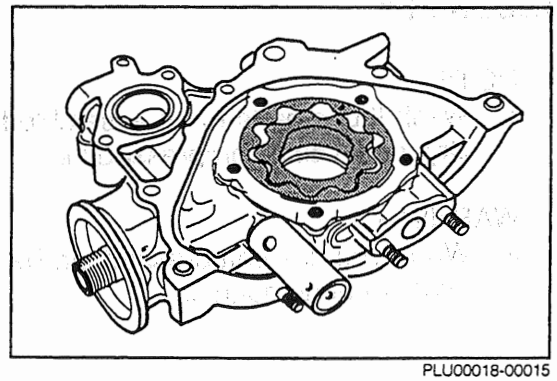
PLU00016-00013

   (7) 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.
   NOTE:
   - Replace the oil pump body if the valve fails to slide smoothly.



PLU00017-00014

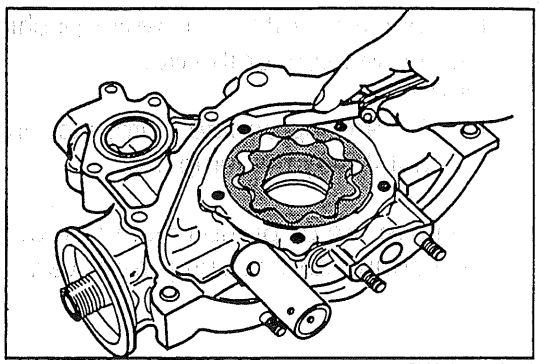
7. Measurement of body clearance, tip clearance and side clearance
   (1) Apply a thin film of engine oil to the rotor mate surface of the oil pump body as well as to the rotor set. Assemble the rotor set in the oil pump body in such a way that the drilled mark may be seen from the outside.



PLU00018-00015

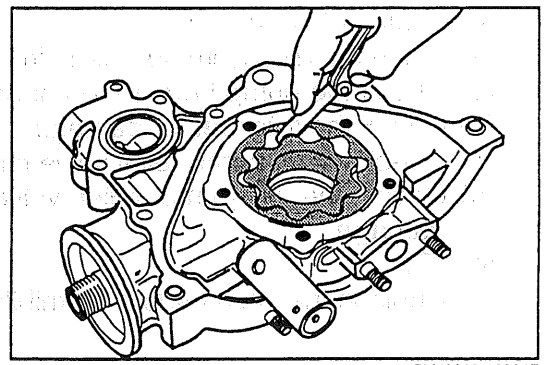
(2) Measure the body clearance between the oil pump body and the outer rotor, using a thickness gauge.
Body Clearance: 0.20 - 0.28 mm

NOTE:
- Replace the oil pump if the body clearance exceeds the specified value.


PLU00019-00016

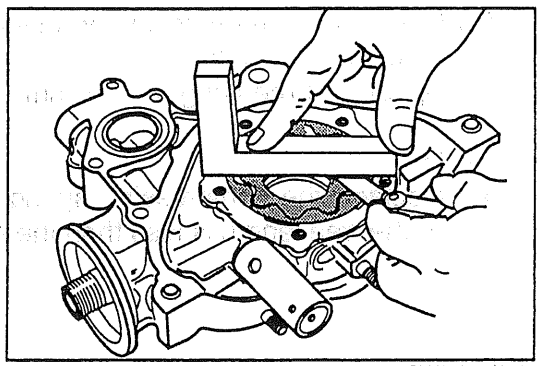
(3) Measure the tip clearance of the rotor set, using a thickness gauge.
Tip Clearance: 0.16 - 0.24 mm

NOTE:
- Replace the rotor set if the tip clearance exceeds the specified value.

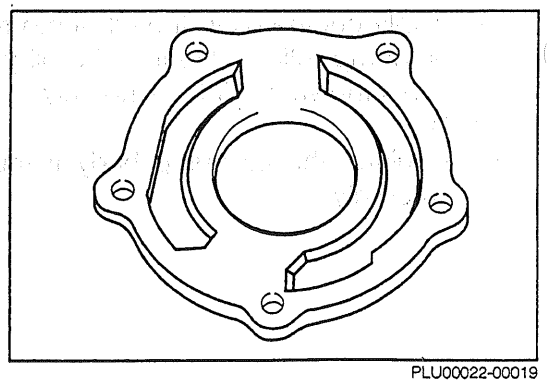

PLU00020-00017

(4) Measure the side clearance between the oil pump body and the rotor set, using and a straightedge and a thickness gauge.
Side Clearance: 0.04 - 0.08 mm

NOTE:
- Replace the oil pump if the side clearance exceeds the specified value.


PLU00021-00018

8. Check to see if any wear is present at the rotor set mate surface of the pump cover.
NOTE:
- Replace the oil pump cover if it exhibits wear.


PLU00022-00019

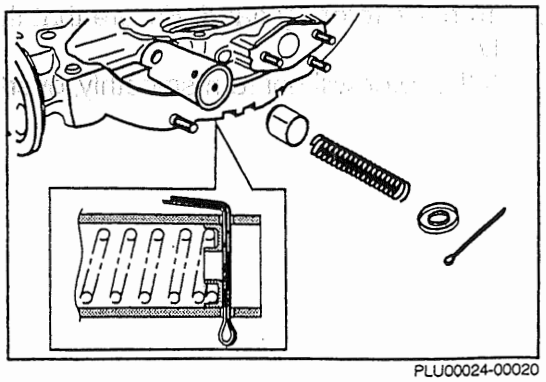
ASSEMBLY

NOTE:
- Wash those parts to be assembled in cleaning solvent. Dry them using compressed air.

WARNING:
- When you use compressed air, be sure to protect your eyes, wearing goggles.

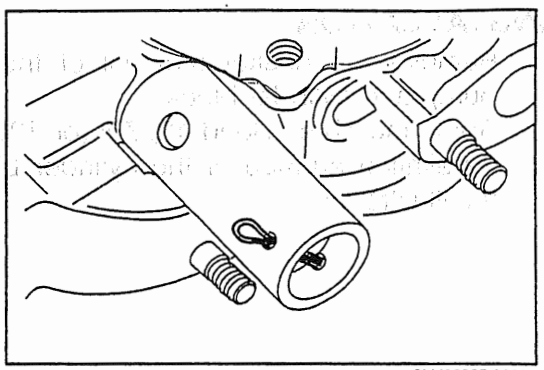
PLU00023-00000

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.
   CAUTION:
   - Install the retainer in such a direction that its projected side may come at the compression spring side.



PLU00024-00020

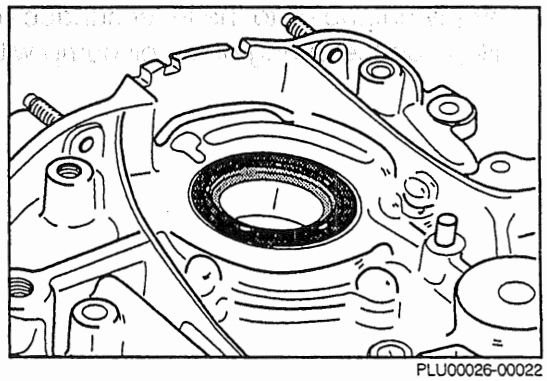
3. Insert a new cotter pin into the retainer while the retainer is being compressed with pliers, etc. Split the end of the cotter pin to form an anchor-like shape.



PLU00025-00021

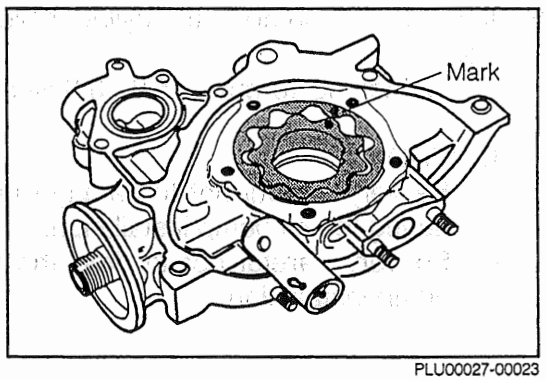
4. Drive a new oil seal into position if the oil seal preset any damaged, using the following SST.
   SST: 09310-87102-000

   NOTE:
   - Be very careful not damage the oil pump during the removal and the installation of the oil seal.
   - Make sure that the oil seal is not driven into position in a tilted state.



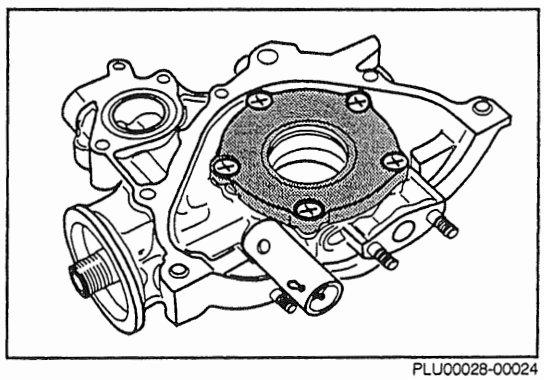
PLU00026-00022

5. 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.



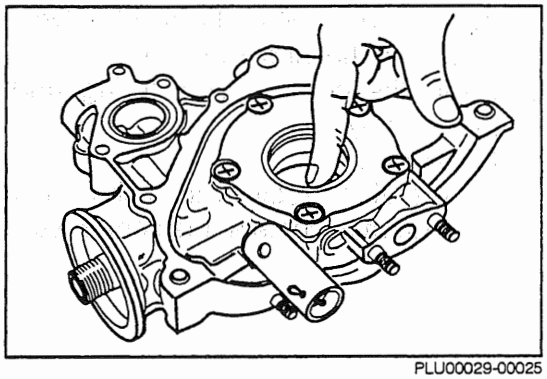
PLU00027-00023

6. Install the oil pump cover. Tighten the cover to the specified torque.
   Tightening Torque: 7.8 - 12.7 N·m



PLU00028-00024

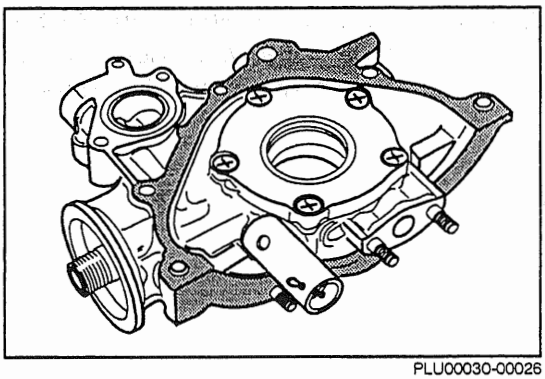
7. Turn the rotor by hand. Ensure that the rotor turns smoothly.
   If the rotor will not turn smoothly, overhaul the oil pump.



PLU00029-00025

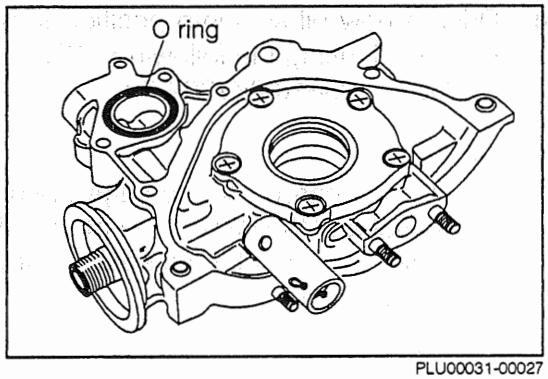
INSTALLATION

1. Remove the gasket material of the sealer from the oil pump and cylinder block.
2. Apply the Three Bond 1207-F (or 1207-C) to the oil pump installation surface of the cylinder block, as indicated in the illustration.



PLU00030-00026

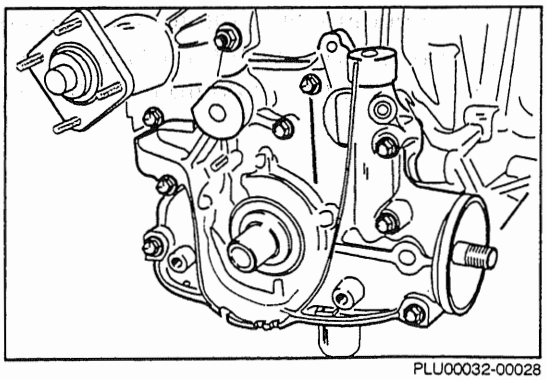
3. Apply engine oil to the inner surface of the oil seal.
4. Replace the O-ring of the oil pump with a new one.



PLU00031-00027

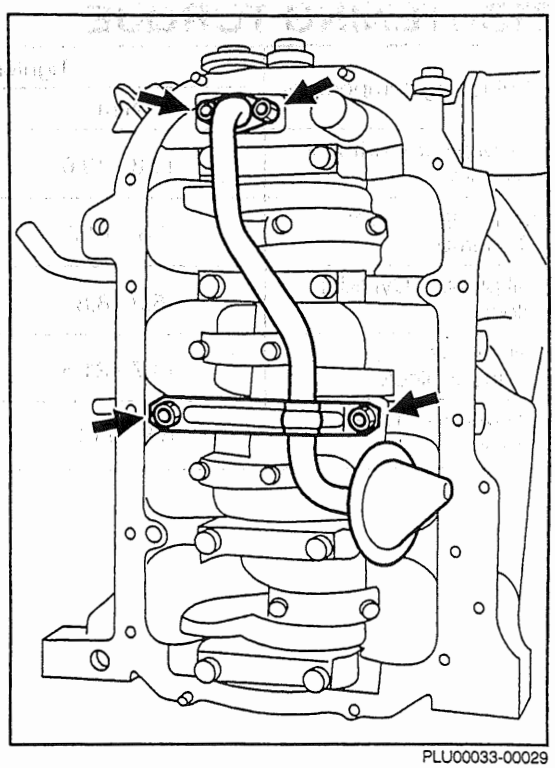
5. Install the oil pump to the cylinder block with the attaching bolts.
   Tightening Torque: 5.9 - 8.8 N·m

   CAUTION:
   - Be very careful not to damage the crankshaft oil seal during the oil pump installation.
   - Be very careful not to drop the O-ring during the oil pump installation.



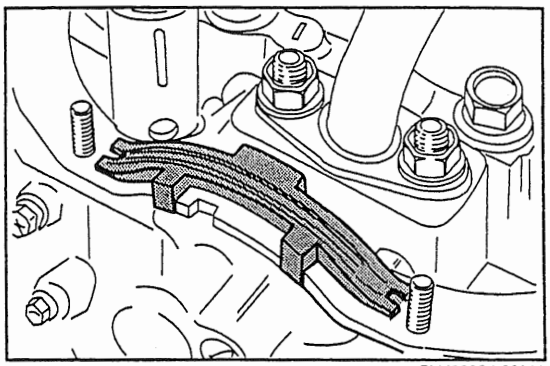
PLU00032-00028

6. Install the oil strainer to the cylinder block with a new gasket interposed.
   Tightening Torque: 14.7 - 21.6 N·m



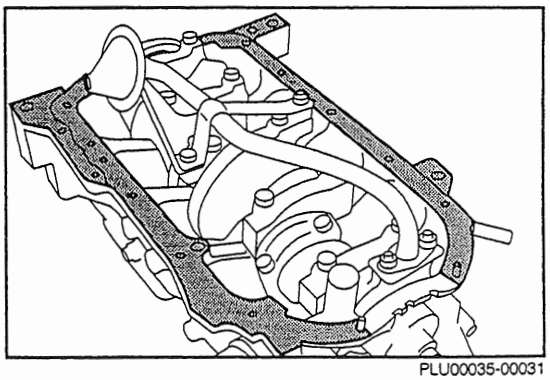
PLU00033-00029

7. Attach the oil pan gaskets to the cylinder block.
   NOTE:
   - The oil pan gaskets are provided at two points; one at the oil pump side and the other at the flywheel side. Fit the protruding section of the gasket into the cut-out section of the cylinder block.



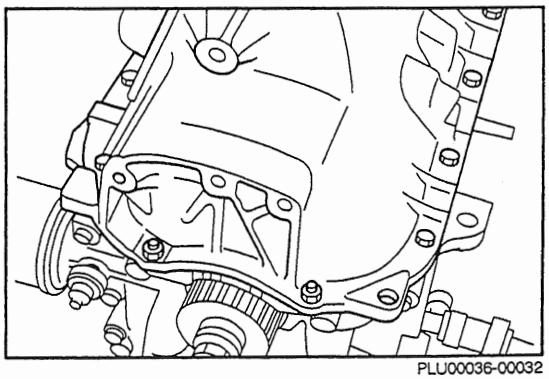
PLU00034-00030

8. Apply the Three Bond 1207-F (or 1207-C) to the cylinder block attaching section of the oil pan as shown in the right figure.
   NOTE:
   - Be sure to apply the Three Bond to both ends of the oil pan gasket in such a way that the applied portions may be overlapped.



PLU00035-00031

9. Install the oil pan to the cylinder block with the attaching bolts and nuts.
10. Tighten the oil pan attaching bolts and nuts to the specified torque evenly over two or three stages.
    Tightening Torque: 6.9 - 11.8 N·m



PLU00036-00032

TIGHTENING TORQUE

Tightening components	Tightening torque		Remarks
	N·m	kgf-m	
Oil pressure switch × Oil pump	11.8 - 19.6	1.2 - 2.0	
Oil pump cover × Oil pump	7.8 - 12.7	0.8 - 1.3	
Oil pump × Cylinder block	5.9 - 8.8	0.6 - 0.9	
Oil strainer × Cylinder block	14.7 - 21.6	1.5 - 2.2	
Oil pan × Cylinder block	6.9 - 11.8	0.7 - 1.2	

PLU00037-00000

CO

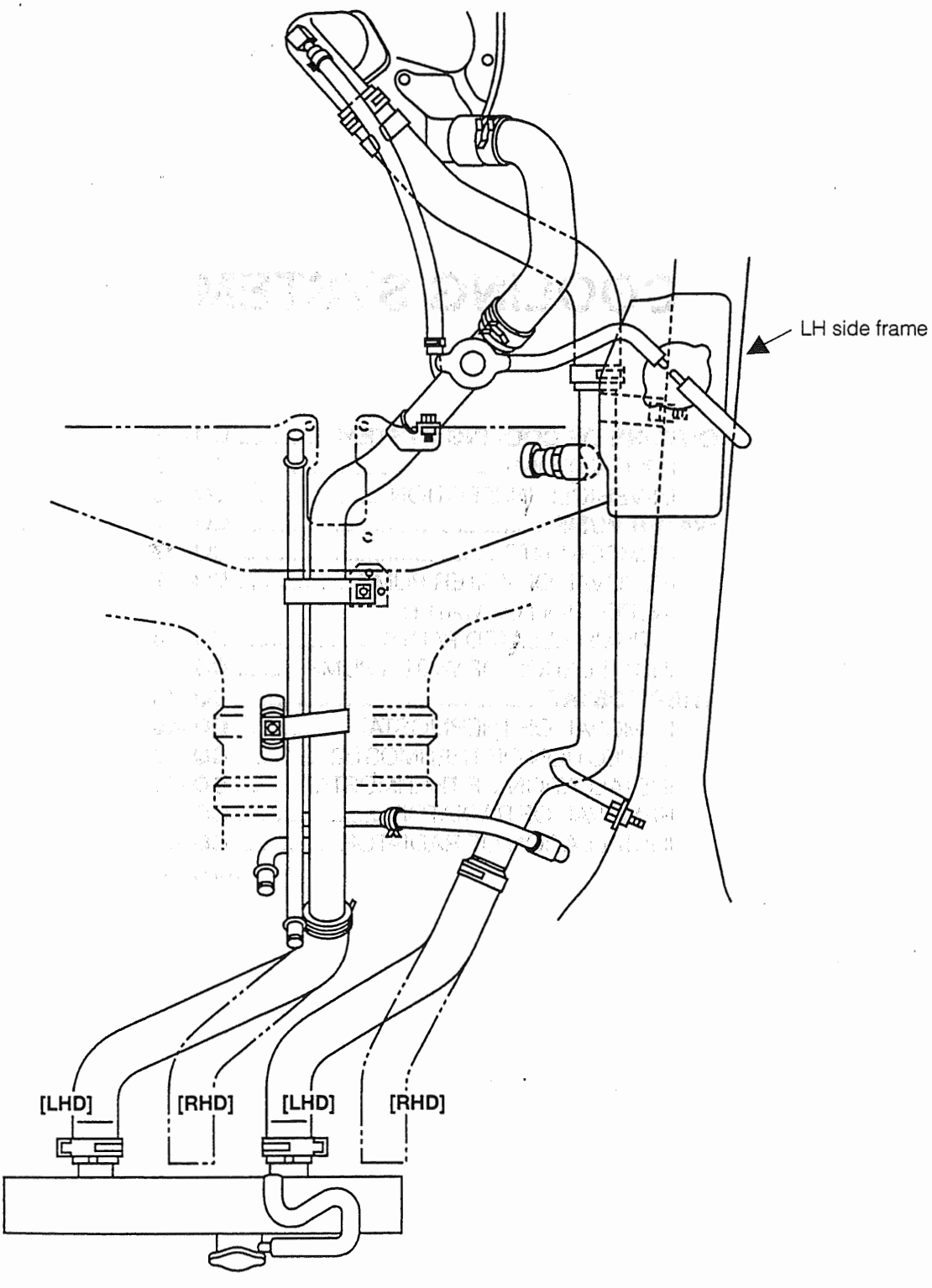
COOLING SYSTEM

OUTLINE OF COOLING SYSTEM ..... CO– 2
PRECAUTIONS ..... CO– 3
IN-VEHICLE INSPECTION ..... CO– 3
WATER PUMP ..... CO– 7
COMPONENTS ..... CO– 7
REMOVAL OF WATER PUMP ..... CO– 7
INSPECTION OF WATER PUMP-RELATED PARTS ..... CO– 8
INSTALLATION OF WATER PUMP ..... CO– 8
THERMOSTAT CO–10
REMOVAL OF THERMOSTAT CO–10
INSPECTION OF THERMOSTAT CO–10
INSTALLATION OF THERMOSTAT CO–11
REMOVAL OF RADIATOR CO–11
INSTALLATION OF RADIATOR CO–13

PCO00001-00000

OUTLINE OF COOLING SYSTEM

The cooling system is a water-cooled, forced-circulation type. Furthermore, it employes an electric cooling fan. The cooling system employs a bottom by-pass type in which the thermostat equipped with a by-pass type vale 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 connection parts.



PCO00002-000001

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 still hot.
- The inside of the radiator is under a pressurized condition when the cooling water is hot. Therefore, if the radiator cap should be removed, the cooling water will blow off, possibly causing injuries such as scald.

PPCO00003-00000

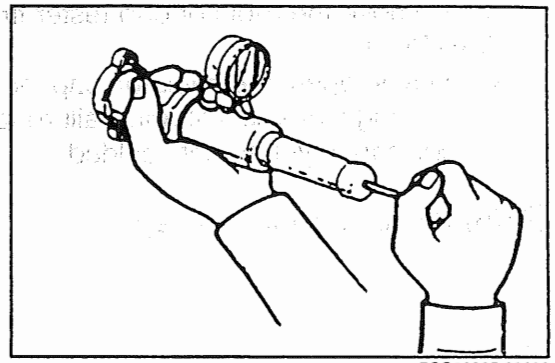
IN-VEHICLE INSPECTION

INSPECTION OF RADIATOR

1. Cleaning of radiator
   Using water or a steam cleaner, remove mud and dirt from the radiator core.
   CAUTION:
   - When using a high-pressure type cleaner, be very careful not to deform the radiator core fins.
   - Keep a distance of more than 40 - 50 cm between the radiator core and the cleaner nozzle when the cleaner nozzle pressure is 2.9 - 4.9 Mpa.
   - Also, the injection angle of pressurized water should be right angles to the radiator.
   - Failure to observe this caution will cause the radiator fins to be deformed.

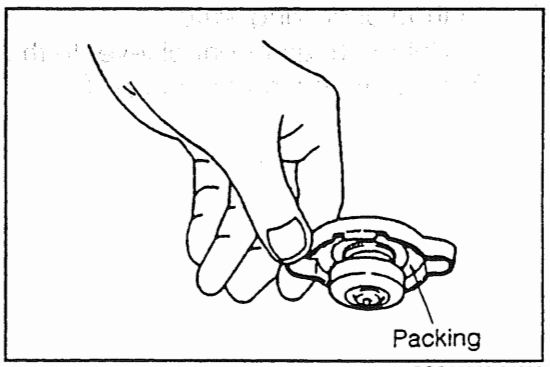
PCO00004-00000

2. Check of radiator cap.
   (1) Check the radiator cap by means of a radiator cap tester to see if the relief valve opens at pressure of 59 - 103 Kpa. If the radiator cap fails to conform to the specification, replace the radiator cap.
   CAUTION:
   - Never open the radiator cap when the engine is still hot. Failure to observe this caution will cause you to get scalded.



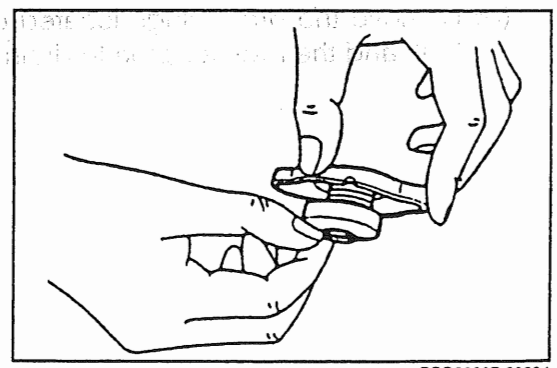
PCO00005-00002

   (2) Check the seal packing of the radiator cap for damage. Replace the radiator cap with a new one, if any damage exists.



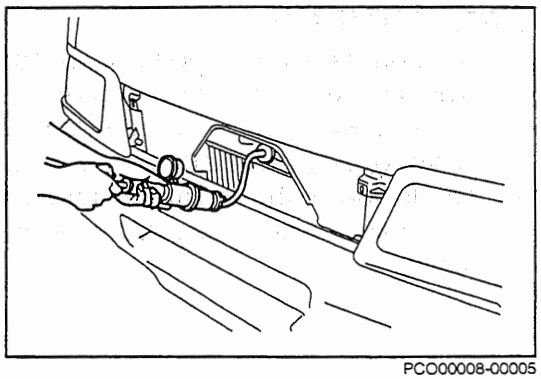
PCO00006-00003

   (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.



PCO00007-00004

3. 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 88 kPa to the cooling system by means of a radiator tester.

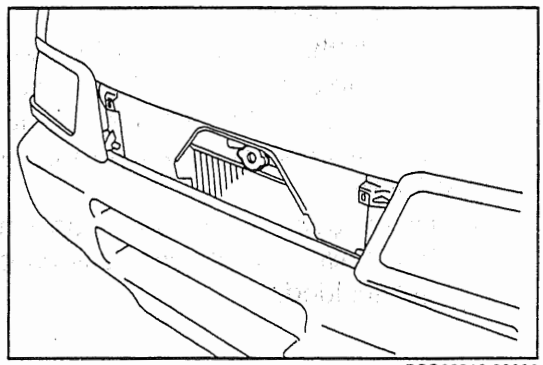


PCO00008-00005

   (4) Check for leakage. Check the hoses for leakage, deterioration, cracks, bulge or damage.
   If the pressure drops; check the hoses, radiator, water pump and heater for evidence of leakage.
   Replace the defective part(s) if necessary.

PCO00009-00000

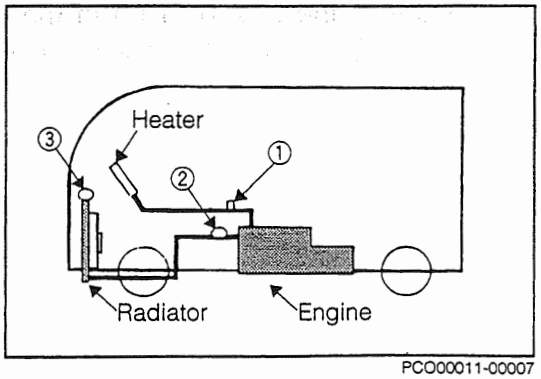
   (5) Remove the radiator cap tester from the radiator.
   CAUTION:
   - Never open the radiator cap or drain plug when the cooling water is still hot. Failure to observe this caution will cause you to get scalded.



PCO00010-00006

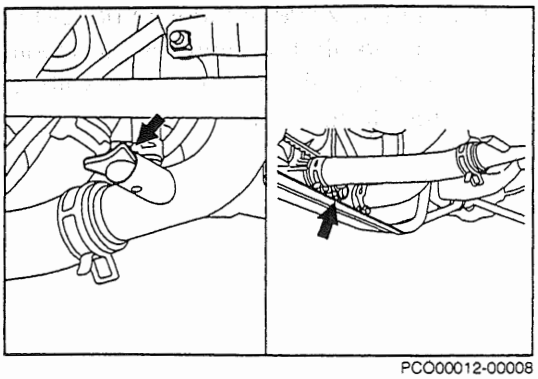
   (6) Secure the radiator cap.

4. Change of cooling water
   (1) Set the heater control lever to the warm position.
   (2) Remove the radiator cap ③.



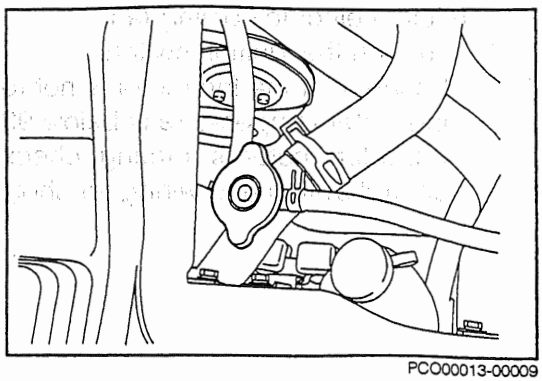
PCO00011-00007

   (3) Remove the drain plugs located on the radiator lower tank and the radiator pipe to drain the cooling water.



PCO00012-00008

(4) Remove the cap ② provided at the engine side and the plug 1 for the heater air bleeding pipe at the upper part of the engine.

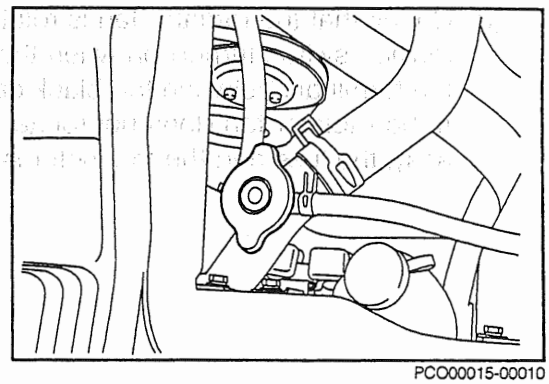


PCO00013-00009

(5) Insert a hose into the radiator filling port. Clean the radiator inside. During this operation, keep the engine idling.
(6) Stop the engine. Close the drain plugs.

PCO00014-00000

(7) Fill the cooling water to the radiator from the filling port ③ of the radiator.
(8) When the cooling water starts to overflow from the plug 1 for the heater air bleeding pipe and the port ② provided at the engine side, close them securely.

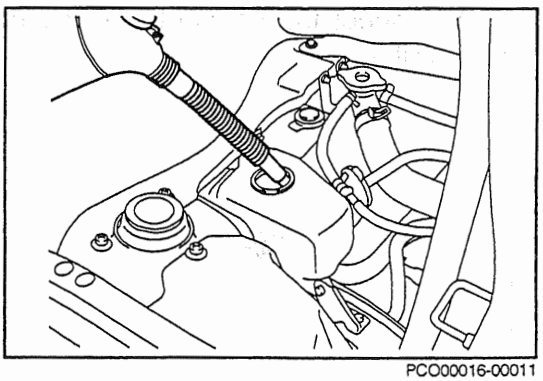


PCO00015-00010

(9) Fill the cooling water until water starts overflowing from the radiator filling port. Close the radiator cap securely.
(10) Clean the inside of the reserve tank. Fill the cooling water fully.
(11) Warm-up the engine until the cooling water temperature rises. Then stop the engine.
(12) After the cooling water temperature drops, remove the cap ②. Check the cooling water level. If the level is too low, add the cooling water.

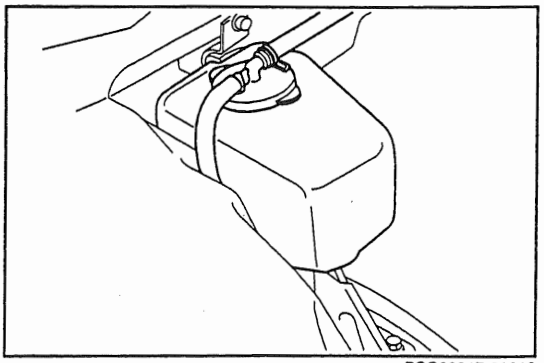
CAUTION:

- Never open the radiator cap ③ at this time, becase the cooling water will overflow from the port ②.



PCO00016-00011

(13) Check the water level of the reserve tank. Fill the cooling water up to the full the level. Reinstall the reserve tank cap securely.

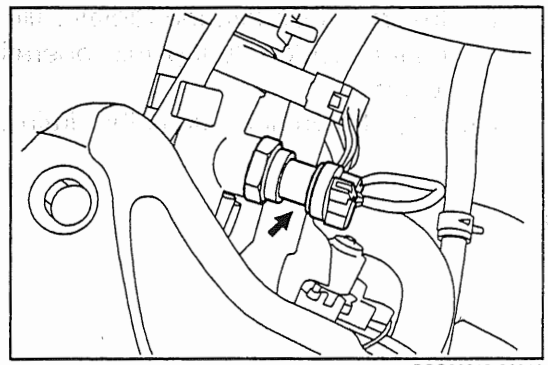


PCO00017-00012

5. Check of electric cooling fan
   (1) Turn on the ignition switch.
   Ensure that the fan motor is not rotating when the cooling water temperature is below 92°C.
   If the fan motor is rotating, check the radiator thermo-control switch and wiring for short circuit.

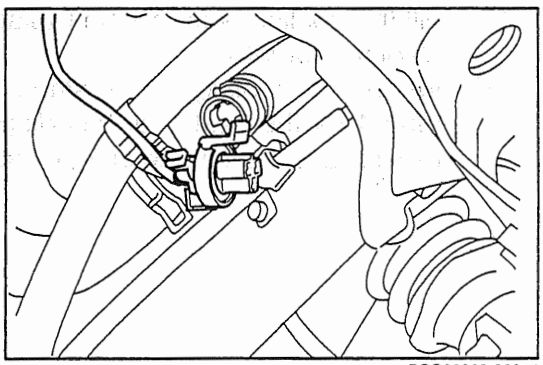
PCO00018-00000

(2) Disconnect the connector of the radiator thermo-control switch.



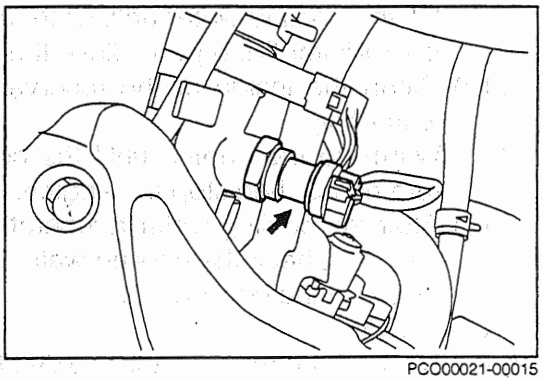
PCO00019-00013

(3) Check that the radiator fan is rotating properly with the ignition switch turned on when the jump wire connects the terminals between the black cable and blue cable.
If the radiator fan does not rotate, check the fan motor assy, the fuse and the fan motor switch.



PCO00020-00014

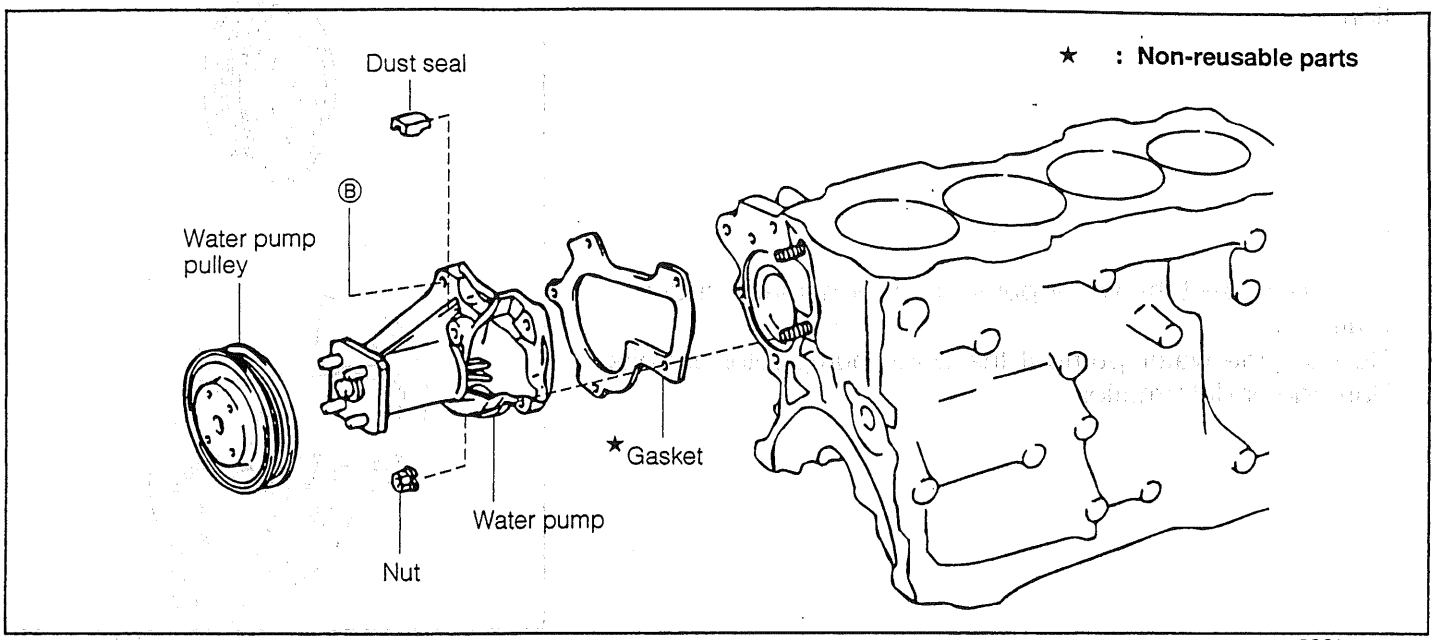
(4) Connect the connector to the radiator thermo-control switch.



PCO00021-00015

WATER PUMP

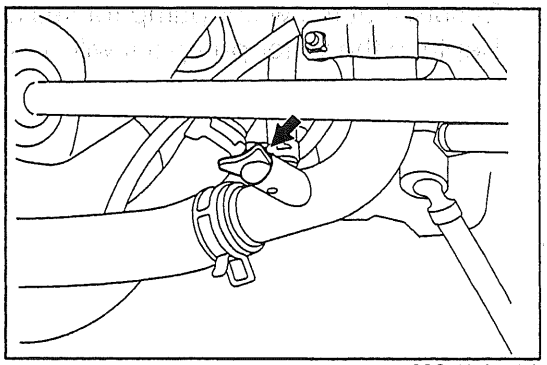
COMPONENTS



PCO00022-00016

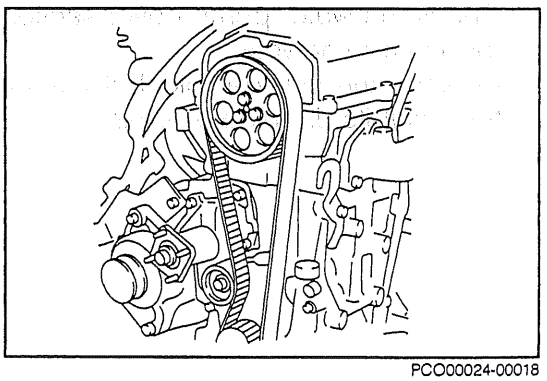
REMOVAL OF WATER PUMP

1. Disconnect the battery ground cable from the negative (–) terminal of the battery.
2. Remove the engine under cover.
3. Drain the coolant.
   Open the radiator cap and drain plug, and allow the coolant to drain into a container.
   WARNING:
   - Never open the radiator cap and/or drain plug. When the engine is hot.



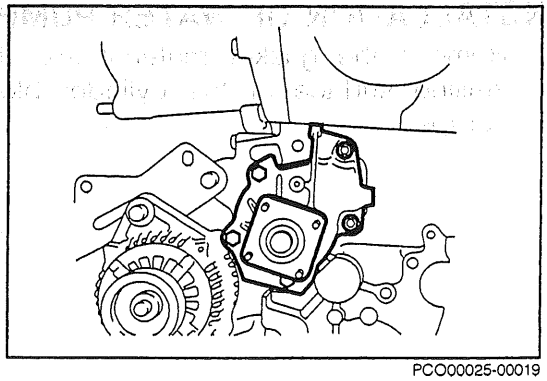
PCO00023-00017

4. Remove the timing belt.
   (Refer to the EM section.)



PCO00024-00018

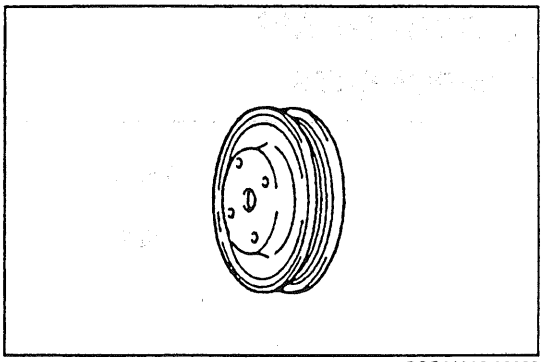
5. Remove the water pump by removing the attaching bolts and nuts of the water pump.



PCO00025-00019

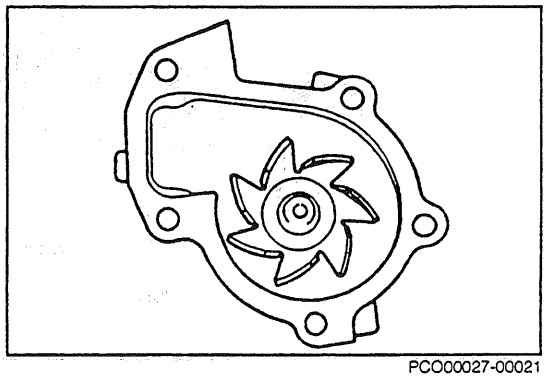
INSPECTION OF WATER PUMP-RELATED PARTS

1. Check the water pump pulley for damage or deformation.
   Replace the water pump if it exhibits damage or deformation.



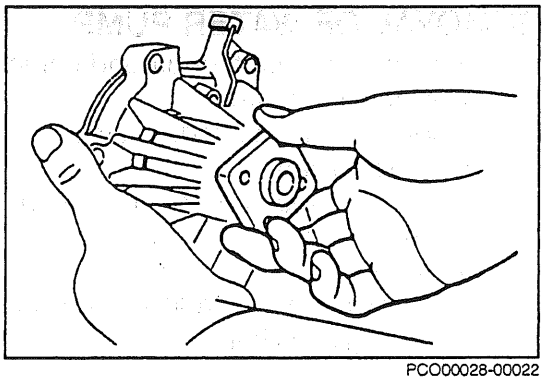
PCO00026-00020

2. Visually inspect the water pump rotor for damage or deformation.
   Replace the water pump if the water pump rotor exhibits damage or deformation.



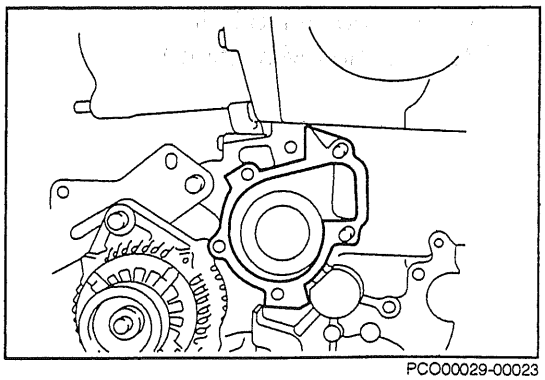
PCO00027-00021

3. Ensure that the water pump rotates smoothly by hand.
   Replace the water pump if it will not rotate smoothly.



PCO00028-00022

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.



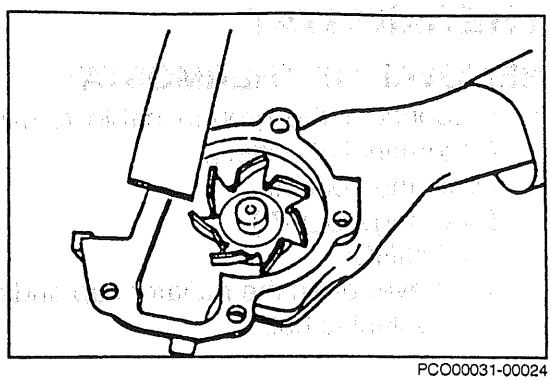
PCO00029-00023

INSTALLATION OF WATER PUMP

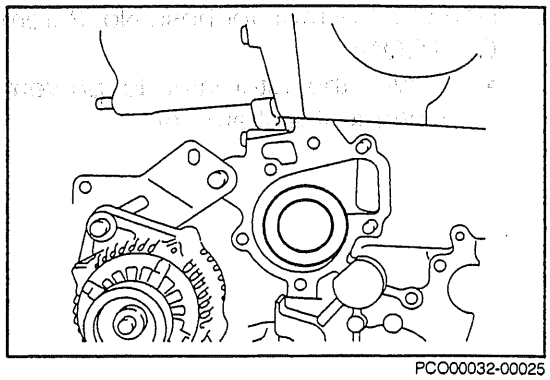
1. Remove the gasket material from the water pump installing surface of the cylinder block, using a gasket scraper.

PCO00030-00000

2. Remove the gasket material from the water pump, using a gasket scraper.

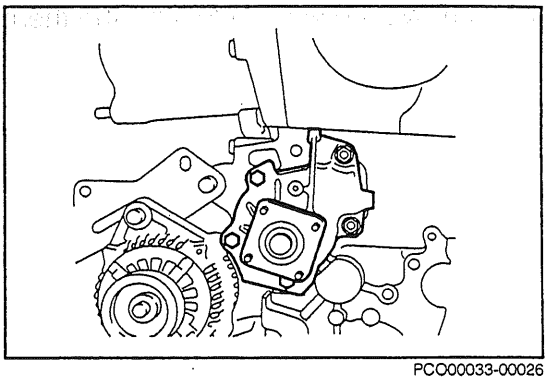

PCO00031-00024

3. Install a new gasket to the cylinder block.

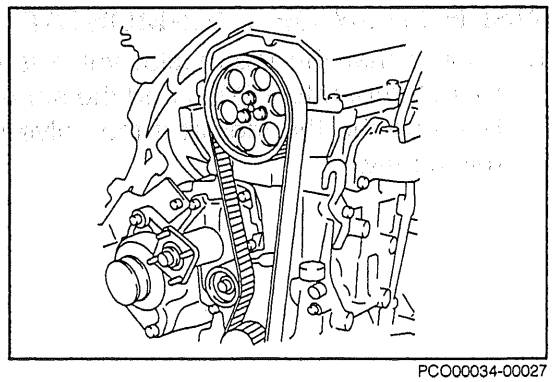

PCO00032-00025

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

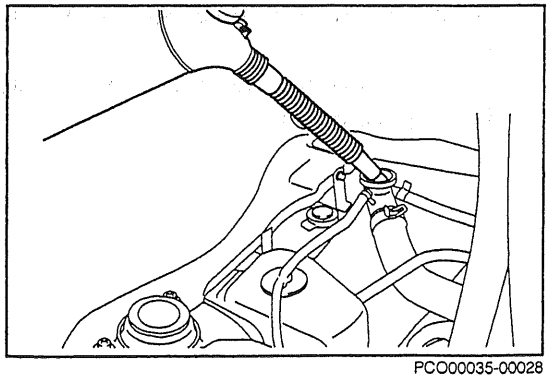
   NOTE:
   - After tightening bolts, ensure that the water pump rotates smoothly by hand.


PCO00033-00026

5. Install the timing belt.
   (Refer to the EM section.)


PCO00034-00027

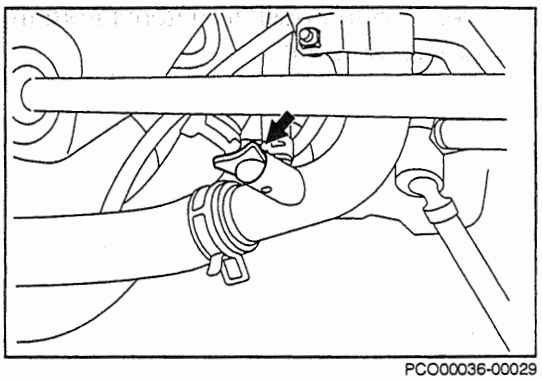
6. Fill coolant.
7. Install the engine under cover.
8. Connect the battery ground cable to the negative (–) terminal of the battery.


PCO00035-00028

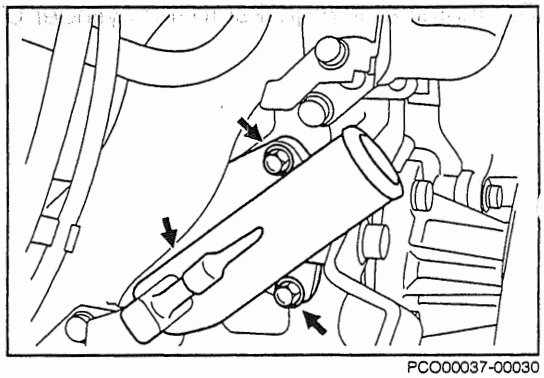
THERMOSTAT

REMOVAL OF THERMOSTAT

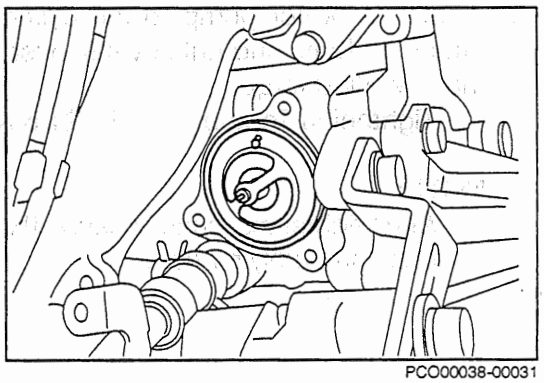
1. Disconnect the ground cable terminal from the negative (–) terminal of battery.
2. Drain the coolant
   (See page CO–7.)
   WARNING:
   - Never open the radiator cap and/or drain plug when the coolant is hot.


PCO00036-00029

3. Remove the radiator hose No. 2 from the water inlet.
   CAUTION:
   - Cover the alternator to prevent entering the cooling water to the alternator.

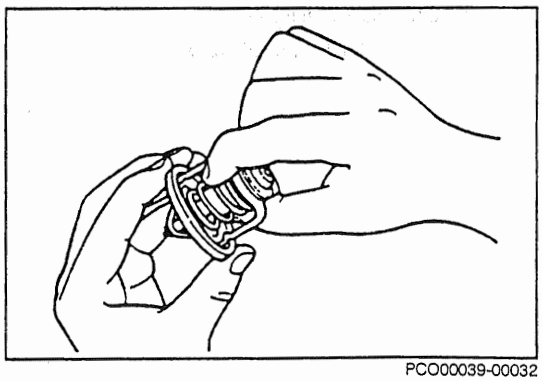

PCO00037-00030

4. Remove the water inlet and the thermostat.

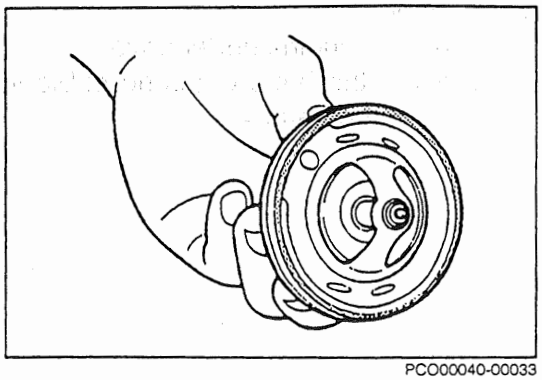

PCO00038-00031

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.


PCO00039-00032

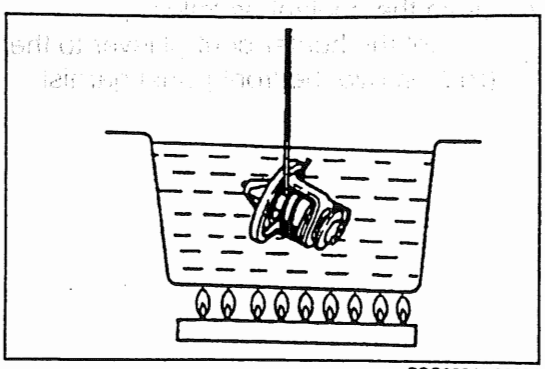
2. Check the rubber grommet of the thermostat for damage or crack.
   Replace the thermostat if the rubber grommet exhibits damage or crack.


PCO00040-00033

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	82 - 86	8.5 mm or more at 97°C

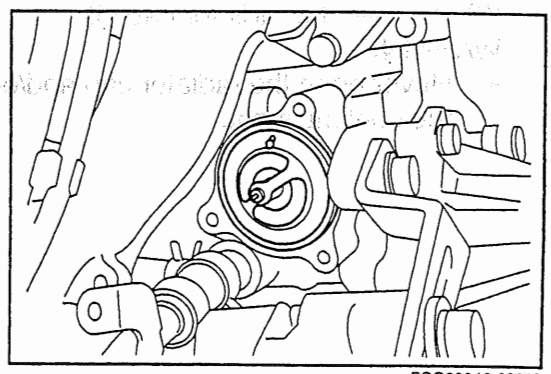
Replace the thermostat if the valve operation fails to conform to the specifications.



PCO00041-00034

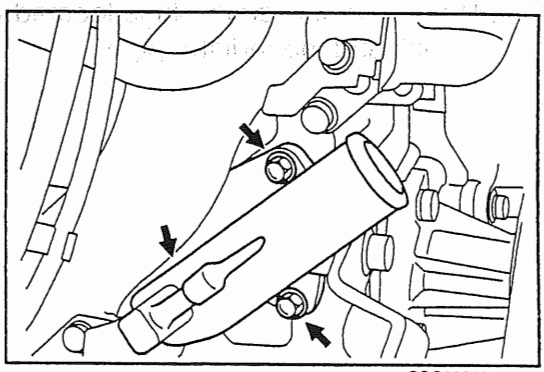
INSTALLATION OF THERMOSTAT

1. 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.



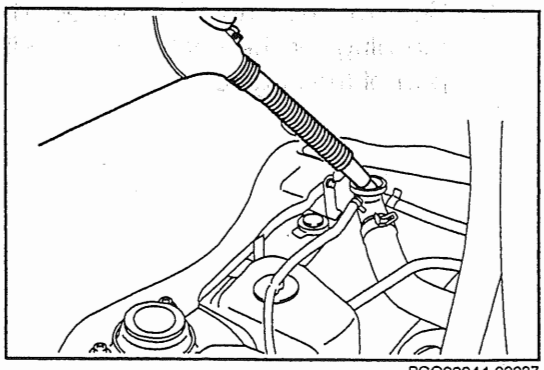
PCO00042-00035

2. Install the water inlet.
   Tightening Torque: 5.9 - 8.8 N·m (0.6 - 0.9 kgf-m)



PCO00043-00036

3. Fill coolant.
4. Connect the battery ground cable to the negative (–) terminal of battery.
5. Start the engine and check it for leakage.
   Repair the leaky point if the leakage exists.



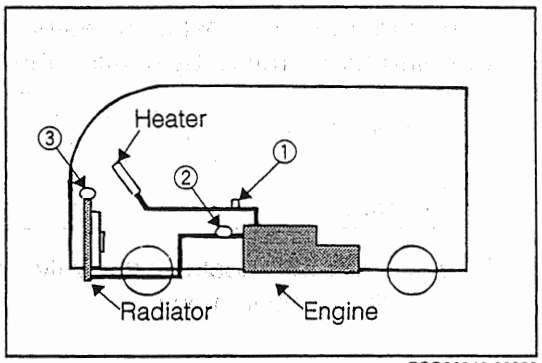
PCO00044-00037

REMOVAL OF RADIATOR

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

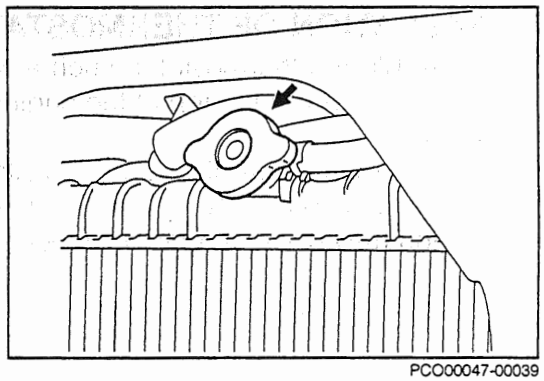
PCO00045-00000

2. Drain the coolant as follows;
   (1) Set the heater control lever to the warm position.
   (2) Remove the front panel garnish.

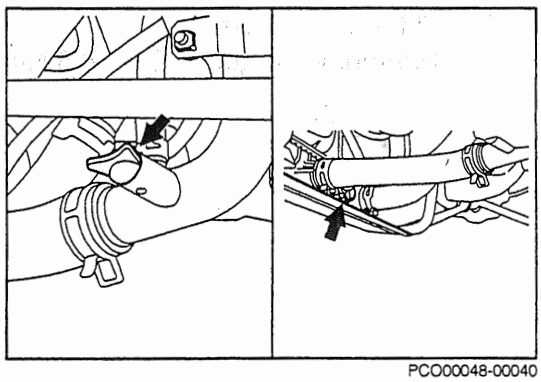


PCO00046-00038

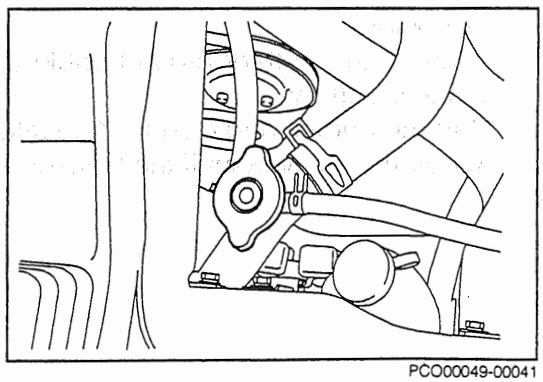
   (3) Remove the radiator cap ③.
   WARNING:
   - Never open the radiator cap and/or the drain plug when the coolant is hot.


PCO00047-00039

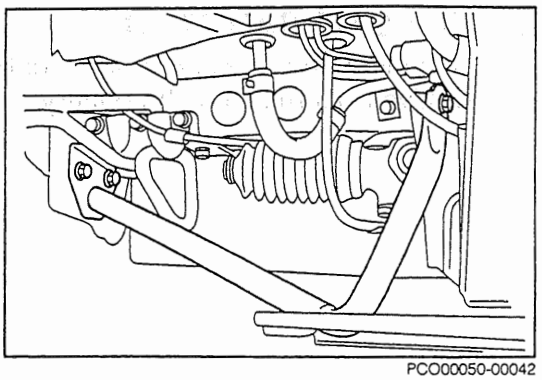
   (4) Remove the drain plugs located on the radiator lower tank and the radiator pipe.


PCO00048-00040

   (5) Remove the cap ② provided at the engine side and the plug for the heater air bleeding pipe at the upper part of the engine.


PCO00049-00041

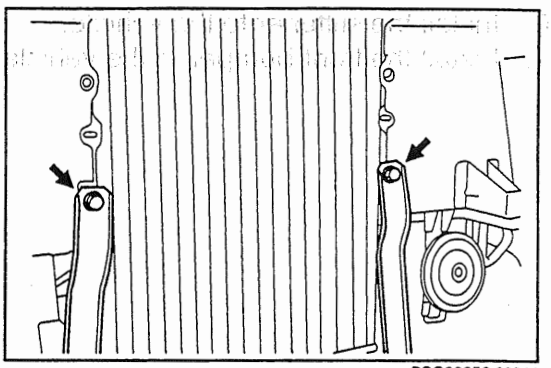
3. Remove the front bumper
4. Remove the stiffener.


PCO00050-00042

5. Disconnect the inlet hose, outlet hose and the water hose for the heater from the radiator.
6. Disconnect the connector of the radiator fan.

PCO00051-00000

7. Remove the right and left radiator supports by removing the attaching bolts.
   CAUTION:
   - Be very careful not to drop the radiator when removing the radiator support.



PCO00052-00044

8. Remove the radiator with the radiator fan and the fan shroud.
9. Remove the radiator fan and the fan shroud from the radiator.

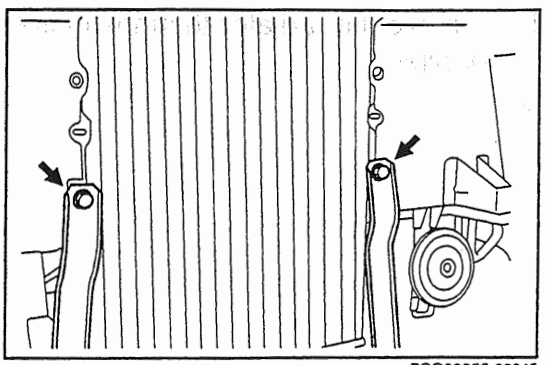
PCO00053-00000

INSTALLATION OF RADIATOR

1. Install the radiator fan and the radiator fan shroud to the radiator and tighten the attaching nuts.
2. Insert the right and left radiator supports to the radiator.

PCO00054-00000

3. Install the radiator with the radiator support to the vehicle and tighten the radiator support attaching bolts.

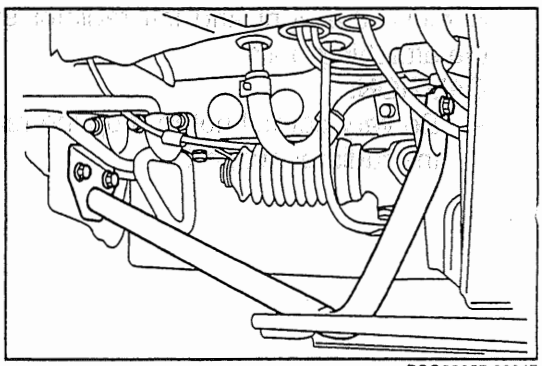


PCO00055-00045

4. Connect the connector of the radiator fan.
5. Connect the radiator inlet hose, the outlet hose and the water hose for the heater.

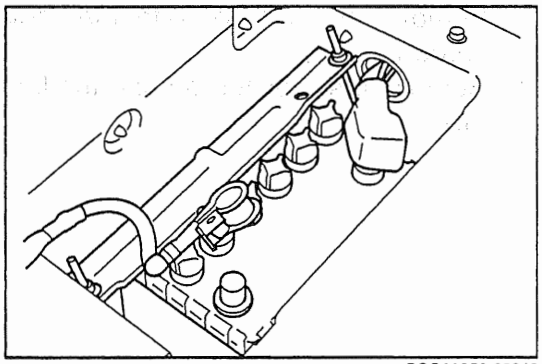
PCO00056-00000

6. Install the stiffener to the vehicle.
7. Install the front bumper to the vehicle.



PCO00057-00047

8. Connect the battery ground cable to the negative (–) terminal of the battery.
9. Fill the coolant.
10. Install the front panel garnish to the vehicle.

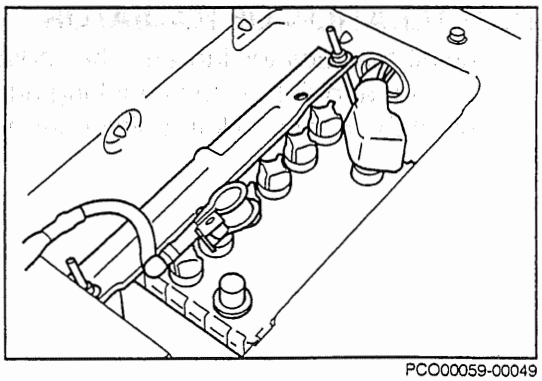


PCO00058-00048

RADIATOR THERMO-CONTROL SWITCH

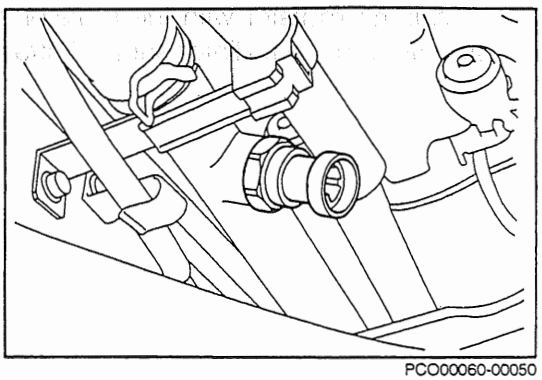
Removal of radiator thermo-control switch

1. Disconnect the ground cable terminal from the negative (–) terminal of the battery.
2. Drain the coolant.
3. Disconnect the connector from the radiator thermo-control switch.



PCO00059-00049

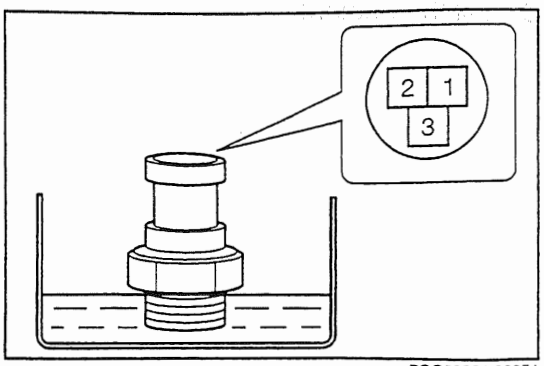
4. Remove the radiator thermo-control switch from the radiator pipe.



PCO00060-00050

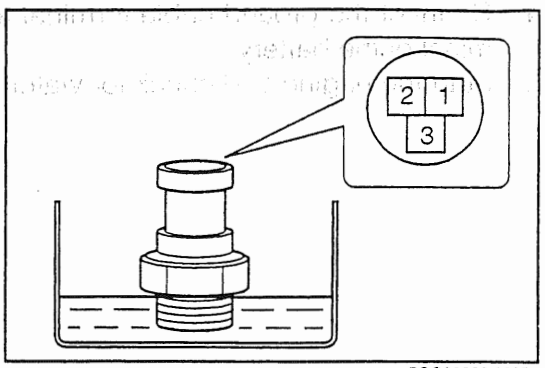
Inspection of radiator thermo-control switch

1. Connect an ohmmeter across the terminals between 3 - 1 and 3 - 2 of the radiator thermo-control switch.
2. Submerge the heat sensing section of the radiator thermo-control switch into oil whose temperature is below 90°C. Ensure that no continuity exists.
   If any continuity exists, replace the radiator thermo-control switch.



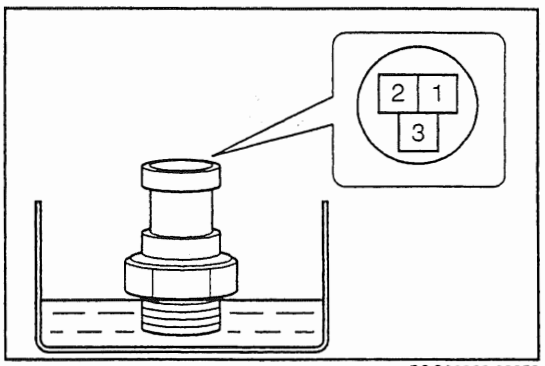
PCO00061-00051

3. Warm up the oil temperature to 92°C.
   Ensure that continuity exists between the terminals 3 - 2 of the thermo-control switch.
   If no continuity exists between the terminals 3 - 2 of the switch and/or continuity exists between the terminals 3 - 1 of the switch, replace the thermo-control switch.



PCO00062-00052

4. Warm up oil temperature above 100°C.
   Ensure that continuity exists between the terminals 3 - 1. If no continuity exists, replace the radiator thermo-control switch.



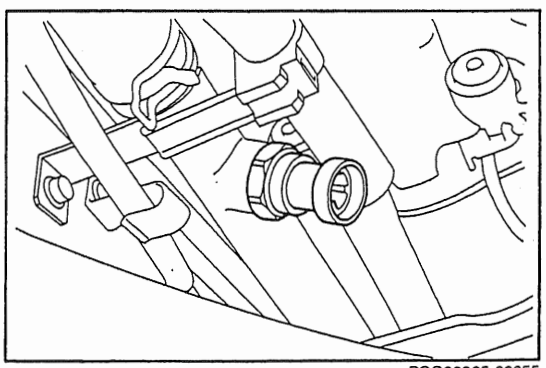
PCO00063-00053

Installation of radiator thermo-control switch

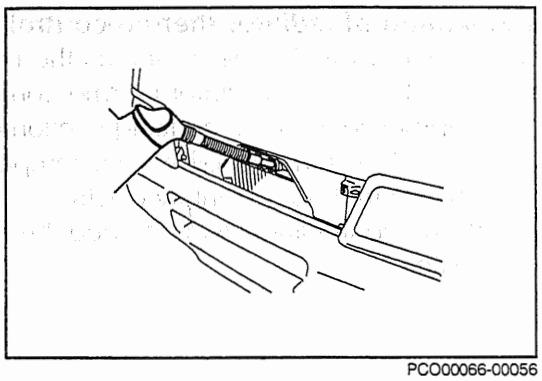
1. Clean the threaded portion of the radiator thermo-control switch. Wind seal tape around the threaded portion.

PCO00064-00000

2. Install the radiator thermo-control switch to the radiator pipe.
   Tightening Torque: 30 N·m

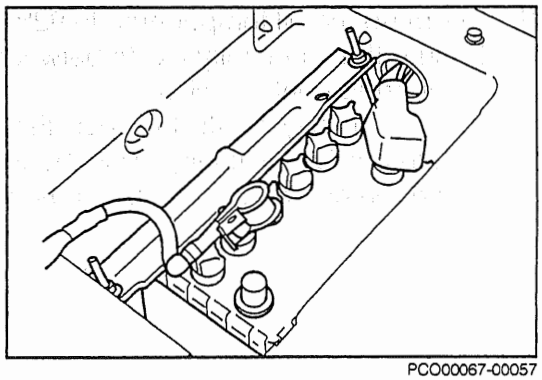

PCO00065-00055

3. Fill the coolant.



PCO00066-00056

4. Connect the ground cable terminal to the negative (–) terminal of the battery.
5. Start the engine and check for water leakage.



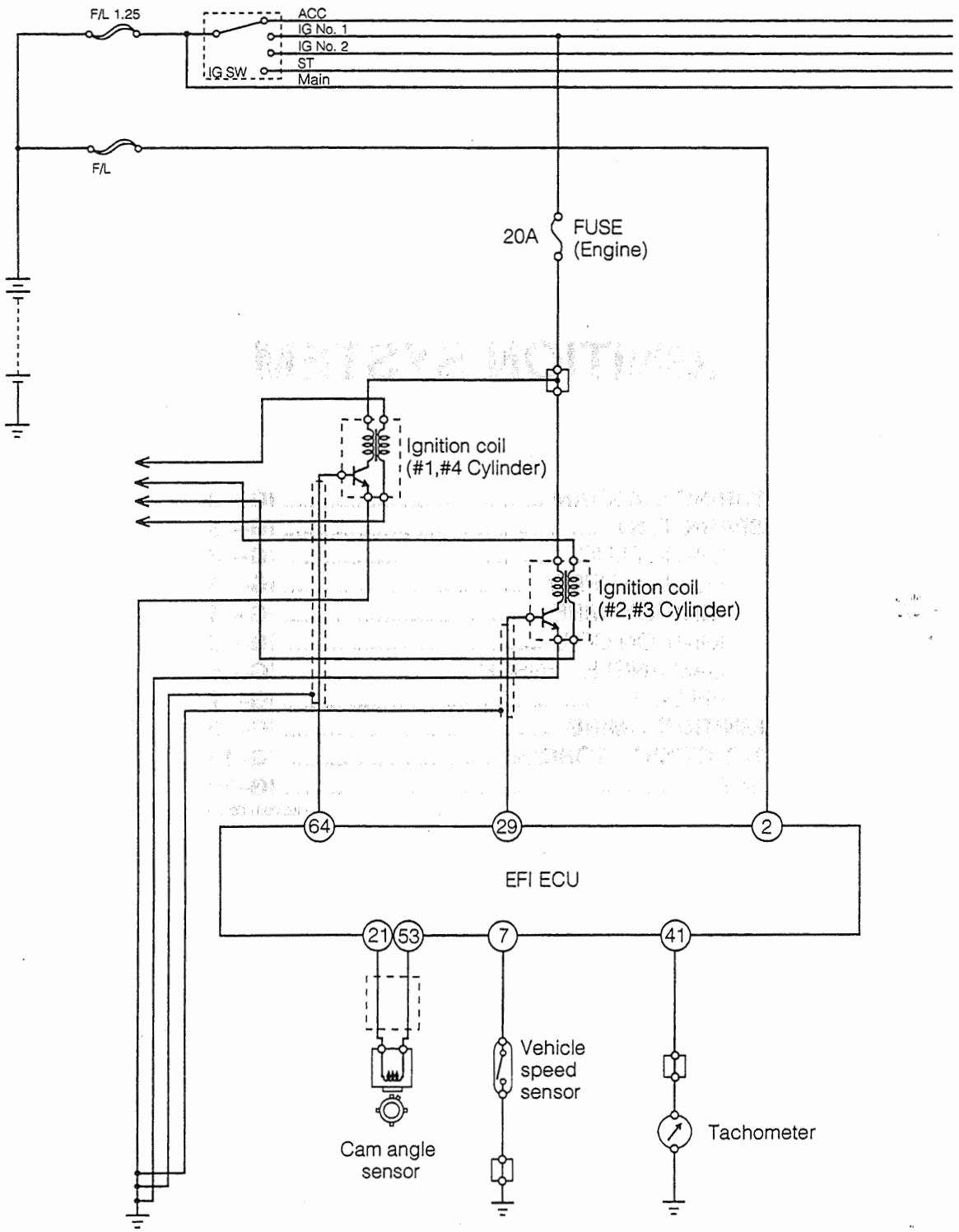
PCO00067-00057

IGNITION SYSTEM

WIRING DIAGRAM ..... **IG– 2**
SPARK TEST ..... **IG– 3**
SPARK PLUG ..... **IG– 3**
POWER SUPPLY ..... **IG– 4**
IGNITION WIRE ..... **IG– 4**
IGNITION COIL ..... **IG– 5**
CAM ANGLE SENSOR ..... **IG– 5**
EFI ECU ..... **IG– 7**
IGNITION TIMING ..... **IG– 9**
TIGHTENING TORQUE **IG–10**
SSTs **IG–10**

PIG00001-00000

WIRING DIAGRAM

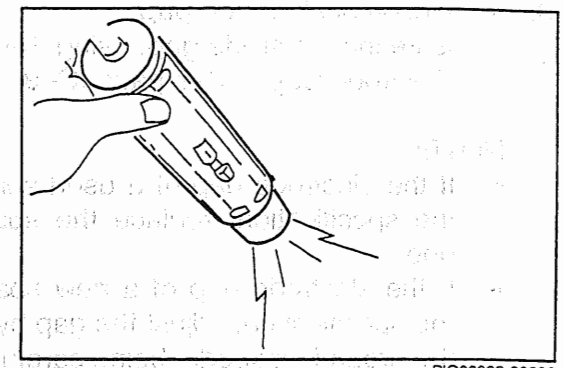


PIG00002-00001

SPARK TEST

SPARK PLUG

1. Connect a timing light to the ignition wire of the No. 1 cylinder.
2. Ensure that the timing light flashes while the engine is being cranked by the starter motor.
   NOTE:
   - If the timing light will not flash, perform the following inspection.



PIG00003-00002

3. Remove the ignition wire from the spark plug at the cylinder No. 1.
4. Connect a spark plug to the ignition wire.
5. Check ignition sparks while the engine is being cranked by the starter motor.
   WARNING:
   - Before performing this operation, check that no fuel is spilled inside the engine compartment. Remove any spilled fuel. Also, be sure to perform this operation at a well-ventilated place where no volatile liquid, gas, etc. exist nearby.

   NOTE:
   - If no ignition sparks occur, check power supply.

6. Remove the spark plug.
   CAUTION:
   - When the operation of the step 6 is performed, care must be exercised to avoid getting scalded, for the spark plugs may be still very hot.

7. Cleaning of spark plug
   NOTE:
   - If there are traces of oil, remove it with gasoline before the spark plug is cleaned by the spark plug cleaner.
   - 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 kPa
     Duration: Less than 20 seconds

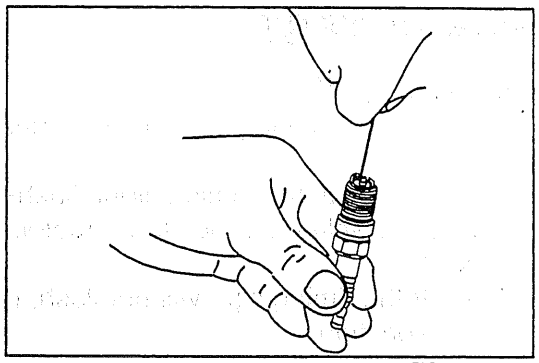
PIG00004-00000

8. Visually inspect the spark plug for electrode wear, thread or insulator damage.
   NOTE:
   - Replace the spark plug if it exhibits damage.

PIG00005-00000

9. Inspection of electrode gap
   Measure the electrode gap, using the plug gap gauge.
   Electrode Gap: See page IG–9

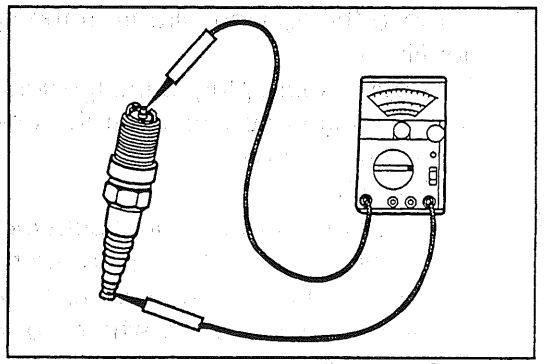
   NOTE:
   - If the electrode gap of a used spark plug is not within the specification, replace the spark plug with a new one.
   - If the electrode gap of a new spark plug is not within the specification, adjust the gap by bending the base of the ground electrode, being careful not to touch the tip.
   - All four plugs should be the same heat range and be ones manufactured by the same manufacturer.



PIG00006-00003

10. Inspection of spark plug insulation resistance
    More Than 20 MΩ

    NOTE:
    - If the insulation resistance is less than the specified value, replace the spark plug.



PIG00007-00004

11. Install the spark plugs. Tighten them to the specified torque.
    Tightening Torque: 14.7 - 21.6 N·m

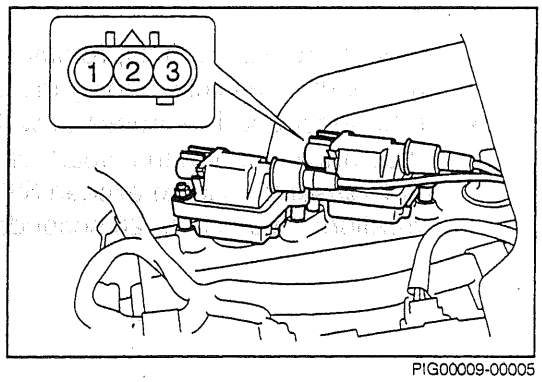
12. Install the ignition coil with ignition wire to the cylinder head cover.
13. Connect the ignition wire to the spark plug.

PIG00008-00000

POWER SUPPLY

1. Disconnect the connector of the ignition coil.
2. Measure the voltage between the terminals 1 and 3 of the wire harness connector side when the ignition switch is turned on.
   Specified Value: Battery voltage

   NOTE:
   - If the voltage is not the specified value, check the fuse and wiring harness.

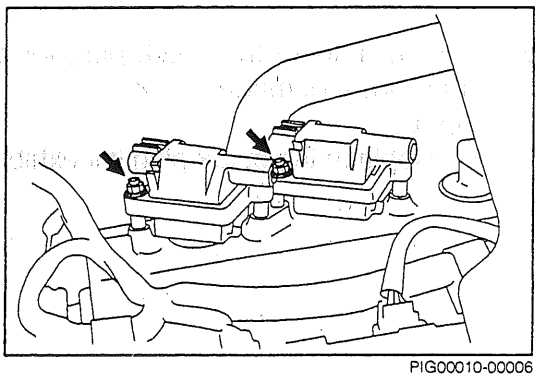


PIG00009-00005

IGNITION WIRE

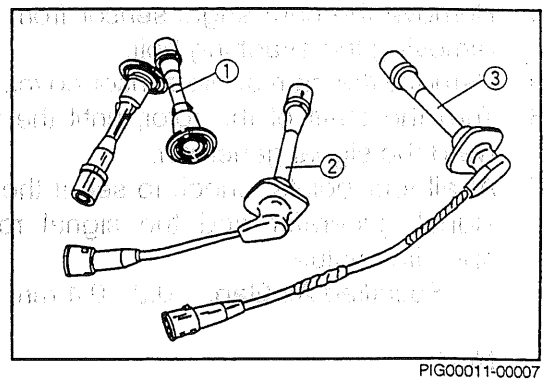
1. Disconnect the connector of the ignition coil.
2. Remove the ignition coil by removing the attaching nuts.
3. Disconnect the spark plug distance piece and the ignition wire from the ignition coil.

   NOTE:
   - Carefully remove the ignition wire from the spark plugs and ignition coil by holding their rubber boots.



PIG00010-00006

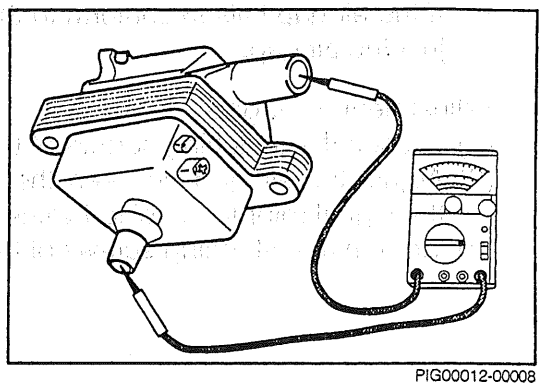
4. Check that the ignition wire resistance is within the specification.
   Specified Value:
   ①: 0.3 Ω (Cylinder No. 3 and No. 4)
   ②: 3.8 ± 1.0 kΩ (Cylinder No. 2)
   ③: 5.6 ± 1.0 kΩ (Cylinder No. 1)



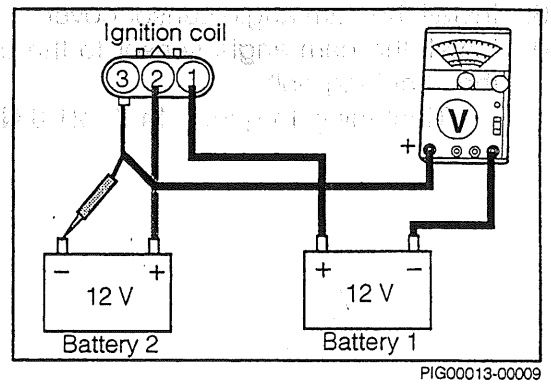
PIG00011-00007

IGNITION COIL

1. Disconnect the connector of the ignition coil.
2. Remove the ignition coil by removing the attaching nuts.
3. Disconnect the spark plug distance piece and the ignition wire from the ignition coil.
4. Check that the ignition coil resistance is within the specification.
   Secondary Coil: 13.6 ± 2.0 kΩ


PIG00012-00008

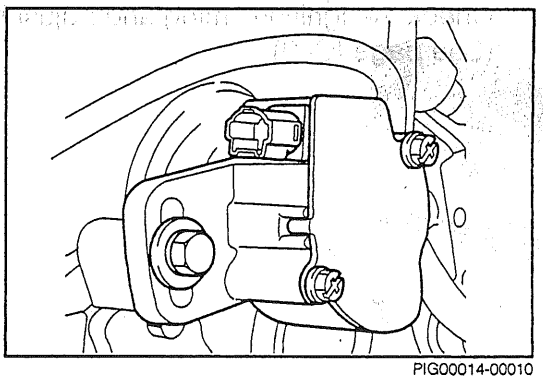
5. Connect a voltmeter (+) to the terminal 3 of the ignition coil.
6. Connect a voltmeter (–) to the negative (–) terminal of the battery 1.
7. Connect the terminal 1 of the ignition coil to the positive (+) terminal of the battery 1.
8. Connect the terminal 3 of the ignition coil to the negative (–) terminal of the battery 2.
9. Ensure that the voltmeter indicates battery 1 volt when the terminal 2 of the ignition coil is connected to the positive (+) terminal of the battery 2.



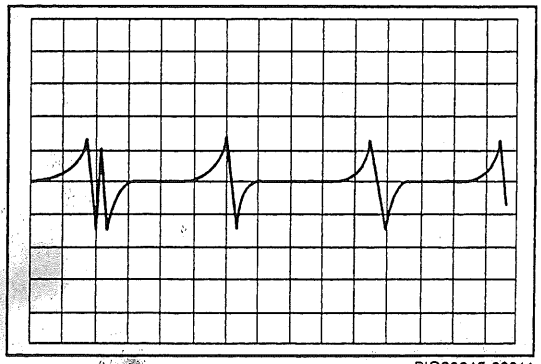
PIG00013-00009

CAM ANGLE SENSOR

1. Disconnect the connector of the cam angle sensor.
2. Measure the resistance between each terminal of the connectors.
   Specified Value: 230 ± 25 Ω (at 20°C)

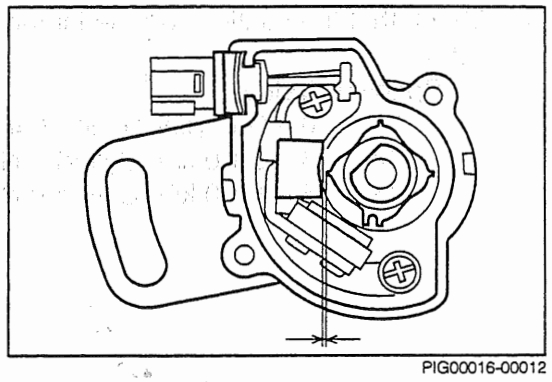

PIG00014-00010

3. Check to see if a signal shown in the graph appears at the terminals when the engine is being cranked by the starter motor.
   NOTE:
   - When the voltage across the connector terminals is measured during the engine cranking period, using an oscilloscope, you will get wave forms as indicated in the illustration, if the signal generator is functioning normally.

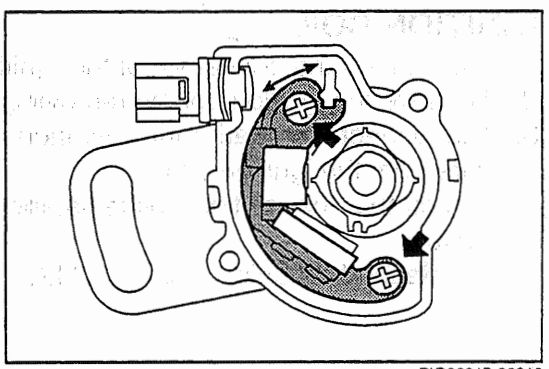

PIG00015-00011

4. Remove the cam angle sensor from the cylinder head by removing the attaching bolt.
5. Remove the cam angle sensor cover.
6. Turn the shaft of the rotor, until the signal rotor faces toward the signal generator.
7. 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 Air Gap: 0.2 - 0.4 mm

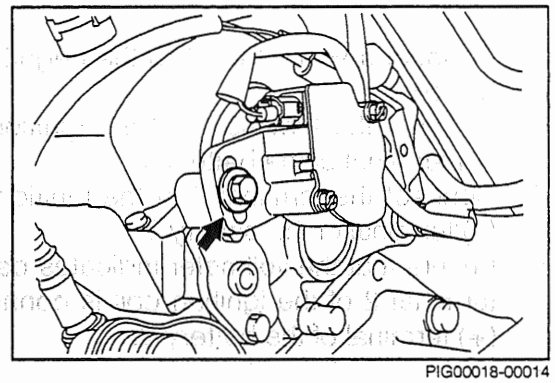
   NOTE:
   - If the air gap fails to conform to the specified value, adjust the air gap.


PIG00016-00012

8. Adjustment of air gap.
   (1) Loosen the attaching screws of the signal generator.
   (2) Adjust the air gap between the signal generator and the signal rotor to specified value.
   (3) Tighten the attaching screws of the signal generator.


PIG00017-00013

9. Install the cam angle sensor cover.
10. Install the cam angle sensor to the cylinder head. tighten the attaching bolt.
    Tightening Torque: 14.7 - 21.6 N·m

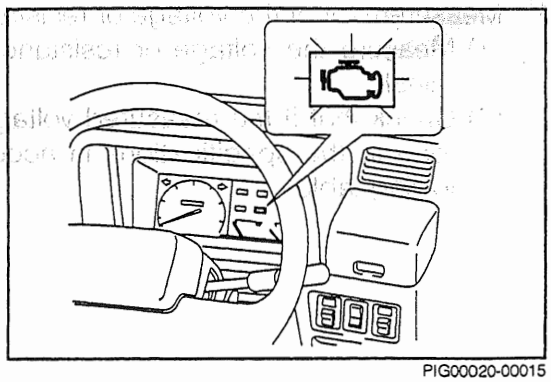

PIG00018-00014

11. Check the ignition timing and adjust it, as required.
    (See page IG-9)

PIG00019-00000

EFI ECU

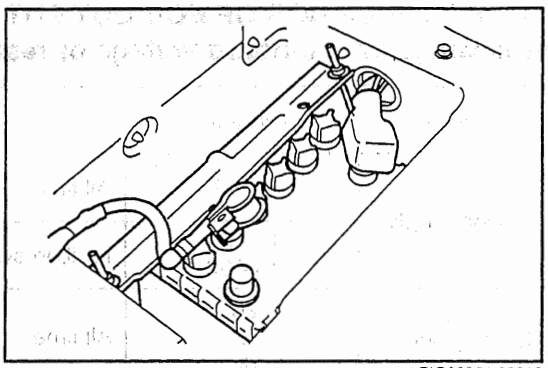
1. Check to see if diagnosis detect malfunction code.
   (Refer to EF section of the service manual)



PIG00020-00015

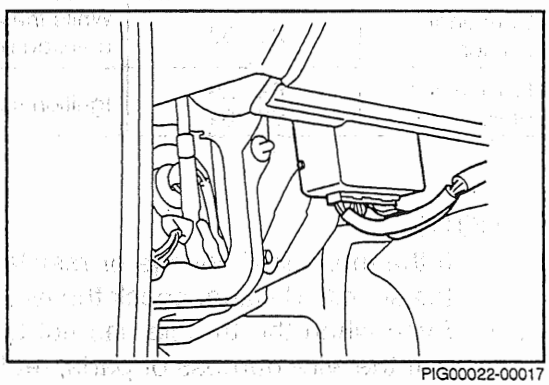
2. Connection of SST
   (Refer to EF section of the service manual)
   NOTE:
   - The EFI unit can be checked by measuring the resistance or voltage at the SST terminals.

   (1) Disconnect the battery ground cable from the negative (–) terminal of the battery.
   CAUTION:
   - Be sure to memorize the malfunction code before disconnecting the battery cable. Otherwise the malfunction code(s) is erased by disconnecting of the battery code.



PIG00021-00016

   (2) Disconnect the wire harness connectors from the EFI ECU connectors at the upper side of the glove compartment.
   (3) Connect the following SST between the wire harness connectors and the EFI ECU connectors.
   SST: 09842-87706-000



PIG00022-00017

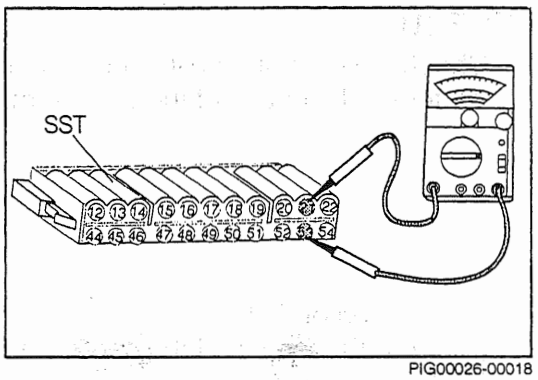
   (4) Reconnect the battery ground cable to the negative (–) terminal of the battery.
   CAUTION:
   - When disconnecting or reconnecting the EFI ECU connectors, be sure to disconnect the battery ground cable from the negative (–) terminal of the battery when the ignition switch and all accessory switches are in the off state.
   - When installing new battery, care must be exercised not to mistake the battery polarity. Failure to observe this caution could cause ECU malfunction.
   - Before using the SST, be sure to check to see if short or open wire exists between the terminals of the SST.

PIG00023-00000

   NOTE:
   - Even when the replacement of the ECU is required in previous check, make sure that the ECU malfunction has not been caused by factors other than the ECU by carrying out the following checks. Then, proceed to replace the ECU.
   - The measurement of voltage should be conducted while all of the connectors are connected.

PIG00024-00000

3. Measurement of the voltage or resistance
   (1) Measure the voltage or resistance between each terminal.
   (2) Check that if the measured voltage or resistance conform to the specifications in accordance with the following table.



PIG00026-00018

CHARACTERISTICS OF ECU OUT PUT
Followings are standard voltage or resistance at ECU.

Family	Terminal	Condition	Standard voltage or resistance	Remedies
Power supply	2 - 62	All time	Battery voltage	Check back up fuse in the relay box
	11 - 62 43 - 62	Ignition switch is turned on	Battery voltage	Check main relay in the relay box
Earth group	20 52 62	All time	1 Ω or less	Check ground earth of wiring harness
Cam angle sensor	21 - 53	While the engine is being cranked by the starter motor.	0.1 - 0.3 V (AC range)	Check crank angle sensor
Ignition coil drive	62 - 29 62 - 64	Ignition switch is turned on.	3 V or less	Check ECU

PIG00027-00000

NOTE:
- If the measured voltage or resistance is not conform to the specified value, check the wiring harness.
- Even when the trouble has not been solved by the repair the wire harness or parts, replace the EFI ECU.

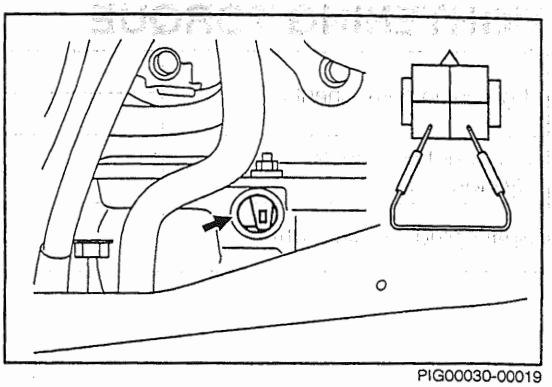
PIG00028-00000

After completion of the inspection
1. Disconnect the ground cable terminal from negative (–) terminal of the battery.
2. Remove the SST by disconnecting its connectors from the ECU and engine wire connectors.
3. Connect the wire harness connectors to the ECU.
4. Reconnect the ground cable terminal to the negative (–) terminal of the battery.

PIG00029-00000

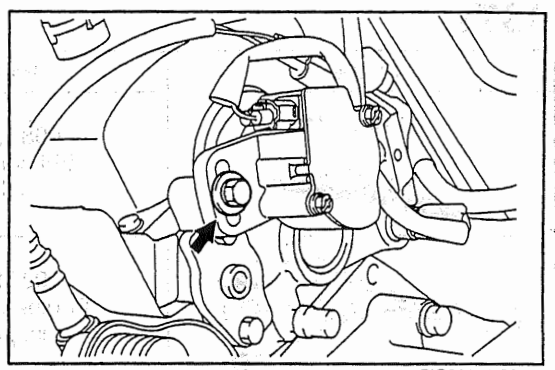
IGNITION TIMING

1. Connect the test terminal and the earth terminal with a jumper wire of the diagnosis connector.
2. Connect a timing light to the ignition wire of the No. 1 cylinder.
3. Start the engine.
4. Check to see if the ignition timing mark (Yellow mark) of the flywheel is aligned with the indicator of the rear end plate, using the timing light.
5. Adjust the ignition timing by turning the cam angle sensor, if the ignition timing mark is not aligned with rear end plate.
   Ignition Timing: B.T.D.C. 3° ± 2°/Idle speed



PIG00030-00019

6. Adjustment of ignition timing
   (1) Loosen the cam angle sensor attaching bolts.
   (2) Adjust the cam angle sensor installation angle by turning the cam angle sensor, until the ignition timing mark of the flywheel is aligned with the indicator of the rear end plate.



PIG00031-00020

NOTE:
- The procedure shows above 4, 5 and 6 steps can be also carried out taking as references the timing mark of crankshaft pulley (Yellow line) and the indicator of the timing belt cover.
- If the cam angle sensor is turned clockwise, the timing will be advanced. Conversely, if the cam angle sensor is turned counterclockwise, the ignition timing will be retarded.

   (3) Tighten the cam angle sensor attaching bolts to the specified torque, making sure that the ignition timing is not disturbed.
   Tightening Torque: 14.7 - 21.6 N·m

PIG00032-00000

Recommended spark plug

Manufacturer	Type	Electrode air gap
NGK	BKUR6EK BKUR7EK	0.9 - 1.0 mm
DENSO	K20TNR-S K22TNR-S	0.9 - 1.0 mm

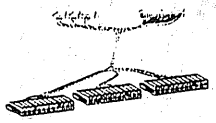
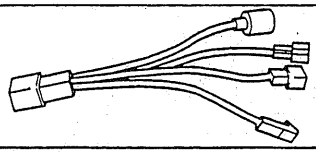
PIG00033-00000

TIGHTENING TORQUE

Tightening components	Tightening torque		Remarks
	N·m	kgf-m	
Cam angle censor × Cylinder head	14.7 - 21.6	1.5 - 2.2	
Spark plug × Cylinder head	14.7 - 21.6	1.5 - 2.2	

PIG00034-00000

SSTs

Shape	Part number	Part name	Remarks
	09842-87706-000 EFI computer check sub harness	Inspection of computer input/output voltage & resistance	
	09991-87501-000 Engine control system inspection wire	EFI system inspection Measure engine speed	

PIG00035-00021

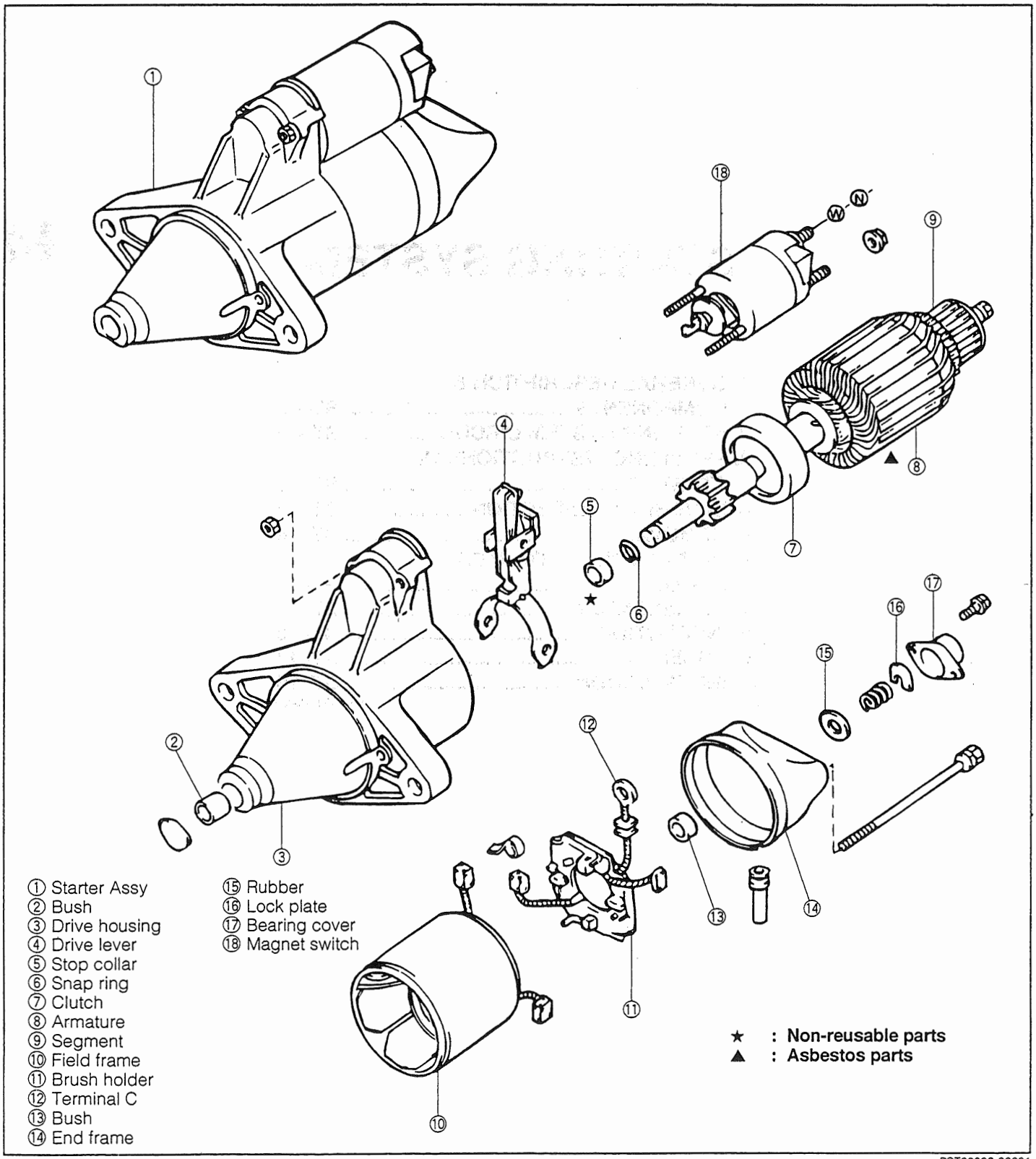
STARTING SYSTEM

1. GENERAL DESCRIPTION & COMPONENTS ..... ST– 2
2. STARTING SYSTEM CIRCUIT ..... ST– 3
3. SERVICING INSTRUCTIONS OF STARTER ..... ST– 3
4. IN-VEHICLE INSPECTION ..... ST– 4
5. REMOVAL ..... ST– 4
6. UNIT CHECK OF STARTER MOTOR ..... ST– 4
7. DISASSEMBLY ..... ST– 6
8. INSPECTION ..... ST– 8
9. ASSEMBLY ST–13
10. INSTALLATION ST–15

PST00001-00000

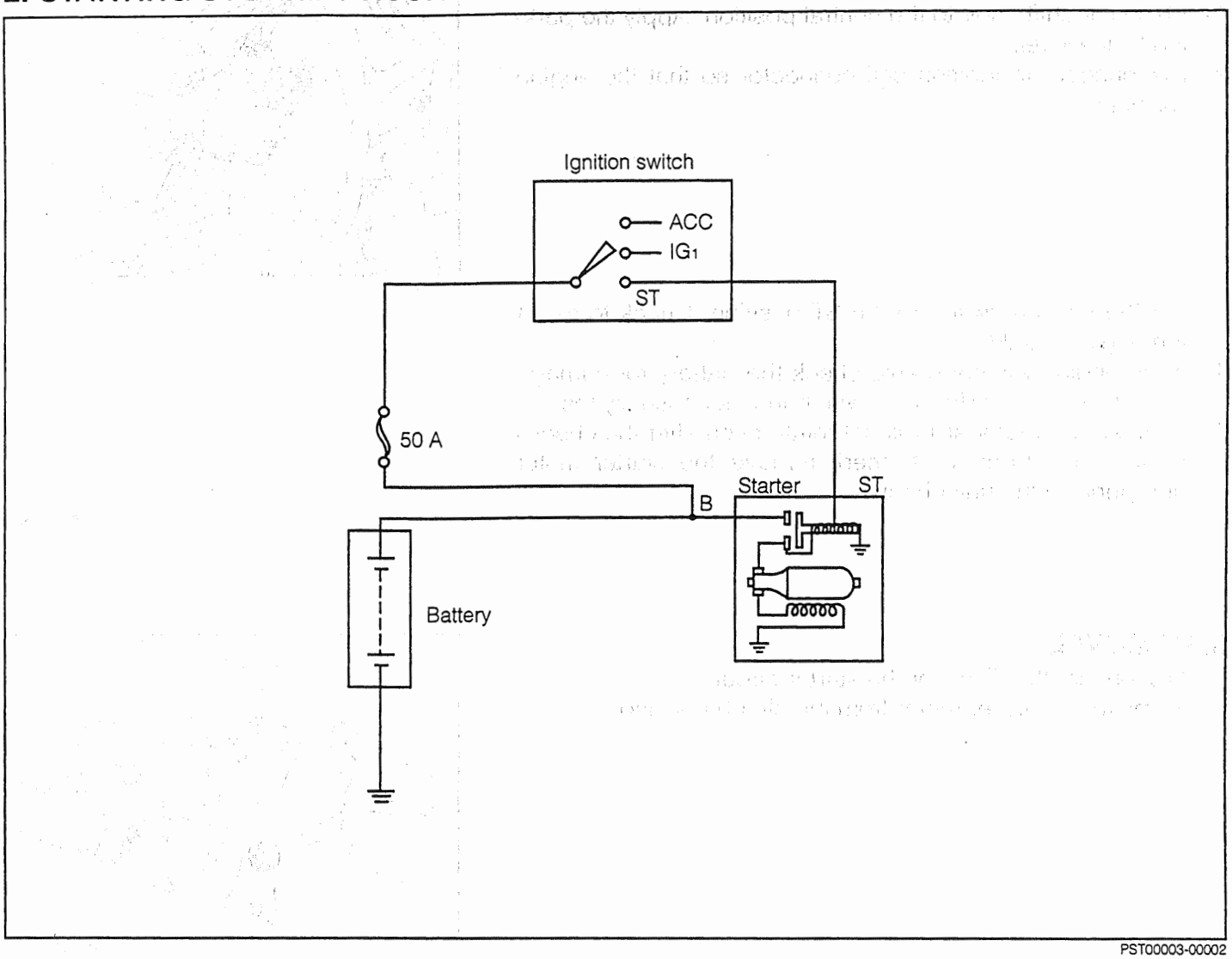
1. GENERAL DESCRIPTION & COMPONENTS

The starter motor is of a conventional design and can be disassembled. The starter consists of a solenoid switch and a motor. The solenoid has electric contact points which supply electric power to the motor. The solenoid also has a shift fork (drive lever) which moves the motor pinion gear into mesh with the ring gear mounted on the engine flywheel.
The starter is connected to the battery and ignition switch without passing through the starter relay.
The starter motor is a four-pole, four-brush unit. A roller clutch drive is provided to make the pinion gear mesh with the ring gear. Its another purpose is the protection of the gears.



PST00002-00001

2. STARTING SYSTEM CIRCUIT



PST00003-00002

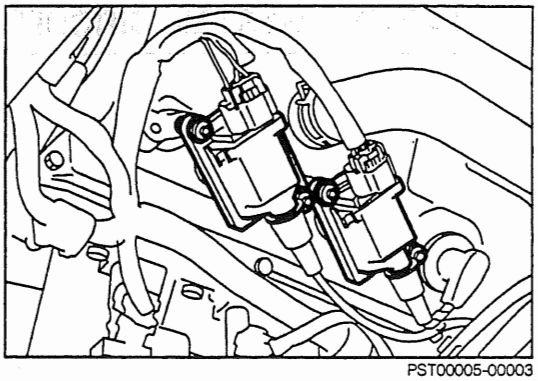
3. SERVICING INSTRUCTIONS OF STARTER

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 ⊖ 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.

PST00004-00000

4. IN-VEHICLE INSPECTION

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



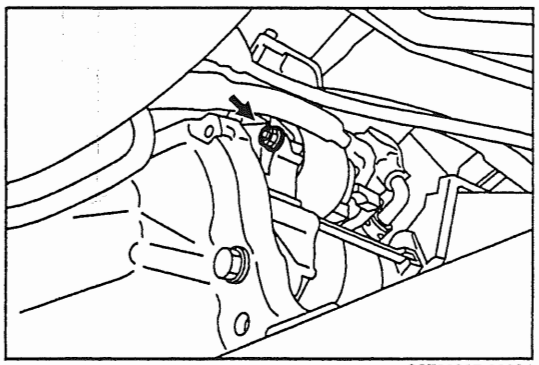
PST00005-00003

3. Set the ignition switch to the ST position. Check to see if the engine cranks.
4. If the engine will not crank, check the battery for damage and discharge. Perform the wire 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.

PST00006-00000

5. REMOVAL

1. Disconnect the wires for the starter circuit.
2. Remove the starter motor from the clutch housing.

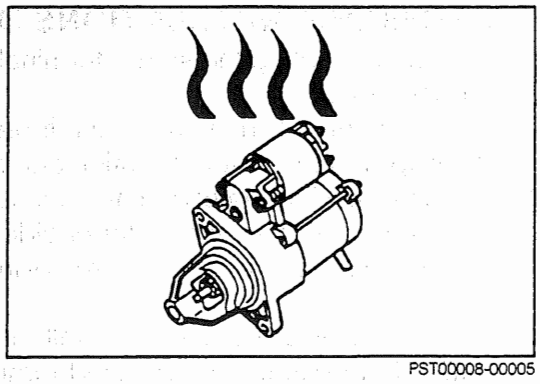


PST00007-00004

6. UNIT CHECK OF STARTER MOTOR

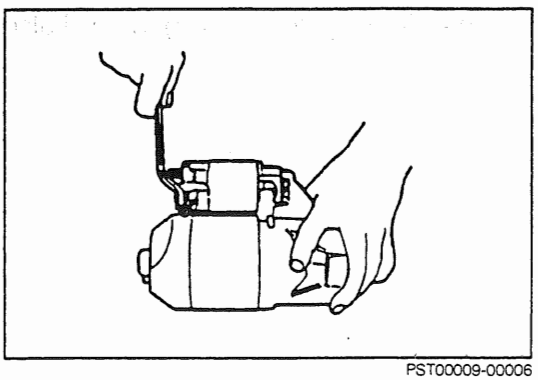
CAUTION:

- 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.



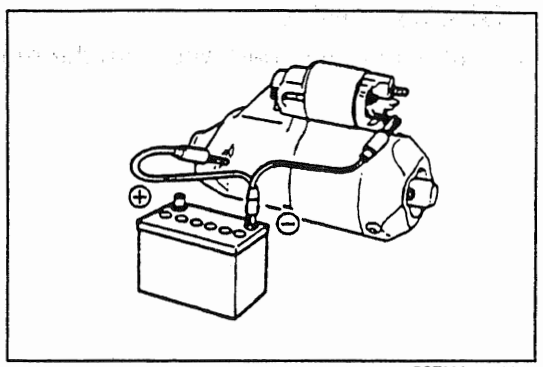
PST00008-00005

1. Pull-in test
   (1) Disconnect the lead wire from the magnetic switch terminal.



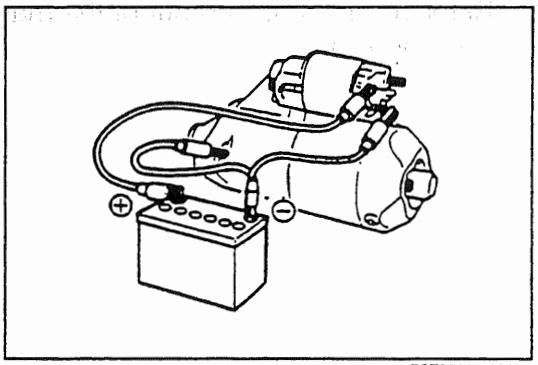
PST00009-00006

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



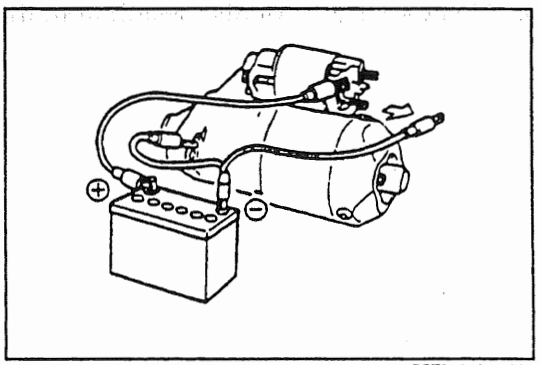
PST00010-00007

(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.



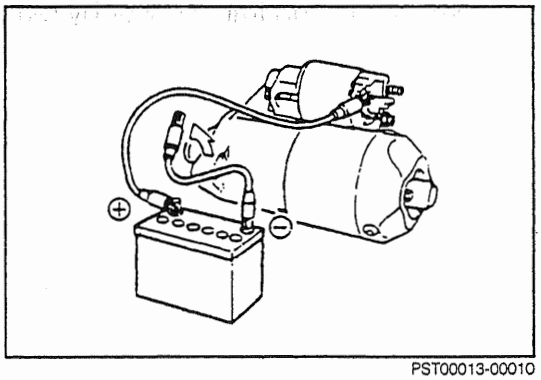
PST00011-00008

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.



PST00012-00009

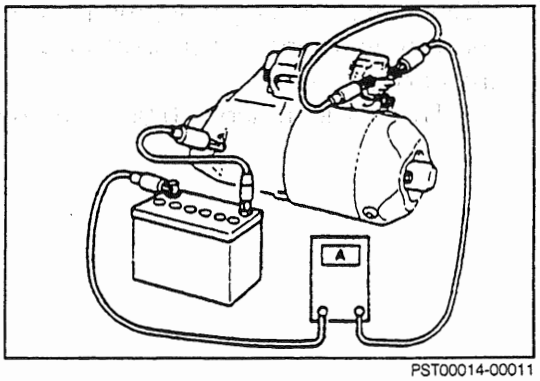
3. Inspection of plunger return
After the check has been performed following the same procedure as with the hold-in test, disconnect the ground terminal of the starter body. Ensure that the drive pinion is drawn into the drive housing.
If the drive pinion fails to be drawn, replace the magnetic switch.



PST00013-00010

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 50 A at 11 V

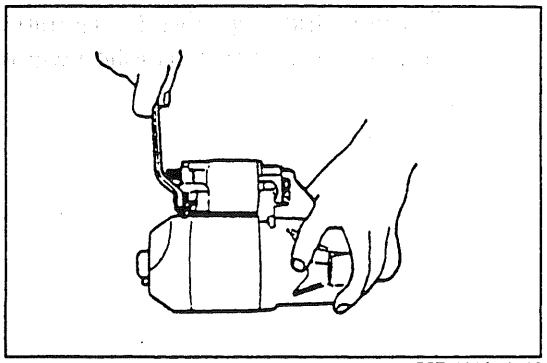
NOTE:
- Prior to the test, be sure to connect the lead wire to the magnetic switch.



PST00014-00011

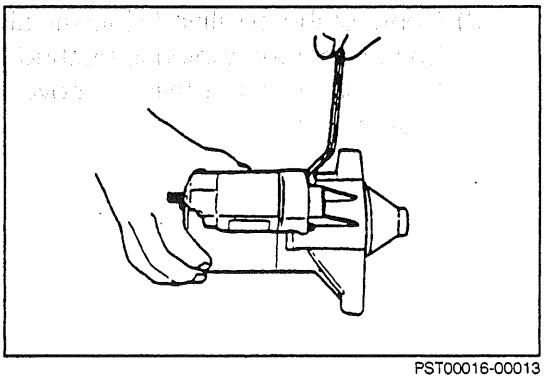
7. DISASSEMBLY

1. Disconnect the lead wire from the magnetic switch.



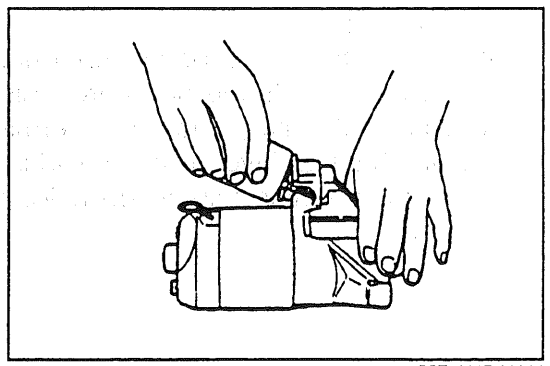
PST00015-00012

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



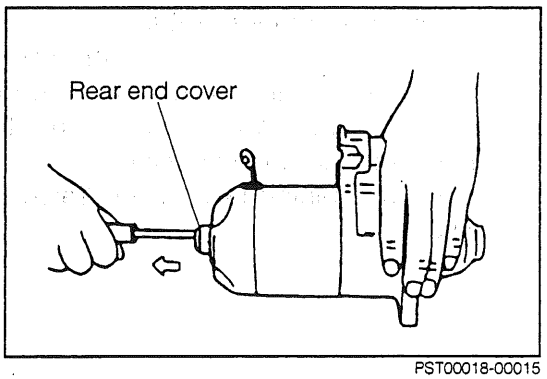
PST00016-00013

3. Remove the magnetic switch from the drive housing.



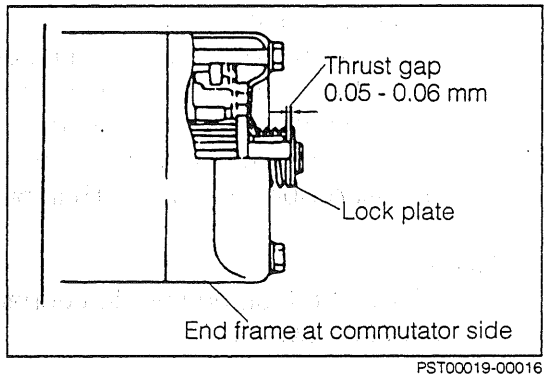
PST00017-00014

4. Remove the end frame cover by removing the two screws.



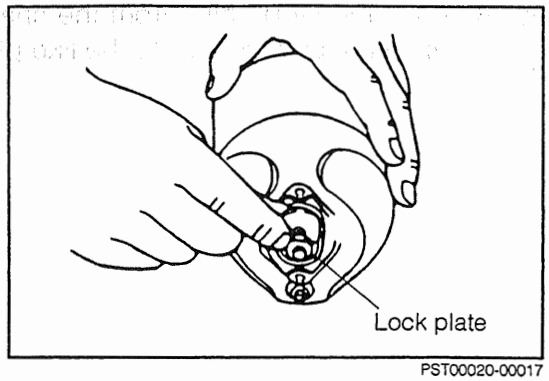
PST00018-00015

5. Using a thickness gauge, measure the thrust clearance of the armature shaft at a point between the lock plate and the end frame.
   Thrust Clearance: 0.05 - 0.60 mm



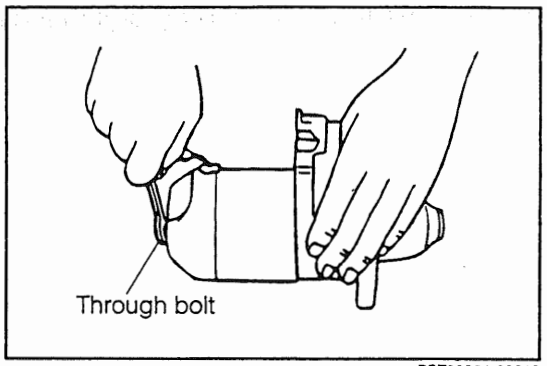
PST00019-00016

6. Remove the lock plate, brake spring and rubber from the commutator end frame.



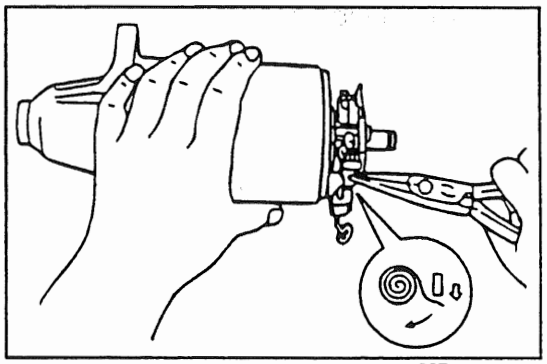
PST00020-00017

7. Remove the commutator end frame from the field frame by removing the two through bolts.

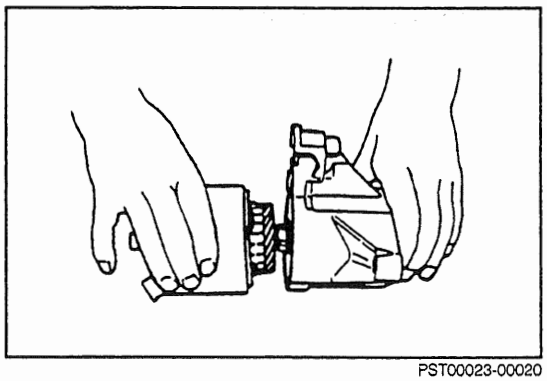


PST00021-00018

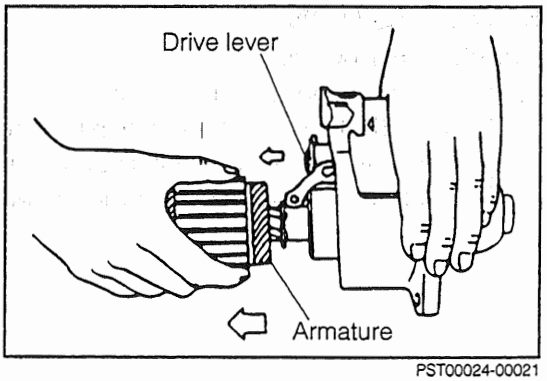
8. Remove the brushes from the brush holder by lifting the brush springs by means of nose pliers or the like.
   NOTE:
   - Care must be exercised not to scratch the commutator during the removal.


PST00022-00019

9. Remove the yoke from the armature.

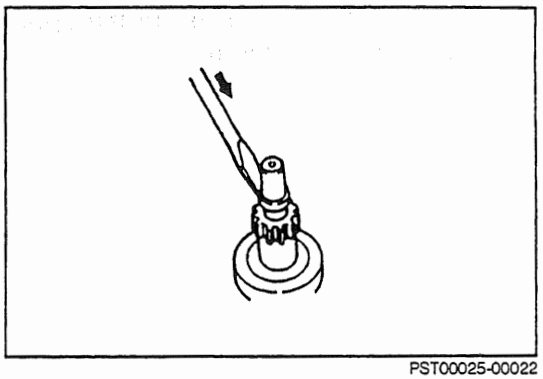

PST00023-00020

10. Remove the drive lever and armature from the drive housing.



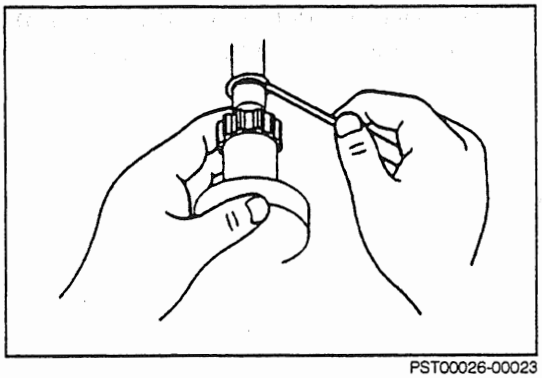
PST00024-00021

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



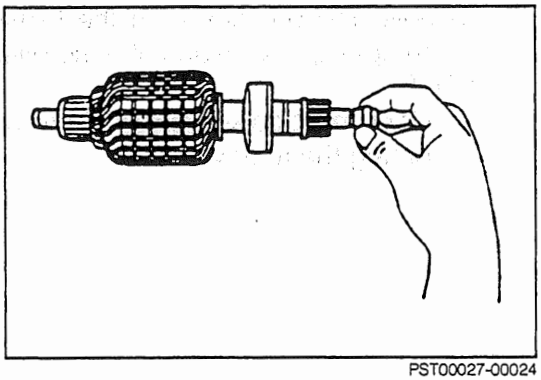
PST00025-00022

12. Remove the snap ring by prying it off with a screwdriver.



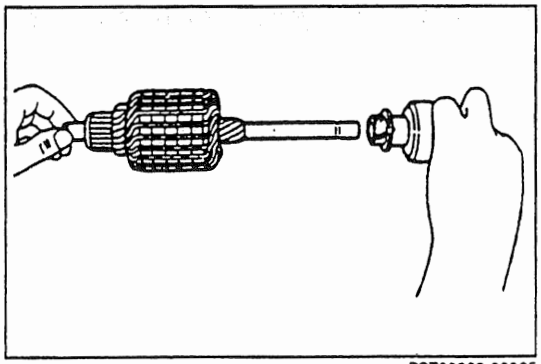
PST00026-00023

13. Remove the collar.



PST00027-00024

14. Remove the clutch.

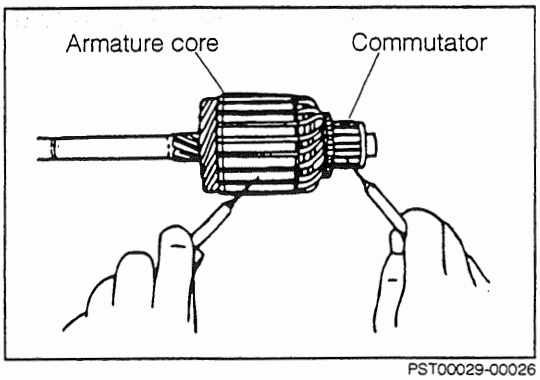


PST00028-00025

8. INSPECTION

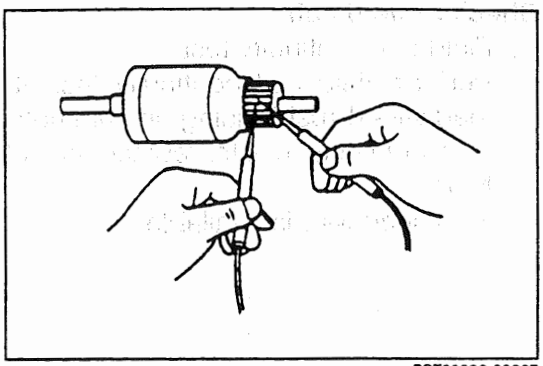
Check of armature

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.



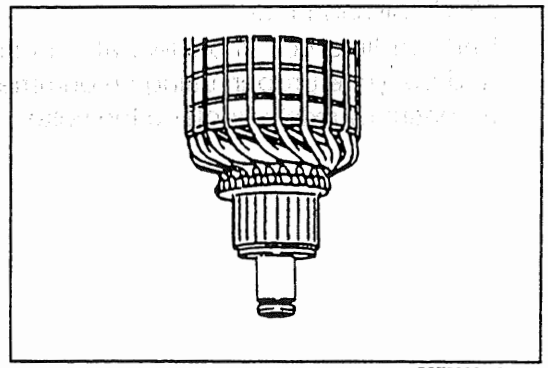
PST00029-00026

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.


PST00030-00027

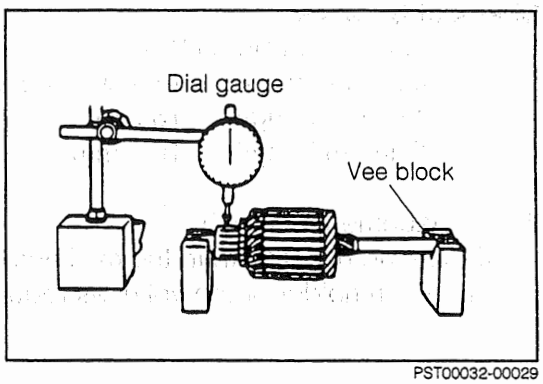
Check of commutator

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.


PST00031-00028

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

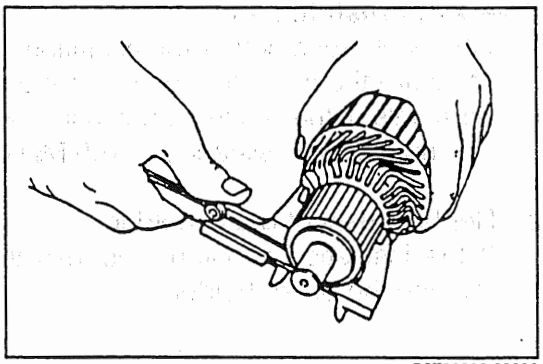
   If the circle runout exceeds the allowable limit, turn down the commutator on a lathe.
   At this point, care must be exercised to ensure that the commutator diameter is not less than the minimum requirement diameter of 27 mm.



PST00032-00029

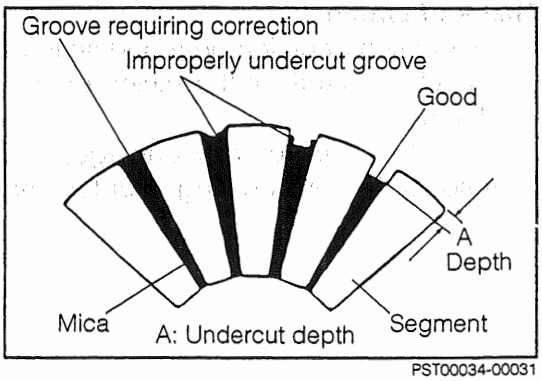
3. Measurement of commutator diameter
   Measure the commutator diameter by means of a micrometer or vernier calipers.
   Standard Diameter: 28 mm
   Minimum Diameter: 27 mm

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


PST00033-00030

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

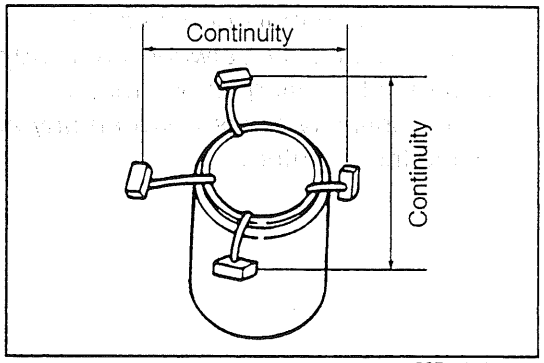
   If the insulator groove depth becomes less than the limit value, replace the commutator.



PST00034-00031

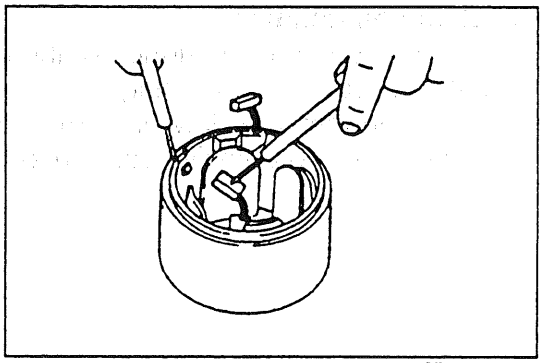
Check of field coil

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



PST00035-00032

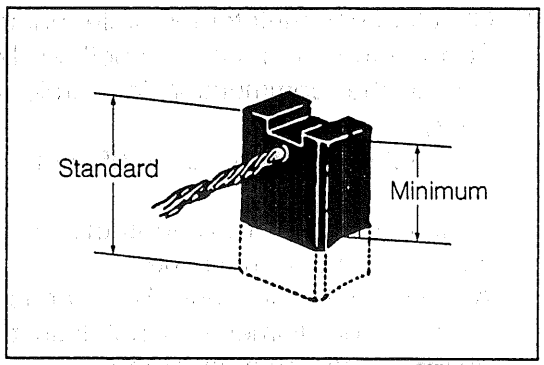
2. Field coil short test
   Perform field coil short test at a point between the brush and the yoke proper, using an ohmmeter.
   If continuity exists, replace the yoke.


PST00036-00033

Check of brushes

1. Measurement of brush length
   Measure the brush length, using vernier calipers.
   Standard Length: 16 mm
   Minimum Length: 10.5 mm

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

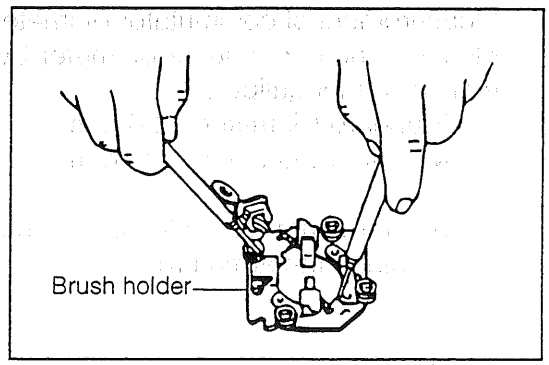


PST00037-00034

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: 100 MΩ or more

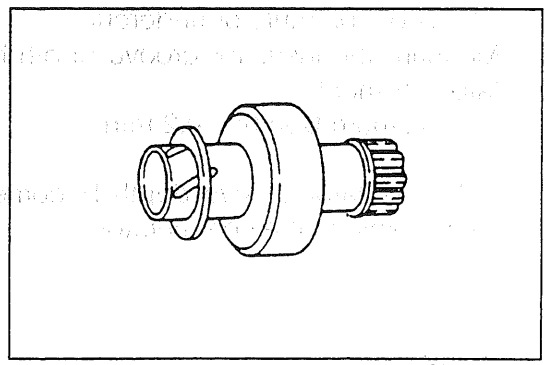
2. Replacement of brush holder.
   If the insulation resistance is less than the specification, replace the brush holder.



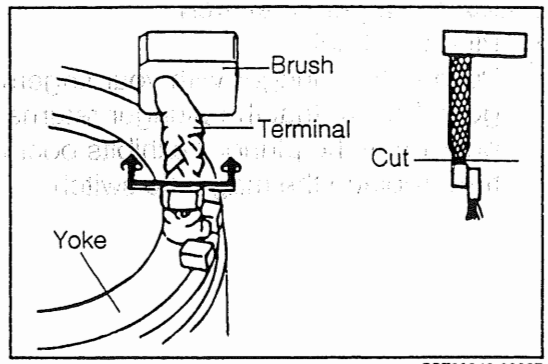
PST00038-00035

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.


PST00039-00036

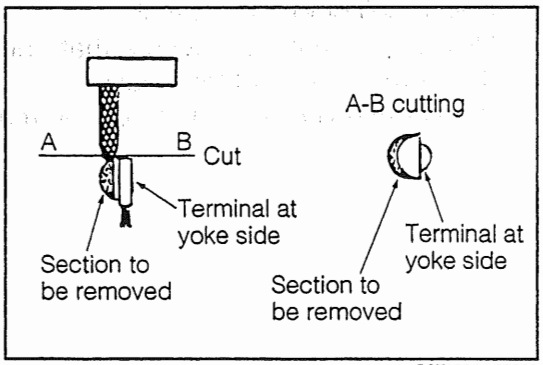
2. Procedure for brush replacement
   (1) Cut the brush lead wire at the terminal side.



PST00040-00037

   (2) Remove welding traces with a file or the like to correct the brush terminal to the specified dimensions.
   Specified Dimensions:
   Thickness: 1.3 - 1.5 mm
   Width: 5 mm

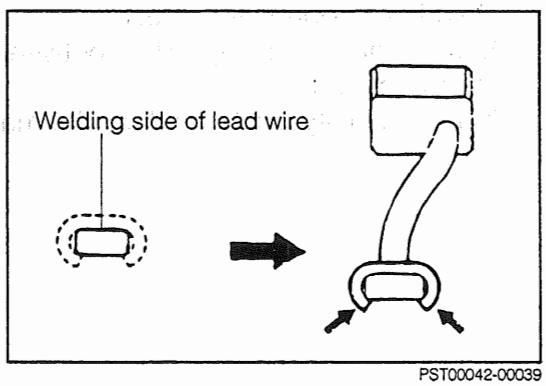
NOTE:
- Be sure to remove the section of the brush terminal as indicated in the right figure. Since the section to be removed is narrow, be very careful not to damage the field coil.



PST00041-00038

   (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.

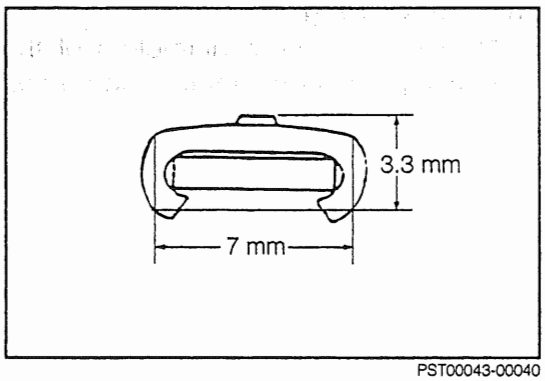
NOTE:
- Be sure to take out the brush lead wire in the correct direction.



PST00042-00039

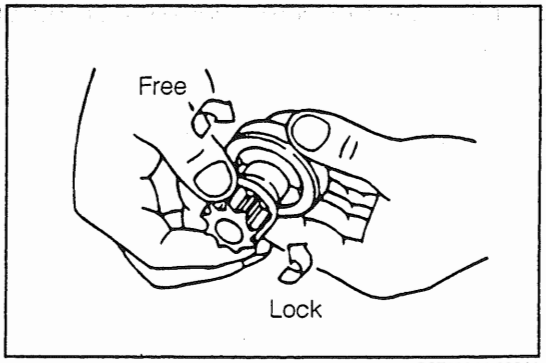
   (4) Solder the pressure connection section. Correct the section, using a file or the like, so that the section conforms to the dimensions, as indicated in the right figure.

NOTE:
- 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.
- Be sure to allow solder in a sufficient amount to flow into the inside of the plate.
- Ensure that no solder oozes to the field side.



PST00043-00040

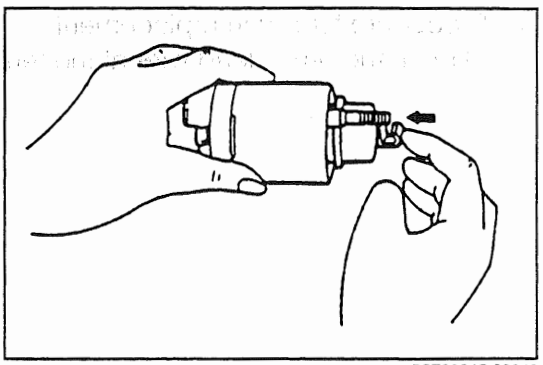
3. Check of starter clutch
   While holding the clutch, turn the pinion clockwise. Ensure that the pinion turns smoothly.
   Turn the pinion counterclockwise. Ensure that the pinion is locked.
   If the check results are unsatisfactory, replace the starter clutch.



PST00044-00041

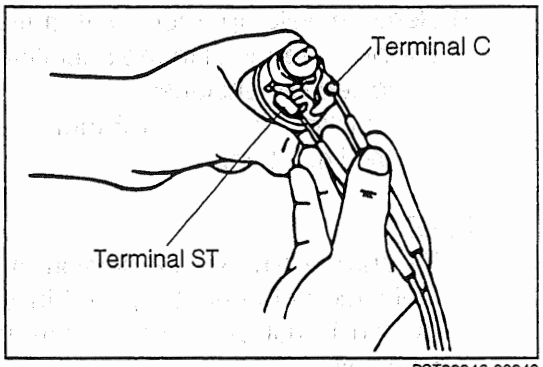
Check of magnetic switch

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.



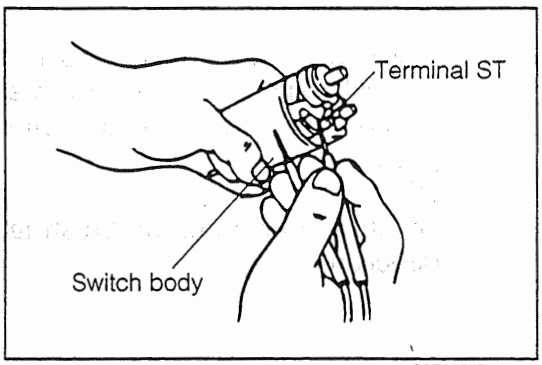
PST00045-00042

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.



PST00046-00043

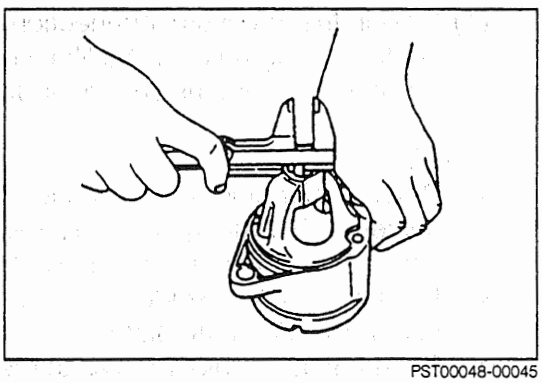
3. Hold-in coil open circuit test
   Ensure that continuity exists between the terminal ST and the switch body.
   If no continuity exists, replace the magnetic switch.



PST00047-00044

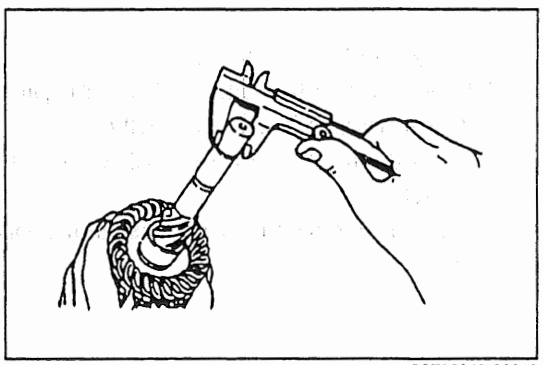
Check of bearing

1. Measure the inner diameters of the bushes of the drive housing and commutator end frame.



PST00048-00045

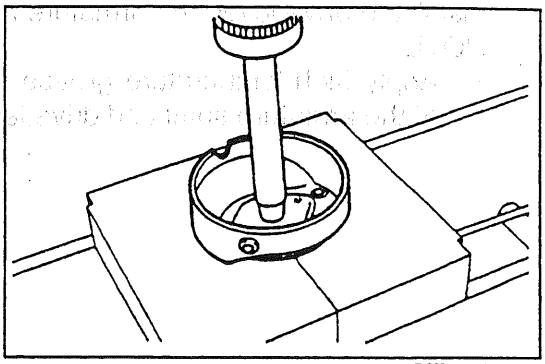
2. Measure the outer diameter of the armature bearing section.



PST00049-00046

3. Determine the clearance by subtracting the outer diameter of the armature bearing section from the inner diameter of the drive shaft.
   Clearance Limit: 0.2 mm

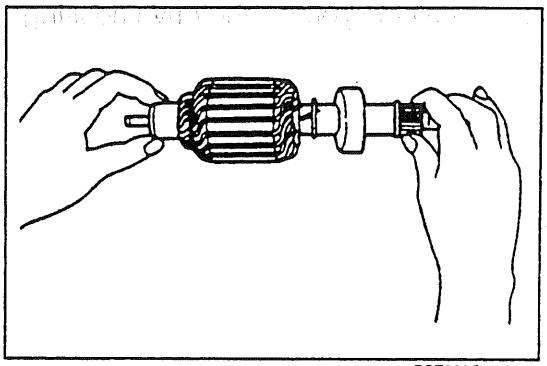
   If the clearance exceeds the limit, replace the drive housing bearing (bush) with a suitable tool.
   [Round rod of 15 mm outer dia.]


PST00050-00047

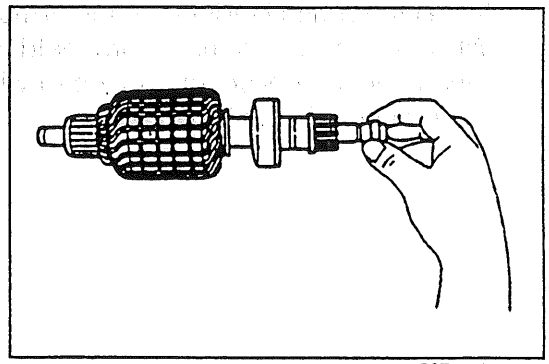
9. ASSEMBLY

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

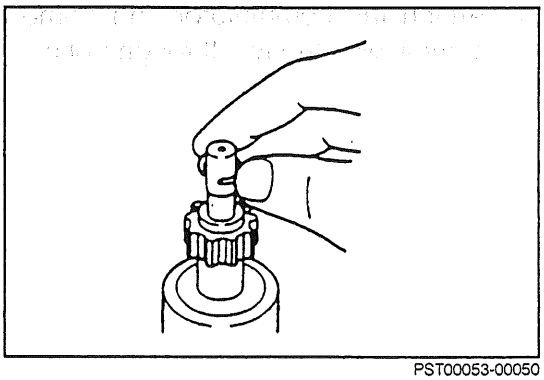
1. Install the clutch on the armature shaft.


PST00051-00048

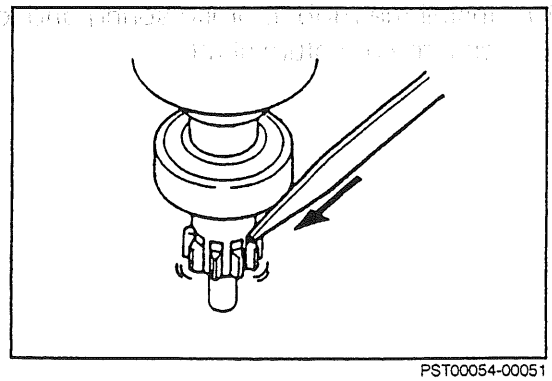
2. Install the collar on the armature shaft.


PST00052-00049

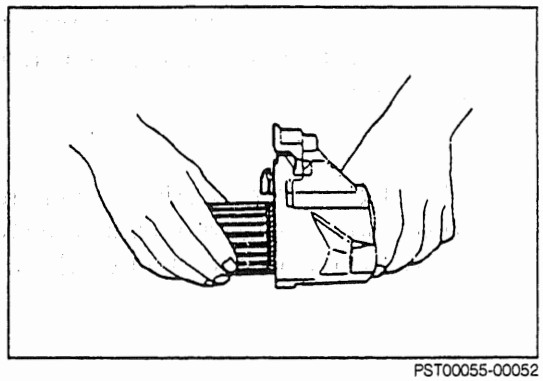
3. Fit the snap ring onto the armature shaft.


PST00053-00050

4. Tap the pinion so that the collar may come onto the snap ring, using a screwdriver.

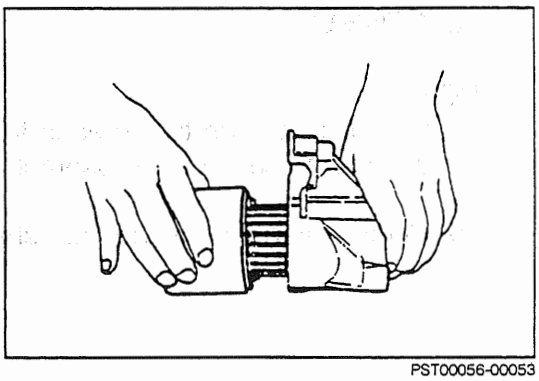

PST00054-00051

5. Install the drive lever and armature in the drive housing.
   NOTE:
   - Apply high-temperature grease to the sliding sections of the armature shaft and drive lever.



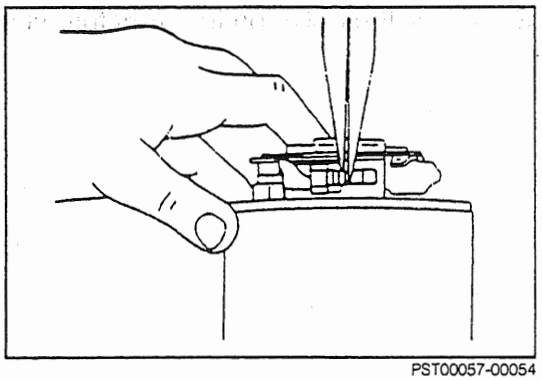
PST00055-00052

6. Install the yoke in the drive housing.



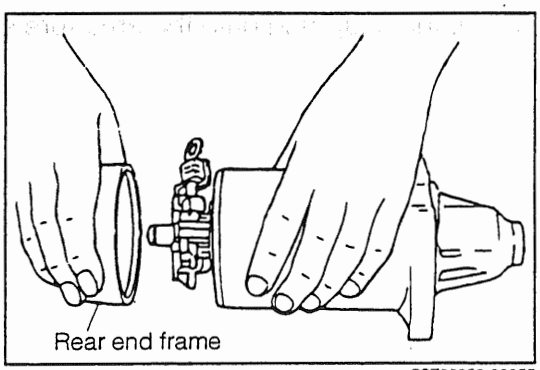
PST00056-00053

7. Install the brush holder over the armature shaft.
8. While the brush springs are held in a raised state by means of nose pliers or a piece of wire, install the brushes (four pieces) in the brush holder.



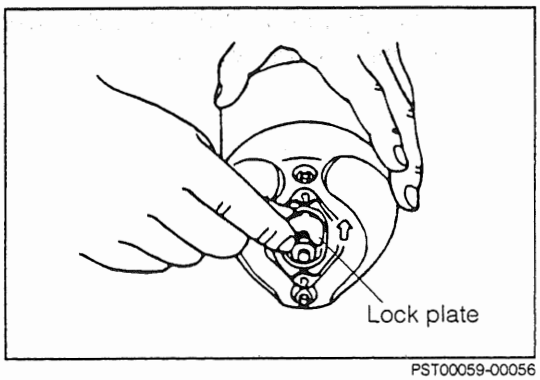
PST00057-00054

9. Attach the commutator end frame to the stator yoke assembly with the two through bolts.



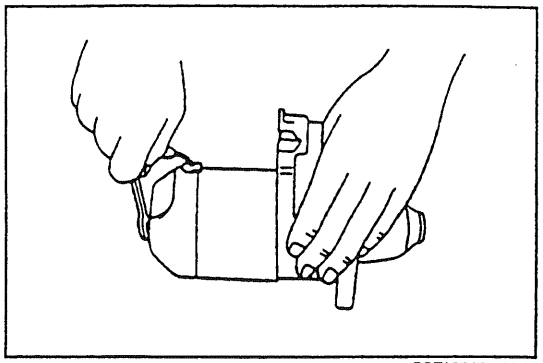
PST00058-00055

10. Install the rubber, brake spring and lock plate in this order onto the armature shaft.



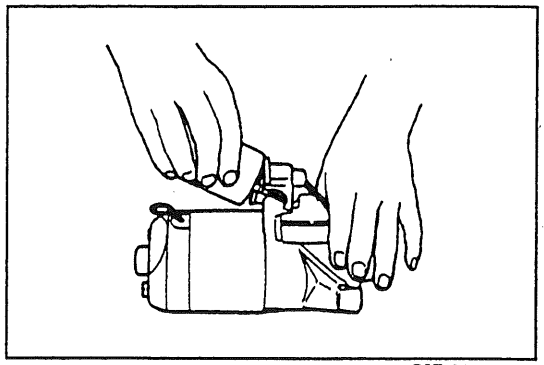
PST00059-00056

11. Install the rear end frame cover in place with the two screws.



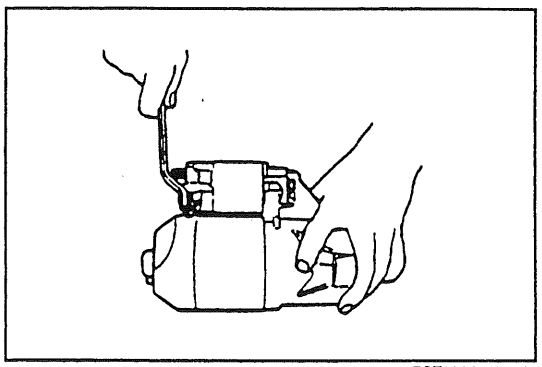
PST00060-00057

12. 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.



PST00061-00058

13. Connect the lead wire to the magnetic switch.

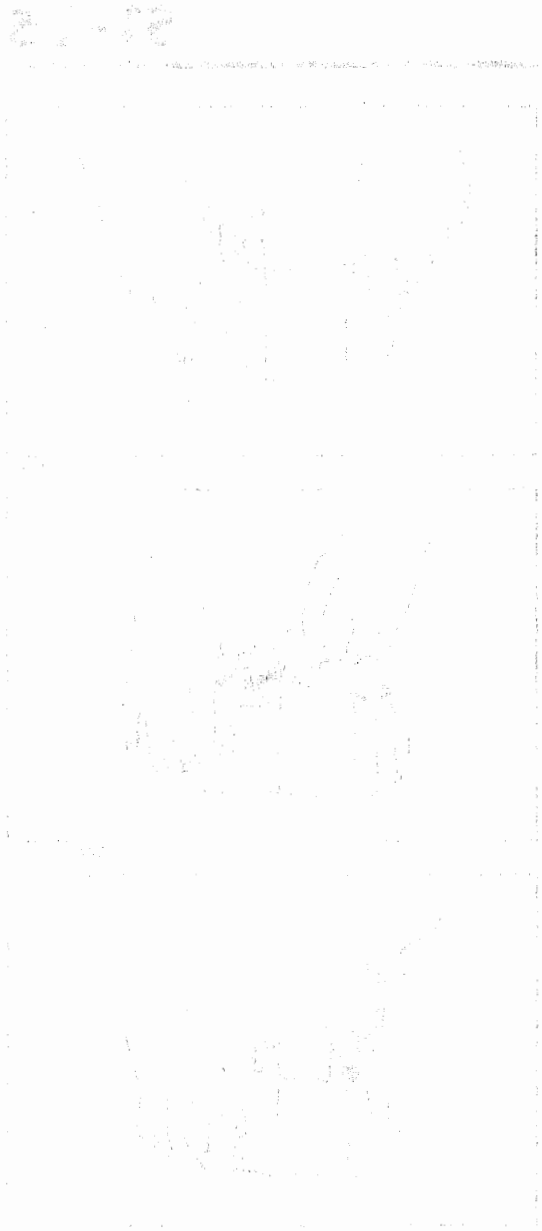


PST00062-00059

10. INSTALLATION

After completion of disassembly and assembly, perform the function check, following the unit check described in the item 7 of this section. Then, install the starter onto the vehicle.

PST00063-00000



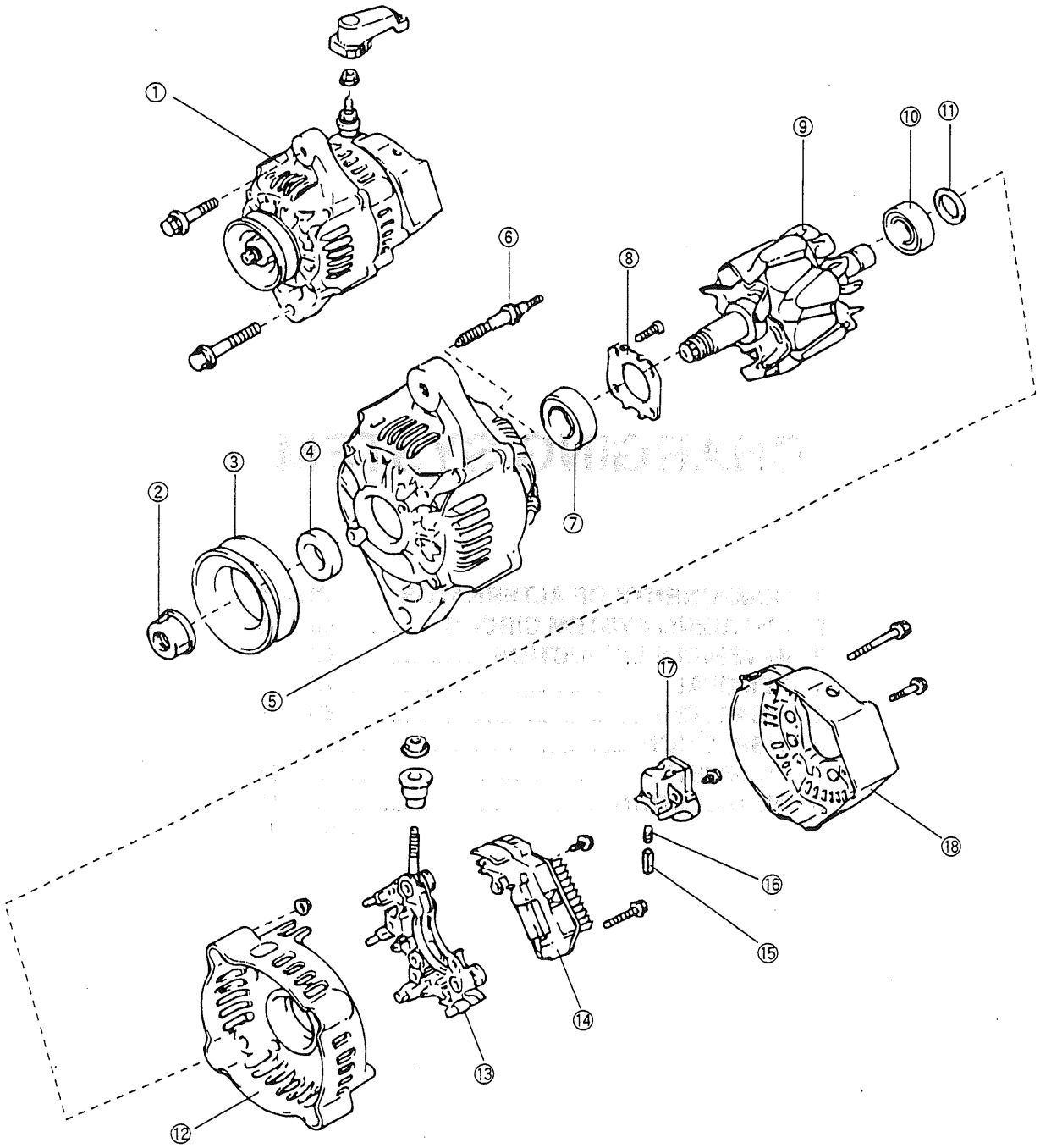
CHARGING SYSTEM

CH

1. COMPONENTS OF ALTERNATOR ..... CH– 2
2. CHARGING SYSTEM CIRCUIT ..... CH– 3
3. IN-VEHICLE INSPECTION ..... CH– 3
4. REMOVAL ..... CH– 4
5. DISASSEMBLY ..... CH– 4
6. INSPECTION ..... CH– 6
7. ASSEMBLY CH–11
8. INSTALLATION CH–13

PCH00001-00000

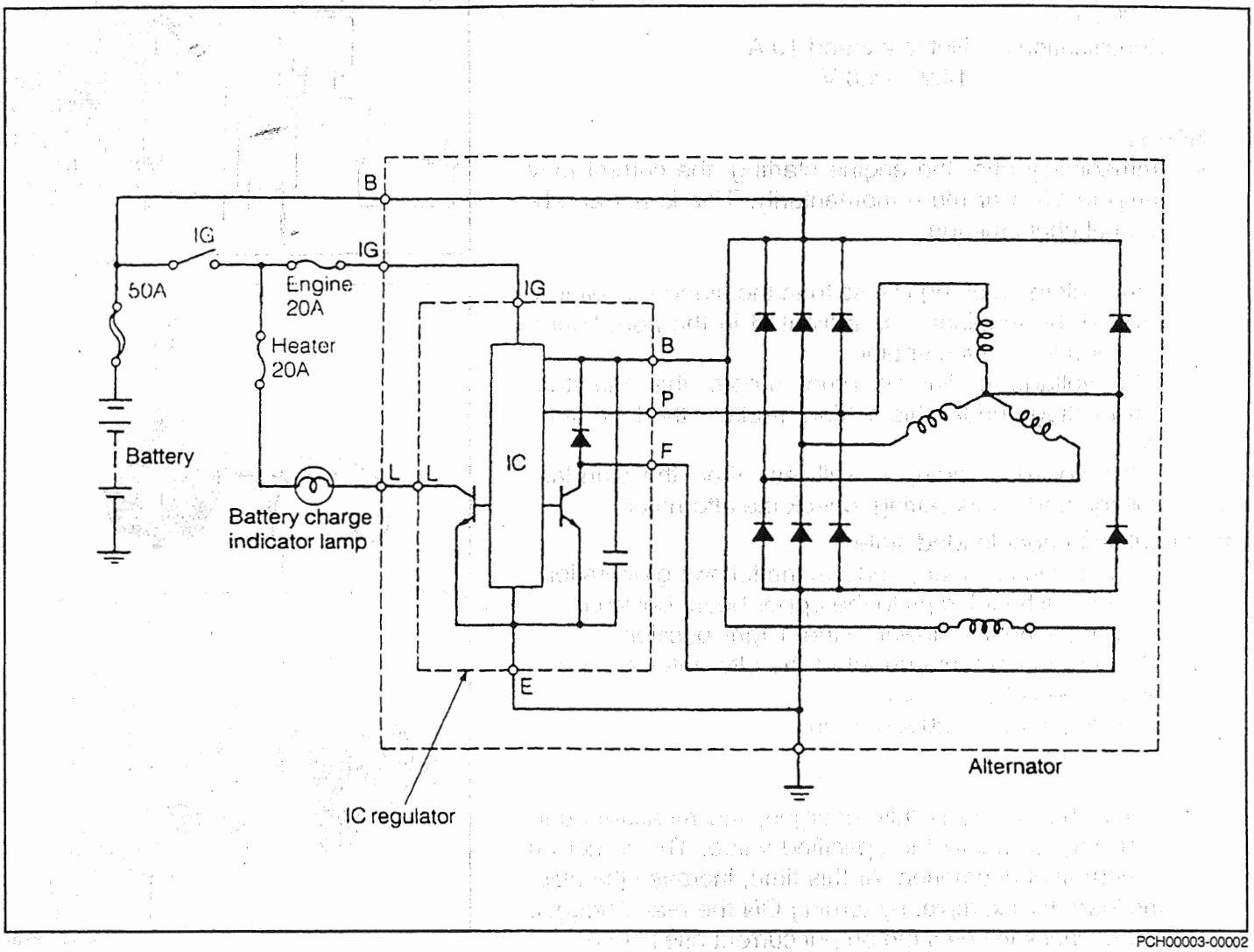
1. COMPONENTS OF ALTERNATOR



① Alternator Assy
② Pulley lock nut
③ Alternator pulley
④ Spacer
⑤ Drive end frame
⑥ Stud bolt
⑦ Bearing
⑧ Retainer plate
⑨ Alternator rotor Assy
⑩ Bearing
⑪ Bearing cover
⑫ Rectifier end frame Assy
⑬ Rectifier holder
⑭ Regulator Assy
⑮ Brush
⑯ Spring
⑰ Brush holder
⑱ Rear end cover

PCH00002-00001

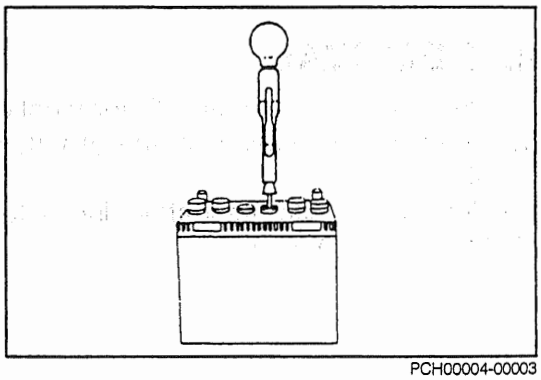
2. CHARGING SYSTEM CIRCUIT



PCH00003-00002

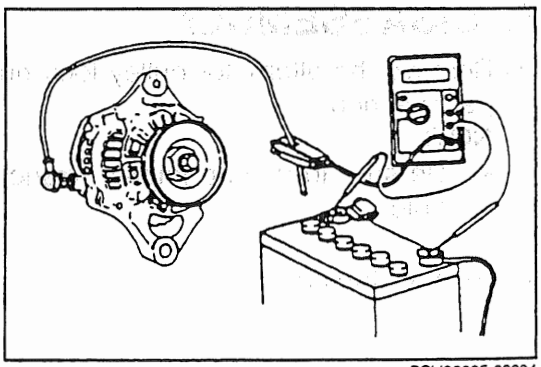
3. IN-VEHICLE INSPECTION

(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



PCH00004-00003

(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.



PCH00005-00004

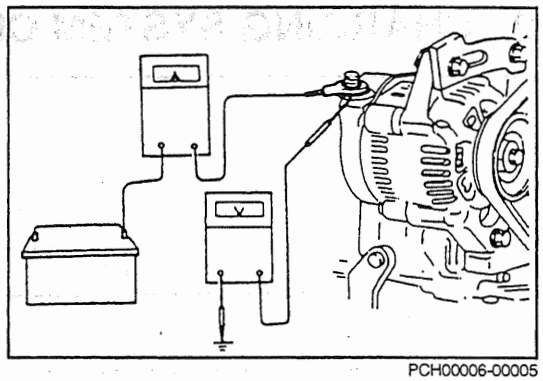
② Raise the engine revolution speed gradually to 2500 rpm. Measure the current and voltage at 2500 rpm.
Specifications: Not to exceed 10 A
14.2 - 14.8 V

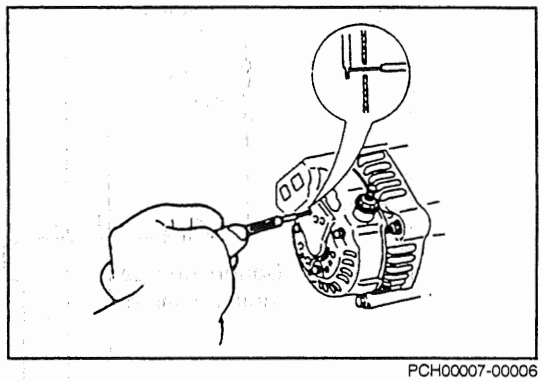
NOTE:
- Immediately after the engine starting, the current may jump to 10 A or more momentarily. This is not an abnormal phenomenon.

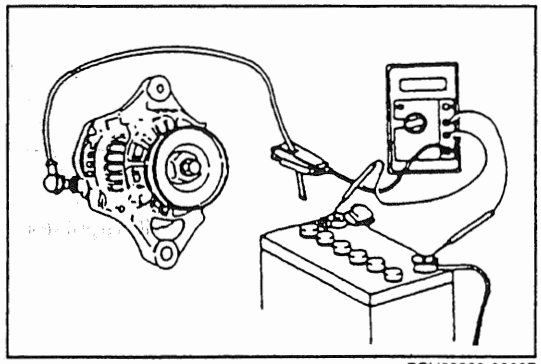
If the voltage reading is less than the standard voltage, ground the terminal F as indicated in the right figure. Proceed to start the engine.
If the voltage reading becomes greater than the standard voltage under this setting, replace the IC regulator.
If the voltage reading is still less than the standard 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 2500 rpm.
Specified Value: 20 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.

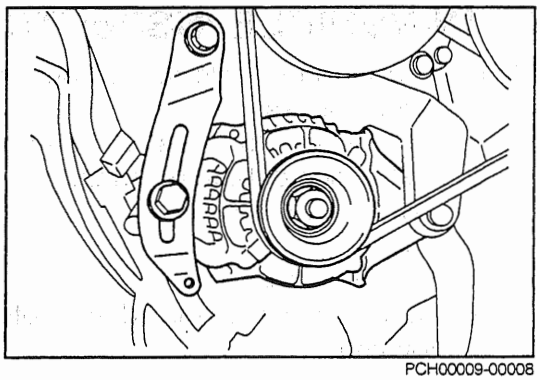

PCH00006-00005


PCH00007-00006


PCH00008-00007

4. REMOVAL

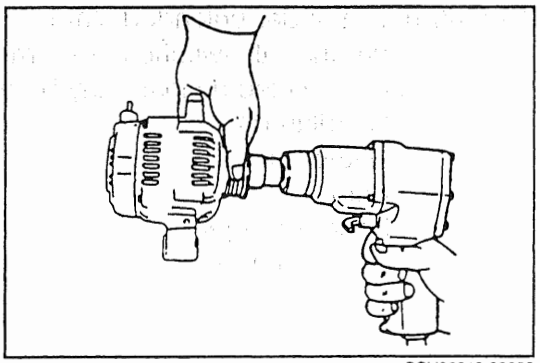
(1) Disconnect the negative ⊖ terminal of the battery.
(2) Remove the couplers for the ⊕B, IG and L terminals of the alternator.
(3) Remove the alternator attaching bolts.
(4) Remove the V-belt.


PCH00009-00008

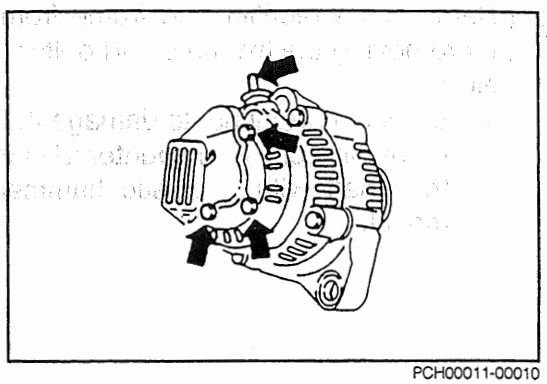
5. DISASSEMBLY

(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.

(2) Remove the spacer.

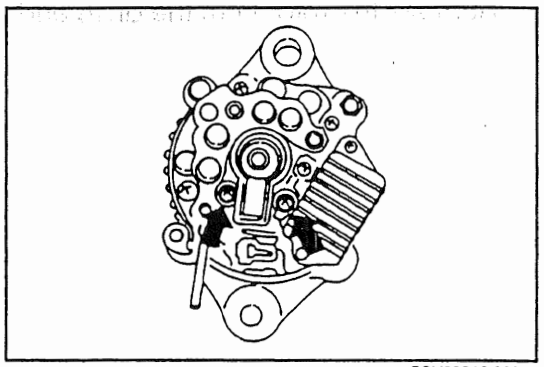

PCH00010-00009

(3) Removal of rear end cover
① Remove the nut and terminal insulator.
② Remove the three screws.
③ Remove the rear end cover.



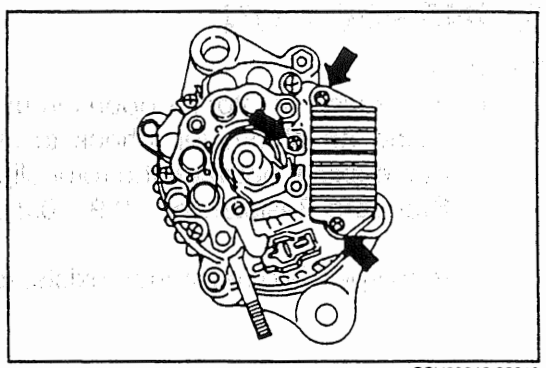
PCH00011-00010

(4) Remove the brush holder.



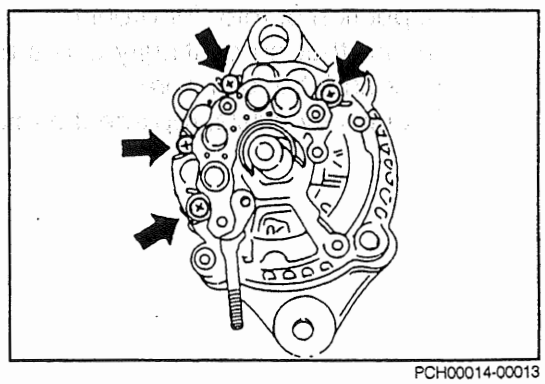
PCH00012-00011

(5) Remove the regulator assembly.



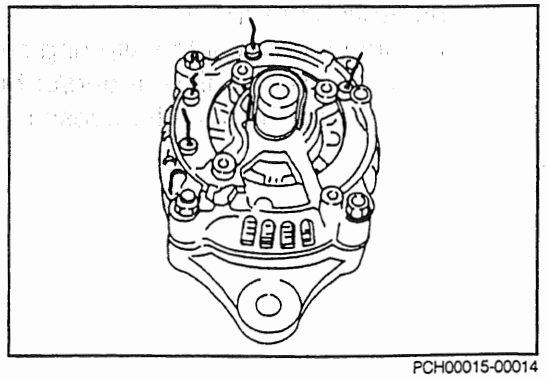
PCH00013-00012

(6) Removal of rectifier holder
① Remove the attaching screws.



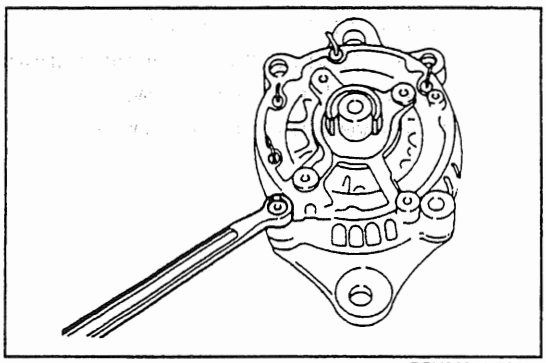
PCH00014-00013

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

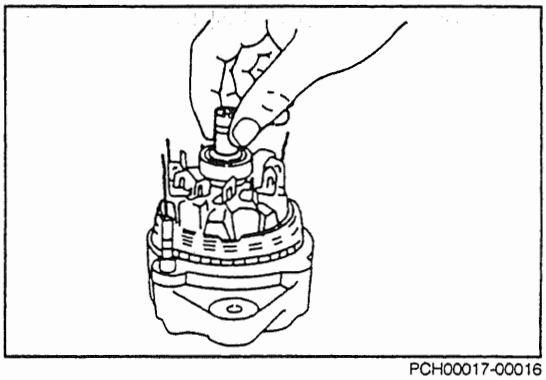


PCH00015-00014

(7) 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.


PCH00016-00015

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

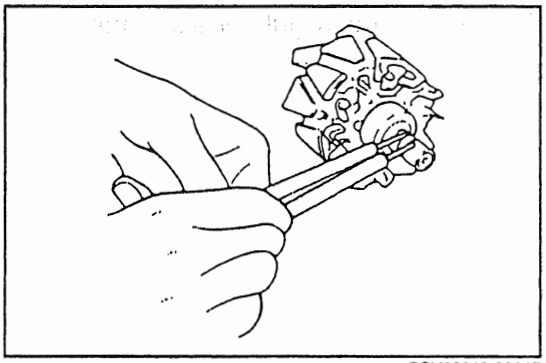

PCH00017-00016

6. INSPECTION

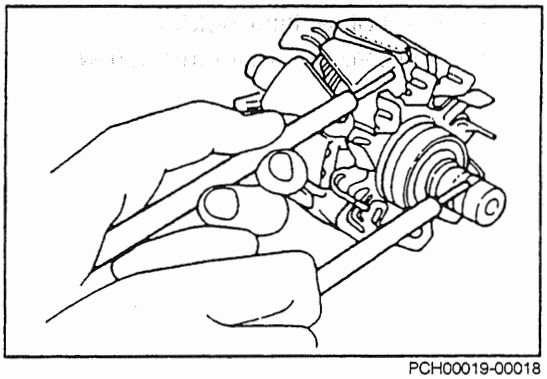
(1) Rotor

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 ± 0.2 Ω

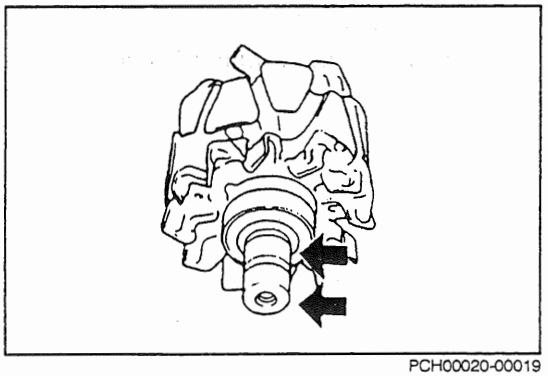
If no specified resistance exists, replace the rotor.


PCH00018-00017

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.

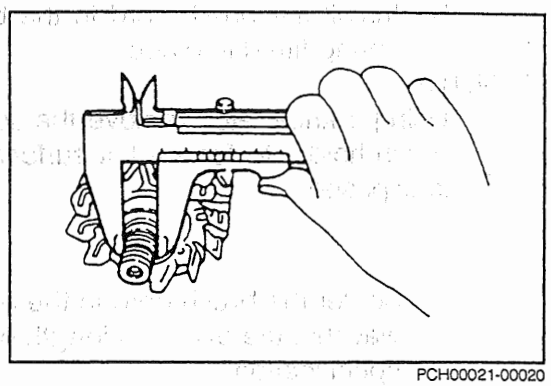

PCH00019-00018

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.


PCH00020-00019

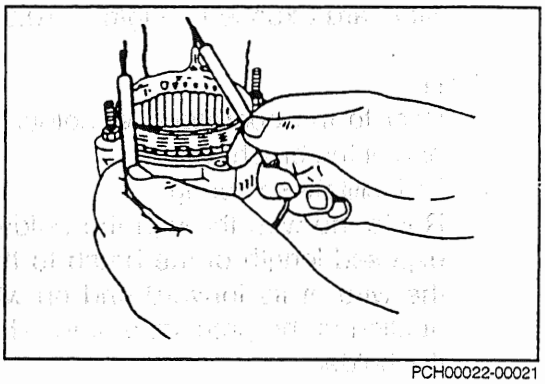
b. Measure the outer diameter of the slip ring, using vernier calipers.
Standard Diameter: 14.4 mm
Minimum Diameter: 14 mm

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

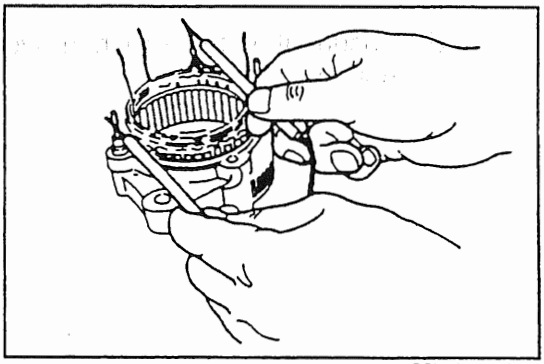

PCH00021-00020

(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


PCH00022-00021

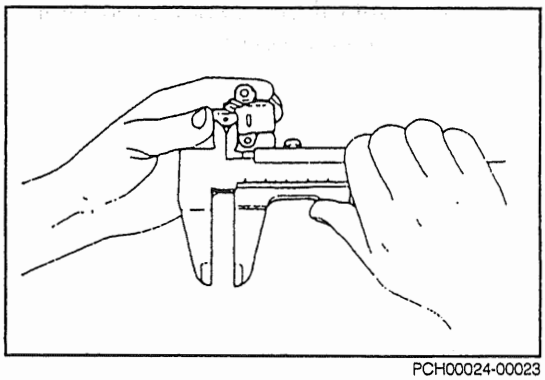
② Inspection of stator for short circuit
Using an ohmmeter, check to see if any short circuit of the stator coil is present between the coil lead and the drive end frame.
If continuity exists, replace the drive end frame assembly.


PCH00023-00022

(3) Brush and Brush Holder

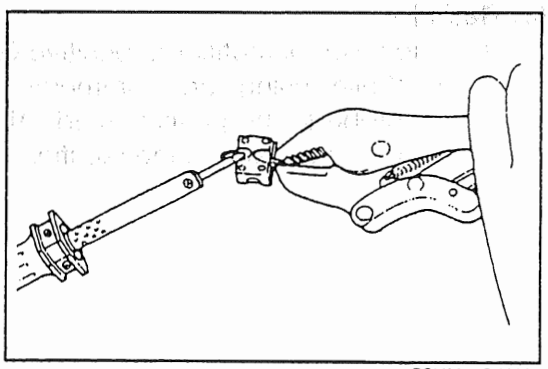
① Measurement of exposed brush length
Measure the exposed brush length, using a scale.
Standard Exposed Length: 10.5 mm
Minimum Exposed Length: 1.5 mm

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


PCH00024-00023

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.

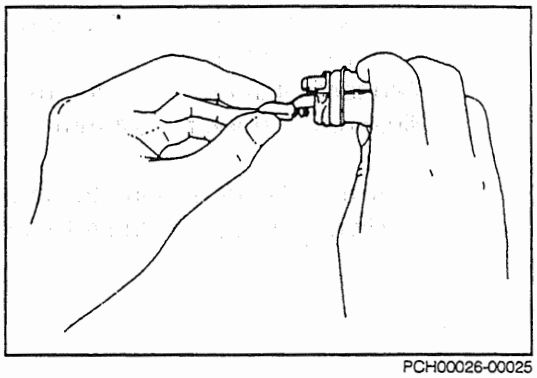
NOTE:
- Prior to the operation, remove the painting film at the solder surface with a knife or the like.
- For this operation, it is advisable to use a soldering iron with a capacity of about 40 W.


PCH00025-00024

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

NOTE:

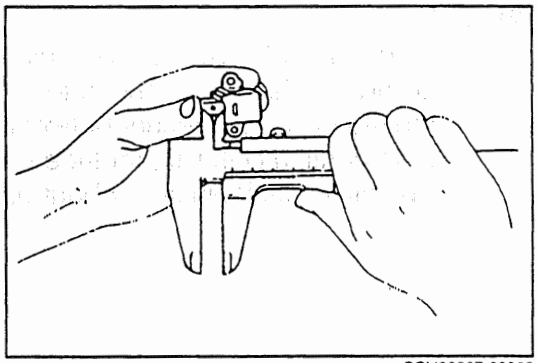
- Using a knife, etc., remove the soldered section of the brush holder to form a flat surface until the bare metal is exposed.



PCH00026-00025

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

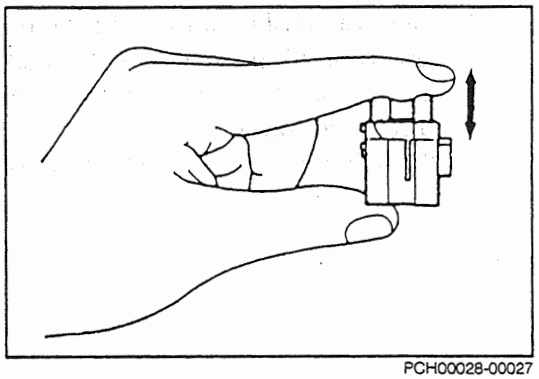


PCH00027-00026

NOTE:

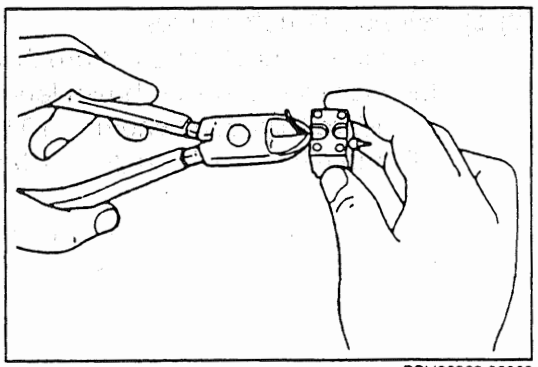
- Prior to the operation, let solder flow onto the forward end of the brush wire.
- To facilitate soldering:
  Route the wire through the holder hole and adjust the exposed length of the brush to the specification. Bend the wire at its forward end on which solder has been applied in the preceding step.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

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



PCH00028-00027

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

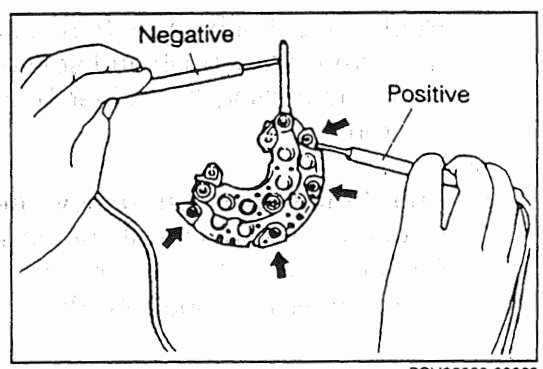


PCH00029-00028

(4) Rectifier

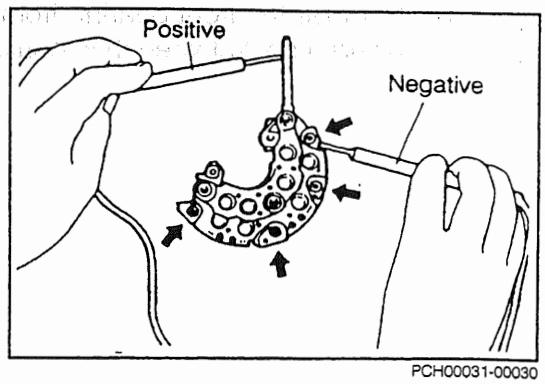
① Inspection of rectifier at positive ⊕ side

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



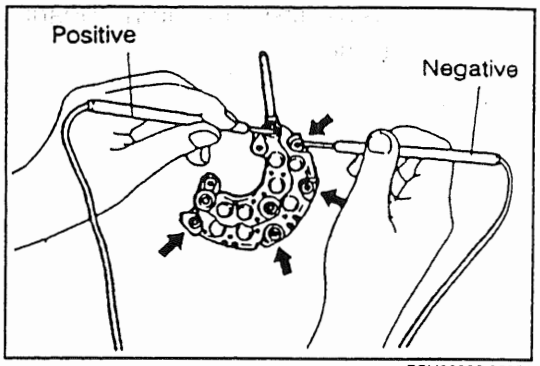
PCH00030-00029

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.



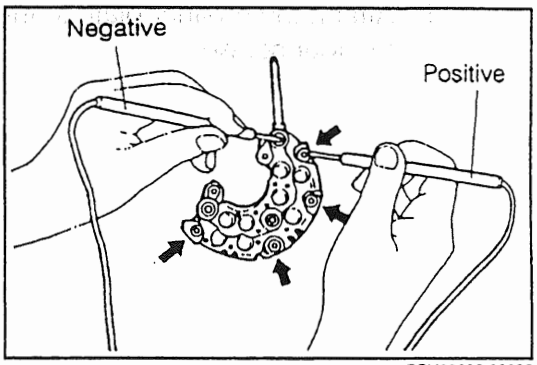
PCH00031-00030

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.



PCH00032-00031

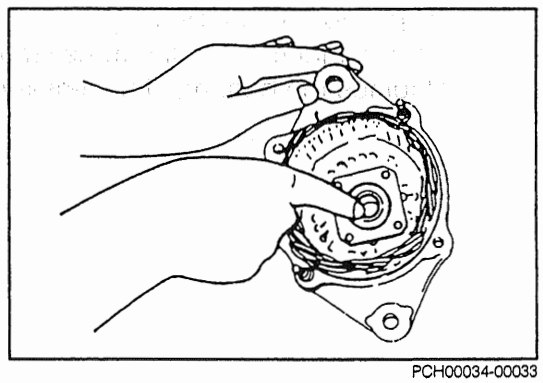
b. Repeat the same steps described in a. above with the polarity of the tester probes reversed this time.
c. Ensure that continuity exists either in the step a. or in the step b. and no continuity exists at the other test.
If not replace the rectifier holder.



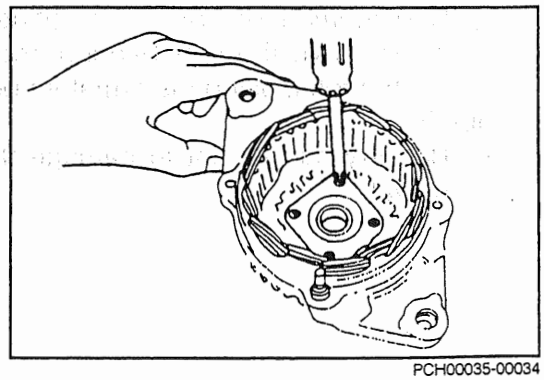
PCH00033-00032

(5) Bearings

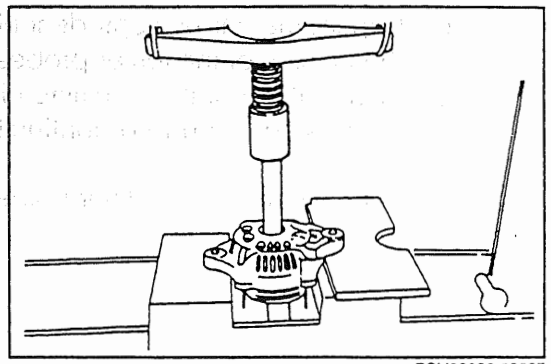
① Inspection of front bearing
Ensure that the bearing turns smoothly.
Replace the bearing, if necessary.


PCH00034-00033

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

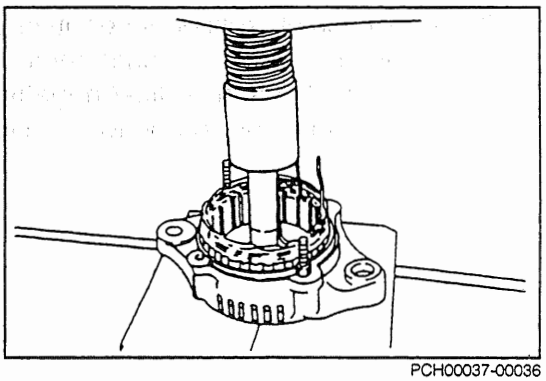

PCH00035-00034

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



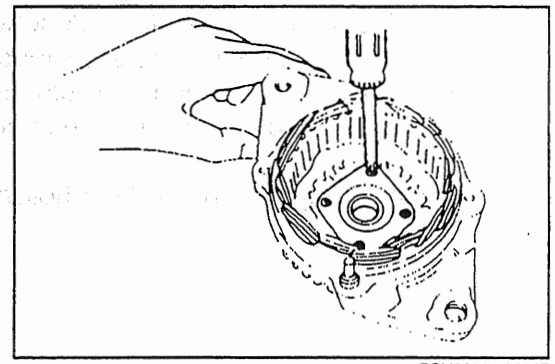
PCH00036-00035

c. Press the new front bearing into the drive end frame.



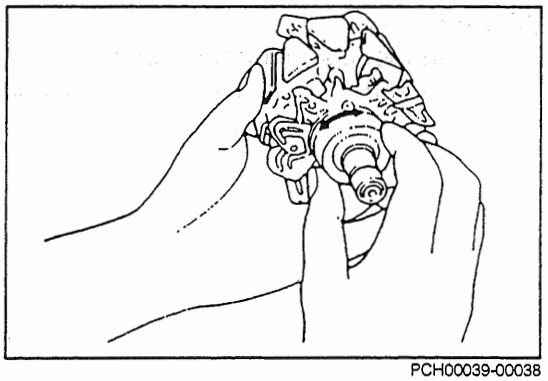
PCH00037-00036

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



PCH00038-00037

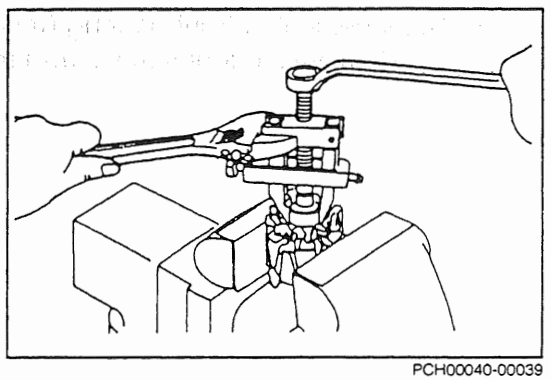
③ Inspection of rear bearing
Ensure that the bearing turns smoothly.
Replace the bearing, if necessary.



PCH00039-00038

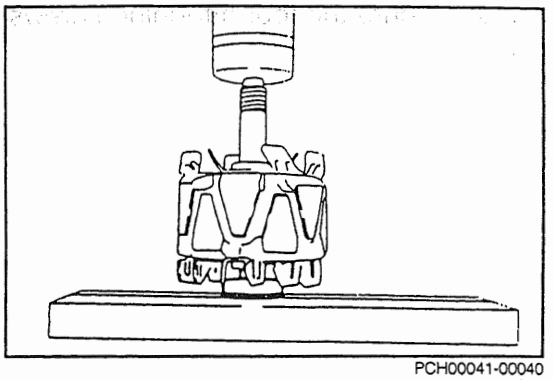
④ Replacement of rear bearing (if necessary)
a. Remove the rear bearing and bearing cover from the rotor, using the armature bearing puller.

NOTE:
- Be very careful not to damage the fan during the removal.



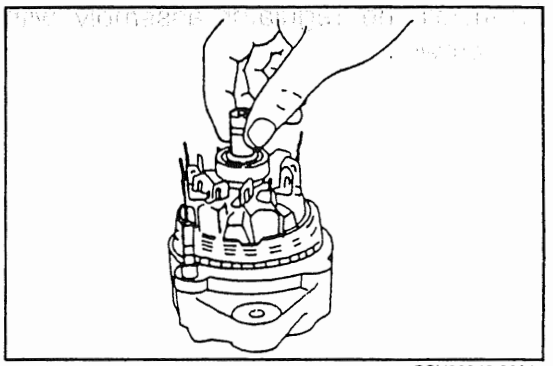
PCH00040-00039

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

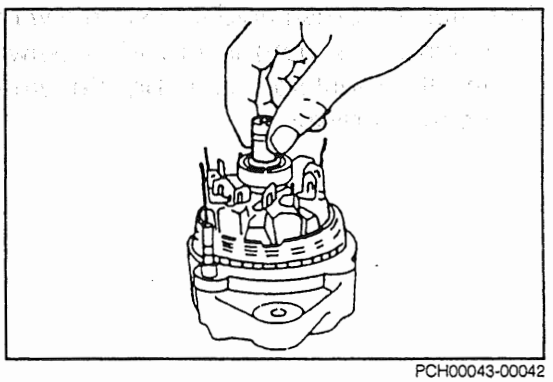

PCH00041-00040

7. ASSEMBLY

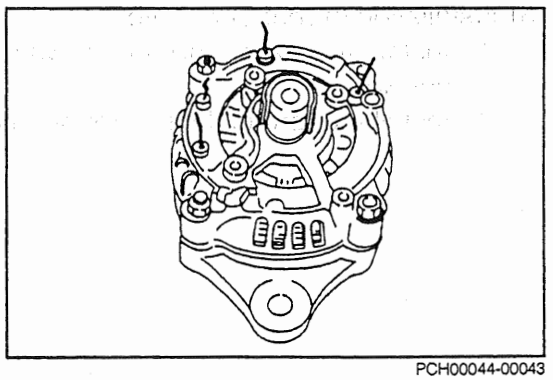
(1) Install the rotor into the drive end frame assembly.


PCH00042-00041

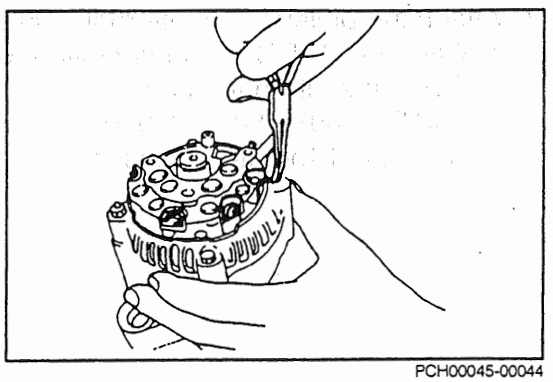
(2) Installation of rectifier end frame on drive end frame.
Install the rectifier end frame on the drive end frame with the two bolts and two nuts.
NOTE:
- Be very careful not to damage the stator wire during the installation.
- If some resistance is encountered during the insertion, lightly tap the frame with a plastic hammer.


PCH00043-00042

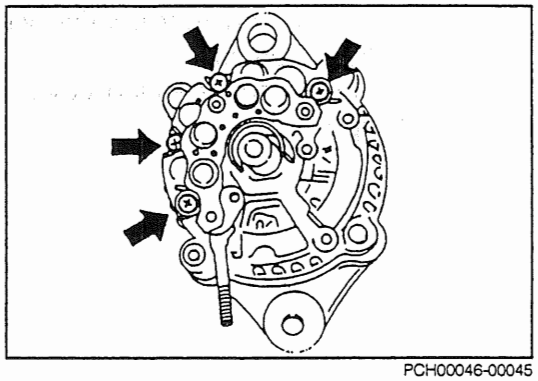
(3) Installation of rectifier holder, regulator assembly and brush holder.
① Attach the rectifier holder to the end frame with the coil wires passed through the aperture of the rectifier holder.


PCH00044-00043

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

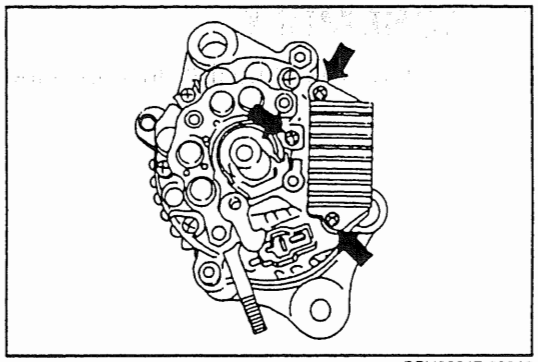

PCH00045-00044

③ Secure the four attaching screws.



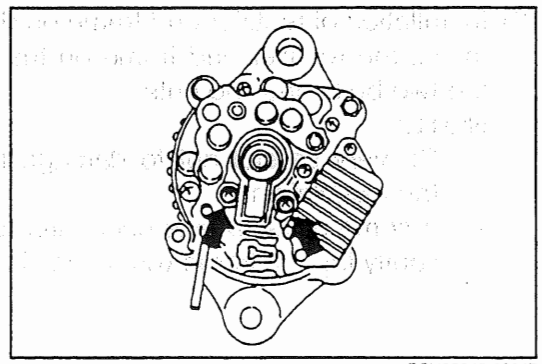
PCH00046-00045

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



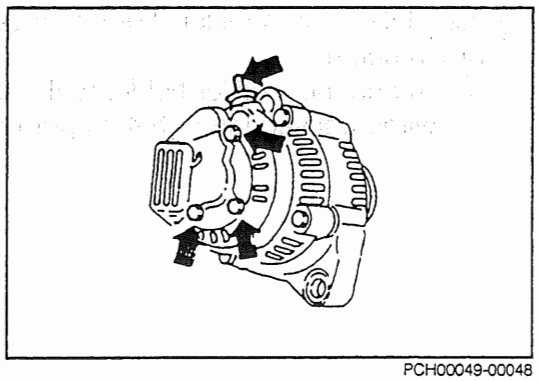
PCH00047-00046

(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.



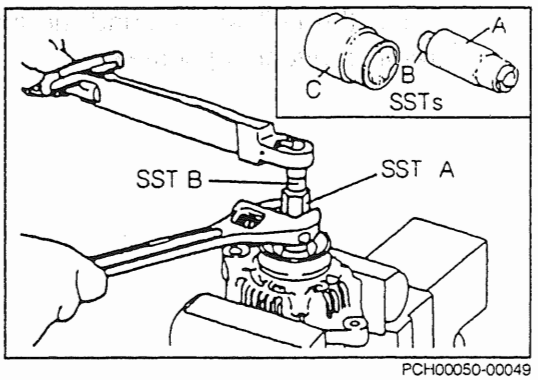
PCH00048-00047

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



PCH00049-00048

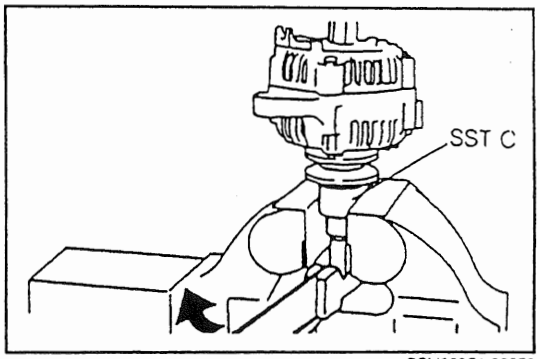
(7) Attach the pulley to the alternator shaft.
(8) Tighten the SST B to the specified torque. Secure the the SST B to the alternator shaft.
SSTs: 09820-87201-000
Specified Torque: 39 N·m



PCH00050-00049

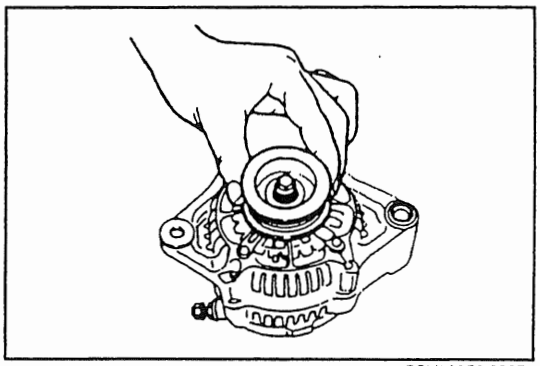
(9) Clamp the SST C in a vise. Tighten the nut by turning the SST B.
Specified Torque: 110 N·m

(10) Remove the SSTs A and B.



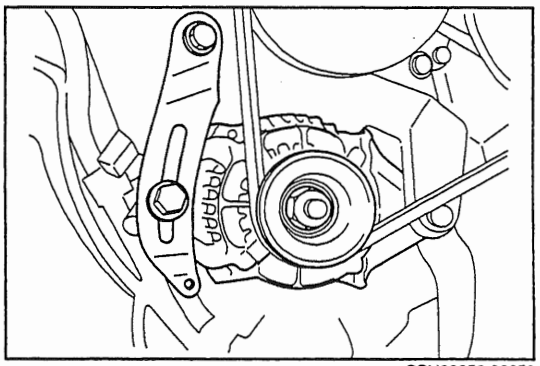
PCH00051-00050

(11) Ensure that the rotor turns smoothly.


PCH00052-00051

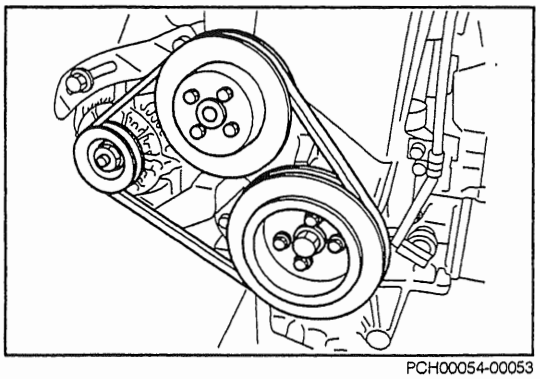
8. INSTALLATION

(1) Temporarily install the alternator on the engine with the two attaching bolts.
(2) Install the alternator drive belt properly.


PCH00053-00052

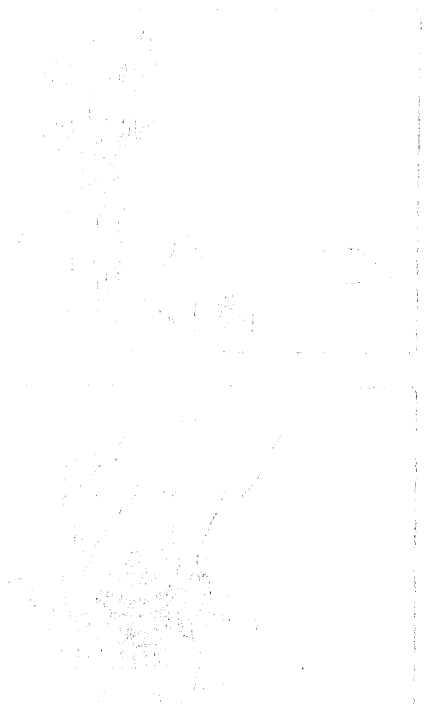
(3) Adjust the belt tension in such a way that the deflection of the drive belt meets the specification when you push the midpoint of the drive belt between the alternator pulley and the water pump pulley by applying a force of 98 N (10 kg-f).
Specified Belt Deflection
New Belt: 5.0 - 7.0 mm
Used Belt: 6.0 - 8.0 mm

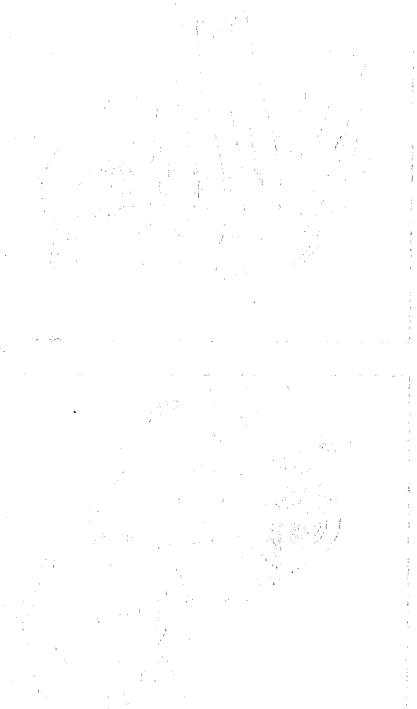
NOTE:
- The new belt refers to a belt which has been used less than five minutes on a running engine.


PCH00054-00053

(4) Install the ⊕ B wire and connector to the alternator.
(5) Reconnect the ground cable terminal to the negative ⊖ terminal of the battery.

PCH00055-00000





DAIHATSU

HIJET

Chassis

Service manual

DAIHATSU MOTOR CO., LTD.

NO.9116-SE

DAIHATSU

HIJET

Chassis

Service manual

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PGI00001-00000

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 the 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 the 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 from 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 the radiator fan blades! The electric cooling fan is mounted on the radiator and can start to operate at anytime by a rise in coolant temperature or turning ON of the air conditioner switch in the case of vehicles equipped with an air conditioner. The electric cooling fan is also mounted on the condenser for air conditioner and starts to operate anytime when the air conditioner switch is turned "ON". For this reason care should be taken to ensure that the electric cooling fan motor is completely disconnected when working under the hood.

The UNITS used in this manual are showed as the SI UNIT (International System of Unit).

"Example"
24.5 - 34.3 N·m

PGI00002-00000

HOW TO USE THIS MANUAL

CONTENTS OF EXPLANATION

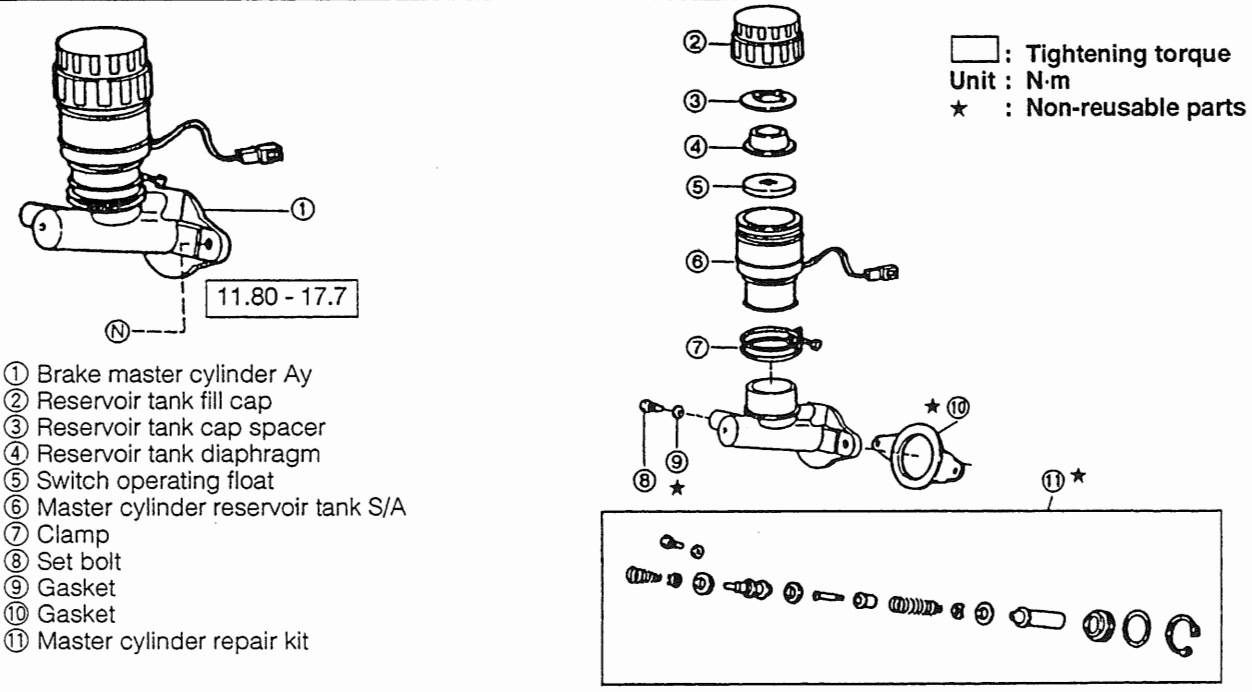
1. Schematic Diagram of Components

(1) The schematic diagram of components that appears at the beginning of each section describes the nomenclature and installed conditions of each component. Furthermore the tightening torque is posted in the figure.

(2) Those parts whose reuse is not permitted bear a "★" mark for an identification purpose. Be certain to replace these parts with new ones during the assembly.

(3) During the assembly, be sure to apply grease to those parts indicated by the mark in the figure.

(Example)



① Brake master cylinder Ay
② Reservoir tank fill cap
③ Reservoir tank cap spacer
④ Reservoir tank diaphragm
⑤ Switch operating float
⑥ Master cylinder reservoir tank S/A
⑦ Clamp
⑧ Set bolt
⑨ Gasket
⑩ Gasket
⑪ Master cylinder repair kit

PGI00003-00001

2. Servicing Procedure

(1) In principle, the servicing procedure is described in the following sequence given below: Removal → Inspection → Installation, and Disassembly → Inspection → Assembly.

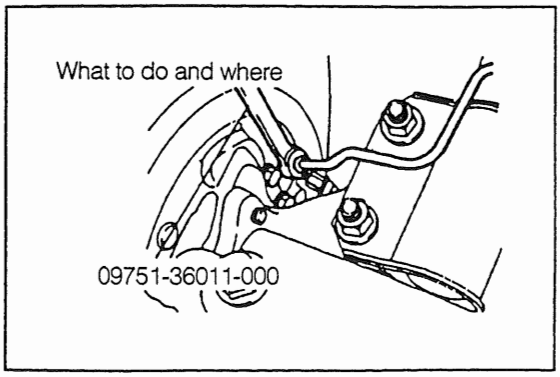
(2) The explanation covers detailed servicing methods, specifications and notes.

(3) The main point of each item explains the servicing section and servicing procedure, using illustrations.

(Example)

What to do / How to do it

3. Brake tube installation
   (1) Install the brake tube to the wheel cylinder temporarily by hands.
   (2) Tighten the brake tube to the wheel cylinder, using the following SST.
   SST: 09751-36011-000



PGI00004-00002

(4) The inspection in this manual describes only checking operation. Therefore, if you find any malfunction, replace any defective parts with new ones.

3. SST

For those operations which require the use of any SST, the SST numbers concerned are given in bold letters.

4. Service Specifications

Service specifications are indicated in bold letters or enclosed by heavy lines. Be certain to confirm the specifications concerned.

5. Tightening Torque

For those operations which require the control of tightening torque, the relevant tightening torque is given in bold letters. Be certain to confirm the tightening torque concerned.

6. Definitions of Terms

Specified Value ..... A value which represents the allowable range during the inspection and adjustment.

Limit ..... A maximum or a minimum limit which the value should not exceed or fall below.

PGI00005-00000

ABBREVIATION CODES

The abbreviation codes that appear in this service manual stand for the following, respectively.

Abbreviation code	Original word	Meaning
A/C	Air Conditioner	Refers to air conditioner.
A/T, AT	Automatic Transmission	Refers to automatic transmission
A/Y or Ay	Assembly	Refers to an assembled component comprising more than two single parts or sub-assembly parts.
API	American Petroleum Institute	The standards set forth by the American Petroleum Institute (abbreviated as API Classification) have been employed to evaluate and classify properties of various oils. Engine oils for gasoline engines are classified as SD, SE, SF and so on, whereas engine oils for diesel engines are classified as CC, CD and so on.
ECU	Electronic Control Unit	Refers to electronic control unit.
EFI	Electronic Fuel Injection	Refers to electronic fuel injection.
F/L	Fusible Link	Refers to fusible link.
L.H.D.	Left-Hand Drive	Left-hand drive vehicle.
LH	Left Hand	Refers to left side.
M/T, MT	Manual Transmission	Refers to manual transmission.
MP	Multipurpose	Means that the following item has multi-purposes.
O/S	Oversize	In instances where fitting becomes too loose due to wear resulting from use for a long period of time or due to frequent removal/installation operations, if the fitting part (e.g. piston) is replaced with a part having larger dimensions, the other mating part may be put into use again. "Oversized" parts denote those parts having larger dimensions compared with the standard parts.
PR	Ply Rating	Represents strength of tires. The larger the ply rating number, the stronger the tire strength.
R.H.D.	Right-Hand Drive	Right hand drive vehicle
RH	Right Hand	Refers to right side.
S/A	Sub-Assembly	Refers to a component comprising more than two single parts which are welded, staked, or studded to each other to form a single component.
SAE	Society of Automotive Engineers	For example, automotive oils are designated as SAE so and so number. These designation numbers have been set forth by the Society of Automotive Engineers in the United States of America (SAE). The larger the SAE number, the higher the oil viscosity. Conversely, the smaller the SAE number, the lower the oil viscosity.
SST	Special Service Tool	Refers to a tool designed for a specific purpose.
STD	Standard	When referring to automotive parts, "standard" represents those parts which have been installed originally by the manufacturer and which have standard dimensions.
T	Torque	Refers to tightening torque.
U/S	Under Size	In the same manner as with the "oversized" parts, if fitting part (e.g. bush and bearing) is replaced with a part having smaller bore dimensions, the other mating part may be put into use again. "Under sized" parts denote those parts having smaller dimensions compared with standard parts.
VSV	Vacuum Switching Valve	Refers to vacuum switching valve.
W/	With	Denotes that the following part is attached.
ETR	Electronic Tuning Radio	Radio which incorporates variable capacitance, etc. which varies the value according to an applied voltage or current.

PGI00006-00000

The abbreviation codes that appear in the figure stand for the following, respectively.

Ⓑ	Bolt	Ⓢ	Screw
Ⓝ	Nut	Ⓦ	Washer

PGI00007-00000

GENERAL SERVICE INSTRUCTION

1. Use fender covers, seat covers and floor sheets so that the vehicle may not get dirty or be scratched.

2. Jacking up
   (1) When only the front section or rear section of the vehicle is jacked up, be sure to place chocks at the wheels so as to insure safe operations.
   (2) When the vehicle has been jacked up, be sure to support the vehicle at the specified section using safety stands. (See page GI–9)

3. Handling instructions related to battery.
   (1) Before you start performing the electrical works, make certain to disconnect the battery ground cable terminal from the negative (–) terminal of the battery.
   NOTE:
   - Before disconnecting the battery ground cable terminal from the negative (–) terminal of the battery, be sure to read out the diagnosis code of the EFI, when necessary.
   - After reconnecting the battery ground cable terminal to the negative terminal of the battery, be sure to reset the watch or radio, if the vehicle is equipped with such equipment.

   (2) When it becomes necessary to disconnect the battery power supply for the purpose of carrying out checks or repairs, always disconnect the battery ground cable terminal from the negative terminal of the battery first.
   (3) To avoid damaging battery plates, after the terminal nut has been loosened, pull out the battery ground cable terminal straight upward, rather than turning or prying the terminal.
   NOTE:
   - Be sure to employ a battery terminal puller (commercially available) to remove the battery ground cable terminal from the negative terminal of the battery, if encountered any difficulty.

   (4) Clean the battery terminal posts or battery ground terminals, using a cloth. Never use a file or other adhesive agents.
   (5) When connecting the battery ground cable terminal to the battery, first the battery ground cable terminal should be fitted onto the battery post with the attaching nut in a loose state.
   Then, tighten the nut. Never tap the terminal onto the battery post, using a hammer or spanner wrench or the like.
   (6) As for the cover at the positive (+) terminal side, be sure to install it at the correct position.

4. Repairs of fuel system
   (1) The EFI equipped vehicles employ a high fuel pressure. Therefore, the following notes should be observed.
      ① Be sure to prevent the fuel from splashing with a cloth or the like, when the union bolt or other connected section of the fuel line is loosened or slackened.
   (2) When connecting/disconnecting the fuel line.
      ① Tighten each connecting section to the specified torque.
      ② Attach new specified clips to each connecting section.
      ③ Be certain to place a suitable container or a cloth, etc. under the connected section of the fuel line before disconnecting the fuel line.
      ④ Before the fuel line is disconnected, be sure to release the inner pressure of the fuel tank by detaching the fuel filler cap.
      ⑤ Be sure to follow the instruction mentioned in the main text when disconnect or connect the quick type connectors.
   (3) Never work near open flames.

5. For increased work efficiency and improved accuracy, be sure to utilize SSTs (Special Service Tools) effectively.

HANDLING INSTRUCTIONS ON CATALYTIC CONVERTER

WARNING:

- When a great amount of unburnt gas is admitted into the catalytic converter, overheating is prone to occur, resulting in a fire hazard.
  To avoid such trouble in advance, be certain to observe the following precautions. Also, be sure to explain such precautions to your customers.

1. Use only unleaded gasoline.

2. Avoid idling the engine for a prolonged length of time.
   Do not run the engine continuously at idle speed for more than 20 minutes.
   WARNING:
   - Immediately check and repair the vehicle if the fast idle speed or idle speed is unstable or the system exhibits malfunction. Failure to observe this warning may result in a fire hazard.

3. Be sure to observe the following points when performing the spark jump tests.
   (1) The spark jump test must be limited to cases where such test is absolutely necessary. Also, be sure to finish the test in the shortest possible time.
   (2) Be sure to shut off the fuel supply when performing the spark jump test in advance.

4. Do not run the engine when the fuel tank becomes nearly empty.
   Failure to observe this caution will cause misfiring. Also, it will apply excessive load to the catalytic converter, even leading to catalyst damage.

5. Do not dispose of the waste catalyst along with parts contaminated with gasoline or oil.

PGI0009-00000

JACKING POINTS AND SUPPORTING POINTS OF SAFETY STANDS

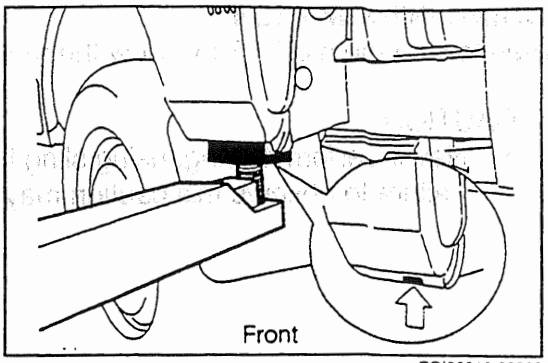
JACKING POINTS AND SUPPORTING POINTS FOR SAFETY STANDS

Front side: Support the vehicle at the body under the center pillar.

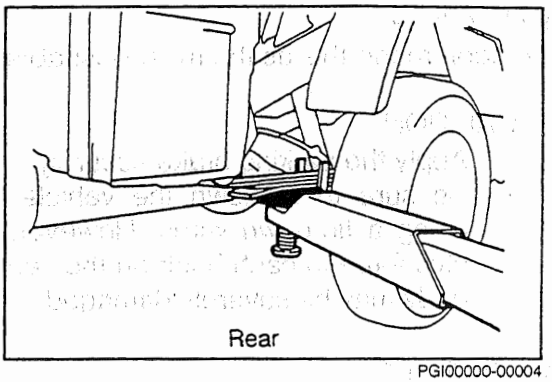
Rear side: Support the vehicle at the leaf spring.

CAUTION:

- Never support the vehicle at the body.



PGI00010-00003

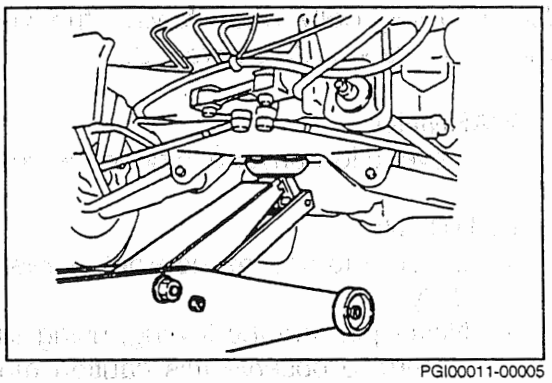


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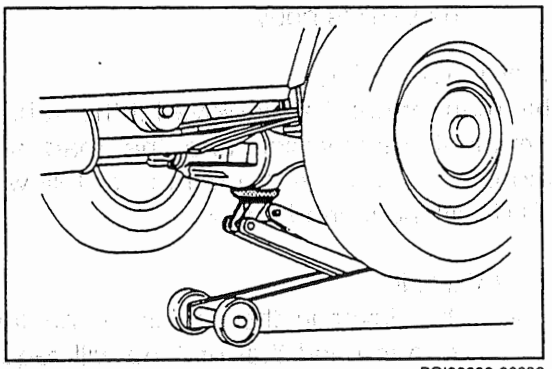
JACKING POINTS FOR GARAGE JACK

Front side: Support the vehicle at the front suspension cross member.

Rear side: Support the vehicle at the differential.



PGI00011-00005



PGI00000-00006

TOWING INFORMATION

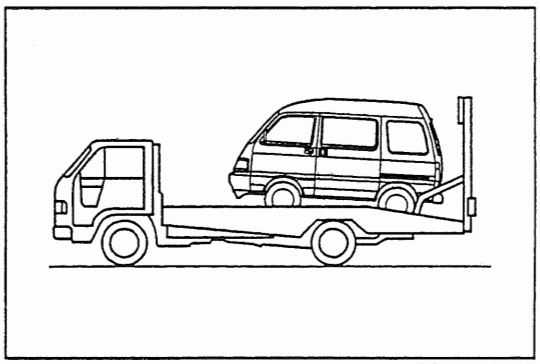
When towing the model S85 follow the manner mentioned below.

CAUTION:
- Never perform towing, using sling type equipment.
  Failure to observe this caution may lead to severe damage on the vehicle body.

PGI00012-00000

Flat bed type
We recommend this as the most desirable method.

CAUTION:
- Apply the parking brake securely.
- Be sure to tie-down the vehicle body to the carrier, using a tie-down wires. However, never apply excessive force to each hook on the vehicle body, for vehicle body may be severely damaged.

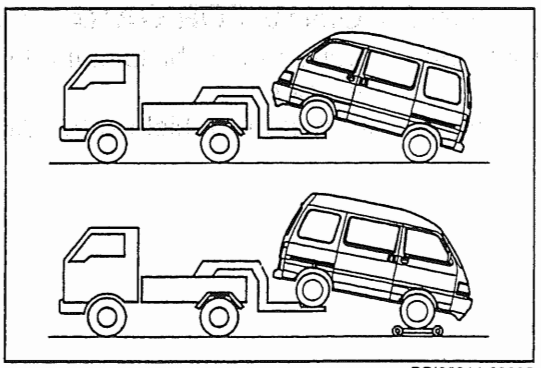


PGI0001300007

Wheel lift type
Use a towing dolly when towing the vehicle with the front wheels or rear wheels on ground.

WARNING:
- Never allow anyone to be in the vehicle being towed.

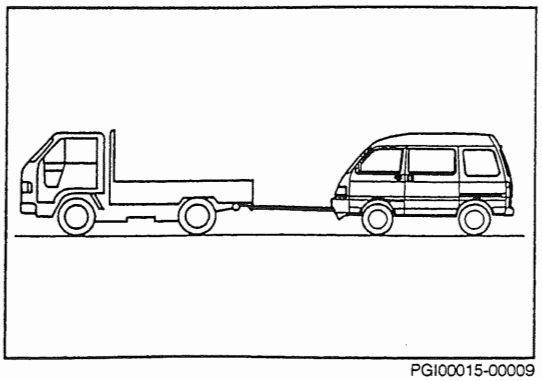
CAUTION:
- Be sure to secure the front or rear tires on the towing dolly.
- Never perform the towing, using sling type equipment. Failure to observe this caution may severely damage the vehicle body.



PGI00014-00008

Emergency towing
This manner can be employed if the vehicle is equipped with a manual transmission and the road surface is hard and smooth. In this case, be certain to follow the WARNING and CAUTION mentioned below.

WARNING:
- The driver in the vehicle to be towed should always keep in mind that braking will require more force than usual when the engine is stopped, because the brake booster is not functioning when the engine is stopped.



PGI00015-00009

- Never tow the vehicle at speed more than 30 km/h.
- Turn the ignition switch of the vehicle to be towed in the "ACC" position during the towing. Never pull out the key or turn the ignition switch to the "LOCK" position during the towing. Failure to observe this warning will loose controllability, causing an accident.
- Never tow the vehicle in this manner unless the wheels, axles, drive train, steering, and brakes are in a good condition.

CAUTION:
- Never tow an automatic transmission vehicle in this manner. Be sure to always use a towing dolly.
- Always pull the hook in a straight-ahead direction to prevent it from being damaged. Never pull it from side or in a vertical direction. Also, never pull it sharply.
- Never connect the towing rope, cable or such to the parts other than the hooks provided on the vehicle shell. Connection of the towing rope, cable or such to other pants than hooks may damage these components
- Ensure that the hooks are installed on the vehicle shell securely before towing.

1. Attach a sturdy rope, towing strap or cable to the towing hook.
2. A driver must ride in the vehicle being towed and control it.
3. Release the parking brake and shift the shift lever of manual transmission to the neutral position.
4. Select the center differential lock switch in the free position.
   NOTE:
   - If you cannot start the engine, ensure that the center differential lock mechanism is free by jacking up one of the wheels and making sure that the wheel turns freely.
     Even if the indicator lamp in the combination meter shows that the differential lock is free, there is the possibility that it is not free actually.
5. Set the ignition switch to the "ACC" position.
6. Perform the towing.

PGI00016-00000

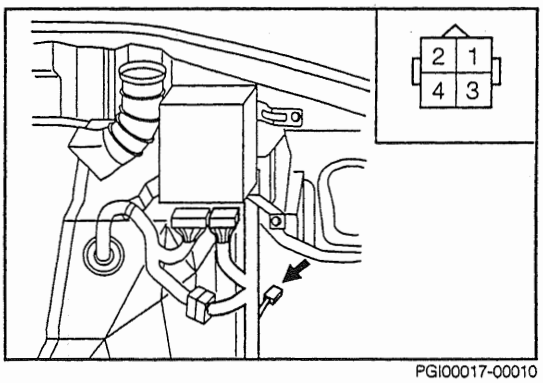
DIAGNOSIS CONNECTOR

LHD: The diagnosis connector is provided under the instrument panel at the passenger's seat side as shown.

RHD: The diagnosis connector is provided under the instrument panel at the driver's seat side between the heater and the steering post.

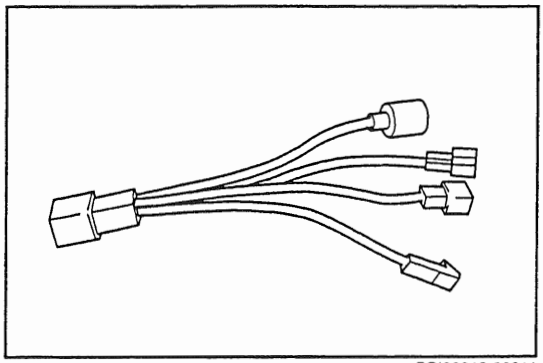
Terminal table

No.	Name
1	VF
2	Rev
3	T
4	GND



PGI00017-00010

1. Be sure to connect the following SST when utilizing this connector, in order to prevent the terminals in the diagnosis connector from being damaged.
   The shape of the SST end is the same as the diagnosis connector.
   SST: 09991-87501-000



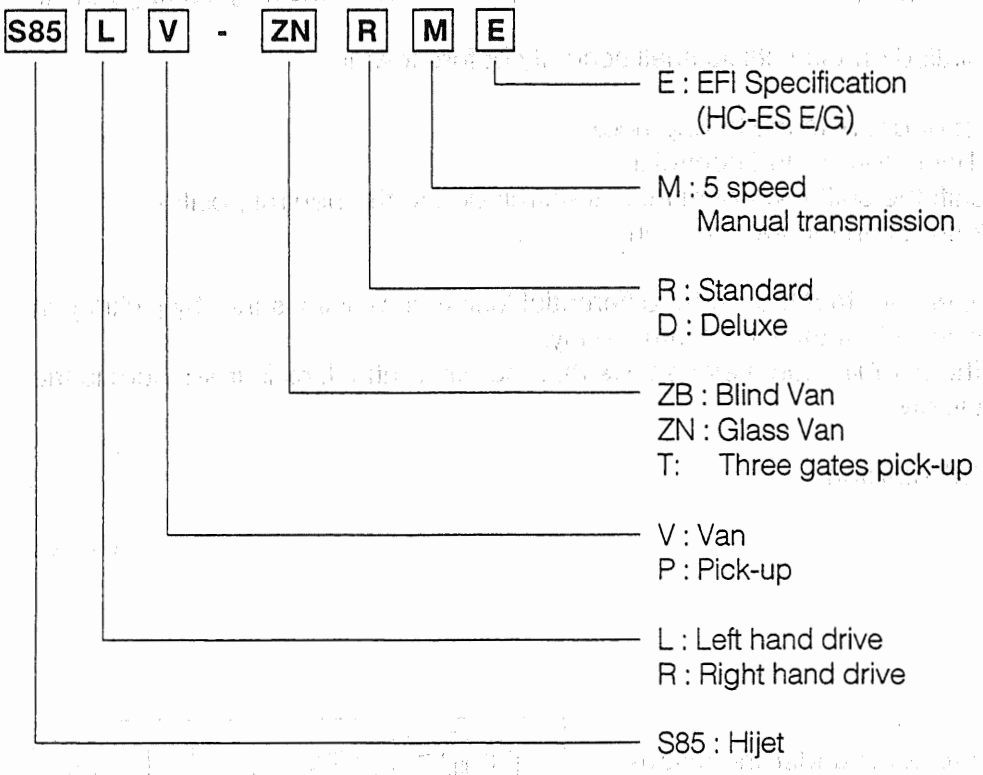
PGI00018-00011

VEHICLE MODELS

Model code	Engine	Drive wheel
S85RP-TRME S85LP-TRME S85RV-ZBRME S85LV-ZBRME S85RV-ZNDME S85LV-ZNDME	HC-ES	Rear, 2-wheel drive

PGI00019-00000

EXPLANATION OF VEHICLE MODEL CODE



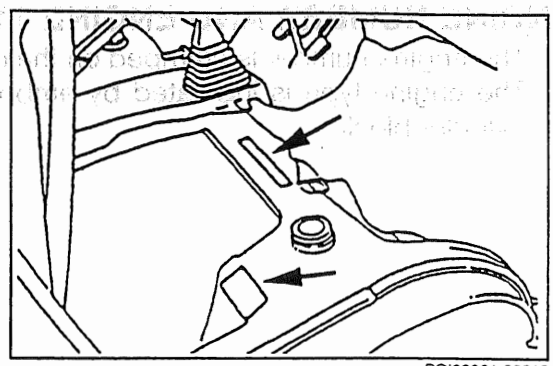
PGI00020-00000

CHASSIS SERIAL NUMBER & MANUFACTURER'S PLATE

CHASSIS NUMBER & MANUFACTURER'S PLATE

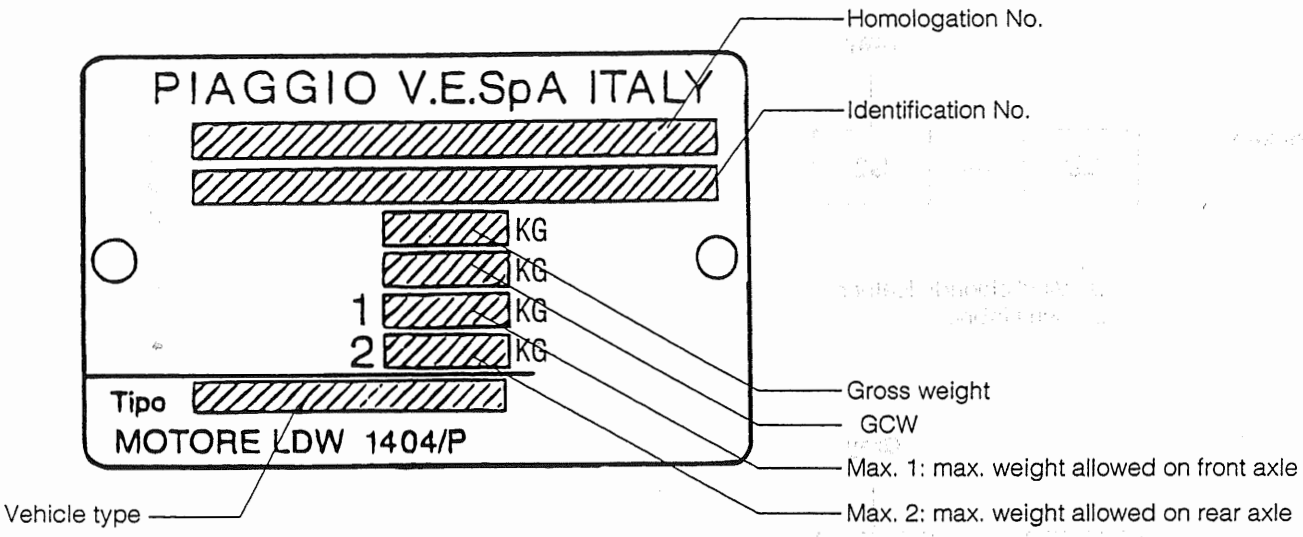
1. Location

The chassis number is stamped on the front floor panel. The manufacturer's plate is attached on the cowl panel at the right side in the engine compartment.



PGI00021-00012

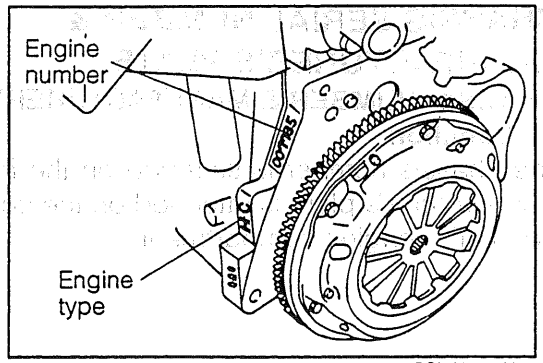
2. Contents of manufacturer's plate



PGI00022-00013

ENGINE NUMBER AND ENGINE TYPE

- The engine number is stamped on the cylinder block.
- The engine type is indicated by embossed letters on the cylinder block.



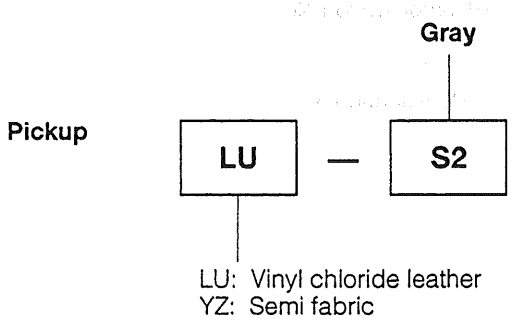
PGI00023-00014

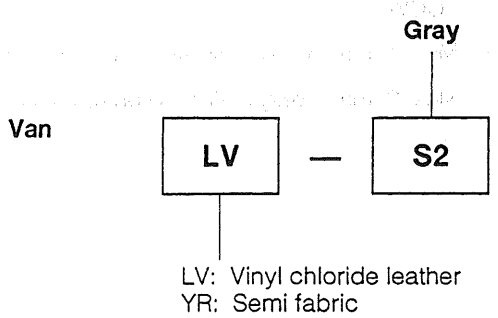
BODY COLOR INFORMATION

Color code	Color	VAN	Pickup
W10	White	●	●
B24	Blue	●	●
R16	Red	●	●
G15	Green Metallic	●	—
S13	Dark gray Metallic	●	—
A01	Dark Blue	●	●

PGI00024-00000

TRIM CODE

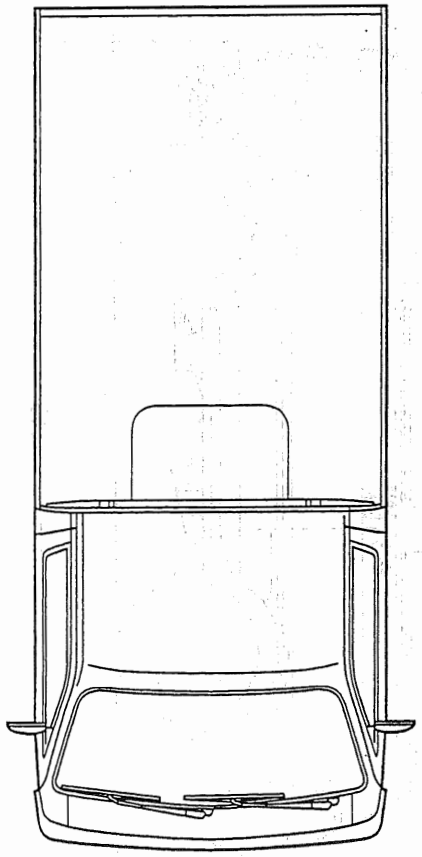


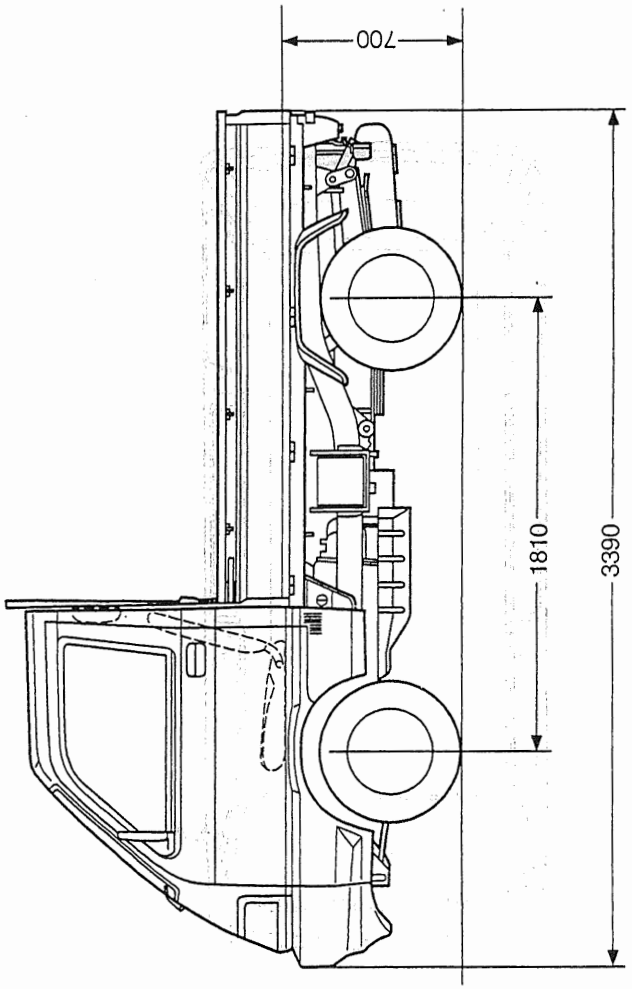


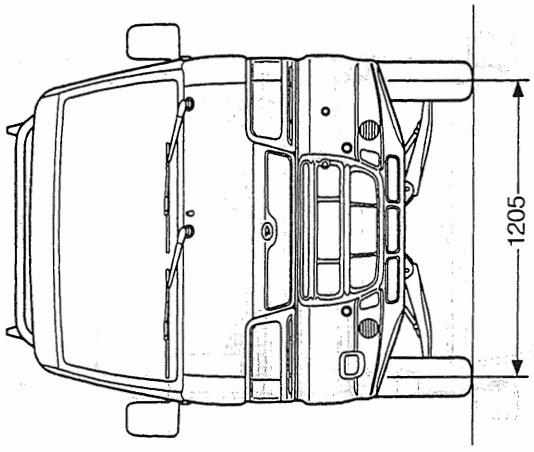
PGI00025-00000

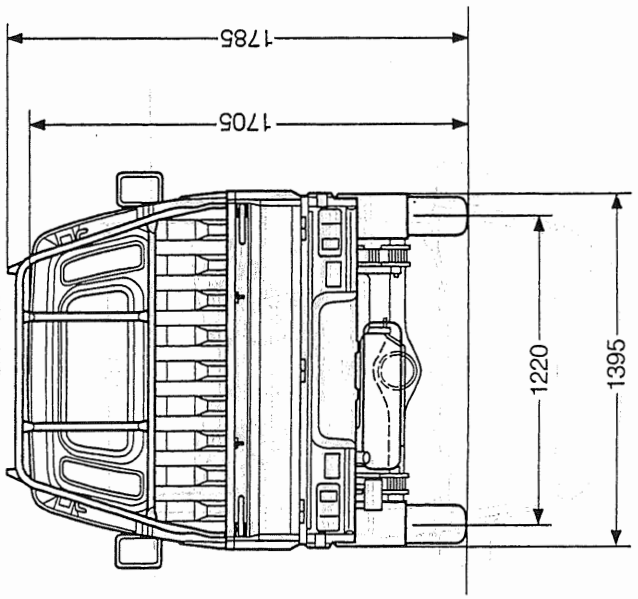
VEHICLE 4-PLANE DIAGRAMS

Pickup

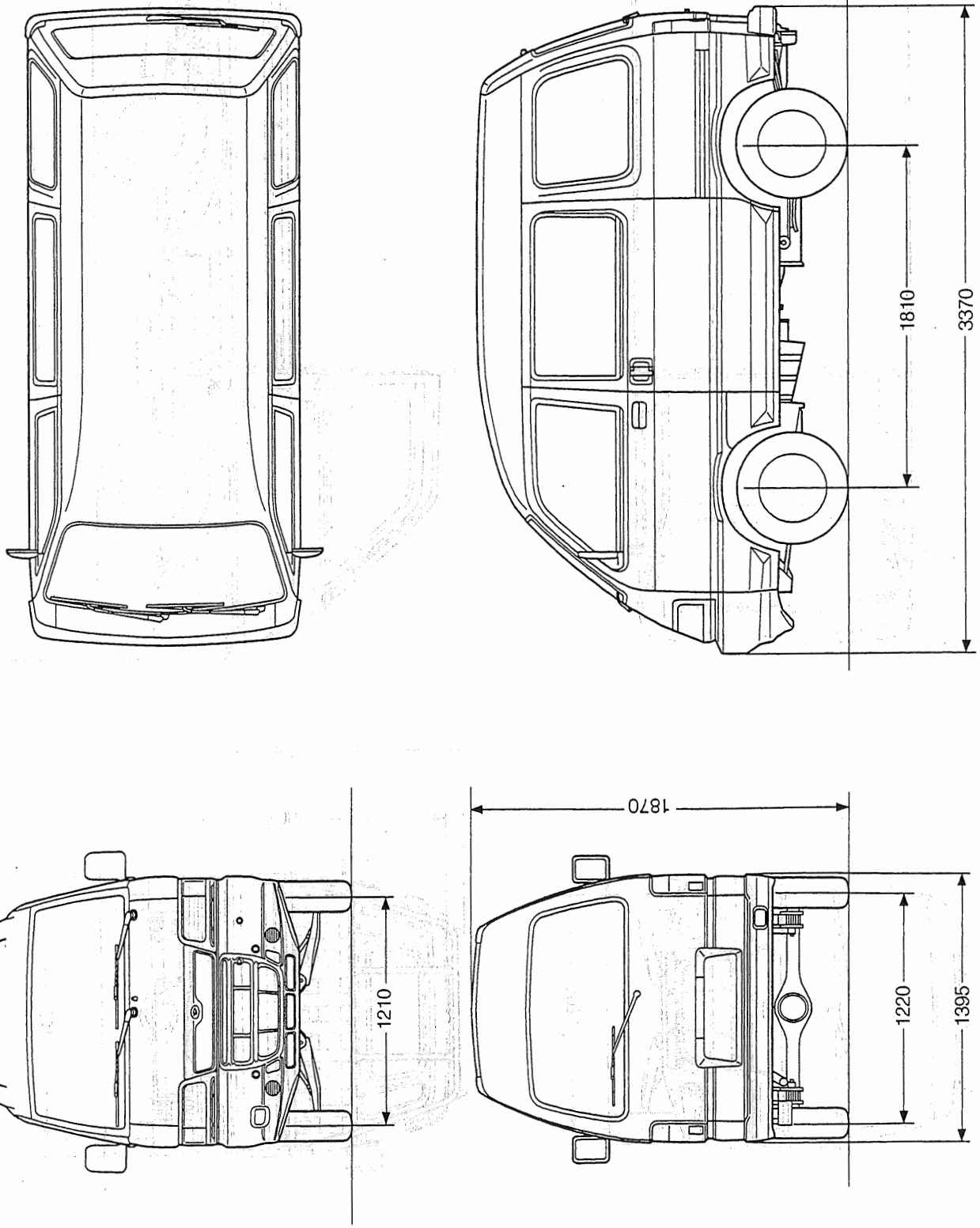








Van



SERVICE SPECIFICATION

Item \ Engine type				HC-ES E/G
Engine proper	Type			Petrol, Water cooled, 4-cycle
	Cylinder No. and arrangement			4-cylinder-in-line, Mounted longitudinally
	Combustion chamber type			Pent roof type
	Valve mechanism			Belt-driven, SOHC
	Bore × stroke (mm)			76.0 × 71.4
	Compression ratio			9.5 ± 0.3
	Compression pressure (kPa/rpm)			1373 / 300
	Maximum output (KW/rpm)			48.0 / 4800
	Maximum torque (N·m/rpm)			99 / 2800
	Engine dimensions (Length-Width-height) (mm)			553 × 466 × 725
	Service weight (kg)			91.5
	Valve timing (°)	Intake	Open	BTDC 1
			Close	ABDC 39
		Exhaust	Open	BBDC 42
			Close	ATDC2
	Valve clearance (mm)		Intake	0.25 ± 0.05 [HOT]
			Exhaust	0.33 ± 0.05 [HOT]
	Idle speed (rpm)			850 ± 50
	Blow-by Gas recirculation system			Closed type
Lubricating system	Lubricating method			Fully-forced feed method
	Oil pump			Trochoid type
	Lubricant capacity (1)			4.2
Cooling system	Cooling method			V-belt driven type
	Radiator type			Fin & Tube
	Coolant capacity (Including the heater and reserve tank) (1)			5.7
	Water pump type			Centrifugal type, belt-driven type
	Thermostat			Wax pellet type
Air cleaner	Type			Dry filter paper type
	Number			1
Fuel system	Fuel tank	Capacity (1)		35: Pick, 33: Van
		Location	Pickup	Under cargo platform at rear side of rear axle
			Van	Under cargo platform at rear side, midpoint between front and rear axle
	Fuel pipe material			Rubber and tube
	Fuel pump type			Electromotor type
	Fuel filter type			Filter paper type
	EFI system	Type		Speed density type
		Manufacture	ECU	DENSO
			Injector	DENSO
			Pressure sensor	DENSO
			Oxygen sensor	DENSO
			Throttle body	DENSO

Item \ Engine type				HC-ES E/G	
Engine electrical system	Ignition system	Voltage		12 [Negative ground]	
		Type		Full transistorized type (ESA) battery ignition type	
		Ignition timing (°)		BTDC 3 ± 2 with check terminal connected with ground terminal	
		Firing order		1-3-4-2	
		Spark plug	Manufacture	NGK	DENSO
			Type	BKUR6EK BKUR7EK	K20TNR-S K22TNR-S
			Spark plug gap (mm)	0.9 - 1.0	0.9 - 1.0
			Thread	M14S × 1.25	
	Battery	Type		230E2SM	190E2SM
		Capacity AH		48 (20 HR) 40 (5 HR)	40 (20 HR) 34 (5 HR)
	Alternator	Type		3-phase alternating current commuting type	
		Output (V-A)		12 - 50	
		Regulator type		Contact pointless type (IC regulator type)	
	Starter	Type		Conventional type	
		Output (V-kW)		12 - 0.9	
	Radio noise suppressing device			Resistive cord	

PGI00028-00000

POWER TRAIN SPECIFICATION

Clutch	Mechanism from engine to transmission			Engine-clutch-transmission
	Type			Dry-single disc diaphragm
	Facing	Dimension [Outer Dia. × inner Dia.] (mm)		190 × 132
		Facing area (mm²)		14,670
		Material		Non-asbestos
Transmission	Type	Forward		Constant-mesh type
		Reverse		Selective sliding type
	Gear ratio (tooth No.) Reduction gear ratio: 27/22	1st gear		3.769 (43/14 × 27/22)
		2nd gear		2.045 (35/21 × 27/22)
		3rd gear		1.376 (37/33 × 27/22)
		4th gear		1.000 (–)
		5th gear		0.838 (28/41 × 27/22)
		reverse		4.128 (37/26 × 26/11 × 27/22)
Differential gear	Type			Conventional
	Gear ratio			4.444 (40/9)
Running system	Front axle	Toe-in (mm)		$2.0\ ^{+1.5}_{-1.0}$
		Camber angle		$1°23'\ ^{+40}_{-50}$ (Pick) $1.0\ ^{+40'}_{-50'}$ (Van)
		Caster angle		3°13′ ± 1° (Pick) 3°02′ ± 1° (Van)
		King pin angle		10°49′ ± 1° (Pick) 11°25′ ± 1° (Van)
	Rear axle type			Semi-floating type
Steering	Wheel	Outer diameter (mm)		370
		Maximum lock to lock turns		4.1
	Gear	Type		Rack and pinion
		Gear ratio		∞
	Turning angle	Inner angle (°)		36.0
		Outer angle (°)		34.8
Brake	Type	Front		Disc
		Rear		Drum
	Master cylinder inner diameter (mm)			19.05
	Wheel cylinder inner diameter (mm)		Front	51.10
			Rear	17.46
	Parking brake system			Mechanical hand operation which applies rear wheels

Suspension	Suspension type		Front	Independent, McPherson strut
			Rear	Rigid axle
	Spring type		Front	Coil spring
			Rear	Semi-elliptical leaf spring
	Main spring dimensions	Front (mm)	Pickup	11.1 × 74.8 × 275 - 7.11
			Van	10.9 × 85.0 × 262 - 6.11
		Rear (mm)	Pickup	1000 × 50 × (7 - 9) - 1, 870 × 50 × 7 - 1
			Van	1000 × 50 × 7 - 1, 850 × 50 × 7 - 1
	Auxiliary spring dimensions	Rear (mm)	Pickup	740 × 50 × 11 - 1 460 × 50 × 11 - 1
			Van	690 × 50 × 9 - 1 460 × 50 × 9 - 1
	Shock absorber type			Double-acting telescopic type
Occupant protective device	Front seat belt			3 point ELR
Grass	Front windshield grass		Kind	Laminated
			Thickness (mm)	5.3

PGI00029-00000

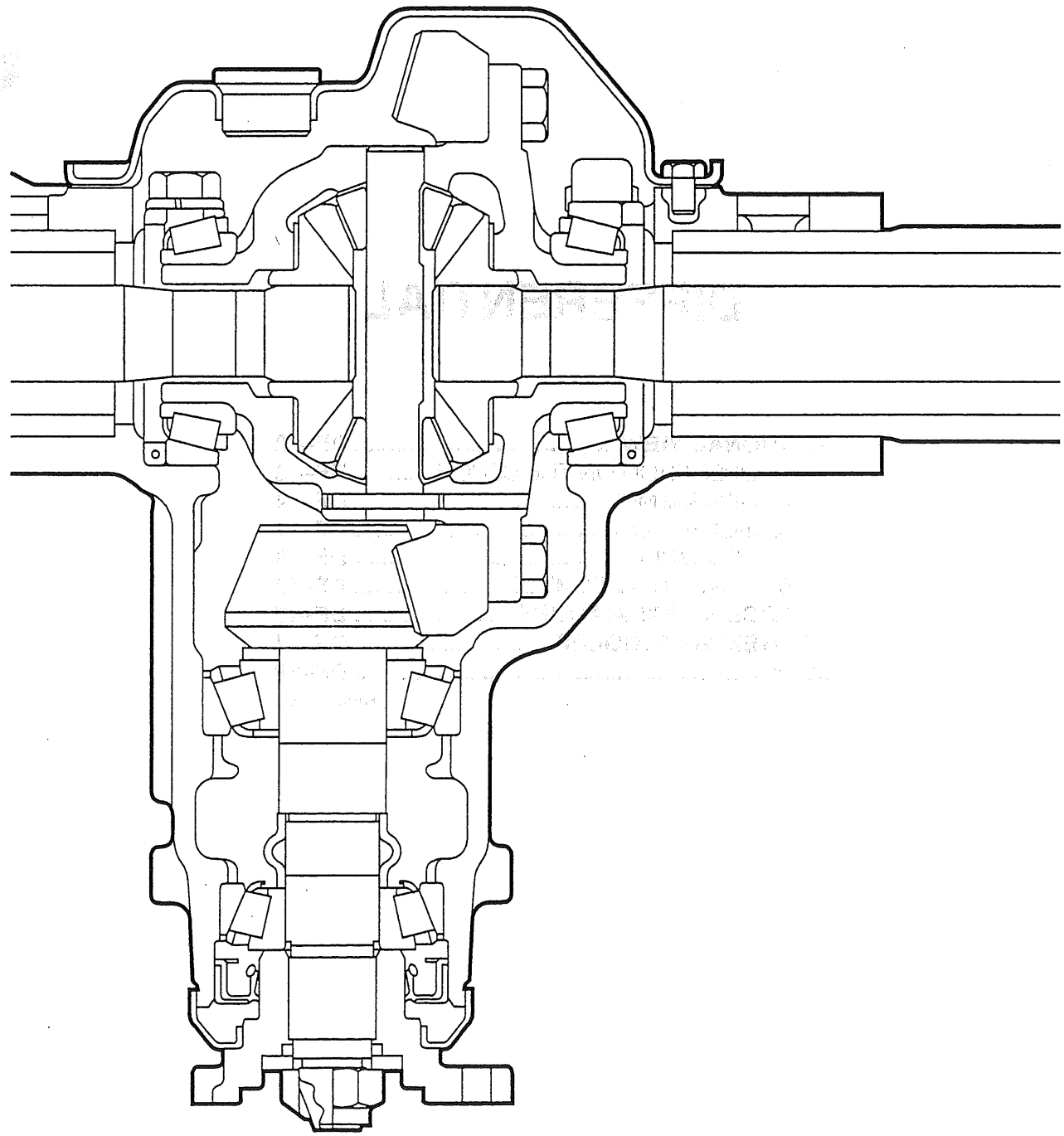
DIFFERENTIAL

SECTIONAL VIEW ..... **DF– 2**
1. OPERATION ON THE BENCH ..... **DF– 3**
2. DISASSEMBLY ..... **DF– 4**
3. INSPECTION ..... **DF– 7**
4. ASSEMBLY ..... **DF– 9**
5. COVER REASSEMBLE **DF–16**

SERVICE SPECIFICATIONS **DF–17**
TIGHTENING TORQUES **DF–17**
SSTs **DF–18**

PDF00001-00000

SECTIONAL VIEW



1. OPERATION ON THE BENCH

REPLACEMENT OF THE SPACER

NOTE:
- This operation implies the disassembly of the axle shafts and the replacement of the spacer.

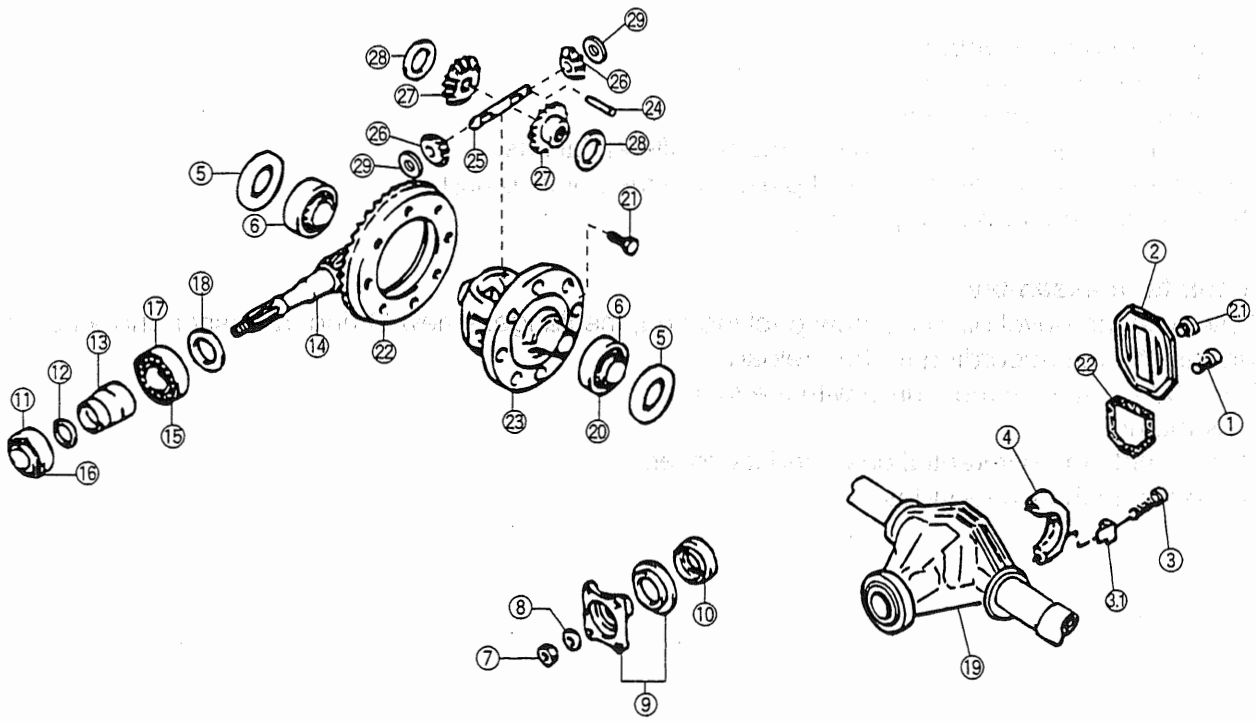
Main points of disassembly
(1) Put the axle on the bench.
(2) Disassemble the wheel sides.
(3) Disassemble the differential cover and the differential case.
(4) Disassemble the flange, the bevel pinion and the packing ring.
(5) Replace the spacer on the pinion.

Main points of assembly
(1) Assemble the bevel pinion, a new packing ring, the flange, a new O-ring, a washer and a new nut.
(2) Tighten the nut according to the preload.
P = 1.03 - 1.42 N·m measured with the tool.
(3) Calk the nut.
(4) Reassemble the differential case and its cover.
(5) Reassemble the wheel sides.

PDF00003-00000

2. DISASSEMBLY

Disassemble the parts shown in the figure below.



① Bolt
② Cover
㉑ Plug/O-ring
㉒ Gasket
③ Bolt
㉛ Washer
④ Differential cap
⑤ Shim
⑥ Tapered roller bearing (outer race)
⑦ Hexagon nut
⑧ Plate washer
㉛ O-ring
⑨ Drive pinion companion flange subassembly
⑩ Type "T" oil seal
⑪ Tapered roller bearing
⑫ Tapered roller bearing spacer
⑬ Differential drive pinion bearing spacer
⑭ Differential drive pinion
⑮ Tapered roller bearing
⑯ Tapered roller bearing (outer race)
⑰ Tapered roller bearing (outer race)
⑱ Shim
⑲ Differential carrier
⑳ Tapered roller bearing
㉑ Bolt
㉒ Differential ring gear
㉓ Differential case
㉔ Pin
㉕ Pinion shaft
㉖ Pinion
㉗ Crown wheel
㉘ Thrust washer
㉙ Pinion thrust washer

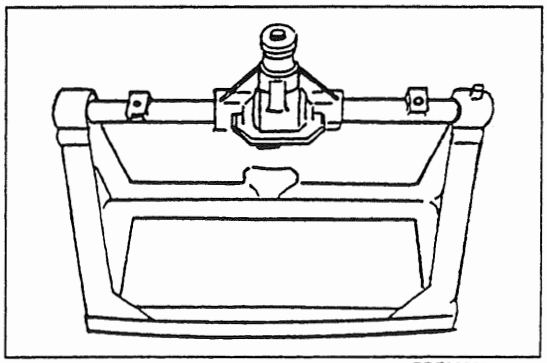
PDF00004-00002

Operation prior to disassembly

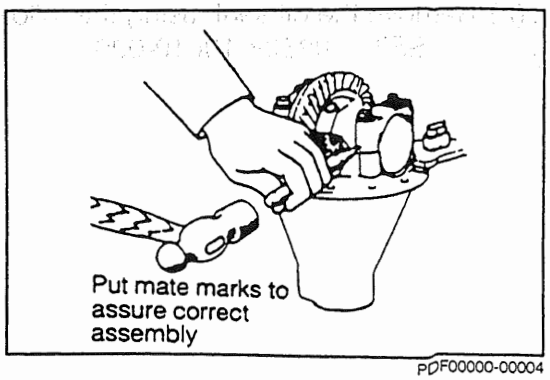
Place the differential carrier removed from the vehicle on the disassembly stand.

SST: 09219-87202-000
19.1.20286 (Prepared by piaggio)

Put mate marks on the differential bearing cap and carrier at the right and left sides, respectively.



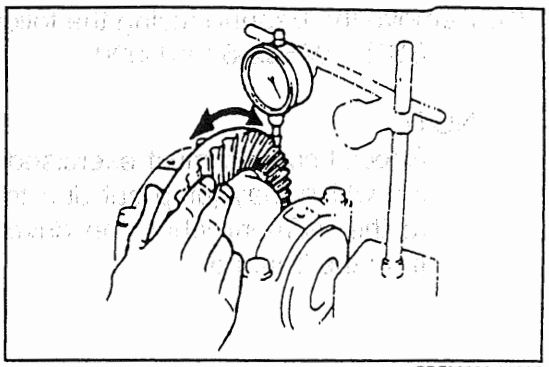
PDF00005-00003



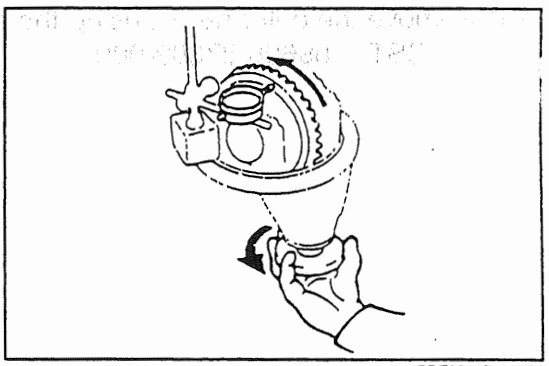
PDF00000-00004

Inspection before disassembly, check the following values:

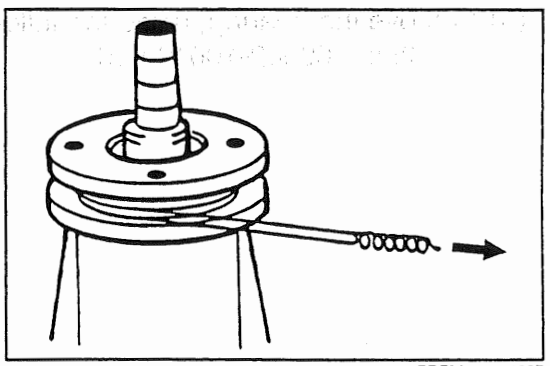
(1) Ring gear backlash
Specified Value: 0.10 - 0.20 mm


PDF00006-00005

(2) Ring gear run out
Allowable Limit: 0.10 mm


PDF00007-00006

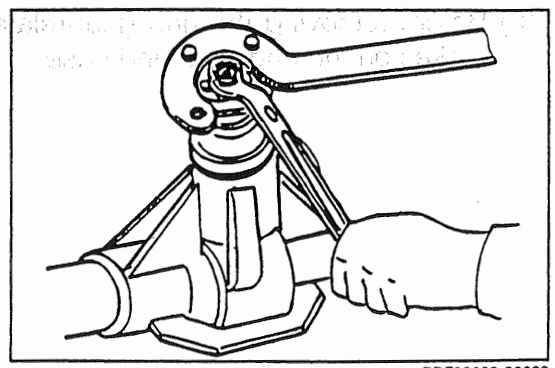
(3) Drive pinion bearing preload
Specified Value: 1.03 - 1.42 N·m
Value measured with tool 19.1.2033 assembled on flange tang and oil seal placed on its seat.


PDF00008-00007

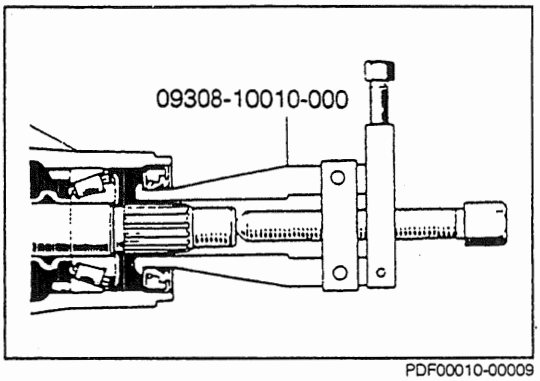
Main points of disassembly

(1) Remove the hexagon nut, using the following SST, given below.
SST: 09330-873011-000

NOTE:
- Before slackened the nut, be sure to release the locking of the lock washer.


PDF00009-00008

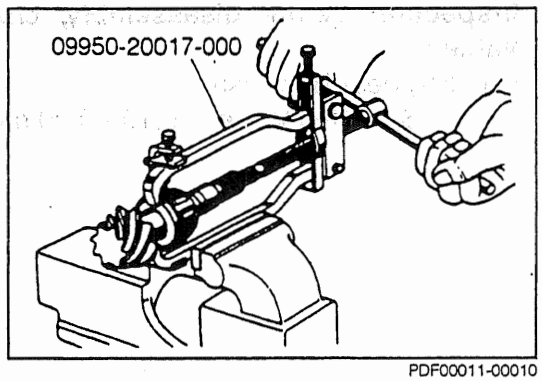
(2) Remove the oil seal, using the following SST.
SST: 09308-10010-000



PDF00010-00009

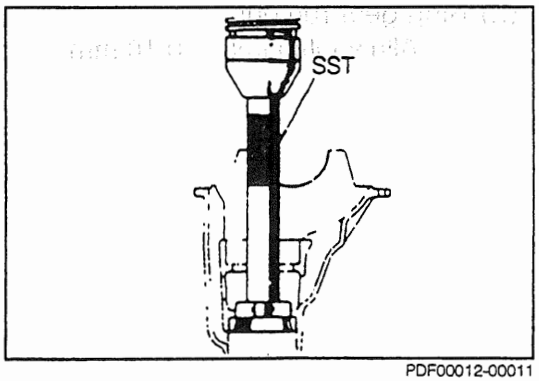
(3) Remove the bearing, using the following SST.
SST: 09602-87301-000

NOTE:
- Special caution must exercised as to the drive pinion which may jump out due to the repulsive force at the moment when the drive pinion is detached from the bearing.



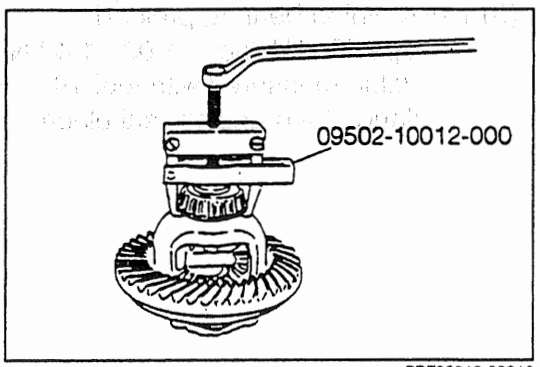
PDF00011-00010

(4) Remove the outer races, using the following SST.
SST: 09608-87302-000



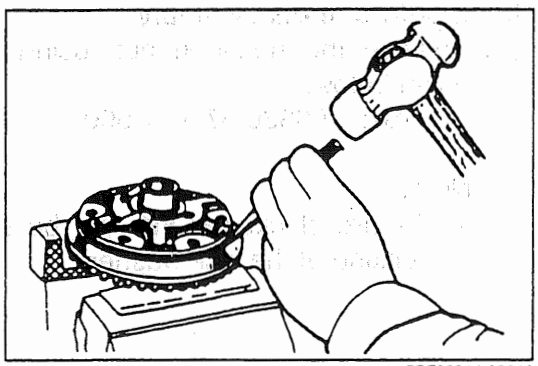
PDF00012-00011

(5) Remove the bearing, using the following SST.
SST: 09502-10012-000



PDF00013-00012

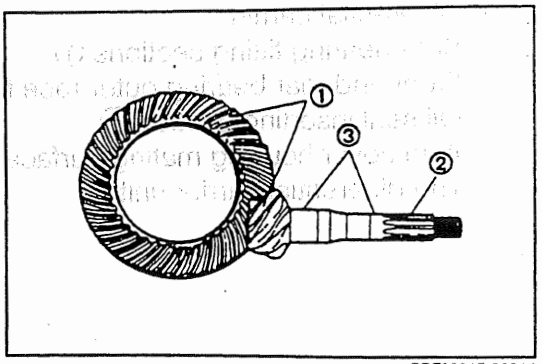
(6) Before removing the ring gear-related parts, put mate makes on the ring gear and case.


PDF00014-00013

3. INSPECTION

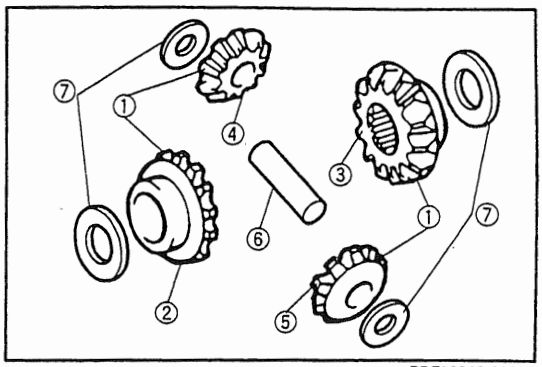
Inspect each section of the following parts for any sign of damage, wear or excessive looseness. Replace any parts which exhibit defects.

(1) Drive pinion and ring gear
Gear teeth ①
Spline portion ② of drive pinion
Bearing fitting section ③



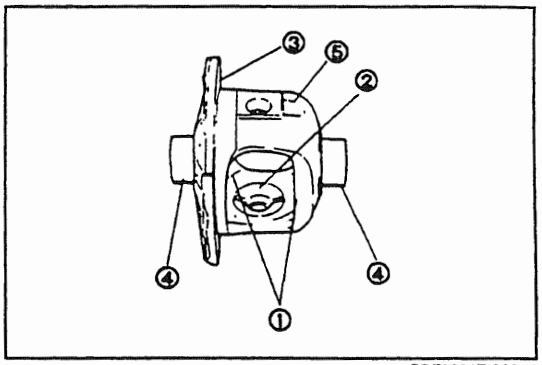
PDF00015-00014

(2) Side gear and pinion
Gear teeth ①
Side gear boss section ②
Side gear serrated section ③
Pinion shaft fitting hole ④
Differential case of planetary gear ⑤
Pinion shaft ⑥
Thrust washer ⑦



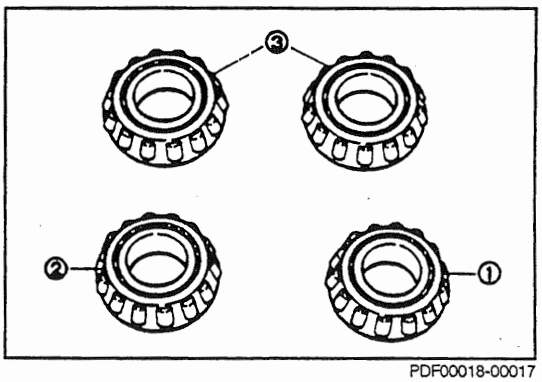
PDF00016-00015

(3) Differential case
Side gear boss contact section ① (Pinion and crown wheel)
Pinion contact section ②
Ring gear attaching section ③
Side beating press-fitting section ④
The differential case proper ⑤



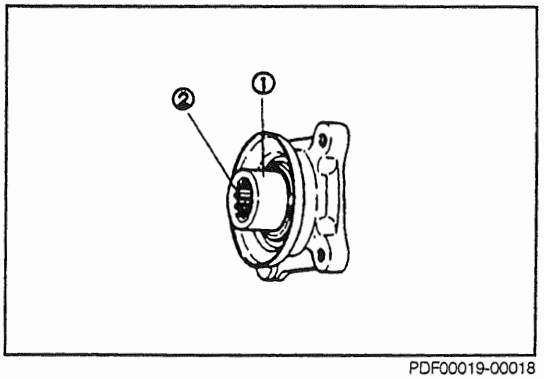
PDF00017-00016

(4) Bearings
Front bearing ①
Rear bearing ②
Side bearing ③
Turn the bearings lightly. Ensure that they rotate smoothly without any binding or abnormal noise.



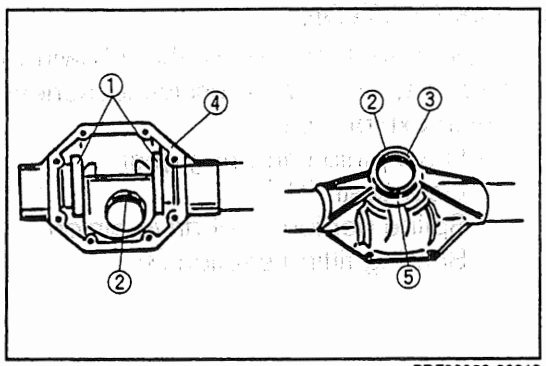
PDF00018-00017

(5) Companion flange
Oil seal contact section ①
Spline section ②



PDF00019-00018

(6) Differential carrier
Side bearing fitting sections ①
Front and rear bearing outer race fitting sections ②
Oil seal inserting section ③
Axle cover housing mating surface ④
The differential carrier unit ⑤

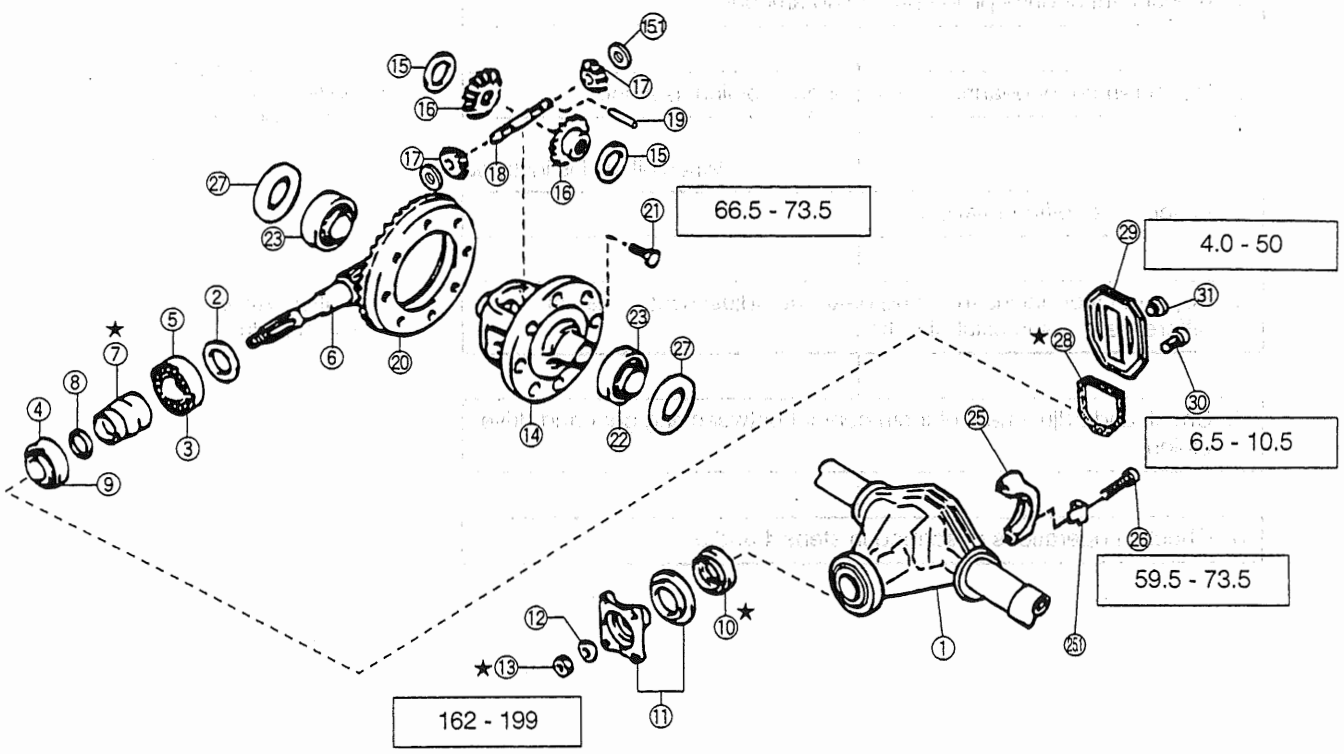


PDF00020-00019

4. ASSEMBLY

Assemble the parts as shown below.

□ : Tightening torque
Unit : N·m
★ : Represents those parts whose reuse is not permitted.



① Differential carrier
② Shim
③ Tapered roller bearing (outer race)
④ Tapered roller bearing (outer race)
⑤ Tapered roller bearing
⑥ Differential drive pinion
⑦ Differential drive pinion bearing spacer
⑧ Spacer tapered roller bearing
⑨ Tapered roller bearing
⑩ Type "T" oil seal
⑪ Drive pinion companion flange subassembly
⑪ O-ring
⑫ Plate washer
⑬ Hexagon nut (as pinion preload)
⑭ Differential case
⑮ Thrush washer
⑮ Pinion thrust washer
⑯ Crown wheel
⑰ Pinion
⑱ Pinion pin
⑲ Spring pin
⑳ Differential ring gear
㉑ Bolt
fixed with loctite 270
㉒ Tapered roller bearing
㉓ Tapered roller bearing (outer race)
㉖ Washer bolt
fixed with loctite 270
㉗ Shim
㉘ Gasket
㉙ Cover
㉚ Bolt
㉛ Plug/O-ring

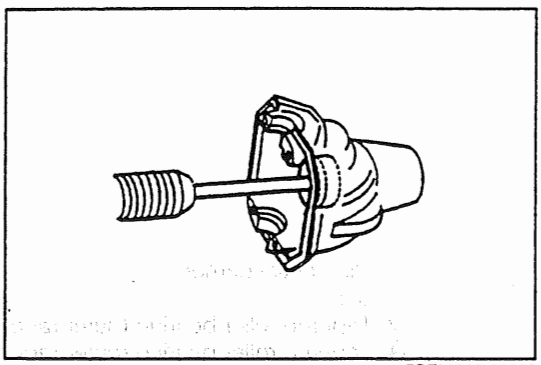
ADJUSTMENT PROCEDURE

1. Adjustment of drive pinion projecting amount
2. Measurement of bearing preload of drive pinion as a unit — Specified Value: 102.5 - 141.7 N·cm
   When oil seal is installed
3. Assembly of differential case
4. Adjustment of backlash of ring gear and adjustment of play of differential case in axial direction — Specified Value: 0.1 - 0.2 mm
5. Check and adjustment of tooth contact between ring gear and drive pinion
6. Check of operations described in steps 4 and 5

PDF00022-00021

ADJUSTMENT OF DRIVE PINION PROJECTING AMOUNT

(1) Install the following parts, using the SST given below.
Front and rear bearing outer races.
SST: 09608-87302-000



PDF00023-00022

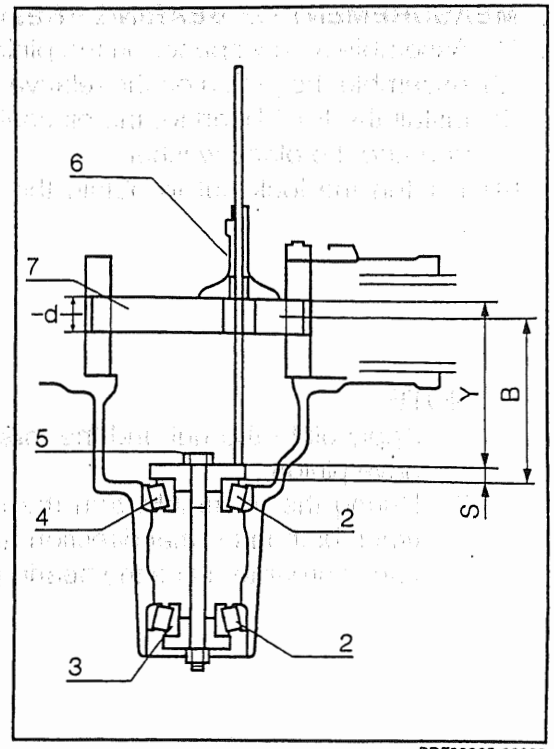
(2) Install the inner race bearing in the differential carrier.

PDF00024-00000

(3) Place the ring sleeves to measure the conical distance (5) and with the bolt and the nut, tighten the differential unit so the bearing may be hand turned.
NOTE:
- Take care not to tighten too much.

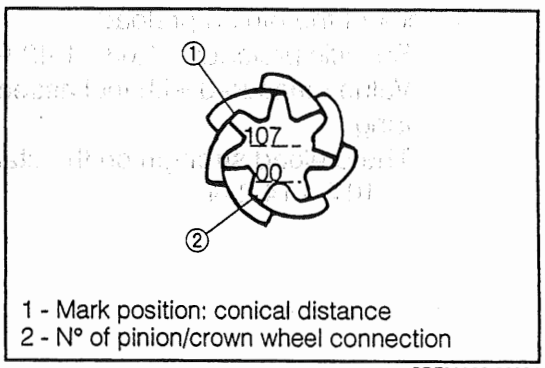
(4) Install the bearing cap on the differential support and tighten the bolts two by two.
(5) Measure the diameter (D) of the differential bearing seat.
(6) Place the pivot (7) drg. ① between the differential bearing seats and with a depth gauge measure the dimension (Y).
Tool: 19.1.20284

(7) Determine the required shim to be inserted between the bearing and under the bevel pinion head, carring out the following calculation:
B = Y - 3



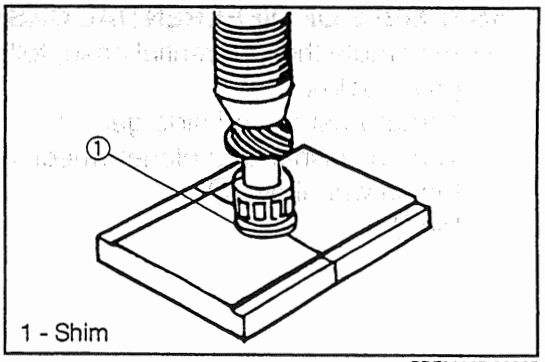
PDF00025-00023

(8) The value of the shift to be inserted will be obtain from the difference of the calculated dimension (B) and the dimension marked on the pinion head.
(9) Select the calculated shim among the available range and install it on the pinion shaft using a press and the following SST.
SST: 09608-87302-000



1 - Mark position: conical distance
2 - N° of pinion/crown wheel connection
PDF00026-00024

(10) Place the shim on the drive pinion with the bevel towards the teeth. Press the rear bearing into position, using a press with the following SST.
SST: 09608-87302-000



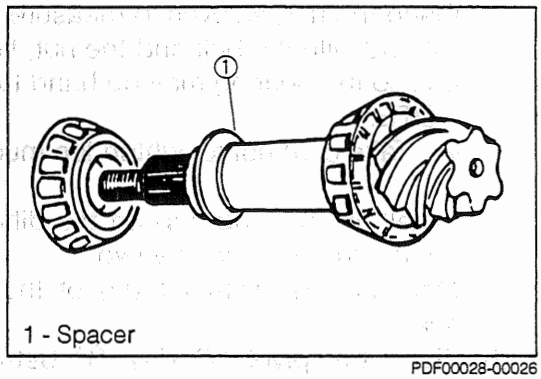
1 - Shim
PDF00027-00025

Shim availability

Part N°	Thickness mm
132001	2.50
132002	2.60
132003	2.70
132004	2.80
132005	2.90
132006	3.00
132007	3.10
132008	3.20
132009	3.30
132010	3.40

MEASUREMENT OF BEARING PRELOAD

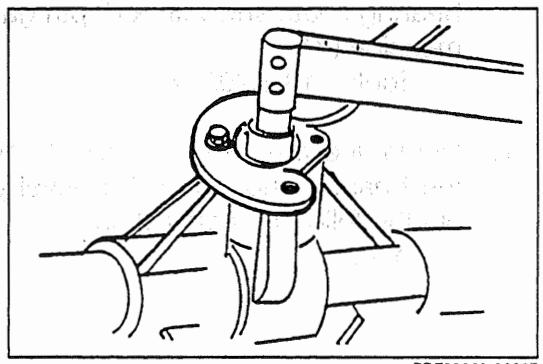
(1) Assemble a new spacer on the pinion.
(2) Assemble the pinion on the relative seat of the carrier.
(3) Install the front bearing, the oil seal, the flange, the O-ring and the plane washer.
(4) Tighten the lock nut to obtain the scheduled preload value.



1 - Spacer

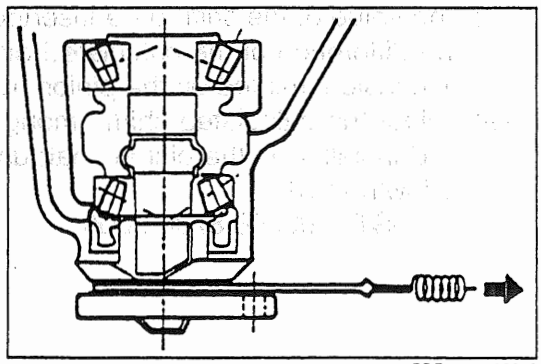
PDF00028-00026

NOTE:
1. Apply oil to the nut and the threaded portion of the drive pinion.
2. During the assembly, turn the drive pinion several times both in normal direction and in reverse direction in order to make the bearings be bedded in.



PDF00029-00027

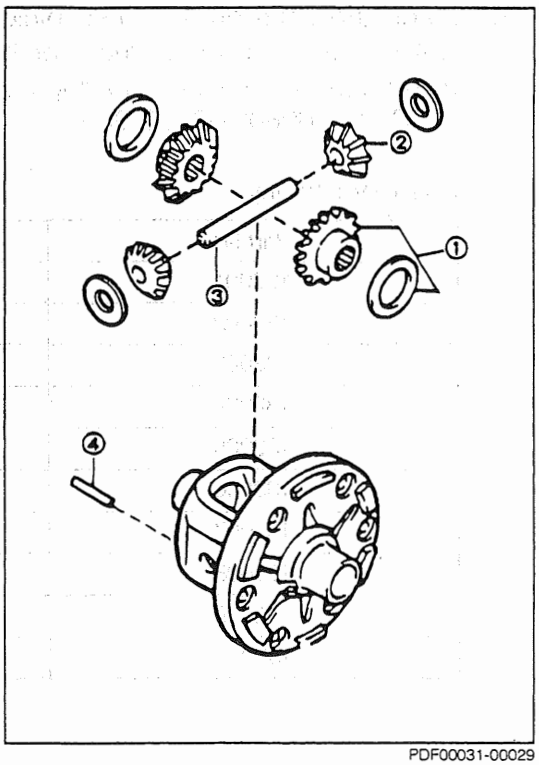
(5) Check of the pinion preload
Specific preload: 1.03 - 1.42 N·m
Value measured with tool assembled on the flange tang.
The preload strength on the stand has to be:
10.3 - 14.2 N.



PDF00030-00028

ASSEMBLY OF DIFFERENTIAL CASE

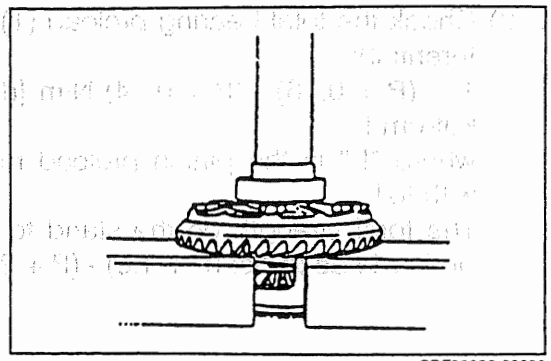
(1) Assemble the differential case, following the procedure given below.
Thrust washer and side gear ①
Thrush washer and planet wheel ②
Pinion wheel pin ③
Pin ④



PDF00031-00029

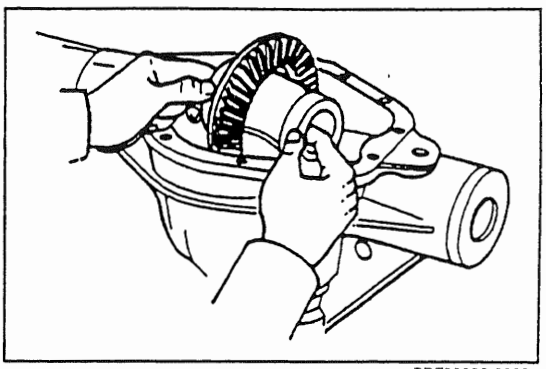
(2) After the differential case has been assembled, proceed to assemble the following parts given below:
Ring gear
NOTE:
- Clean the mate surfaces of the ring gear and case. Be sure that the mate marks which were made during the removal are lined up with each other.

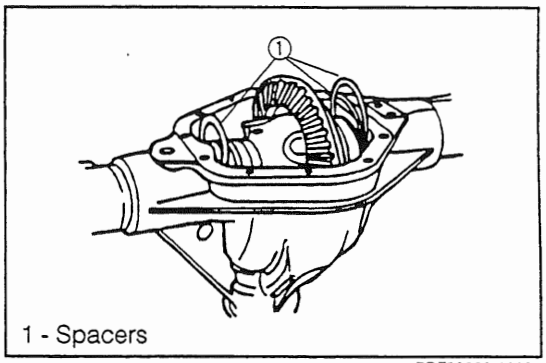
Side bearing
SST: 09608-87302-000


PDF00032-00030

ADJUSTMENT OF BACKLASH OF RING GEAR AND BEARING PRELOAD

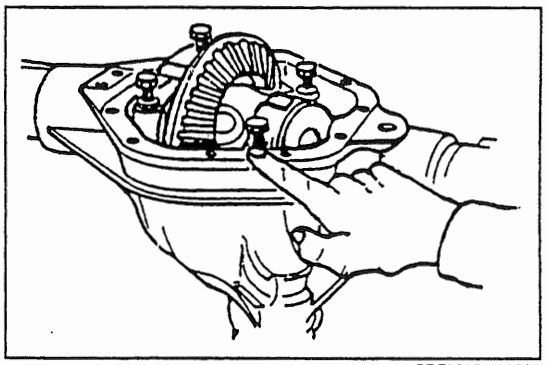
(1) Install the differential case in the carrier. Care must be exercised not to install the right and left bearing outer races in wrong places.
(2) Assemble the shims in the relative seats to obtain zero backlash on the bearings and secure backlash between drive pinion and ring gear.


PDF00033-00031

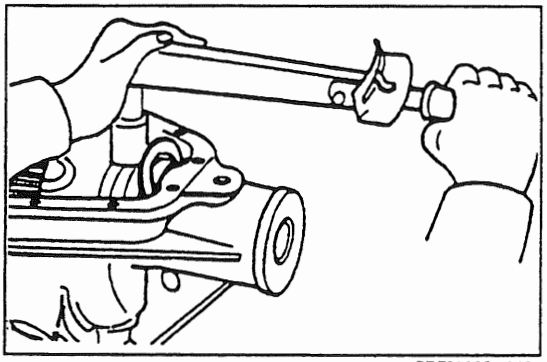


1 - Spacers
PDF00000-00032

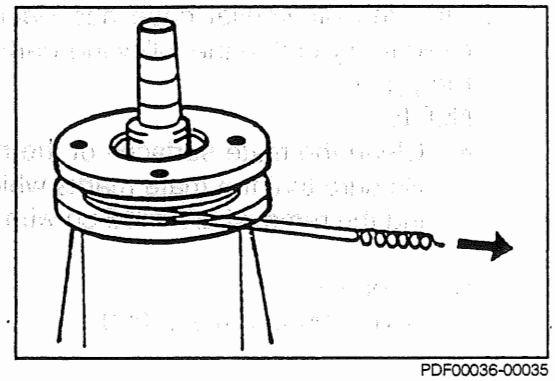
(3) Make sure that the marks on the bearing caps are aligned with the mate marks on the carrier make at disassembly time. Screw in the bolts two or three turns.
(4) Check the pinion-ring gear backlash, and after the removing of the caps, replace the shims in order to obtain a backlash of 1.0 mm.
(5) Remove the shim from the opposite side of the ring gear, and after the widening of the differential housing with the suitable widener tool, install a shim of oversized thickness (0.1 mm pitches)


PDF00034-00033

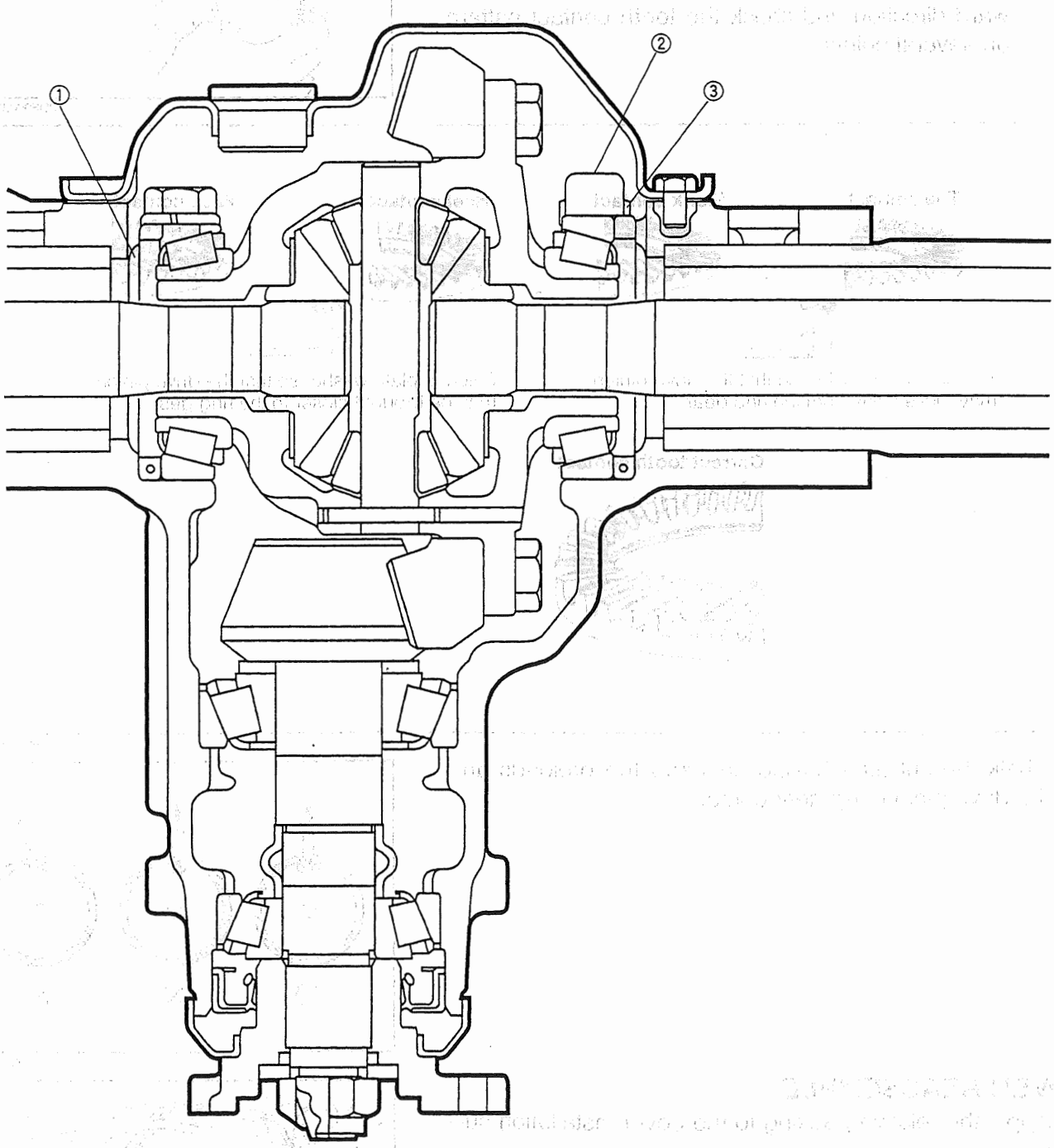
(6) Remove the widener tool, reassemble the caps and check the pinion-ring gear backlash: 0.1 - 0.2 mm
(7) Finally, lock the bolts two by two, after having interposing breather protection: 59.5 - 73.5 N.


PDF00035-00034

(8) Check the total bearing preload (T) (drive pinion + differential):
T = (P + 0.16) - (P + 0.24) N·m {(P + 1.6) - (P + 2.4) kgf-cm.}
where "P" is the pinion preload measured previously with toll.
The total strength on the stand to overcome the total preload has to be: (P + 1.6) - (P + 2.4) N



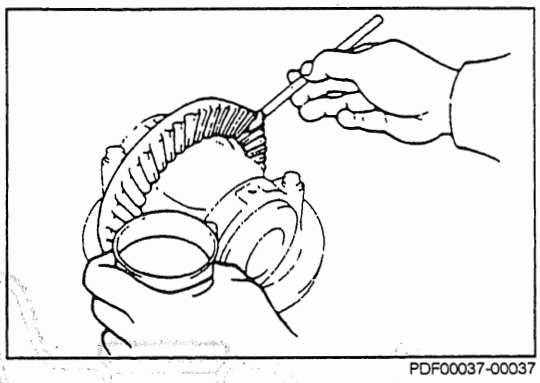
PDF00036-00035



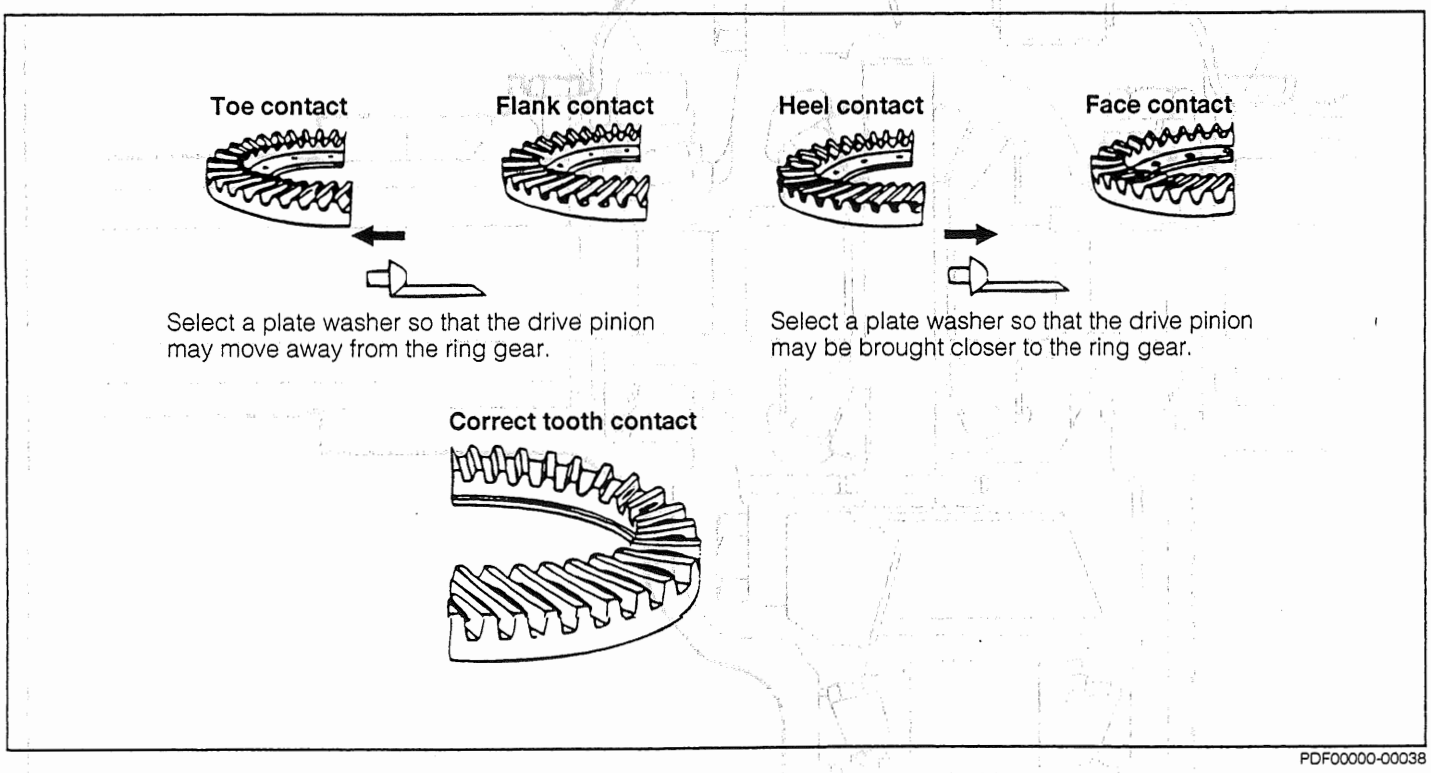
① Shim of regulation for crown-pinion clearance
② Cap
③ Protection

CHECK AND ADJUSTMENT OF TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION

(1) Apply red lead to both sides of the gear teeth. Turn the flange to check the tooth contact between the ring gear and the drive pinion.
NOTE:
- Be sure to turn the flange in both forward and backward direction and check the tooth contact pattern on several points.

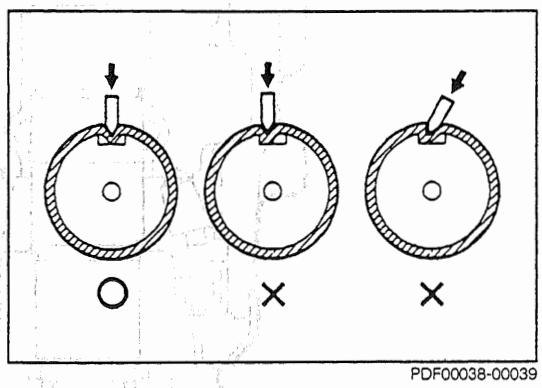


PDF00037-00037



PDF00000-00038

(2) Chalk the nut after having checked the preloads and the drive pinion-ring gear contact.

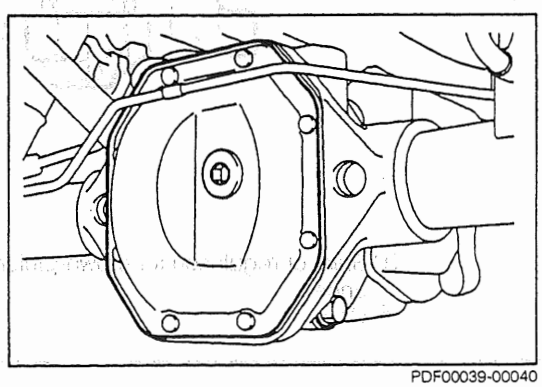


PDF00038-00039

5. COVER REASSEMBLE

(1) Apply the relative packing to the cover installation surface.
(2) Reassemble the cover on the relative housing.
Tightening Torque: 6.5 - 10.5 N·m

(3) Fill the differential with the following oil:
Type: API GL-5
Grade: 80 W - 90
Capacity: 1.1 l.



PDF00039-00040

SERVICE SPECIFICATIONS

Item		Specific value	Allowable limit
Preload of drive pinion unit	N·m (kgf-cm)	1.03 - 1.42	—
Additive value for total preload	N·m	(*1P + 0.16) - (*1P + 0.24)	—
Drive pinion-to-ring gear backlash	mm	0.1 - 0.2	
Play of differential case in axial direction	mm	0.2 - 0.4	—
Runout of differential ring gear	mm	—	0.1

*1: P = Preload of drive pinion unit

PDF00040-00000

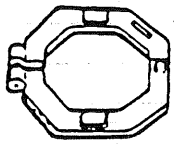
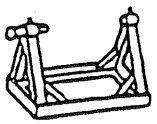
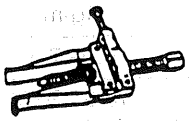
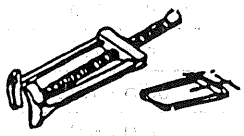
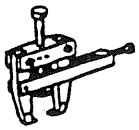
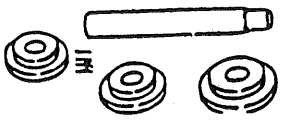
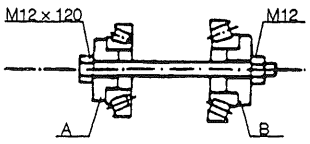
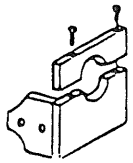
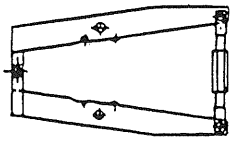
TIGHTENING TORQUES

Tightening component	Tightening torque	
	N·m	Kg-m
Differential bearing cap × Differential carrier	59.5 - 73.5	6.0 - 7.5
Drive pinion × Universal joint differential companion flange	162 - 199*	16.5 - 20.0*
Rear axle housing × Drain plug	39.0 - 63.0	4.0 - 6.5
Differential companion flange × Propeller shaft	39.2 - 53.9	4.0 - 5.5
Differential case × Ring gear	66.5 - 73.5	6.8 - 7.5
Differential cover × Rear axle	6.5 - 10.5	0.65 - 1.05
Differential cover × Inlet plug	39.2 - 49.0	4.0 - 5.0

*: Value to be determined according to preload and pinion bearings.

PDF00041-00000

SSTs

Illustration	Tool No.	Tool name
	09219-87202-000	Engine overhaul stand
	09308-10010-000	Oil seal puller
	09602-87301-000	Counter gear bearing puller
	09330-87301-000	Drive pinion flange holding tool
	09502-10012-000	Differential side hearing puller
	09608-87302-000	Axle hub and drive pinion bearing tool set
	09401-87601-000	Differential gear case expander
	*19.1.20284	Tool for bearing backlash adjustment
	*19.1.20286	Rear stand
	*19.1.20293	Wider tool

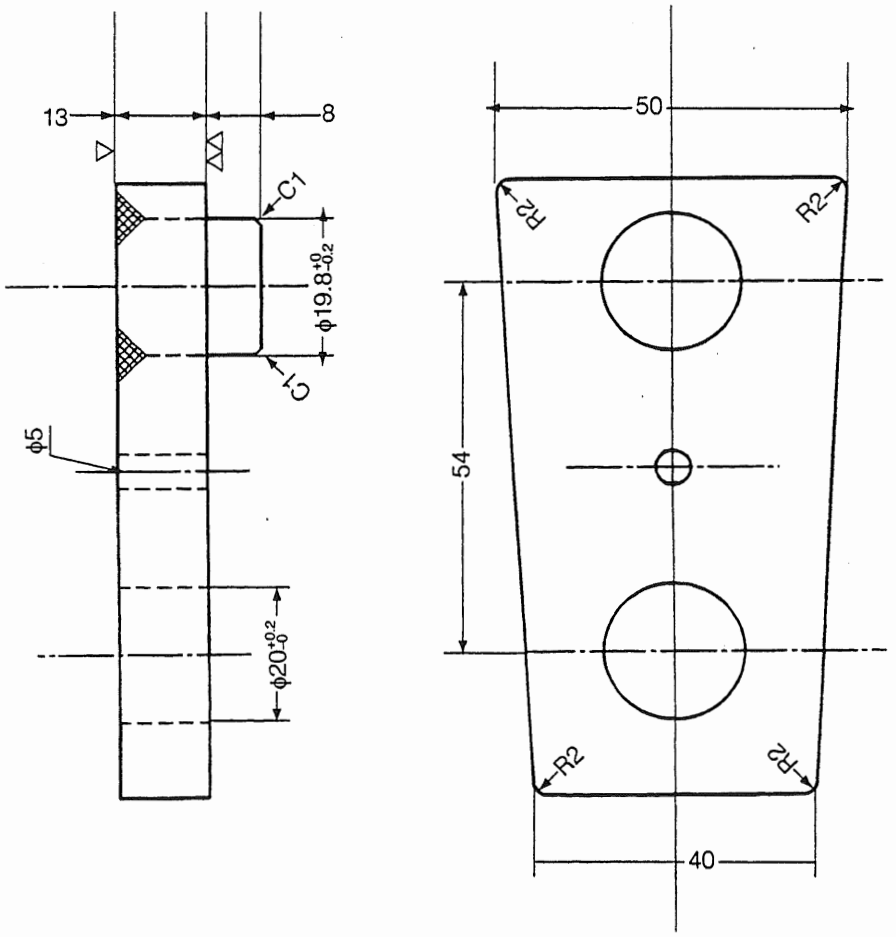
*: This SST is prepared by Piaggio.

REMARKS

Substitute use of SST

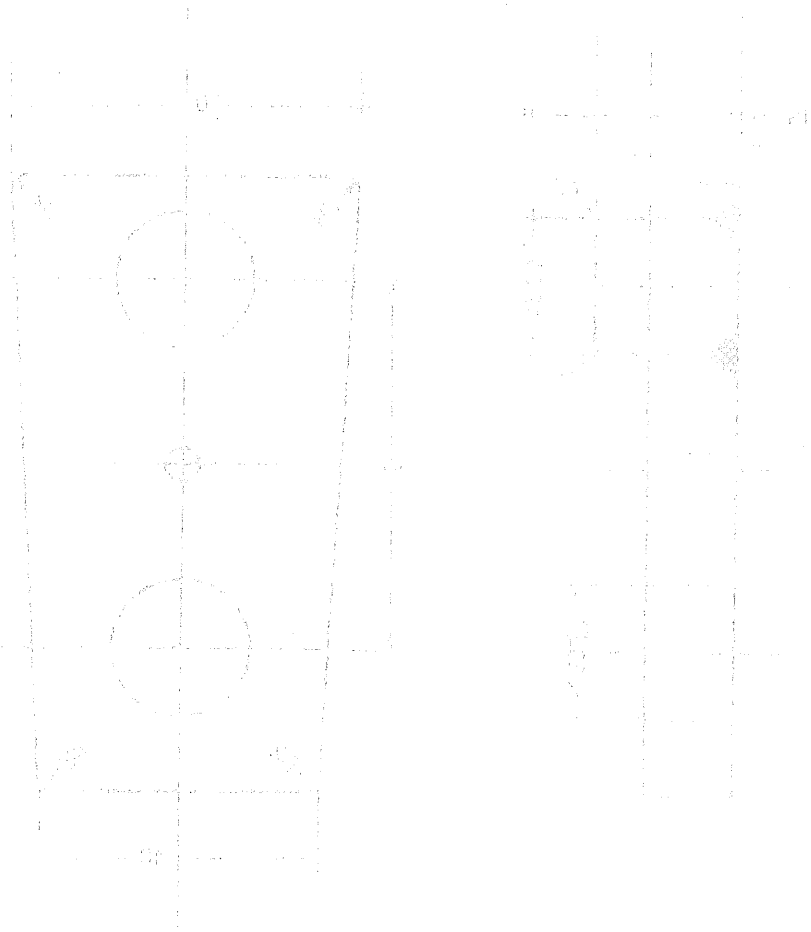
If a dealer has already the Daihatsu SST (NO. 09401- 87601-000; Differential gear case expander), this Daihatsu SST can be used as a substitute tool to the piaggio SST (No. 19.1.20293, winder tool) that is posted in the preceding page. In this case, use this Daihatsu SST in combination with the extension tool (in which two pieces are used as one single set) given below.

It is expected that each distributor fabricates the jigs below so that they may be distributed to each dealer.



Material: S-45C

PDF00043-00042



FS

FRONT AXLE & SUSPENSION

FRONT AXLE ..... **FS– 2**
1. COMPONENTS ..... **FS– 2**
2. REMOVAL ..... **FS– 2**
3. INSPECTION ..... **FS– 4**
4. INSTALLATION ..... **FS– 5**

FRONT SHOCK ABSORBER AND COIL SPRING ..... **FS– 7**
1. COMPONENTS ..... **FS– 7**
2. REMOVAL ..... **FS– 7**
3. DISASSEMBLY ..... **FS– 8**
4. INSPECTION ..... **FS– 9**
5. ASSEMBLY ..... **FS– 9**
6. INSTALLATION **FS–10**

SUSPENSION LOWER ARM **FS–12**
1. COMPONENTS **FS–12**
2. REMOVAL **FS–12**
3. INSPECTION **FS–13**
4. INSTALLATION **FS–14**

FRONT WHEEL ALIGNMENT **FS–16**
CHECKS PRIOR TO WHEEL ALIGNMENT MEASUREMENT **FS–16**
CHECKS AND ADJUSTMENTS OF FRONT WHEEL ALIGNMENT **FS–17**

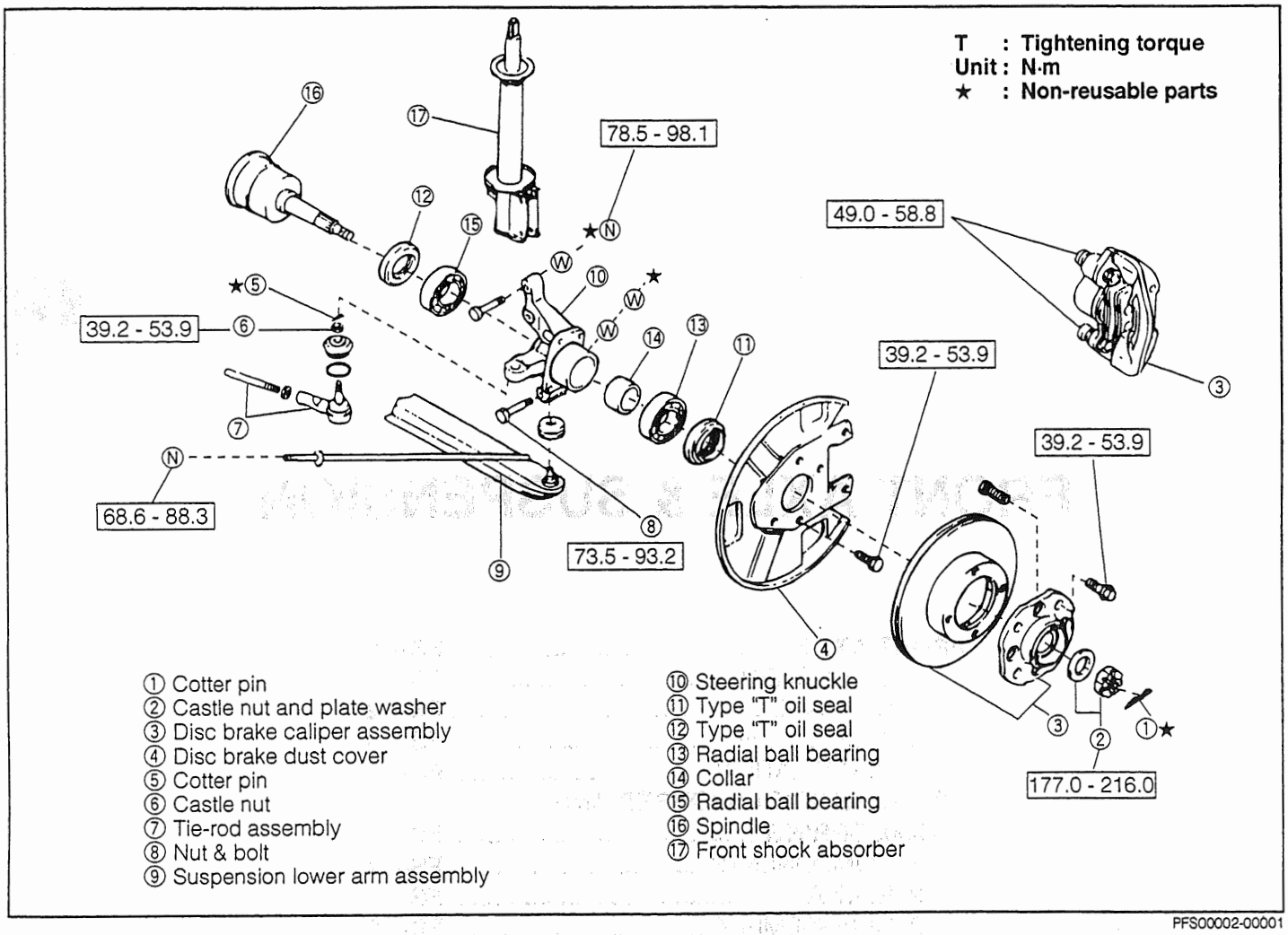
SST **FS–23**

TIGHTENING TORQUES **FS–24**

PFS00001-00000

FRONT AXLE

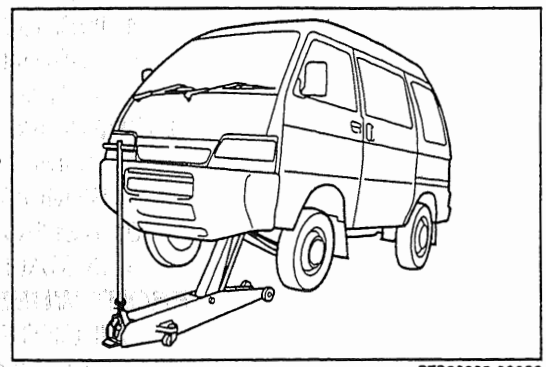
1. COMPONENTS



PFS00002-00001

2. REMOVAL

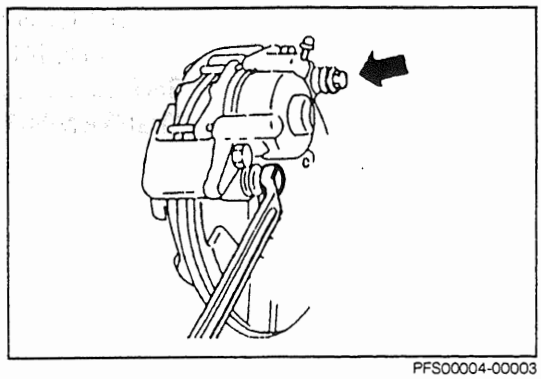
(1) Jack up the vehicle
NOTE:
- Be sure to support the vehicle securely with safety stands.



PFS00003-00002

(2) Remove the front wheel

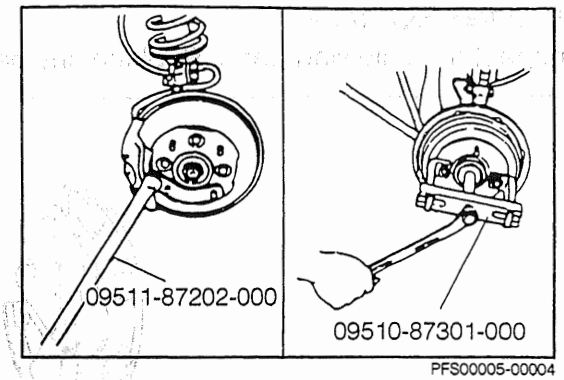
(3) Disconnect the brake hose from the caliper.
(4) Remove the caliper assembly by removing the two bolts.
NOTE:
- Be sure to cover the connection of brake hose/tube with cloth or the like so that it may not be avoided from the dust until connecting.



PFS00004-00003

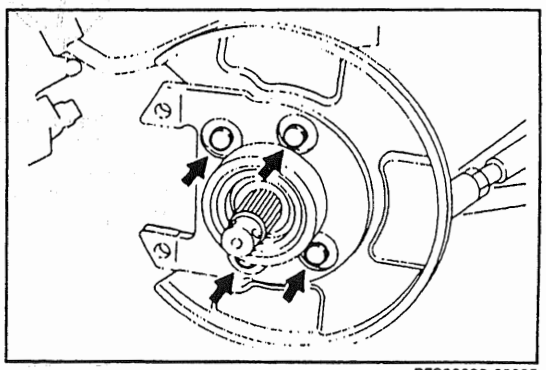
(5) Disc assembly removal
① Remove the cotter pin.
② Remove the castle nut, using the following SST.
SST: 09511-87202-000

(6) Remove the disc brake assembly, using the following SST.
SST: 09510-87301-000

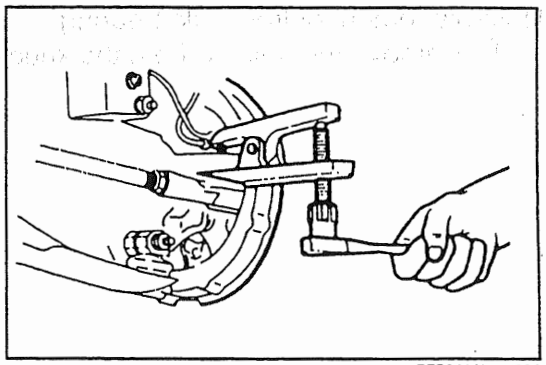


PFS00005-00004

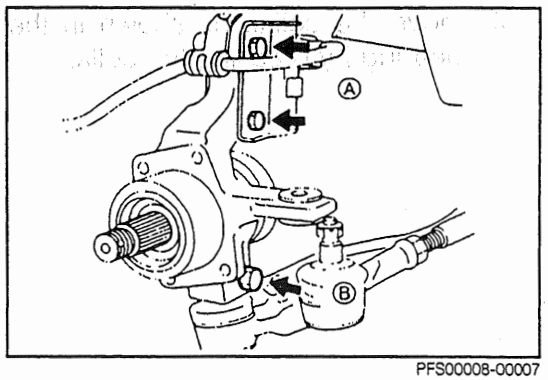
(7) Remove the disc brake dust cover.


PFS00006-00005

(8) Remove the tie-rod end, using the SST.
SST: 09611-87701-000


PFS00007-00006

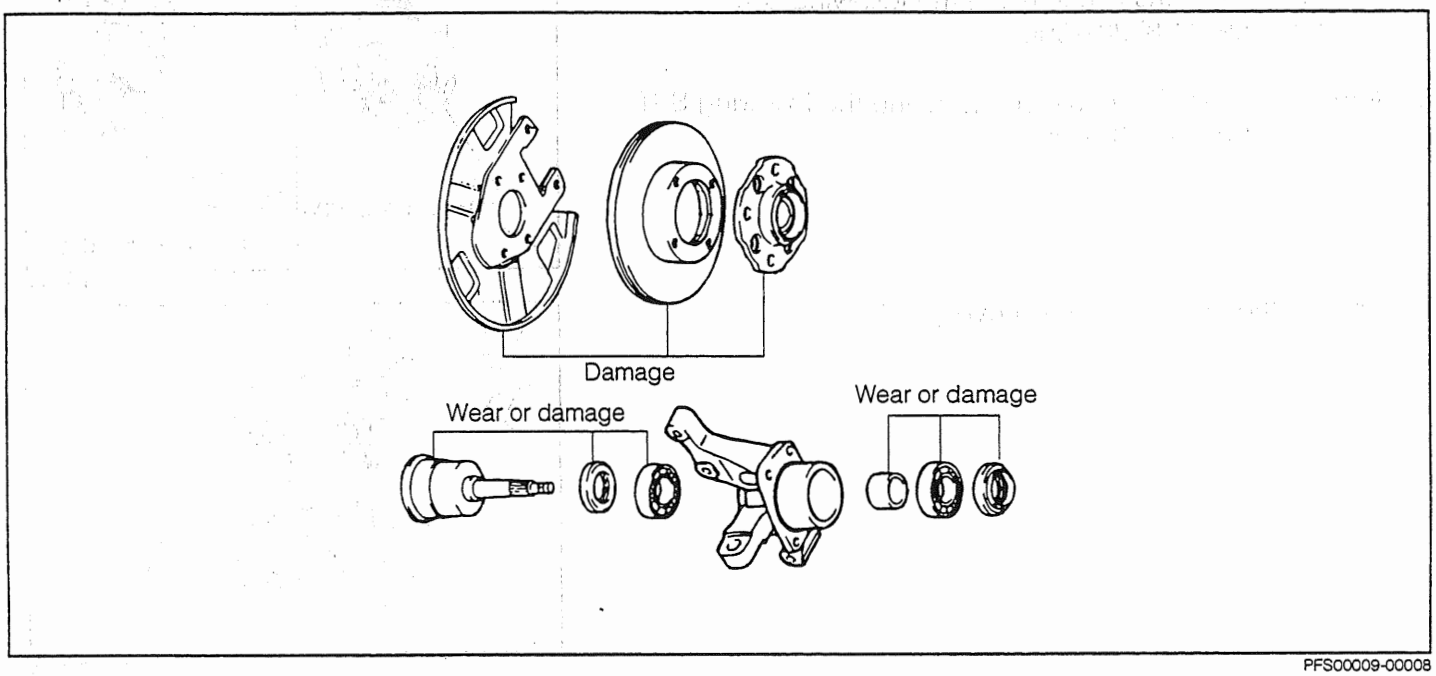
(9) Remove the steering knuckle by removing the bolts Ⓐ Ⓑ.



PFS00008-00007

3. INSPECTION

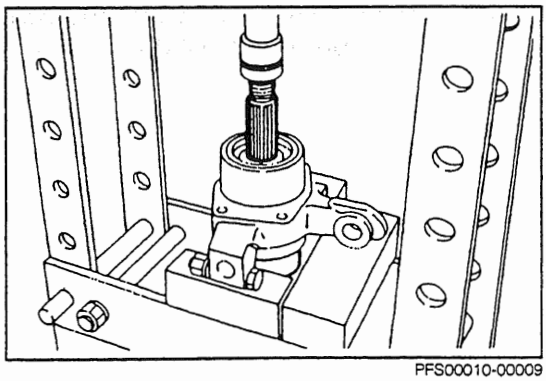
Inspect the following parts. Replace any parts which exhibit defects.



PFS00009-00008

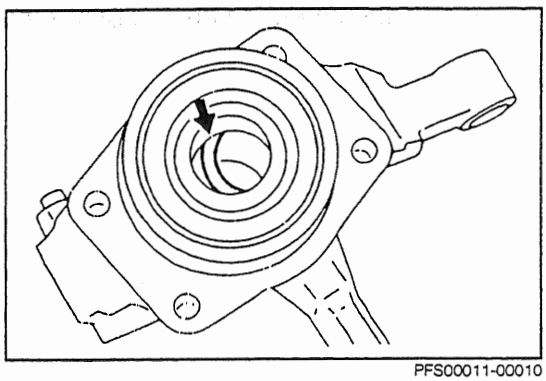
(1) Replacement of front axle bearing

① Remove the spindle from the knuckle, using the press.



PFS00010-00009

② Move the collar, as shown in the figure. Remove the bearing by pressing the collar.



PFS00011-00010

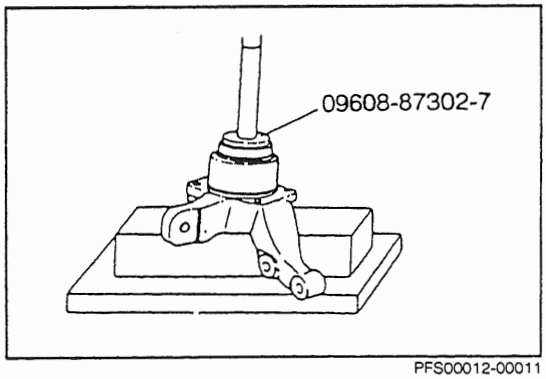
(2) Front axle bearing installation

① Press the radial ball bearing inner into the position, using the following SST.

SST: 09608-87302-7 that is a part of the SST set 09608-87302-000.

NOTE:

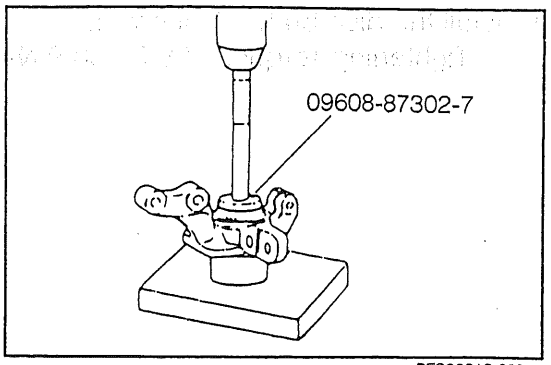
- Be sure to contact the bearing with the retaining section of steering knuckle.



PFS00012-00011

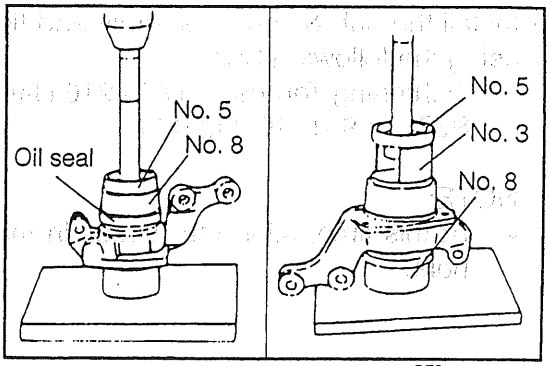
② Press the radial ball bearing outer into the position, using the following SST.
SST: 09608-87302-7

NOTE:
- Be sure to contact the bearing with the retaining section of steering knuckle.



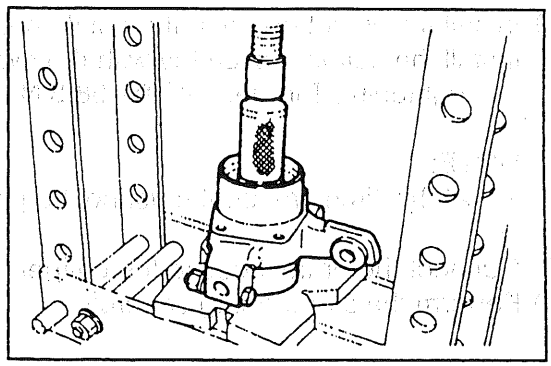
PFS00013-00012

③ Press the Type "T" oil seal inner and outer into the position, using the following SST.
SST: Use the pieces No. 5 and No. 8 that are parts of the SST set 09726-27010-000 (for inner).
SST: Use the pieces No. 3, No. 5 and No. 8 that are parts of the SST set 09726-27010-000 (for outer).



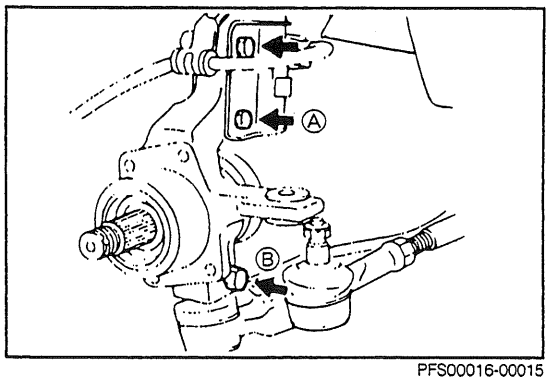
PFS00014-00013

(3) Press the spindle into the knuckle, using the following SST.
SST: 09222-87303-000


PFS00015-00014

4. INSTALLATION

(1) Install the steering knuckle.
Tightening Torque:
Ⓐ 78.5 - 98.1 N·m
Ⓑ 73.5 - 93.2 N·m

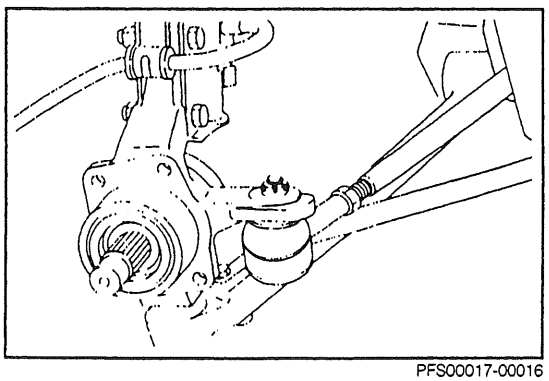


PFS00016-00015

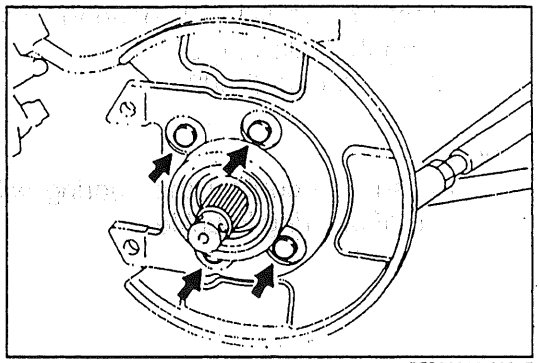
(2) Install the tie-rod end to the knuckle.
Tightening Torque: 39.2 - 53.9 N·m

NOTE:
- At this time, align the recess in the castle nut with the hole.

(3) Install a new cotter pin to the castle nut.

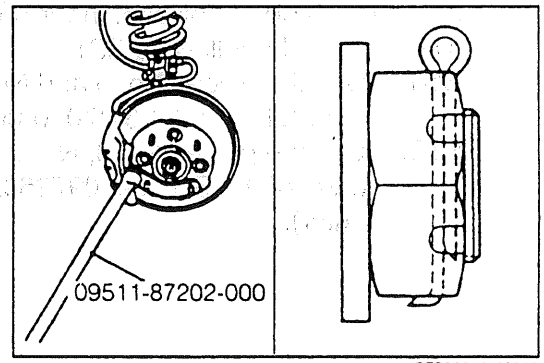

PFS00017-00016

(4) Install the disc brake dust cover.
Tightening Torque: 39.2 - 53.9 N·m


PFS00018-00017

(5) Install the hub & disc assembly and tighten the castle nut, using the following SST.
Tightening Torque: 177 - 216 N·m
SST: 09511-87202-000

NOTE:
- At this time, align the recess in the castle nut with the hole.

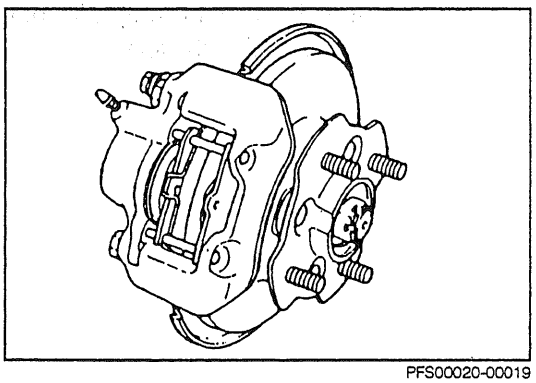


PFS00019-00018

(6) Install a new cotter pin to the castle nut.
(7) Install the caliper assembly with the two bolts.
Tightening Torque: 49.0 - 58.8 N·m

NOTE:
- At this time, the boot must not be pinched.

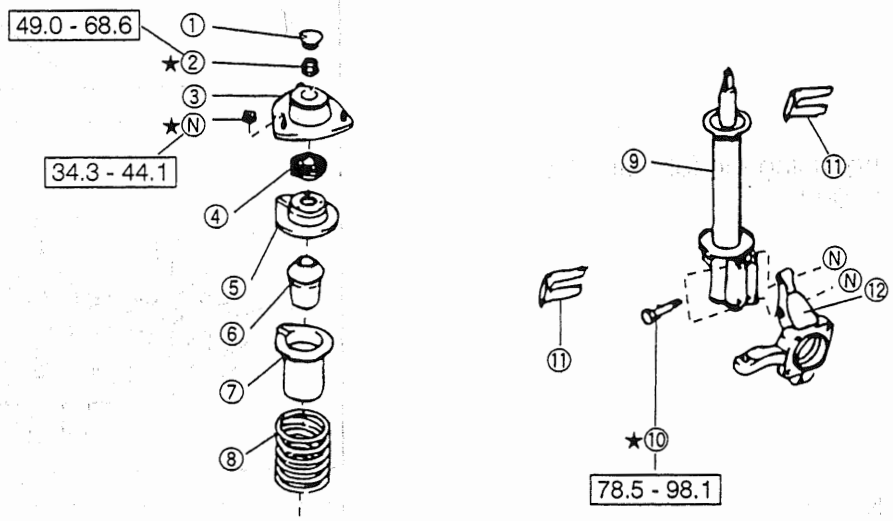
(8) Connect the brake hose to the caliper.
(9) Perform the air-bleeding securely.


PFS00020-00019

FRONT SHOCK ABSORBER AND COIL SPRING

1. COMPONENTS

T : Tightening torque
Unit : N·m
★ : Non-reusable parts

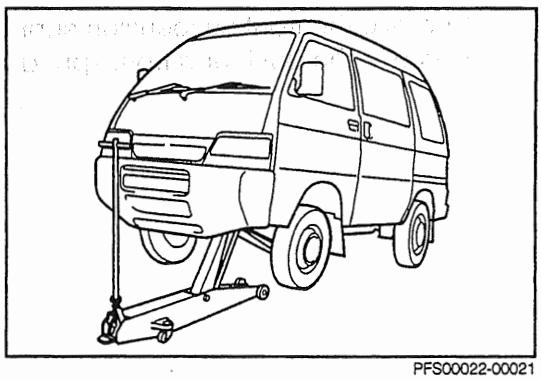


① Bearing dust cover
② Lock nut
③ Front suspension support
④ Bush
⑤ Front spring upper seat
⑥ Front spring bumper
⑦ Shock absorber dust cover
⑧ Front coil spring
⑨ Front shock absorber
⑩ Bolt
⑪ Clamp
⑫ Steering knuckle

PFS00021-00020

2. REMOVAL

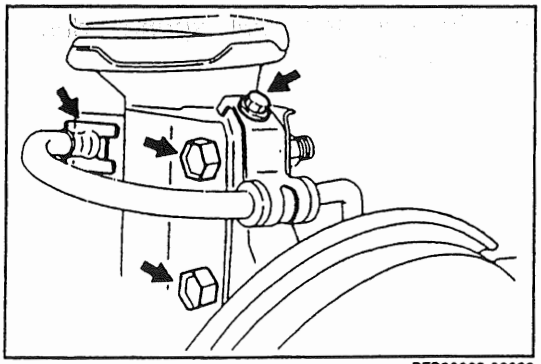
(1) Jack up the vehicle.
NOTE:
- Be sure to support the vehicle securely with safety stands.



PFS00022-00021

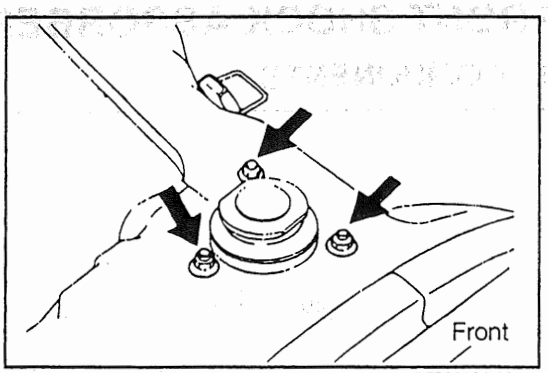
(2) Remove the front wheel.
(3) Open the front seat.

(4) Detach the clamp at the shock absorber side.
(5) Disconnect the brake hose from the caliper.
(6) Shock absorber removal.
① Remove the attaching nuts. Leave the bolts in their inserted conditions.



PFS00023-00022

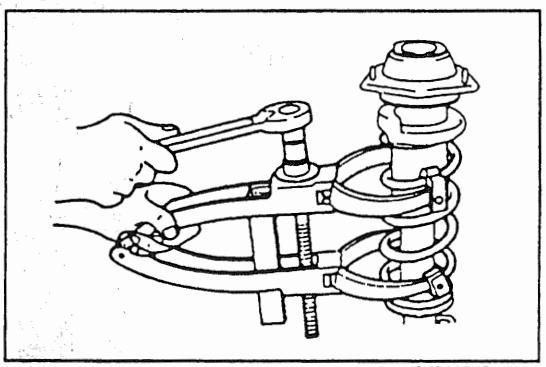
② Remove the three attaching nuts of the suspension.
③ Remove the steering knuckle attaching bolts. Draw out the shock absorber from the body.



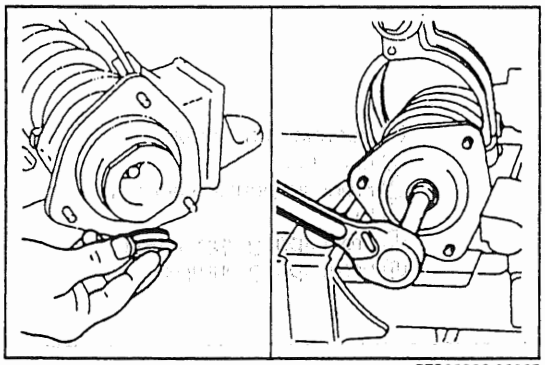
PFS00024-00023

3. DISASSEMBLY

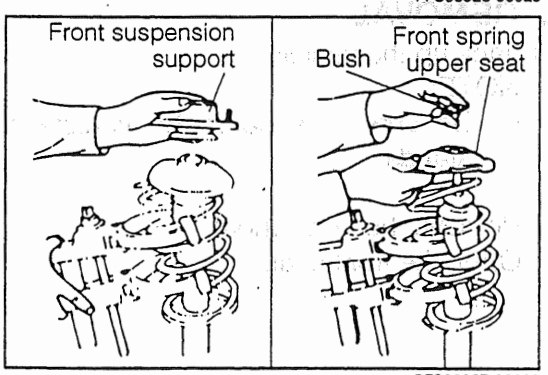
(1) Compress the coil spring, using the following SST.
SST: 09727-87701-000


PFS00025-00024

(2) Coil spring disassembly
① Clamp the front suspension support in a vice.
② Remove the bearing dust cover.
③ Loosen the nut.
NOTE:
- Never the nut by applying impacts on it, using an impact wrench or the like.

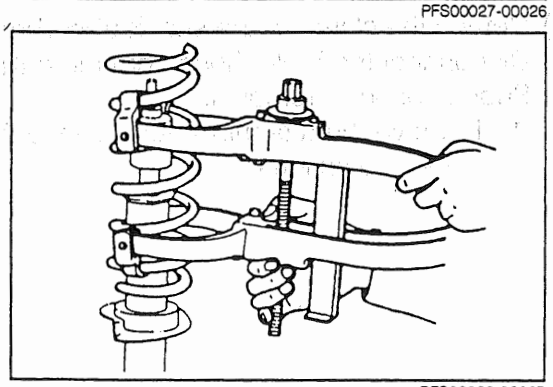

PFS00026-00025

④ Remove the front suspension support.
⑤ Remove the bush and front spring upper seat.



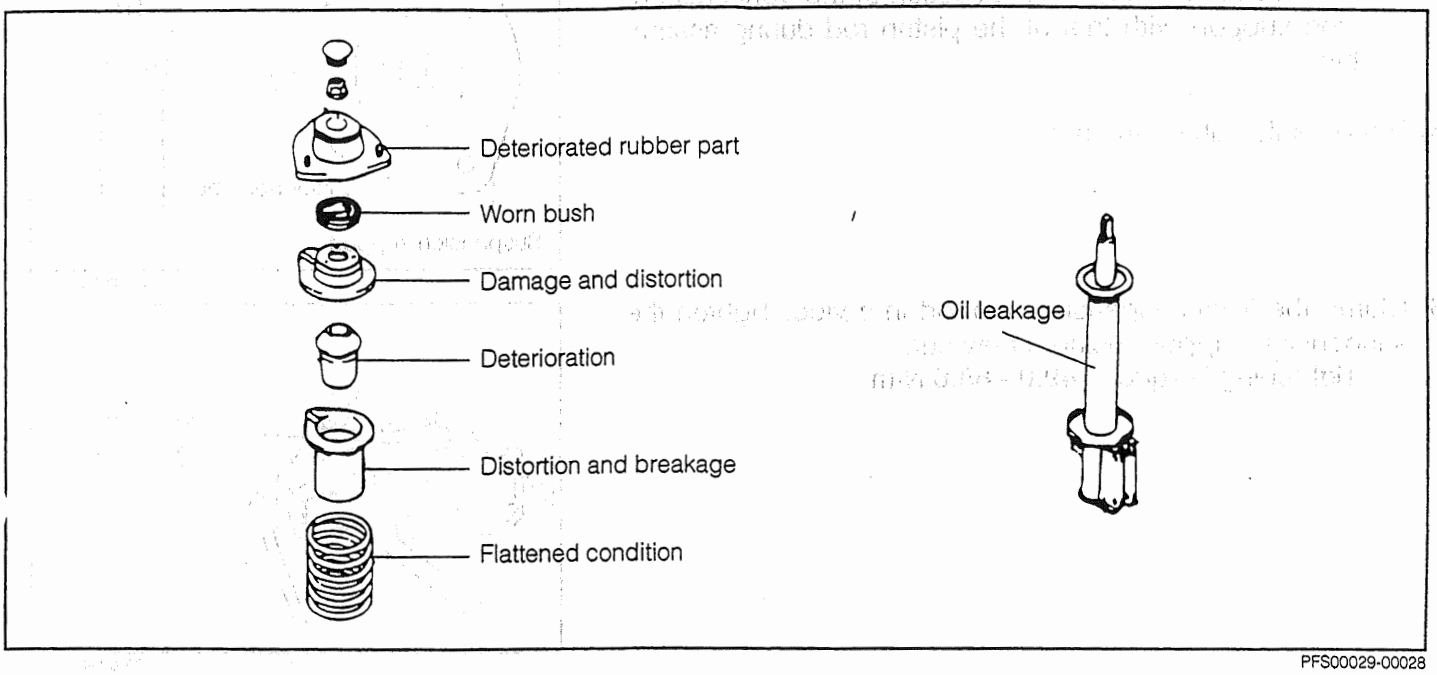
PFS00027-00026

⑥ Remove the coil spring, dust cover and spring bumper.


PFS00028-00027

4. INSPECTION

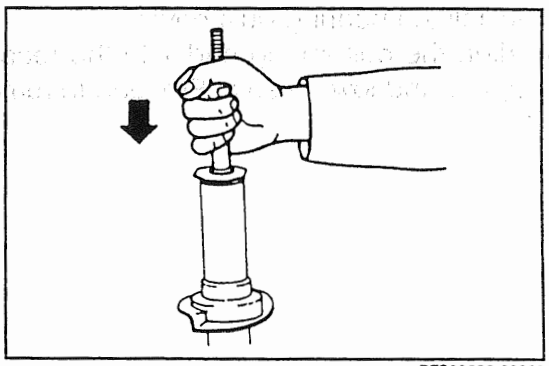
(1) Inspect the following parts.



PFS00029-00028

(2) Shock absorber operation inspection
   ① While pushing the piston rod, check that the pull throughout the stroke is even, and there is no abnormal resistance or noise.
   ② Push the piston rod in fully and release it. Check that it returns at a constant speed throughout.
   ③ If the absorber operations is defective, replace the absorber, as an assembly.

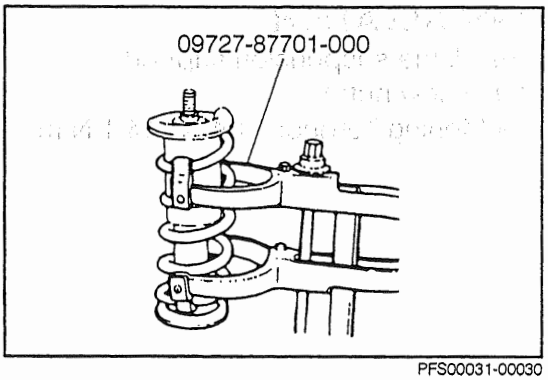
   CAUTION:
   - Release the gas completely, before discarding the shock absorber.



PFS00030-00029

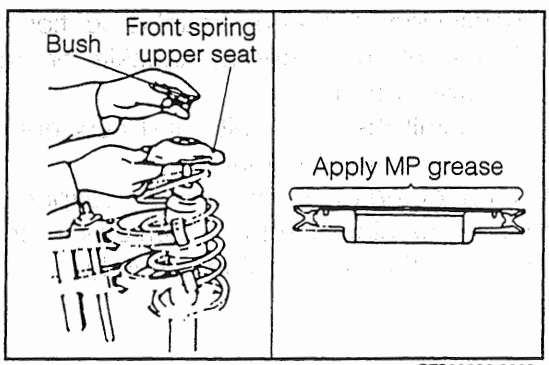
5. ASSEMBLY

(1) Insert the dust cover and spring bumper to the piston rod.
(2) Compress the coil spring, using the following SST.
   SST: 09727-87701-000



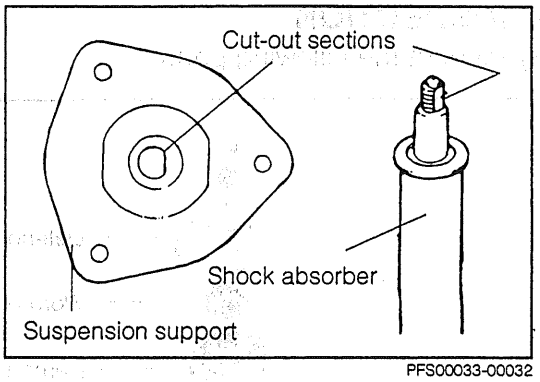
PFS00031-00030

(3) Install the spring upper seat and bush.
   NOTE:
   - Apply the 0.5 gram or more of MP grease to the upper surface of bush.



PFS00032-00031

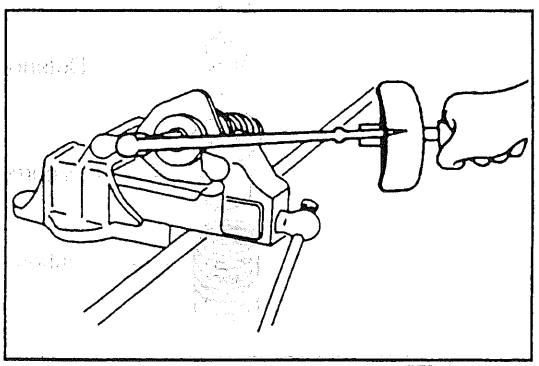
(4) Install the front suspension support.
NOTE:
- Be sure to align the cut-out section of the front suspension support with that of the piston rod during assembly.



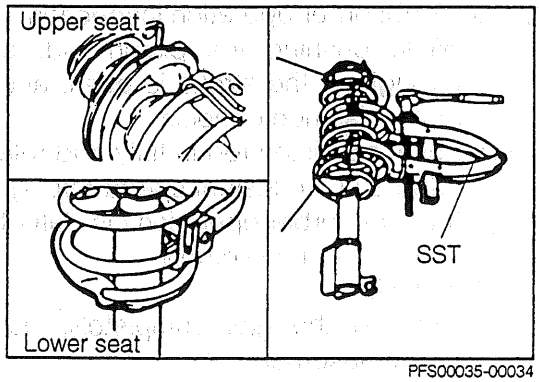
PFS00033-00032

(5) Temporarily tighten the nut.

(6) Clamp the from suspension support in a vice. Tighten the suspension support, using a new nut.
Tightening Torque: 49.0 - 68.6 N·m


PFS00034-00033

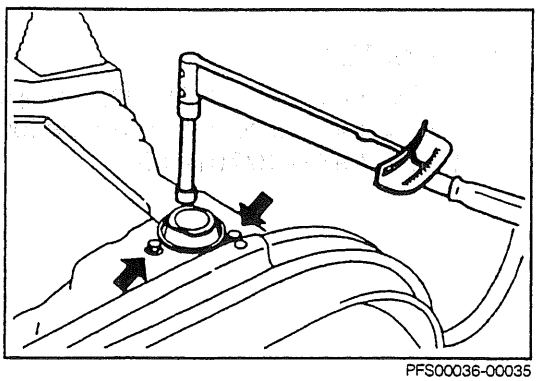
(7) Install the bearing dust cover.
(8) Align the coil spring end with the recessed section of the upper and lower seats, Proceed to remove the SST.



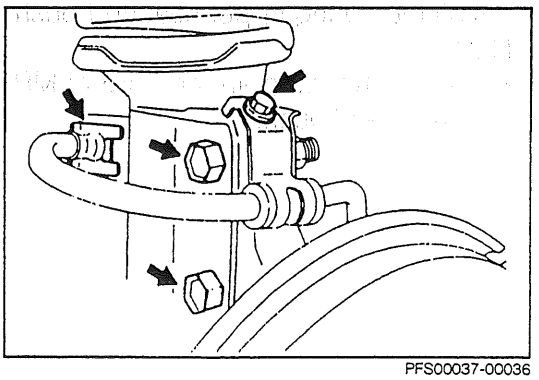
PFS00035-00034

6. INSTALLATION

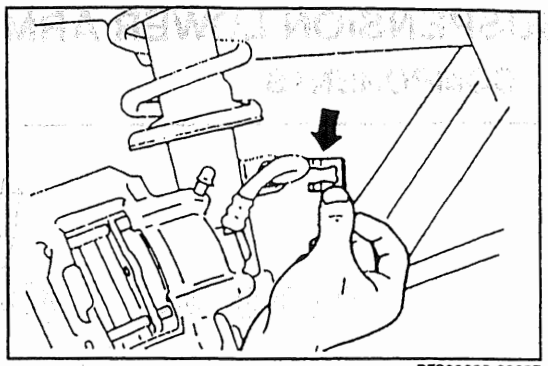
(1) Install the suspension support.
(Use new nuts)
Tightening Torque: 34.3 - 44.1 N·m


PFS00036-00035

(2) Installation of steering knuckle section
① Mount the steering knuckle on the shock absorber lower bracket.
② Install the new bolts and new nuts in place and temporarily tighten them.
(3) Connect the brake hose to the caliper.
(4) Install the clamp at the shock absorber side.
(5) Perform the air bleeding securely.


PFS00037-00036

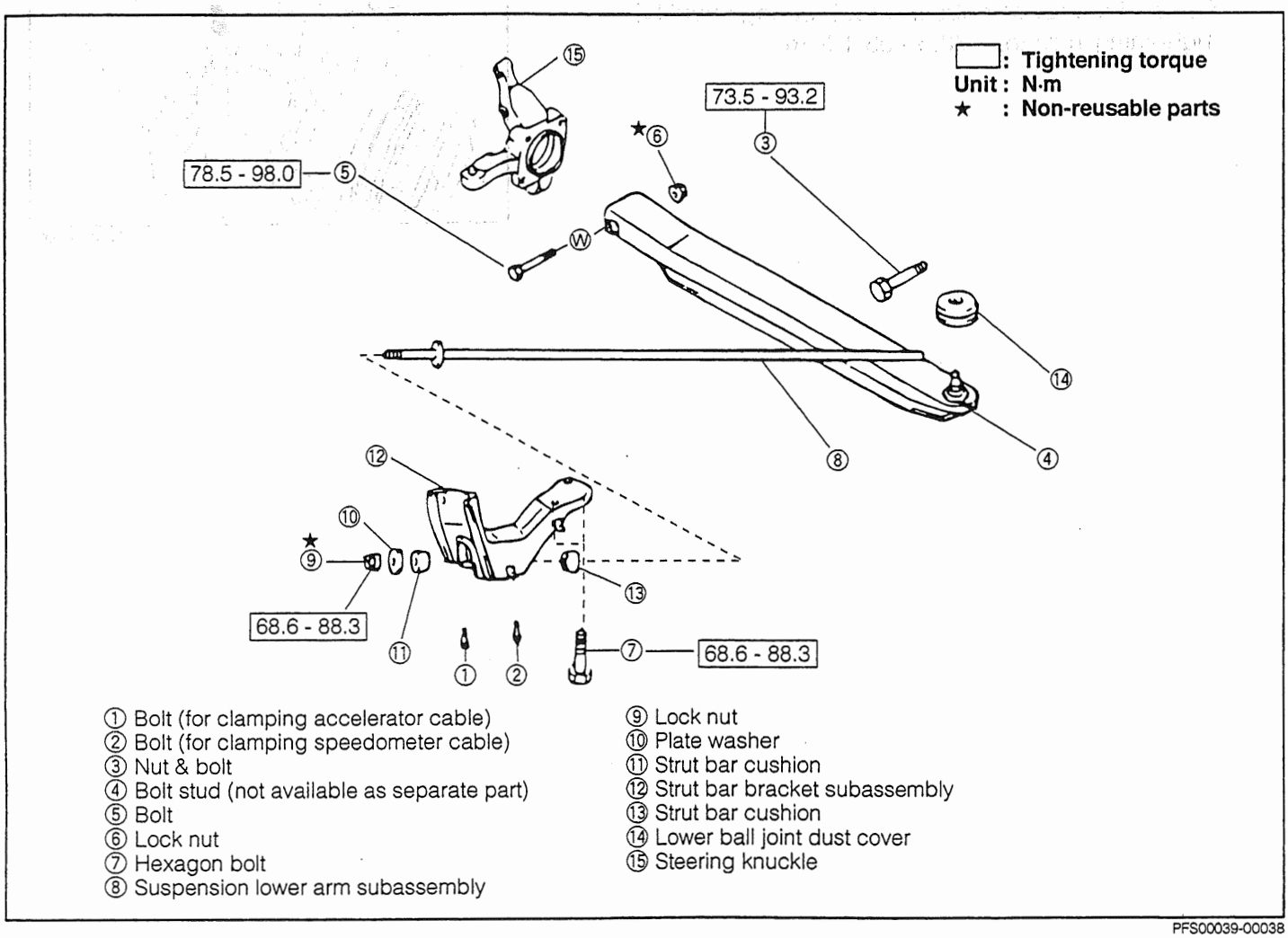
(6) Rock the vehicle with unloaded state in an up-and-down directions so as to settle the suspension.
(7) Proceed to tighten the following section.
    ① Bolt and nut (Shock absorber × Steering knuckle)
    Tightening Torque: 78.5 - 98.1 N·m



PFS00038-00037

SUSPENSION LOWER ARM

1. COMPONENTS

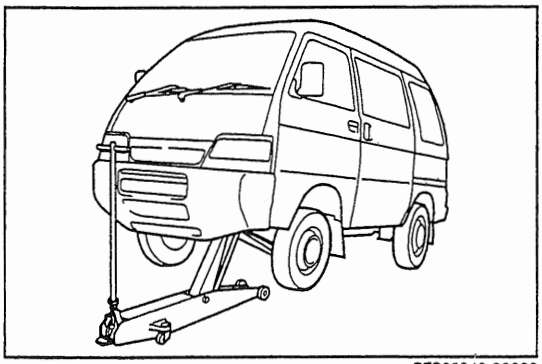


① Bolt (for clamping accelerator cable)
② Bolt (for clamping speedometer cable)
③ Nut & bolt
④ Bolt stud (not available as separate part)
⑤ Bolt
⑥ Lock nut
⑦ Hexagon bolt
⑧ Suspension lower arm subassembly
⑨ Lock nut
⑩ Plate washer
⑪ Strut bar cushion
⑫ Strut bar bracket subassembly
⑬ Strut bar cushion
⑭ Lower ball joint dust cover
⑮ Steering knuckle

PFS00039-00038

2. REMOVAL

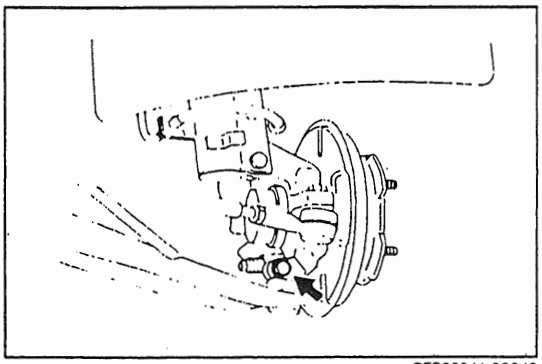
(1) Jack up the vehicle.
NOTE:
- Be sure to support the vehicle securely with safety stands.



PFS00040-00039

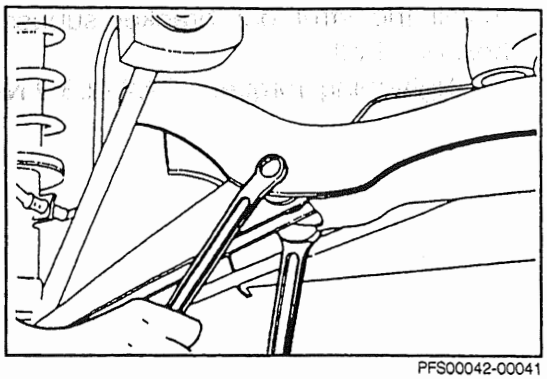
(2) Remove the front wheel.

(3) Suspension lower arm subassembly removal
① Remove the bolt and nut attaching to the steering knuckle.
② Detach the suspension lower arm subassembly from the steering knuckle.



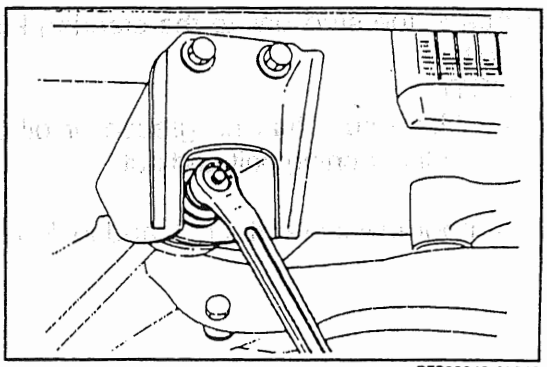
PFS00041-00040

③ Remove the suspension lower arm subassembly by removing the bolt and lock nut at the cross member.



PFS00042-00041

④ Remove the suspension lower arm subassembly by removing the lock nut at the strut bar bracket.
⑤ Remove the suspension lower arm subassembly from the vehicle.

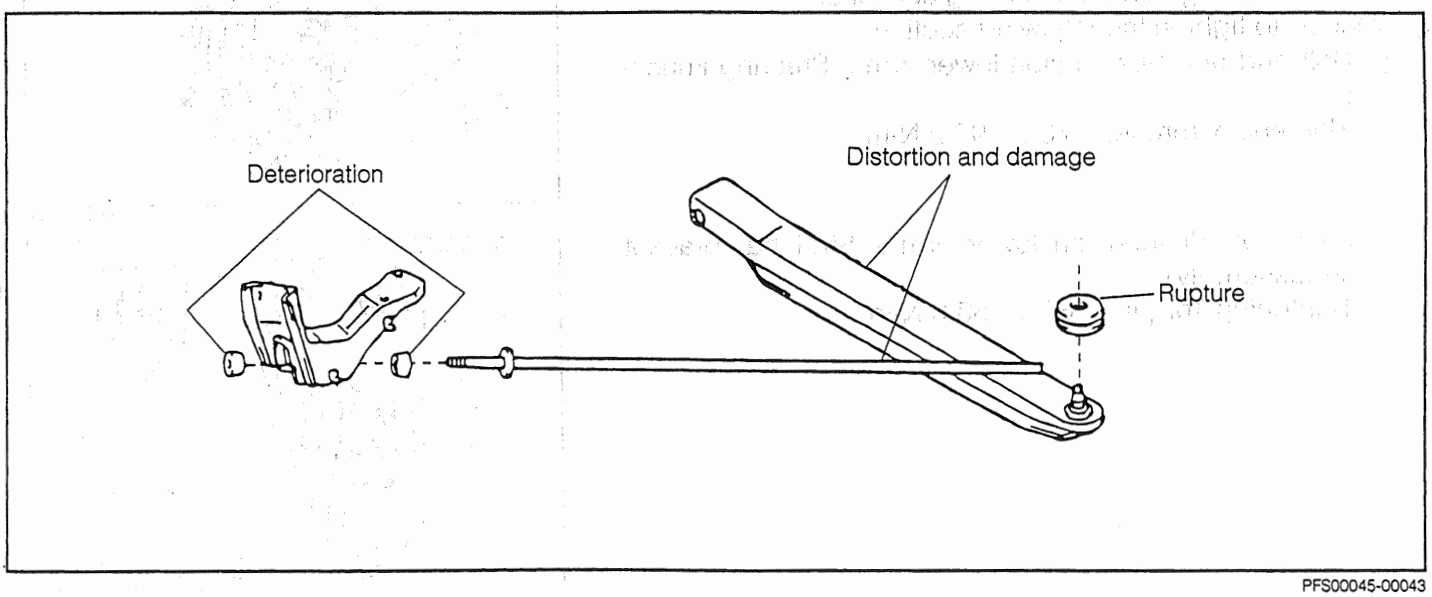


PFS00043-00042

(4) Remove the strut bar bracket subassembly by removing the four hexagon bolts.

PFS00044-00000

3. INSPECTION



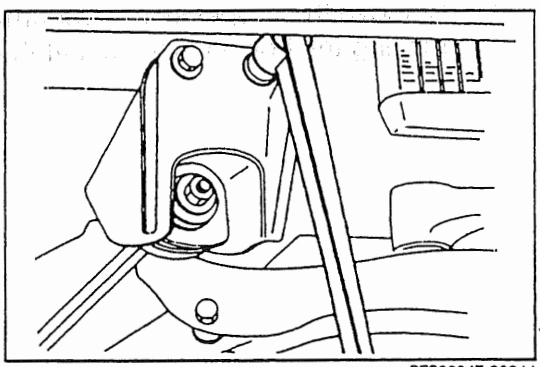
PFS00045-00043

4. INSTALLATION

(1) Insert the strut bar cushion to the suspension lower arm subassembly.
(2) Temporarily install the strut bar bracket subassembly to the body.
(3) Install the strut bar cushion, plate washer to the strut bar bracket subassembly and temporarily tighten the lock nut.

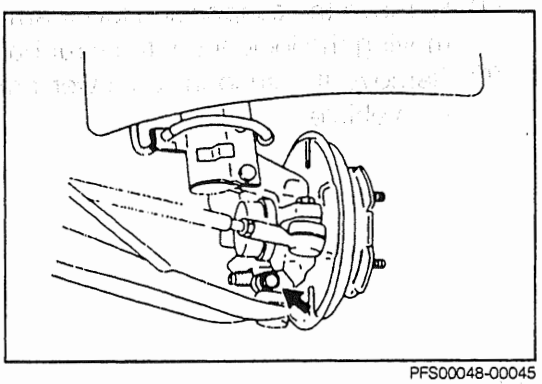
PFS00046-00000

(4) Install the strut bar bracket subassembly with the four hexagon bolts.
Tightening Torque: 39.2 - 53.9 N·m

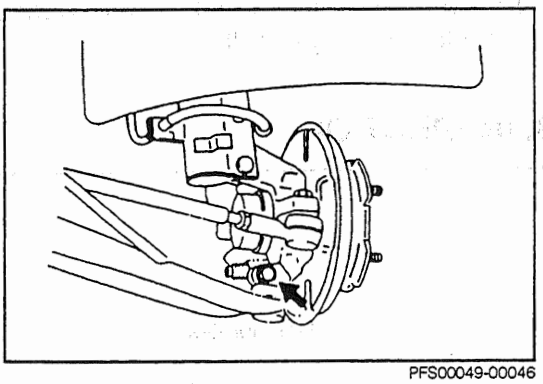

PFS00047-00044

(5) Attach the stud ball to the steering knuckle and insert the bolt.
NOTE:
- Make sure that no grease or oil etc. gets to the stud ball attaching bolt and nut.

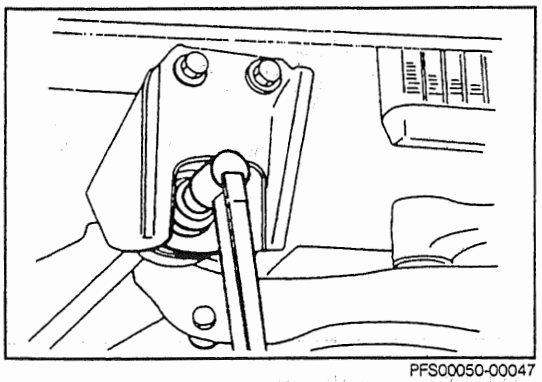
(6) Temporarily install the bolt and lock nut.


PFS00048-00045

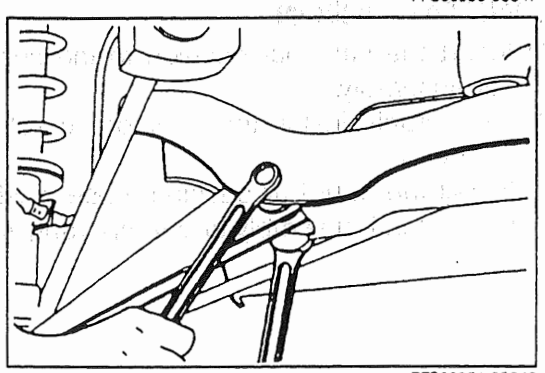
(7) Install the front wheel.
(8) Jack down the vehicle. Rock the vehicle with unloaded state in an up-and-down directions so as to settle the suspension. With the vehicle in an unloaded state (lower arm is horizontal), tighten the following sections.
(9) Proceed to tighten the following section.
① Bolt and nut (Suspension lower arm × Steering knuckle)
Tightening Torque: 73.5 - 93.2 N·m


PFS00049-00046

② Lock nut (Suspension lower arm × Strut bar bracket subassembly)
Tightening Torque: 68.6 - 88.3 N·m


PFS00050-00047

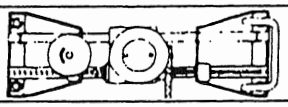
③ Bolt and nut (Suspension lower arm subassembly × Cross member)
Tightening Torque: 78.5 - 98.0 N·m


PFS00051-00048

10) Front wheel alignment adjustment and inspection.

PFS00052-00000

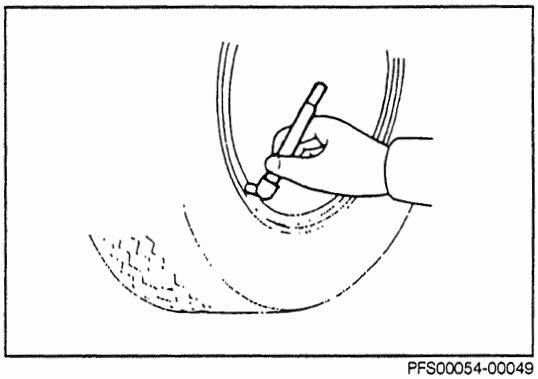
FRONT WHEEL ALIGNMENT

	Shape	Nomenclature	Use
Tools		CCK gauge compensator (CCK-IN) Supplied by Banzai, Ltd.	Attachment for camber, caster and kingpin gauge
	Brake pusher, hexagon wrench key (width across flats: 8mm)		
Instruments	Turning radius gauge, tire pressure gauge, camber, caster, kingpin gauge and dial gauge		

PFS00053-00000

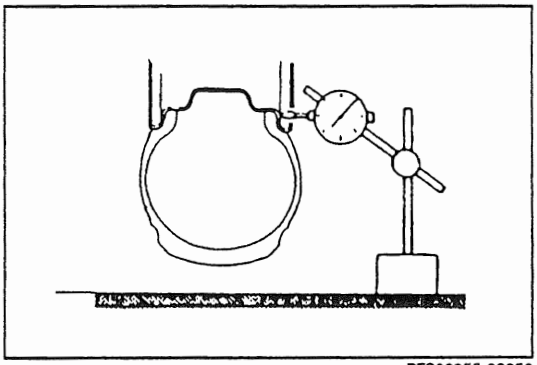
CHECKS PRIOR TO WHEEL ALIGNMENT MEASUREMENT

(1) Check of tires for wear
(2) Check of tires for correct air pressure



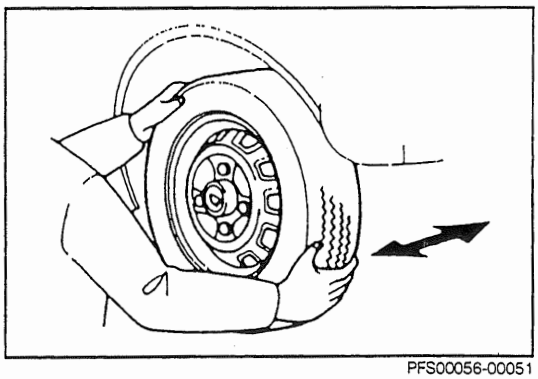
PFS00054-00049

(3) Check of bolts of related sections for tightened condition



PFS00055-00050

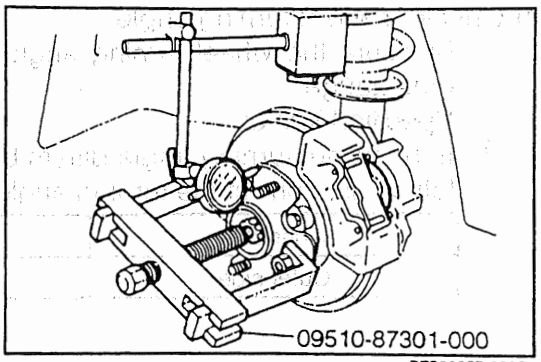
(4) Check of related sections for excessive amount of play
   ① Jack up the vehicle. Alternately push and pull the upper and lower parts of each tire. Ensure that the tire exhibits no excessive play.
   ② If the tire exhibits an excessive amount of play, perform the following check while the brake pedal is being depressed.
   - The excessive amount of play disappear:
     This indicates that the front wheel bearing is loose.
   - The excessive amount of play still persists:
     This indicates that the knuckle section, axle carrier section or suspension is loose.



PFS00056-00051

③ If the wheel bearing is judged as being loose, proceed to check the play in the axial direction, using the following SST and a dial gauge.
SST: 09510-87301-000

(Front wheel bearings)
Specified Value
Maximum Limit: Not to exceed 0.05 mm



PFS00057-00052

Wheel alignment specified value

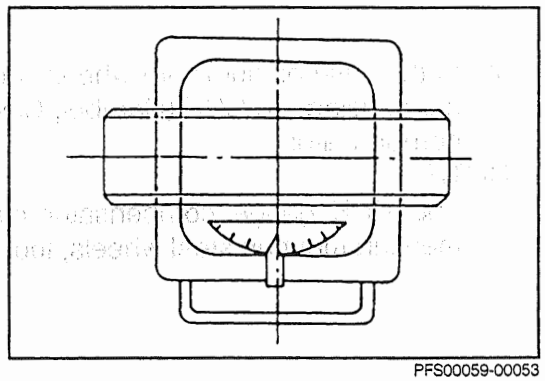
Item			Pick	Van
Front wheel alignment	Camber angle		1°23′ $^{+40'}_{-50'}$	1° $^{+40'}_{-50'}$
	Caster angle		3°13′ ± 1°	3°02′ ± 1°
	Kingpin angle		10°49′ ± 1°	11°25′ ± 1°
	Toe-in mm	One passenger	2.0 $^{+1.5}_{-1.0}$	
		In unloaded vehicle	1.5 $^{+1.5}_{-1.0}$	
	Wheel turning angle	Inner	36° $^{+0°}_{-3°}$	
		Outer	34.8° $^{+0°}_{-3°}$	

PFS00058-00000

CHECKS AND ADJUSTMENTS OF FRONT WHEEL ALIGNMENT

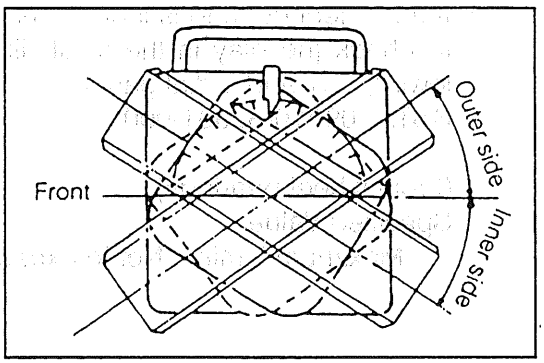
(1) Turning radius gauge set
① Set the turning radius gauge to the zero point. Proceed to lock the gauge.
② Place the vehicle on the gauge in such a way that the center of the tire-to-floor contact surface may be aligned with the center of the turning radius gauge.

NOTE:
- Perform the check on a level floor.
- When a portable type turning radius gauge is employed, a plate having the same thickness as that of the gauge should be placed under the rear wheel so that the vehicle levelness may be maintained.
- Make sure that the wheels are in their straightahead conditions.
- Keep the vehicle in an unloaded state. In order to prevent the vehicle from moving during the check, be sure to apply the foot brake, using a brake pedal pusher or the like.
- Remove the stop lamp fuse so as to prevent the stop lamp from staying on.


PFS00059-00053

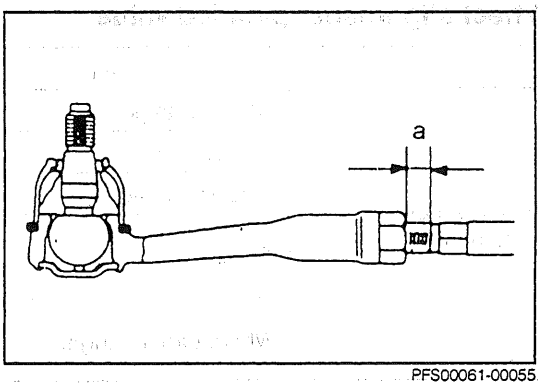
(2) Check of wheel turning angle
① Measure the wheel turning angle, using a turning radius gauge.
Specified Value:
② If the wheel turning angle differs between the right and left sides, correct the turning angle.

Inner side	36° $^{+0°}_{-3°}$
Outer side	34.8° $^{+0°}_{-3°}$



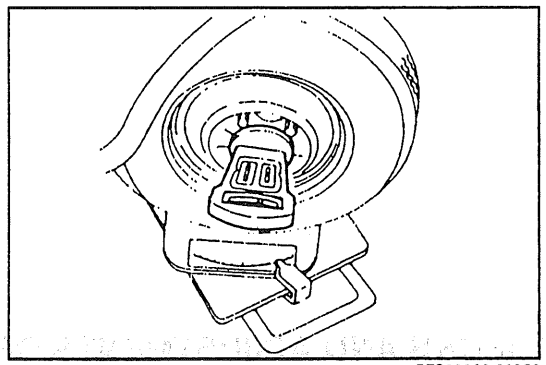
PFS00060-00054

(3) Correction of wheel turning angle
① Loosen the lock nuts of the tie-rod ends.
② Make the length (a) indicated in the right figure equal between the right and left sides.
NOTE:
- Make sure that the boot is not twisted during this correction.
- Make sure that the tie-rods at the right and left sides are turned by the same amount.

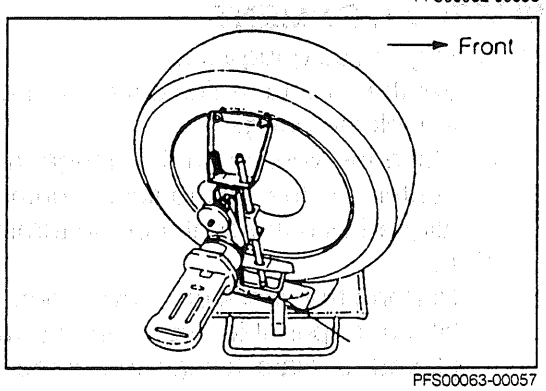


PFS00061-00055

(4) Check of camber, caster and kingpin angles
① In the case of steel wheels, perform the measurement, using the following SST (attachment).
SST: 09722-87702-000

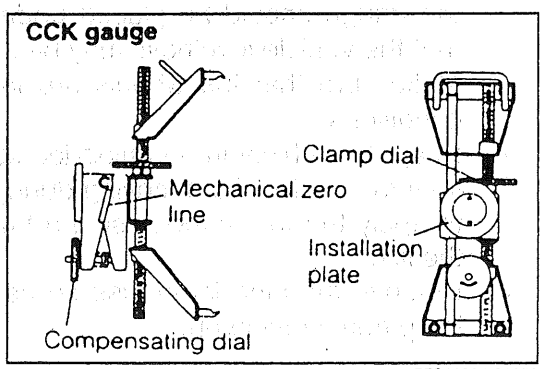

PFS00062-00056

② In the case of aluminum wheels, perform the measurement, using the CCK (Camber, Caster, Kingpin) gauge compensator.
NOTE:
- The CCK gauge compensator can be used for the measurement on steel wheels, too.



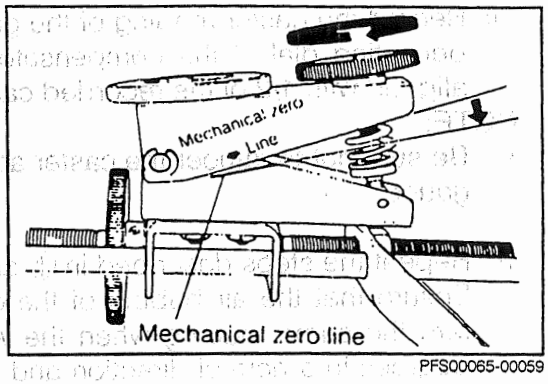
PFS00063-00057

③ Installation procedure for the CCK gauge compensator, and the camber, caster and kingpin gauge.



PFS00064-00058

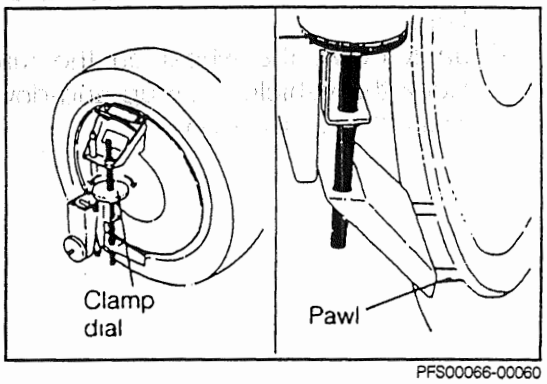
ⓐ Jack up the vehicle.
ⓑ Before installing the CCK gauge to the wheel, set the CCK gauge compensator to the mechanical zero line by turning the compensating dial of the compensator.



PFS00065-00059

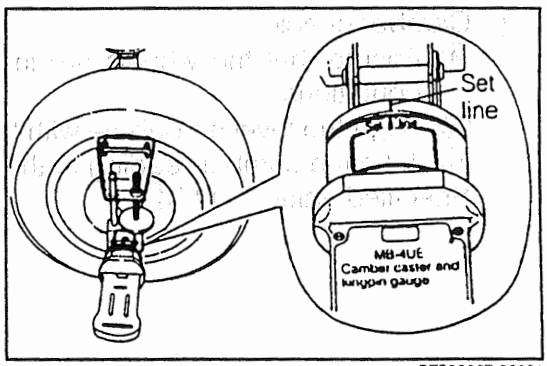
ⓒ While turning the clamp dial of the CCK gauge compensator, hook the four pawls to the wheel edges securely. While pushing the compensator, lock the compensator positively by turning the clamp dial.

NOTE:
- In order to prevent the wheel edges from being scratched, affix tapes on the wheel edge sections to which the four pawls of the compensator are hooked.



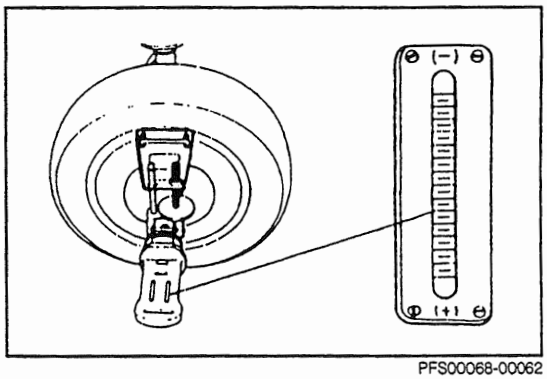
PFS00066-00060

ⓓ Set the camber caster and kingpin gauge to the installation plate of the CCK gauge compensator.
At this point, align the lines on the gauge and compensator with each other.



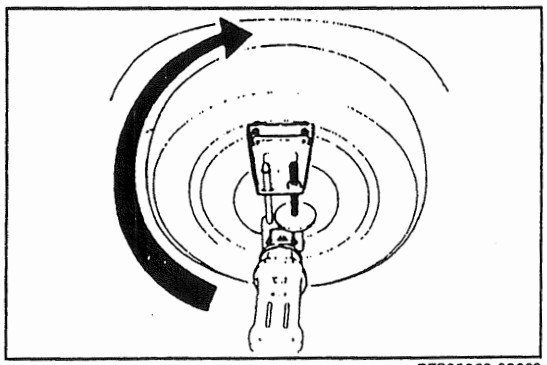
PFS00067-00061

ⓔ Turn the wheel so that the level air bubble in the gauge comes to the central position.
At this position, turn the caster adjusting screw of the gauge so that the caster air bubble may be aligned with the graduation zero position.



PFS00068-00062

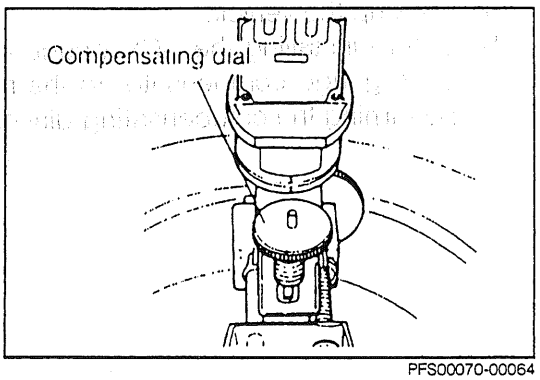
ⓕ Turn the wheel 180 degrees so that the gauge may be turned over. Proceed to align the set lines on the gauge and compensator with each other.
Next, turn the wheel so that the level air bubble in the gauge comes to the central position.


PFS00069-00063

ⓖ Record the caster reading of the gauge. Turn the compensating dial of the compensator so that it may be aligned with 1/2 of the recorded caster reading.

NOTE:

- Be sure not to tamper the caster adjusting screw of the gauge.



PFS00070-00064

ⓗ Repeat the steps described in ⓕ and ⓖ.
Ensure that the air bubble of the caster gauge registers the same reading when the wheel is turned 180 degrees in a normal direction and in a reversed direction.

ⓘ Jack down the wheel on the turning radius gauge. Rock the vehicle in an up-and-down direction so as to settle the suspension.

PFS00071-00000

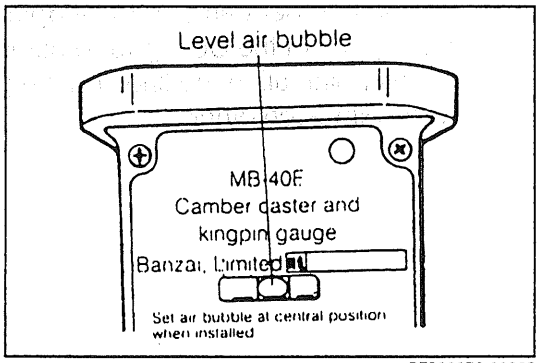
④ Camber check

ⓐ Ensure that the wheels are in their straight-ahead conditions.

ⓑ Align the level air bubble with the central position.

ⓒ Take the camber reading of the gauge.

Specified Value: $1° \begin{smallmatrix}+40' \\ -50'\end{smallmatrix}$



PFS00072-00065

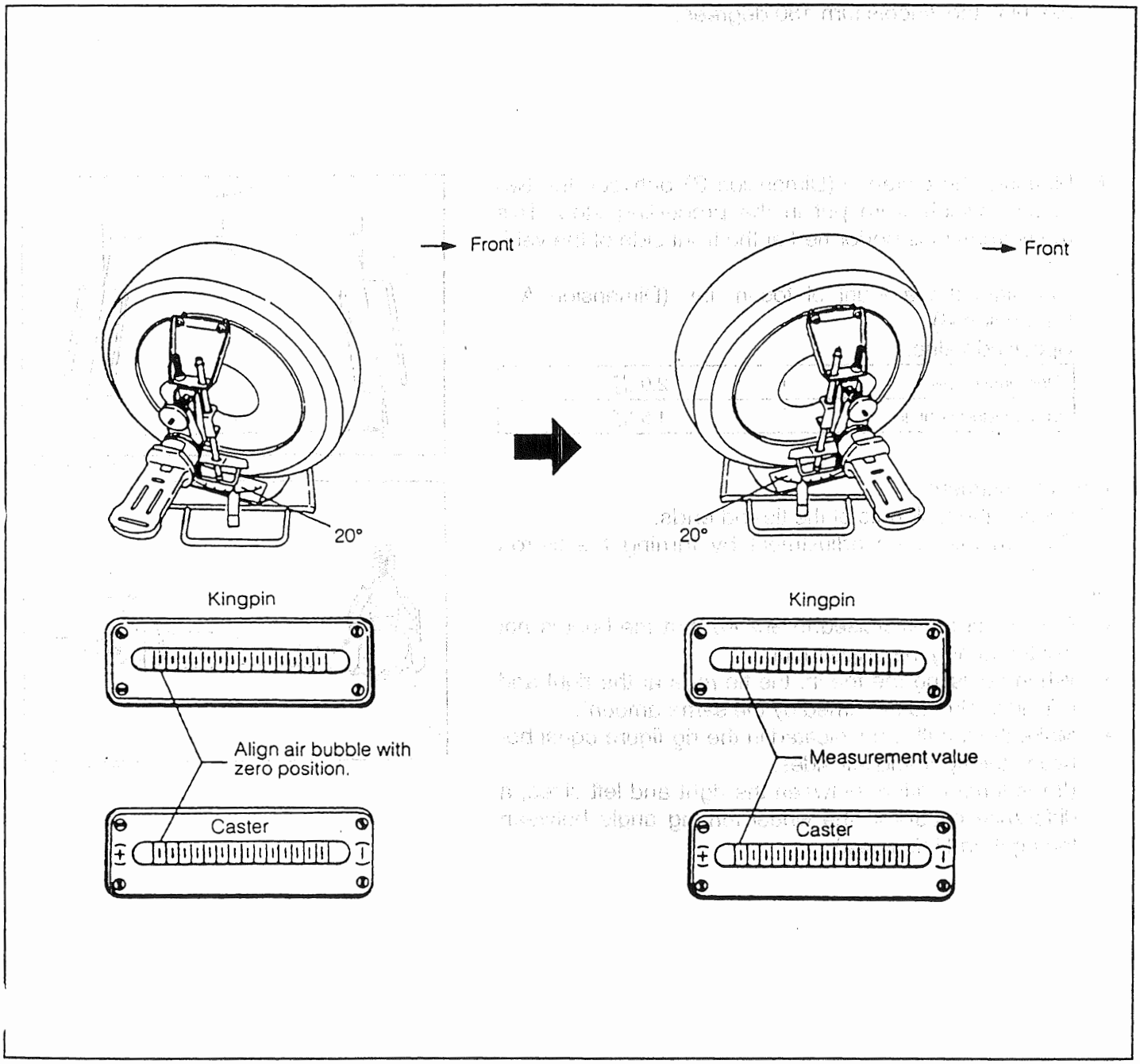
⑤ Check of caster and kingpin angles.
(Right wheel)

- Turn the steering wheel to the right side, until the right front tire comes at a point where the turning radius gauge registers 20 degrees.
- Turn each of the caster and kingpin adjusting screws so that the respective air bubble may be aligned with the zero point.
- Turn the steering wheel to the left side, until the right front tire comes at a point where the turning radius gauge registers 20 degrees.
- Take the gauge readings of the caster and kingpin angles.

Specified Value:
Caster ..... 3°13′ ± 1° (Pick), 3°02′ ± 1° (Van)
Kingpin angle ..... 10°49′ ± 1° (Pick),11°25′ ± 1° (Van)

(Left wheel)

- Perform the check, following the same procedure as with the right wheel. However, the turning direction of the steering wheel must be reversed.



PFS00073-00066

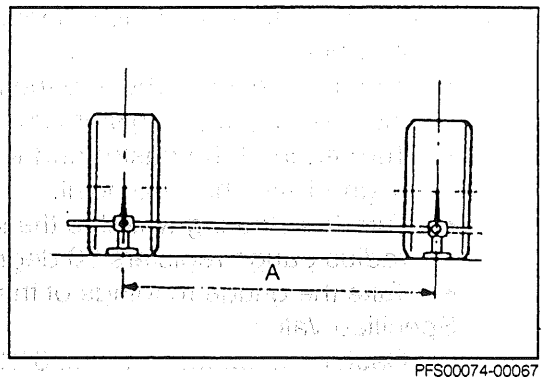
(5) Toe-in measurement

① Rock the vehicle so that the vehicle height may stabilize.

② Move the vehicle forward about five meters so that the front wheels may become in their straight-ahead conditions.

NOTE:

- Do not move the vehicle backward during the measurement.



PFS00074-00067

③ Align the height of the toe-in gauge pointers with the center height of the front wheels.

④ Put a mark on the tread center of each front wheel tire at the rear side. Measure the distance between the two marks (Dimension A) in the figure.

⑤ Slowly move the vehicle forward by pushing the vehicle, until the wheels turn 180 degrees.

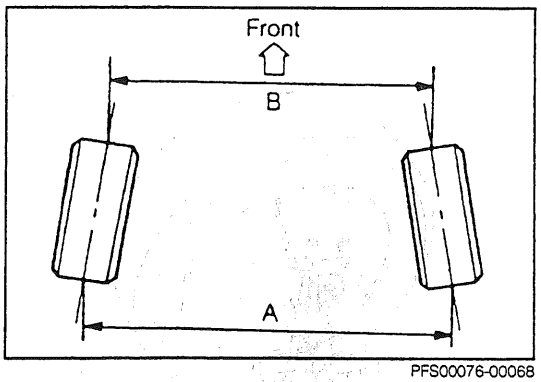
PFS00075-00000

⑥ Measure the distance (Dimension B) between the two marks which were put in the preceding step. This measurement is performed at the front side of the vehicle.

Calculate the amount of toe-in, i.e. (Dimension A – Dimension B).

Specified Value:

One passenger	$2.0^{+1.5}_{-1.0}$
In unloaded vehicle	$1.5^{+1.5}_{-1.0}$



PFS00076-00068

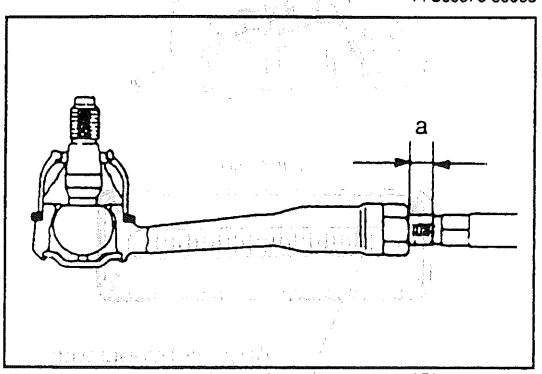
(6) Toe-in adjustment

① Loosen the lock nuts of the tie-rod ends.

② Perform the toe-in adjustment by turning the tie-rod ends.

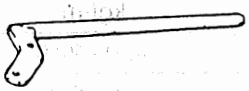
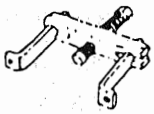
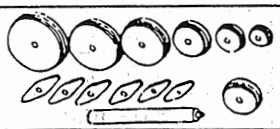
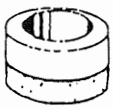
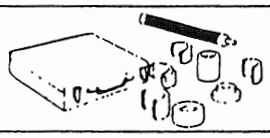
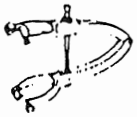
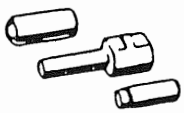
NOTE:

- Care must be exercised to ensure that the boot is not twisted during the adjustment.
- When adjusting the toe-in, the tie-rods at the right and left sides should be turned by the same amount.
- Make the length (a) indicated in the rig figure equal between the right and left sides.
  (If the length differs between the right and left sides, a difference occurs in the wheel turning angle between the right and left sides.)



PFS00077-00069

SST

Figure	Part number	Part name
	09511-87202-000	Brake drum stopper
	09510-87301-000	Front hub & drum puller
	09608-87302-000	Axle hub & drive pinion bearing tool set
	09611-87701-000	Tie-rod end puller
	09722-87702-000	Camber caster gauge attachment
	09726-27010-000	Front suspension arm bush remover & replacer
	09727-87701-000	Front coil spring compressor
	09222-87303-000	Remover & replacer, connecting rod bush

PFS00078-00000

TIGHTENING TORQUES

Tightening components	Tightening torque	
	N·m	kgf-m
Front axle hub × Castle nut	177.0 - 216.0	18.0 - 22.0
Suspension lower arm × Srut bar bracket	68.6 - 88.3	7.0 - 9.0
Suspension lower arm × Cross member	78.5 - 98.0	8.0 - 10.0
Strut bar bracket × Body	39.2 - 53.9	4.0 - 5.5
Steering knuckle × Suspension lower arm	73.5 - 93.2	7.5 - 9.5
Steering knuckle × Tie-rod end	39.2 - 53.9	4.0 - 5.5
Steering knuckle × Brake dust cover	39.2 - 53.9	4.0 - 5.5
Front shock absorber × Steering knuckle	78.5 - 98.1	8.0 - 10.0
Front suspension support × Shock absorber	49.0 - 68.6	5.0 - 7.0

PFS00079-00000

RS

REAR AXLE & SUSPENSION

REAR AXLE ..... **RS– 2**
1. COMPONENTS ..... **RS– 2**
2. REMOVAL ..... **RS– 2**
3. INSPECTION ..... **RS– 4**
4. INSTALLATION ..... **RS– 5**

REAR SHOCK ABSORBER ..... **RS– 7**
1. COMPONENTS ..... **RS– 7**
2. REMOVAL ..... **RS– 7**
3. INSPECTION ..... **RS– 8**
4. INSTALLATION ..... **RS– 8**

REAR SUSPENSION ..... **RS– 9**
1. COMPONENTS ..... **RS– 9**
2. REMOVAL ..... **RS– 9**
3. INSPECTION **RS–11**
4. INSTALLATION **RS–12**

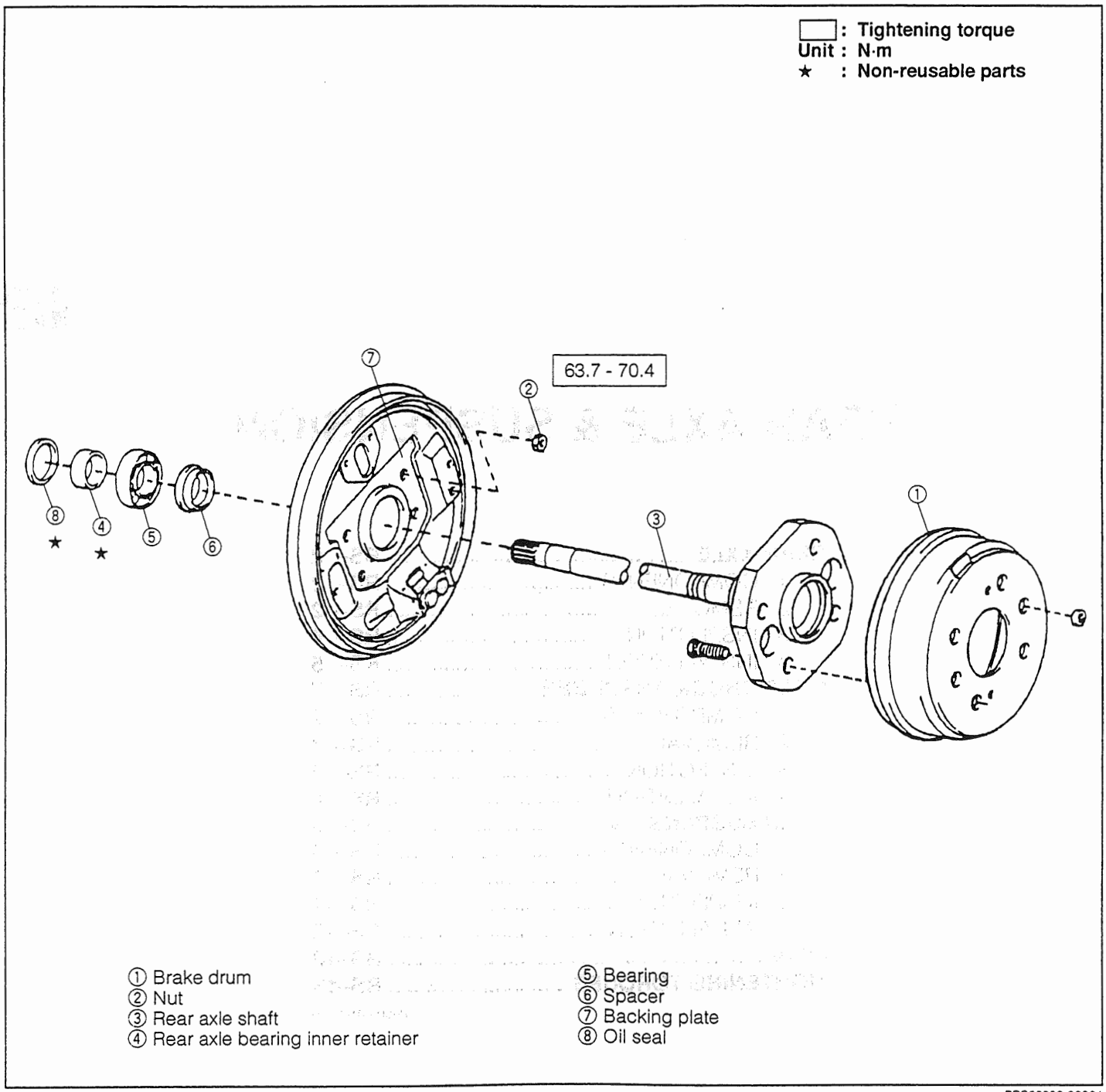
SSTs **RS–13**

TIGHTENING TORQUES **RS–13**

PRS00001-00000

REAR AXLE

1. COMPONENTS

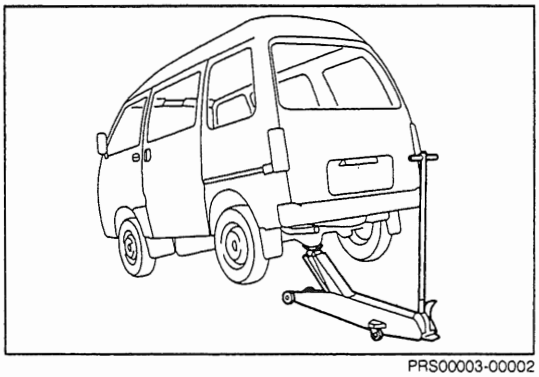


PRS00002-00001

2. REMOVAL

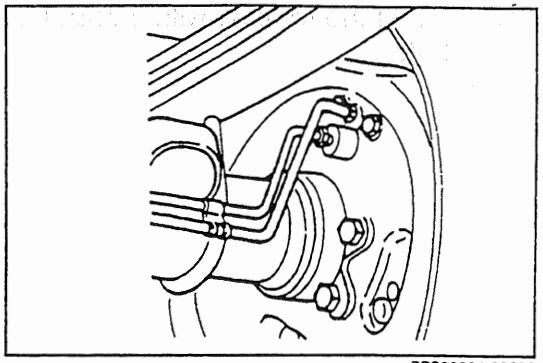
(1) Jack up the vehicle.
NOTE:
- Be sure to support the vehicle securely with safety stands.

(2) Drain the differential oil.

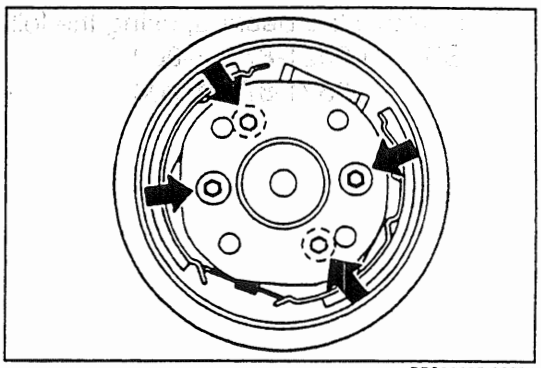


PRS00003-00002

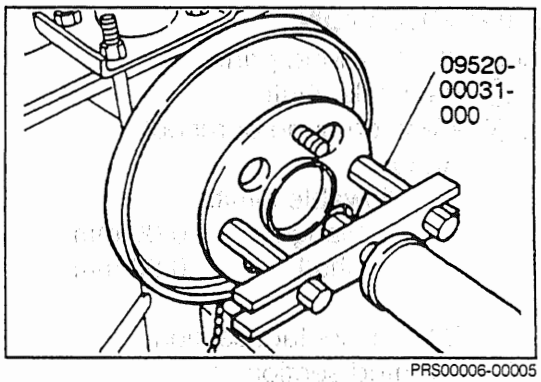
(3) Remove the rear wheel.
(4) Remove the parking cable adjusting nut.
(5) Remove the parking cable end.
(6) Disconnect the brake tube union nut from the wheel cylinder.


PRS00004-00003

(7) Remove the brake drum.
(8) Remove the four nuts attaching to the backing plate.

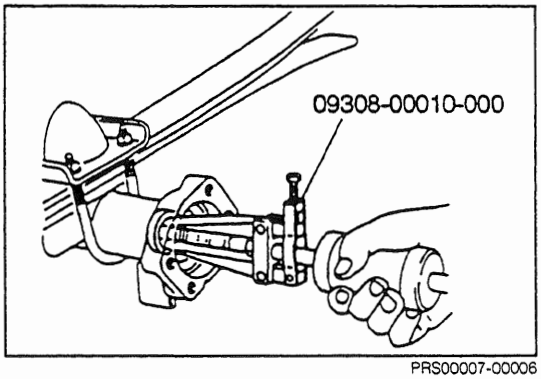

PRS00005-00004

(9) Remove the rear axle shaft with backing plate, using the following SST.
SST: 09520-00031-000



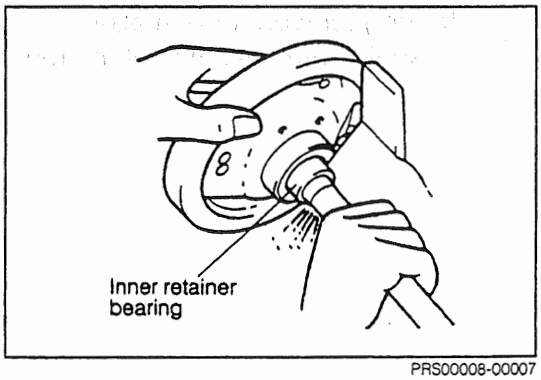
PRS00006-00005

(10) Remove the oil seal, using the following SST.
SST: 09308-00010-000



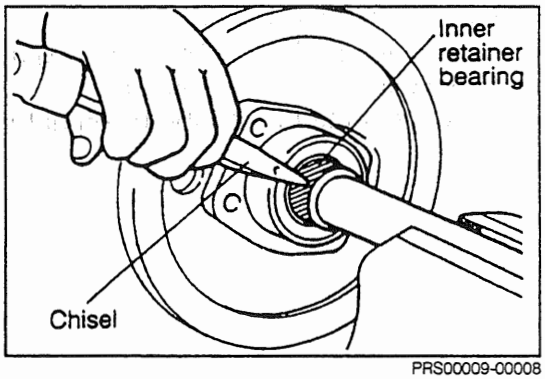
PRS00007-00006

(11) Rear axle bearing removal
① Grind off the bearing inner retainer with a grinder.



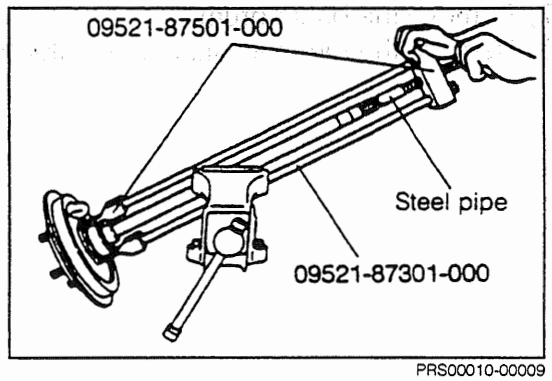
PRS00008-00007

② Cut off the retainer with a chisel and remove it from the shaft.



PRS00009-00008

③ Remove the bearing, using the following SST.
SST: 09521-87301-000
09521-87501-000



PRS00010-00009

3. INSPECTION

Inspect the following parts.

① Rear axle shaft

Ⓐ Wear, damage or runout.

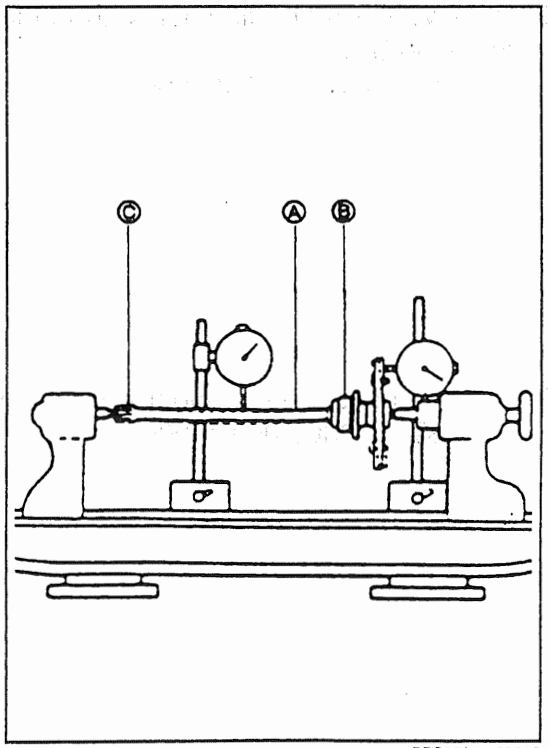
Runout

Allowable Limit:

Flange	0.05 mm
Shaft	0.80 mm

Ⓑ Oil seal contact section

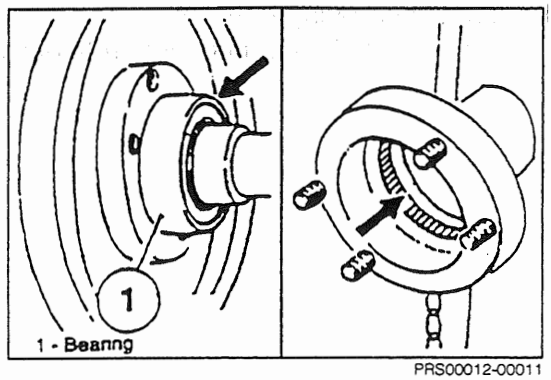
Ⓒ Serrated section



PRS00011-00010

② Bearing for wear or damage.

③ Oil seal contact section at the rear axle housing.



PRS00012-00011

(1) Booster air-tight performance check

Start the engine. After running the engine for one to two minutes, stop the engine. Depress the brake pedal several times, applying a force which would be used during normal brake application. If the brake pedal's position rises progressively at the second and third applications and so on, it indicates that the brake booster is functioning properly.

NOTE:

- Intervals between the first and second applications as well as between the second and third applications should be at least five seconds.

(2) Booster operation check

With the engine stopped, depress the brake pedal several times, applying the nearly same force at each brake application. Make sure that the brake pedal height will not vary at each brake application. Then, start the engine while depressing the brake pedal. If the brake pedal moves in slightly, it indicates that the booster is functioning properly.

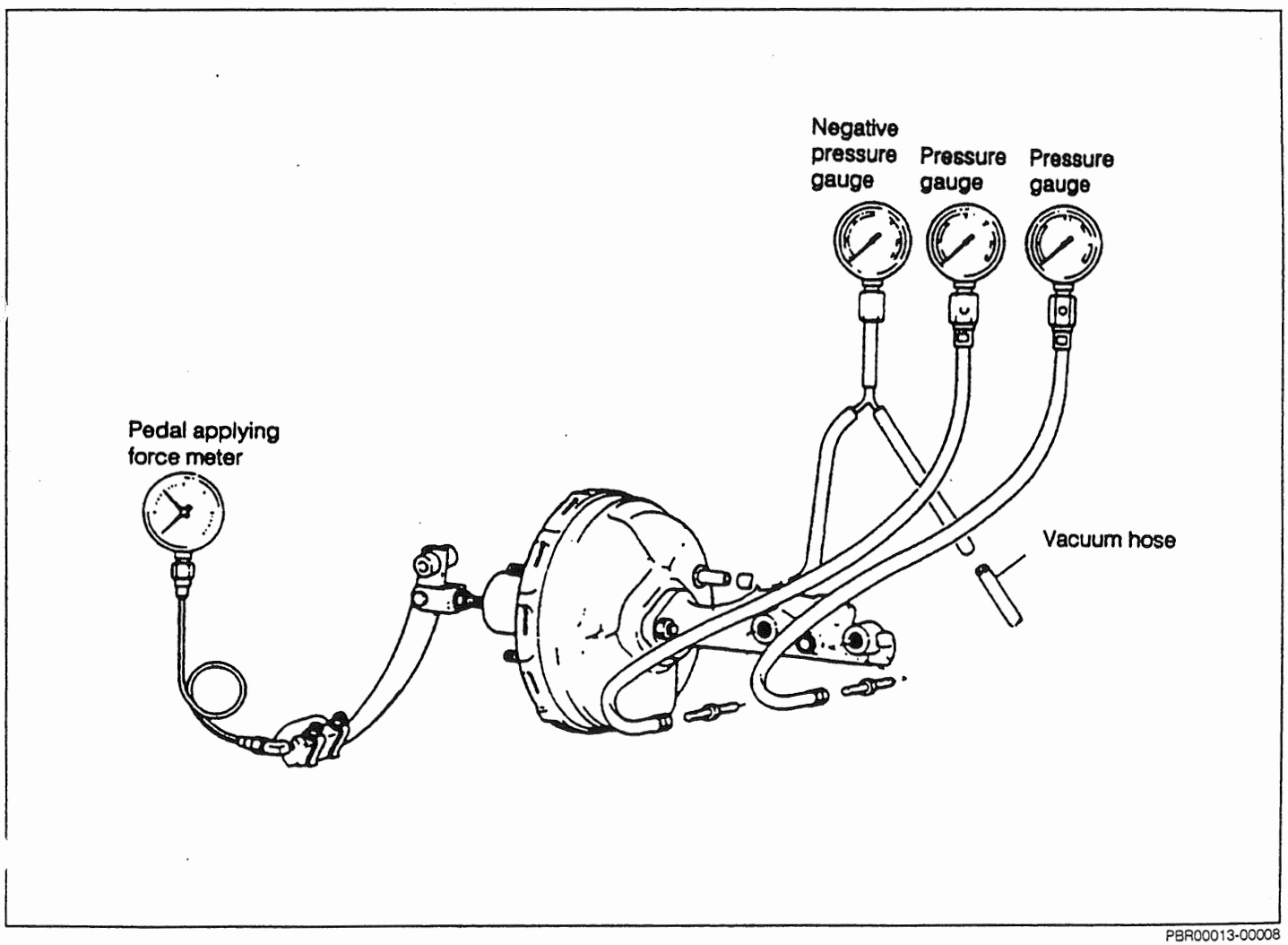
(3) Booster air-tight performance check under loaded condition

With the engine running, depress the brake pedal. While maintaining this condition, stop the engine. If the brake pedal height remains at the same level at least for a period of 30 seconds, it indicates that the booster is functioning properly.

(4) Connection of booster tester

Connect the booster tester as indicated in the figure. Carry out air bleeding operation of the booster tester. Then, conduct the following checks listed below.

PBR00012-00000



PBR00013-00008

(5) Booster air-tight performance check
Start the engine. When the negative pressure gauge registers about 500 mmHg, stop the engine. Then, proceed to check the booster air-tightness.

(6) Booster air-tight performance check under loaded condition
With the engine running, depress the brake pedal with a pedal applying force of 20 kg. Stop the engine when the negative pressure gauge registers about 500 mmHg. Then, proceed to check the booster air-tightness.

(7) No-boosting operation check
With the engine stopped, set the reading of the negative pressure gauge to zero. Under this condition, check the relationship between the pedal applying force and the hydraulic pressure.

(8) Boosting operation check
With the engine running, set the reading of the negative pressure gauge to about 500 mmHg. Under this condition, depress the brake pedal. Then, check the relationship between the pedal applying force and the hydraulic pressure.

PBR00014-00000

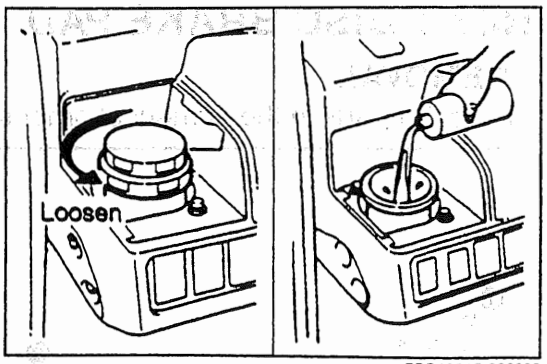


AIR BLEEDING FOR BRAKE SYSTEM

(1) Pouring of brake fluid

NOTE:

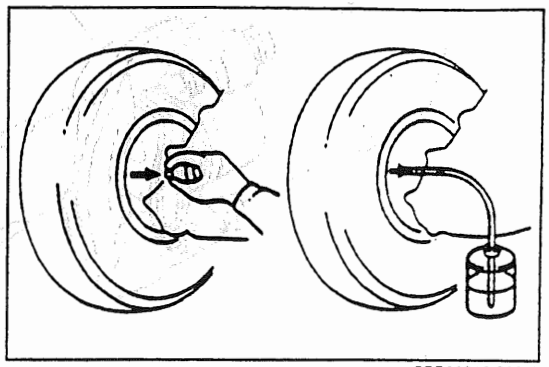
- If the brake fluid is spilled over the paint-finish surfaces of the motor vehicle inadvertently, quickly wipe off the brake fluid.
  Then, clean the area using white gasoline or the like.



PBR00015-000009

(2) Connection of vinyl hose to bleeder plug of wheel cylinder

Submerge one end of the vinyl hose in a container filled with the brake fluid. Connect the other end of the vinyl hose to the wheel cylinder bleeder plug of the motor vehicle.



PBR00016-00010

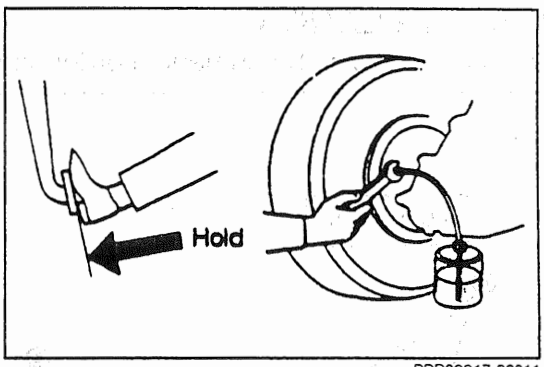
(3) The air bleeding operation should be performed in the following sequence.

① Left rear wheel
② LSPV
③ Left front wheel
④ Right front wheel

(4) Air bleeding

The following points must be observed for the motor vehicle equipped with the LSPV.

① Perform the operation by two persons. Be sure to always keep the brake fluid tank full.
② The other worker slackens the bleeder plug 1/3 through 1/2 turn at a time. Be certain to depress the pedal slowly one time and hold.
③ Tighten the bleeder plug and release the brake pedal.
④ Repeat the ② and ③ steps above, until you no longer observe bubbles in the fluid.



PBR00017-00011

(5) Checking of brake fluid leakage

Depress the brake pedal and ensure that each section of the pipe line exhibits no fluid leakage.

(6) Checking of rear wheel cylinder hydraulic pressure

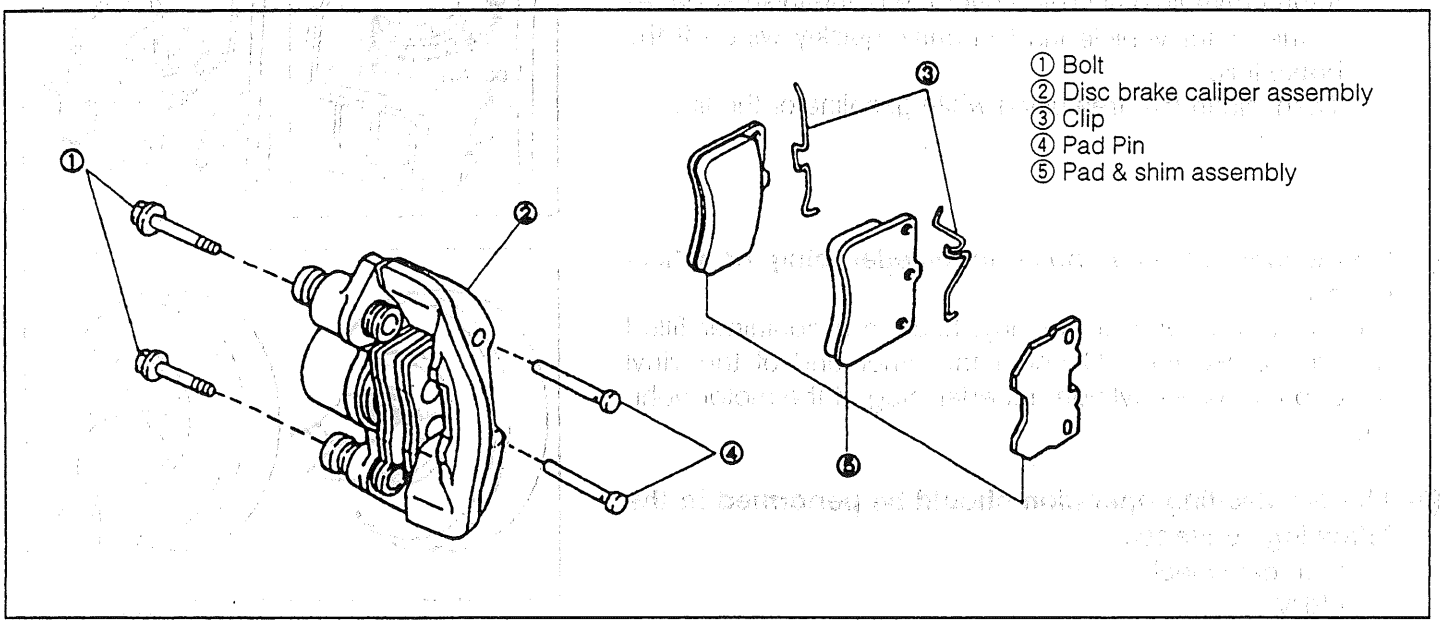
*Refer to the section under "Hydraulic Pressure Check."

PBR00018-00000

FRONT DISC BRAKE PAD

1. REMOVAL

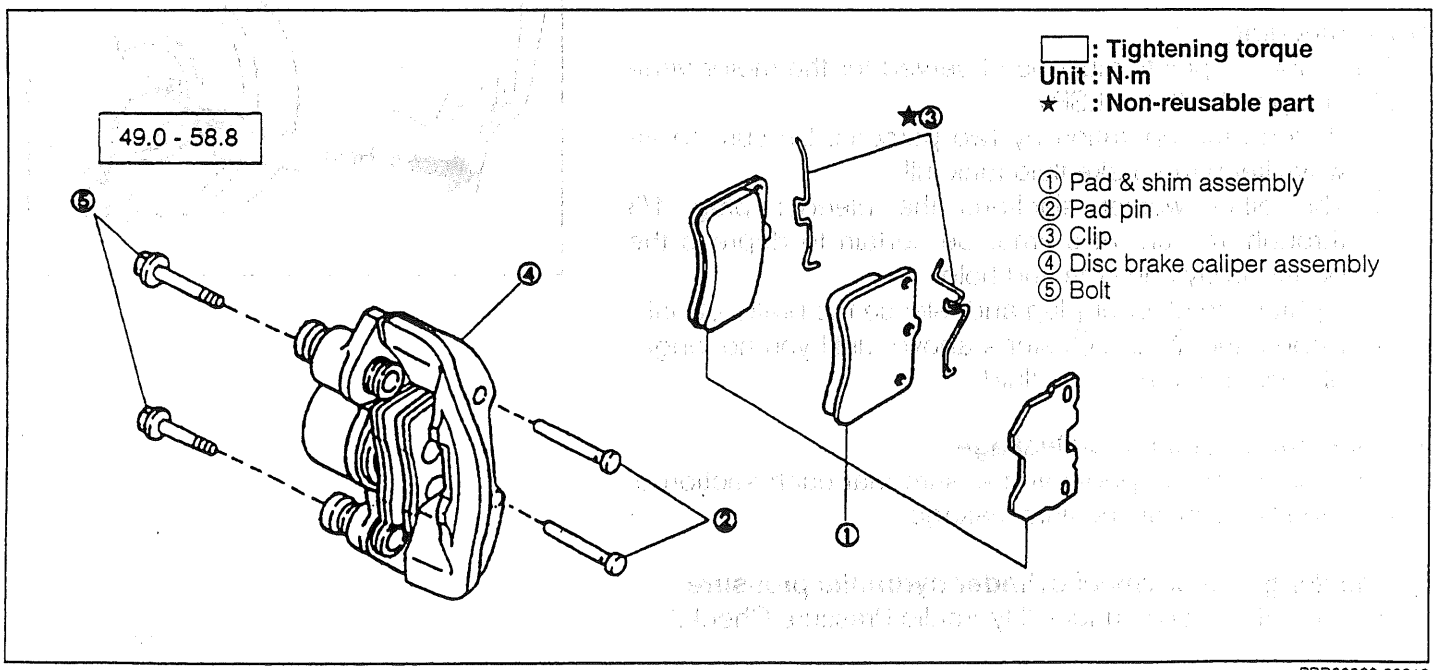
Remove the parts in the numerical order shown in the figure below.



PBR00019-00012

2. INSTALLATION

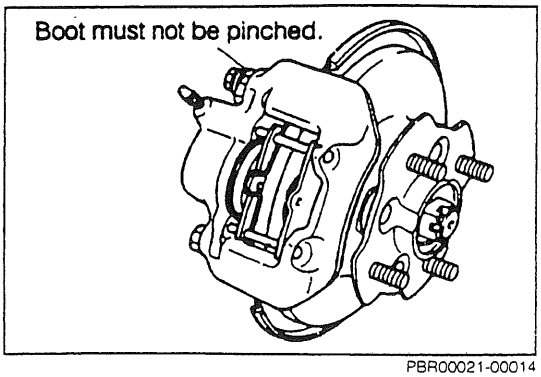
Install the parts in the numerical order shown in the figure below.



PBR00020-00013

NOTE:

- When installing this part, care must be exercised that the piston boot may not be pinched.

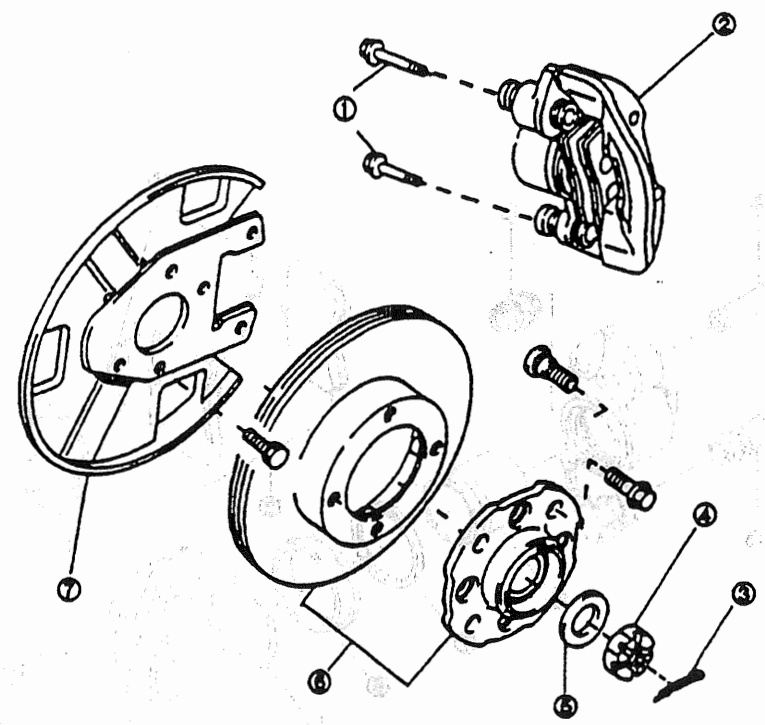


PBR00021-00014

FRONT DISC BRAKE

1. REMOVAL

Remove the parts in the numerical order shown in the figure below.



① Bolt
② Disc brake caliper assembly
③ Cotter pin
④ Castle nut
⑤ Washer plate
⑥ Hub & disc assembly
⑦ Disc brake dust cover

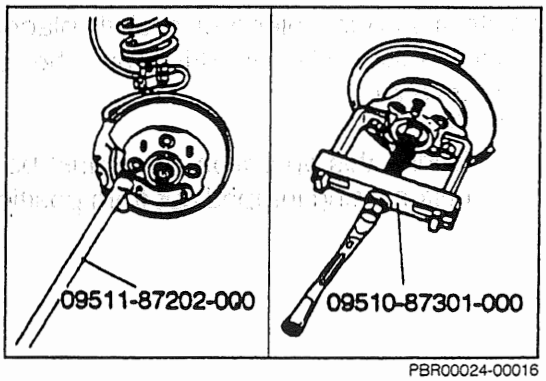
PBR00022-00015

(1) Disconnect the flexible hose.

PBR00023-00000

(2) Remove the castle nut, using the following SST given below.
SST: 09511-87202-000

(3) Remove the hub & disc, using the following SST given below.
SST: 09510-87301-000

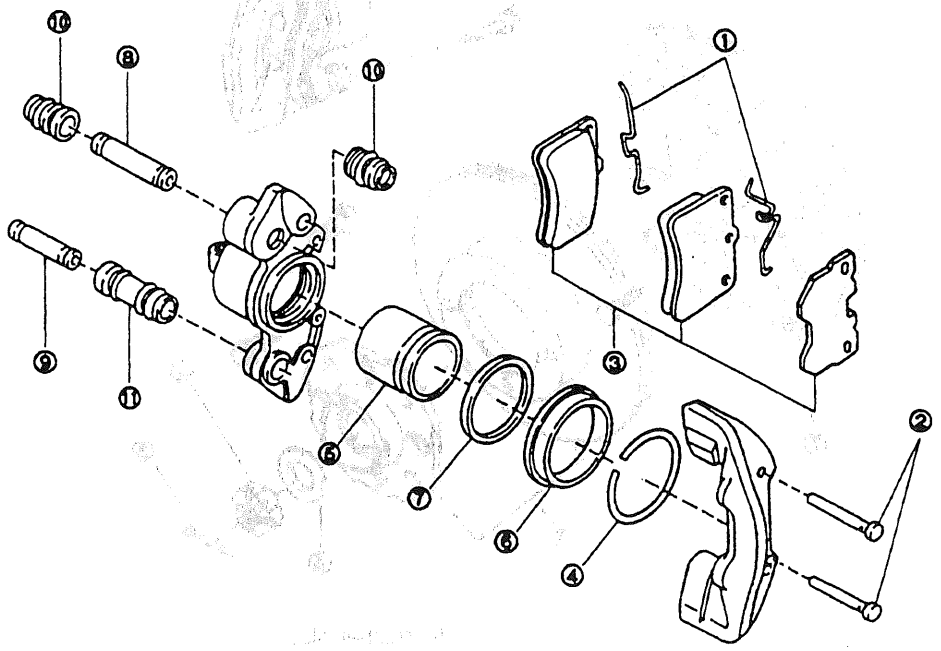


PBR00024-00016

FRONT DISC BRAKE CALIPER

1. DISASSEMBLY

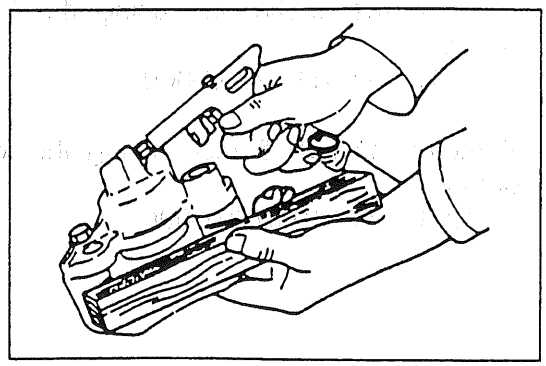
Disassemble the parts in the numerical order shown in the figure below.



① Clip
② Pad pin
③ Pad & shim assembly
④ Retaining ring
⑤ Piston
⑥ Piston boot
⑦ Piston seal
⑧ Main sleeve
⑨ Sub sleeve
⑩ Pin boot
⑪ Bush

PBR00025-00017

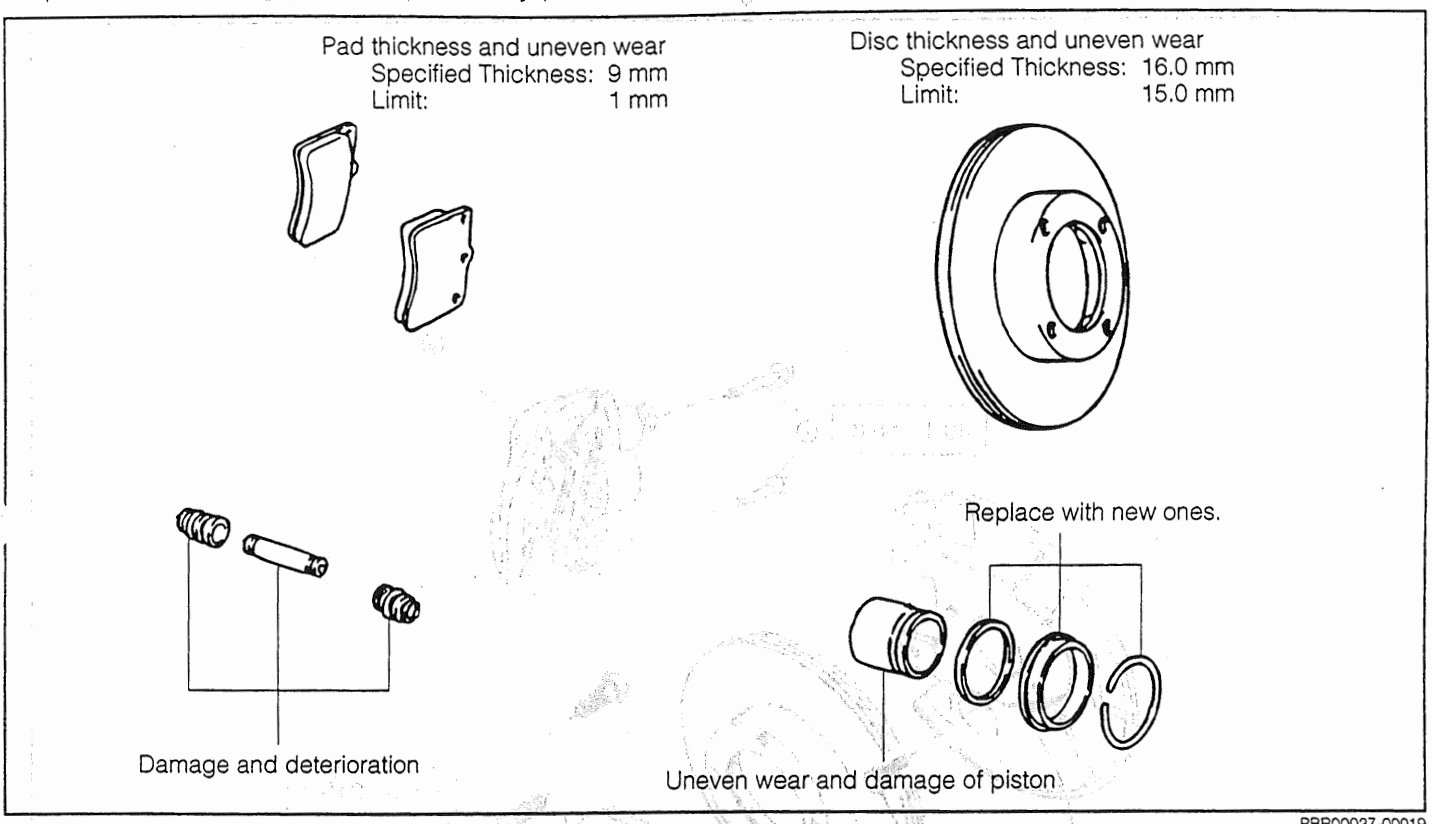
(1) With a wooden piece or a cloth placed at the end of the disc brake cylinder, drive out the piston, using compressed air.
NOTE:
- During this operation, care must be exercised as to the piston being jumped out from position.



PBR00026-00018

2. INSPECTION

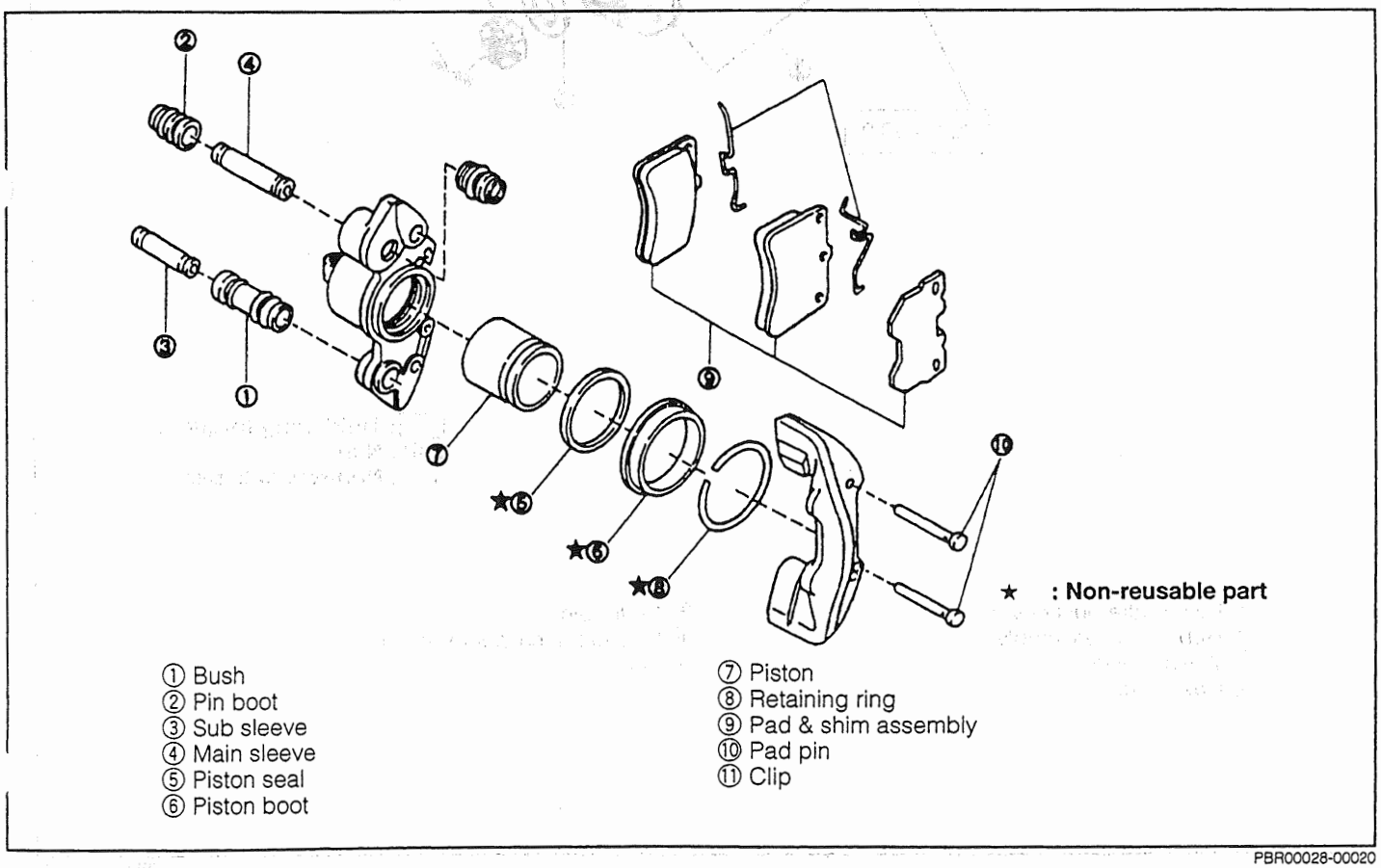
Inspect the following parts. Replace any parts which exhibit defects.



PBR00027-00019

3. ASSEMBLY

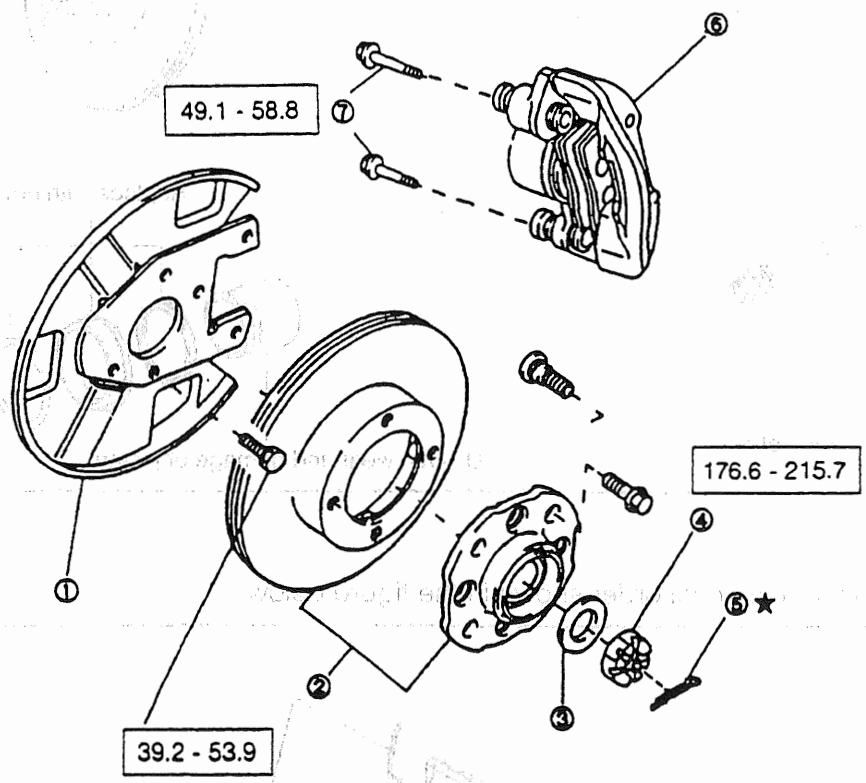
Assemble the parts in the numerical order shown in the figure below.



PBR00028-00020

4. INSTALLATION

Install the parts in the numerical order shown in the figure below.



□: Tightening torque
Unit : N·m
★ : Non-reusable part

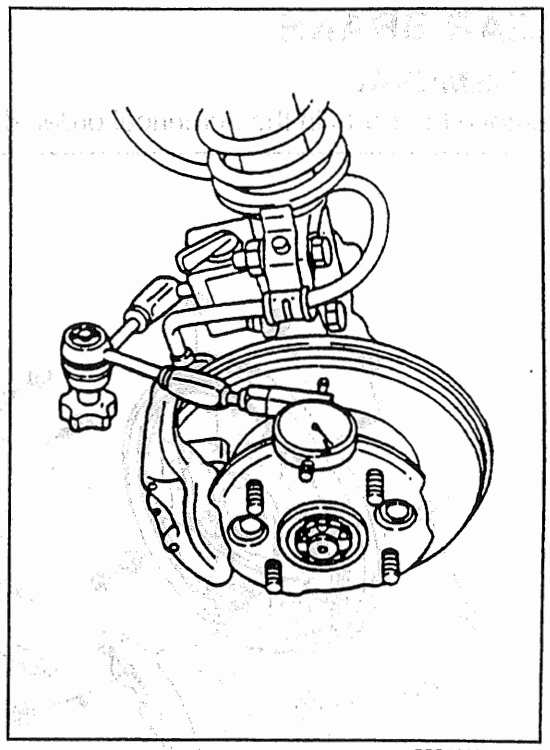
① Disc brake dust cover
② Hub & disc assembly
③ Washer plate
④ Castle nut
⑤ Cotter pin
⑥ Disc brake caliper assembly
⑦ Bolt

5. OPERATION AFTER INSTALLATION

(1) Disc run-out check
   ① Prior to the disc run-out check, ensure that the front wheel bearings exhibit no excessive looseness.
   ② Measure the run-out of the disc rotor at the outer edge.
   Limit: 0.15 mm
   [At point 10 mm inboard from rotor outer periphery]

   If the run-out of the disc rotor exceeds the limit, replace the disc rotor.

(2) Adjust the brake pedal installation height.
   (Refer to page BR–3.)

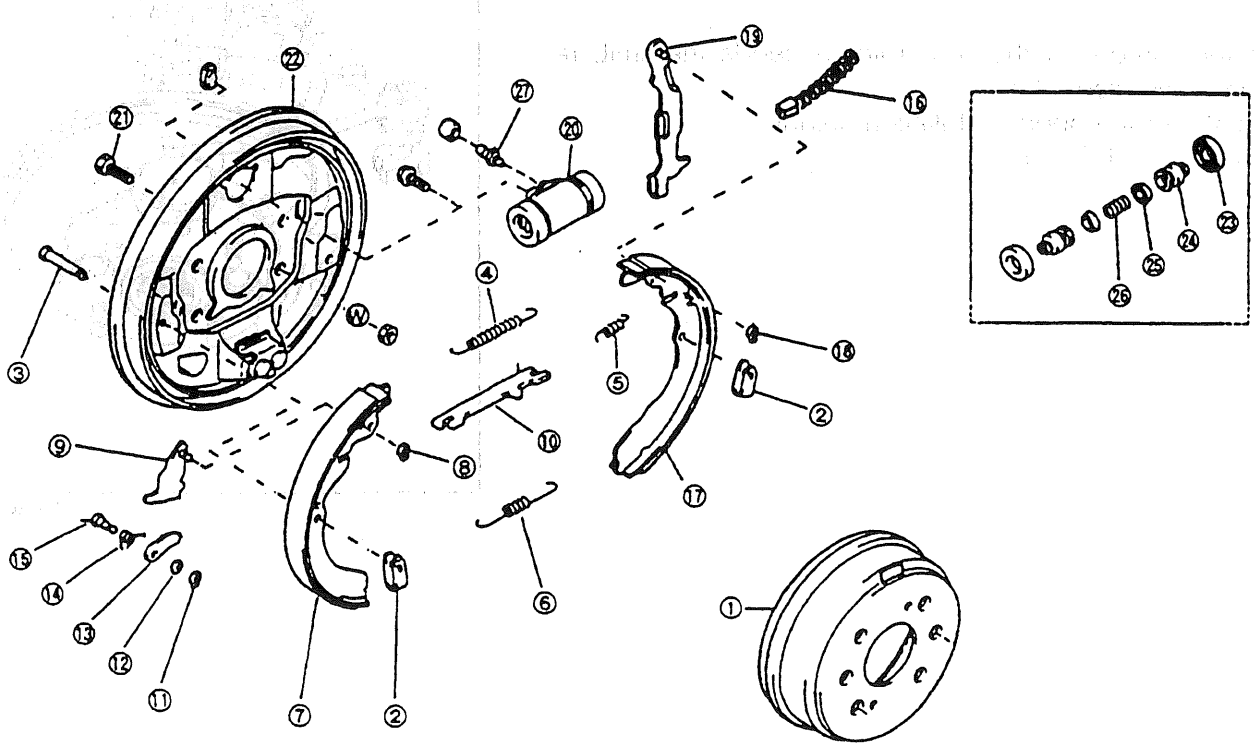


PBR00030-00022

REAR BRAKE

1. REMOVAL

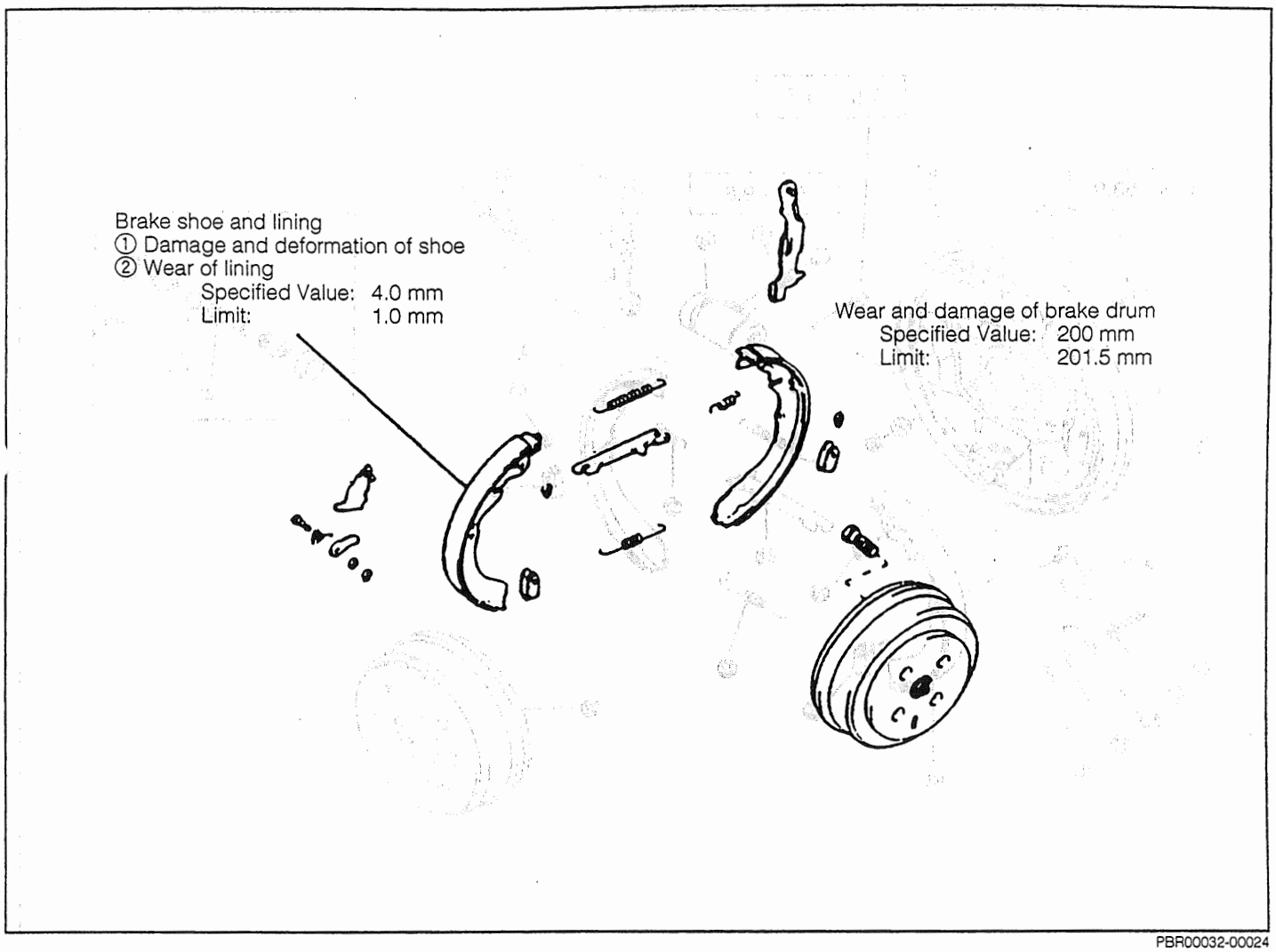
Remove the parts in the numerical order shown in the figure below.



① Brake drum assembly
② Shoe hold-down spring
③ Shoe hold-down pin
④ Tension spring
⑤ Tension spring No. 4
⑥ Tension spring
⑦ Rear brake shoe No. 1 assembly
⑧ C-ring
⑨ Automatic adjusting lever subassembly
⑩ Parking brake shoe strut
⑪ C-ring
⑫ Washer
⑬ Automatic adjusting latch
⑭ Torsion spring
⑮ Automatic adjusting lever pin
⑯ Parking brake cable assembly
⑰ Rear brake shoe No. 2 assembly
⑱ C-ring
⑲ Parking brake shoe lever subassembly
⑳ Rear wheel brake cylinder assembly
㉑ Bolt
㉒ Brake backing rear plate subassembly
㉓ Wheel cylinder boot
㉔ Wheel brake cylinder piston
㉕ Cylinder cup
㉖ Compression spring
㉗ Bleeder plug

2. INSPECTION

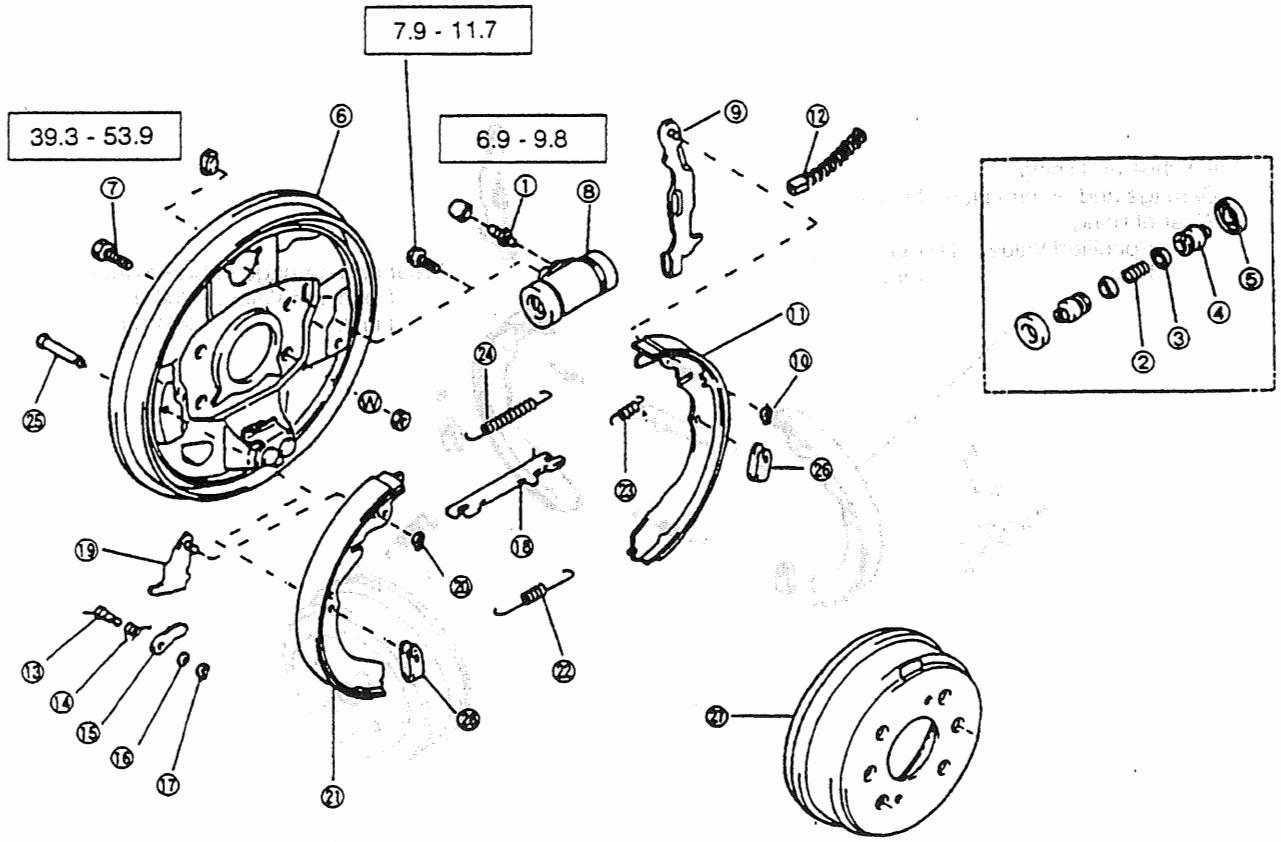
Inspect the following parts. Replace any parts which exhibit defects.



PBR00032-00024

3. INSTALLATION

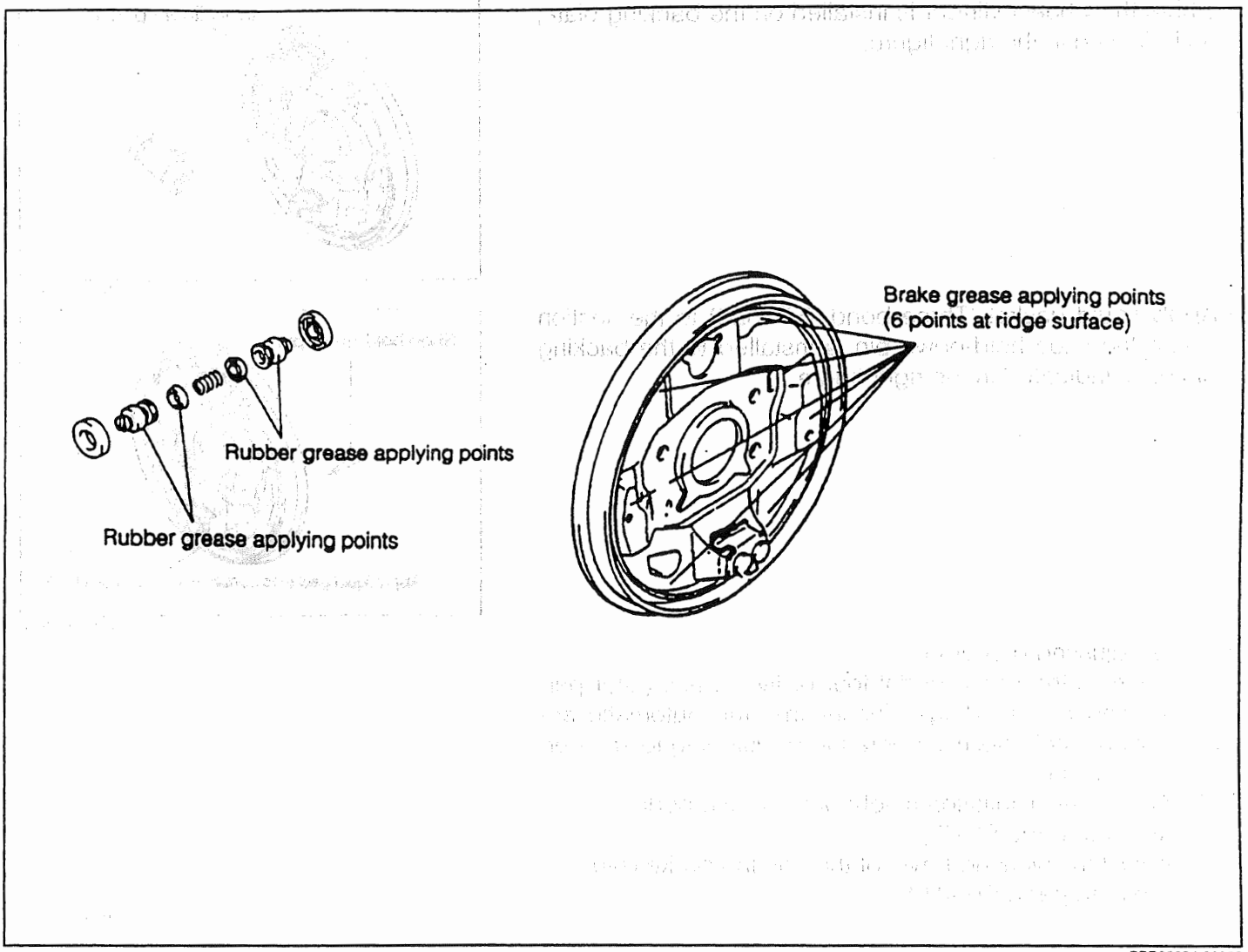
Install the parts in the numerical order shown in the figure below.



□: Tightening torque
Unit : N·m
★ : Non-reusable part

① Bleeder plug
② Compression spring
③ Cylinder cup
④ Wheel brake cylinder piston
⑤ Wheel cylinder boot
⑥ Brake backing rear plate subassembly
⑦ Bolt
⑧ Rear wheel brake cylinder assembly
⑨ Parking brake shoe lever subassembly
⑩ C-ring
⑪ Rear brake shoe No. 2 assembly
⑫ Parking brake cable assembly
⑬ Automatic adjusting lever pin
⑭ Torsion spring
⑮ Automatic adjusting latch
⑯ Washer
⑰ C-ring
⑱ Parking brake shoe strut
⑲ Automatic adjusting lever subassembly
⑳ C-ring
㉑ Rear brake shoe No. 1 assembly
㉒ Tension spring
㉓ Tension spring No. 4
㉔ Tension spring
㉕ Shoe hole-down pin
㉖ Shoe hold-down spring
㉗ Brake drum assembly

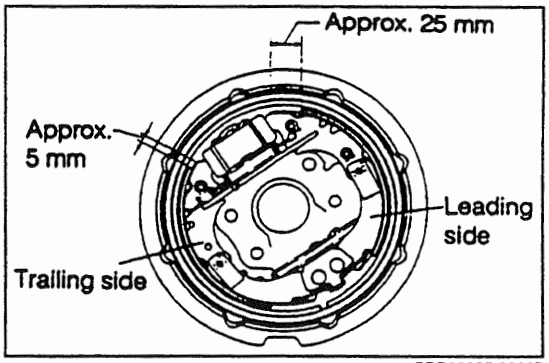
(1) Apply the rubber grease and brake grease to the following points specified in the figure below.



PBR00034-00026

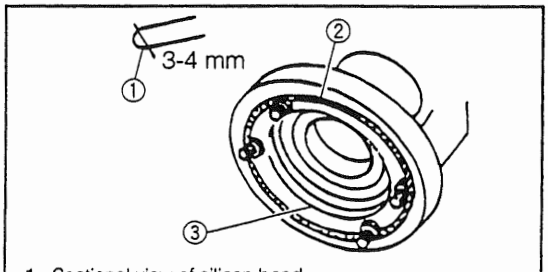
NOTE:

- The lining position of the brake shoe assembly differed between the leading side and the trailing side.



PBR00035-00027

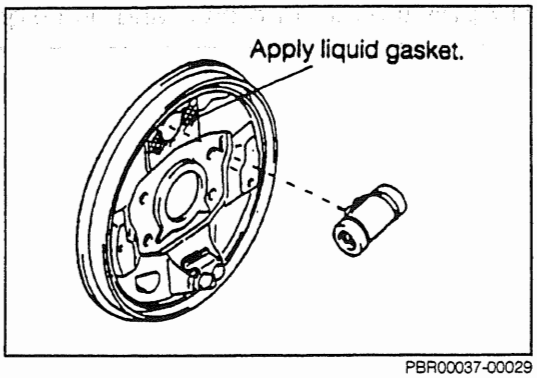
(2) Apply the Three bond No. 1212 to the end section of the rear axle housing, as indicated in the right figure. Then, install the backing plate to the rear axle.



1 - Sectional view of silicon bond
2 - Silicon bond 1212
3 - Apply elastic packing on the inner edge at the bearing base

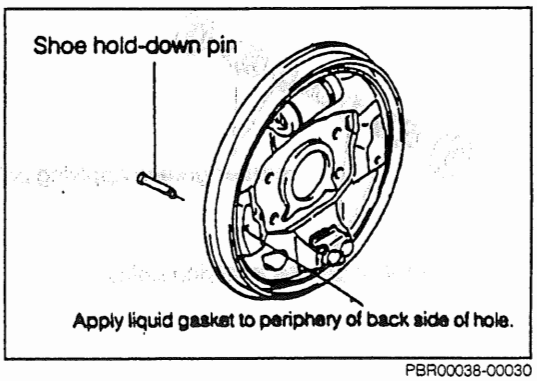
PBR00036-00028

(3) Apply liquid gasket (Three bond THK-520) to the section where the wheel cylinder is installed on the backing plate, as indicated in the right figure.



PBR00037-00029

(4) Apply liquid gasket (Three bond THK-520) to the section where the shoe hold-down pin is installed to the backing plate, as indicated in the right figure.



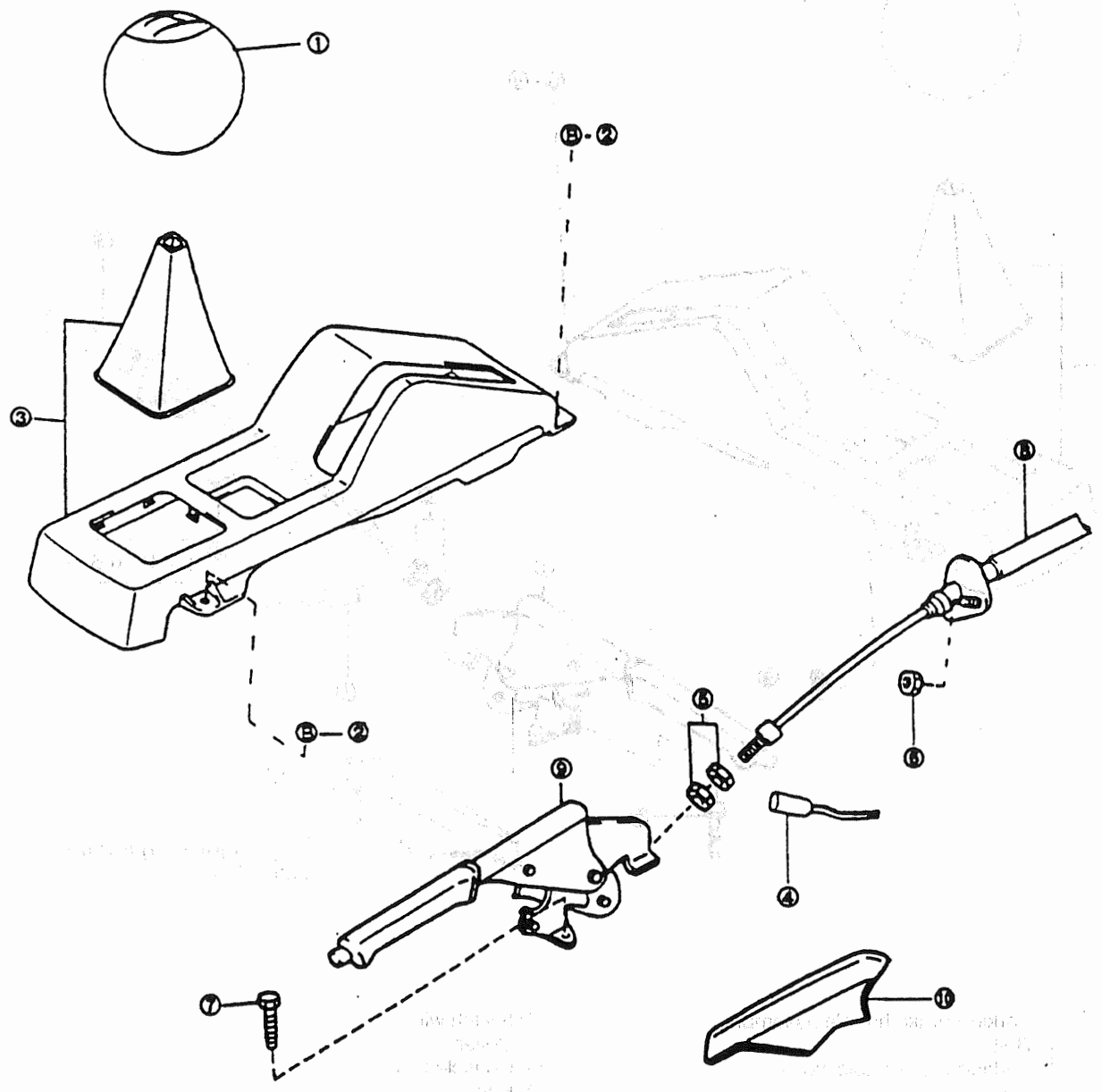
PBR00038-00030

(5) Brake adjusting procedure
   ① Depress the brake pedal four or five times, (after performing air bleeding). Ensure that the automatic adjusting mechanism is operating by listening to an operating sound.
   ② Adjust the installation height of the brake pedal. (Refer to page BR–3.)
   ③ Adjust the working travel of the parking brake lever. (Refer to page BR–24.)

PBR00039-00000

PARKING BRAKE LEVER

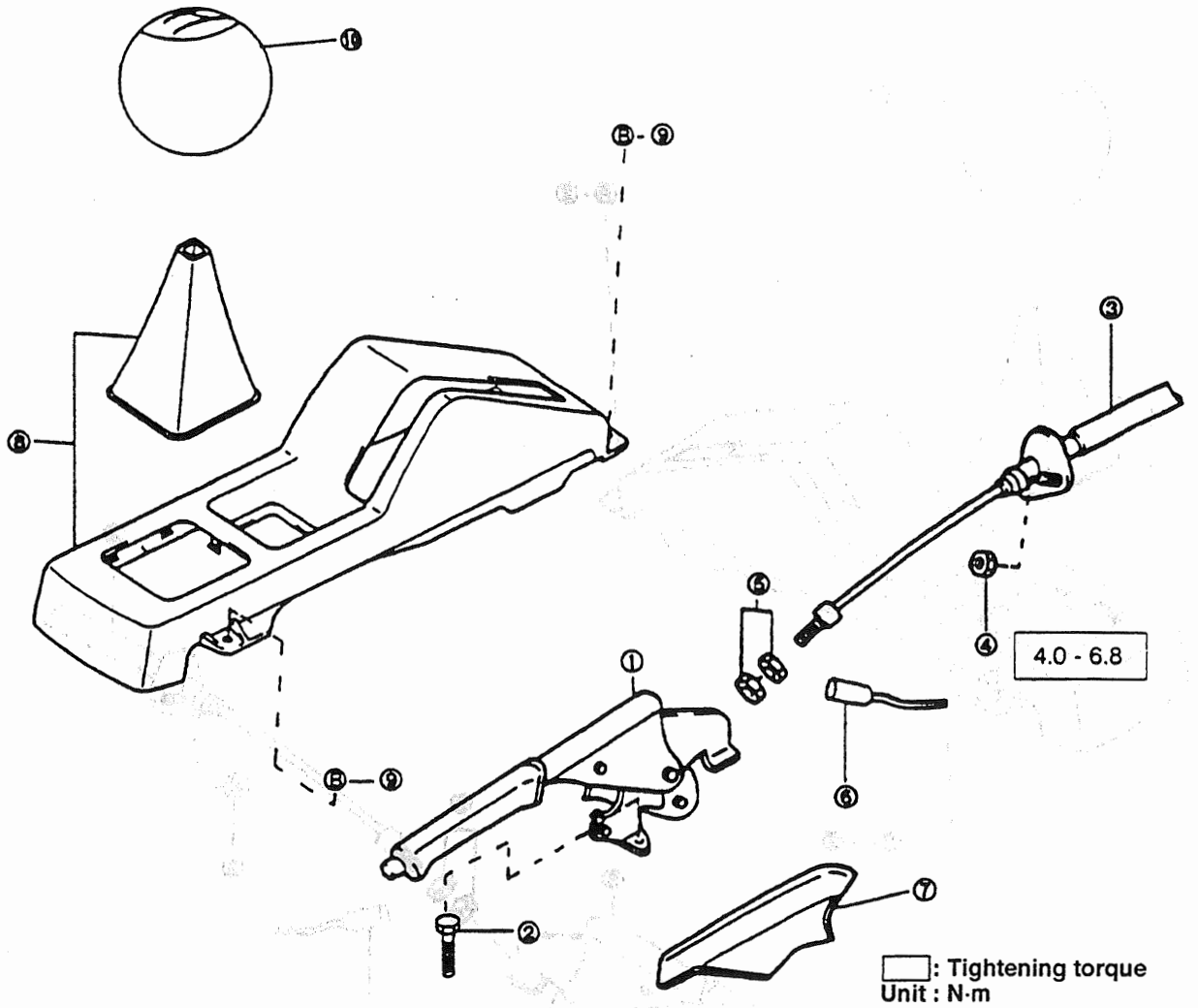
1. REMOVAL



① Shift lever knob
② Bolt
③ Console box
④ Switch wire
⑤ Nut
⑥ Nut
⑦ Bolt
⑧ Parking brake cable No. 1
⑨ Parking brake handle assembly
⑩ Cover

2. INSTALLATION

Install the parts in the numerical order shown in the figure below.



PBR00041-00032

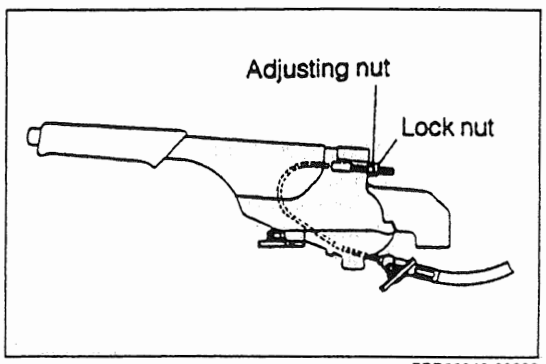
① Parking brake handle assembly
② Bolt
③ Parking brake cable No. 1
④ Nut
⑤ Nut
⑥ Switch wire
⑦ Cover
⑧ Console box
⑨ Bolt
⑩ Shift lever knob

(1) Turn the adjusting nut to adjust the working travel of the parking brake lever.

Specified Value: 6 - 10 Notches
(When pulled upward by force of 20 kg)

NOTE:

- The parking brake lever adjustment should be performed when the rear brake shoe clearance complies with the specification.

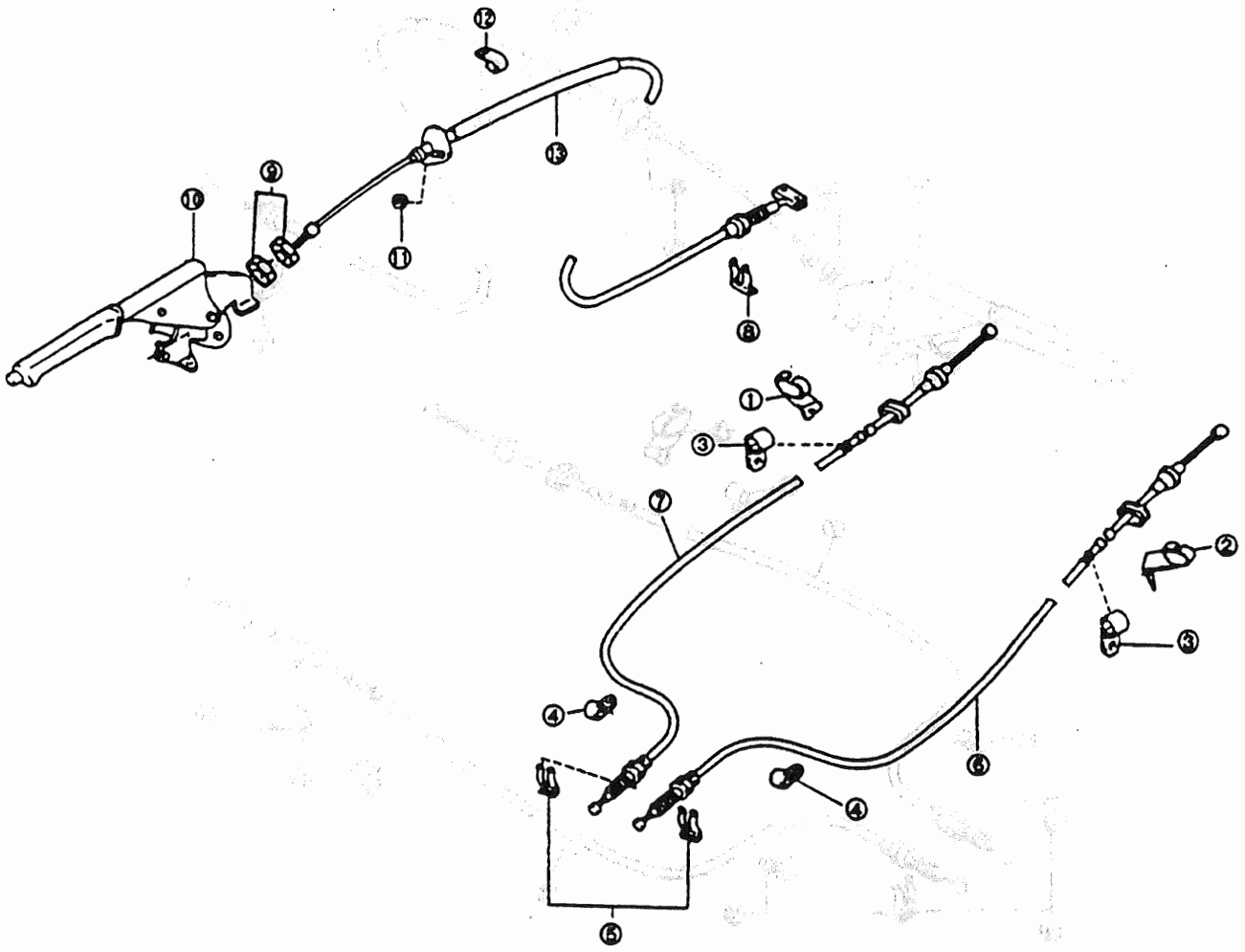


PBR00042-00033

PARKING BRAKE CABLE

1. REMOVAL (Pickup)

Remove the parts in the numerical order shown in the figure below.



① Parking brake cable right guide
② Parking brake cable left guide
③ Clamp
④ Cable clamp
⑤ Cable clamp
⑥ Parking brake cable assembly
⑦ Parking brake cable assembly
⑧ Cable clamp
⑨ Nut
⑩ Parking brake handle assembly
⑪ Nut
⑫ Clamp
⑬ Parking brake with equalizer cable assembly

PBR00043-00034

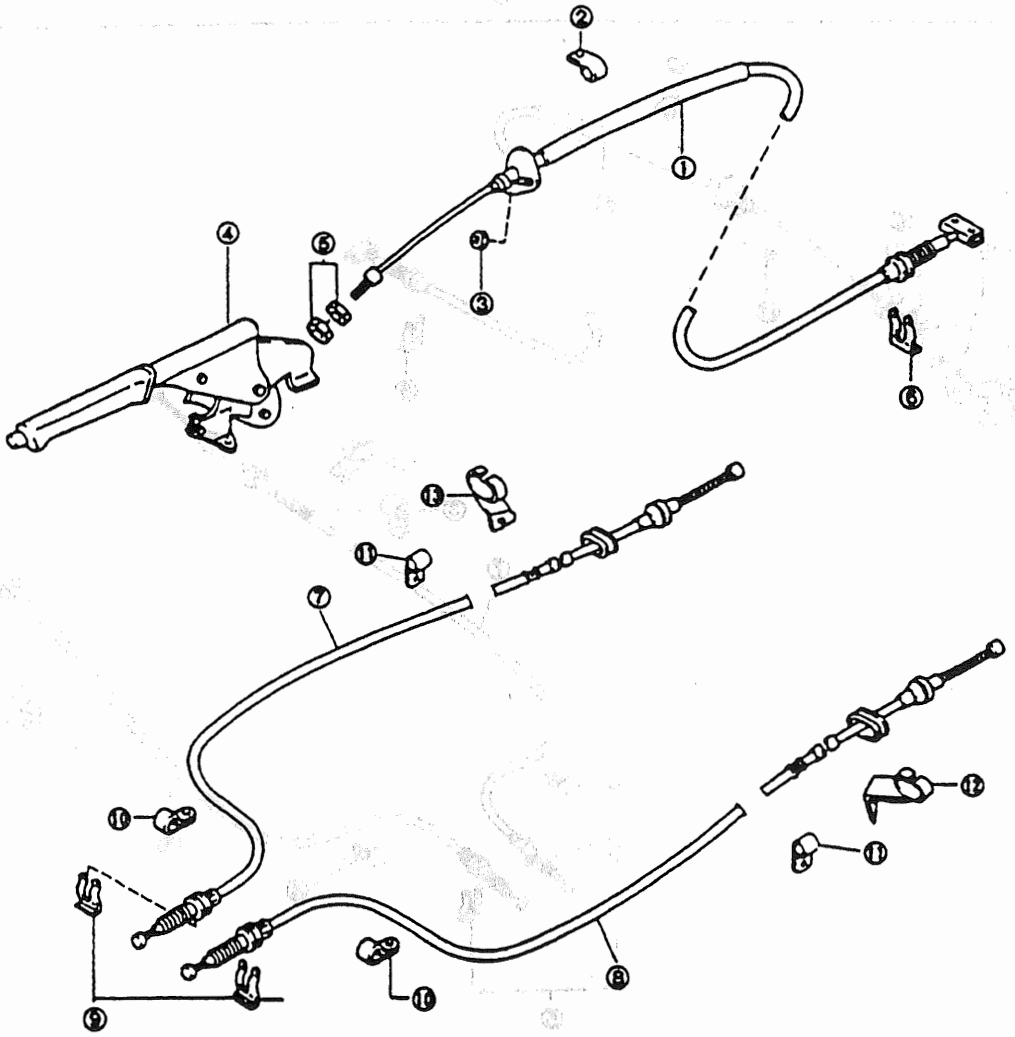
Operation prior to removal

(1) Remove the engine service hole cover.
(2) Raise the front/left seat.
(3) Remove the rear brake drum. Detach the parking brake cable from the rear brake.
(Refer to page BR–18.)

PBR00044-00000

2 INSTALLATION

Install the parts in the numerical order shown in the figure below.



① Parking brake with equalizer cable assembly
② Clamp
③ Nut
④ Parking brake handle assembly
⑤ Nut
⑥ Cable clamp
⑦ Parking brake cable assembly
⑧ Parking brake cable assembly
⑨ Cable clamp
⑩ Cable clamp
⑪ Clamp
⑫ Parking brake cable left guide
⑬ Parking brake cable right guide

PBR00045-00035

Operation after installation

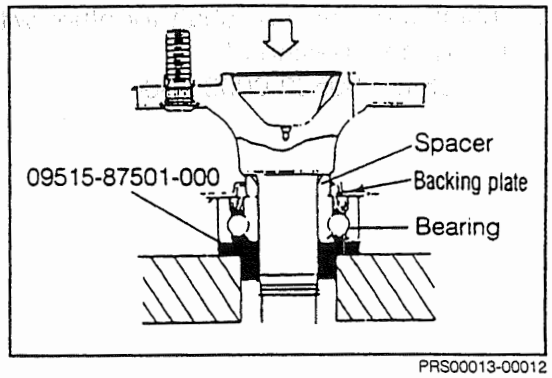
(1) Adjust the rear brake.
(2) Adjust the parking brake.

PBR00046-00000

4. INSTALLATION

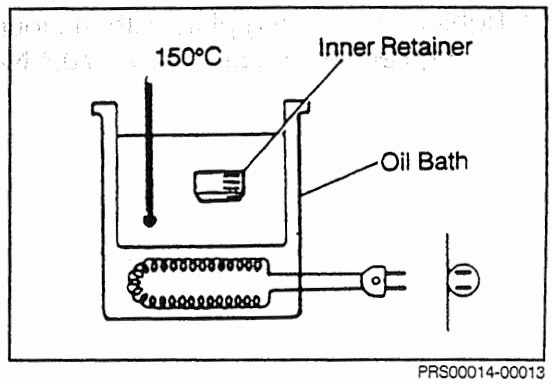
(1) Rear axle bearing and bearing retainer installation.

① Insert the spacer into the shaft and then, install the bearing using the following SST.
SST: 09515-87501-000



PRS00013-00012

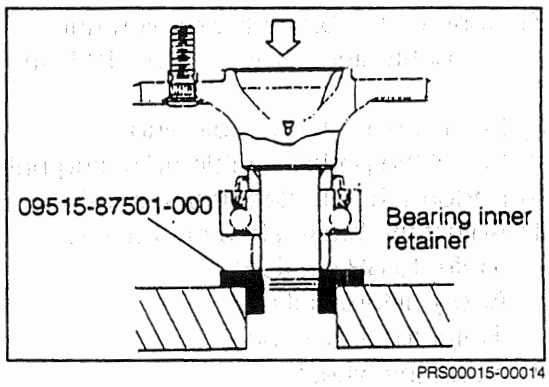
② Heat the bearing inner retainer in an oil bath, until the temperature reaches about 150°C.



PRS00014-00013

③ Install the bearing inner retainer quickly on the shaft, using a press in conjunction with the following SST.
SST: 09515-87501-000

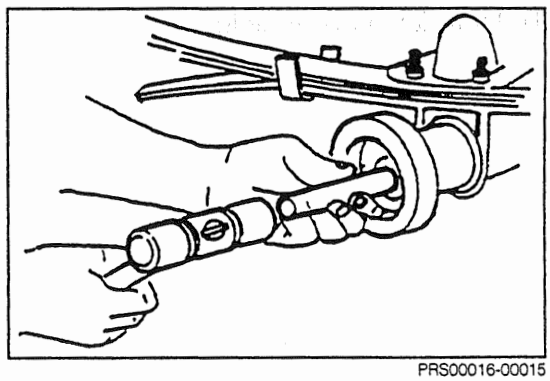
NOTE:
- Make sure that there is no oil or grease on the rear axle shaft nor on the retainer.



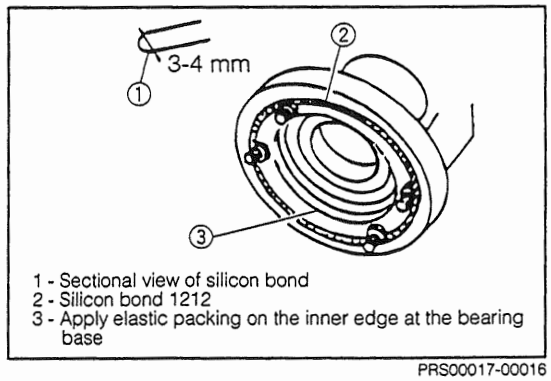
PRS00015-00014

(2) Apply the MP grease to the lip section of the oil seal.

(3) Install the oil seal, using the following SST.
SST: 09515-87201-000


PRS00016-00015

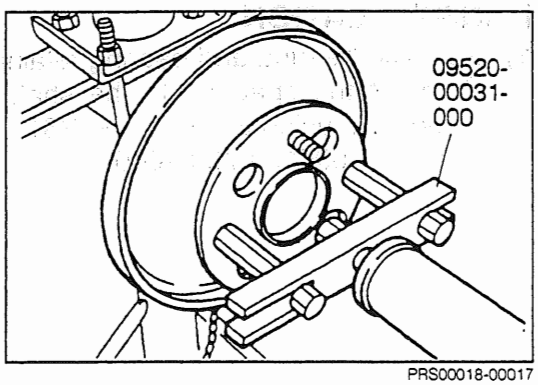
(4) Apply the silicon bond 1212 to the rear axle housing end section. This application of the sealer must be made liberally without forming any missing spots, as indicated in the right figure, so that the sealer may be oozed out liberally from the mating surfaces when the rear axle shaft is attached in place. (Furthermore, the cross-section of the applied sealer should be a cylindrical shape.)
NOTE:
- After the bond has been applied, be sure to immediately perform the operation.



1 - Sectional view of silicon bond
2 - Silicon bond 1212
3 - Apply elastic packing on the inner edge at the bearing base

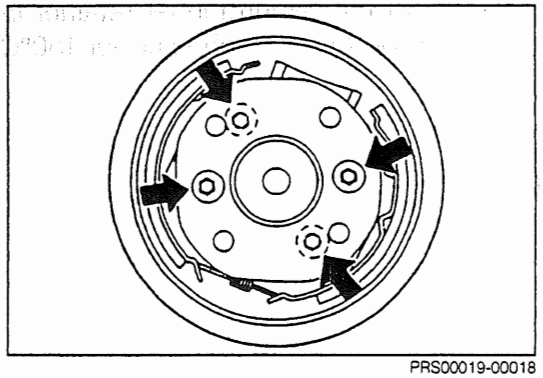
PRS00017-00016

(5) Install the rear axle shaft together with the backing plate, using the following SST.
SST: 09520-00031-000



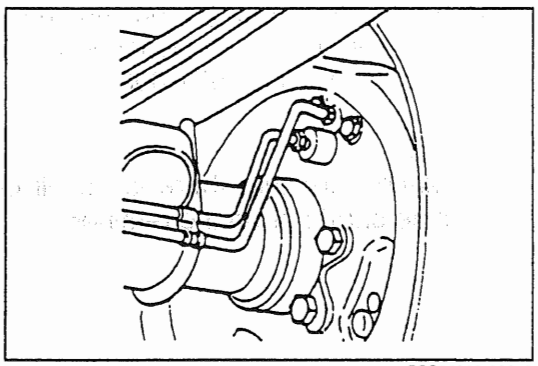
PRS00018-00017

(6) Tighten the backing plate with the four nuts.
Tightening Torque: 63.7 - 70.4 N·m


PRS00019-00018

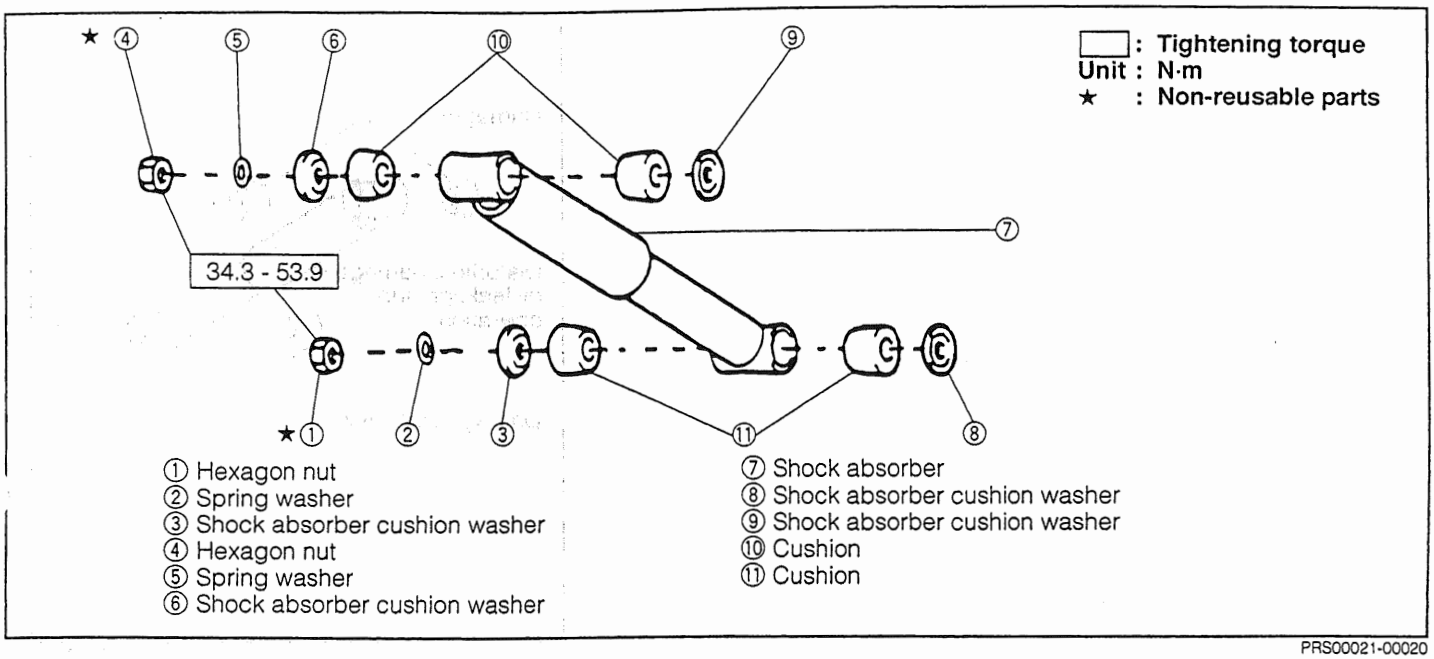
(7) Connect the brake tube union nut.
Tightening Torque: 10 - 12 N·m

(8) Install the parking cable end.
(9) Install the parking cable adjusting nut.
(10) Perform the air bleeding securely.
(11) Adjust the brake shoe clearance.
(Refer to BR section)
(12) Apply differential oil.
(Refer to DF section.)
(13) Install the wheel.
(14) Jack down the vehicle.


PRS00020-00019

REAR SHOCK ABSORBER

1. COMPONENTS

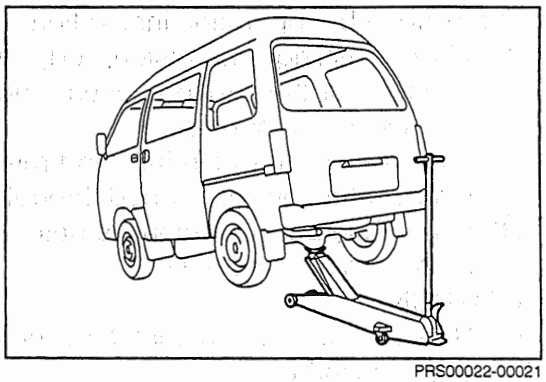


PRS00021-00020

2. REMOVAL

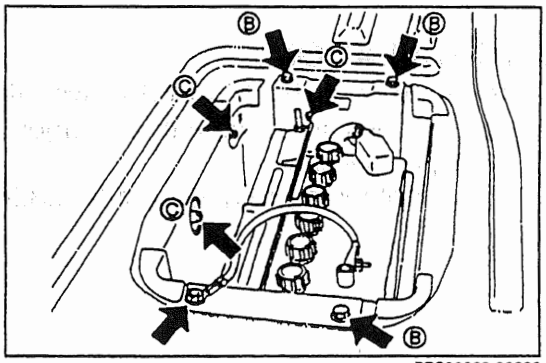
(1) Jack up the vehicle.
NOTE:
- Be sure to support the vehicle securely with safety stands.

(2) Support the rear axle housing with a garage jack.



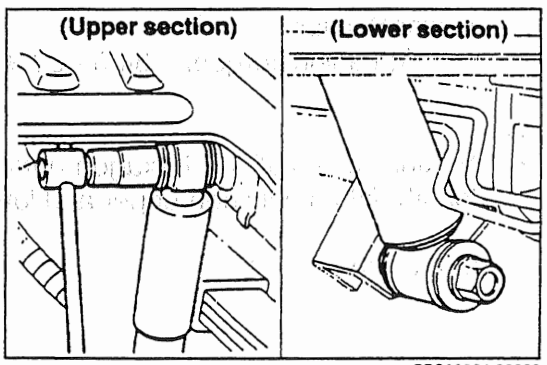
PRS00022-00021

(3) Disconnect the battery plus and minus terminal.
(4) Remove the battery box by removing the three bolts/clips and one earth bolt (only van models).



PRS00023-00022

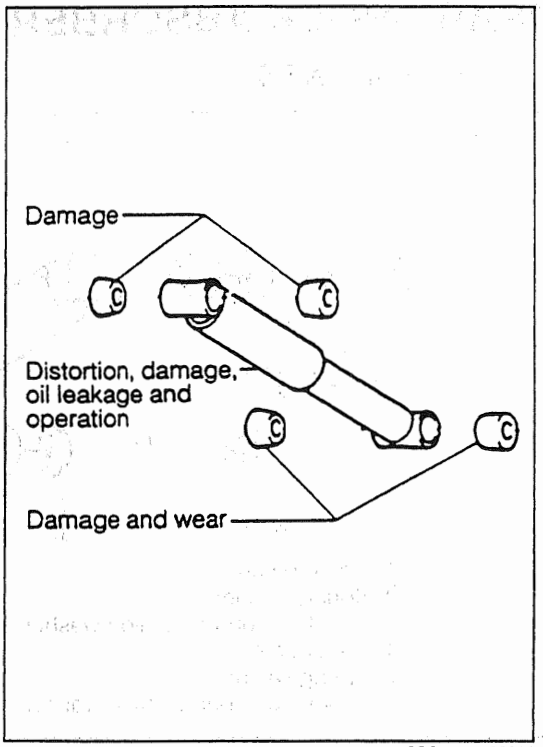
(5) Remove the rear shock absorber by removing the hexagon nuts from the body (upper section) and rear axle housing (lower section).
(6) Detach the cushions and cushion washers at the both upper and lower section.



PRS00024-00023

3. INSPECTION

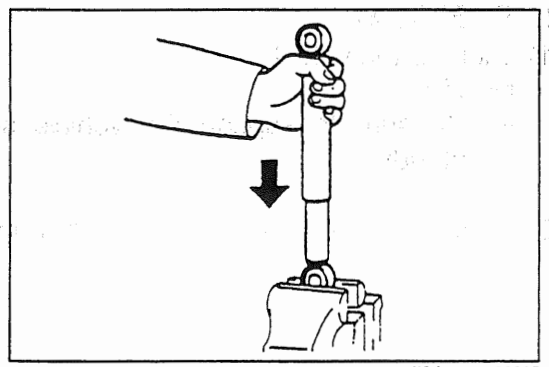
(1) Inspect the following parts.



PRS00025-00024

(2) Shock absorber operation inspection
   ① While pushing the piston rod, check that the pull through out the stroke is even, and there is no abnormal resistance or noise.
   ② Push the piston rod in fully and release it. Check that it returns at a constant speed throughout.
   ③ If the absorber operations is defective, replace the absorber, as an assembly.

   CAUTION:
   - Release the gas completely, before discarding the shock absorber.

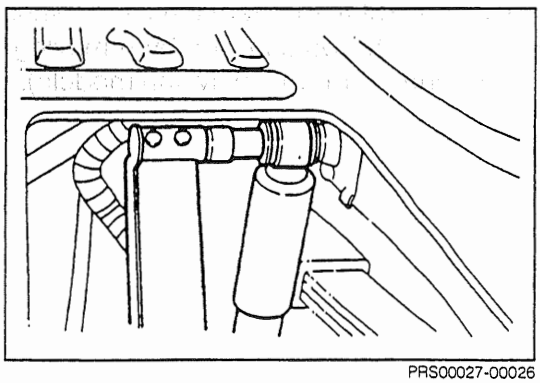


PRS00026-00025

4. INSTALLATION

(1) Install the rear shock absorber with the cushion washers and cushions and tighten the hexagon nuts.

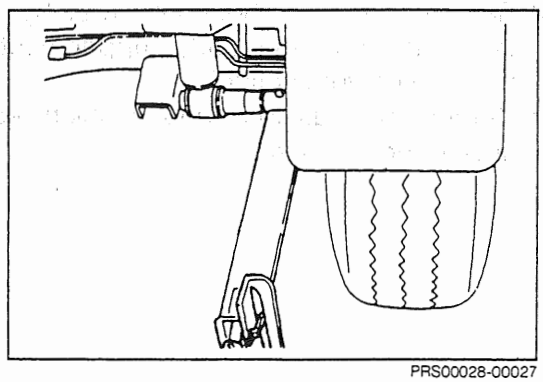
   Upper Section
   Tightening Torque: 34.3 - 53.9 N·m



PRS00027-00026

   Lower Section
   Tightening Torque: 34.3 - 53.9 N·m

   NOTE:
   - Be sure to install the hexagon nuts correctly, as its nut length differs between upper and lower section.

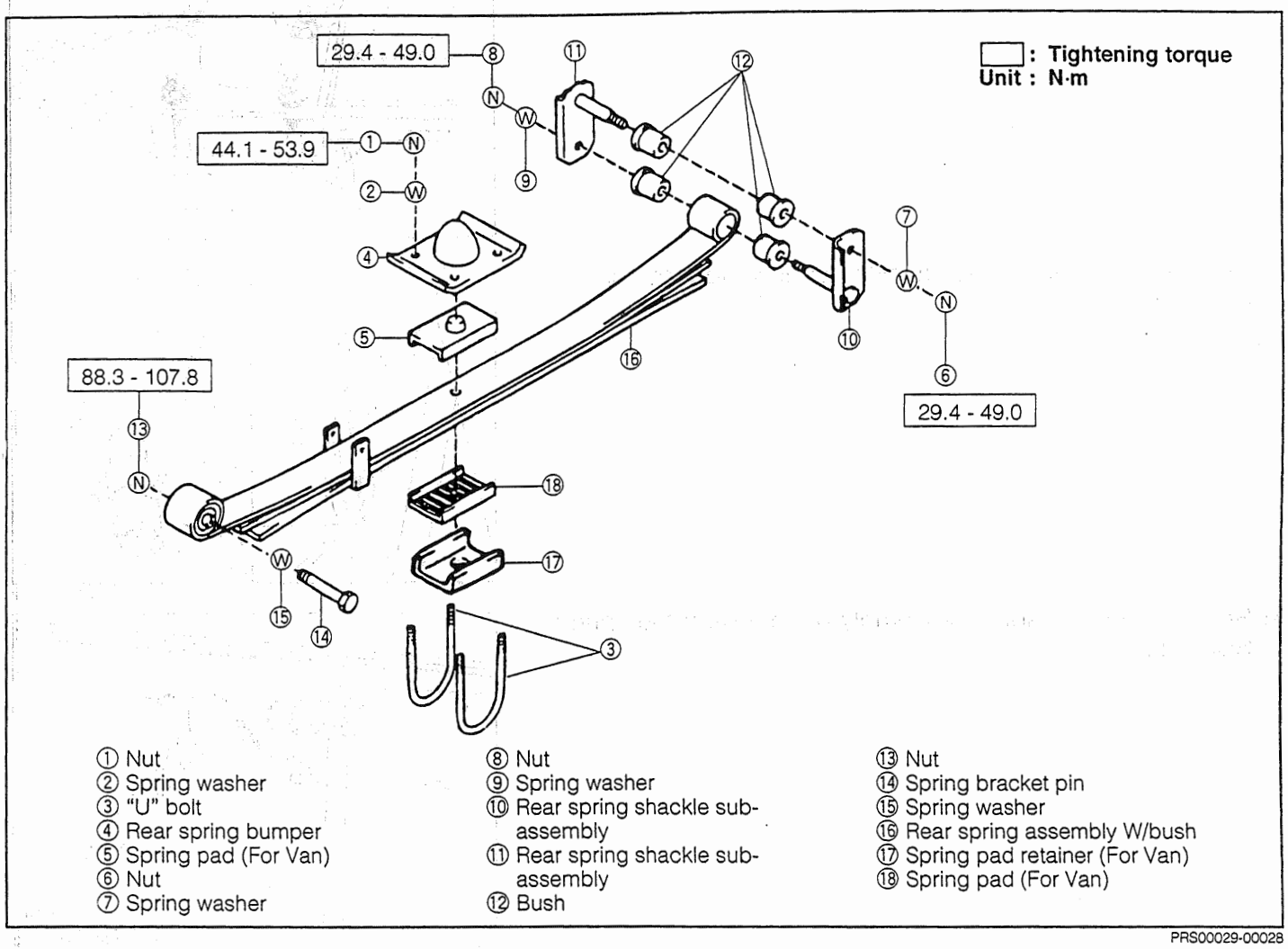


PRS00028-00027

(2) Jack down the vehicle.

REAR SUSPENSION

1. COMPONENTS

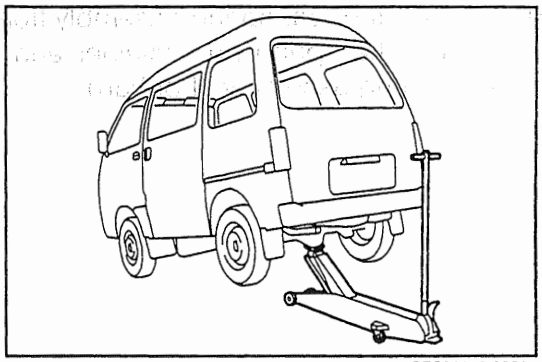


① Nut
② Spring washer
③ "U" bolt
④ Rear spring bumper
⑤ Spring pad (For Van)
⑥ Nut
⑦ Spring washer
⑧ Nut
⑨ Spring washer
⑩ Rear spring shackle sub-assembly
⑪ Rear spring shackle sub-assembly
⑫ Bush
⑬ Nut
⑭ Spring bracket pin
⑮ Spring washer
⑯ Rear spring assembly W/bush
⑰ Spring pad retainer (For Van)
⑱ Spring pad (For Van)

PRS00029-00028

2. REMOVAL

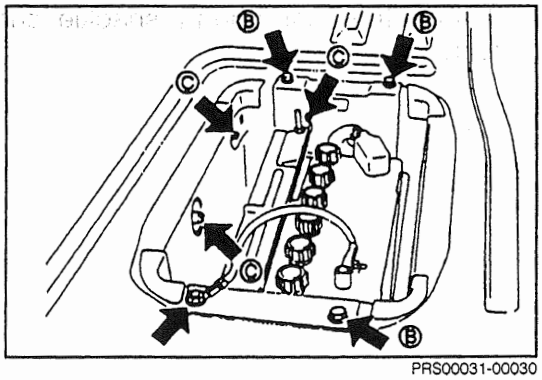
(1) Jack up the vehicle.
NOTE:
- Be sure to support the vehicle securely with safety stands.



PRS00030-00029

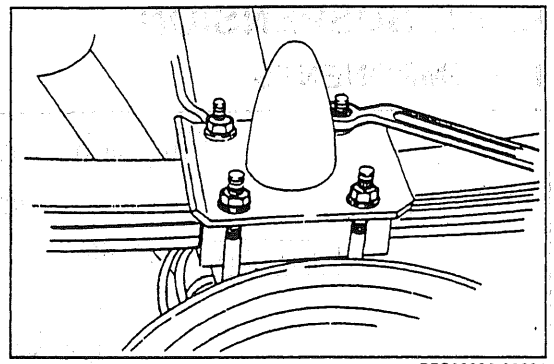
(2) Remove the rear wheel.

(3) Remove the battery box by removing the three bolts/clips and one earth bolt (only van models).
(4) Disconnect the battery plus and minus terminal.



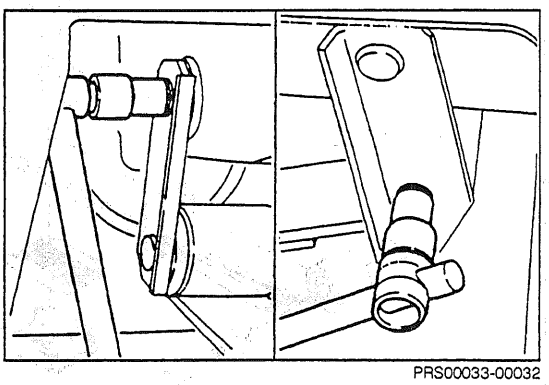
PRS00031-00030

(5) Remove the "U" bolt by removing the four nuts.
(6) Detach the rear spring bumper and spring plate from the rear spring assembly.



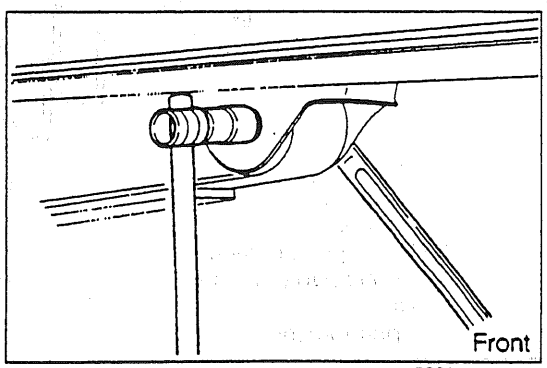
PRS00032-00031

(7) Remove the rear spring shackle subassembly by removing the nuts.



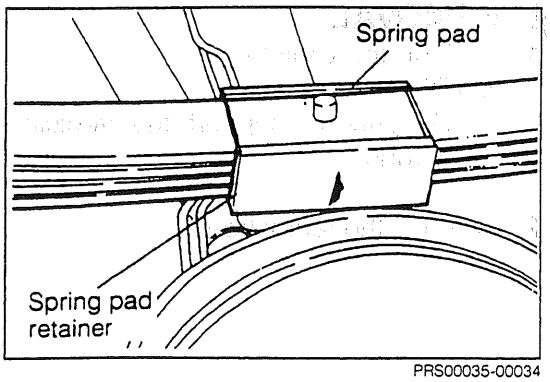
PRS00033-00032

(8) Remove the rear spring assembly by removing the spring bracket pin.



PRS00034-00033

(9) Remove the rear spring assembly from the vehicle.
(10) Detach the spring pad retainer and spring pad from the rear spring assembly. (For Van)



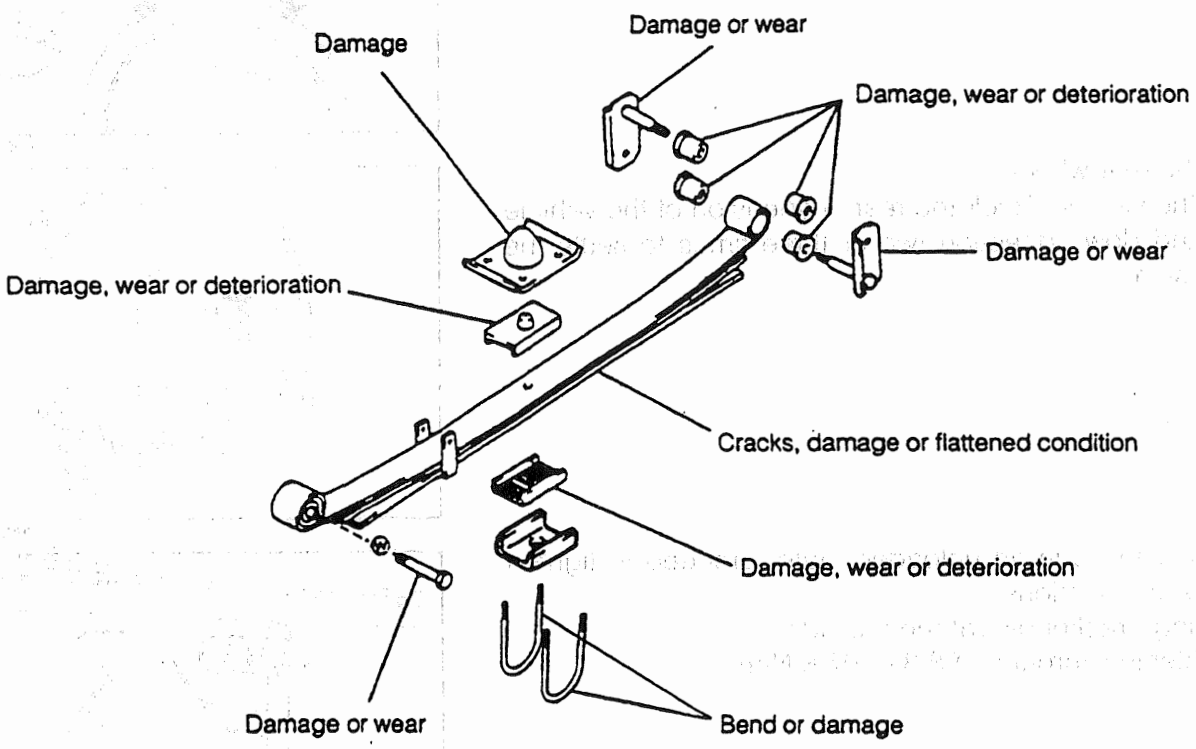
PRS00035-00034

(11) Detach the rear spring shackle subassembly from the body.

PRS00036-00000

3. INSPECTION

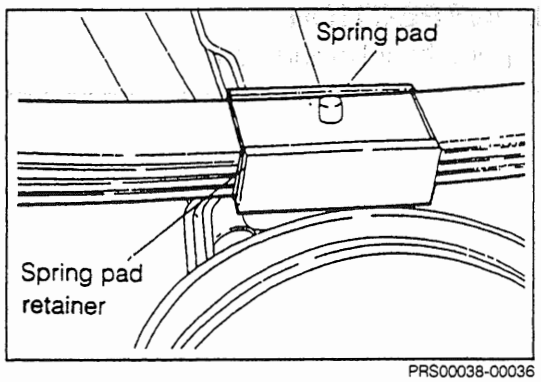
Inspect the following parts.



PRS00037-00035

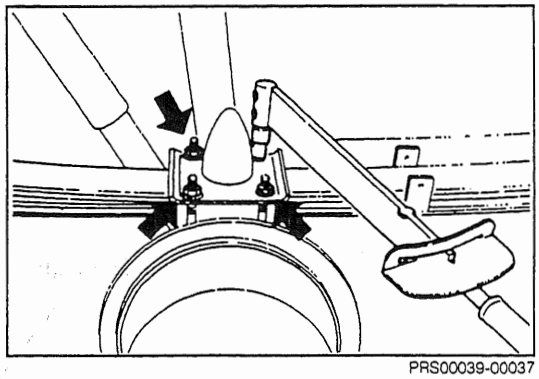
4. INSTALLATION

(1) Attach the spring pad and spring pad retainer to the underneath of rear spring. (For Van)
(2) Temporalily install the rear spring to the body with spring bracket pin and nut.
(3) Temporalily install the rear spring shackle subassembly with bushes and nut.

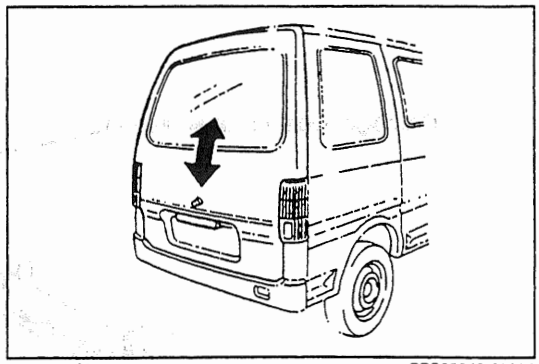


PRS00038-00036

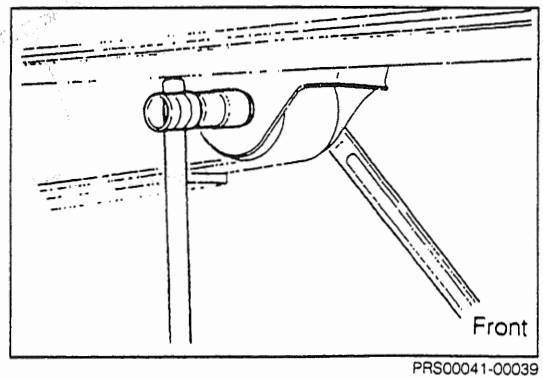
(4) Attach the spring plate and rear spring bumper.
(5) Install the "U" bolts and tighten the nuts.
Tightening Torque: 44.1 - 53.9 N·m


PRS00039-00037

(6) Install the rear wheel.
(7) Lower the vehicle. Rock the rear suspension of the vehicle in up and down direction two or three times to settle the suspension.

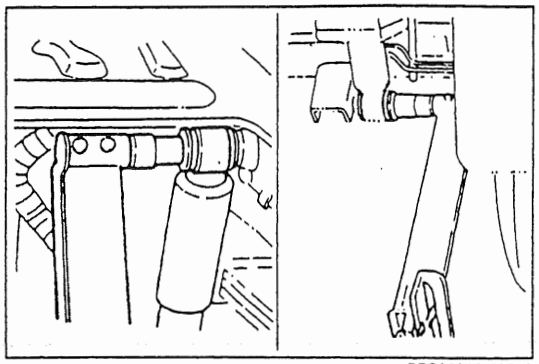

PRS00040-00038

(8) With the vehicle in an unloaded state, proceed to tighten the following sections.
① Spring bracket pin (at the nut side)
Tightening Torque: 88.3 - 107.8 N·m

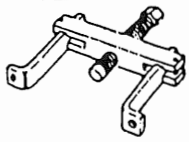
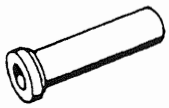
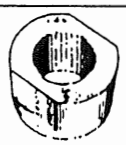
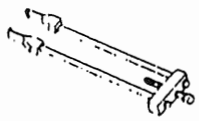


PRS00041-00039

② Nut (rear spring shackle subassembly upper and lower section)
Tightening Torque: 29.4 - 49.0 N·m


PRS00042-00040

SSTs

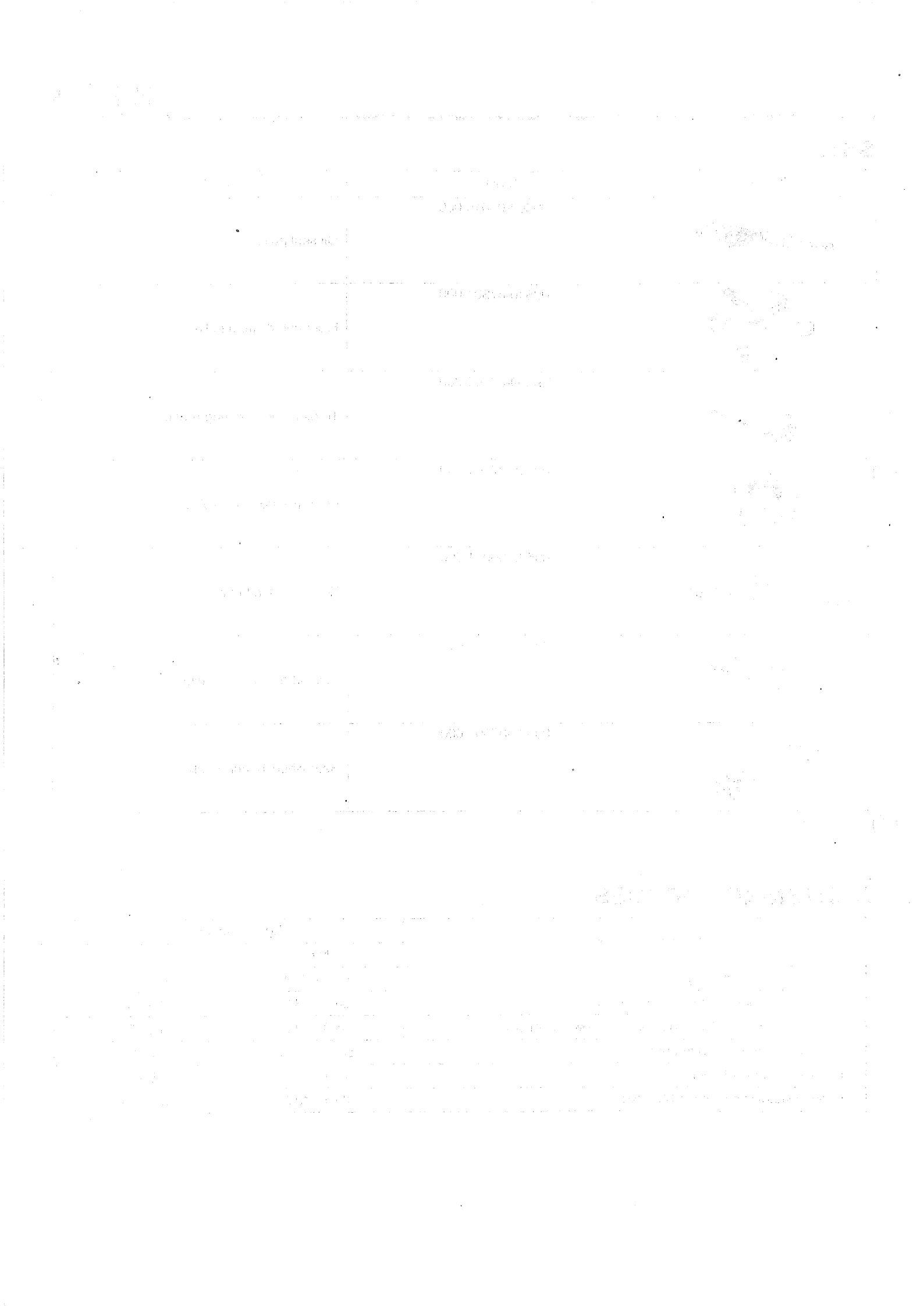
Illustration	Tool No.	Tool Names
	09308-00010-000	Oil seal puller
	09510-87301-000	Front hub & drum puller
	09309-87201-000	Transmission bearing replacer
	09515-87501-000	Rear axle bearing replacer
	09520-00031-000	Rear axle shaft puller
	09521-87301-000	Rear wheel bearing puller
	09521-87501-000	Rear wheel bearing puller

PRS00043-00041

TIGHTENING TORQUES

Tightening components	Tightening torque	
	N·m	kgf-m
Rear axle housing × Backing plate	63.7 - 70.4	6.4 - 7.2
Rear shock absorber × Frame (upper section)	34.3 - 53.9	3.5 - 5.5
Rear shock absorber × Rear axle housing (Lower section)	34.3 - 53.9	3.5 - 5.5
Rear spring assembly × Spring bracket pin	88.3 - 107.8	9.0 - 11.0
Rear spring bumper × U-bolt	44.1 - 53.9	4.5 - 5.5
Rear spring shackle subassembly × Nut	29.4 - 49.0	3.0 - 5.0

PRS00044-00000



BRAKE

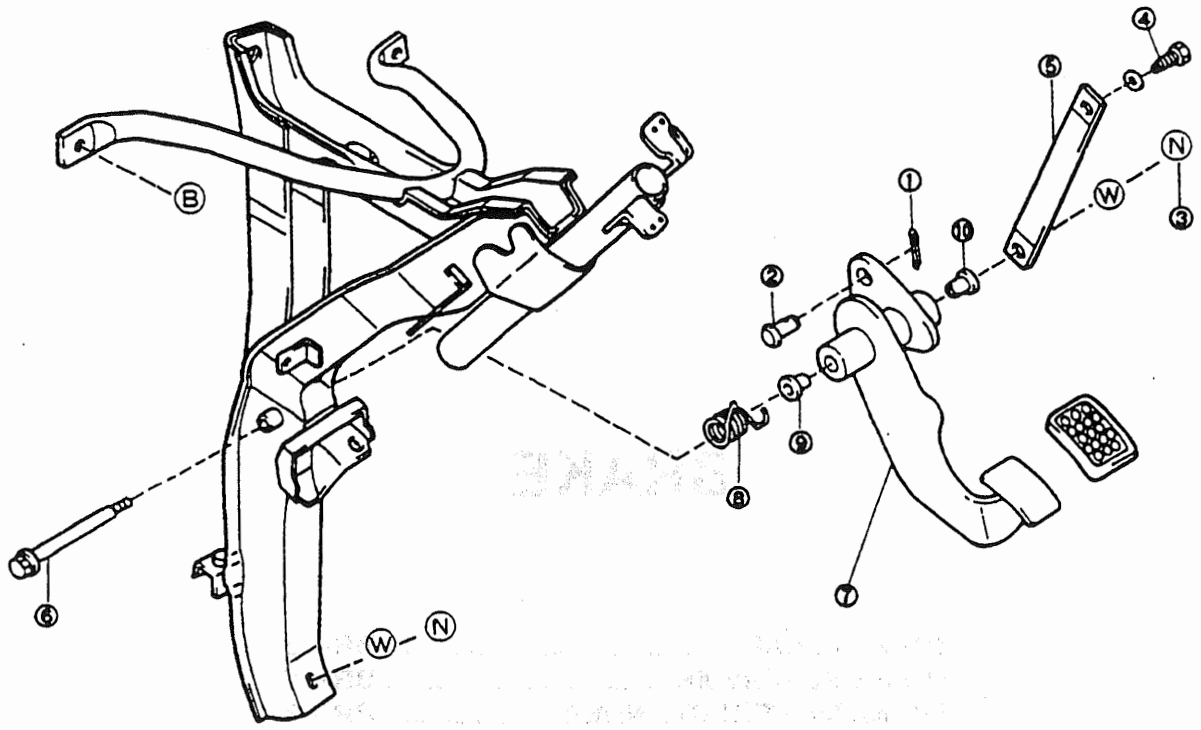
BRAKE PEDAL ..... BR– 2
BRAKE RESERVOIR ..... BR– 5
BRAKE MASTER CYLINDER ..... BR– 7
BRAKE BOOSTER BR–13
AIR BLEEDING FOR BRAKE SYSTEM BR–21
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REAR BRAKE BR–28
PARKING BRAKE LEVER BR–33
PARKING BRAKE CABLE BR–35
LSPV (Load Sensing Proportioning Valve) BR–40
SSTs BR–40
SERVICE SPECIFICATIONS BR–41
TIGHTENING TORQUE BR–41

PBR00001-00000

BRAKE PEDAL

1. REMOVAL

Remove the parts in the numerical order shown in the figure below.

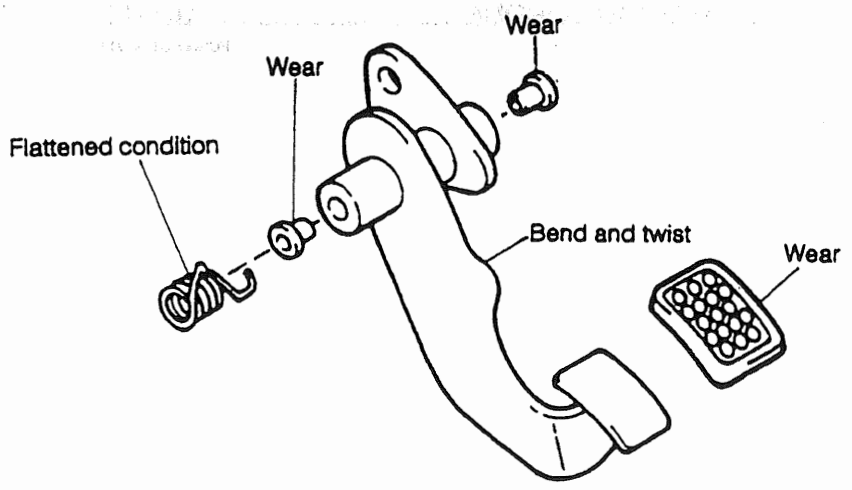


① Cotter pin
② Pin with ball
③ Nut
④ Bolt
⑤ Pedal shaft lock plate
⑥ Pedal shaft
⑦ Brake pedal assembly
⑧ Spring
⑨ Bush
⑩ Bush

PBR00002-00001

2. INSPECTION AND REPAIRS

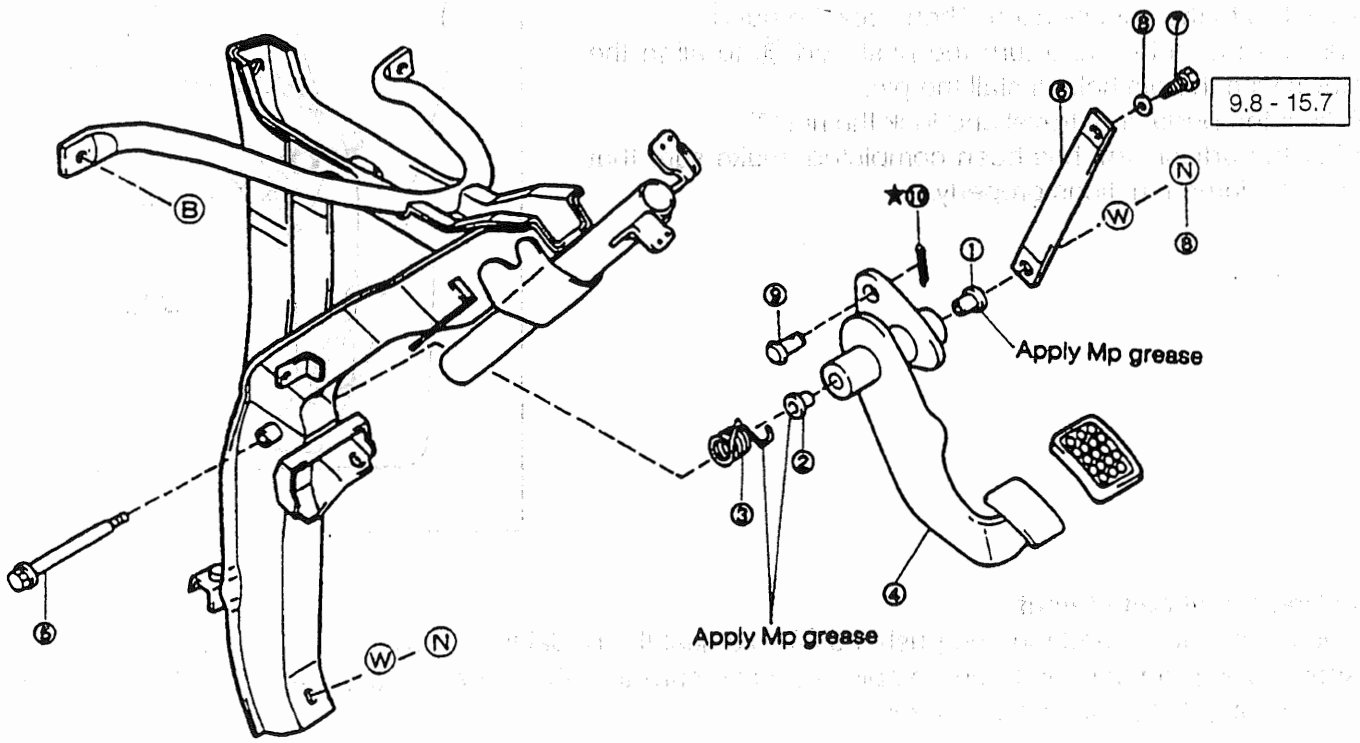
Inspect the following parts. Replace any parts which exhibit defects.



PBR00003-00002

3. INSTALLATION

Install the parts in the numerical order shown in the figure below.



□: Tightening torque
Unit : N·m
★ : Non-reusable part

① Bush
② Bush
③ Spring
④ Brake pedal assembly
⑤ Pedal shaft
⑥ Pedal shaft lock plate
⑦ Bolt
⑧ Nut
⑨ Pin with ball
⑩ Cotter pin

PBR00004-00003

Specified values

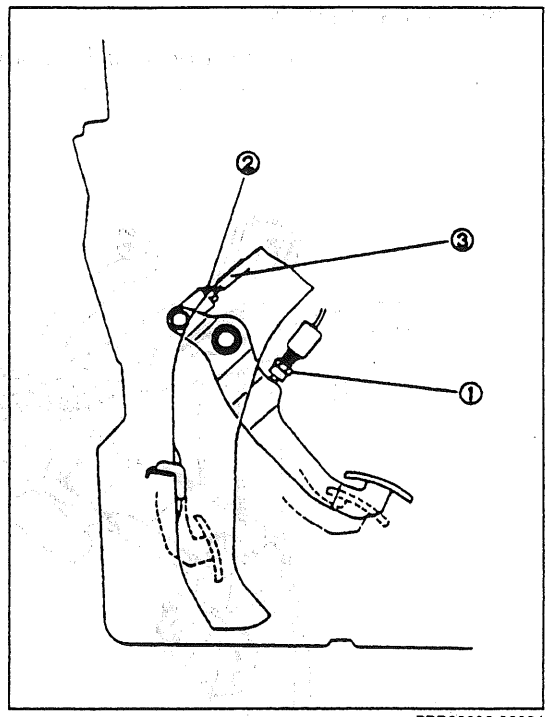
Item		Specified value
Pedal height	mm	132 - 142
Pedal free travel	mm	2 - 7
Pedal reserve travel		Not less than 85 mm [When pedal applying force is 30 kg]

PBR00005-00004

4. ADJUSTMENT

Pedal height adjustment

(1) Remove the pin of the push rod clevis.
(2) Disconnect the connector of the stop lamp switch.Slacken the nut ① and turn the switch so that the pedal height is adjusted to the specification. Then, lock the nut ①.
(3) Slacken the nut ② and turn the push rod ③ to align the clevis with the pin hole. Install the pin.
(4) Adjust the pedal free travel and lock the nut ②.
(5) After the adjustment has been completed, make sure that the stop lamp functions properly.



PBR00006-00004

Pedal free travel adjustment

(1) Slacken the nut ② and turn the push rod ③ to adjust the pedal free travel.
(2) After the adjustment has been completed, make sure that the pedal height is the specified value and that the stop lamp functions properly.

Brake pedal reserve travel adjustment

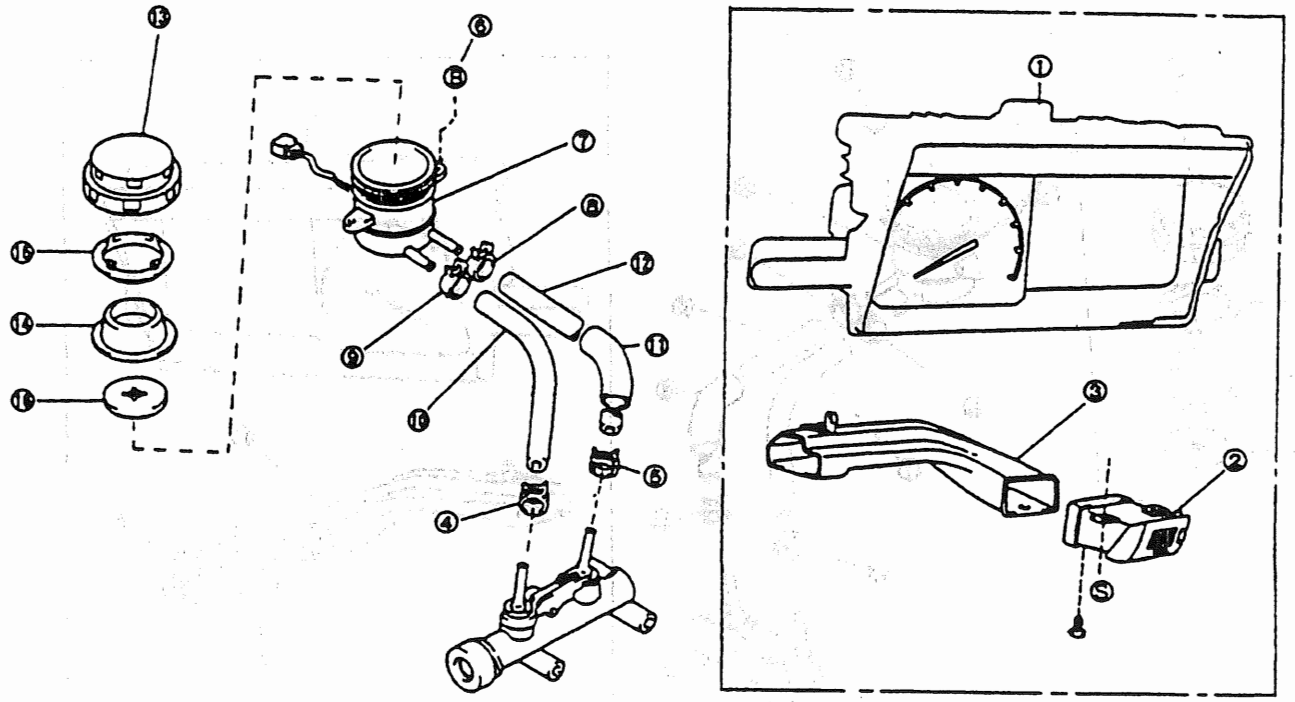
(1) Run the engine at the idling speed.
(2) With the parking brake lever in its returned state, depress the brake pedal with a pedal applying force of 30 kg. Then, measure the distance between the stopped brake pedal and the front panel.
Specified Value: Not less than 85 mm

PBR00007-00000

BRAKE RESERVOIR

1. REMOVAL

Remove the parts in the numerical order shown in the figure below.



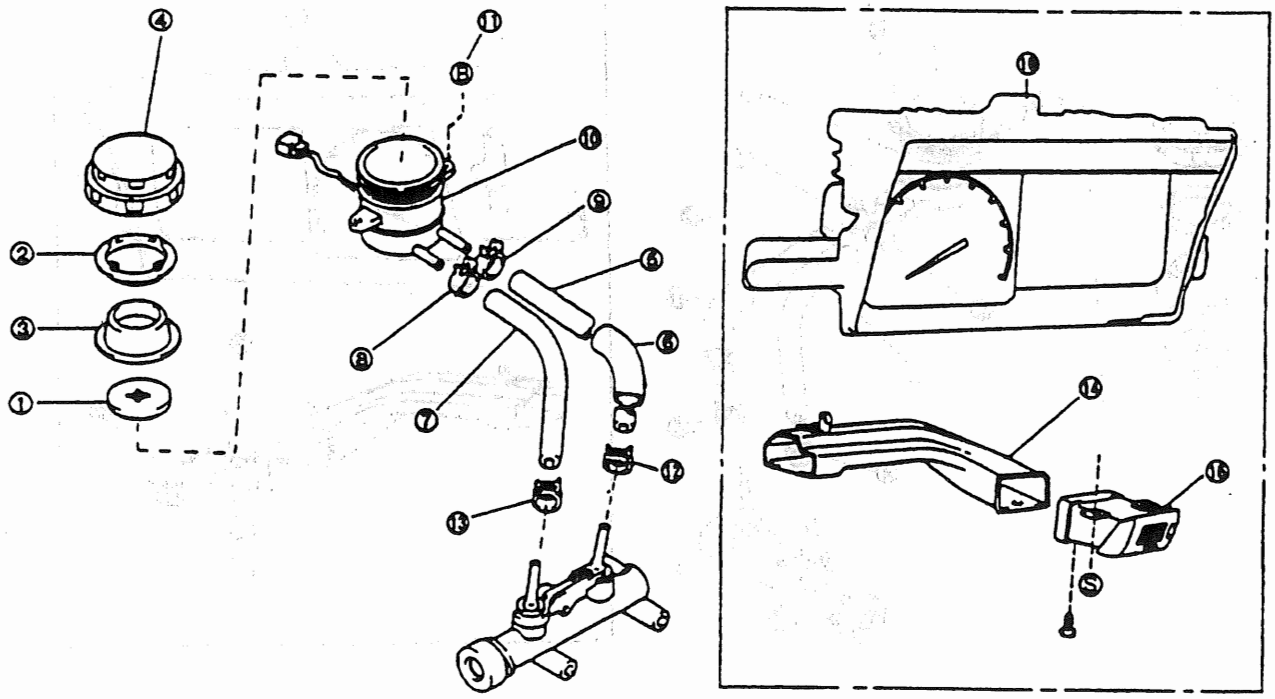
① Combination meter assembly
② Instrument panel No. 1 register subassembly
③ Heater to resistor No. 4 duct subassembly
④ Clip
⑤ Clip
⑥ Bolt
⑦ Master cylinder reservoir assembly
⑧ Clip
⑨ Clip
⑩ Reservoir tube
⑪ Hose
⑫ Reservoir No. 2 tube
⑬ Reservoir cap
⑭ Reservoir diaphragm
⑮ Spacer
⑯ Master cylinder reservoir float

NOTE:

- **The installation and removal of the master cylinder reservoir assembly are performed, working from the lower side of the instrument panel.**

2. INSTALLATION

Install the parts in the numerical order shown in the figure below.



① Master cylinder reservoir float
② Spacer
③ Reservoir diaphragm
④ Reservoir cap
⑤ Reservoir No. 2 tube
⑥ Hose
⑦ Reservoir tube
⑧ Clip
⑨ Clip
⑩ Master cylinder reservoir assembly
⑪ Bolt
⑫ Clip
⑬ Clip
⑭ Heater to resistor No. 4 duct subassembly
⑮ Instrument panel No. 1 register subassembly
⑯ Combination meter assembly

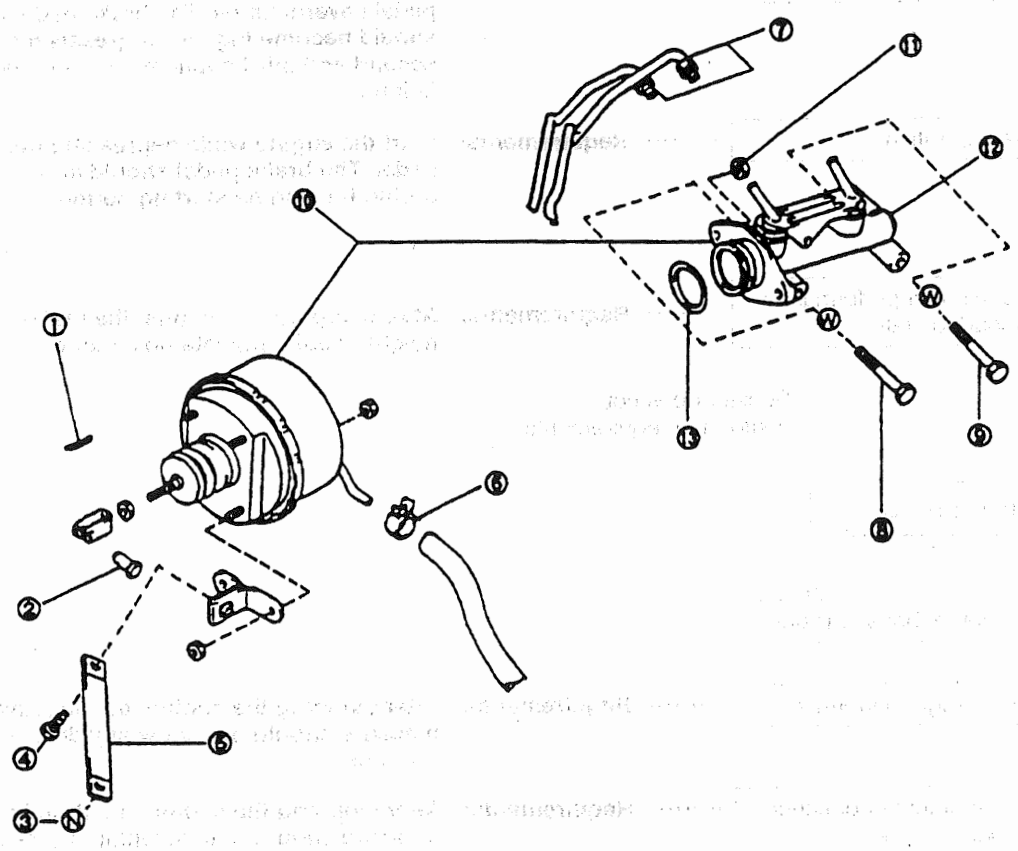
NOTE:

- **The installation and removal of the master cylinder reservoir assembly are performed, working from the lower side of the instrument panel.**

BRAKE MASTER CYLINDER

1. REMOVAL

Remove the parts in the numerical order shown in the figure below.



① Cotter pin
② Pin with ball
③ Nut
④ Bolt
⑤ Pedal shaft lock plate
⑥ Clip
⑦ Brake tube union nut
⑧ Hexagon bolt
⑨ Hexagon bolt
⑩ Brake master cylinder assembly with booster
⑪ Nut
⑫ Brake master cylinder assembly
⑬ O-ring

PBR00010-00007

BRAKE BOOSTER

1. BOOSTER CHECK PROCEDURE (AFTER INSTALLATION)

Simple booster check

1. Booster air-tight performance ····· **Requirements:** **After stopping the engine, depress the brake pedal several times. The brake pedal position should become higher progressively at the second and third applications than the original height.**

2. Booster operation ····· **Requirements:** **Start the engine while depressing the brake pedal. The brake pedal should move in slightly during the engine starting period.**

3. Booster air tight performance under loaded state ····· **Requirements:** **After stopping the engine, the brake pedal height should indicate no change.**

Booster does not conform to requirements.

Booster check using tester

4. Connection of booster tester

5. Booster air-tight performance ····· **Requirements:** **After stopping the engine, the negative pressure should not show any drop for 15 seconds.**

6. Booster air-tight performance under loaded state ····· **Requirements:** **After stopping the engine, the drop in negative pressure should remain within 3.3 kPa for 15 seconds.**

7. No-boosting operation ····· **Requirements:**

Brake pedal applying force	Hydraulic pressure
10 kg	3.13 MPa
30 kg	3.07 MPa

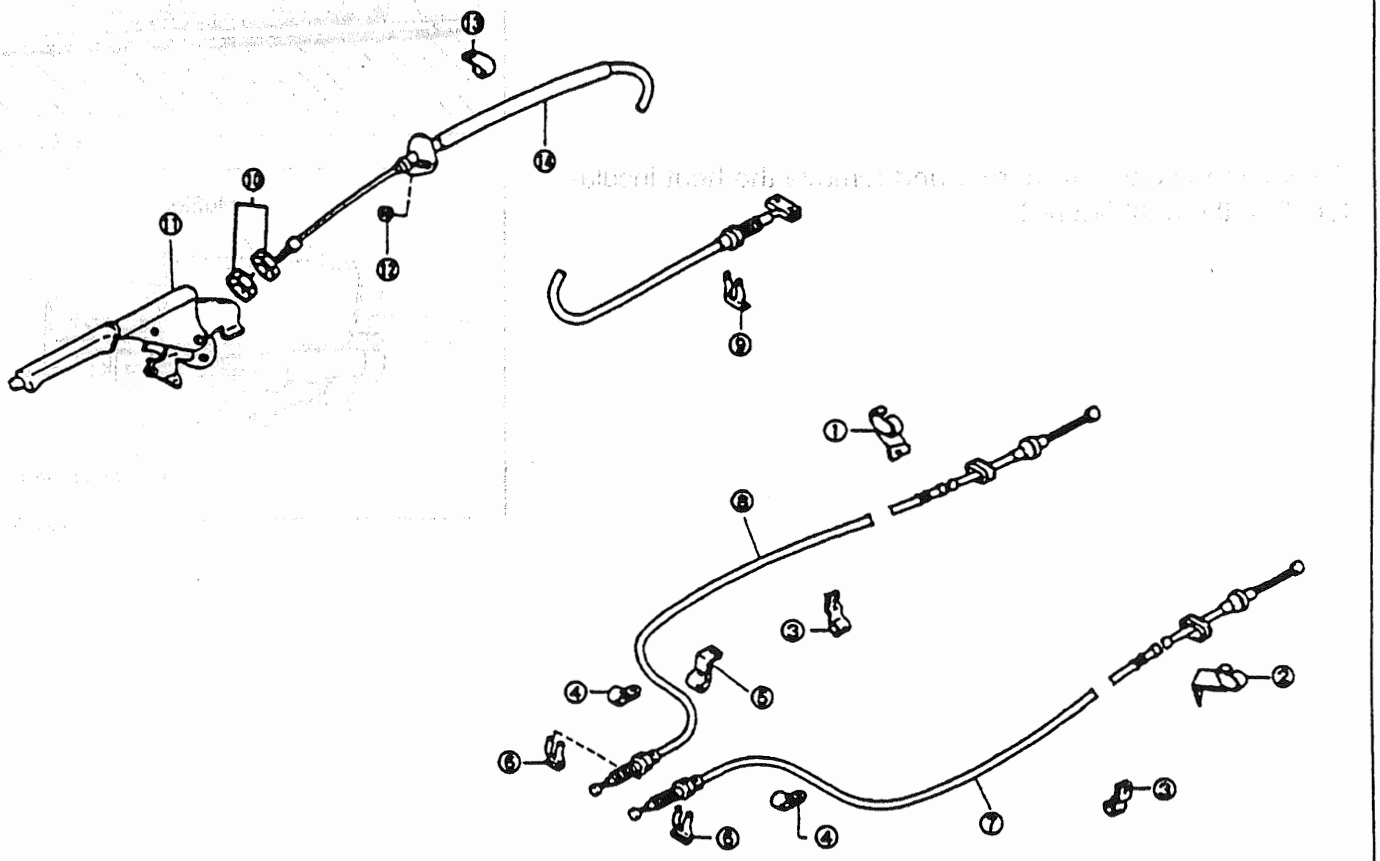
8. Boosting operation ····· **Requirements (Vacum 59.9 kPa)**

Brake pedal applying force	Hydraulic pressure
5 kg	568.7 MPa
10 kg	1.81 MPa
15 kg	3.05 MPa
20 kg	4.3 MPa

: As for those items enclosed by heavy lines, the main points of their operations are described in the main text.

3. REMOVAL (Van)

Remove the parts in the numerical order shown in the figure below.

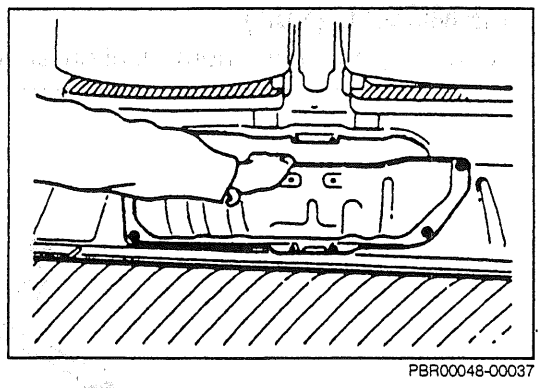


① Parking brake cable right guide
② Parking brake cable left guide
③ Clamp
④ Cable clamp
⑤ Cable clamp
⑥ Cable clamp
⑦ Parking brake cable assembly
⑧ Parking brake cable assembly
⑨ Cable clamp
⑩ Nut
⑪ Parking brake handle assembly
⑫ Nut
⑬ Clamp
⑭ Parking brake with equalizer cable assembly

PBR00047-00036

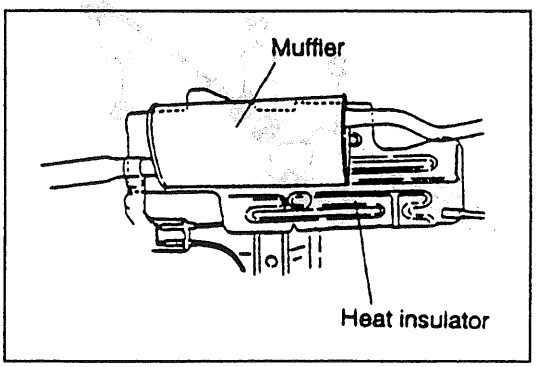
Operation prior to removal

(1) Remove the engine service hole covers.
(2) Raise the front/left seat.
(3) Remove the rear brake drum. Disconnect the rear brake and parking brake cable.



PBR00048-00037

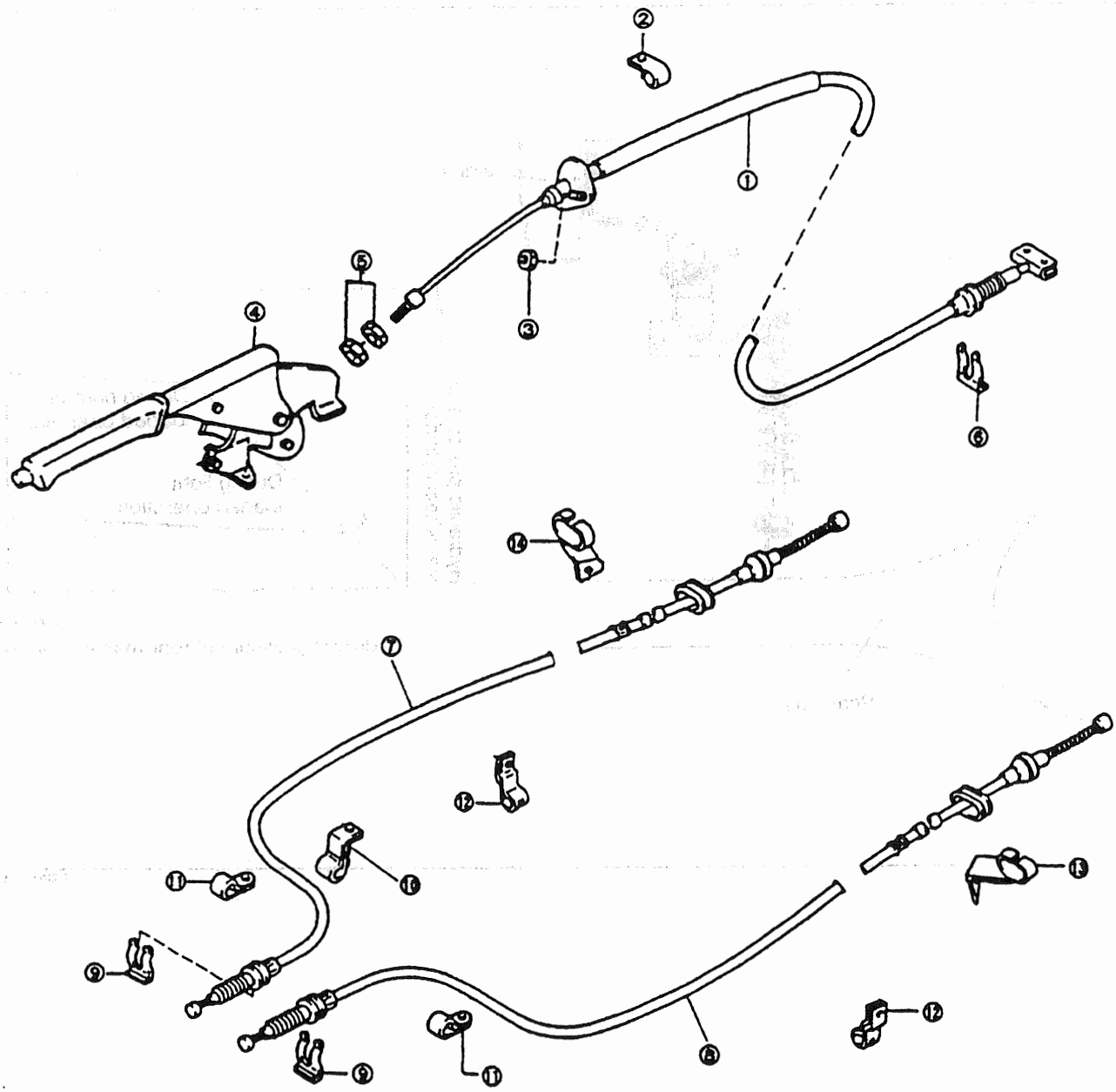
(4) Remove the spare tire carrier and remove the heat insulator. (See the right figure.)



PBR00049-00038

4. INSTALLATION

Install the parts in the numerical order shown in the figure below.

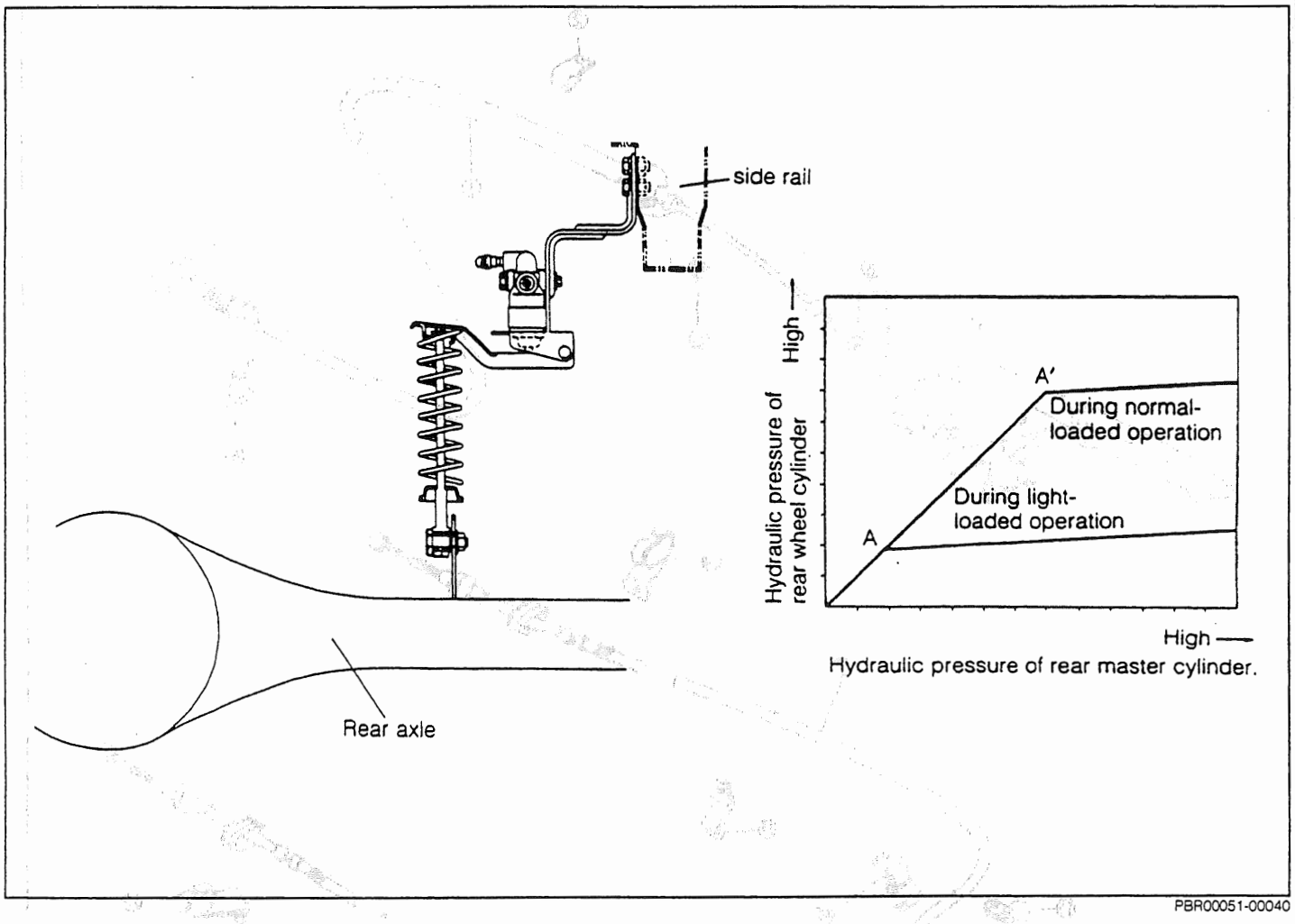


① Parking brake with equalizer cable assembly
② Clamp
③ Nut
④ Parking brake handle assembly
⑤ Nut
⑥ Cable clamp
⑦ Parking brake cable assembly
⑧ Parking brake cable assembly
⑨ Cable clamp
⑩ Cable clamp
⑪ Cable clamp
⑫ Clamp
⑬ Parking brake cable left guide
⑭ Parking brake cable right guide

PBR00050-00039

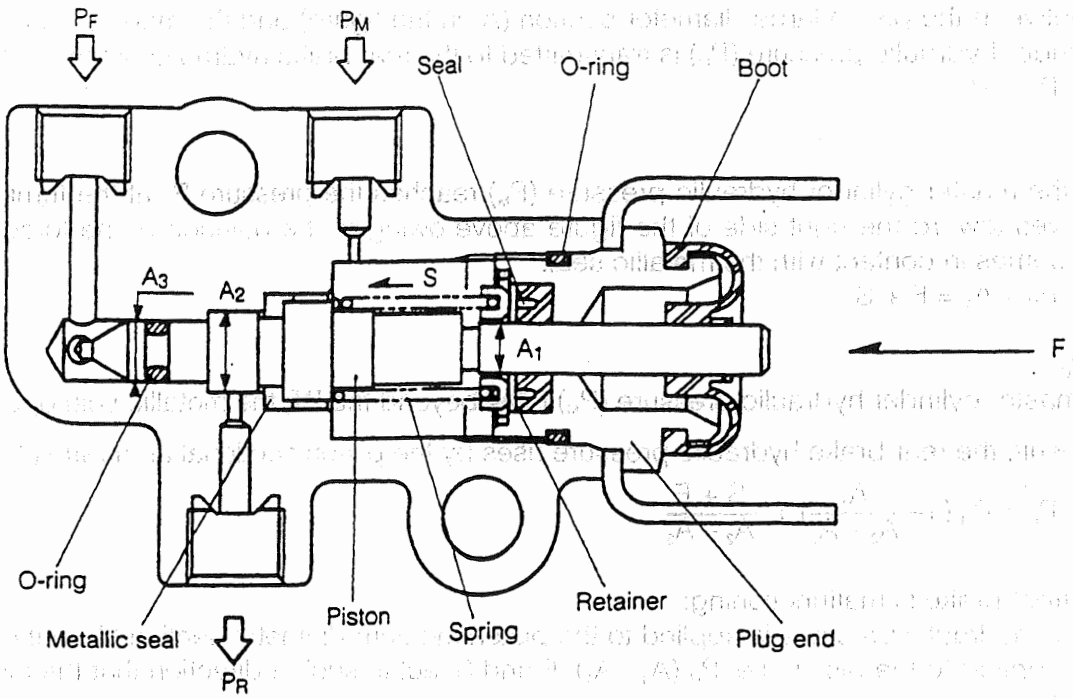
LSPV (Load Sensing Proportioning Valve)

The LSPV adjusts the turning point of hydraulic pressure of the proportioning valve in accordance with the weight being applied to the rear axle of the vehicle.



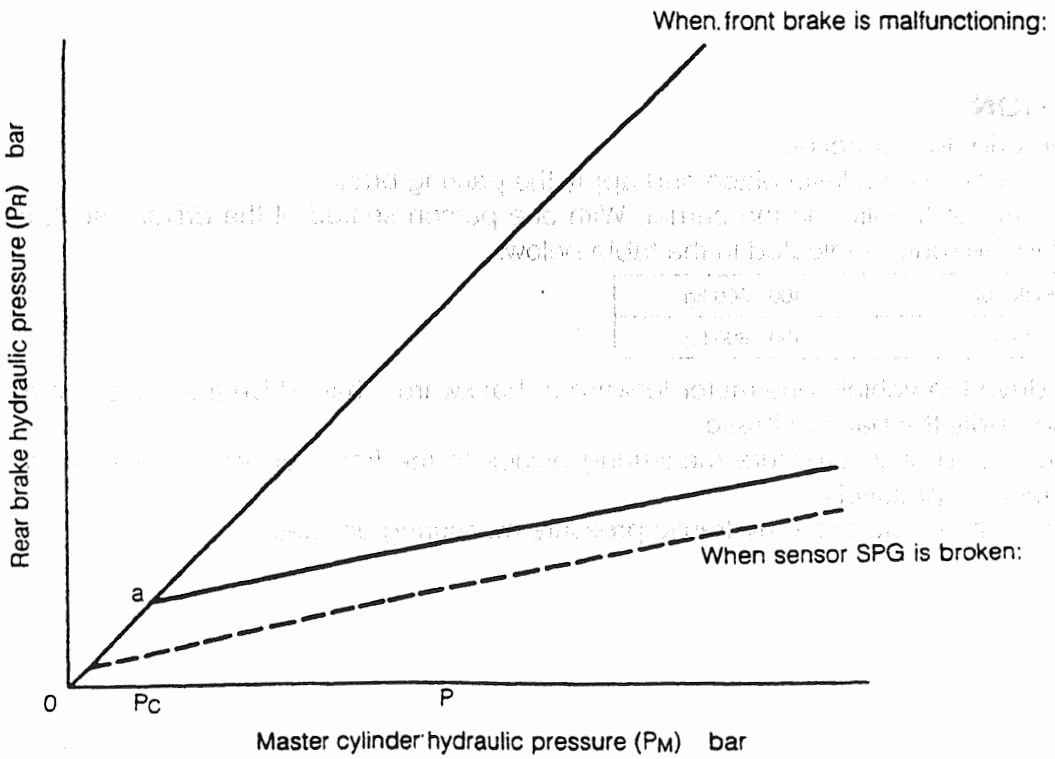
PBR00051-00040

1. DESCRIPTION



P_M : Master cylinder hydraulic pressure	bar	P_R : Hydraulic pressure of rear brake	bar
P_F : Hydraulic pressure of front brake	bar	F : Pushing force of piston	kg
S : Pushing force of SPG	kg	A_1 : Sectional area of small-diameter section of piston	cm²
A_2 : Sectional area of large-diameter section of piston	cm²	A_3 : Sectional area of medium-diameter section of piston	cm²

Performance Diagram



(1) $P_M < P_T$
The master cylinder hydraulic pressure (P_M) starts to rise. At this moment, however, a clearance is still kept between the piston large-diameter section (A_2 in the figure) and the metallic seal. Hence, the master cylinder hydraulic pressure (P_M) is transmitted to the rear brake hydraulic pressure (P_R).

$$P_M = P_R$$

(2) $P_M = P_C$
When the master cylinder hydraulic pressure (P_M) reaches the pressure P_C at the turning point, the piston moves toward the right side of the figure above owing to the balance of the force. As a result, the piston comes in contact with the metallic seal.

$$P_M \times A_1 = F + S$$

(3) $P_M > P_C$
If the master cylinder hydraulic pressure (P_M) rises beyond the PT, the metallic seal opens and closes. As a result, the rear brake hydraulic pressure rises by the piston sectional area ratio $(1 - \frac{A_1}{A_2 - A_3})$.

$$P_R = P_M (1 - \frac{A_1}{A_2 - A_3}) + \frac{S + F}{A_2 - A_3}$$

(4) When front brake is malfunctioning:
Since no hydraulic pressure is applied to the piston medium-diameter section (A_3 in the figure), all of the forces applied to the piston, i.e. $P_M (A_3 - A_1)$, F and S, act in such a direction that the piston is pushed in the body.
Hence, a clearance is kept between the piston large- diameter section (A_2 in the figure) and the metallic seal. Consequently, the master cylinder hydraulic pressure (P_M) is transmitted to the rear brake hydraulic pressure.

$$P_M = P_R$$

(5) When reaction force (F) toward piston no longer exists:
If the spring or the link system is broken, the brake system functions as the P valve.

PBR00053-00000

2. INSPECTION

(1) Preparation prior to inspection
① Park the vehicle on a level place and apply the parking brake.
② Put weights or the like on the carrier. With one person seated at the driver's seat, set the rear axle weight to the range indicated in the table below.

Pick - up	400 - 800 kg
Van	450 - 800 kg

③ Slowly drive the vehicle one meter forward or backward. Then, drive the vehicle to the original position and apply the parking brake.
④ Connect a hydraulic pressure measuring device to the front caliper and wheel cylinder of the left rear wheel, respectively.
⑤ Perform air bleeding of the hydraulic pressure measuring devices.

PBR00054-00000

(2) Calculation of check hydraulic pressure of front brake

① Calculate the hydraulic pressure at the turning point of the LSPV from the rear axle weight Wr (kg), using the following formula.

	Rear axle weight ≦ 450 kg	Rear axle weight ≧ 450 kg
Pick - up	$Pc = 21.6 \times 10^{-3} Wr - 6.7$ (MPa)	$Pc = 71.6 \times 10^{-3} Wr - 0.21$ (MPa)

	Rear axle weight ≦ 463 kg	Rear axle weight ≧ 463 kg
Van	$Pc = 20.2 \times 10^{-3} Wr - 7.32$ (MPa)	$Pc = 9.95 \times 10^{-3} Wr - 2.57$ (MPa)

② The check hydraulic pressure (P_F) of the front brake should be set to a value greater than that obtained by the following formula.
Hydraulic pressure at turning point of LSPV (P_C) + 4.9 MPa

PBR00055-00000

(3) Measurement of hydraulic pressure

① Depress the brake pedal so that the hydraulic pressure of the front brake may become the check hydraulic pressure which was determined in the step (2). At this time, read out the hydraulic pressure of the rear brake.

NOTE:

- When the hydraulic pressure of the front brake is set, if you should interrupt the pedal depressing or release the pedal during the depressing stroke, be sure to completely release your foot from the pedal. Then, depress the pedal again.
- As for the hydraulic pressure of the rear brake, be sure to take a reading about two seconds after the setting of the hydraulic pressure of the front brake.

PBR00056-00000

(4) Verification of hydraulic pressure

① Calculate the reference hydraulic pressure (P_R) of the rear brake, based on the hydraulic pressure (P_C) at the turning point of the LSPV and the check hydraulic pressure (P_F) of the front brake which were calculated in the step (2).

$P_R = 0.1\ P_F + 0.9\ P_C$

② Calculate the permissible range of the reference hydraulic pressure of the rear brake from the following formula given below.

Permissible value at plus side	Permissible value at minus side
$x = 1.98 \times 10^{-3} Wr - 0.19$ (MPa)	$y = -1.60 \times 10^{-3} Wr + 0.14$ (kPa)

③ Determine the reference hydraulic pressure of the rear brake according to the steps ① and ②.

Reference hydraulic = (P_R + y) to (P_R + x) pressure of rear brake

④ If the hydraulic pressure of the rear brake measured in the step (3) conforms to the reference value calculated in the step above, the hydraulic pressure is satisfactory.
If not, adjust the LSPV.

PBR00057-00000

(5) Reference

With one person seated on the vehicle, set the rear axle weight as follows.

	Rear axle weight (kg)	Difference between right and left (kg)
Pick - up	400 ± 5	Not to exceed 10
Van	450 ± 5	Not to exceed 10

↓

At this time, depress the brake pedal so that the check hydraulic pressure of the front brake may become 7.85 MPa.

↓

Ensure that the hydraulic pressure of the rear brake conforms to the specifications.
Pick-up: 2.08 - 2.86 MPa
Van: 1.95 - 2.72 MPa

PBR00058-00000

3. ADJUSTMENT

(1) Calculation of moving amount of LSPV link end
The hydraulic pressure of the rear brake changes about 0.13 MPa when the LSPV link end is moved 1 mm in an up-&-down direction. Therefore, calculate the required moving amount, using the following formula.

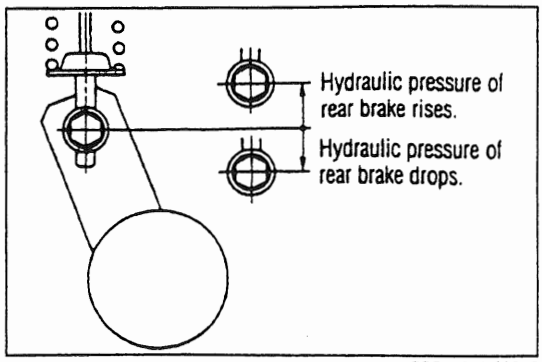
$$\frac{\text{Deviation in hydraulic pressure MPa (kgf/cm}^2\text{)}}{\text{0.13 MPa/mm}} = \text{(Moving amount of LSPV end) mm}$$

PBR00059-00000

(2) Loosen the attaching nut of the LSPV link at the axle side. Move the LSPV link end by the amount calculated in the step (1).
Specified Torque: 9.8 - 15.7 N·m

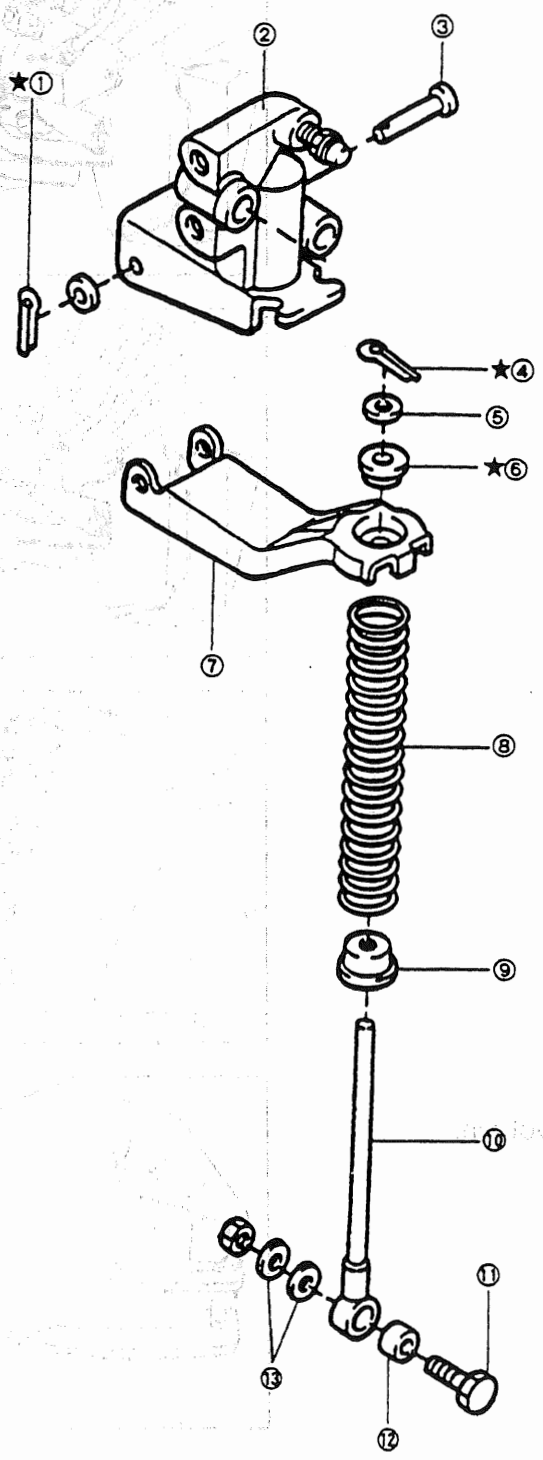
NOTE:
- When moving the LSPV link, be sure to put a mark so as to determine the position of the nut. However, never scribe or punch on the part surface.

(3) Check the hydraulic pressure again. Ensure that the LSPV hydraulic pressure is within the specified range.



PBR00060-00042

4. COMPONENT



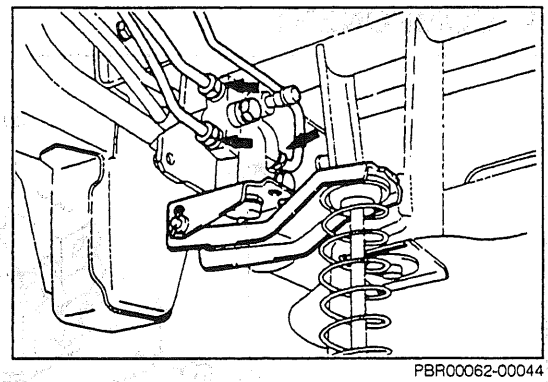
★ :Non-reusable part

① Cotter pin
② LSPV assembly
③ Pivot pin
④ Cotter pin
⑤ Plate washer
⑥ Load sensing No. 1 bush
⑦ Valve control lever
⑧ Load sensing spring
⑨ Spring retainer
⑩ Valve control rod
⑪ Bolt
⑫ Load sensing No. 2 bush
⑬ Plate washer

PBR00061-00043

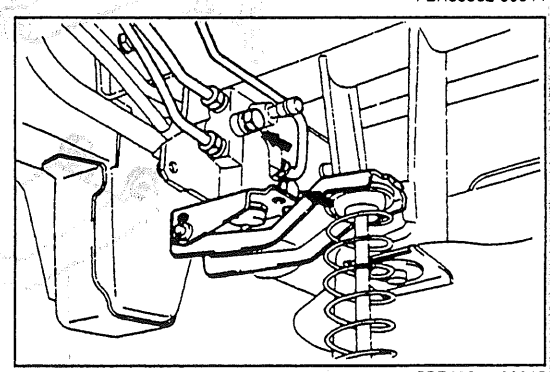
5 REMOVAL

(1) Disconnect the brake tube from the valve body.



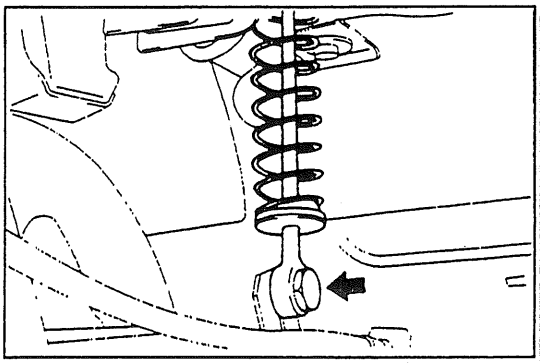
PBR00062-00044

(2) Remove the valve control bolt.



PBR00063-00045

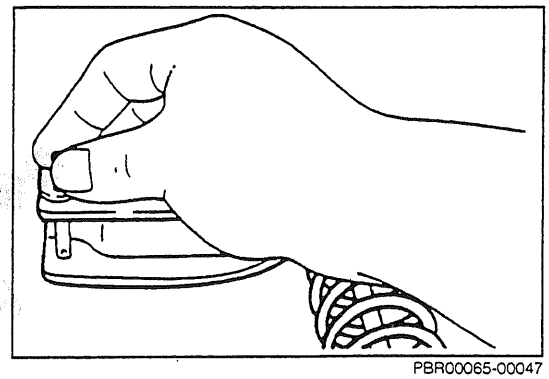
(3) Remove the valve bracket mounting bolts.



PBR00064-00046

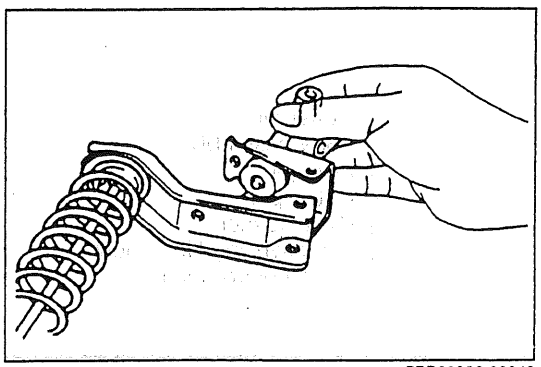
6. DISASSEMBLY

(1) Remove the cotter pin, then remove the pivot pin.



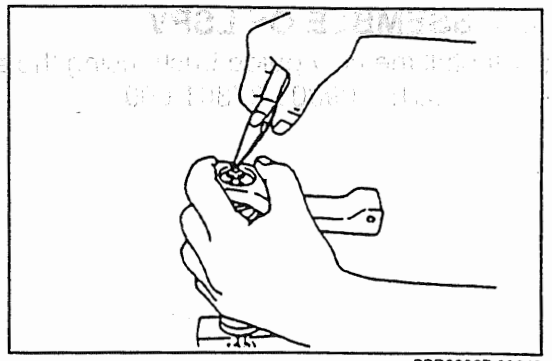
PBR00065-00047

(2) Remove the LSPV with the bracket.
NOTE:
- Never attempt to disassemble the LSPV.

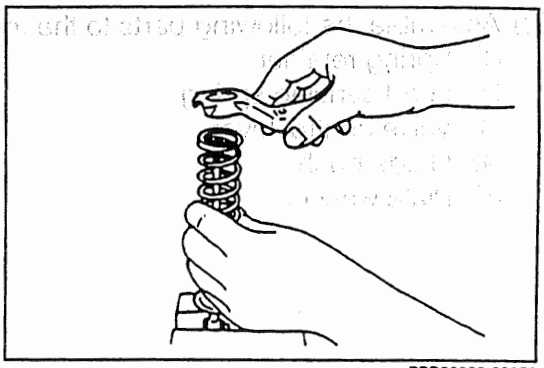


PBR00066-00048

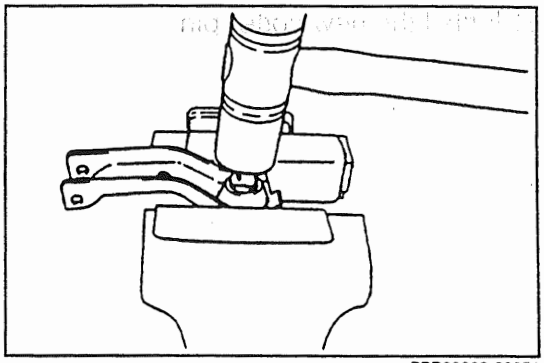
(3) Remove the cotter pin.


PBR00067-00049

(4) Remove the following parts.
① Valve control lever
② Plate washer
③ Guide bush
④ Load sensing spring
⑤ Spring retainer
⑥ Valve control rod

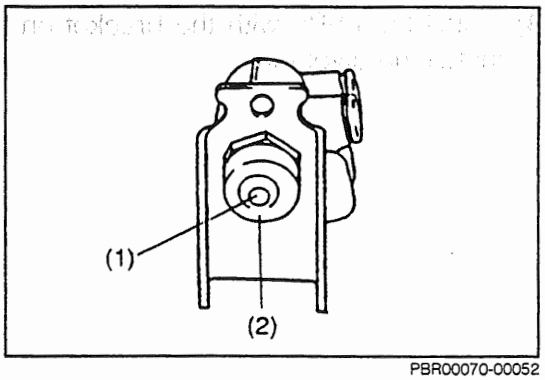

PBR00068-00050

(5) Remove the guide bush by tapping with the plastic hammer.


PBR00069-00051

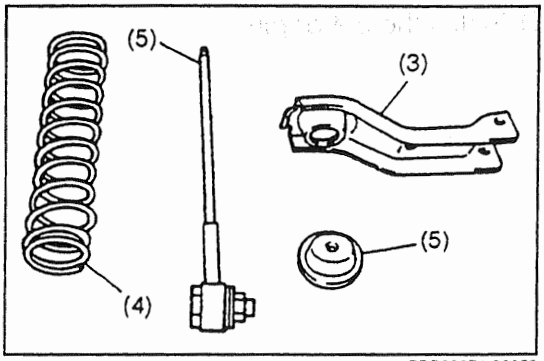
7. INSPECTION

Inspect the following items. Replace any parts which exhibit defects.
(1) Worn piston
(2) Deteriorated rubber part



PBR00070-00052

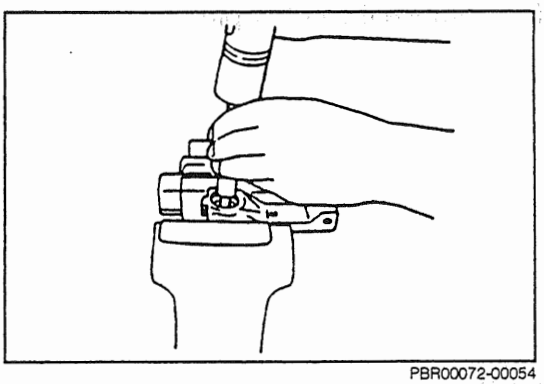
(3) Damage and distortion
(4) Flattened condition
(5) Distortion and damage



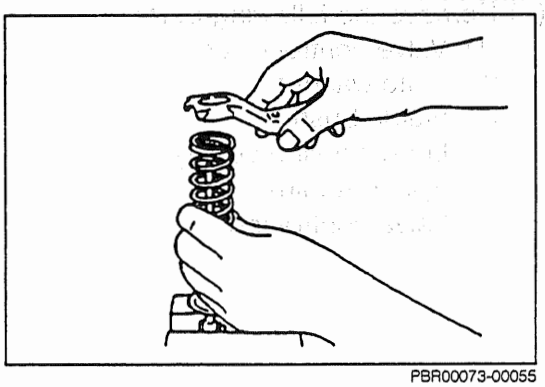
PBR00071-00053

8. ASSEMBLE OF LSPV

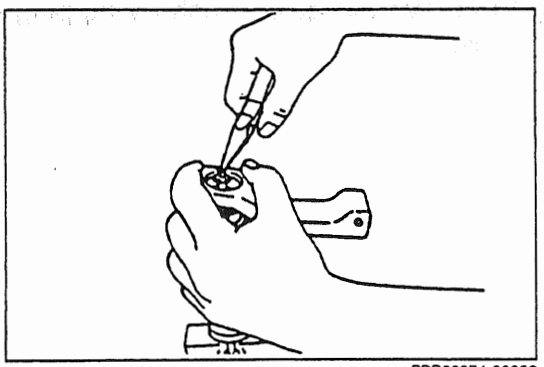
(1) Install the new guide bush, using the suitable tool.
SST: 09301-87301-000


PBR00072-00054

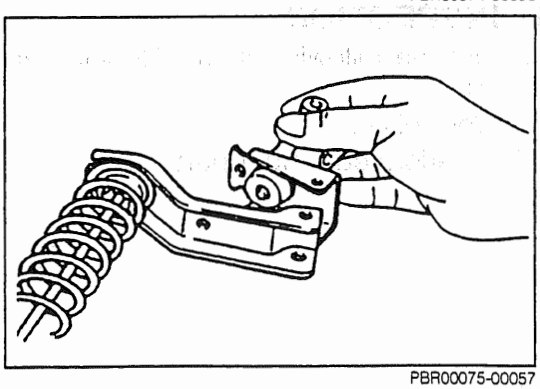
(2) Assemble the following parts to the rod.
① Spring retainer
② Load sensing spring
③ Valve control lever
④ Guide bush
⑤ Plate washer


PBR00073-00055

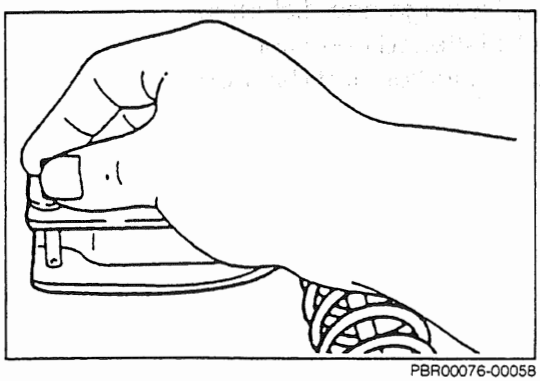
(3) Install the new cotter pin.


PBR00074-00056

(4) Install the LSPV with the bracket on the control lever and install the pivot pin.

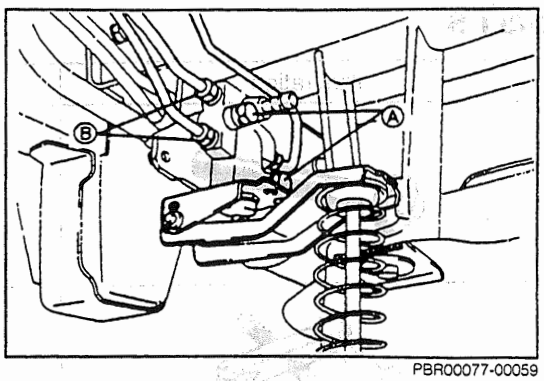

PBR00075-00057

(5) Install the cotter pin.


PBR00076-00058

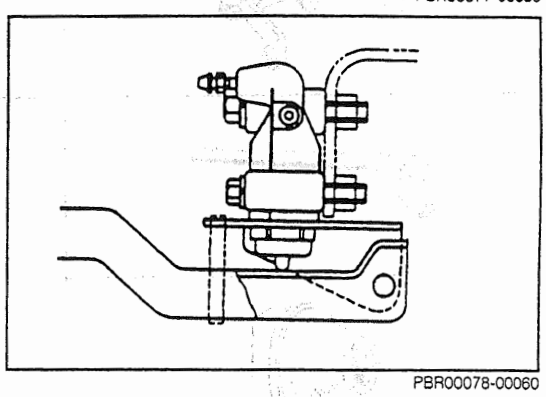
9. INSTALLATION

(1) Install the LSPV assembly to the frame. Then, connect the brake tube.
Specified Torque:
A, 14.7 - 21.6 N·m
B, 12.7 - 17.7 N·m



PBR00077-00059

(2) Secure the lever of the LSPV link to the bracket of the valve proper by means of a band or the like.
NOTE:
- Make sure that the LSPV piston end comes in full contact with the link lever when securing.


PBR00078-00060

(3) Set the rear axle weight as follows.

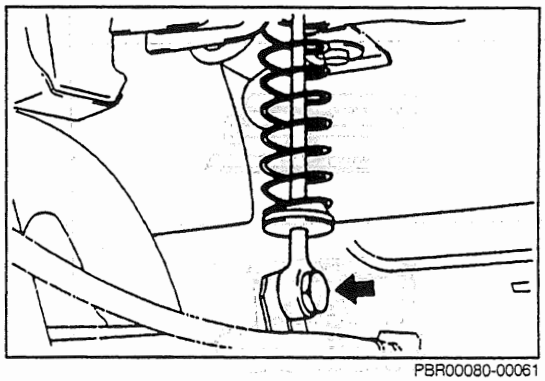
	Rear axle weight (kg)	Difference between right and left (kg)
Pick - up	363 ± 5	Not to exceed 10
Van	417 ± 5	Not to exceed 10

(4) Slowly drive the vehicle about 1 m forward and backward. Apply the parking brake.

PBR00079-00000

(5) Install the LSPV link end to the bracket at the axle side. Tighten the nut to the specified torque.
Specified Torque: 9.8 - 15.7 N·m

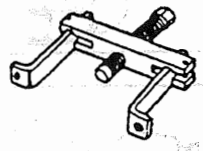
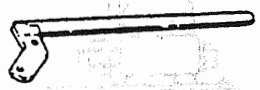
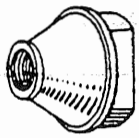
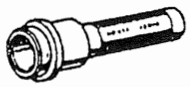
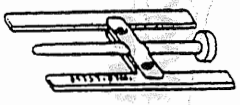
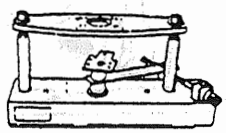
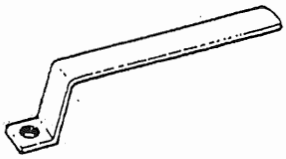
NOTE:
- Never push up or down the LSPV end when assembling the LSPV link end to the bracket at the axle side.


PBR00080-00061

(6) Remove the band securing the LSPV link lever.
(7) Check the hydraulic pressure. If the hydraulic pressure fails to conform to the specifications, adjust the pressure. (Refer to page BR–31.)

PBR00081-00000

SSTs

Illustration	Tool No.	Tool name
	09304-12012-000	Input shalt front bearing replacer
	09310-87301-000	Front hub & drum puller
	09511-87202-000	Brake drum stopper
	09512-87201-000	Brake drum replacer nut
	09515-87301-000	Rear axle shaft bearing replacer
	09517-12010-000	Rear axle shaft oil seal replacer
	09737-87001-000	Brake booster push rod gauge
	09753-87701-000	Brake booster overhaul tool
	09737-87602-000	Brake booster push rod wrench

PBR00082-00000

SERVICE SPECIFICATIONS

Brake pedal

Unit: mm

Item	Specified value	Allowable limit	Remarks
Installation height	132 - 142	—	
Free travel	2 - 7	—	
Reserve travel	Not less than 85	—	When pedal applying force is 30 kg

PBR00083-00000

Front brake

Unit: mm

Item			Specified value	Allowable limit	Remarks
Brake drum	Inner diameter mm (inch)		200	201.5	
Brake lining	Thickness mm (inch)		5.0	1.0	
Disc brake	Pad thickness		9.0	1.0	
	Disc	Thickness	16.0	15.0	
		Run - out	—	0.15	

PBR00084-00000

Rear brake

Unit: mm

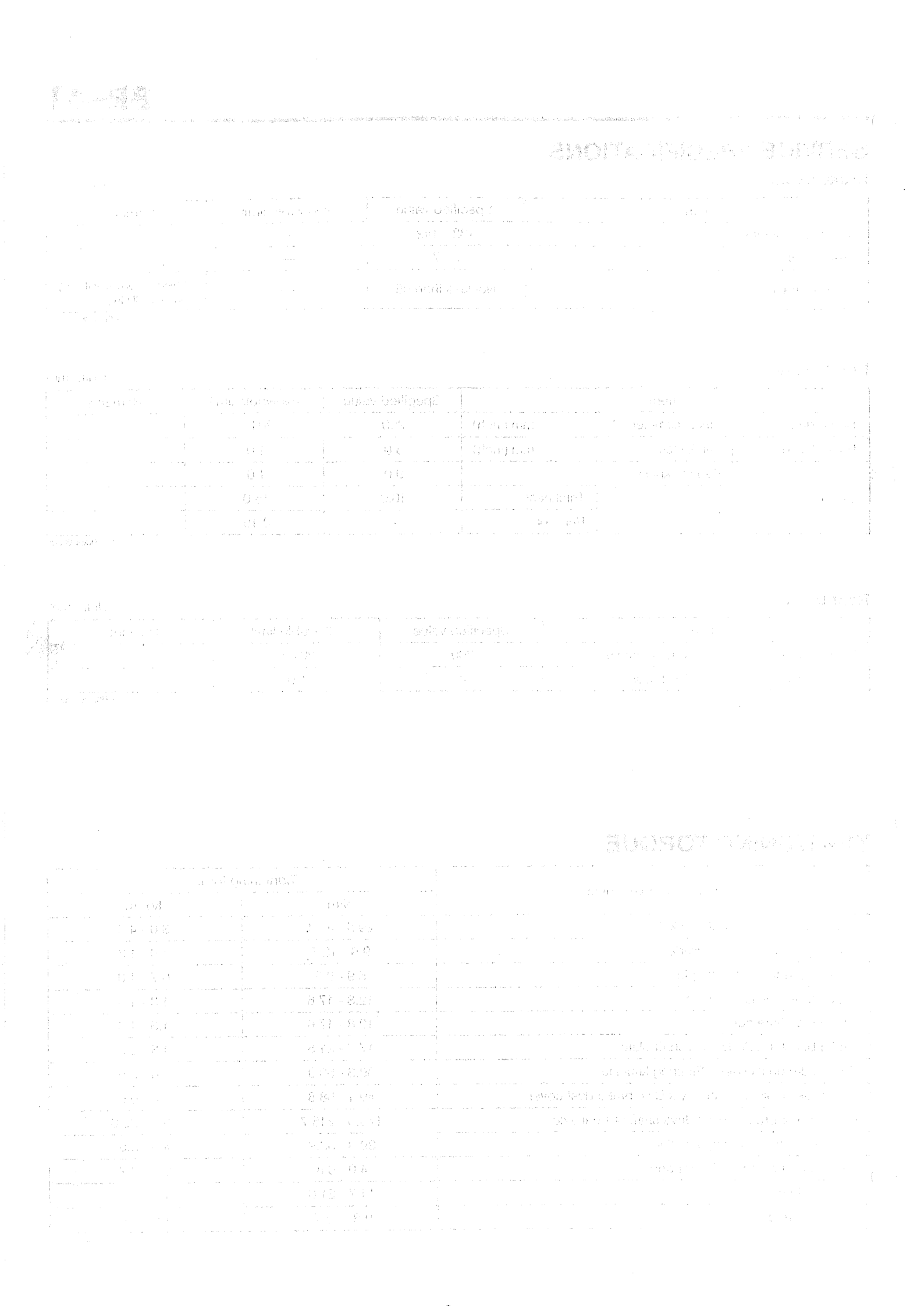
Item		Specified value	Allowable limit	Remarks
Brake drum	Inner diameter	200	201.5	
Brake lining	Thickness	4	1.0	

PBR00085-00000

TIGHTENING TORQUE

Tightening component	Tightening torque	
	N·m	kgf-m
Master cylinder × Pedal bracket	29.5 - 44.1	3.0 - 4.5
Backing plate × Wheel cylinder	9.9 - 12.7	1.0 - 1.3
Wheel cylinder × Bleeder plug	6.9 - 9.8	0.7 - 1.0
Brake tube × Wheel cylinder	12.8 - 17.6	1.3 - 1.8
Brake tube flare nut	12.8 - 17.6	1.3 - 1.8
Brake booster × Pedal lock shaft plate	17.7 - 21.5	1.8 - 2.2
Disc brake dust cover × Steering knuckle	39.3 - 53.9	4.0 - 5.5
Disc brake caliper assembly × Disc brake dust cover	49.1 - 58.8	5.0 - 6.0
Front hub or drum × Front drive shaft or front axle	176.6 - 215.7	18.0 - 22.0
Backing plate × Steering knuckle	39.3 - 53.9	4.0 - 5.5
Parking brake cable × Floor panel	4.0 - 6.8	0.4 - 0.7
LSPV × Flam	14.7 - 21.6	1.5 - 2.2
LSPV × Rear axle	9.8 - 15.7	1.0 - 1.6

PBR00086-00000



STEERING

SR

STEERING WHEEL ..... **SR– 2**
1. REMOVAL ..... **SR– 2**
2. INSTALLATION ..... **SR– 2**

STEERING MAIN SHAFT ..... **SR– 3**
1. REMOVAL ..... **SR– 3**
2. INSTALLATION ..... **SR– 4**
3. INSPECTION ..... **SR– 6**

STEERING GEAR ASSEMBLY ..... **SR– 7**
1. REMOVAL ..... **SR– 7**
2. DISASSEMBLY ..... **SR– 8**
3. INSPECTION **SR–11**
4. ASSEMBLY **SR–12**
5. INSTALLATION **SR–16**

DRAG LINK **SR–17**
1. REMOVAL **SR–17**
2. INSTALLATION **SR–17**

CENTER ARM **SR–19**
1. COMPONENTS **SR–19**
2. REMOVAL & DISASSEMBLY **SR–19**
3. INSPECTION **SR–21**
4. INSTALLATION & ASSEMBLY **SR–21**

TIE-RODS **SR–24**
1. REMOVAL **SR–24**
2. INSPECTION **SR–24**
3. INSTALLATION **SR–25**
4. FRONT WHEEL ALIGNMENT **SR–26**

SSTs **SR–28**

SERVICE SPECIFICATIONS **SR–29**

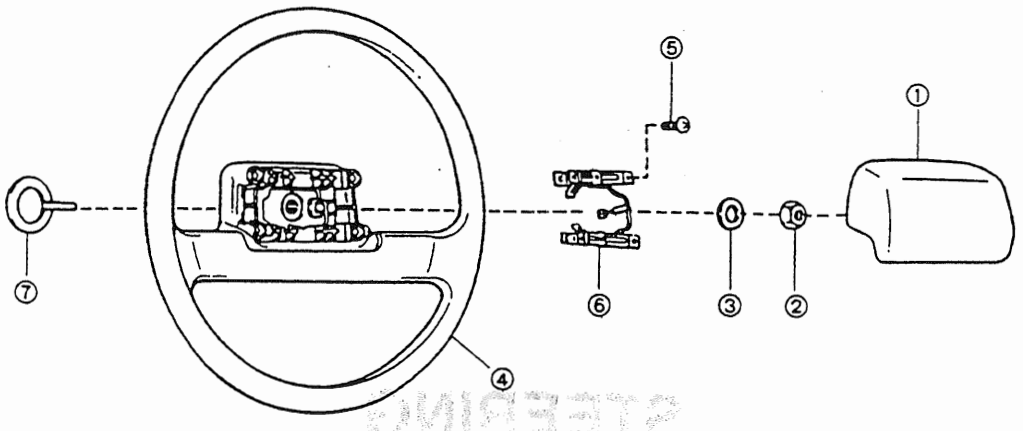
TIGHTENING TORQUE **SR–30**

PSR00001-00000

STEERING WHEEL

1. REMOVAL

Remove the parts in the numerical order shown in the figure below.



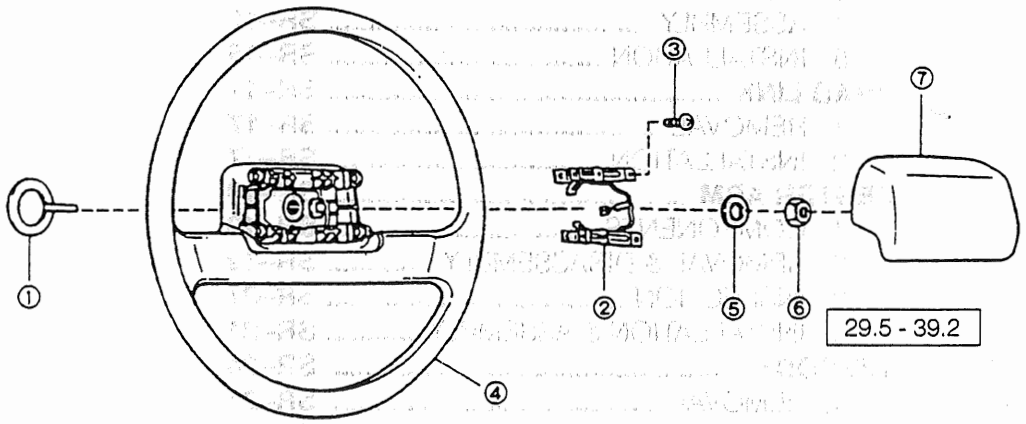
① Steering wheel pad subassembly
② Nut
③ Washer
④ Steering wheel assembly
⑤ Screw
⑥ Horn button contact plate
⑦ Horn ring

NOTE:
- Prior to the operation, be sure to disconnect the cable from the negative terminal of the battery.

PSR00002-00001

2. INSTALLATION

Install the parts in the numerical order shown in the figure below.



① Horn ring
② Horn button contact plate
③ Screw
④ Steering wheel assembly
⑤ Washer
⑥ Nut
⑦ Steering wheel pad subassembly

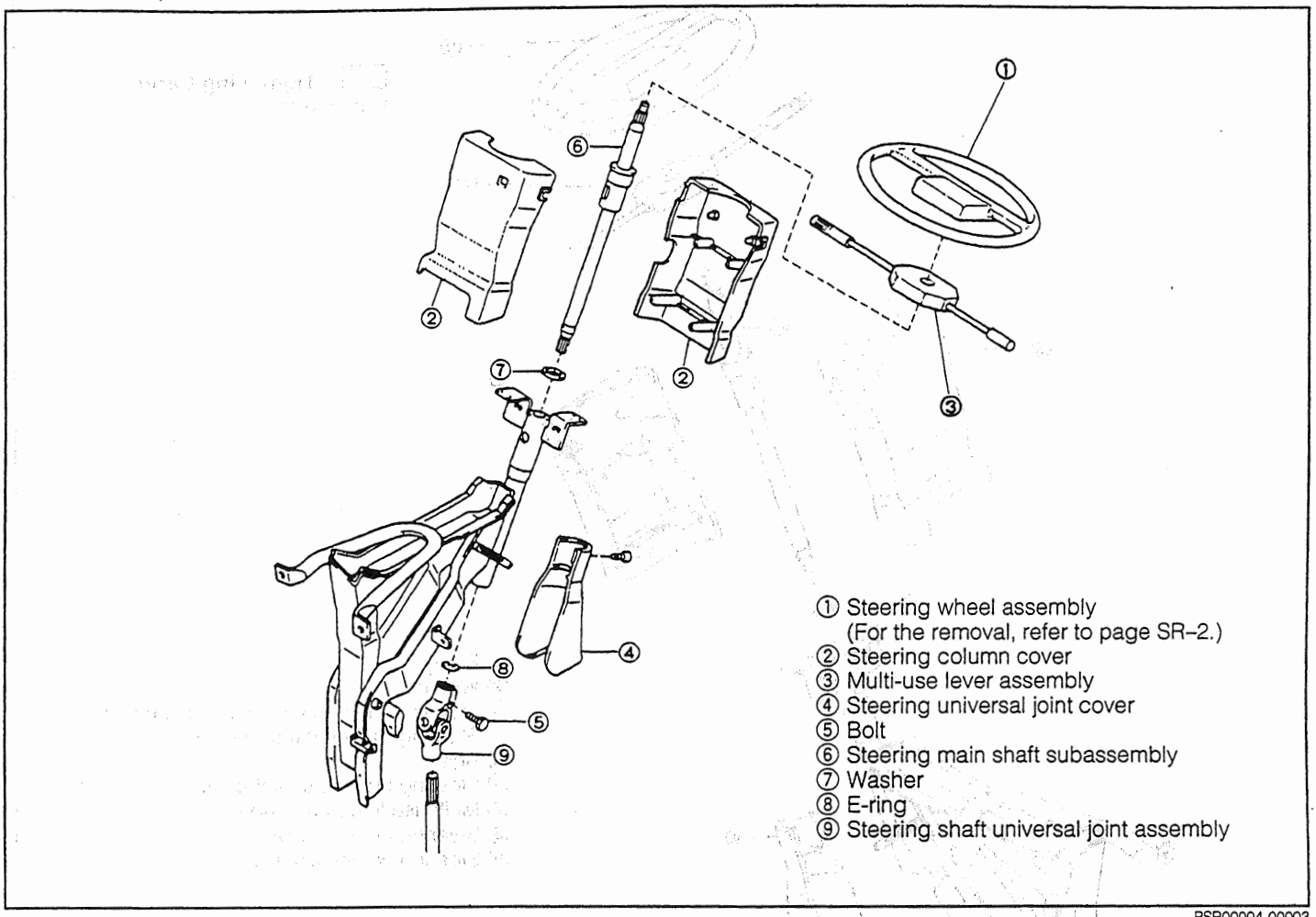
□: Tightening torque
Unit : N·m

PSR00003-00002

STEERING MAIN SHAFT

1. REMOVAL

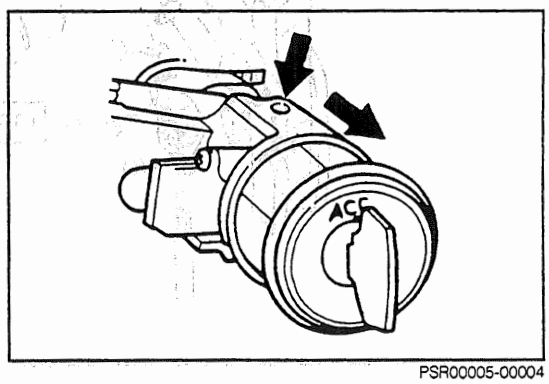
Remove the parts in the numerical order shown in the figure below.



PSR00004-00003

Removal of ignition key cylinder

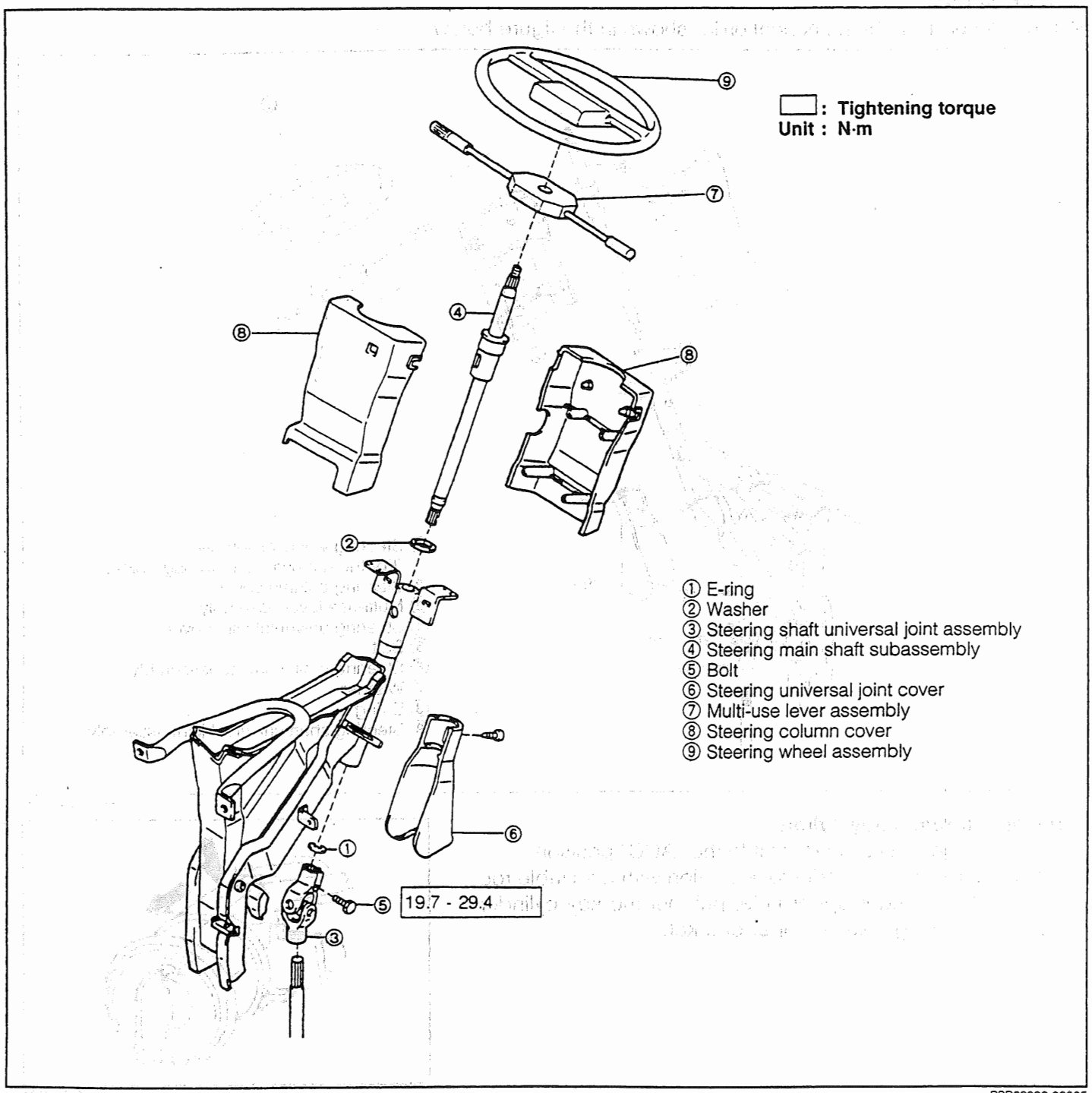
(1) Insert the ignition key and set it to the "ACC" position.
(2) While retaining the cylinder lock section with a suitable rod through the cylinder upper hole, pull out the key cylinder from the steering column upper bracket.



PSR00005-00004

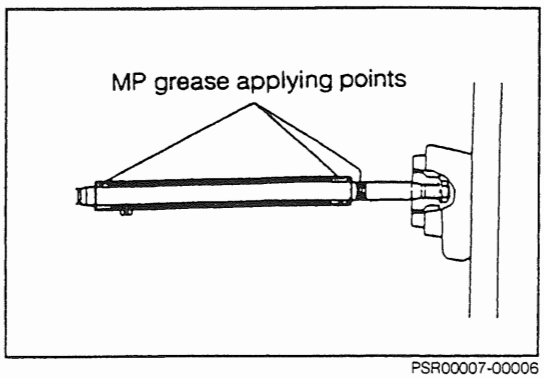
2. INSTALLATION

Install the parts in the numerical order shown in the figure below.



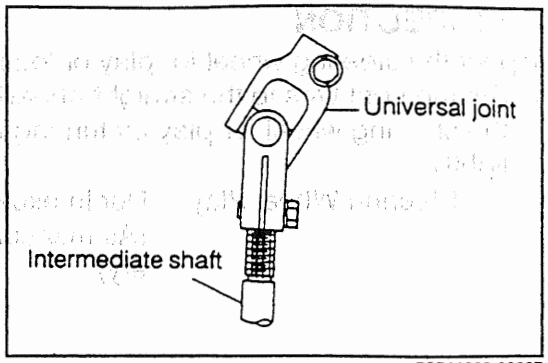
PSR00006-00005

(1) Apply the MP grease to those points specified in the right figure.



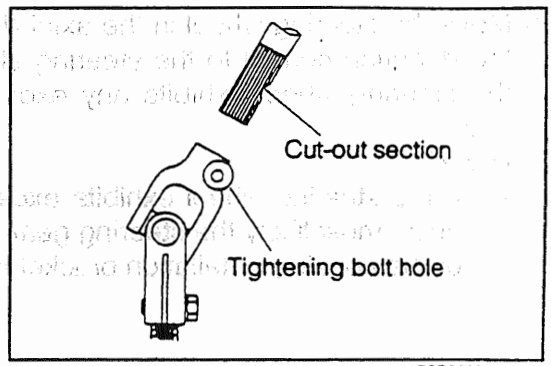
PSR00007-00006

(2) Set the front wheels to the straight-ahead condition. Install the universal joint in the positional relationship as indicated in the right figure.



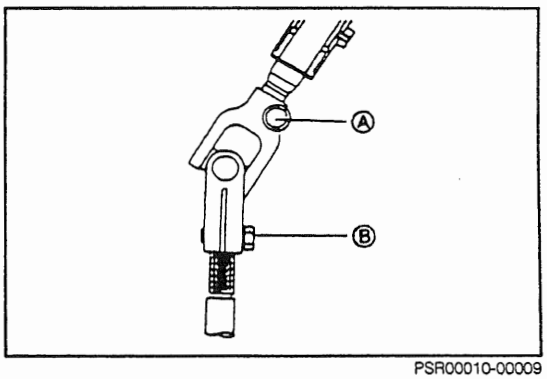
PSR00008-00007

(3) Install the steering main shaft in such a way that the cut-out section provided at the spline section of the steering main shaft may be aligned with the tightening bolt hole of the universal joint.



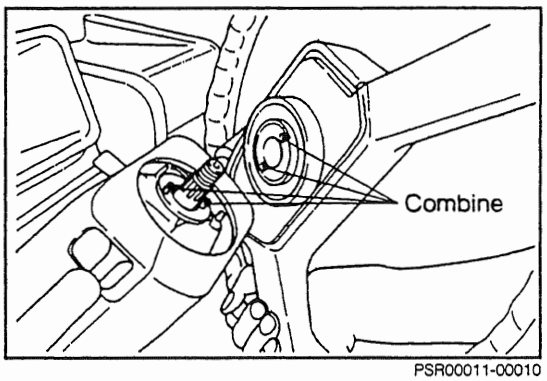
PSR00009-00008

(4) Temporarily tighten the bolts j and k as indicated in the right figure. Also, install the steering wheel temporarily.
(5) Operate the steering wheel two or three times both to the right and to the left, until it is locked. Then, bring the front wheels to the straight-ahead condition.
(6) Tighten the bolts j and k to the specified torque.
(7) Remove the steering wheel that has been mounted temporarily.



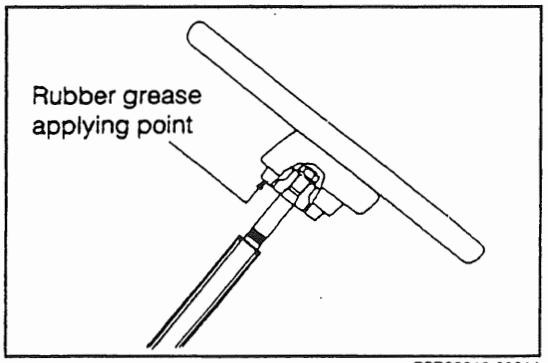
PSR00010-00009

(8) Install the steering wheel in such a way that the recessed section at the back side of the steering wheel may be aligned with the projected section of the self-canceling cam of the turn signal switch.



PSR00011-00010

(9) Apply rubber grease to the point specified in the right figure.



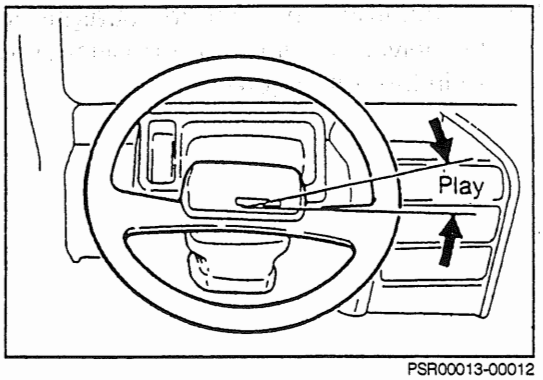
PSR00012-00011

3. INSPECTION

Inspect the steering wheel for play or looseness as follows.

(1) Set the front tires to the straight-ahead condition. Check the steering wheel for play by turning the steering wheel lightly.

Steering Wheel Play: Not to exceed 30 mm (As measured at wheel periphery)

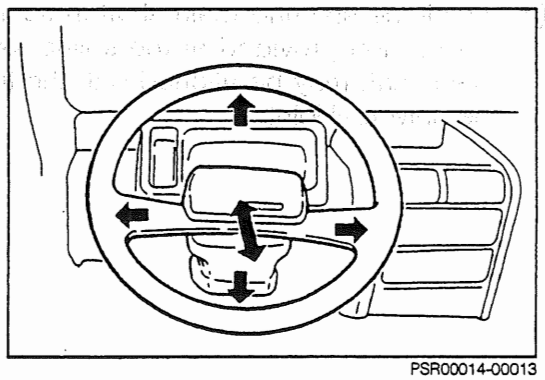


PSR00013-00012

(2) Move the steering wheel in the axial direction as well as in the direction normal to the steering shaft. Check to see if the steering wheel exhibits any excessive play or looseness.

NOTE:

- If the steering wheel exhibits excessive play or looseness, most likely the steering gear or links are worn out or the housing installation bracket is loose.

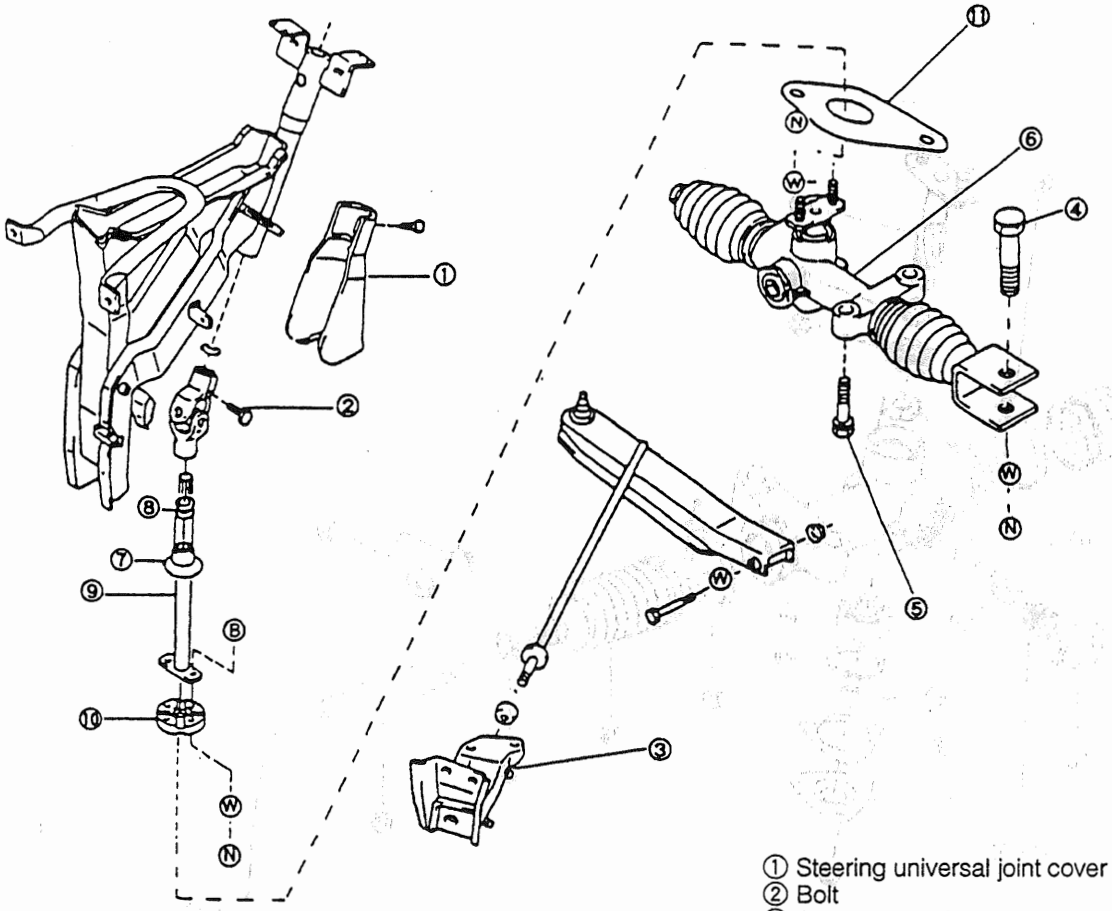


PSR00014-00013

STEERING GEAR ASSEMBLY

1. REMOVAL

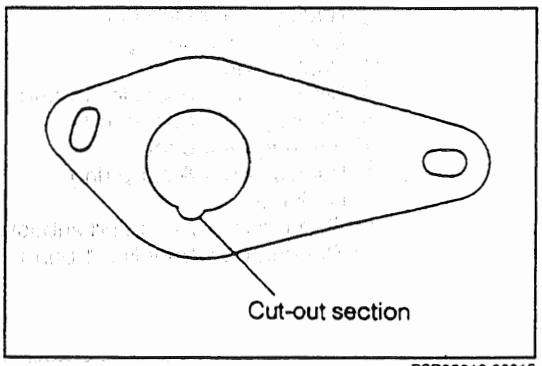
Remove the parts in the numerical order shown in the figure below.



① Steering universal joint cover
② Bolt
③ Strut bar bracket subassembly
(For the removal, refer to FS section.)
④ Hexagon bolt
⑤ Bolt
⑥ Steering gear assembly
⑦ Dust cover
⑧ Bush
⑨ Steering intermediate shaft subassembly
⑩ Flexible coupling assembly
⑪ Steering gear housing cover

PSR00015-00014

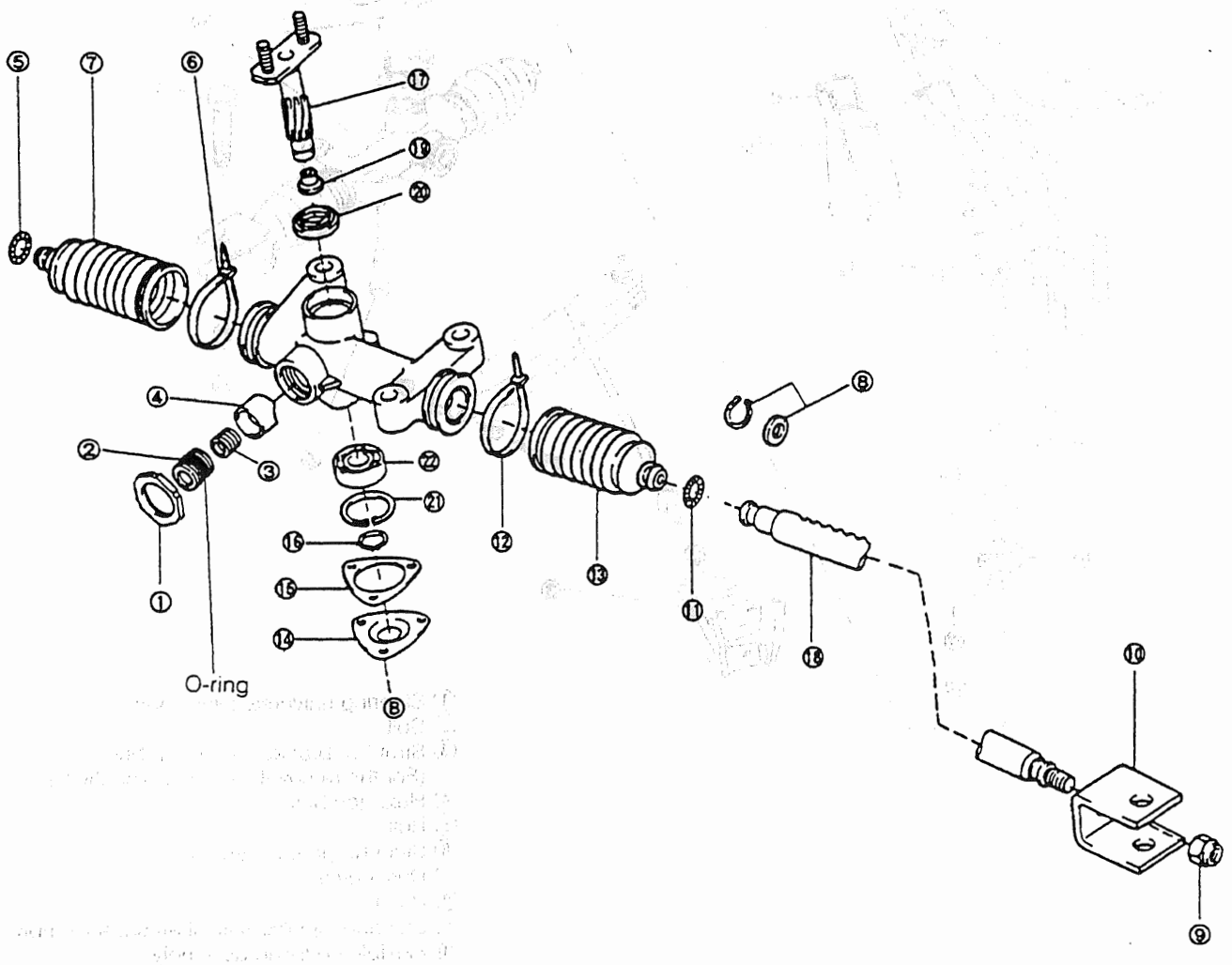
(1) Jack up the front section of the vehicle.
(2) Remove the steering gear housing cover by aligning the cut-out section of the plate with the pinion flange.



PSR00016-00015

2. DISASSEMBLY

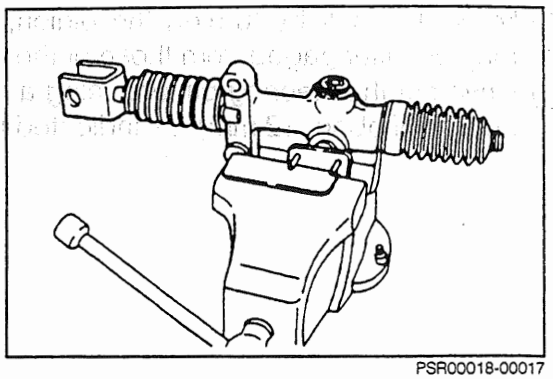
Disassemble the parts in the numerical order shown in the figure below.



① Hexagon nut
② Rack guide spring cap
③ Compression spring
④ Rack guide
⑤ Steering rack boot No. 1 band
⑥ Steering rack boot band
⑦ Steering rack boot
⑧ Rack stopper & snap ring
⑨ Lock nut
⑩ Steering rack No. 1 end subassembly
⑪ Steering rack boot No. 1 band
⑫ Steering rack boot band
⑬ Steering rack boot
⑭ Steering gear housing cover
⑮ Steering rack housing left packing
⑯ Shaft snap ring
⑰ Steering pinion
⑱ Steering rack
⑲ Dust cover
⑳ Type "T" oil seal
㉑ Bearing snap ring
㉒ Radial ball bearing

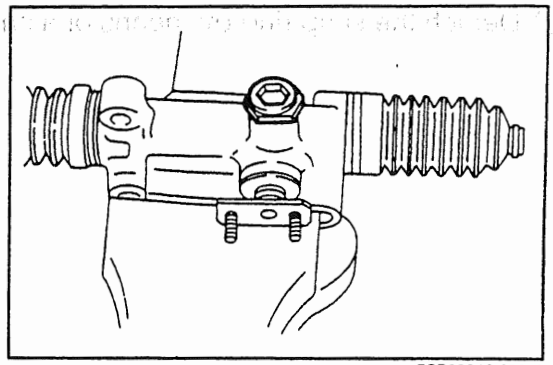
PSR00017-00016

(1) Clamp the steering gear housing in a vice. This clamping should be made at the mounting section of the steering gear housing with jaw plates of copper or aluminum interposed.



PSR00018-00017

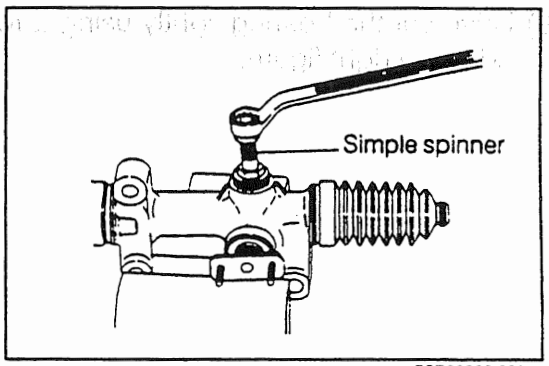
(2) Remove the hexagon nut, using the socket wrench (whose width across flats is 39 mm).



PSR00019-00018

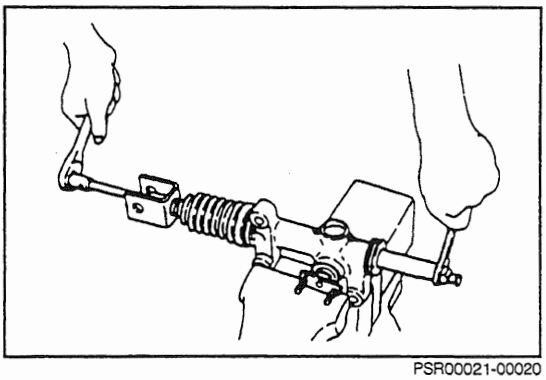
(3) Remove the rack guide spring cap by means of a simple spinner.

Simple Spinner: (Width across two flats, 17 mm)



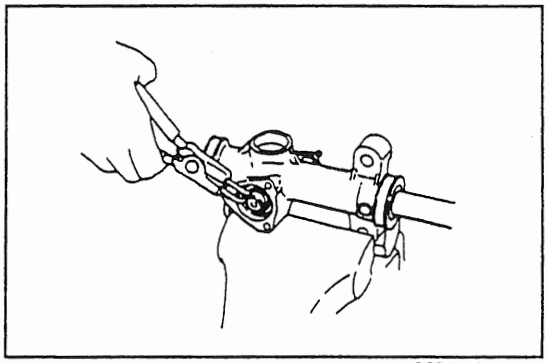
PSR00020-00019

(4) To prevent the tooth surfaces from being damaged, remove the lock nut with a wrench applied to the machined section whose width across flats is 17 mm. This machined section has been provided at the rack end, as indicated in the right figure.



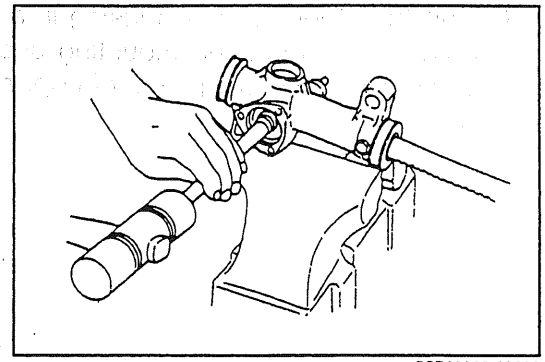
PSR00021-00020

(5) Detach the snap ring, using a snap ring expander.



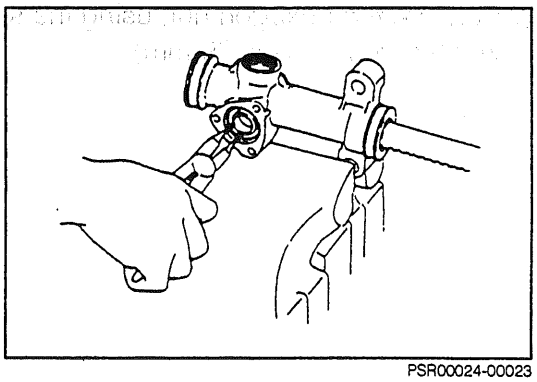
PSR00022-00021

(6) Move the rack by turning the pinion, until the rack teeth may be disengaged from those of the pinion.
(7) Drive out the steering pinion, using a round rod (with a diameter of about 12 mm), as indicated in the right figure.



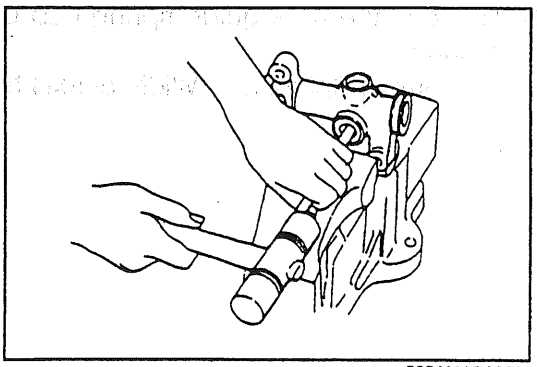
PSR00023-00022

(8) Detach the snap ring by means of a snap ring expander.



PSR00024-00023

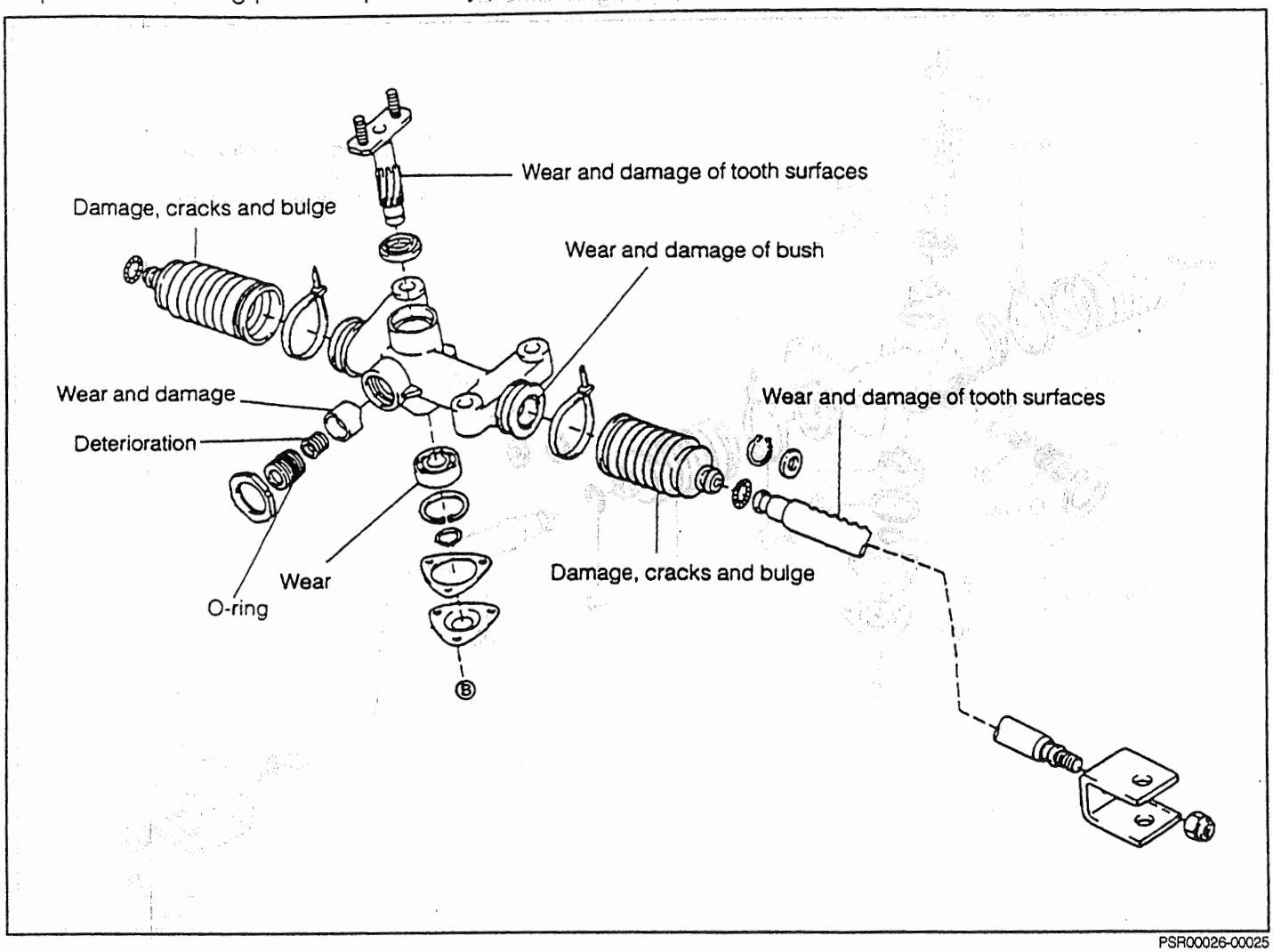
(9) Drive out the bearing lightly using a round rod, as indicated in the right figure.



PSR00025-00024

3. INSPECTION

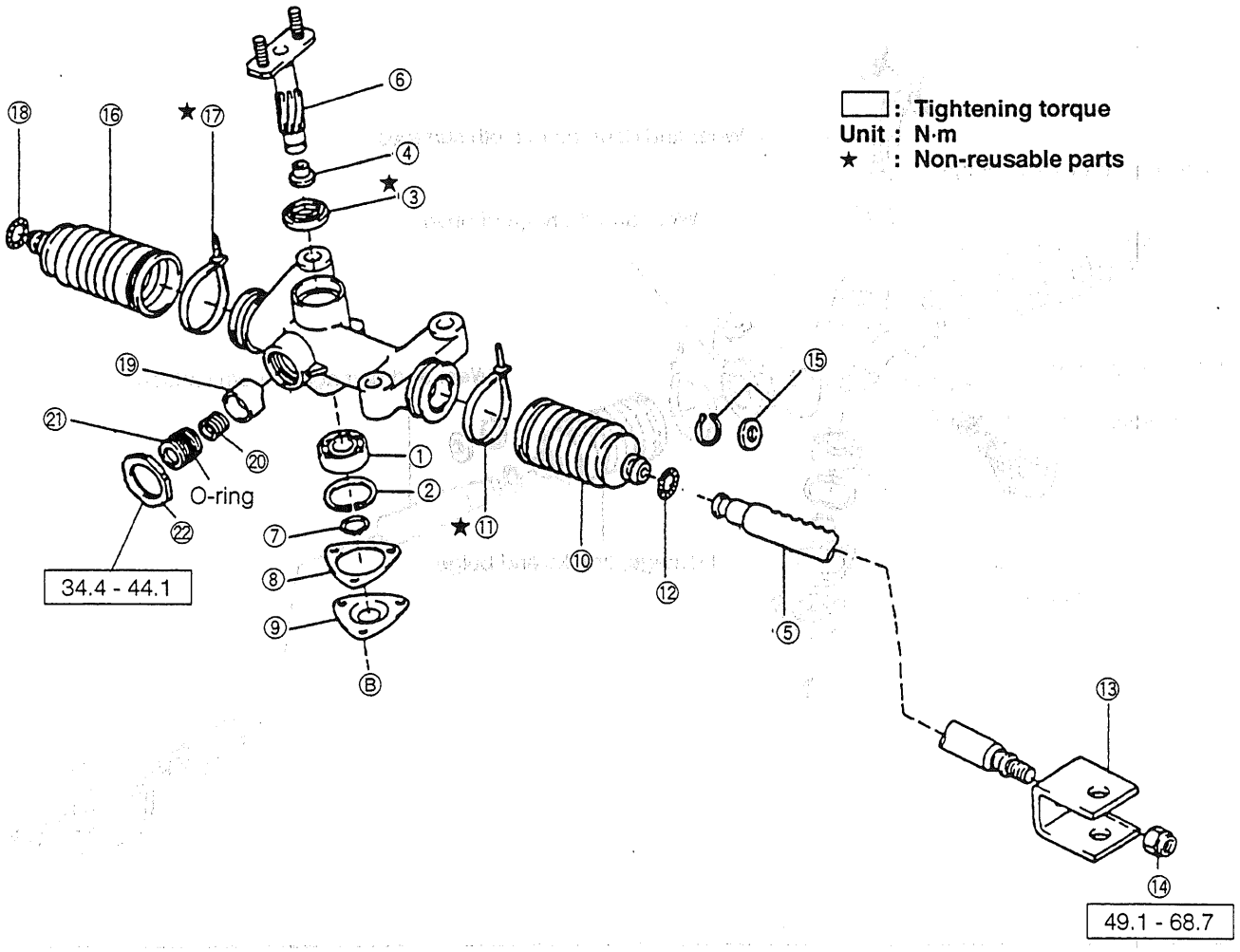
Inspect the following parts. Replace any parts which exhibit defects.



PSR00026-00025

4. ASSEMBLY

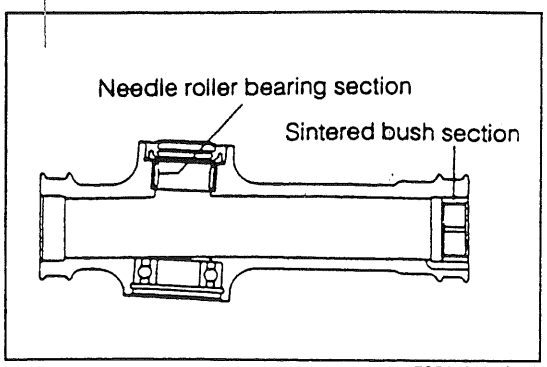
Assemble the parts in the numerical order shown in the figure below.



① Radial ball bearing
② Bearing snap ring
③ Type "T" oil seal
④ Dust cover
⑤ Steering rack
⑥ Steering pinion
⑦ Steering snap ring
⑧ Steering rack housing left packing
⑨ Steering gear housing cover
⑩ Steering rack boot
⑪ Steering rack boot band
⑫ Steering rack boot No. 1 band
⑬ Steering rack No. 1 end subassembly
⑭ Lock nut
⑮ Rack stopper & snap ring
⑯ Steering rack boot
⑰ Steering rack boot band
⑱ Steering rack boot No. 1 band
⑲ Rack guide
⑳ Compression spring
㉑ Rack guide spring cap
㉒ Hexagon nut

PSR00027-00026

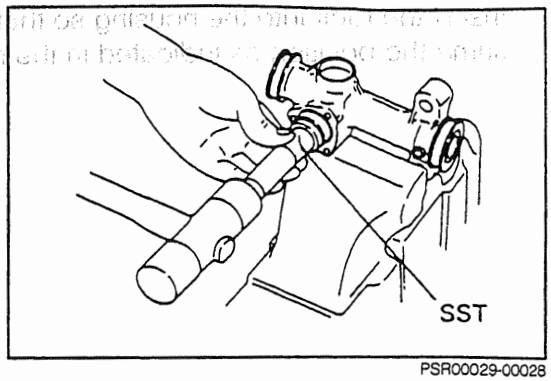
(1) Apply specified amount of Extreme-Pressure grease (EP grease) to those points specified in the right figure specified grease amount.
Needle Roller Bearing: 0.2 - 0.4 gr.
Sintered Bush Section: 0.2 - 0.4 gr.



PSR00028-00027

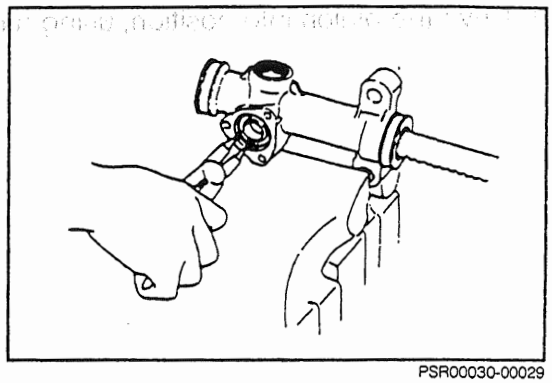
(2) Install the radial ball bearing, using the following SST.
SST: 09608-87501-000

(3) Pack the specified amount of Extreme-Pressure grease (EP grease) to the radial ball bearing.



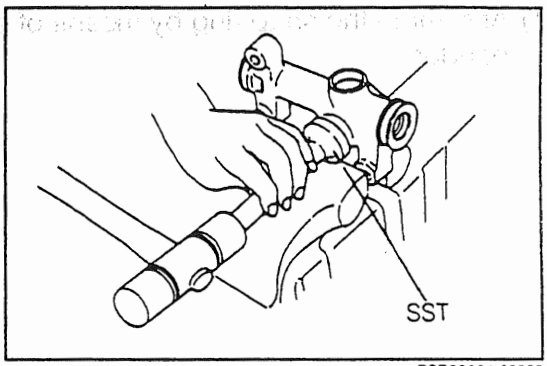
PSR00029-00028

(4) Assemble the snap ring by means of a snap ring expander.


PSR00030-00029

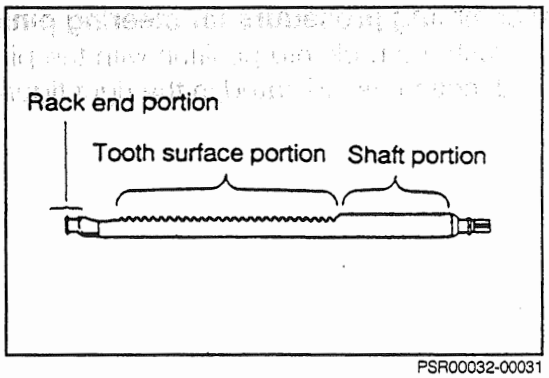
(5) Install the oil seal, using the following SST.
SST: 09608-87501-000

(6) When assembling the oil seal, coat the entire lip-section of the oil seal with Extreme-Pressure grease (EP grease).



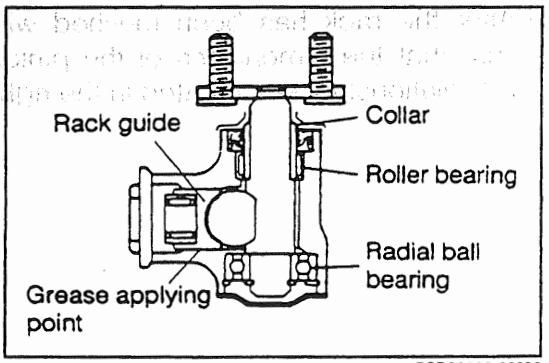
PSR00031-00030

(7) Apply the specified amount of Extreme-Pressure grease (EP grease) to the tooth surfaces and the shaft portion of the rack.
Specified Grease Amount
Rack End: Very small amount
Tooth Surface: 4 gr.
Shaft: 1 gr.



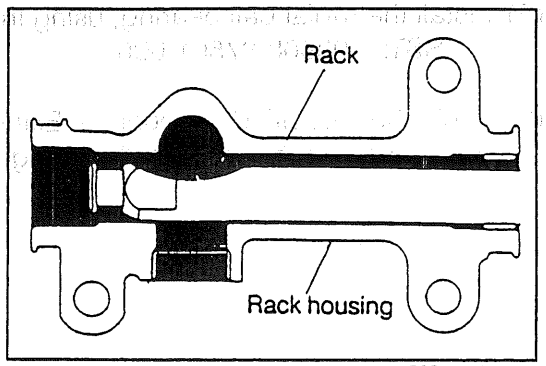
PSR00032-00031

(8) Apply the specified amount of Extreme-Pressure grease (EP grease) to the rack guide insertion hole.
Specified Grease Amount: 2 - 4 gr.



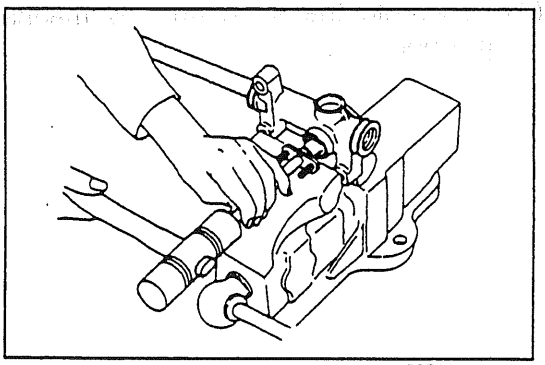
PSR00033-00032

(9) Insert the rack into the housing so that the rack may assume the position as indicated in the right figure.



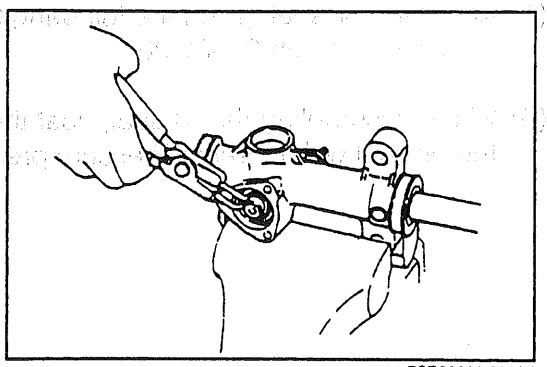
PSR00034-00033

(10) Drive the pinion into position, using a round rod.



PSR00035-00034

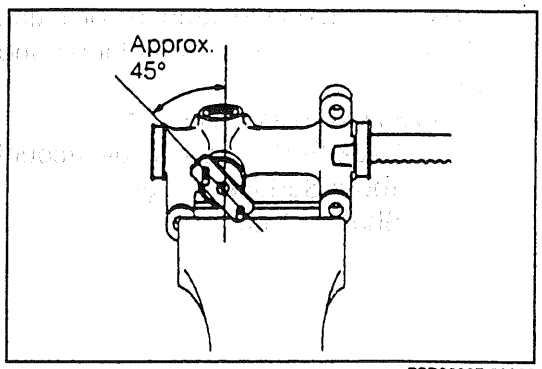
(11) Assemble the snap ring by means of a snap ring expander.



PSR00036-00035

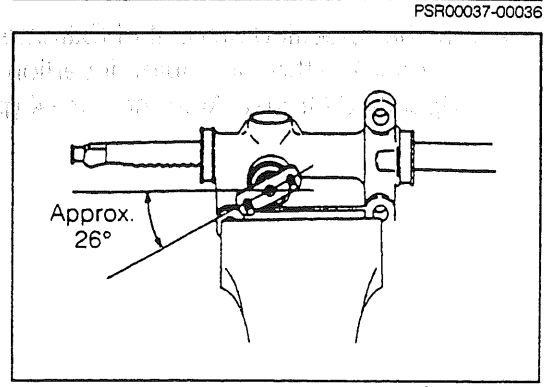
Assembling procedure for steering pinion and rack

(1) Push the rack into position with the pinion flange set to the direction as indicated in the right figure.



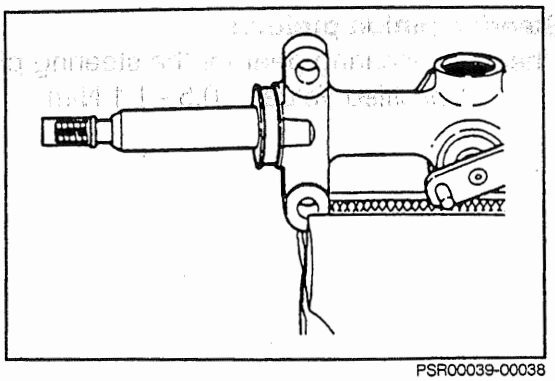
PSR00037-00036

(2) After the rack has been meshed with the pinion, make sure that the dimensions of the pinion and rack assume the relationship as indicated in the right figure.



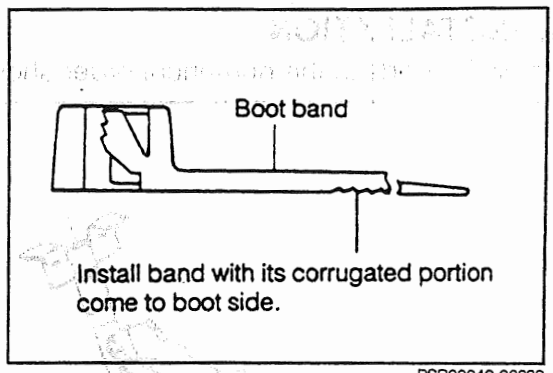
PSR00038-00037

(3) Fit a vinyl tube or the like onto the threaded portion of the rack so that no damage may be made to the boot during the assembly.



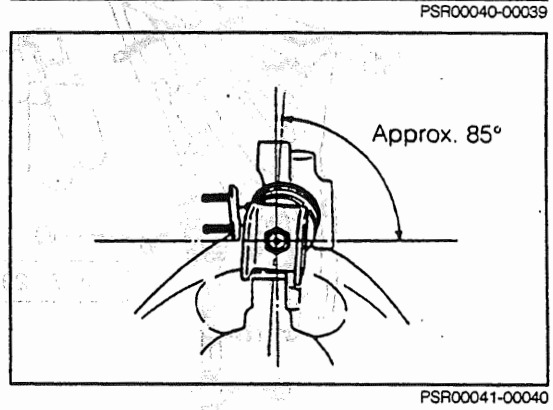
PSR00039-00038

(4) Tighten the boot band at the position as specified in the right figure.



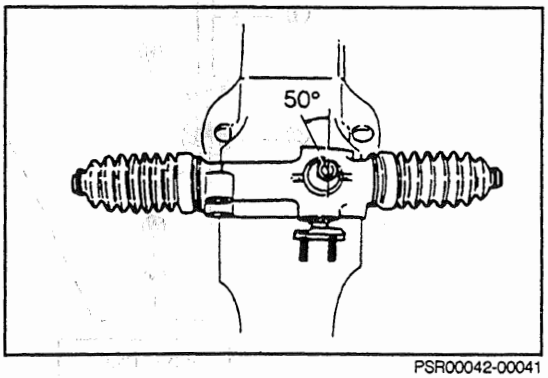
PSR00040-00039

(5) Set the steering rack end No. 1 to the angle specified in the right figure.
(6) Tighten the lock nut with a wrench applied to the machined section whose width across flats is 17 mm.



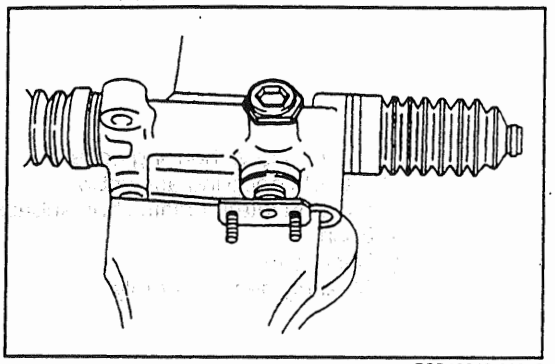
PSR00041-00040

(7) At the rack neutral position, torque the spring cap to 6.9 N·m (0.7 kgf-m). Move the rack about 10 to 20 times as the bedding-in operation. Loosen the spring cap and set the rack the neutral position.
Afterwards, torque the spring cap to 6.9 N·m by means of the simple spinner (whose width across flats is 17 mm). Then, back off it to an angle of 50° ± 5°.



PSR00042-00041

(8) Install the hexagon nut, using the socket wrench (whose width across flats is 39 mm).
Specified Torque: 34.4 - 44.1 N·m



PSR00043-00042

Steering pinion preload

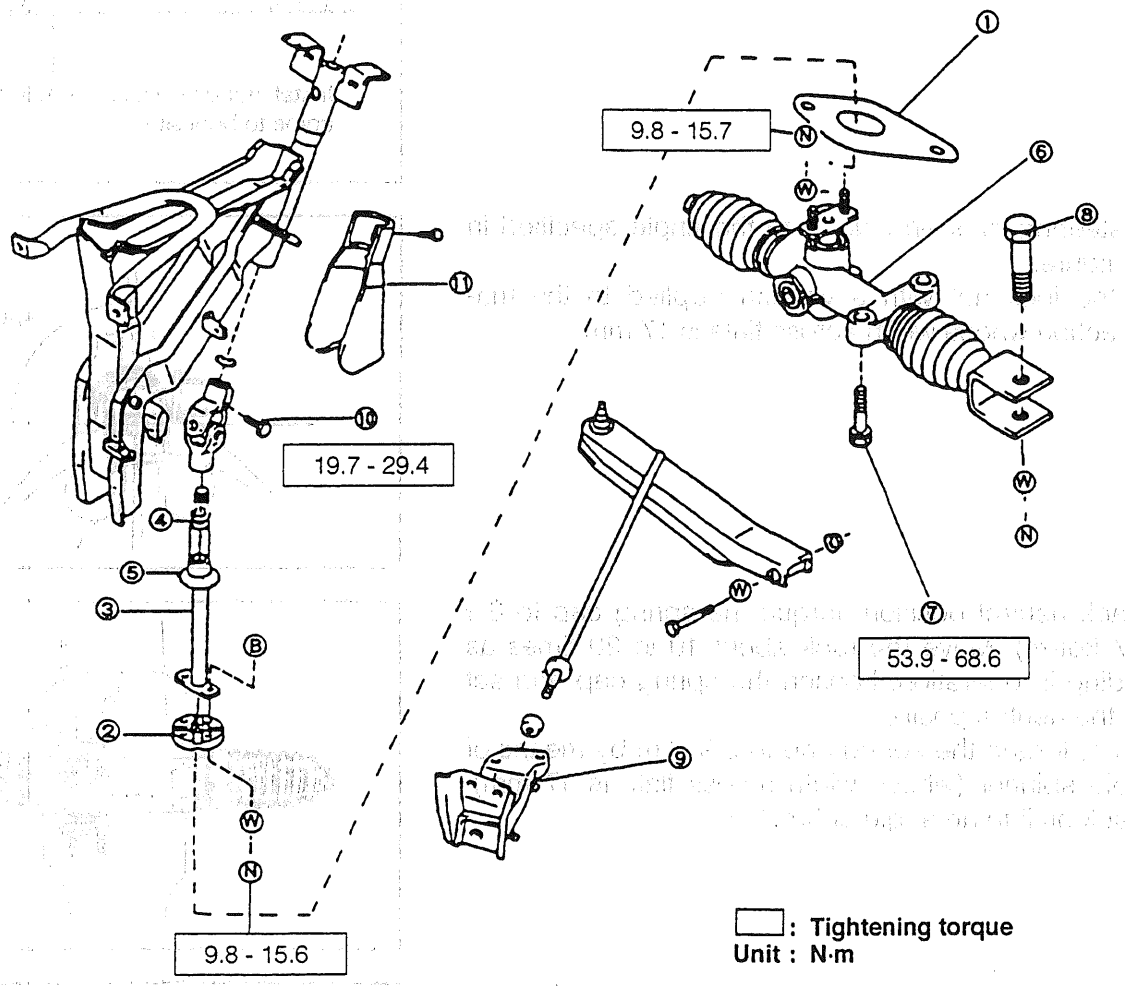
Check the steering gear for the steering pinion preload.

Specified Value: 0.5 - 1.1 N·m

PSR00044-00000

5. INSTALLATION

Install the parts in the numerical order shown in the figure below.



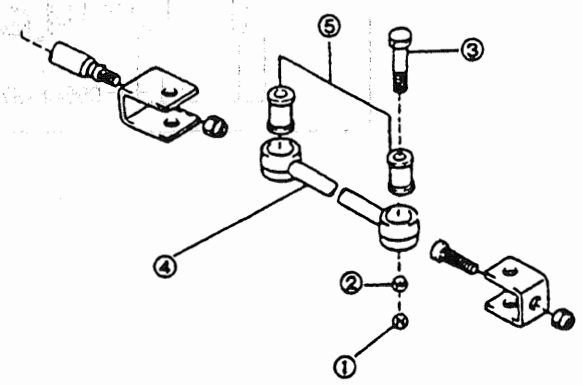
① Steering gear housing cover
② Flexible coupling assembly
③ Steering intermediate shaft subassembly
④ Bush
⑤ Dust cover
⑥ Steering gear assembly
⑦ Bolt
⑧ Hexagon bolt
⑨ Strut bar bracket subassembly
⑩ Bolt
⑪ Steering universal joint cover

PSR00045-00043

DRAG LINK

1. REMOVAL

Remove the parts in the numerical order shown in the figure below.

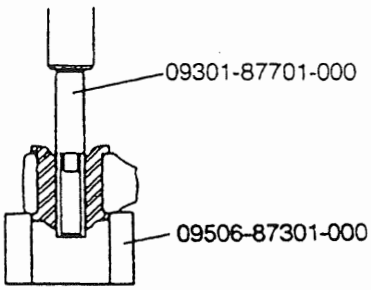


① Nut
② Spring washer
③ Bolt
④ Steering drag link
⑤ Bush

PSR00046-00044

Press the bush off. For this removal operation, use a set of the following SSTs in conjunction with a press, as indicated in the right figure.

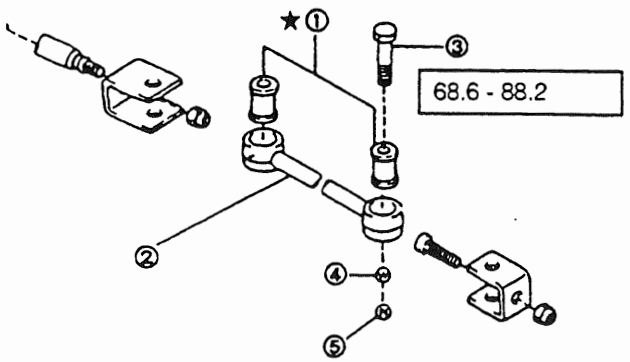
SST: 09301-87701-000
SST: 09506-87301-000



PSR00047-00045

2. INSTALLATION

Install the parts in the numerical order shown in the figure below.



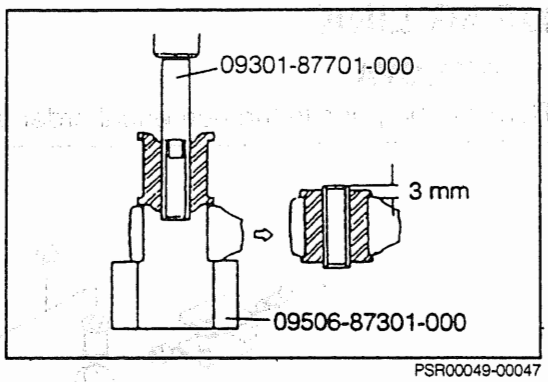
① Bush
② Steering drag link
③ Bolt
④ Spring washer
⑤ Nut

□ : Tightening torque
Unit : N·m
★ : Non-reusable parts

PSR00048-00046

Press the bush into position. For this installation, use a set of the following SSTs in conjunction with a press, as indicated in the right figure.

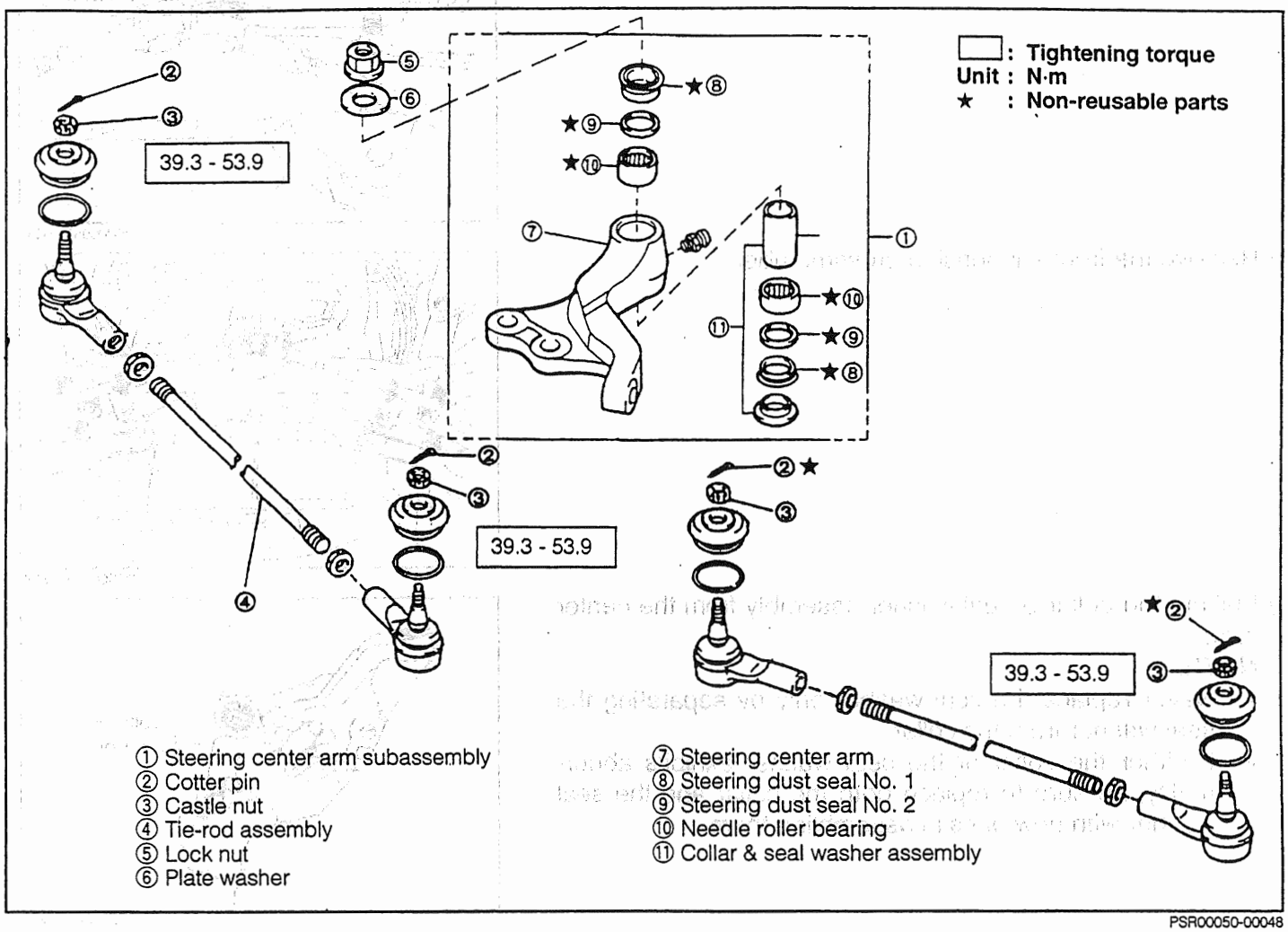
SST: 09301-87701-000
SST: 09506-87301-000



PSR00049-00047

CENTER ARM

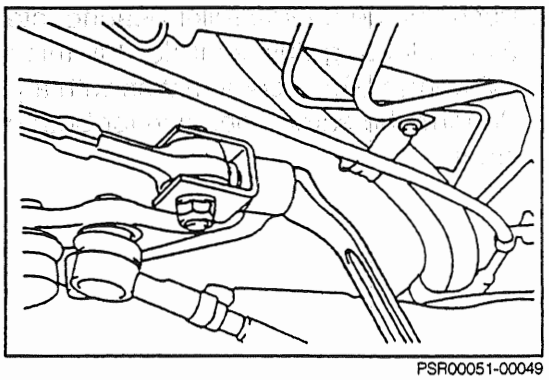
1. COMPONENTS



PSR00050-00048

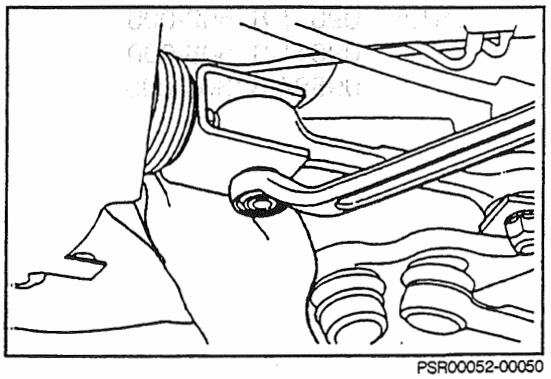
2. REMOVAL & DISASSEMBLY

(1) Turn the steering wheel. Remove the nut at a position where the tool can be applied easily.
Then, separate the center arm and the drag link by pulling them.



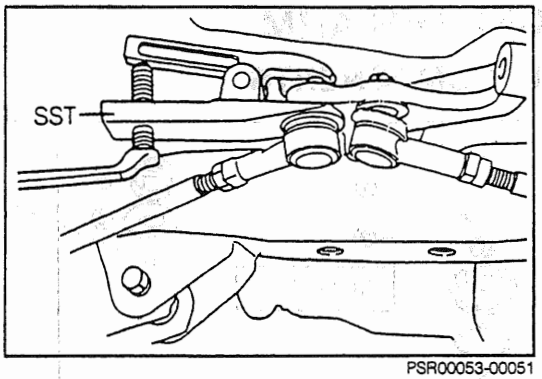
PSR00051-00049

(2) Remove the nut at the steering rack side. With the tires set to the straight-ahead state, pull out the attaching bolt upward.



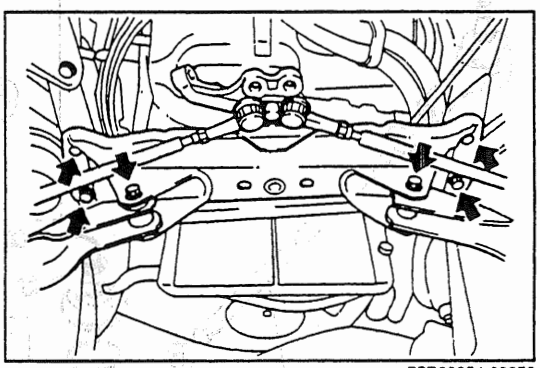
PSR00052-00050

(3) Disconnect the tie rod end, using the following SST.
SST: 09611-87701-000

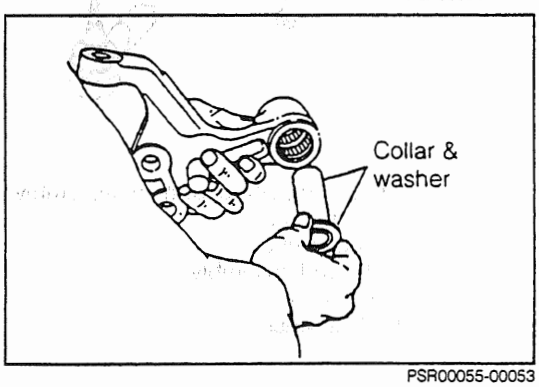


PSR00053-00051

(4) Remove the front suspension crossmember.


PSR00054-00052

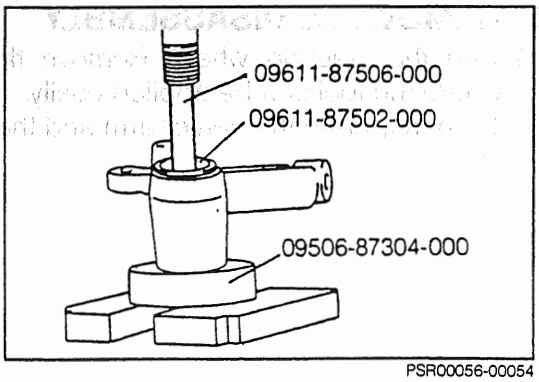
(5) Pull out the collar & seal washer assembly from the center arm.
NOTE:
- Never replace the seal washer only by separating the seal washer from the collar.
- If either the collar or the seal washer exhibits abnormality, be sure to replace both the collar and the seal washer with new ones in assembling them.



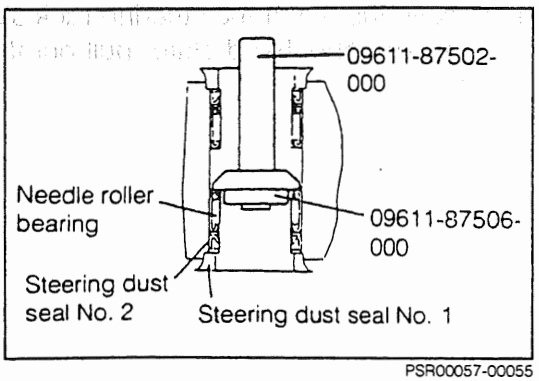
PSR00055-00053

(6) Push out the needle roller bearing, steering dust seal No. 2 and steering dust seal No. 1 in this sequence, using the following SSTs in combination with a press.
Perform the same operation for both upper and lower sides.

SSTs: 09611-87502-000
09611-87506-000
09506-87304-000



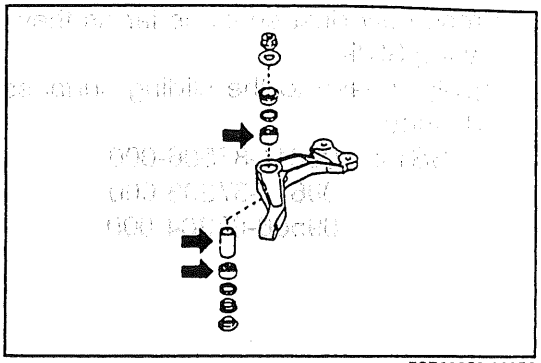
PSR00056-00054



PSR00057-00055

3. INSPECTION

Check the collar and bearings for wear or damage.

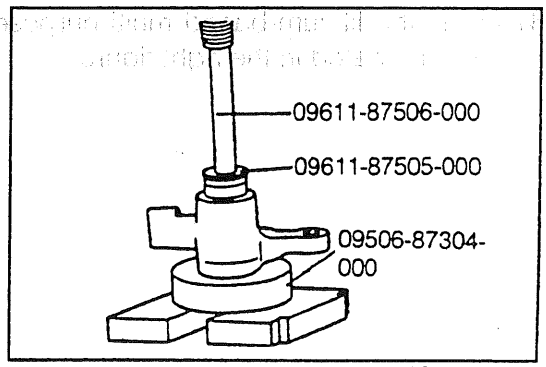


PSR00058-00056

4. INSTALLATION & ASSEMBLY

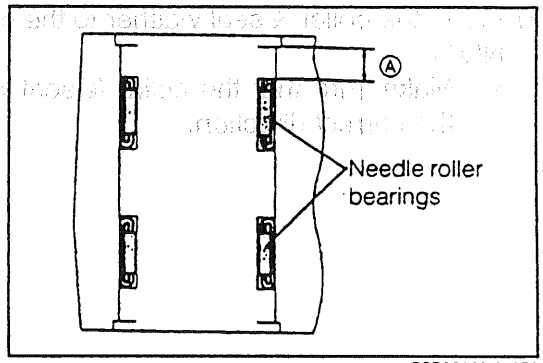
(1) Press new bearings, using the following SSTs in combination with a press.
Liberally apply the lithium-based multi-purpose grease to the inside of the bearing in advance.

SSTs: 09611-87506-000
09611-87505-000
09506-87304-000



PSR00059-00057

Specified Depth of Bearing: 6.0 - 6.3 mm

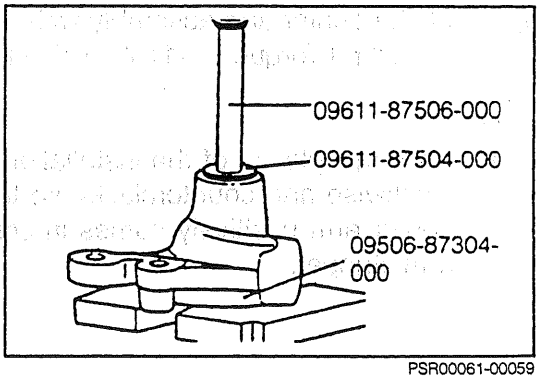


PSR00060-00058

(2) Press new dust seals, using the following SSTs.
Apply grease to the sliding surfaces of the dust seals in advance.

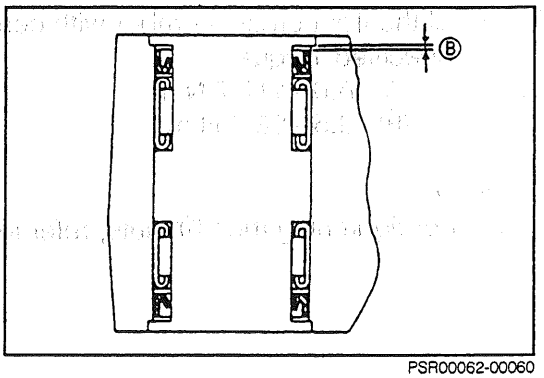
SSTs: 09611-87506-000
09611-87504-000
09506-87304-000

NOTE:
- Make sure that the dust seal is assembled in the correct direction.



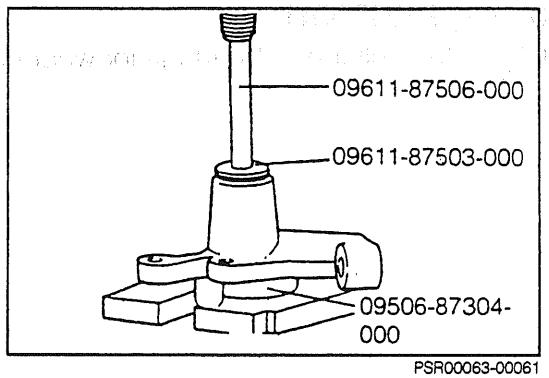
PSR00061-00059

Specified Depth of Dust Seal: 0.1 - 0.7 mm



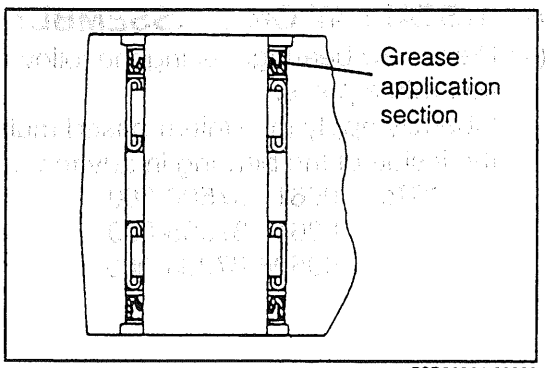
PSR00062-00060

(3) Press new dust seals as far as they will go, using the following SSTs.
Apply grease to the sliding surfaces of the dust seals in advance.
SSTs: 09611-87506-000
09611-87503-000
09506-87304-000



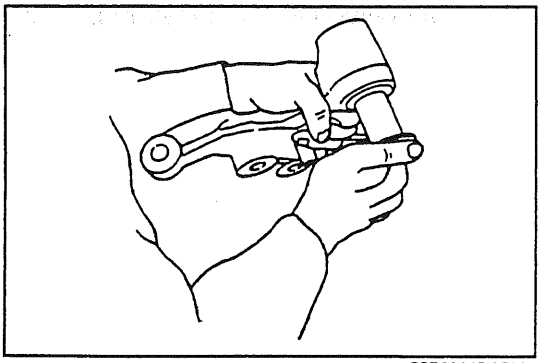
PSR00063-00061

(4) Apply the lithium-based multi-purpose grease to the sections indicated in the right figure.



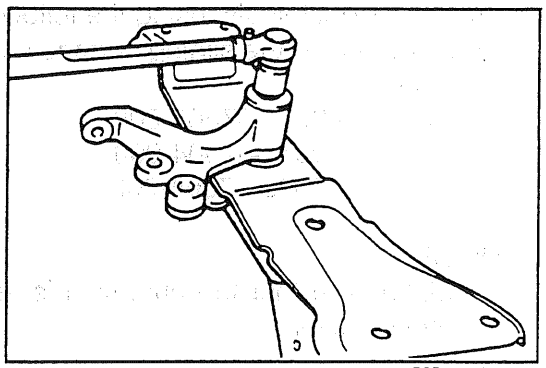
PSR00064-00062

(5) Insert the collar & seal washer to the center arm.
NOTE:
- Make sure that the collar & seal washer is inserted in the correct direction.


PSR00065-00063

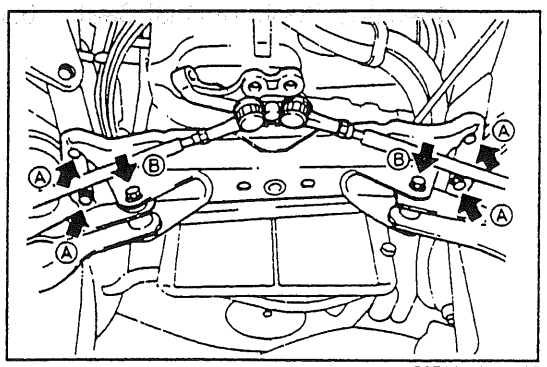
(6) Install the center arm assembly with a new lock nut.
Specified Torque: 111.7 - 137.3 N·m

NOTE:
- After completion of the installation, turn the center arm clockwise and counterclockwise to make sure that the center arm positively comes in contact with the center arm stopper.


PSR00066-00064

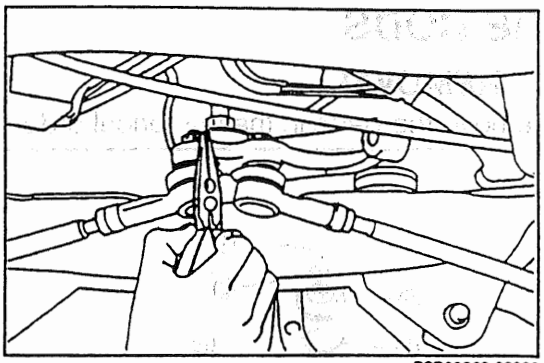
(7) Install the front cross member with center arm assembly.
Specified Torque:
Ⓐ 98.0 - 117.7 N·m
Ⓑ 78.5 - 98.0 N·m

NOTE:
- For tightening the "Ⓑ" nuts, refer to the FS section.

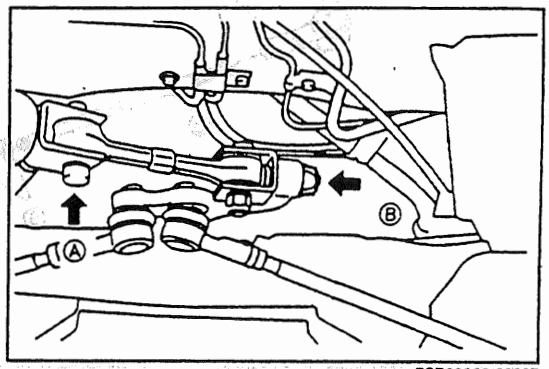


PSR00067-00065

(8) Tighten the tie rod end to the specified torque. Then, attach a new cotter pin.
Specified Torque:
39.3 - 53.9 N·m (4.0 - 5.5 kgf-m, 28.9 - 39.8 ft-lb)


PSR00068-00066

(9) Tighten the drag link to the specified torque.
Specified Torque:
Ⓐ 68.6 - 88.2 N·m
Ⓑ 53.9 - 68.6 N·m



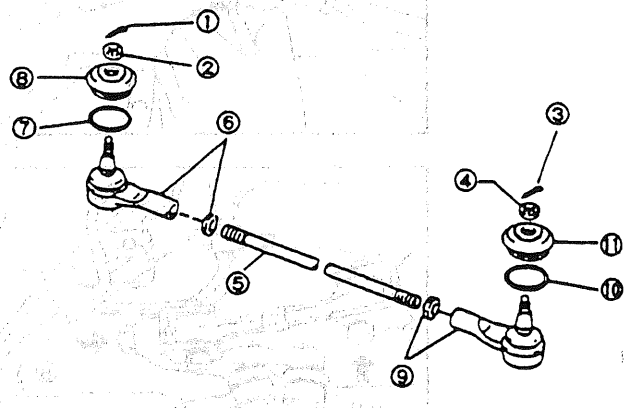
PSR00069-00067

(10) Front wheel alignment adjustment and inspection.

TIE-RODS

1. REMOVAL

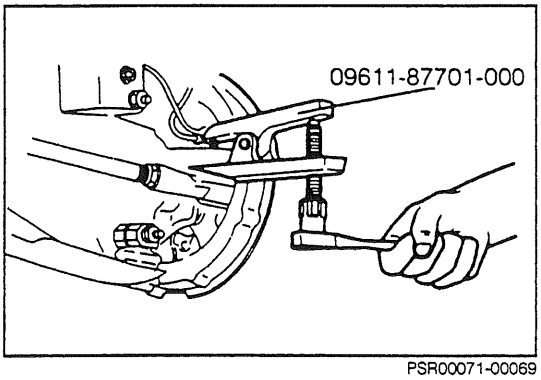
Remove the parts in the numerical order shown in the figure below.



① Cotter pin
② Castle nut
③ Cotter pin
④ Castle nut
⑤ Tie-rod assembly
⑥ Tie-rod No. 1 end subassembly
⑦ Steering joint dust seal band
⑧ Steering link joint dust seal
⑨ Tie-rod No. 2 end subassembly
⑩ Steering joint dust seal band
⑪ Steering link joint dust seal

PSR00070-00068

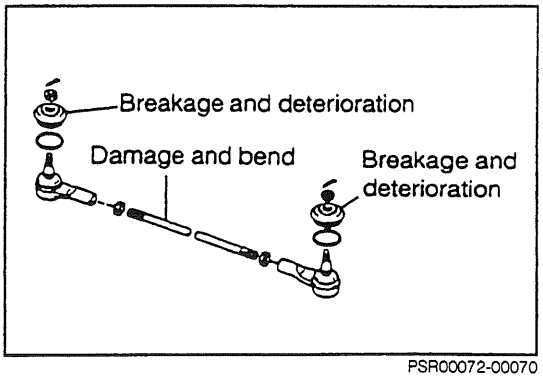
(1) Jack up the vehicle.
(2) Remove the tie-end assembly, using the following SST.
SST: 09611-87701-000



PSR00071-00069

2. INSPECTION

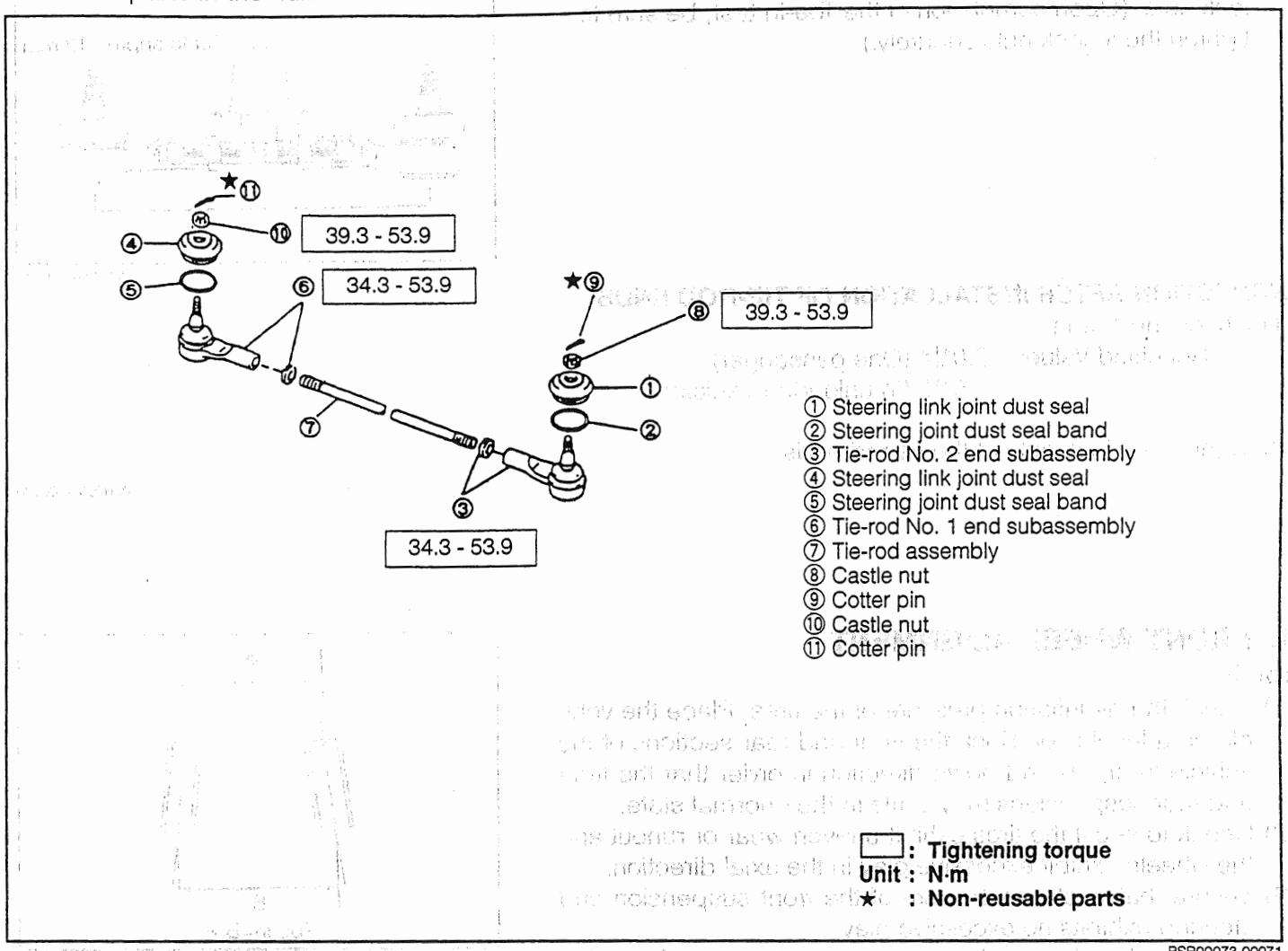
Inspect the following parts. Replace any parts which exhibit defects.



PSR00072-00070

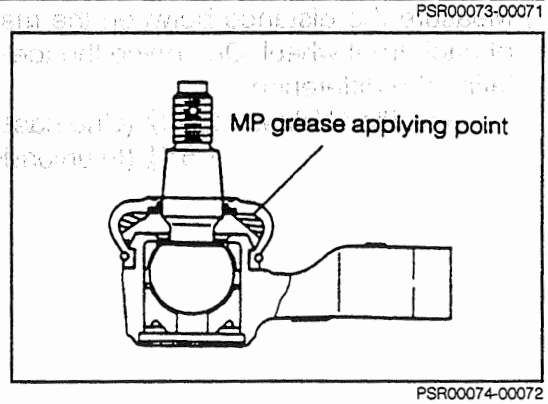
3. INSTALLATION

Install the parts in the numerical order shown in the figure below.



PSR00073-00071

(1) Apply the specified amount of lithium-based multi-purpose grease to the point specified in the right figure.
Specified Grease Amount: 3 cc



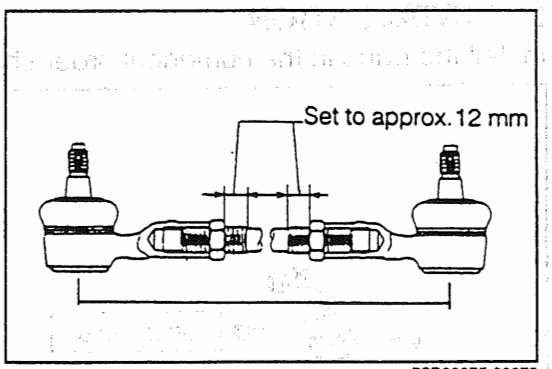
PSR00074-00072

NOTE:
- Make sure that the tapered section or the bolt serration section is free from grease.

Tie-rod end subassembly No. 1

NOTE:
- Make sure that the tie-rod ends having left-hand threads come at the center arm side of the right tie-rod assembly and at the knuckle side of the left tie-rod end assembly.

(2) Set the distance between the tie-rod ends to the dimension specified in the right figure. Temporarily tighten the lock nuts. (Upon completion of the Toe-in test, be sure to tighten these lock nuts securely.)



PSR00075-00073

INSPECTION AFTER INSTALLATION OF TIE-ROD ENDS

(1) Check the Toe-in.

Specified Value: $2.0^{+1.5}_{-1.0}$ (One passenger)
$1.5^{+1.5}_{-1.0}$ (In unloaded vehicle)

(2) Tighten the lock nuts of the tie-rod ends.

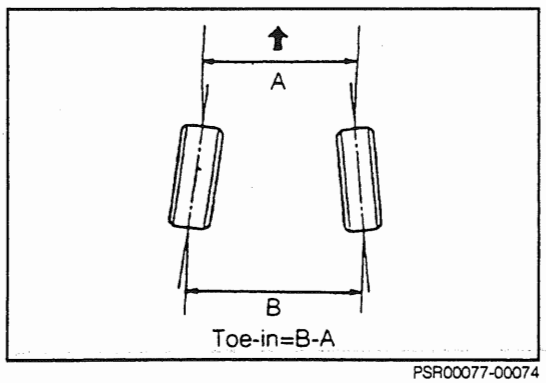
PSR00076-00000

4. FRONT WHEEL ALIGNMENT

Toe-in

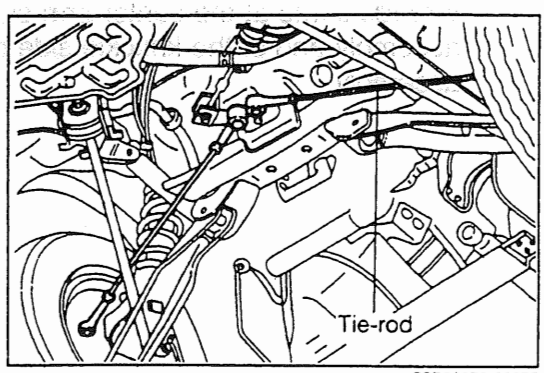
(1) Check the air inflation pressure of the tires. Place the vehicle on a level floor. Rock the front and rear sections of the vehicle in an up-and-down direction in order that the front and rear suspensions may settle in their normal state.
(2) Check to see if the tires exhibit uneven wear or runout and the wheels exhibit excessive play in the axial direction.
(3) Ensure that each mechanism of the front suspension and steering exhibits no excessive play.
(4) 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: $2.0^{+1.5}_{-1.0}$ (One passenger)
$1.5^{+1.5}_{-1.0}$ (In unloaded vehicle)



PSR00077-00074

(5) If the amount of toe-in is not within the specified range, slacken the lock nuts of the tie-rod ends. Perform the adjustment by turning the tie-rod ends.
NOTE:
- The adjustment must be carried out in such away that the tie-rod length at the right and left sides may become the same.



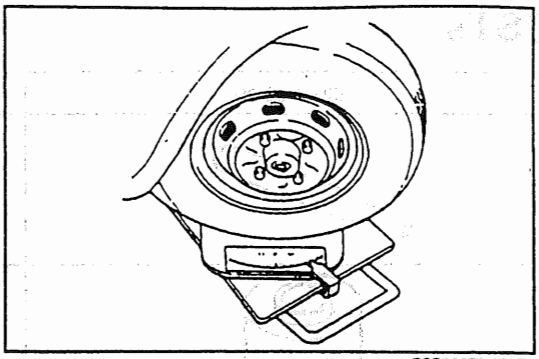
PSR00078-00075

(6) Set the turning radius gauge to "0" degree. Place the front wheels under the straight-ahead condition. Perform the check of the turning angles as follows:

① Turn the steering wheel fully to the right and left sides, respectively. Read the scales of the turning radius gages at the right and left sides.

NOTE:

- Make sure that there is no possibility that the wheels interfere with the body, etc. when the wheels are turned fully.

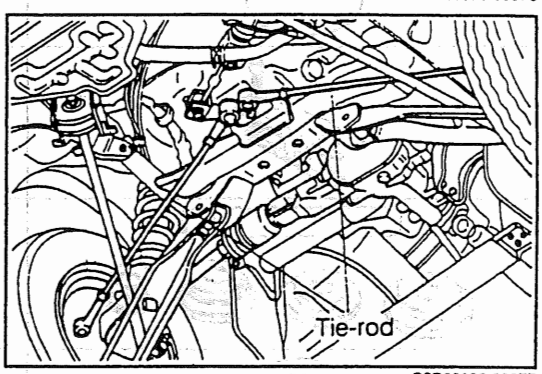


PSR00079-00076

② Check the tire turning angles when the steering wheel is turned fully to the right and left sides, respectively.

NOTE:

- If the length of the left tie-rod is increased by two turns, it is necessary to decrease the length of the right tie-rod by two turns, thereby making sure that the toe-in may remain the same.



PSR00080-00077

Inside	36°
Outside	34.8°
Difference between right and left sides	Not to exceed 3°

Front wheel alignment

Camber	$1°23' {}^{+40'}_{-50'}$ (Pick)	$1° {}^{+40'}_{-50'}$ (Van)
Caster	$3°13' \pm 1°$ (Pick)	$3°02' \pm 1°$ (Van)
Kingpin angle	$10°49' \pm 1°$ (Pick)	$11°25' \pm 1°$ (Van)
Toe-in	One passenger	$2.0 {}^{+1.5}_{-1.0}$
	In unloaded vehicle	$1.5 {}^{+1.5}_{-1.0}$

PSR00081-00078

Front wheel alignment check

In the strut type suspension, the rigidity of its components is very high and the distance between the upper and lower supporting points is great, thus resulting in high body rigidity. Hence, the front wheel alignment remains unchanged, unless the motor vehicle has encountered with major motor vehicle accidents. Nevertheless, if the front wheel alignment seems to be out-of-adjustment because of the tire's abnormal wear, steering troubles or other symptoms, it is advisable to check the front wheel alignment.

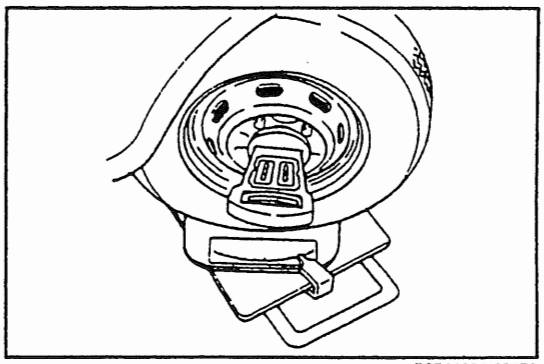
NOTE:

1 Before the front wheel alignment is measured make sure to check the vehicle for proper vehicle height as is the case with the toe-in measurement. Also ensure that the vehicle exhibits no excessive looseness at any point.

2 Be sure to place the turning radius gauge on a level ground. Furthermore raise the rear wheels of the vehicle by a height equivalent to the height of the turning radius gauge in order that the levelness of the motor vehicle may be maintained. Moreover be sure that the turning radius gauge moves lightly.

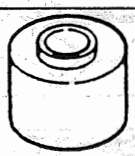
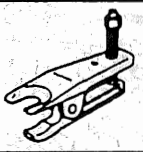
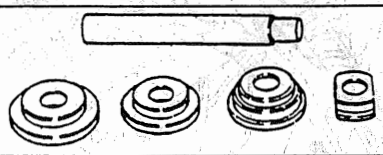
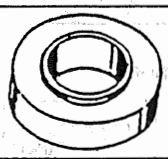
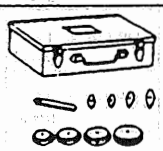
3 Prior to the measurement make certain to rock the front and rear parts of the vehicle in an up-and-down-direction so that the front and rear suspensions may be settled under a natural condition.

4 The measurement should be carried out with the brakes in a locked state.



PSR00082-00079

SSTs

Illustration	Tool No.	Tool name
	09301-87701-000	Clutch guide tool
	09506-87301-000	Differential drive pinion bearing cone rear replacer
	09611-87701-000	Tie-rod end puller
	09611-87502-000 09611-87503-000 09611-87504-000 09611-87505-000 09611-87506-000	Needle roller bearing & oil seal replacer
	09506-87304-000	Differential drive pinion bearing replacer
	09608-87501-000	Axle hub & drive pinion bearing tool set

PSR00083-00080

SERVICE SPECIFICATIONS

Item		Specified value		Remarks
Steering wheel play		Not to exceed 30 mm		
Steering rack starting force		Not to exceed 15 kg		With rack boots
Steering pinion preload		29.5 - 68.6 N·cm (3 - 7 kgf-m)		
Tire turning angle	Inside	36°		
	Outside	34.8°		
	Difference between right and left sides	Not to exceed 3°		
Front wheel alignment	Camber	$1°23' \pm 40'/-50'$ (Pick)	$1° \pm 40'/-50'$ (Van)	
	Caster	$3°13' \pm 1°$ (Pick)	$3°02' \pm 1°$ (Van)	
	Kingpin angle	$10°49' \pm 1°$ (Pick)	$11°25' \pm 1°$ (Van)	
	Toe-in mm	$2.0 \pm 1.5/-1.0$		One passenger
		$1.5 \pm 1.5/-1.0$		In unloaded vehicle

PSR00084-00000

TIGHTENING TORQUE

Tightening component	Tightening torque	
	N·m	kgf-m
Steering wheel × Steering shaft	29.4 - 39.2	3.0 - 4.0
Universal joint	19.6 - 29.4	2.0 - 3.0
Flexible coupling × Intermediate shaft	9.8 - 15.7	1.0 - 1.6
Flexible coupling × Steering pinion flange	9.8 - 15.7	1.0 - 1.6
Steering rack housing × Body	53.9 - 68.6	5.5 - 7.0
Steering rack × Steering rack No. 1	49.0 - 68.6	5.0 - 7.0
Rack guide cap lock nut × Steering rack housing	34.3 - 44.1	3.5 - 4.5
Drag link end × Drag link	68.6 - 88.2	7.0 - 9.0
Center arm × Front suspension cross member	111.7 - 137.3	12.0 - 14.0
Center arm × Tie-rod end	39.3 - 53.9	4.0 - 5.5
Tie-rod end × Tie-rod end lock nut	34.3 - 53.9	3.5 - 5.5
Tie-rod end × Knuckle arm	39.3 - 53.9	4.0 - 5.5

PSR00085-00000

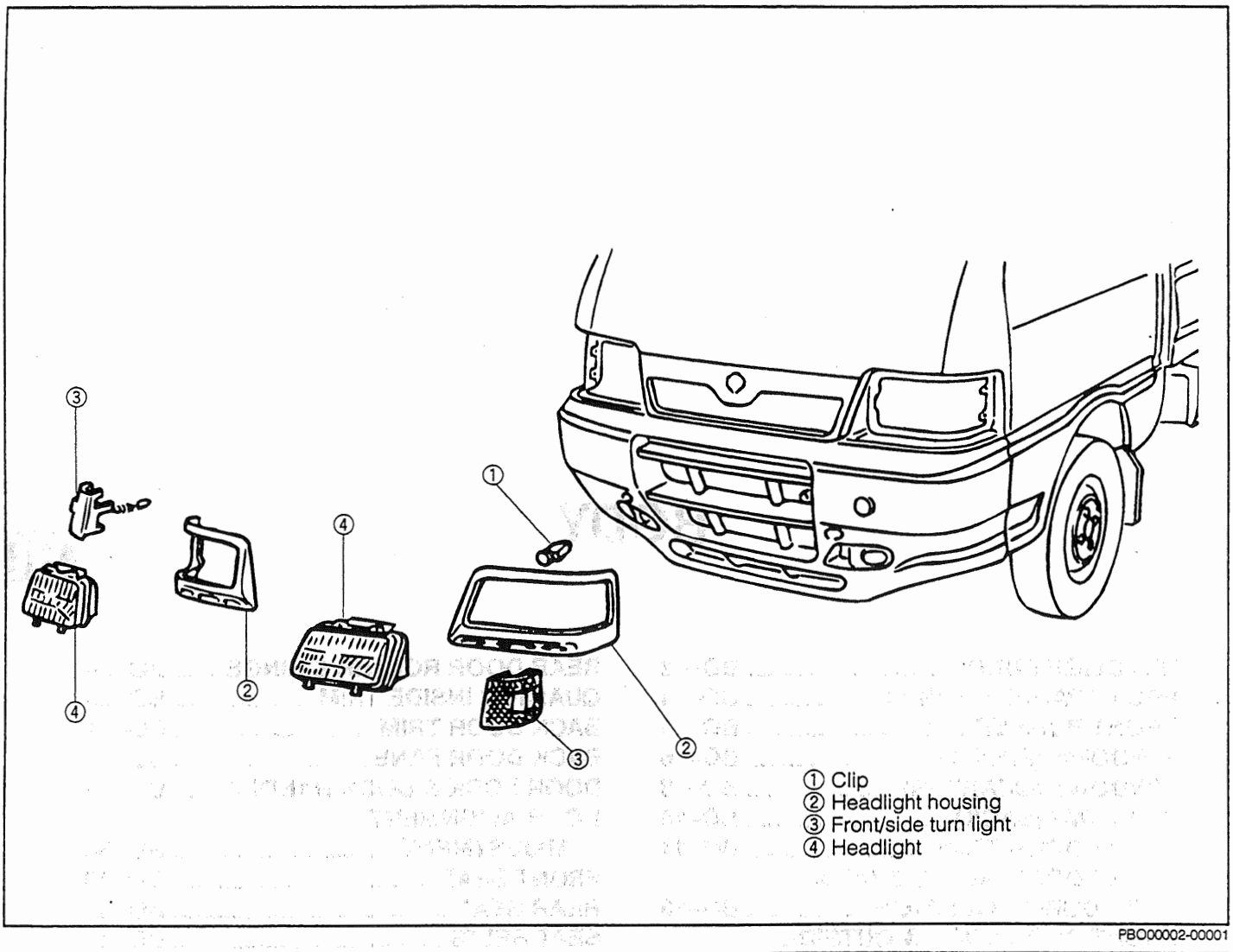
BODY

BO

HEADLIGHT UNIT ..... BO– 2
FRONT PANEL GARNISH ..... BO– 4
FRONT BUMPER ..... BO– 5
WINDOWS (FRONT) ..... BO– 6
WINDOWS (QUARTER) ..... BO– 8
WINDOWS (BACK) BO–10
FRONT DOOR TRIM BO–11
FRONT DOOR GLASS & DOOR WINDOW REGULATOR BO–13
FRONT DOOR LOCK & OUTSIDE HANDLE BO–16
REAR DOOR TRIM BO–18
REAR DOOR GLASS & DOOR WINDOW REGULATOR BO–20
REAR DOOR FRAME BO–23
REAR DOOR LOCK & OUTSIDE HANDLE BO–24
REAR DOOR ROLLER & HINGE BO–26
QUARTER INSIDE TRIM BO–30
BACK DOOR TRIM BO–31
BACK DOOR PANEL BO–32
DOOR LOCK & DOOR HANDLE BO–34
DOOR ALIGNMENT ADJUSTMENT BO–36
FRONT SEAT BO–40
REAR SEAT BO–41
SEAT BELTS BO–42
FUEL TANK BO–44
INSTRUMENT PANEL BO–46
EXHAUST PIPE BO–54
TIGHTENING TORQUE BO–56
SST BO–56

PBO00001-00000

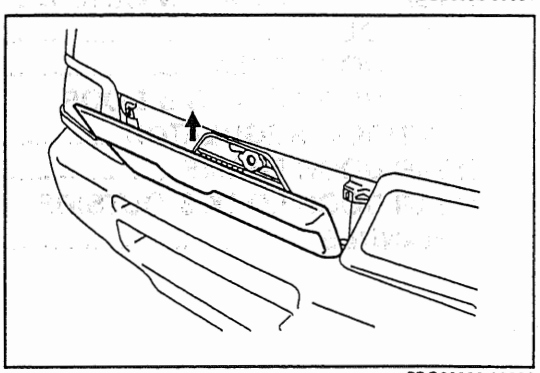
HEADLIGHT UNIT



PBO00002-00001

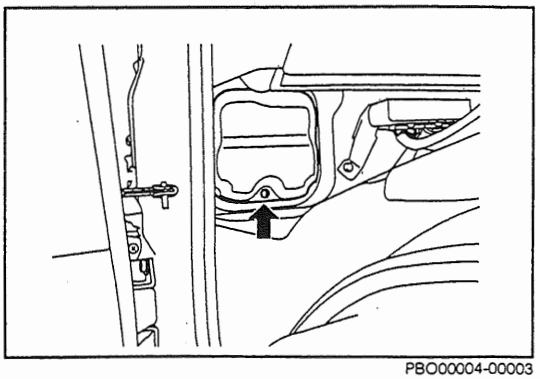
REMOVAL/REASSEMBLY

1. Remove the front panel center cover (see page BO-4).



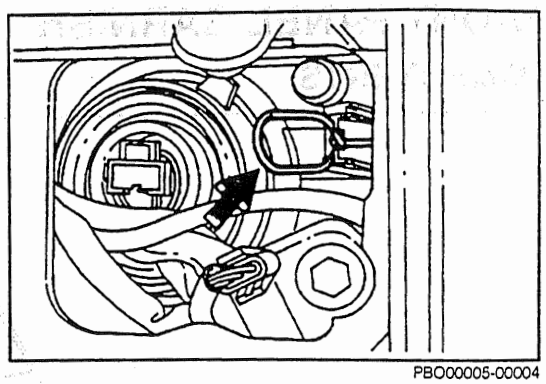
PBO00003-00002

2. Loosen and remove the fastening screw. Remove the headlight cover.



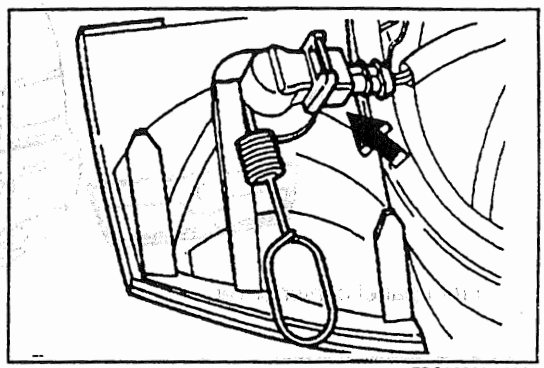
PBO00004-00003

3. Remove the turn light securing spring.



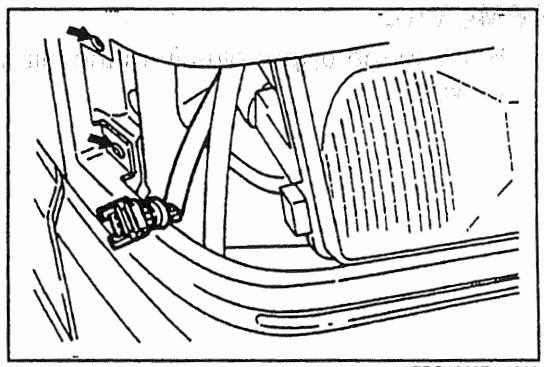
PBO00005-00004

4. Remove the turn light unit from outside the vehicle.
5. Disconnect the connector and remove the turn indicator.



PBO00006-00005

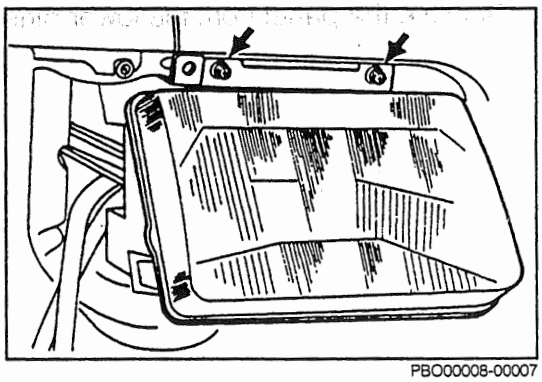
6. Loosen the two screws securing the headlight unit to the front panel.
7. Remove the headlight housing from the clip on the front panel.



PBO00007-00006

8. Loosen the two screws securing the headlight to the front panel.
9. Remove the headlight from the clip located in the lower part.

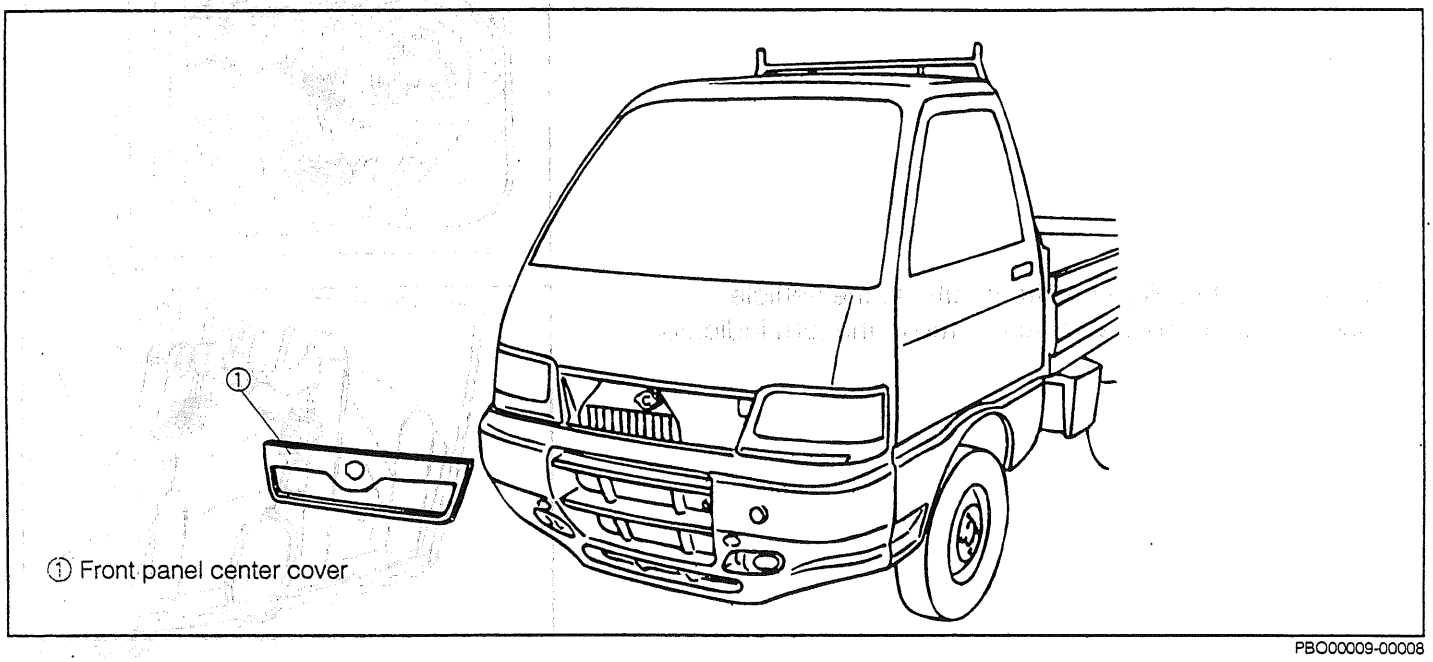
Carry out the reverse order of the removal operations to fit back.



PBO00008-00007

FRONT PANEL GARNISH

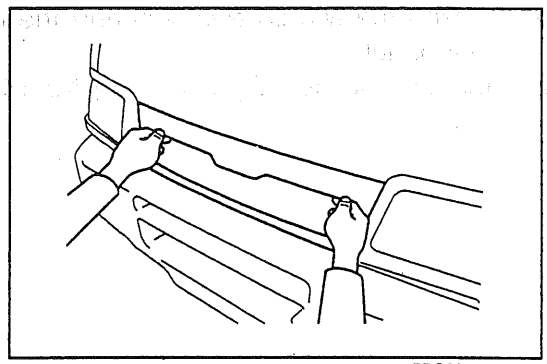
COMPONENTS



PBO00009-00008

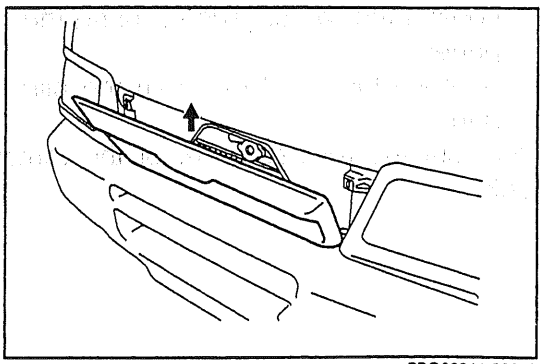
REMOVAL

1. Release the upper pins from the clips and tilt the panel ① forward.



PBO00010-00009

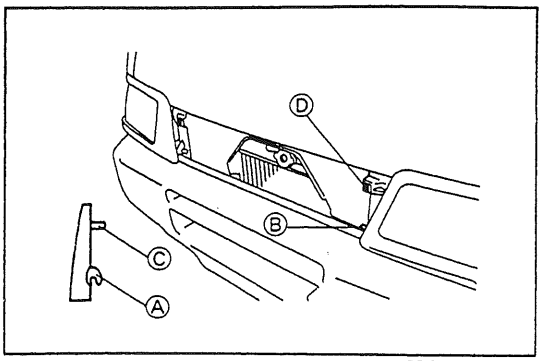
2. Release the panel from the lower pins and remove it.



PBO00011-00010

REASSEMBLY

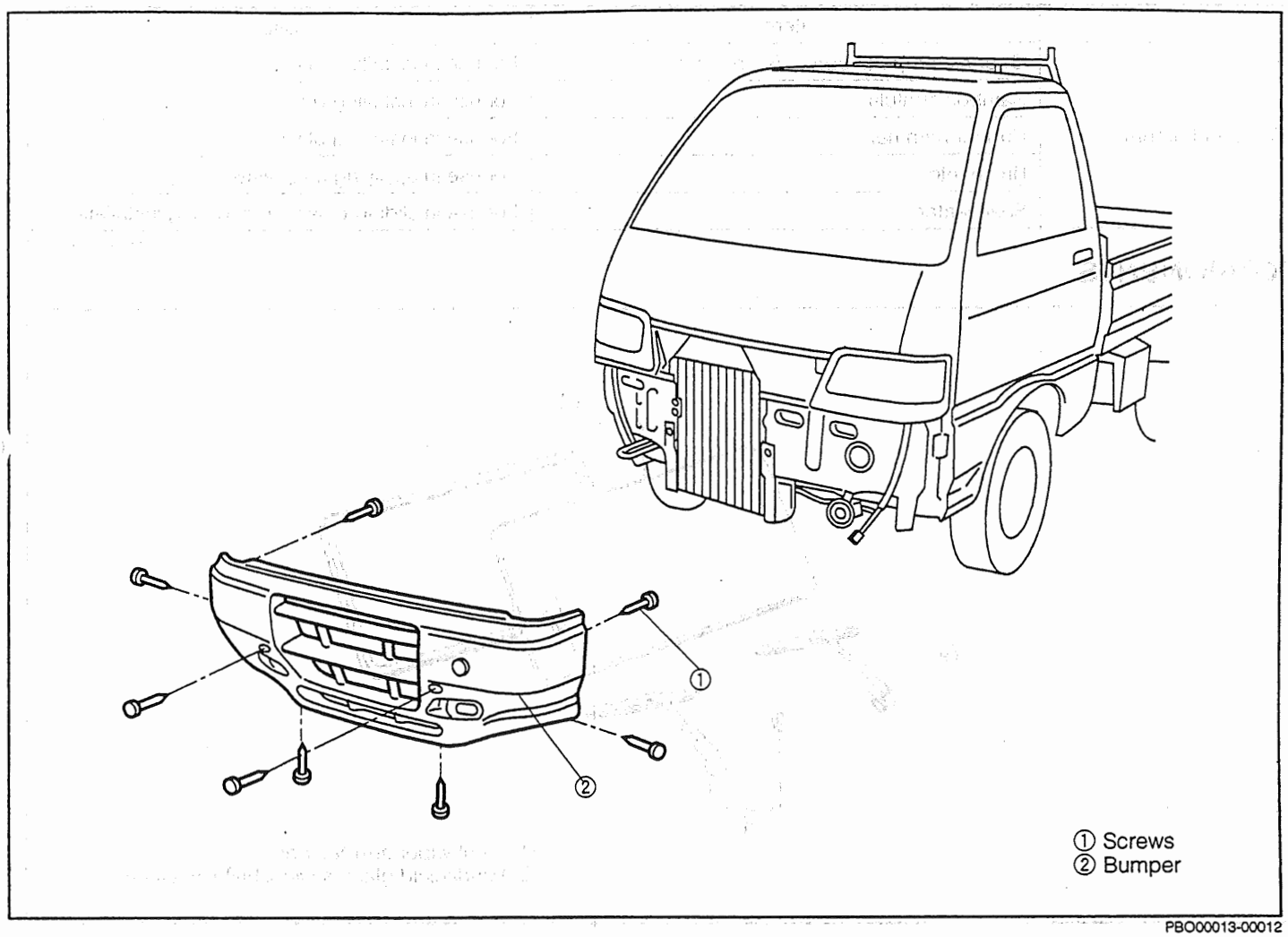
1. Position lower hooks Ⓐ on pins Ⓑ.
2. Tilt the panel and secure pins Ⓒ in clips Ⓓ.



PBO00012-00011

FRONT BUMPER

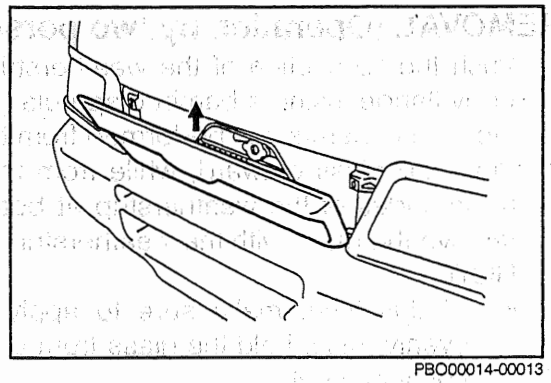
COMPONENTS



PBO00013-00012

REMOVAL/REASSEMBLY

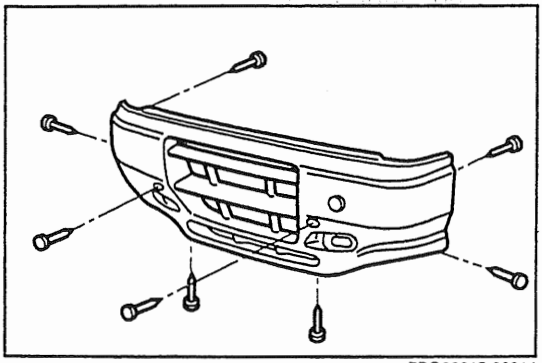
1. Remove the front panel.



PBO00014-00013

2. Loosen the eight screws and remove the front bumper from the two upper clips.

Carry out the reverse order of the removal operations to fit back.



PBO00015-00014

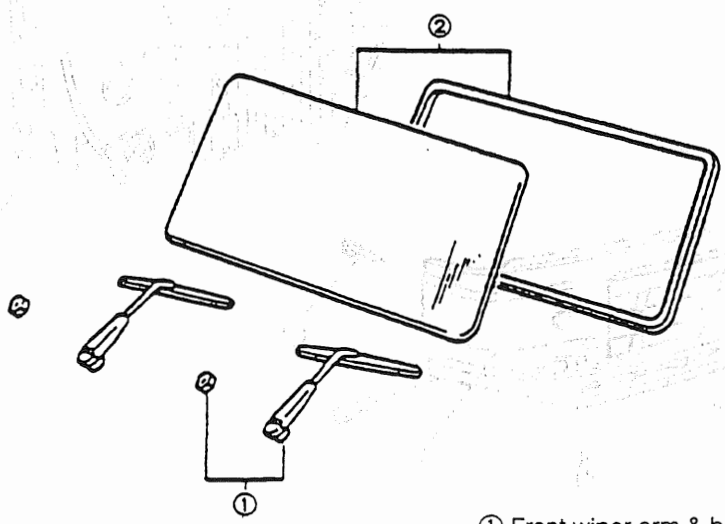
WINDOWS (FRONT)

Articles to be prepared

	Item	Use
Tools and others	Operation rope (Approx. 5 mm × 6 m)	For use in installing glass
	Bamboo spatula	For use in installing glass
	Rubber hammer	For use in installing glass
	Brush, etc.	For use in applying soap water
	Soap water	For use in sliding glass easily during installation

PBO00016-00000

COMPONENTS

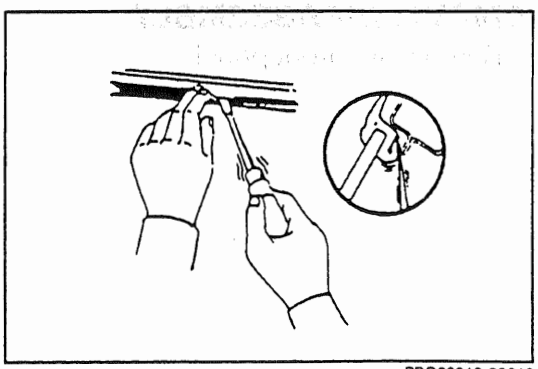


① Front wiper arm & blade
② Windshield glass & windshield weatherstrip

PBO00017-00015

REMOVAL (Operation by two persons)

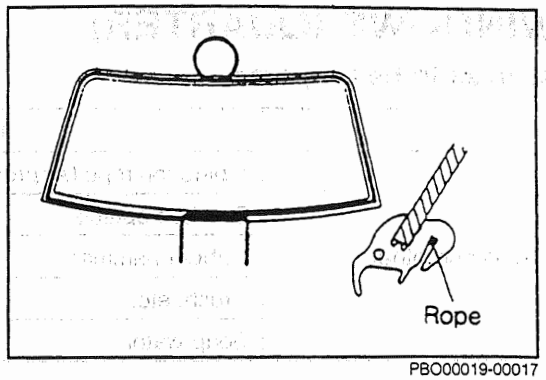
1. Push the lip section of the weatherstrip outward from the body flange, using a bamboo spatula [or a (–) screwdriver, etc]. This operation is performed from the vehicle interior.
2. Push the glass outward, while from the inside prying the upper sides of the weatherstrip at both ends. Proceed to remove the glass with the weatherstrip attached thereon.
   NOTE:
   - At this time, make sure to apply force to the glass evenly. Also, hold the glass from outside so that it may not spring out.



PBO00018-00016

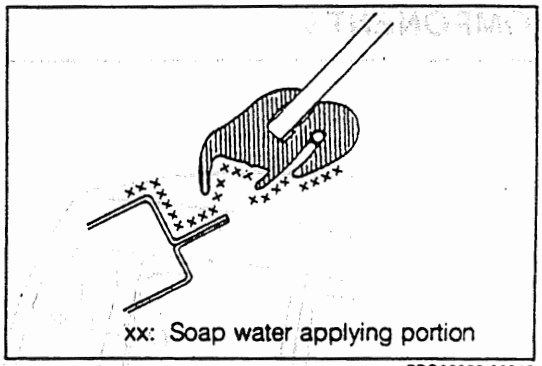
INSTALLATION (Operation by two persons)

1. Perform the preparatory operation as follows:
   (1) Attach the weatherstrip to the windshield glass.
   (2) Set an operation rope as indicated in the right figure. (Apply soap water to the periphery of the weatherstrip so that it can slide more easily.)



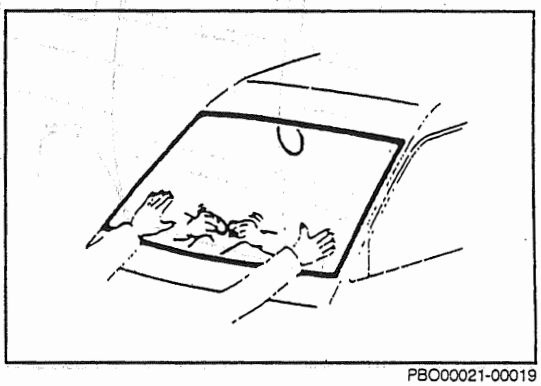
PBO00019-00017

2. Apply the windshield glass and windshield weatherstrip to the body in such a way that they are fitted evenly in an up-and-down as well as in a right-and-left direction. Ensure that the operation rope is suspended to the vehicle interior.

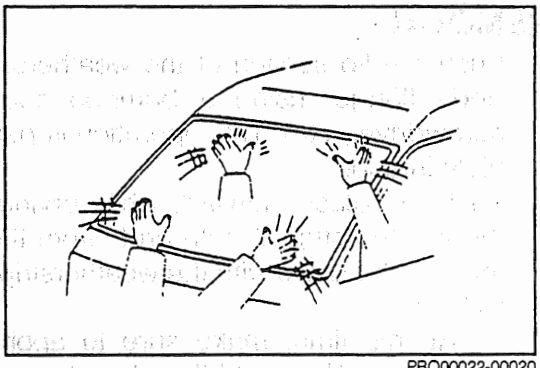


PBO00020-00018

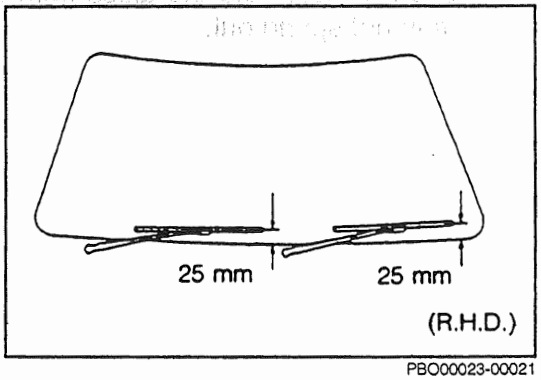
3. Pull the rope in such an angle that the rope suspending to the vehicle interior may be allowed to cross over the flange. While doing so, the other person working from the outside pounds the portions of the windshield adjacent to the weatherstrip by his palms so that the windshield is installed into position.


PBO00021-00019

4. Pound the windshield by your palms so that it is settled.
   NOTE:
   - Never use again the weatherstrip which exhibits damage, cracks and so forth at its lip-section. Such defective weatherstrip may cause water leakage.
   - When you pound the windshield using a rubber hammer, if the operation is made in such a manner as if it pushes the windshield, it will facilitate the installation.


PBO00022-00020

5. Front wiper arm & blade
   For the installing position, see the figure.



PBO00023-00021

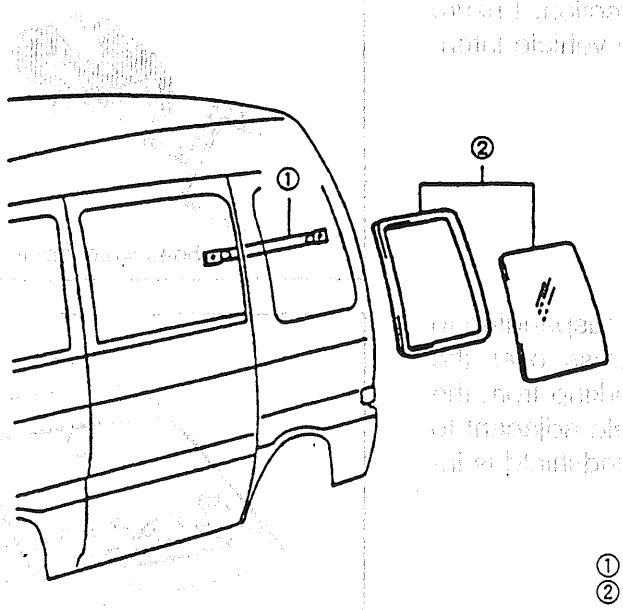
WINDOWS (QUARTER)

Articles to be prepared

	Item	Use
Tools and others	Operation rope (Approx. 5 mm × 6 m)	For use in installing glass
	Bamboo spatula	For use in installing glass
	Rubber hammer	For use in installing glass
	Brush, etc.	For use in applying soap water
	Soap water	For use in sliding glass easily during installation

PBO00024-00000

COMPONENTS

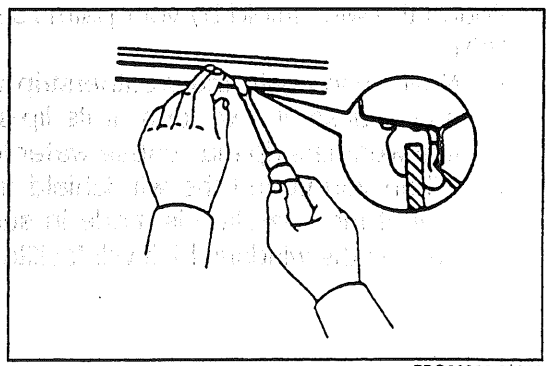


① Quarter window guard No. 1 (Option)
② Side window weatherstrip & quarter window glass

PBO00025-00022

REMOVAL

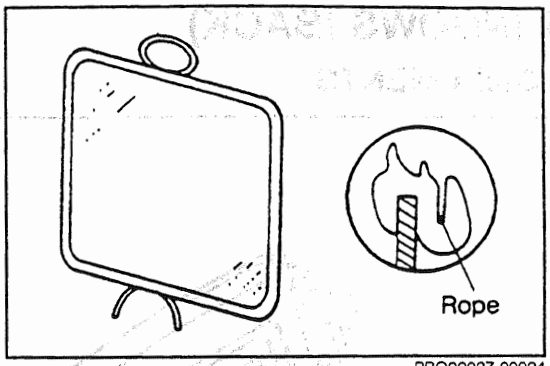
1. Push the lip section of the weatherstrip outward from the body flange, using a bamboo spatula (or a common screwdriver, etc). This operation is performed from the vehicle interior.
2. Push the glass outward, while prying the upper sides of the weatherstrip at both ends from the inside. Proceed to remove the glass with the weatherstrip attached thereon.
   NOTE:
   - At this time, make sure to apply force to the glass evenly. Also, hold the glass from the outside so that it may not spring out.



PBO00026-00023

INSTALLATION

1. Attach the weatherstrip to the quarter window glass.
2. Set an operation rope as indicated in the right figure. Apply soap water to the periphery of the weatherstrip so that it can slide more easily.

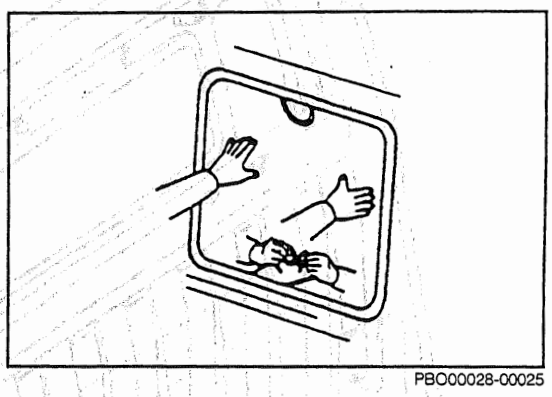


PBO00027-00024

3. Apply the quarter window glass and weatherstrip to the body in such a way that they are fitted evenly in an up-and-down as well as in a right-and-left direction. Ensure that the operation rope is suspended to the vehicle interior.
4. Pull the rope in such an angle that the rope suspending to the vehicle interior may be allowed to cross over the flange. While doing so, the other person working from the outside pounds the portions of the quarter window adjacent to the weatherstrip by his palms so that the quarter window may be installed into position.
5. Pound the quarter window by your palms so that it may be settled.

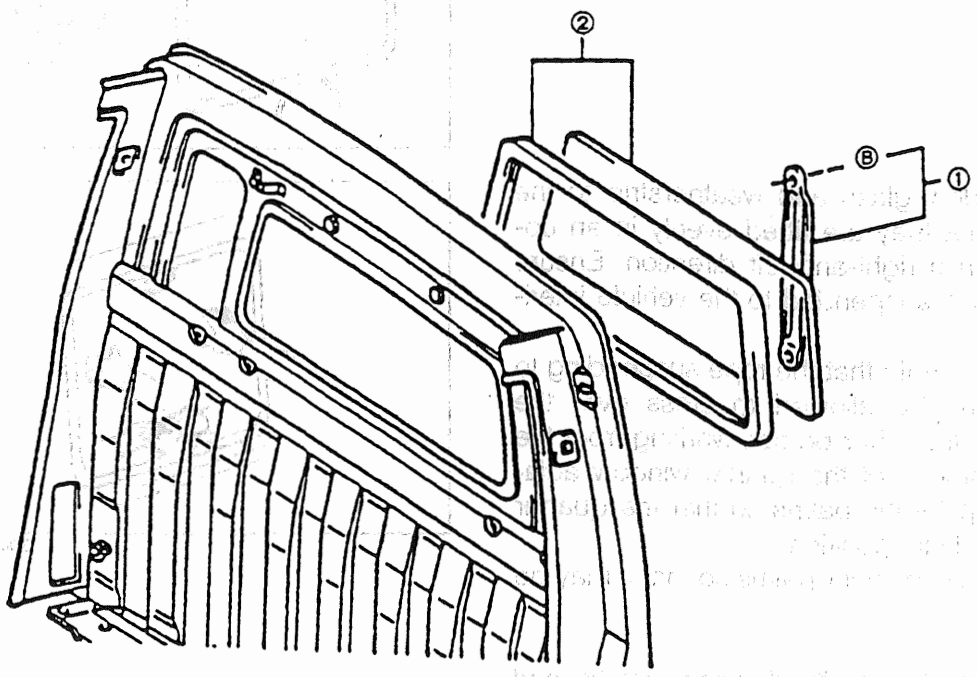
NOTE:

- The weatherstrip which exhibits damage, cracks and so forth at its lip-section may cause water leakage.


PBO00028-00025

WINDOWS (BACK)

COMPONENTS



① Back window guard bar
② Back window glass & back window glass weatherstrip

PBO00029-00026

REMOVAL AND INSTALLATION

1. Remove the back window guard bar.
2. Proceed to remove the back window glass as well as the same manner of the front window glass (See page BO–6, 7).

PBO00030-00000

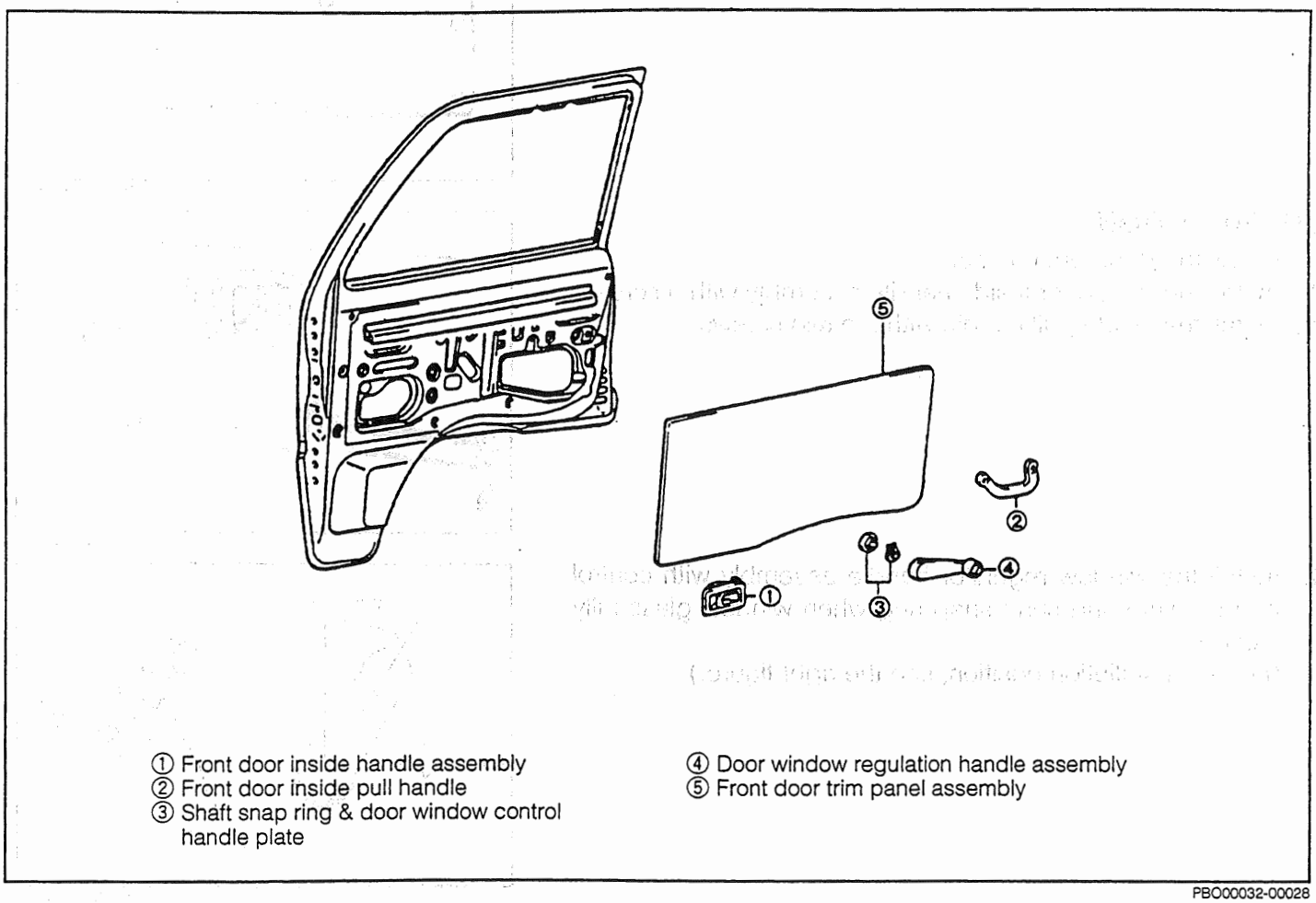
FRONT DOOR TRIM

Articles to be prepared

	Item	Use	
Grease, etc.	Butyl tape	For use in preventing water leakage	
	MP grease	For lubrication	
Others	Soap water	For use in sliding weatherstrip easily	
	Brush, etc.	For use in applying soap water	
	Wooden hammer	For use in installing holder	
	Touch-up paint	For use in touch-up paining after removal/installation and adjustment	
Tools		Screwdriver type clip clamping tool by Banzai, Ltd.	For use in removing door trim

PBO00031-00027

COMPONENTS

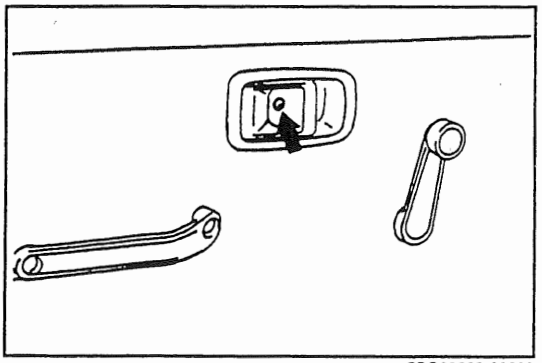


① Front door inside handle assembly
② Front door inside pull handle
③ Shaft snap ring & door window control handle plate
④ Door window regulation handle assembly
⑤ Front door trim panel assembly

PBO00032-00028

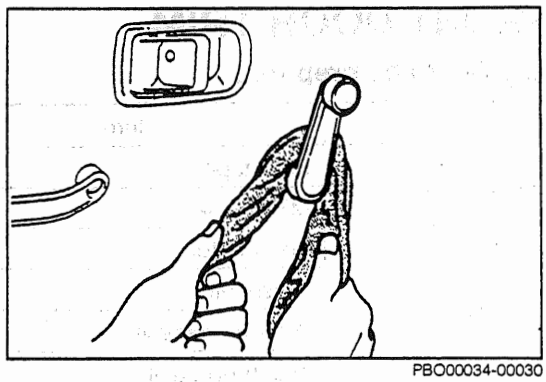
REMOVAL

1. Remove the one attaching screw of door inside handle. Remove the front door inside handle.
2. Remove the inside pull handle by removing the two screws.



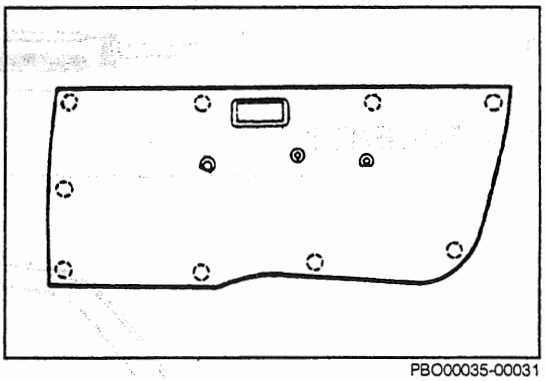
PBO00033-00029

3. Remove the window regulator handle assembly by removing the shaft snap ring, using a cloth.



PBO00034-00030

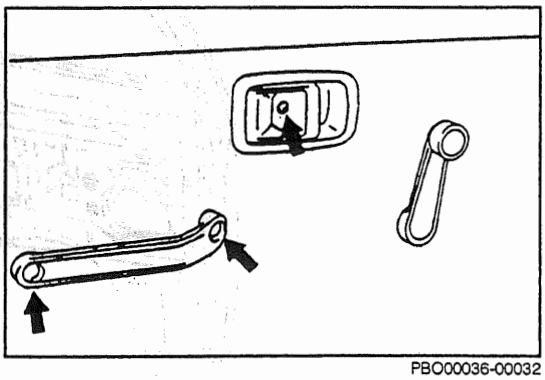
4. Remove the front door trim panel assembly by removing the door trim retainers, using the clip clamping tool.



PBO00035-00031

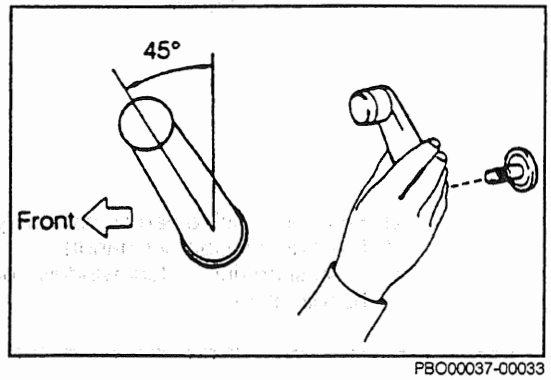
INSTALLATION

1. Install the door trim retainer.
2. Install the front door inside handle assembly with a screw.
3. Install the inside pull handle with the two screws.



PBO00036-00032

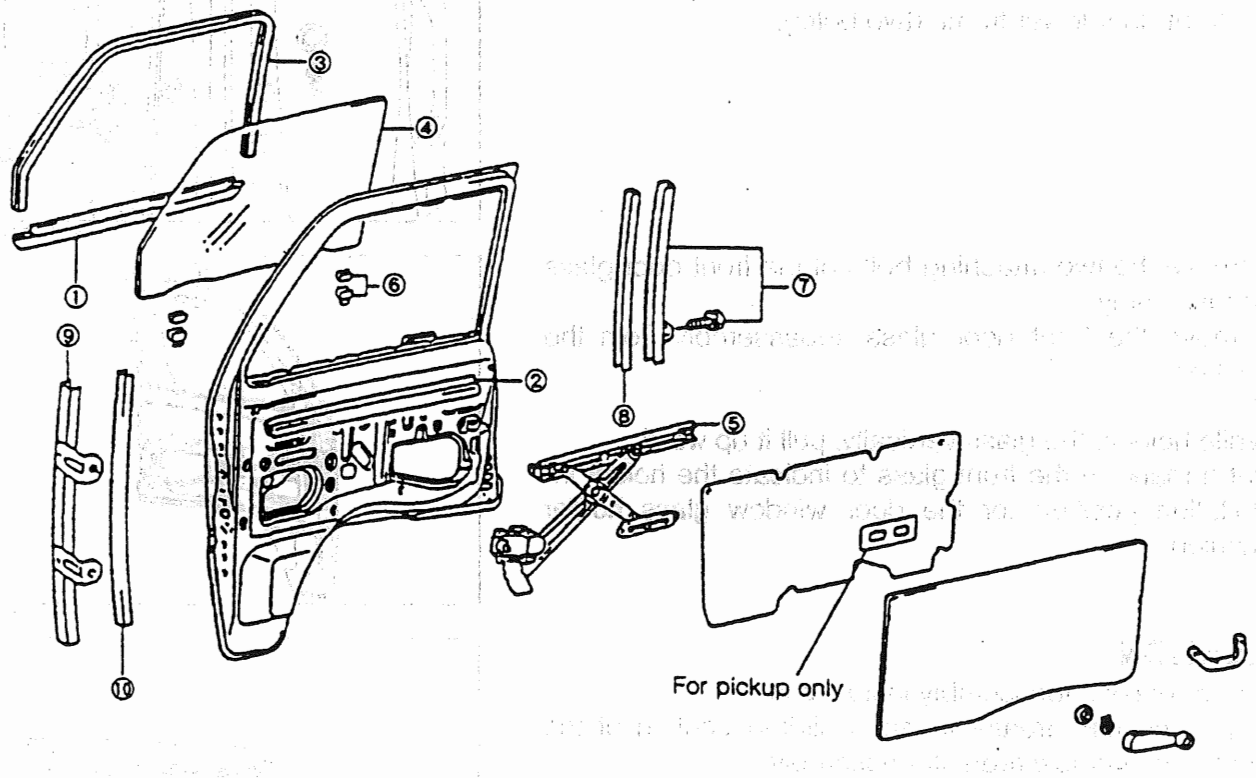
4. Install the window regulator handle assembly with control handle plate and shaft snap ring when window glass fully closed.
   (For the installation position, see the right figure.)



PBO00037-00033

FRONT DOOR GLASS & DOOR WINDOW REGULATOR

COMPONENTS

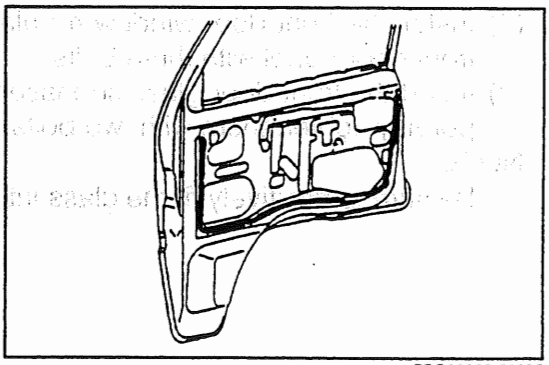


① Front door glass outer weatherstrip
② Front door glass inner weatherstrip
③ Front door glass run
④ Front door glass
⑤ Front door window regulator assembly
⑥ Door window glass holder cushion
⑦ Front door rear lower frame subassembly
⑧ Front door window rear lower run
⑨ Front door front lower frame
⑩ Front door glass front run No. 2

PBO00038-00034

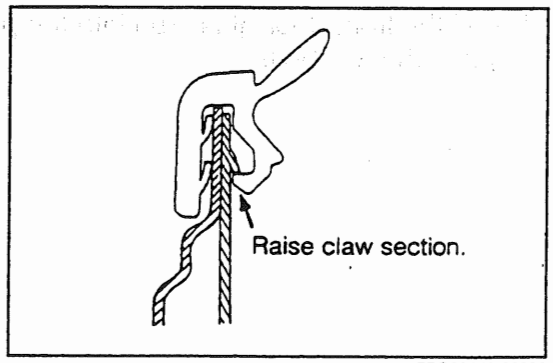
REMOVAL

1. Remove the front door trim related parts (See page BO–15).
2. Remove the front door service hole cover.
   NOTE:
   - Be sure to remove the service hole cover together with the butyl tape so that the cover may not be ruptured.



PBO00039-00035

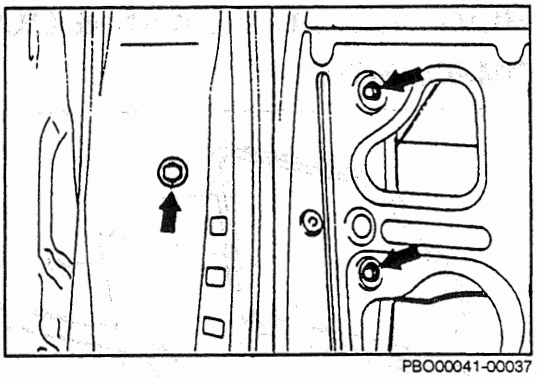
3. Remove the front door glass outer weatherstrip.
   NOTE:
   - When removing this part, raise the claw section. This will facilitate the removal operation.
   - After completion of the removal, correct the claw section of the weatherstrip to the original shape.



PBO00040-00036

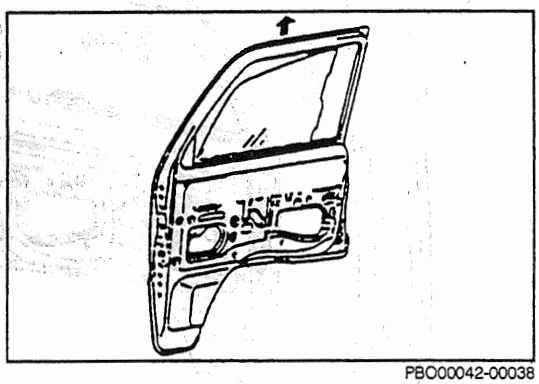
4. Remove the front door glass inner weatherstrip.

5. Remove the front door glass run.
6. Front door glass removal
   (1) Remove the attaching bolt at the
   - front door rear lower frame subassembly (one bolt).
   - front door lower frame (two bolts).


PBO00041-00037

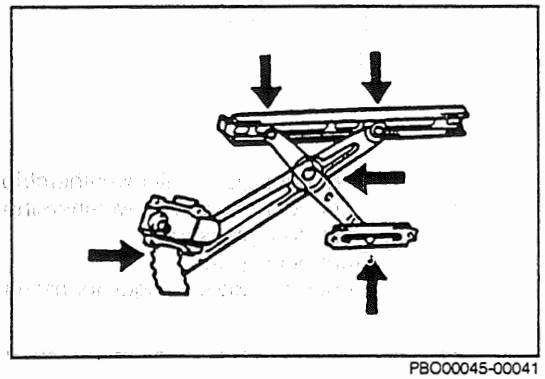
   (2) Remove the two attaching bolts of the front door glass subassembly.
   (3) Remove the front door glass subassembly from the front door.

   NOTE:
   - While holding the glass vertically, pull it up ward.
   - Put a mark on the front glass to indicate the holder installation position for the door window glass holder cushion.


PBO00042-00038

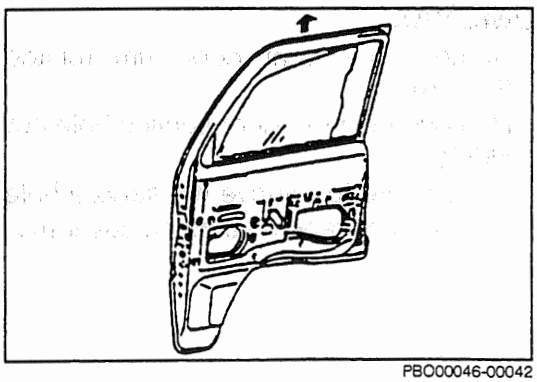
INSTALLATION

1. Front door glass subassembly installation
   (1) Apply the MP grease to each sliding section of the front door window regulator assembly.


PBO00045-00041

   (2) Install the front door window regulator assembly to the front door panel with three bolts.
   (3) Insert the front door glass subassembly and then, temporarily tighten them with two bolts.

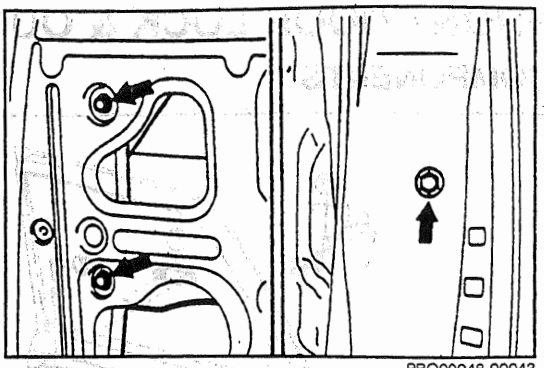
   NOTE:
   - Be sure to positively fit the glass into the door frame.


PBO00046-00042

2. Install the front door glass run into the place.
3. Tighten the two bolts.

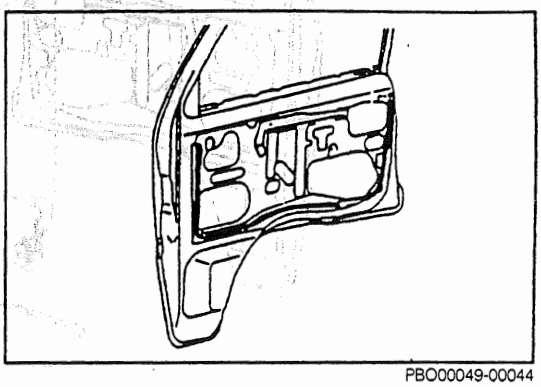
PBO00047-00000

4. Tighten the bolt at the
   - front door rear lower frame subassembly (one bolt).
   - front door lower frame (two bolts).



PBO00048-00043

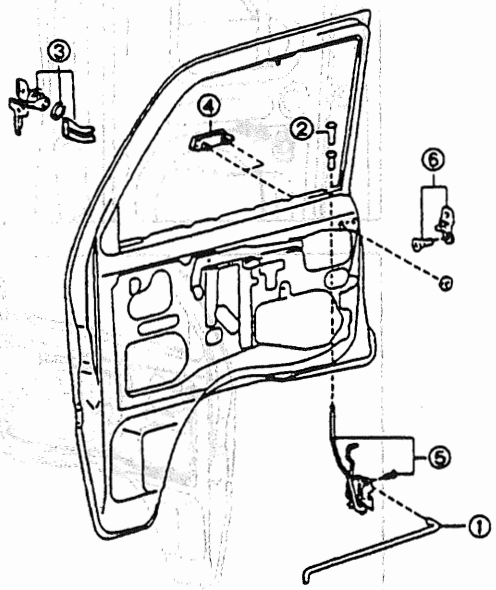
5. Install the service hole cover.
6. Install the door panel assembly.
7. Install the door trim related parts.



PBO00049-00044

FRONT DOOR LOCK & OUTSIDE HANDLE

COMPONENTS

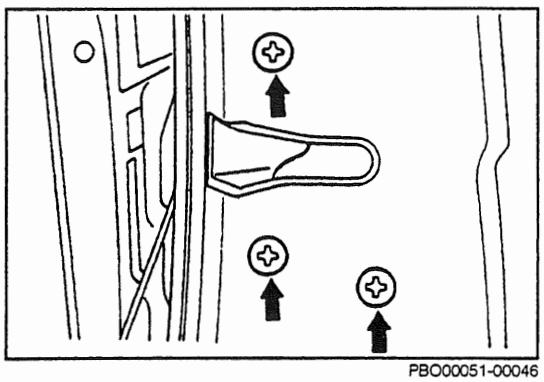


① Front door open control link
② Door locking button
③ Door lock cylinder & door lock cylinder clamp
④ Front door outside handle
⑤ Front door lock
⑥ Front door plate

PBO00050-00045

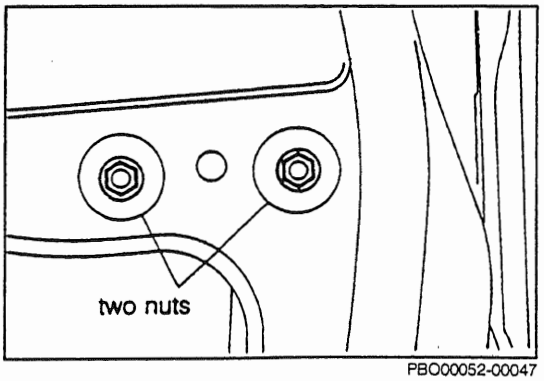
REMOVAL

1. Remove the front door trim related parts.
2. Remove the door locking button.
3. Remove the front door lock with front door open control link by removing the three screws.



PBO00051-00046

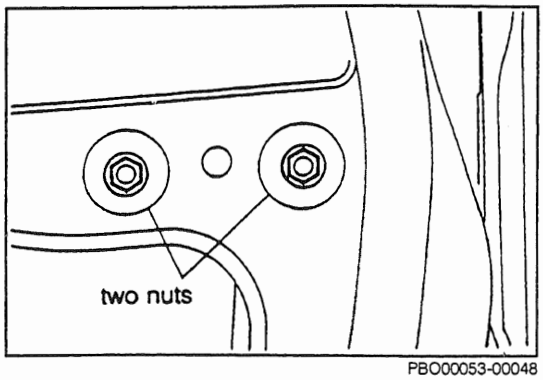
4. Remove the door lock cylinder by detaching the clamp.
5. Remove the front door outside handle by removing the two nuts.



PBO00052-00047

INSTALLATION

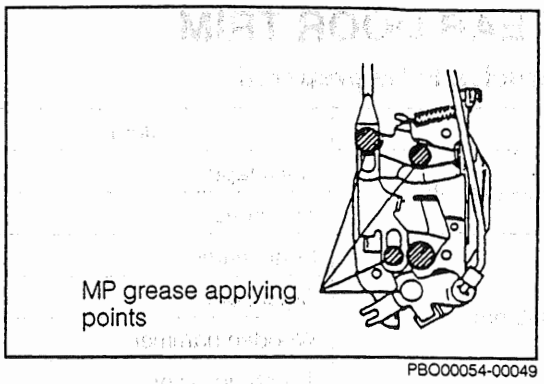
1. Install the front door outside handle with the two nuts.
2. Install the door lock cylinder with a clamp.



PBO00053-00048

3. Install the front door lock with three screws.
   NOTE:
   - Apply the MP grease to each sliding section.

4. Install the front door open control link.
   NOTE:
   - After installation, be sure to check and adjust the lock condition.



PBO00054-00049

5. Install the door locking button.
6. Install the door trim related parts.

PBO00055-00000

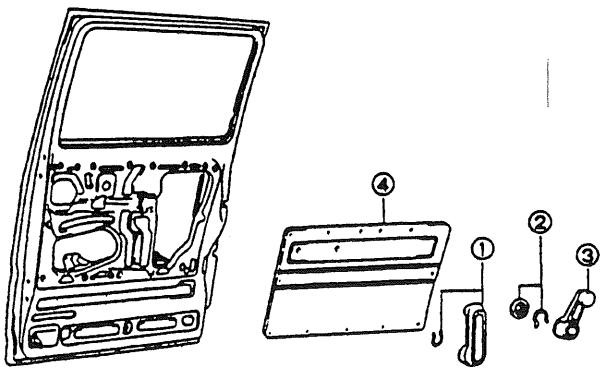
REAR DOOR TRIM

Articles to be prepared

	Item	Use	
Grease, etc.	Butyl tape	For use in preventing water leakage	
	MP grease	For lubrication	
Others	Soap water	For use in sliding weatherstrip easily	
	Brush, etc.	For use in applying soap water	
	Wooden hammer	For use in installing holder	
	Touch-up paint	For use in touch-up paining after removal/installation and adjustment	
Tools		Screwdriver type clip clamping tool by Banzai, Ltd.	For use in removing door trim

PBO00056-00050

COMPONENTS

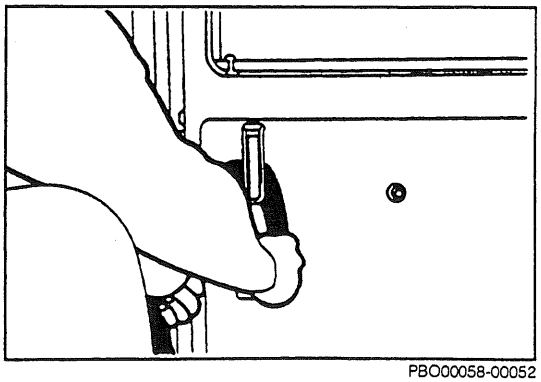


① Shaft snap ring & rear door inside handle
② Shaft snap ring & door window regulator handle plate
③ Door window regulator handle
④ Rear door trim board

PBO00057-00051

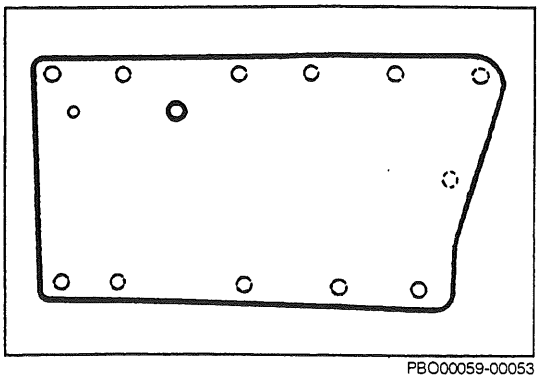
REMOVAL

1. Remove the shaft snap ring & rear door inside handle, using a cloth.
2. Remove the shaft snap ring & door window regulator handle plate, using a cloth.



PBO00058-00052

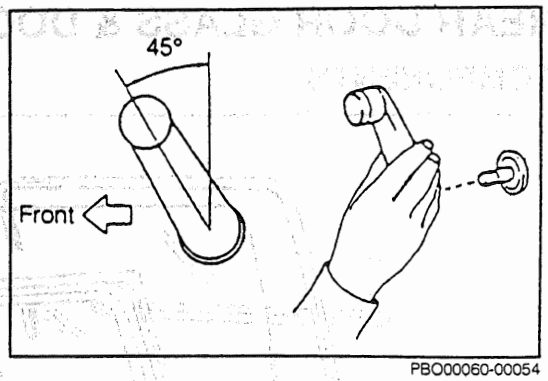
3. Remove the rear door trim board, using the clip clamping tool.



PBO00059-00053

INSTALLATION

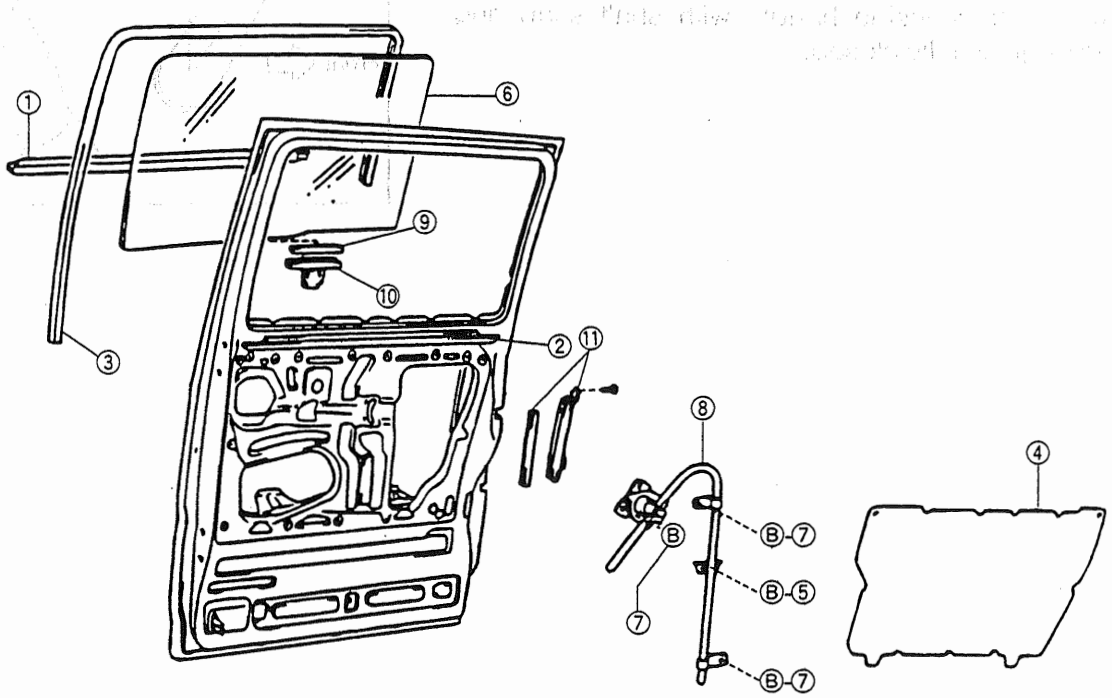
1. Install the rear door trim board into the place.
2. Install the door window regulator handle with shaft snap ring and window regulator handle plate.
3. Install the rear door inside handle with shaft snap ring when window glass fully closed.



PBO00060-00054

REAR DOOR GLASS & DOOR WINDOW REGULATOR

COMPONENTS

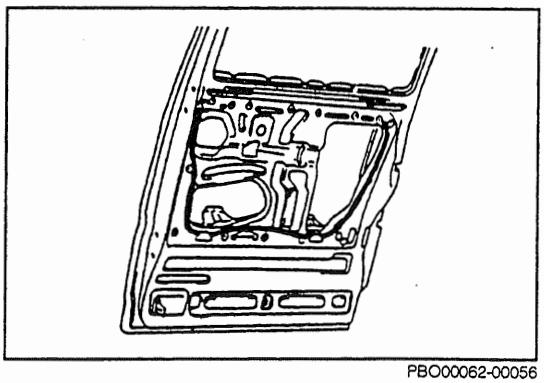


① Rear door glass outer weatherstrip
② Rear window glass inner weatherstrip
③ Rear door glass run
④ Door service hole cover
⑤ W/washer bolt
⑥ Rear door window glass
⑦ W/washer bolt
⑧ Rear door window regulator assembly
⑨ Rear door window weatherstrip
⑩ Rear door window glass channel
⑪ Rear door window frame subassembly

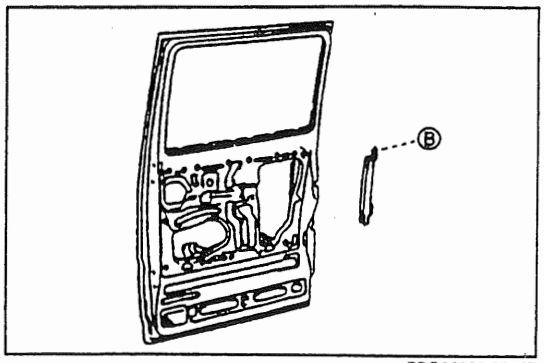
PBO00061-00055

REMOVAL

1. Remove the rear door trim related parts (See page BO-18).
2. Remove the service hole cover together with the butyl tape.
   NOTE:
   - The service hole cover may not be ruptured.
3. Remove the rear door glass outer weatherstrip.
4. Remove the window glass inner weatherstrip.
5. Remove the rear door glass run.
6. Temporarily loosen the bolt at the rear door window frame subassembly.

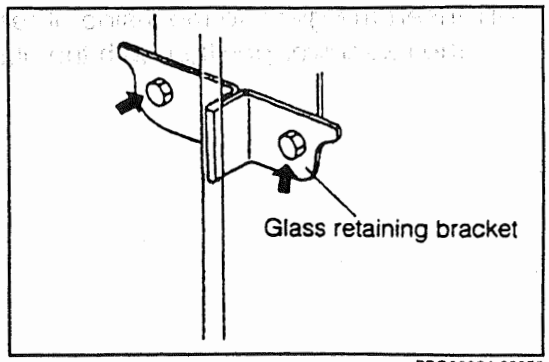


PBO00062-00056



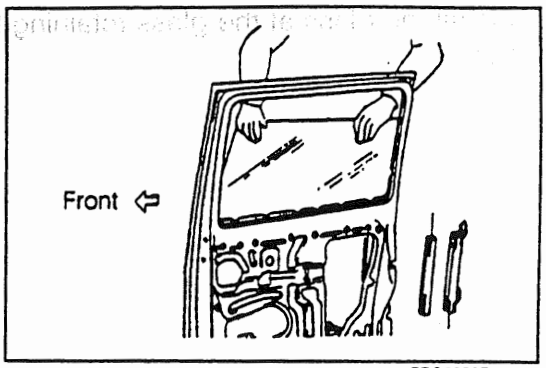
PBO00063-00057

7. Rear door window glass removal.
   (1) Remove the two bolts at the glass retaining bracket.



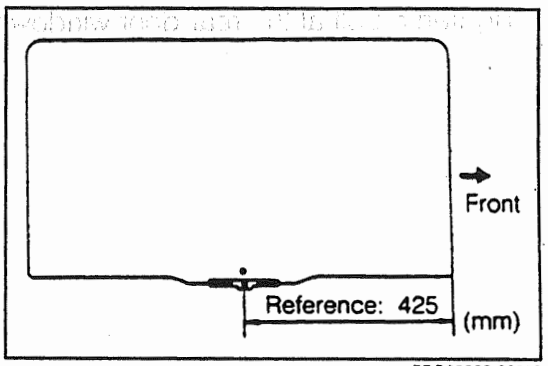
PBO00064-00058

   (2) Remove the glass to the outside, starting from the front/upper portion, with the glass tilted rearward.



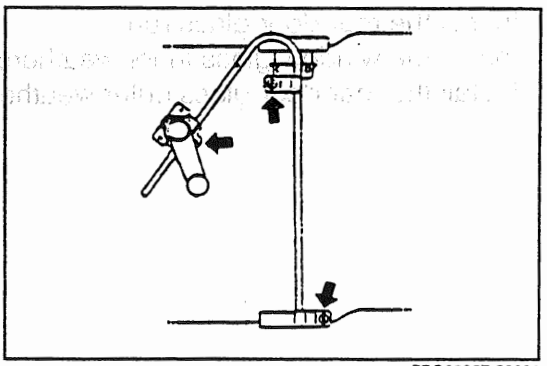
PBO00065-00059

8. Separate the rear window glass channel from the rear window glass.
   NOTE:
   - Put a mark on the glass to indicate the channel installation position.



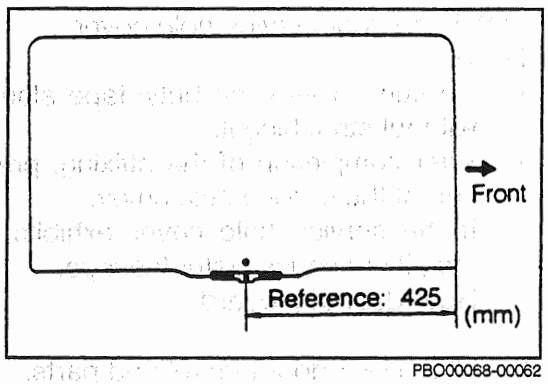
PBO00066-00060

9. Remove the rear window regulator assembly by removing the three bolts.


PBO00067-00061

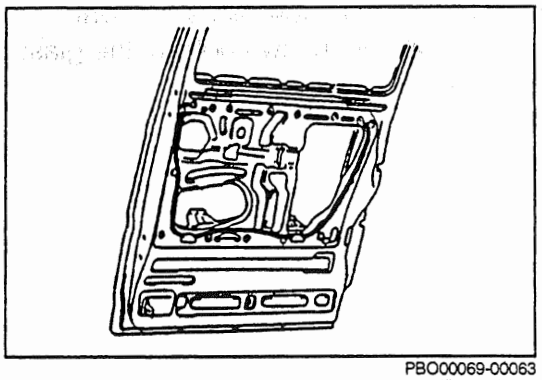
INSTALLATION

1. Rear door window glass channel weatherstrip installation
   (1) Put a mark on the glass to indicate the weatherstrip & channel installation position.
   (2) Apply soap water to the inside of the weatherstrip.
   (3) To install the weatherstrip & channel, tap them lightly, using a wooden hammer or the like.



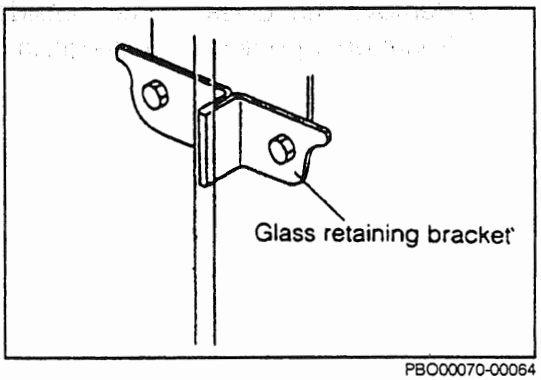
PBO00068-00062

(4) Insert the glass to the inside of rear door, starting from the rear/lower position, with the glass tilted forward.



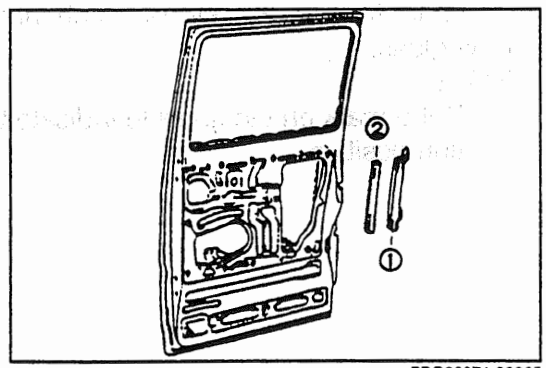
PBO00069-00063

2. Install the glass at the glass retaining bracket with the two bolts.



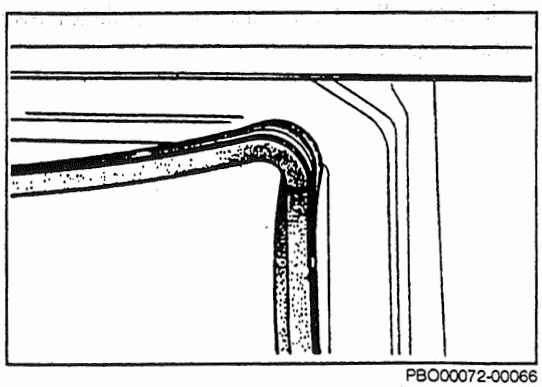
PBO00070-00064

3. Tighten a bolt at the rear door window frame subassembly.



PBO00071-00065

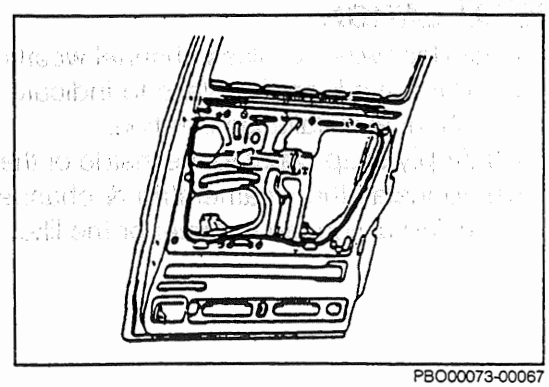
4. Install the rear door glass run.
5. Install the window glass inner weatherstrip.
6. Install the rear door glass outer weatherstrip.



PBO00072-00066

7. Install the door service hole cover.
   NOTE:
   - Be sure to affix the butyl tape along the panel groove without stretching it.
   - After completion of the affixing, press the affixing portion of the service hole cover.
   - If the service hole cover exhibits rupture or wrinkle, etc., it will cause water leakage.

   Rear door trim board

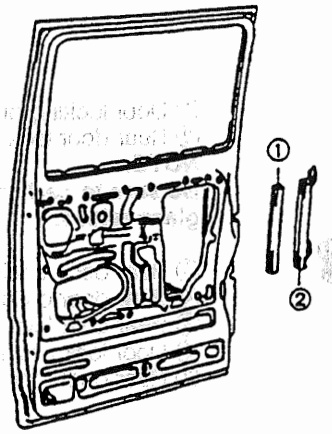


PBO00073-00067

8. Install the rear door trim related parts.

REAR DOOR FRAME

COMPONENTS

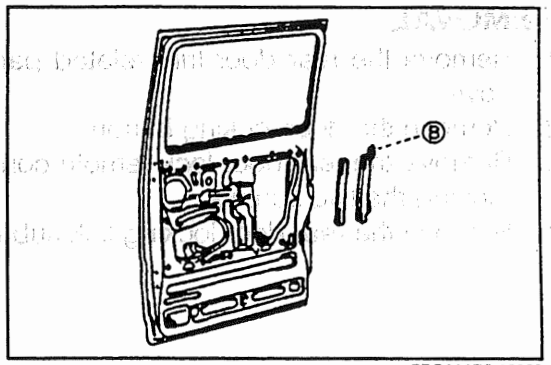


① Rear door glass run
② Rear door window frame subassembly

PBO00074-00068

REMOVAL

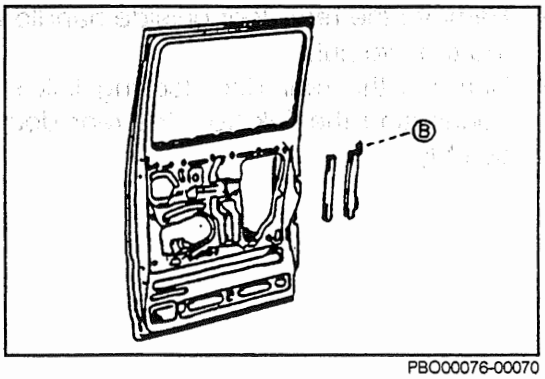
1. Remove the rear door trim related parts and service hole cover.
2. Remove the rear door glass run.
3. Remove the rear door window frame subassembly by removing a bolt.



PBO00075-00069

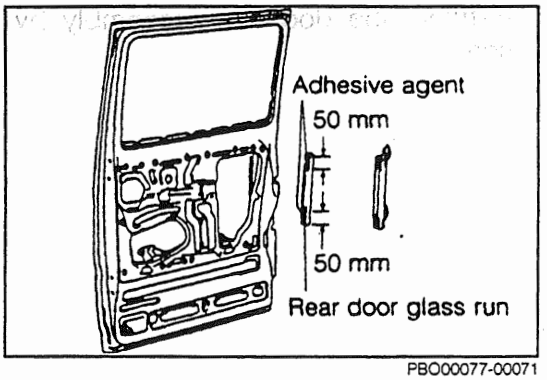
INSTALLATION

1. Install the rear door window frame subassembly with a bolt.
   NOTE:
   - When installing, apply adhesive agent to the upper and lower 50 mm-portions or over the entire portion of the back side of the glass run.



PBO00076-00070

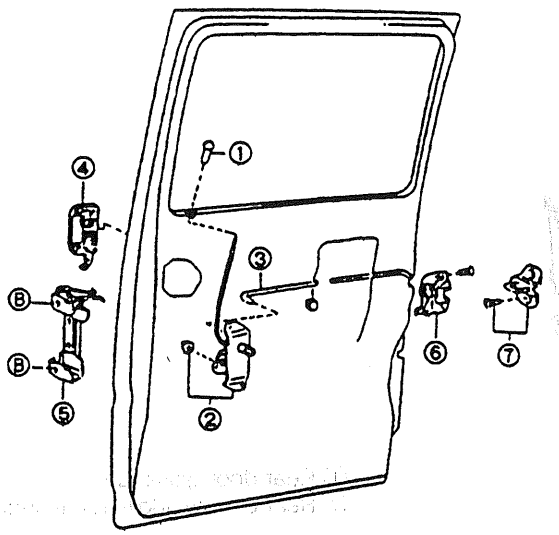
2. Install the rear door glass run.
3. Install the rear door trim related parts and service hole cover.



PBO00077-00071

REAR DOOR LOCK & OUTSIDE HANDLE

COMPONENTS

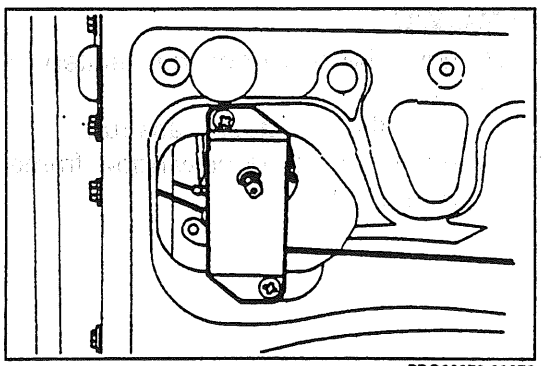


① Door locking button
② Rear door lock remote control assembly
NOTE:
Be sure to perform the operation with the glass raised.
③ Rear door locking link subassembly
④ Rear door outside handle assembly
⑤ Rear door locking link subassembly
⑥ Door lock assembly
⑦ Rear door lock striker plate assembly

PBO00078-00072

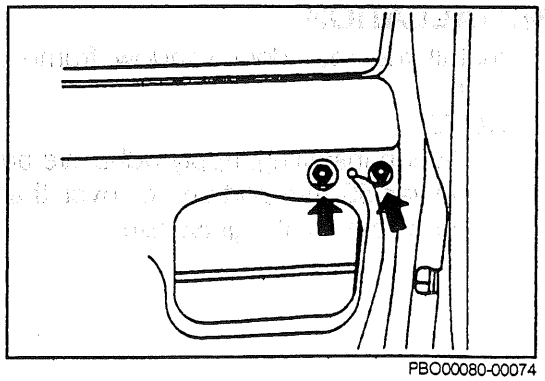
REMOVAL

1. Remove the rear door trim related parts and service hole cover.
2. Remove the door locking button.
3. Remove the rear door lock remote control assembly by removing the two screws.
4. Remove the rear door locking link subassembly.



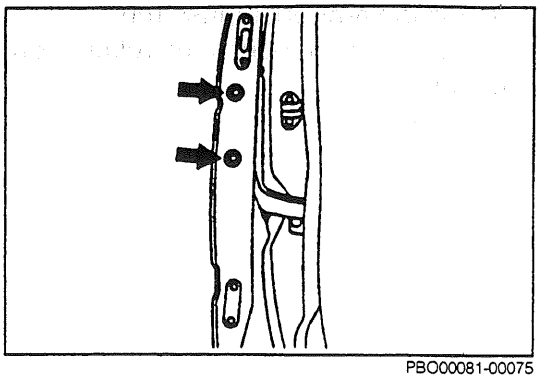
PBO00079-00073

5. Remove the rear door outside handle assembly by removing the two nuts.
6. Remove the rear door locking link subassembly by disconnecting the link from the rear door outside handle assembly.



PBO00080-00074

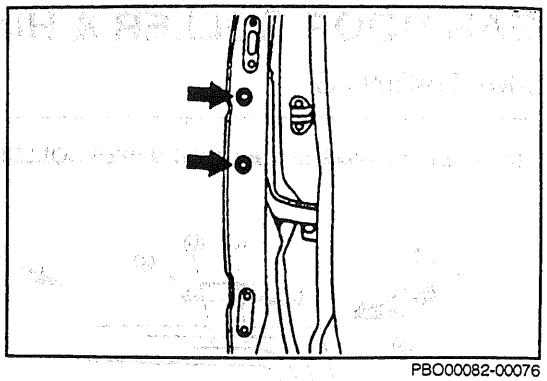
7. Remove the door lock assembly by removing the three screws.



PBO00081-00075

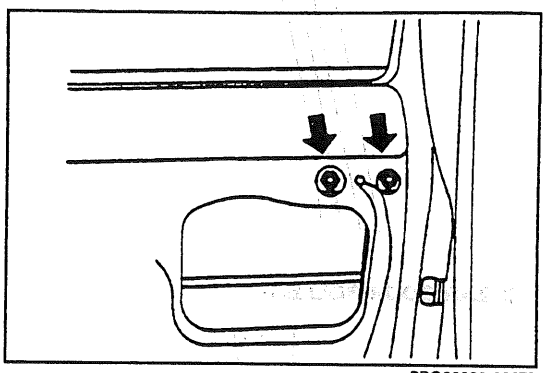
INSTALLATION

1. Apply the MP grease to each sliding section.
2. Install the door lock assembly with the two bolts.
3. Install the rear door locking link subassembly with connecting the link.



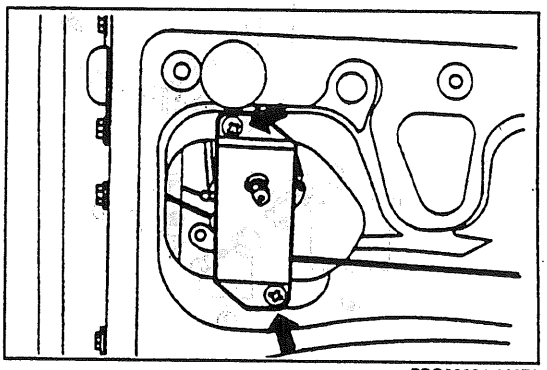
PBO00082-00076

4. Install the rear door outside handle assembly with the two nuts.
5. Install the rear door locking link subassembly.



PBO00083-00077

6. Install the rear door lock remote control subassembly with the two screws.



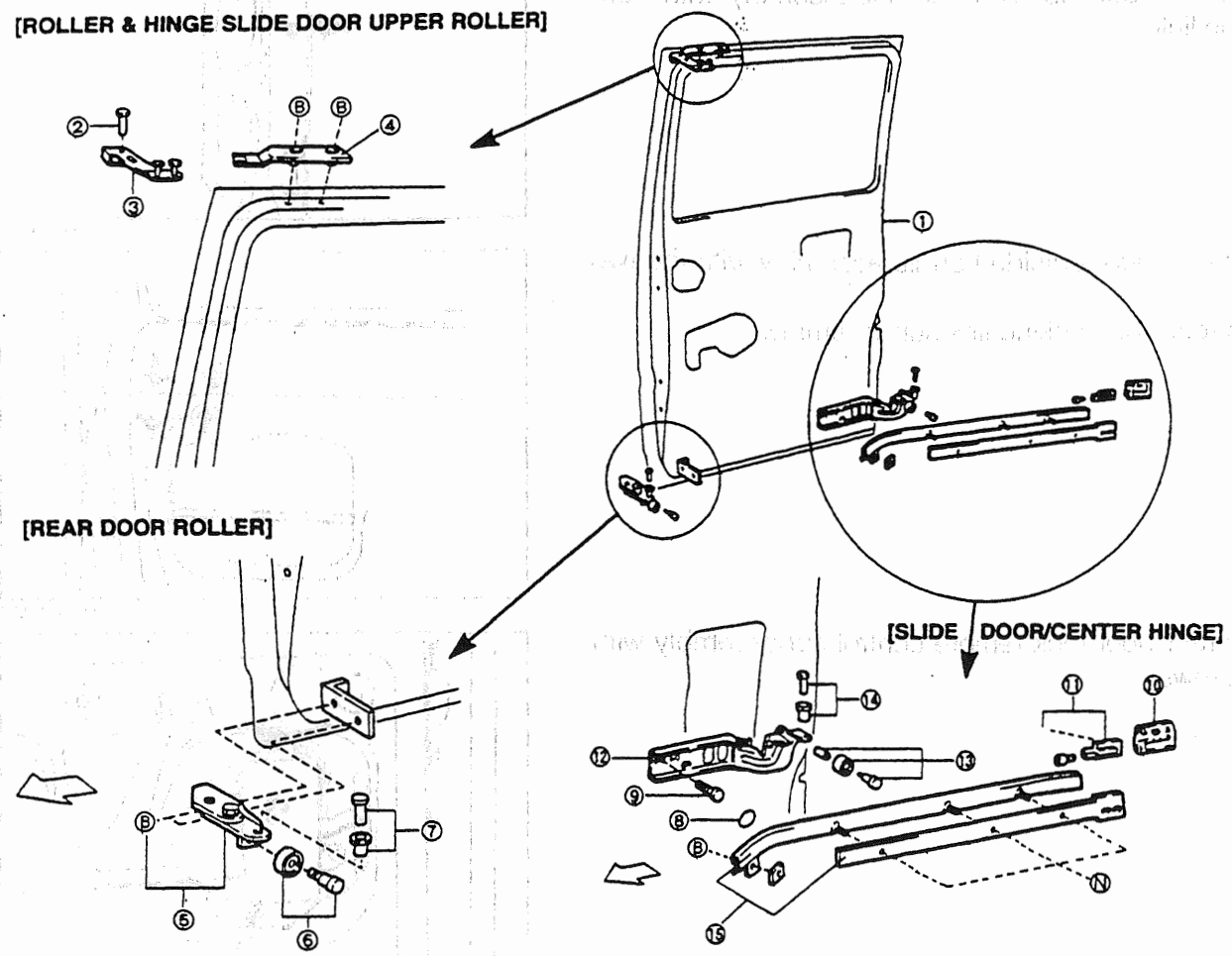
PBO00084-00078

7. Install the door locking button.
8. Install the rear door trim related parts and service hole cover.

PBO00085-00000

REAR DOOR ROLLER & HINGE

COMPONENTS

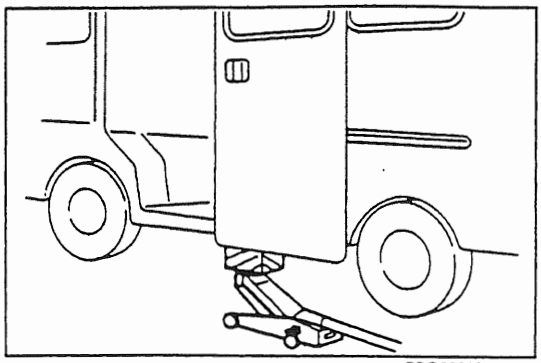


① Rear door
② Rear door guide roller pin No. 2 (Torx bolt)
③ Slide door upper roller arm
④ Rear door roller upper base
⑤ Rear door lower roller arm
⑥ Rear door guide pin & slide door lower roller
⑦ Rear door guide roller pin No. 2 & slide door lower roller
⑧ Hole cover
⑨ W/washer bolt
⑩ Rear door center rail cover
⑪ Rear door center rail bracket
⑫ Slide door center hinge
⑬ Radial ball bearing
⑭ Slide door roller
⑮ Rear door center rail & pad slide door

PBO00086-00079

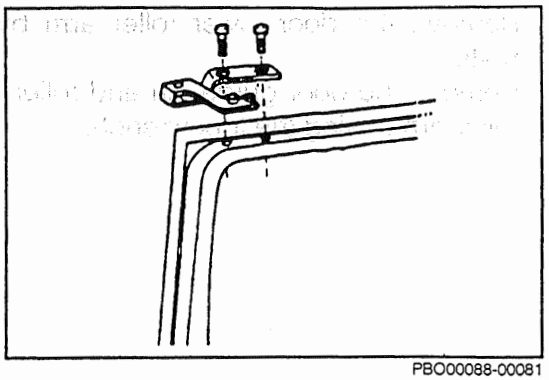
REMOVAL (UPPER ROLLER)

1. Support the lower front of the door panel by means of a jack, with a wooden block interposed.



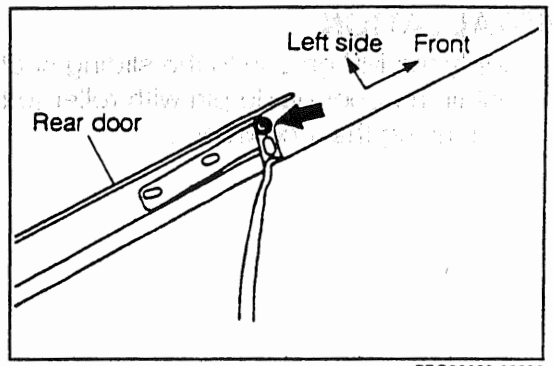
PBO00087-00080

2. Remove the door glass run.
3. Remove the door roller upper base by removing the two nuts.



PBO00088-00081

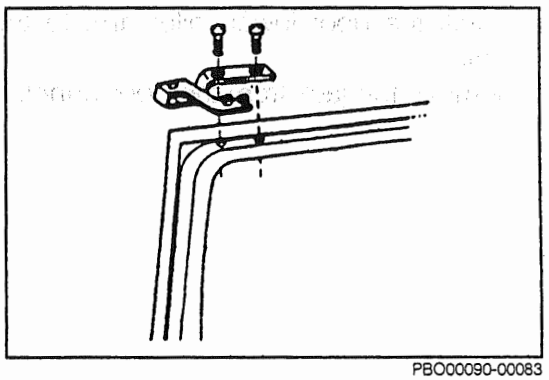
4. Remove the door upper roller arm by removing the door guide roller pin No. 2, using the torx wrench.
5. Remove the door upper roller arm from the body.



PBO00089-00082

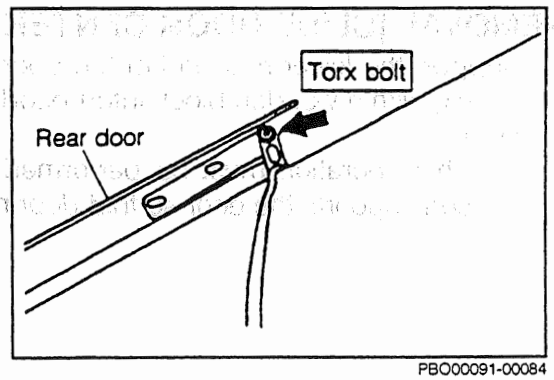
INSTALLATION

1. Apply the MP grease to each sliding section.
2. Install the door roller upper base to the rear door with the two nuts.
   NOTE:
   - The nuts and around nuts must be coated with paint.



PBO00090-00083

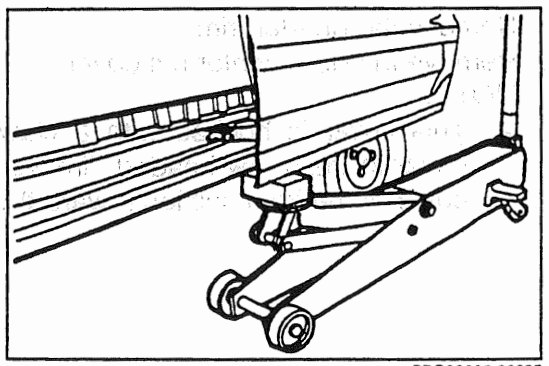
3. Install the door upper roller and door upper roller base with a door roller guide pin No. 2, using a torx wrench.
4. Insert the door upper roller arm to the rail section.
5. Remove the jack from the door panel.



PBO00091-00084

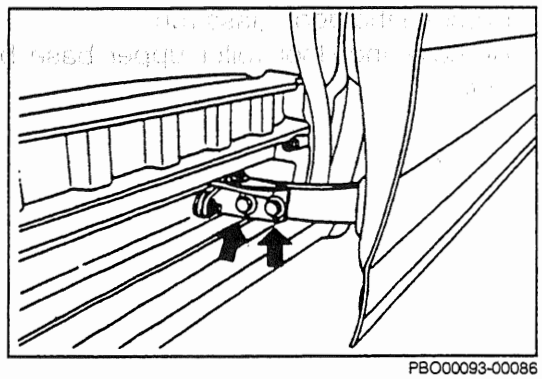
REMOVAL [REAR DOOR ROLLER]

1. Support the lower front of the door panel by means of a jack, with a wooden block interposed.



PBO00092-00085

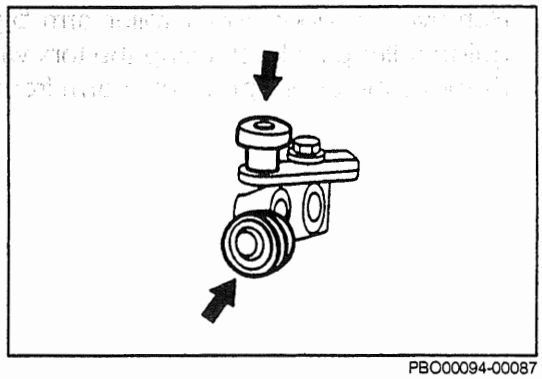
2. Remove the door lower roller arm by removing the two bolts.
3. Remove the door guide pin and roller from the door lower roller arm, using the torx wrench.



PBO00093-00086

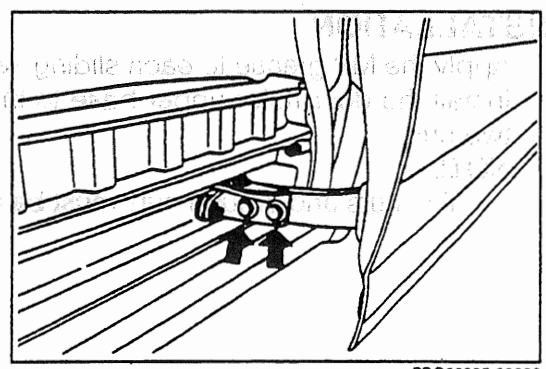
INSTALLATION

1. Apply the MP grease to the sliding section.
2. Install the door guide pin with roller to the door lower roller arm, using the torx wrench.



PBO00094-00087

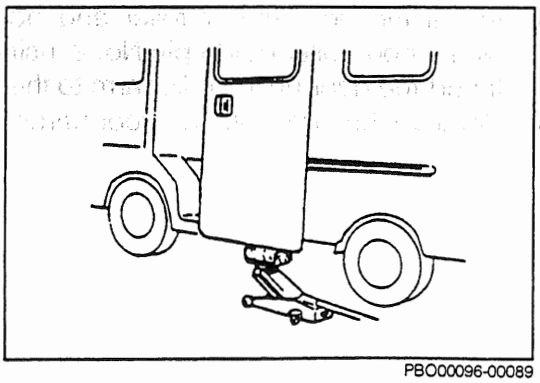
3. Install the door lower roller arm to the door with the two bolts.
4. Remove the jack from the door panel.



PBO00095-00088

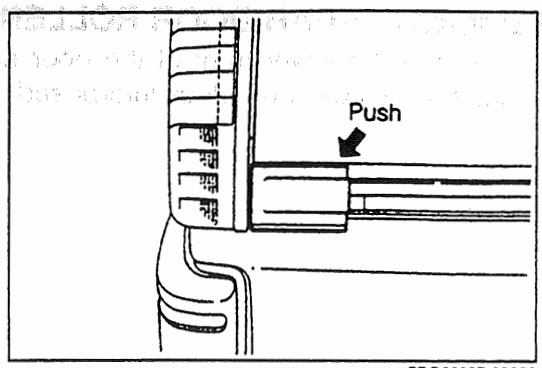
REMOVAL [SLIDE DOOR CENTER HINGE]

1. Support the lower rear end of the door panel by means of a jack, with a wooden block interposed.
   NOTE:
   - This operation must be performed while another person supports the door so that door may not lift.



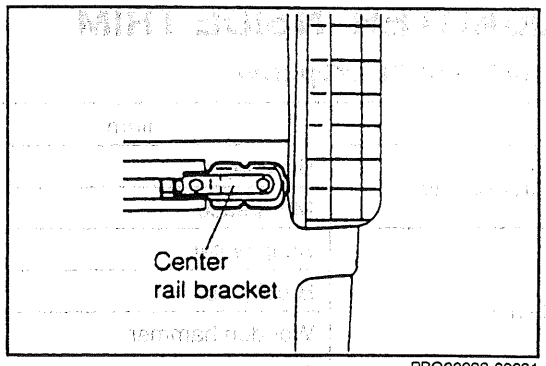
PBO00096-00089

2. Remove the quarter trim.
3. Remove the door center rail cover
   NOTE:
   - This cover is hooked with a claw. Hence, move the cover in the arrow-headed direction. Then, remove the cover at the front section toward the vehicle outside.



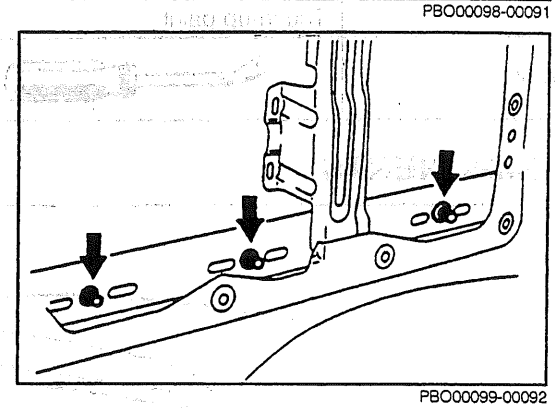
PBO00097-00090

4. Remove the door center rail bracket by removing the two bolts.
5. Remove the slide door center hinge by removing the two bolts.
   NOTE:
   - Slide the door. Then, remove the upper roller and center hinge from the rail, starting from the rear (cut-out section for removal).



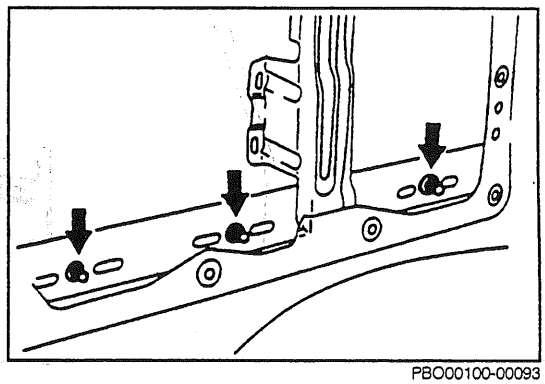
PBO00098-00091

6. Remove the center rail by removing the three nuts.

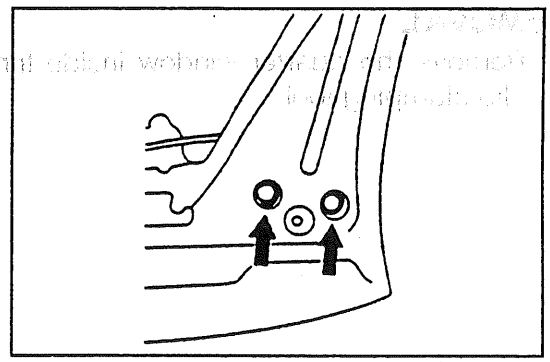

PBO00099-00092

INSTALLATION

1. Apply the MP grease to the sliding section.
2. Install the center rail with the three nuts.


PBO00100-00093

3. Install the slide door center hinge with the two bolts.
4. Install the door center rail bracket with the two bolts.
5. Install the door center rail cover.
6. Remove jack from the door panel.


PBO00101-00094

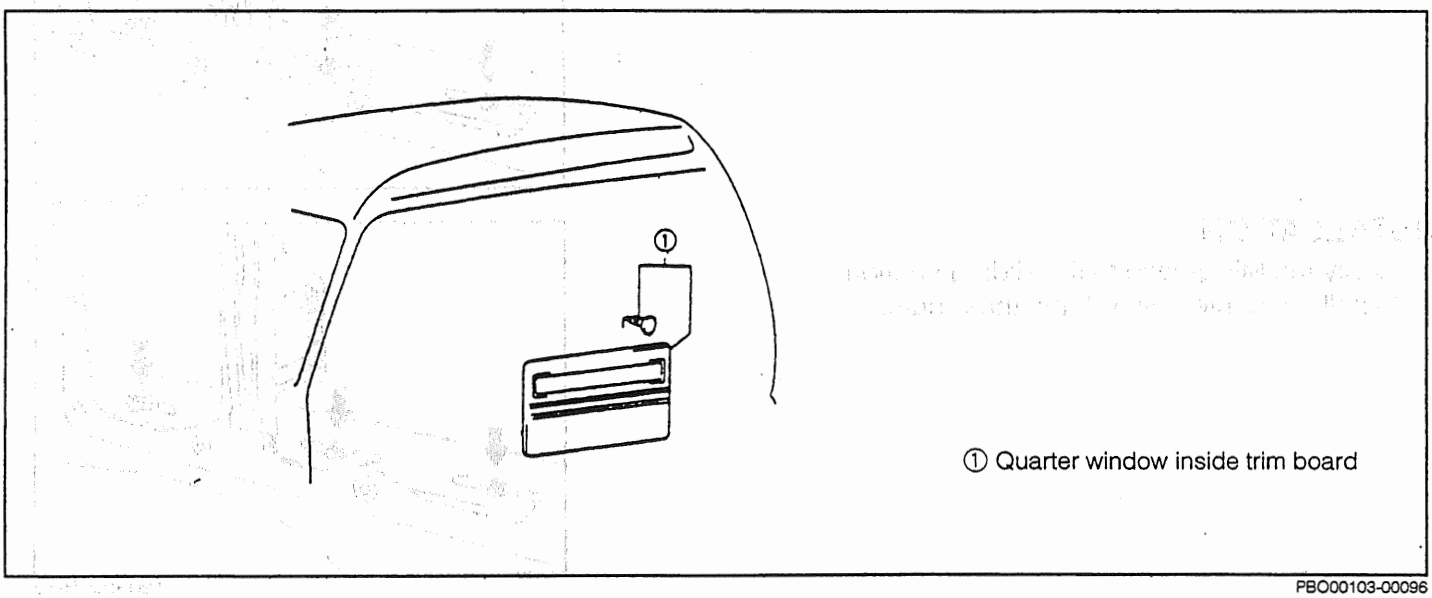
QUARTER INSIDE TRIM

Articles to be prepared

	Item	Use	
Grease, etc.	Butyl tape	For use in preventing water leakage	
	MP grease	For lubrication	
Others	Soap water	For use in sliding weatherstrip easily	
	Brush, etc.	For use in applying soap water	
	Wooden hammer	For use in installing holder	
	Touch-up paint	For use in touch-up paining after removal/installation and adjustment	
Tools		Screwdriver type clip clamping tool by Banzai, Ltd.	For use in removing door trim

PBO00102-00095

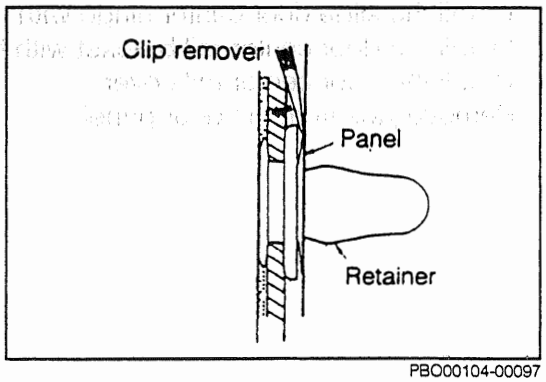
COMPONENTS



PBO00103-00096

REMOVAL

1. Remove the quarter window inside trim board, using the clip clamping tool.



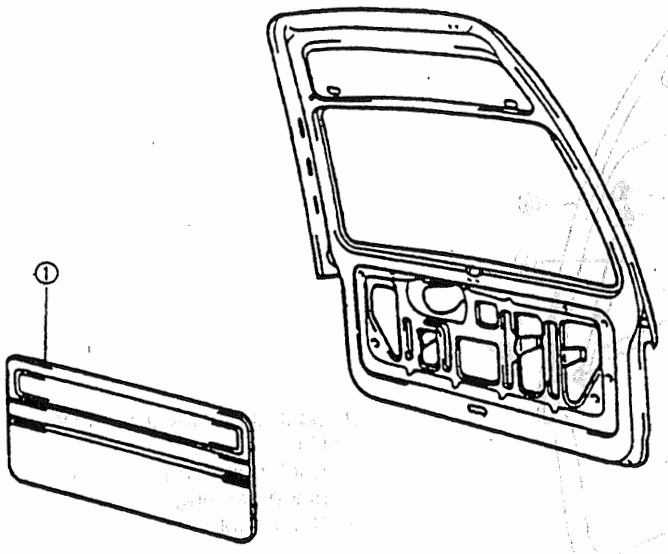
PBO00104-00097

INSTALLATION

1. Install the quarter window inside trim board.

PBO00105-00000

BACK DOOR TRIM



① Back door trim board

PBO00106-00098

REMOVAL

1. Remove the back door trim board, using the clip clamping tool.

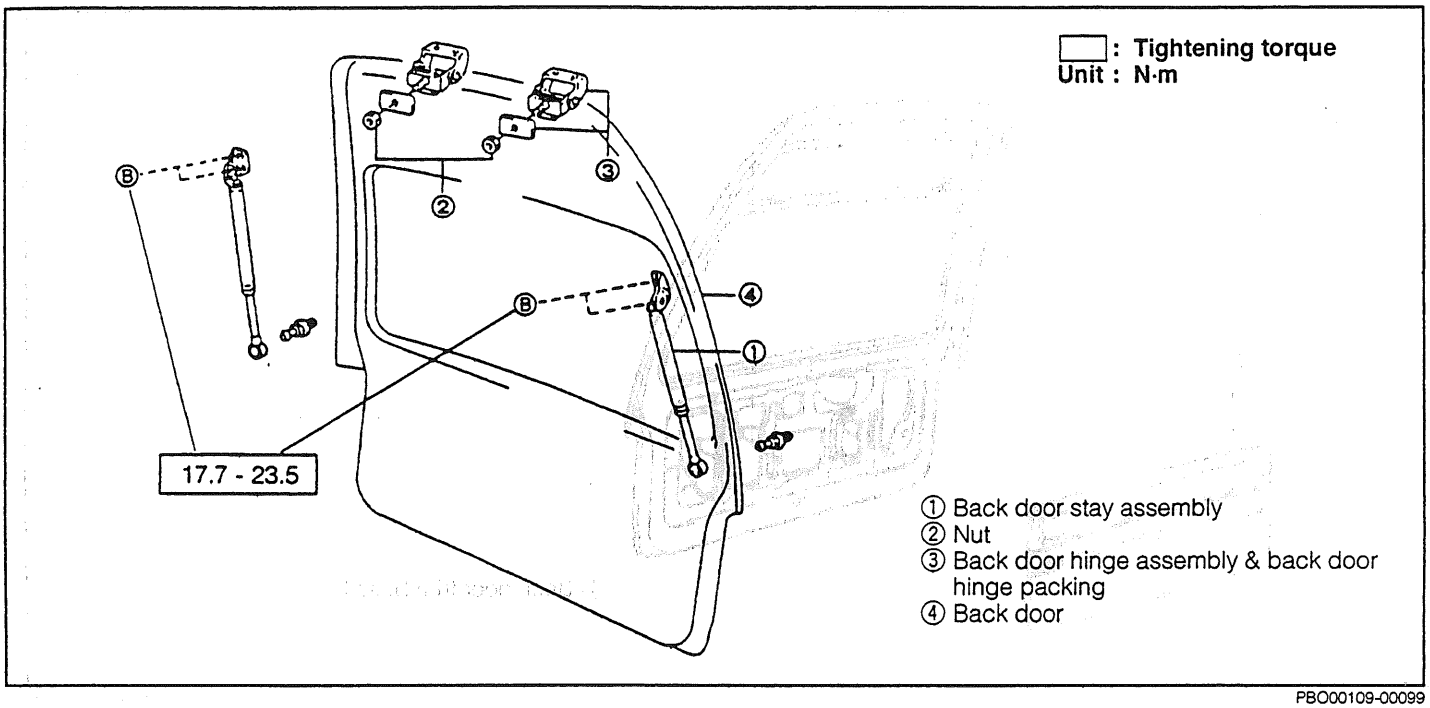
PBO00107-00000

INSTALLATION

1. Install the back door trim board.

PBO00108-00000

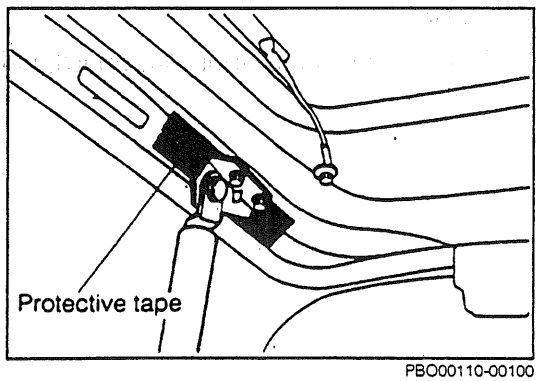
BACK DOOR PANEL



PBO00109-00099

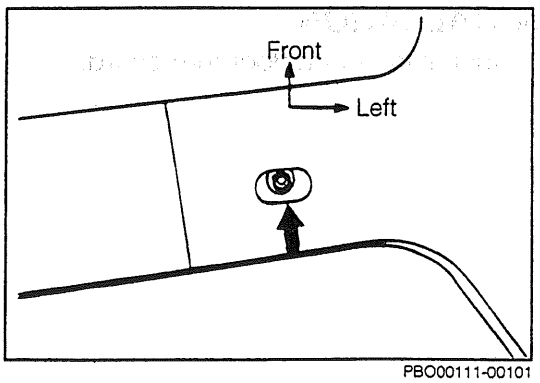
REMOVAL

1. Remove the back door stay by removing ON both left and right side of two bolts.
   NOTE:
   - Apply the adhesive tape so that the door inside panel may be avoided from the damage during removal, installation.



PBO00110-00100

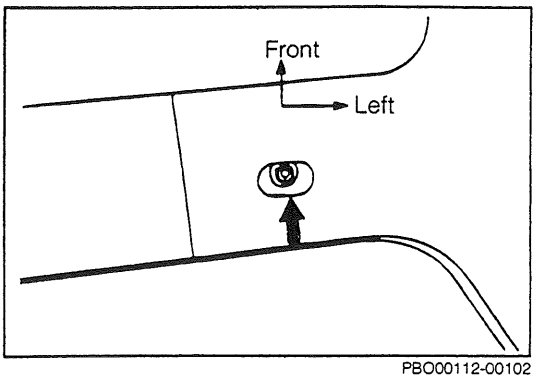
2. Remove the two nuts on both left and right side from the back door hinge.
3. Disconnect the rear window defogger connector (if equipped so).
4. Remove the back door from the body.



PBO00111-00101

INSTALLATION

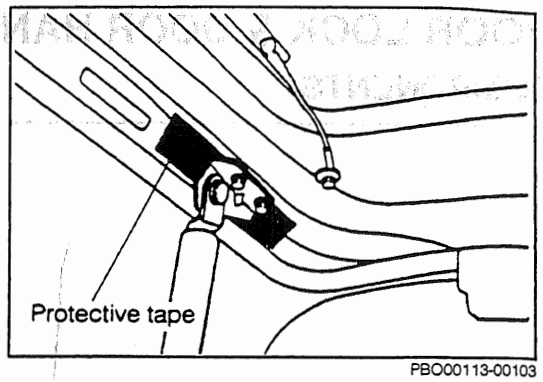
1. Install the back door to the body.
2. Connect the rear window defogger (if equipped so).
3. Tighten the nut to the back door hinge.



PBO00112-00102

4. Install the back door stay with the two bolts.
   Tightening Torque: 17.7 - 23.5 N·m

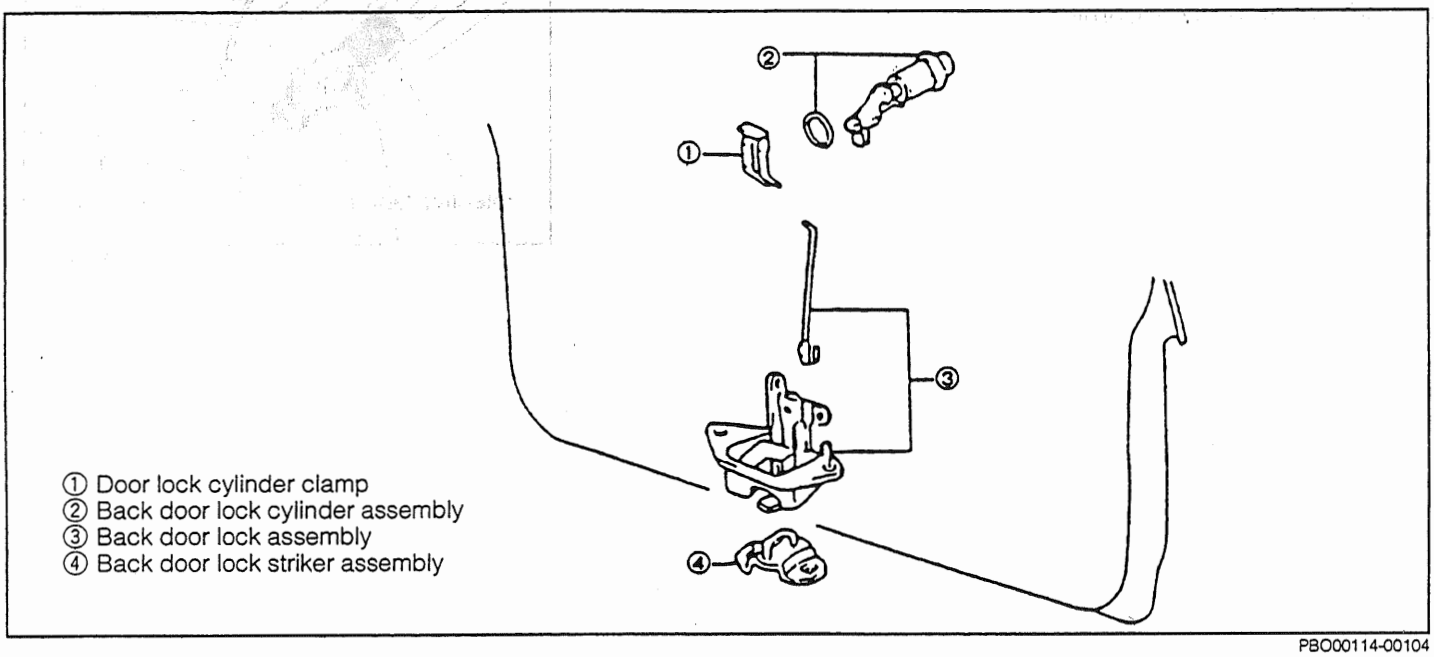
5. Adjust the body alignment.



PBO00113-00103

DOOR LOCK & DOOR HANDLE

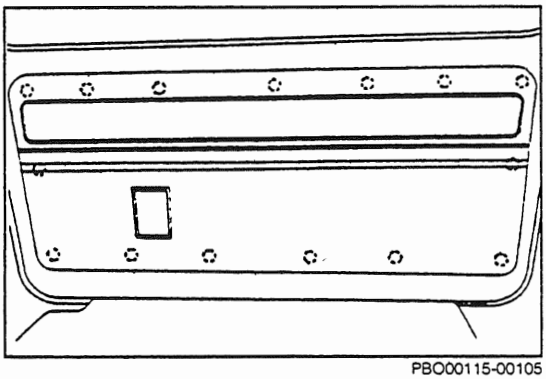
COMPONENTS



PBO00114-00104

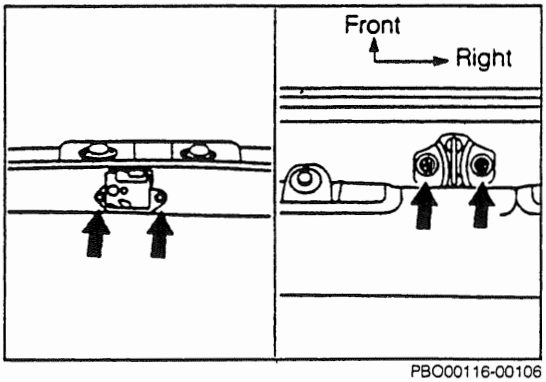
REMOVAL

1. Remove the back door trim board.
2. Remove the back door lock cylinder assembly by removing the door lock cylinder clamp.



PBO00115-00105

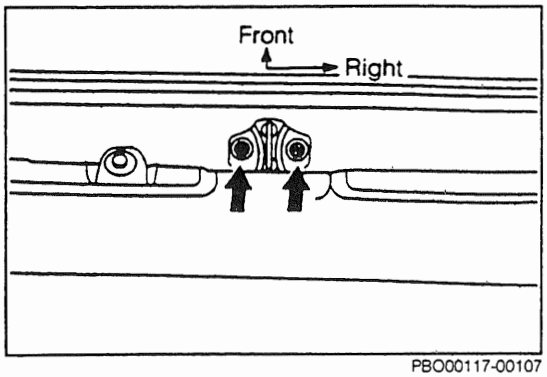
3. Remove the back door lock cylinder assembly by removing the two bolts.
4. Remove the back door lock striker assembly by removing the two bolts.



PBO00116-00106

INSTALLATION

1. Apply the MP grease to each sliding section.
2. Install the back door lock striker assembly with the two bolts.



PBO00117-00107

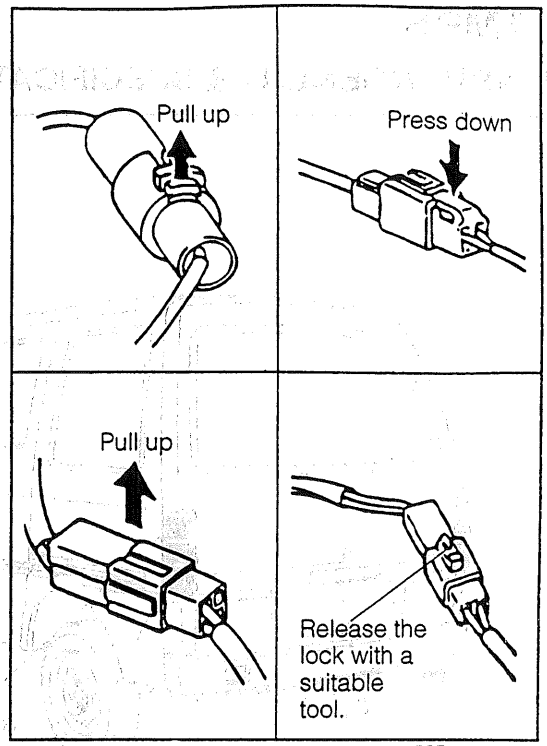
2. DISCONNECTION

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.



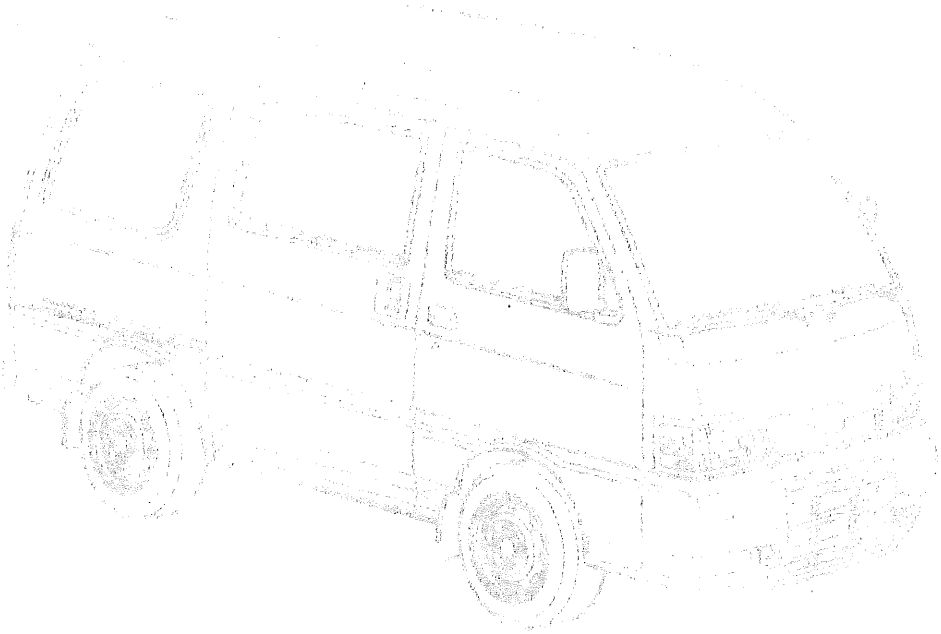
PBE00006-00004

3. CONNECTION

Perform the connection, until the lock is completely engaged.

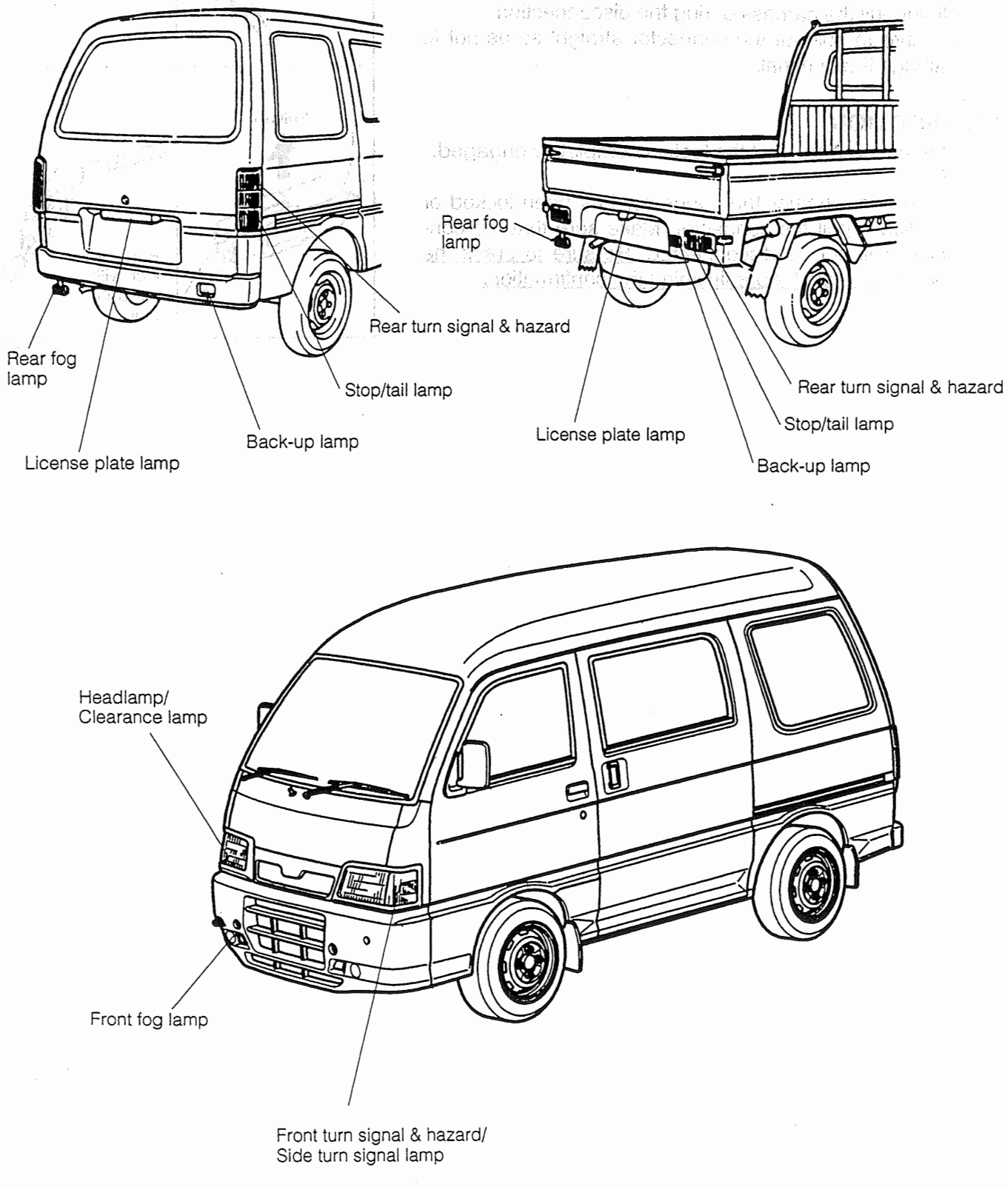
NOTE:

- 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.



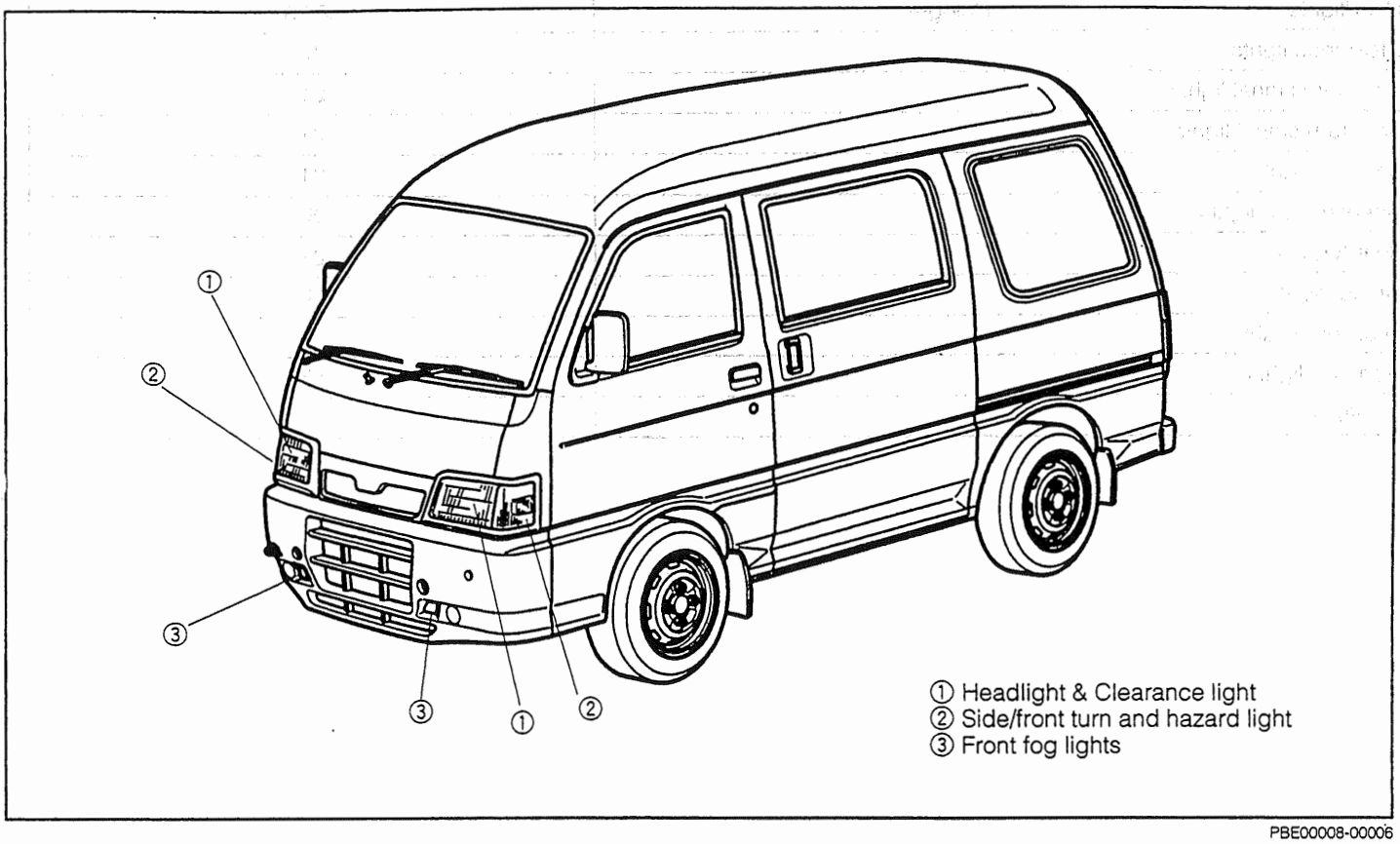
LAMPS

1. ARRANGEMENT & SPECIFICATIONS OF LAMPS



LAMP BULBS

1. BULB LOCATION AND FEATURES



PBE00008-00006

2. BULB FEATURES

Light	WATTAGE
Headlight	55 - 60
Front side direction lights	21
Front fog lights	55
Clearance light	5

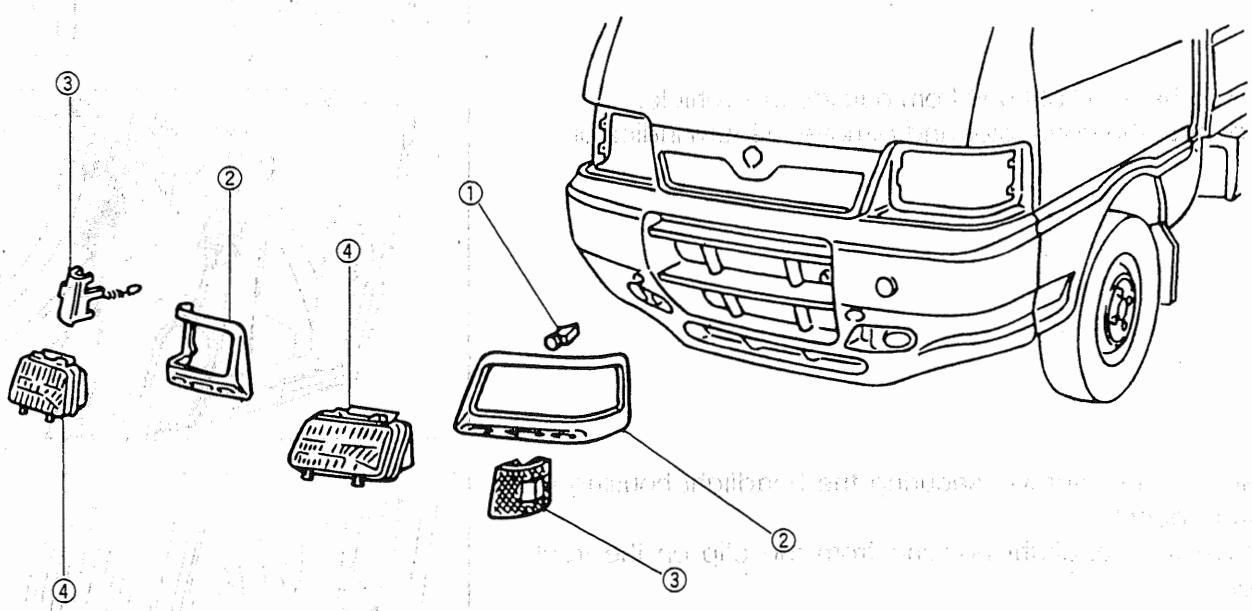
PBE00009-00000

3. LAMP SPECIFICATIONS

Light		Wattage
Headlights	Halogen	60/55
Clearance lights		5
Front turn signal lights		21
Rear turn signal lights		21
Back-up light		21
License plate lights		5
Rear fog light		21
Interior light		5
Rear room light		5
Front fog lights		55
Stop/tail		21/5

PBE00010-00000

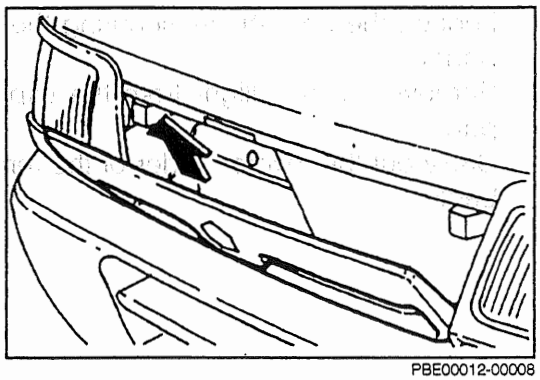
4. HEADLIGHT UNIT



PBE00011-00007

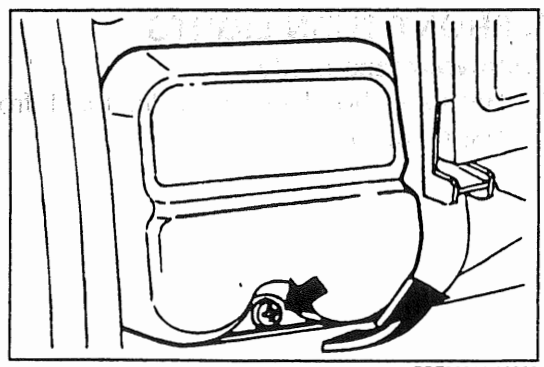
REMOVAL/REASSEMBLY

1. Remove the front panel (see page BO–4).



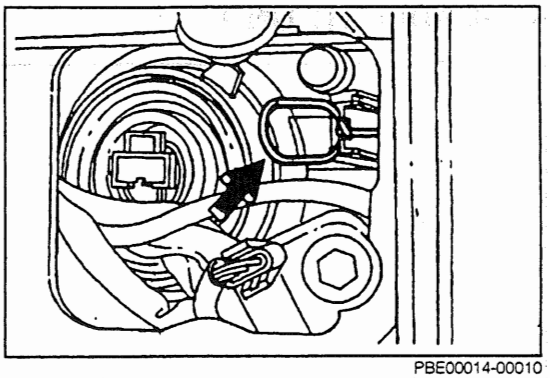
PBE00012-00008

2. Loosen and remove the fastening screw. Remove the headlight cover.



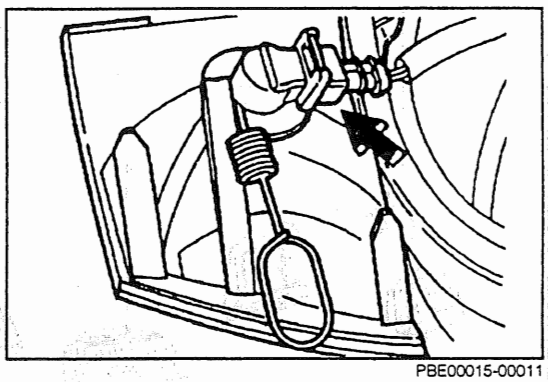
PBE00013-00009

3. Remove the turn light securing spring.



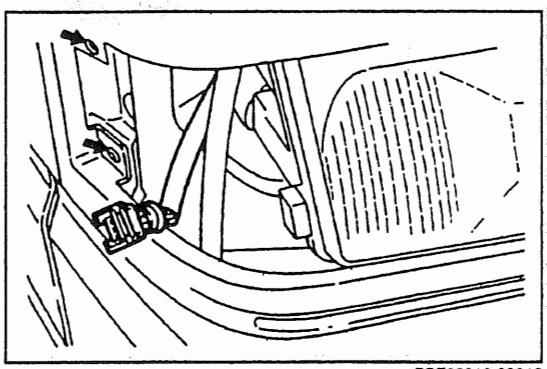
PBE00014-00010

4. Remove the turn light unit from outside the vehicle.
5. Disconnect the connector and remove the turn indicator.



PBE00015-00011

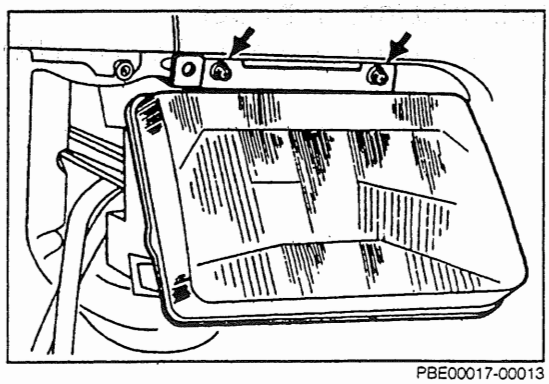
6. Loosen the two screws securing the headlight housing to the front panel.
7. Remove the headlight housing from the clip on the front panel.



PBE00016-00012

8. Loosen the two screws securing the headlight to the front panel.
9. Remove the headlight from the clip located in the lower part.

   Carry out the reverse order of the removal operations to fit back.

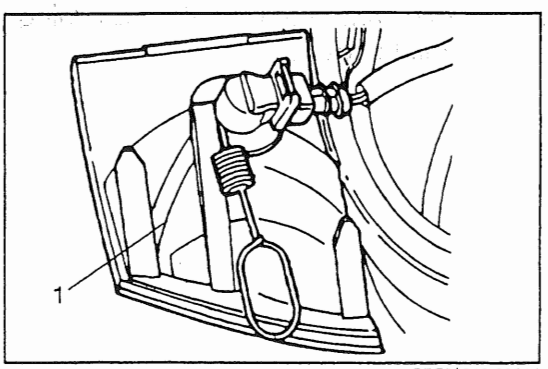


PBE00017-00013

5. FRONT TURN LIGHTS

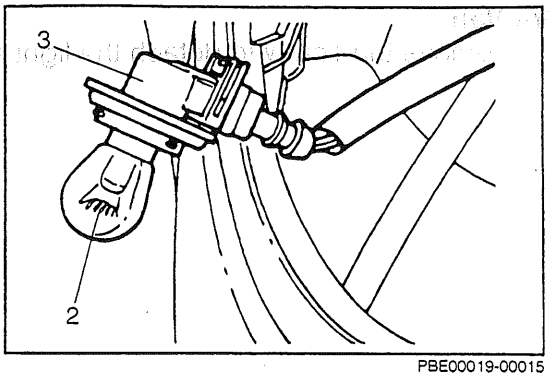
Removal/reassembly

1. Remove the direction indicator 1 from its housing. (see page BO-3).



PBE00018-00014

2. Disconnect the bulb holder.
3. Remove bulb 2 from bulb holder 3.
   Carry out the reverse order of the removal operations to fit back.

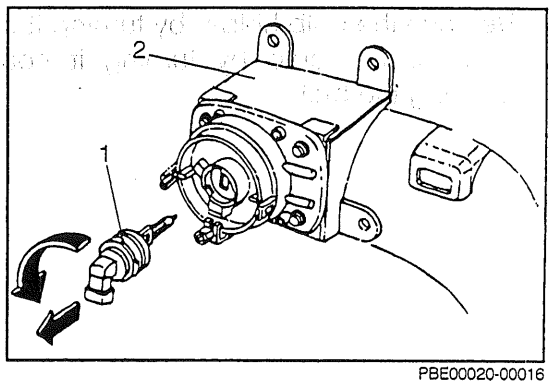


PBE00019-00015

6. FRONT FOG LIGHTS

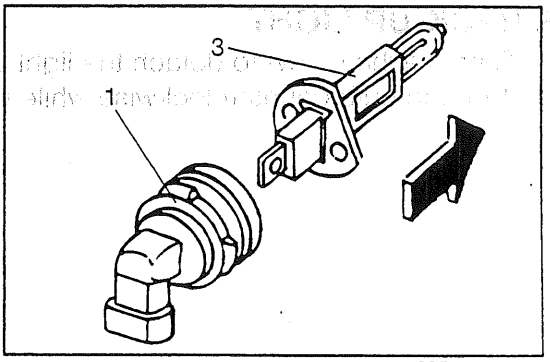
Removal/reassembly

1. From the front bumper compartment disconnect bulb holder 1 and light bulb, and remove it from front fog light support 2.



PBE00020-00016

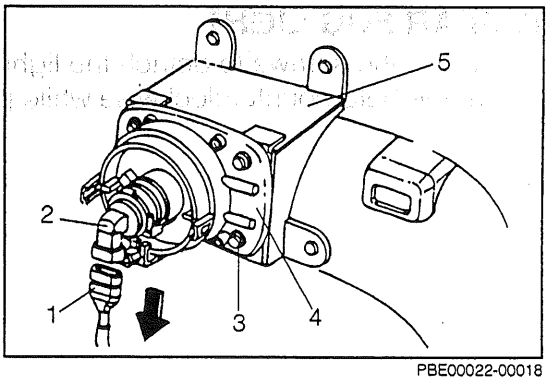
2. Remove bulb 3 from bulb holder 1.
   Carry out the reverse order of the removal operations to fit back.



PBE00021-00017

7. CHANGING A FRONT FOG LIGHT

1. From the front bumper compartment, disconnect connector 1 from lamp holder 2.
2. Release the four fastening screws 3 from front fog light 4 on the support 5.
3. Remove front fog light 4 with the lamp holder and bulb.
   Reverse the operations above to refit.

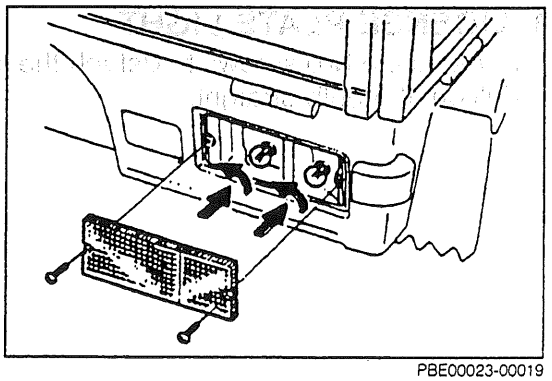


PBE00022-00018

8. REAR TURN SIGNAL LIGHTS/STOP & TAIL LIGHTS

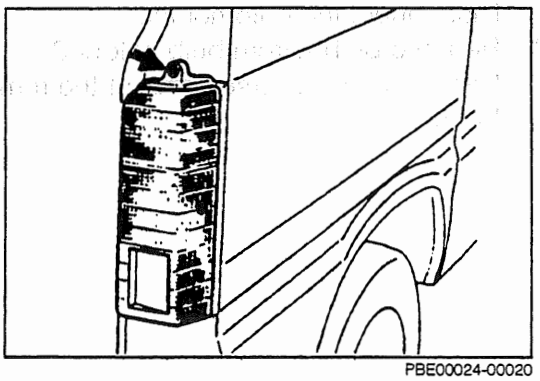
For Pickup

1. Remove the two screws to detach the light assembly.
2. Turn the bulb counterclockwise while pushing it.


PBE00023-00019

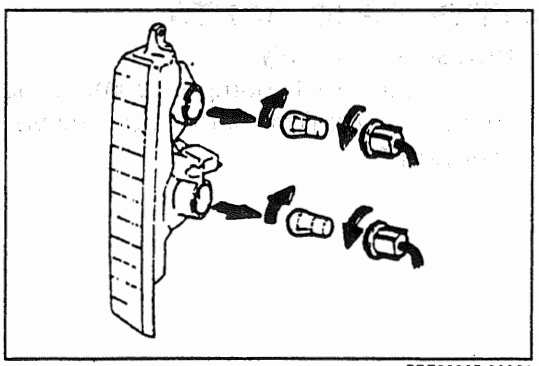
For Van

1. Remove the screw to detach the light assembly.



PBE00024-00020

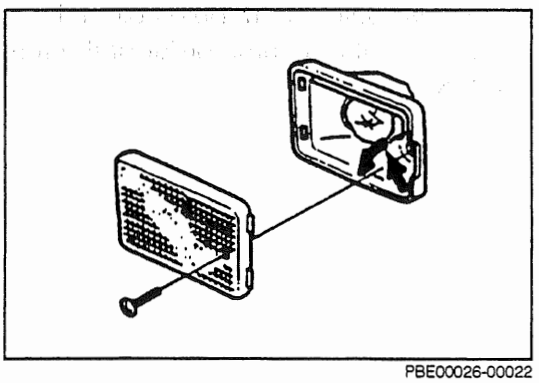
2. Remove the bulb holder by turning it counterclockwise.
3. Remove the bulb by turning it counterclockwise while pushing the bulb.



PBE00025-00021

9. BACK-UP LIGHT

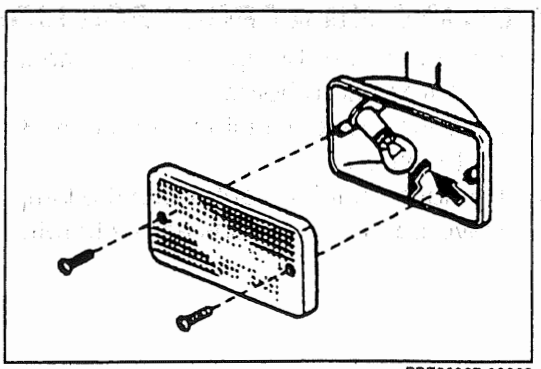
1. Remove the screw to detach the light assembly.
2. Turn the bulb counterclockwise while pushing it.



PBE00026-00022

10. REAR FOG LIGHT

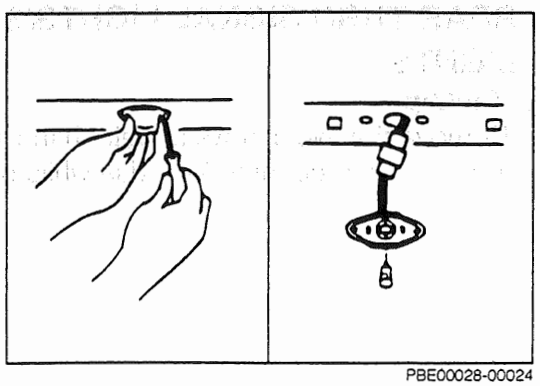
1. Remove the screws to detach the light assembly.
2. Turn the bulb counterclockwise while pushing it.



PBE00027-00023

11. LICENSE PLATE LIGHT

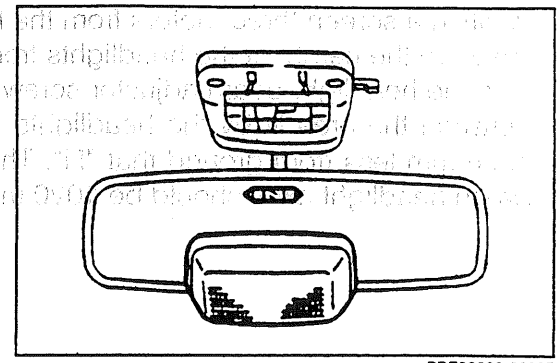
1. Remove the two screws to detach the light assembly.
2. Pull out the bulb straight.



PBE00028-00024

12. INTERIOR LIGHT

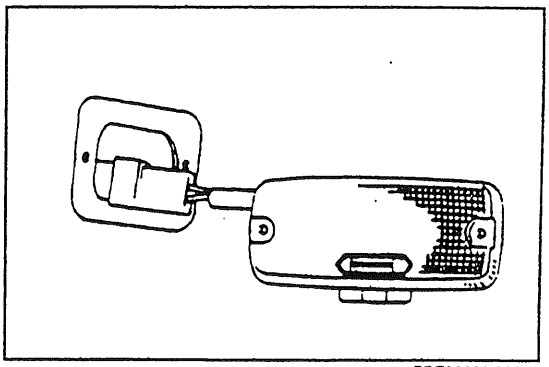
1. Lightly pry the lens to detach it.
2. Pull out the bulb straight.



PBE00029-00025

13. REAR INTERIOR LIGHT

1. Remove the two screws to detach the light assembly.
2. Pull out the bulb straight.



PBE00030-00026

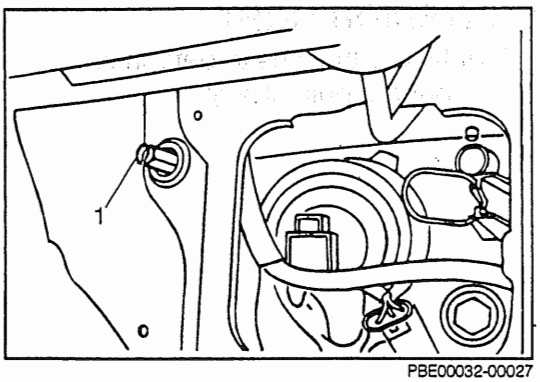
14. HEADLIGHT AIMING ADJUSTMENT

NOTE:
Before starting, perform the following operations:

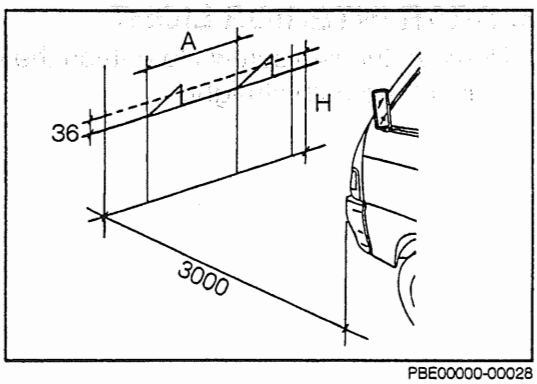
- Sit a person (approximately 75 kg) in the driver's seat. Check and adjust type pressure, if required.
- Check that the spare wheel, jack and tool bag are correctly stored.
- Check the engine oil, gearbox oil, windscreen washer fluid, etc. and top up, if required.
- Rock the vehicle in all directions to ensure weights are equally distributed so that the vehicle position is correct.
- Run the engine at 1500 rpm or more during headlight beam adjustment.
- Turn the headlight adjustment knob to "0".

PBE00031-00000

1. Position a screen three meters from the headlights.
2. Measure the height of the headlights from ground "H".
3. Turn the headlight beam adjuster screw (1) so that the line between the area lit by the headlights and the shadow is at 36 mm less from ground that "H". The distance "A" between headlight axes should be 1020 mm.

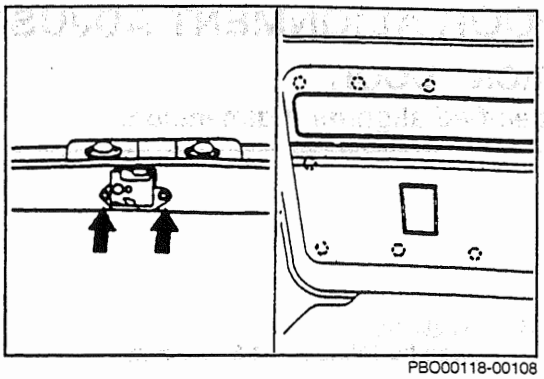


PBE00032-00027



PBE00000-00028

3. Install the back door lock assembly with the two bolts.
4. Install the back door lock cylinder assembly with a clamp.
5. Perform the check and adjustment for the locking condition.



PBO00118-00108

DOOR ALIGNMENT ADJUSTMENT

FRONT DOOR

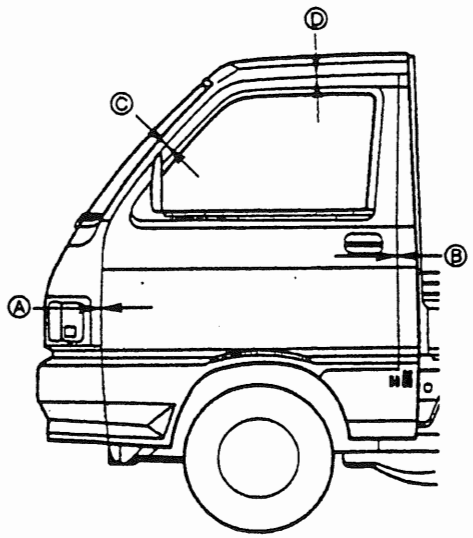
Specified alignment dimensions

Gap Ⓐ, Ⓑ, Ⓒ, Ⓓ
Specified Value: 3.5 - 7.5 mm

Deviation in Each Side Ⓐ, Ⓑ, Ⓒ
Specified Value: Not to Exceed 1.5 mm
Deviation in Each Side Ⓓ
Specified Value: Not to Exceed 2.0 mm

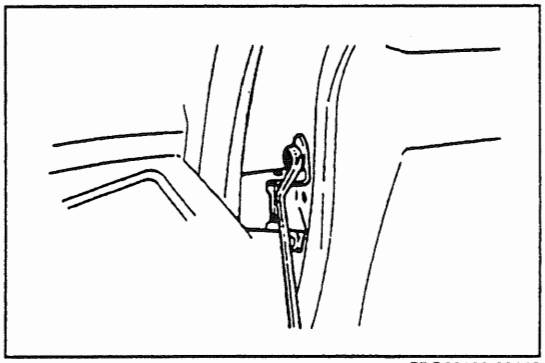
Difference in Height
Specified Value: Not to Exceed ±1.5 mm

Deviation between Right and Left Sides Ⓐ, Ⓑ, Ⓒ, Ⓓ
Specified Value: Not to Exceed 2.0 mm



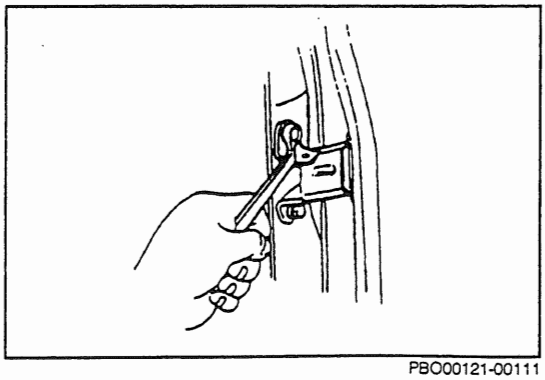
PBO00119-00109

1. **Adjustment in right-and-left and up-and-down directions**
   Perform this adjustment after loosening the hinge bolts (two pieces) at the door side.



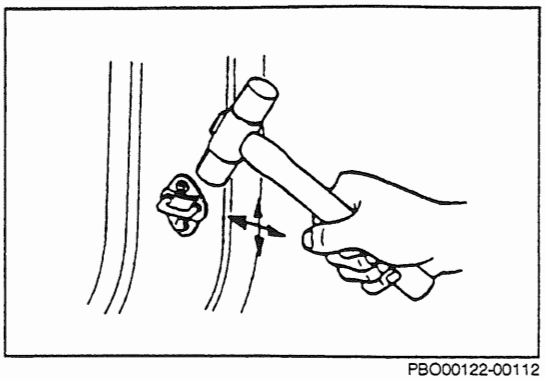
PBO00120-00110

2. **Adjustment in fore-and-aft and up-and-down directions**
   Perform this adjustment after loosening the hinge bolts (two pieces) at the pillar side.



PBO00121-00111

3. **Door plate adjustment**
   Loosen the door plate screw. Adjust and tighten the door plate so that the door is lightly closed and no difference in height with the rear pillar exists.
   NOTE:
   - If the door is sagged or raised at the rear section, never attempt to correct this at the door plate. This adjustment must be performed at the door hinge.



PBO00122-00112

REAR DOOR

Specified alignment dimensions

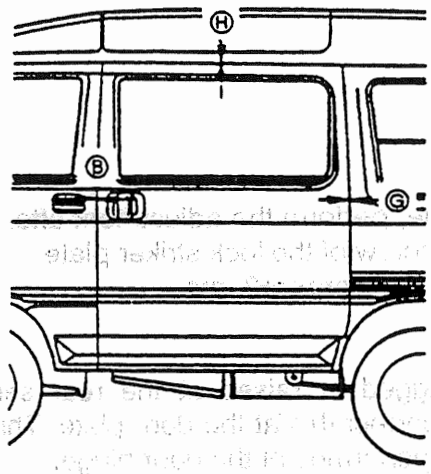
Gap Ⓑ, Ⓖ, Ⓗ
Specified Value: 3.5 - 7.5 mm

Deviation in Each Side Ⓑ, Ⓖ
Specified Value: Not to Exceed 1.5 mm

Deviation in Each Side Ⓗ
Specified Value: Not to Exceed 2.0 mm

Difference in Height
Specified Value: Not to Exceed ±1.5 mm

Deviation between Right and Left Sides Ⓐ, Ⓖ, Ⓗ
Specified Value: Not to Exceed 2.0 mm

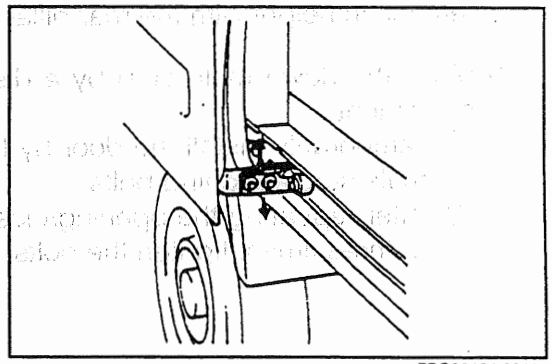


PBO00123-00113

1. Adjustment in up-and-down direction

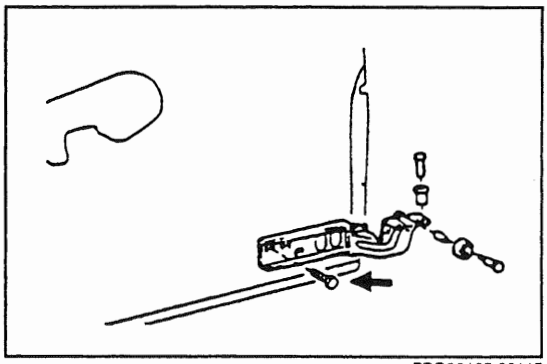
(1) As for the front side, perform the adjustment after loosening setting bolts (two pieces) of the lower roller.
Adjustable Range: Approx. ±2 mm

At this time, move the down male stopper by a distance equal to the lower roller movement.



PBO00124-00114

(2) As for the rear side, perform the adjustment after loosening the setting bolts (two pieces) of the center hinge.
Adjustable Range: Approx. ±2 mm

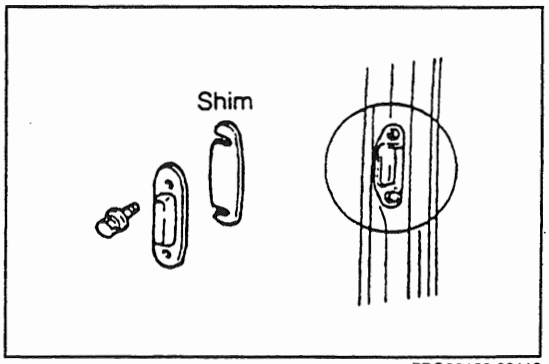


PBO00125-00115

2. Adjustment in fore-and-aft direction

Perform this adjustment after loosening the setting bolts (two pieces) of the center hinge.
Adjustable Range: Approx. ±2 mm

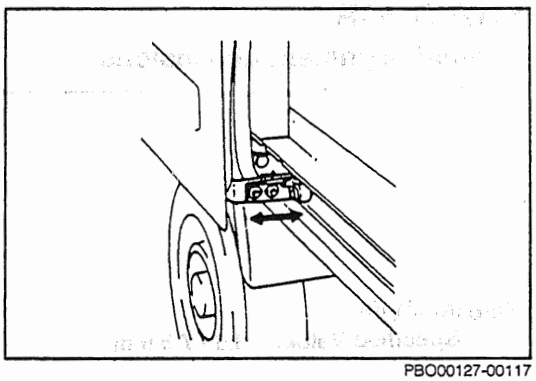
Even after the center hinge has been adjusted, if the gap at the door front side (point (G) in the figure left) is too narrow, adjust this by inserting a shim to the down male stop attaching section.
Shim Thickness: 1 mm



PBO00126-00116

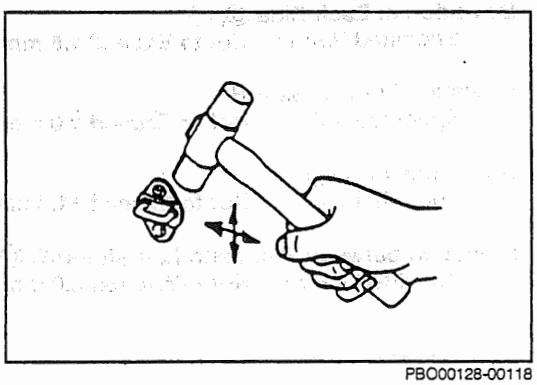
3. Adjustment of difference in height

(1) As for the front side, perform the adjustment after loosening the setting bolt of the lower roller.
Adjustable Range: Approx. ±2 mm



PBO00127-00117

(2) As for the rear side, perform the adjustment after loosening the setting screw of the lock striker plate.
Adjustable Range: Approx. ±2 mm



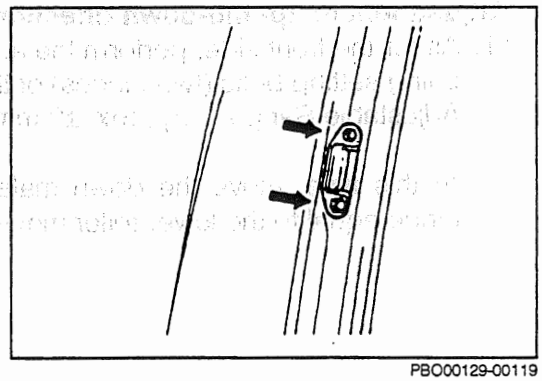
PBO00128-00118

NOTE:

- If the door is sagged or raised at the rear section, never attempt to correct this at the door plate. This adjustment must be performed at the door hinge.

  Loosen the door plate screw. Adjust and tighten the door plate so that the door is lightly closed and no difference in height with the rear pillar exists.

(3) Move the down male stop by a distance equal to the movement.
   ① Temporarily install the door by tightening the down male stop attaching bolts.
   ② After repeating the opening/closing of the door two or three times, tighten the bolts securely.



PBO00129-00119

BACK DOOR PANEL

Specified alignment dimensions

Gap Ⓙ
Specified Value: 3.6 - 8.6 mm

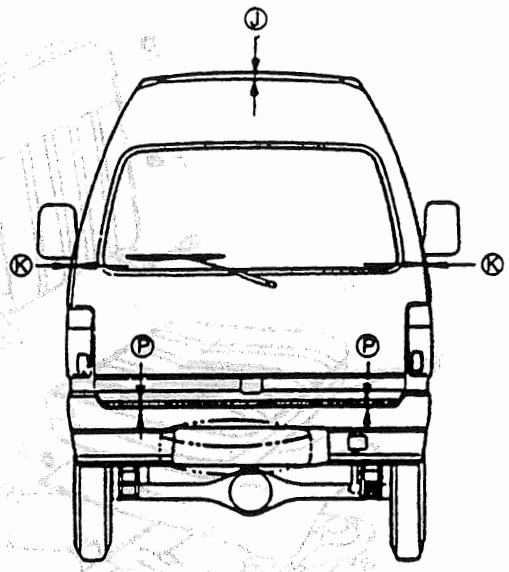
Gap Ⓚ
Specified Value: 4.6 - 8.6 mm

Gap Ⓟ
(Standard)
Specified Value: 5.5 - 9.5 mm
(Not Standard)
Specified Value: 7.0 - 11.0 mm

Deviation in Each Side
Specified Value: Not to Exceed 2.0 mm

Difference in Height
Specified Value: Not to Exceed ±1.5 mm

Deviation between Right and Left Sides
Specified Value: Not to Exceed 2.0 mm



PBO00130-00120

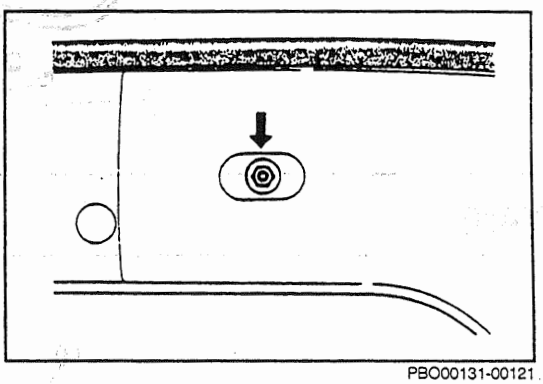
ADJUSTMENT

Adjustment of upper section in fore-and-aft direction

Perform this adjustment after loosening the hinge bolts at the body side.

NOTE:

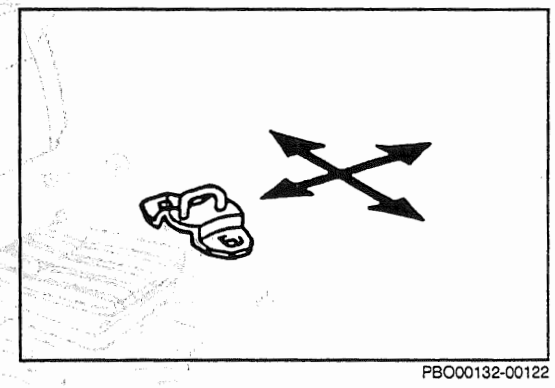
- When adjusting the door upper section in a fore-and-aft direction, be sure that the gap between the rear quarter pillar side surface and the back door side surface will not exceed 4.6 - 8.6 mm.
- In respect to the adjustment not exceeding 2.0 mm, loosen the hinge bolts at the door side.



PBO00131-00121

Adjustment of lower section in fore-and-aft direction and adjustment of closing condition

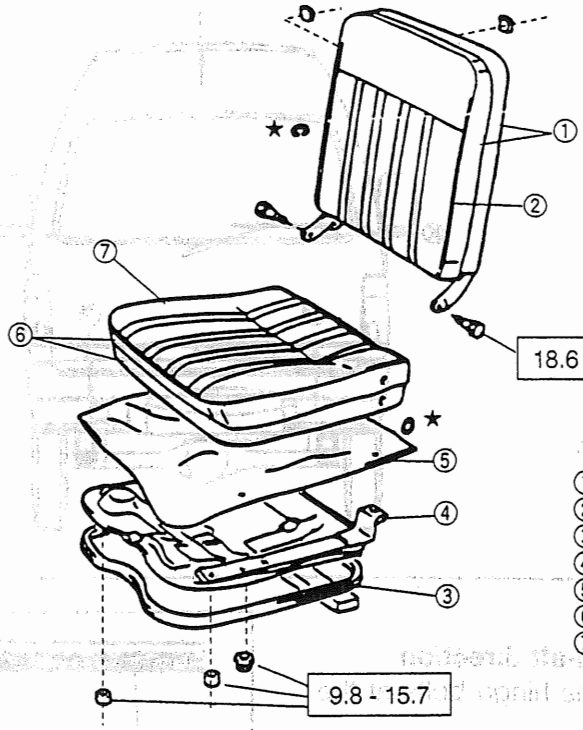
Perform these adjustments by changing the lock striker installation position.



PBO00132-00122

FRONT SEAT

(PICKUP)

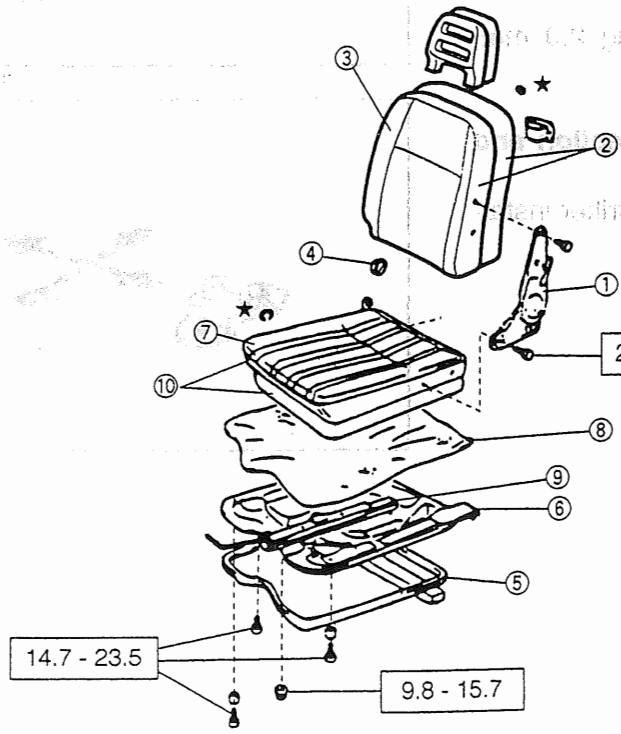


□ : Tightening torque
Unit : N·m
★ : Non-reusable parts

① Front seat back assembly
② Front seat back cover
③ Front seat cushion packing
④ Engine service hole cover panel
⑤ Center floor mat
⑥ Front seat cushion assembly
⑦ Front seat cushion cover

PBO00133-00123

(VAN)



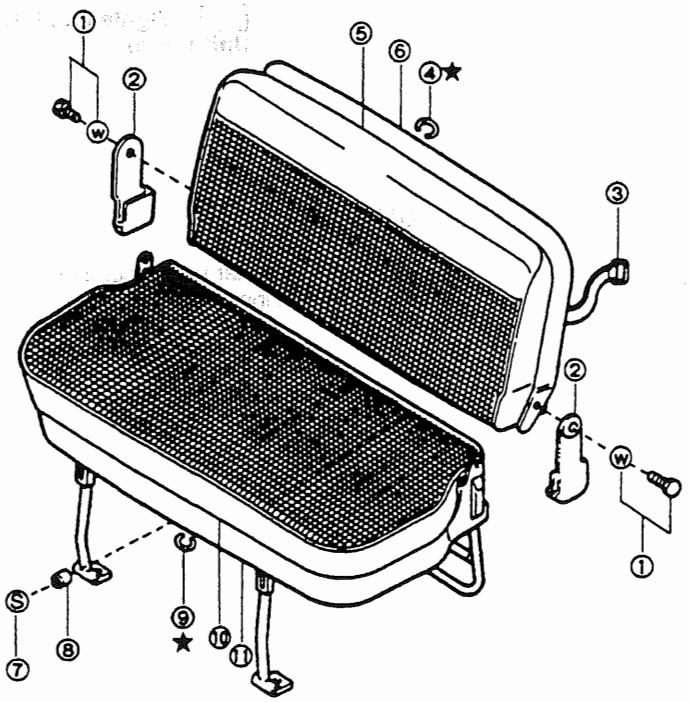
□ : Tightening torque
Unit : N·m
★ : Non-reusable parts

① Reclining seat back adjuster assembly
② Front seat back assembly
③ Front seat back cover
④ Bush
⑤ Engine service hole cover packing
⑥ Engine service hole main cover
⑦ Front seat cushion cover
⑧ Center floor mat
⑨ Front seat inner track assembly
⑩ Front seat cushion assembly

PBO00134-00124

REAR SEAT

★ : Non-reusable parts



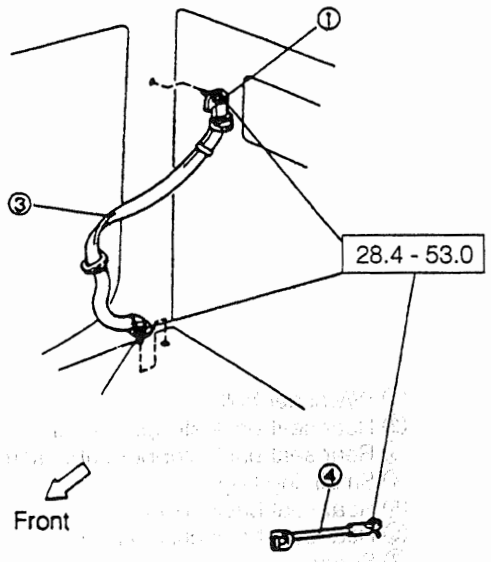
① W/washer bolt
② Rear seat back stopper cover
③ Rear seat back stopper subassembly
④ Small ring hog
⑤ Rear seat back cover
⑥ Rear seat back cushion
⑦ Screw
⑧ Cushion
⑨ Small ring hog
⑩ Rear seat cushion cover
⑪ Rear seat cushion

PBO00135-00125

SEAT BELTS

FRONT

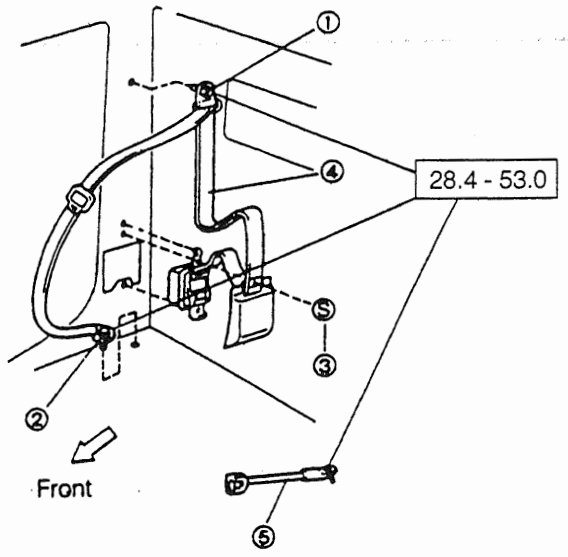
Three-point type seat belt



□: Tightening torque
Unit : N·m

① Bolt
② Bolt
③ Front seat outer belt assembly
④ Front seat inner belt assembly

ELR type seat belt



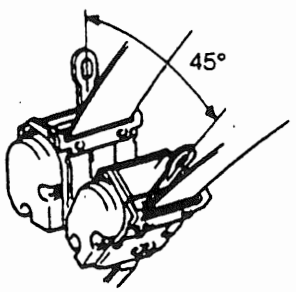
① Bolt
② Bolt
③ Screw
④ Front seat outer belt assembly
⑤ Front seat inner belt assembly

PBO00136-00126

INSPECTION

Checking of inclination angle at which ELR starts locking

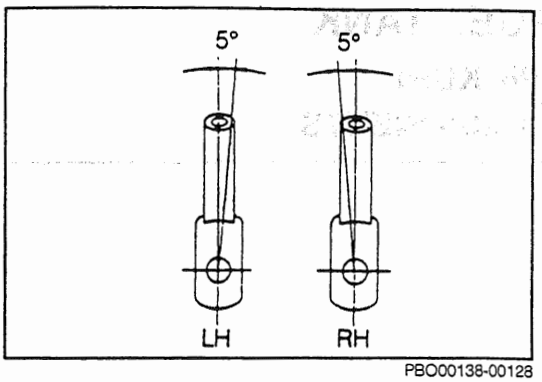
1. Gently tilt the retractor from the installation angle position. Ensure that the seat belt lock is not actuated in all directions when the inclination angle is within 15 degrees.
2. Ensure that the seat belt remains locked when the inclination angle exceeds 45 degrees.
   NOTE:
   - Never disassemble the retractor.



PBO00137-00127

Installation of the front seat inner bolt

Install the front seat inner bolt assembly in the correct installing indicated in the right figure.

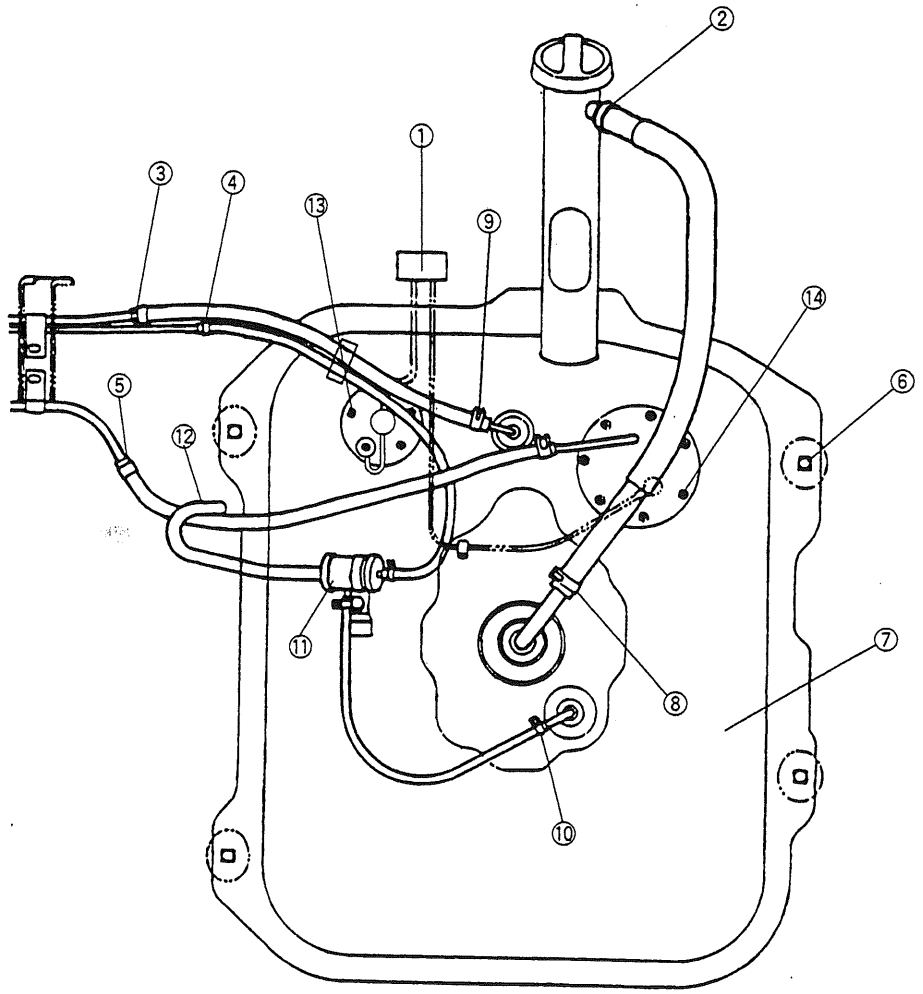


PBO00138-00128

FUEL TANK

(PICKUP)

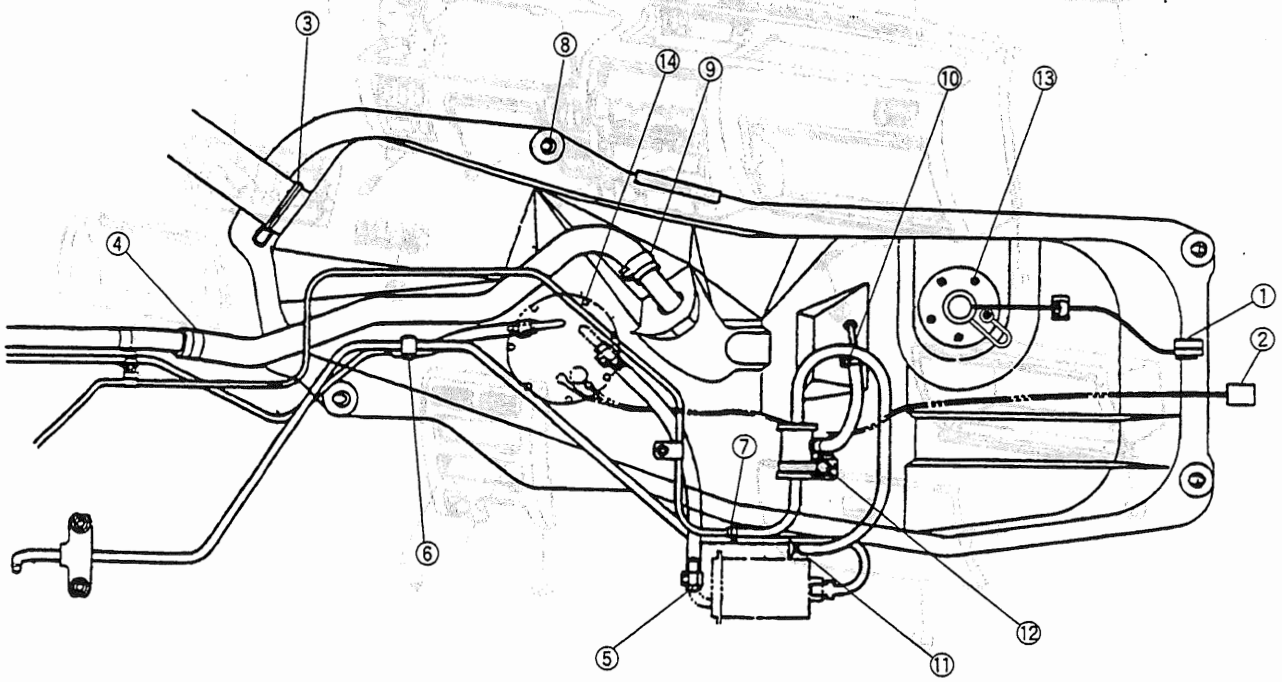
COMPONENTS



① Harness wire (Fuel pump)
Harness wire (Fuel sender gauge)
② Clamp & hose (for breather)
③ Clip & hose (for fuel return)
④ Clip & hose (for emission)
⑤ Clip & hose (for fuel main)
⑥ Bolt
⑦ Fuel tank assembly
⑧ Clamp & hose (for breather)
⑨ Clip & hose (for fuel return)
⑩ Clip & hose (for emission)
⑪ Evapo purge control valve assembly
⑫ Hose
⑬ Fuel sender gauge assembly
⑭ Fuel pump assembly

PBO00139-00129

(VAN)
COMPONENTS

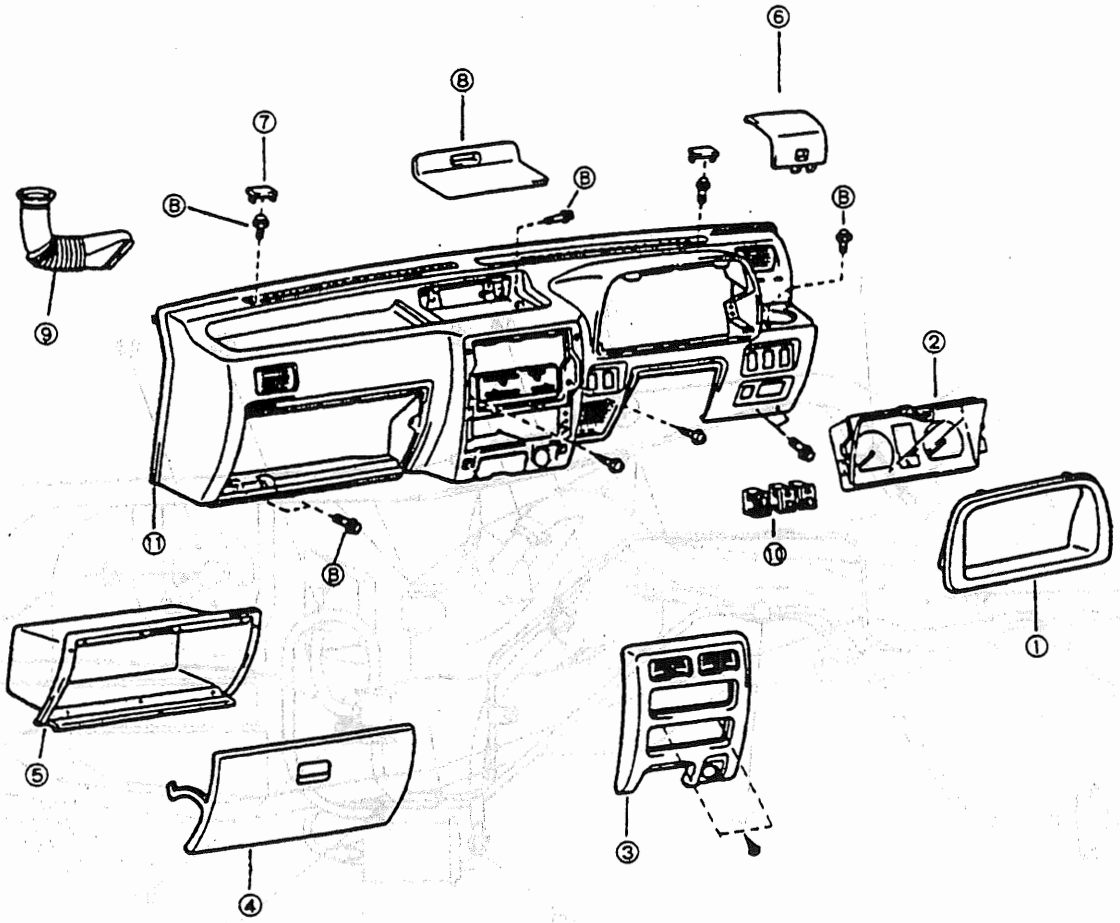


① Harness wire (for fuel sender gauge)
② Harness wire (for fuel pump)
③ Clamp & hose (for fuel inlet)
④ Clamp & hose (for breather)
⑤ Clip & hose (for fuel main)
⑥ Clip & hose (for fuel return)
⑦ Clip & hose (for emission)
⑧ Bolt
⑨ Clamp & hose (for breather)
⑩ Clip & hose (for emission)
⑪ Hose (for emission)
⑫ Evapo purge control valve assembly
⑬ Fuel sender gauge assembly
⑭ Fuel pump assembly

PBO00140-00130

INSTRUMENT PANEL

COMPONENTS

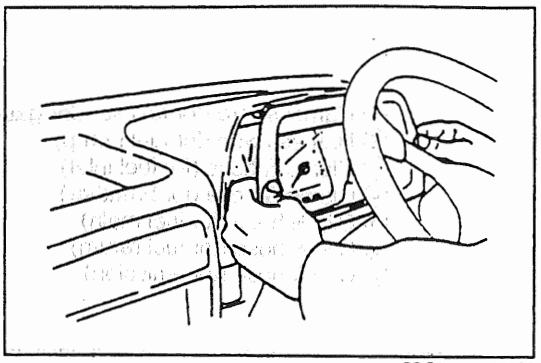


① Instrument cluster finish panel assembly
② Combination meter assembly
③ Instrument cluster finish center panel assembly
④ Glove compartment door assembly
⑤ Glove compartment box assembly
⑥ Reserver service hole door
⑦ Instrument panel hole cover
⑧ Instrument panel finish upper panel assembly
⑨ Defroster hose No. 2
⑩ Switches
⑪ Instrument panel assembly

PBO00141-00131

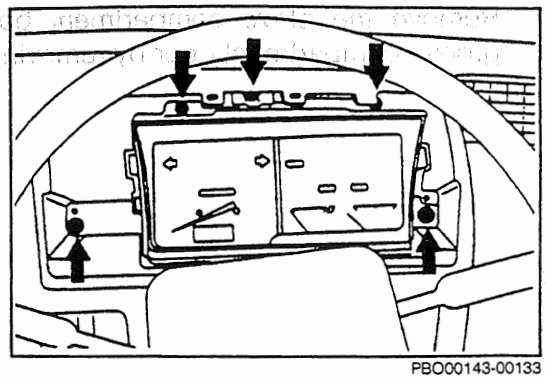
REMOVAL

1. Disconnect the battery minus terminal.
2. Remove the steering wheel (Refer to Steering Section).
3. Pull out the instrument cluster finish panel assembly toward you.



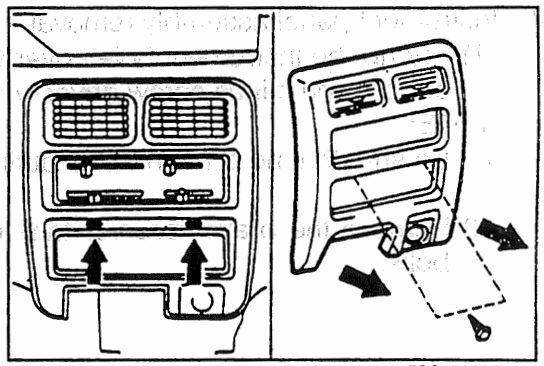
PBO00142-00132

4. Remove the combination meter assembly by removing the five screws.
5. Disconnect the speedometer cable and couplers.
6. Remove the choke cable knob by removing the screw.



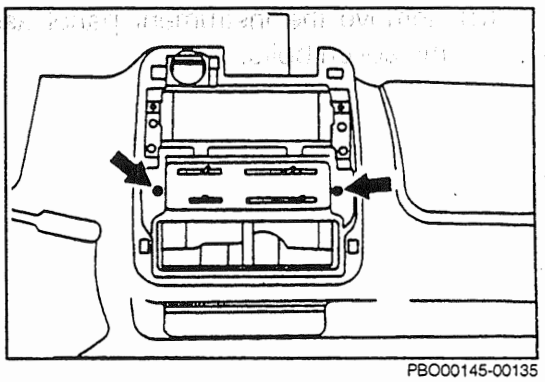
PBO00143-00133

7. Detach the heater control knobs.
8. Removal of instrument panel cluster finish panel
   (1) Remove the two screws.
   (2) Detach the lower section of the clip.
   (3) Pull out them toward you.



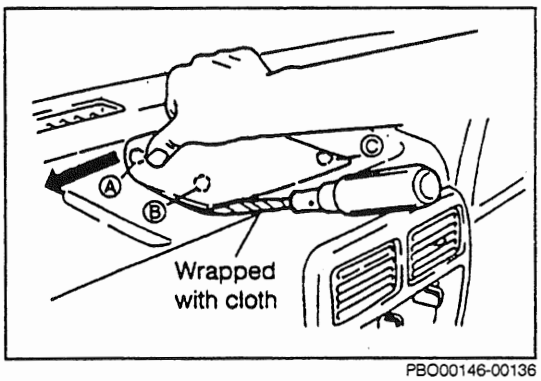
PBO00144-00134

9. Remove the two screws at the heater control panel.



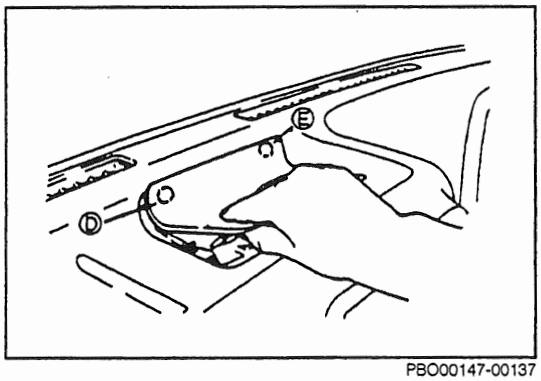
PBO00145-00135

10. Removal of instrument panel finish upper panel assembly
    (1) Strongly push the left edge section at the front of the finish panel toward the front lower direction Ⓐ of the vehicle. Then, open the joint at the section Ⓑ.
    Insert a screwdriver wound with protective tape into position so as to detach the fitting at the section Ⓑ.
    (2) Insert a screwdriver into the joint at the section Ⓒ so as to detach the fitting at the section Ⓒ.



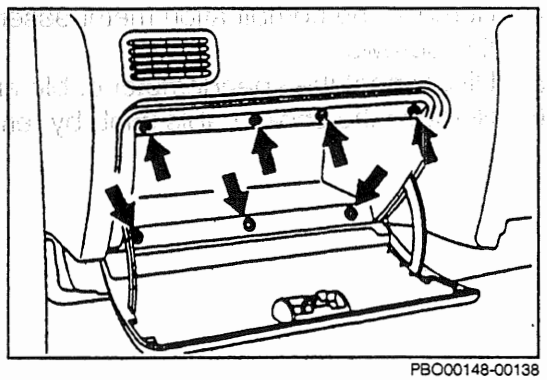
PBO00146-00136

    (3) Grasp and draw the section Ⓑ toward the rear upper direction of the vehicle so as to detach the fitting at the section Ⓓ. (Be very careful not to scratch the instrument panel by the clip at the section Ⓒ during the drawing.)
    (4) Grasp and draw the section Ⓒ toward the rear upper direction of the vehicle so as to detach the fitting at the section Ⓔ.



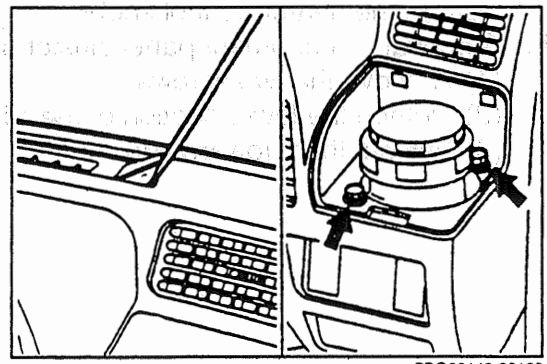
PBO00147-00137

11. Remove the glove compartment box with installed the groove compartment door by removing the seven screws.



PBO00148-00138

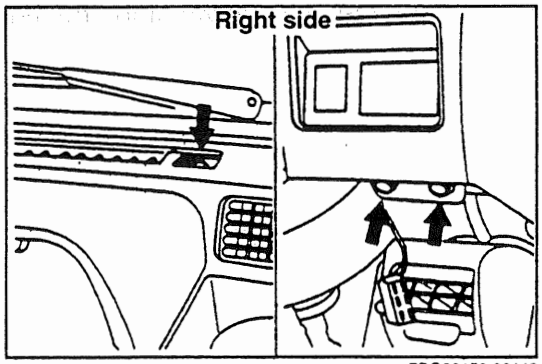
12. Instrument panel assembly removal
    (1) Pry up the instrument hole cover with bamboo spaluta or common minus screw driver wrapped with cloth.
    NOTE:
    - Be sure that no scratch made during the removal.



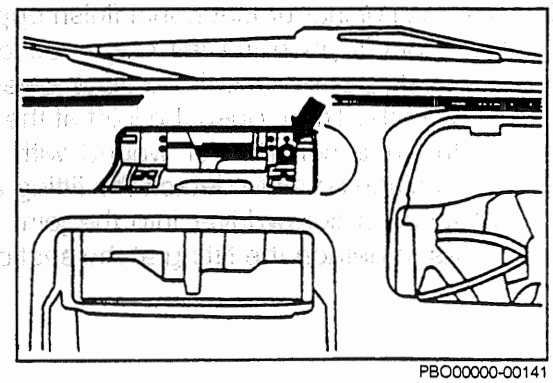
PBO00149-00139

    (2) Remove the brake reserver tank by removing the two bolts.

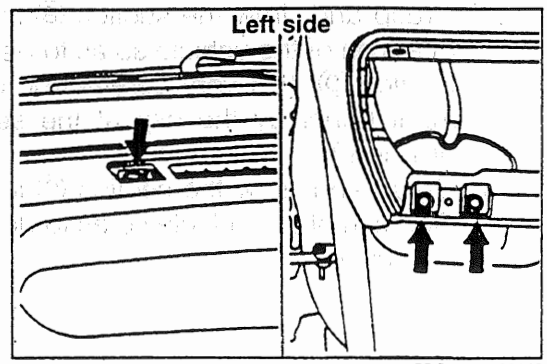
    (3) Remove the instrument panel assembly by removing the seven bolts.



PBO00150-00140

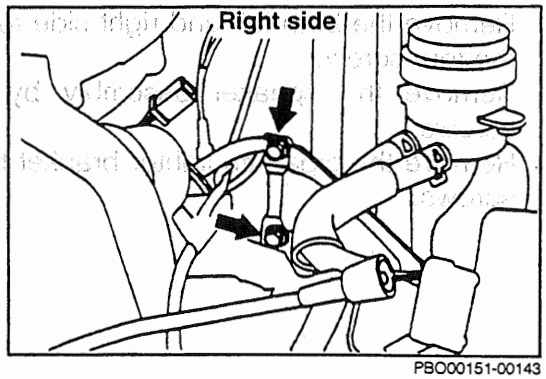


PBO00000-00141

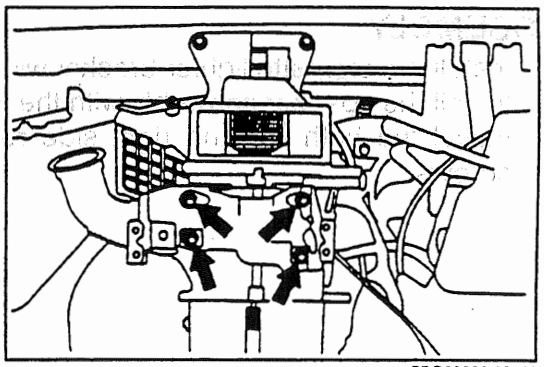


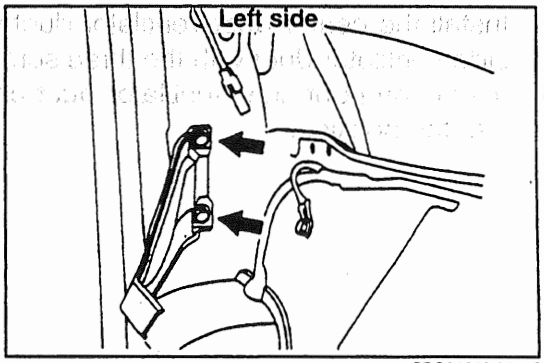
PBO00000-00142

(4) Remove the reinforcement bracket from the body by removing the eight bolts.



PBO00151-00143

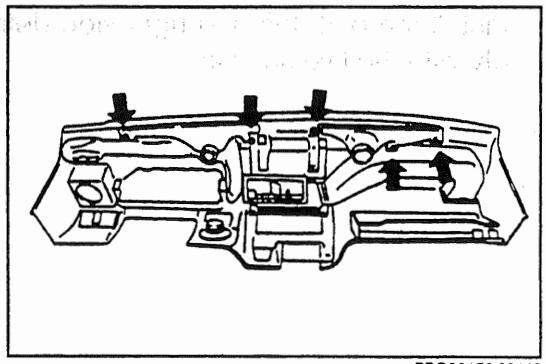

PBO00000-00144



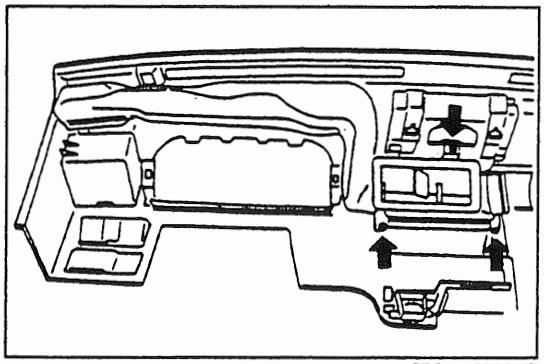
PBO00000-00145

DISASSEMBLY

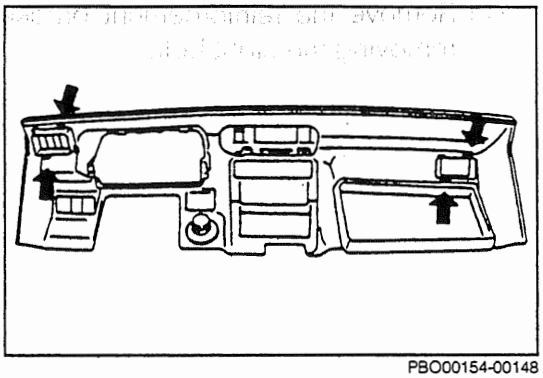
1. Remove the both left and right side defroster nozzle assembly by removing the five screws.
2. Remove a clip both left and right side ventilator duct.


PBO00152-00146

3. Remove the right side ventilator duct.
4. Remove the center ventilator duct with installed the left side ventilator duct by removing the three screws.


PBO00153-00147

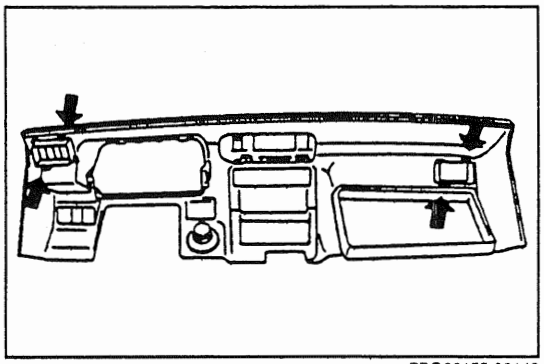
5. Remove the both left and right side resisters by removing the four screws.
6. Remove the speaker assembly by removing the two screws.
7. Remove the cigarette lighter bracket by removing the two screws.



PBO00154-00148

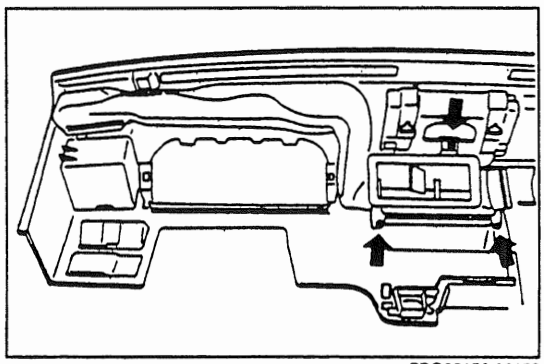
ASSEMBLY

1. Install the cigarette lighter bracket with the two screws.
2. Install the speaker assembly with the two screws.
3. Install the both left and right side resisters with the four screws.



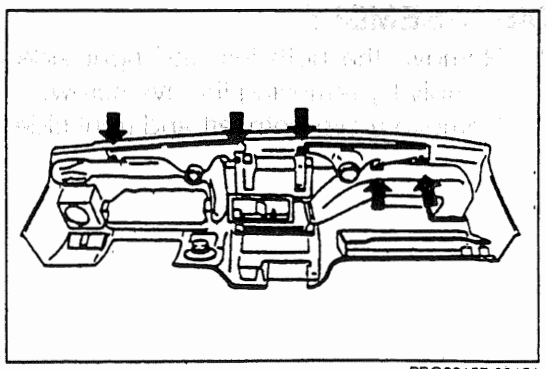
PBO00155-00149

4. Install the center duct ventilator duct with installed the left side ventilator duct with the three screws.
5. Install the right side ventilator duct and then, insert a clip into the position.



PBO00156-00150

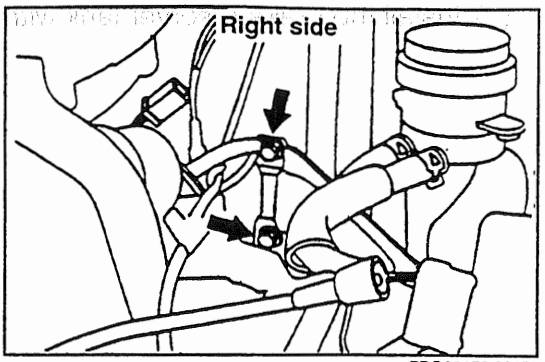
6. Install the both left and right side defroster nozzle assembly with the five screws.



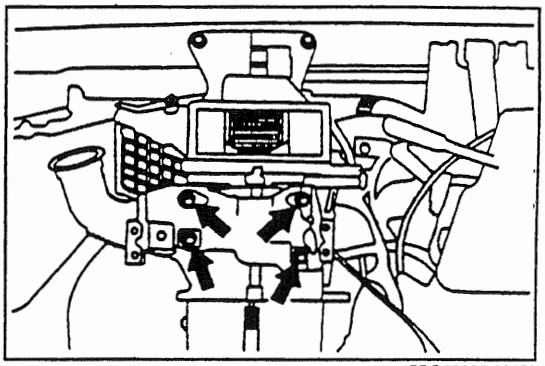
PBO00157-00151

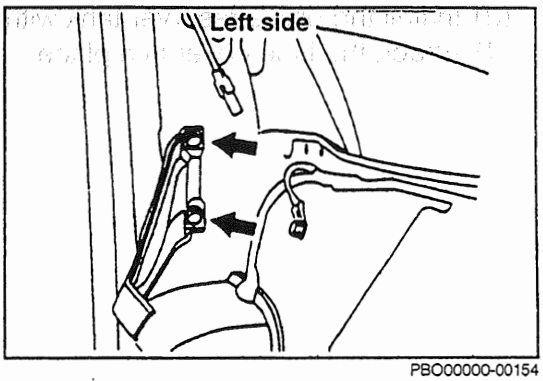
INSTALLATION

1. Install the reinforcement bracket to the body and tighten the eight bolts.
   Tightening Torque: 17.7 - 27.5 N·m (1.8 - 2.8 kgf-m)



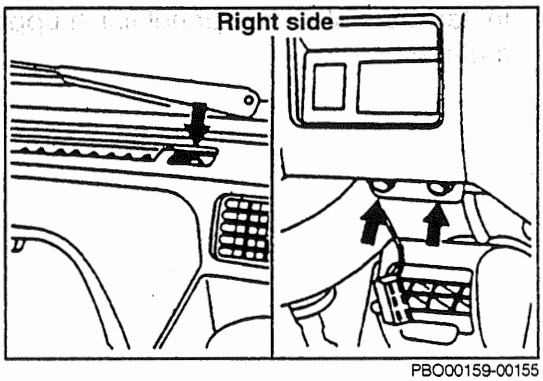
PBO00158-00152


PBO00000-00153



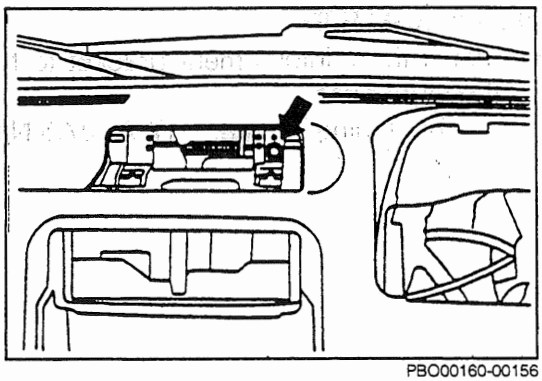
PBO00000-00154

2. Instrument panel assembly installation
   (1) Install the instrument panel assembly to the body and tighten the seven bolts.
   Tightening Torque: 17.7 - 27.5 N·m (1.8 - 2.8 kgf-m)

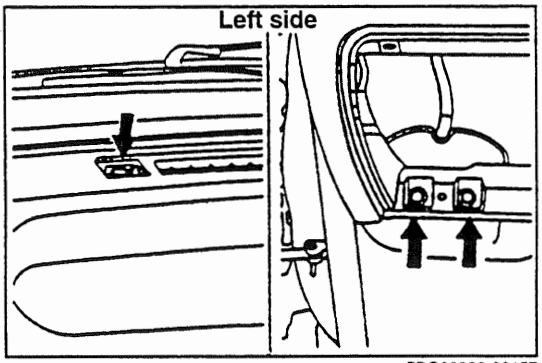


PBO00159-00155

(2) Install the brake reserver tank with the two bolts.

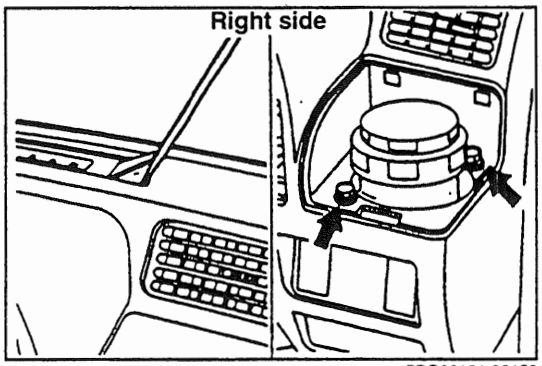


PBO00160-00156



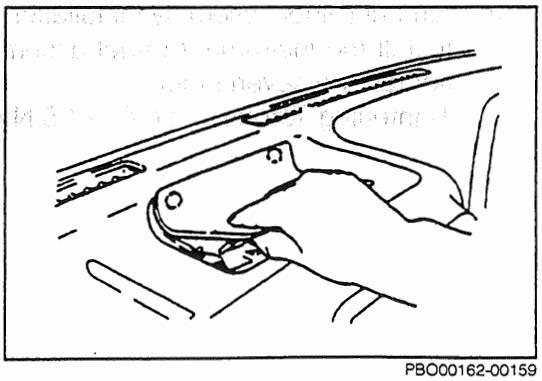
PBO00000-00157

(3) Install the brake reserver tank with the two bolts.
(4) Attach the hole cover in a place.

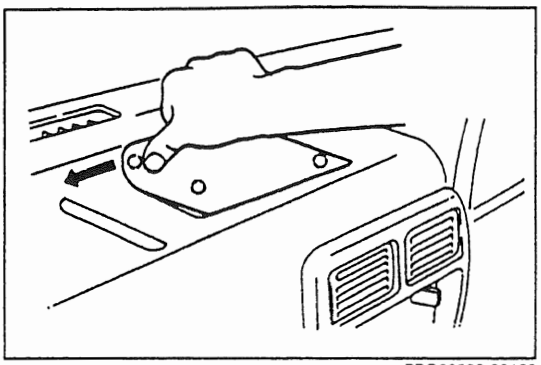


PBO00161-00158

3. Install the instrument panel finish upper panel assembly in a place.

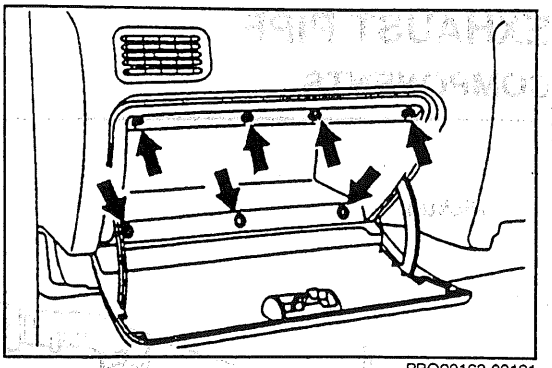


PBO00162-00159



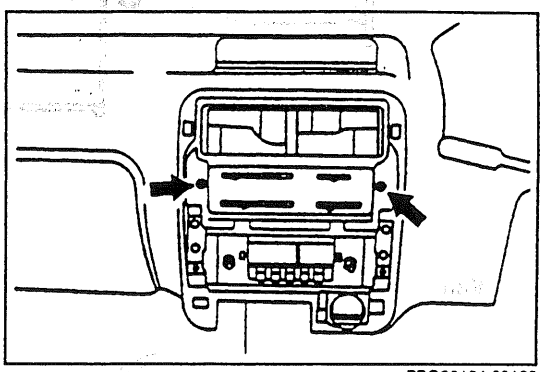
PBO00000-00160

4. Install the glove compartment box installed the glove compartment door with seven screws.
5. Connect the coupler at the back side of radio assembly.



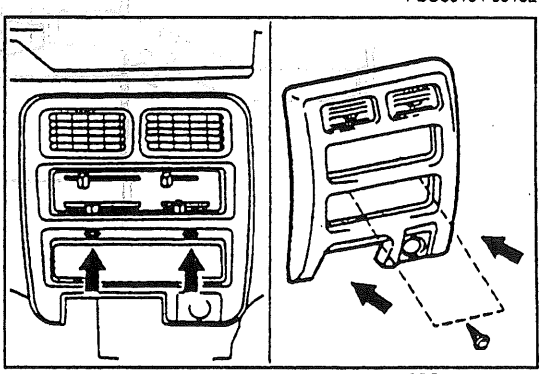
PBO00163-00161

6. Install the heater control panel with the two screws.



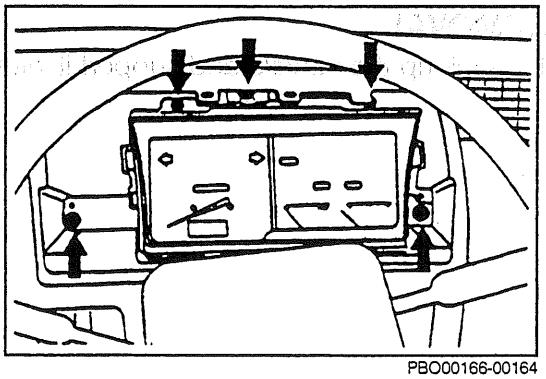
PBO00164-00162

7. Instrument panel cluster finish panel installation.
   (1) Attach the lower section of the clip.
   (2) Push them reward you.
   (3) Install them with the two screws.
8. Attach the heater control knobs.



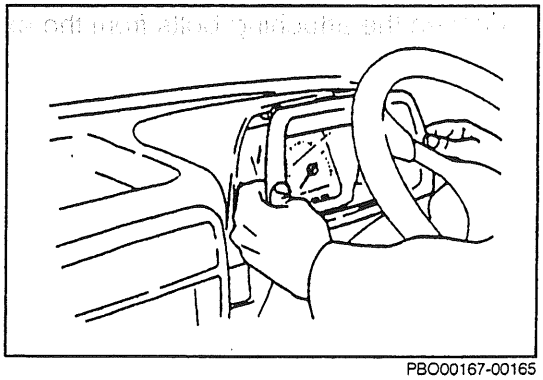
PBO00165-00163

9. Install the choke cable knob with a screw.
10. Connect the speedometer cable and couples.
11. Install the combination meter assembly with the five screws.



PBO00166-00164

12. Install the instrument cluster finish panel assembly reward you.
13. Install the steering wheel (Refer to Steering Section).
14. Connect the battery minus terminal.

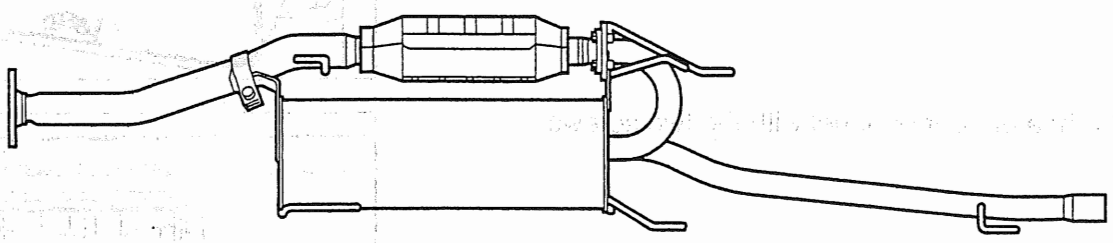


PBO00167-00165

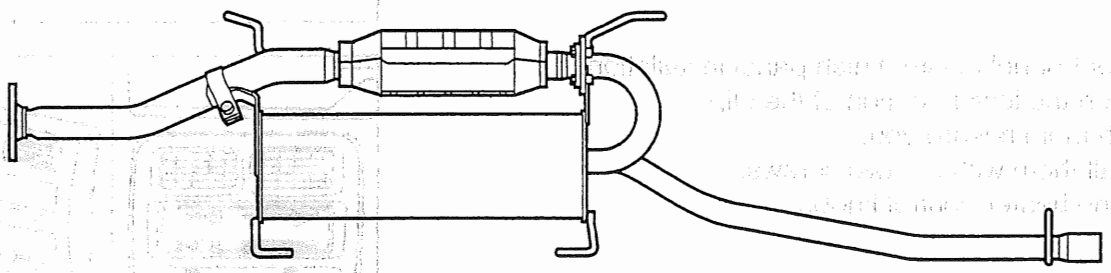
EXHAUST PIPE

COMPONENTS

Pickup



Van



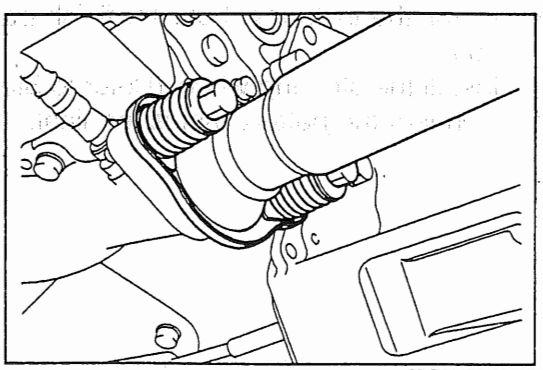
PBO00168-00166

REMOVAL

1. Jack up the vehicle and support it with the safty stand.

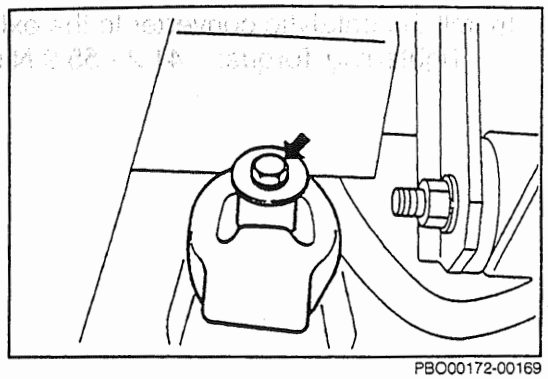
PBO00169-00000

2. Loosen the attaching bolts from the exhaust manifold.



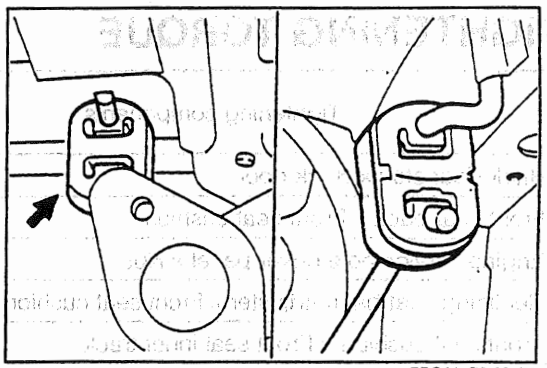
PBO00170-00167

3. Removal of main muffler.
   (1) Remove the muffler support by loosen the attaching bolt.



PBO00172-00169

   (2) Disconnect the muffler support from the main muffler.
   (3) Remove the main muffler.



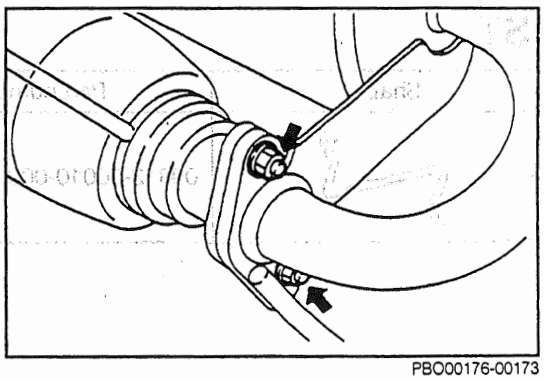
PBO00173-00170

4. Separate the catalytic converter from the main muffler.

PBO00180-00000

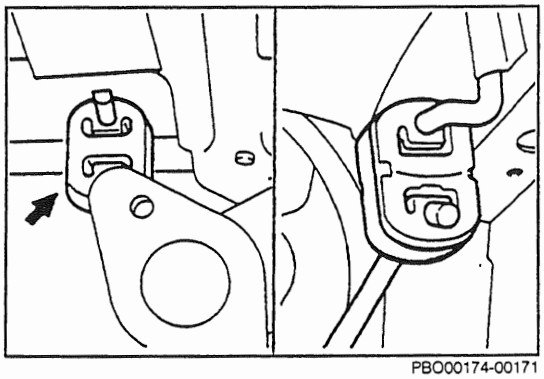
INSTALLATION

1. Install the catalytic converter to the main muffler, using a new gasket.
2. Tighten the attaching nuts.
   Tightening Torque: 41.2 - 55.9 N·m



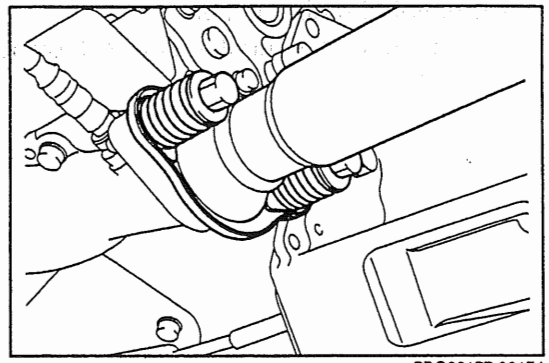
PBO00176-00173

3. Install the main muffler to the vehicle and connect the muffler supports.



PBO00174-00171

4. Install the catalytic converter to the exhaust manifold.
   Tightening Torque: 41.2 - 55.9 N·m



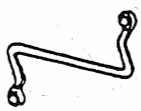
PBO00177-00174

TIGHTENING TORQUE

Tightening components	Tightening Torque	
	N·m	kgf-m
Back door stay × Back door	17.7 - 23.5	1.8 - 2.4
Front seat back × Front seat cushion	18.6 - 30.4	1.9 - 3.1
Engine service hole cover panel × Nut	9.8 - 15.7	1.0 - 1.6
Reclining seat back adjuster × Front seat cushion	22.6 - 44.1	2.3 - 4.5
Front seat cushion × Front seat inner track	14.7 - 23.5	1.5 - 2.4
Engine service hole main cover × Nut	9.8 - 15.7	1.0 - 1.6
Front seat outer belt × Body	28.4 - 53.0	2.9 - 5.4
Front seat inner belt × Body	28.4 - 53.0	2.9 - 5.4
Rear seat inner belt × Body	28.4 - 53.0	2.9 - 5.4
Rear seat outer belt × Body	28.4 - 53.0	2.9 - 5.4
Instrument panel reinforcement bracket × Body	17.7 - 27.5	1.8 - 2.8
Exhaust front pipe × Exhaust manifold	39.2 - 53.9	4.0 - 5.5

PBO00178-00000

SST

Shape	Part number	Part name
	09812-00010-000	Door hinge set bolt wrench

PBO00179-00175

BODY ELECTRICAL SYSTEM

BE

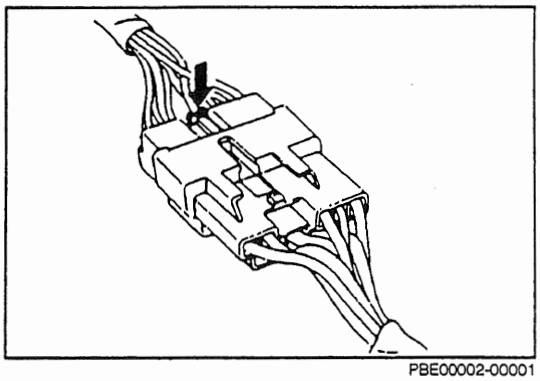
INTRODUCTION ..... BE– 2
LAMPS ..... BE– 4
LAMP BULBS ..... BE– 5
SWITCH & RELAY BE–13
COMBINATION METER BE–19
FRONT WIPER BE–23
REAR WIPER BE–27
HEATER & VENTILATION SYSTEM BE–29

PBE00001-00000

INTRODUCTION

1. HANDLING OF CONNECTORS WITH LOCK

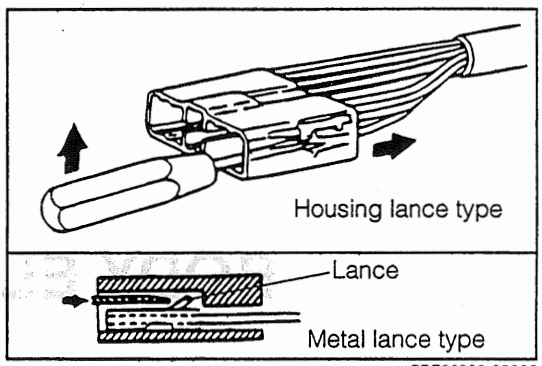
1. Disconnection
   While pushing the lock lever as shown in the right figure, disconnect the connector. Do not pull the harness during this operation.
2. Connection
   Connect the male connector to the female connector.
   Ensure that the lock is engaged completely.



PBE00002-00001

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.

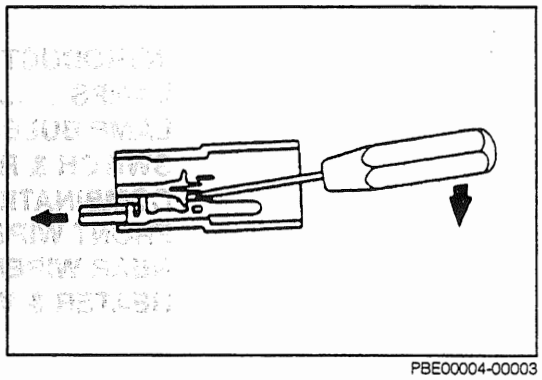
   Metal lance type
   While pushing the lance with the screwdriver, pull the terminal backward.



PBE00003-00002

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.

   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.



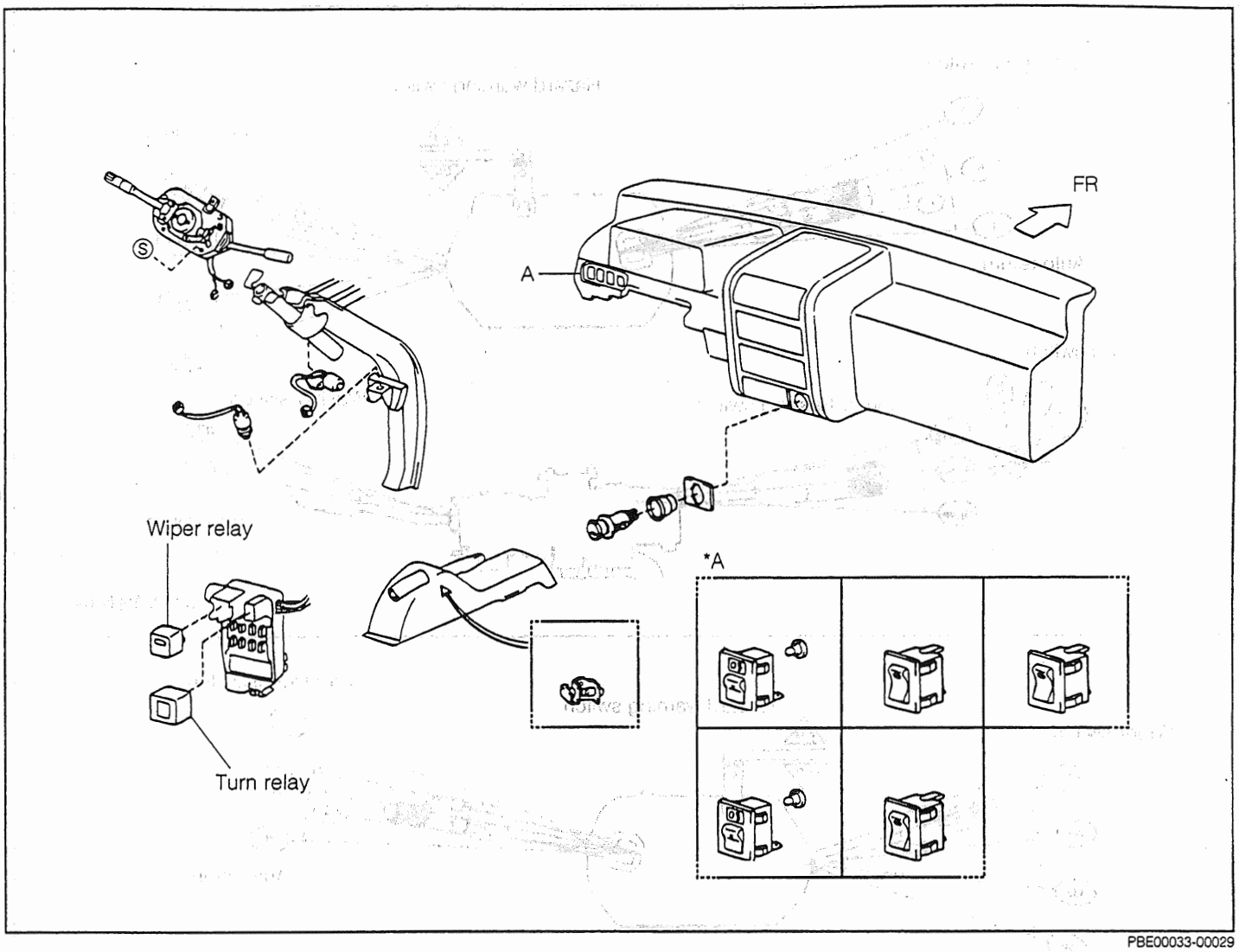
PBE00004-00003

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.

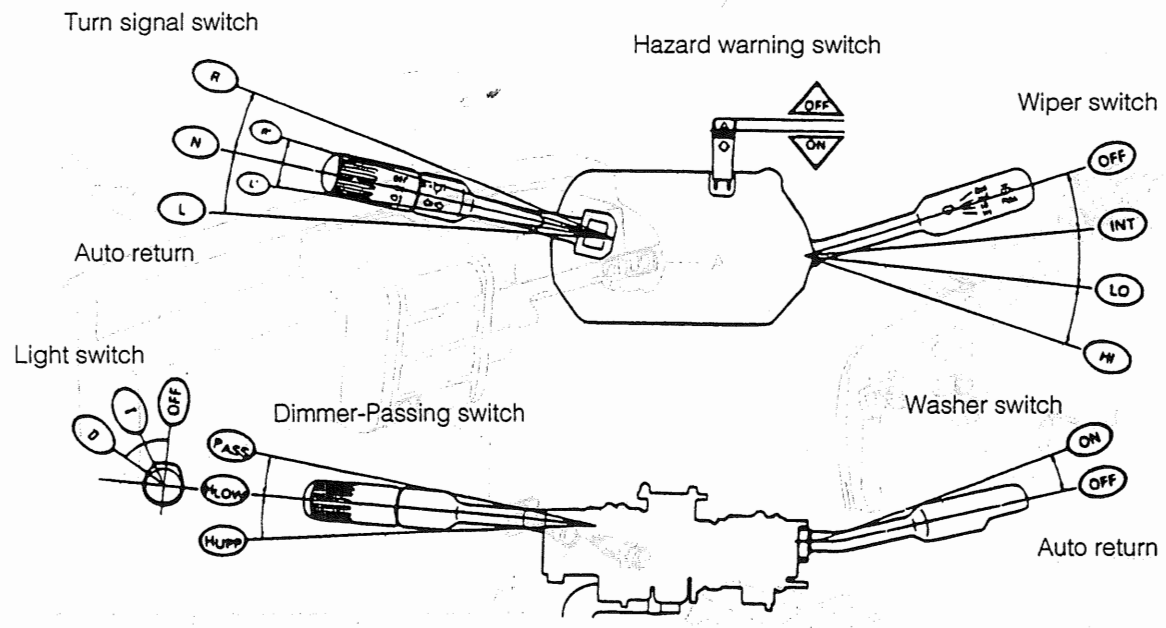
PBE00005-00000

SWITCH & RELAY

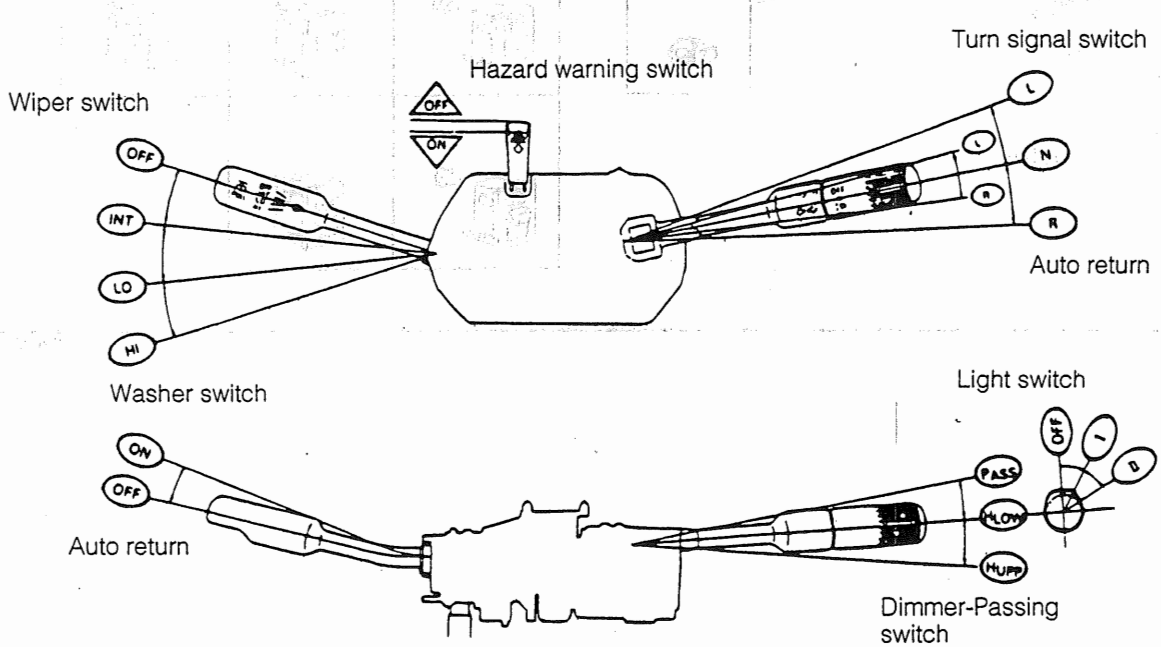


PBE00033-00029

1. MULTI-USE LEVER SWITCH



L.H.D. Vehicle



R.H.D. Vehicle

PBE00034-00030

Inspection

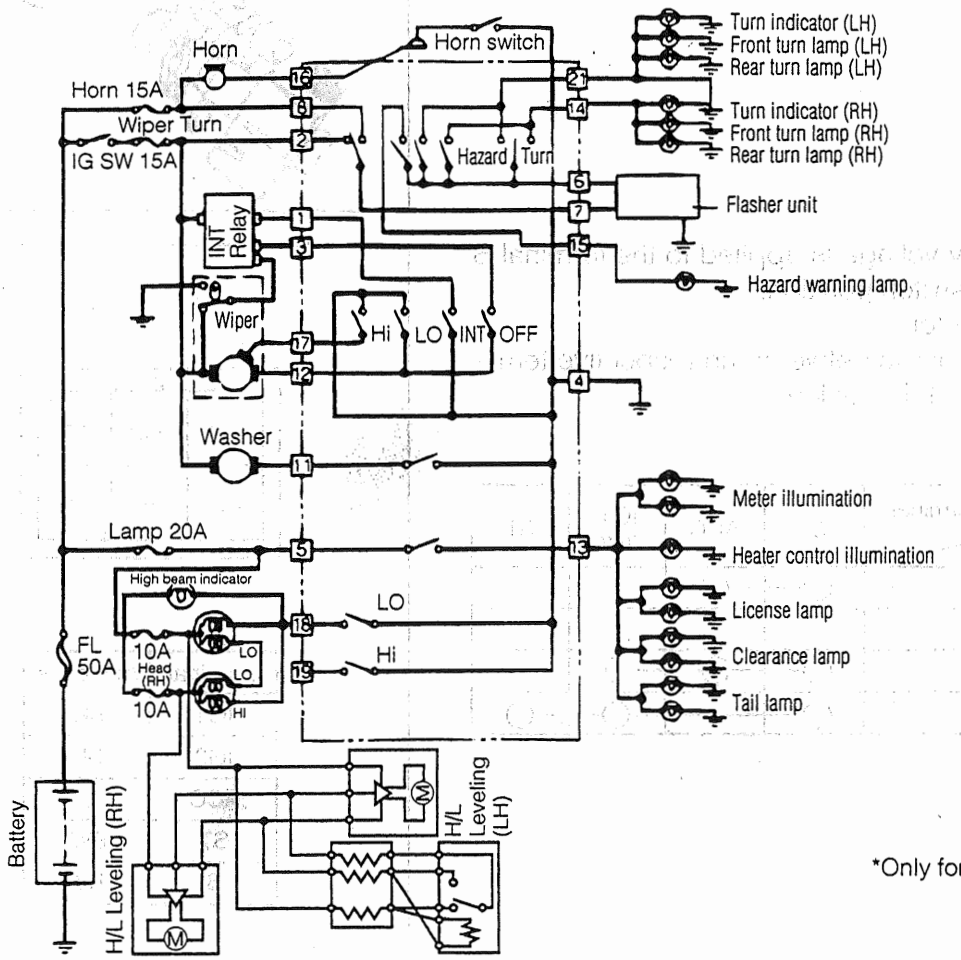
1. Ensure that each of the turn signal, dimmer, lighting, hazard warning and front wiper switches is functioning smoothly with a positive detent feeling.
2. Disconnect the connector for multi-use lever switch. Ensure that continuity exists between the respective terminals in accordance with the continuity table in pages 11 to 14.

PBE00035-00000

Removal and Installation

See the SR section.

PBE00036-00000



1	INT
2	B1
3	S
4	E
5	BL
6	FL
7	BF
8	B2

11	WA
12	+1
13	RF
14	RT
15	Hz
16	HO
17	+2
18	HUP
19	HLW
*20	FF
21	LT
22	

*Only for L.H.D vehicle

Light & dimmer passing switch

		5	13	20	4	19	18
OFF	Bean				○		○
	HL						
	HU						
I	Bean	○	○		○		○
	HL	○	○				
	HU	○	○				
II	Bean	○	○	○	○		○
	HL	○	○	○	○	○	
	HU	○	○	○	○		○

Turn & hazard

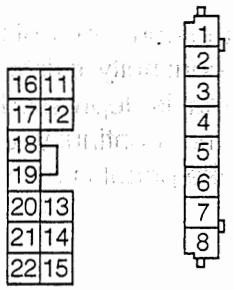
		14	6	21	7	2	8	16	15
Turn	R	○	○						
	N								
	L		○	○					
Hazard	OFF				○	○			
	ON	○	○	○	○	○			○

Wiper switch

	4	12	17	3	1
OFF		○		○	
INT		○		○	
	○				○
LO	○	○			
HI	○		○		

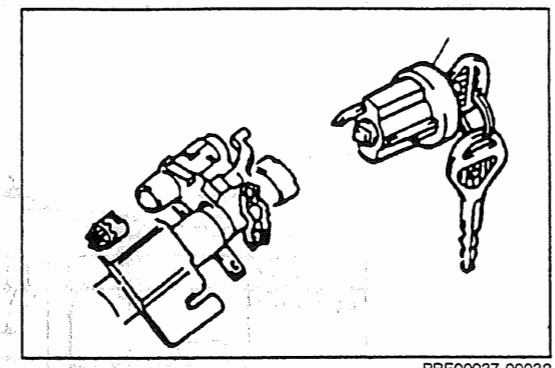
Washer switch

	4	11
OFF		
ON	○	○



2. IGNITION KEY SWITCH

For the removal/installation procedure for the ignition key switch lock cylinder assembly, see the SR section.

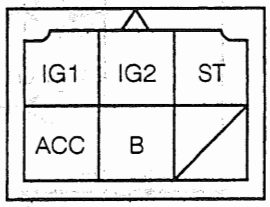


PBE00037-00032

1. Ensure that the battery voltage is applied to the terminal B regardless of the key switch position.
2. Disconnect the connector.
3. Ensure that continuity exists between the respective terminals as indicated in the table below.

Continuity table

Position \ Terminal	B	ACC	IG1 IG2	ST
ACC	○—○			
OFF				
ON	○—○	○	○	
ST	○		○	○



Terminal	Wire color
IG1	BR
IG2	BL
ACC	L
ST	BW
B	BY

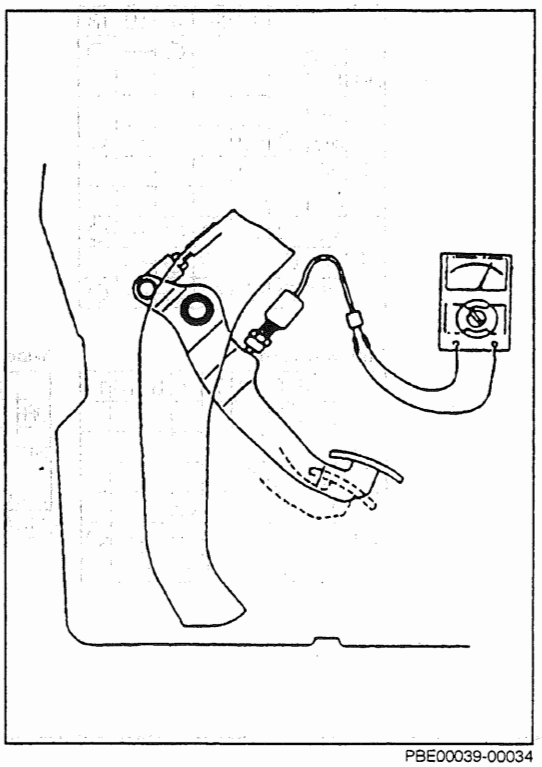
PBE00038-00033

3. STOP LAMP SWITCH

The stop lamp switch is located at the pedal bracket section.

Inspection

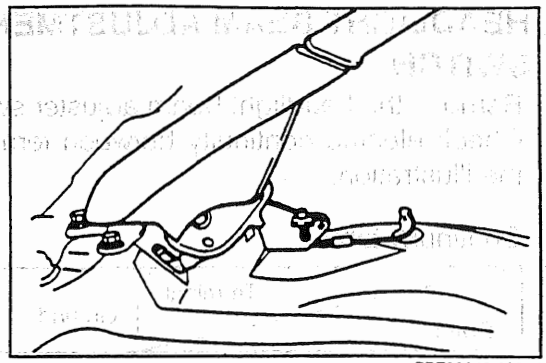
1. Disconnect the connector of the stop lamp switch.
2. Ensure that continuity exists between the terminals when the brake pedal is depressed.
3. Ensure that no continuity exists between the terminals when the brake pedal is not depressed.



PBE00039-00034

4. PARKING BRAKE SWITCH

1. Pull out the connector of the parking brake switch and conduct continuity checks between the terminal and the body earth.
2. Ensure that continuity exists between the terminals when the parking brake lever is pulled upward.
3. Ensure that no continuity exists between the terminals when the parking brake lever is returned.



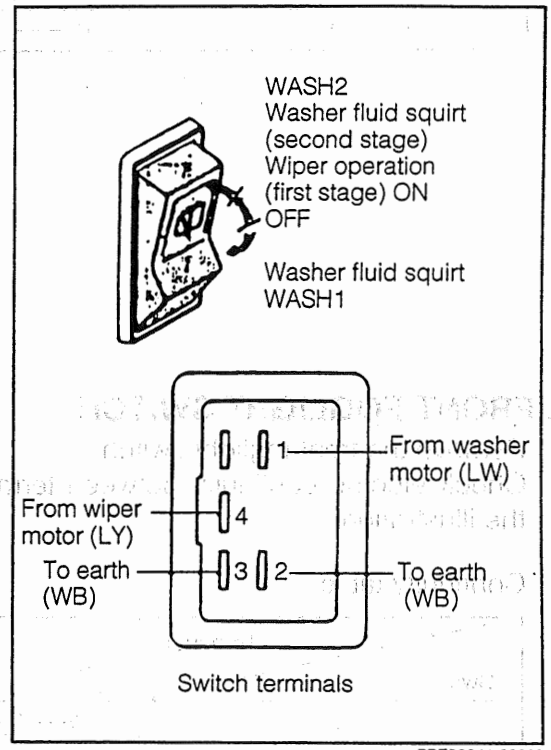
PBE00040-00035

5. REAR WIPER & WASHER SWITCH

Ensure that continuity exists between the respective terminals as indicated in the table below.

Continuity table

Switching \ Terminal	4	3	2	1
WASH2	○—○		○—○	
ON	○—○			
OFF				
WASH1			○—○	



PBE00041-00036

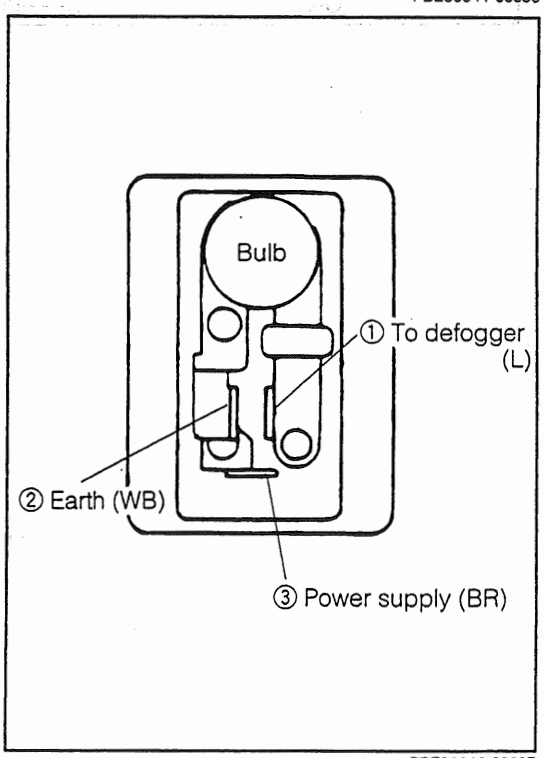
6. REAR WINDOW DEFOGGER SWITCH

1. Remove the rear window defogger switch.
2. Ensure that continuity exists between the respective terminals as indicated in the table below.

Continuity table

Switch \ Terminal	②	①	③
OFF	○—◎—○		
ON	○—◎—○		○

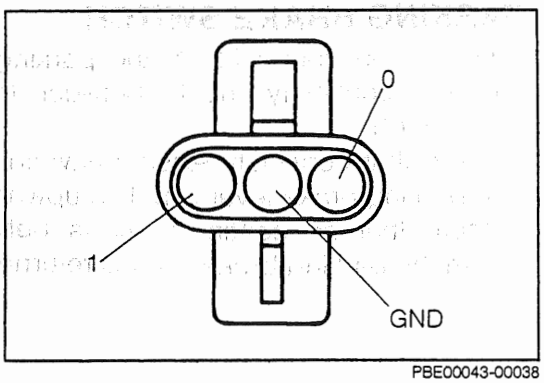
Bulb instaling condition



PBE00042-00037

7. HEADLIGHT BEAM ADJUSTMENT DEVICE SWITCH

1. Remove the headlight beam adjuster switch.
2. Check electric continuity between terminals, as shown in the illustration.



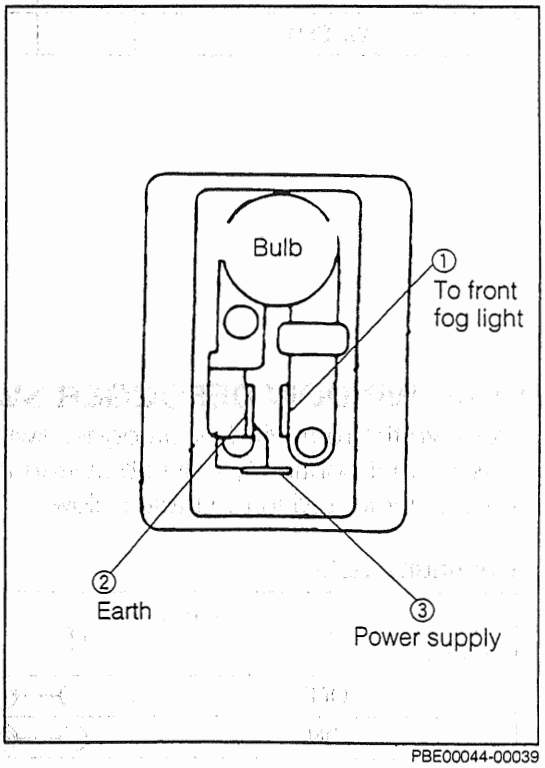
PBE00043-00038

Continuity table

Switch \ Terminal	Ground	0	1
0	○——	——○	
1	○——	——	——○

8. FRONT FOGLIGHT SWITCH

1. Remove the front foglight switch.
2. Check electric continuity between terminals, as shown in the illustration.

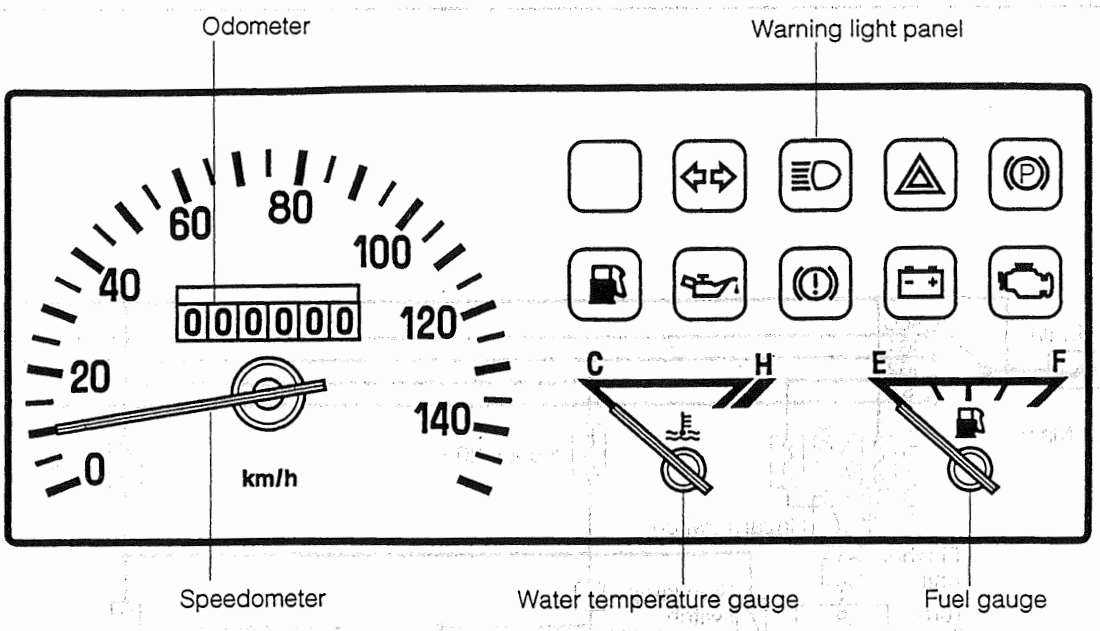


PBE00044-00039

Continuity table

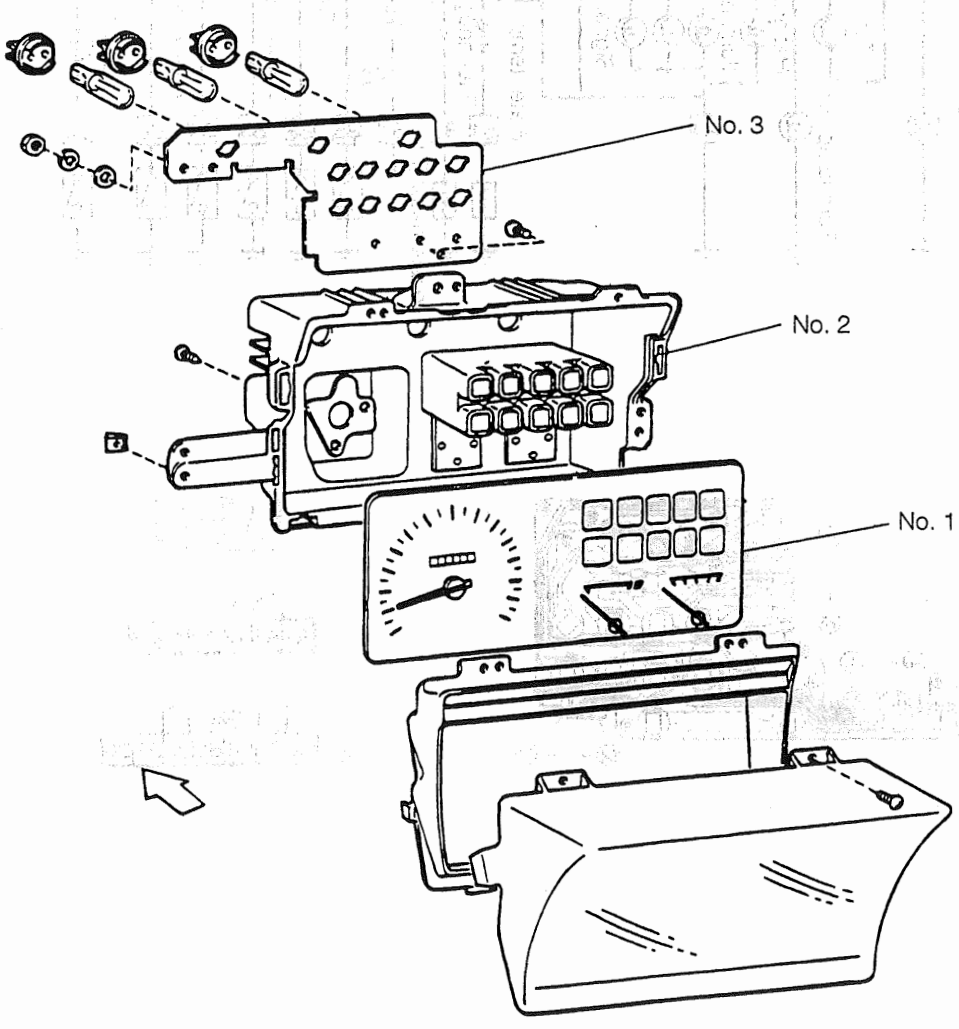
Switch \ Terminal	②	①	③
OFF	○—(○)	——○	
ON	○—(○)	○——	——○

COMBINATION METER



PBE00045-00040

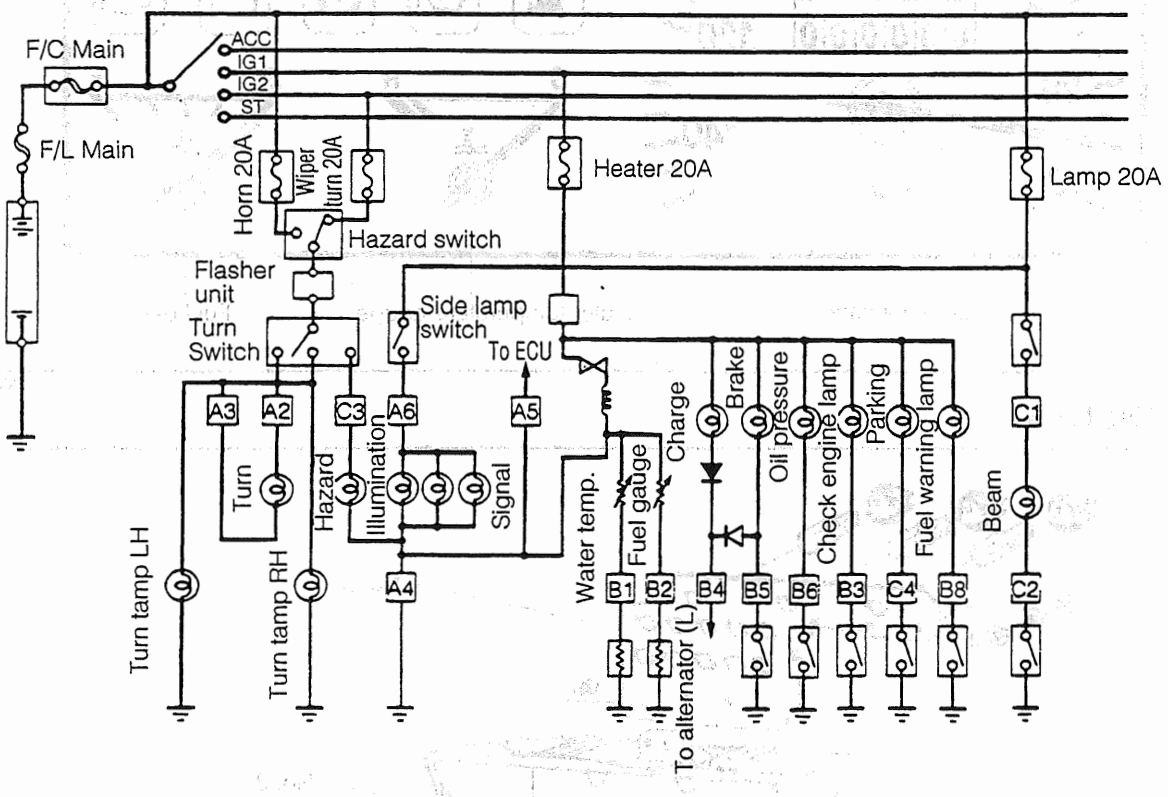
1. COMPONENTS

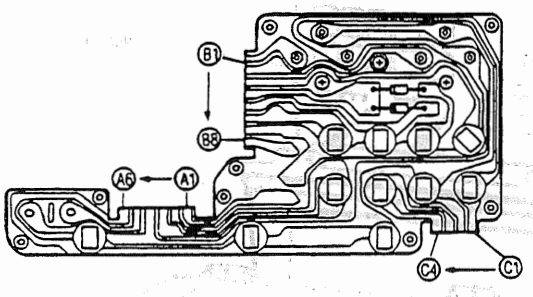


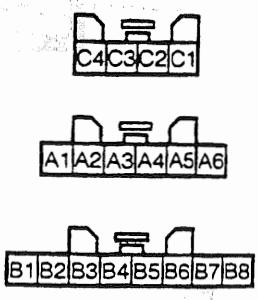
PBE00046-00041

2. WIRING DIAGRAM FOR COMBINATION METER

Standard specifications

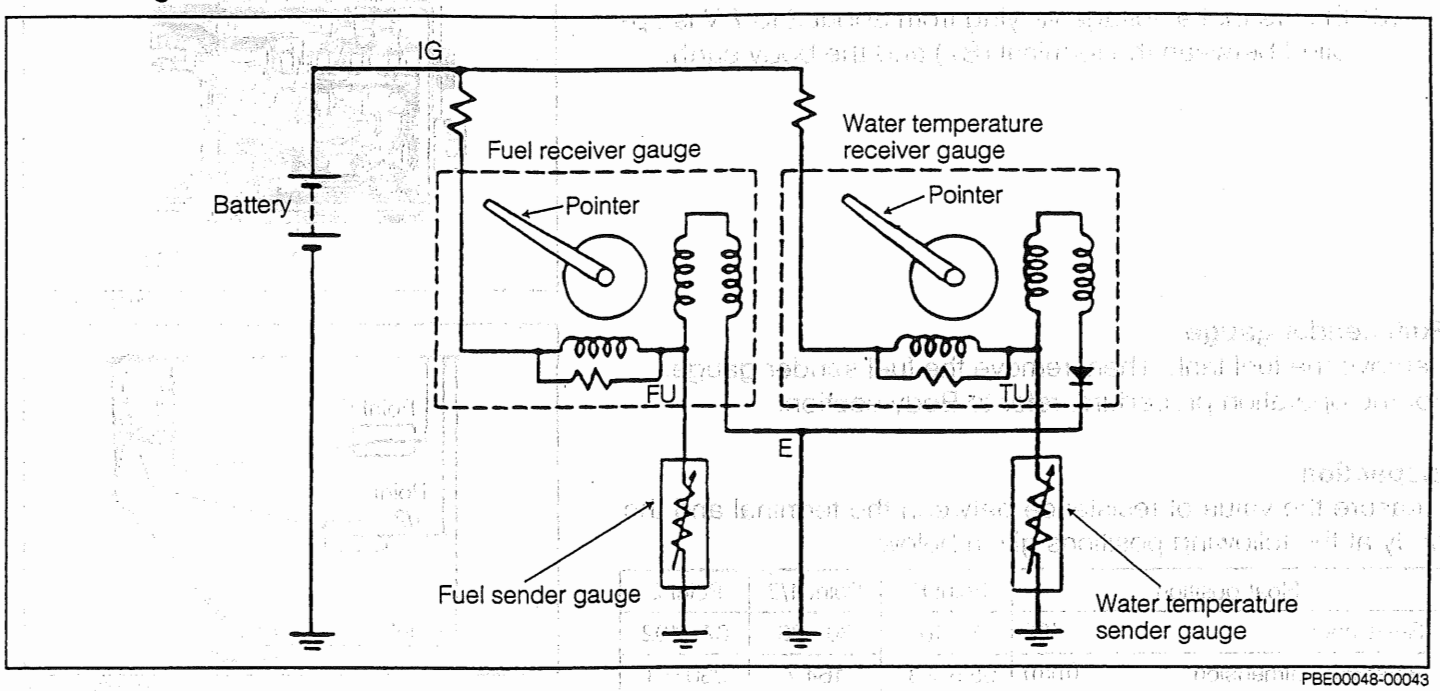






3. FUEL GAUGE & WATER TEMPERATURE GAUGE

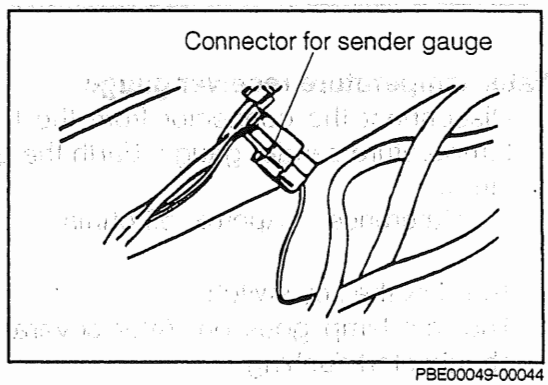
Circuit diagram



PBE00048-00043

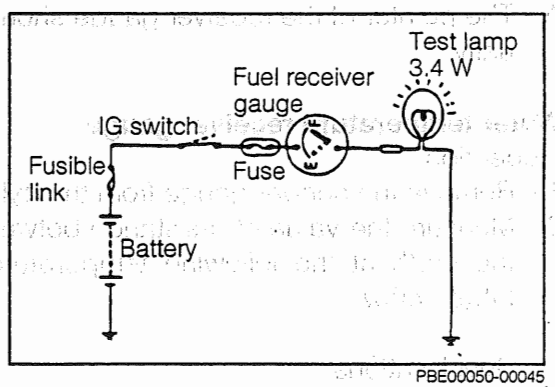
Fuel receiver gauge

1. In-vehicle check
   Disconnect the connector located at the upper part of the fuel tank. Carry out the following checks at the terminal at the receiver side.



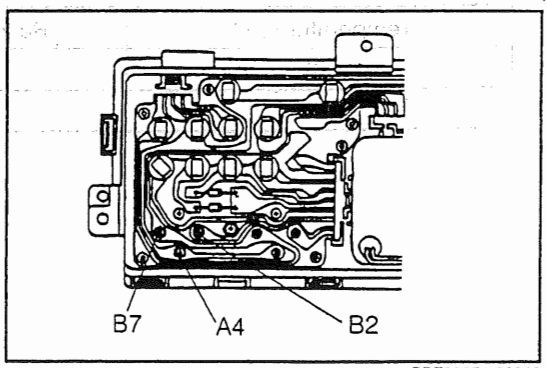
PBE00049-00044

   (1) Disconnect the connector from the harness of the fuel sender gauge. Earth the gauge through a test lamp.
   (2) Turn ON the key switch.
   (3) The test lamp goes on. After several seconds, the lamp should start flashing.
   (4) The pointer of the receiver gauge should start to rise gradually.



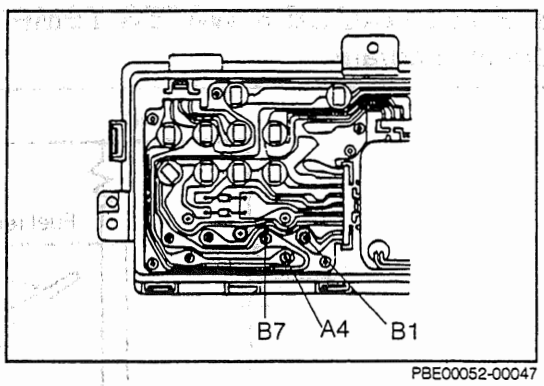
PBE00050-00045

2. Unit inspection
   (1) Remove the combination meter.
   (2) Measure the value of resistance between the terminal (B7) and the (B2).
   (3) Connect the multi-pole connector to the combination meter.
   (4) Turn ON the key switch.



PBE00051-00046

(5) Ensure that the battery voltage is applied between the terminal A4 and the body earth.
(6) Ensure that a voltage varying from about 2 to 7 V is applied between the terminal (B7) and the body earth.

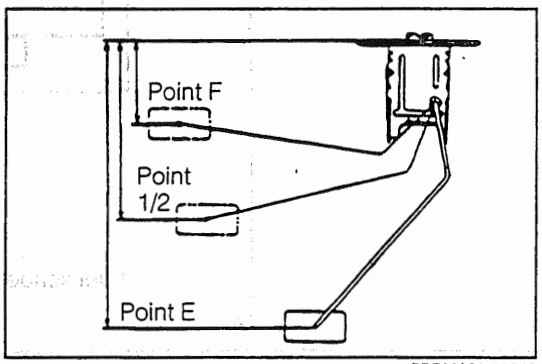


PBE00052-00047

Fuel sender gauge
Remove the fuel tank. Then, remove the fuel sender gauge.
For the operation procedure, refer to Body section.

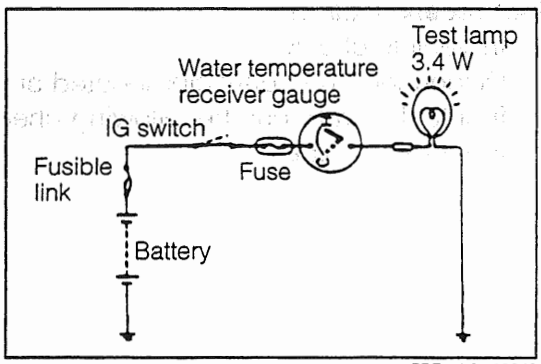
Inspection
Measure the value of resistance between the terminal and the body at the following positions given below.

Float position		Point F	Point 1/2	Point E
Resistance	(Ω)	5 - 10	30 - 38	87 - 102
Reference dimension	(mm)	95.5 ± 3	164.7	230 ± 3



PBE00053-00048

Water temperature receiver gauge
1. Disconnect the connector from the harness of the water temperature sender gauge. Earth the gauge through a test lamp.
   Reference: Approx. 55 ohms
2. Turn ON the key switch.
3. The test lamp goes on. After several seconds, the lamp should start flashing.
4. The pointer of the receiver gauge should start to rise gradually.

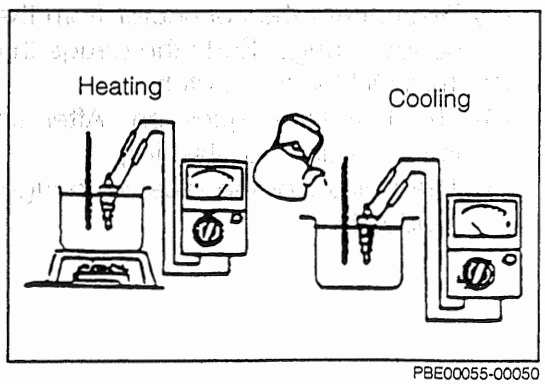


PBE00054-00049

Water temperature receiver gauge
Inspection
1. Remove the sender gauge from the cylinder head.
2. Measure the value of resistance between the terminal and the earth at the following temperatures specified in the table below.

Specifications

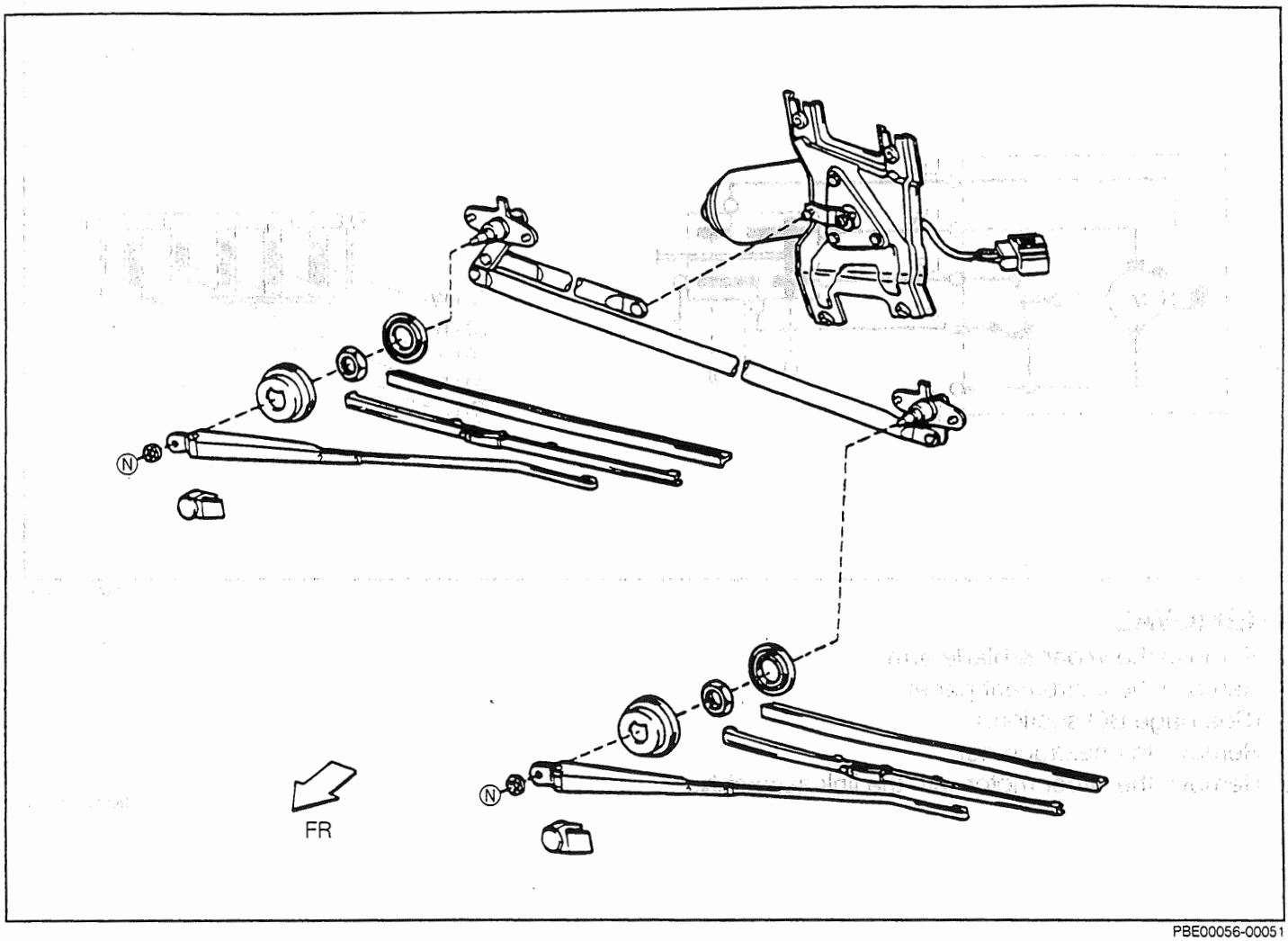
Temperature (°C)	Resistance Value (Ω)
50	226
115	26.0



PBE00055-00050

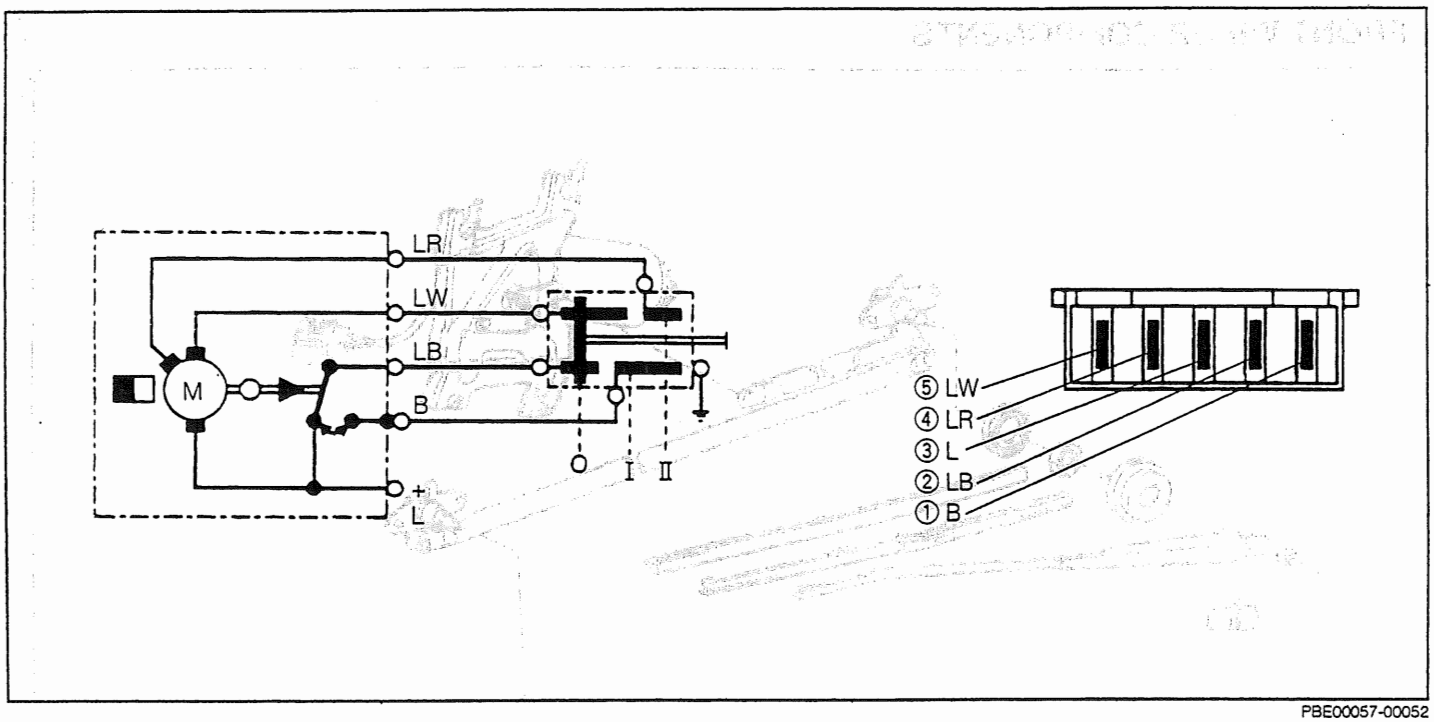
FRONT WIPER

1. FRONT WIPER COMPONENTS



PBE00056-00051

Circuit diagram



PBE00057-00052

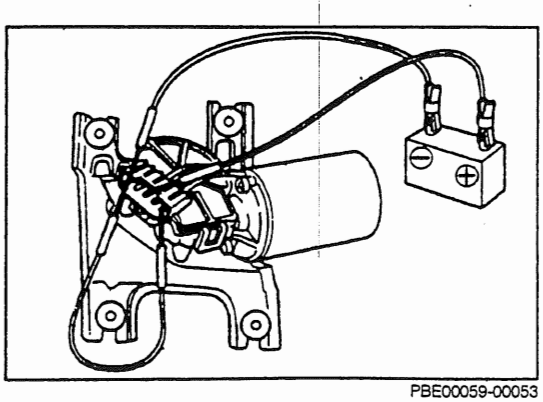
2. REMOVAL

1. Remove the wiper & blade arm.
2. Remove the instrument panel.
   (See page BO section.)
3. Remove the hexagon nut.
4. Remove the wiper motor with the link assembly.

PBE00058-00000

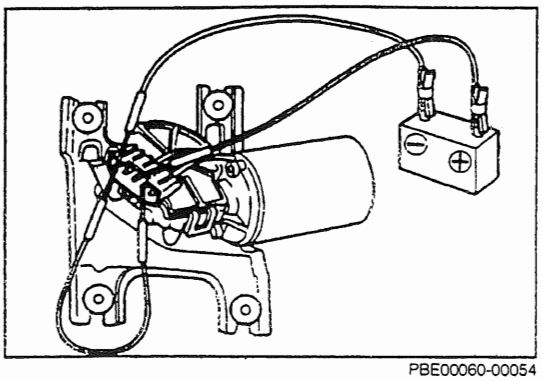
3. INSPECTION

1. Low-Speed Operation Check
   Connect the terminal ③ to the positive (+) terminal of the battery; the terminal ① to the negative (–) terminal of the battery. Then, connect the terminal ① to the terminal ⑤. Ensure that the wiper operates at the low speed.



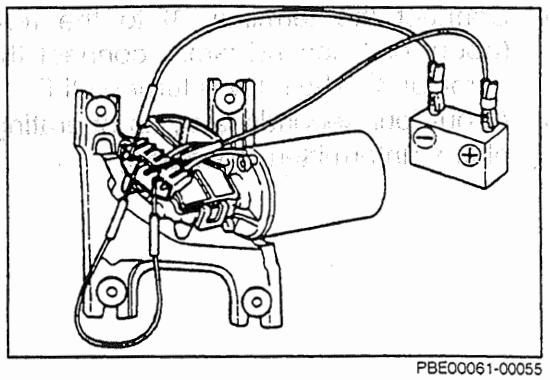
PBE00059-00053

2. High-Speed Operation Check
   Connect the terminal ③ to the positive (+) terminal of the battery; the terminal ① to the negative (–) terminal of the battery. Then, connect the terminal ① to the terminal ④. Ensure that the wiper operates at the high speed.



PBE00060-00054

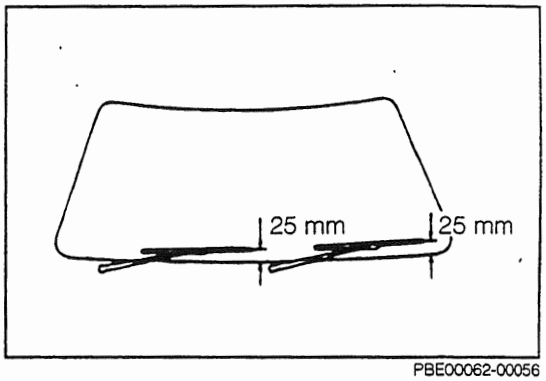
3. Off-Operation Check
   After checking of Low-Speed operation and High-Speed operation.
   Connect the terminal ② to the terminal ④, or connect the terminal ② to the terminal ⑤.
   Ensure that the wiper operates and stops at the automatic stopping position.



PBE00061-00055

4. INSTALLATION

1. Install the wiper motor with the link assembly.
2. Operate the wiper motor and set it to the automatic stopping position.
3. Set the blades to the respective positions as indicated in the right illustration.



PBE00062-00056

NOTE:
- The wiper arm should comply with the table.

		Driver's seat side	Passenger seat side
Length (mm)	Arm	441	416.5
	Blade	400	380

4. Install the instrument panel.

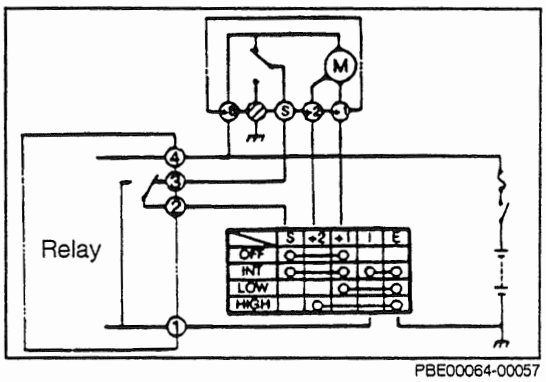
PBE00063-00000

5. WIPER CONTROL RELAY

Location: Upper part of fuse block

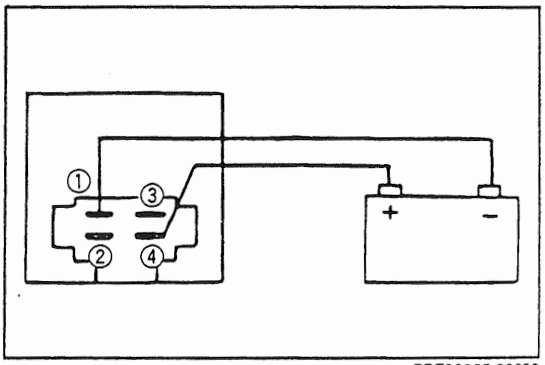
Ensure that continuity exists between the respective terminals indicated in the table below.

Between terminals ② and ③	Continuity exsts.
Between terminals ② and ④	No continuity exists.



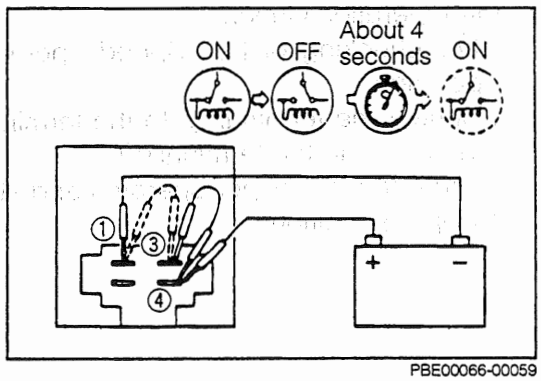
PBE00064-00057

1. Connect the terminal ④ to the positive (+) terminal of the battery.
2. Connect the terminal ① to the negative (–) terminal of the battery.
3. Ensure that an operating sound (clicking) takes place.
   The relay is turned ON.



PBE00065-00058

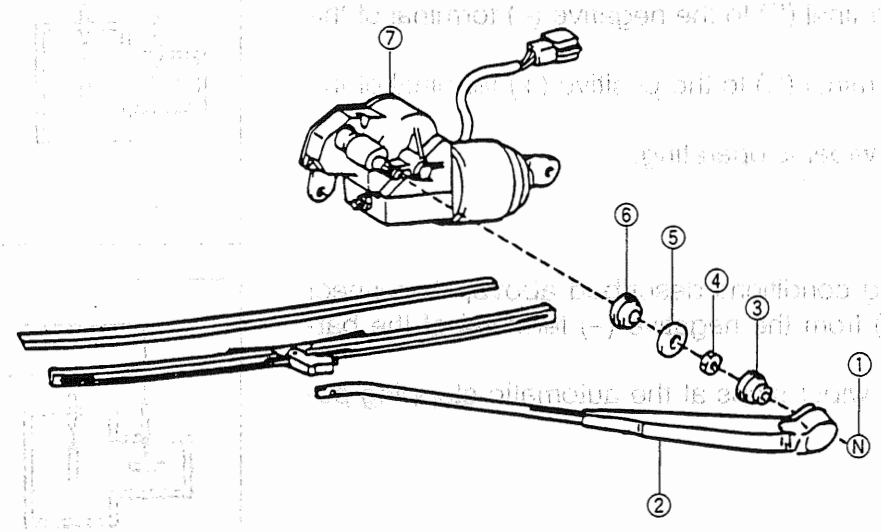
4. Connect the terminal ③ to the terminal ①. Afterward (about one second later), connect the terminal ③ to the terminal ④. The relay is turned OFF.
5. About four seconds later, an operating sound should take place. (Intermittent operation)



PBE00066-00059

REAR WIPER

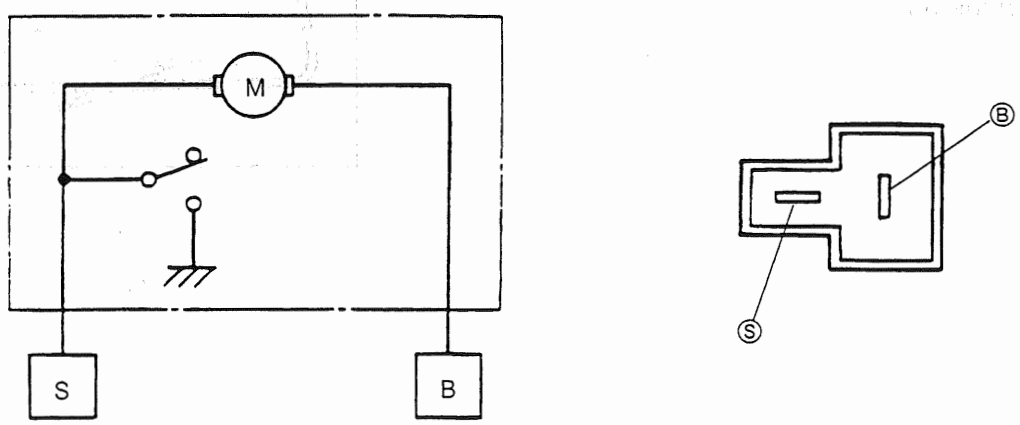
1. REAR WIPER COMPONENTS



① Nut
② Blade & wiper arm
③ Wiper link cap
④ Hexagon nut
⑤ Washer
⑥ Wiper link packing
⑦ Motor assembly

PBE00067-00060

Circuit diagram



PBE00068-00061

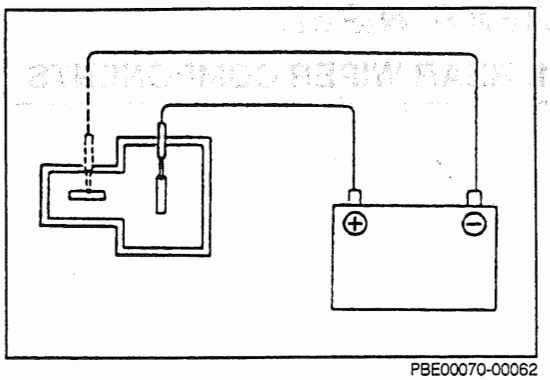
2. REMOVAL

1. Remove the wiper & blade arm.
2. Remove the wiper link cap and Hexagon nut.
3. Remove the washer and wiper link packing.
4. Remove the motor assembly.

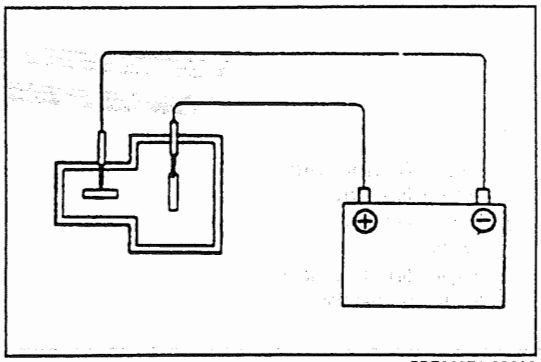
PBE00069-00000

3. INSPECTION

1. Connect the body of the wiper motor to the negative (–) terminal of the battery.
2. Connect the terminal (S) to the negative (–) terminal of the battery.
3. Connect the terminal (B) to the positive (+) terminal of the battery.
   Ensure that the wiper is operating.

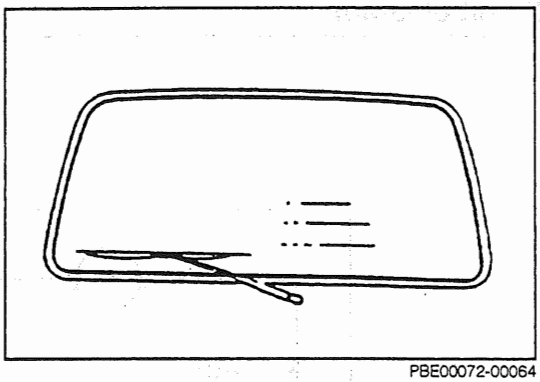

PBE00070-00062

4. Under operating conditions described above, disconnect the terminal (S) from the negative (–) terminal of the battery.
   Ensure that the wiper stops at the automatic stopping position.


PBE00071-00063

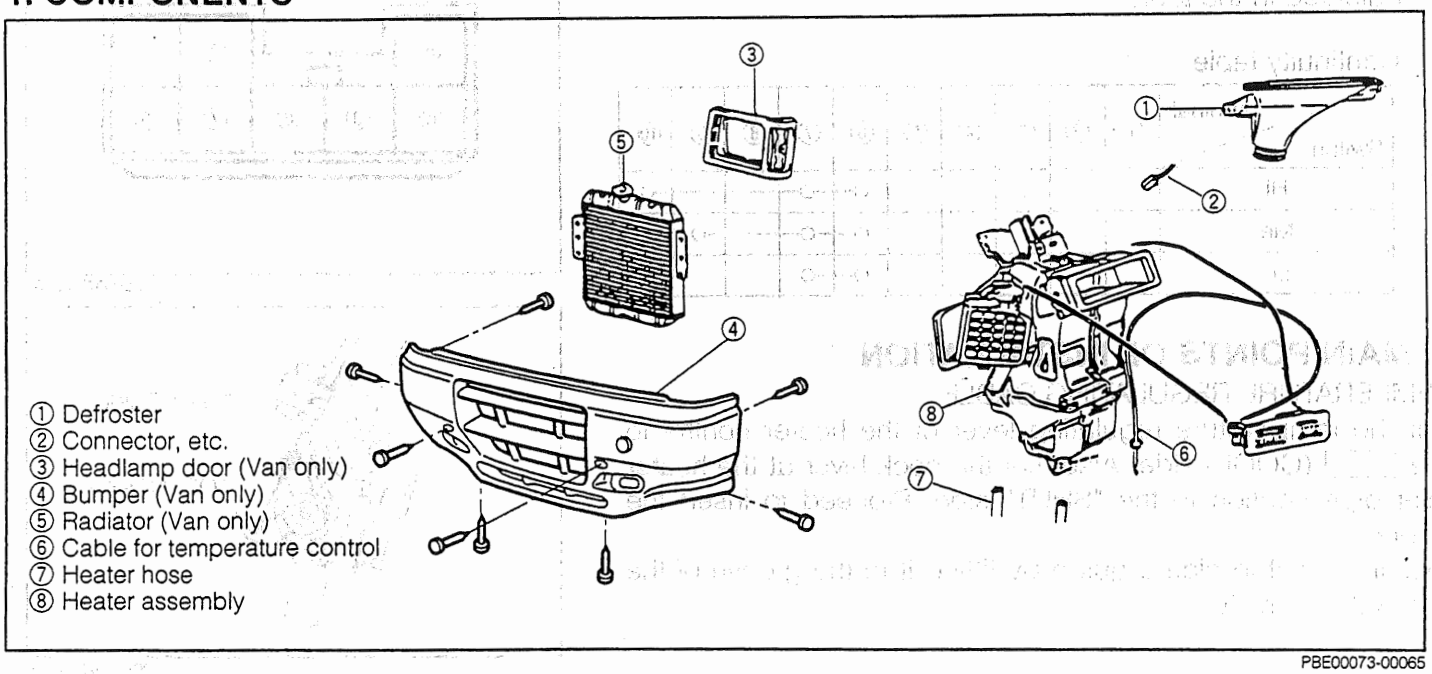
4. INSTALLATION

1. Install the wiper motor.
2. Operate the wiper motor and set it to the automatic stopping position.
3. Align the blade with the bottom line of the rear window defogger. Tighten the nut.


PBE00072-00064

HEATER & VENTILATION SYSTEM

1. COMPONENTS



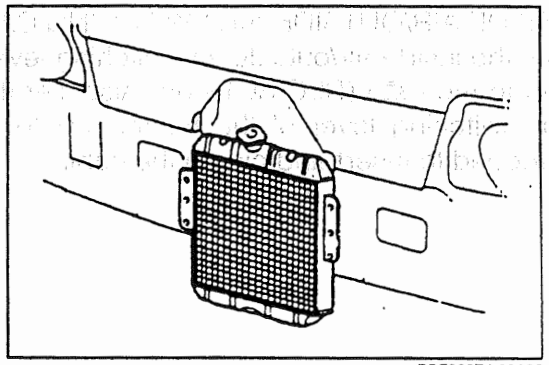
PBE00073-00065

2. MAIN POINTS OF REMOVAL

Operation prior to removal

1. Disconnect the negative ⊖ terminal of the battery.
2. With the temperature regulating lever of the heater control set to the "WARM" side, drain the cooling water from the radiator. (About 500 cc)

   Radiator (Van only)
   Remove the attaching bolts. Slide the radiator downward with the radiator hoses mounted on the radiator.



PBE00074-00066

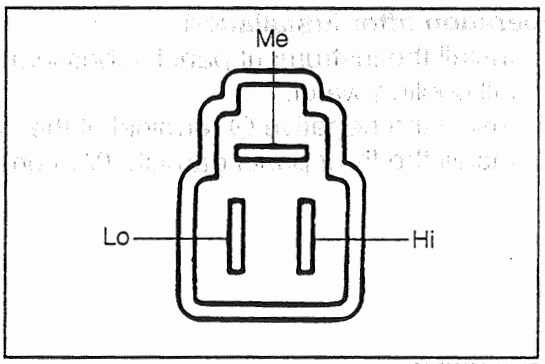
3. Remove the instrument panel subassembly.
4. Remove the front panel garnish. (Van only)

PBE00075-00000

Inspection of blower register

Measure the value of resistance between the following terminals below.

Specified Value
Lo - Me: About 2 Ω
Lo - Hi : About 3 Ω



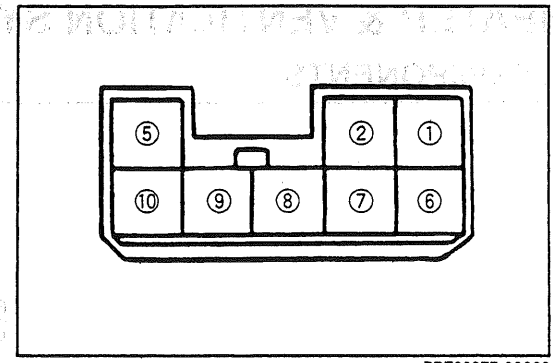
PBE00076-00067

Inspection of blower switch

Ensure that continuity exists between the respective terminals as indicated in the table.

Continuity table

Switch \ Terminal	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
Hi						○	○			○
Me						○	○		○	
Lo						○	○			



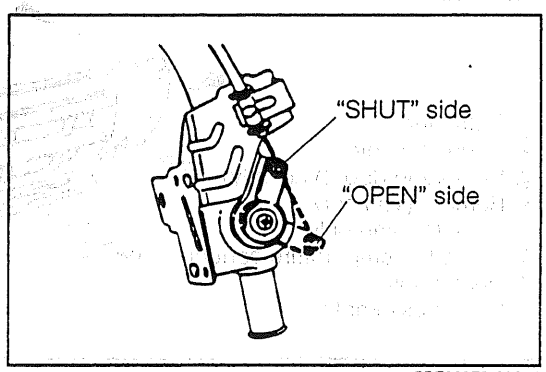
PBE00077-00068

3. MAIN POINTS OF INSTALLATION

TEMPERATURE REGULATING CABLE

Set the temperature regulating lever of the heater control to the ▭ (COOL) side. Also, set the cock lever at the heater inlet pipe section to the "SHUT" side. Proceed to insert the cable.

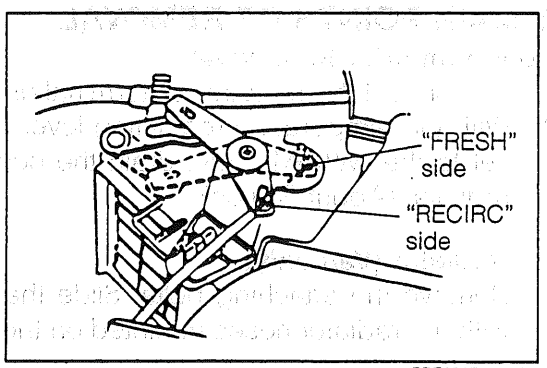
Install the cable clamp guide by fitting it to the groove of the bracket positively.



PBE00078-00069

INSIDE AIR/OUTSIDE AIR SWITCHING CABLE

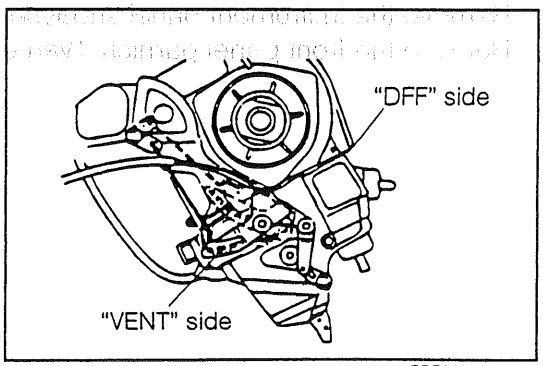
Set the inside air/outside air switching lever of the heater control to the ⟲ (RECIRC) side. Also, set the inside air/outside air switching lever of the heater unit to the "RECIRC" side. Proceed to insert and clamp the cable.



PBE00079-00070

MODE SWITCHING CABLE

Set the mode switching lever of the heater control to ↝ (VENT) side. Also, set the mode switching lever of the heater unit to the "VENT" side. Insert and clamp the cable.



PBE00080-00071

Operation after installation

1. Install the instrument panel subassembly.
2. Fill cooling water.
3. Install the negative ⊖ terminal of the battery.
4. Install the front panel garnish. (Van only)

PBE00081-00000

Check after installation

Ensure that the air amount and the air flowing direction vary correctly in accordance with the position of the heater control lever.

PBE00082-00000

HARNESS & WIRING DIAGRAM

HW

HANDLING INSTRUCTIONS OF LOCK
TYPE CONNECTOR ..... HW– 2
FUSE BLOCK ..... HW– 6
WIRE HARNESS ..... HW– 7

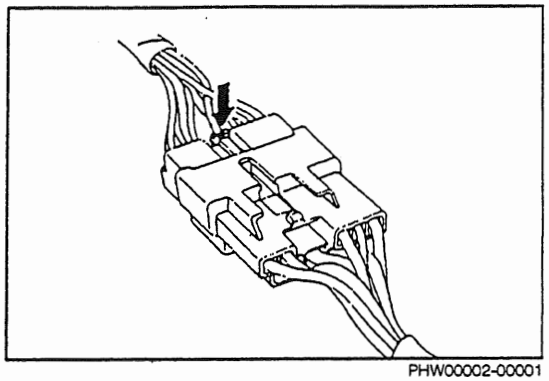
PHW00001-00000

HANDLING INSTRUCTIONS OF LOCK TYPE CONNECTOR

HANDLING AND INSPECTION

Removal

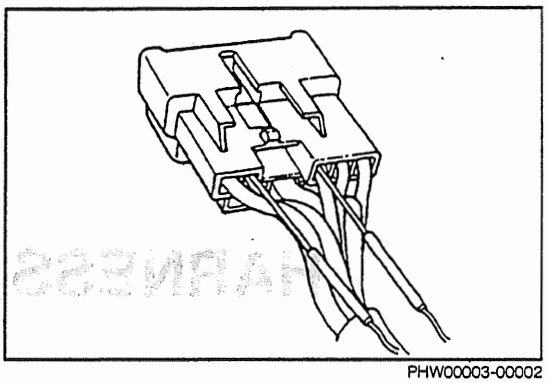
To disconnect the connector, simply pull out the connector while the lock lever is being pressed down, as indicated in the right figure.



PHW00002-00001

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.

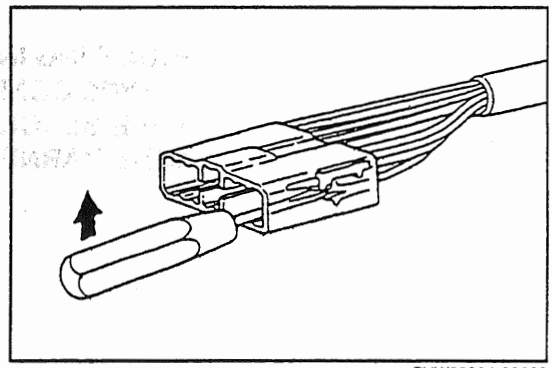


PHW00003-00002

REPLACEMENT

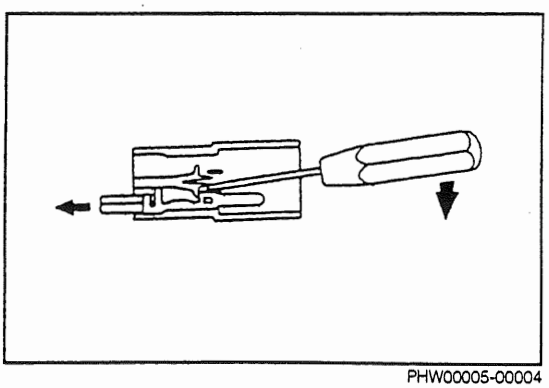
Removal

1. From the aperture, insert a miniature type common screwdriver into between the locking lug and the terminal.



PHW00004-00003

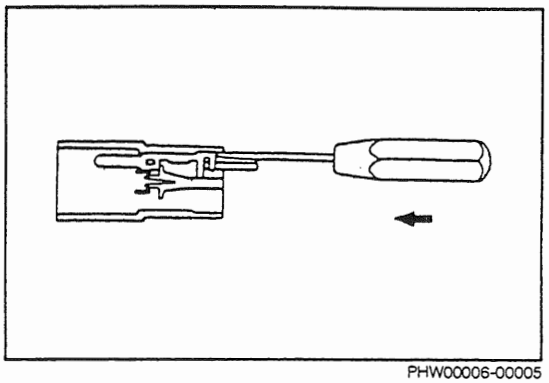
2. While the locking lug is being pried upward by means of a screwdriver, pull out the terminal from the backside.



PHW00005-00004

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.

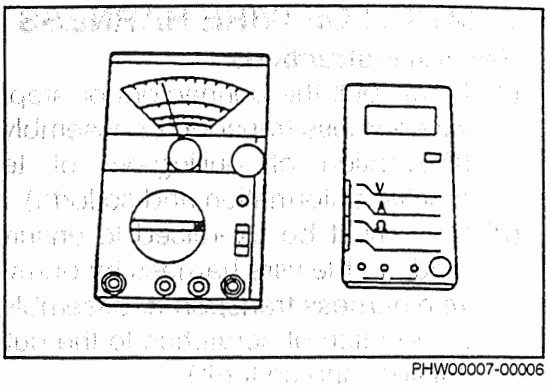


PHW00006-00005

INSPECTION

Tester (Volt/ohmmeter)

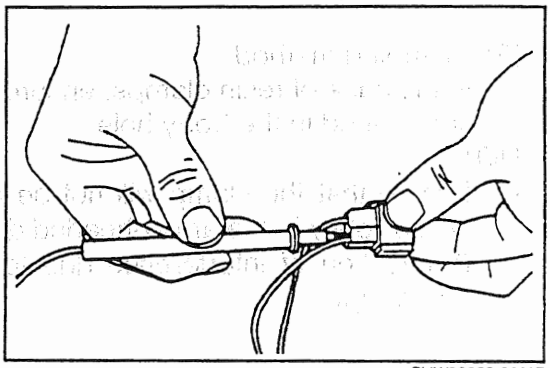
For the inspection, use a tester having an internal resistance of more than 10 kΩ/V.
Use of a tester with a low internal resistance may cause wrong measurement or secondary troubles.



PHW00007-00006

Conventional type connector

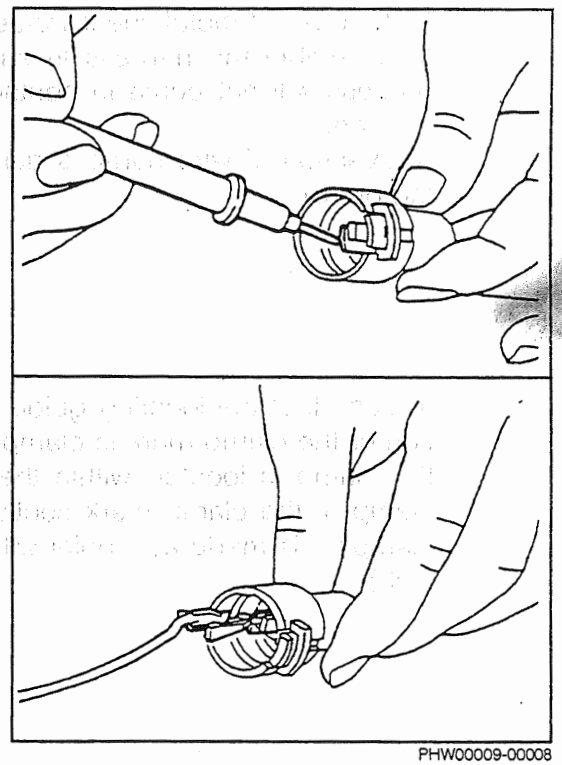
When resistance measurement and/or voltage measurement is conducted at the connector section, insert the measuring probe from the back of the connector, being very careful not to damage the harness-to-terminal connections.



PHW00008-00007

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.



PHW00009-00008

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.

PHW00010-00000

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)

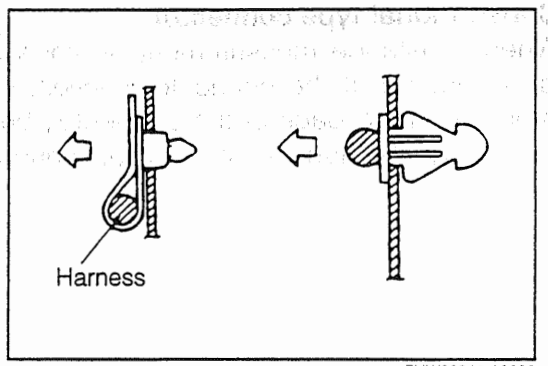
(2) Care must be exercised to ensure that no scratch is made to the wire harness by burrs or edges during the wire harness transport or assembly.
(Prevention of scratches to the outer trim, electrical insulators and so forth)

PHW00011-00000

(3) Clamping method
In the case of resin clamps, ensure that the clamp section is fitted in the body hole.

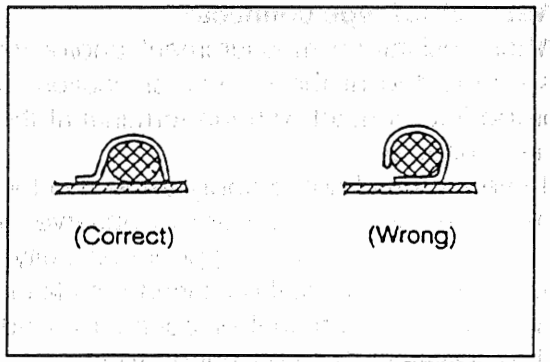
NOTE:

- 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)



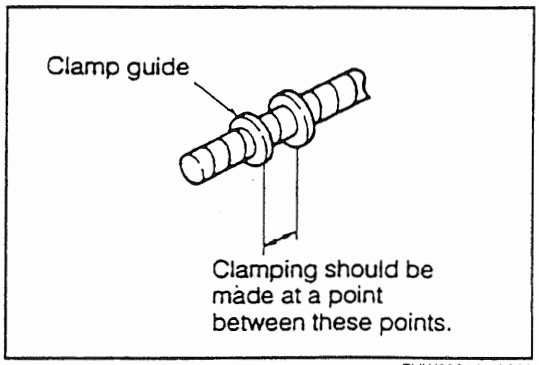
PHW00012-00009

- 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)



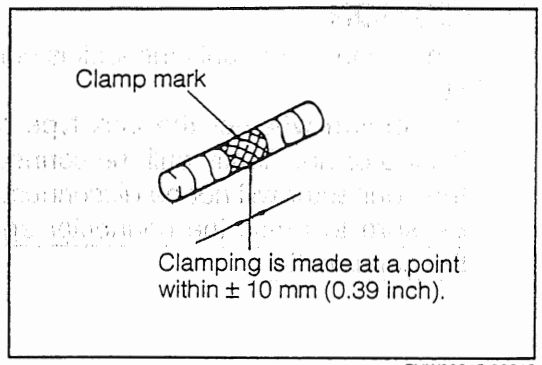
PHW00013-00010

- 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).



PHW00014-00011

(Prevention of slackness or interference)

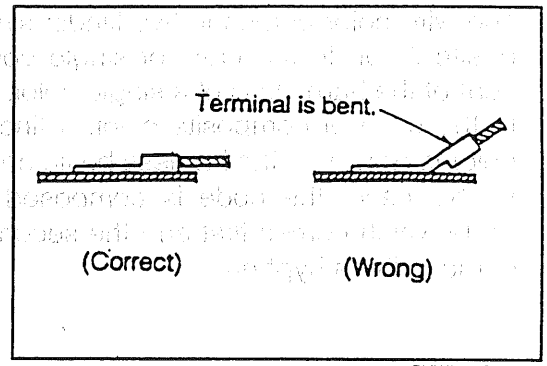


PHW00015-00012

(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.

PHW00016-00000

- 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.



PHW00017-00013

- When performing other operations, care must be exercised to ensure that no connected connector is detached by pulling out the wire harness forcibly.

PHW00018-00000

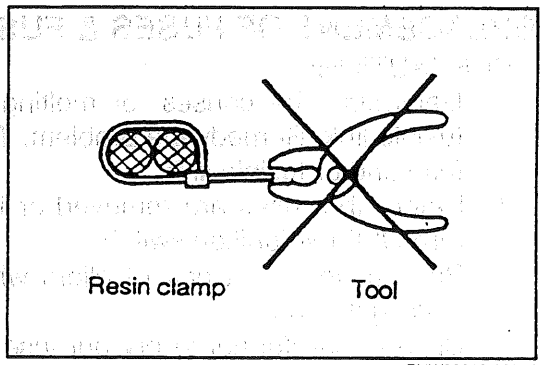
2. Work procedure for tightening-up type resin clamps

<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



PHW00019-00014

WIRING HARNESSES

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.

PHW00020-00000

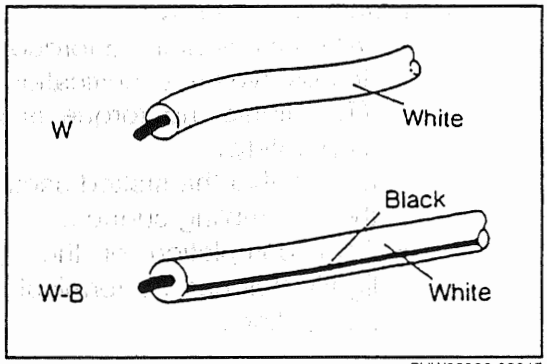
Wiring color code

- 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

PHW00021-00000

- 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.

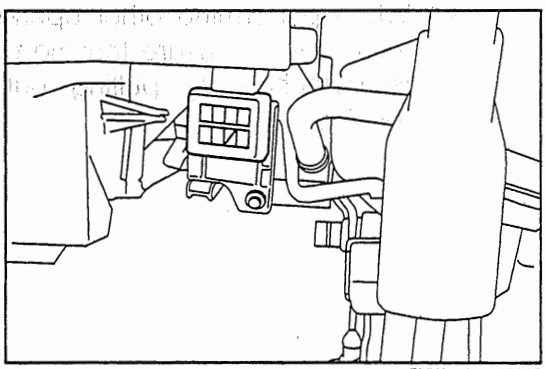


PHW00022-00015

FUSE BLOCK

Installing position

The fuse block is located at the left side of the steering wheel both on the L.H.D. vehicles and on the R.H.D. vehicles.

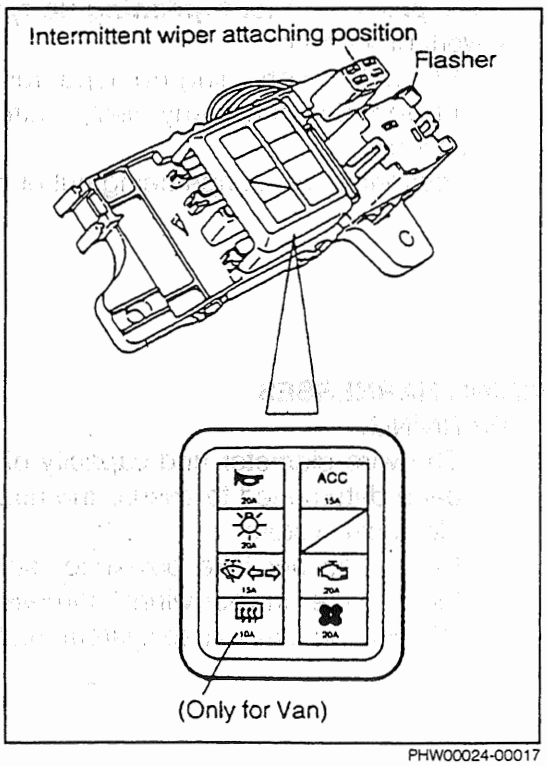


PHW00023-00016

REPLACEMENT OF FUSES & FUSIBLE LINK

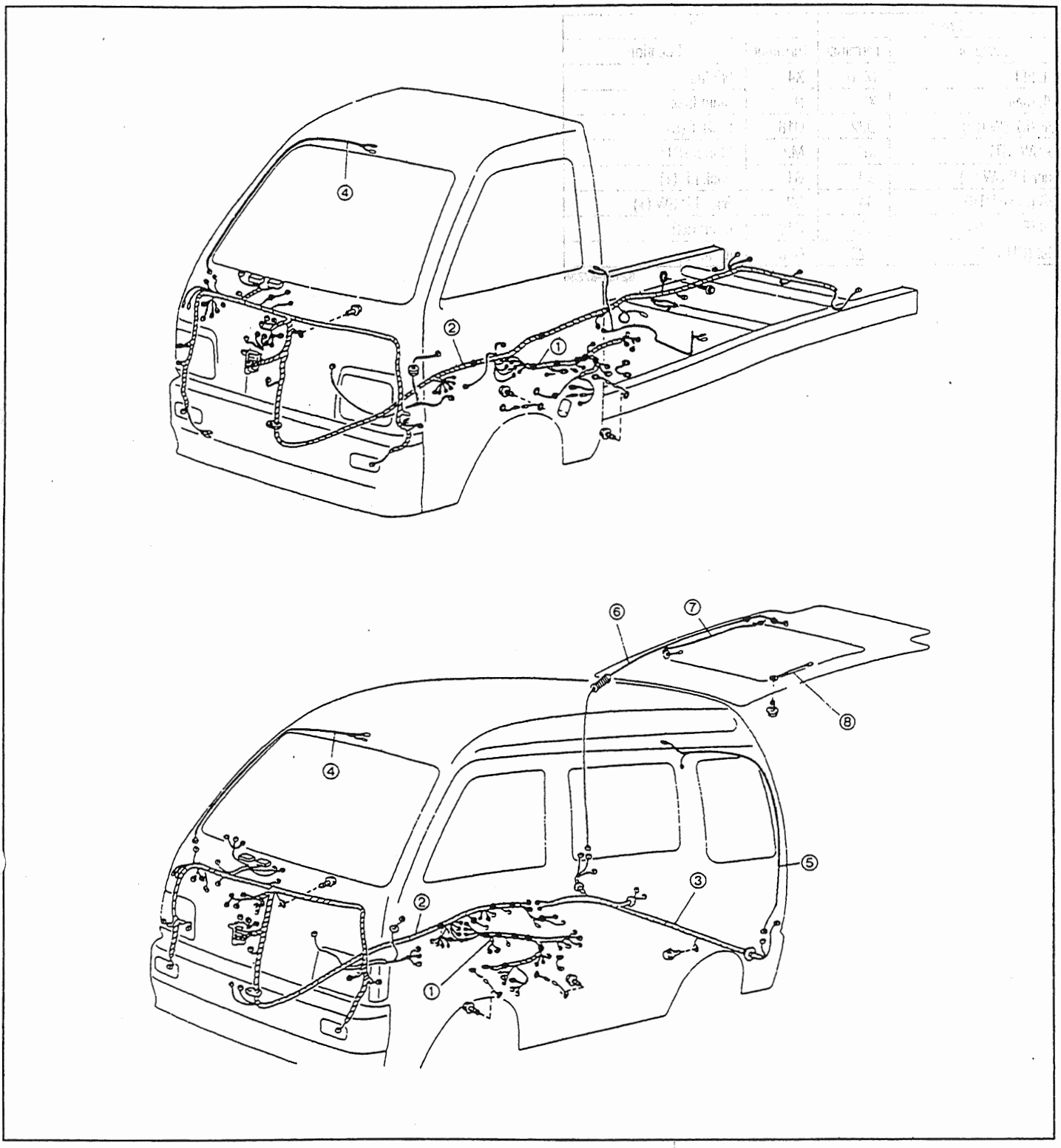
PRECAUTION:

1. Determine the causes for melting of the fuse and/or fusible link. Remedy the problem. Then, connect a new fuse and/or fusible link.
2. Before the fuses are removed or installed, be sure to turn OFF the ignition switch.
3. Be sure to use a pair of pliers when removing or installing the fuses.
4. Be very careful not to pry out fuses when removing or installing fuses.
5. When replacing a fuse with a new one, be sure to install a fuse having a capacity specified at the caution plate.



PHW00024-00017

WIRE HARNESS



No.	Name of wiring harness	No.	Name of wiring harness
①	Engine wire*	⑤	Roof wire No. 2
②	Cowl wire*	⑥	Back door wire No. 1*
③	Frame wire*	⑦	Rear window No. 1
④	Roof wire	⑧	Rear window wire No. 2

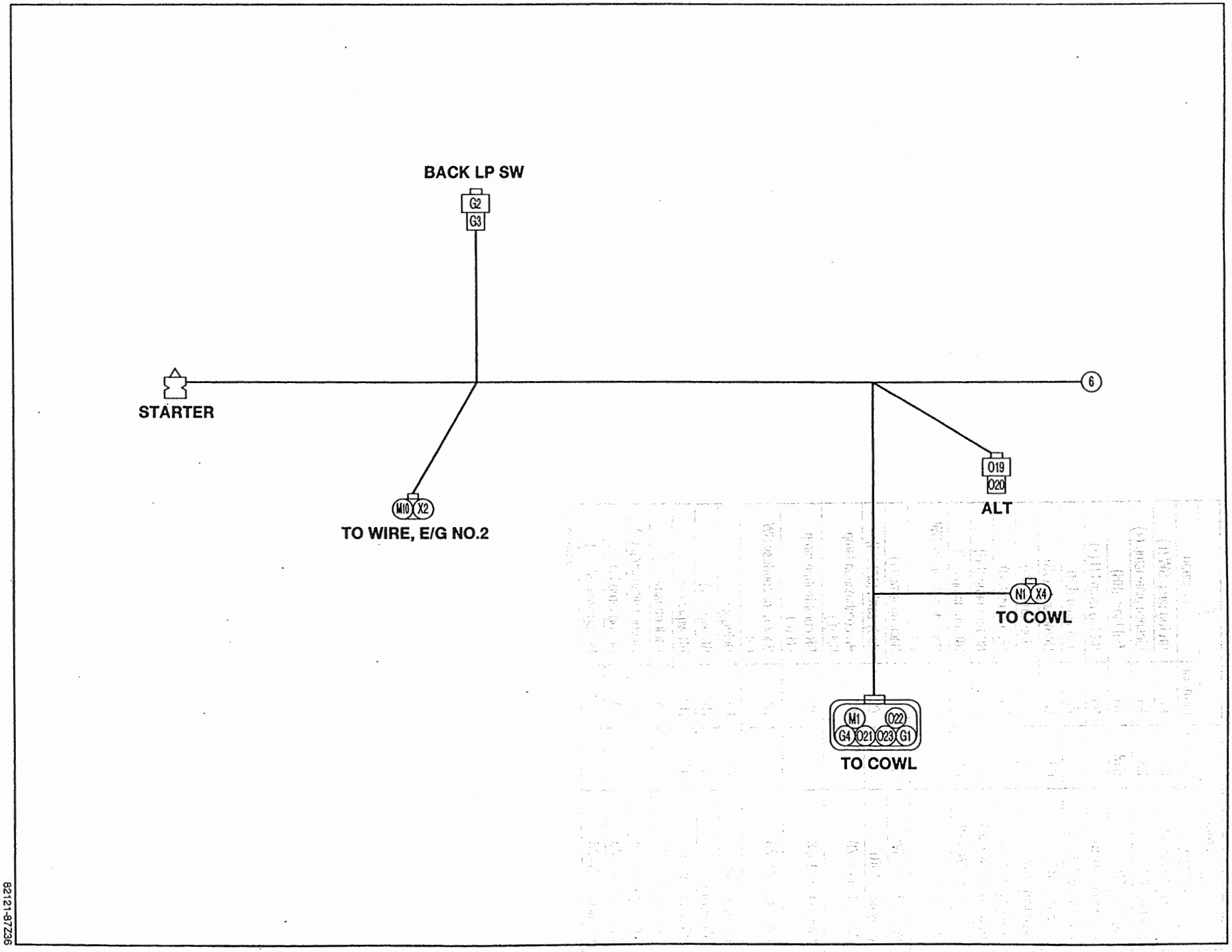
* Detail shows following pages.

PHW00025-00018

WIRE, ENGINE

From		To	
Location	Terminal	Terminal	Location
F/L EFI	M10	X4	EFI fuse
F/L main	X2	N1	Main fuse
J/B (IG SW (B))	022	018	IC ALT (B)
IG SW (ST)	M1	M2	Starter (ST)
Back LP SW (–)	G3	G1	Back LP (+)
J/B (Fuse HTR)	G4	G2	Back LP SW (+)
J/B (Fuse E/G)	021	019	IC alt (IG)
Met (CHG LP)	023	020	IC alt (L)

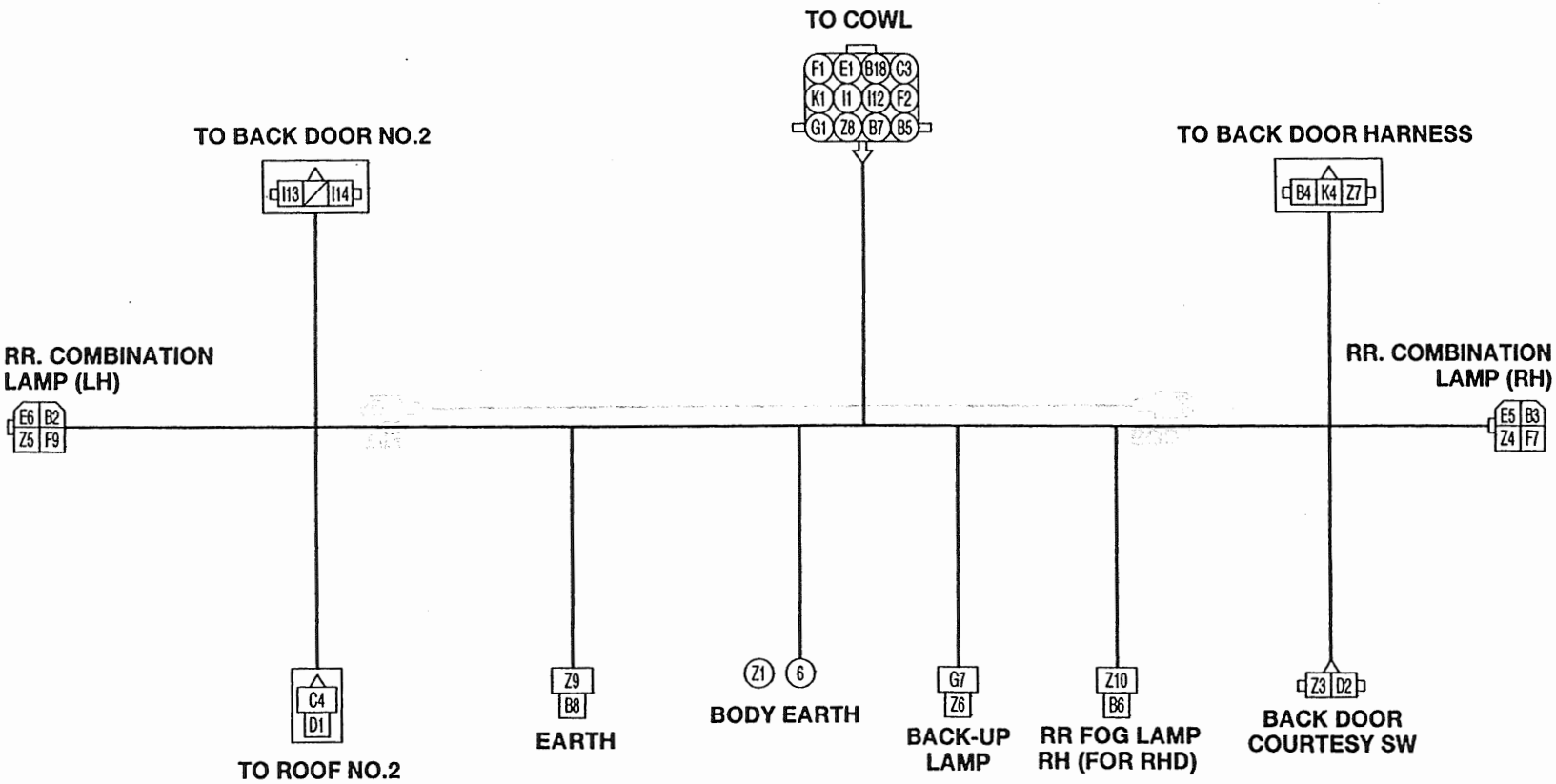
82121-87Z36


BACK LP SW
G2
G3
STARTER
6
M10
X2
TO WIRE, E/G NO.2
O19
O20
ALT
N1
X4
TO COWL
M1
O22
G4
O21
O23
G1
TO COWL
82121-87Z36

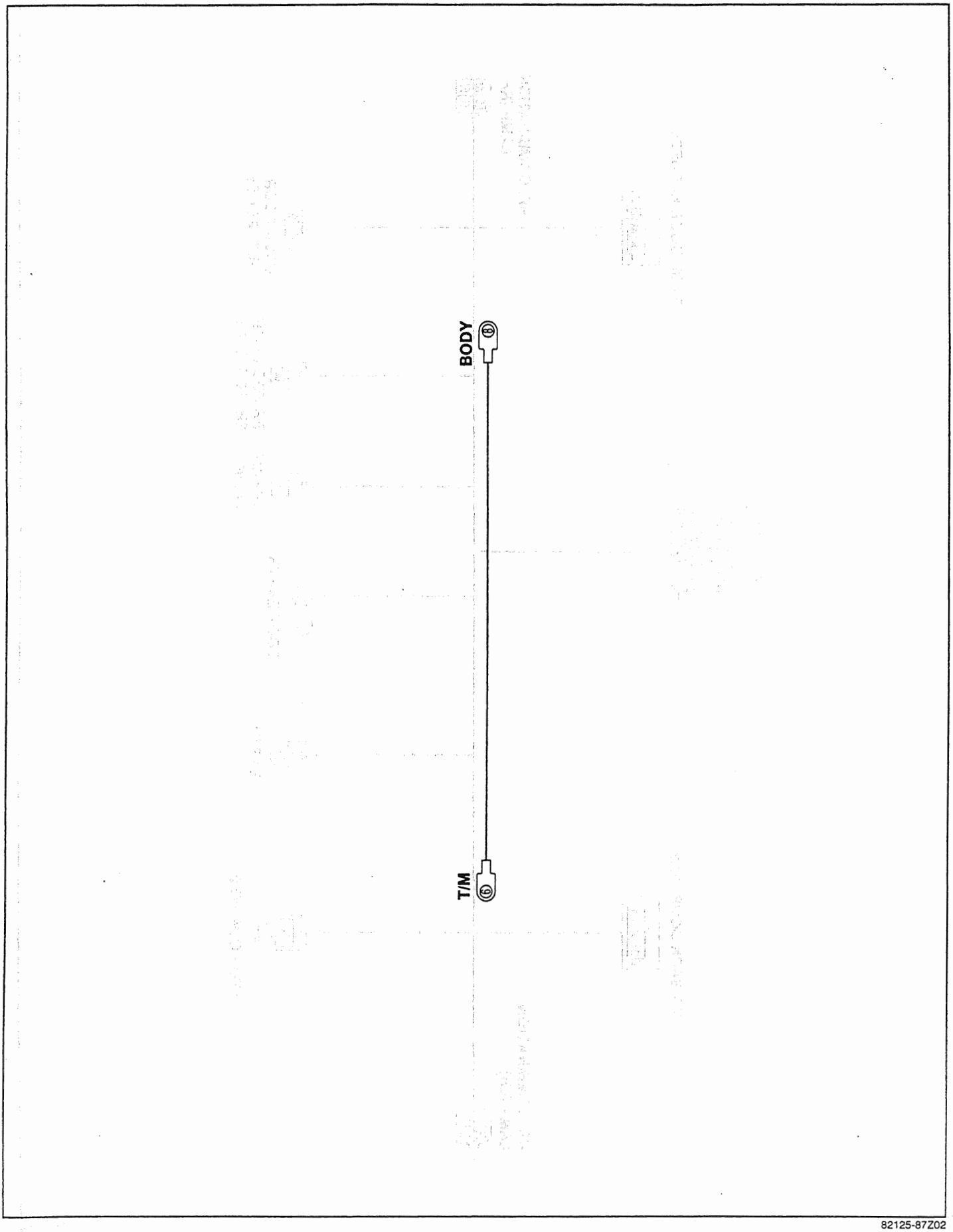
WIRE, FRAME

From		To	
Location	Terminal	Terminal	Location
PR fog lamp RH (+)	B6	B7	RR fog lamp SW (L)
Lighting SW	B5	B4	Licence plate lamp (+)
Lighting SW	B18	B3	Tail lamp (RH)
Connect to B6-B7		B8	RR fog lamp LH (+)
Connect to B18-B3		B2	Tail lamp (LH)
Fuse lamp (L)	C3	C4	Dome lamp (+B)
Stop lamp SW	E1	E5	Stop lamp (RH)
Connect to E1-E5		E6	Stop lamp (LH)
Turn signal SW (RH)	F1	F7	RR turn lamp (RH)
Turn signal SW (LH)	F2	F9	RR turn lamp (LH)
Dome lamp (L)	D1	D2	Back door courtesy SW (+)
Back VP lamp SW	G1	G7	Back up lamp (+)
Body earth (RR)	Z1	Z8	Body earth (J/B (–))
Connect to Z1-Z8		Z4	RR combination lamp RH (E)
Connect to Z1-Z8		Z5	RR combination lamp LH (E)
Connect to Z1-Z8		Z3	Back door courtesy SW (–)
Defogger SW	K1	K4	Defogger
RR wiper (L)	I1	I14	RR wiper (+)
RR wiper SW (+)	I12	I13	RR wiper (–)
Connect to Z1-Z8		Z6	Back up lamp (–)
Connect to Z1-Z8		Z7	Licence plate lamp (–)
Connect to Z1-Z8		Z9	RR fog lamp LH (–)
Connect to Z1-Z8		Z10	RR fog lamp RH (–)

82164-87Z02


TO COWL
F1 E1 B18 C3
K1 I1 I12 F2
G1 Z8 B7 B5
TO BACK DOOR NO.2
I13 I14
TO BACK DOOR HARNESS
B4 K4 Z7
RR. COMBINATION LAMP (LH)
E6 B2
Z5 F9
RR. COMBINATION LAMP (RH)
E5 B3
Z4 F7
C4
D1
TO ROOF NO.2
Z9
B8
EARTH
Z1 6
BODY EARTH
G7
Z6
BACK-UP LAMP
Z10
B6
RR FOG LAMP RH (FOR RHD)
Z3 D2
BACK DOOR COURTESY SW

WIRE, TRANSMISSION (Pick)



82125-87Z02

WIRE, TRANSMISSION (Van)



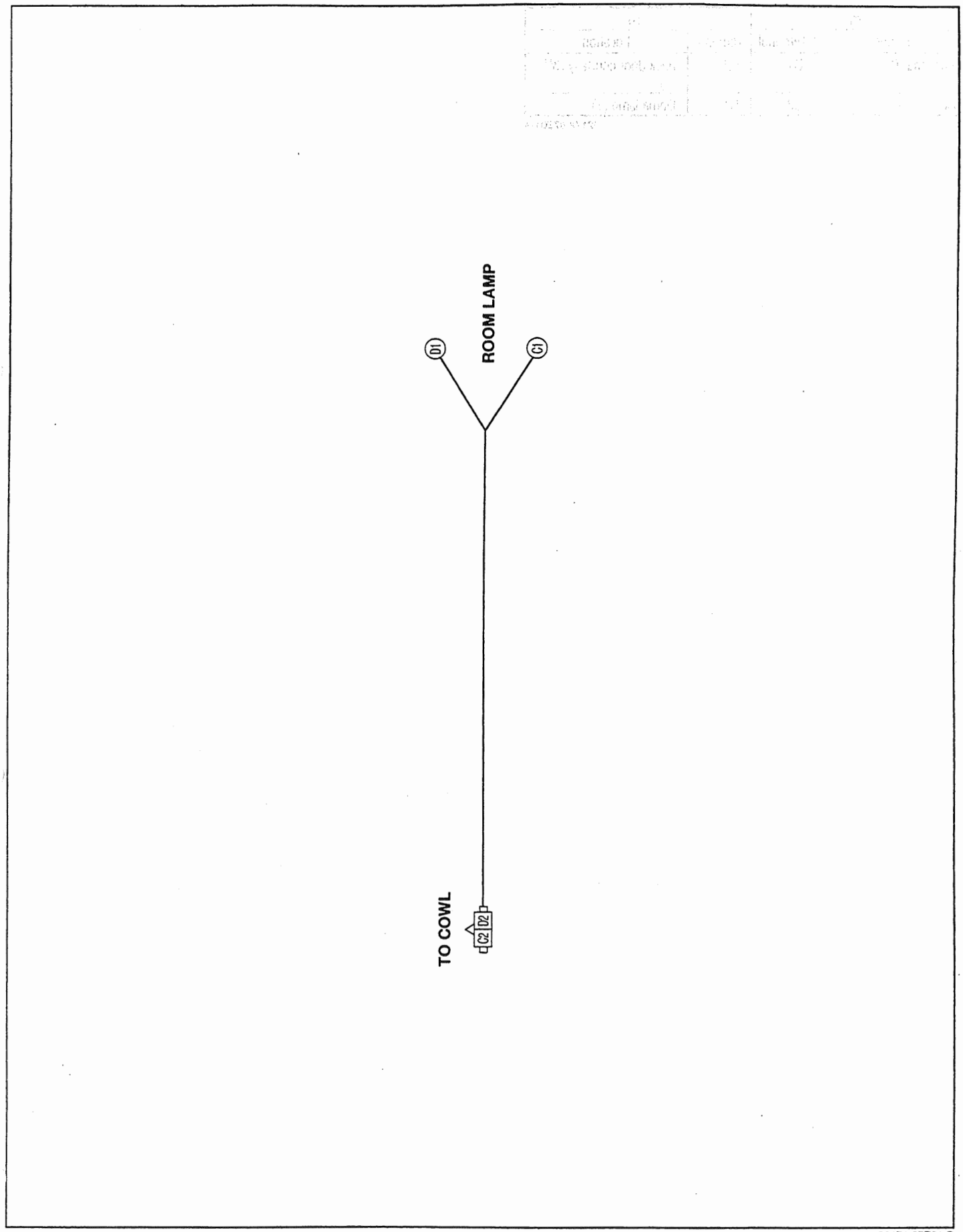
82125-87Z03

WIRE, ROOF (Van)

From		To	
Location	Terminal	Terminal	Location
Fuse head (L)	C2	C1	Room lamp (B)
Room lamp (Door)	D1	D2	Courtesy switch (+)

82171-87Z01-D

WIRE, ROOF (Van)



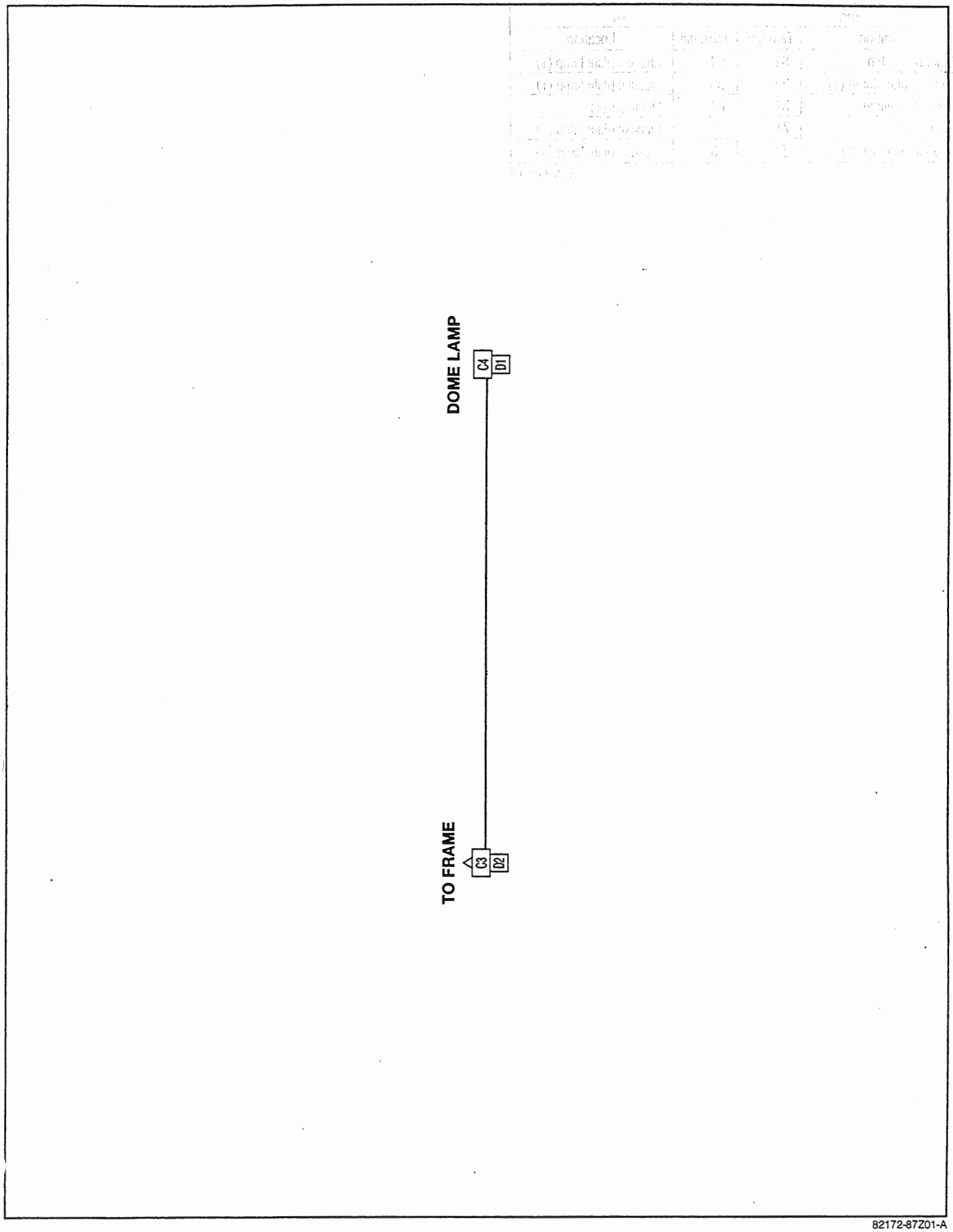
82171-87Z01-D

WIRE, ROOF NO.2 (Van)

From		To	
Location	Terminal	Terminal	Location
Dome lamp (Door)	D1	D2	Back door courtesy SW (+)
Fuse head (L)	C3	C4	Dome lamp (+)

82172-87Z01-A

WIRE, ROOF NO.2 (Van)



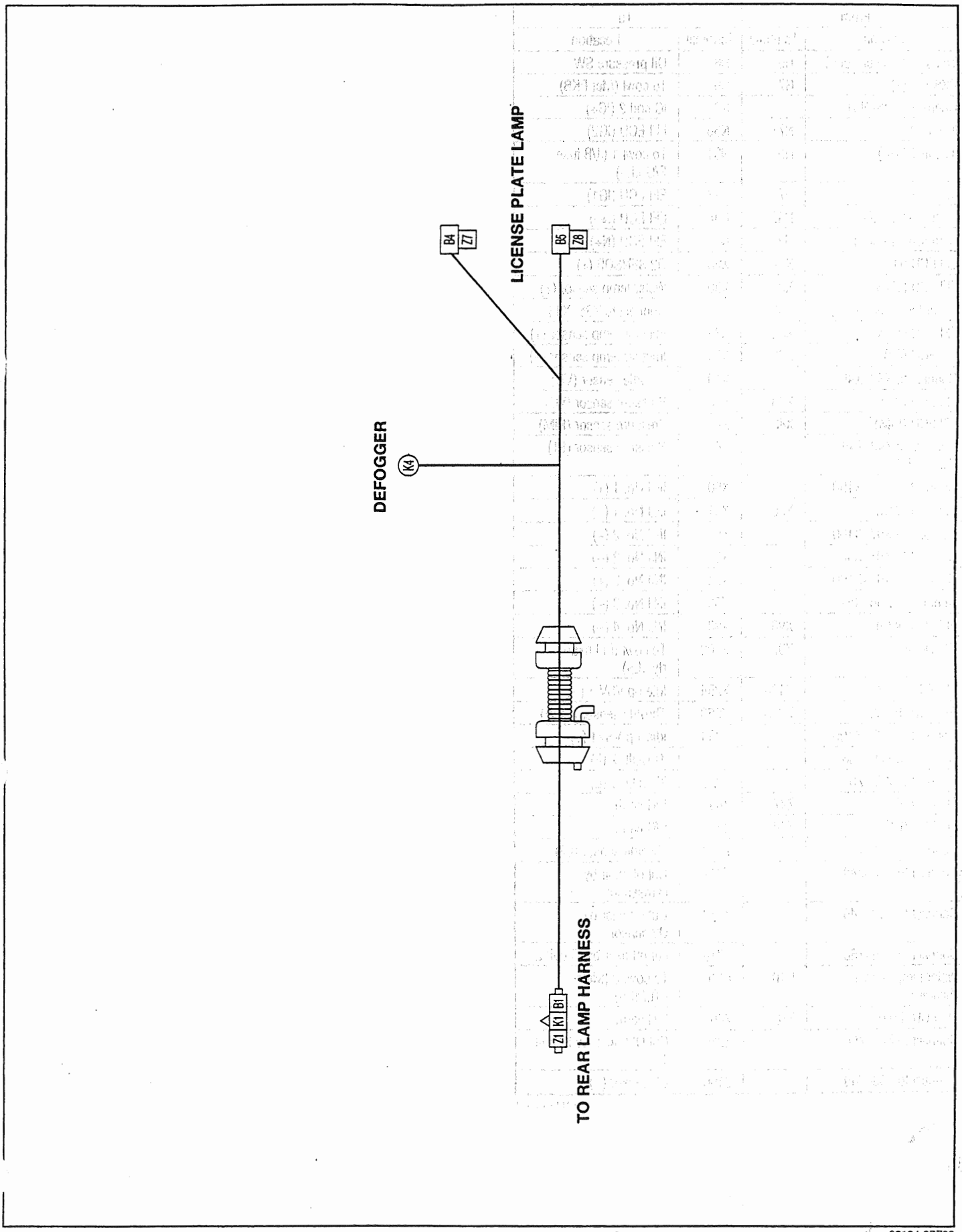
82172-87Z01-A

WIRE BACK DOOR NO.1

From		To	
Location	Terminal	Terminal	Location
Lighting switch	B1	B4	License plate lamp (+)
License plate lamp (+)	B4	B5	Licence plate lamp (+)
Defogger switch	K1	K4	Defogger (+)
Body earth	Z1	Z7	License plate lamp (–)
Licence plate lamp (–)	Z7	Z8	License plate lamp (–)

82184-87Z03

WIRE BACK DOOR NO.1

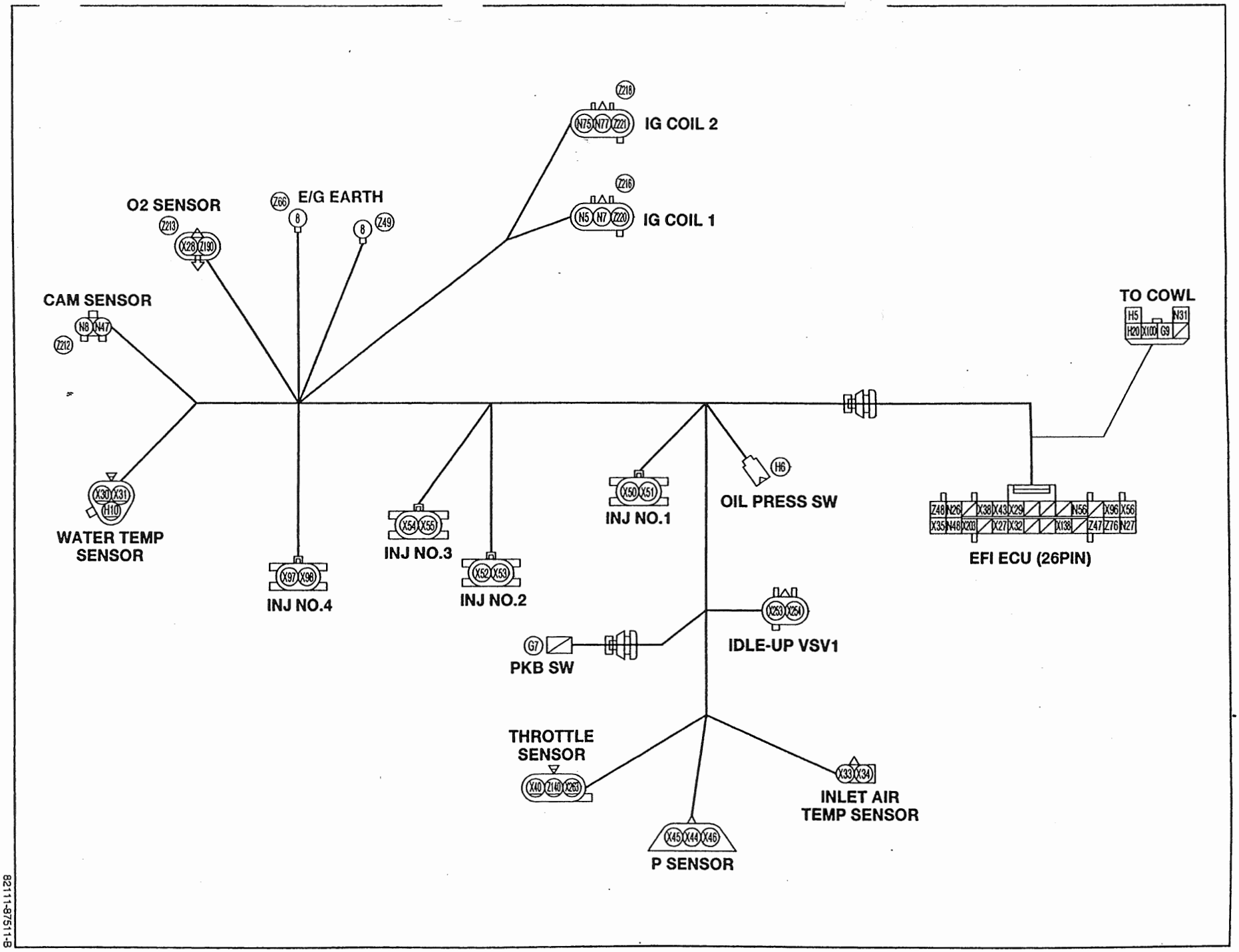


82184-87Z03

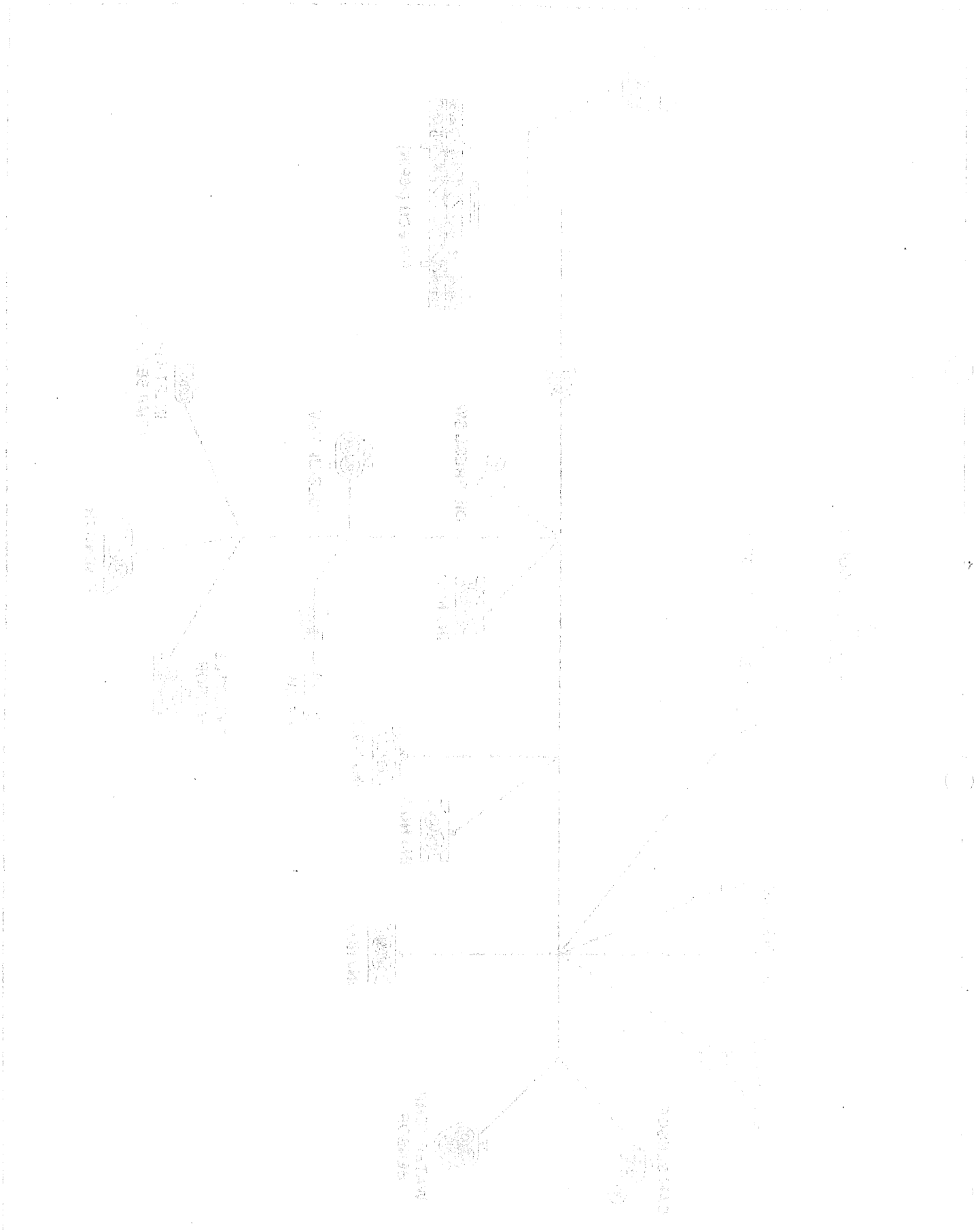
WIRE, ENGINE ROOM MAIN

From		To	
Location	Terminal	Terminal	Location
To cowl 2 (Meter <oil>)	H5	H6	Oil pressure SW
PKB SW (+)	G7	G9	To cowl (Met PKB)
Connect to N5–N31		N75	IG coil 2 (IG+)
IG coil 2 (–)	N77	N56	EFI ECU (IG2)
IG coil 1 (IG+)	N5	N31	To cowl 1 (J/B fuse E/G <L>)
IG coil 1 (–)	N7	N27	EFI ECU (IG1)
Cam sensor (NE–)	N47	N48	EFI ECU (N–)
Cam sensor (NE+)	N8	N26	EFI ECU (N+)
EFI ECU (OX)	X27	X28	O2 SENSOR (+)
EFI ECU (THW)	X29	X30	Water temp sensor (+)
Water temp sensor (–)	X31		Connect to X35–X34
EFI ECU (THA)	X32	X33	Inlet air temp sensor (+)
EFI ECU (E2)	X35	X34	Inlet air temp sensor (–)
Connect to X38–X46		X40	Throttle sensor (VC)
EFI ECU (VC)	X38	X46	Pressure sensor (VC)
EFI ECU (PIM)	X43	X45	Pressure sensor (PIM)
Connect to Z48–Z49 (Near X44)		X44	Pressure sensor (E1)
Connect to X97–X100		X50	INJ No. 1 (+)
EFI ECU (#10)	X56	X51	INJ No. 1 (–)
Connect to X97–X100		X52	INJ No. 2 (+)
Connect to X96–X98		X53	INJ No. 2 (–)
Connect to X97–X100		X54	INJ No. 3 (+)
Connect to X56–X51		X55	INJ No. 3 (–)
EFI ECU (#20)	X96	X98	INJ No. 4 (–)
INJ No. 4 (+)	X97	X100	To cowl (EFI main rly <L>)
EFI ECU (VSV1)	X138	X254	Idle up VSV 1 (–)
EFI ECU (PSW)	X203	X263	Throttle sensor (PSW)
Connect to X97–X100		Z253	Idle-up VSV1 (+)
Connect to Z76–Z66		Z221	IG COIL 2 (E)
Connect to Z76–Z66		Z220	IG COIL 1 (E)
EFI ECU (E01)	Z47	Z49	E/G earth
EFI ECU (E1)	Z48	Z49	E/G earth
Connect to X35–X34		Z140	Throttle sensor (E2)
Connect to Z48–Z49		Z212	Cut off near by camsensor
Connect to Z48–Z49		Z213	Cut off near by O2 sensor
Connect to Z76–Z66		Z218	cut off near by IG coil 2
Water temp sensor (Sender)	H10	H20	To cowl 2 (Meter <TEMP>)
EFI ECU (E02)	Z76	Z66	E/G earth
Connect to Z76–Z66		Z216	Cut OFF near by IG coil 1
Connect to Z48–Z49		Z190	O2 sensor (–)

82111-87511



82111-87511-B



WIRE, COWL (Van LHD)

From		To	
Location	Terminal	Terminal	Location
H/L RH (H1)	A1	A2	H/L LH (HI)
H/L RH (LO)	A3	A4	H/L LH (LO)
Connect to A1~A2		A5	Turn signal SW (Dimmer (HU))
Connect to A3~A4		A6	Turn signal SW (Dimmer (HL))
Connect to A1~A2		A7	Meter (Hibeam ind)
Fuse H/L LH (B)	A21	A8	J/B (Fuse lamp: 1)
H/L RH (+B)	A9	A24	Fuse H/L RH (B)
Connect to A22~A14		A10	Meter (Hibeam ind +)
H/L LH (+B)	A11	A23	Fuse H/L LH (L)
Connect to A22~A14		A12	Room lamp (B)
Connect to A22~A14		A13	Doom lamp (B)
Fuse H/L RH (B)	A22	A14	J/B (Fuse lamp: L)
Connect to A3~A4		A15	Diode (Out)
Connect to A1~A2		A16	Diode (Out)
Turn signal SW (Hazard)	A19	A39	Meter (Hazard)
Connect to A9~A24		A54	H/L leveling RH (+)
Connect to A11~A23		A61	H/L leveling LH (+)
H/L leveling RH (O)	A56	A63	H/L leveling LH (0)
Connect to A56~A63		A69	Resister
Connect to A11~A23		A70	Resister
Resister	A71	A75	H/L leveling SW
Resister	A72	A73	H/L leveling SW
Resister	A72	A74	H/L leveling SW
FR position lamp (RH)	B1	B2	FR position lamp (LH)
Connect to B1~B2		B3	Tail lamp (B)
Connect to B1~B2		B5	Turn signal SW (Lighting (–))
RR fog SW (L)	B7	B15	RR fog lamp (+)
FR fog SW	B21	B16	FR fog rly
Fuse (FR fog)	B17	B18	FR fog rly
Connect to B1~B2		B20	FR fog SW
FR fog rly	B19	B22	FR fog lamp (RH)
Connect to B21~B22		B23	FR fog lamp (LH)
Turn signal SW (FR fog)	C1	C20	RR fog SW (B)
Connect to B1~B2		C2	Meter (Illumination)
Connect to B1~B2		C3	License lamp (B)
Connect to B1~B2		C4	Heater SW (Illumination)
Room lamp (–)	D1	D2	Courtesy SW (+)
J/B fuse horn (L)	E1	E7	Stop lamp SW (+)
Horn (+)	E2	E7	Stop lamp SW (+)
Horn (–)	E3	E4	Turn signal SW (Horn (+))
Stop lamp RH (+)	E5	E5	Stop lamp SW (–)
Turn signal SW (RH)	F1	F9	Side turn lamp (RH)
Turn signal SW (LH)	F3	F10	Side turn lamp (LH)
Connect to F1~F9		F5	Meter (Turn RH)
Connect to F3~F10		F6	Meter (Turn LH)
Connect to F1~F9		F7	RR turn lamp (RH)
Connect to F3~F10		F8	RR turn lamp (LH)
Parking brake SW	G1	G5	Meter (Parking brake)
Meter (Brake)	G2	G3	Brake fluid level SW

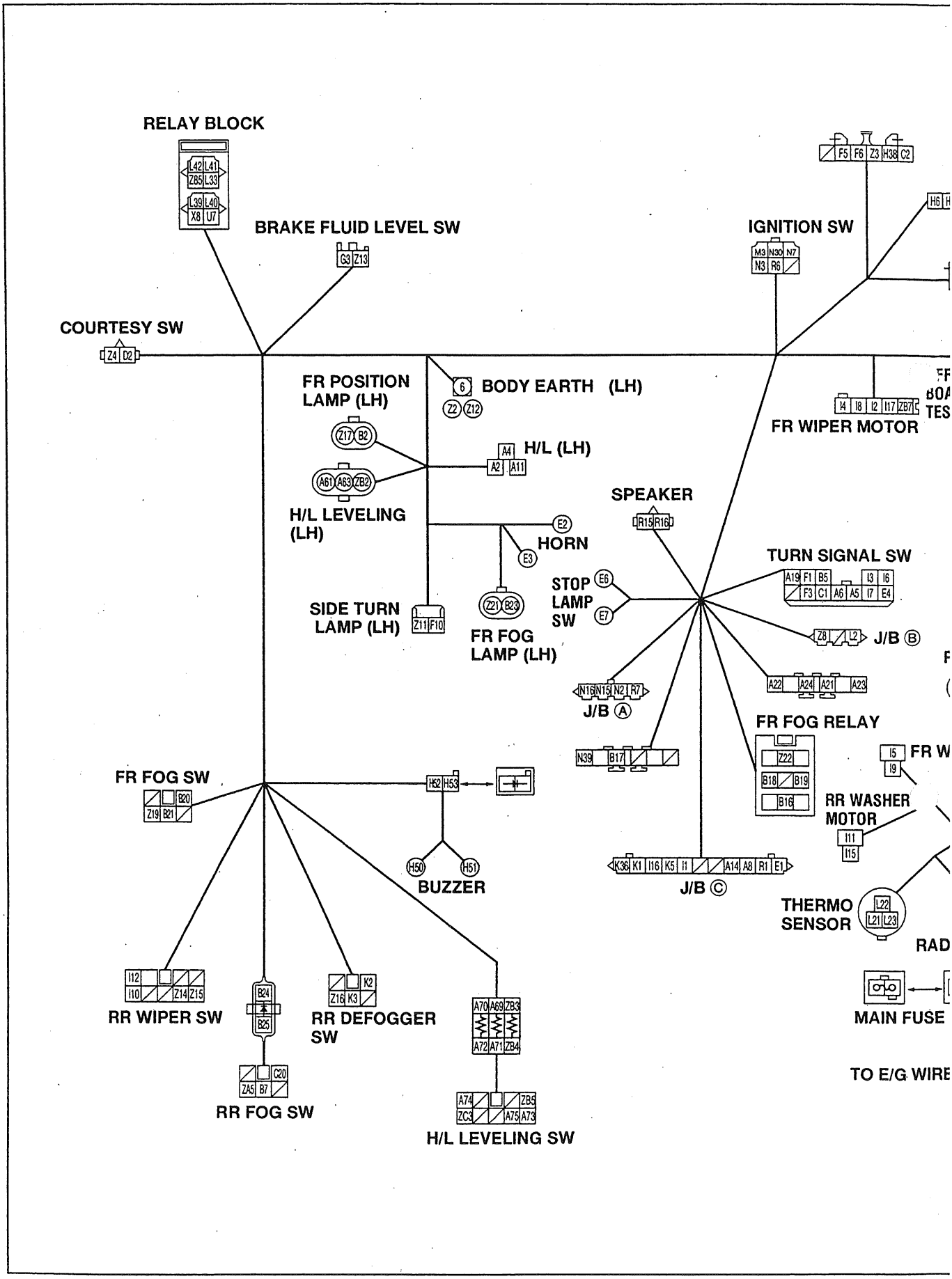
From		To	
Location	Terminal	Terminal	Location
Back lamp SW (–)	G6	G7	Back lamp (+)
Fuel level sender (+)	H2	H3	Meter (Fuel)
Oil pressure SW (+)	H4	H5	Meter (Oil pressure)
Meter (Coolant temp.)	H6	H7	Coolant temp sender
Meter (Fuel warning)	H8	H9	Fuel sender
Connect B1~B2		H50	Buzzer
Buzzer	H51	H52	Diode (In)
Diode (Out)	H53	D2	Courtesy SW (+)
Connect to B19~B22		B24	Diode
Connect to A22~A14		B25	Diode
J/B (Fuse: wiper)	I1	I2	FR wiper motor (+)
Turn signal SW (FR wiper (+1))	I3	I4	FR wiper motor (+1)
FR washer motor (–)	I5	I6	Turn signal S R washer)
Turn signal SW (FR wiper (+2))	I7	I8	FR wiper motor (+2)
Connect to I1~I2		I9	FR washer motor (+)
RR wiper SW (Washer)	I10	I11	RR washer motor (–
RR wiper SW (+)	I12	I13	RR wiper motor (–)
Connect to ~I9		I14	RR wiper motor (+)
Connect to ~I9		I15	RR washer motor (+
J/B (Int wiper relay: S)	I16	I17	FR wiper motor (S)
Connect to K5~K6			Connect to K36~K1
J/B (Fuse: deffoger (L))	K1	K2	RR deffoger SW (+)
RR deffoger SW (–)	K3	K4	RR deffoger (+)
J/B (Fuse: heater (L))	K5	K6	Heater blower motor
Heater blower SW (HI)	K7	K8	Heater blower motor
Heater blower motor (–)	K8	K9	Heater resistor (HI)
Heater blower SW (ME)	K10	K11	Heater resistor (ME)
Heater blower SW (LO)	K12	K13	Heater resistor (LO)
J/B (Fuse: heater (L))	K36	K14	Heater SW (B
Connect to K5~K6		K17	Back lamp SW (+)
Connect to K5~K6		K18	Meter (+B)
Connect to K12~K13		KA1	Diode (Out)
Connect to N1~N2		L1	Rad fan motor (+)
J/B (Fuse: E/G (L))	L2	L3	Rad fan rly (B)
Rad fan rly (L)	L4	L23	Thermo sensor (HI)
Rad fan motor (–)	L10	L21	Thermo sensor (LO)
Connect to L2~L3		L11	Alternator (IG)
Connect to L2~L3		L16	Rad fan rly (B)
Connect to Z32~Z6		L17	Rad fan rly (L)
Thermo sensor (–)	L22	L25	Rad fan rly (+)
Connect to Z32~Z8		L26	Rad fan rly (–)
Connect to L33~L40		L31	EFI ECU (+B)
R/B (Main relay (L))	L33	L40	R/B (Fuel pump rela (+B))
R/B (main relay (+S))	L42	L39	R/B (Fuel pump rela (+S))
Fuse EFI No. 1	L41A	L41	R/B (Main rel B
Fuse EFI No. 2	L48	L42	R/B (Main relay (+S
Connect to L10~L21		L46	EFI ECU (RFAN)
Connect to X151~X152		L50	Diode (In)

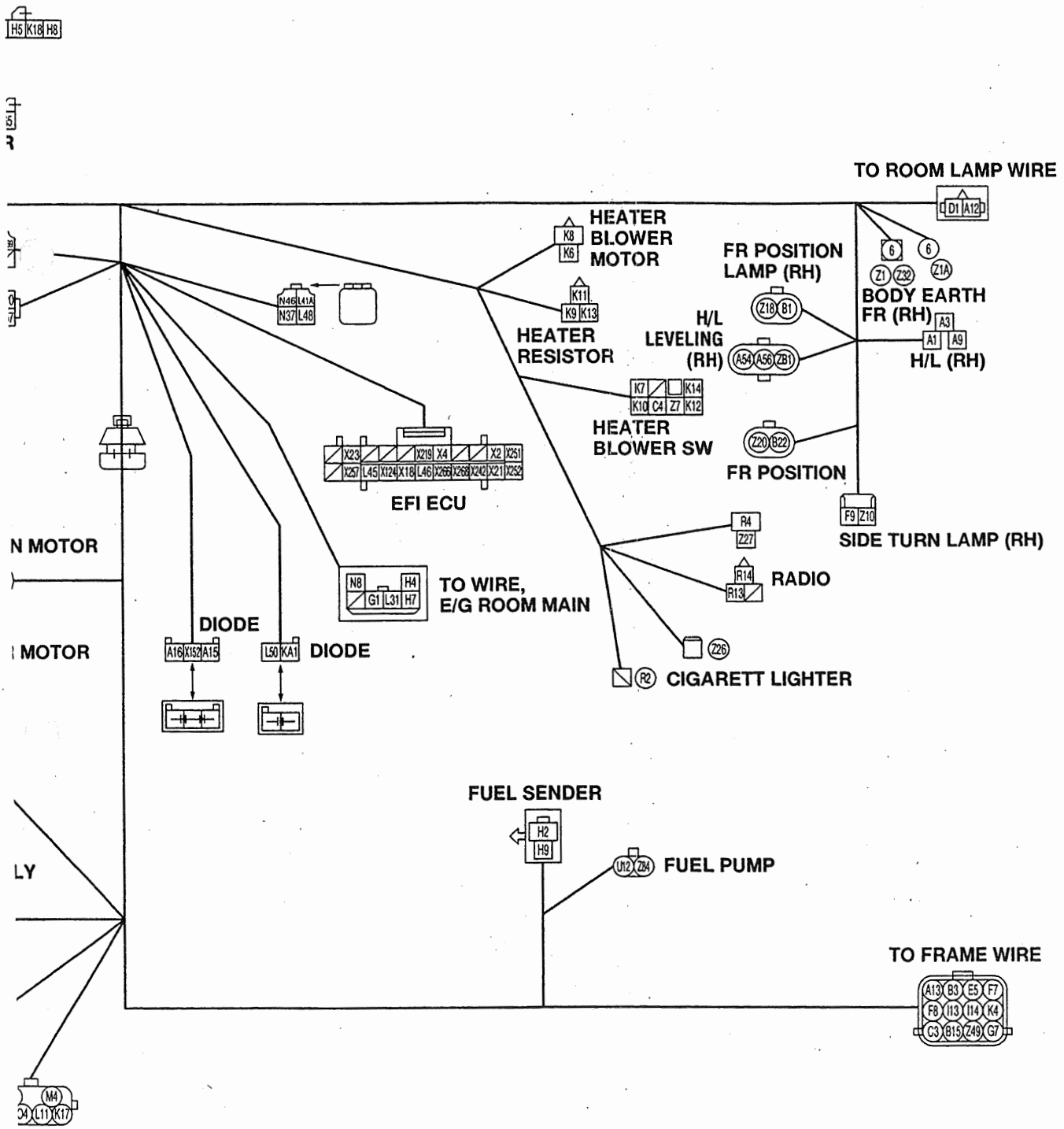
From		To	
Location	Terminal	Terminal	Location
Main fuse (B)	M1	M2	Main F/L
Ignition SW (ST)	M3	M4	Starter (ST)
Main fuse (L)	N1	N2	J/B (IG SW (B))
Connect to N1~N2		N3	Ignition SW (B)
Ignition SW (IG)	N7	N15	J/B (IG SW (IG))
Connect to L2~L3		N8	Igniter
Connect to N7~N15		N16	J/B (IG SW (IG1))
EFI F/L	N35	N45	Fuse EFI No. 1
Ignition SW (IG2)	N30	N37	Fuse EFI No. 2
Connect to L48~L42		N38	Off board tester (IG2)
Connect to N1~N2		O1	Alternator (B)
Meter (Charge)	O3	O4	Alternator (L)
J/B (Fuse: ACC (L))	R1	R2	Cigarette lighter (+)
Connect to R1~R2		R4	Radio (+)
Ignition SW (ACC)	R6	R7	J/B (IG SW (ACC))
Radio (Speaker (+))	R13	R15	Speaker (+)
Radio (Speaker (–))	R14	R16	Speaker (–)
R/B (Fuel pump relay (L)	U7	U12	Fuel pump (+B)
EFI ECU (W)	X2	T4	Meter (Diagnosis)
EFI ECU (SPD)	X4	H3B	Meter (Speed sensor)
R/B (Fuel pump relay (L)	X8	X257	EFI ECU (FCI)
Off board tester (VF)	X20	X21	EFI ECU (VF)
Connect to L41A~L41		X23	EFI ECU (BAT)
Connect to K3~K4		X124	EFI ECU (DEF)
EFI ECU (M/L)	X18	X152	Diode (In)
Connect to K12~K13		X219	EFI ECU (BLW)
Connect to L33~L40		X251	EFI ECU (+B1)
Connect to L33~L40		X252	EFI ECU (+B2)
Off board tester (T)	X57	X266	EFI ECU (T)
EFI ECU (SIO)	X268	X269	Off board tester (SIO)
EFI ECU (REV)	X242	X271	Off board tester (REV)
Body earth FR (RH)	Z1	Z2	Body earth FR (LH)
Connect to Z1~Z2		Z3	Meter (Earth)
Connect to Z1~Z2		Z4	Courtesy SW (–)
Connect to Z1~Z2		Z7	Heater blower SW (–)
Body earth FR (RH)	Z32	Z8	J/B (Earth)
Connect to Z1~Z2		Z10	Side turn lamp RH (–)
Connect to Z32~ZB		Z11	Side turn lamp LH (–)
Connect to Z1~Z2		Z13	Brake fluid level SW (–)
Connect to Z1~Z2		Z14	RR washer SW (–)
Connect to Z1~Z2		Z15	RR wiper SW (–)
Connect to Z1~Z2		Z16	RR deffoger SW (–)
Connect to Z32~ZB		Z17	FR position lamp LH (–)
Connect to Z1~Z2		Z18	FR position lamp RH (–)
Connect to Z1~Z2		Z19	FR fog SW
Connect to Z1~Z2		Z20	FR fog lamp (RH)
Connect to Z1~Z2		Z21	FR fog lamp (LH)
Connect to Z1~Z2		Z22	FR fog rly
Connect to Z1~Z2		Z26	Cigarette lighter (–)
Connect to Z1~Z2		Z26	Cigarette lighter (–)
Body earth FR (LH)	Z12	Z27	Radio (–)
Connect to Z32~ZB		Z49	Body earth (RR)

From		To	
Location	Terminal	Terminal	Location
Connect to Z1~Z2		Z84	Fuel pump (Earth)
Connect to Z1~Z2		Z85	R/B (Main relay (–S))
Connect to Z1~Z2		ZA5	RR fog lamp SW (–)
Connect to Z1~Z2		ZB1	H/L leveling RH (–)
Connect to Z1~Z2		ZB2	H/L leveling LH (–)
Connect to Z1~Z2		ZB3	Resister
Resister	ZB4	ZB5	H/L leveling SW
Resister	ZB4	ZC3	H/L leveling SW
Connect to Z1~Z2		ZB7	FR wiper motor (–)
Connect to Z1~Z2		ZC1	Off board tester
Connect to Z1~Z2		ZC2	Off board tester

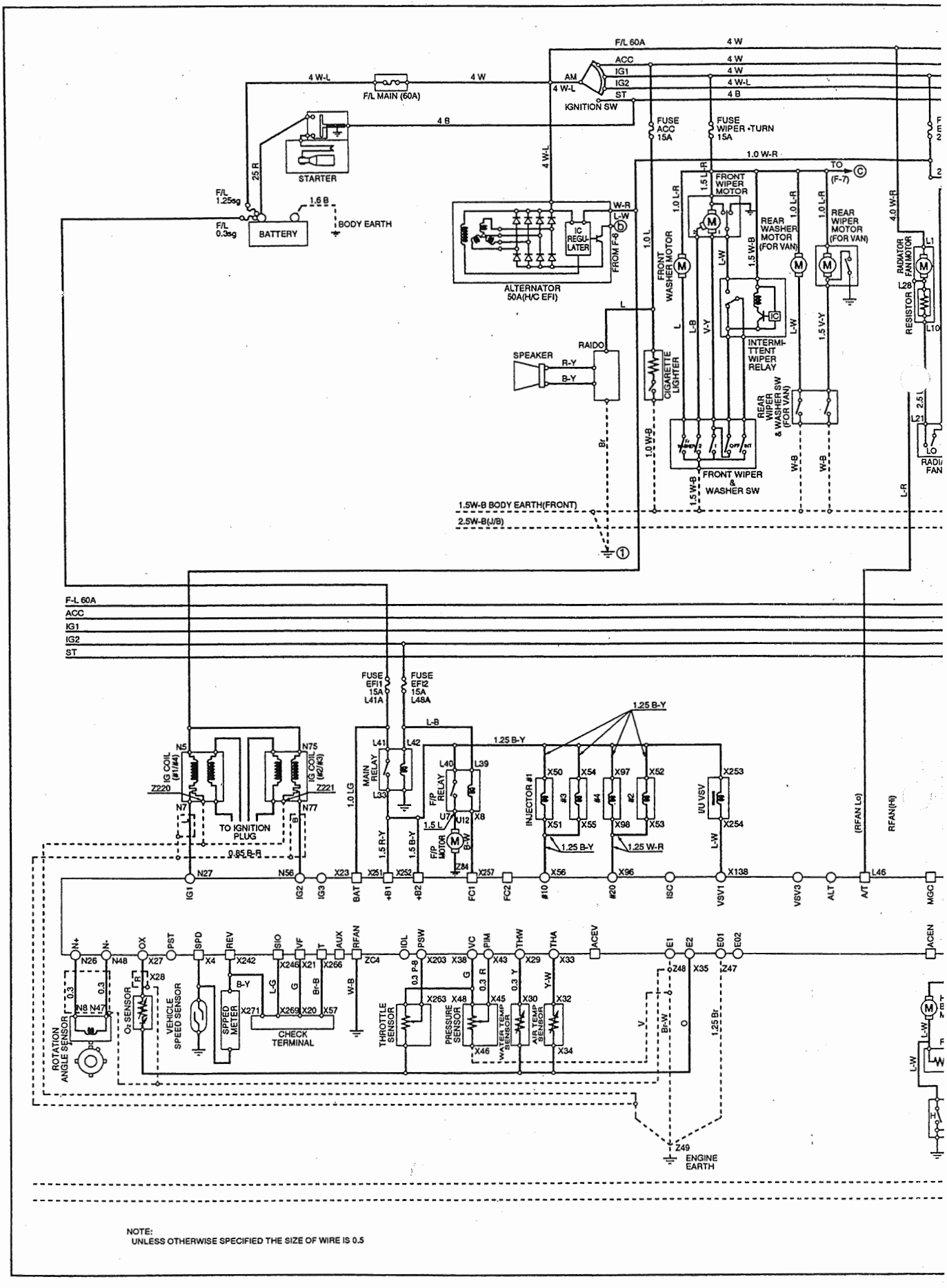
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WIRE, COWL (Van LHD)

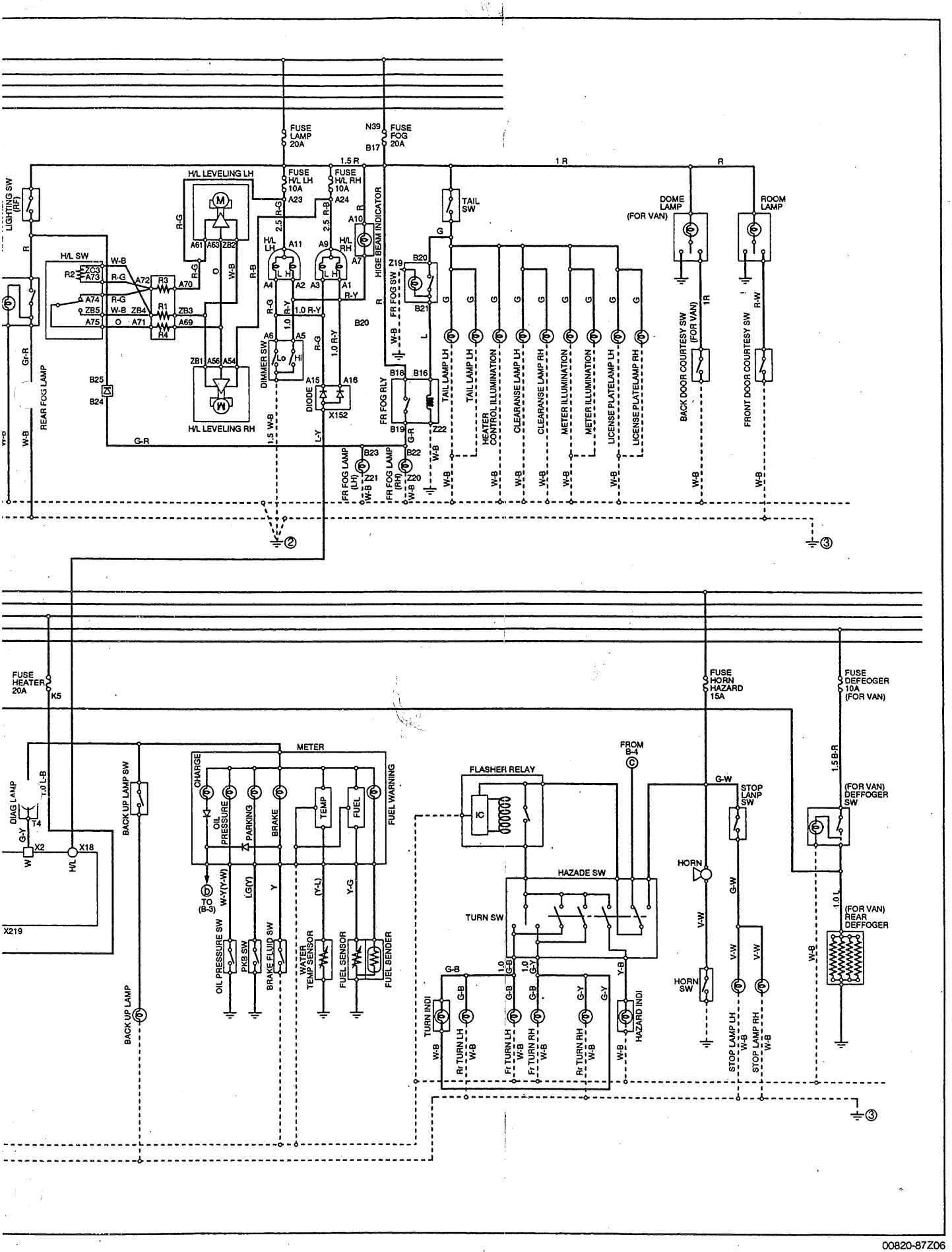



TO ROOM LAMP WIRE
D1 A12
HEATER BLOWER MOTOR
K8 K6
K11 K9 K13
HEATER RESISTOR
FR POSITION LAMP (RH)
Z18 B1
H/L LEVELING (RH)
A54 A56 ZB1
6 6
Z1 Z32 Z1A
BODY EARTH FR (RH)
A3 A1 A9
H/L (RH)
K7 K14 K10 C4 Z7 K12
HEATER BLOWER SW
Z20 B22
FR POSITION
F9 Z10
SIDE TURN LAMP (RH)
N46 L41A N37 L48
X23 X219 X4 X2 X251 X257 L45 X124 X18 L46 X266 X268 X242 X21 X252
EFI ECU
R4 Z27
R14 R13
RADIO
N8 H4 G1 L31 H7
TO WIRE, E/G ROOM MAIN
Z26
R2
CIGARETT LIGHTER
DIODE
A16 X152 A15
L50 KA1
DIODE
FUEL SENDER
H2 H9
U12 ZB4
FUEL PUMP
TO FRAME WIRE
A13 B3 E5 F7 F8 I13 I14 K4 C3 B15 Z49 G7
M4 L11 K17

WIRING DIAGRAM



NOTE:
UNLESS OTHERWISE SPECIFIED THE SIZE OF WIRE IS 0.5


FUSE LAMP 20A
FUSE FOG 20A
N39
B17
1.5 R
1 R
R
LIGHTING SW (RF)
H/L LEVELING LH
FUSE H/L LH 10A
FUSE H/L RH 10A
A23
A24
HIGE BEAM INDICATOR
A10
TAIL SW
DOME LAMP (FOR VAN)
ROOM LAMP
H/L SW
H/L LH
H/L RH
A11
A9
A7
Z19
B20
FR FOG SW
B21
DIMMER SW
DIODE
X152
A15
A16
B18
B16
FR FOG RLY
B19
Z22
TAIL LAMP LH
HEATER CONTROL ILLUMINATION
CLEARANSE LAMP LH
CLEARANSE LAMP RH
METER ILLUMINATION
LICENSE PLATELAMP LH
LICENSE PLATELAMP RH
BACK DOOR COURTESY SW (FOR VAN)
FRONT DOOR COURTESY SW
REAR FOG LAMP
B25
B24
H/L LEVELING RH
FR FOG LAMP (LH)
FR FOG LAMP (RH)
B23
B22
Z21
Z20
FUSE HEATER 20A
K5
FUSE HORN HAZARD 15A
FUSE DEFEOGER 10A (FOR VAN)
METER
CHARGE
OIL PRESSURE
PARKING
BRAKE
TEMP
FUEL
FUEL WARNING
FLASHER RELAY
IC
FROM B-4
G-W
STOP LAMP SW
(FOR VAN) DEFFOGER SW
HAZADE SW
HORN
TURN SW
(FOR VAN) REAR DEFFOGER
DIAG LAMP
BACK UP LAMP SW
BACK UP LAMP
X2
X18
X219
OIL PRESSURE SW
PKB SW
BRAKE FLUID SW
WATER TEMP SENSOR
FUEL SENSOR
FUEL SENDER
TURN INDI
Rr TURN LH
Fr TURN LH
Fr TURN RH
Rr TURN RH
HAZARD INDI
HORN SW
STOP LAMP LH
STOP LAMP RH
TO (B-3)
③
②

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