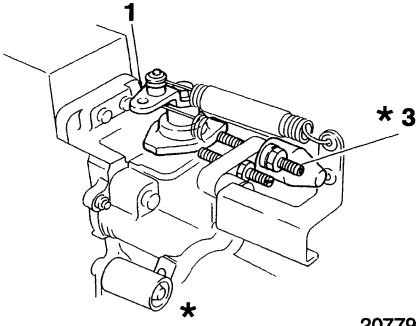
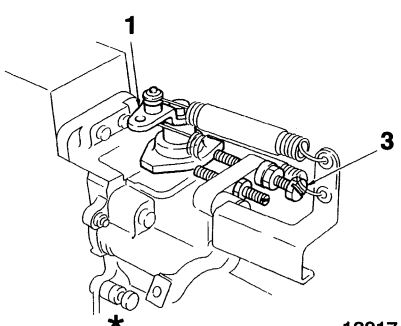
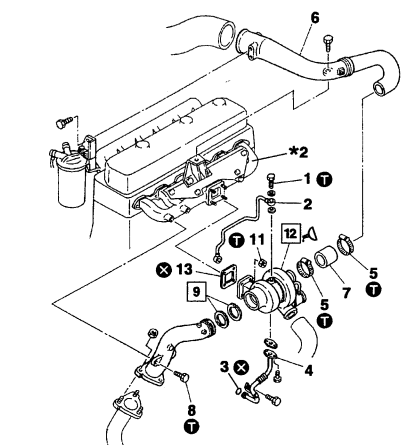
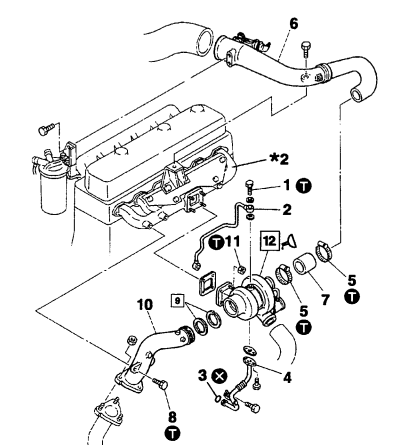
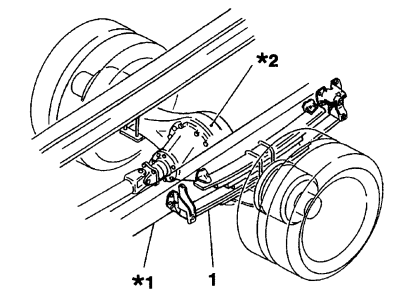
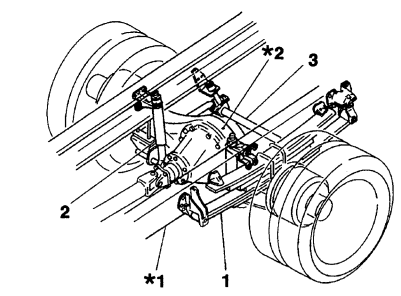


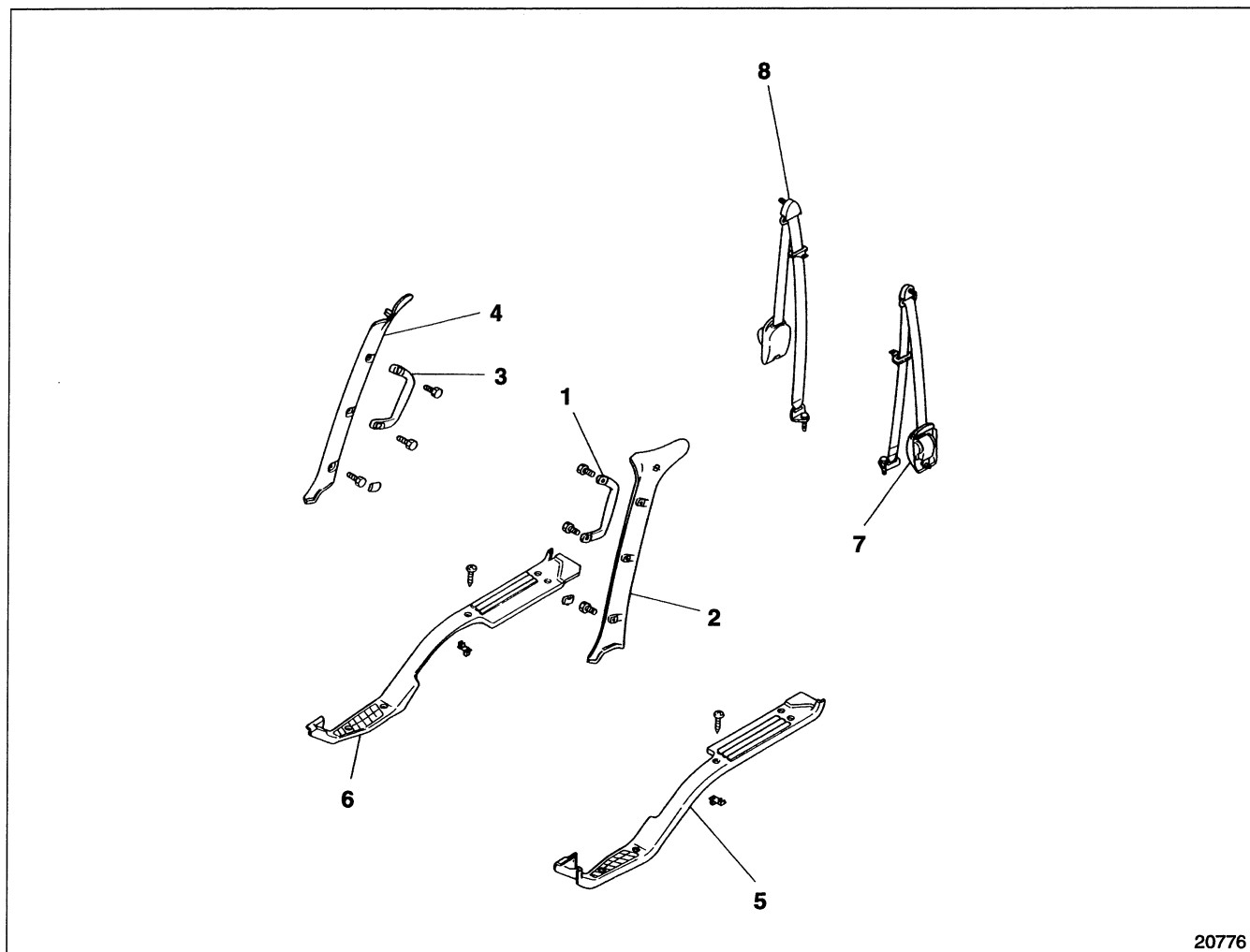
1997 MODEL CHANGES

Item	'97 Model	'96 Model
Gr 13 Fuel and engine control Seals have been added to injection pumps to fit within the legal restriction. CAUTION  Injection pumps should not be adjusted by anyone other than the specified ZEXEL service stations.	 * : Sealed part	 * : Sealed part
Gr 15 Intake and exhaust The intake silencer on the air inlet pipe assembly has been eliminated.	 6 Air inlet pipe assembly (without intake silencer)	 6 Air inlet pipe assembly (with intake silencer)
Gr 34 Rear suspension The shock absorber and stabilizer on the rear suspension have been eliminated.	 20780	 2 Shock absorber 3 Stabilizer 00495

Item	'97 Model	'96 Model
Gr 42 Cab The trim inside the cab has been changed from the full trim type to the semi trim type.	See pages 4 to 5 in this manual	—
Gr 54 Electrical The sub-starter switch and circuit have been eliminated.	The circuit now is the same as the engine starter circuit described in Gr 54 ('96 Model).	—
The cold starter switch, cold starter 3-way magnetic valve (automatic transmission only), and cold start indicator lamp have been eliminated.	See pages 6 to 9 in this manual	

CAB INTERIOR FITTING

Trim ('97 model)



● Removal sequence

- | | | |
|-------------------------|-------------------------|--------------------------|
| 1 Front pillar grip, LH | 4 Front pillar trim, RH | 7 Seat belt assembly, LH |
| 2 Front pillar trim, LH | 5 Scuff plate, LH | 8 Seat belt assembly, RH |
| 3 Front pillar grip, RH | 6 Scuff plate, RH | |

CAUTION

Do not disassemble seat belt assemblies 7, 8 because this might cause malfunction of the emergency locking reactor.

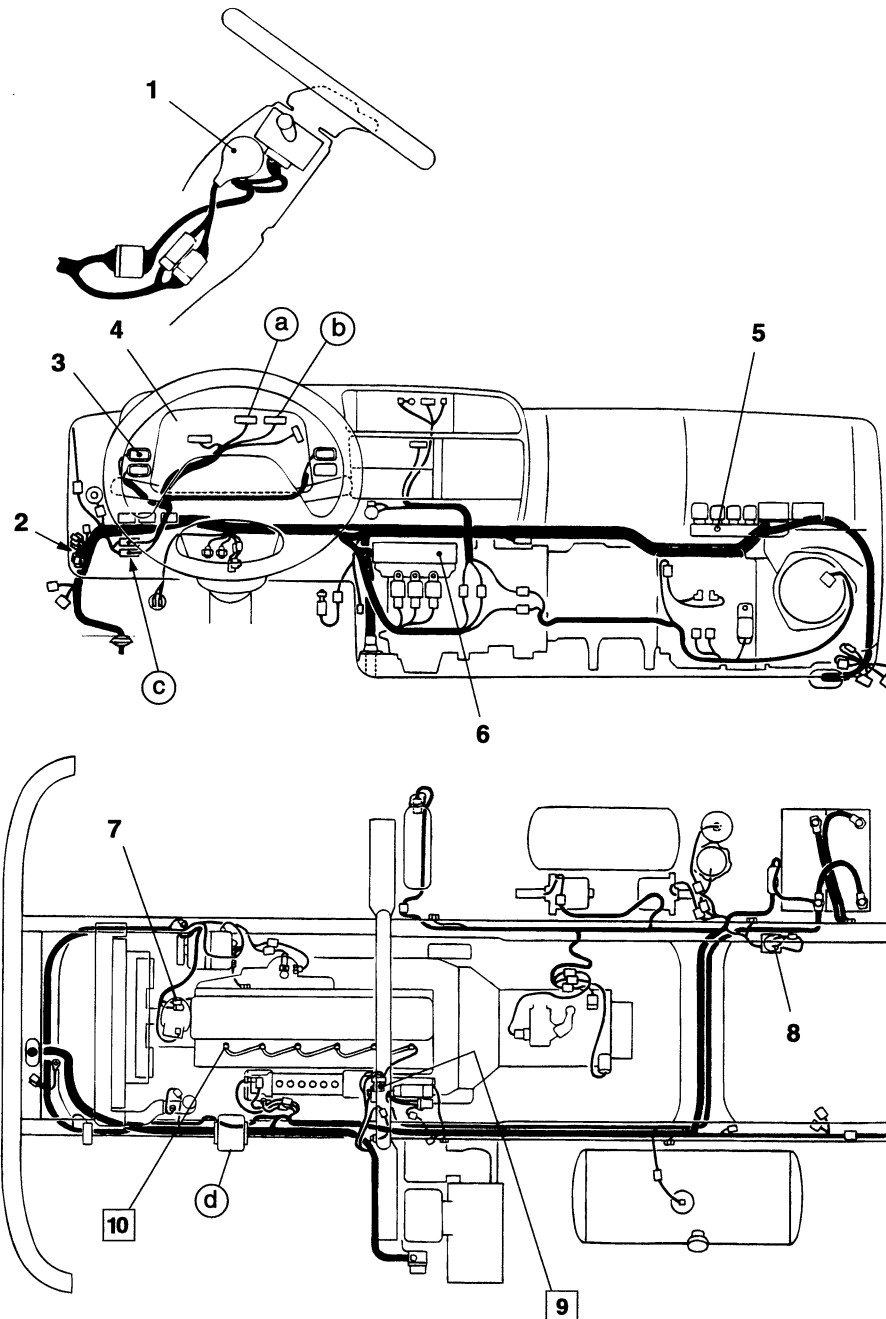
● Installation sequence

Follow the removal sequence in reverse.

('96 model) → 42-49

M E M O



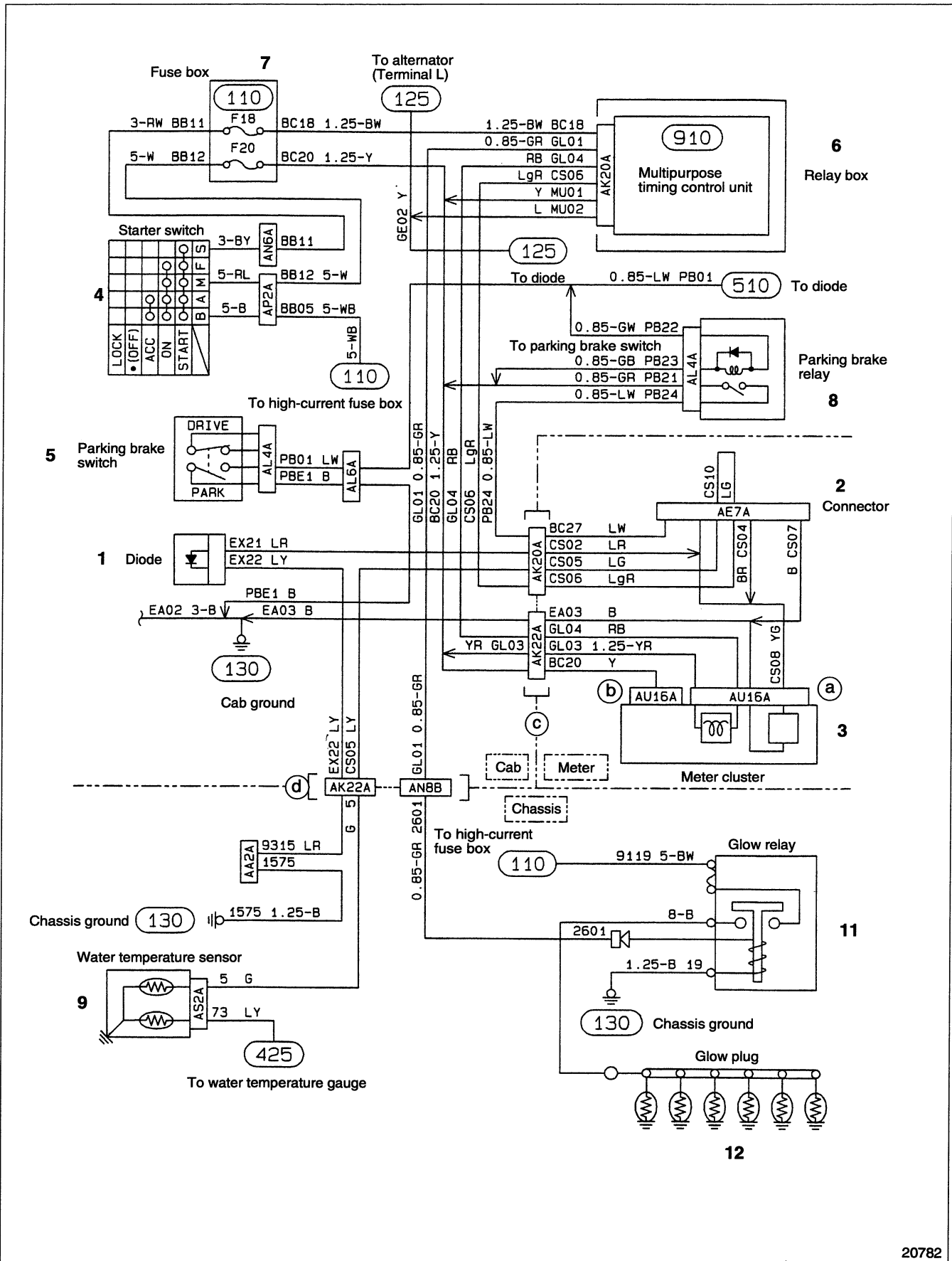


12726

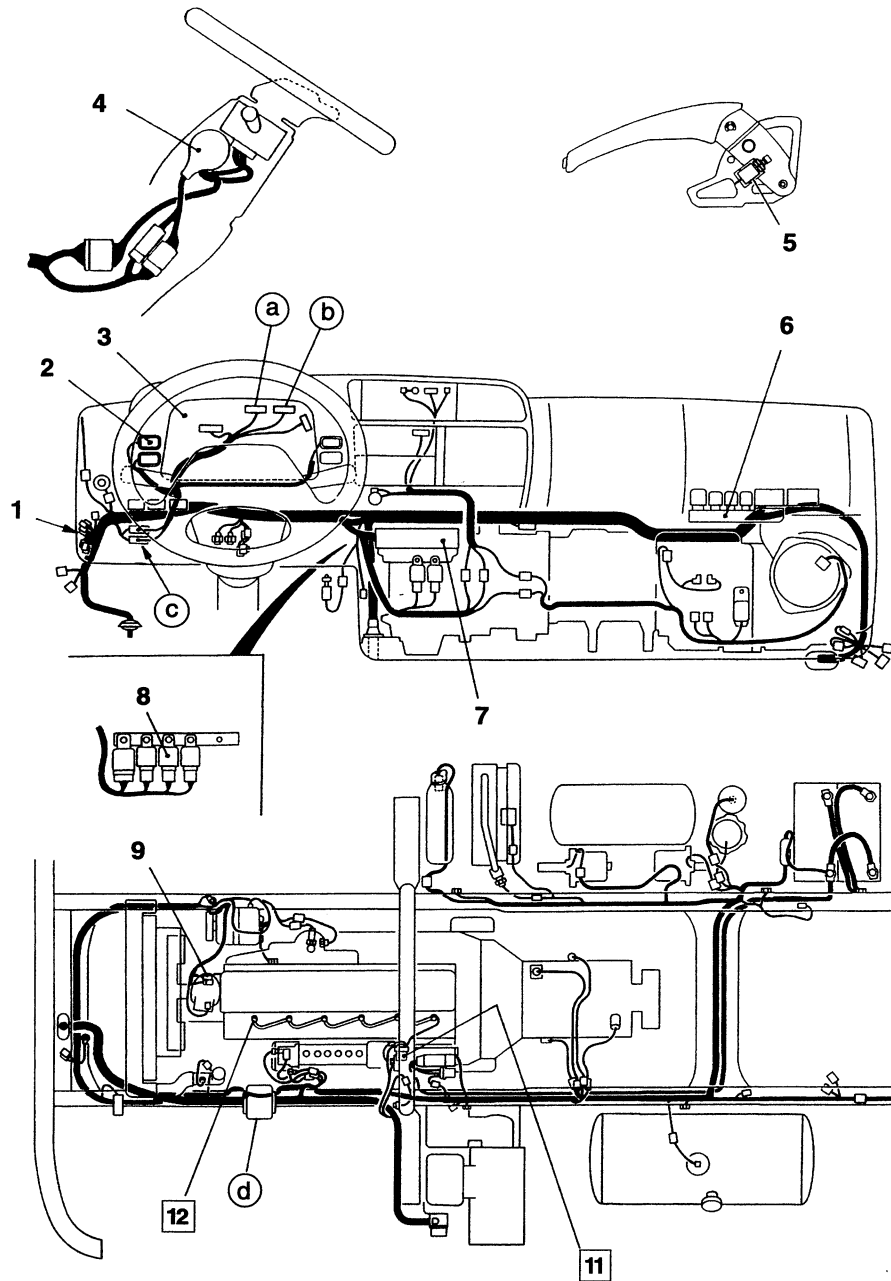
- 1 Starter switch (210)
- 2 Diode
- 3 Connector
- 4 Meter cluster (401)
- 5 Relay box (604)

- 6 Fuse box (104)
- 7 Water temperature sensor (801)
- 8 Exhaust brake 3-way magnetic valve (701)
- 9 Glow relay
- 10 Glow plug

220 ENGINE PREHEATING AND COLD START CIRCUIT : '97 MODEL < Automatic Transmission >



20782



20783

- | | |
|-------------------------------|-----------------------------------|
| 1 Diode | 7 Fuse box (104) |
| 2 Connector | 8 Parking brake relay (604) |
| 3 Meter cluster (401) | 9 Water temperature sensor (801) |
| 4 Starter switch (210) | 11 Glow relay |
| 5 Parking brake switch (510) | 12 Glow plug |
| 6 Relay box (604) | |



FH

Service Manual

Group 00
General

 **MITSUBISHI FUSO TRUCK OF AMERICA, Inc.**

GROUP 00 GENERAL

MODEL CODING SYSTEM	2
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CHASSIS NUMBER AND ENGINE NUMBER	3
POWER TRAIN LABEL	4
VEHICLE IDENTIFICATION NUMBER	4
PRECAUTIONS FOR MAINTENANCE OPERATION	6
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CONNECTOR CONFIGURATION CHART	22

MODEL CODING SYSTEM

Equipment Model Code

Equipment name	Model description	Code description
Engine	6 D 3 4 - 0 A T2	With turbocharger Stands for automobile Remodeling sequence Version number Series number Stands for diesel engine No. of cylinders (6 : Six cylinders) These are omitted in the Service Manual
Clutch	C 5 M 33	Disc outer diameter Facing material (M : Cera-metallic) Loading capacity of major type (tonnage) Stands for clutch
Transmission	M 050 S 5	No. of forward speeds Meshing (S : Synchromesh, A : Automatic) Loading capacity of major type (tonnage) Stands for transmission
Propeller shaft	P 4	Loading capacity of major type (tonnage) Stands for propeller shaft
Reduction and differential	D 040 H	Teeth shape (H : hypoid gear) Loading capacity of major type (tonnage) Stands for reduction and differential

POWER TRAIN TABLE/CHASSIS NUMBER AND ENGINE NUMBER

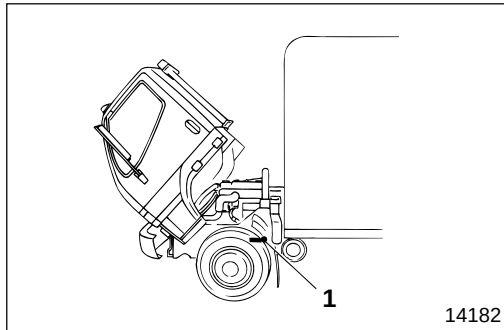
00

POWER TRAIN TABLE

Model	Engine model	Clutch model	Transmission model	Propeller shaft	Rear axle model	Final reduction and gear ratio
FH211C, E, G, H, J G.V.W. 8160 kg {17995 lb}	6D34T2 175 HP/2900 rpm 325 lbf.ft/2000 rpm (SAE, Gross)	C5M33 Torque converter (TC290-1.72)	M050S5 6.875/1.000 M4A4 (Allison) AT542 3.454/1.000	P4	R040T	D040H 4.111

CHASSIS NUMBER AND ENGINE NUMBER

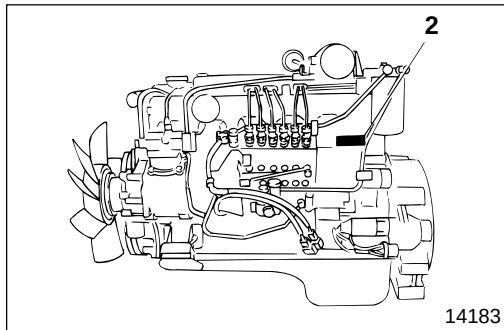
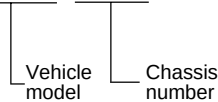
The serial numbers for chassis and engines are assigned to the respective vehicles and engines in manufacturing sequence: every vehicle and engine has its own numbers. These numbers are required for registration and incidental inspection of the vehicle. Please do not fail to mention these numbers to the dealers when ordering spare parts.



Chassis number

Chassis number 1 is punch-marked on the frame by the left-side front wheel.

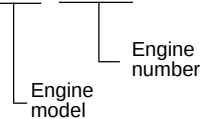
Example : FH211C-□□□□□□



Engine number

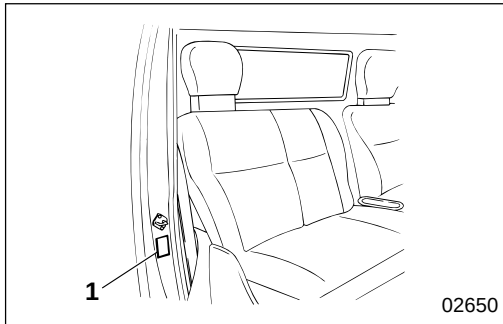
Engine number 2 is punch-marked on the left of the crankcase.

Example : 6D34-□□□□□□



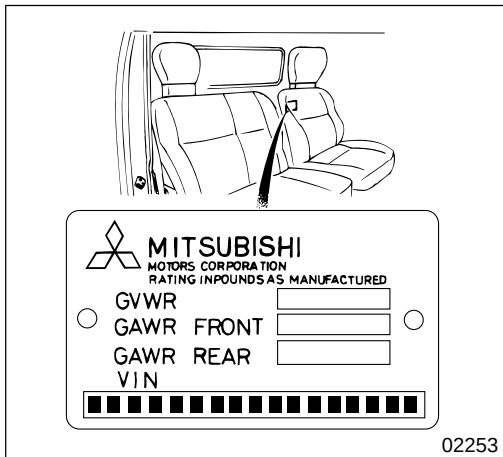
POWER TRAIN LABEL/VEHICLE IDENTIFICATION NUMBER

POWER TRAIN LABEL



Power train label **1** located in the position illustrated indicates the vehicle model, chassis number and information relevant to the vehicle's power transmission components.

VEHICLE IDENTIFICATION NUMBER



The vehicle identification number is punch-marked on the plate, which is attached in the position as illustrated.

The vehicle identification number consists of a 17-digit set of alphanumeric characters. Each digit represents the following specifications.

J W 6 C C C 1 G □ T L □ □ □ □ □ □

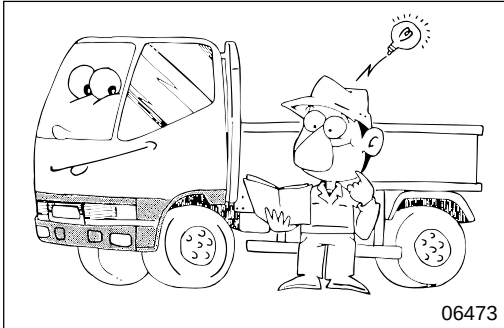
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

- | | |
|-------------------------------------|--|
| ① Country | J : Japan |
| ② Make | W : Mitsubishi Fuso |
| ③ Vehicle type | 6 : Incomplete Vehicle |
| ④ Gross vehicle weight/Brake system | C : 7258 to 8845 kg {16001 to 19500 lbs} /Air over hydraulic |
| ⑤ Line | C : FH211 |
| ⑥ Series (Wheelbase) | C : 2.6 to 2.9 m {8.6 to 9.5 ft.} |
| | E : 3.2 to 3.5 m {10.5 to 11.5 ft.} |
| | G : 3.8 to 4.1 m {12.5 to 13.4 ft.} |
| | H : 4.1 to 4.4 m {13.5 to 14.4 ft.} |
| | J : 4.4 to 4.7 m {14.5 to 15.4 ft.} |
| ⑦ Cab chassis type | 1 : Chassis cab |
| ⑧ Engine | G : 358 CID Diesel turbocharged and charge air cooled |
| ⑨ Check digit | |
| ⑩ Model year | T : 1996 |
| ⑪ Plant | L : Kawasaki-2 |
| ⑫ Plant sequential number | |

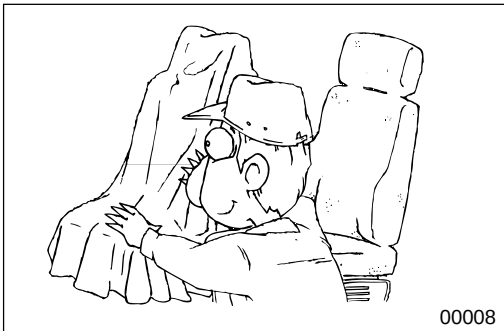
MEMO

PRECAUTIONS FOR MAINTENANCE OPERATION

In order to determine the condition of the vehicle adequately, attend the vehicle beforehand to find and keep record of the accumulated mileage, operating condition, what the customer's demand is, and other information that may be necessary. Prepare the steps to be taken and perform efficient and wasteless maintenance procedure.



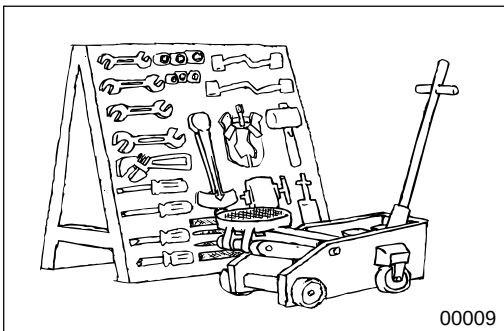
Determine where the fault exists and check for the cause to see whether removal or disassembly of the part is necessary. Then follow the procedure specified by this manual.



Perform maintenance work at a level area.

Prepare the following.

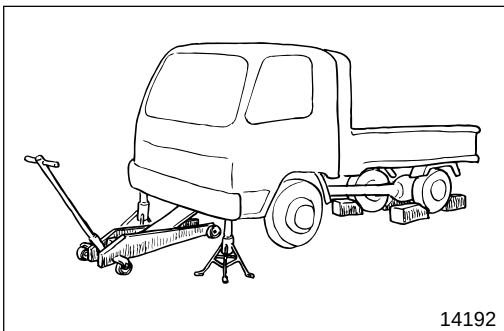
- To prevent the seats, upholstery, floor and bodywork from being spoiled or scratched, cover with workshop sheet cover(s).



- Prepare general and special tools necessary for the maintenance work.

WARNING ⚠

Do not attempt to use tools other than special tools where use of special tools is specified in this manual. This will avoid injury or damage.

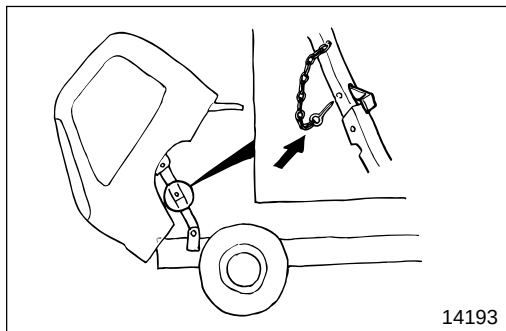


When jacking up the vehicle to work under the vehicle, carry out the following preparatory work:

- Chock the wheels on both sides.
- Jack up the vehicle using a garage jack.
- Support the frame on rigid racks.

WARNING ⚠

- **Chock the wheels securely so the vehicle does not move.**
 - **Do not remove the chocks until the entire operation is completed.**
 - **Supporting a vehicle on a garage jack only is extremely dangerous, so always support the frame on rigid racks.**
 - **Leave the garage jack and rigid racks in place until the entire operation is completed. Never remove them during the operation.**
-

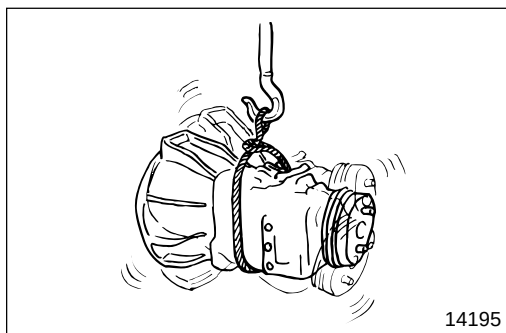
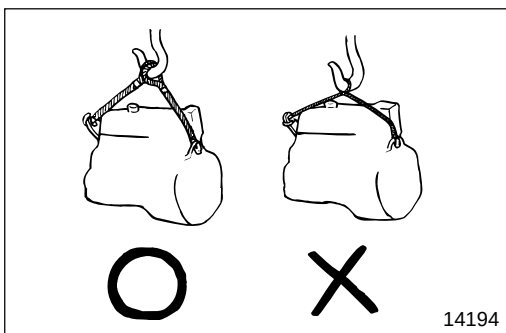


When tilting the cab, be sure to insert the safety pin into the cab stay so that the cab stay remains locked and is not released when the cab is tilted.

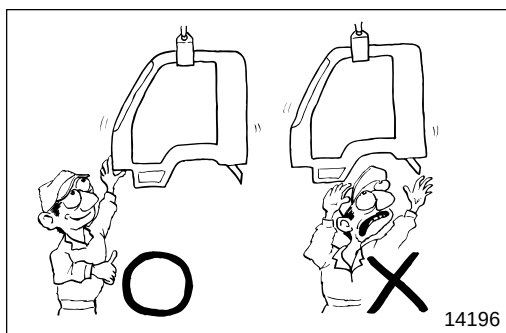
Pay special attention to safety when removing or installing heavy items such as engines, transmissions and axles.

When lifting up heavy items using cables, pay special attention to the following points:

- Check the mass of the item to be lifted and use a cable capable of lifting that mass.



- If you do not have the specified lifting hanger, secure the item using cable taking the point-of-balance of the item into consideration.

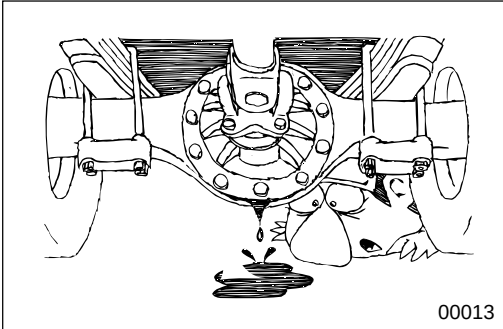


- You must work in a position where you will not be injured even if the cable comes undone and the lifted item falls.

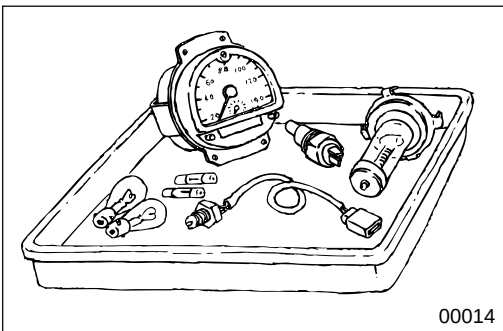
PRECAUTIONS FOR MAINTENANCE OPERATION



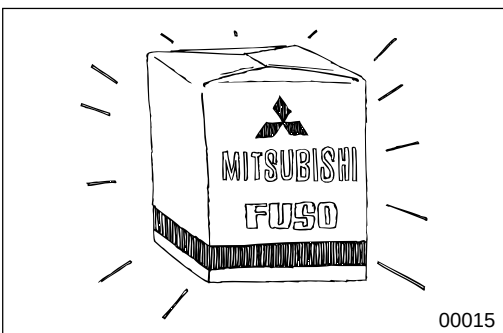
Be particularly careful not to work in shoes that have oily soles and are slippery. When working as a team of two or more, arrange signals in advance and keep confirming safety. Be careful not to accidentally bump switches or levers.



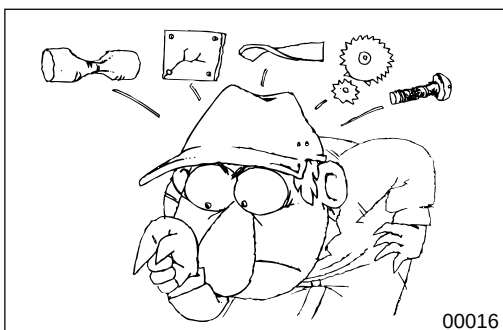
Check for oil leakage before cleaning the area having the fault otherwise you might miss detecting the leakage.



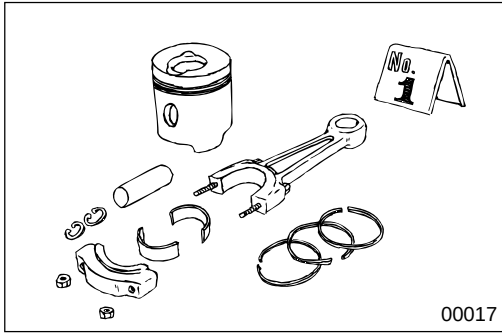
Prepare replacement part(s) beforehand.



Replace oil seals, packing, O-rings and other rubber parts; gaskets and split pins with new parts whenever any of them has been removed. Use only genuine MITSUBISHI replacement parts.



On disassembly, visually inspect all parts for wear and tear, cracks, damage, deformation, degradation, rust, corrosion, smoothness in rotation, fatigue, clogging and any other possible defect.



00017

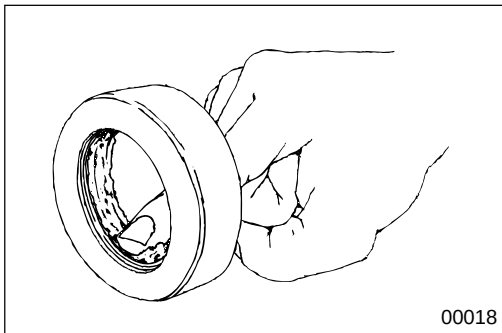
Put alignment marks on part combinations before disassembly and arrange the disassembled parts neatly. This will help avoid mismatching of the parts later.

Put the alignment marks, punch marks, etc. where performance and appearance will not be affected.

Cover the area left open after removal of parts to keep it free from dust.

CAUTION ⚠

- Take care to avoid mixing up numerous parts, similar parts, left and right, etc.
- Keep new parts for replacement and original (removed) parts separate.



00018

Apply the specified oil or grease to U-packings, oil seals, dust seals and bearings during assembly.

Use only the specified oil, grease, etc. for lubricant, remove the excess immediately after application with a piece of waste, etc.

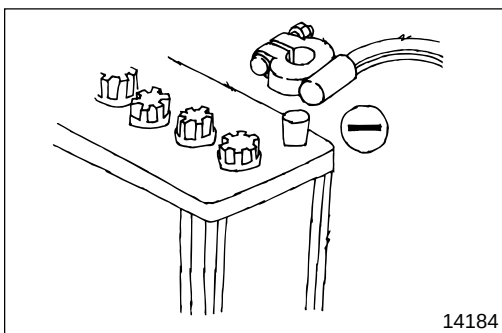
CAUTION ⚠

When the specified lubricant, fluid and sealant is not available, you may use an equivalent.



00019

Wear goggles when using a grinder or welder. Pay full attention to safety by wearing gloves when necessary. Watch out for sharp edges, etc. that might injure your hands or fingers.



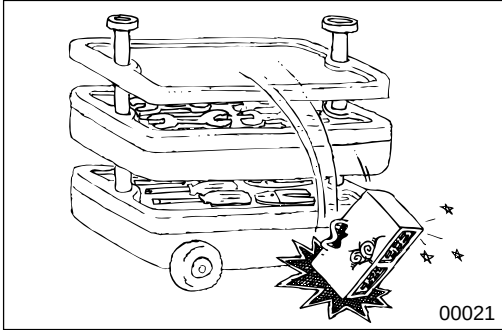
14184

Before carrying out maintenance work on the electric system, disconnect the negative terminals of the batteries to prevent them from short-circuiting and burning-out.

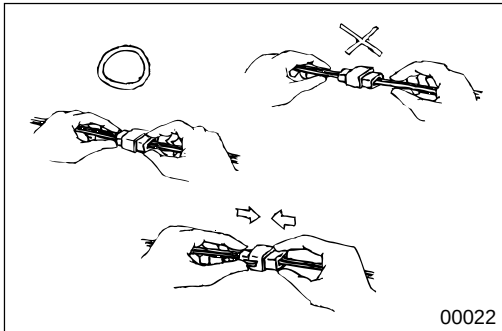
CAUTION ⚠

Be sure to turn starter and lighting switches, etc. off before disconnecting or connecting battery terminals, because the semi-conductors can be damaged.

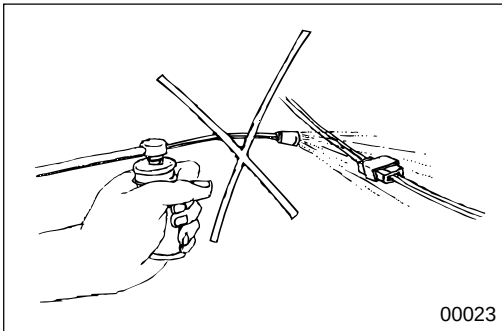
PRECAUTIONS FOR MAINTENANCE OPERATION



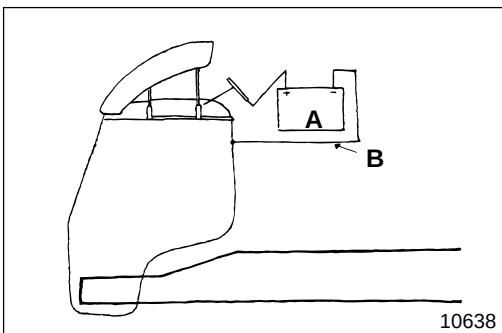
Take care when handling sensors, relays, etc. which are vulnerable to shock and heat. Do not attempt to remove the cover from, or apply paint to, the electronic control unit.



Pull the connector, and not the harness lead, to separate connectors. To separate a lock-type connector, first push toward arrow mark. To reconnect a lock-type connector, press the separated parts until they click together.



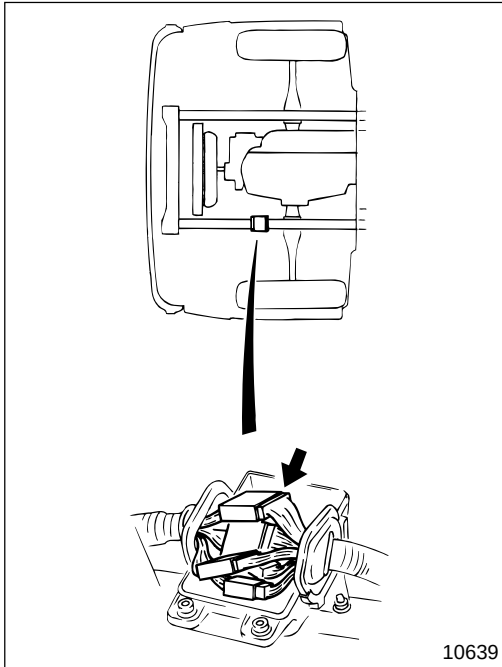
When washing the vehicle, cover the electric system parts and instruments with waterproof material beforehand (Cover with vinyl sheet or the like). Keep water away from harness wire connectors and sensors. If any of them should get wet, wipe them off immediately.



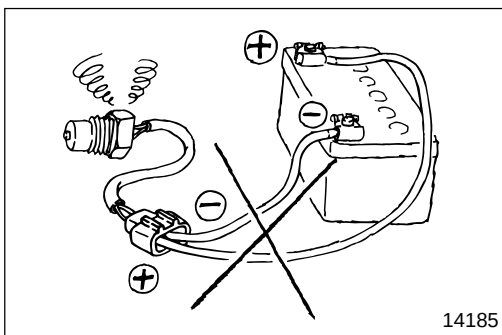
When using an electric welder, such electronic parts that are directly connected to the batteries might be damaged due to the flow of current from the welder that flows through the negative circuit. Parts that have switches might be subject to the same danger if the switches are left on. Therefore, do not fail to observe the following.

A : Welder

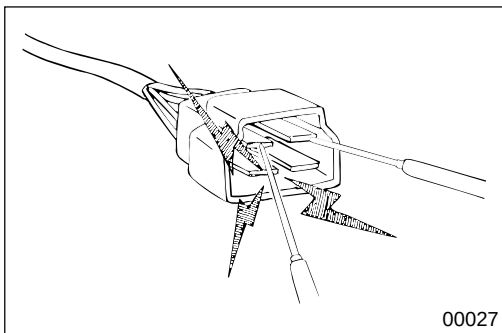
B : Connect the negative terminal of the welder as near as possible to the area that is to be welded.



- Disconnect the negative terminals of batteries.
- Disconnect connections between the cab harness wires and the chassis harness wires.

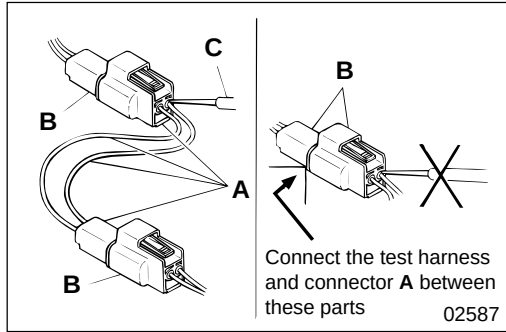


To apply voltage for testing, check that the positive and negative cables are connected properly, then increase voltage gradually from 0 volt. Do not apply voltage higher than the specified value. In particular, pay close attention to the electronic control unit and sensors, since they are not always fed the battery voltage.



When using testers or the like for continuity tests, be careful not to allow test probes to touch the wrong terminals.

PRECAUTIONS FOR MAINTENANCE OPERATION



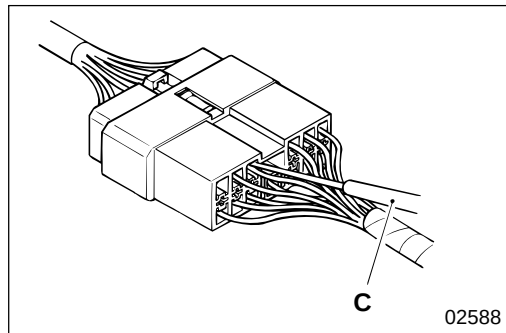
Measurement procedures using connectors

- **Test with connectors engaged (continuity through circuit obtained)**

< Waterproof connector >

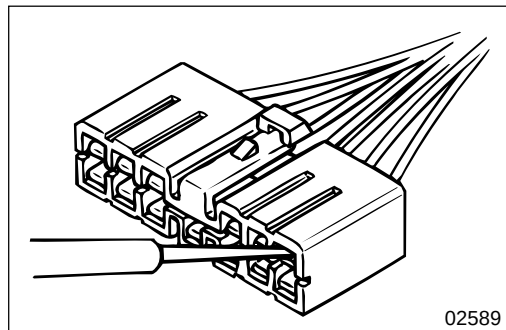
Prepare a test harness and connectors **A**, then connect it between the two parts of harness **B** that is to be tested. Check the circuit by touching test probe **C** to the test connector.

Never insert the test probe from the harness side of the waterproof connection, or waterproof performance might be diminished causing corrosion of the connector.



< Non-waterproof connector >

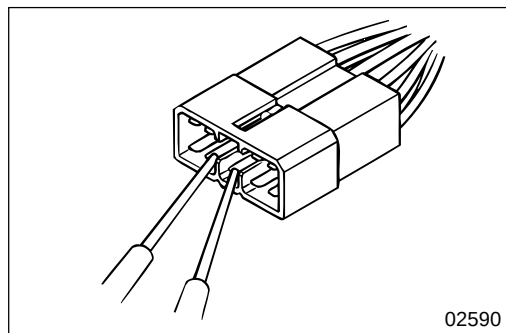
Insert test probe **C** from the harness side of the connector. Where control units, etc. have connectors that are too small to accept the test probe, do not force the test probe into them.



- **Test with connectors disengaged**

Using female pins

Insert a test probe into a terminal. However, do not force the probe into the terminal, or it will cause a poor contact.

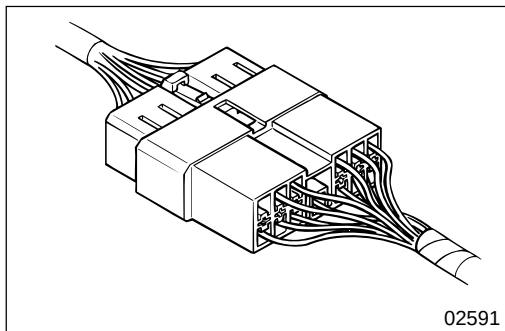


Using male pins

Touch the pins directly using test probes.

CAUTION ⚠

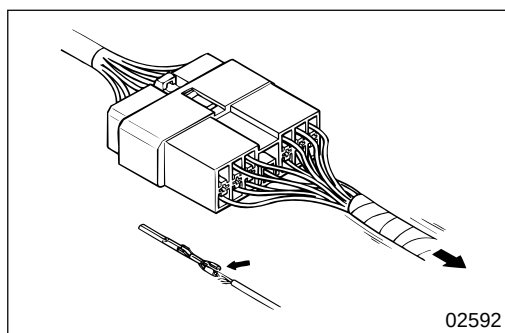
Be sure that you do not short circuit the connector pins when you use the test probe because this could damage the internal circuit of the electronic control unit.



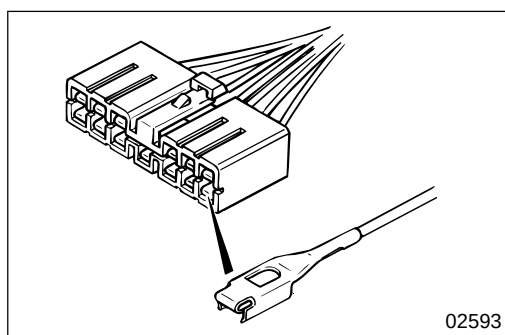
Connector inspection procedures

- **Visual inspection**

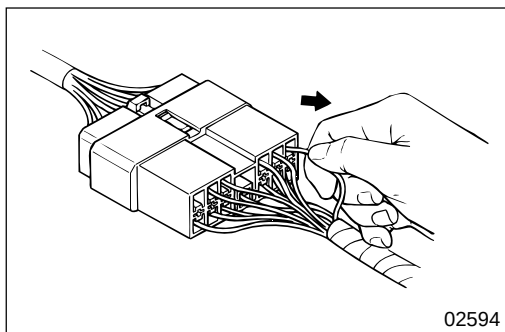
Check for loose connection and poor engagement.



Check if harnesses are broken by pulling gently around the terminals.



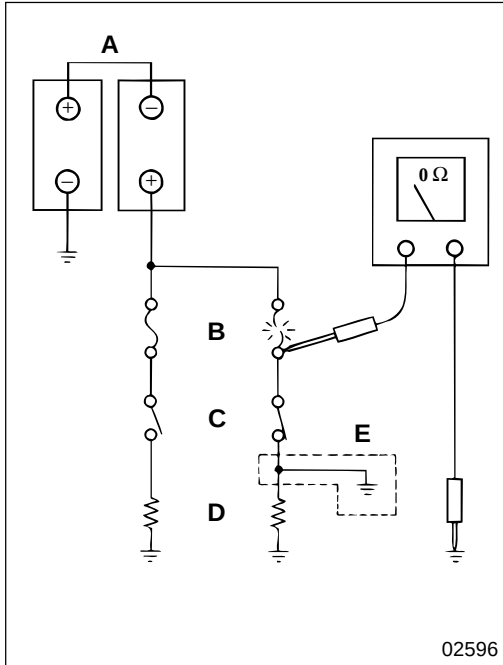
Check for a decrease in contact pressure between the male and female terminals.



- **Connector pin fall out inspection**

Damaged connector pin stoppers can cause poor engagement of the terminals (male and female pins) even if the connector body is secured, and might cause some pins to fall out. Check if the pins have fallen out from the connector by pulling each harness gently.

PRECAUTIONS FOR MAINTENANCE OPERATION



Inspection procedures for blown fuses

Remove fuse **B** and measure resistance between the loaded side of the fuse and ground.

Turn on all circuit switches (connected to the fuse). If the resistance value reading is approximately 0 Ω, a short has occurred between the switch and the loaded point. A value of other than zero may indicate that the fuse was blown by a temporary short but the short is no longer present.

The major causes of a short circuit are as follows:

- Harness stuck onto the vehicle body.
- Harness sheath damaged by friction or heat.
- Water in connectors or circuits.
- Mistakes (accidental short circuits)

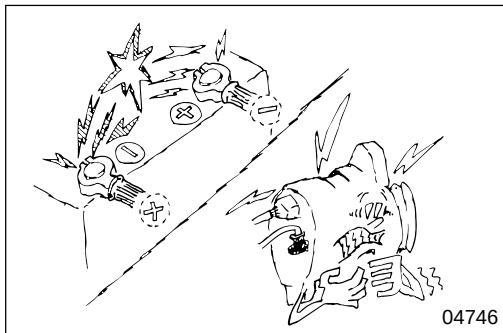
A : Battery

B : Fuse

C : Loaded switch

D : Load

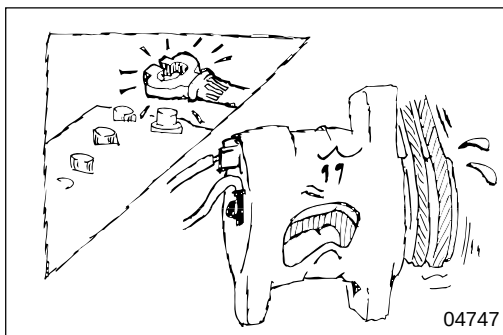
E : Short circuit



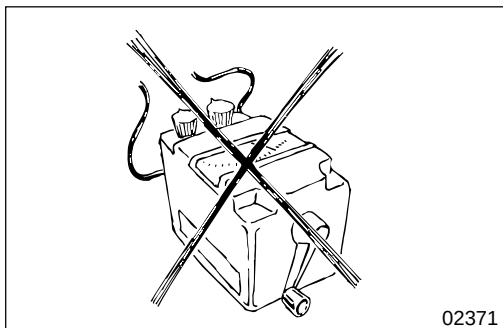
Precautions for handling alternator

When servicing the alternator, pay attention to the following :

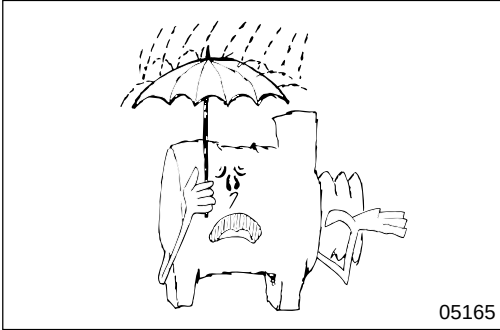
- Do not connect the alternator with battery polarities reversed. If the alternator is connected with reversed polarities, a large current flow from the battery to the alternator occurs, and the diode or regulator might be damaged.



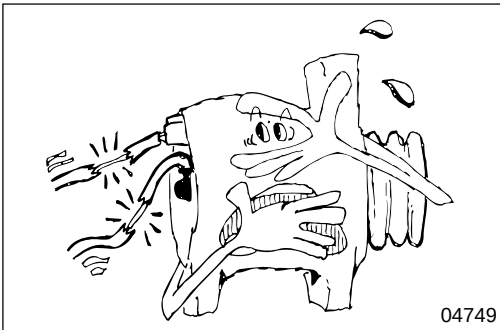
- While the engine is running, do not remove the battery terminals. If the battery terminals are removed at that time, a surge voltage is generated and the diode or regulator might be weakened.



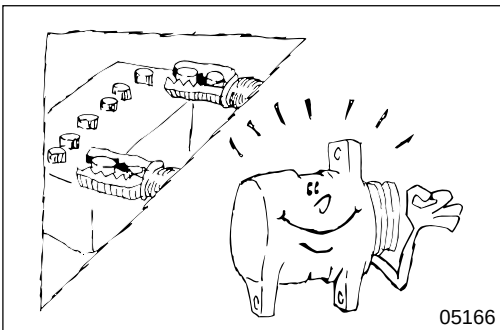
- Do not use a high-voltage tester such as a megger for inspection. If a high-voltage tester is used, the diode or regulator might be destroyed.



- Do not splash water over the alternator.
If water is directly splashed over the alternator, individual components will be short-circuited and might be destroyed.

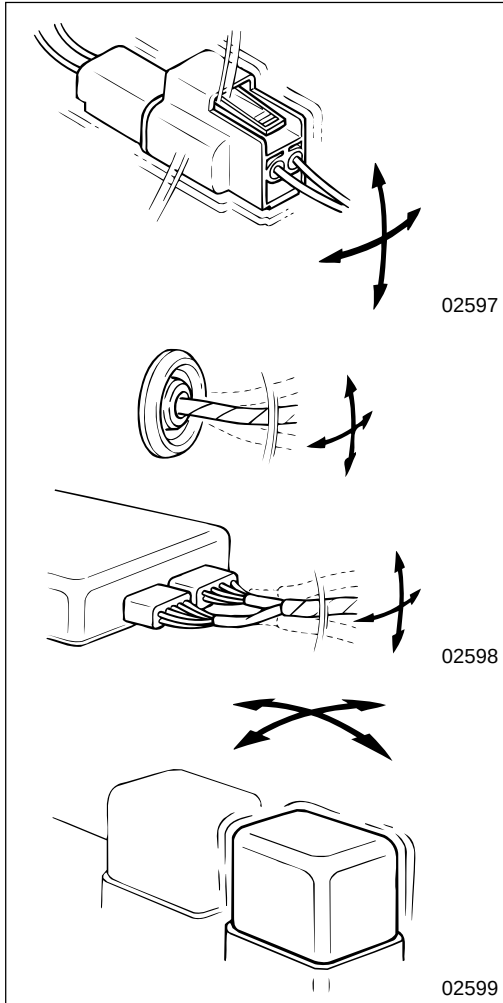


- Do not short-circuit terminal B and terminal L while running the alternator.
If the terminals are short-circuited while the alternator is running, the diode trio might be destroyed.



- Disconnect the battery terminals before quick-charging the battery.
Quick-charging without disconnecting the battery terminals might damage the diode or regulator.

PRECAUTIONS FOR MAINTENANCE OPERATION



Measures for temporary faults

Temporary faults often occur under certain conditions. So identifying those conditions helps to find possible causes. To find the conditions under which temporary faults occurred, you need to reproduce the faults after interviewing customers in detail about actual driving conditions, weather, frequency of occurrence and fault phenomena.

Then determine if the faults were caused by vibration, temperature or other possible elements depending on the actual conditions identified. If vibration is suspected as a possible cause, inspect individual connectors as follows to check if the fault will occur:

- Shake the connector gently in all four directions of the arrows as illustrated.
- Shake the wiring harness gently in all four directions of the arrows as illustrated.
- Wiggle each sensor or piece of equipment by hand.
- Gently shake the wiring harnesses near movable parts such as suspensions.

The inspection subjects include possible causes related to the diagnosis code outputs and faults, as well as the connectors and other parts in the inspection procedure.

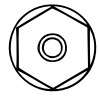
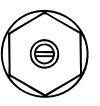
MEMO

TABLE OF STANDARD TIGHTENING TORQUES

- Use specified bolts and nuts and tighten them at specified torques according to the following table, unless otherwise specified.
- Threads and contact seats shall be dry.
- Where there is a difference in strength classification between the nut and bolt (or stud bolt), the torque specified for the bolt shall apply.

Hex-head Bolt and Stud Bolt

Unit : N·m {lbf.ft, kgf·m}

Strength classification	4 T		7 T		8 T	
Repre- sentation Diameter symbol	 (Stud)		 (Stud)		 (Stud)	
M 5	2 to 3 {1.4 to 2.2, 0.2 to 0.3}	—	4 to 6 {2.9 to 4.3, 0.4 to 0.6}	—	5 to 7 {3.6 to 5.1, 0.5 to 0.7}	—
M 6	4 to 6 {2.9 to 4.3, 0.4 to 0.6}	—	7 to 11 {5.1 to 8.0, 0.7 to 1.1}	—	8 to 12 {5.8 to 8.7, 0.8 to 1.2}	—
M 8	9 to 14 {6.5 to 10, 0.9 to 1.4}	—	17 to 26 {12 to 19, 1.7 to 2.6}	—	20 to 29 {14 to 22, 2.0 to 3.0}	—
M 10	19 to 28 {14 to 20, 1.9 to 2.8}	18 to 26 {13 to 20, 1.8 to 2.7}	36 to 52 {25 to 40, 3.5 to 5.5}	33 to 49 {25 to 36, 3.5 to 5.0}	45 to 60 {33 to 43, 4.5 to 6.0}	41 to 59 {31 to 50, 4.3 to 6.9}
M 12	35 to 50 {25 to 36, 3.4 to 5.0}	31 to 46 {22 to 34, 3.1 to 4.7}	70 to 95 {51 to 69, 7.0 to 9.5}	65 to 85 {47 to 61, 6.5 to 8.5}	85 to 110 {61 to 80, 8.5 to 11}	75 to 100 {54 to 72, 7.5 to 10}
M 14	60 to 85 {43 to 61, 6.0 to 8.5}	55 to 75 {40 to 54, 5.5 to 7.5}	120 to 160 {87 to 115, 12 to 16}	110 to 140 {80 to 100, 11 to 14}	130 to 180 {94 to 130, 13 to 18}	120 to 160 {87 to 120, 12 to 17}
M 16	90 to 130 {69 to 94, 9.5 to 13}	90 to 120 {65 to 87, 9.0 to 12}	180 to 240 {130 to 175, 18 to 24}	160 to 220 {115 to 160, 16 to 22}	200 to 270 {145 to 195, 20 to 27}	190 to 260 {135 to 190, 19 to 26}
M 18	140 to 190 {100 to 135, 14 to 19}	120 to 160 {87 to 115, 12 to 16}	260 to 340 {180 to 255, 25 to 35}	220 to 290 {160 to 215, 22 to 30}	290 to 390 {215 to 290, 30 to 40}	260 to 340 {190 to 255, 26 to 35}
M 20	190 to 260 {135 to 190, 19 to 26}	170 to 230 {120 to 165, 17 to 23}	350 to 470 {260 to 345, 36 to 48}	320 to 420 {230 to 310, 32 to 43}	410 to 550 {295 to 405, 41 to 56}	370 to 490 {265 to 360, 37 to 50}
M 22	260 to 340 {190 to 255, 26 to 35}	230 to 300 {165 to 225, 23 to 31}	470 to 640 {345 to 470, 48 to 65}	430 to 570 {310 to 420, 43 to 58}	550 to 740 {405 to 540, 56 to 75}	490 to 670 {360 to 490, 50 to 68}
M 24	340 to 450 {255 to 330, 34 to 46}	290 to 390 {210 to 290, 29 to 40}	630 to 840 {455 to 620, 63 to 86}	540 to 730 {395 to 535, 55 to 74}	730 to 980 {535 to 725, 74 to 100}	630 to 840 {460 to 620, 64 to 86}

Hex-head Flange Bolt

Unit : N·m {lbf.ft, kgf·m}

Strength classification	4 T		7 T		8 T	
Repre- sentation Diameter symbol						
M 6	4 to 6 {2.9 to 4.3, 0.4 to 0.6}	—	8 to 12 {5.8 to 8.7, 0.8 to 1.2}	—	9 to 14 {6.5 to 10, 0.9 to 1.4}	—
M 8	10 to 15 {7.0 to 11, 1.0 to 1.5}	—	19 to 28 {14 to 20, 1.9 to 2.8}	—	22 to 32 {16 to 24, 2.2 to 3.3}	—
M 10	21 to 30 {15 to 22, 2.1 to 3.1}	20 to 28 {14 to 21, 1.9 to 2.9}	39 to 58 {28 to 43, 3.9 to 6.0}	37 to 53 {26 to 39, 3.6 to 5.4}	50 to 65 {36 to 47, 5.0 to 6.5}	45 to 65 {33 to 47, 4.5 to 6.5}
M 12	38 to 54 {27 to 40, 3.8 to 5.5}	35 to 51 {25 to 38, 3.4 to 5.2}	80 to 110 {58 to 80, 8.0 to 11}	70 to 95 {51 to 69, 7.0 to 9.5}	90 to 120 {65 to 87, 9.0 to 12}	85 to 110 {61 to 80, 8.5 to 11}

Hex-head Nut

Unit : N·m {lb.ft, kgf·m}

Strength classification	4 T		6 T			
Repre- sentation						
Diameter symbol	Standard screw	Coarse screw	Standard screw		Coarse screw	
M 5	2 to 3 {1.4 to 2.2, 0.2 to 0.3}	—	4 to 6 {2.9 to 4.3, 0.4 to 0.6}		—	
M 6	4 to 6 {2.9 to 4.3, 0.4 to 0.6}	—	7 to 11 {5.1 to 8.0, 0.7 to 1.1}		—	
M 8	9 to 14 {6.5 to 10, 0.9 to 1.4}	—	17 to 26 {12 to 19, 1.7 to 2.6}		—	
M 10	19 to 28 {14 to 20, 1.9 to 2.8}	18 to 26 {13 to 20, 1.8 to 2.7}	36 to 52 {25 to 40, 3.5 to 5.5}		33 to 49 {25 to 36, 3.5 to 5.0}	
M 12	35 to 50 {25 to 36, 3.4 to 5.0}	31 to 46 {22 to 34, 3.1 to 4.7}	70 to 95 {51 to 69, 7.0 to 9.5}		65 to 85 {47 to 61, 6.5 to 8.5}	
M 14	60 to 85 {43 to 61, 6.0 to 8.5}	55 to 75 {40 to 54, 5.5 to 7.5}	120 to 160 {87 to 115, 12 to 16}		110 to 140 {80 to 100, 11 to 14}	
M 16	90 to 130 {69 to 94, 9.5 to 13}	90 to 120 {65 to 87, 9.0 to 12}	180 to 240 {130 to 175, 18 to 24}		160 to 220 {115 to 160, 16 to 22}	
M 18	140 to 190 {100 to 135, 14 to 19}	120 to 160 {87 to 115, 12 to 16}	260 to 340 {180 to 255, 25 to 35}		220 to 290 {160 to 215, 22 to 30}	
M 20	190 to 260 {135 to 190, 19 to 26}	170 to 230 {120 to 165, 17 to 23}	350 to 470 {260 to 345, 36 to 48}		320 to 420 {230 to 310, 32 to 43}	
M 22	260 to 340 {190 to 255, 26 to 35}	230 to 300 {165 to 225, 23 to 31}	470 to 640 {345 to 470, 48 to 65}		430 to 570 {310 to 420, 43 to 58}	
M 24	340 to 450 {255 to 330, 34 to 46}	290 to 390 {210 to 290, 29 to 40}	630 to 840 {455 to 620, 63 to 86}		540 to 730 {395 to 535, 55 to 74}	

Hex-head Flange Nut Unit : N·m {lb.ft, kgf·m}

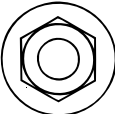
Strength classification	tion	
Repre- sentation		
4 T	Standard screw	Coarse screw
M 6	4 to 6 {2.9 to 4.3, 0.4 to 0.6}	—
M 8	10 to 15 {7.0 to 11, 1.0 to 1.5}	—
M 10	21 to 30 {15 to 22, 2.1 to 3.1}	20 to 28 {14 to 21, 1.9 to 2.9}
M 12	38 to 54 {27 to 40, 3.8 to 5.5}	35 to 51 {25 to 38, 3.4 to 5.2}

TABLE OF STANDARD TIGHTENING TORQUES

Tightening torque for flair nut for general purpose

Unit : N·m {lbf.ft, kgf·m}

Pipe diameter	ø4.76 mm {0.19 in.}	ø6.35 mm {0.25 in.}	ø8 mm {0.31 in.}	ø10 mm {0.39 in.}	ø12 mm {0.47 in.}	ø15 mm {0.59 in.}
Tightening torque	17 {12, 1.7}	25 {19, 2.6}	39 {29, 4.0}	59 {43, 6.0}	88 {65, 9.0}	98 {72, 10.0}

Tightening torque for air piping nylon tube for general purpose {DIN type} Unit : N·m {lbf.ft, kgf·m}

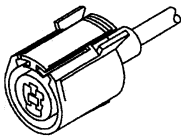
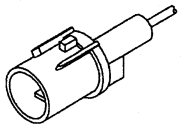
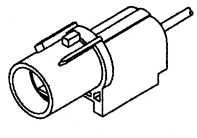
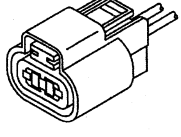
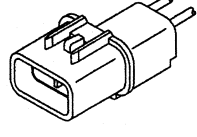
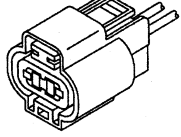
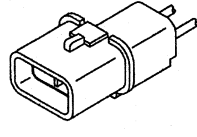
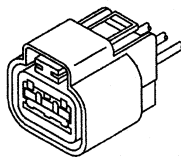
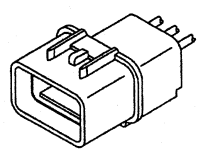
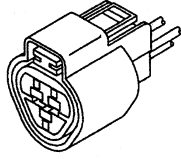
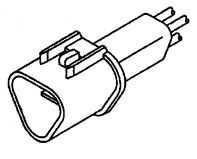
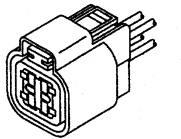
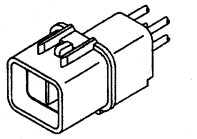
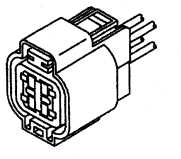
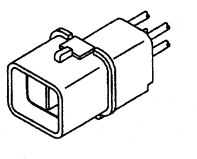
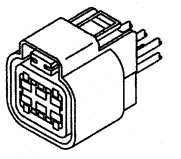
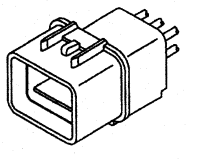
Standard diameter	6×1 mm {0.24×0.039 in.}	10×1.25 mm {0.39×0.049 in.}	12×1.5 mm {0.47×0.059 in.}	15×1.5 mm {0.59×0.059 in.}
Tightening torque	$20^{+5.9}_{-0} \left\{ \begin{matrix} +4.3 \\ -0, \end{matrix} \right. 2.0^{+0.6}_{-0} \}$	$29^{+9.8}_{-0} \left\{ \begin{matrix} +7.2 \\ -0, \end{matrix} \right. 3.0^{+1.0}_{-0} \}$	$49^{+9.8}_{-0} \left\{ \begin{matrix} +7.2 \\ -0, \end{matrix} \right. 5.0^{+1.0}_{-0} \}$	$54^{+4.9}_{-0} \left\{ \begin{matrix} +7.2 \\ -0, \end{matrix} \right. 5.5^{+1.0}_{-0} \}$

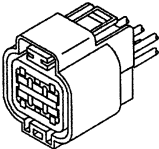
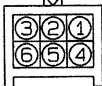
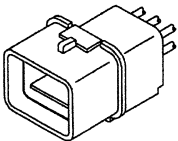
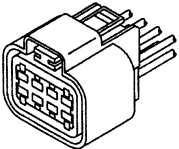
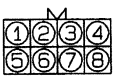
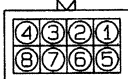
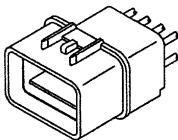
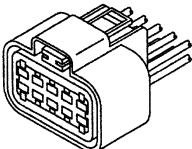
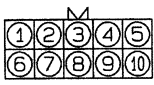
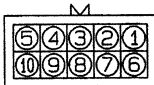
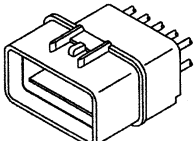
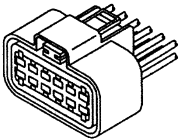
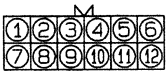
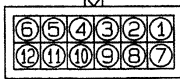
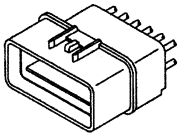
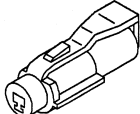
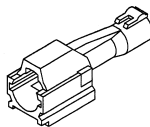
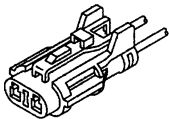
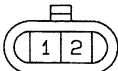
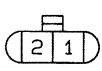
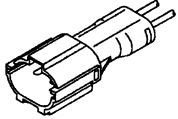
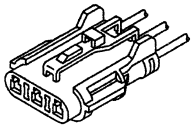
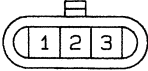
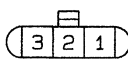
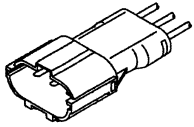
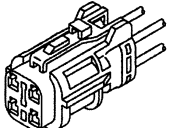
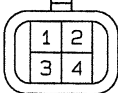
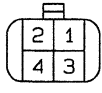
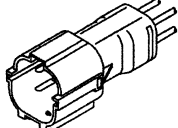
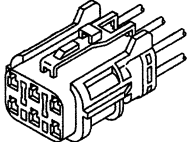
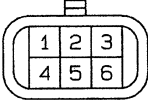
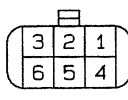
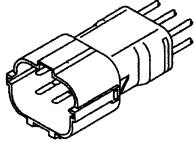
Tightening torque for air piping nylon tube for general purpose {SAE type} Unit : N·m {lbf.ft, kgf·m}

Standard diameter	1/4 in.	3/8 in.	1/2 in.	5/8 in.
Tightening torque	$13^{+3.9}_{-0} \left\{ \begin{matrix} +2.9 \\ -0, \end{matrix} \right. 1.3^{+0.4}_{-0} \}$	$29^{+4.9}_{-0} \left\{ \begin{matrix} +3.6 \\ -0, \end{matrix} \right. 3.0^{+0.5}_{-0} \}$	$49^{+4.9}_{-0} \left\{ \begin{matrix} +3.6 \\ -0, \end{matrix} \right. 5.0^{+0.5}_{-0} \}$	$64^{+4.9}_{-0} \left\{ \begin{matrix} +3.6 \\ -0, \end{matrix} \right. 6.5^{+0.5}_{-0} \}$

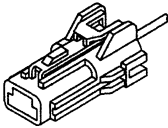
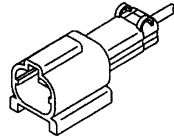
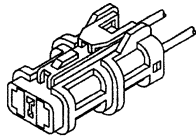
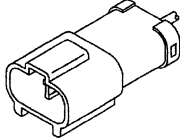
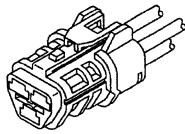
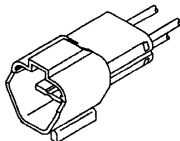
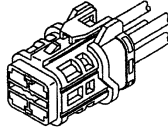
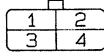
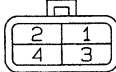
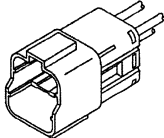
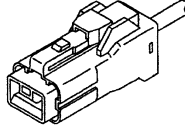
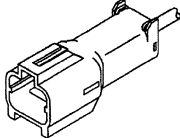
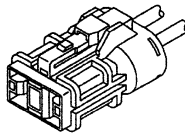
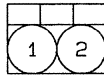
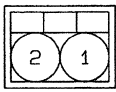
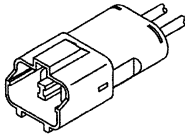
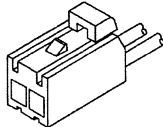
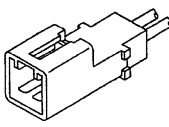
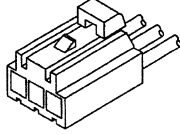
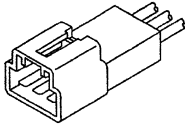
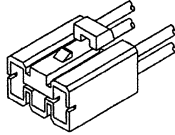
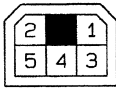
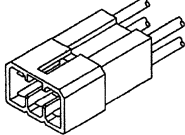
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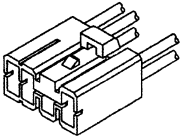
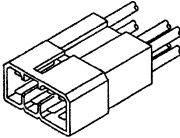
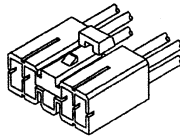
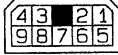
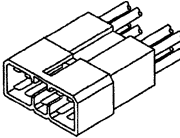
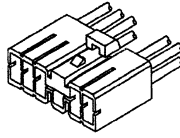
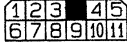
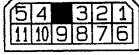
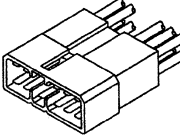
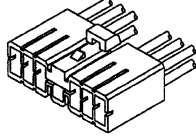
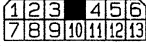
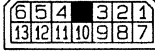
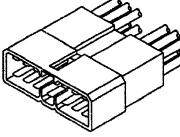
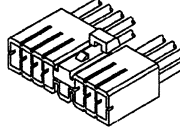
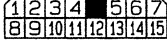
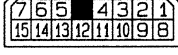
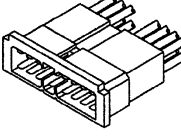
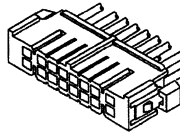
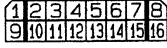
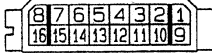
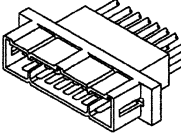
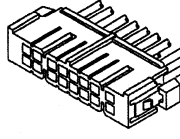
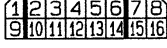
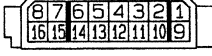
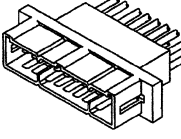
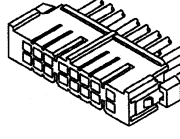
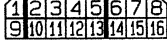
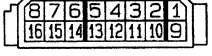
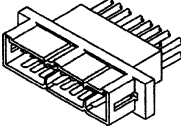
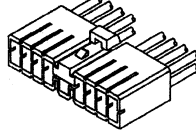
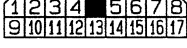
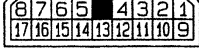
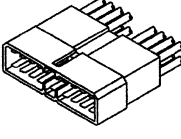
CONNECTOR CONFIGURATION CHART

Model (Number shows number of pins)		 Connection 			
AA	AA 1 A				
					
	AA 2 A				
	AA 2 B				
	AA 3 A				
	AA 3 B				
	AA 4 A				
	AA 4 B				
	AA 6 A				

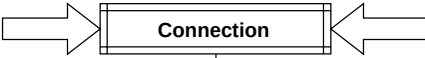
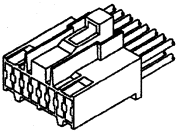
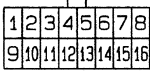
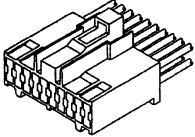
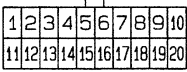
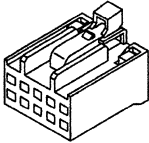
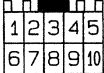
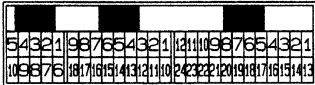
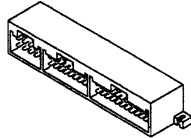
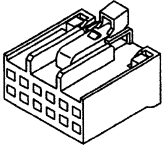
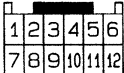
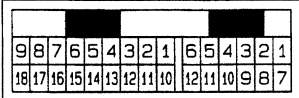
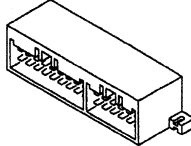
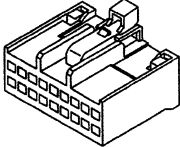
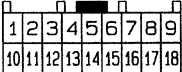
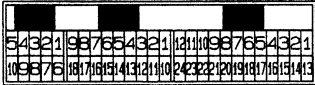
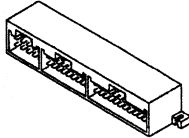
Model (Number shows number of pins)					
AA	AA 6 B				
	AA 8 A				
	AA10A				
	AA12A				
AB	AB 1 A				
	AB 2 A				
	AB 3 A				
	AB 4 A				
	AB 6 A				

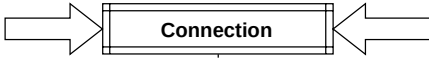
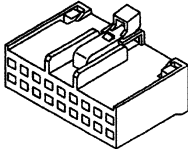
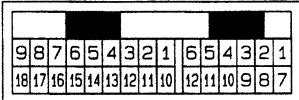
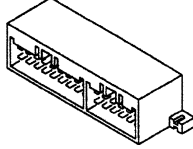
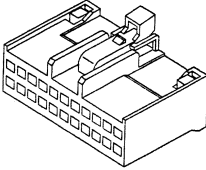
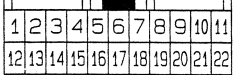
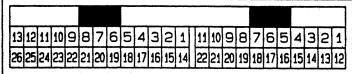
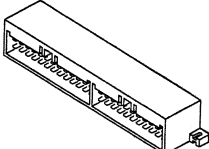
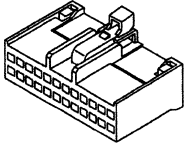
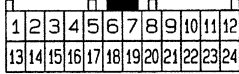
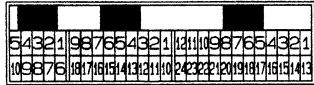
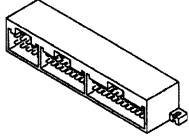
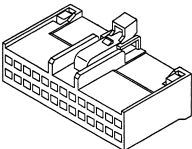
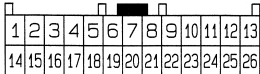
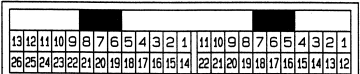
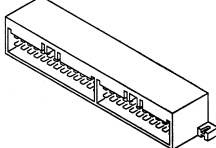
CONNECTOR CONFIGURATION CHART

Model (Number shows number of pins)		 Connection 			
AC	AC 1 A				
	AC 2 A				
	AC 3 A				
	AC 4 A				
AD	AD 1 A				
	AD 2 A				
AE	AE 2 A				
	AE 3 A				
	AE 5 A				

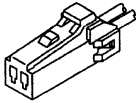
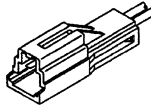
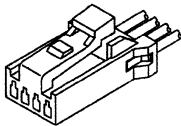
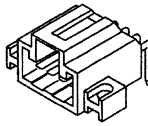
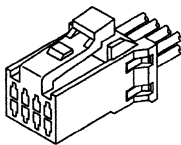
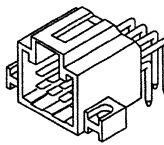
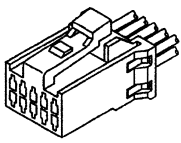
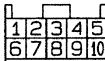
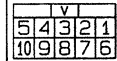
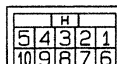
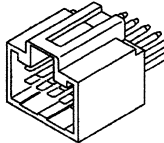
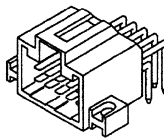
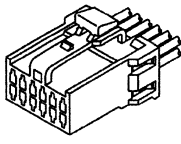
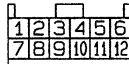
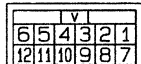
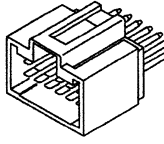
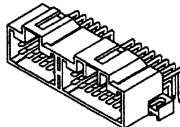
Model (Number shows number of pins)			
AE	AE 7 A	   	
	AE 9 A	   	
	AE11A	   	
	AE13A	   	
	AE15A	   	
	AE16A (White, Gray, Black)	   	
	AE16B (Green)	   	
	AE16C (Blue)	   	
	AE17A	   	

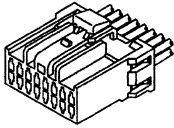
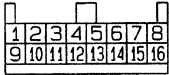
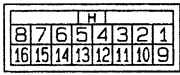
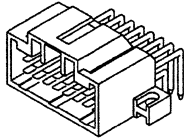
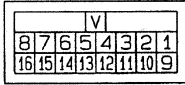
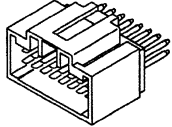
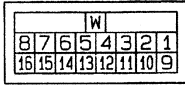
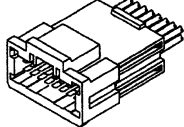
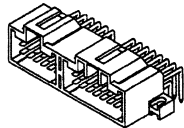
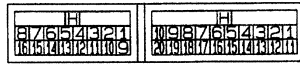
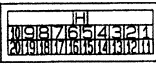
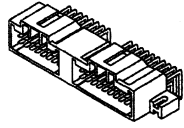
CONNECTOR CONFIGURATION CHART

Model (Number shows number of pins)			
AG	AG16A	 	
	AG20A	 	
AH	AH10A	 	 AH10A (AH18A) (AH24A) 
	AH12A	 	 (AH18A) AH12A 
	AH18A	 	 (AH10A) AH18A AH24A 

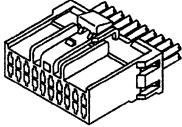
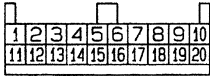
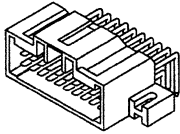
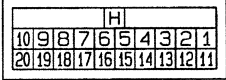
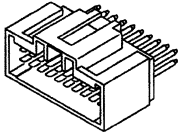
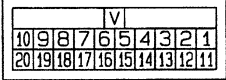
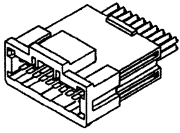
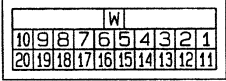
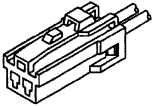
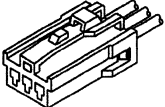
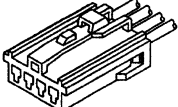
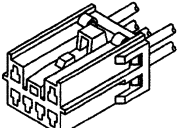
Model (Number shows number of pins)			
AH	AH18B	 	 AH18A (AH12A) 
	AH22A	 	 (AH26A) AH22 
	AH24A	 	 (AH10A) (AH18A) AH24A 
	AH26A	 	 AH26A (AH22) 

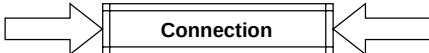
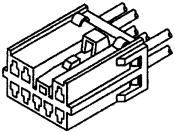
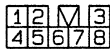
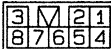
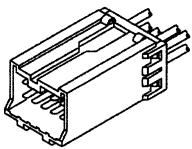
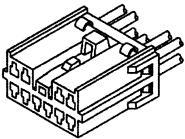
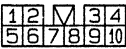
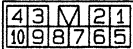
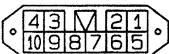
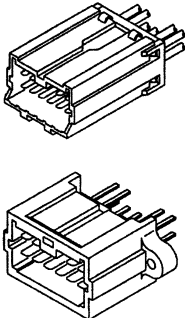
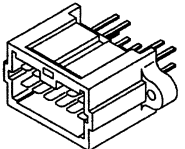
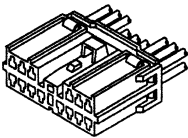
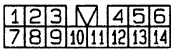
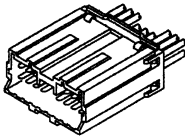
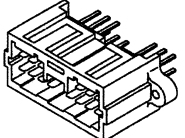
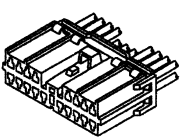
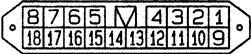
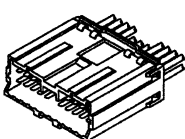
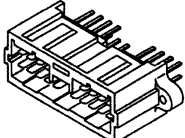
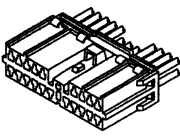
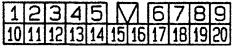
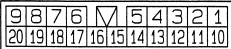
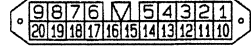
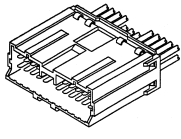
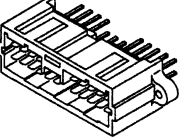
CONNECTOR CONFIGURATION CHART

Model (Number shows number of pins)		➡ Connection ⬅			
AJ	AJ 2 A				
	AJ 4 A				
	AJ 8 A				
	AJ10A			 	 
	AJ12A			  AJ12  (AJ16)	 

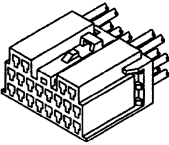
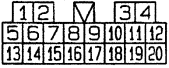
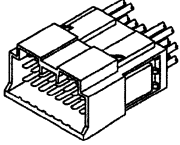
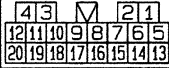
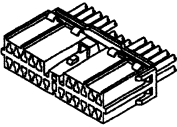
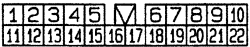
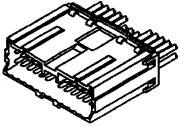
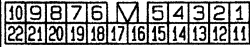
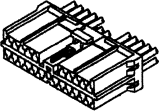
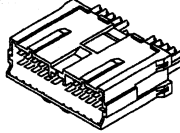
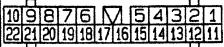
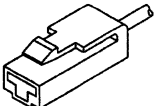
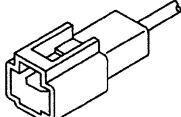
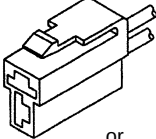
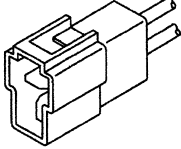
	Model (Number shows number of pins)		
AJ	AJ16A	 	       (AJ12A)  AJ16A   AJ16A  (AJ20A) 

CONNECTOR CONFIGURATION CHART

Model (Number shows number of pins)		Connection	
AJ	AJ20A		
			
			
			
AK	AK 2 A		
	AK 3 A		
	AK 4 A		
	AK 6 A		

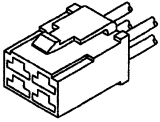
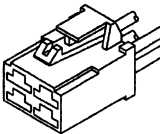
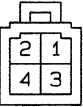
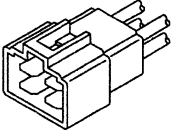
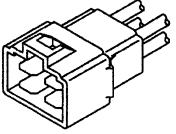
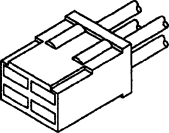
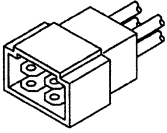
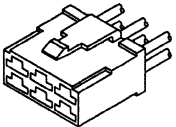
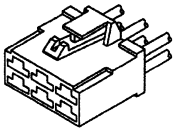
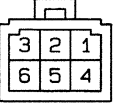
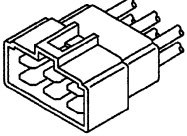
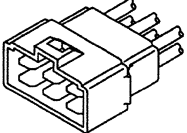
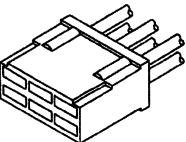
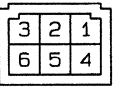
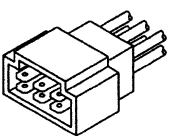
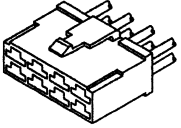
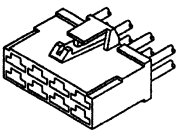
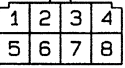
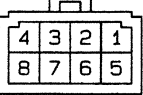
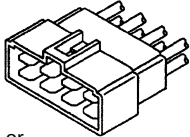
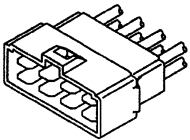
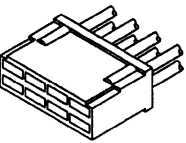
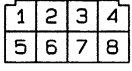
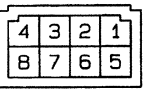
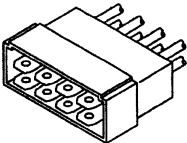
Model (Number shows number of pins)			
AK	AK 8 A	   	
	AK10A	     	
	AK14A	     	
	AK18A	     	
	AK20A	     	

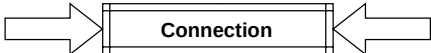
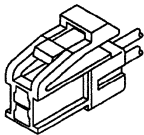
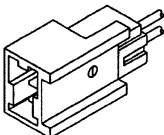
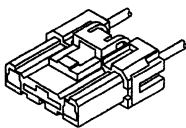
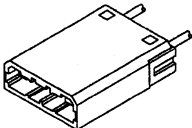
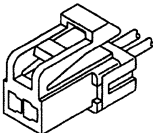
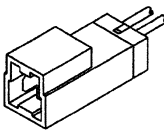
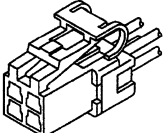
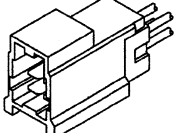
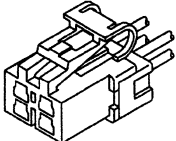
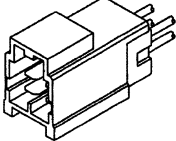
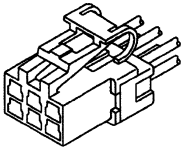
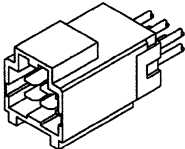
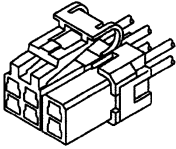
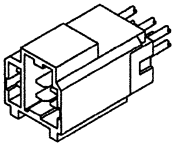
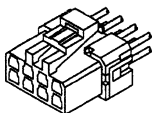
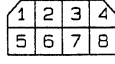
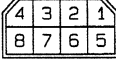
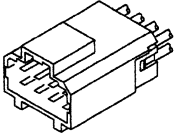
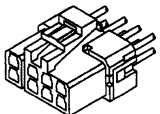
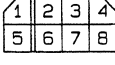
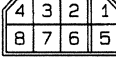
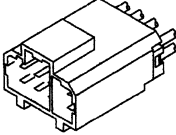
CONNECTOR CONFIGURATION CHART

Model (Number shows number of pins)		Connection	
AK	AK20B	 	 
	AK22A	 	 
	AK22B	 	 
AL	AL 1 A	 	 
	AL 2 A	 	 

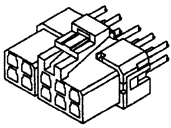
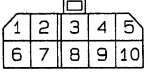
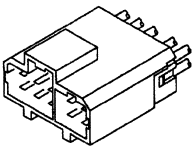
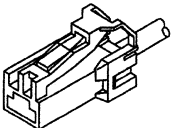
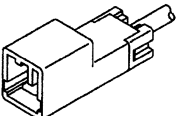
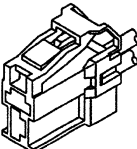
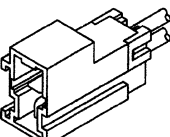
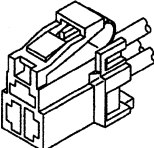
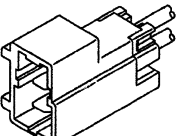
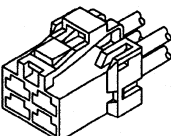
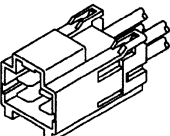
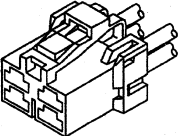
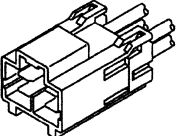
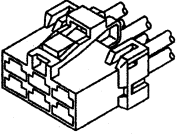
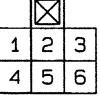
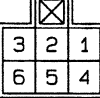
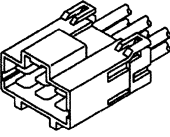
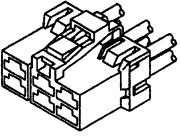
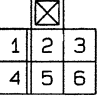
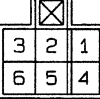
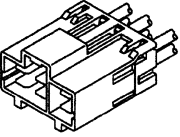
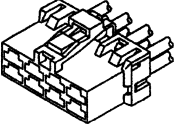
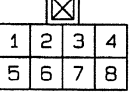
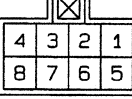
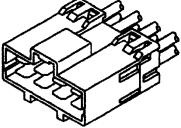
Model (Number shows number of pins)		→ Connection ←			
AL	AL 2 B		1 2	1 2	
	AL 3 A	 or 	1 2 3	1 3 2	 or
	AL 3 B		1 2 3	1 3 2	
	AL 3 C		1 2 3	1 3 2	
	AL 3 D	 or 	1 2 3		
	AL 3 E	 or 	1 2 3		

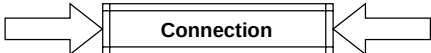
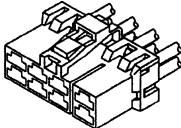
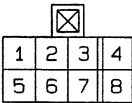
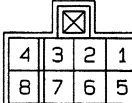
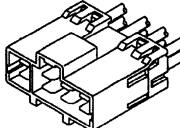
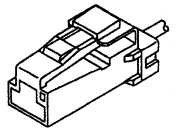
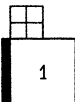
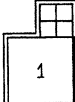
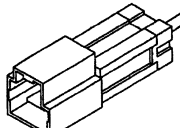
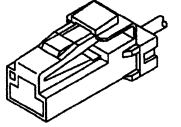
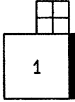
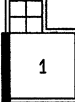
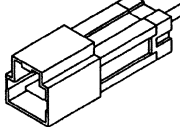
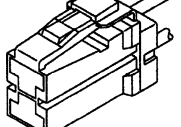
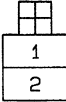
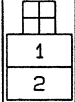
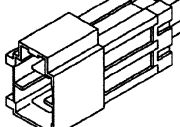
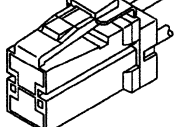
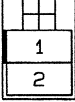
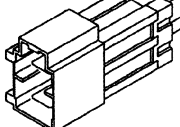
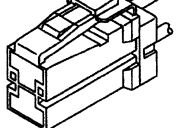
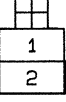
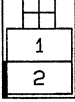
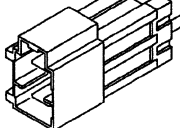
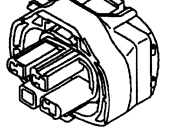
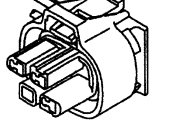
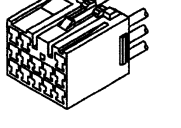
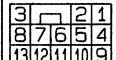
CONNECTOR CONFIGURATION CHART

Model (Number shows number of pins)		 Connection 			
AL	AL 4 A	 or 			 or 
	AL 4 B				
	AL 6 A	 or 			 or 
	AL 6 B				
	AL 8 A	 or 			 or 
	AL 8 B				

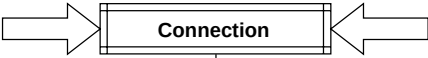
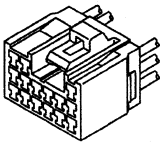
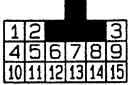
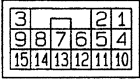
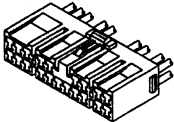
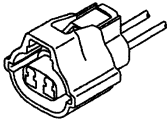
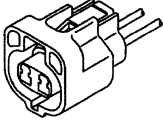
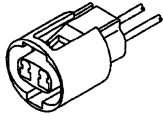
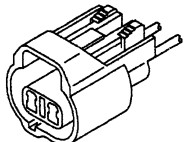
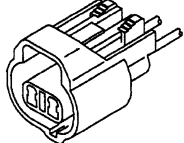
Model (Number shows number of pins)					
AM	AM 2 A				
	AM 2 B				
	AM 2 C				
	AM 4 A				
	AM 4 B				
	AM 6 A				
	AM 6 B				
	AM 8 A				
	AM 8 B				

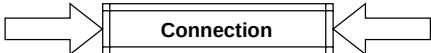
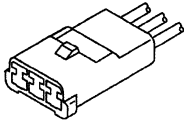
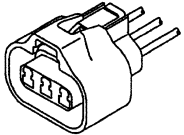
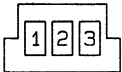
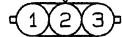
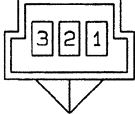
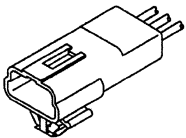
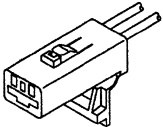
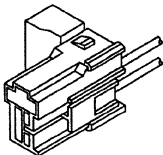
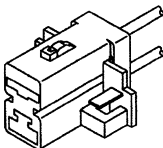
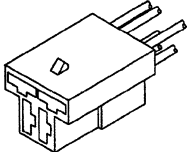
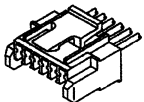
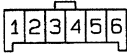
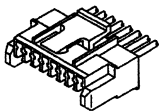
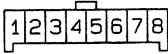
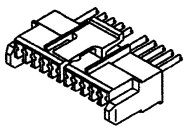
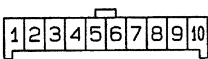
CONNECTOR CONFIGURATION CHART

Model (Number shows number of pins)		 Connection 			
AM	AM10A				
AN	AN 1 A				
	AN 2 A				
	AN 3 A				
	AN 4 A				
	AN 4 B				
	AN 6 A				
	AN 6 B				
	AN 8 A				

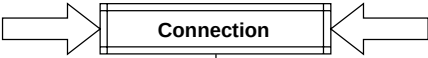
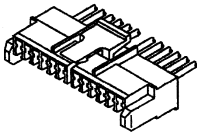
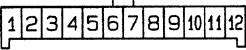
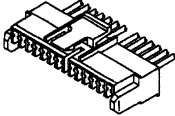
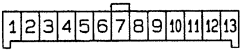
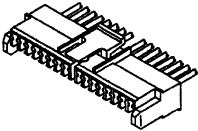
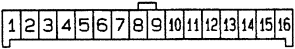
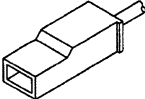
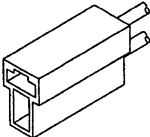
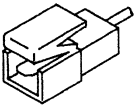
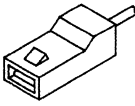
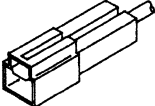
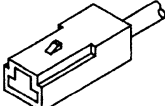
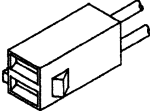
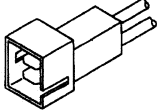
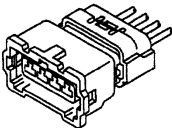
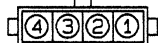
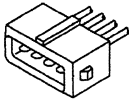
Model (Number shows number of pins)			
AN	AN 8 B	 	 
	AN 8 B		
AP	AP 1 A	 	 
	AP 1 B	 	 
	AP 2 A	 	 
	AP 2 B	 	 
	AP 2 C	 	 
AQ	AQ 3 A	 	
	AQ 3 B	 	
	AQ13A	 	

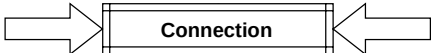
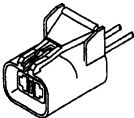
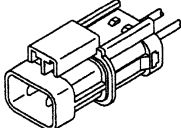
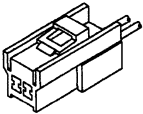
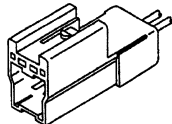
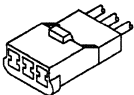
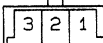
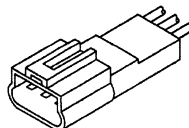
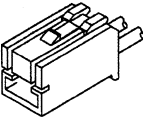
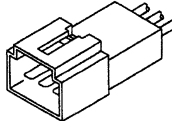
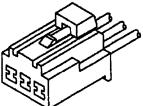
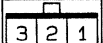
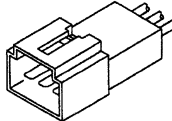
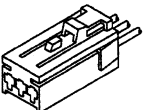
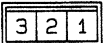
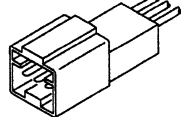
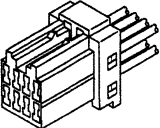
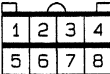
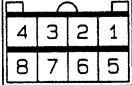
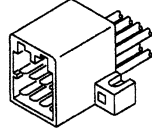
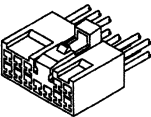
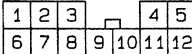
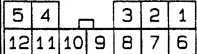
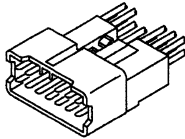
CONNECTOR CONFIGURATION CHART

Model (Number shows number of pins)			
AQ	AQ15A	  	
	AQ20A	 	
AR	AR 2 A	 	
	AR 2 B	 	
	AR 2 C	 	
	AR 2 D	 	
	AR 2 E	 	
	AR 2 F		

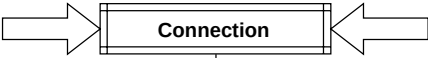
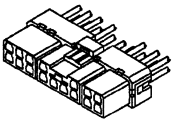
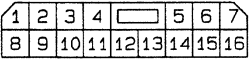
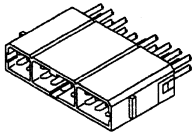
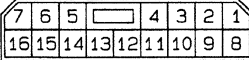
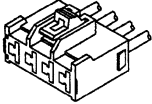
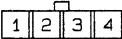
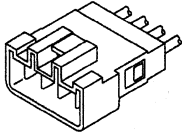
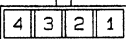
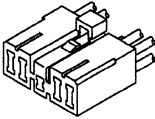
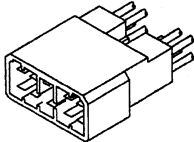
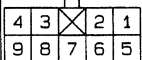
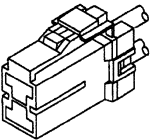
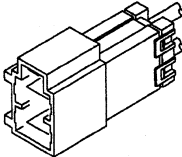
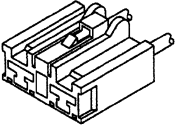
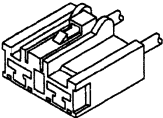
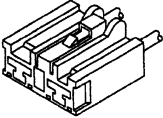
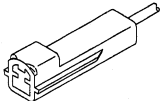
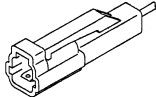
Model (Number shows number of pins)			
AR	AR 3 A	     	
AS	AS 1 A	 	
	AS 2 A	 	
	AS 2 B	 	
AT	AT 4 A	 	
AU	AU 6 A	 	
	AU 8 A	 	
	AU10A	 	

CONNECTOR CONFIGURATION CHART

Model (Number shows number of pins)			
AU	AU12A	 	
	AU13A	 	
	AU16A	 	
AV	AV 1 A	 	
	AV 2 A	 	
AW	AW 1 A	 	 
	AW 1 B	 	 
	AW 2 A	 	 
AX	AX 4 A	 	 

Model (Number shows number of pins)			
AY	AY 2 A	   	
AZ	AZ 2 A	   	
BA	BA 3 A	   	
BB	BB 2 A	   	
	BB 3 A	   	
BC	BC 3 A	   	
BD	BD 8 A	   	
BE	BE 6 A	   	
BF	BF12A	   	

CONNECTOR CONFIGURATION CHART

Model (Number shows number of pins)			
BG	BG16A	 	 
BH	BH 4 A	 	 
BJ	BJ 9 A	 	 
BL	BL 2 A	 	 
BM	BM 2 A	 	
	BM 2 B	 	
	BM 2 C	 	
BN	BN 1 A	 	 



FH

Service Manual

Group 01 - Maintenance Schedule

Group 01 - 1998 Minor Changes

 **MITSUBISHI FUSO TRUCK OF AMERICA, Inc.**



FH

Service Manual

Group 01

Maintenance Schedule

'98 Minor Change

 **MITSUBISHI FUSO TRUCK OF AMERICA, Inc.**

MAINTENANCE SCHEDULE

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• Manual Transmission Gear Oil	01- 31
• Automatic Transmission Fluid and Oil Filter	01- 32
• Rear Axle Gear Oil	01- 35
• Power Steering Fluid	01- 36
• Brake Fluid	01- 38
• Greasing Various Areas of Chassis	01- 42

HOW TO READ THE MAINTENANCE SCHEDULE TABLES

Example Table :

*1 : 30000 km/18000 miles or 6 months, whichever occurs first.
 *2 : 60000 km/36000 miles or 12 months, whichever occurs first.
 (E) : Exhaust emission items
 (N) : Noise control items

Inspection and maintenance (1)		Time of inspection and maintenance (2)					Working procedures (3)	Remarks (4)
		Pre-operation checks	New vehicle at 4000 km/2500 miles	Inspection interval				
				Every 10000 km/ 6000 miles	Every 30000 km/ 18000 miles *1	Every 60000 km/ 36000 miles *2		
ENGINE								
1	Air, fuel, oil or coolant leakage from engine			×			Check engine for air, fuel, oil and coolant leakage	 Gr 11, 12, 13, 14
2	Ⓔ Ⓝ Engine starting performance, speed, noise and exhaust gas conditions			×			Check for engine starting performance, idling speed, abnormal engine noise, dark smoke or other abnormal exhaust gas during idling and acceleration. Check engine speed on tachometer	 Gr 11, 13, 15
3	Retightening of inlet and exhaust manifold bolts					×	Check manifold bolts for looseness	 Gr 15
4	Ⓔ Valve clearance		×			×	Check valve clearance with feeler gauge	 Gr 11
5				Every 20000 km /12000 miles			Replace element	

- (1) This column contains the maintenance and inspection items.
- (2) The periods between inspection and service are based on the assumption that the vehicle will be driven approximately 60000 kilometers (36000 miles) per year.
Inspections which must be made are indicated by an "x" or by the appropriate period between servicing.
- (3) This column provides a simplified explanation of the operational procedures involved for each inspection or maintenance item.
- (4) The Gr. No. refers to the "group number" in this vehicle Service Manual. For visual checks and simple inspections, see the sections labelled "Working Procedures".

MAINTENANCE SCHEDULE TABLES

01

*1 : 30000 km/18000 miles or 6 months, whichever occurs first.

*2 : 60000 km/36000 miles or 12 months, whichever occurs first.

(E) : Exhaust emission items

(N) : Noise control items

Inspection and maintenance		Time of inspection and maintenance					Working procedures	Remarks	
		Pre-operation checks	New vehicle at 4000 km/2500 miles	Inspection interval					
				Every 10000 km/ 6000 miles	Every 30000 km/ 18000 miles *1	Every 60000 km/ 36000 miles *2			
ENGINE									
1	Air, fuel, oil or coolant leakage from engine			×			Check engine for air, fuel, oil and coolant leakage	Gr 11, 12, 13, 14	
2	Ⓔ Ⓝ Engine starting performance, speed, noise and exhaust gas conditions			×			Check for engine starting performance, idling speed, abnormal engine noise, dark smoke or other abnormal exhaust gas during idling and acceleration. Check engine speed on tachometer	Gr 11, 13, 15	
3	Retightening of inlet and exhaust manifold bolts					×	Check manifold bolts for looseness	Gr 15	
4	Ⓔ Valve clearance		×			×	Check valve clearance with feeler gauge	Gr 11	
5	Ⓔ Oil filter replacement			Every 20000 km/ 12000 miles On new vehicles, replace the first filter at 10000 km/6000 miles			Replace element	Gr 12	
6	Ⓔ Ⓝ Check injection nozzles			Every 90000 km/ 54000 miles			Check injection nozzles	Gr 13	
7	Ⓔ Ⓝ Fuel injection pressure and spray pattern of injection nozzles			Every 250000 km/ 150000 miles			Remove injection nozzle and check with nozzle tester	Gr 13	
8	Ⓔ Ⓝ Fuel injection timing					×	Turn crankshaft in normal running direction and check injection starting timing of No.1 cylinder	Gr 13	
9	Ⓔ Cleaning fuel feed pump filter					×	Remove connector from fuel feed pump inlet and clean filter inside connector with gas oil		
10	Ⓔ Fuel filter replacement				×		Replace element	Gr 13	
11	Ⓔ Water separator water discharge	×					Loosen water separator drain plug to discharge water	Gr 13	
12	Ⓔ Removal of water and sediment from fuel tank			Every 24 months			Remove fuel tank drain plug and remove water and sediment	Gr 13	
13	Retightening of fuel tank bracket bolts			×			Check mounting bolts for looseness and retighten to a torque of 34 to 54 N·m {25 to 40 lbf.ft, 3.5 to 5.5 kgf·m}	Gr 13	
14	Ⓔ Replacing fuel line in engine compartment			Every 24 months			Replace fuel line in engine compartment	Gr 13	
15	Ⓔ Check fuel line outside of engine compartment			Every 24 months			Check fuel line outside of engine compartment. Replace if necessary	Gr 13	
16	Ⓔ Ⓝ V-belt tension and damage	×		×			Press midpoint of V-belt firmly with your finger to measure deflection and check for belt damage	Gr 14	
17	Coolant level and leakage from cooling system	×					Check coolant level and if level is low, check for coolant leakage	Gr 14	
18	Coolant replacement			Every 24 months			Replace with new coolant	Gr 14	
19	Installed condition of surge tank cap			×			Check surge tank cap for sealing and mounting condition	Gr 14	
20	Ⓔ Cooling system hose clamp position and clamping condition			×			Check clamp position and clamping condition of cooling system hose	Gr 14	
21	Ⓔ Turbocharger rotor play			Every 250000 km/ 150000 miles			Check whether rotor has excessive end play using a dial indicator	Gr 15	
22	Ⓔ Ⓝ Cleaning of air cleaner	×					Check air cleaner dust indicator. If the red signal appears, clean the element	Gr 15	
23	Ⓔ Ⓝ Air cleaner element replacement			Every 50000 km/ 30000 miles			Replace element	Gr 15	
24	Ⓔ Ⓝ Damage of inlet system, looseness of clamp and loss of parts			×			Check inlet system for damage and check that all parts are installed	Gr 15	
25	Ⓝ Looseness and damage of exhaust pipe and muffler			×			Check installation and connections for looseness and damage, check for exhaust gas leakage	Gr 15	
26	Starter function					×	Operate starter switch and check the switch functions properly	Gr 54	
27	Alternator function					×	Check function with a circuit tester	Gr 54	

MAINTENANCE SCHEDULE TABLES

*1 : 30000 km/18000 miles or 6 months, whichever occurs first.

*2 : 60000 km/36000 miles or 12 months, whichever occurs first.

Ⓔ : Exhaust emission items

Ⓖ : Noise control items

Inspection and maintenance		Time of inspection and maintenance					Working procedures	Remarks
		Pre-operation checks	New vehicle at 4000 km/2500 miles	Inspection interval				
				Every 10000 km/ 6000 miles	*1 Every 30000 km/ 18000 miles	*2 Every 60000 km/ 36000 miles		
POWER TRAIN								
28	Oil leakage from power train			×			Check power train for oil leakage	
29	Clutch pedal play			×			Press clutch lightly and check that play is adequate	Gr 21
30	Clutch function			×			(1) Press the clutch pedal to check for unusual noise or stiffness. Also check if gearshift engages quietly (2) Check the clutch does not slip and engages smoothly	Gr 21
31	Manual transmission gearshift control looseness				×		In NEUTRAL position, check shift lever for looseness. With shift lever in each gear position, check engagement condition and degree of looseness. Also check if control cable is damaged	Gr 22
32	Automatic transmission range selector linkage and throttle (modulator) linkage condition				×		Shifting to each shift range must be done firmly and securely	Gr 23
33	Propeller shaft couplings and bearings looseness		×	×			(1) Check flange yoke bolt and center bearing attaching bolt for looseness (2) Turn propeller shaft manually to check for spline looseness (3) Check looseness between spider and needle roller bearing	Gr 25
FRONT AND REAR AXLES								
34	Axle shaft torsion and cracks					×	Remove axle shaft and check for torsion, bending, and cracks	Gr 27
35	Front wheel hub bearing looseness				×		With front axle jacked up, move the wheel up and down holding the top and bottom of the tire to check for bearing looseness	Gr 26
36	Rear wheel hub bearing damage					×	Disassemble rear wheel and check for hub bearing wear and damage	Gr 27
37	Retightening wheel nuts		×	×			Check wheel nuts for looseness after replacing tires, also after 1000 km/600 miles	Gr 31
38	Disc wheel damage			×			Check disc wheel for corrosion, deformation and cracks	Gr 31
39	Tire inflation pressure, cracking, tread groove depth, abnormal wear, etc.	×		×			(1) Measure inflation pressure with tire gauge, and check that tire tread groove is deep enough (2) Check tire tread and side walls for cracks, damage, uneven wear, stepped wear and other abnormal wear	Gr 31
40	Tire rotation			×			Rotate all tires	Gr 31
SUSPENSION SYSTEM								
41	Looseness, play and damage of suspension system				×		Check suspension system for looseness, play and damage	Gr 33, 34
42	Damage and looseness of leaf springs	×			×		Check leaf springs for damage and looseness	Gr 33, 34
43	Retightening U-bolts		×		×		Check U-bolts for looseness	Gr 33, 34
44	Oil leakage and damage of shock absorbers				×		Check for oil leakage and damage of cylinder, etc.	Gr 33, 34
BRAKING SYSTEM								
45	Fluid leakage from braking system and power steering system			×			Check braking system and power steering system for fluid leakage	Gr 35, 37
46	Looseness, play and damage of braking system parts			×			Check braking system parts for looseness, play and damage	Gr 35
47	Brake pedal play and stroke	×		×			Depress the brake pedal lightly and check that play is not as specified. While the engine is idling, fully depress the brake pedal and check the distance between pedal and floor	Gr 35
48	Brake booster (hydraulic booster) emergency pump	×					With the engine stopped, depress the brake pedal and check the operating sound of the emergency pump	Gr 35

*1 : 30000 km/18000 miles or 6 months, whichever occurs first.

*2 : 60000 km/36000 miles or 12 months, whichever occurs first.

Ⓔ : Exhaust emission items

Ⓖ : Noise control items

Inspection and maintenance		Time of inspection and maintenance					Working procedures	Remarks
		Pre-operation checks	New vehicle at 4000 km/2500 miles	Inspection interval				
				Every 10000 km/ 6000 miles	Every 30000 km/ 18000 miles ⁺¹	Every 60000 km/ 36000 miles ⁺²		
49	Service brake effectiveness	×		×			While driving the vehicle at low speed, check braking effect and check for uneven braking	Gr 35
50	Operation of exhaust brake	×		×			Check exhaust brake operation	Gr 35
51	Exhaust brake vacuum chamber diaphragm replacement			Every 12 months			Check exhaust brake vacuum chamber diaphragm; replace if necessary	Gr 35
52	Brake shoe clearance				×		Measure clearance with feeler gauge	Gr 35
53	Brake lining wear				×		Check lining wear	Gr 35
54	Brake drum wear					×	Disassemble and check drum for wear, cracks and damage	Gr 35
55	Parking brake effectiveness			×			On a slope, check that vehicle can be held stationary	Gr 36
56	Parking brake lever stroke	×		×			With lever fully pulled, check that lever is locked completely and that there is allowance in pulling stroke	Gr 36
57	Parking brake drum and lining wear					×	Disassemble and check drum for wear, cracks and damage and check lining for wear	Gr 36
58	Wheel cylinder piston cup and dust seal replacement			Every 12 months			Check wheel cylinder piston cup and dust seal; replace if necessary	Gr 35
59	Brake hose replacement			Every 12 months			Check brake hose; replace if necessary	Gr 35
60	Brake fluid reservoir tank tube replacement			Every 24 months			Check and replace brake fluid reservoir tank tube	Gr 35
STEERING SYSTEM								
61	Fluid leakage from steering system			×			Check steering system for fluid leakage	Gr 37
62	Steering wheel play	×		×			Turn steering wheel right and left to measure play at steering wheel rim. Measure while engine is running	Gr 37
63	Steering operating condition	×		×			Check steering wheel to see if it vibrates, pulls to one side or requires unusual steering effort	Gr 37
64	Looseness and play of steering system (including hoses and pipes)			×			(1) Check steering system for looseness and play (2) Check power steering hoses and pipes for looseness	Gr 37
65	Wheel alignment					×	Measure toe-in, camber, caster and kingpin inclination angles	Gr 26
66	Right and left turning angles and power steering function					×	Check that stopper bolt is sufficiently tight, without damage, and that steering linkage operates smoothly until blocked by stopper bolt. Also check that steering wheel does not make contact with other parts	Gr 26
67	Power steering booster and oil pump internal rubber parts replacement			Every 48 months			Replace internal rubber parts	Gr 37
68	Power steering hose replacement			Every 48 months			Replace power steering hose	Gr 37
CAB AND FRAME								
69	Looseness and damage of chassis and body			×			(1) Check frame, cross members and other parts for loose rivets (2) Also check for body damage and loose mounting bolts	Gr 41, 42
70	Heater and defroster operation			×			Check operation and installation of defroster	Gr 55
71	Reflection of rearview mirrors and reflectors	×					Check for reflecting condition, stains and damage	Gr 42
72	Door lock function			×			Check door lock mechanism functions properly	Gr 42
73	Seat belt mounting condition			×			Check seat belt for damage, buckle and retracting function and mounting condition	Gr 42
ELECTRICAL SYSTEM								
74	Looseness and damage of electrical wiring and connections			×			Check wiring, connectors and battery terminals for looseness and corrosion	Gr 54

MAINTENANCE SCHEDULE TABLES

*1 : 30000 km/18000 miles or 6 months, whichever occurs first.

*2 : 60000 km/36000 miles or 12 months, whichever occurs first.

Ⓔ : Exhaust emission items

Ⓔ : Noise control items

Inspection and maintenance		Time of inspection and maintenance					Working procedures	Remarks
		Pre-operation checks	New vehicle at 4000 km/2500 miles	Inspection interval				
				Every 10000 km/ 6000 miles	Every 30000 km/ 18000 miles *1	Every 60000 km/ 36000 miles *2		
75	Battery electrolyte level and specific gravity			Every 20000 km/ 12000 miles			(1) Check electrolyte level (2) Measure electrolyte specific gravity with hydrometer	 Gr 54
76	Operation and damage of lighting system	×		×			Check operation, damage and installation of each lighting unit	 Gr 54
77	Operation of horn and turn signal lamps	×		×			Check operation, damage and mounting condition. Also check turn signal lamps are operated by turn signal switch	 Gr 54
78	Operation and fluid level of windshield wiper and washer	×		×			Check operation, damage and mounting condition. Check if fluid level in washer tank is okay	 Gr 42
79	Gauges and pilot lamps function	×		×			Check function of gauges and pilot lamps	 Gr 54
80	Switch function					×	Check operation, damage and installation of each switch	 Gr 54
OTHER								
81	Road test of vehicle			×			Drive the vehicle to check for overall vehicle operating condition	

MAINTENANCE OPERATIONS

01

This section explains simple maintenance procedures. See the relevant Group in this manual for further details.

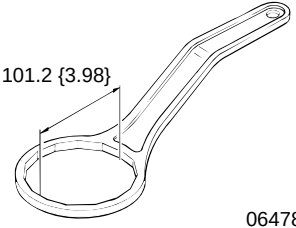
Replacement of Oil Filter

Lubricant

Location	Points of application	Specified lubricant	Quantity
2	Inside oil filter	Engine oil	Approximately 1 L {1.1 qts}
	Gasket area of oil filter with thin application	Engine oil	As required

Special tools

Unit : mm {in.}

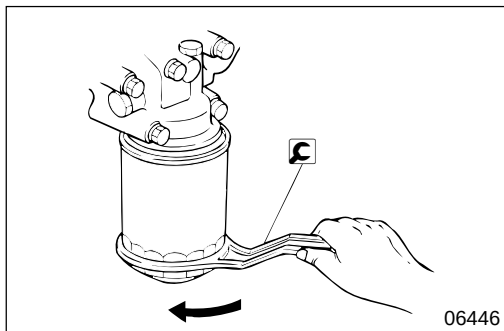
Location	Tool name and shape	Part No.	Application
2	Oil filter wrench 	MH061587	Removal of oil filter

WARNING

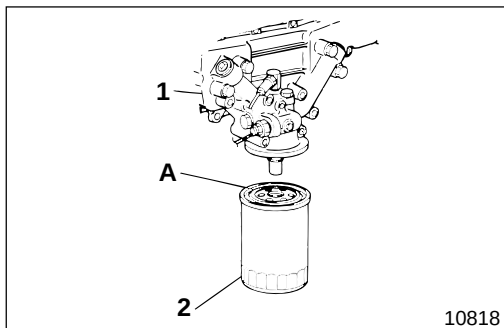
- Wipe up any engine oil that has been spilled because it can cause a fire.
- Do not touch the engine while it is hot because it will burn you.

CAUTION

Take care not to spill engine oil on the V-belts, because this would cause them to slip, reducing service life.



[Removal]



[Installation]

- Clean the surface of oil cooler body **1** that makes contact with oil filter **2**.
- Apply engine oil thinly and evenly to gasket area **A** of oil filter **2**.
- Screw oil filter **2** into oil cooler body **1** until gasket area **A** sits on the body. From this position, tighten further by rotating by three quarters of a turn.
- After installation, run the engine and check that there is no oil leakage from gasket area **A**.
- Check the oil level and if it is low, top it up.

MAINTENANCE OPERATIONS

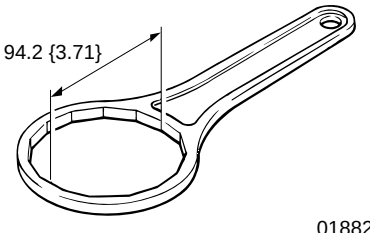
Replacement of Fuel Filter

Lubricant

Location	Points of application	Specified lubricant	Quantity
2	Gasket contact surfaces of fuel filter and fuel filter head	Engine oil	As required

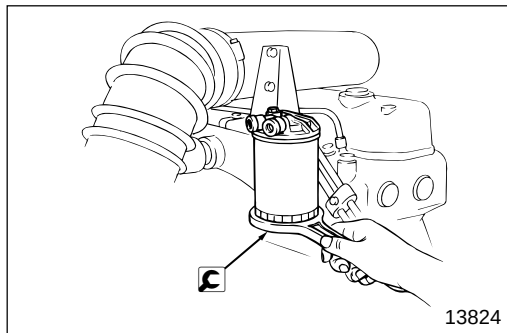
Special tools

Unit : mm {in.}

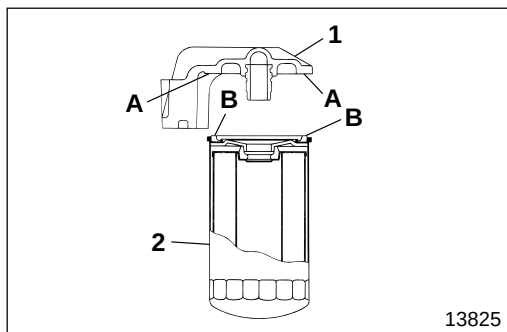
Location	Tool name and shape	Part No.	Application
2	 Filter wrench	MH061572	Removal of fuel filter

WARNING

- Fuel ignites easily. Do not get it near flame or heat.
- Wipe up any diesel fuel that has been spilled because it can cause a fire.
- Do not use an unsuitable filter because it can cause a fire.



[Removal]



[Installation]

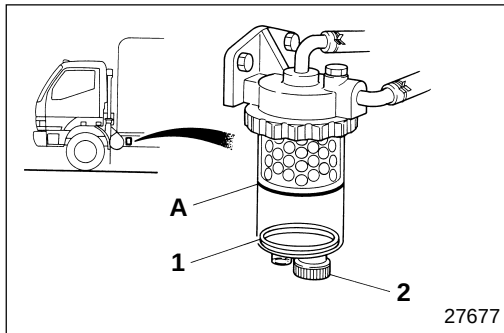
- Install by tightening three quarters to one full turn after contact surface **A** of fuel filter head **1** makes contact with gasket **B** of fuel filter **2**. Be sure to tighten by hand.
- After installation, run the engine and check for fuel leakage.

Draining of Water Separator Condensation

Tightening torque

Unit : N·m {lbf.ft, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
2	Drain plug	3 to 4 {2.2 to 2.9, 0.3 to 0.4}	—



Visually inspect the water separator before driving.

When float **1** reaches red line **A**, drain the condensation as follows:

- Loosen drain plug **2** and drain out the condensation.
- When float **1** has dropped to the bottom, tighten drain plug **2**.
- Carefully wipe the water separator and the surrounding area.
- Check for fuel leakage.

Cleaning of Fuel Feed Pump Gauze Filter

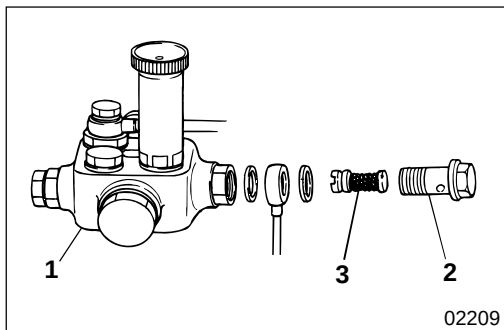
Tightening torque

Unit : N·m {lbf.ft, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
2	Eye bolt	25 to 29 {18 to 22, 2.5 to 3}	—

WARNING

- Fuel ignites easily. Do not get it near flame or heat.
- Wipe up any diesel fuel that has been spilled because it can cause a fire.



- Remove eye bolt **2** on the inlet side of fuel feed pump **1**.
- Remove gauze filter **3** from eye bolt **2**.
- Clean gauze filter **3** with gas oil.
- Follow the removal sequence in reverse and reinstall gauze filter **3**.
- Install eye bolt **2** in the fuel feed pump.
- Bleed the air from the fuel line.
- Start the engine and check for fuel leakage.

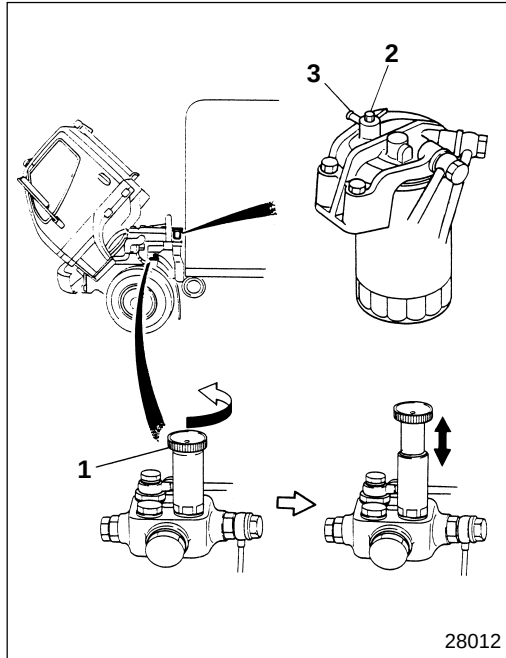
MAINTENANCE OPERATIONS

Bleeding of Air from Fuel Line

Tightening torque

Unit : N·m {lbf.ft, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
2	Air vent plug	7.8 to 12 {5.8 to 8.7, 0.8 to 1.2}	—



WARNING

- Fuel ignites easily. Do not get it near flame or heat.
- Wipe up any diesel fuel that has been spilled because it can cause a fire.

- Turn the top of priming pump 1 of the injection pump counterclockwise and pull it up so the top protrudes.
- Loosen air vent plug 2 of the fuel filter and move the top part of priming pump 1 up and down.
- Move priming pump 1 up and down repeatedly until air bubbles are no longer present in the fuel drained from air vent cock 3.
- When the fuel being drained is free of air bubbles, tighten air vent plug 2.
- After moving priming pump 1 up and down another five or six times, push the top down and turn clockwise tighten.
- After bleeding the air, carefully wipe up spilled fuel and start the engine.
- Check for fuel leakage.

Adjustment of V-Belt Tension

Newly installed V-belts can stretch during their initial running-in period. To prevent this from becoming a problem, run the engine for several minutes after installing the V-belt, then readjust. Perform this cycle several times.

WARNING

You must take special precautions to prevent the engine from rotating while a V-belt is being inspected or adjusted.

CAUTION

- Make sure that you turn off the engine before attempting to inspect or adjust the V-belts.
- Make sure that you fasten all bolts and nuts securely after adjusting the V-belts. Remember that too much tension can damage the V-belts and bearings.
- Do not grease V-belts. This causes them to slip, which reduce service life.

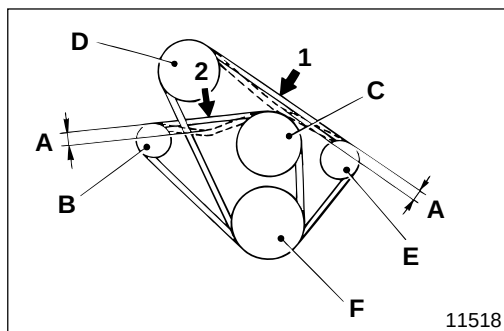
Service standards

Unit : mm {in.}

Location	Maintenance item		Standard value	Limit	Remedy
1, 2	V-belt tension (Each one)	Fan	12 to 16 {0.47 to 0.63}	—	Adjust
		Air-conditioner	16 to 20 {0.63 to 0.79}		

Special tools

Location	Tool name and shape	Part No.	Application
1, 2	Belt tension gauge  03612	MH062345	Measurement of tension of V-belt

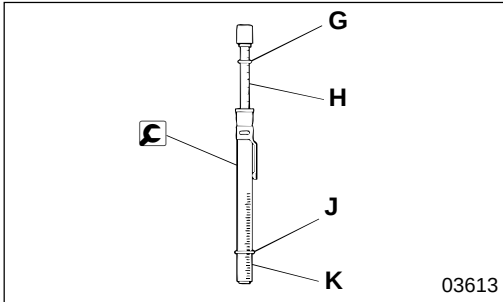


[Inspection]

Measure the extent of flex **A** when the center of V-belts **1, 2** as illustrated is depressed with a force of 98 N·m {72 lbf.ft, 10 kgf·m}.

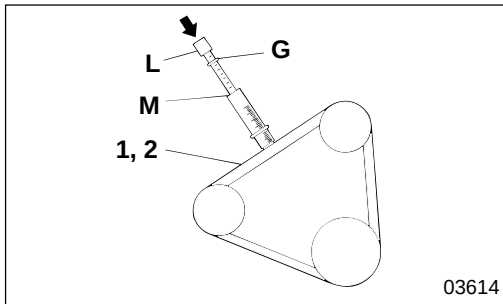
- B** : Alternator pulley
C : Water pump pulley
D : Cooler compressor pulley (Air-conditioner)
E : Tension pulley
F : Crankshaft pulley

MAINTENANCE OPERATIONS

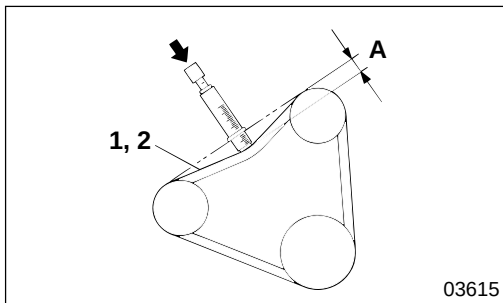


Use of special tool belt tension gauge

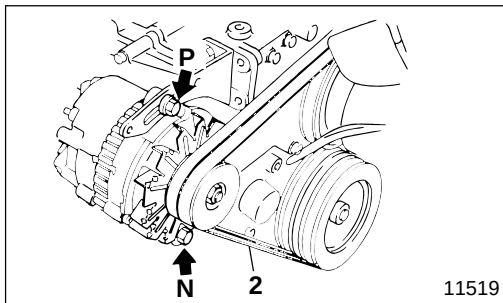
- Set upper O-ring **G** of belt tension gauge to 98 N·m {72 lbf.ft, 10 kgf·m} (push load) on graduation **H**.
- Set lower O-ring **J** of belt tension gauge to graduation **K** (maximum flex of belt).



- Place belt tension gauge at the center of V-belts **1, 2** perpendicularly as illustrated and push top **L** all the way down until upper O-ring **G** hits upper edge **M**.



- Measure the extent of flex **A** of V-belts **1, 2** at this point, and if the measured value deviates from the standard value, adjust as follows:



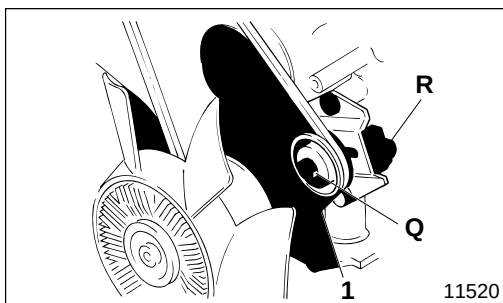
[Adjustment]

(1) Adjustment of tension of V-belt for fan

- Loosen alternator mounting bolts **N** (two points), and adjust the tension of V-belts **2** by moving adjusting bolt **P**.
- After adjustment, tighten the bolts **N, P** securely.

CAUTION

- Bear in mind that excessive tension of V-belts **2** might damage the belts and bearings that engage with the V-belts.
- Be sure to replace V-belts **2** as a set to maintain even tension between them.
- Be careful not to let oil stick to V-belts **2**. If oil gets onto the belts, it causes slipping, resulting in overheating and insufficient battery charging.



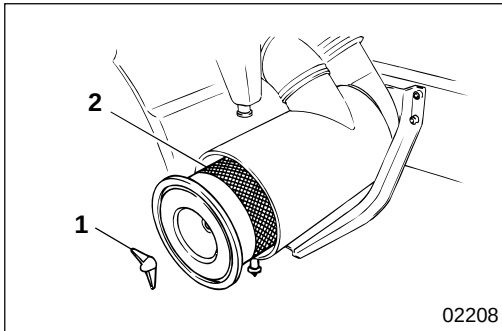
(2) Adjustment of tension of V-belt for air-conditioner

- Loosen tension pulley mounting nut **Q**, and adjust the tension of V-belt **1** moving adjusting bolt **R**.
- After adjustment, tighten mounting nut **Q** securely.

CAUTION

- Bear in mind that excessive tension of V-belt **1** might damage the belt and bearings that engage with the V-belt.
- Be careful not to let oil stick to V-belt **1**. If oil gets onto the belt, it causes slipping, resulting in poor performance of the air conditioner.

Cleaning and Replacement of Air Cleaner Element

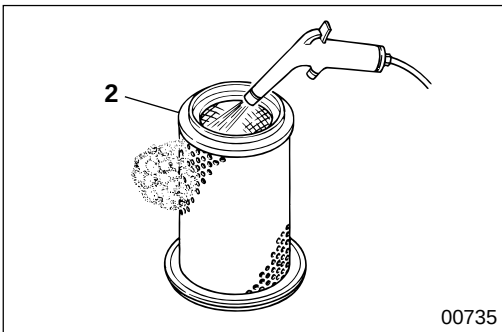


[Removal]

Remove wing nut **1** to remove element **2**.

[Installation]

Install element **2** securely.

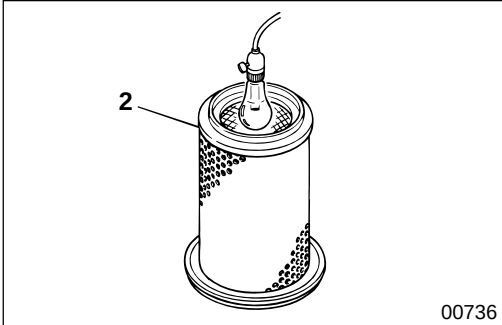


[Cleaning]

- Blow compressed air of 685 kPa {100 lbf/in², 7 kgf/cm²} or less through air cleaner element **2** from the inside.
- When using compressed air, move the blower's nozzle up and down along the pleats of air cleaner element **2** evenly.

CAUTION

- Do not tap or hit air cleaner element **2** to remove dust.
- Do not blow compressed air through air cleaner element **2** from the outside.



[Inspection]

- Illuminate the inside of air cleaner element **2**.
- If parts of the filter paper are torn or thin, or if the packing of the upper surface of air cleaner element **2** is damaged, replace the air cleaner element.

NOTE

If the dust on air cleaner element **2** is wet due to oil smoke or soot, replace the air cleaner regardless of the scheduled replacement interval.

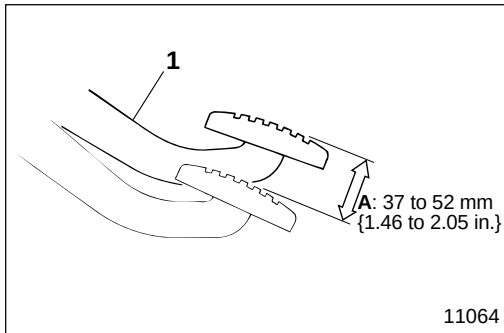
MAINTENANCE OPERATIONS

Inspection of Clutch Pedal Free Play

Service standards

Unit : mm {in.}

Location	Maintenance item	Standard value	Limit	Remedy
1	Clutch pedal free play	37 to 52 {1.46 to 2.05}	—	Adjust or replace



[Confirmation]

Push clutch pedal **1** with your hand and measure the amount of movement **A** (free play) until you meet resistance. If the measured value does not conform to the standard value, adjust by stroke of clutch power cylinder push rod, or replace the clutch disc.

[Clutch operation]

- Check for unusual noises when clutch pedal **1** is pressed while the engine is idling, and also for abnormally heavy clutch operation. Also check to be certain that it is not difficult to shift the vehicle into first and reverse gears.
- Gradually release clutch pedal **1** to set the vehicle in motion. Check to be sure there is no slippage, and that the clutch engages smoothly.

Tire

Service standards

Unit : mm {in.}

Location	Maintenance item	Standard value	Limit	Remedy
1	Depth of tire tread grooves	—	1.6 {0.063}	Replace

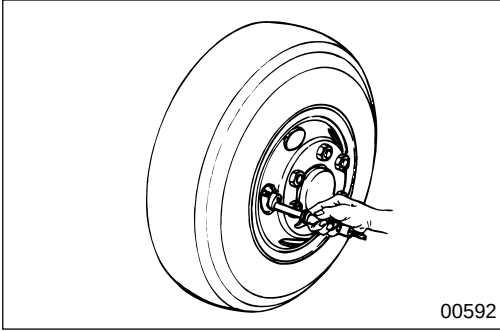
Tightening torque

Unit : N·m {lbf.ft, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
2	Wheel nut	370 to 410 {275 to 305, 38 to 42}	Wet

Lubricant

Location	Points of application	Specified lubricant	Quantity
2	Wheel nut spherical area	Chassis grease [NLGI No.1 (Ca soap)] or Wheel bearing grease [NLGI No.1 (Li soap)]	As required
4	Wheel nut (inner) at thread area and spherical area		
6	Thread area of hub bolt		



00592

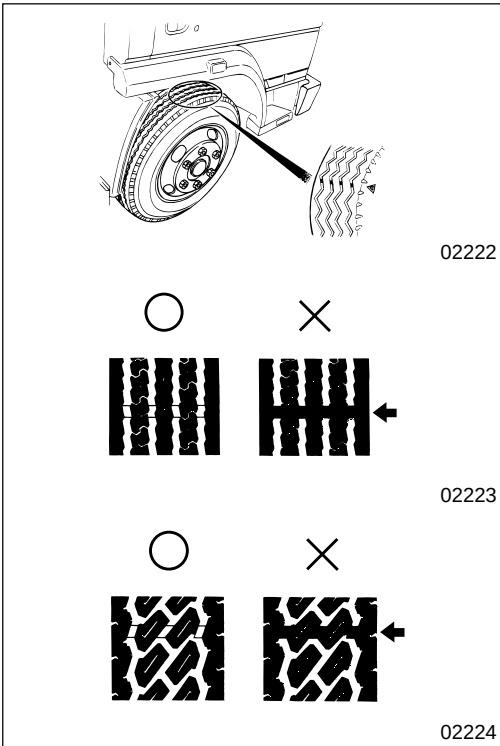
Air pressure

Tire air pressure should be checked before the vehicle is driven, while the tires are still cool.

Tire Size	Air Pressure kPa {Psi, kgf/cm ² }
215/75R 17.5 124/123L	700 {100, 7.00}

CAUTION

- Make certain that there is no difference in the air pressure between the inner and outer rear tires.
- Make certain you use valve caps on the air valves.
- It is not necessary to increase the air pressure for high-speed driving.



02222

02223

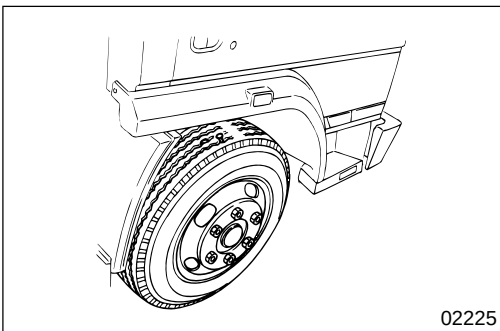
02224

Checking tread depth

- Check all around the tire treads to make sure that the depth of the tread grooves is above the wear limit.
- If the tread grooves are not deep enough, slip sign **A** appears at the position of the mark, where the tread groove has worn away.

WARNING

If the depth of the tread grooves is not adequate, the tires will slip on wet roads and present a hazard. Such tires are also extremely dangerous because they are more susceptible to hydroplaning when the vehicle is running at high speeds in the rain. Such tires must be replaced with new ones as soon as possible.



02225

Checking for cracks, damage, and objects embedded in the treads

- Check the tire treads and walls for cracks and damage.
- Check tire treads for uneven wear or other abnormal wear.
- Check if metal objects or nails have penetrated the tires.
- Check for stones embedded between double tires.

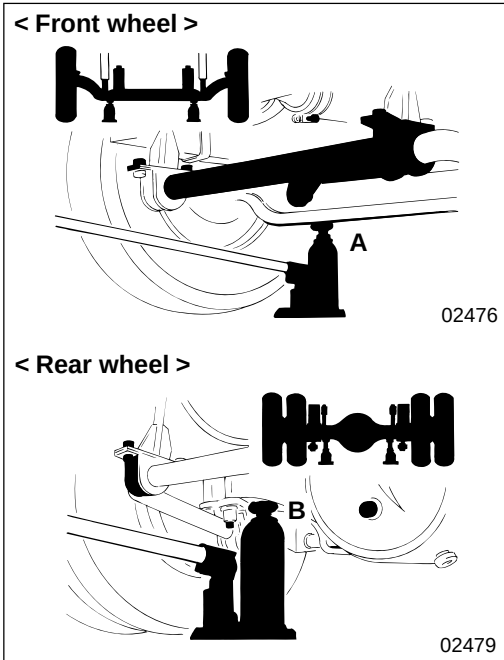
WARNING

Badly damaged or worn tires are extremely dangerous, because they can be punctured more easily when the vehicle is running, they must be replaced with new ones as soon as possible.

MAINTENANCE OPERATIONS

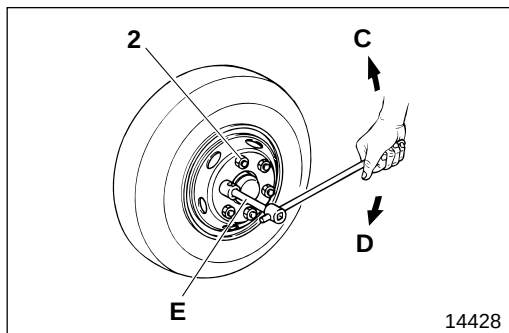
Removing tires

- Jacking up point
 - For front wheels : Front axle bottom A
 - For rear wheels : Rear axle tube bottom B



WARNING

- The jack should be placed on flat, solid ground, and should not be used to raise the vehicle higher than necessary.
- Do not use the jack at vehicle locations other than those illustrated.
- Keep in mind the danger of a slipping jack. Never crawl under the vehicle while the jack is in use or rock the vehicle. Also, do not start the engine while the vehicle is jacked up.
- To increase safety, use supports for the vehicle when it is necessary to leave it jacked up for long periods.
- Chock both the tire to be removed and the tire diagonally opposite to it so that they will not rotate when you are removing the tire.



- Loosen wheel nuts **2** slightly. The wheel nuts for right tires **C** have right-hand threads "R", and the wheel nuts for left tires **D** have left-hand threads "L".

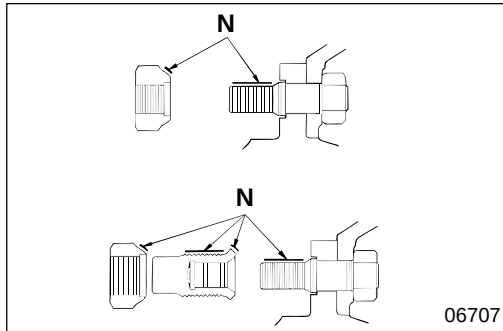
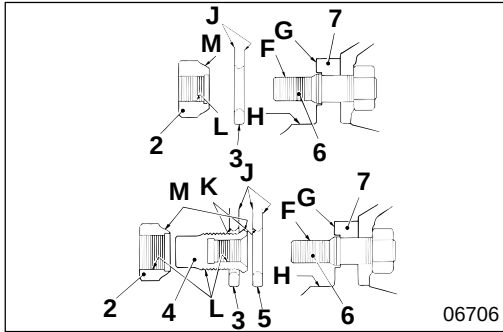
WARNING

Make certain that wheel nut wrench **E** is fully engaged, all the way to the back of nuts **2**. If it is not, it could slip.

CAUTION

Only loosen wheel nuts **2** slightly. Do not remove them.

- Jack up the vehicle carefully, until the tire is slightly off the ground. Remove wheel nuts **2**, then remove the tire.
- When working on the double tires at the rear of the vehicle, first remove the outside tire, then lower the vehicle and loosen the nuts on the inside tire. After doing this, jack the vehicle back up and remove the tire.



Mounting tires

- To prevent wheel nuts **2, 4** and hub bolt **6** from becoming loose and to prevent mounting parts (tire assemblies **3, 5** and hub **7**) from being damaged, remove rust, dust, additional coatings of paint, and foreign particles from the following areas:

F : Hub bolt thread area

G : Wheel mounting surface of hub

H : Wheel alignment area of hub

J : Disc wheel mating surface

K : Disc wheel nut mounting surface

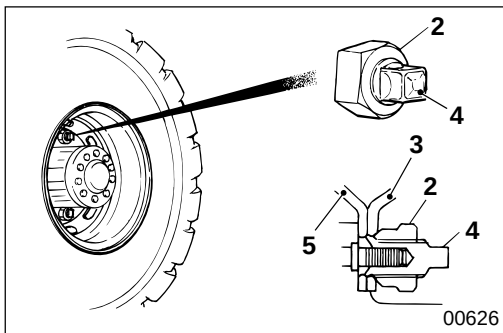
L : Wheel nut thread area

M : Wheel nut spherical area

N : Grease application area

WARNING

Never use grease containing molybdenum disulfide, since it can cause loosening of fitted screws.



- Put on the double rear tires as follows:

- After mounting inner tire **5** and fully tightening inner wheel nuts **4**, jack the vehicle up and mount on outer tire **3**, then tighten outer wheel nuts **2**.
- Even if only outside tire **3** is to be changed, do not mount it until inner wheel nuts **4** have been fastened at the specified torque.
- Slide the air valves on the inside and outside tires down when mounting the tires.

WARNING

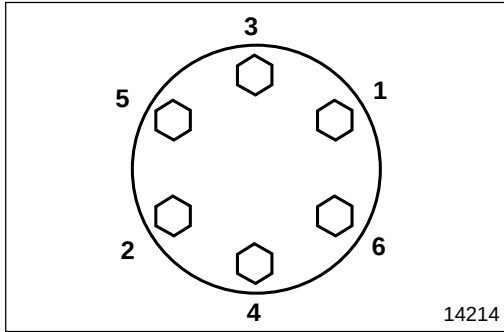
If the threads are scored, or the disc wheel is deformed or cracked, change bolts **6**, nuts **2, 4** and disc. Driving the truck before correcting such problems can cause the tire in question to come loose, which could be the source of major accidents.

CAUTION

Check hub bolt **6** threads carefully for scratches before putting the tire on.

- Place the tapered end of wheel nuts **2, 4** towards the disc wheel and fasten temporarily. Center so that there is no eccentricity between bolts **6** and the disc wheel bolt holes.
- Lower the vehicle.

MAINTENANCE OPERATIONS



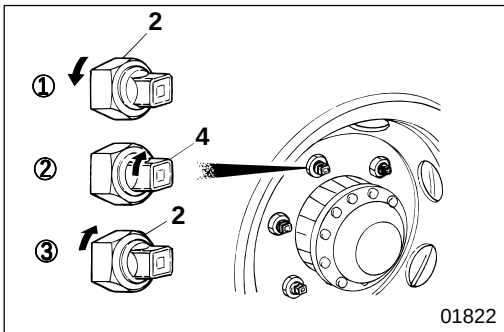
- Tighten the nuts in the order as illustrated, tightening each nut two or three times. To finish, tighten each nut at the specified torque.

WARNING

Always use the specified torque when tightening the wheel nuts. If the wheel nuts are not tightened properly, the wheels could come loose while the vehicle is being driven, which could result in life threatening accidents or the truck being disabled.

CAUTION

Over-tightening the wheel nuts can damage them.



Checking the wheel nuts for looseness

The wheel nuts should be checked for looseness every 10000 km (6000 miles). All nuts should be tightened at the specified torque.

- Check the double rear tires for looseness as follows:

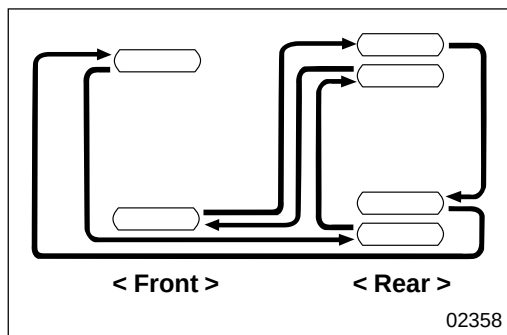
- ① Loosen outer wheel nuts 2.
- ② Tighten inner wheel nuts 4 at specified torque.
- ③ Tighten outer wheel nuts 2 at specified torque.

CAUTION

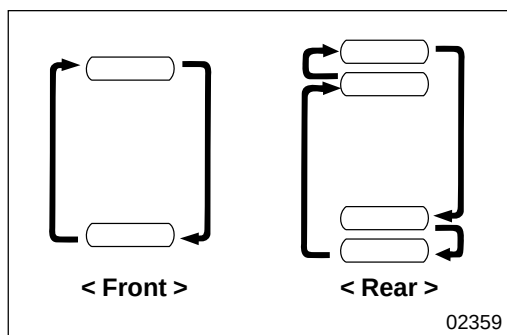
If outer wheel nuts 2 are tightened without first being loosened, it might not be possible to tighten them at the specified torque.

Tire rotation

Tires wear differently, according to the location where they are mounted. To make this wear uniform and prolong the life of your tires, they should be rotated every 10000 km (6000 miles) in the rotation order shown below:



- When the tread patterns for all tires are identical:



- When the tread patterns are different for the front and rear tires:

CAUTION

- Always adjust air pressure after running-in new tires.
- When using tires of different tread patterns, use rib-type patterns for the front tires and traction type patterns for the rear tires.
- Avoid using both radial and biased tires on the same vehicle.

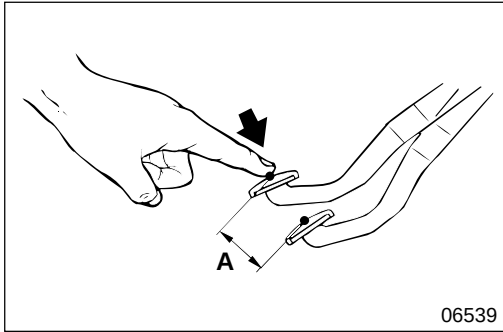
MAINTENANCE OPERATIONS

Inspection of Brake Pedal Free Play

Service standards

Unit : mm {in.}

Location	Maintenance item	Standard value	Limit	Remedy
—	Free play of brake pedal	10 to 15 {0.39 to 0.59}	—	Adjust



[Inspection]

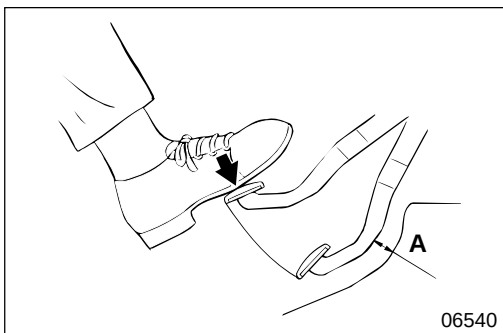
Check if brake pedal free play **A** confirms to the standard value with starter switch OFF. If the measured value deviates from the standard value, adjust the position of the brake pedal.

Inspection of Clearance between Brake Pedal and Floor Panel

Service standards

Unit : mm {in.}

Location	Maintenance item	Standard value	Limit	Remedy
—	Clearance between brake pedal and floor panel (with pedal depressed at 490 N {110 lbf, 50 kgf})	52 {2.05} or more	—	Adjust



[Inspection]

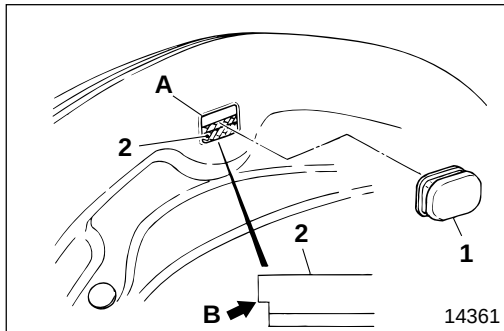
Depress the brake pedal using 490 N {110 lbf, 50 kgf} when the engine is idling to check if clearance **A** between the brake pedal and the floor panel conforms to the standard value. If the measured value deviates from the standard value, adjust the position of the brake pedal.

Inspection of Brake Lining Thickness

Service standards

Unit : mm {in.}

Location	Maintenance item	Standard value	Limit	Remedy
2	Thickness of brake lining	—	5 {0.20} (Wear limit at side step)	Replace



NOTE

Be sure to inspect at two points for each wheel per side.

- Remove check hole plug **1** from the packing plate.
- Inspect through check hole **A** whether brake lining **2** is worn to the point of side shoulder **B** of the brake lining (the limit).
- If the measured value is lower than the limit, replace brake lining **2** on the same axle as a unit.
- After inspection, be sure to reinstall check hole plug **1**.

Battery

DANGER ⚠

- Since flammable hydrogen gas is generated by the battery, be sure to obey the following warnings :
 - Do not short-circuit the $\oplus$ and $\ominus$ terminals on the battery.
 - Keep sparks and lit cigarettes away from the battery.
 - Do not wear metal objects on your arms and lean over the battery.
- Because the battery electrolyte is diluted sulfuric acid and is corrosive, when handling the battery wear safety glasses and rubber gloves to protect the eyes and hands.

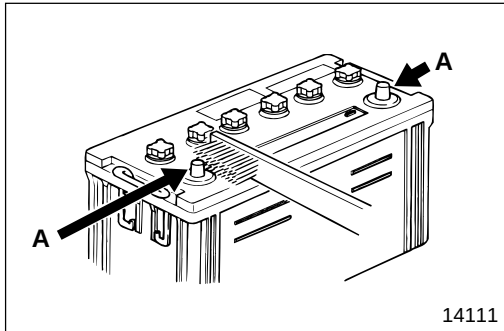
WARNING ⚠

To prevent a short-circuit be sure that disconnected the battery cables do not accidentally touch the battery terminals.

CAUTION ⚠

- Make sure that you disconnect the battery cable $\ominus$ first when you disconnect the battery cables.
- Make sure that all electrical switches of the vehicle are OFF before connecting the battery cables.
- Make sure that you connect the battery cable $\oplus$ before you connect the battery cable $\ominus$.

MAINTENANCE OPERATIONS

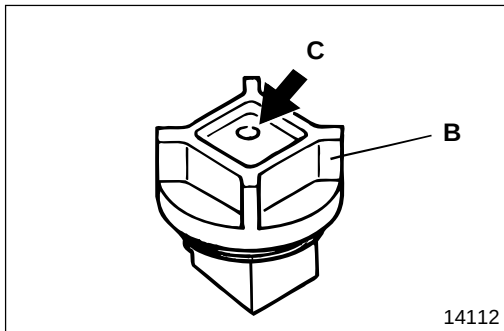


Visual inspection

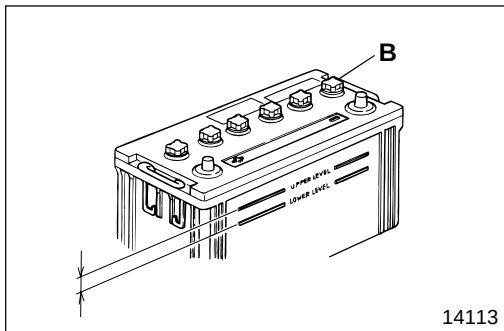
- If terminal **A** is corroded, scrub off the corrosion from it using a wire brush.
- If cracks or defects are found on the battery, replace it since the cracks or defects can cause liquid spills.

CAUTION

Make sure you grease the ⊕ side of terminal **A** because it is easily corroded.

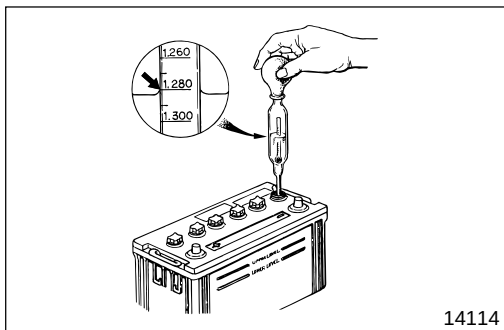


- If bleed hole **C** of vent plug **B** is clogged, clean the hole.



Inspection of fluid level

- Make sure that the battery electrolyte level is between UPPER and LOWER.
- If the level is below LOWER, remove vent plug **B** and fill the battery with distilled water or battery replenisher to UPPER.



Measurement of specific gravity

Measure the specific gravity of the battery electrolyte. If the measured value is lower than the limit, charge the battery.

NOTE

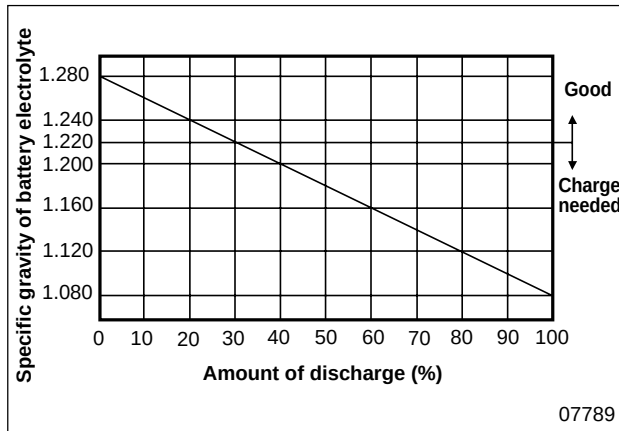
The specific gravity of the battery electrolyte depends on the liquid temperature. Use the following formula to convert the actual value to the value were the temperature 20°C {68°F}.

$$S_{20} \{68\} = S_t + 0.0007 (t - 20 \{68\})$$

$S_{20} \{68\}$: Specific gravity were the temperature 20°C {68°F}

S_t : Specific gravity actually measured with the temperature at t°C {t°F}

t : Temperature of battery electrolyte



Charging

- Although, as a rule, charging of the battery should be done with the battery removed from the vehicle, if you have to charge the battery while it is on the vehicle, make sure that you stop the engine and disconnect the battery cable ⊖.
- Remove vent plug **B** before charging the battery.
- For the recommended charge time and current, see the following table to avoid overcharging.

	Charge current (A)	Charge time (H)	Upper limit of fluid temperature (°C {°F})
Normal charge	Value of 5-hour rating capacity	$\frac{\text{*Amount of discharge (Ah)}}{\text{Charge current (A)}} \times 1.2 \text{ (to 1.5)}$	45 {113}
	10		
Quick charge	Value of 5-hour rating capacity	0.5	55 {131}
	1.5		

$$\text{* Amount of discharge (Ah)} = \frac{\text{5-hour rating capacity (Ah)} \times \text{Amount of discharge (\%)}}{100}$$

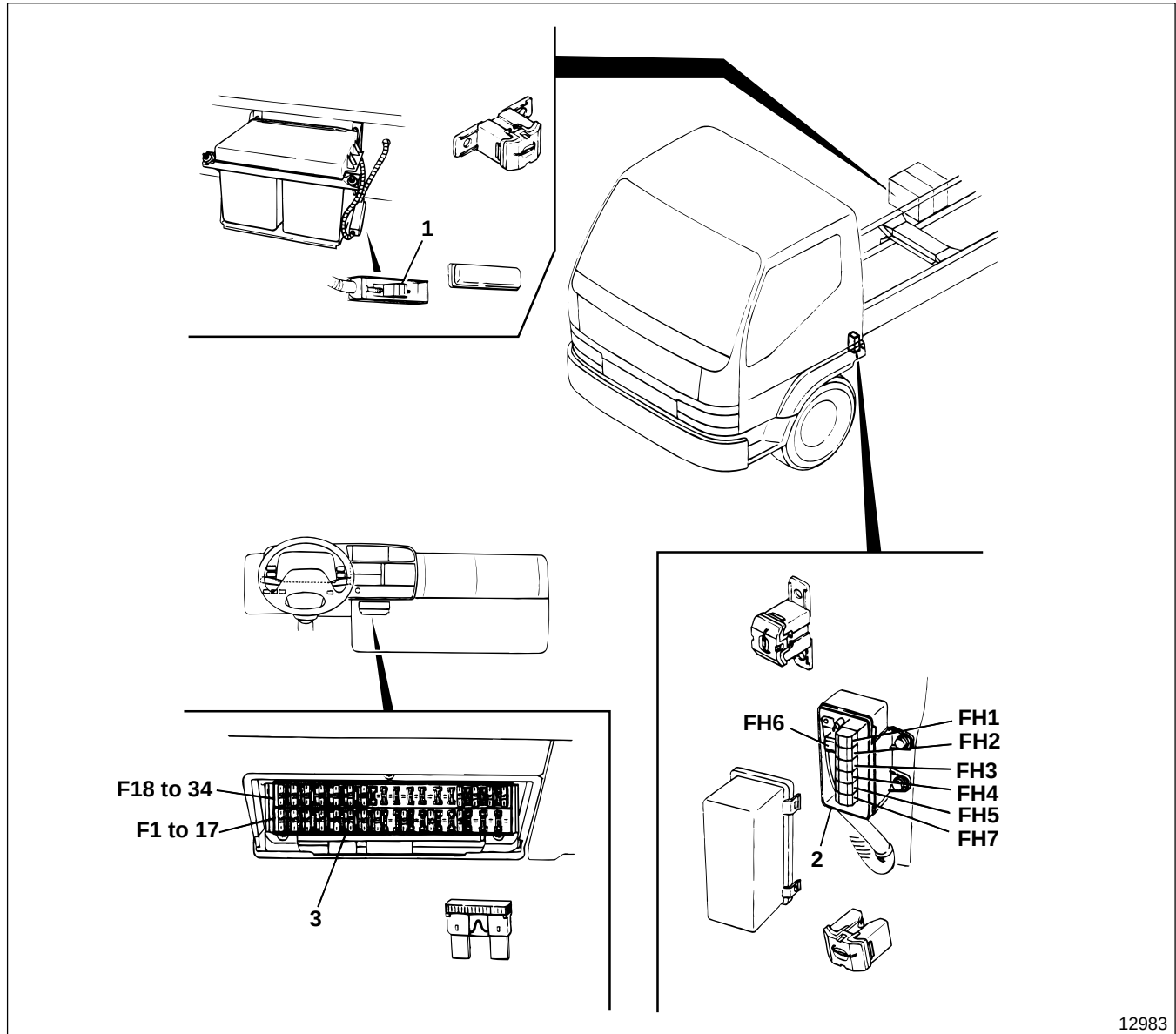
- Use the graph shown on the left to calculate the amount of discharge (%).
- Use diluted sulfuric acid, made up of sulfuric acid and refined or distilled water, as the battery electrolyte.
- The specific gravity of fully-charged battery electrolyte is 1.280 with the temperature at 20°C {68°F}.

DANGER ⚠

- Do not let the battery electrolyte level rise and overflow while charging the battery.
- Keep naked lights away from the battery while charging it or it might explode.
- Be careful not to generate sparks while charging the battery because its dangerous.
- After charging the battery, tighten vent plug **B**, wash away sulfuric acid from the battery using water, and dry the surface.

MAINTENANCE OPERATIONS

Fuse



12983

- 1 Main high-current fuse
- 2 High-current fuse box
- 3 Fuse box

CAUTION ⚠

- If a fuse blows, make sure you identify and remedy the cause, then replace the fuse.
- Make sure that you replace the fuse with one having the same rating.
- Make sure that you remove the $\ominus$ terminal of the battery cable before removing main high-current fuse 1 and high-current fuses FH1 to 7.

Main high-current fuse

Fuse No.	Main load	Capacity
—	High-current fuse box	120 A

High-current fuse box

Fuse No.	Main load	Capacity
FH1	Fuse box (F1 to F4)	50 A
FH2	Fuse box (F5 to F8, F11)	40 A
FH3	Brake booster (Hydraulic booster)	50 A
FH4	Starter switch (Terminal B)	50 A
FH5	Glow relay	50 A
FH6	Alternator	120 A
FH7	Fuse box (F31 to F34)	40 A

Fuse box

Fuse No.	Main load	Capacity
F1	Headlamp, LH	15 A
F2	Headlamp, RH	15 A
F3	Stop lamp, horn	15 A
F4	Turn signal lamp	15 A
F5	Fuel-cut motor	10 A
F6	Cab lamp	10 A
F7	Reserve power (BATT)	10 A
F8	A/T fluid cooler fan relay	—
F9	—	—
F10	—	—
F11	Reserve power (BATT)	10 A
F12	—	—
F13	* Cigarette lighter	15 A
F14	Radio	10 A
F15	Reserve power (ACC)	—
F16	—	10 A
F17	Fuel-cut relay	10 A

Fuse No.	Main load	Capacity
F18	Starter	10 A
F19	Backup lamp	10 A
F20	Meter cluster	10 A
F21	Wiper	10 A
F22	—	—
F23	—	—
F24	—	—
F25	—	—
F26	—	—
F27	Exhaust brake < M/T >	10 A
F28	Transmission PTO	10 A
F29	Pre-stroke cut relay	15 A
F30	* Air-conditioner control	10 A
F31	* Air-conditioner compressor	10 A
F32	* Condenser fan	15 A
F33	Blower fan	25 A
F34	Tail lamp	15 A

* : Fuses are provided for these pieces of equipment only where they are installed.

PTO : Power take-off

A/T : Automatic transmission

M/T : Manual transmission

LUBRICATION

*1 : 30000 km/18000 miles or 6 months, whichever occurs first.

*2 : 60000 km/36000 miles or 12 months, whichever occurs first.

(E) : Exhaust emission items

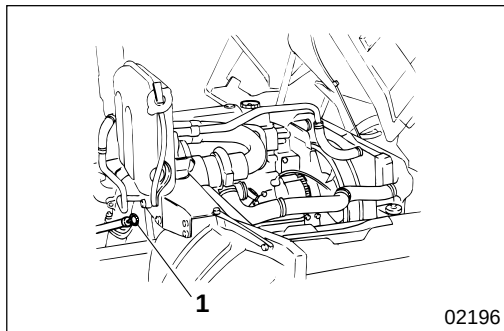
Inspection and maintenance		Time of inspection and maintenance					Lubrication procedures	Remarks
		Pre-operation checks	New vehicle at 4000 km/2500 miles	Inspection interval				
				Every 10000 km/ 6000 miles	Every 30000 km/ 18000 miles *1	Every 60000 km/ 36000 miles *2		
1	Ⓔ Engine oil contamination and oil level	×					Engine oil API classification CD, CD/SF, CE, CE/SF or CF-4 Over 30°C {86°F} SAE 40 40 to −5°C {104 to 23°F} SAE 30 15 to -15°C {59 to 5°F} SAE 20W-20 Over -15°C {5°F} SAE 15W-40 Below 0°C {32°F} SAE 10W-30	📦 Gr 12
	Ⓔ Engine oil replacement		×	×				
2	Brake fluid tank fluid level	×		×			Brake fluid (SAE J1703f or FMVSS No.116 DOT3)	📦 Gr 21, 35
	Brake fluid tank fluid replacement					×		
3	Lubrication of clutch fork shaft				×		Wheel bearing grease [NLGI No.2 (Li soap)]	📦 Gr 21
4	Lubrication of clutch shifter			When replacing clutch disc assembly				
5	Manual transmission oil level			×			Gear oil, API classification GL-3 SAE 80 (General) GL-3 SAE 90 (Warm region) GL-4 SAE 90 (Tropical region) Engine oil Long period of high-speed driving API classification CC or CC/SF SAE 30 or SAE 40	📦 Gr 22
	Manual transmission oil replacement		×		×			
6	Automatic transmission fluid level			×			Automatic transmission fluid (DEXRON, DEXRON II type)	📦 Gr 23
	Automatic transmission fluid and filter replacement			Every 40000 km/ 25000 miles Replace the fluid at the first 10000 km/6000 miles inspection				
7	Axle housing gear oil level			×			Gear oil API classification GL-5 Below 40°C {104°F} SAE 90 Over 40°C {104°F} SAE 140 Use SAE 140 when operating vehicle at high load such as continuous ascent on slopes and when the outside temperature is 10°C {50°F} or more	📦 Gr 27
	Axle housing gear oil replacement		×			×		
8	Hub bearing grease and oil seal replacement					×	Wheel bearing grease [NLGI No.2 (Li soap)]	📦 Gr 26, 27
9	Power steering fluid level			×			Automatic transmission fluid (DEXRON, DEXRON II type)	📦 Gr 37
	Power steering fluid replacement					×		
10	Lubrication of propeller shaft (universal joint, slip joint, center bearing)			×			Wheel bearing [NLGI No.2 (Li soap)]	📦 Gr 25
11	Lubrication of kingpins			×			Chassis grease [NLGI No.1 (Ca soap)]	📦 Gr 26
12	Lubrication of all chassis parts			×				

Engine Oil

Tightening torque

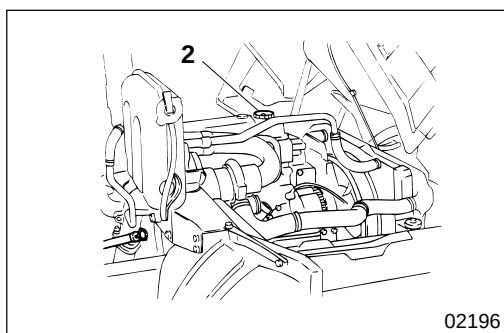
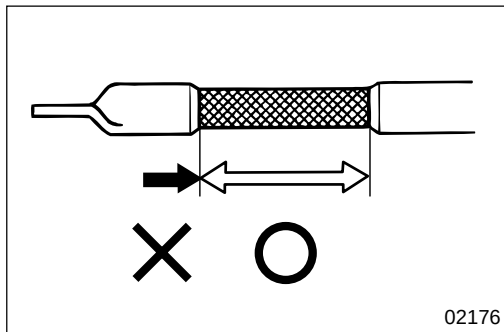
Unit : N·m {lbf.ft, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
3	Oil pan drain plug	69 {51, 7}	—



[Inspection]

- Pull out dipstick **1**, wipe off the oil with a cloth.
- Reinsert dipstick **1**, then pull it out carefully.
- Oil level is correct if there is oil sticking to dipstick **1** within the hatched area.
- If the level is low, top it up.
- Tilt the cab.



[Replenishment]

- Clean the area surrounding oil filler cap **2** and prevent dust from entering through the filler.
- Remove oil filler cap **2** and top up with engine oil.
- Wait five minutes before checking the oil level.
- Replace filler cap **2**.

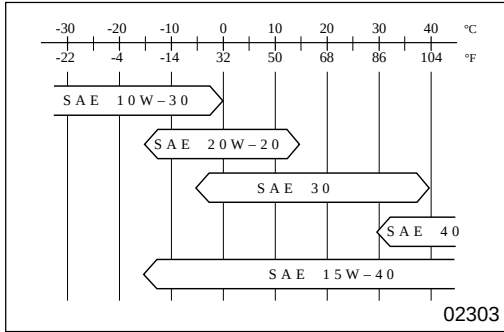
WARNING

- Wipe up any engine oil that has been spilled because it can cause a fire.
- Do not touch the engine while it is hot as it will burn you.

CAUTION

Take care not to spill engine oil on the V-belts, because this would cause them to slip, reducing service life.

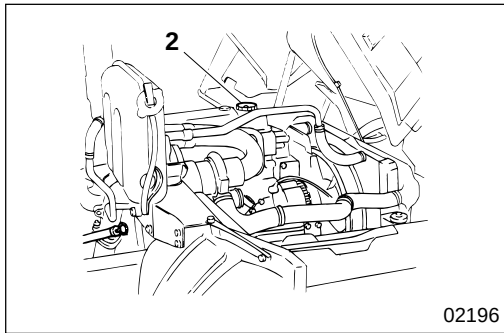
LUBRICATION



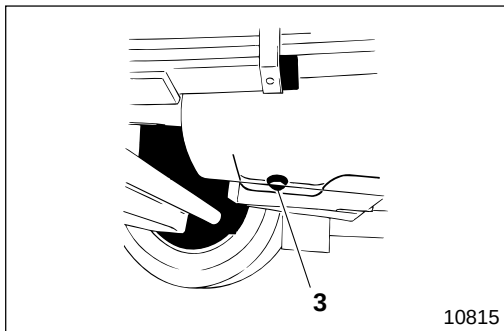
[Replacement]

Since engine oil greatly influences the performance, the life expectancy, and the ability to start the engine, use only oil of the specified grade and viscosity.

The chart illustrates the relationship between oil viscosity and the ambient air temperature.



- Clean the area surrounding oil filler cap **2** and prevent dust from entering through the filler.
- Remove oil filler cap **2**.
- Remove oil pan drain plug **3**, and drain the oil. At the same time replace the oil filter.
- After reinstalling drain plug **3**, slowly add engine oil through the oil filler.
- Using the dipstick, check the oil level after more than six minutes have passed.
- Start the engine and let it idle. When the oil has reached all parts, stop the engine. Let 30 minutes pass before checking the oil level again.



Clutch Fluid (Brake Fluid)

Tightening torque

Unit : N·m {lbf.ft, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
2	Air bleeder	25 to 34 {18 to 25, 2.5 to 3.5}	—

Fluid

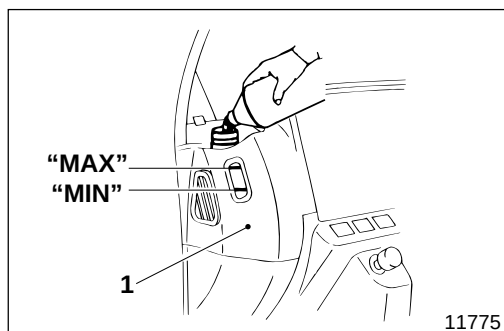
Location	Points of application	Specified fluid	Quantity
1	Fluid tank	Brake fluid (SAE J1703f or FMVSS No.116 DOT3)	As required

WARNING

- The clutch fluid system and the brake fluid system use the fluid tank in common.
- You must use new brake fluid (SAE J1703f or FMVSS No.116 DOT3). Do not add different quality fluid or mineral oil (gas oil, engine oil, gear oil, automatic transmission fluid, etc.) to the clutch system, because this will cause the rubber parts of the clutch system and brake system to swell, resulting in faulty clutch operation, as well as ineffective braking and brake dragging.
- Do not allow foreign particles or water to become mixed into the brake fluid when refilling, because this will result in ineffective clutch and brake operations.
- If you use a mug for adding brake fluid, keep it solely for that purpose.

CAUTION

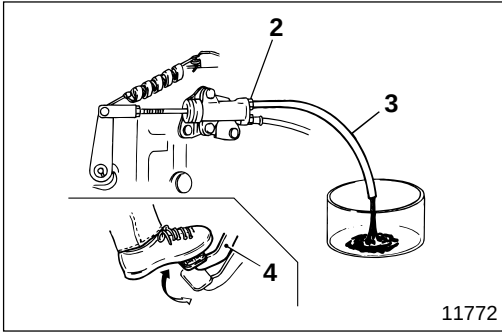
- Be careful not to splash brake fluid on related parts as this could damage the paintwork.
- Be sure to wipe off brake fluid immediately if you splash it on the paintwork.



[Inspection and replenishment]

- Inspect the level of the brake fluid in fluid tank 1. It should fall between the "MAX" and "MIN" levels.
- If it is below the "MIN" level, lift up the lid flap and remove the cap from fluid tank 1, then supply the specified brake fluid until the level has come up to the "MAX" level. Do not fill above the "MAX" level.

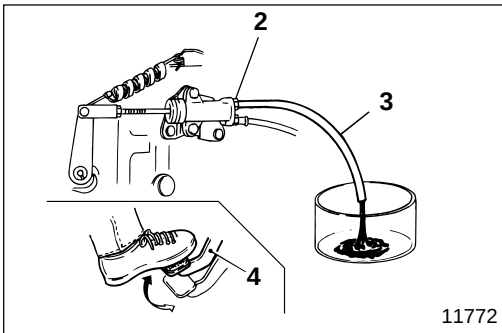
LUBRICATION



[Replacement]

- Attach vinyl pipe **3** to air bleeder **2** of the clutch power cylinder.
- Loosen air bleeder **2** and depress clutch pedal **4** several times to drain brake fluid completely.

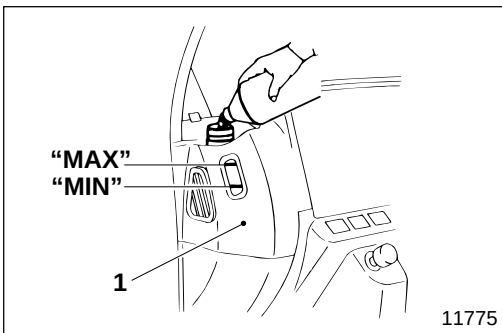
- Supply new brake fluid to the “**MAX**” level of fluid tank **1**. Depress clutch pedal **4** repeatedly until the old brake fluid discharged from vinyl pipe **3** is replaced by the new brake fluid.



NOTE

Carry out this operation maintaining the brake fluid level in fluid tank **1** between “**MAX**” and “**MIN**”.

- Attach vinyl pipe **3** to air bleeder **2** of the clutch power cylinder as in the replacement procedure.
- Fill fluid tank **1** with brake fluid, and loosen air bleeder **2** of the clutch power cylinder then depress clutch pedal **4** continuously.
- Keep depressing clutch pedal **4**, and tighten air bleeder **2** when air is bled completely.
- Depress clutch pedal **4** several times again, then keep it depressed at its fullest extent.
- With clutch pedal **4** depressed, loosen air bleeder **2** to drain brake fluid containing air. Release the pedal after tightening the air bleeder.
- Repeat this operation until air is no longer present in the fluid being drained.
- When this operation is completed, tighten air bleeder **2** at specified torque.
- Check that brake fluid is at the “**MAX**” level of fluid tank **1**, and supply new brake fluid if necessary.
- Check for brake fluid leakage from each of the parts with clutch pedal **4** depressed.



Manual Transmission Gear Oil

Tightening torque

Unit : N·m {lbf.ft, kgf·m}

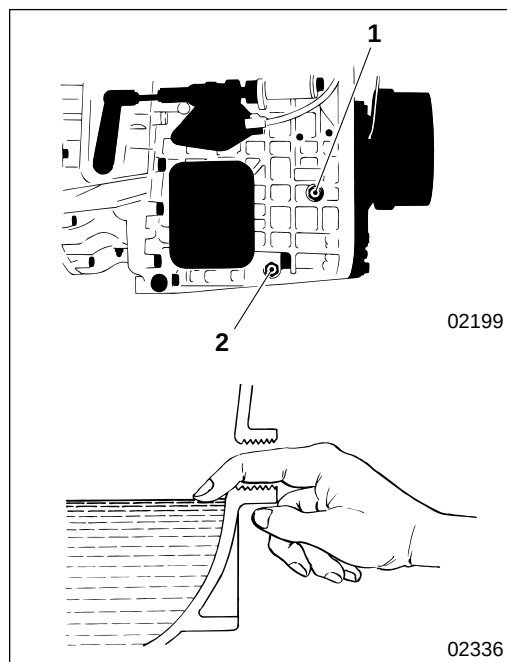
Location	Parts to be tightened	Tightening torque	Remarks
1	Inspection plug	69±15 {51±11, 7±1.5}	—
2	Drain plug	69±15 {51±11, 7±1.5}	—

Sealant

Location	Points of application	Specified sealant	Quantity
1	Thread area of inspection plug	THREEBOND 1105D	As required
2	Thread area of drain plug	THREEBOND 1105D	As required

WARNING

The engine is hot immediately after the vehicle stopped, so take care not to burn yourself.



[Inspection and replenishment]

- Remove inspection plug **1** and check whether the oil level is up to the edge of the entrance.
- If the level is low, add oil through the inspection plug hole until the level comes up to the edge of the entrance.

[Replacement]

- Drain the oil after removing inspection plug **1** and drain plug **2**.
- Remove any metal particles sticking to the magnetic part of drain plug **2** before reinstalling the plug.
- Add oil through the inspection plug hole until the level comes up to the edge of the entrance.
- Insert inspection plug **1**.

LUBRICATION

Automatic Transmission Fluid and Oil Filter

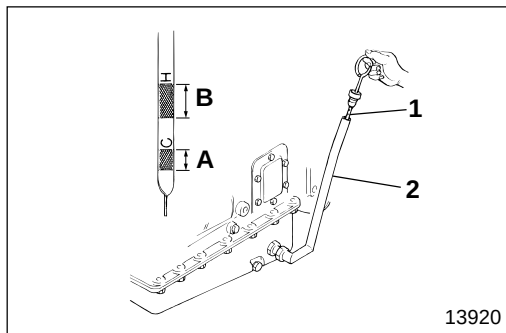
Tightening torque

Unit : N·m {lbf.ft, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
4	Drain plug	20 to 27 {15 to 20, 2.05 to 2.75}	—
5	Dipstick guide connector	125 to 135 {91 to 100, 12.55 to 13.76}	—
6	Bolt (Oil pan mounting)	14 to 18 {10 to 13, 1.4 to 1.8}	—
8	Bolt (Oil filter mounting)	14 to 18 {10 to 13, 1.4 to 1.8}	—
12	Oil filter	9.8 to 20 {7 to 14, 1 to 2}	—

Fluid

Location	Points of application	Specified fluid	Quantity
11	Body of O-ring	Automatic transmission fluid (DEXRON or DEXRON II type)	As required
12	Gasket of oil filter with thin application	Automatic transmission fluid (DEXRON or DEXRON II type)	As required



[Inspection and replenishment]

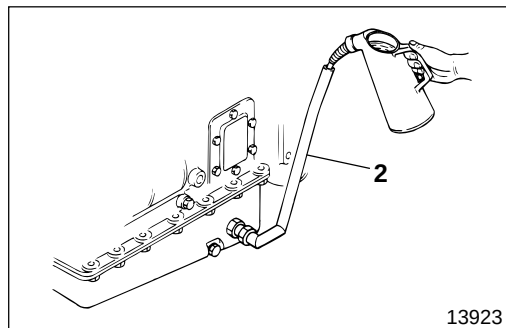
- Park the vehicle on level ground, make sure that the parking brake is fully activated and chock the wheels to keep them from rolling.
- Start the engine and let it idle. To fill the hydraulic circuit with automatic transmission fluid, shift the range selector lever from N → R → N → D → 2 → D → N. Repeat this process five times, finally shifting to N.
- While the engine is still idling, pull out dipstick **1** and wipe off the fluid sticking to it. Reinsert the dipstick, then pull it out again and check the fluid level.
- If the fluid level is inspected right after the engine is started and the fluid temperature is still low (approximately 15 to 49°C {60 to 120°F}), the level should be within area **A** marked COLD on dipstick **1**.
- If the fluid level is inspected after the vehicle has been driven and the fluid temperature is high (approximately 71 to 93°C {160 to 200°F}), the level should be within area **B** marked HOT on dipstick **1**.

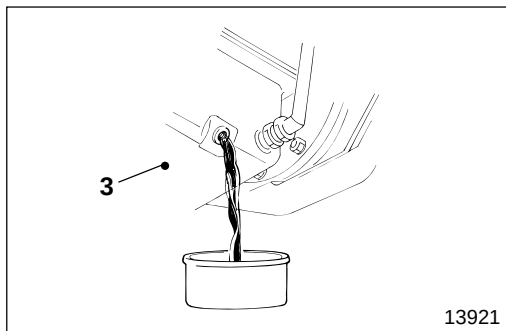
WARNING ⚠

Take care during the inspection because the engine will be running. Take sufficient care to avoid burns or injuries resulting from contact with moving parts.

NOTE

- Make sure the vehicle is parked on level ground when you are checking the fluid level.
- Make sure the range selector lever is in the N position and the engine is idling when you are checking the fluid level. When the engine is stopped, the fluid level appears higher than it actually is.
- Be sure to wipe off the dust from the safety cap and the upper part of dipstick guide **2** before you pull out dipstick **1**.
- To ensure the fluid is correct, reinspect the fluid level after an actual drive.
- If the fluid level is low, add automatic transmission fluid (DEXRON or DEXRON II type) through dipstick guide **2** until the correct level on dipstick **1** is reached.





[Replacement]

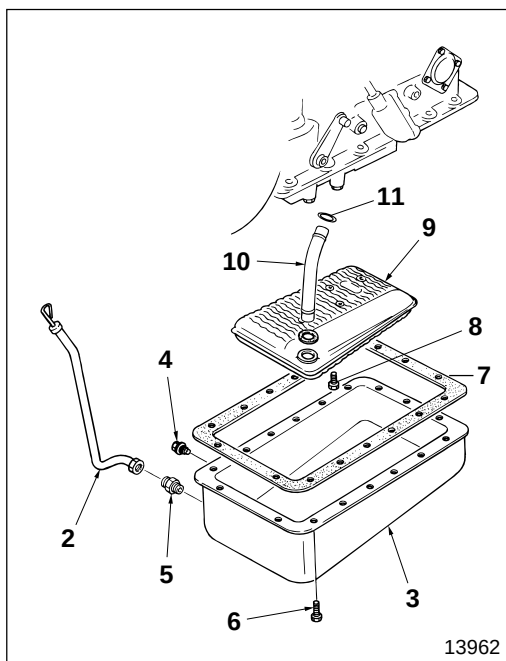
- Park the vehicle on level ground, chock the wheels and shift the range selector lever to the N position.
- Place a container under oil pan **3**, remove drain plug **4** and drain the fluid.

WARNING ⚠

Take care because the fluid temperature immediately after the engine has stopped is very high. To avoid scalds, wait until a safe temperature has been reached before draining the fluid.

NOTE

- The fluid will drain faster if the engine is first run to raise the fluid temperature.
- The fluid cannot be drained from the hydraulic circuit, the torque converter or the oil cooler.
- Check the drained fluid for dirt, metal particles and metal fragments.



- Remove oil pan **3**, intake pipe **10**, O-ring **11**, gasket **7** and oil filter **9**.
- Clean oil pan **3**.
- Replace O-ring **11**, gasket **7** and oil filter **9**.

2 : Dipstick guide

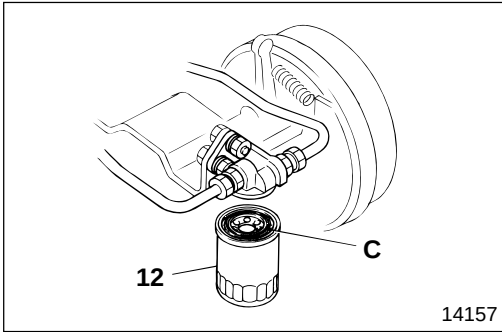
4 : Drain plug

5 : Dipstick guide connector

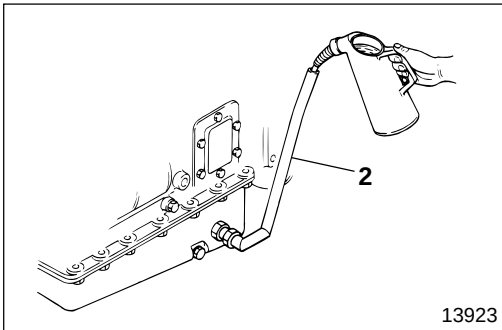
6 : Bolt

8 : Bolt

LUBRICATION



- Remove oil filter **12** (for oil cooler) by turning it counterclockwise.
- Lightly coat gasket **C** with the fluid before installing oil filter **12**. Then tighten the oil filter.



- Supply fluid through dipstick guide **2**.

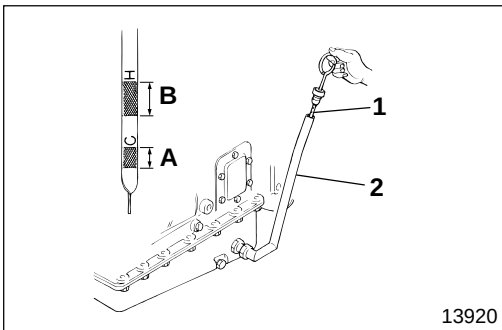
CAUTION

Make sure that dirt and foreign particles do not become mixed in with the fluid when it is added.

- Shift the range selector lever to the N position, start the engine and let it idle for about one minute.
- After shifting the lever through all positions once, shift it back to N position.

CAUTION

To prevent burning out the interior of the automatic transmission assembly, make sure that the engine is not allowed to race when you do the above.



- Check and adjust so that the fluid level is within the specified area on dipstick **1**.

NOTE

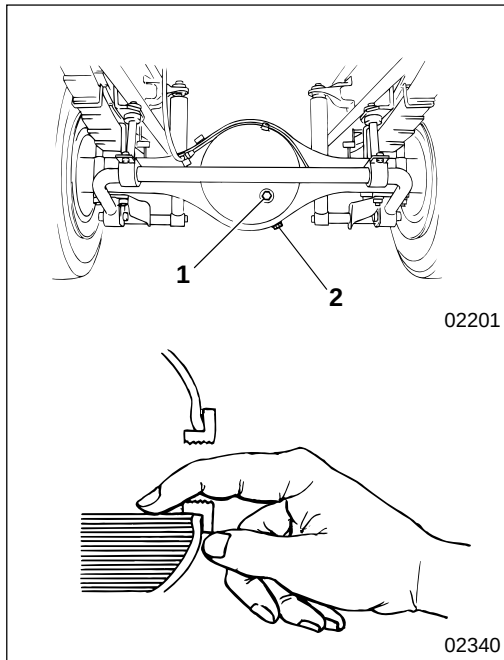
- As the temperature of the fluid rises, so does the fluid level. If you add fluid while the temperature is still low (approximately 15 to 49°C {60 to 120°F}), make sure that the level stays within area **A**, marked **COLD** on dipstick **1**.
- Let the engine idle and, while paying attention to the fluid level, pour in the fluid slowly.
- It is sometimes hard to check the fluid level, immediately after supplying fluid, because of the fluid adhering to the interior of dipstick guide **2**. If this is the case, check the fluid level several times at intervals.
- Be careful not to supply too much fluid because you might mistake the fluid that overflows from the air breather for fluid leakage.

Rear Axle Gear Oil

Tightening torque

Unit : N·m {lbf.ft, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
1	Inspection plug	98 to 115 {72 to 87, 10 to 12}	—
2	Drain plug	98 to 115 {72 to 87, 10 to 12}	—



[Inspection and replenishment]

WARNING

The oil temperature is high immediately after the vehicle stopped, so take care not to scald yourself.

- Remove inspection plug **1**, check the oil level and make sure it is up to the edge of the entrance.
- If the oil level is low, add oil through the inspection plug hole until the level comes up to the edge of the entrance.
- Insert inspection plug **1**.

[Replacement]

- Drain the oil after removing inspection plug **1** and drain plug **2**.
- Remove any metal particles sticking to the magnetic part of drain plug **2** before reinstalling the plug.
- Supply oil through the inspection plug hole until the level comes up to the edge of the entrance.
- Reinstall the inspection plug.

LUBRICATION

Power Steering Fluid

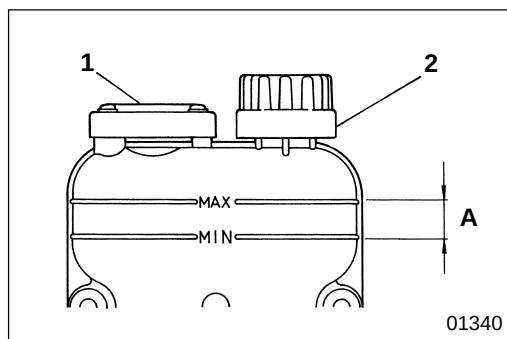
Tightening torque

Unit : N·m {lbf.ft, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
3	Oil pipe	66.69±12.75 {49±9.4, 6.8±1.3}	—

Fluid

Location	Points of application	Specified fluid	Quantity
1	Power steering oil tank	Automatic transmission fluid (DEXRON or DEXRON II type)	Between "MAX" and "MIN" on the power steering oil tank



WARNING

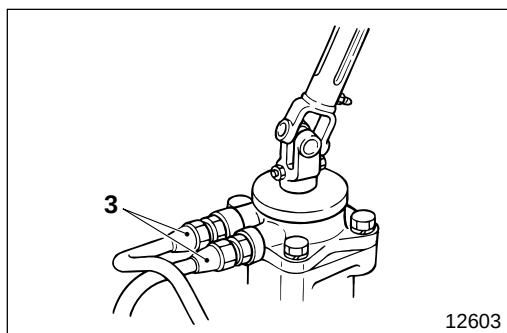
Because the brake booster (hydraulic booster) uses power steering fluid, do not let other fluids such as brake fluid, etc. get mixed with the power steering fluid inside the power steering oil tank.

[Inspection and replenishment]

- Straighten the front wheels and stop the engine.
- Inspect the level of the fluid in power steering oil tank 1. It should fall between fluid level range A.
- If it is below the "MIN" level, remove filler cap 2 from power steering oil tank 1, then supply the specified fluid until the level has come up to the "MAX" level. Do not fill above the "MAX" level.

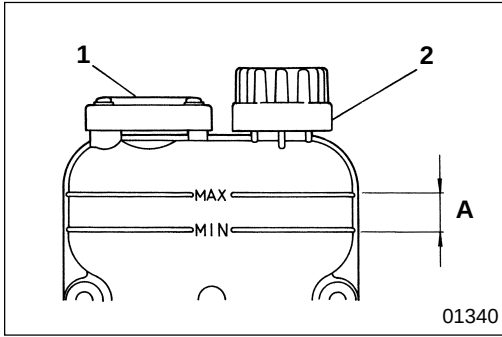
CAUTION

If the fluid level is far below the recommended range, the fluid may be leaking.



[Replacement]

- Drainage
 - Jack up the front wheels.
 - Disconnect oil pipe 3 connected to the power steering booster.
 - Turn the steering wheel fully left and right repeatedly, and drain the fluid from the power steering booster.
 - After draining the fluid, tighten oil pipe 3 at specified torque.



[Supply]

- Supply fluid into power steering oil tank **1** up to filler cap **2**.
- With the engine stopped, jack up the front wheels and turn the steering wheel fully left and right repeatedly. When the fluid level has dropped, add fluid to maintain the fluid level within range **A**.
- Start the engine and letting it idle, turn the steering wheel fully left and right repeatedly. When the fluid level has dropped, add fluid to maintain the fluid level within range **A**. Repeat these steps until the fluid level does not drop.
- Depress the brake pedal fully several times repeatedly, until as in the case of the steering wheel, the fluid level does not drop anymore. (The steering wheel at such time does not need to be operated)
- If there is an abnormal noise, air is still in the system. Turn the steering wheel several times, next depress the brake pedal several times to raise the fluid temperature to approximately 60 to 80°C {140 to 176°F}, then stop the engine and wait for approximately five minutes.
- Lower the front wheels and turn the steering wheel several times to make sure there is no abnormal noise.
- With the engine stopped, depress the brake pedal several times, activate the brake booster (hydraulic booster) emergency pump and bleed air.
- When there is no abnormal noise after the above procedure has been performed, bleeding is completed. Check oil tank **1** fluid level, and pipe and hose connections for fluid leakage.
- After bleeding is completed, inspect brake booster (hydraulic booster) performance (input and output characteristics).  Gr 35

LUBRICATION

Brake Fluid

Tightening torque

Unit : N·m {lbf.ft, kgf·m}

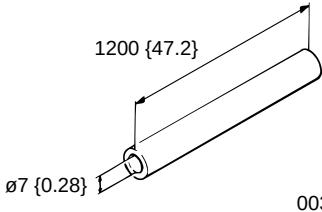
Location	Parts to be tightened	Tightening torque	Remarks
2	Air bleeder	7.8 to 12 {5.8 to 8.5, 0.8 to 1.2}	—

Fluid

Location	Points of application	Specified fluid	Quantity
1	Fluid tank	Brake fluid (SAE J1703f or FMVSS No.116 DOT3)	As required

Special tools

Unit : mm {in.}

Location	Tool name and shape	Part No.	Application
2	Vinyl hose 	MH033102	Air bleeding

WARNING

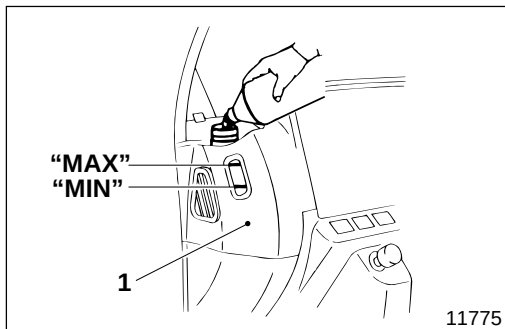
- The clutch fluid system and the brake fluid system use the fluid tank in common.
- You must use new brake fluid (SAE J1703f or FMVSS No.116 DOT3). Do not add different quality fluid or mineral oil (gas oil, engine oil, gear oil, automatic transmission fluid, etc.) to the clutch system, because this will cause the rubber parts of the clutch system and brake system to swell, resulting in faulty clutch operation, as well as ineffective braking and brake dragging.
- Do not allow foreign particles or water to become mixed into the brake fluid when refilling, because this will result in ineffective clutch and brake operations.
- If you use a mug for adding brake fluid, keep it solely for that purpose.

CAUTION

- Be careful not to splash brake fluid on related parts as this could damage the paintwork.
- Be sure to wipe off brake fluid immediately if you splash it on the paintwork.

NOTE

Supply and maintain brake fluid level to the "MAX" level of the fluid tank .

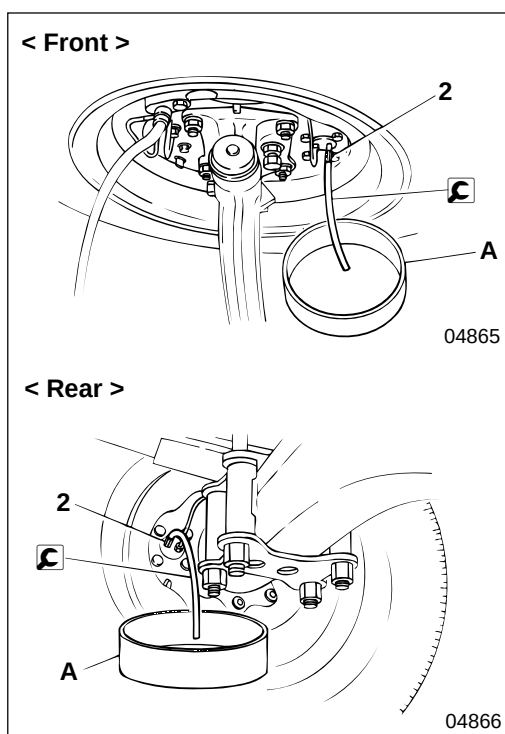


[Inspection and replenishment]

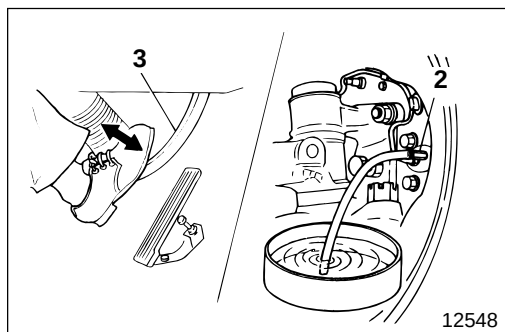
- Inspect the level of the brake fluid in fluid tank **1**. It should fall between the "**MAX**" and "**MIN**" levels.
- If it is below the "**MIN**" level, remove the cap from fluid tank **1**, then supply the specified brake fluid until the level comes up to the "**MAX**" level. Do not fill above the "**MAX**" level.

[Replacement]

- Start engine and let it idle until brake fluid replacement is completed.

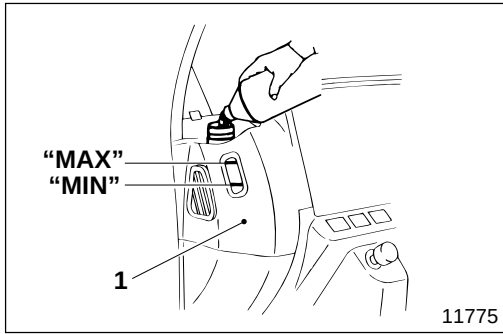


- Attach one end of  vinyl hose to air bleeder **2** and place the other end in container **A**.



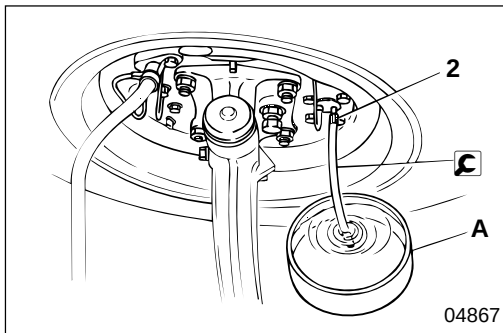
- Loosen air bleeders **2** and depress brake pedal **3** several times to drain brake fluid completely.

LUBRICATION



- Maintaining a supply of new brake fluid up to the **"MAX"** level of fluid tank **1**, depress brake pedal **3** repeatedly until the old brake fluid of the brake system is replaced with new fluid.
- Carry out air bleeding of the brake system.

[Air bleeding]



- Start the engine and let it idle until brake fluid replacement is completed.
- Attach one end of  vinyl hose to air bleeder **2** of the wheel brake. Place free end in container **A** filled with brake fluid.
- Carry out air bleeding in the following sequence:

Front brake system

Right-hand side wheel brake



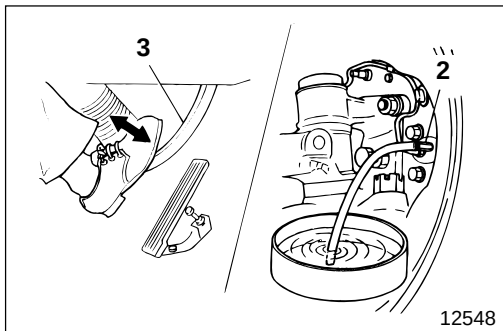
Left-hand side wheel brake

Rear brake system

Right-hand side wheel brake



Left-hand side wheel brake



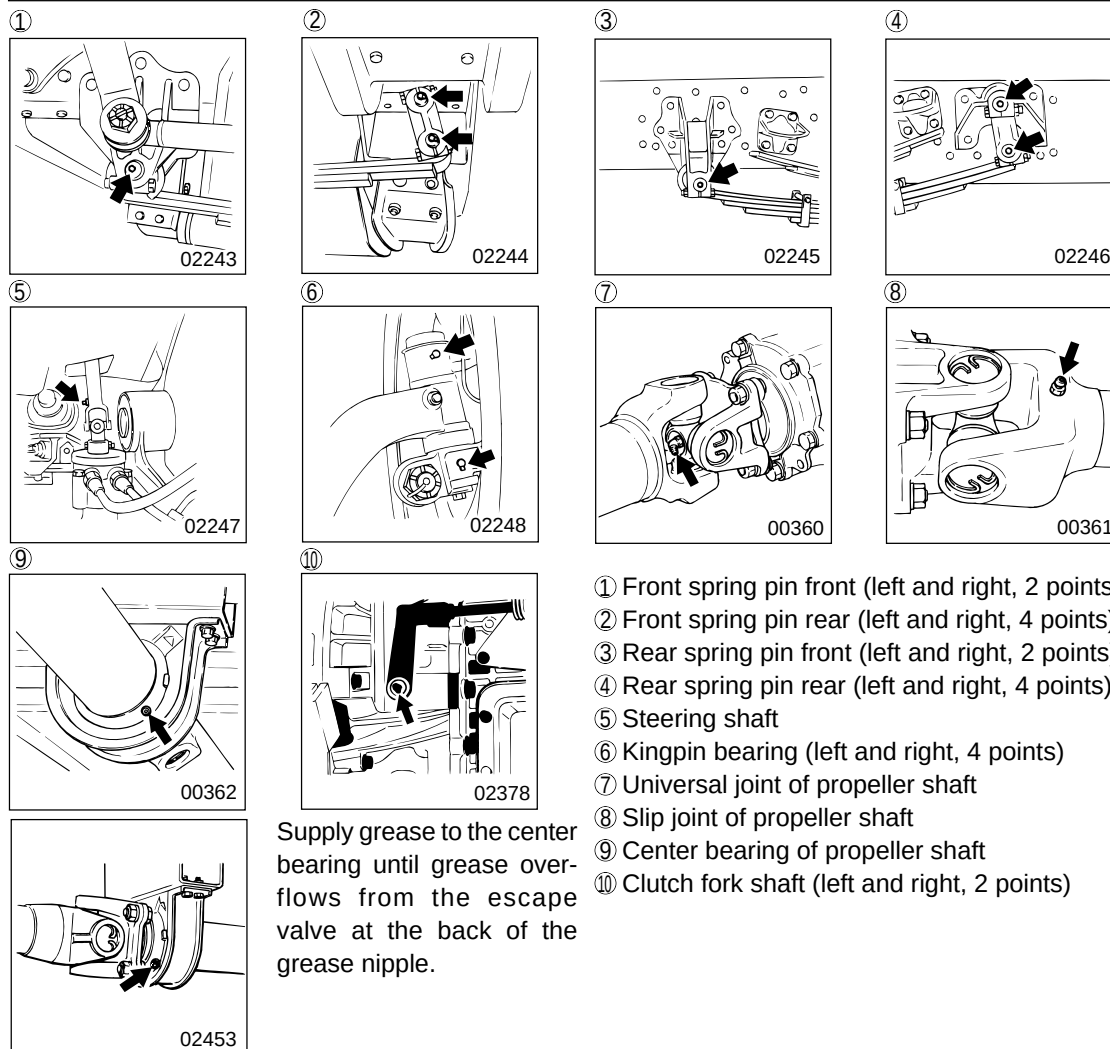
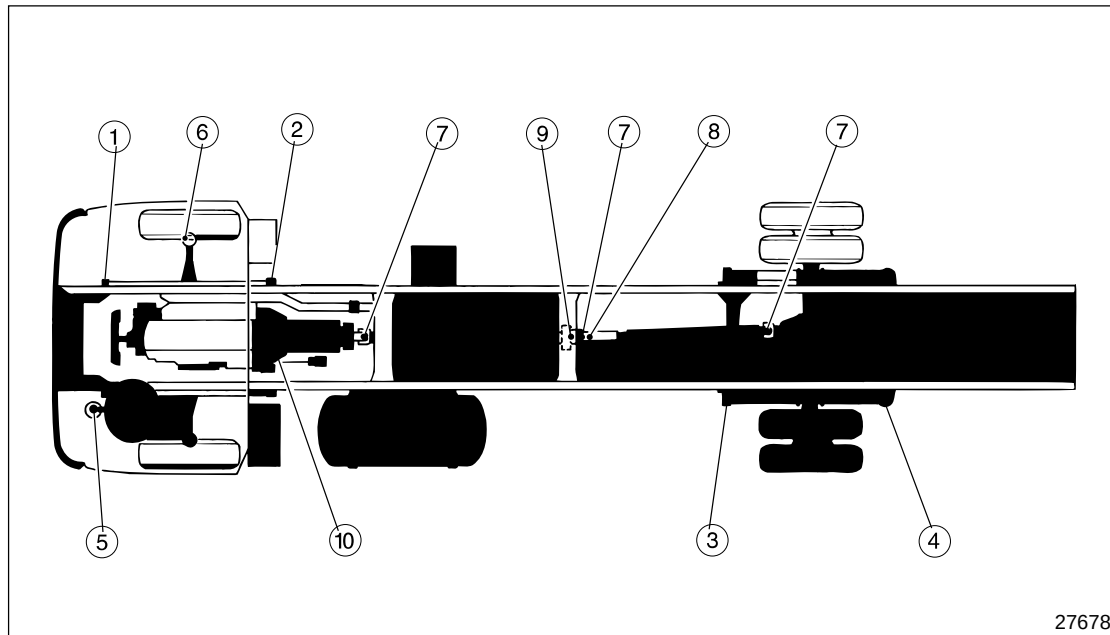
- Depress brake pedal **3** slowly a few times, and with the brake pedal depressed, loosen air bleeder **2** to drain brake fluid containing air.
- Tighten air bleeder **2**, and release brake pedal **3**.
- Repeat this service procedure until air is no longer present in the fluid being drained.
- Tighten air bleeder **2** at specified torque as soon as brake fluid flowing out is free of air bubbles.
- Adjust brake shoe clearance when you have finished air bleeding.
- Check that brake fluid comes up to level **"MAX"** of fluid tank **1**. If it does not, refill with new brake fluid.
- Depress brake pedal **3** a few times and check for any leakage of brake fluid, then test the brakes.

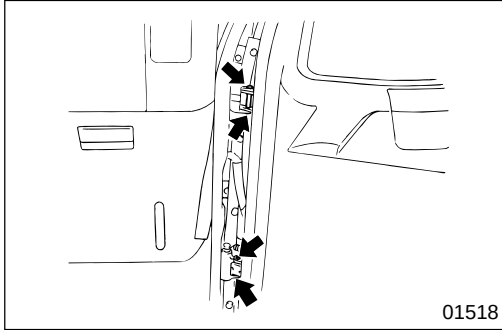
MEMO

LUBRICATION

● Greasing Various Areas of Chassis

Carefully clean away all dust and dirt from the grease nipples, and use the specified type of grease. The areas to be greased are shown in the following illustration.





● Door hinge



FH

Service Manual

Group 01

Maintenance Schedule

 **MITSUBISHI FUSO TRUCK OF AMERICA, Inc.**

MAINTENANCE SCHEDULE

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HOW TO READ THE MAINTENANCE SCHEDULE TABLES

Example Table :

*1 : 30000 km/18000 miles or 6 months, whichever occurs first.
 *2 : 60000 km/36000 miles or 12 months, whichever occurs first.
 (E) : Exhaust emission items
 (N) : Noise control items

Inspection and maintenance (1)		Time of inspection and maintenance (2)					Working procedures (3)	Remarks (4)
		Pre-operation checks	New vehicle at 4000 km/2500 miles	Inspection interval				
				Every 10000 km/6000 miles	Every 30000 km/18000 miles *1	Every 60000 km/36000 miles *2		
ENGINE								
1	Air, fuel, oil or coolant leakage from engine			×			Check engine for air, fuel, oil and coolant leakage	 Gr 11, 12, 13, 14
2	Ⓔ Ⓝ Engine starting performance, speed, noise and exhaust gas conditions			×			Check for engine starting performance, idling speed, abnormal engine noise, dark smoke or other abnormal exhaust gas during idling and acceleration. Check engine speed on tachometer	 Gr 11, 13, 15
3	Retightening of inlet and exhaust manifold bolts					×	Check manifold bolts for looseness	 Gr 15
4	Ⓔ Valve clearance		×			×	Check valve clearance with feeler gauge	 Gr 11
5				Every 20000 km /12000 miles			Replace element	

(1) This column contains the maintenance and inspection items.

(2) The periods between inspection and service are based on the assumption that the vehicle will be driven approximately 60000 kilometers (36000 miles) per year.

Inspections which must be made are indicated by an "×" or by the appropriate period between servicing.

(3) This column provides a simplified explanation of the operational procedures involved for each inspection or maintenance item.

(4) The Gr. No. refers to the "group number" in this vehicle Service Manual. For visual checks and simple inspections, see the sections labelled "Working Procedures".

MAINTENANCE SCHEDULE TABLES

01

*1 : 30000 km/18000 miles or 6 months, whichever occurs first.

*2 : 60000 km/36000 miles or 12 months, whichever occurs first.

(E) : Exhaust emission items

(N) : Noise control items

Inspection and maintenance		Time of inspection and maintenance					Working procedures	Remarks
		Pre-operation checks	New vehicle at 4000 km/2500 miles	Inspection interval				
				Every 10000 km/ 6000 miles	Every 30000 km/ 18000 miles +1	Every 60000 km/ 36000 miles +2		
ENGINE								
1	Air, fuel, oil or coolant leakage from engine			×			Check engine for air, fuel, oil and coolant leakage	Gr 11, 12, 13, 14
2	Ⓔ Ⓝ Engine starting performance, speed, noise and exhaust gas conditions			×			Check for engine starting performance, idling speed, abnormal engine noise, dark smoke or other abnormal exhaust gas during idling and acceleration. Check engine speed on tachometer	Gr 11, 13, 15
3	Retightening of inlet and exhaust manifold bolts					×	Check manifold bolts for looseness	Gr 15
4	Ⓔ Valve clearance		×			×	Check valve clearance with feeler gauge	Gr 11
5	Ⓔ Oil filter replacement			Every 20000 km/ 12000 miles On new vehicles, replace the first filter at 10000 km/6000 miles			Replace element	Gr 12
6	Ⓔ Ⓝ Check injection nozzles			Every 90000 km/ 54000 miles			Check injection nozzles	Gr 13
7	Ⓔ Ⓝ Fuel injection pressure and spray pattern of injection nozzles			Every 250000 km/ 150000 miles			Remove injection nozzle and check with nozzle tester	Gr 13
8	Ⓔ Ⓝ Fuel injection timing					×	Turn crankshaft in normal running direction and check injection starting timing of No.1 cylinder	Gr 13
9	Ⓔ Cleaning fuel feed pump filter					×	Remove connector from fuel feed pump inlet and clean filter inside connector with gas oil	
10	Ⓔ Fuel filter replacement				×		Replace element	Gr 13
11	Ⓔ Water separator water discharge	×					Loosen water separator drain plug to discharge water	Gr 13
12	Ⓔ Removal of water and sediment from fuel tank			Every 24 months			Remove fuel tank drain plug and remove water and sediment	Gr 13
13	Retightening of fuel tank bracket bolts			×			Check mounting bolts for looseness and retighten to a torque of 34 to 54 N·m {25 to 40 lbf.ft, 3.5 to 5.5 kgf·m}	Gr 13
14	Ⓔ Replacing fuel line in engine compartment			Every 24 months			Replace fuel line in engine compartment	Gr 13
15	Ⓔ Check fuel line outside of engine compartment			Every 24 months			Check fuel line outside of engine compartment. Replace if necessary	Gr 13
16	Ⓔ Ⓝ V-belt tension and damage	×		×			Press midpoint of V-belt firmly with your finger to measure deflection and check for belt damage	Gr 14
17	Coolant level and leakage from cooling system	×					Check coolant level and if level is low, check for coolant leakage	Gr 14
18	Coolant replacement			Every 24 months			Replace with new coolant	Gr 14
19	Installed condition of surge tank cap			×			Check surge tank cap for sealing and mounting condition	Gr 14
20	Ⓔ Cooling system hose clamp position and clamping condition			×			Check clamp position and clamping condition of cooling system hose	Gr 14
21	Ⓔ Turbocharger rotor play			Every 250000 km/ 150000 miles			Check whether rotor has excessive end play using a dial indicator	Gr 15
22	Ⓔ Ⓝ Cleaning of air cleaner	×					Check air cleaner dust indicator. If the red signal appears, clean the element	Gr 15
23	Ⓔ Ⓝ Air cleaner element replacement			Every 50000 km/ 30000 miles			Replace element	Gr 15
24	Ⓔ Ⓝ Damage of inlet system, looseness of clamp and loss of parts			×			Check inlet system for damage and check that all parts are installed	Gr 15
25	Ⓝ Looseness and damage of exhaust pipe and muffler			×			Check installation and connections for looseness and damage, check for exhaust gas leakage	Gr 15
26	Starter function					×	Operate starter switch and check the switch functions properly	Gr 54
27	Alternator function					×	Check function with a circuit tester	Gr 54

MAINTENANCE SCHEDULE TABLES

*1 : 30000 km/18000 miles or 6 months, whichever occurs first.
 *2 : 60000 km/36000 miles or 12 months, whichever occurs first.
 (E) : Exhaust emission items
 (N) : Noise control items

Inspection and maintenance		Time of inspection and maintenance					Working procedures	Remarks
		Pre-operation checks	New vehicle at 4000 km/2500 miles	Inspection interval				
				Every 10000 km/ 6000 miles	Every 30000 km/ 18000 miles *1	Every 60000 km/ 36000 miles *2		
POWER TRAIN								
28	Air or oil leakage from power train			×			Check power train for air and oil leakage	
29	Clutch pedal play			×			Press clutch lightly and check that play is adequate	Gr 21
30	Clutch function			×			(1) Press the clutch pedal to check for unusual noise or stiffness. Also check if gearshift engages quietly (2) Check the clutch does not slip and engages smoothly	Gr 21
31	Manual transmission gearshift control looseness				×		In NEUTRAL position, check shift lever for looseness. With shift lever in each gear position, check engagement condition and degree of looseness. Also check if control cable is damaged	Gr 22
32	Automatic transmission range selector linkage and throttle (modulator) linkage condition					×	Shifting to each shift range must be done firmly and securely	Gr 23
33	Propeller shaft couplings and bearings looseness		×	×			(1) Check flange yoke bolt and center bearing attaching bolt for looseness (2) Turn propeller shaft manually to check for spline looseness (3) Check looseness between spider and needle roller bearing	Gr 25
FRONT AND REAR AXLES								
34	Axle shaft torsion and cracks					×	Remove axle shaft and check for torsion, bending, and cracks	Gr 27
35	Front wheel hub bearing looseness				×		With front axle jacked up, move the wheel up and down holding the top and bottom of the tire to check for bearing looseness	Gr 26
36	Rear wheel hub bearing damage					×	Disassemble rear wheel and check for hub bearing wear and damage	Gr 27
37	Retightening wheel nuts		×	×			Check wheel nuts for looseness after replacing tires, also after 1000 km/600 miles	Gr 31
38	Disc wheel damage			×			Check disc wheel for corrosion, deformation and cracks	Gr 31
39	Tire inflation pressure, cracking, tread groove depth, abnormal wear, etc.	×		×			(1) Measure inflation pressure with tire gauge, and check that tire tread groove is deep enough (2) Check tire tread and side walls for cracks, damage, uneven wear, stepped wear and other abnormal wear	Gr 31
40	Tire rotation			×			Rotate all tires	Gr 31
SUSPENSION SYSTEM								
41	Looseness, play and damage of suspension system				×		Check suspension system for looseness, play and damage	Gr 33, 34
42	Damage and looseness of leaf springs	×			×		Check leaf springs for damage and looseness	Gr 33, 34
43	Retightening U-bolts		×		×		Check U-bolts for looseness	Gr 33, 34
44	Oil leakage and damage of shock absorbers				×		Check for oil leakage and damage of cylinder, etc.	Gr 33, 34
BRAKING SYSTEM								
45	Discharge of condensed water from air tank	×					Discharge condensed water from air tank by opening drain cock	Gr 35
46	Air pressure and its charging speed	×					After discharging air from air tank, start and run the engine at idle and measure time taken to charge air to specified pressure in air tank	Gr 35
47	Air and fluid leakage from braking system			×			Check braking system for air and fluid leakage	Gr 35
48	Looseness, play and damage of braking system parts			×			Check braking system parts for looseness, play and damage	Gr 35

*1 : 30000 km/18000 miles or 6 months, whichever occurs first.

*2 : 60000 km/36000 miles or 12 months, whichever occurs first.

Ⓔ : Exhaust emission items

Ⓖ : Noise control items

Inspection and maintenance		Time of inspection and maintenance					Working procedures	Remarks
		Pre-operation checks	New vehicle at 4000 km/2500 miles	Inspection interval				
				Every 10000 km/6000 miles	Every 30000 km/18000 miles *1	Every 60000 km/36000 miles *2		
49	Operation of brake pedal			×			Depress the brake pedal and release it, checking for the sound of air being released from the brake valve and to ensure that the pedal returns normally without catching	Gr 35
50	Service brake effectiveness	×		×			While driving the vehicle at low speed, check braking effect and check for uneven braking	Gr 35
51	Operation of exhaust brake	×		×			Check exhaust brake operation	Gr 35
52	Exhaust brake control cylinder packing replacement			Every 12 months			Check exhaust brake control cylinder packing; replace if necessary	Gr 35
53	Operation of air dryer			×			Open drain cock of air tank and make sure there is no drainage	Gr 35
54	Check drain from air dryer exhaust port			×			Check to see that oil is not discharged abnormally from exhaust port of air dryer	Gr 35
55	Air dryer disassembly and inspection					×	Disassemble the air dryer and inspect its components. When more than 1/5 of the desiccant is discolored, replace it	Gr 35
	Air dryer desiccant replacement			Every 24 months			Disassemble the air dryer and replace the desiccant and rubber parts	Gr 35
56	Brake shoe clearance				×		Measure clearance with feeler gauge	Gr 35
57	Brake lining wear				×		Check lining wear	Gr 35
58	Brake drum wear					×	Disassemble and check drum for wear, cracks and damage	Gr 35
59	Parking brake effectiveness			×			On a slope, check that vehicle can be held stationary	Gr 36
60	Parking brake lever stroke	×		×			With lever fully pulled, check that lever is locked completely and that there is allowance in pulling stroke	Gr 36
61	Parking brake drum and lining wear					×	Disassemble and check drum for wear, cracks and damage and check lining for wear	Gr 36
62	Wheel cylinder piston cup and dust seal replacement			Every 12 months			Check wheel cylinder piston cup and dust seal; replace if necessary	Gr 35
63	Brake booster packing, cup and rubber parts replacement			Every 12 months			Check brake booster packing, cup and rubber parts; replace if necessary	Gr 35
64	Brake hose replacement			Every 12 months			Check brake hose; replace if necessary	Gr 35
65	Check valve packing and rubber parts replacement			Every 12 months			Check the check valve packing and rubber parts; replace if necessary	Gr 35
66	Brake valve packing and rubber parts replacement			Every 12 months			Check brake valve packing and rubber parts; replace if necessary	Gr 35
67	Air compressor and pressure gauge hoses replacement			Every 24 months			Replace air compressor and pressure gauge hoses	Gr 35
68	Brake booster power cylinder packing replacement			Every 24 months			Replace brake booster power cylinder packing	Gr 35
69	Brake fluid reservoir tank tube replacement			Every 24 months			Check and replace brake fluid reservoir tank tube	Gr 35
STEERING SYSTEM								
70	Fluid leakage from steering system			×			Check steering system for fluid leakage	Gr 37
71	Steering wheel play	×		×			Turn steering wheel right and left to measure play at steering wheel rim. Measure while engine is running	Gr 37
72	Steering operating condition	×		×			Check steering wheel to see if it vibrates, pulls to one side or requires unusual steering effort	Gr 37
73	Looseness and play of steering system (including hoses and pipes)			×			(1) Check steering system for looseness and play (2) Check power steering hoses and pipes for looseness	Gr 37
74	Wheel alignment					×	Measure toe-in, camber, caster and kingpin inclination angles	Gr 26

MAINTENANCE SCHEDULE TABLES

*1 : 30000 km/18000 miles or 6 months, whichever occurs first.
 *2 : 60000 km/36000 miles or 12 months, whichever occurs first.
 (E) : Exhaust emission items
 (N) : Noise control items

Inspection and maintenance		Time of inspection and maintenance					Working procedures	Remarks
		Pre-operation checks	New vehicle at 4000 km/2500 miles	Inspection interval				
				Every 10000 km/ 6000 miles	Every 30000 km/ 18000 miles *1	Every 60000 km/ 36000 miles *2		
75	Right and left turning angles and power steering function					×	Check that stopper bolt is sufficiently tight, without damage, and that steering linkage operates smoothly until blocked by stopper bolt. Also check that steering wheel does not make contact with other parts	 Gr 26
76	Power steering booster and oil pump internal rubber parts replacement			Every 24 months			Replace internal rubber parts	 Gr 37
77	Power steering hose replacement			Every 24 months			Replace power steering hose	 Gr 37
CAB AND FRAME								
78	Looseness and damage of chassis and body			×			(1) Check frame, cross members and other parts for loose rivets (2) Also check for body damage and loose mounting bolts	 Gr 41, 42
79	Heater and defroster operation			×			Check operation and installation of defroster	 Gr 55
80	Reflection of rearview mirrors and reflectors	×					Check for reflecting condition, stains and damage	 Gr 42
81	Door lock function			×			Check door lock mechanism functions properly	 Gr 42
82	Seat belt mounting condition			×			Check seat belt for damage, buckle and retracting function and mounting condition	 Gr 42
ELECTRICAL SYSTEM								
83	Looseness and damage of electrical wiring and connections			×			Check wiring, connectors and battery terminals for looseness and corrosion	 Gr 54
84	Battery electrolyte level and specific gravity			Every 20000 km/ 12000 miles			(1) Check electrolyte level (2) Measure electrolyte specific gravity with hydrometer	 Gr 54
85	Operation and damage of lighting system	×		×			Check operation, damage and installation of each lighting unit	 Gr 54
86	Operation of horn and turn signal lamps	×		×			Check operation, damage and mounting condition. Also check turn signal lamps are operated by turn signal switch	 Gr 54
87	Operation and fluid level of windshield wiper and washer	×		×			Check operation, damage and mounting condition. Check if fluid level in washer tank is okay	 Gr 42
88	Gauges and pilot lamps function	×		×			Check function of gauges and pilot lamps	 Gr 54
89	Switch function					×	Check operation, damage and installation of each switch	 Gr 54
OTHER								
90	Road test of vehicle			×			Drive the vehicle to check for overall vehicle operating condition	

MAINTENANCE OPERATIONS

01

This section explains simple maintenance procedures. See the relevant Group in this manual for further details.

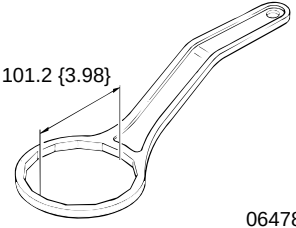
Replacement of Oil Filter

Lubricant

Location	Points of application	Kinds	Quantity
2	Inside oil filter	Engine oil	Approximately 1 L {1.1 qts}
	Gasket area of oil filter with thin application	Engine oil	As required

Special tools

Unit : mm {in.}

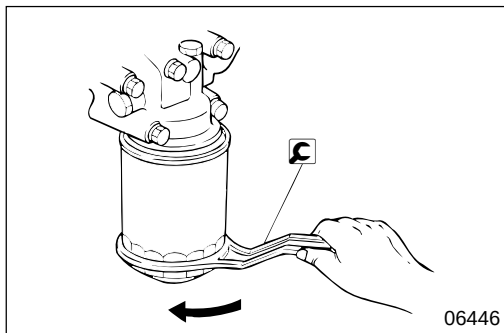
Location	Tool name and shape	Part No.	Application
2	Oil filter wrench 	MH061587	Removal of oil filter

WARNING

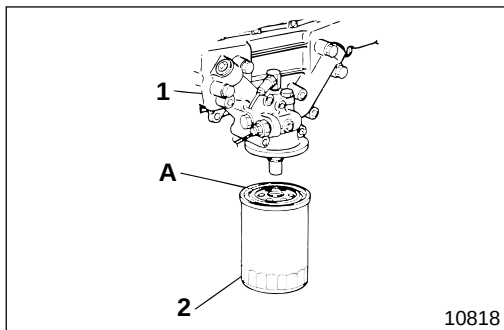
- Wipe up any engine oil that has been spilled because it can cause a fire.
- Do not touch the engine while it is hot because it will burn you.

CAUTION

Take care not to spill engine oil on the V-belts, because this would cause them to slip, reducing service life.



[Removal]



[Installation]

- Clean the surface of oil cooler body **1** that makes contact with oil filter **2**.
- Apply engine oil thinly and evenly to gasket area **A** of oil filter **2**.
- Screw oil filter **2** into oil cooler body **1** until gasket area **A** sits on the body. From this position, tighten further by rotating by three quarters of a turn.
- After installation, run the engine and check that there is no oil leakage from gasket area **A**.
- Check the oil level and if it is low, top it up.

MAINTENANCE OPERATIONS

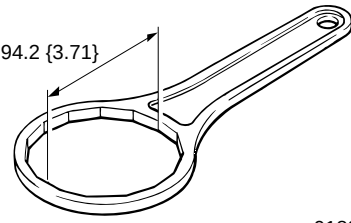
Replacement of Fuel Filter

Lubricant

Location	Points of application	Kinds	Quantity
2	Gasket contact surfaces of fuel filter and fuel filter head	Engine oil	As required

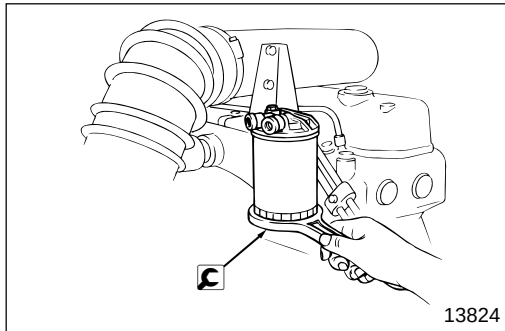
Special tools

Unit : mm {in.}

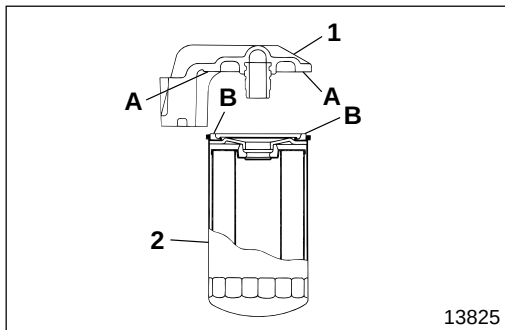
Location	Tool name and shape	Part No.	Application
2	 01882	MH061572	Removal of fuel filter

WARNING

- Fuel ignites easily. Do not get it near flame or heat.
- Wipe up any gas oil that has been spilled because it can cause a fire.
- Do not use an unsuitable filter because it can cause a fire.



[Removal]



[Installation]

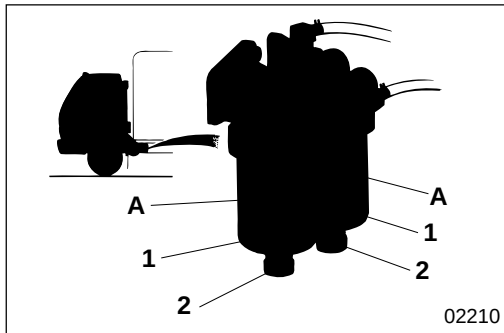
- Install by tightening three quarters to one full turn after contact surface **A** of fuel filter head **1** makes contact with gasket **B** of fuel filter **2**. Be sure to tighten by hand.
- After installation, run the engine and check for fuel leakage.

Draining of Water Separator Condensation

Tightening torque

Unit : N·m {lbf.ft, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
2	Drain plug	2.9 to 3.9 {2.2 to 2.9, 0.3 to 0.4}	—



Visually inspect the water separator before driving.

When float **1** reaches red line **A**, drain the condensation as follows:

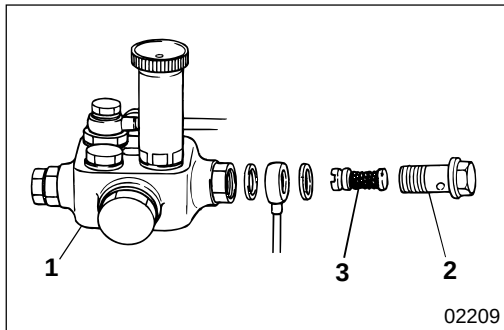
- Loosen drain plug **2** and drain out the condensation.
- When float **1** has dropped to the bottom, tighten drain plug **2**.
- Carefully wipe the water separator and the surrounding area.
- Check for fuel leakage.

Cleaning of Fuel Feed Pump Gauze Filter

Tightening torque

Unit : N·m {lbf.ft, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
2	Eye bolt	25 to 29 {18 to 22, 2.5 to 3}	—



WARNING

- Fuel ignites easily. Do not get it near flame or heat.
- Wipe up any gas oil that has been spilled because it can cause a fire.

- Remove eye bolt **2** on the inlet side of fuel feed pump **1**.
- Remove gauze filter **3** from eye bolt **2**.
- Clean gauze filter **3** with gas oil.
- Follow the removal sequence in reverse and reinstall gauze filter **3**.
- Install eye bolt **2** in the fuel feed pump.
- Bleed the air from the fuel line.
- Start the engine and check for fuel leakage.

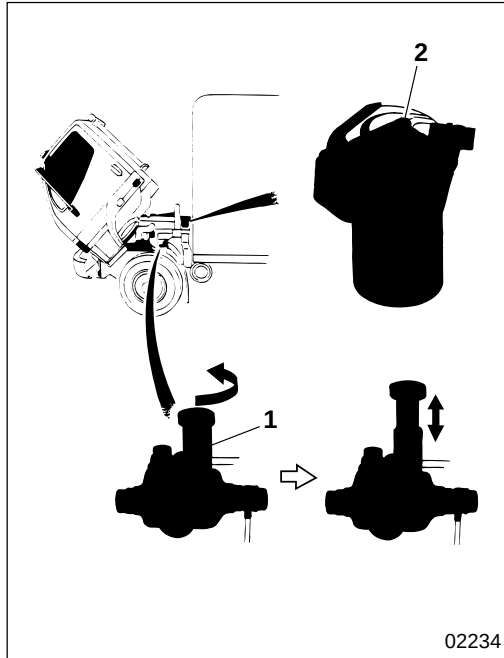
MAINTENANCE OPERATIONS

Bleeding of Air from Fuel Line

T Tightening torque

Unit : N·m {lb·ft, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
2	Air vent plug	7.8 to 12 {5.8 to 8.7, 0.8 to 1.2}	—



WARNING ⚠

- Fuel ignites easily. Do not get it near flame or heat.
- Wipe up any gas oil that has been spilled because it can cause a fire.

- Turn the top of priming pump 1 of the injection pump counterclockwise and pull it up so the top protrudes.
- Loosen air vent plug 2 of the fuel filter and move the top part of priming pump 1 up and down.
- Move priming pump 1 up and down repeatedly until air bubbles are no longer present in the fuel drained from air vent plug 2.
- When the fuel being drained is free of air bubbles, tighten air vent plug 2.
- After moving priming pump 1 up and down another five or six times, push the top down and turn clockwise to drive it in fully.
- After bleeding the air, carefully wipe up spilled fuel and start the engine.
- Check for fuel leakage.

Adjustment of V-Belt Tension

Newly installed V-belts can stretch during their initial running-in period. To prevent this from becoming a problem, run the engine for several minutes after installing the V-belt, then readjust. Perform this cycle several times.

WARNING

You must take special precautions to prevent the engine from rotating while a V-belt is being inspected or adjusted.

CAUTION

- Make sure that you turn off the engine before attempting to inspect or adjust the V-belts.
- Make sure that you fasten all bolts and nuts securely after adjusting the V-belts. Remember that too much tension can damage the V-belts and bearings.
- Do not grease V-belts. This causes them to slip, which reduce service life.

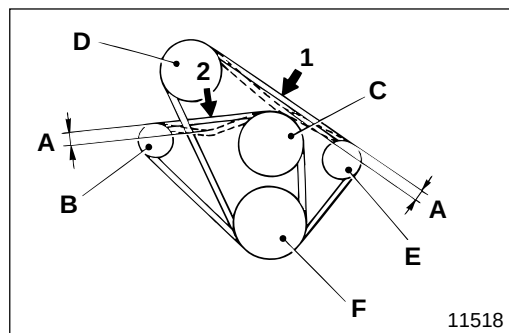
Service standards

Unit : mm {in.}

Location	Maintenance item		Standard value	Limit	Remedy
1, 2	V-belt tension (Each one)	Fan	12 to 16 {0.47 to 0.63}	—	Adjust
		Air-conditioner	16 to 20 {0.63 to 0.79}		

Special tools

Location	Tool name and shape	Part No.	Application
1, 2	Belt tension gauge  03612	MH062345	Measurement of tension of V-belt

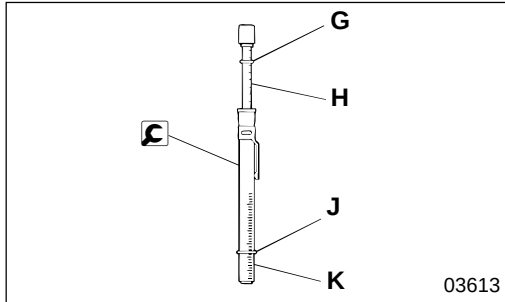


[Inspection]

Measure the extent of flex **A** when the center of V-belts **1, 2** as illustrated is depressed with a force of 98 N·m {72 lbf.ft, 10 kgf·m}.

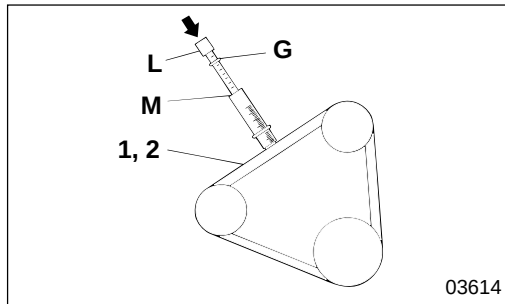
- B** : Alternator pulley
C : Water pump pulley
D : Cooler compressor pulley (Air-conditioner)
E : Tension pulley
F : Crankshaft pulley

MAINTENANCE OPERATIONS

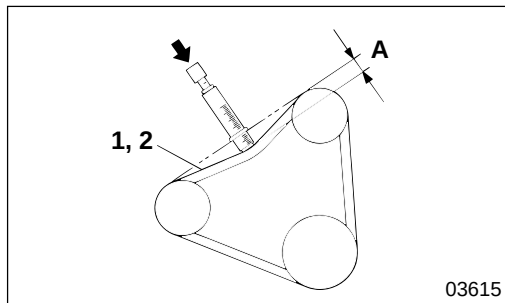


Use of special tool belt tension gauge

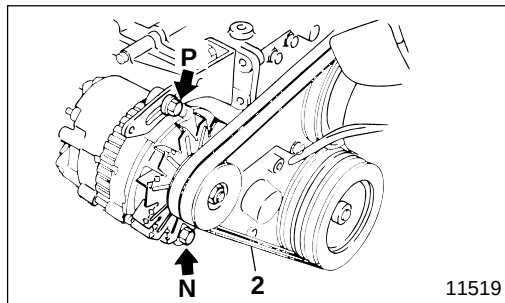
- Set upper O-ring **G** of belt tension gauge to 98 N·m {72 lbf.ft, 10 kgf·m} (push load) on graduation **H**.
- Set lower O-ring **J** of belt tension gauge to graduation **K** (maximum flex of belt).



- Place belt tension gauge at the center of V-belts **1, 2** perpendicularly as illustrated and push top **L** all the way down until upper O-ring **G** hits upper edge **M**.



- Measure the extent of flex **A** of V-belts **1, 2** at this point, and if the measured value deviates from the standard value, adjust as follows:



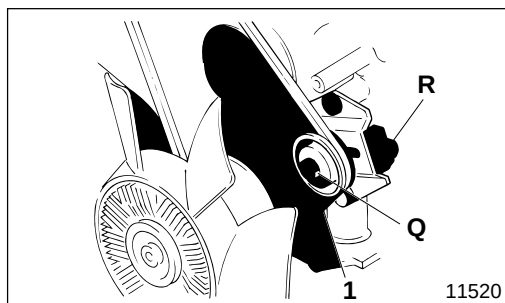
[Adjustment]

(1) Adjustment of tension of V-belt for fan

- Loosen alternator mounting bolts **N** (two points), and adjust the tension of V-belts **2** by moving adjusting bolt **P**.
- After adjustment, tighten the bolts **N, P** securely.

CAUTION

- Bear in mind that excessive tension of V-belts **2** might damage the belts and bearings that engage with the V-belts.
- Be sure to replace V-belts **2** as a set to maintain even tension between them.
- Be careful not to let oil stick to V-belts **2**. If oil gets onto the belts, it causes slipping, resulting in overheating and insufficient battery charging.



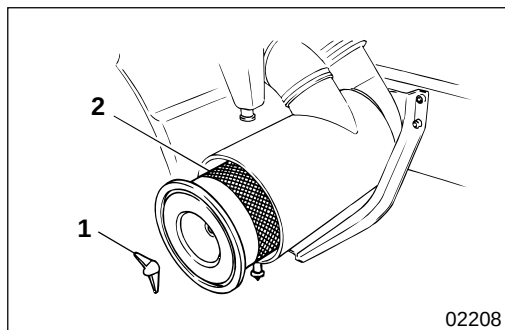
(2) Adjustment of tension of V-belt for air-conditioner

- Loosen tension pulley mounting nut **Q**, and adjust the tension of V-belt **1** moving adjusting bolt **R**.
- After adjustment, tighten mounting nut **Q** securely.

CAUTION

- Bear in mind that excessive tension of V-belt **1** might damage the belt and bearings that engage with the V-belt.
- Be careful not to let oil stick to V-belt **1**. If oil gets onto the belt, it causes slipping, resulting in poor performance of the air conditioner.

Cleaning and Replacement of Air Cleaner Element

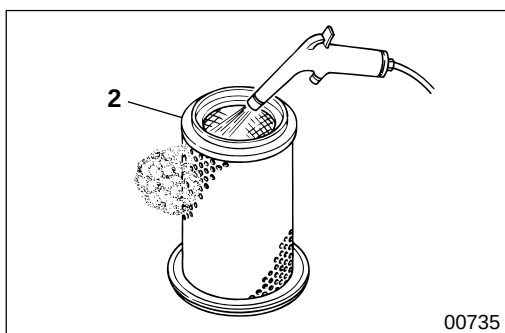


[Removal]

Remove wing nut **1** to remove element **2**.

[Installation]

Install element **2** securely.

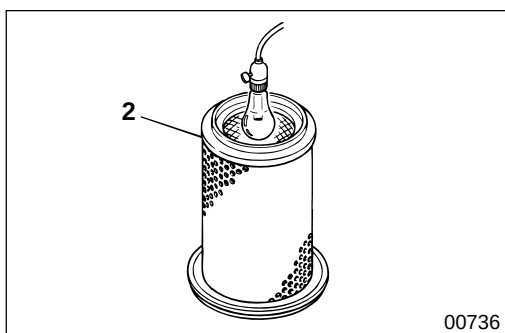


[Cleaning]

- Blow compressed air of 685 kPa {100 lbf/in², 7 kgf/cm²} or less through air cleaner element **2** from the inside.
- When using compressed air, move the blower's nozzle up and down along the pleats of air cleaner element **2** evenly.

CAUTION

- Do not tap or hit air cleaner element **2** to remove dust.
- Do not blow compressed air through air cleaner element **2** from the outside.



[Inspection]

- Illuminate the inside of air cleaner element **2**.
- If parts of the filter paper are torn or thin, or if the packing of the upper surface of air cleaner element **2** is damaged, replace the air cleaner element.

NOTE

If the dust on air cleaner element **2** is wet due to oil smoke or soot, replace the air cleaner regardless of the scheduled replacement interval.

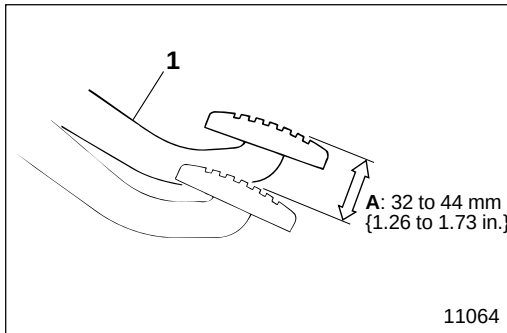
MAINTENANCE OPERATIONS

Inspection of Clutch Pedal Free Play

Service standards

Unit : mm {in.}

Location	Maintenance item	Standard value	Limit	Remedy
1	Clutch pedal free play	32 to 44 {1.26 to 1.73}	—	Adjust or replace



[Confirmation]

Push clutch pedal **1** with your hand and measure the amount of movement **A** (free play) until you meet resistance. If the measured value does not conform to the standard value, adjust by stroke of clutch power cylinder push rod, or replace the clutch disc.

[Clutch operation]

- Check for unusual noises when clutch pedal **1** is pressed while the engine is idling, and also for abnormally heavy clutch operation. Also check to be certain that it is not difficult to shift the vehicle into first and reverse gears.
- Gradually release clutch pedal **1** to set the vehicle in motion. Check to be sure there is no slippage, and that the clutch engages smoothly.

Tire

Service standards

Unit : mm {in.}

Location	Maintenance item	Standard value	Limit	Remedy
1	Depth of tire tread grooves	—	1.6 {0.063}	Replace

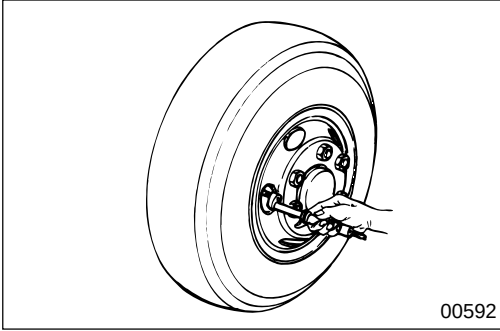
T Tightening torque

Unit : N·m {lbf.ft, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
2	Wheel nut	370 to 410 {275 to 305, 38 to 42}	Wet

L Lubricant

Location	Points of application	Kinds	Quantity
2	Wheel nut spherical area	Chassis grease [NLGI No.1 (Ca soap)] or Wheel bearing grease [NLGI No.1 (Li soap)]	As required
4	Wheel nut (inner) at thread area and spherical area		
6	Thread area of hub bolt		



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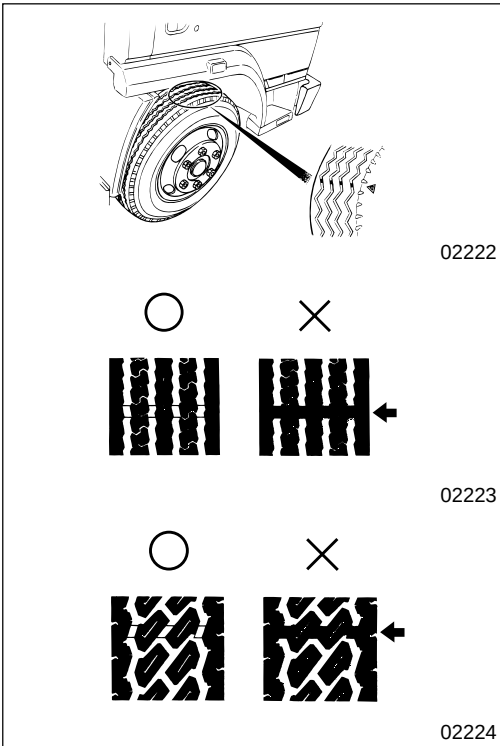
Air pressure

Tire air pressure should be checked before the vehicle is driven, while the tires are still cool.

Tire Size	Air Pressure kPa {Psi, kgf/cm ² }
215/75R 17.5 124/123L	700 {100, 7.00}

CAUTION

- Make certain that there is no difference in the air pressure between the inner and outer rear tires.
- Make certain you use valve caps on the air valves.
- It is not necessary to increase the air pressure for high-speed driving.



02222

02223

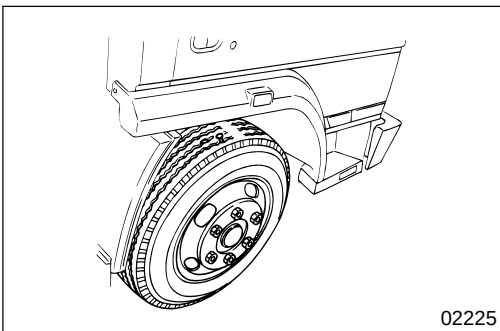
02224

Checking tread depth

- Check all around the tire treads to make sure that the depth of the tread grooves is above the wear limit.
- If the tread grooves are not deep enough, slip sign **A** appears at the position of the mark, where the tread groove has worn away.

WARNING

If the depth of the tread grooves is not adequate, the tires will slip on wet roads and present a hazard. Such tires are also extremely dangerous because they are more susceptible to hydroplaning when the vehicle is running at high speeds in the rain. Such tires must be replaced with new ones as soon as possible.



02225

Checking for cracks, damage, and objects embedded in the treads

- Check the tire treads and walls for cracks and damage.
- Check tire treads for uneven wear or other abnormal wear.
- Check if metal objects or nails have penetrated the tires.
- Check for stones embedded between double tires.

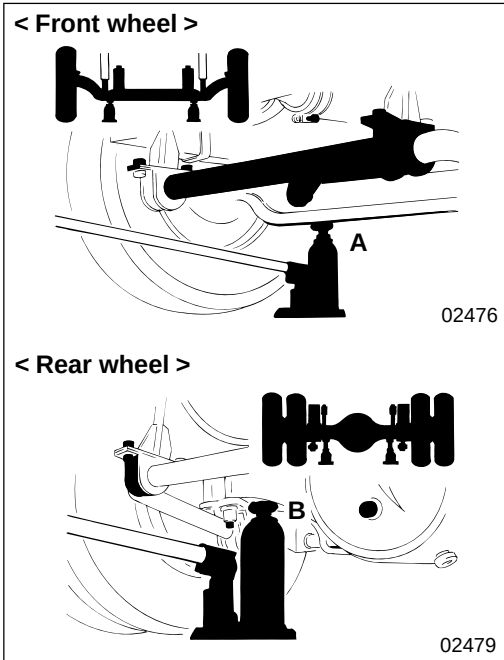
WARNING

Badly damaged or worn tires are extremely dangerous, because they can be punctured more easily when the vehicle is running, they must be replaced with new ones as soon as possible.

MAINTENANCE OPERATIONS

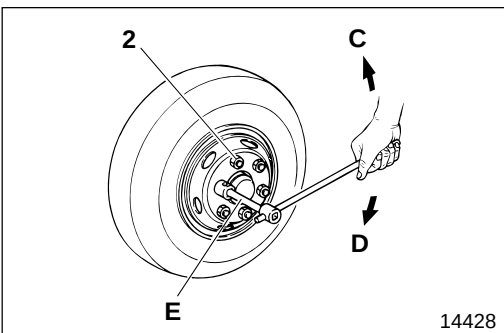
Removing tires

- Jacking up point
 - For front wheels : Front axle bottom A
 - For rear wheels : Rear axle tube bottom B



WARNING

- The jack should be placed on flat, solid ground, and should not be used to raise the vehicle higher than necessary.
- Do not use the jack at vehicle locations other than those illustrated.
- Keep in mind the danger of a slipping jack. Never crawl under the vehicle while the jack is in use or rock the vehicle. Also, do not start the engine while the vehicle is jacked up.
- To increase safety, use supports for the vehicle when it is necessary to leave it jacked up for long periods.
- Chock both the tire to be removed and the tire diagonally opposite to it so that they will not rotate when you are removing the tire.



- Loosen wheel nuts **2** slightly. The wheel nuts for right tires **C** have right-hand threads "R", and the wheel nuts for left tires **D** have left-hand threads "L".

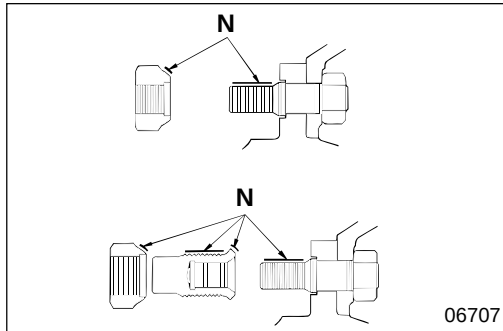
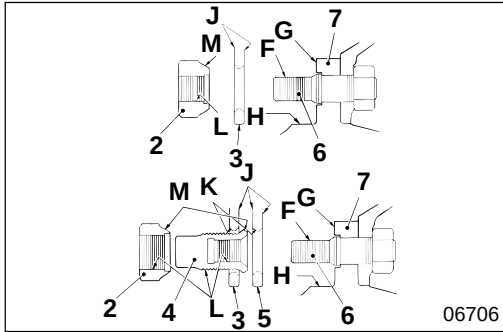
WARNING

Make certain that wheel nut wrench **E** is fully engaged, all the way to the back of nuts **2**. If it is not, it could slip.

CAUTION

Only loosen wheel nuts **2** slightly. Do not remove them.

- Jack up the vehicle carefully, until the tire is slightly off the ground. Remove wheel nuts **2**, then remove the tire.
- When working on the double tires at the rear of the vehicle, first remove the outside tire, then lower the vehicle and loosen the nuts on the inside tire. After doing this, jack the vehicle back up and remove the tire.



Mounting tires

- To prevent wheel nuts **2**, **4** and hub bolt **6** from becoming loose and to prevent mounting parts (tire assemblies **3**, **5** and hub **7**) from being damaged, remove rust, dust, additional coatings of paint, and foreign particles from the following areas:

F : Hub bolt thread area

G : Wheel mounting surface of hub

H : Wheel alignment area of hub

J : Disc wheel mating surface

K : Disc wheel nut mounting surface

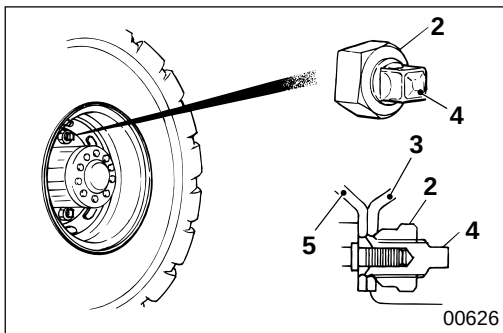
L : Wheel nut thread area

M : Wheel nut spherical area

N : Grease application area

WARNING

Never use grease containing molybdenum disulfide, since it can cause loosening of fitted screws.



- Put on the double rear tires as follows:

- After mounting inner tire **5** and fully tightening inner wheel nuts **4**, jack the vehicle up and mount on outer tire **3**, then tighten outer wheel nuts **2**.
- Even if only outside tire **3** is to be changed, do not mount it until inner wheel nuts **4** have been fastened at the specified torque.
- Slide the air valves on the inside and outside tires down when mounting the tires.

WARNING

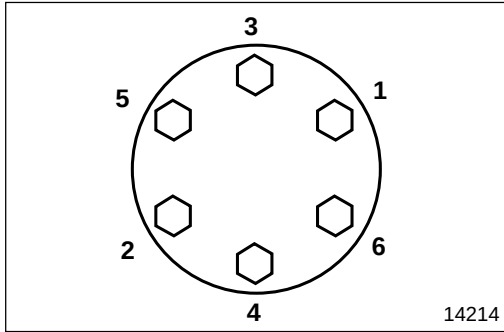
If the threads are scored, or the disc wheel is deformed or cracked, change bolts **6**, nuts **2**, **4** and disc. Driving the truck before correcting such problems can cause the tire in question to come loose, which could be the source of major accidents.

CAUTION

Check hub bolt **6** threads carefully for scratches before putting the tire on.

- Place the tapered end of wheel nuts **2**, **4** towards the disc wheel and fasten temporarily. Center so that there is no eccentricity between bolts **6** and the disc wheel bolt holes.
- Lower the vehicle.

MAINTENANCE OPERATIONS



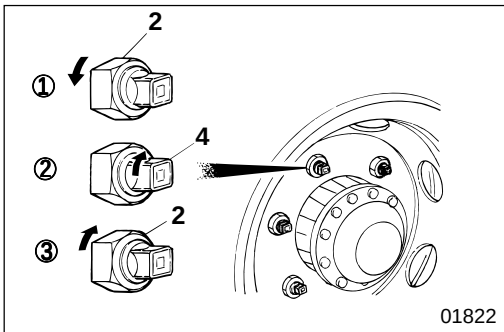
- Tighten the nuts in the order as illustrated, tightening each nut two or three times. To finish, tighten each nut at the specified torque.

WARNING

Always use the specified torque when tightening the wheel nuts. If the wheel nuts are not tightened properly, the wheels could come loose while the vehicle is being driven, which could result in life threatening accidents or the truck being disabled.

CAUTION

Over-tightening the wheel nuts can damage them.



Checking the wheel nuts for looseness

The wheel nuts should be checked for looseness every 10000 km (6000 miles). All nuts should be tightened at the specified torque.

- Check the double rear tires for looseness as follows:

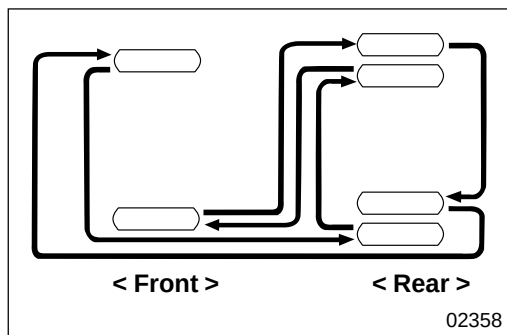
- ① Loosen outer wheel nuts 2.
- ② Tighten inner wheel nuts 4 at specified torque.
- ③ Tighten outer wheel nuts 2 at specified torque.

CAUTION

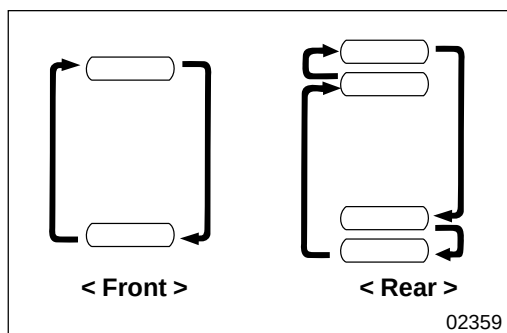
If outer wheel nuts 2 are tightened without first being loosened, it might not be possible to tighten them at the specified torque.

Tire rotation

Tires wear differently, according to the location where they are mounted. To make this wear uniform and prolong the life of your tires, they should be rotated every 10000 km (6000 miles) in the rotation order shown below:



- When the tread patterns for all tires are identical:



- When the tread patterns are different for the front and rear tires:

CAUTION

- Always adjust air pressure after running-in new tires.
- When using tires of different tread patterns, use rib-type patterns for the front tires and traction type patterns for the rear tires.
- Avoid using both radial and biased tires on the same vehicle.

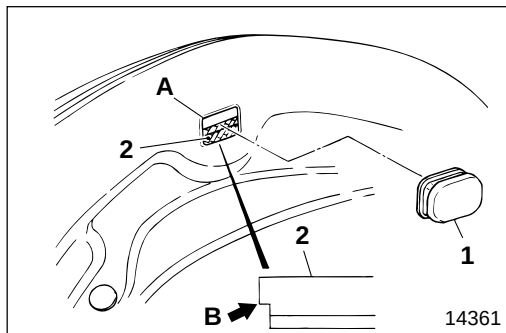
MAINTENANCE OPERATIONS

Inspection of Brake Lining Thickness

Service standards

Unit : mm {in.}

Location	Maintenance item	Standard value	Limit	Remedy
2	Thickness of brake lining	—	5 {0.20} (Wear limit at side step)	Replace



NOTE

Be sure to inspect at two points for each wheel per side.

- Remove check hole plug **1** from the packing plate.
- Inspect through check hole **A** whether brake lining **2** is worn to the point of side shoulder **B** of the brake lining (the limit).
- If the measured value is lower than the limit, replace brake lining **2** on the same axle as a unit.
- After inspection, be sure to reinstall check hole plug **1**.

Battery

DANGER ⚠

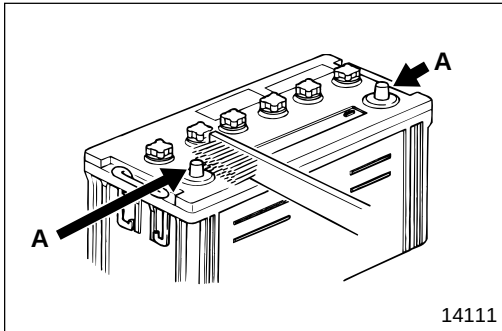
- Since flammable hydrogen gas is generated by the battery, be sure to obey the following warnings :
 - Do not short-circuit the $\oplus$ and $\ominus$ terminals on the battery.
 - Keep sparks and lit cigarettes away from the battery.
 - Do not wear metal objects on your arms and lean over the battery.
- Because the battery electrolyte is diluted sulfuric acid and is corrosive, when handling the battery wear safety glasses and rubber gloves to protect the eyes and hands.

WARNING ⚠

To prevent a short-circuit be sure that disconnected the battery cables do not accidentally touch the battery terminals.

CAUTION ⚠

- Make sure that you disconnect the battery cable $\ominus$ first when you disconnect the battery cables.
- Make sure that all electrical switches of the vehicle are OFF before connecting the battery cables.
- Make sure that you connect the battery cable $\oplus$ before you connect the battery cable $\ominus$.

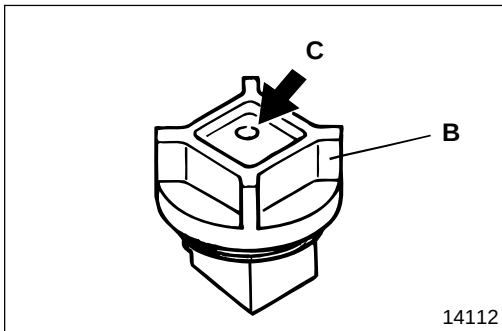


Visual inspection

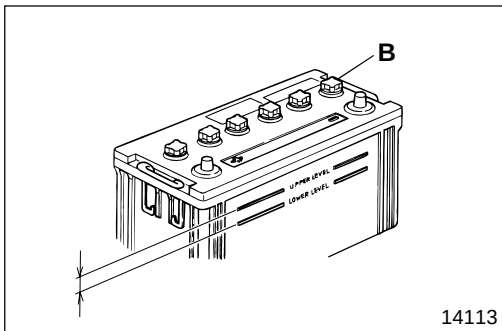
- If terminal **A** is corroded, scrub off the corrosion from it using a wire brush.
- If cracks or defects are found on the battery, replace it since the cracks or defects can cause liquid spills.

CAUTION

Make sure you grease the $\oplus$ side of terminal **A** because it is easily corroded.

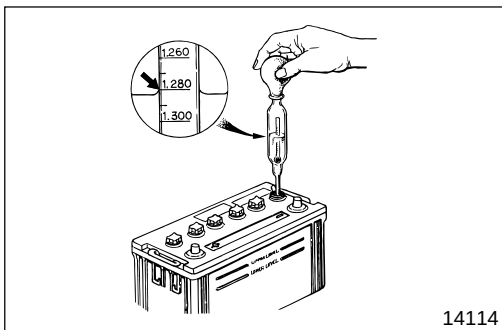


- If bleed hole **C** of vent plug **B** is clogged, clean the hole.



Inspection of fluid level

- Make sure that the battery electrolyte level is between UPPER and LOWER.
- If the level is below LOWER, remove vent plug **B** and fill the battery with distilled water or battery replenisher to UPPER.



Measurement of specific gravity

Measure the specific gravity of the battery electrolyte. If the measured value is lower than the limit, charge the battery.

NOTE

The specific gravity of the battery electrolyte depends on the liquid temperature. Use the following formula to convert the actual value to the value were the temperature 20°C {68°F}.

$$S_{20} \{68\} = S_t + 0.0007 (t - 20 \{68\})$$

$S_{20} \{68\}$: Specific gravity were the temperature 20°C {68°F}

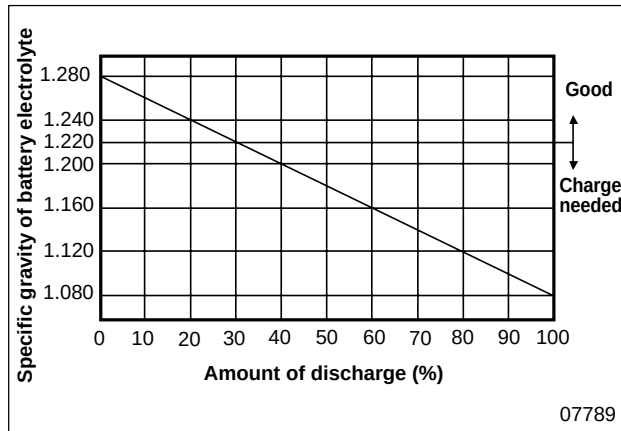
S_t : Specific gravity actually measured with the temperature at t°C {t°F}

t : Temperature of battery electrolyte

MAINTENANCE OPERATIONS

Charging

- Although, as a rule, charging of the battery should be done with the battery removed from the vehicle, if you have to charge the battery while it is on the vehicle, make sure that you stop the engine and disconnect the battery cable ⊖.
- Remove vent plug **B** before charging the battery.
- For the recommended charge time and current, see the following table to avoid overcharging.



	Charge current (A)	Charge time (H)	Upper limit of fluid temperature (°C {°F})
Normal charge	Value of 5-hour rating capacity $\frac{10}{\{113\}}$	$\frac{\text{★Amount of discharge (Ah)}}{\text{Charge current (A)}} \times 1.2 (\text{to } 1.5)$	45
Quick charge	Value of 5-hour rating capacity $\frac{15}{\{131\}}$	0.5	55

$$\text{★ Amount of discharge (Ah)} = \text{5-hour rating capacity (Ah)} \times \frac{\text{Amount of discharge (\%)}}{100}$$

- Use the graph shown on the left to calculate the amount of discharge (%).
- Use diluted sulfuric acid, made up of sulfuric acid and refined or distilled water, as the battery electrolyte.
- The specific gravity of fully-charged battery electrolyte is 1.280 with the temperature at 20°C {68°F}.

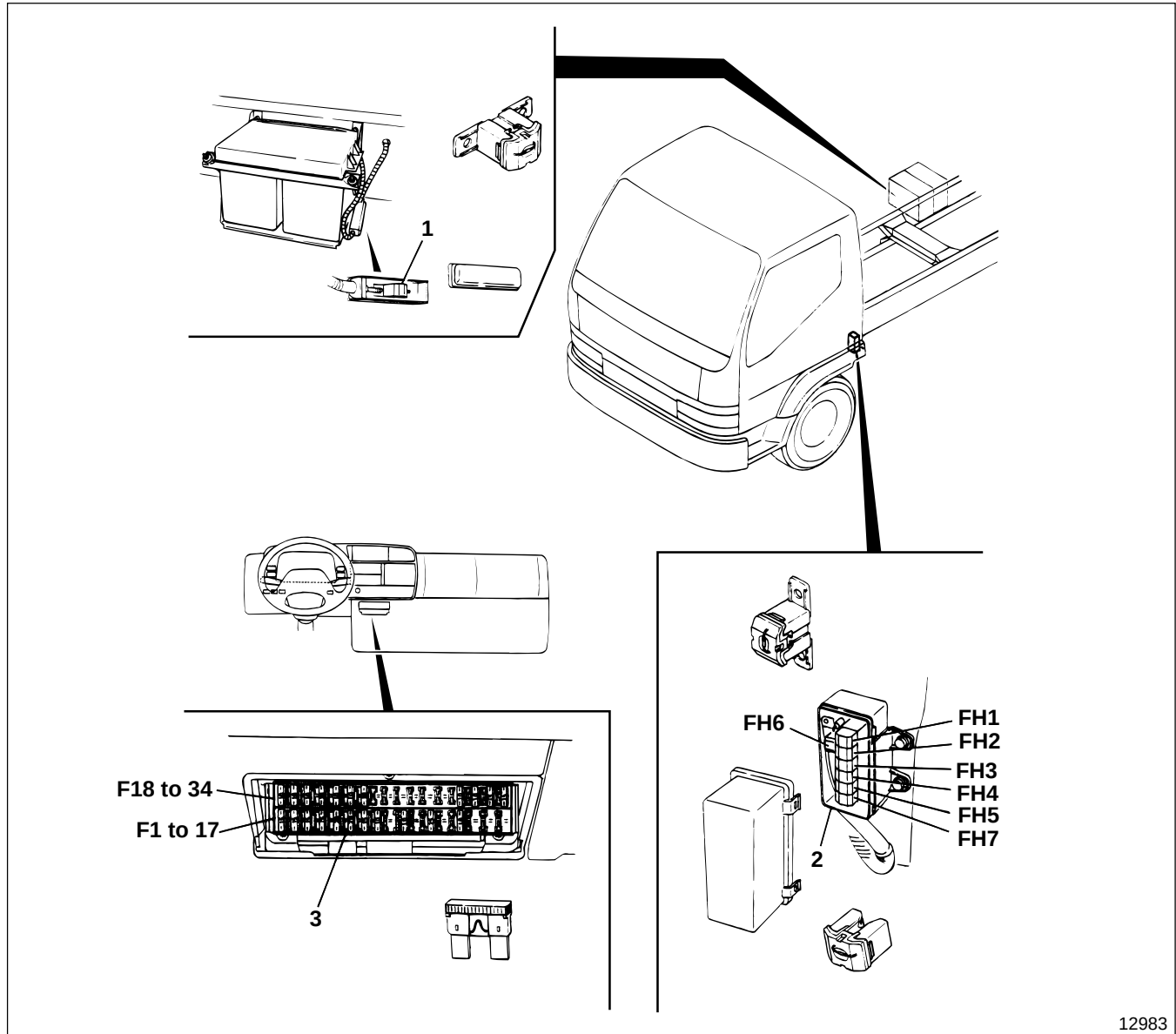
DANGER ⚠

- Do not let the battery electrolyte level rise and overflow while charging the battery.
- Keep naked lights away from the battery while charging it or it might explode.
- Be careful not to generate sparks while charging the battery because its dangerous.
- After charging the battery, tighten vent plug B, wash away sulfuric acid from the battery using water, and dry the surface.

MEMO

MAINTENANCE OPERATIONS

Fuse



12983

- 1 Main high-current fuse
- 2 High-current fuse box
- 3 Fuse box

CAUTION

- If a fuse blows, make sure you identify and remedy the cause, then replace the fuse.
- Make sure that you replace the fuse with one having the same rating.
- Make sure that you remove the $\ominus$ terminal of the battery cable before removing main high-current fuse 1 and high-current fuses FH1 to 7.

Main high-current fuse

Fuse No.	Main load	Capacity
—	High-current fuse box	120 A

High-current fuse box

Fuse No.	Main load	Capacity
FH1	Fuse box (F1 to F4)	50 A
FH2	Fuse box (F5 to F8)	50 A
FH3	Fuse box (F9 to F12)	40 A
FH4	Starter switch (Terminal B)	40 A
FH5	Glow relay	50 A
FH6	Alternator	120 A
FH7	Fuse box (F31 to F34)	40 A

Fuse box

Fuse No.	Main load	Capacity
F1	Headlamp, LH	15 A
F2	Headlamp, RH	15 A
F3	Stop lamp, horn	15 A
F4	Turn signal lamp	15 A
F5	Fuel-cut motor	10 A
F6	Cab lamp	10 A
F7	Reserve power (BATT)	10 A
F8	—	—
F9	—	—
F10	—	—
F11	—	—
F12	—	—
F13	* Cigarette lighter	15 A
F14	Radio	10 A
F15	—	—
F16	—	—
F17	Fuel-cut relay	10 A

Fuse No.	Main load	Capacity
F18	Starter	10 A
F19	Backup lamp	10 A
F20	Meter cluster	10 A
F21	Wiper	10 A
F22	Air dryer	10 A
F23	—	—
F24	—	—
F25	—	—
F26	—	—
F27	Exhaust brake	10 A
F28	Transmission PTO	10 A
F29	Pre-stroke cut relay	15 A
F30	* Air-conditioner control	10 A
F31	* Air-conditioner compressor	10 A
F32	* Condenser fan	15 A
F33	Blower fan	25 A
F34	Tail lamp	15 A

* : Fuses are provided for these pieces of equipment only where they are installed.

PTO : Power take-off

LUBRICATION

*1 : 30000 km/18000 miles or 6 months, whichever occurs first.

*2 : 60000 km/36000 miles or 12 months, whichever occurs first.

Ⓔ : Exhaust emission items

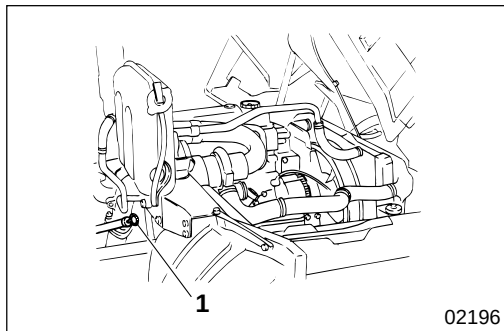
Inspection and maintenance		Time of inspection and maintenance					Lubrication procedures	Remarks
		Pre-operation checks	New vehicle at 4000 km/2500 miles	Inspection interval				
				Every 10000 km/ 6000 miles	Every 30000 km/ 18000 miles *1	Every 60000 km/ 36000 miles *2		
1	Ⓔ Engine oil contamination and oil level	×					Engine oil API classification CD, CD/SF, CE, CE/SF or CF-4 Over 30°C {86°F} SAE 40 40 to -5°C {104 to 23°F} SAE 30 15 to -15°C {59 to 5°F} SAE 20W-20 Over -15°C {5°F} SAE 15W-40 Below 0°C {32°F} SAE 10W-30	📦 Gr 12
	Ⓔ Engine oil replacement		×	×				
2	Clutch fluid tank fluid level	×		×			Brake fluid (SAE J1703f or FMVSS No.116 DOT3)	📦 Gr 21
	Clutch fluid tank fluid replacement					×		
3	Lubrication of clutch fork shaft				×		Wheel bearing grease [NLGI No.2 (Li soap)]	📦 Gr 21
4	Lubrication of clutch shifter			When replacing clutch disc assembly				
5	Manual transmission oil level			×			Gear oil, API classification GL-3 SAE 80 (General) GL-3 SAE 90 (Warm region) GL-4 SAE 90 (Tropical region)	📦 Gr 22
	Manual transmission oil replacement		×		×			
6	Automatic transmission fluid level			×			Automatic transmission fluid (DEXRON, DEXRON II type)	📦 Gr 23
	Automatic transmission fluid and filter replacement			Every 40000 km/ 25000 miles Replace the fluid at the first 10000 km/6000 miles inspection				
7	Axle housing gear oil level			×			Gear oil API classification GL-5 Below 40°C {104°F} SAE 90 Over 40°C {104°F} SAE 140 Use SAE 140 when operating vehicle at high load such as continuous ascent on slopes and when the outside temperature is 10°C {50°F} or more	📦 Gr 27
	Axle housing gear oil replacement		×			×		
8	Hub bearing grease and oil seal replacement					×	Wheel bearing grease [NLGI No.2 (Li soap)]	📦 Gr 26, 27
9	Brake fluid tank fluid level	×		×			Brake fluid (SAE J1703f or FMVSS No.116 DOT3)	📦 Gr 35
	Brake fluid tank fluid replacement					×		
10	Power steering fluid level			×			Automatic transmission fluid (DEXRON, DEXRON II type)	📦 Gr 37
	Power steering fluid replacement					×		
11	Lubrication of propeller shaft (universal joint, slip joint, center bearing)			×			Wheel bearing [NLGI No.2 (Li soap)]	📦 Gr 25
12	Lubrication of kingpins			×			Chassis grease [NLGI No.1 (Ca soap)]	📦 Gr 26
13	Lubrication of all chassis parts			×				

Engine Oil

Tightening torque

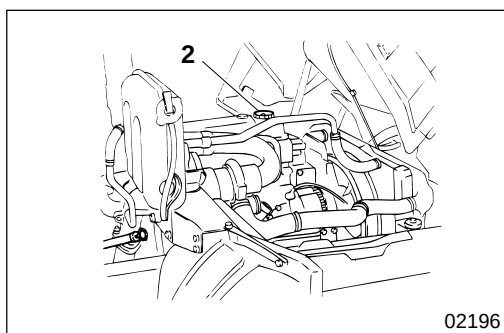
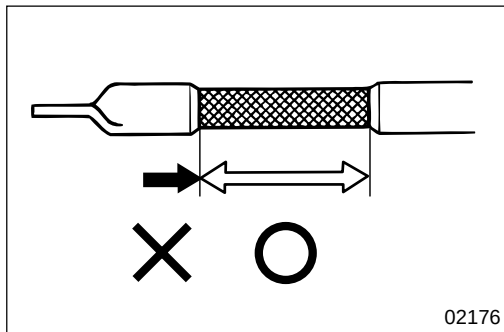
Unit : N·m {lbf.ft, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
3	Oil pan drain plug	69 {51, 7}	—



[Inspection]

- Pull out dipstick **1**, wipe off the oil with a cloth.
- Reinsert dipstick **1**, then pull it out carefully.
- Oil level is correct if there is oil sticking to dipstick **1** within the hatched area.
- If the level is low, top it up.
- Tilt the cab.



[Replenishment]

- Clean the area surrounding oil filler cap **2** and prevent dust from entering through the filler.
- Remove oil filler cap **2** and top up with engine oil.
- Wait five minutes before checking the oil level.
- Replace filler cap **2**.

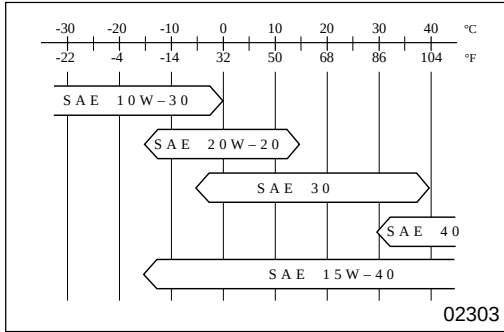
WARNING

- Wipe up any engine oil that has been spilled because it can cause a fire.
- Do not touch the engine while it is hot as it will burn you.

CAUTION

Take care not to spill engine oil on the V-belts, because this would cause them to slip, reducing service life.

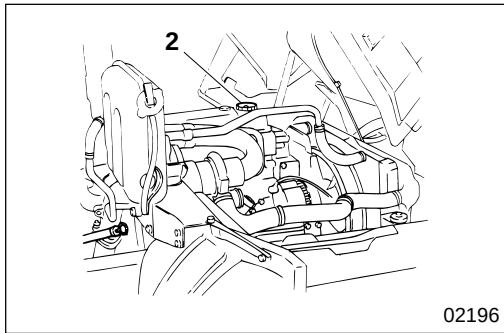
LUBRICATION



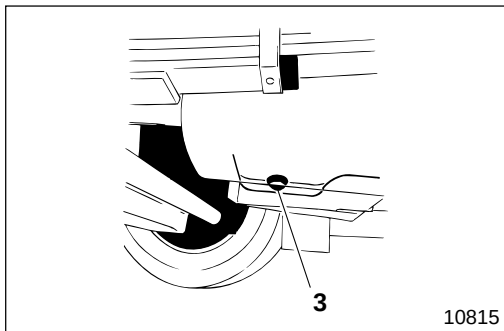
[Replacement]

Since engine oil greatly influences the performance, the life expectancy, and the ability to start the engine, use only oil of the specified grade and viscosity.

The chart illustrates the relationship between oil viscosity and the ambient air temperature.



- Clean the area surrounding oil filler cap **2** and prevent dust from entering through the filler.
- Remove oil filler cap **2**.
- Remove oil pan drain plug **3**, and drain the oil. At the same time replace the oil filter.
- After reinstalling drain plug **3**, slowly add engine oil through the oil filler.
- Using the dipstick, check the oil level after more than six minutes have passed.
- Start the engine and let it idle. When the oil has reached all parts, stop the engine. Let 30 minutes pass before checking the oil level again.



Clutch Fluid (Brake Fluid)

Tightening torque

Unit : N·m {lbf.ft, kgf·m}

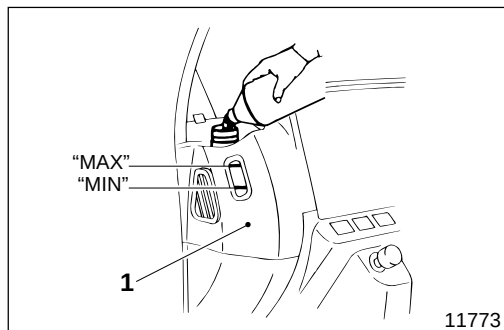
Location	Parts to be tightened	Tightening torque	Remarks
2	Air bleeder	25 to 34 {18 to 25, 2.5 to 3.5}	—

Fluid

Location	Points of application	Kinds	Quantity
1	Fluid tank	Brake fluid (SAE J1703f or FMVSS No.116 DOT3)	As required

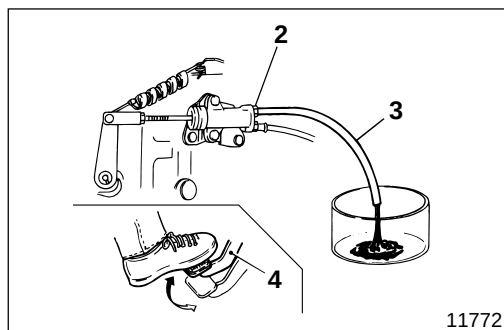
CAUTION

- Be careful not to splash brake fluid on related parts as this could damage the paintwork.
- Be sure to wipe off brake fluid immediately if you splash it on the paintwork.
- You must use new brake fluid (SAE J1703f or FMVSS No.116 DOT3). Do not add different quality fluid or mineral oil (gas oil, engine oil, gear oil, automatic transmission fluid, etc.) to the clutch system, because this will cause the rubber parts of the clutch system to swell, resulting in faulty clutch operation.
- Do not allow foreign particles or water to become mixed into the brake fluid when refilling, because this will cause faulty clutch operation.
- If you use a mug for adding brake fluid, keep it solely for that purpose to prevent contamination from different quality fluids or mineral oils.



[Inspection and replenishment]

- Inspect the level of the brake fluid in fluid tank 1. It should fall between the "MAX" and "MIN" levels.
- If it is below the "MIN" level, lift up the lid flap and remove the cap from fluid tank 1, then supply the specified brake fluid until the level has come up to the "MAX" level. Do not fill above the "MAX" level.

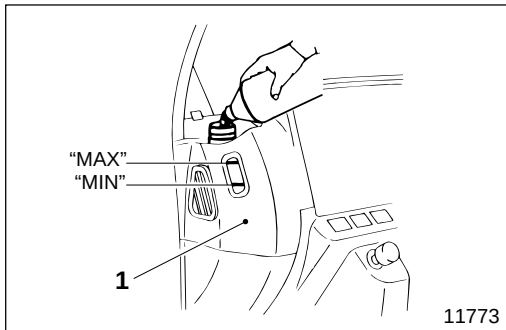
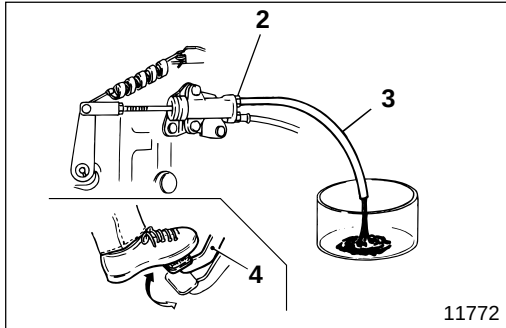


[Replacement]

- Attach vinyl pipe 3 to air bleeder 2 of the clutch power cylinder.
- Loosen air bleeder 2 and depress clutch pedal 4 several times to drain brake fluid completely.

LUBRICATION

- Supply new brake fluid to the “MAX” level of fluid tank **1**. Depress clutch pedal **4** repeatedly until the old brake fluid discharged from vinyl pipe **3** is replaced by the new brake fluid.



NOTE

Carry out this operation maintaining the brake fluid level in fluid tank **1** between “MAX” and “MIN”.

- Attach vinyl pipe **3** to air bleeder **2** of the clutch power cylinder as in the replacement procedure.
- Fill fluid tank **1** with brake fluid, and loosen air bleeder **2** of the clutch power cylinder then depress clutch pedal **4** continuously.
- Keep depressing clutch pedal **4**, and tighten air bleeder **2** when air is bled completely.
- Depress clutch pedal **4** several times again, then keep it depressed at its fullest extent.
- With clutch pedal **4** depressed, loosen air bleeder **2** to drain brake fluid containing air. Release the pedal after tightening the air bleeder.
- Repeat this operation until air is no longer present in the fluid being drained.
- When this operation is completed, tighten air bleeder **2** at specified torque.
- Check that brake fluid is at the “MAX” level of fluid tank **1**, and supply new brake fluid if necessary.
- Check for brake fluid leakage from each of the parts with clutch pedal **4** depressed.

Manual Transmission Gear Oil

Tightening torque

Unit : N·m {lbf.ft, kgf·m}

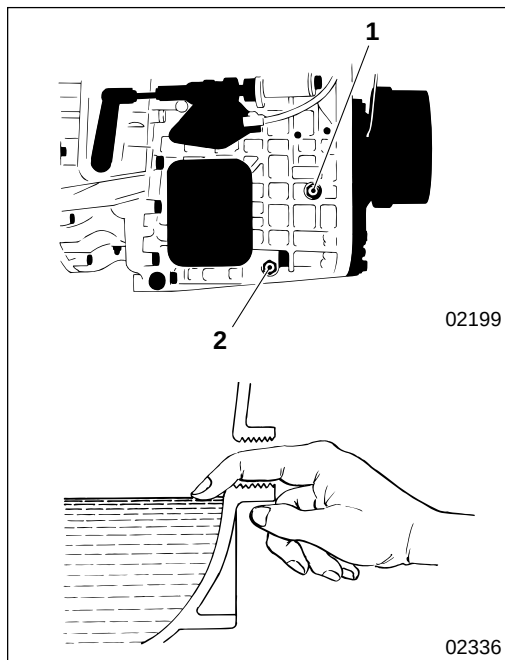
Location	Parts to be tightened	Tightening torque	Remarks
1	Inspection plug	69±15 {51±11, 7±1.5}	—
2	Drain plug	69±15 {51±11, 7±1.5}	—

Sealant

Location	Points of application	Kinds	Quantity
1	Thread area of inspection plug	THREEBOND 1105D	As required
2	Thread area of drain plug	THREEBOND 1105D	As required

WARNING

The engine is hot immediately after the vehicle stopped, so take care not to burn yourself.



[Inspection and replenishment]

- Remove inspection plug **1** and check whether the oil level is up to the edge of the entrance.
- If the level is low, add oil through the inspection plug hole until the level comes up to the edge of the entrance.

[Replacement]

- Drain the oil after removing inspection plug **1** and drain plug **2**.
- Remove any metal particles sticking to the magnetic part of drain plug **2** before reinstalling the plug.
- Add oil through the inspection plug hole until the level comes up to the edge of the entrance.
- Insert inspection plug **1**.

LUBRICATION

Automatic Transmission Fluid and Oil Filter

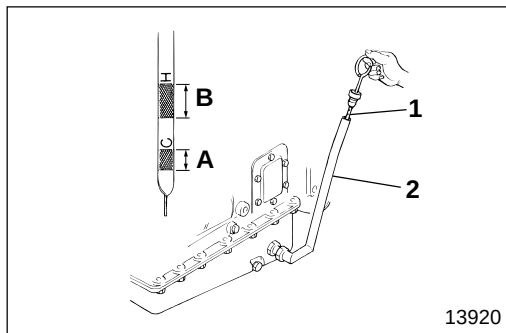
Tightening torque

Unit : N·m {lbf.ft, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
4	Drain plug	20 to 27 {15 to 20, 2.05 to 2.75}	—
5	Dipstick guide connector	125 to 135 {91 to 100, 12.55 to 13.76}	—
6	Bolt (Oil pan mounting)	14 to 18 {10 to 13, 1.4 to 1.8}	—
8	Bolt (Oil filter mounting)	14 to 18 {10 to 13, 1.4 to 1.8}	—
12	Oil filter	9.8 to 20 {7 to 14, 1 to 2}	—

Fluid

Location	Points of application	Kinds	Quantity
11	Body of O-ring	Automatic transmission fluid (DEXRON or DEXRON II type)	As required
12	Gasket of oil filter with thin application	Automatic transmission fluid (DEXRON or DEXRON II type)	As required



[Inspection and replenishment]

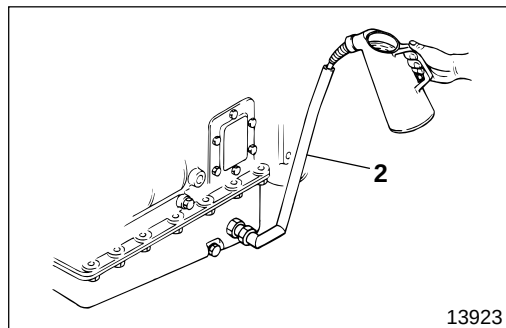
- Park the vehicle on level ground, make sure that the parking brake is fully activated and chock the wheels to keep them from rolling.
- Start the engine and let it idle. To fill the hydraulic circuit with automatic transmission fluid, shift the range selector lever from N → R → N → D → 2 → D → N. Repeat this process five times, finally shifting to N.
- While the engine is still idling, pull out dipstick **1** and wipe off the fluid sticking to it. Reinsert the dipstick, then pull it out again and check the fluid level.
- If the fluid level is inspected right after the engine is started and the fluid temperature is still low (approximately 15 to 49°C {60 to 120°F}), the level should be within area **A** marked COLD on dipstick **1**.
- If the fluid level is inspected after the vehicle has been driven and the fluid temperature is high (approximately 71 to 93°C {160 to 200°F}), the level should be within area **B** marked HOT on dipstick **1**.

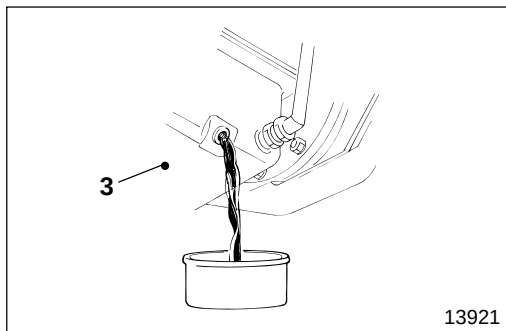
WARNING ⚠

Take care during the inspection because the engine will be running. Take sufficient care to avoid burns or injuries resulting from contact with moving parts.

NOTE

- Make sure the vehicle is parked on level ground when you are checking the fluid level.
- Make sure the range selector lever is in the N position and the engine is idling when you are checking the fluid level. When the engine is stopped, the fluid level appears higher than it actually is.
- Be sure to wipe off the dust from the safety cap and the upper part of dipstick guide **2** before you pull out dipstick **1**.
- To ensure the fluid is correct, reinspect the fluid level after an actual drive.
- If the fluid level is low, add automatic transmission fluid (DEXRON or DEXRON II type) through dipstick guide **2** until the correct level on dipstick **1** is reached.





[Replacement]

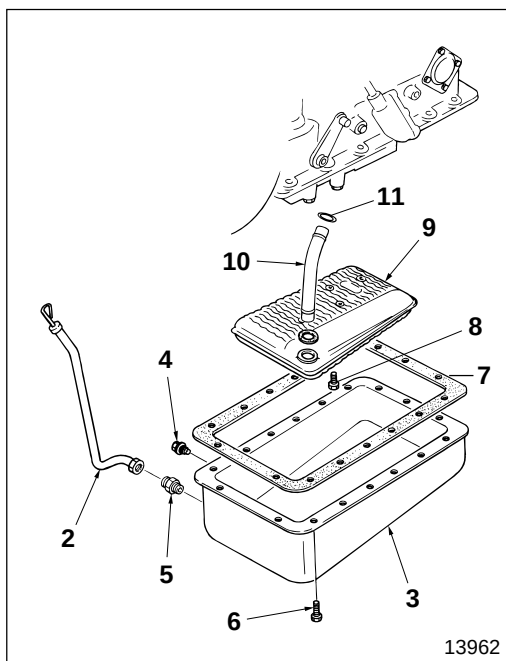
- Park the vehicle on level ground, chock the wheels and shift the range selector lever to the N position.
- Place a container under oil pan 3, remove drain plug 4 and drain the fluid.

WARNING ⚠

Take care because the fluid temperature immediately after the engine has stopped is very high. To avoid scalds, wait until a safe temperature has been reached before draining the fluid.

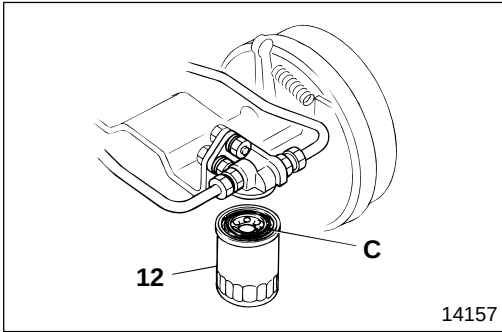
NOTE

- The fluid will drain faster if the engine is first run to raise the fluid temperature.
- The fluid cannot be drained from the hydraulic circuit, the torque converter or the oil cooler.
- Check the drained fluid for dirt, metal particles and metal fragments.

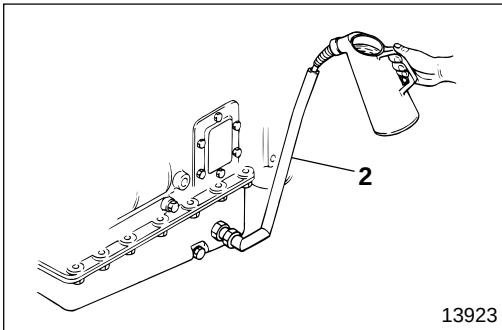


- Remove oil pan 3, intake pipe 10, O-ring 11, gasket 7 and oil filter 9.
- Clean oil pan 3.
- Replace O-ring 11, gasket 7 and oil filter 9.

LUBRICATION



- Remove oil filter **12** (for oil cooler) by turning it counterclockwise.
- Lightly coat gasket **C** with the fluid before installing oil filter **12**. Then tighten the oil filter.



- Supply fluid through dipstick guide **2**.

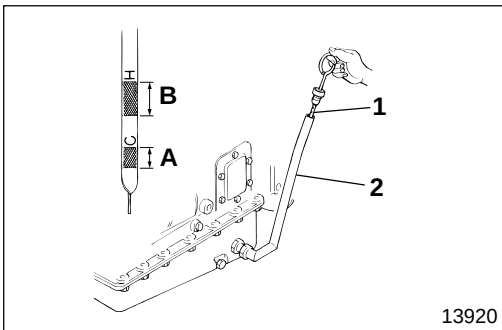
CAUTION

Make sure that dirt and foreign particles do not become mixed in with the fluid when it is added.

- Shift the range selector lever to the N position, start the engine and let it idle for about one minute.
- After shifting the lever through all positions once, shift it back to N position.

CAUTION

To prevent burning out the interior of the automatic transmission assembly, make sure that the engine is not allowed to race when you do the above.



- Check and adjust so that the fluid level is within the specified area on dipstick **1**.

NOTE

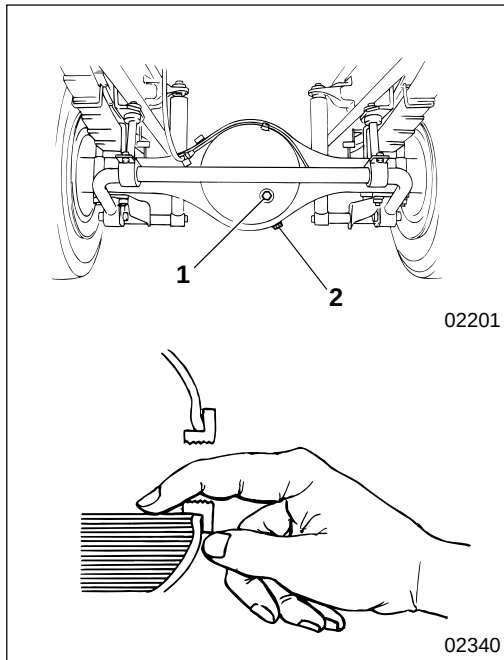
- As the temperature of the fluid rises, so does the fluid level. If you add fluid while the temperature is still low (approximately 15 to 49°C {60 to 120°F}), make sure that the level stays within area **A**, marked **COLD** on dipstick **1**.
- Let the engine idle and, while paying attention to the fluid level, pour in the fluid slowly.
- It is sometimes hard to check the fluid level, immediately after supplying fluid, because of the fluid adhering to the interior of dipstick guide **2**. If this is the case, check the fluid level several times at intervals.
- Be careful not to supply too much fluid because you might mistake the fluid that overflows from the air breather for fluid leakage.

Rear Axle Gear Oil

Tightening torque

Unit : N·m {lbf.ft, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
1	Inspection plug	98 to 115 {72 to 87, 10 to 12}	—
2	Drain plug	98 to 115 {72 to 87, 10 to 12}	—



[Inspection and replenishment]

WARNING ⚠

The oil temperature is high immediately after the vehicle stopped, so take care not to scald yourself.

- Remove inspection plug **1**, check the oil level and make sure it is up to the edge of the entrance.
- If the oil level is low, add oil through the inspection plug hole until the level comes up to the edge of the entrance.
- Insert inspection plug **1**.

[Replacement]

- Drain the oil after removing inspection plug **1** and drain plug **2**.
- Remove any metal particles sticking to the magnetic part of drain plug **2** before reinstalling the plug.
- Supply oil through the inspection plug hole until the level comes up to the edge of the entrance.
- Reinstall the inspection plug.

LUBRICATION

Power Steering Fluid

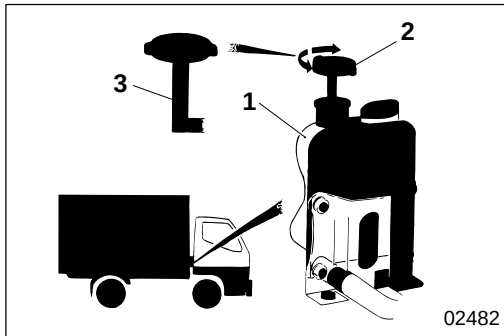
Tightening torque

Unit : N·m {lb·ft, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
4	Oil pipe	66.69±12.75 {49±9.4, 6.8±1.3}	—

Fluid

Location	Points of application	Kinds	Quantity
1	Power steering oil tank	Automatic transmission fluid (DEXRON or DEXRON II type)	Between end and F on filler cap dipstick



[Inspection and replenishment]

- Straighten the front wheels and stop the engine.
- Remove filler cap 2 of power steering oil tank 1 by turning the filler cap counterclockwise.
- Wipe off the fluid sticking to dipstick 3 on filler cap 2. Replace the filler cap.

NOTE

Check the fluid level without screwing on filler cap 2.

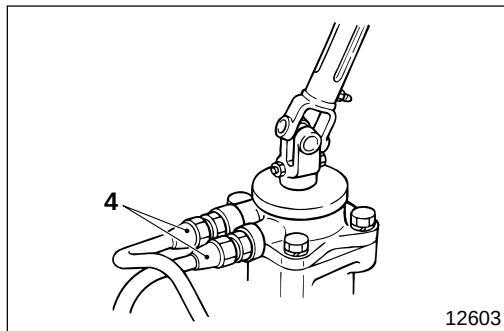
- Carefully lift up filler cap 2 and check the fluid sticking to dipstick 3 to make sure that the fluid is at a point between the end and F on the dipstick. If the level is low, add fluid.
- After inspection install filler cap 2 by turning it clockwise.

WARNING ⚠

Close filler cap 2 firmly; otherwise power steering fluid will leak and could catch fire. Also wipe up spilled fluid.

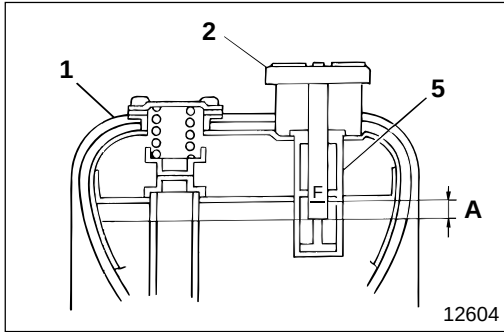
CAUTION ⚠

If the fluid level is far below the recommended range, the fluid may be leaking.



[Replacement]

- Drainage
 - Jack up the front wheels.
 - Disconnect oil pipe 4 connected to the power steering booster.
 - Turn the steering wheel fully left and right repeatedly, and drain the fluid from the power steering booster.
 - After draining the fluid, tighten oil pipe 4 at specified torque.



[Supply]

- Pour fluid into power steering oil tank **1** up to the inner port of strainer **5**.
- With the engine stopped, jack up the front wheels and turn the steering wheel fully left and right repeatedly. When the fluid level has dropped, add fluid to maintain the fluid level within range **A**.

NOTE

Check the fluid level without screwing on filler cap **2.**

- Start the engine and letting it idle, turn the steering wheel fully left and right repeatedly. When the fluid level has dropped, add fluid to maintain the fluid level within range **A**. Repeat these steps until the fluid level does not drop.
- If there is an abnormal noise, air is still in the system. Turn the steering wheel several times to raise the fluid temperature to approximately 60 to 80°C {140 to 176°F}, then stop the engine and wait for approximately five minutes.
- Lower the front wheels and turn the steering wheel several times. If there is no noise, bleeding is completed.
- When bleeding is finished, check fluid level of power steering oil tank **1**, and pipe and hose connections for fluid leakage.

LUBRICATION

Brake Fluid

Tightening torque

Unit : N·m {lb·ft, kgf·m}

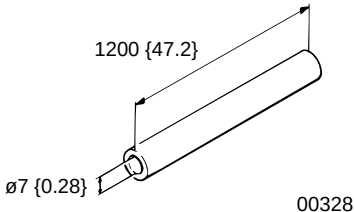
Location	Parts to be tightened	Tightening torque	Remarks
—	Air bleeder (Airmaster)	6.9 to 12.7 {5.1 to 9.4, 0.7 to 1.3}	—
—	Air bleeder (Wheel brake)	7.8 to 12 {5.8 to 8.5, 0.8 to 1.2}	—

Fluid

Location	Points of application	Kinds	Quantity
—	Fluid tank	Brake fluid (SAE J1703f or FMVSS No.116 DOT3)	As required

Special tools

Unit : mm {in.}

Location	Tool name and shape	Part No.	Application
—	Vinyl hose 	MH033102	Air bleeding

WARNING

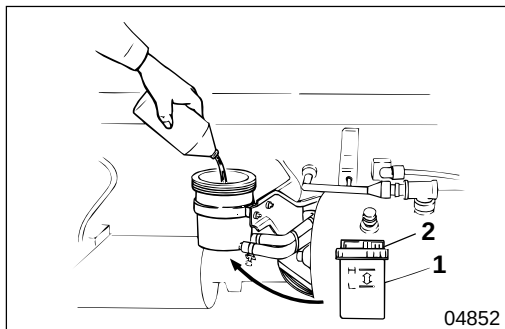
- You must use new brake fluid (SAE J1703f or FMVSS No.116 DOT3).
- Do not add different quality fluid or mineral oil (gas oil, engine oil, gear oil, automatic transmission fluid, etc.) to the brake system, because this will cause the rubber parts of the brake system to swell, resulting in brake dragging or ineffective braking.
- Be sure not to allow dirt or water to become mixed into brake fluid when refilling, because this will cause the brake to malfunction.
- If you use a mug for adding brake fluid, keep it solely for that purpose to prevent contamination from different quality fluids or mineral oils.

CAUTION

- Be careful not to splash brake fluid on related parts as this could damage the paintwork.
- Be sure to wipe off brake fluid immediately if you splash it on the paintwork.

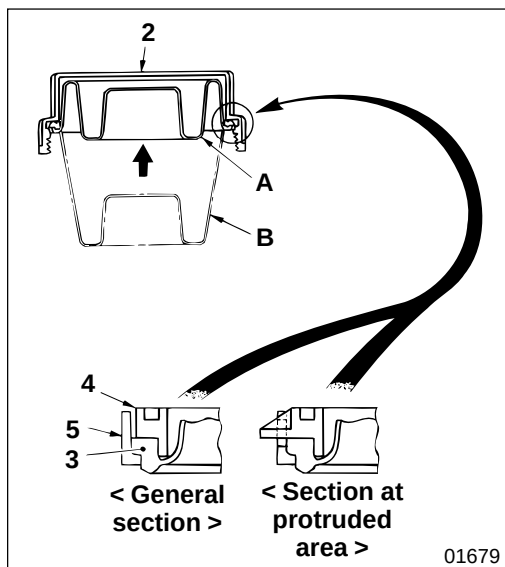
NOTE

Supply brake fluid to maintain the “H” level of the brake fluid tank always.



[Inspection and replenishment]

Inspect the level of the brake fluid in fluid tank **1**. It should fall between the "L" and "H" levels. If it is below the "L" level, remove cap **2** from the fluid tank, then supply the specified brake fluid until the level comes up to the "H" level. Do not fill above the "H" level.



- If diaphragm **3** is not in its normal posture when the brake fluid is supplied, correct it to its normal posture, and install cap **2**. If brake fluid leaks from the cap area after you have supplied brake fluid, check whether the diaphragm is assembled as illustrated.

4 : Slide ring

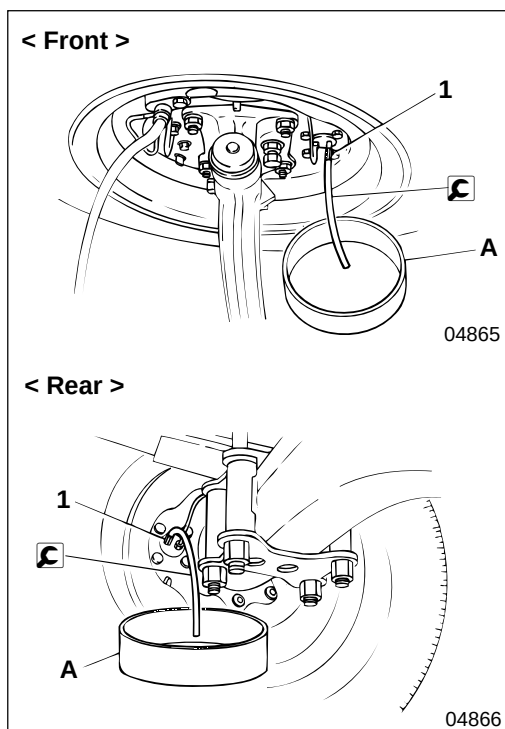
5 : Ring cover

A : Correct condition of diaphragm when brake fluid is being supplied

B : Condition when diaphragm is extended when brake fluid has decreased

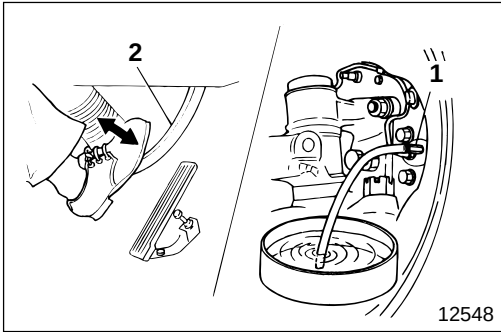
[Replacement]

- Start engine and let it idle until brake fluid replacement is completed.

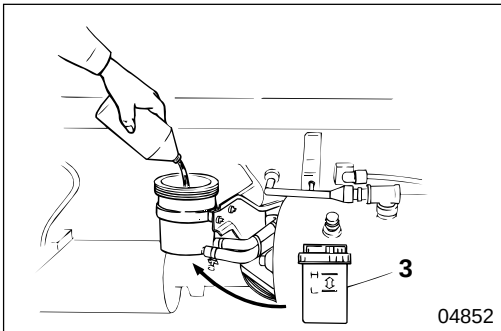


- Attach one end of  vinyl hose to air bleeder **1** and place the other end in container **A**.

LUBRICATION

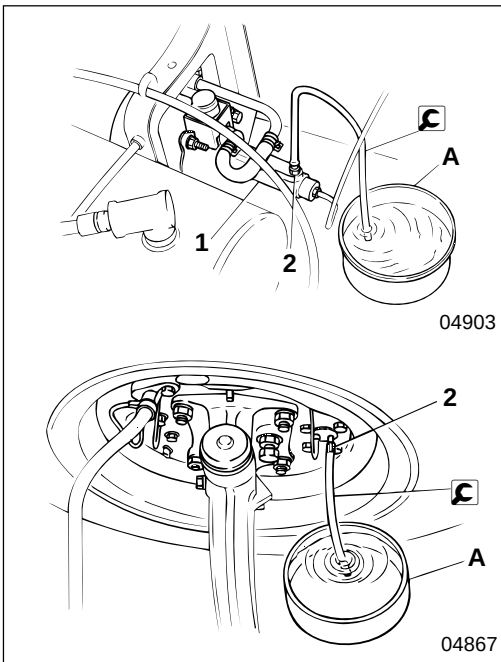


- Loosen air bleeders **1** and depress brake pedal **2** several times to drain brake fluid completely.



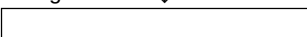
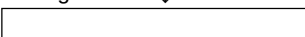
- Maintaining a supply of new brake fluid up to the "H" level of fluid tank **3**, depress the brake pedal repeatedly until the old brake fluid of the brake system is replaced with new fluid.
- Carry out air bleeding of the brake system.

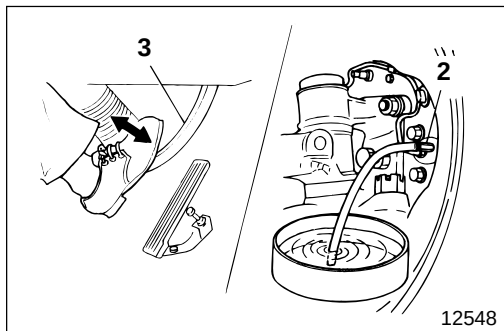
[Air bleeding]



- Start the engine and let it idle until brake fluid replacement is completed.
- Attach one end of  vinyl hose to front or rear airmaster **1**. Then, attach one end of another vinyl hose to air bleeder **2** of the wheel brake. Finally, place both free ends in container **A** filled with brake fluid.

- Carry out air bleeding in the following sequence:

Front brake system	Rear brake system
	
Airmaster for front	Airmaster for rear
	
Right-hand side wheel brake	Right-hand side wheel brake
	
Left-hand side wheel brake	Left-hand side wheel brake

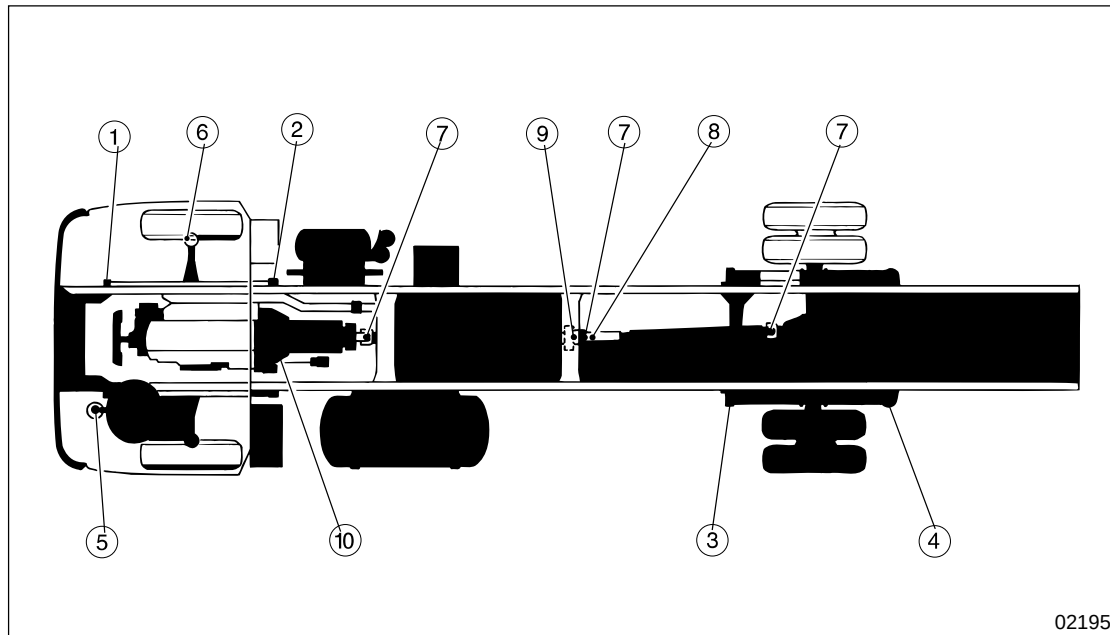


- Depress brake pedal **3** slowly a few times, and with the brake pedal depressed, loosen air bleeder **2** to drain brake fluid containing air.
- Tighten air bleeder **2**, and release brake pedal **3**.
- Repeat this service procedure until air is no longer present in the fluid being drained.
- Tighten air bleeder **2** at specified torque as soon as brake fluid flowing out is free of air bubbles.
- Adjust brake shoe clearance when you have finished air bleeding.
- Check that brake fluid comes up to level "H" of the fluid tank. If it does not, refill with new brake fluid.
- Depress brake pedal **3** a few times and check for any leakage of brake fluid, then test the brakes.
- When you test the brakes, if the brake warning lamp within the meter cluster lights, it means that air has not been bled completely. Redo air bleeding.

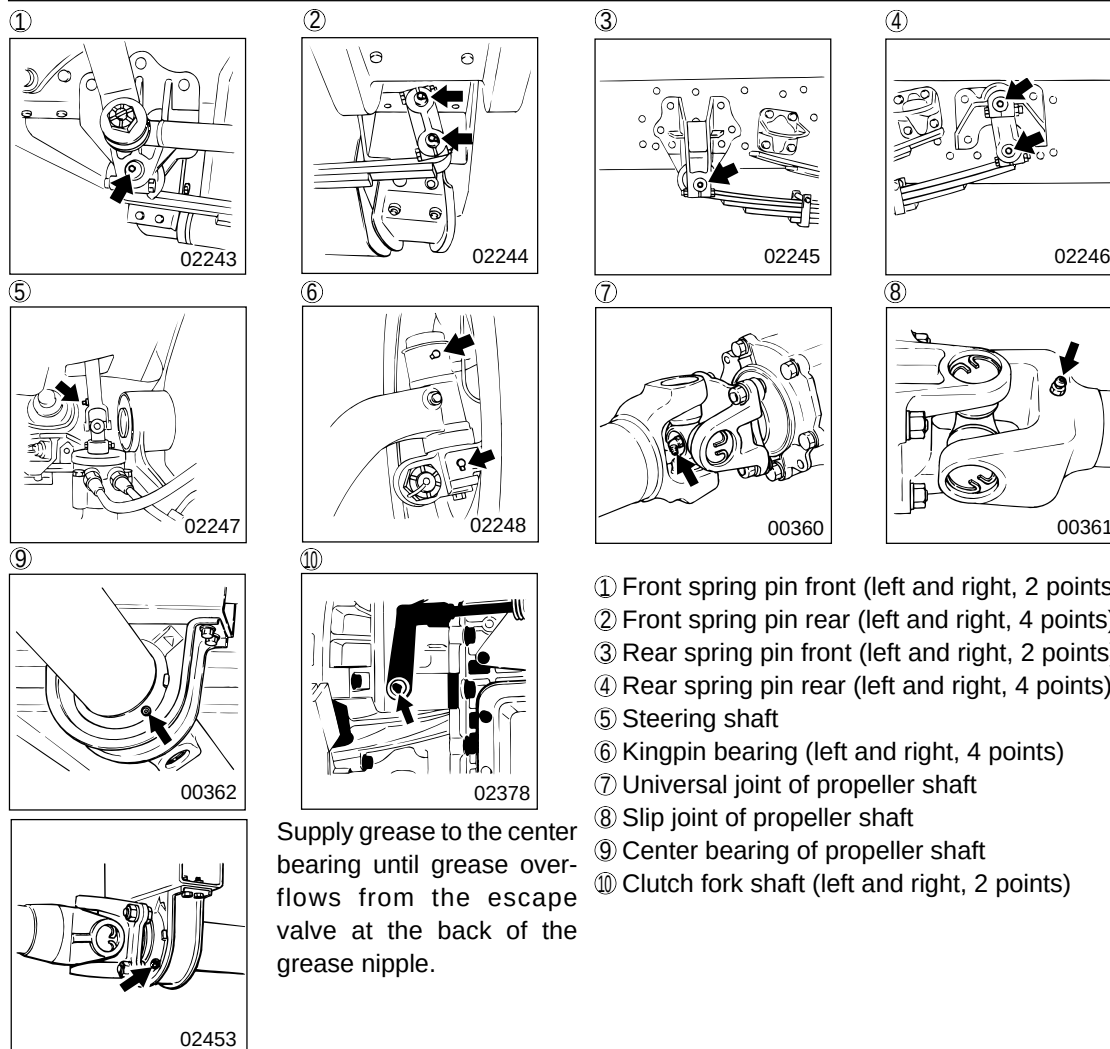
LUBRICATION

● Greasing Various Areas of Chassis

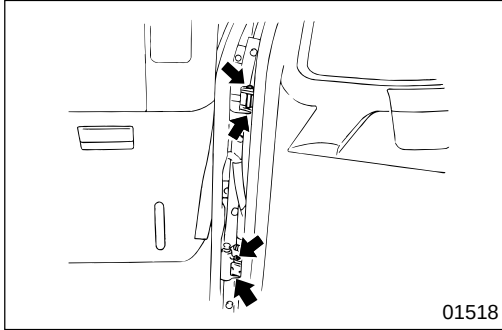
Carefully clean away all dust and dirt from the grease nipples, and use the specified type of grease. The areas to be greased are shown in the following illustration.



02195



Supply grease to the center bearing until grease overflows from the escape valve at the back of the grease nipple.



● Door hinge



FH

Service Manual

Group 10

Removal and Installation

of Engine

 **MITSUBISHI FUSO TRUCK OF AMERICA, Inc.**

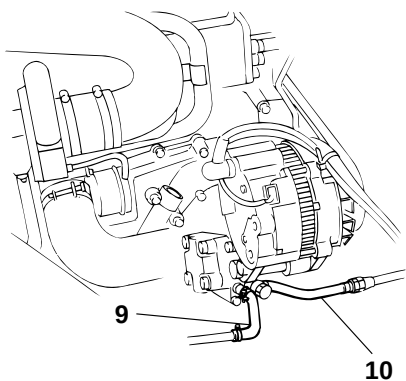
GROUP 10 REMOVAL AND INSTALLATION OF ENGINE

REMOVAL AND INSTALLATION OF ENGINE

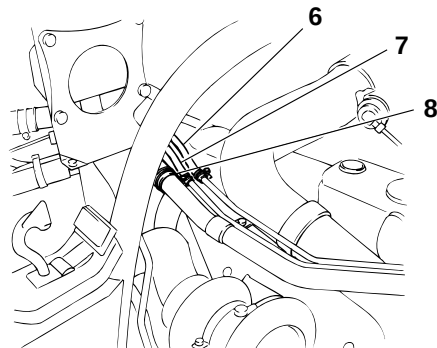
- Charge and Discharge of Engine Coolant,
Removal and Installation of Hoses 2
- Removal and Installation of Engine Related Parts 4
- Removal and Installation of Engine 6

REMOVAL AND INSTALLATION OF ENGINE

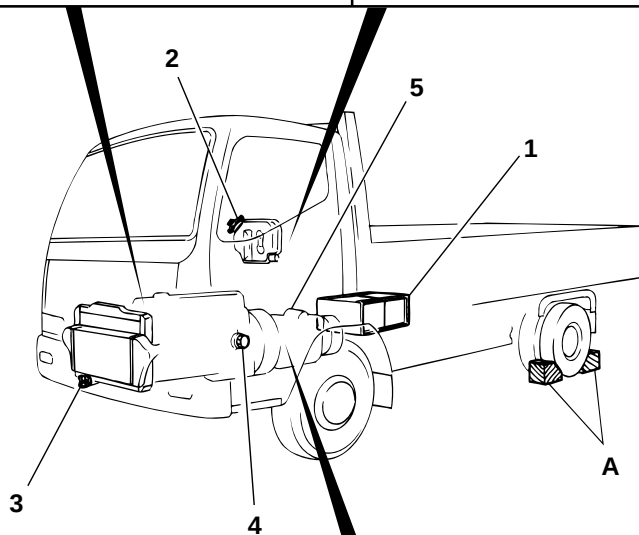
Charge and Discharge of Engine Coolant, Removal and Installation of Hoses



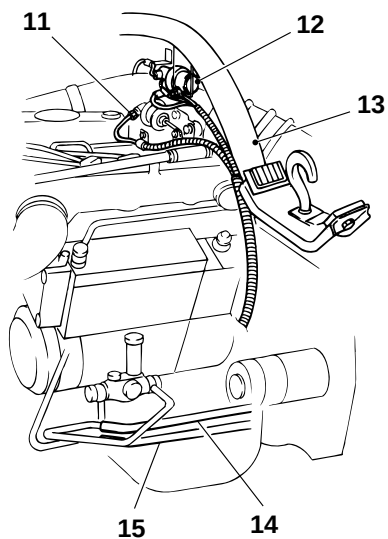
13257



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13259



13260

● Work before removal and after installation

📖 P10-3

● Removal sequence

- 1 Battery cable ⊖
- 2 Pressure cap (Surge tank)
- 3 Radiator drain plug 📦 Gr 14
- 4 Crankcase drain plug 📦 Gr 14
- 5 Transmission assembly 📦 Gr 22, 23
- 6 Air hose 📦 Gr 14
- 7 Suction hose 📦 Gr 14
- 8 Supply hose 📦 Gr 14
- 9 Power steering oil hose
- 10 Power steering oil hose
- 11 Nylon tube (Intake silencer)
- 12 Glow relay
- 13 Cab bridge 📦 Gr 42
- 14 Fuel feed hose
- 15 Fuel return hose

A : Wheel chock

WARNING ⚠️

- You must insert blanking plugs into fuel feed hose 14 and fuel return hose 15 after you remove them and secure them at a higher level than the fuel tank to prevent fuel from flowing out of them. Otherwise a fire might be caused.
- You must make sure that the engine coolant is cold before draining it so as not to scald yourself.
- It is dangerous to open pressure cap 2, when the coolant temperature is high, without taking due care because the hot water would spray out. Be sure to cover the pressure cap with a cloth and loosen slowly to bleed the pressure before opening fully.

● Installation sequence

Follow the removal sequence in reverse.

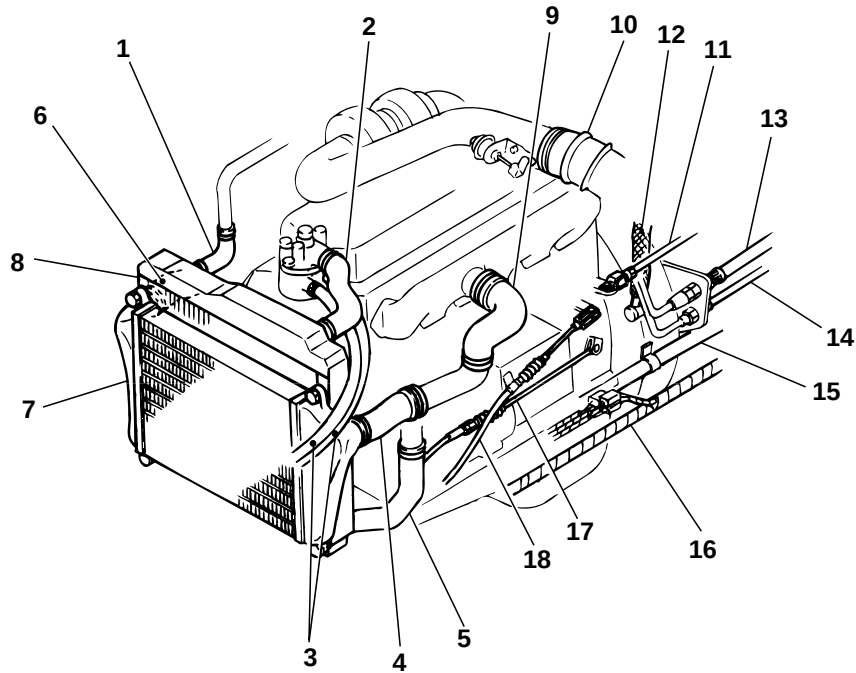
◆ Service procedure

● Work before removal and after installation

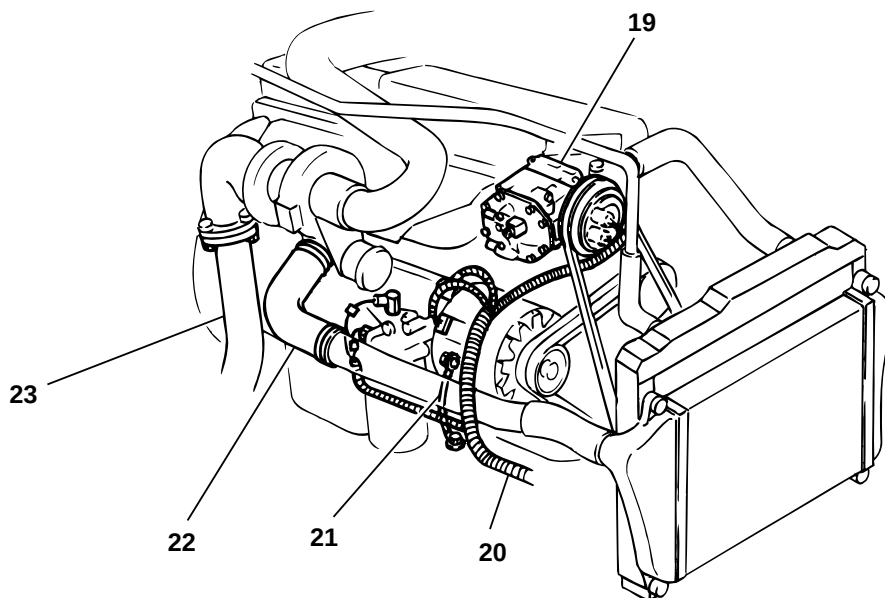
- Discharge, charge, and air bleeding of engine coolant 📦 Gr 14
- Discharge, charge, and air bleeding of oil 📦 Gr 37
- Air bleeding of fuel system 📦 Gr 13

REMOVAL AND INSTALLATION OF ENGINE

Removal and Installation of Engine Related Parts



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● Removal sequence

- 1 Supply hose  Gr 14
- 2 Inlet hose  Gr 14
- 3 Heater hose  Gr 55B
- 4 Air intake hose  Gr 15
- 5 Outlet hose  Gr 14
- 6 Air intake hose  Gr 15
- 7 Intercooler  Gr 15
- 8 Radiator  Gr 14
- 9 Air intake hose  Gr 15
- 10 Air intake hose  Gr 15
- 11 Modulator cable  Gr 23
- 12 Harness (Ground)
- 13 Air outlet hose
- 14 Air unloader hose
- 15 Harness (Starter)
- 16 Harness (Chassis harness)
- 17 Engine stop cable  Gr 13
- 18 Accelerator control cable  Gr 13
- 19 Cooler compressor  Gr 55A
- 20 Harness (Chassis harness)
- 21 Harness (Ground)
- 22 Air intake hose  Gr 15
- 23 Front pipe  Gr 15

NOTE

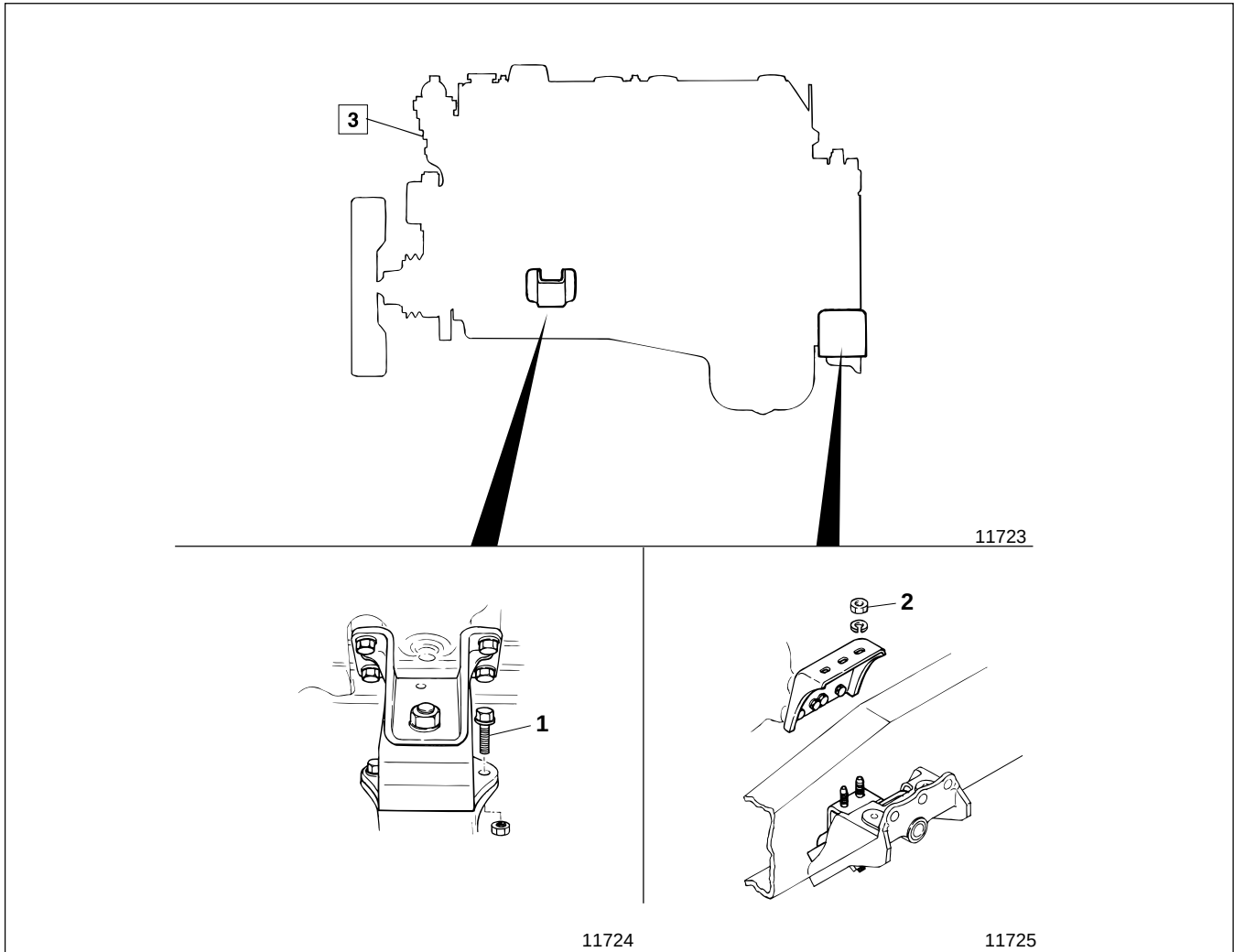
- For vehicles fitted with an air-conditioner do not disconnect the hose that goes to the air-conditioner from cooler compressor 19 when you remove it otherwise you will have to recharge the air-conditioner with refrigerant.
- After removing cooler compressor 19 tie it to the frame temporarily.

● Installation sequence

Follow the removal sequence in reverse.

REMOVAL AND INSTALLATION OF ENGINE

Removal and Installation of Engine



● Removal sequence

- 1 Bolt
- 2 Nut
- 3 Engine assembly

WARNING ⚠

When you lift engine assembly 3, you must use lifting gear that is strong enough to lift the mass of the engine (approximately 550 kg {1210 lb}).

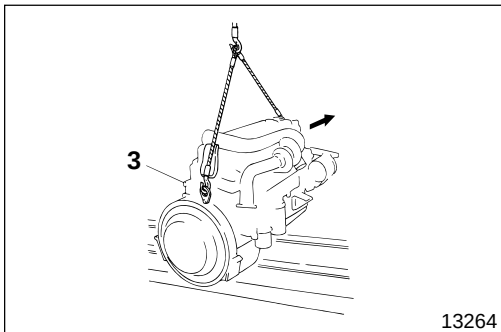
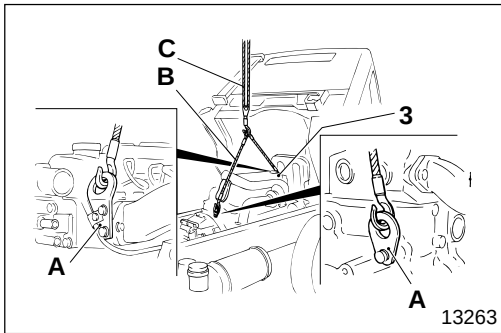
● Installation sequence

Follow the removal sequence in reverse.

◆ Service procedure

3 Removal of engine assembly

- Hook lifting gear **B** to two hangers **A** on engine assembly **3** and lift the engine using crane **C** until the lifting gear becomes taut.
- Make sure that wiring and hoses are disconnected.



- Lower engine assembly **3** slowly so that it does not hit the frame or cab.
- When the lower part of engine assembly **3** appears from the frame, turn the engine assembly 90° to remove it.



FH

Service Manual

Group 11

Engine

 **MITSUBISHI FUSO TRUCK OF AMERICA, Inc.**

GROUP 11 ENGINE

SPECIFICATIONS	2
STRUCTURE AND OPERATION	3
TROUBLESHOOTING	6
INSPECTION AND ADJUSTMENT MOUNTED IN VEHICLE	
• Inspection of Engine Compression	7
• Inspection and Adjustment of Valve Clearance	9
CYLINDER HEAD AND VALVE MECHANISM	10
TIMING GEAR	24
CAMSHAFT	28
PISTON, CONNECTING ROD AND CYLINDER SLEEVE	34
FLYWHEEL	48
CRANKSHAFT AND CRANKCASE	52

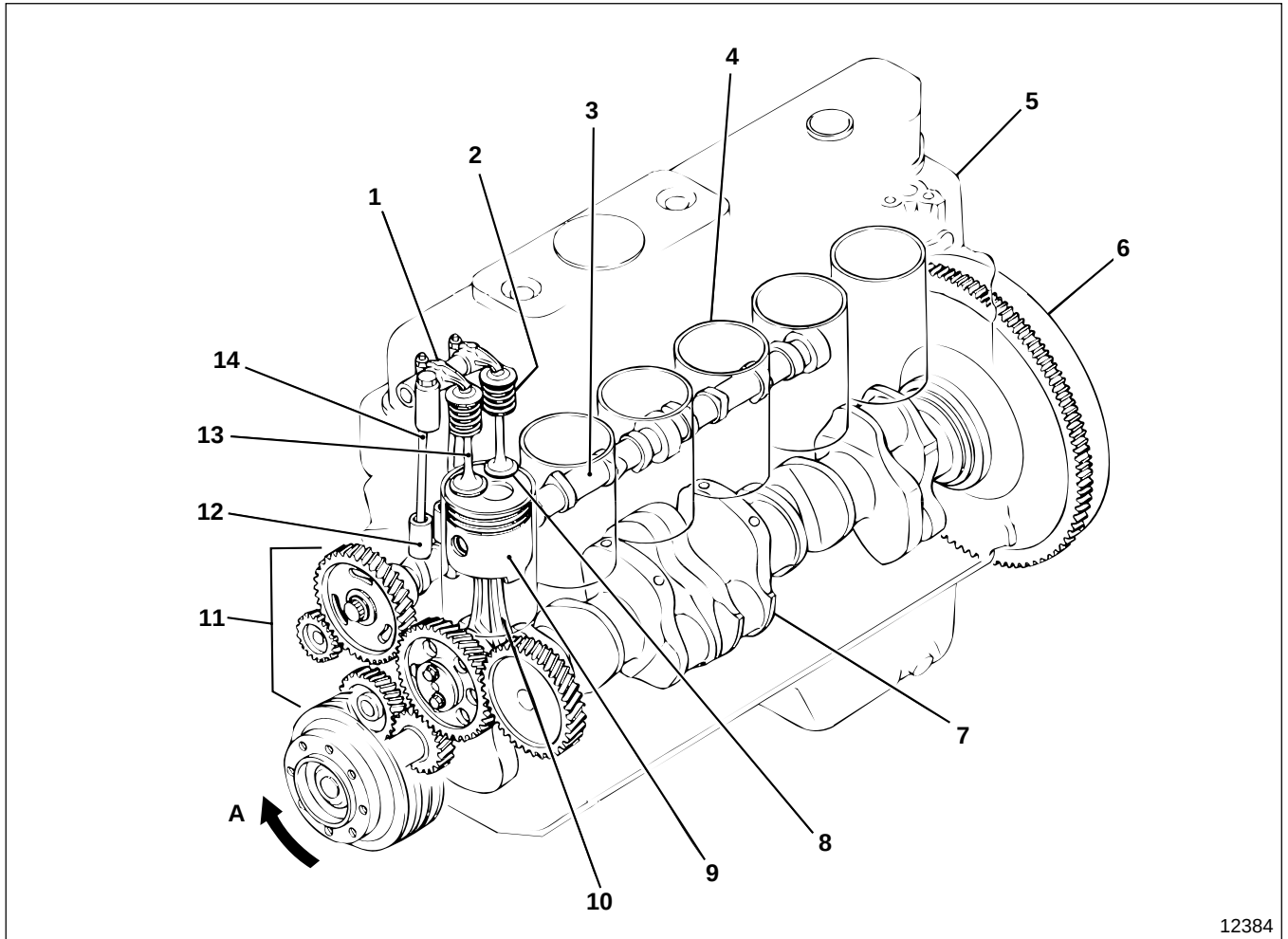
SPECIFICATIONS

Item		Specifications
Engine model		6D34T2
Type		6-cylinder in-line, water-cooled 4-cycle diesel
Combustion chamber type		Direct injection type
Valve mechanism		Overhead valve (OHV) type
Maximum output	HP/rpm (SAE Gross)	175/2900
Maximum torque	lbs.ft/rpm (SAE Gross)	325/2000
Bore×stroke	mm {in.}	ø104×115 {4.09×4.53}
Total displacement	cm ³ {cu. in.}	5861 {357.7}
Compression ratio		18

STRUCTURE AND OPERATION

11

Engine Body



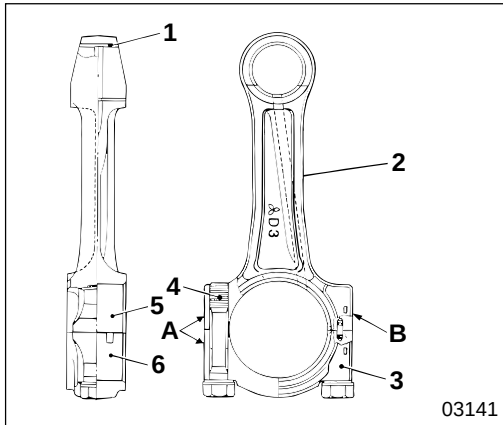
- 1 Rocker arm
- 2 Valve spring
- 3 Camshaft
- 4 Cylinder sleeve
- 5 Cylinder head
- 6 Flywheel
- 7 Crankshaft
- 8 Exhaust valve

- 9 Piston
- 10 Connecting rod
- 11 Timing gear
- 12 Tappet
- 13 Inlet valve
- 14 Push rod

A : Direction of rotation

STRUCTURE AND OPERATION

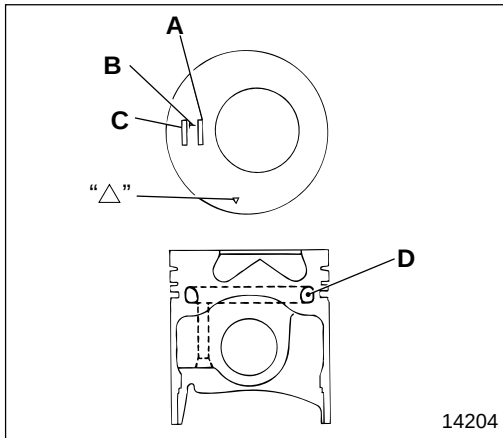
Connecting Rod



- 1 Connecting rod bushing
- 2 Connecting rod
- 3 Connecting rod cap
- 4 Connecting rod bolt
- 5 Upper connecting rod bearing
- 6 Lower connecting rod bearing

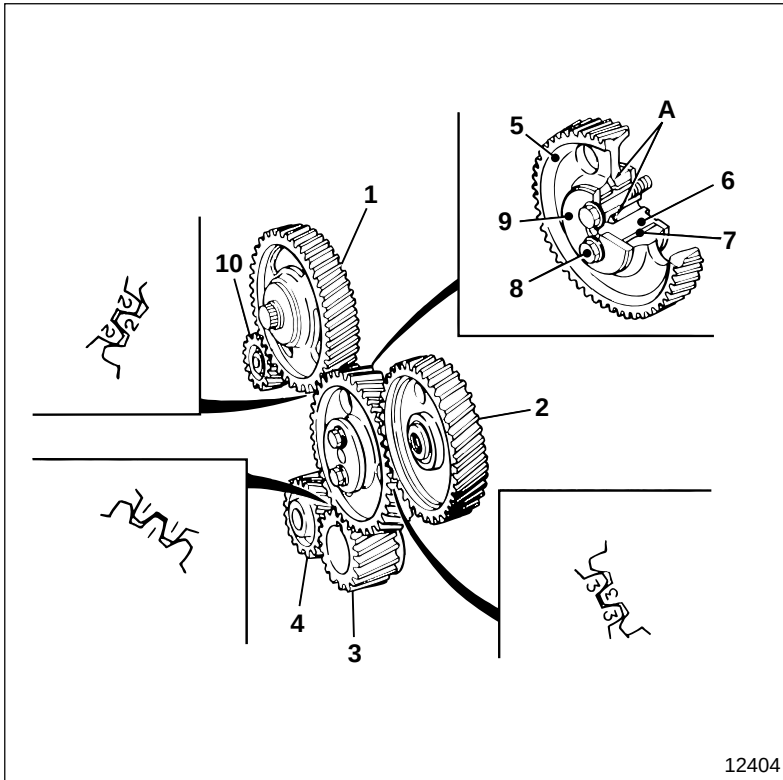
A : Alignment mark
B : Mass mark
(A, B, C, D, E, F, G)

Piston



A : Stamped mass
B : Stamped "T"
C : Part number
D : Free space for piston cooling
△ : Front mark

Timing Gear



- 1 Camshaft gear
- 2 Injection pump gear
- 3 Crankshaft gear
- 4 Oil pump gear
- 5 Idler gear
- 6 Idler shaft
- 7 Idler bushing
- 8 Bolt
- 9 Thrust plate
- 10 Power steering oil pump gear

A : Oil hole

Alignment marks "1", "2", "3" are punch-marked on each timing gear to ensure proper engagement of the gears at installation.

TROUBLESHOOTING

Symptoms	Decrease of power	Engine noise abnormal	Remarks
Possible causes			
Oil viscosity unsuitable	☐		 Gr 12
Fuel incorrect or unsuitable	☐		
Valve clearance faulty	☐	☐	
Head gasket faulty	☐	☐	
Valve and valve seat worn, and carbon deposits	☐	☐	
Valve spring fatigued	☐	☐	
Piston ring worn or damaged	☐	☐	
Piston ring grooves worn or damaged	☐	☐	
Injection timing faulty	☐	☐	 Gr 13
Injection pump malfunctioning	☐	☐	 Gr 13
Cooling system malfunctioning	☐		 Gr 14
Injection nozzle malfunctioning	☐	☐	 Gr 13
Fuel system sucking air	☐		 Gr 13
Air cleaner mesh clogged	☐		 Gr 15
Muffler clogged	☐		 Gr 15
Pipe and hose installation faulty		☐	
Ancillary equipment (injection pump, alternator, etc.) or installation faulty		☐	 Gr 13  Gr 54
V-belt loose or damaged		☐	 Gr 14
Crankshaft pulley mounted incorrectly		☐	
Air cleaner or muffler malfunctioning		☐	 Gr 15
Rocker shaft and bracket faulty		☐	
Rocker shaft bracket lubrication faulty		☐	
Timing gear backlash faulty		☐	
Timing gear system and idler shaft lubrication faulty		☐	
Connecting rod small end bushing worn and piston pin worn		☐	
Crankshaft pin and big end bearing of connecting rod worn or damaged		☐	
Crankshaft journal and main bearing worn or damaged		☐	
Crankshaft and camshaft end play excessive		☐	
Tappet and camshaft worn		☐	

INSPECTION AND ADJUSTMENT MOUNTED IN VEHICLE 11

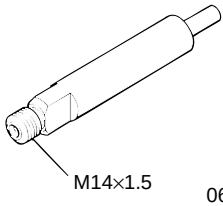
Inspection of Engine Compression

Service standards

Location	Maintenance item		Standard value	Limit	Remedy
—	Engine Compression	Each cylinder (200 rpm)	2550 kPa {370 lbf/in ² , 26 kgf/cm ² }	1960 kPa {285 lbf/in ² , 20 kg/cm ² }	Inspect
		Pressure difference between each cylinder	—	within 390 kPa {57 lbf/in ² , 4 kgf/cm ² }	Inspect

Special tools

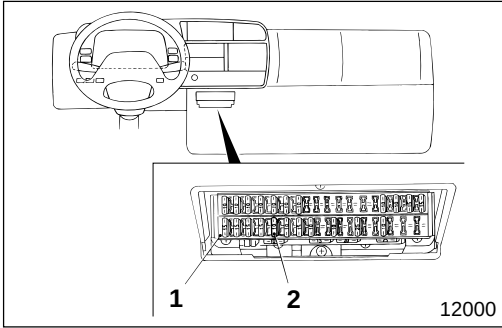
Unit : mm {in.}

Location	Tool name and shape		Part No.	Application
—	Compression gauge adapter		MH061460	Measurement of engine compression

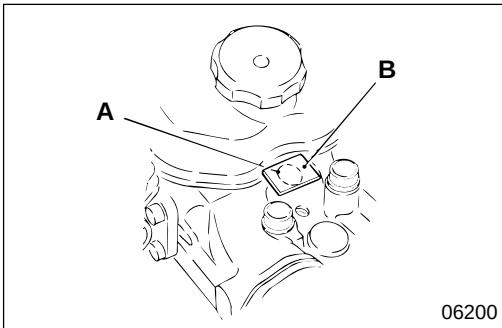
The decrease of engine compression is a signal that it is time to overhaul the engine. It is strongly recommended that this item is inspected periodically and that you record the history of deterioration in engine performance as this will help you to diagnose causes of future irregularities. When the vehicle is still new or immediately after installation of new parts, there may be a slight increase in engine compression, but normal performance will be restored soon.

- Before inspection make sure that engine oil, starter and battery are in normal condition.
- Before inspecting the vehicle do the following:
 - Run the engine to bring the temperature of the coolant up to approximately 75 to 85°C {167 to 185°F}.
 - Turn all the lights and accessory equipment OFF.
 - Put transmission in neutral. (N range for automatic transmission)
 - Set the steering wheel at center and straight position.

INSPECTION AND ADJUSTMENT MOUNTED IN VEHICLE



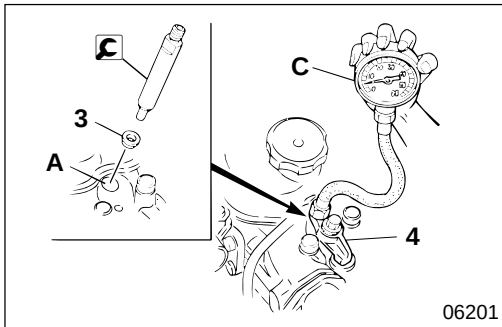
- Remove fuse 2 for the fuel-cut motor from fuse box 1 inside the cab to prevent the fuel from being injected when the engine is cranked by the starter.



- Remove all the injection nozzles. Gr 13
- Check that no foreign particles are sticking to waste cloth B covering injection nozzle mounting hole A after cranking the engine.

WARNING

You must stay clear of injection nozzle mounting hole A when you crank the engine during this inspection. Assume that all cylinders have cracked, and that coolant, engine oil, fuel, etc. have seeped into the cylinder chambers. If this is the state when the engine is cranked, there is an extreme danger of these substances being injected out of the injection nozzle mounting hole at high temperature.



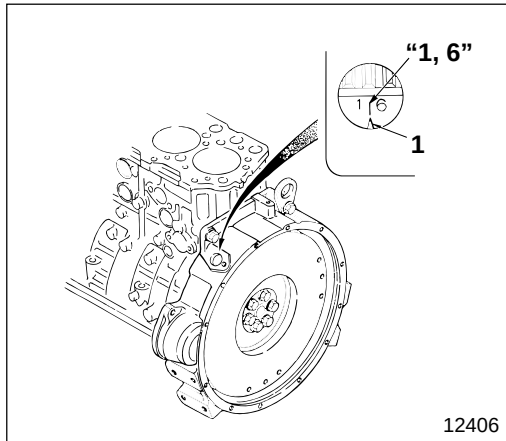
- Mount gasket 3 and compression gauge adaptor in injection nozzle mounting hole A and fasten them with nozzle bridge 4, then mount compression gauge C.
- Measure engine compression while cranking the engine.
- Measure engine compression of cylinders and calculate the difference among the cylinders.
- If the engine compression and pressure difference between each cylinder deviate from the limit, reinspect by pouring a small amount of engine oil into injection nozzle mounting hole A.
 - When pressure is high : It is likely that either wear or damage of the slide-contact area of both the piston ring and the cylinder inner surface has taken place.
 - When pressure is low : It is likely that burning of the valve, faulty contact of valve surfaces and/or faults in the cylinder head gasket have developed.

Inspection and Adjustment of Valve Clearance

Service standards

Unit : mm {in.}

Location	Maintenance item	Standard value	Limit	Remedy
—	Valve clearance (When engine is cold)	0.4 {0.016}	—	Adjust



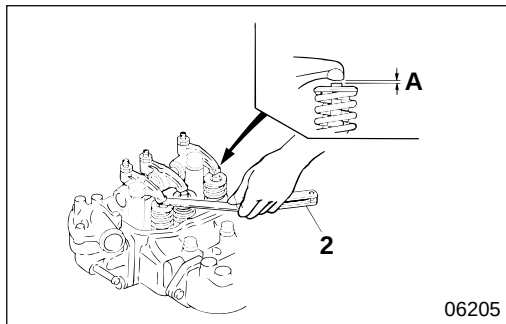
Inspect and adjust the valve clearance while the engine is cold in the following way.

[Inspection]

- Crank the engine to move No.1 or No.6 piston to top dead center, and align stamped marks “1, 6” on the flywheel with pointer 1 on the flywheel housing.

NOTE

The cylinder whose push rod is not pushing up the inlet/outlet rocker is the one whose piston is at top dead center.



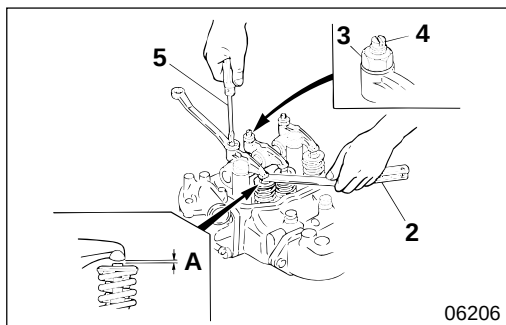
- Measure valve clearance **A** when either No.1 or No.6 piston is at top dead center in accordance with the following tabulated sequence of each valve.

Piston No.	1		2		3		4		5		6	
Valve arrangement	In-take	Ex-haust	In-take	Ex-haust	In-take	Ex-haust	In-take	Ex-haust	In-take	Ex-haust	In-take	Ex-haust
No.1 piston at top dead center	○	○	○	×	×	○	○	×	×	○	×	×
No.6 piston at top dead center	×	×	×	○	○	×	×	○	○	×	○	○

NOTE

Be sure when taking measurements using feeler gauge 2 that some resistance is felt when inserting the gauge. If the gauge can be inserted freely without any resistance, an accurate measurement cannot be obtained.

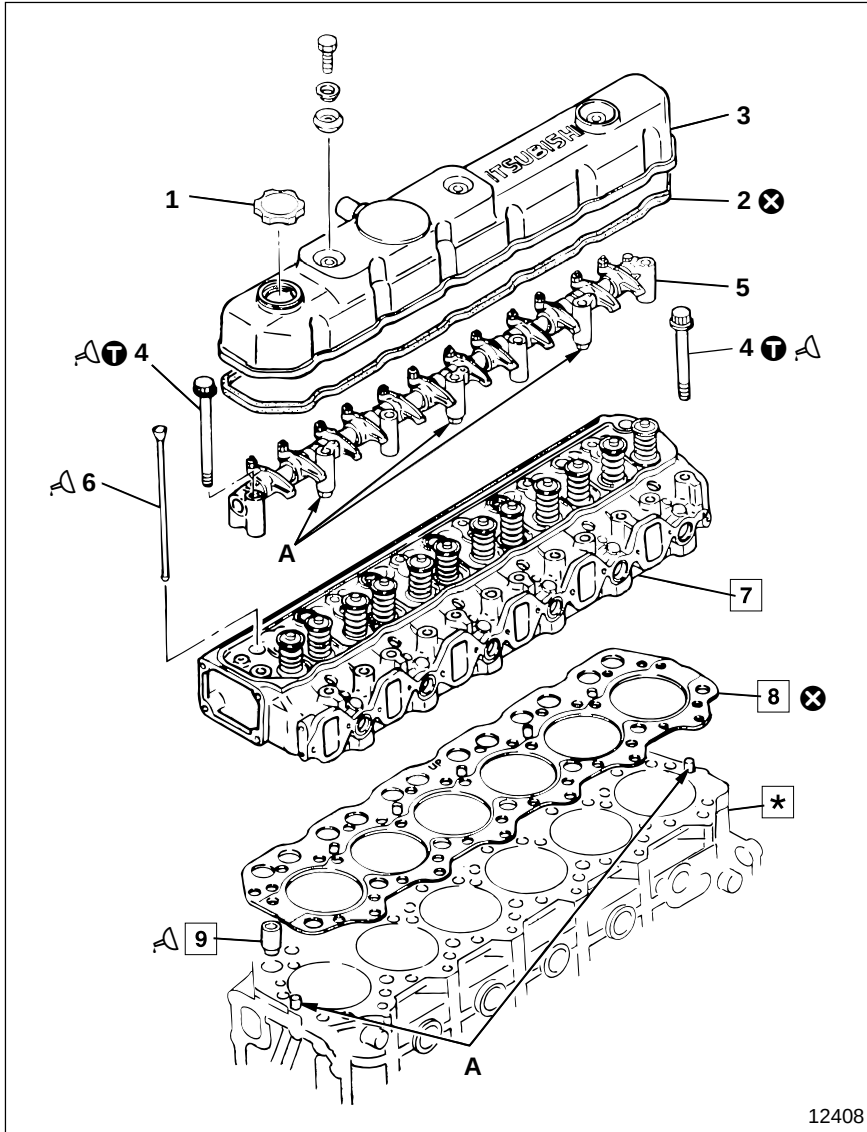
- If the measured value deviates from the limit, adjust as follows:



[Adjustment]

- Adjust valve clearance **A** so that feeler gauge 2 encounters some resistance when it is inserted. Do this by loosening lock nut 3 and turning adjusting screw 4.
- After adjusting, tighten adjusting screw 4 using screwdriver 5 and tighten lock nut 3. Reinspect valve clearance **A** using feeler gauge 2.

CYLINDER HEAD AND VALVE MECHANISM



● Disassembly sequence

- 1 Oil filler cap
- 2 Rocker cover gasket
- 3 Rocker cover
- 4 Cylinder head bolt
- 5 Rocker and bracket assembly
P11-14
- 6 Push rod
- 7 Cylinder head and valve assembly
P11-16
- 8 Cylinder head gasket
- 9 Tappet

* : Crankcase P11-52

A : Positioning pin

⊗ : Non-reusable parts

● Assembly sequence

Follow the disassembly sequence in reverse.

Service standards

Unit : mm {in.}

Location	Maintenance item	Standard value (Basic diameter in [])	Limit	Remedy
6	Push rod deflection	—	0.4 {0.016}	Replace
9, *	Clearance between tappet and crankcase tappet hole	[28] 0.05 to 0.09 {[1.10] 0.0020 to 0.0035}	0.2 {0.0079}	Replace

ⓘ Tightening torque

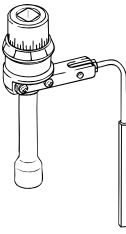
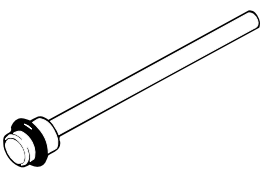
Unit : N·m {lbf.ft, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
4	Cylinder head bolt	145 {110, 15}+90°	Wet Reuse up to three times

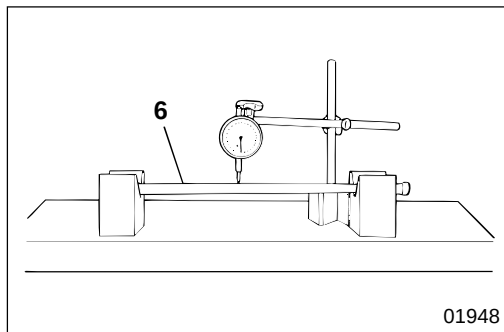
🔧 Lubricant

Location	Points of application	Kinds	Quantity
4	Thread area of cylinder head bolt	Engine oil	As required
6	Both ends of push rod	Engine oil	As required
9	External periphery of tappet	Engine oil	As required

Special tools

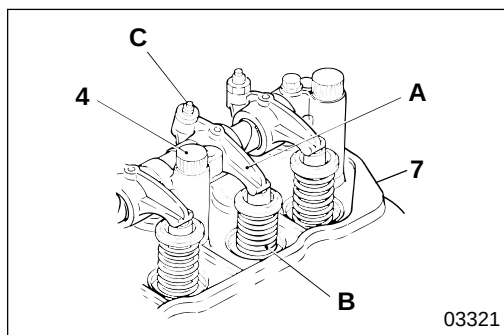
Location	Tool name and shape	Part No.	Application
7	Socket wrench  01984	MH061560	Installation of cylinder head and valve assembly
9	Tappet extractor  03320	MH063329	Removal of tappet

Service procedure



6 Push rod deflection

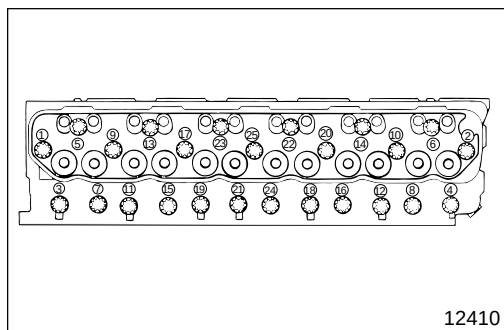
If the measured value is higher than the limit, replace push rod 6.



7 Cylinder head and valve assembly

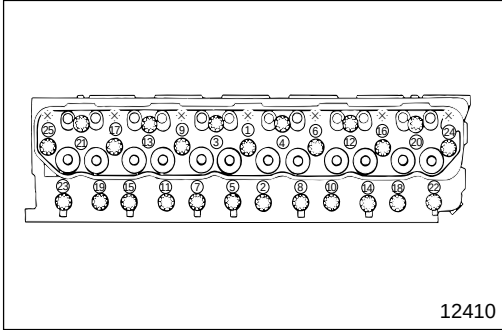
[Removal]

- Before undoing cylinder head bolts 4, first loosen adjusting screw C of rocker A that pushes down valve spring B.



- First loosen cylinder head bolts 4 in the numbered order as illustrated, then remove them.

CYLINDER HEAD AND VALVE MECHANISM

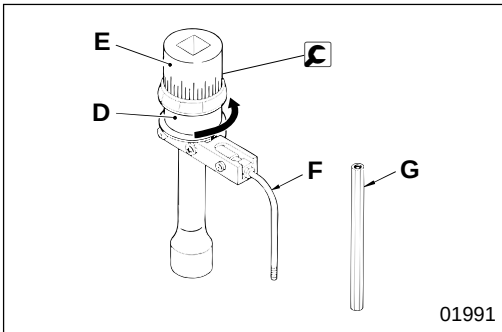


[Installation]

- Center punch the heads of cylinder head bolts **4** before installation.

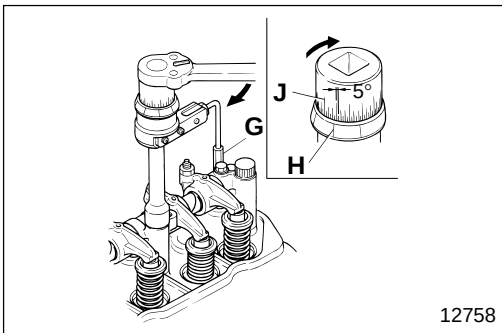
CAUTION

If there are already three center-punch marks, replace the cylinder head bolt with a new one.

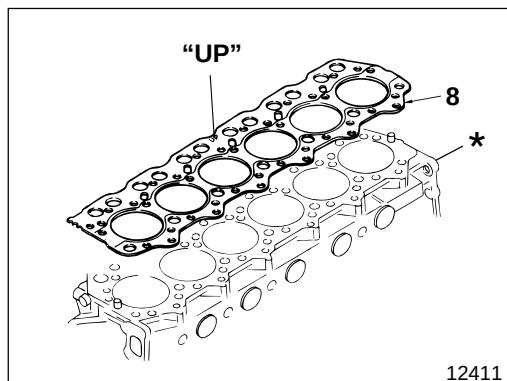


- After tightening cylinder head bolts **4** at specified torque in the numbered order as illustrated, tighten further as follows:
 ✕ : Tightened simultaneously with rocker and bracket assembly

- Turn socket wrench holder **D** counterclockwise and keep the spring in the wrench compressed.
E : Socket
F : Rod
G : Rod (for connection)



- Set socket wrench holder **D** so that the percussive force of the spring presses rod **G** (for connection) against adjacent parts such as, the rocker shaft bracket or the injection pipe.
- Select a scale that is convenient for reading graduation **H** on holder **D**.
- Tighten further by turning socket **H** clockwise by 90° (setting is in 5° increments), referring to graduation **J** on the selected scale.



8 Cylinder head gasket

[Removal]

CAUTION ⚠

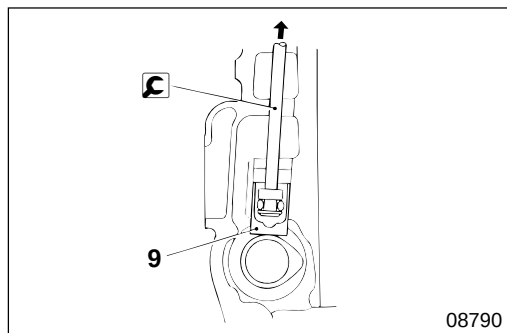
Be careful not to scratch the cylinder head or crankcase * when you remove cylinder head gasket 8.

[Installation]

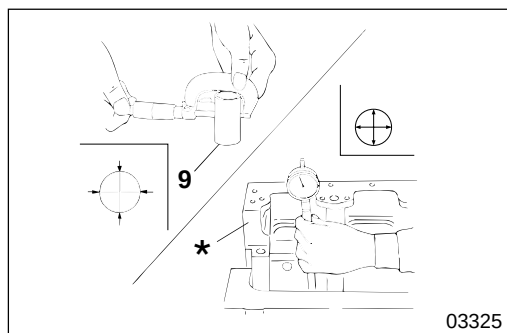
- Install cylinder head gasket 8 onto crankcase * in the direction as illustrated.

CAUTION ⚠

Be sure to measure the amount of protrusion whenever a piston or connecting rod is replaced, since replacement changes the amount of protrusion.



9 Removal of tappet

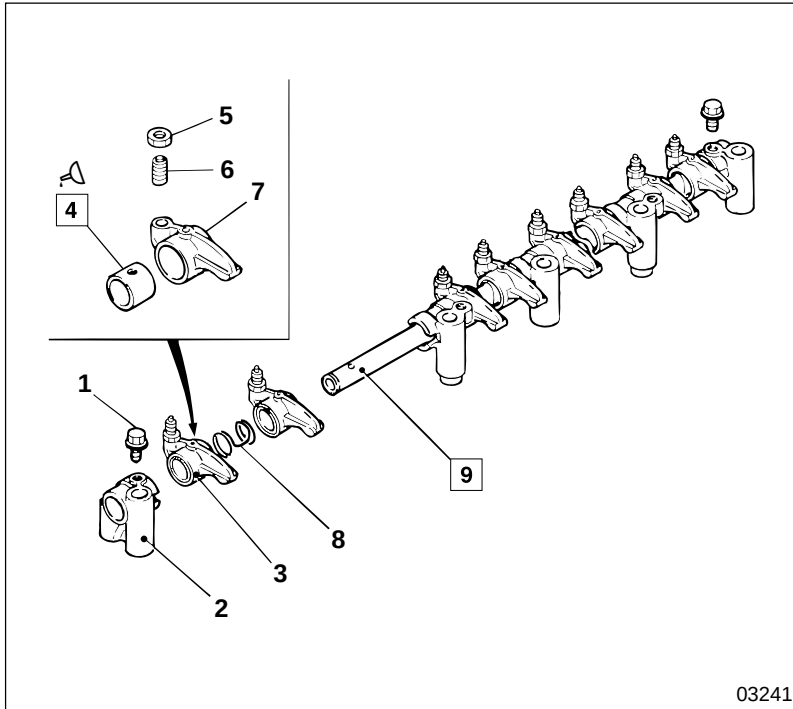


9 * Clearance between tappet and crankcase tappet hole

If the measured value is higher than the limit, replace the faulty parts.

CYLINDER HEAD AND VALVE MECHANISM

Rocker and Bracket Assembly



● Disassembly sequence

- 1 Set bolt
- 2 Rocker shaft bracket
- 3 Rocker assembly
- 4 Rocker bushing
- 5 Lock nut
- 6 Adjusting screw
- 7 Rocker
- 8 Rocker shaft spring
- 9 Rocker shaft

● Assembly sequence

Follow the disassembly sequence in reverse.

Service standards

Unit : mm {in.}

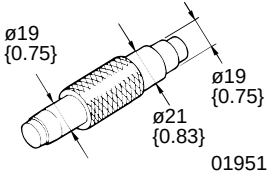
Location	Maintenance item	Standard value (Basic diameter in [])	Limit	Remedy
4, 9	Clearance between rocker bushing and rocker shaft	[19] 0.06 to 0.11 {[0.75] 0.0024 to 0.0043}	0.2 {0.0079}	Replace

Lubricant

Location	Points of application	Kinds	Quantity
4	Inner surface of rocker bushing	Engine oil	As required

Special tools

Unit : mm {in.}

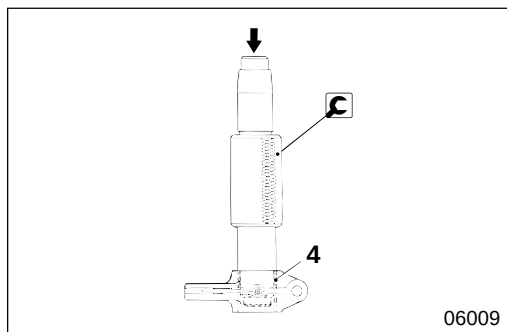
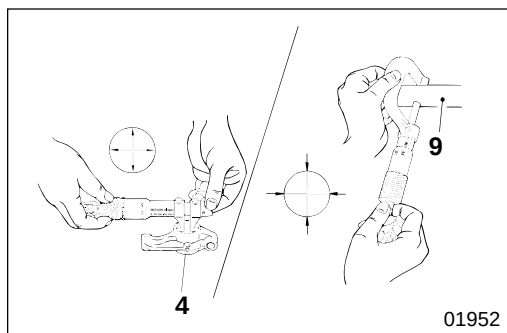
Location	Tool name and shape	Part No.	Application
4	Rocker bushing puller 	MH061378	Removal and installation of rocker bushing

◆ Service procedure

4 9 Rocker bushing and rocker shaft

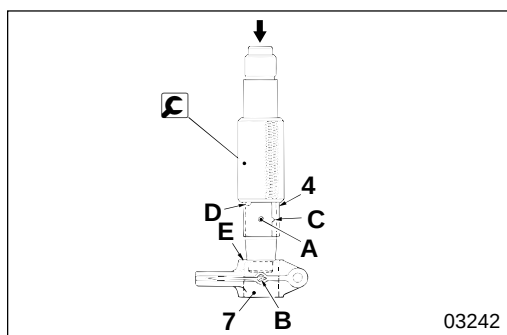
[Inspection]

If the clearance is higher than the limit, replace the faulty parts.



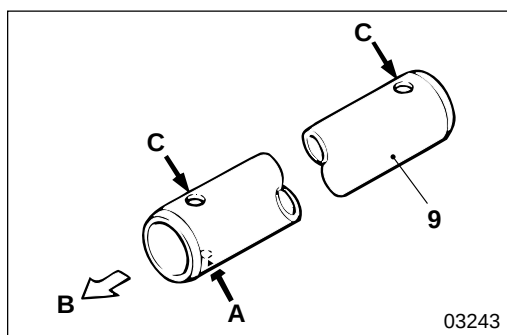
Rocker bushing

[Removal]



[Press-fitting]

- Align oil hole **A** of rocker bushing **4** with oil hole **B** of rocker **7**.
- Position clinch **C** and split **D** of rocker bushing **4** in the direction as illustrated.
- Press-fit rocker bushing **4** from chamfered side **E** of rocker **7**.



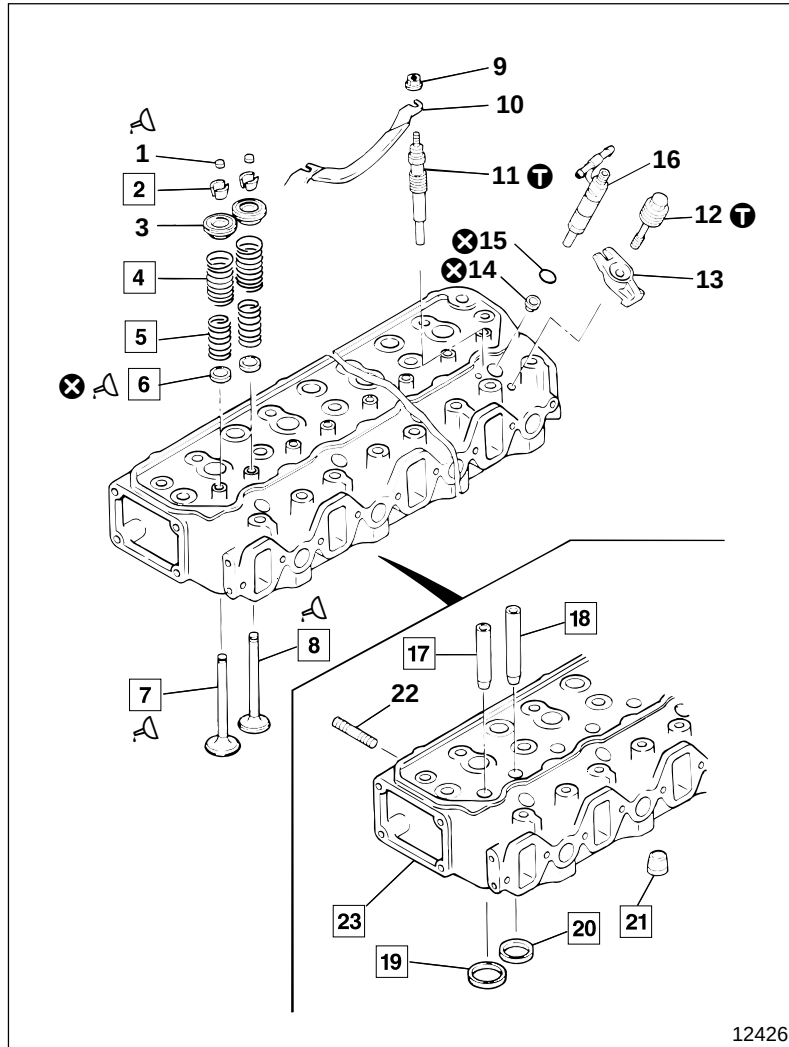
9 Installation of rocker shaft

When installing rocker shaft **9**, bring oil passage hole for lubrication **A** to front side **B**.

C : Fixing hole of the set bolt.

CYLINDER HEAD AND VALVE MECHANISM

Cylinder Head and Valve Assembly



● Disassembly sequence

- 1 Valve cap
- 2 Valve cotter
- 3 Upper retainer
- 4 Outer valve spring
- 5 Inner valve spring
- 6 Valve stem seal
- 7 Inlet valve
- 8 Exhaust valve
- 9 Nut
- 10 Connecting plate
- 11 Glow plug  Gr 54
- 12 Bolt
- 13 Nozzle bridge
- 14 Nozzle tip gasket
- 15 O-ring
- 16 Injection nozzle  Gr 13
- 17 Inlet valve guide
- 18 Exhaust valve guide
- 19 Inlet valve seat
- 20 Exhaust valve seat
- 21 Water director
- 22 Stud
- 23 Cylinder head

⊗ : Non-reusable parts

CAUTION

Be careful of the protrusion of glow plug 11 and injection nozzle 16 from the bottom surface of cylinder head 23.

● Assembly sequence

Follow the disassembly sequence in reverse.

NOTE

When inlet valve 7 and exhaust valve 8 have been removed, replace valve stem seal 6.

Service standards

Unit : mm {in.}

Location	Maintenance item		Standard value (Basic diameter in [])	Limit	Remedy
4	Outer valve spring	Without load	66.1 {2.60}	63.0 {2.48}	Replace
		Installed load (Installed length 47.25 {1.86})	273±12 N {62±2.6 lbf, 27.9±1.2 kgf}	230 N {52 lbf, 23.7 kgf}	Replace
		Tilt	—	2.5 {0.098}	Replace
5	Inner valve spring	Without load	60.0 {2.36}	52.1 {2.05}	Replace
		Installed load (Installed length 40.3 {1.59})	119±4.4 N {27±1.0 lbf, 12.1±0.45 kgf}	79 N {18 lbf, 8.1 kgf}	Replace
		Tilt	—	2 {0.079}	Replace
7	Inlet valve	Stem diameter	8.96 to 8.97 {0.3529 to 0.3531}	8.85 {0.348}	Replace
		Valve recess from the cylinder head bottom surface	0.75 to 1.25 {0.030 to 0.049}	1.5 {0.059}	Inspect each part
		Valve margin	1.5 {0.059}	1.2 {0.047}	Correct or replace
		Valve seat angle	45°±15'	—	Correct or replace
7, 17	Clearance between inlet valve stem and inlet valve guide		[9] 0.04 to 0.06 {[0.35] 0.0016 to 0.0024}	0.15 {0.0059}	Replace
8	Exhaust valve	Outer diameter of stem	8.93 to 8.94 {0.3515 to 0.3519}	8.85 {0.348}	Replace
		Valve recess from the cylinder head bottom surface	0.75 to 1.25 {0.030 to 0.049}	1.7 {0.067}	Inspect each part
		Valve margin	1.5 {0.059}	1.2 {0.047}	Correct or replace
		Valve seat angle	45°±15'	—	Correct or replace
8, 19	Clearance between exhaust valve stem and exhaust valve guide		[9] 0.07 to 0.1 {[0.35] 0.0028 to 0.0039}	0.2 {0.0079}	Replace
19	Seat width of inlet valve seat		2±0.2 {0.079±0.0079}	2.8 {0.11}	Correct or replace
20	Seat width of exhaust valve seat		2±0.2 {0.079±0.0079}	2.8 {0.11}	Correct or replace
23	Cylinder head	Distortion of bottom	0.05 {0.0020} or less	0.2 {0.0079}	Correct or replace
		Height from top to bottom	95±0.1 {3.74±0.0039}	94.6 {3.72}	Replace

T Tightening torque

Unit : N·m {lbf.ft, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
11	Glow plug	15 to 20 {11 to 14, 1.5 to 2.0}	—
12	Bolt (Nozzle bridge mounting)	25 {18, 2.5}	—

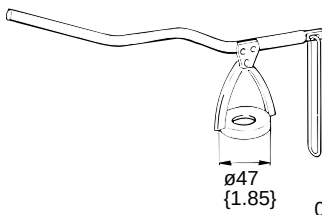
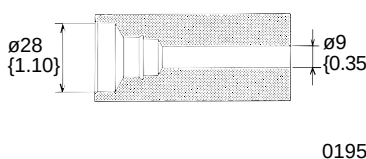
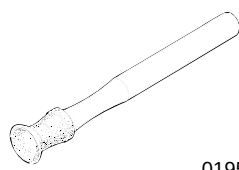
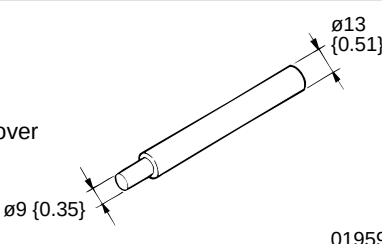
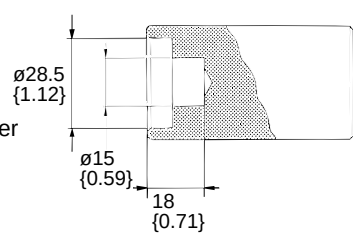
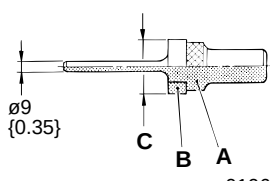
L Lubricant

Location	Points of application	Kinds	Quantity
1	Slide contact areas of valve cap and rocker	Engine oil	As required
6	Lip of valve stem seal	Engine oil	As required
7, 8	Valve stem	Engine oil	As required

CYLINDER HEAD AND VALVE MECHANISM

Special tools

Unit : mm {in.}

Location	Tool name and shape	Part No.	Application						
2	Valve lifter 	30091-08500	Removal and installation of valve cotter						
6	Valve stem seal installer 	MH061293	Installation of valve stem						
7, 8	Valve lapper 	30091-07500	Fitting of valve and valve guide						
17, 18	Valve guide remover 	MH061066	Removal of valve guide						
	Valve guide installer 	MH061998	Press-fitting of valve guide						
19, 20	A : Caulking tool body B : Caulking ring <table><tr><th></th><th>C dimension</th></tr><tr><td>Inlet</td><td>47.6 {1.87}</td></tr><tr><td>Exhaust</td><td>40.6 {1.60}</td></tr></table> 		C dimension	Inlet	47.6 {1.87}	Exhaust	40.6 {1.60}	A : MH061067 B : MH061275 (Inlet) MH061069 (Exhaust)	Press-fitting of valve seat
	C dimension								
Inlet	47.6 {1.87}								
Exhaust	40.6 {1.60}								

◆ Service procedure

2 Valve cotter

[Removal]

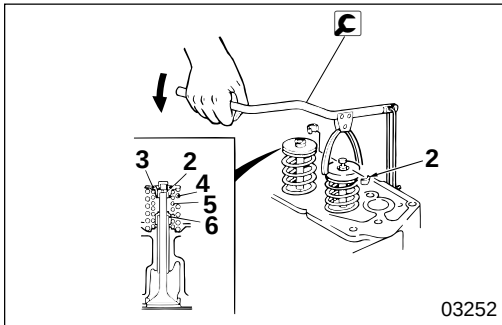
Remove valve cotter **2** making sure that valve springs **4**, **5** are squarely and evenly pressed down by  valve lifter.

[Installation]

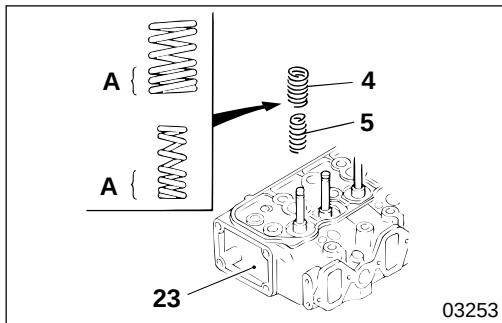
Follow the removal procedure in reverse.

CAUTION

Be sure not to press down on valve springs **4**, **5** too hard because this would cause upper retainer **3** to contact valve stem seal **6** and damage it.



03252

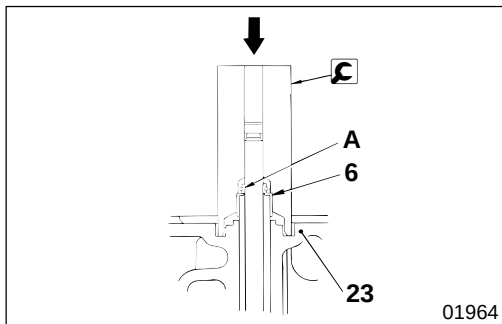


03253

4 5 Installation of outer and inner valve springs

Install outer springs **4** and inner springs **5** in cylinder head **23** in the direction as illustrated.

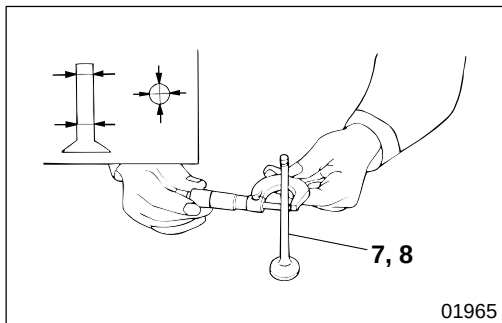
A : Closely wound area



01964

6 Installation of valve stem seal

- Apply engine oil to lip **A** of valve stem seal **6**.
- Tap down  valve stem seal installer until it hits cylinder head **23**.



01965

7 8 Inlet valve and exhaust valve

[Inspection]

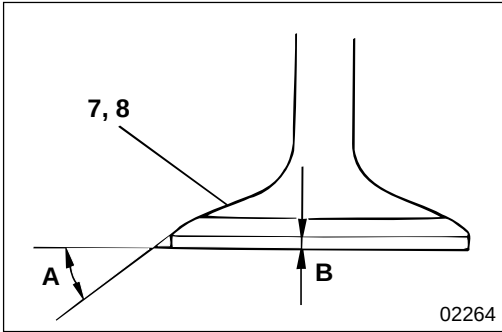
(1) Inspection of stems

If the measured value is lower than the limit or in the case of excessive wear, replace valves **7**, **8**.

CAUTION

Be sure to lap valve seats **19**, **20** when valves **7**, **8** are replaced with new ones.  P11-21

CYLINDER HEAD AND VALVE MECHANISM

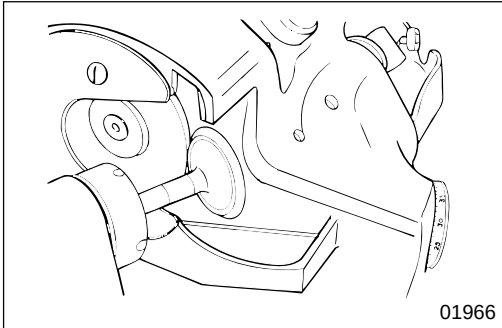


(2) Valve seat angle and valve margin

If the measured value is higher than the limit, correct or replace valves 7, 8.

A : Valve seat angle

B : Valve margin

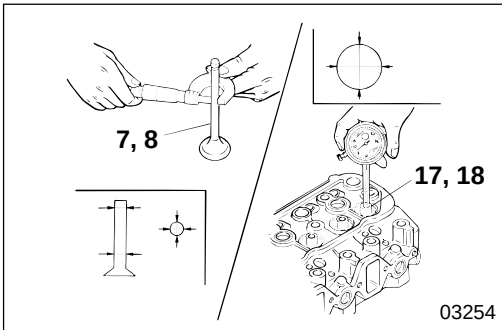


[Correction]

NOTE

- Be sure to keep the grinding work as light as possible.
- Be sure to replace valves 7, 8 after grinding if valve margin deviates from the limit.
- Be sure to lap valve 7, 8 and valve seats 19, 20 after grinding.

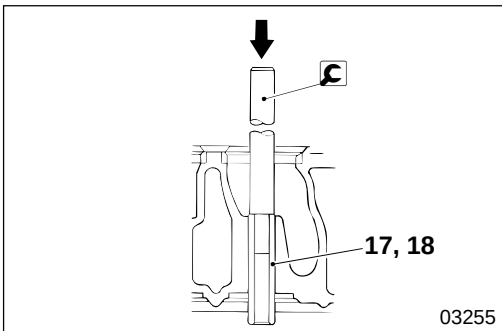
📖 P11-21



7 8 17 18 Valve and valve guide

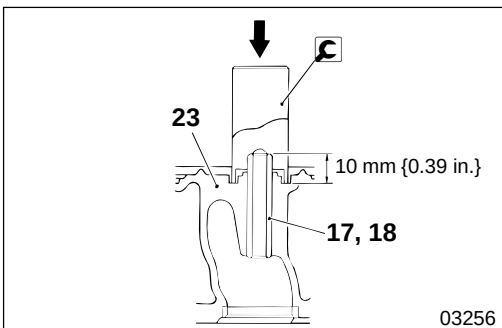
[Inspection]

When the clearance is higher than the limit, replace the faulty parts.



Valve guide

[Removal]

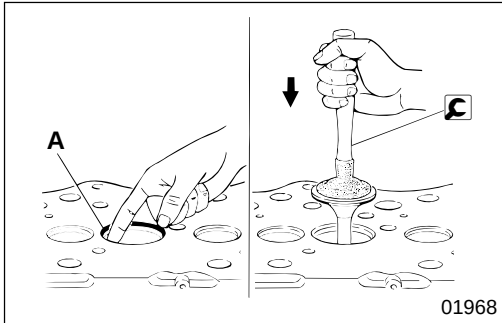


[Installation]

- Tap down valve guides 17, 18 with valve guide installer until it hits cylinder head 23.

CAUTION ⚠

- The length of fit of valve guides 17, 18 is standardized. Be sure to use valve guide installer.
- Be sure to distinguish between valve guides 17, 18. Exhaust valve guide 18 is longer.



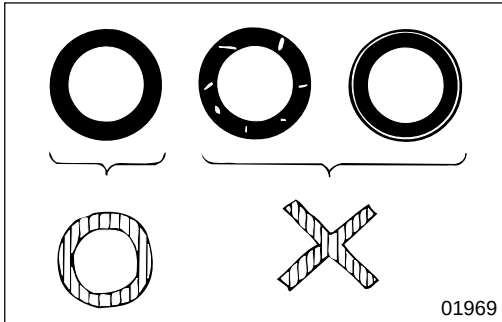
7 8 19 20 Valve and valve seat

[Inspection]

- Apply red lead evenly to entire surface **A** of valve seats **19, 20** that contact valves **7, 8**.
- Fit valves **7, 8** to valve seats **19, 20** and tap once without rotating.

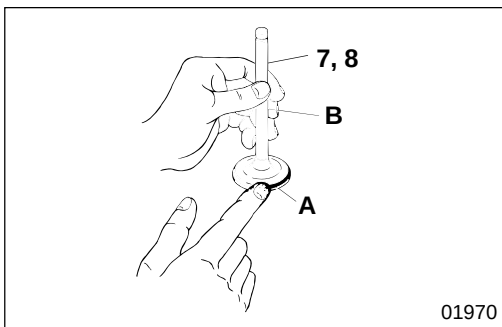
NOTE

Be sure to carry out inspection under the condition that valves **7, 8 and all parts of valve guides **17, 18** are normal.**



- Check how much red lead has transferred to valves **7, 8** to determine the contact of the valve and the seat. According to the degree of abnormality, take proper measures to correct it.

Contact conditions	Correction measures
Minor fault	Valve lapping
Major fault	Repair of valve and seat or replacement of both



[Correction]

Valve polishing is done in the following manner:

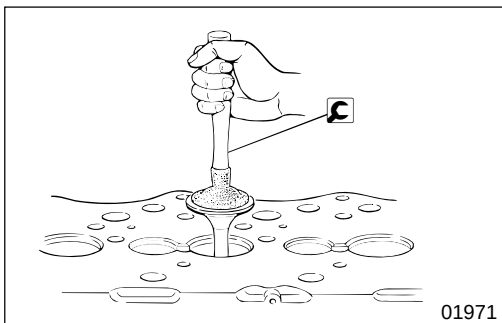
- Apply valve lapping compound thinly to contact surface **A** of valves **7, 8** with valve seats **19, 20**.

CAUTION ⚠

Take care not to smear stems **B of valves **7, 8** with the compound.**

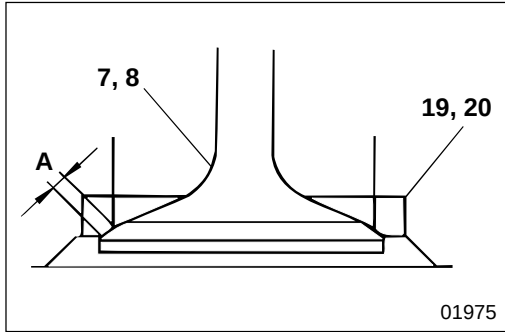
NOTE

- **Start with medium grit compound (120 to 150 grit) and for finishing up, use finer grit (200 grit or finer).**
- **Mixing with a small amount of engine oil will make the compound consistent and make even application easier.**



- Tap valves **7, 8** against valve seats **19, 20** several times while rotating the valves slightly at each strike.
- Clean off the compound with gas oil.
- Apply engine oil to contact surface **A** of valve seats **19, 20** and smooth the surface.
- Check the contact of valves **7, 8** and valve seats **19, 20**.
- If contact does not take place completely around the seat, replace valve seats **19, 20**.

CYLINDER HEAD AND VALVE MECHANISM



19 20 Valve seat

[Inspection]

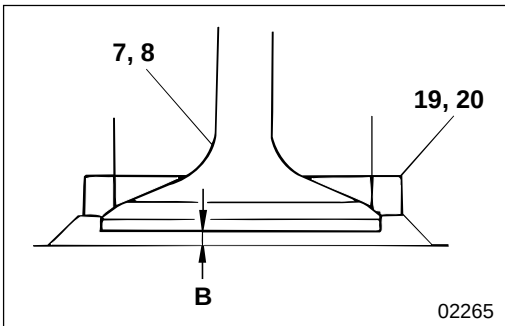
(1) Valve seat width

If the measured value is higher than the limit, replace valve seats **19, 20**.

A : Valve seat width

NOTE

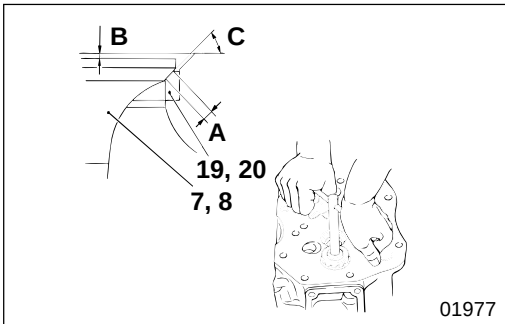
Be sure to lap and fit valves 7, 8 and valve seats 19, 20 after correction or replacement.



(2) Extent of valve recess from the bottom surface of cylinder head

If the measured value is higher than the limit, correct or replace the faulty parts.

B : Extent of valve recess



[Correction]

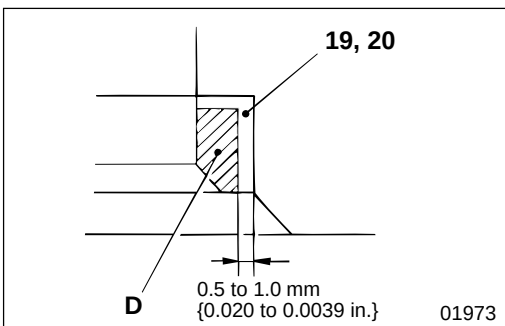
- Grind valve seats **19, 20** using valve seat cutter or valve seat grinder.
- After grinding, do another light abrasion using 400 grit emery paper placed between the cutter and the seat.
- Adjust the seat width **A** of valves **7, 8** using 15° or 75° cutter to make seat width conform to the standard value.

C : Valve seat angle

CAUTION ⚠

Be sure that as a result of grinding, recess B of valves 7, 8 does not become higher than the limit.

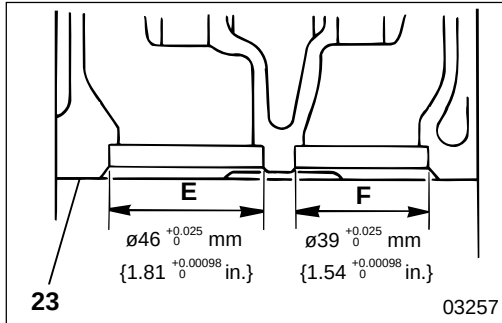
- After correction is done, be sure to carry out lapping and fitting on valves **7, 8** and valve seats **19, 20**.



[Removal]

- Valve seats **19, 20** have been set in by the cooling-off-process, and have to be thinned by grinding off the inner side for removal under normal temperature.

D : Part to be ground

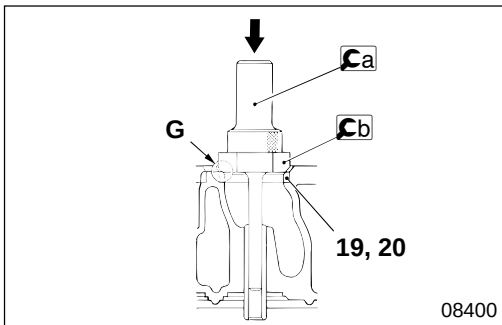


[Installation]

- Make sure that the diameter of valve seat hole of cylinder head **23** conforms to the standard value.

E : Inlet valve seat hole diameter

F : Exhaust valve seat hole diameter

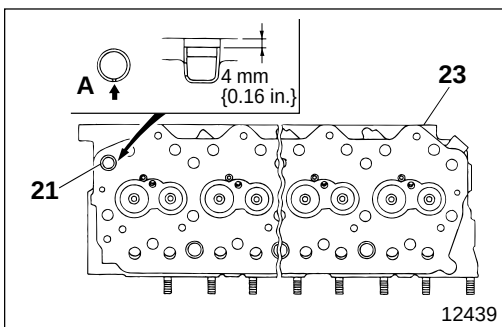


- Immerse valve seats **19**, **20** in liquid nitrogen and cool them substantially. Press-fit into the cylinder head using **Ca** caulking tool body and **Cb** caulking rings inlet and exhaust.

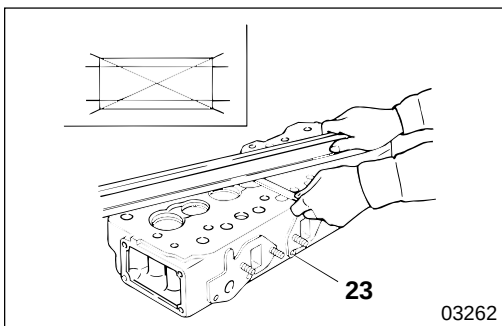
CAUTION ⚠

Be sure, when press-fitting, to place the chamfered side **G** of **Cb** caulking rings inlet and exhaust against valve seats **19**, **20**.

- After installation of valve seats **19**, **20**, work until they contact valves **7**, **8** smoothly.

**21** Installation of water director

- With indent **A** set in the direction as illustrated, press-fit water director **21** into cylinder head **23** to the specified depth.

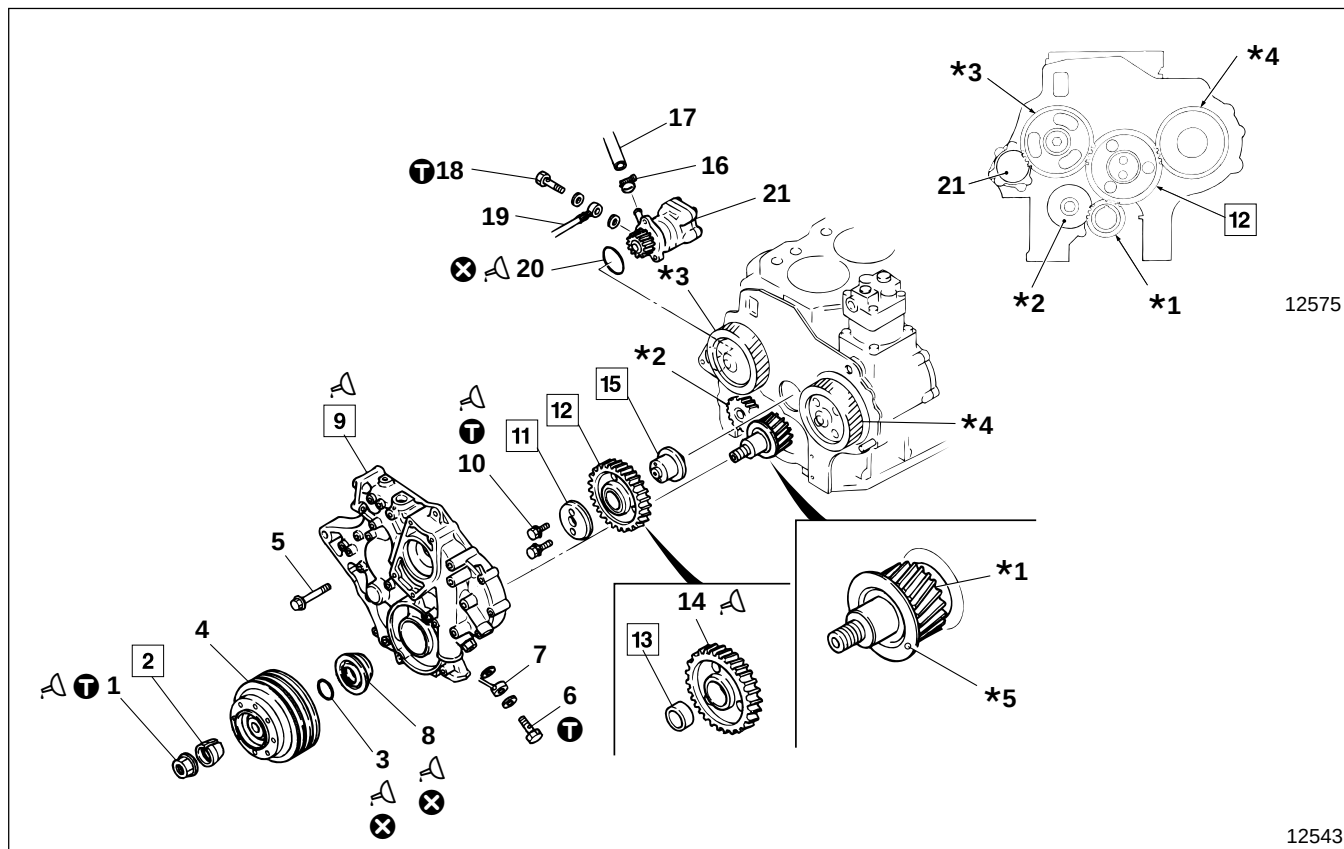
**23** Inspection of cylinder head

Measure the extent of distortion of the bottom of cylinder head **23**, and if the measured value is higher than the standard value, grind using a surface grinder.

CAUTION ⚠

Be sure to keep the amount of grinding within the limit of the height of cylinder head **23**.

TIMING GEAR



● Inspection before disassembly

📖 P11-26

● Disassembly sequence

- | | |
|------------------------------|----------------------------|
| 1 Nut | 12 Idle gear assembly |
| 2 Taper cone | 13 Idle gear bushing |
| 3 O-ring | 14 Idle gear |
| 4 Crankshaft pulley | 15 Idle gear shaft |
| 5 Bolt | 16 Clamp |
| 6 Eye bolt | 17 Oil hose 📦 Gr 37 |
| 7 Air and water suction pipe | 18 Bolt |
| 📦 Gr 12 | 19 Oil hose 📦 Gr 37 |
| 8 Front oil seal | 20 O-ring |
| 9 Timing gear case | 21 Power steering oil pump |
| 10 Bolt | 📦 Gr 37 |
| 11 Thrust plate | |

- *1 : Crankshaft gear 📖 P11-52
 *2 : Oil pump gear 📦 Gr 12
 *3 : Camshaft gear 📖 P11-28
 *4 : Air compressor gear 📦 Gr 35
 *5 : Front oil seal slinger 📖 P11-52

⊗ : Non-reusable parts

NOTE

Do not remove front oil seal 8, unless it is faulty.

● Assembly sequence

Follow the disassembly sequence in reverse.

Service standards

Unit : mm {in.}

Location	Maintenance item		Standard value (Basic diameter in [])	Limit	Remedy
—	Backlash of gears	Idler gear assembly and crankshaft gear	0.07 to 0.15 {0.0023 to 0.0059}	0.3 {0.012}	Replace
		Idler gear assembly and camshaft gear	0.07 to 0.17 {0.0023 to 0.0067}	0.3 {0.012}	
		Idler gear assembly and injection pump gear	0.07 to 0.17 {0.0023 to 0.0067}	0.3 {0.012}	
		Crankshaft gear and oil pump gear	0.10 to 0.18 {0.0039 to 0.0071}	0.3 {0.012}	
		Camshaft gear and power steering oil pump gear	0.08 to 0.16 {0.0031 to 0.0063}	0.3 {0.012}	
—	End play of idler gear		0.05 to 0.15 {0.0020 to 0.0059}	0.3 {0.012}	Inspect
13, 15	Clearance between idler gear bushing and idler shaft		[45] 0.03 to 0.06 {[1.77] 0.0012 to 0.0024}	0.1 {0.0039}	Replace

T Tightening torque

Unit : N·m {lbf.ft, kgf·m}

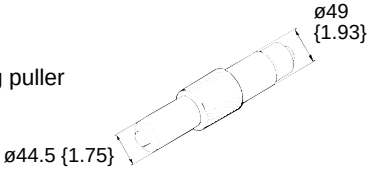
Location	Parts to be tightened	Tightening torque	Remarks
1	Nut (Taper cone mounting)	490 {360, 50}	Wet
6	Eye bolt (Air and water suction pipe mounting)	25 {19, 2.6}	—
10	Bolt (Thrust plate mounting)	24 {17, 2.4}	—
18	Bolt (Oil hose mounting)	125 {94, 13}	—

L Lubricant and sealant

Location	Points of application	Kinds	Quantity
1	Thread area of nut	Engine oil	As required
3, 20	Entire body of O-ring	Engine oil	As required
8	Front oil seal lip	Engine oil	As required
9	Mounting surface of timing gear case	THREEBOND 1207C	As required
10	Thread area of bolt	Engine oil	As required

C Special tools

Unit : mm {in.}

Location	Tool name and shape	Part No.	Application
2	Cone puller  M44×1.5 12708	MH062496	Removal of taper cone
13	Idler gear bushing puller  ø49 {1.93} ø44.5 {1.75} 03532	MH062224	Removal and installation of idler gear bushing

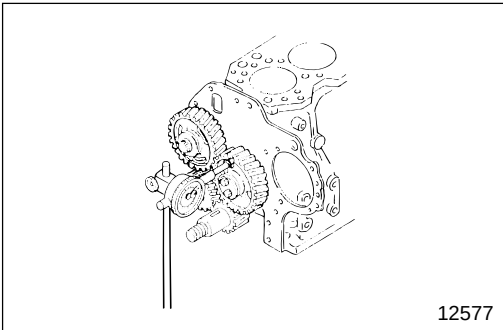
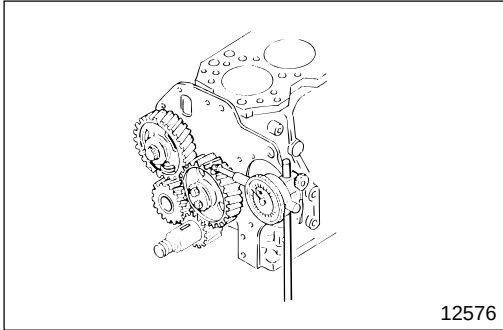
TIMING GEAR

◆ Service procedure

● Inspection before disassembly

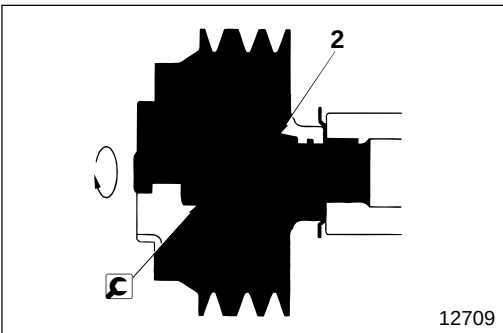
(1) Backlash of each gear

Measure three or more locations on the pairing gears and if the measurements are higher than the limit, replace the faulty parts.

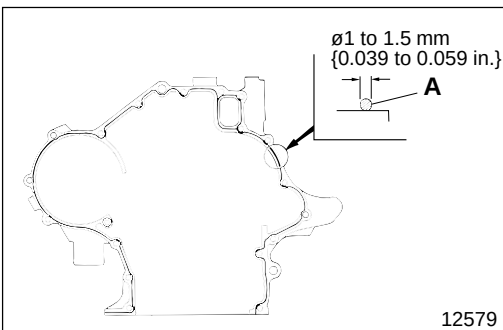


(2) End play of idler gear

If the measured value is higher than the limit, replace the faulty parts.



2 Removal of taper cone

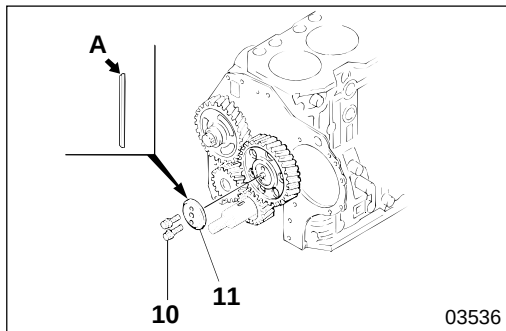


9 Installation of timing gear case

Apply sealant **A** to the mounting surface of timing gear case **9** evenly without break. After applying sealant, within three minutes, mount to the front plate.

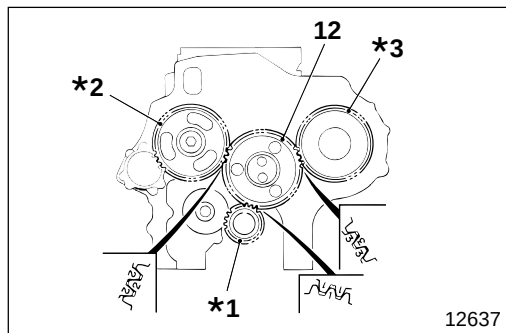
CAUTION ⚠

- Be sure to clean and wipe off oily substances from the surface where sealant **A** is to be applied.
- Make sure that sealant **A** is not transferred to other areas while the mounting work is being done.
- Be sure to reapply sealant **A** if the bolts are loosened or removed by any cause whatsoever after mounting.
- Do not start the engine within an hour of mounting.



11 Installation of thrust plate

A : Chamfered side



12 Installation of idler gear assembly

Install idler gear assembly **12** by matching alignment marks “**1**”, “**2**”, “**3**” on the gears that engage with those on the assembly.

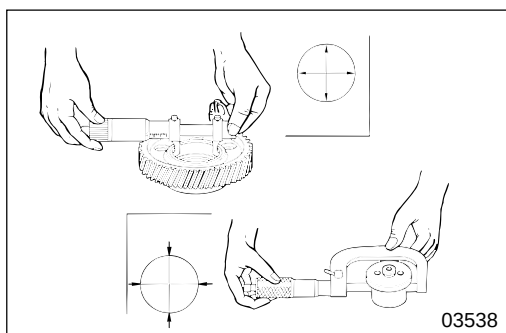
*1 : Crankshaft gear

*2 : Camshaft gear

*3 : Air compressor gear

NOTE

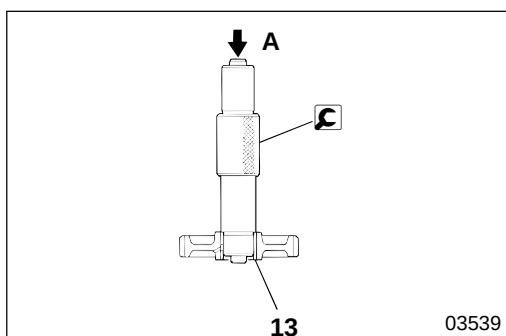
When aligning each gear with its alignment mark, make sure that pistons No.1, 6 are higher than top dead center.



13 15 Idler gear bushing and idler shaft

[Inspection]

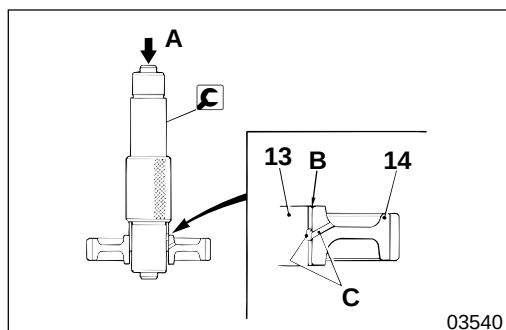
If the clearance is higher than the limit, replace the faulty parts.



Idler gear bushing

[Removal]

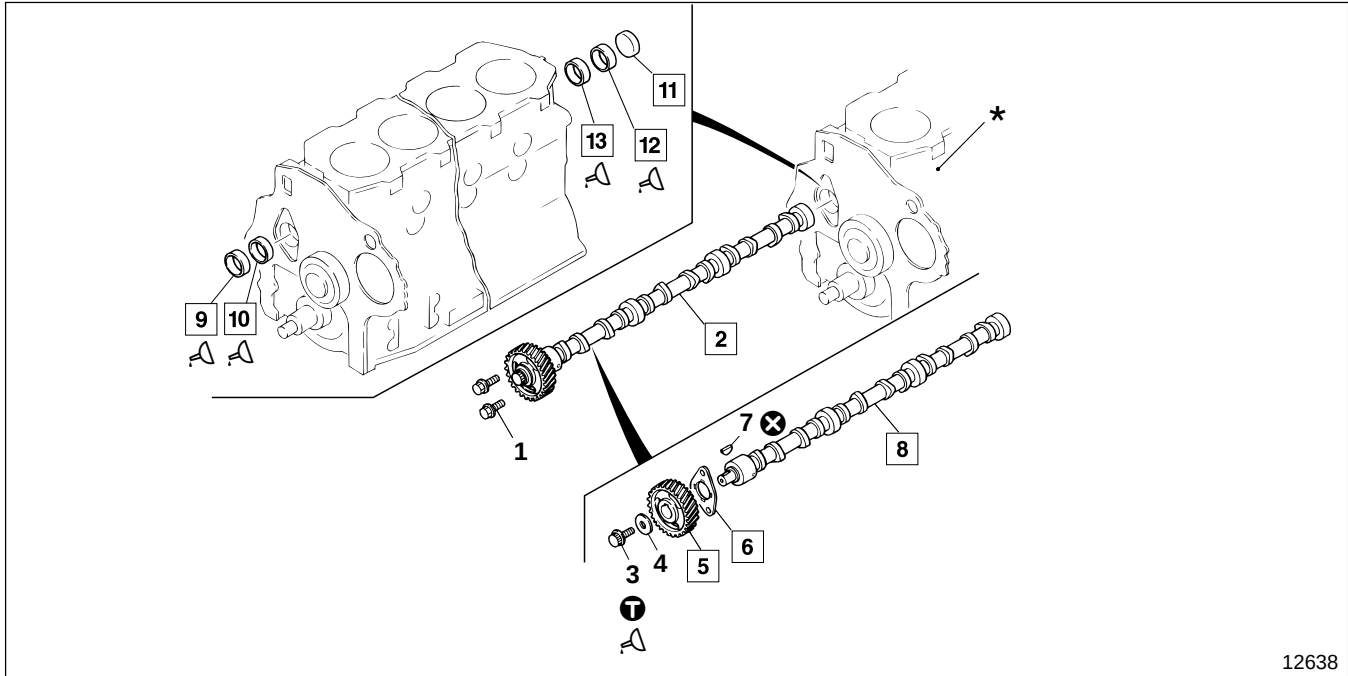
A : Press



[Press-fitting]

- Press-fit idler gear bushing **13** from chamfered side **B** of idler gear **14** and align oil holes **C** of the idler gear and the bushing.
- After press-fitting, finish the fitting by bringing the clearance between idler gear bushing **13** and the idler shaft to the standard value.

CAMSHAFT



12638

● Disassembly sequence

- | | | |
|---------------------|--------------------------|--------------------------|
| 1 Bolt | 6 Thrust plate | 11 Sealing cap |
| 2 Camshaft assembly | 7 Key | 12 No.4 camshaft bushing |
| 3 Bolt | 8 Camshaft | 13 No.3 camshaft bushing |
| 4 Washer | 9 No.1 camshaft bushing | |
| 5 Camshaft gear | 10 No.2 camshaft bushing | |

* : Crankcase P11-52

⊗ : Non-reusable parts

NOTE

Do not remove camshaft gear 5 unless it is faulty.

● Assembly sequence

Follow the disassembly sequence in reverse.

Service standards

Unit : mm {in.}

Location	Maintenance item			Standard value (Basic diameter in [J])	Limit	Remedy
—	End play of camshaft			0.05 to 0.22 {0.0020 to 0.0087}	0.3 {0.012}	Inspect
8	Camshaft	Difference between diameters	Inlet long and short	7.195±0.05 {0.28±0.0020}	6.70 {0.26}	Replace Long diameter 47.105 {1.85} Short diameter 39.910 {1.57}
			Exhaust	7.321±0.05 {0.29±0.0020}	6.82 {0.27}	
	Bend			0.02 {0.00079} or less	0.05 {0.0020}	Replace
9, 10, 12, 13	Clearance between camshaft and camshaft bushing		No.1 to No.3	[54.5] 0.03 to 0.08 {[2.15] 0.0012 to 0.0031}	0.15 {0.0059}	Repair or replace
			No.4	[53] 0.03 to 0.08 {[2.09] 0.0012 to 0.0031}	0.15 {0.0059}	

T Tightening torque

Unit : N·m {lbf.ft, kgf·m}

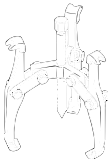
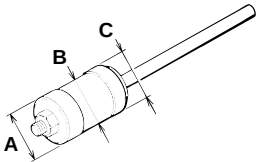
Location	Parts to be tightened	Tightening torque	Remarks
3	Bolt (Camshaft gear mounting)	175 {130, 18}	Wet

Lubricant

Location	Points of application	Kinds	Quantity
3	Thread area of bolt	Engine oil	As required
9, 10 12, 13	Inner surface of camshaft bushing	Engine oil	As required

Special tools

Unit : mm {in.}

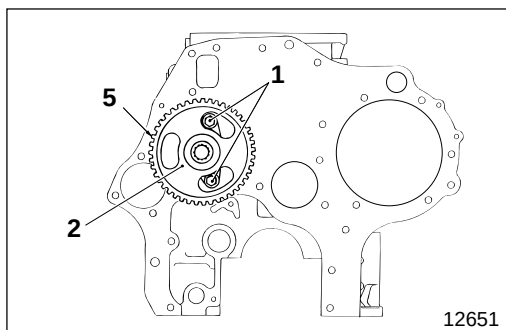
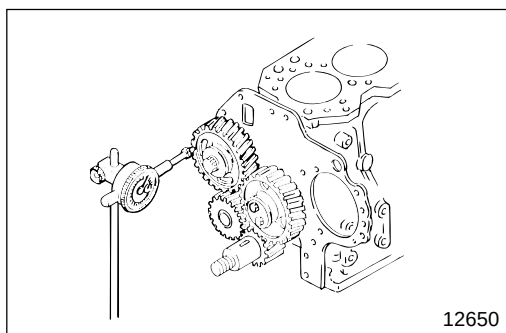
Location	Tool name and shape	Part No.	Application															
5	Gear puller  02065	MH061326	Removal of camshaft gear															
	Plug  M14×1.5 03543	MF665004	Blind plug for removal of camshaft gear															
9, 10, 12, 13	Camshaft bushing installer and extractor <table border="1"><thead><tr><th></th><th>A, C Dimension</th><th>B Dimension</th></tr></thead><tbody><tr><td>No. 1</td><td>ø58.5 {2.30}</td><td>ø54.5 {2.15}</td></tr><tr><td>No. 2</td><td>ø58 {2.28}</td><td>ø54.5 {2.15}</td></tr><tr><td>No. 3</td><td>ø58 {2.28}</td><td>ø54.5 {2.15}</td></tr><tr><td>No. 4</td><td>ø57 {2.24}</td><td>ø53 {2.09}</td></tr></tbody></table>  02083		A, C Dimension	B Dimension	No. 1	ø58.5 {2.30}	ø54.5 {2.15}	No. 2	ø58 {2.28}	ø54.5 {2.15}	No. 3	ø58 {2.28}	ø54.5 {2.15}	No. 4	ø57 {2.24}	ø53 {2.09}	MH061276	Removal and press-fitting of camshaft bushing
	A, C Dimension	B Dimension																
No. 1	ø58.5 {2.30}	ø54.5 {2.15}																
No. 2	ø58 {2.28}	ø54.5 {2.15}																
No. 3	ø58 {2.28}	ø54.5 {2.15}																
No. 4	ø57 {2.24}	ø53 {2.09}																

Service procedure

● Inspection before disassembly

Camshaft end play

If the measured value is higher than the limit, replace the faulty parts.



2 Camshaft assembly

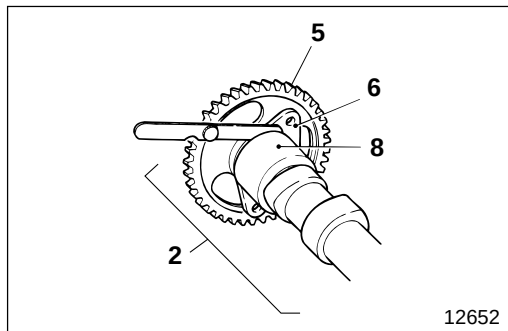
[Removal]

Remove camshaft assembly 2 by undoing bolts 1 through the holes in camshaft gear 5.

CAUTION

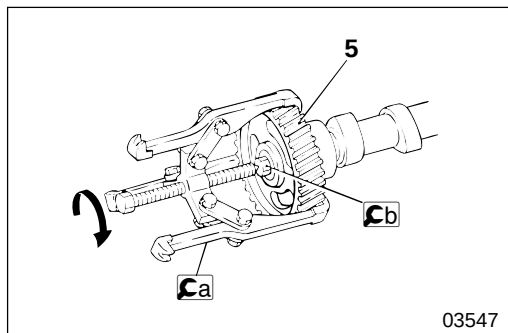
Be careful not to damage the camshaft bushings when you remove camshaft assembly 2.

CAMSHAFT



[Installation]

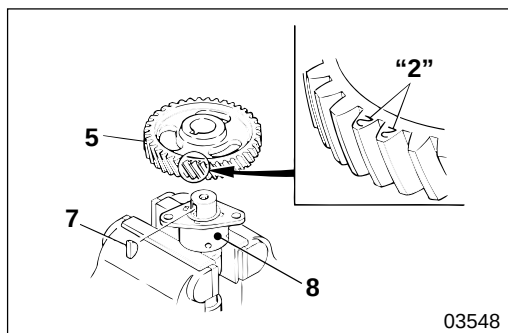
- Before installing camshaft assembly 2, measure the end play between thrust plate 6 and camshaft 8.
- If the measured value is higher than the limit, replace the faulty parts.
- Install the camshaft assembly by matching the alignment mark on camshaft gear 5 with the alignment mark on the idler gear. P11-



5 Camshaft gear

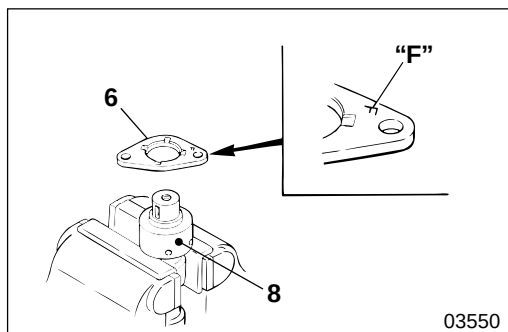
[Removal]

- Never remove camshaft gear 5 by striking, hitting, or hammering it.



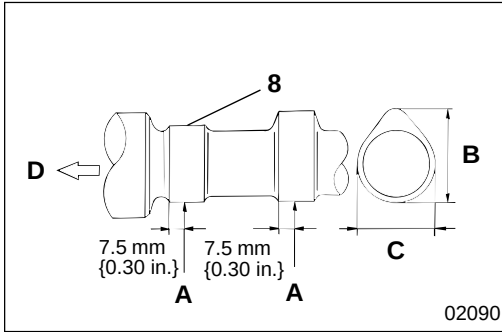
[Installation]

- Install camshaft gear 5 onto camshaft 8 in the direction as illustrated.
- Be sure when finishing the installation to install key 7.



6 Installation of thrust plate

Install thrust plate 6 onto camshaft 8 in the direction as illustrated.



8 Inspection of camshaft

(1) Difference between long diameter and short diameter

If the measured value is lower than the limit, replace camshaft 8.

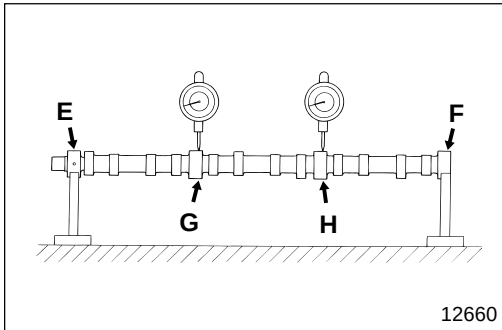
NOTE

Measure at point A, as illustrated, because the cam is tapered.

B : Long diameter

C : Short diameter

D : Front of the engine

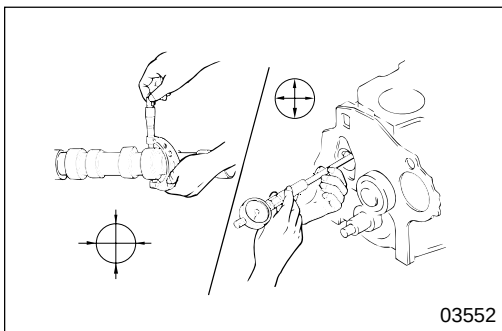


(2) Degree of bend

To measure deflection, support camshaft 8 at area E of No.1 journal, and area F of No.4 journal. Then, measure the amount of deflection at area G of No.2 journal, and area H of No.3 journal. If any of the measured values is higher than the limit, replace the camshaft.

NOTE

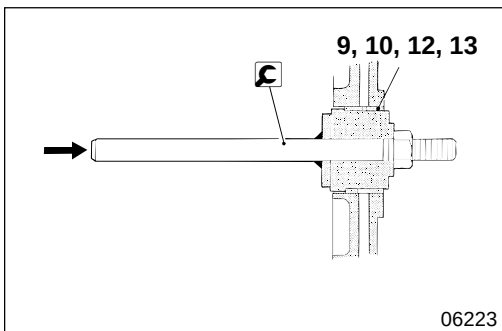
Degree of bend of camshaft 8 is a half of the indicated value of the gauge after rotating the shaft 360°.



8 to 10 12 13 Camshaft and camshaft bushing

[Inspection]

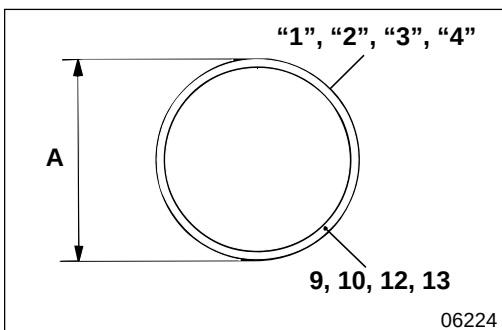
If the clearance is greater than the limit, replace the faulty parts.



Camshaft bushing

[Removal]

Remove No.3 camshaft bushing 13, and No.4 camshaft bushing 12 from the rear end of the crankcase.

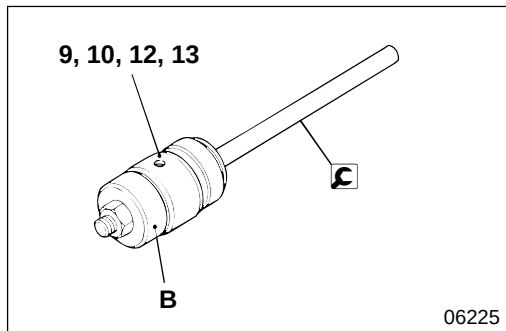


[Press-fitting]

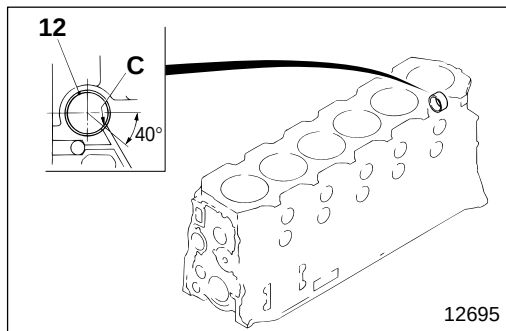
- Identify, by referring to the table below, No.1 to No.4 camshaft bushings by noting marks "1", "2", "3", "4" on camshaft bushings 9, 10, 12, 13. If you cannot identify the mark, measure outer diameter A of the bushing and refer to the table below.

Bushing No. (from the front of the engine)	Mark	Outer diameter A (mm {in.})
No.1	1	ø58.50 {2.30}
No.2	2	ø58.06 {2.28}
No.3	3	ø57.5 {2.26}
No.4	4	ø57.06 {2.25}

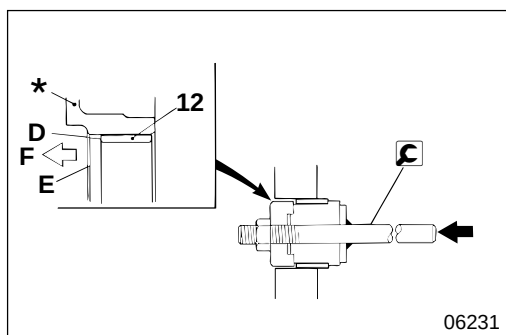
CAMSHAFT



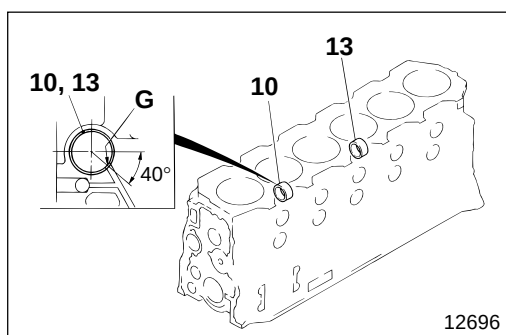
- For press-fitting, mount guide **B** to  camshaft bushing installer and extractor.
- Install camshaft bushings **9, 10, 12, 13** in descending order, from No.4 to No.1.
- Install No.4 camshaft bushing **12** from the rear end of the engine, and No.3 to No.1 camshaft bushings **9, 10, 13** from the front end of the engine.



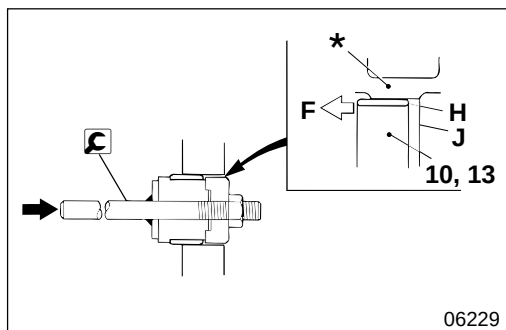
- Align oil hole **C** of No.4 camshaft bushing **12** in the direction as illustrated.



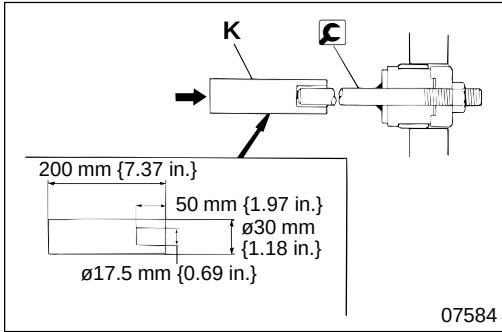
- Press in until surface **D** of No.4 camshaft bushing **12** is flush with chamfered part **E** of crankcase *****.
F : Front of the engine



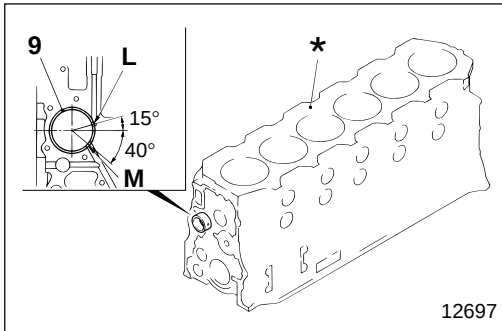
- Align oil hole **G**, of No.2 to No.3 camshaft bushings **10, 13**, in the direction as illustrated, and press-fit in the order of No.3, 2.



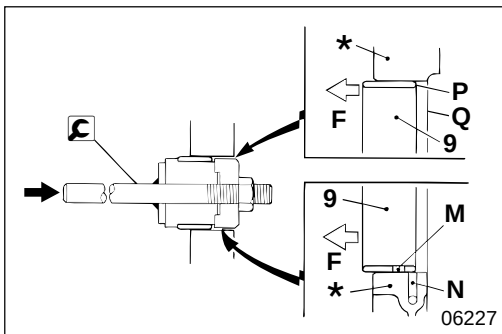
- Press in until surface **H** of No.2 to No.3 camshaft bushings **10, 13** is flush with surface **J** of crankcase *****.
F : Front of the engine



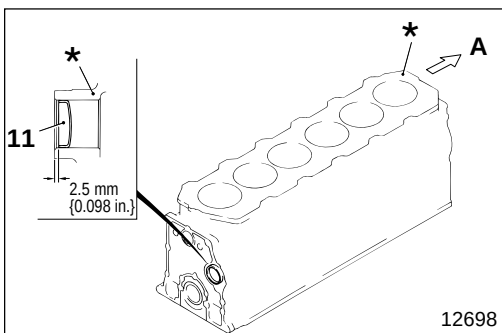
- For press-fitting of No.3 camshaft bushing **13**, use tool **K** as illustrated.



- Align oil holes **L**, **M** of No.1 camshaft bushing **9** in the direction as illustrated.
L : $\varnothing 3$ mm {0.11 in.}
M : $\varnothing 8$ mm {0.31 in.}
***** : Crankcase



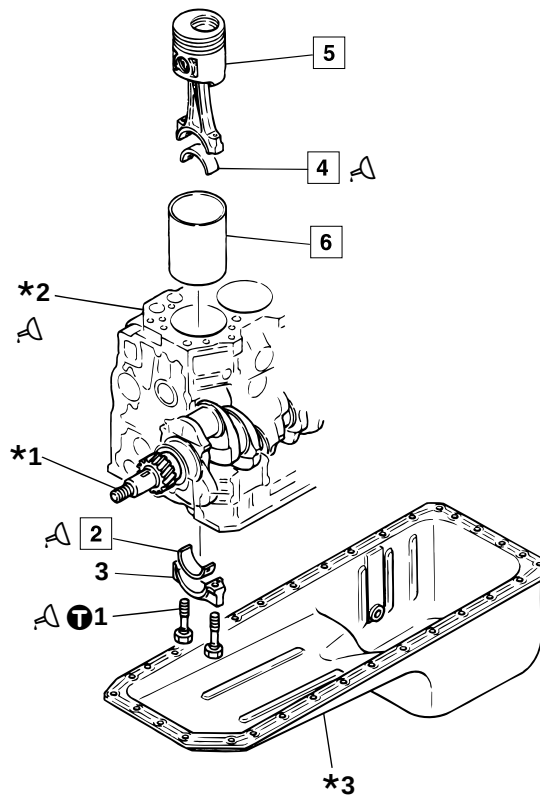
- Align oil hole **M** of No.1 camshaft bushing **9** with oil hole **N** of crankcase ***** and press in until camshaft bushing surface **P** is flush with crankcase surface **Q**.
F : Front of the engine



11 Installation of sealing cap

- Press-fit sealing cap **11** into crankcase ***** to the specified depth.
A : Front of the engine

PISTON, CONNECTING ROD AND CYLINDER SLEEVE



12702

● Disassembly sequence

- 1 Bolt
- 2 Lower connecting rod bearing
- 3 Connecting rod cap
- 4 Upper connecting rod bearing
- 5 Piston and connecting rod assembly
P11-42
- 6 Cylinder sleeve

- *1 : Crankshaft P11-52
 *2 : Crankcase P11-52
 *3 : Oil pan Gr 12

● Assembly sequence

Follow the disassembly sequence in reverse.

Service standards

Unit : mm {in.}

Location	Maintenance item		Standard value (Basic diameter in [])	Limit	Remedy
—	Extent of piston protrusion		0.43 to 0.69 {0.017 to 0.027}	—	Inspect
—	End play of connecting rod		0.15 to 0.45 {0.0059 to 0.018}	0.6 {0.024}	Inspect
2, 4	Connecting rod bearing	Oil clearance	[60] 0.04 to 0.09 {[2.36] 0.0016 to 0.0035}	0.2 {0.0079}	Replace
		Expansion	—	Upper : less than 64.5 {2.54} Lower : less than 64.27 {2.53}	
5, 6	Clearance between piston and connecting rod assembly and cylinder sleeve		[104] 0.07 to 0.11 {[4.094] 0.0028 to 0.0043}	—	Adjust or replace with oversizes
6	Cylinder sleeve	Inner diameter	104 to 104.03 {4.094 to 4.095}	104.25 {4.10}	Adjust or replace with oversizes
		Circular accuracy	0.01 {0.00039} or less	—	
		Cylindrical accuracy	0.03 {0.0012} or less	—	
6, *2	Interference between cylinder sleeve and crankcase	Standard	0.17 to 0.23 {0.0067 to 0.0091}	—	Replace with oversizes
		Oversize	0.19 to 0.21 {0.0075 to 0.0083}	—	Replace

Tightening torque

Unit : N·m {lbf.ft, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
1	Bolt	30 {22, 3}+90°±5°	Wet

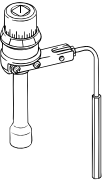
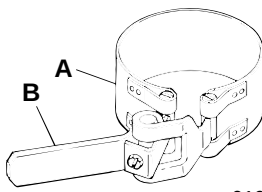
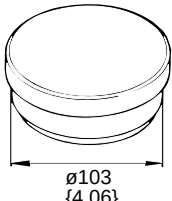
Lubricant

Location	Points of application	Kinds	Quantity
1	Thread area of bolt	Engine oil	As required
2, 4	Inner surface of bearing	Engine oil	As required
*2	Sleeve hole of crankcase	Spindle oil (ISO VG 32)	As required

PISTON, CONNECTING ROD AND CYLINDER SLEEVE

Special tools

Unit : mm {in.}

Location	Tool name and shape	Part No.	Application
5	Socket wrench  01984	MH061560	Installation of piston and connecting rod assembly
	A : Piston guide clamp B : Piston guide lever  01981	A : MH061890 B : MF061658	
6	Cylinder sleeve installer  ø103 {4.06} 03377	MH062228	Installation of cylinder sleeve

Service procedure

Inspection before disassembly

(1) Extent of piston protrusion from the upper surface of crankcase *2

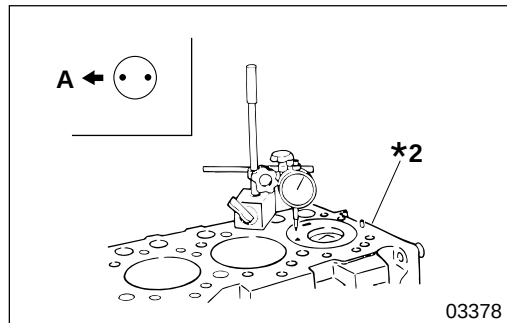
NOTE

Always inspect the extent of piston protrusion because it affects the engine performance greatly.

- Measure piston protrusion at two points on the top of the piston, and produce the average value.

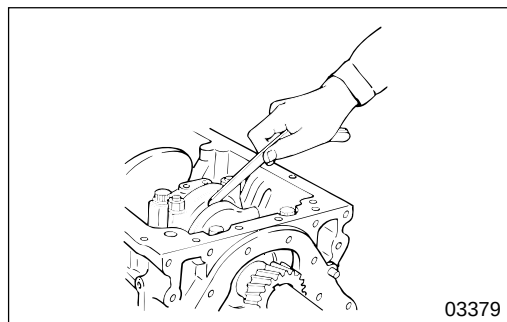
A : Front of the engine

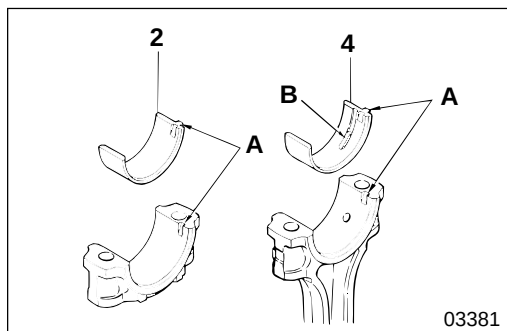
- If the average value deviates from the limit, inspect clearance of the related parts.



(2) End play of connecting rod

- Measure the end play of each connecting rod.
- If the measured value is higher than the limit, replace the faulty parts.





2 4 Connecting rod bearing

[Installation]

Install connecting rod bearings 2, 4 by matching lugs A to the connecting rods.

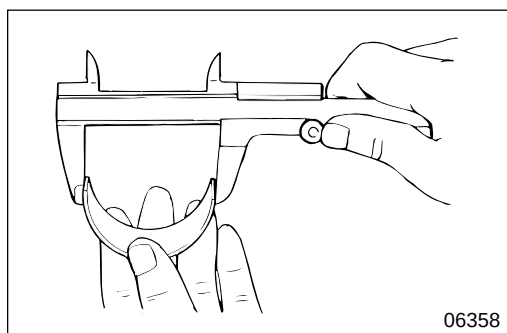
CAUTION ⚠

Be sure to distinguish between upper and lower connecting rod bearings 2, 4. The upper bearing has oil opening B while the lower bearing has no oil opening.

[Inspection]

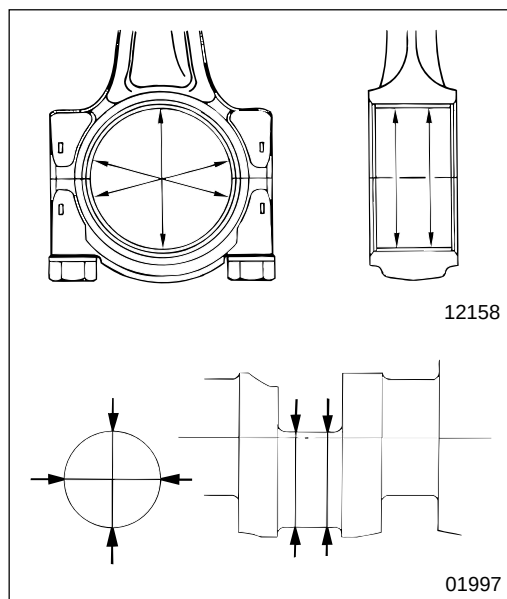
CAUTION ⚠

- Do not forcibly open or expand connecting rod bearings 2, 4.
- When either upper or lower connecting rod bearings 2, 4 needs replacing, replace as a set.



(1) Expansion at free state

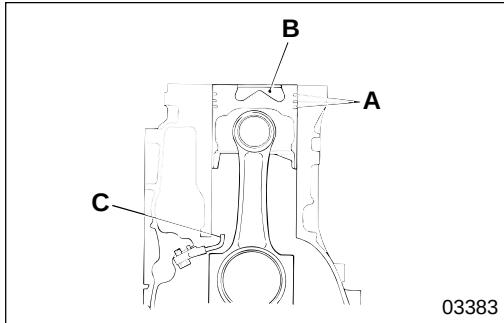
If the measured value is lower than the limit, replace connecting rod bearings 2, 4.



(2) Clearance between connecting rod bearing and crankshaft

If the clearance between connecting rod bearing 2, 4 and crankshaft *1 is lower than the limit, replace the faulty parts.

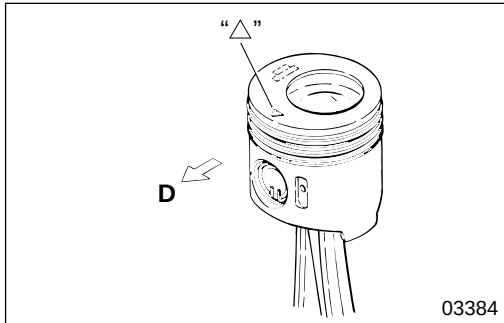
PISTON, CONNECTING ROD AND CYLINDER SLEEVE



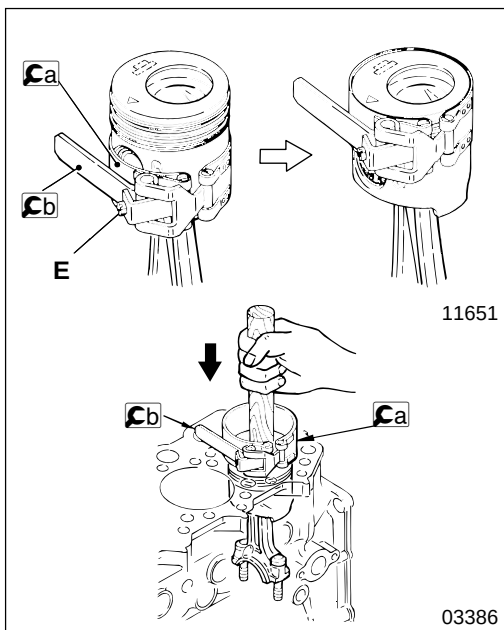
5 Installation of piston and connecting rod assembly

CAUTION

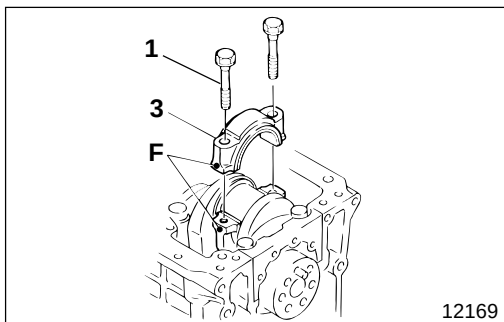
- Be sure to fit piston ring A in the correct position.
 P11-46
- Be careful not to scratch or damage head B of the piston (a part of the combustion chamber).
- Make sure that the connecting rod does not hit oil jet C.



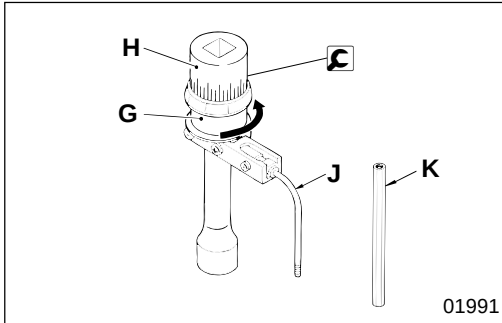
- Install piston front mark "△" directed towards the front of the engine using the following procedure.
D : Front of the engine



- Match the inner diameter of  Ca piston guide clamp to the outer diameter of the piston skirt by turning adjusting bolt E of  Cb piston guide lever.
- After adjusting, set  Ca piston guide clamp and  Cb piston guide lever at the top of the piston so that the clamp is flush with the top of the piston.



- After the piston is inserted, align alignment marks F on the connecting rod with the alignment marks on connecting rod cap 3 and tighten bolt 1 at specified torque. Then tighten the bolt further as follows:

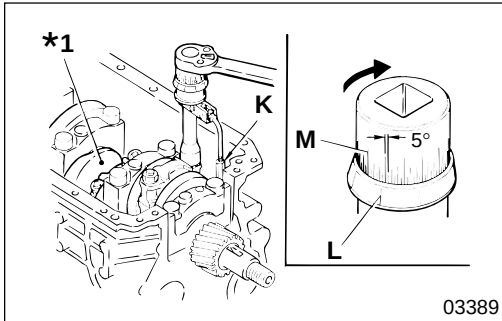


- Turn socket wrench holder **G** counterclockwise and keep the spring in the wrench compressed.

H : Socket

J : Rod

K : Rod (for connection)

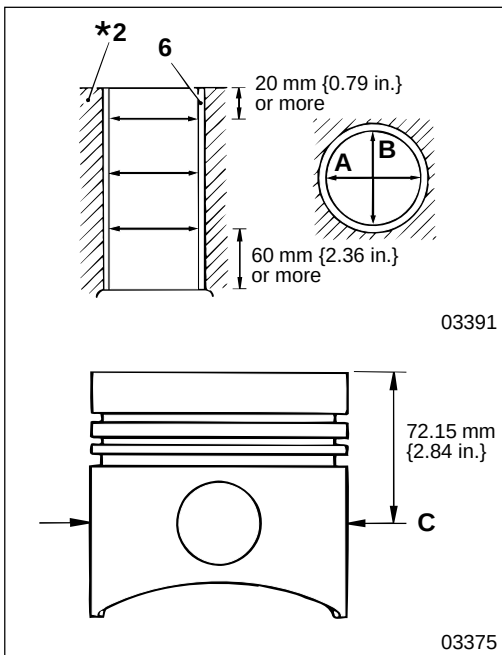


- Set socket wrench holder **G** so that the repercussive force of the spring presses rod **K** (for connection) against crankshaft ***1**.
- Select a scale that is convenient for reading graduation **L** on holder **G**.
- Tighten further by turning socket **H** clockwise by $90^\circ \pm 5^\circ$ (setting is in 5° increments), referring to graduation **M** on the selected scale.

NOTE

After installation of connecting rod cap 3, inspect the following points :

- End play of the connecting rod : P11-36
- Piston protrusion : P11-36



5 6 Piston and connecting rod assembly, and cylinder sleeve

[Inspection]

- If the inner diameter of cylinder sleeve **6** is higher than the limit, bore the cylinder sleeve oversize and use an oversized piston.

A : In the direction of the crankshaft axis

B : At right angles to the crankshaft axis

- If the clearance between piston **5** and cylinder sleeve **6** deviates from the standard value, even when the inner diameter of the cylinder sleeve is within the limit, replace the piston.

[Selection of oversized piston]

Extent of oversize : 0.50, 1.00 mm {0.020, 0.039 in.}

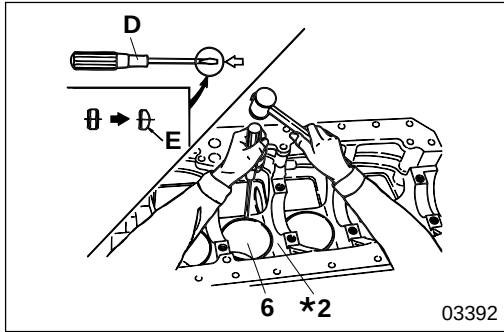
- Determine the extent of oversize by measuring the inner diameters of all the cylinders and calculating the maximum wear amount of all the cylinders.
- Measure the outer diameter of the oversized piston to be used.
- C** : Position to measure the outer diameter of the piston

- Bore cylinder sleeve **6** and hone it to make the clearance between piston **5** and the cylinder sleeve conform to the standard value.

NOTE

- Even if only one cylinder sleeve **6** requires boring, all the other cylinder sleeves must be bored to the identical oversize.
- Piston rings must be replaced with the corresponding oversized ones.

PISTON, CONNECTING ROD AND CYLINDER SLEEVE



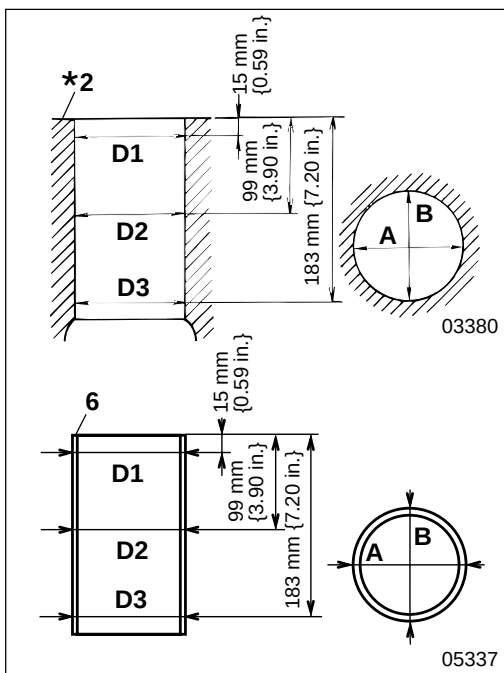
Cylinder sleeve

[Removal]

- Mount a boring machine on crankcase ***2** and center. Centering must be done at the lower part of cylinder sleeve **6** which is less unevenly worn.
- Bore until the thickness of cylinder sleeve **6** is approximately 0.5 mm {0.020 in.}.
- Insert tool **D** (a modified screwdriver) between crankcase ***2** and cylinder sleeve **6**, break the sleeve by tapping it gently, then remove.

CAUTION

Make sure when inserting tool **D** that round part **E** is facing crankcase ***2**.



[Installation]

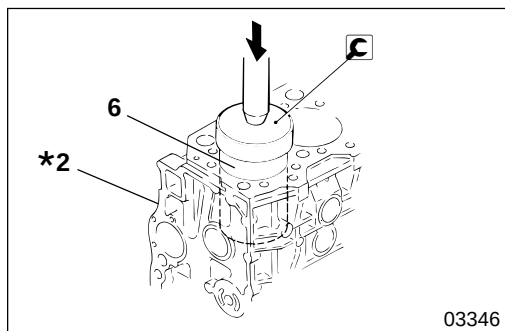
- Inspect sleeve hole of crankcase ***2** before installing cylinder sleeve **6**. If there are irregularities, such as defects or insufficient interference, correct them by boring.

NOTE

- Pull out cylinder sleeve **6** of all cylinders and bore the sleeve holes perfectly round when you bore the sleeve holes of crankcase ***2**.
- Apply spindle oil (ISO VG 32) when you push cylinder sleeve **6** into the sleeve hole of crankcase ***2**.

Inspection of interference must be carried out as follows.

- Measure the inner diameter of the sleeve hole of crankcase ***2** and the outer diameter of cylinder sleeve **6** at the specified positions illustrated.
- Take the average value at the top, middle and bottom (**D1**, **D2**, **D3**) and across the diameter (**A**, **B**). If the interference is lower than the limit, bore the sleeve hole of crankcase ***2** oversize.



< If interference is sufficient >

- Press-fit cylinder sleeve **6** into crankcase ***2** from the chamfered end using  cylinder sleeve installer.

NOTE

Align the top of cylinder sleeve 6 with the top of crankcase *2 when press-fitting.

- After press-fitting, make the inner diameter of cylinder sleeve **6** conform to the standard value by honing the surface.

< If interference is insufficient >

- Prepare cylinder sleeve **6** which is 0.5 mm {0.020 in.} oversize in diameter.
- Hone crankcase ***2**, making the clearance between the outer diameter of cylinder sleeve **6** and the sleeve hole of crankcase ***2** conform to the standard value.
- Press-fit cylinder sleeve **6** into crankcase ***2** from the chamfered end using  cylinder sleeve installer.

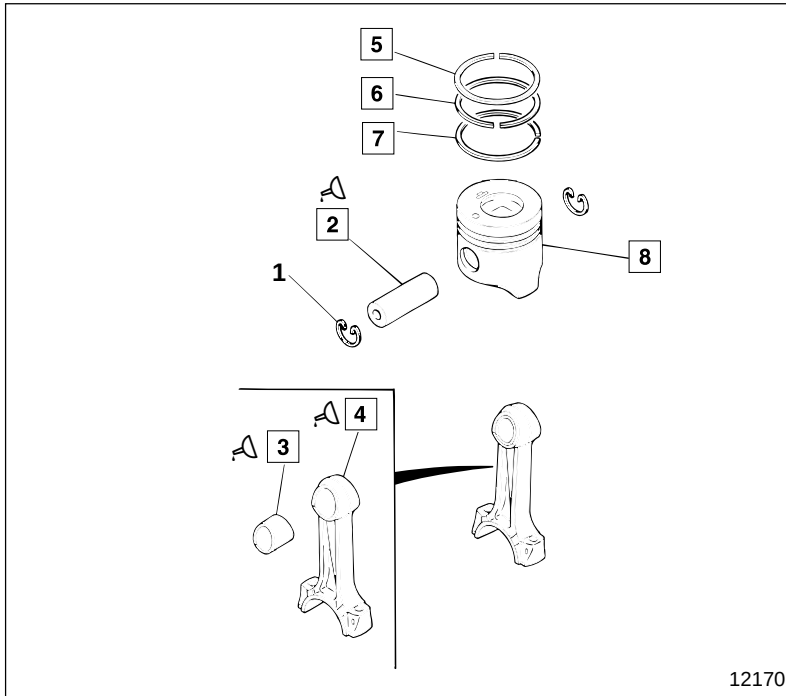
NOTE

Align the upper face of cylinder sleeve 6 with the upper face of crankcase *2 when press-fitting.

- After press-fitting, make the inner diameter of cylinder sleeve **6** conform to the standard value by honing the surface.

PISTON, CONNECTING ROD AND CYLINDER SLEEVE

Piston and Connecting Rod Assembly



● Disassembly sequence

- 1 Snap ring
- 2 Piston pin
- 3 Connecting rod bushing
- 4 Connecting rod
- 5 1st compression ring
- 6 2nd compression ring
- 7 Oil ring
- 8 Piston

● Assembly sequence

Follow the disassembly sequence in reverse.

Service standards

Unit : mm {in.}

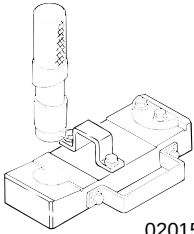
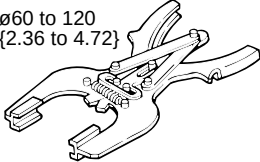
Location	Maintenance item		Standard value (Basic diameter in [])	Limit	Remedy
2, 3	Clearance between piston pin and connecting rod bushing		[36] 0.03 to 0.04 {[1.42] 0.0012 to 0.0016}	0.1 {0.0039}	Replace
2, 8	Clearance between piston and piston pin		[36] 0.007 to 0.021 {[1.42] 0.00028 to 0.00083}	0.05 {0.0020}	Replace
4	Degree of bend and distortion of connecting rod		—	0.05 {0.0020}	Repair or replace
5 to 7	Deviation of piston ring fitted position	1st compression ring	0.3 to 0.45 {0.012 to 0.018}	1.5 {0.059}	Replace
		2nd compression ring	0.4 to 0.55 {0.016 to 0.022}		
		Oil ring	0.25 to 0.45 {0.0098 to 0.018}		
5 to 8	Clearance between piston ring and piston ring groove	1st compression ring	0.02 to 0.10 {0.00079 to 0.0039}	0.2 {0.0079}	Replace
		2nd compression ring	0.05 to 0.08 {0.0020 to 0.0031}	0.15 {0.0059}	
		Oil ring	0.03 to 0.06 {0.0012 to 0.0024}		

Lubricant

Location	Points of application	Kinds	Quantity
2	Exterior of piston pin	Engine oil	As required
3	Exterior of connecting rod bushing	Engine oil	As required
4	Bushing attachment area of connecting rod	Engine oil	As required

Special tools

Unit : mm {in.}

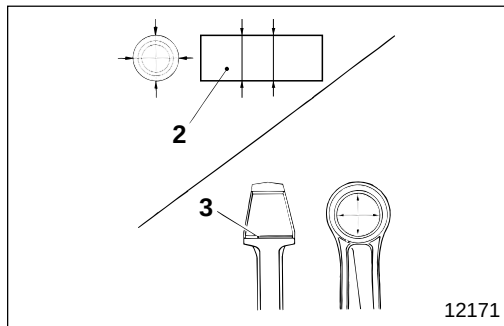
Location	Tool name and shape	Part No.	Application
3	Connecting rod bushing puller kit  02015	MH062225	Removal and installation of connecting rod bushing
5 to 7	Piston ring tool  02013	MH060014	Removal and installation of piston ring

◆ Service procedure

2 3 Piston pin and connecting rod bushing

[Inspection]

If the clearances are higher than the limit, replace the faulty parts.



Connecting rod bushing

Use  connecting rod bushing puller kit to replace connecting rod bushing 3.

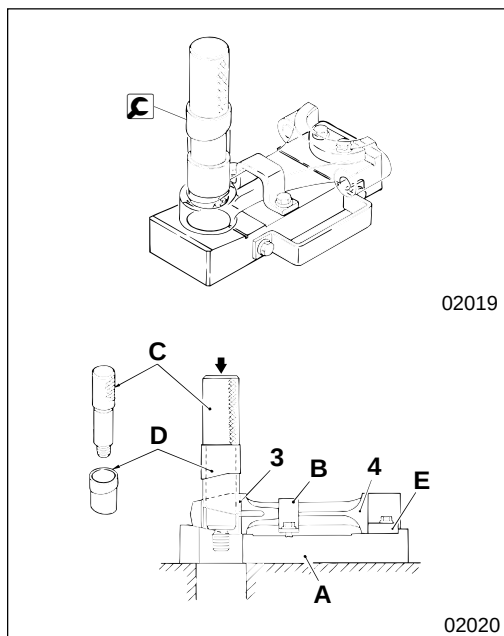
(Components of  connecting rod bushing puller kit)

A : Base **B** : Bracket **C** : Puller **D** : Collar
E : Plate **F** : Collar **G** : Nut

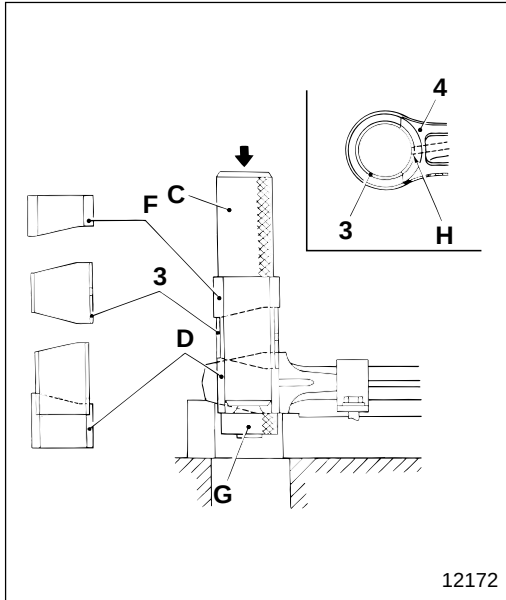
Nut

[Pulling-out]

- Remove upper connecting rod bearing from the big end of connecting rod 4.
- Place connecting rod 4 on base **A** and fix it to the base at two points, bracket **B** and plate **E**.
- Fit collar **D** in puller **C** in the direction as illustrated, and pull out connecting rod bushing 3 with a gradual load of approximately 49 kN {11020 lbf, 5000 kgf}.



PISTON, CONNECTING ROD AND CYLINDER SLEEVE

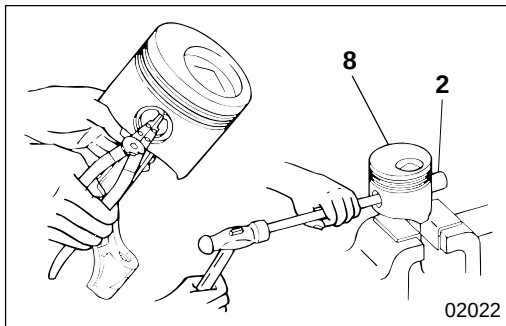


[Press-fitting]

- Apply engine oil to the exterior peripheral area of connecting rod bushing 3 and the inner area of the bushing fitting ring of connecting rod 4.
- Fit collar F, connecting rod bushing 3 and collar D in puller C in the arrangement and direction as illustrated and mount them with nut G.
- Align oiling holes H of connecting rod bushing 3 and connecting rod 4, and gradually press in the bushing with approximately 49 kN {11023 lbf, 5000 kgf} load.
- After press-fitting, ream connecting rod bushing 3 to make its clearance with piston pin 2 conform to the standard value.

NOTE

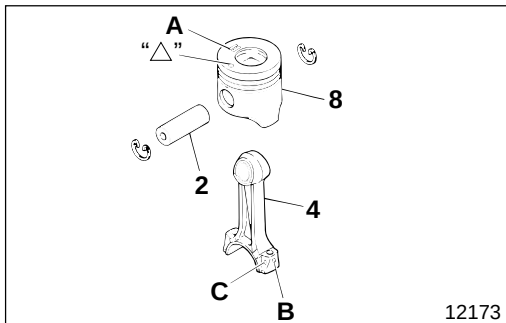
After press-fitting bushing 3, insert piston pin 2 and make sure that the rod moves smoothly without any excessive play.



2 4 8 Piston pin and connecting rod and piston

[Disassembly]

- Drift out piston pin 2 using a rod.
- When removal of piston pin 2 is difficult, warm piston 8 using a piston heater or hot water.



[Installation]

- Apply engine oil to piston pin 2 and assemble connecting rod 4 and piston 8 in the direction as illustrated.

A : Piston mass (Mass of piston is marked)

B : Connecting rod mass mark (Alphabetical: A, B, C, D, E, F, G)

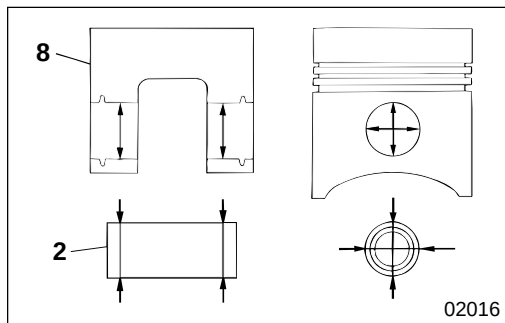
C : Mounting base of connecting rod cap

Δ : Front mark

- When piston pin 2 insertion is difficult, warm piston 8 using a piston heater or hot water.

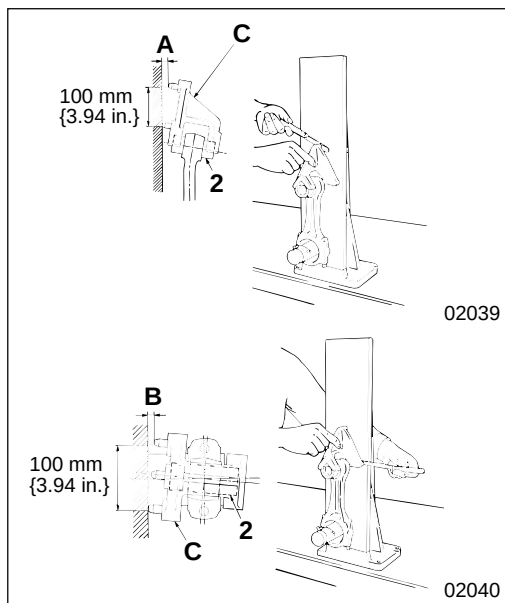
CAUTION ⚠

- Make sure that the total mass error of all pistons 8 in one engine is 10 g {0.35oz} or less.
- Be sure to install connecting rods 4, to be used in one engine, that have identical mass mark B.
- Be sure that after inserting piston pin 2 the connecting rod operates smoothly without excessive play.



2 8 Clearance between piston pin and piston

If the clearance is higher than the limit, replace the faulty parts.



4 Degree of bend or distortion of connecting rod

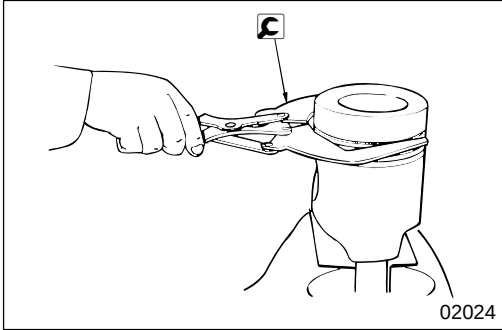
- Mount connecting rod bushing 3 and piston pin 2 to connecting rod 4.
- Measure degree of bend A and distortion B of connecting rod 4. If the measured value is higher than the limit, repair or replace the connecting rod.

C : Connecting rod aligner (Measuring instrument)

NOTE

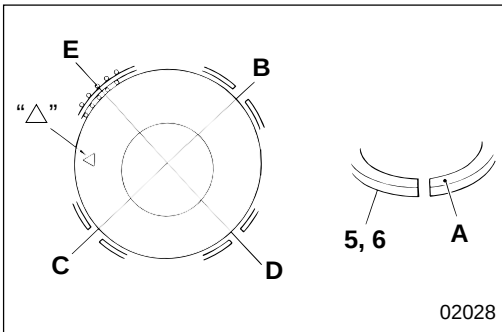
- When making measurements by mounting connecting rod 5 to connecting rod aligner C, make sure that the upper connecting rod bearing and the lower connecting rod bearing are mounted on the rod.
- Mount the connecting rod cap by tightening the bolt at specified torque. P11-34

PISTON, CONNECTING ROD AND CYLINDER SLEEVE



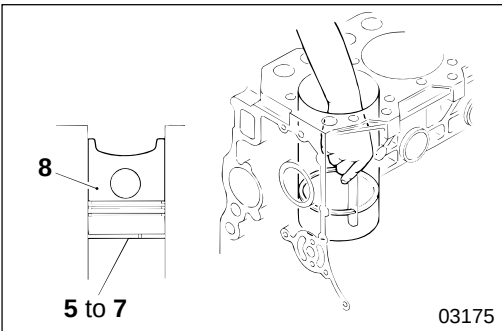
5 to 8 Piston ring and piston

Piston ring
[Removal]



[Installation]

- Install oil ring **8** so that split **D** and the butting joint of expander spring **E** come to the points as illustrated.
 - Compression rings **5** and **6** have a manufacturer's mark **A** at the split, and installation should be made with the mark outward.
- B** : The split of the 1st compression ring
C : The split of the 2nd compression ring
D : Oil ring slit
E : Oil ring expander spring butt joint
△ : Front mark of piston



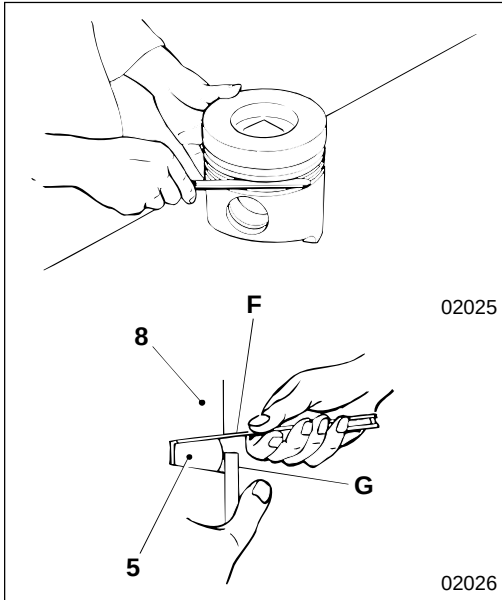
[Inspection]

(1) Clearance of piston ring slit

- Install piston rings **5** to **7** into the crankcase cylinder sleeve using the head of piston **8** to level the piston ring.
- Measure the clearance of the piston ring split while keeping them level and stationary. If the measured value is higher than the limit, replace the piston ring.

NOTE

- Use piston **8** to ensure that piston rings **5** to **7** are kept level when inserting them into the crankcase cylinder sleeve.
- Insert piston rings **5** to **7** into the lower part of the crankcase cylinder sleeve, where the area is less worn, when measuring clearance of piston ring split **5** to **7**.
- Exchange the whole set of piston rings **5** to **7** as a set if any of the rings is faulty.



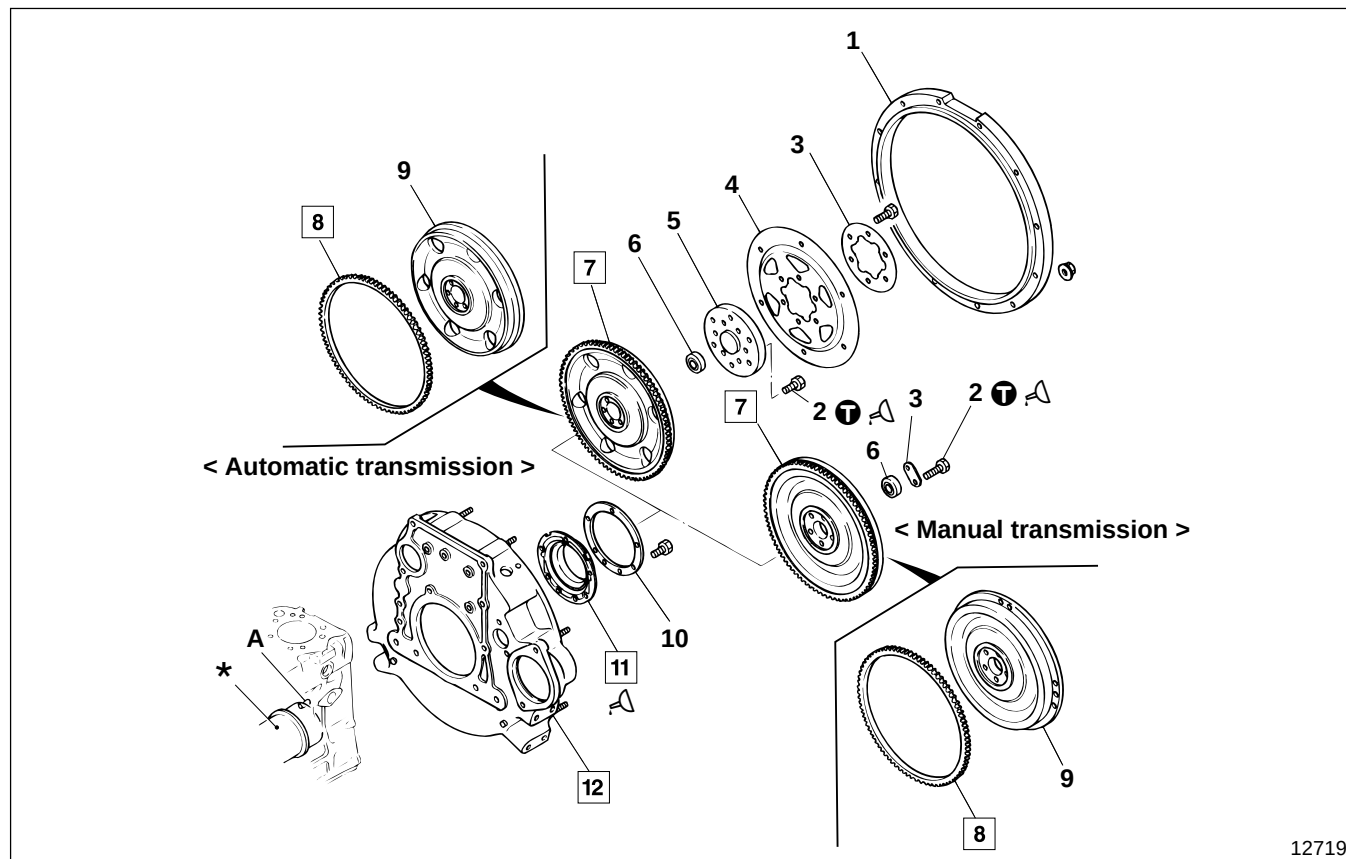
(2) Clearance between piston ring and ring groove

- If the measured value is higher than the limit, replace the faulty parts.
- Measure using feeler gauge **F**, by pressing 1st compression ring **5** against piston **8** with straight edge **G**.

NOTE

- Measurement has to be conducted around the whole periphery of piston **8** after removing carbon deposits.
- Be sure to exchange the whole set of piston rings 5 to 7 as a set if any of the rings is faulty.

FLYWHEEL



12719

● Disassembly sequence

- | | | |
|---|--|---------------------------------|
| 1 Flywheel housing adaptor
< Automatic transmission > | 5 Flywheel adaptor
< Automatic transmission > | 11 Rear oil seal |
| 2 Bolt | 6 Bearing | 12 Flywheel housing |
| 3 Plate < Manual transmission >
Wear plate
< Automatic transmission > | 7 Flywheel assembly | * : Crankshaft assembly P11-52 |
| 4 Flex plate
< Automatic transmission > | 8 Ring gear | A : Positioning pin |
| | 9 Flywheel | |
| | 10 Washer plate | |

● Assembly sequence

Follow the disassembly sequence in reverse.

NOTE

Be sure to check wobble of flywheel 9 after installing flywheel assembly 7. P11-49

Service standards

Unit : mm {in.}

Location	Maintenance item		Standard value	Limit	Remedy
7	Flywheel assembly < Manual transmission >	Height from bolt mounting surface to friction surface	20 {0.787}	19 {0.748}	Correct or replace
		Distortion of friction surface	0.050 {0.002} or less	0.2 {0.008}	Correct or replace
		Wobble of friction surface when installed	—	0.2 {0.008}	Correct or replace
12	Eccentricity of flywheel housing when install		—	0.2 {0.008}	Inspect or replace

T Tightening torque

Unit : N·m {lbf.ft, kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
2	Bolt (Flywheel mounting)	39 {29, 4} +45° ±5°	Wet

L Lubricant and sealant

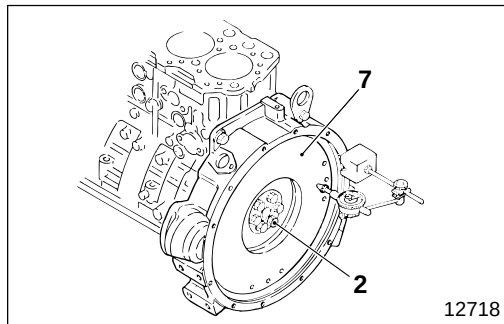
Location	Points of application	Kinds	Quantity
2	Thread area of bolt	Engine oil	As required
11	Lip area of rear oil seal	Engine oil	As required
	Crankcase mounting surface of rear oil seal	THREEBOND 1207C	As required

◆ Service procedure**7 Flywheel assembly**

[Inspection]

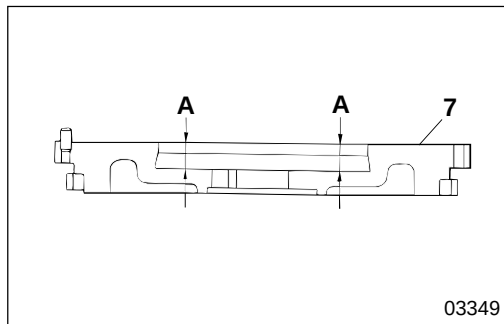
(1) Wobble

If the measured value is higher than the limit, check the fastening of bolt **2**, the attachment surface of crankshaft assembly, and depending on the condition found, either repair or replace flywheel assembly **7**.

**(2) Height of friction surfaces**

If the measured value is lower than the limit, repair or replace flywheel assembly **7**.

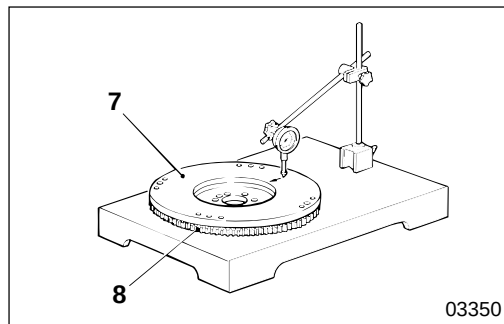
A : Height from bolt mounting surface to friction surface

**(3) Distortion of friction surface**

If the measured value is lower than the limit, repair or replace flywheel assembly **7**.

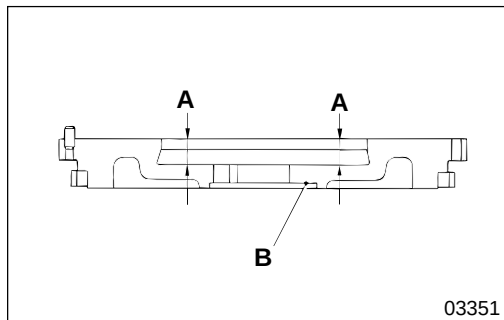
NOTE

If any fault is found in ring gear **8**, replace it first, then begin the inspection.

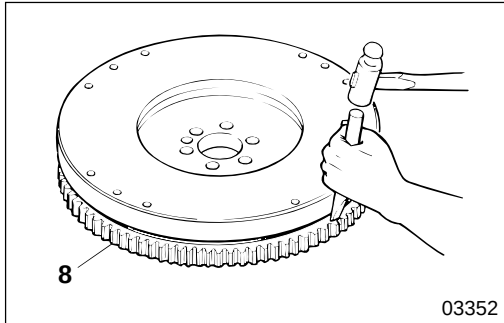


[Correction]

Make sure when grinding the friction surfaces for correction, that height **A** is not lower than the limit while maintaining the degree of parallel with surface **B** within 0.1 mm {0.0039 in.}.



FLYWHEEL



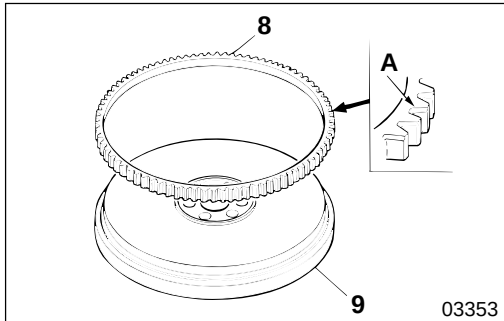
8 Ring gear

[Inspection]

Check and see if there is any damage, wear or other fault, and if any fault is found, replace ring gear 8.

[Removal]

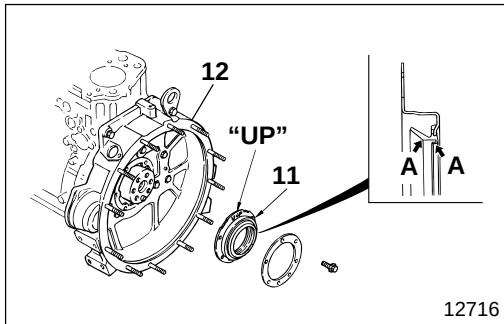
- Heat up ring gear 8 evenly using an acetylene torch.
- Hammer the outer edge of ring gear 8 evenly until it drops off.



[Installation]

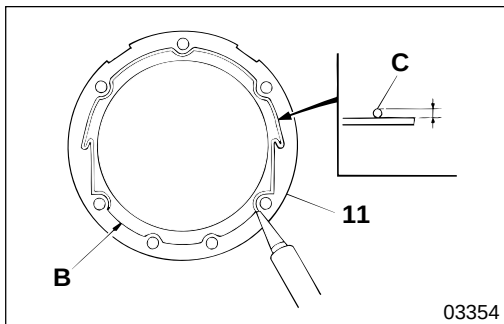
- Heat up ring gear 8 using a piston heater to approximately 100°C {212°F} for three minutes.
- With the side of the chamfered teeth of ring gear 8 facing you, mount it on flywheel 9.

A : Chamfered ring gear side



11 Mounting of rear oil seal

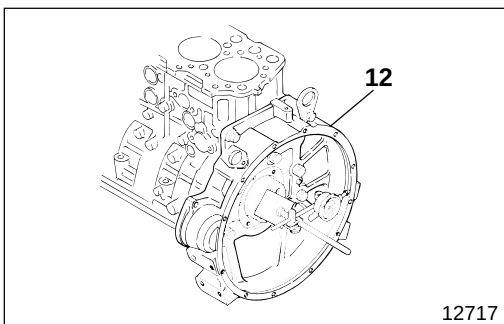
- Apply engine oil to lip area A of rear oil seal 11.
- Install rear oil seal 11 in flywheel housing 12 in the direction as illustrated.



- Apply sealant C along line B on rear oil seal 11 evenly without break
- After applying sealant C, within three minutes, mount rear oil seal 11.

CAUTION ⚠

- Do not start the engine within an hour of installing rear oil seal 11.
- Be sure to reapply sealant C if the bolts (for mounting rear oil seal 11) are loosened or removed by any cause whatsoever after mounting.



12 Inspection of flywheel housing

Mount of eccentricity

- If the measured value is higher than the limit, reassemble flywheel housing 12.
- After reassembly, if the measured value is still higher than the limit, replace the faulty parts.

MEMO
