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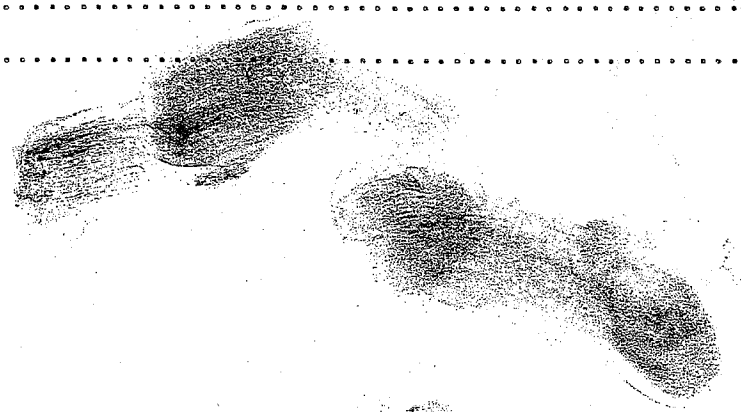


PAGE

010001

MAIN DATA AND SPECIFICATIONS

Item \ Engine model	4JA1	4JB1	4JB1T	4JB1TC
Engine type	Four-cycle, overhead valve, water cooled			
Combustion chamber type	Direct injection			
Cylinder liner type	Dry type, chrome plated, stainless steel tube			
Timing gear train system	Gear drive		Gear drive or Belt drive	Belt drive
No. of cylinders — bore x stroke mm(in)	4 - 93 x 92 (3.66 x 3.62)		4 - 93 x 102 (3.66 x 4.02)	
No. of piston rings	Compression ring: 2/Oil ring: 1			
Total piston displacement $cm^3(in^3)$	2,499 (152.4)		2,771 (169.0)	
Compression ratio (to 1)	18.4	18.2	17.5	
Compression pressure kg/cm^2(psi/kPa)	31 (441/3)			
Engine weight kg(lb)	Approximately 226 (498)	Approximately 229 (505)	Approximately 250 (550)	Approximately 255 (562)
Fuel injection order	1 - 3 - 4 - 2			
Fuel injection timing BTDC deg	12 (Gear drive)		12 (Gear drive) 10 (Belt drive)	11
Specified fuel type	SAE No. 2 diesel fuel			
Idling speed rpm	750 - 790			
Valve clearances (At cold): Intake mm(in)	0.4 (0.016)			
Exhaust mm(in)	0.4 (0.016)			
Intake valves Open at (BTDC) deg	24.5	24.0		
Close at (ABDC) deg	55.5	55.0		
Exhaust valves Open at (BBDC) deg	54.0	54.0		
Close at (ATDC) deg	26.0	26.0		
Fuel system				
Injection pump type	BOSCH distributor VE type			
Governor type	Mechanical (All speed)			
Injection nozzle type	Single spring, hole with 4 orifices		Single spring, hole with 4 orifices (Gear drive)	
	—		Two springs, hole with 4 orifices (Belt drive)	

4JB1T : 4JB1 Engine with turbocharger.
4JB1TC: 4JB1 Engine with turbocharger and intercooler.

Item \ Engine model	4JA1	4JB1	4JB1T	4JB1TC
Injection nozzle opening kg/cm²(psi/kPa) pressure (Service value)				
Single spring type (Gear drive models only)	185 (2,631/18,143)		185 (2,631/18,143)	
Two spring type: (Belt drive models only) : First pressure	—		180 (2,560/17,653)	
: Second pressure	—		274.5 (3,903/26,920)	274.5 (3,903/26,920) 224* (3,185/21,968)
Main fuel filter type	Cartridge paper element and water separator			
Lubricating system				
Lubricating method	Pressure circulation			
Specified engine oil (API grade)	CC or CD		CD	
Oil pressure kg/cm²(psi/kPa)/rpm	Approximately 1.0 (14.2/98.1)/770 (SAE 10W-30 API CD grade) engine oil at an oil temperature of 80°C (176°F)			
Oil pump type	Gear	Trochoid		Gear
Oil filter type	Cartridge paper element			
*Bypass filter type	**Cartridge paper element			
Oil capacity lit(US/UK gal)	5.5 (1.5/1.2)			
Oil cooler type	Water cooled			
Cooling system				
Water pump type	Centrifugal			
Thermostat type	Wax pellet with jiggle valve			
Air cleaner type	Dry paper element			
Battery type/voltage x No. of units	N702/12 x 1	NX120-7/12 x 1 or NX200-10/12 x 1		
Alternator capacity V-A (Kw)	12 - 40 (480) or 12 - 50 (600)			
Starter motor output V-Kw	12 - 2.0 or 12 - 2.2			

*For E.G.R (Exhaust Gas Recircuration) system equipped models only.
**Built-in to the oil filter element.

Note:

Engine Application Chart

	Vehicle Model	Transmission Model	Clutch Model
4JA1	KBD 4 × 2	MSG	Hydraulic
4JB1, 4JB1T, 4JB1TC	UBS	MUA	

0200

TORQUE SPECIFICATIONS

0201

STANDARD BOLTS

The torque values given in the following table should be applied where a particular torque is not specified.

kg·m(lb.ft/N.m)

Bolt identification / Material / Bolt diameter x pitch (mm)			
	4 T (Low carbon steel)	7 T (High carbon steel)	9 T (Alloy steel)
M 6 x 1.0	0.60±0.20 (4.33±1.44/5.88±1.96)	0.75±0.25 (5.43±1.80/7.35±2.45)	—
M 8 x 1.25	1.30±0.50 (9.40±3.62/12.74±4.90)	1.75±0.55 (12.66±4.00/17.15±5.39)	2.40±0.70 (17.36±5.06/23.52±6.86)
M10 x 1.25	2.80±0.70 (20.25±5.06/27.44±6.86)	3.75±0.95 (27.12±6.87/36.75±9.31)	5.10±1.30 (36.89±9.40/49.98±12.74)
M12 x 1.25	6.25±1.25 (45.21±9.04/61.25±12.25)	7.75±1.55 (56.06±11.21/75.95±15.19)	9.65±1.95 (69.80±14.10/94.57±19.11)
M14 x 1.5	9.75±1.95 (70.52±14.10/95.55±19.11)	11.85±2.35 (85.71±17.00/116.13±23.03)	14.50±2.90 (104.88±21.00/142.10±28.42)
M16 x 1.5	13.30±2.70 (96.20±19.53/130.34±26.46)	17.30±3.50 (125.13±25.32/169.54±34.30)	20.40±4.10 (147.55±29.66/199.92±40.18)
M18 x 1.5	19.20±3.80 (138.87±27.49/188.16±37.24)	24.90±5.00 (180.10±36.17/244.02±49.00)	29.30±5.90 (211.93±42.67/287.14±57.82)
M20 x 1.5	26.30±5.30 (190.23±38.33/257.74±51.94)	34.40±6.90 (248.82±49.41/337.12±67.62)	40.40±8.10 (292.21±58.59/395.92±79.38)
M22 x 1.5	33.90±8.30 (245.20±60.03/332.22±81.34)	46.25±9.25 (334.53±66.91/453.25±90.65)	54.10±10.80 (391.30±78.12/530.18±105.84)
M24 x 2.0	45.80±9.20 (331.27±66.54/448.84±90.16)	58.20±14.30 (420.96±103.43/570.36±140.14)	70.60±14.10 (510.65±101.99/691.88±138.18)
*M10 x 1.5	2.70±0.70 (19.53±5.06/26.46±6.86)	3.70±0.90 (26.76±6.50/36.26±8.82)	4.90±1.20 (35.44±8.68/48.02±11.76)
*M12 x 1.5	5.80±1.20 (41.95±8.68/56.84±11.76)	7.20±1.40 (52.08±10.13/70.56±13.72)	9.10±1.80 (65.82±13.02/89.18±17.64)
*M14 x 2.0	9.10±1.80 (65.82±13.02/89.18±17.64)	11.20±2.20 (81.01±15.91/109.76±21.56)	13.60±2.70 (98.37±19.53/133.28±26.46)
*M16 x 2.0	12.70±2.50 (91.86±18.08/124.46±24.50)	16.50±3.30 (119.34±23.87/161.70±32.34)	19.50±3.90 (141.04±28.21/191.10±38.22)

Note:

The asterisk * indicates that the bolts are used for female-threaded parts that are made of soft materials such as casting.

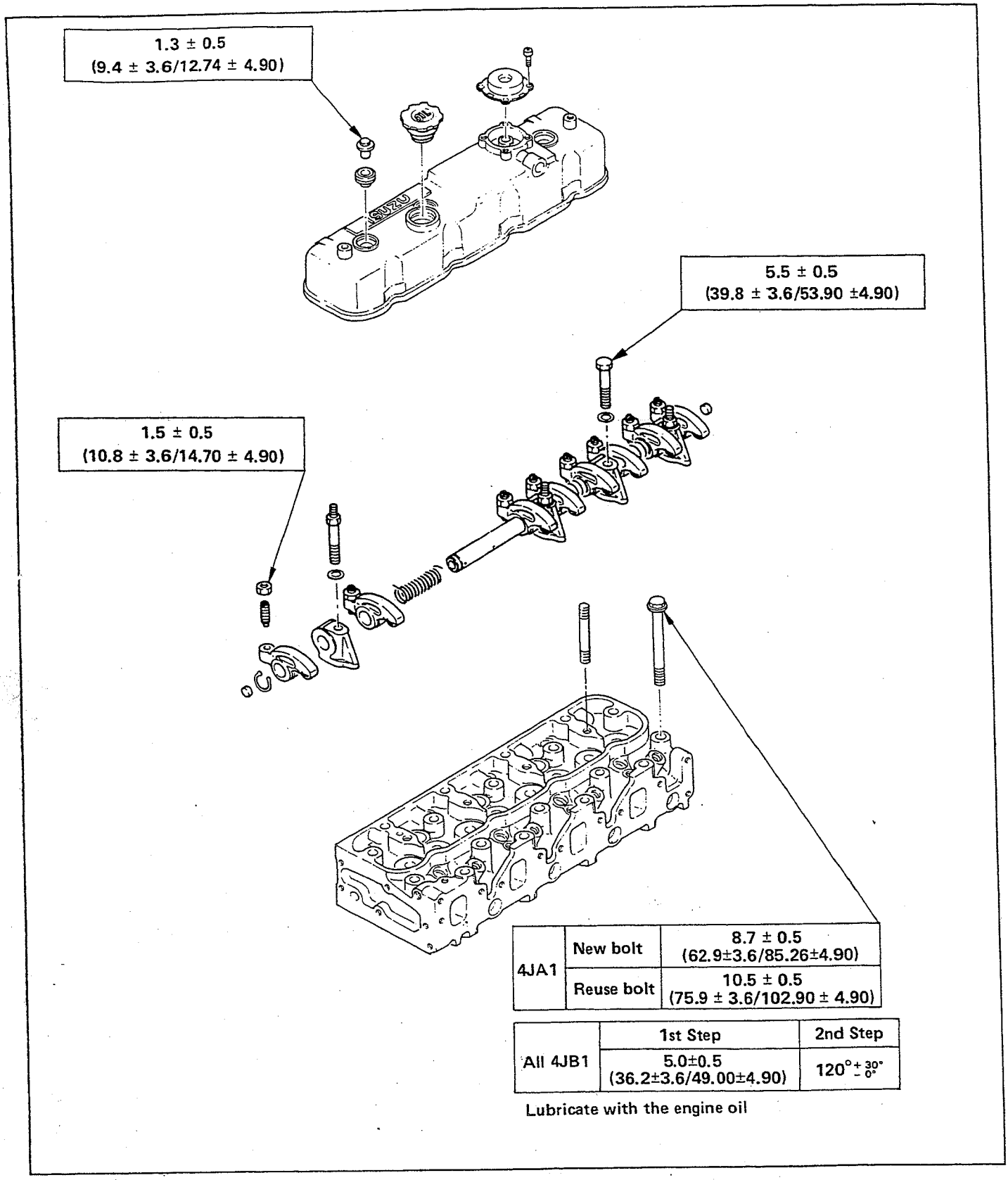
0204

SPECIAL PARTS FIXING NUTS AND BOLTS

020401

Cylinder Head Cover, Cylinder Head, and Rocker Arm Shaft Bracket

kg·m(lb.ft/N·m)



4JA1	New bolt	8.7 ± 0.5 (62.9±3.6/85.26±4.90)
	Reuse bolt	10.5 ± 0.5 (75.9 ± 3.6/102.90 ± 4.90)

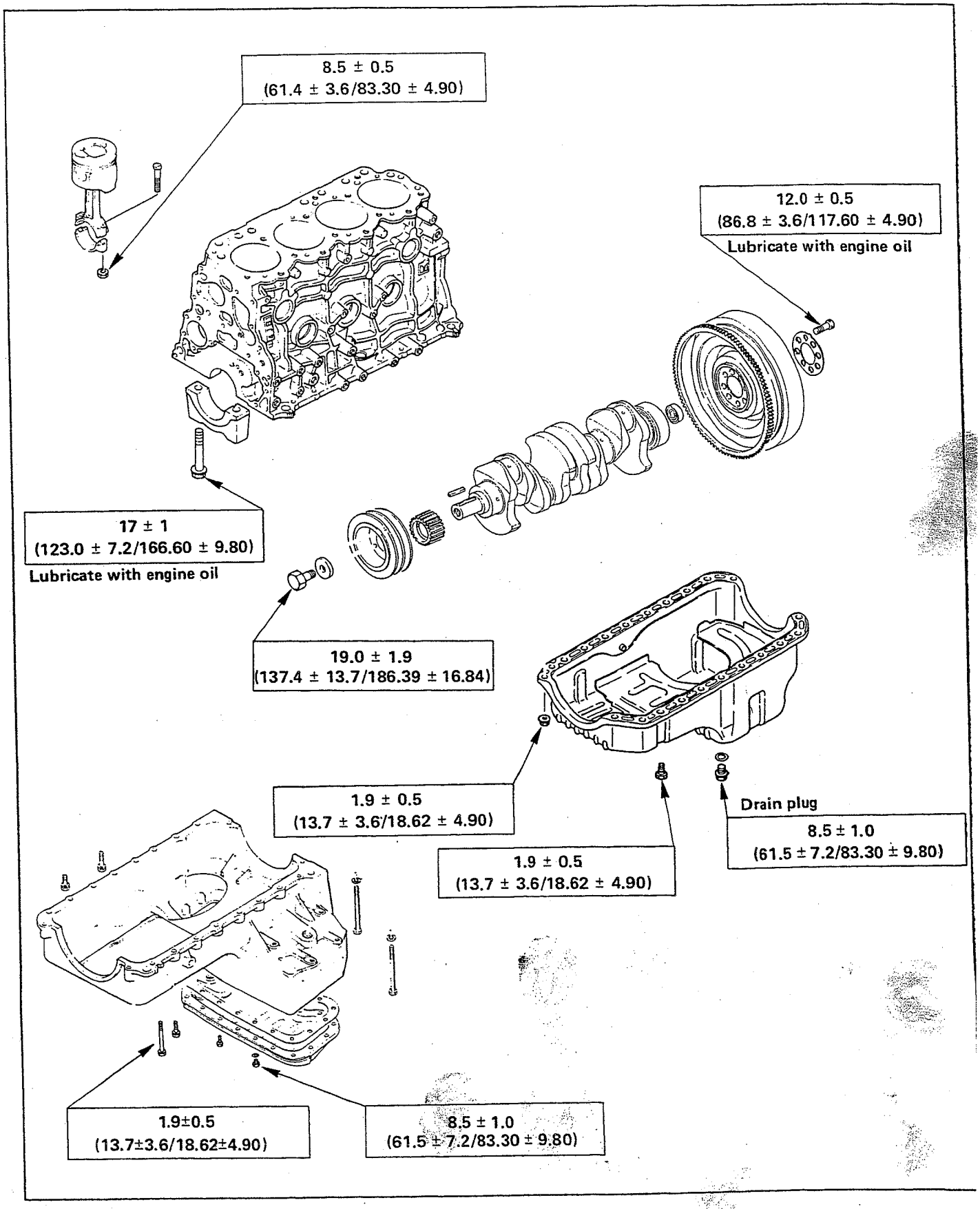
	1st Step	2nd Step
All 4JB1	5.0±0.5 (36.2±3.6/49.00±4.90)	$120^{\circ}{}^{+30^{\circ}}_{-0^{\circ}}$

Lubricate with the engine oil

020402

Crankshaft Bearing Cap, Connecting Rod Bearing Cap, Crankshaft Damper Pulley, Flywheel, and Oil Pan

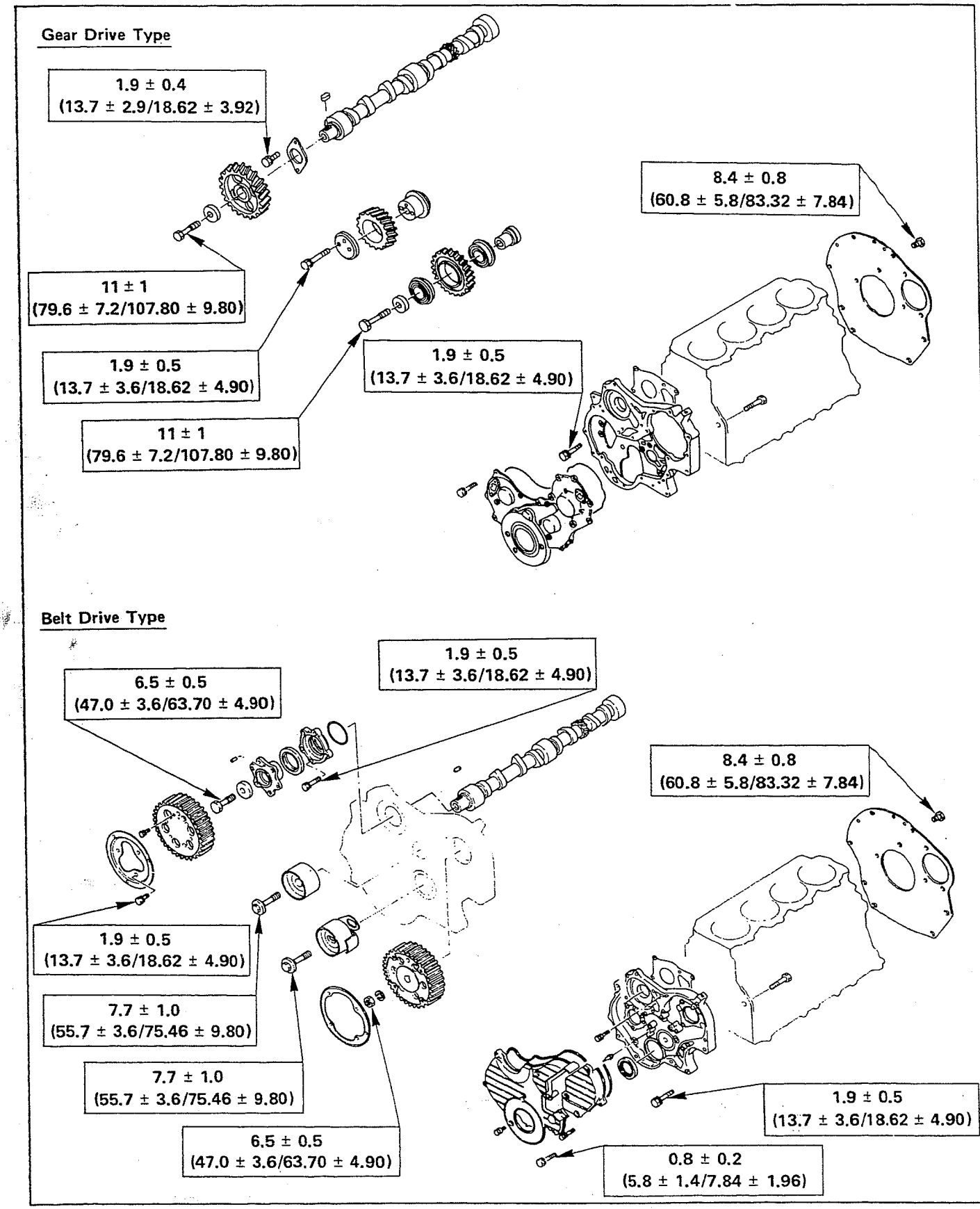
kg·m(lb.ft/N·m)



02040301

Timing Gear Case, Pulley Housing, Timing Gear, Timing Pulley, and Camshaft

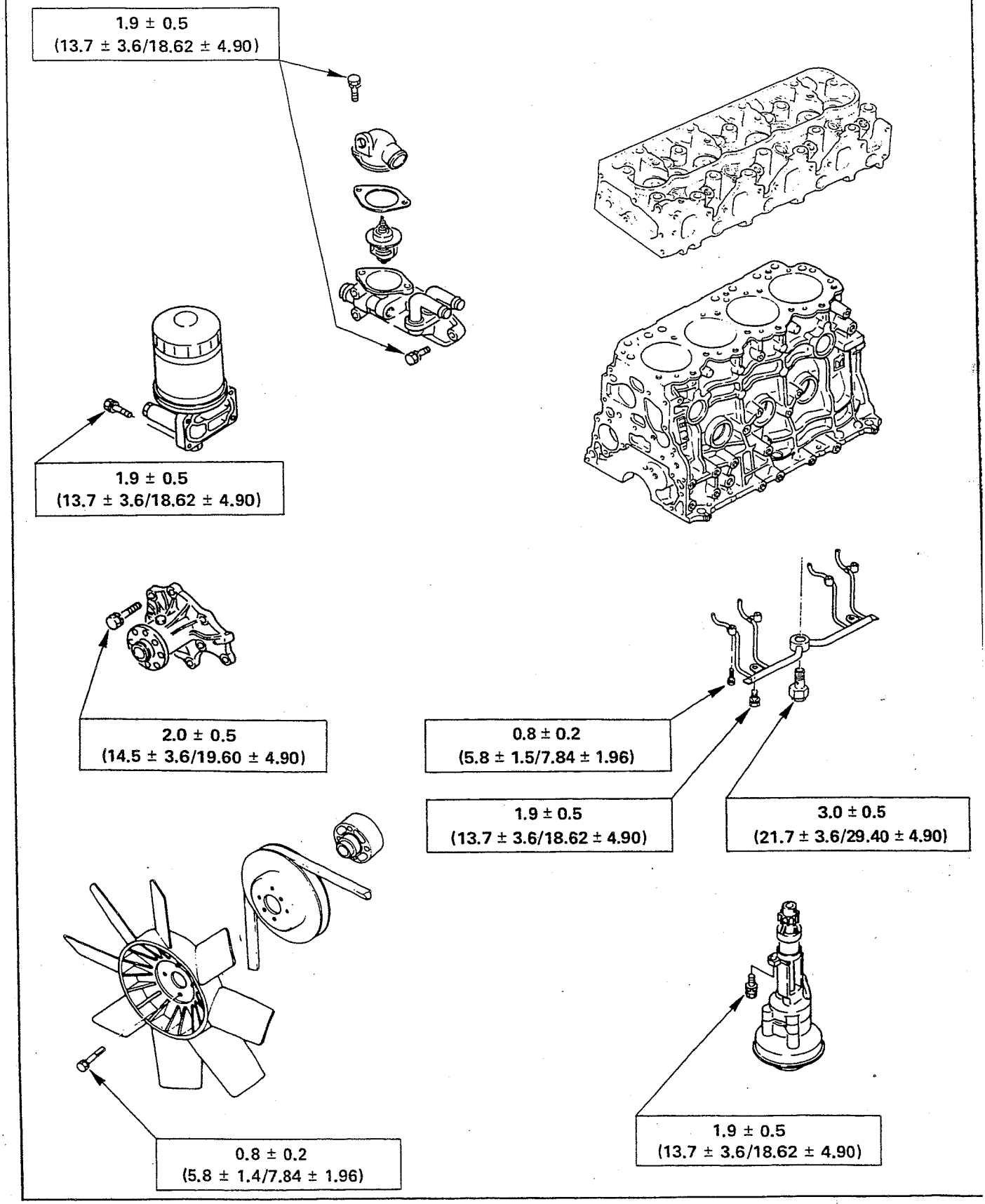
kg·m(lb.ft/N·m)



020404

Cooling and Lubricating System

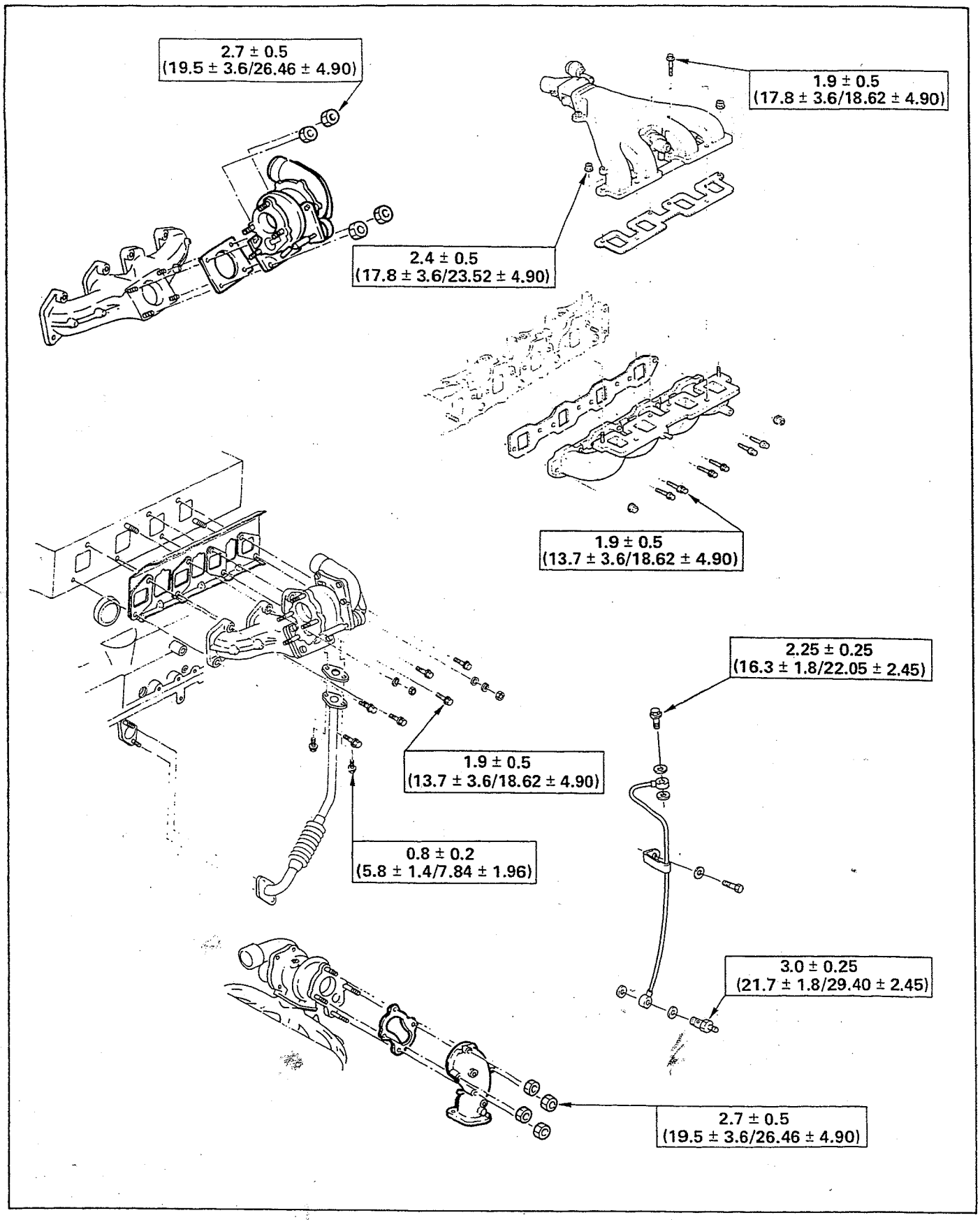
kg·m(lb.ft/N·m)



020405

Intake Manifold, Exhaust Manifold, and Turbocharger

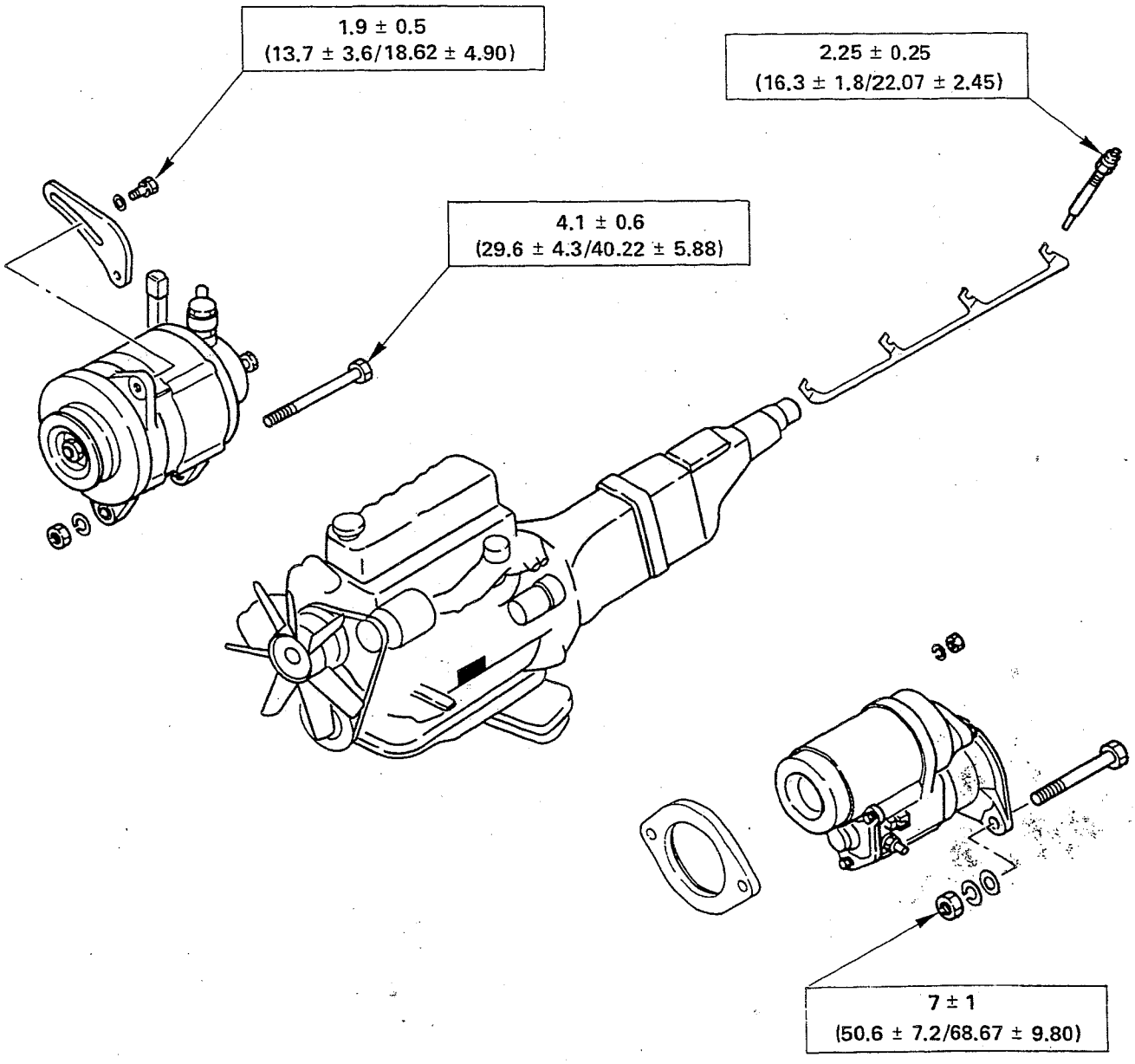
kg·m(lb.ft/N·m)



020407

Engine Electrical

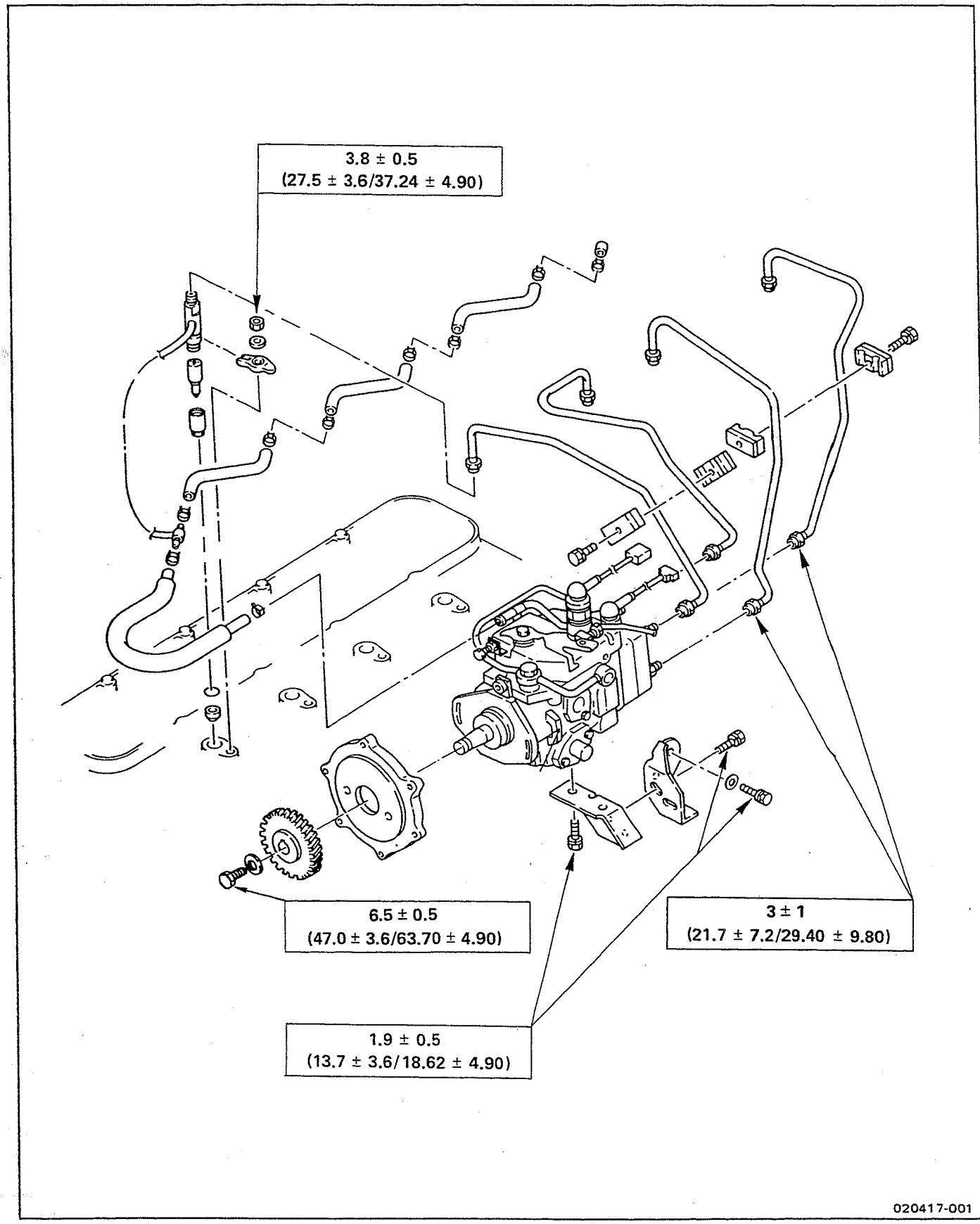
kg·m(lb.ft/N·m)



020408

Fuel Injection System

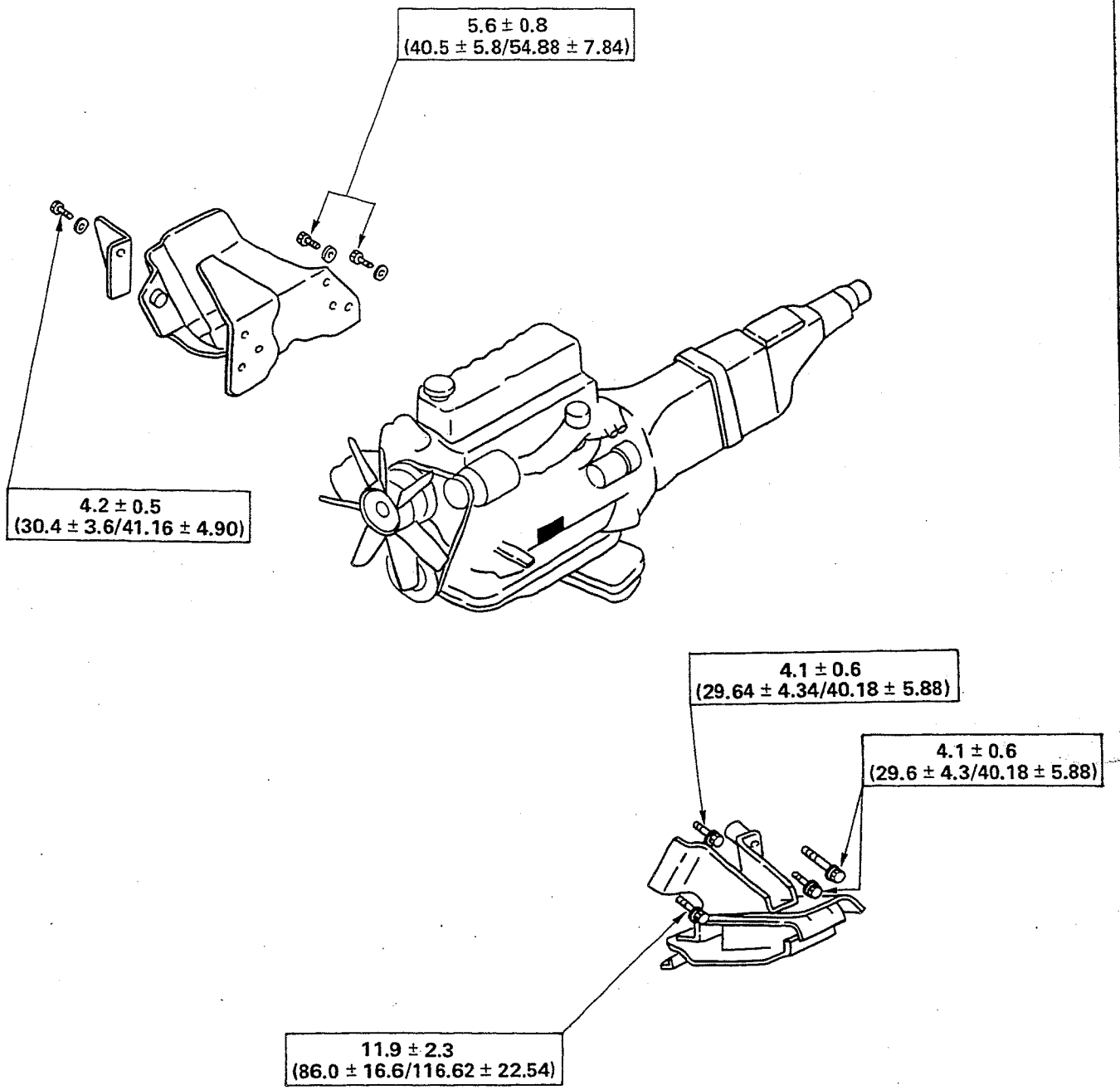
kg·m(lb.ft/N·m)



020410

Engine Mounting Bracket

kg·m(lb.ft/N·m)



1700

RECOMMENDED LIQUID GASKET

Type	Brand Name	Manufacturer	Remarks
RTV* Silicon Base	ThreeBond 1207B ThreeBond 1207C	Three Bond Three Bond	
Water Base	ThreeBond 1141E	Three Bond	
Solvent	ThreeBond 1104 BelcoBond 4 BelcoBond 401 BelcoBond 402	Three Bond Isuzu Isuzu Isuzu	
Anerobic	LOCTITE 515 LOCTITE 518	Loctite Loctite	Recommended for transaxle repairs

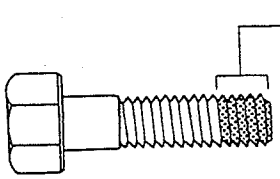
* RTV : Room Temperature Vulcanizer

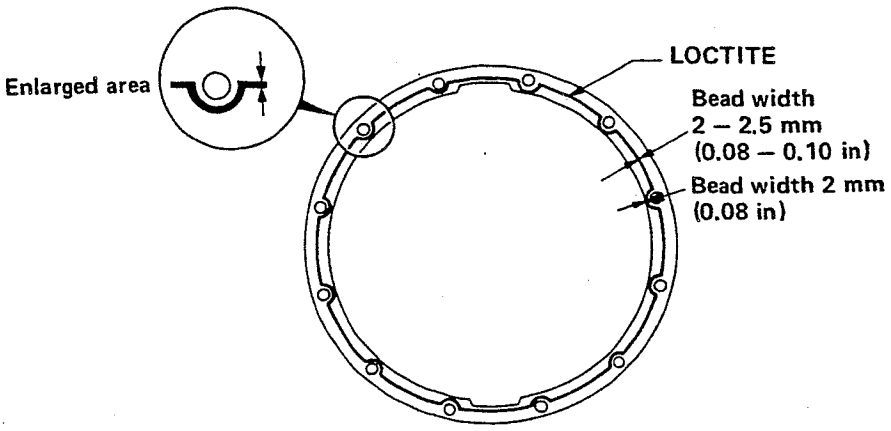
Note:

1. **It is very important that the liquid gaskets listed above or their exact equivalent be used on the vehicle.**
2. **Be careful to use the specified amount of liquid gasket.**
   Follow the manufacturer's instructions at all times.
3. **Be absolutely sure to remove all lubricants and moisture from the connecting surfaces before applying the liquid gasket.**
   The connecting surfaces must be perfectly dry.
4. **LOCTITE 515 and LOCTITE 518 harden upon contact with a metal surface.**
   Do not apply LOCTITE 515 or LOCTITE 518 between two metal surfaces having a clearance of greater than 0.25 mm (0.01 in). Poor adhesion will result.

1600

LOCTITE APPLICATION PROCEDURE

<table>
<tr><th>LOCTITE Type</th><th>LOCTITE Color</th><th>Application Steps</th></tr>
<tr><td>LOCTITE 242</td><td>Blue</td><td rowspan="3">1. Completely remove all lubricant and moisture from the bolts and the female threaded surfaces of the parts to be joined.
The surfaces must be perfectly dry.
2. Apply LOCTITE to the bolts.
 

3. Tighten the bolts to the specified torque.
4. Wait at least one hour before continuing the installation procedure.</td></tr>
<tr><td>LOCTITE 262</td><td>Red</td></tr>
<tr><td>LOCTITE 270</td><td>Green</td></tr>
<tr><td>LOCTITE 271</td><td>Red</td><td rowspan="2">1. Completely remove lubricant and moisture from the connecting surfaces.
The surfaces must be perfectly dry.
2. Apply a 2.0 — 2.5 mm bead of LOCTITE to one of the connecting surfaces.
There must be no gaps in the bead.
 

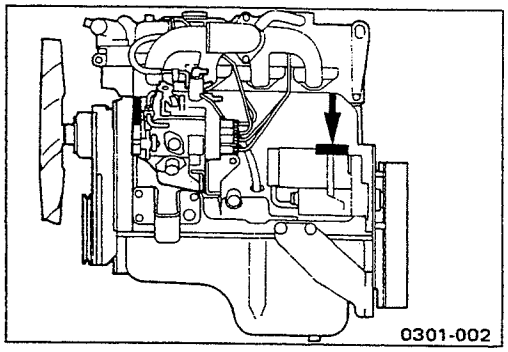
3. Tighten the bolts to the specified torque.
4. Let the joined parts set for at least thirty minutes.</td></tr>
<tr><td>LOCTITE 515</td><td>Violet</td></tr>
</table>

0300

SERVICING

Servicing refers to general maintenance procedures to be performed by qualified service personnel.

0301, 030101

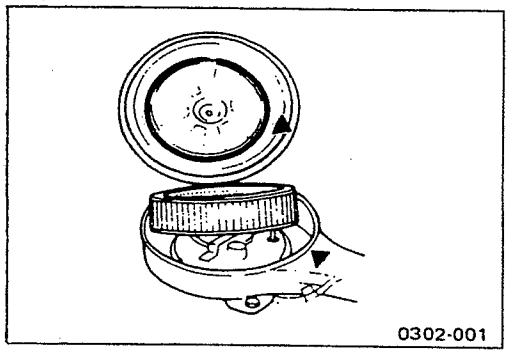


MODEL IDENTIFICATION

Engine Serial Number

The engine number is stamped on the front left hand side of the cylinder body.

0302, 030201



AIR CLEANER

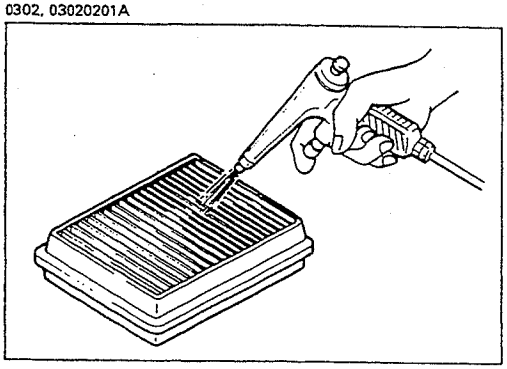
Oil Wetted (Viscous) Type Paper Element (For KB)

The air cleaner has an oil wetted paper element. No servicing is required until the replacement interval is reached.

Never attempt to clean the element, no matter how dirty it may appear. The element is designed to provide normal filtering efficiency until it becomes due for replacement.

Refer to the Item "Service and Maintenance" in the Owner's and Driver's Manual for general service information.

0302, 03020201A



Dry Type Washable Paper Element (For KB)

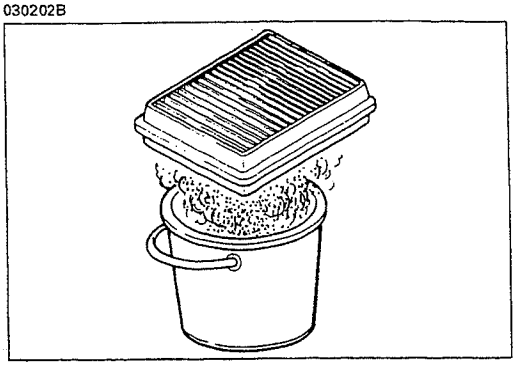
Element cleaning procedures will vary according to the condition of the element.

Dust Fouled Element

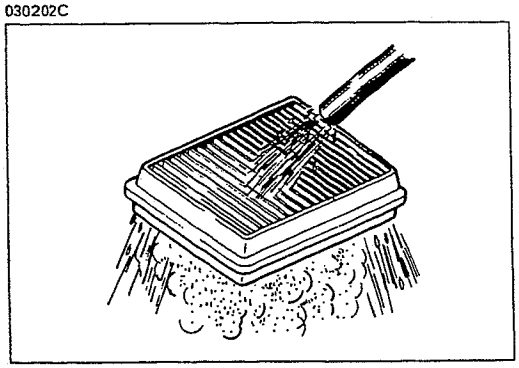
Rotate the element with your hand while applying compressed air to the inside of the element. This will blow the dust free.

Compressed air pressure must not exceed 7 kg/cm^2 (99.6 psi/686 kPa).

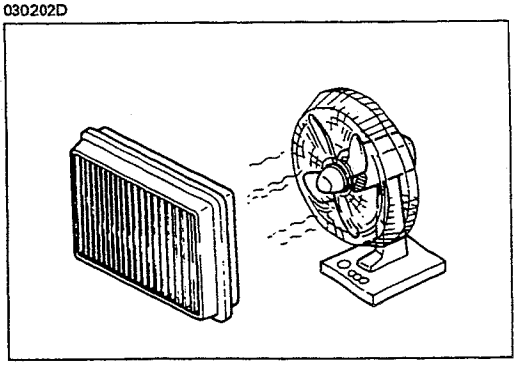
030202B



030202C



030202D



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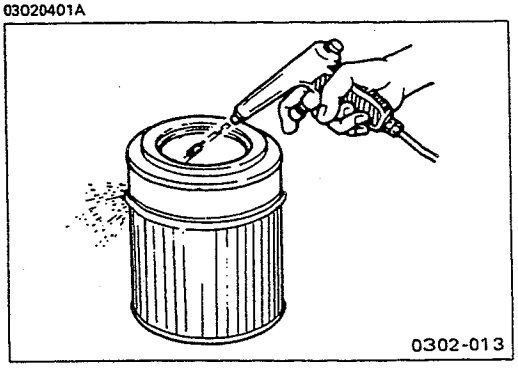

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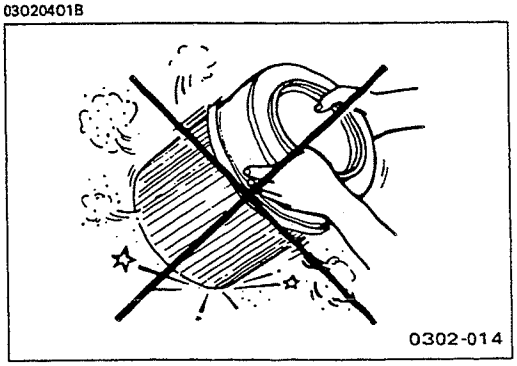


Carbon and Dust Fouled Element

1. Prepare a cleaning solution of Isuzu Genuine Element Cleaner (Donaldson D1400) diluted with water.
2. Submerge the element in the solution for twenty minutes.
3. Remove the element from the solution and rinse it well with running water.

   Water pressure must not exceed 2.8 kg/cm² (39.8 psi/274 kPa).
4. Dry the element in a well ventilated area.

   An electric fan will hasten drying.

Note:

Do not use compressed air or an open flame to dry the element quickly. Damage to the element will result.

It will usually take two or three days for the element to dry completely. Therefore, it is a good idea to have a spare on hand to use in the interim.

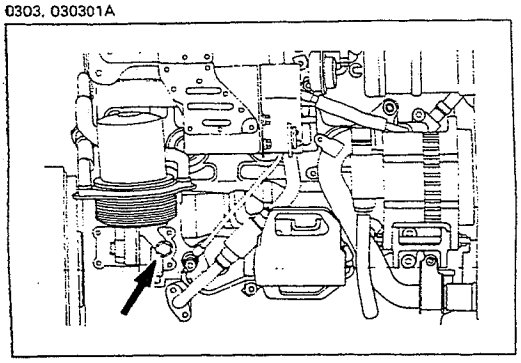
Dry Type Paper Element (For UBS)

Apply compressed air to the inside of the element as you rotate it with your hand. This will blow the dust free.

Compressed Air Pressure	kg/cm²(psi/kPa)
4 — 5 (56.9 — 71.1/392.26 — 490.33)	

Do not bang the element against another object in an attempt to clean it. Damage to the element will result.

0303, 030301A



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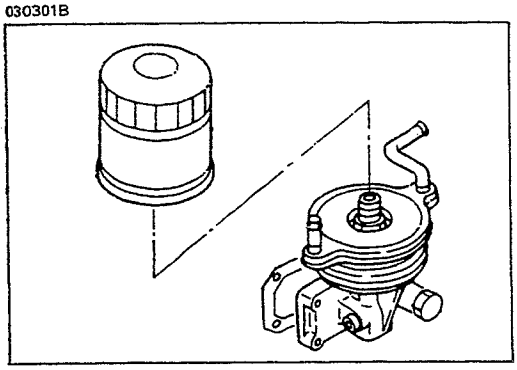
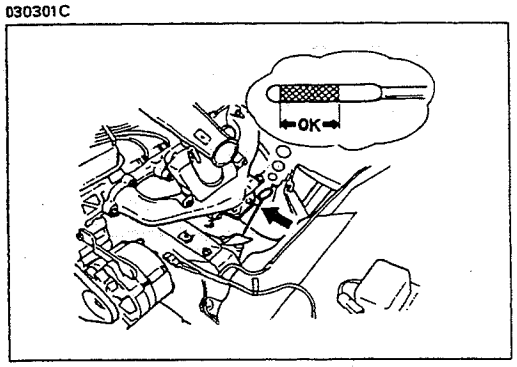


030301C



LUBRICATING SYSTEM

Main Oil Filter (Cartridge Type Paper Element)

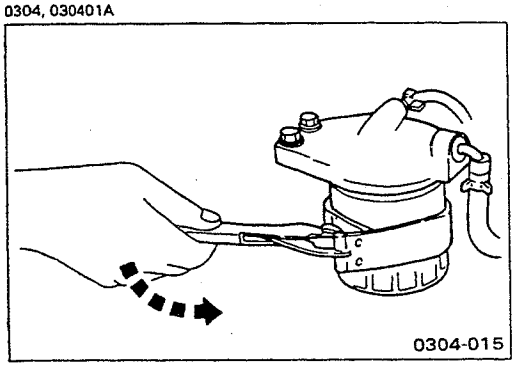
Replacement Procedure

1. Loosen the drain plug to drain the engine oil.
2. Wait a few minutes and then retighten the drain plug.
3. Loosen the used oil filter by turning it counterclockwise with the filter wrench.
4. Clean the oil cooler fitting face.
   This will allow the new oil filter to seat properly.
5. Apply a light coat of engine oil to the O-ring.
6. Turn in the new oil filter until the filter O-ring is fitted against the sealing face.
7. Use the filter wrench to turn in the filter an additional 1 and 1/4 turns.
   Filter Wrench: 5-8840-0200-0 (For 4JB1)
   5-8840-0201-0 (For 4JA1)
8. Check the engine oil level and replenish to the specified level if required.

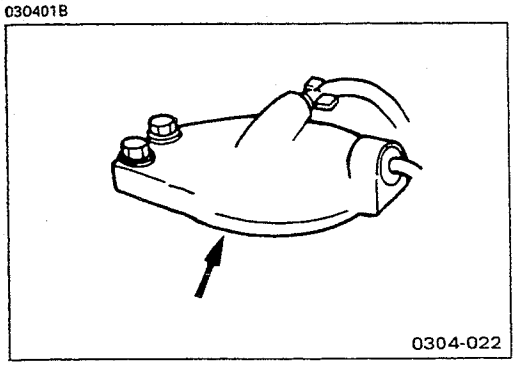
Replenished Engine Oil	lit(US/UK gal)
	0.7 (0.19/0.15)

9. Start the engine and check for oil leakage from the main oil filter.

0304, 030401A



030401B



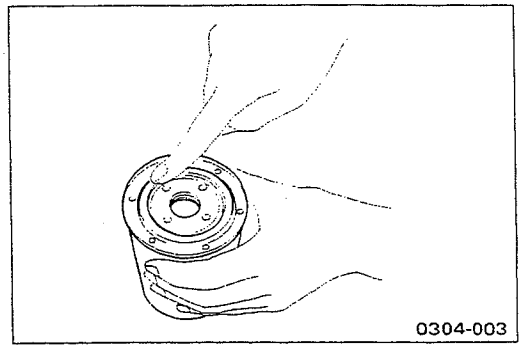
FUEL SYSTEM

Fuel Filter

Replacement Procedure

1. Loosen the used fuel filter by turning it counterclockwise with the filter wrench.
   Filter Wrench: 5-8840-0253-0 (J-22700)
2. Clean the upper cover fitting face.
   This will allow the new fuel filter to seat properly.

030401C

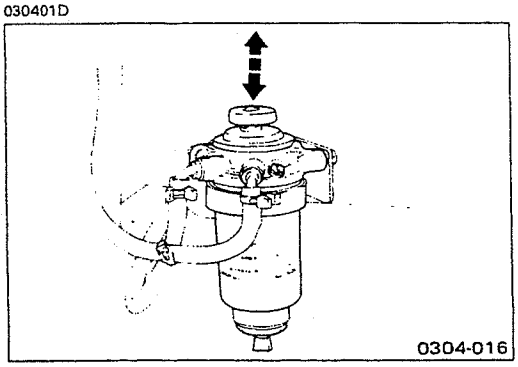


3. Apply a light coat of engine oil to the O-ring.
4. Supply fuel to the new fuel filter to facilitate bleeding.
5. Turn in the new fuel filter until the filter O-ring is fitted against the sealing face.

   Be very careful to avoid fuel spillage.
6. Use the filter wrench to turn in the fuel filter an additional 1/3 to 2/3 of a turn.

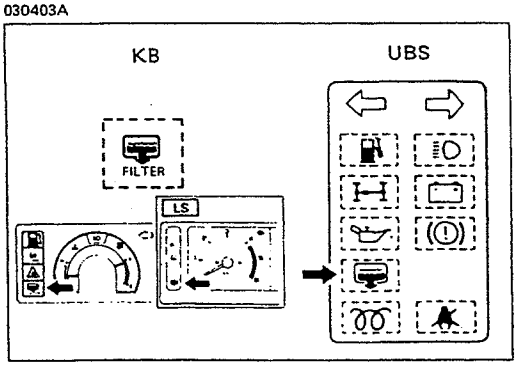
   Filter Wrench: 5-8840-0253-0 (J-22700)

030401D



7. Loosen the bleeder screw on the injection pump overflow valve.
8. Operate the priming pump until fuel flows out of the bleeder screw.
9. Retighten the bleeder screw.
10. Operate the priming pump several times while checking for fuel leakage.

030403A

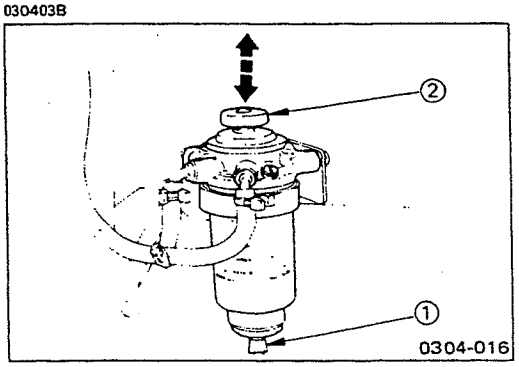


Water Separator (Water Sedimentor)

The indicator light will come on when the water level in the water separator exceeds the specified level.

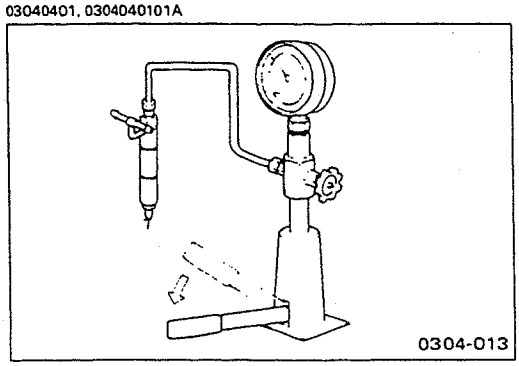
Drain the water and foreign material from the water separator with the following procedure.

030403B



1. Place the end of the vinyl hose (beneath the drain plug) in a container.
2. Loosen the drain plug ①.
3. Operate the priming pump ② several times to drain the water.
4. After draining the water, tighten the drain plug ①.
5. Operate the priming pump several times and check for fuel leakage.
6. Check the water separator indicator light. It should be off.

03040401, 0304040101A



Injection Nozzle (Single spring type)

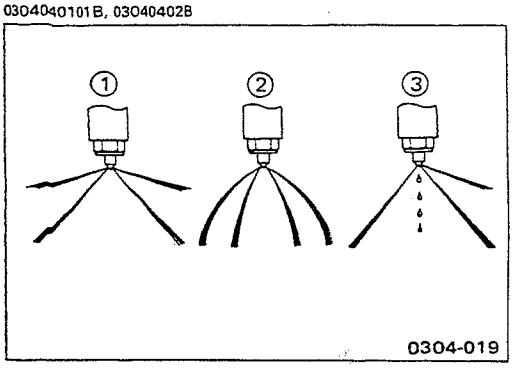
Injection Nozzle Inspection

Use a nozzle tester to check the injection nozzle opening pressure and the spray condition.

If the opening pressure is above or below the specified value, the injection nozzle must be replaced or adjusted.

Injection Nozzle Opening Pressure	kg/cm²(psi/kPa
185 (2,631/18,130)	

0304040101B, 03040402B

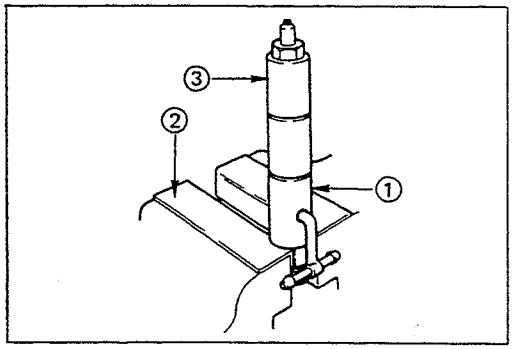


If the spray condition is bad, the injection nozzle must be replaced or repaired.

Spray Condition

① Correct
② Incorrect (Restrictions in orifice)
③ Incorrect (Dripping)

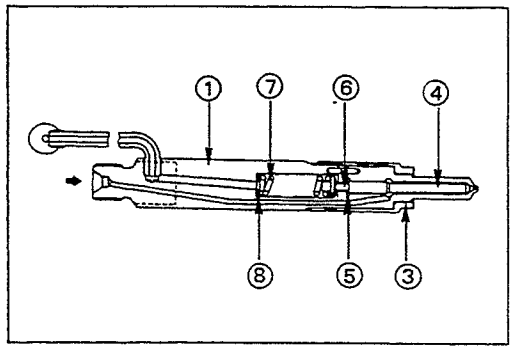
0304040001A



Injection Nozzle Adjustment

1. Clamp the injection nozzle holder ① in a vise ②.
2. Use a wrench to remove the injection nozzle retaining nut ③.

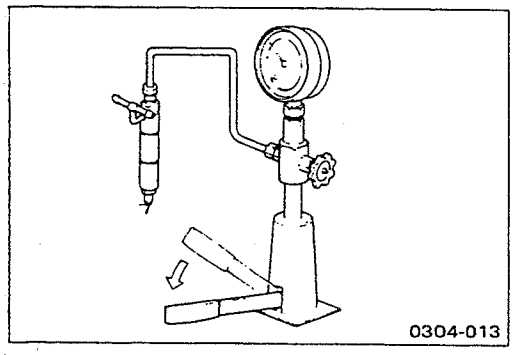
03040401B



3. Remove the injection nozzle holder from the vise.
4. Remove the injection nozzle ④, the spacer ⑤, the spring seat ⑥, the spring ⑦ and the adjusting shim ⑧.
5. Install the new adjusting shim, the spring, the spring seat, the spacer, the injection nozzle, and the retaining nut.
6. Clamp the injection nozzle holder in the vise.
7. Tighten the injection nozzle holder retaining nut to the specified torque.

Injection Nozzle Holder Retaining Nut Torque	kg·m(lb.ft/N·m)
4.5 ± 0.5 (32.5 ± 3.6/44.10 ± 4.90)	

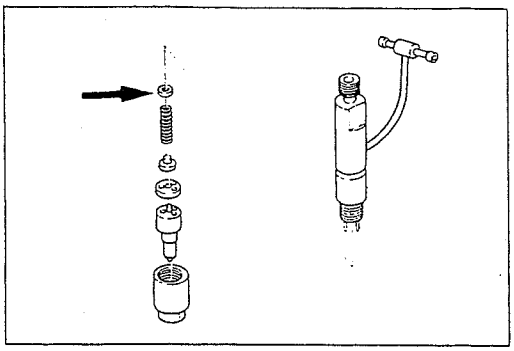
03040401D



8. Remove the injection nozzle holder from the vise.
9. Attach the injection nozzle holder to the injection nozzle tester.
10. Apply pressure to the nozzle tester to check that the injection nozzle opens at the specified pressure.

    If the injection nozzle does not open at the specified pressure, install or remove the appropriate number of adjusting shims to adjust it.

03040401E



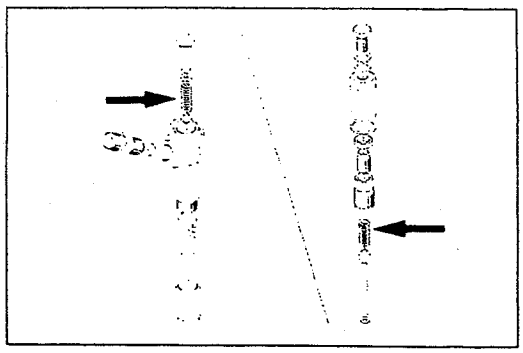
(Reference)
Removing or installing one shim will increase or decrease the nozzle opening pressure approximately 3.77 kg/cm² (53.6 psi/370 kPa).

Adjusting Shim Availability	mm(in)
Range	0.5 — 1.5 (0.02 — 0.06)
Increment	0.025 (0.001)
Total No. of Shims	41

WARNING:

TEST FLUID FROM THE INJECTION NOZZLE WILL SPRAY OUT UNDER GREAT PRESSURE. IT CAN EASILY PUNCTURE A PERSON'S SKIN. KEEP YOUR HANDS AWAY FROM THE INJECTION NOZZLE TESTER AT ALL TIMES.

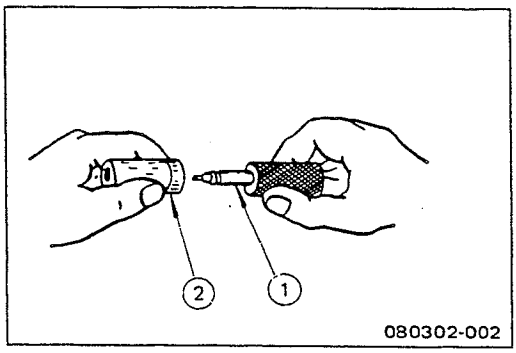
030406



Two Spring Type Injection Nozzle Adjustment

Refer to "Injection Nozzle Adjustment" in the "FUEL SYSTEM" of this manual.

08030202



Nozzle Lapping Procedure

1. Lap the nozzle needle ① and the nozzle body ② by applying a compound of oxidized chrome and animal oil.

Note:

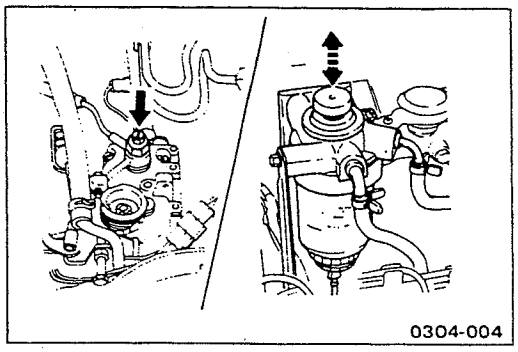
Do not apply an excessive amount of the oxidized chrome and animal oil compound to the injection needle valve seat area.

2. Carefully wash the needle valve and the nozzle body in clean diesel fuel after lapping.

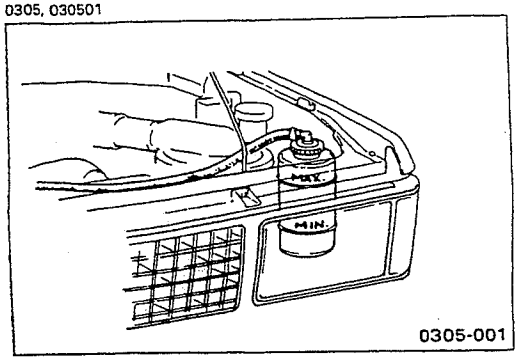
Air Bleeding

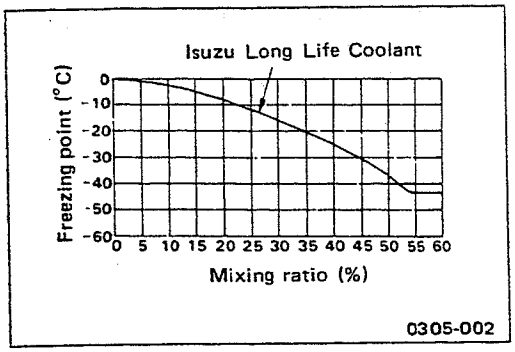
1. Loosen the bleeder screw on the injection pump overflow valve.
2. Operate the priming pump until fuel flows from the bleeder screw.
3. Tighten the bleeder screw.
4. Operate the priming pump several times and check for fuel leakage.

030404E

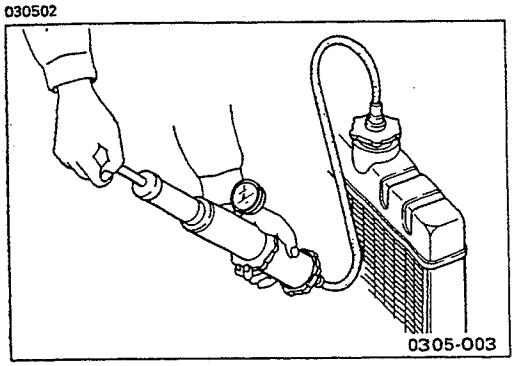


0305, 030501

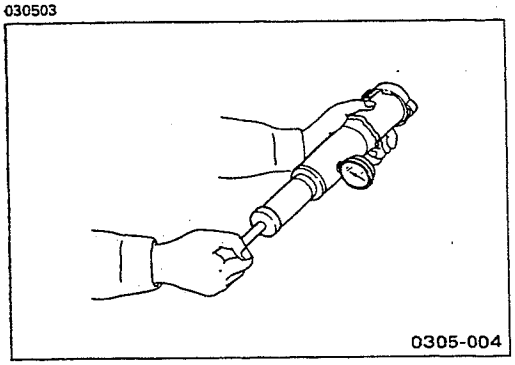




030502



030503



COOLING SYSTEM

Coolant Level

Check the coolant level and replenish the radiator reserve tank as necessary.

If the coolant level falls below the "MIN" line, carefully check the cooling system for leakage. Then add enough coolant to bring the level up to the "MAX" line.

Note:

Do not overfill the reserve tank.

Remove the radiator filler cap only when absolutely necessary.

Always check the coolant level when the engine is cold.

Always refer to the chart at the left to determine the correct cooling water to antifreeze solution mixing ratio.

Cooling System Inspection

Install a radiator filler cap tester to the radiator. Apply testing pressure to the cooling system to check for leakage. The testing pressure must not exceed the specified pressure.

Testing Pressure	kg/cm² (psi/kPa)
2 (28.45/196)	

Radiator Cap Inspection

The radiator filler cap is designed to maintain coolant pressure in the cooling system at 1.05 kg/cm² (15 psi/ 103 kPa).

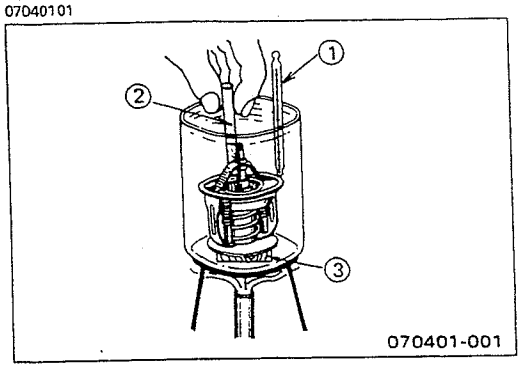
Check the radiator filler cap with a radiator filler cap tester. The radiator filler cap must be replaced if it fails to hold the specified pressure during the test procedure.

Radiator Filler Cap Pressure

Pressure Valve	kg/cm² (psi/kPa)
0.9 — 1.2 (12.8 — 17.1/88 — 118)	

Negative Valve (Reference)	kg/cm² (psi/kPa)
0.01 — 0.04 (0.14 — 0.57/1.0 — 3.9)	

07040101



Thermostat Operating Test

1. Completely submerge the thermostat in water.
2. Heat the water.
   Stir the water constantly to avoid direct heat being applied to the thermostat.
3. Check the thermostat initial opening temperature.

Thermostat Initial Opening Temperature	°C(°F)
Single Valve Type	82 (180)
Two Valve Type	Primary 85 (185)
	Secondary 88 (190)

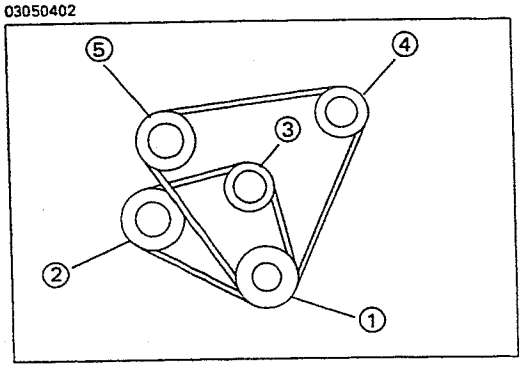
4. Check the thermostat full opening temperature.

Thermostat Full Opening Temperature	°C(°F)
Single Valve Type	95 (203)
Two Valve Type	100 (212)

Valve Lift at Fully Open Position	mm(in)
Single Valve Type	8 (0.31)
Two Valve Type	10 (0.39)

① Thermometer
② Agitating rod
③ Wooden piece

03050402



Drive Belt Adjustment

Check the drive belt tension.

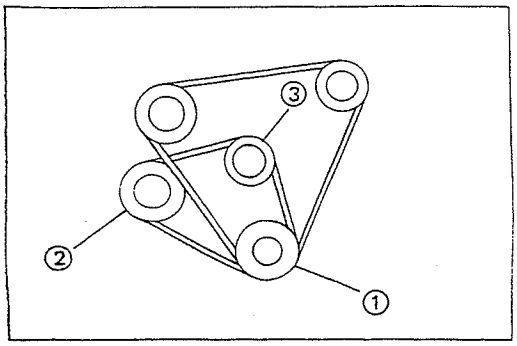
Depress the drive belt mid-portion with a 10 kg (22 lb/ 98 N) force.

Drive Belt Deflection	mm(in)
10 (0.39)	

Check the drive belt for cracking and other damage.

① Crankshaft damper pulley
② Alternator pulley
③ Cooling fan pulley
④ Oil pump pulley or idler pulley
⑤ Compressor pulley or idler pulley

030505



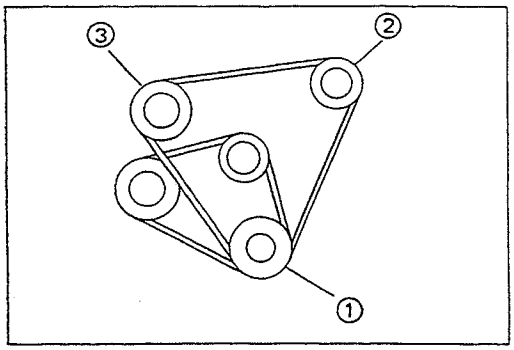
Cooling Fan Pulley Drive Belt

Fan belt tension is adjusted by moving the alternator.

Depress the drive belt mid-portion with a 10 kg (22 lb/ 98 N) force.

① Crankshaft damper pulley
② Alternator pulley
③ Cooling fan pulley

03050601



Compressor Pulley Drive Belt

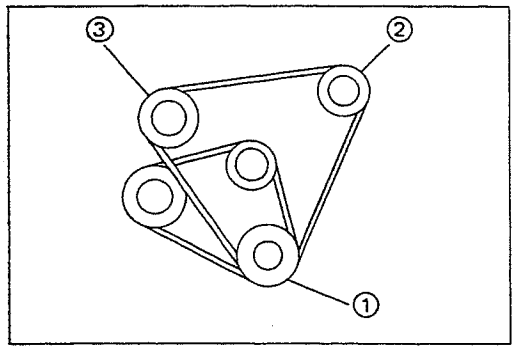
Move the idler pulley as required to adjust the compressor drive belt tension.

If the vehicle is equipped with power steering, move the oil pump as required.

Depress the drive belt mid-portion with a 10 kg (22 lb/ 98 N) force.

① Crankshaft damper pulley
② Oil pump pulley or idler pulley
③ Compressor pulley

03050701



Power Steering Oil Pump Pulley Drive Belt

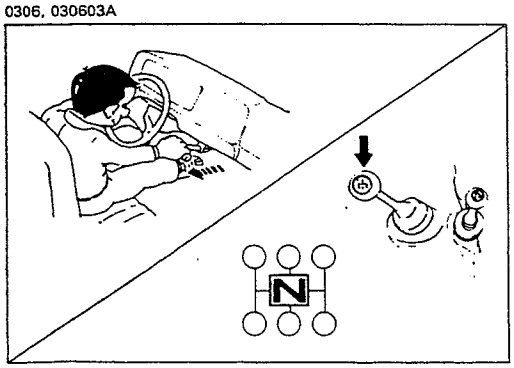
Move the oil pump as required to adjust the oil pump drive belt tension.

On air conditioner equipped models, both drive belts pulley must always be replaced as a set.

Depress the drive belt mid-portion with a 10 kg (22 lb/ 98 N) force.

① Crankshaft damper pulley
② Oil pump pulley
③ Compressor pulley or idler pulley

0306, 030603A

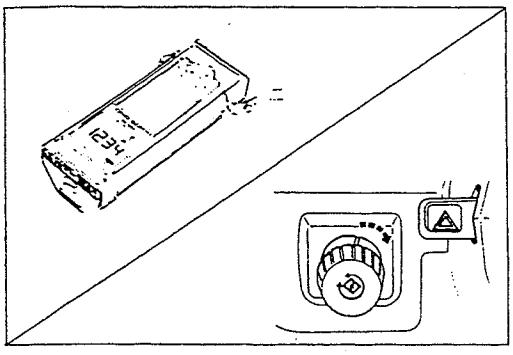


ENGINE CONTROL

Idling Speed Adjustment

1. Set the vehicle parking brake and chock the drive wheels.
2. Place the transmission in neutral.
3. Start the engine and allow it to warm up.

030603B

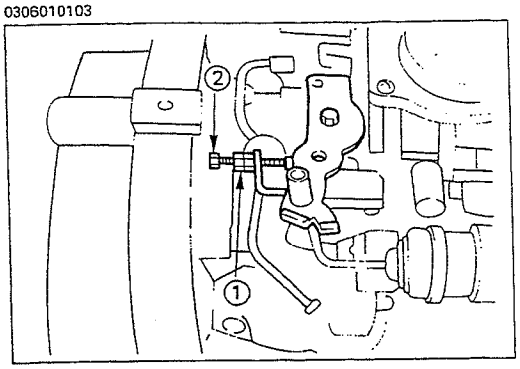


4. Disconnect the engine control cable from the control lever.
5. Set a tachometer to the engine.
6. Check the engine idling speed.

   If the engine idling speed is outside the specified range, it must be adjusted.

Engine Idling Speed	rpm
750 — 790	

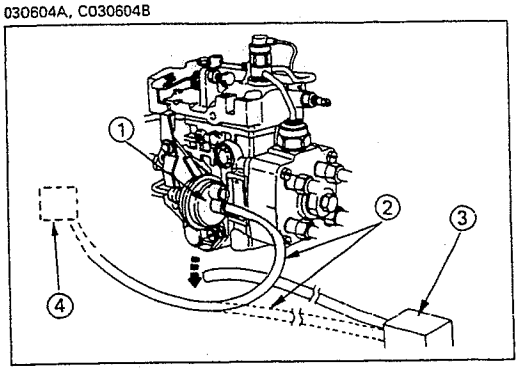
0306010103



Idling Speed Adjustment

1. Loosen the idling set screw lock nut ① on the injection pump idling set bolt.
2. Adjust the idling speed to the specified range by turning the idling set bolt ②.
3. Lock the idling set bolt with the idling set screw lock nut.
4. Check that the idling control cable is tight (free of slack). If required, remove the slack from the cable.

030604A, C030604B



Fast Idling Speed Inspection

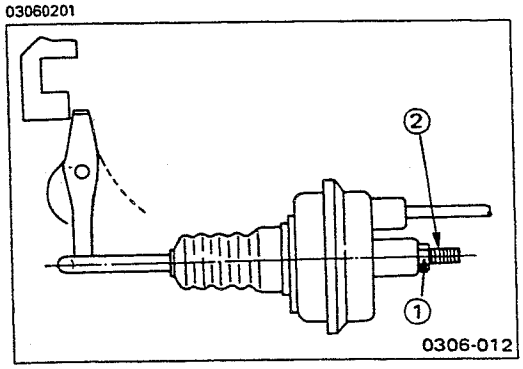
1. Set tachometer to the engine.
2. Disconnect the vacuum hose from the fast idle actuator ① on the injection pump.
3. Disconnect the other vacuum hose ② from the vacuum switching valve ③ and connect it to the fast idle actuator ①.

   The vacuum line will now be connected directly from the vacuum pump ④ to the fast idle acturator.
4. Check the engine fast idling speed.

   If the engine idling speed is outside the specified range, it must be adjusted.

Fast Idling Speed	rpm
850 — 950	

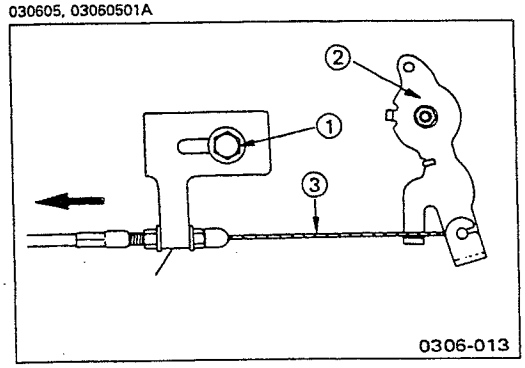
03060201



Fast Idling Speed Adjustment

1. Loosen the fast idle actuator lock nut ①.
2. Adjust the fast idling speed by turning the adjusting screw ②.
3. Tighten the lock nut ①.
4. Connect the vacuum hose to the fast idle actuator.
5. Connect the other vacuum hose to the vacuum switching valve.

030605, 03060501A

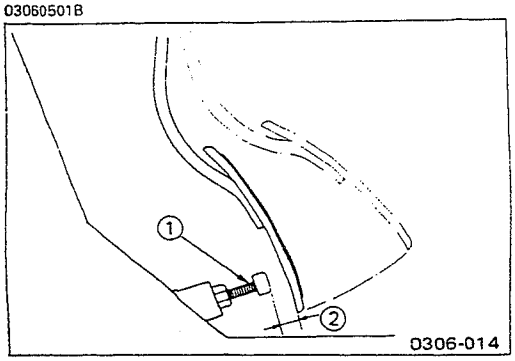


Accelerator Control

Accelerator Control Cable Adjustment

1. Loosen the accelerator cable clamp bolt ①.
2. Check that the idling control knob on the instrumen panel is in the engine idling position.
3. Hold the accelerator lever ② in the fully closed pos tion and stretch the control cable ③ in the directio indicated by the arrow to remove any slack.

03060501B

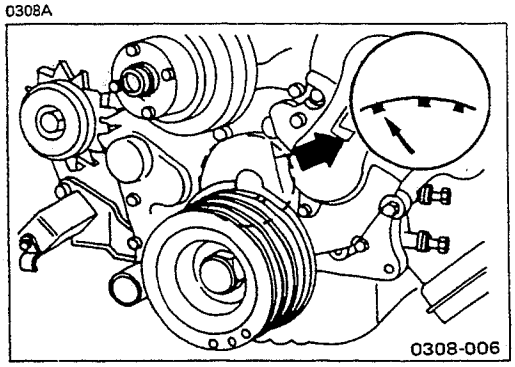


Accelerator Pedal Adjustment

1. Depress the accelerator pedal and hold it.
2. Use the stopper bolt ① to adjust the clearance between the stopper bolt end and the accelerator pedal lower face ②.

Accelerator and Stopper Bolt Clearance	mm(in)
2 — 5 (0.08 — 0.20)	

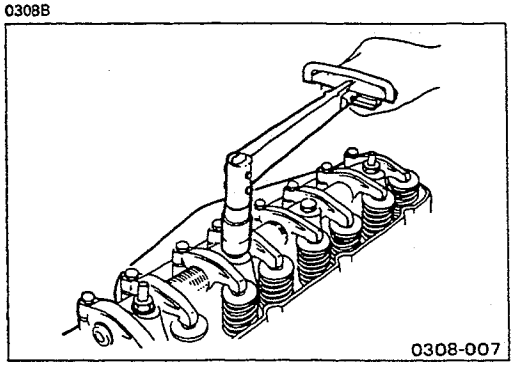
0308A



VALVE CLEARANCE ADJUSTMENT

1. Bring the piston in either the No. 1 cylinder or the No. 4 cylinder to TDC on the compression stroke by turning the crankshaft until the crankshaft damper pulley TDC line is aligned with the timing pointer.

0308B

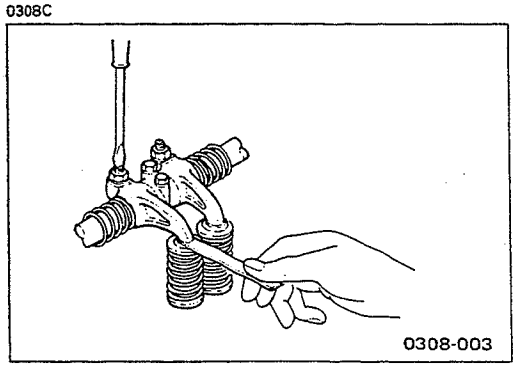


2. Check the rocker arm shaft bracket nuts for looseness.

   Tighten any loose rocker arm shaft bracket nuts before adjusting the valve clearance.

Rocker Arm Shaft Bracket Nut Torque	kg·m(lb.ft/N·m)
5.5 ± 0.5 (39.8 ± 3.6/53.90 ± 4.90)	

0308C

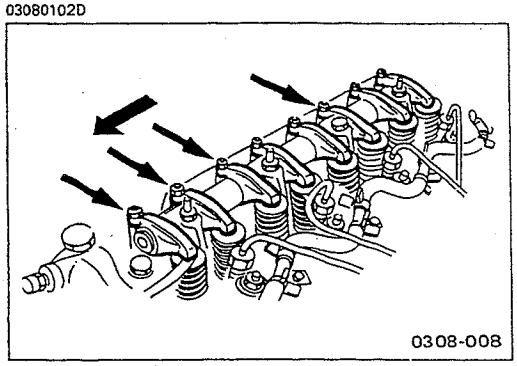


3. Check for play in the No. 1 intake and exhaust valve push rods.

   If the No. 1 cylinder intake and exhaust valve push rods have play, the No. 1 piston is at TDC on the compression stroke.

   If the No. 1 cylinder intake and exhaust valve push rods are depressed, the No. 4 piston is at TDC on the compression stroke.

03080102D

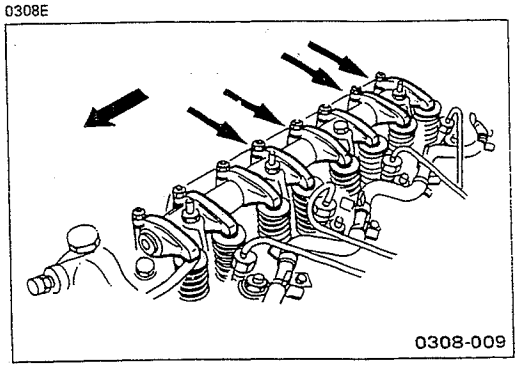


Adjust the No. 1 or the No. 4 cylinder valve clearances while their respective cylinders are at TDC on the compression stroke.

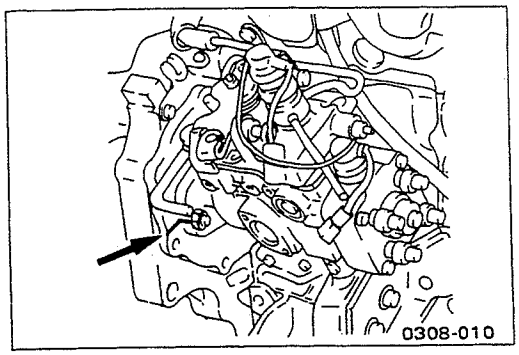
Valve Clearance (At Cold)	mm(in)
0.4 (0.016)	

4. Loosen each valve clearance adjusting screw as shown in the illustration.
5. Insert a feeler gauge of the appropriate thickness between the rocker arm and the valve stem end.

0308E

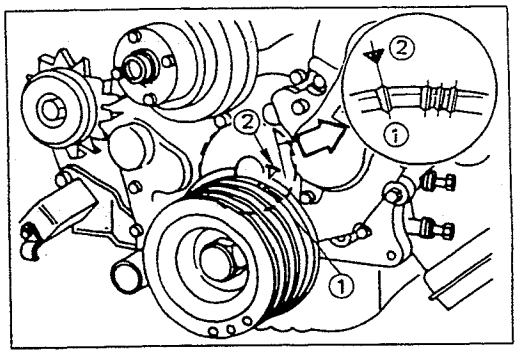


6. Turn the valve clearance adjusting screw until a slight drag can be felt on the feeler gauge.
7. Tighten the lock nut securely.
8. Rotate the crankshaft 360°.
9. Realign the crankshaft damper pulley TDC notched line with the timing pointer.
10. Adjust the clearances for the remaining valves as shown in the illustration.



INJECTION TIMING ADJUSTMENT

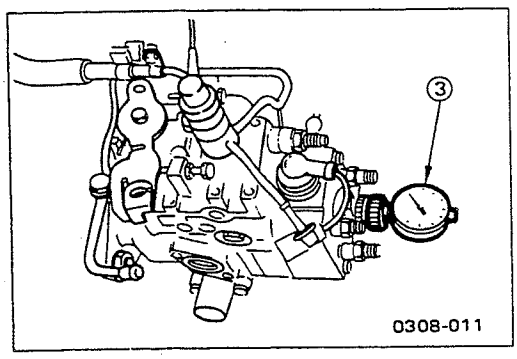
1. Check that the notched line on the injection pump flange is aligned with the front plate or the timing pulley housing or timing gear case notched line.



2. Bring the position in the No. 1 cylinder to TDC on the compression stroke by turning the crankshaft until the crankshaft pulley TDC line ① is aligned with the timing mark ②.

Note:

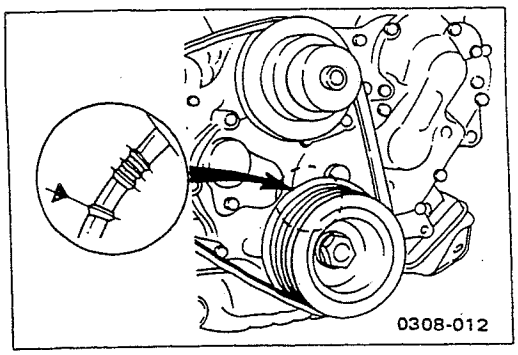
Check for play in the No. 1 intake and exhaust valve push rods.
If the No. 1 cylinder intake and exhaust valve push rods have play, the No. 1 piston is at TDC on the compression stroke.



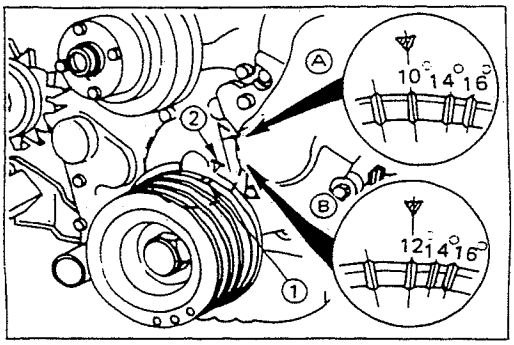
3. Disconnect the injection pipe from the injection pump.
4. Remove one bolt from the distributor head.
5. Install the static timing gauge ③.

   The probe of the gauge should be depressed inward approximately 1 mm (0.039 in).

   Static Timing Gauge: 5-8840-0145-0 (J-28827)



6. Rotate the crankshaft to bring the piston in the No. 1 cylinder to a point 30 — 40° BTDC.
7. Set the timing gauge needle to zero.
8. Move the crankshaft pulley slightly in both directions to check that the gauge indication is stable.



9. Turn the crankshaft clockwise and read the gauge indication when the crankshaft pulley timing mark is aligned with the pointer.

Plunger Life at Fuel Injection

Starting Timing	mm(in)
0.5 (0.02)	

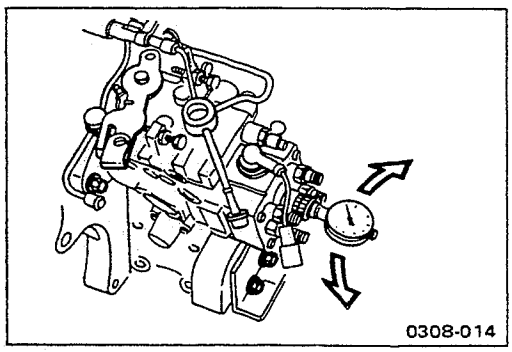
① Timing mark on the pulley
② Pointer
③ Ignition Timing (Deg)

(A) Belt drive	4JB1T	10
	4JB1TC	11
(B) Gear drive	4JA1, 4JB1 4JB1T	12

Note:

Belt drive and gear drive timing train systems use different crankshaft pulleys.

If the injection timing is outside the specified range, continue with the following steps.



10. Loosen the injection pump fixing nuts and bracket bolts.
11. Adjust the injection pump setting angle.

	If injection timing will be advanced	If injection timing will be retarded
Gear drive	B	A
Belt drive	A	B

A: Move the injection pump toward the engine.
B: Move the injection pump away from the engine.

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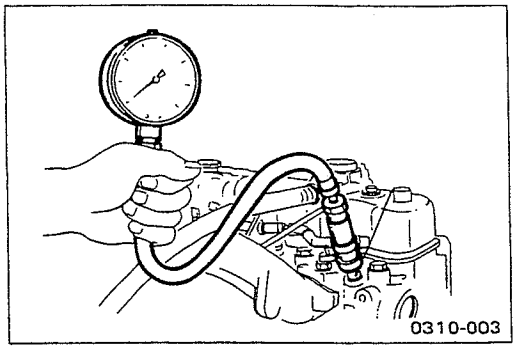

COMPRESSION PRESSURE MEASUREMENT

1. Start the engine and allow it to idle until the coolant temperature reaches 70 — 80°C (158 — 176°F).
2. Remove the following parts.
   * Glow plugs
   * Fuel cut solenoid connector
   * QOS (Quick-On Start System) fusible link wire at the connector.
3. Set the adapter and compression gauge to the No. 1 cylinder glow plug hole.

   Compression Gauge
   (with Adapter): 5-8840-2008-0 (J-29762)

   Adapter: 5-8531-7001-0

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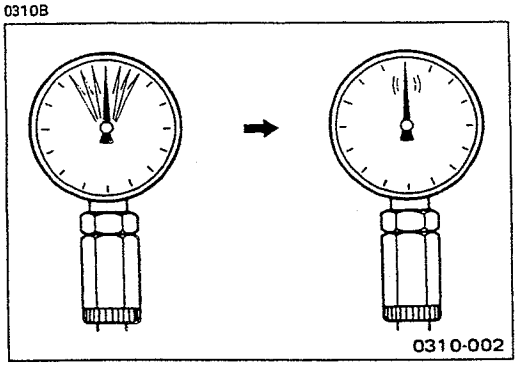
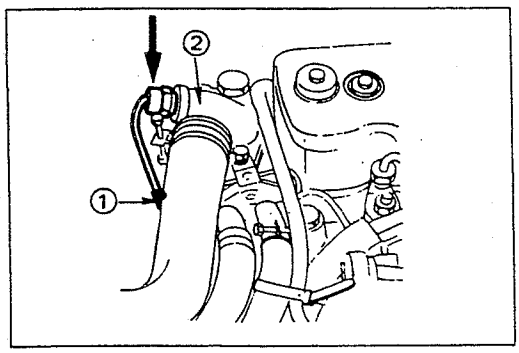


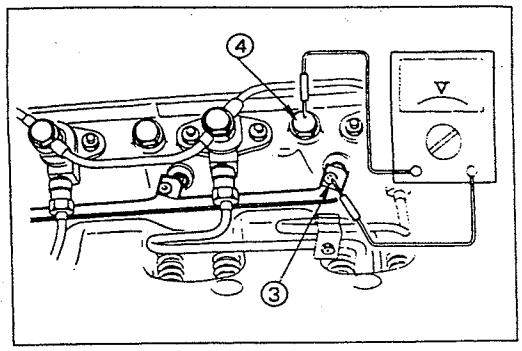
4. Turn the engine over with the starter motor and take the compression gauge reading.

Compression Pressure	kg/cm² (psi/kPa) at 200 rpm
Standard	Limit
31 (441/3,038)	22 (313/2,156)

5. Repeat the procedure (Steps 3 and 4) for the remaining cylinders.

   If the measured value is less than the specified limit, refer to "Trouble Shooting" in this Manual.





QUICK-ON START II SYSTEM

Quick-On Start II System Inspection Procedure

1. Disconnect the thermo-switch connector ① on the thermostat housing ②.
2. Connect the voltmeter between the glow plug ③ and the engine body earth ④.
3. Turn the starter switch to the "ON" position.

   If the Quick-ON Start II System is operating properly.

   1) The glow indicator will light for 3.5 seconds.
   2) The voltmeter will show the souce boltage fo approximately 18 seconds.

   If the Quick-On Start II is not operating properly check the QOS timer, the glow relay, and the ther mo switch.

   If these parts are normal, check each glow plug.

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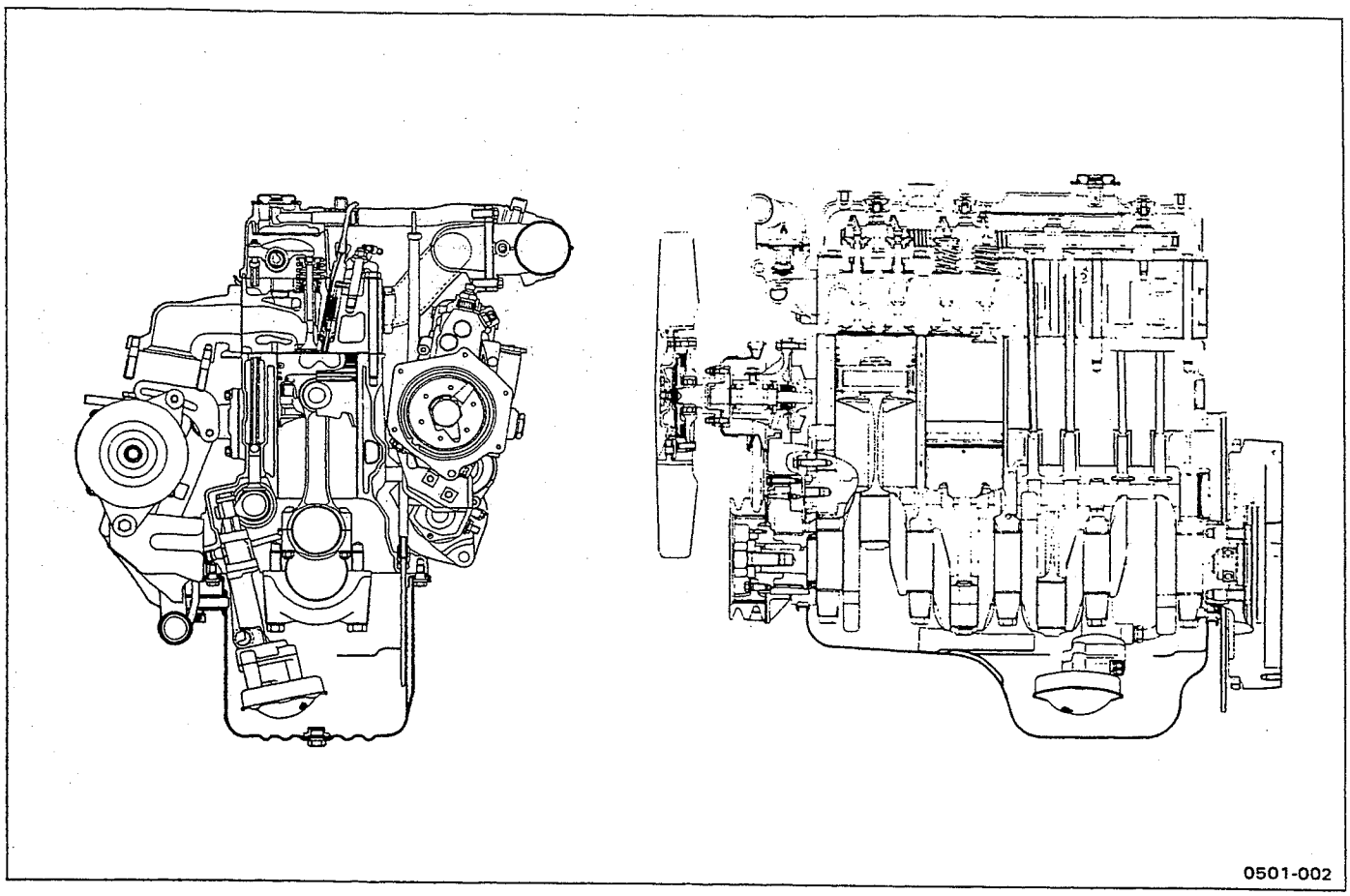
ENGINE ASSEMBLY

GENERAL DESCRIPTION



The 4J Series of Isuzu Diesel Engines features the unique ISUZU toroidal square combustion chamber. This design provides superior fuel economy over a wide range of operating conditions.

4J Series engine power ratings vary with bore and stroke.

The 4JB1T engine and the 4JB1TC engine are turbocharger equipped.

The laminated steel sheet cylinder head gasket is very durable. This type of gasket eliminates cylinder head bolt retightening.

4JB1 engine cylinder heads use the angular tightening method.

Chrome plated dry type cylinder liners are used. This type of cylinder liner has a proven reputation for high durability.

Each piston has two compression rings and one oil ring.

4J Series engine crankshafts have been tuftrided to provede a longer service life. Because the crankshaft is tuftrided, it cannot be reground.

4J Series engines are equipped with a VE-type distributor injection pump. A fuel-cut solenoid is used to stop the engine.

There are three systems available to ease cold-weather starting, speed engine warmup, and reduce engine operating noise,

1. Cold Start Device (CSD)
2. Quick-On-Start System (QOS)
3. Quick Warmup System (QWS)

Installation of these systems will vary with vehicle model and vehicle application.

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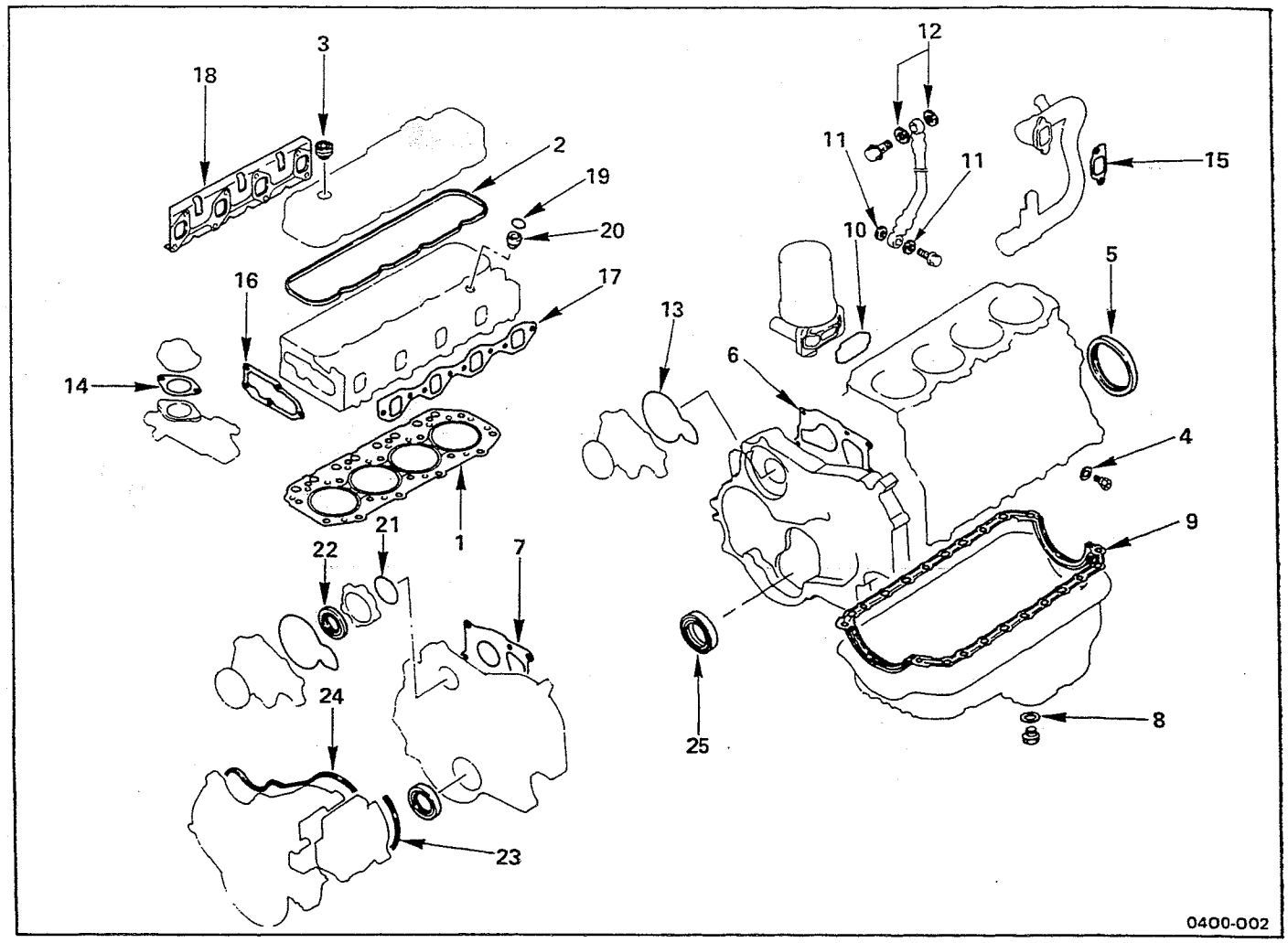
ENGINE REPAIR KIT

All of the numbered parts listed below are included in the Engine Repair Kit.
The gaskets marked with an asterisk (*) are also included in the Top Overhaul Kit.



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* 1. Cylinder head gasket
* 2. Head cover gasket
* 3. Head cover cap nut gasket
4. Drain cock gasket
5. Crankshaft rear oil seal
6. Gear case gasket (Gear drive)
7. Gear case cover gasket (Belt drive)
8. Oil pan drain plug gasket
9. Oil pan gasket
10. Oil filter gasket
11. Joint bolt gasket
12. Vacuum pump gasket
13. Water pump O-ring
* 14. Water outlet pipe gasket
* 15. Intake pipe gasket
16. Thermostat housing gasket
* 17. Intake manifold gasket
* 18. Exhaust manifold gasket
* 19. Nozzle holder O-ring
* 20. Nozzle holder gasket
21. Cam retainer O-ring (Belt drive)
22. Cam retainer oil seal (Belt drive)
* 23. Dust cover upper gasket (Belt drive)
* 24. Dust cover lower gasket (Belt drive)
25. Crankshaft front oil seal

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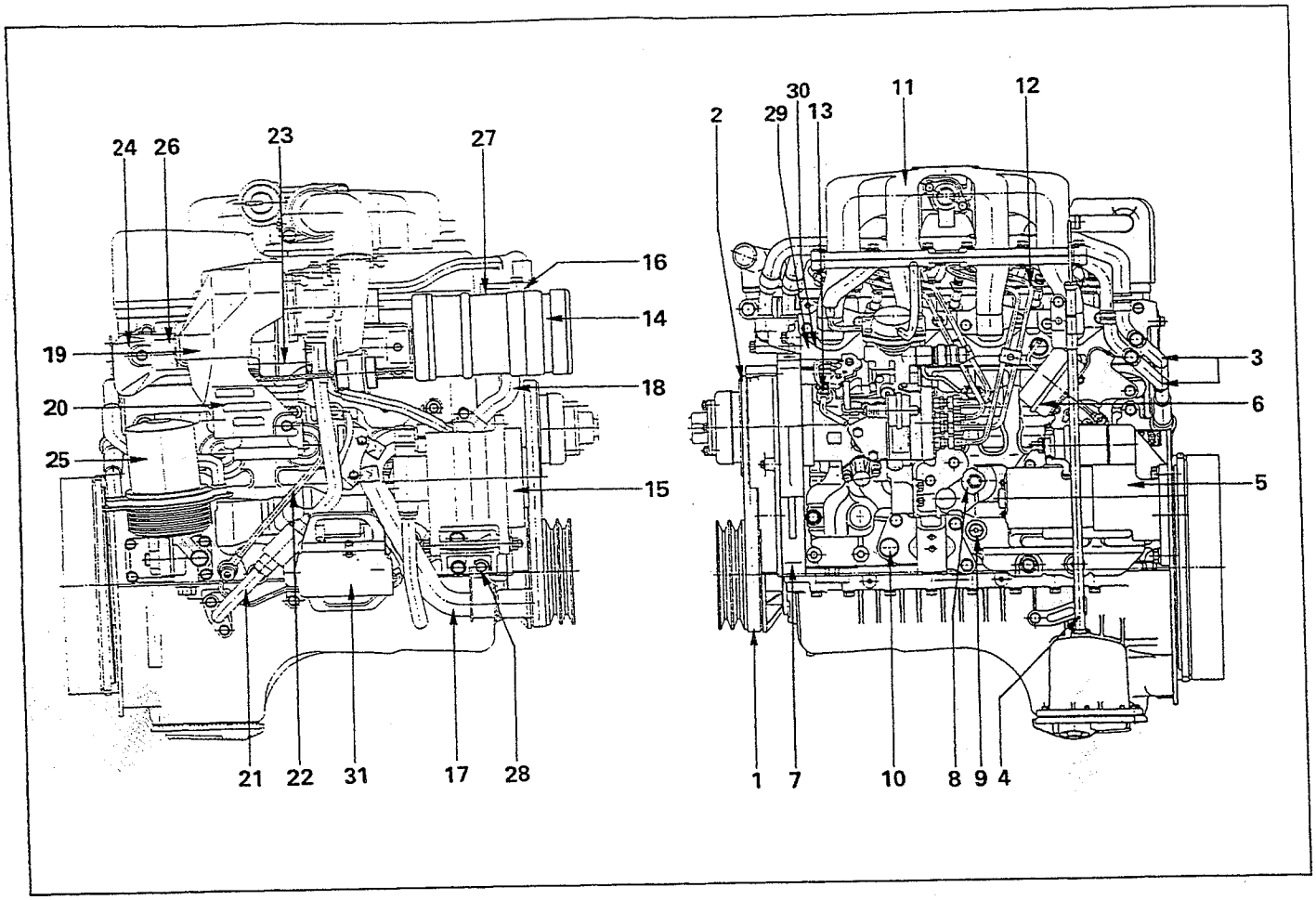
DISASSEMBLY

EXTERNAL PARTS

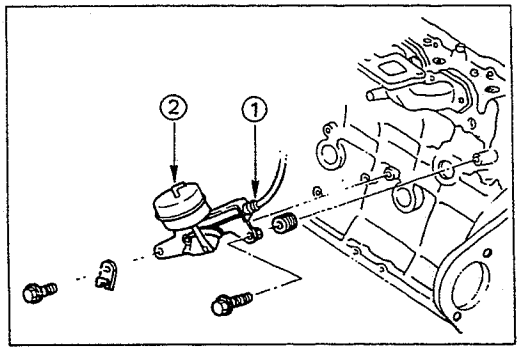
These disassembly steps are based on the 4JB1T engine.



Disassembly Steps

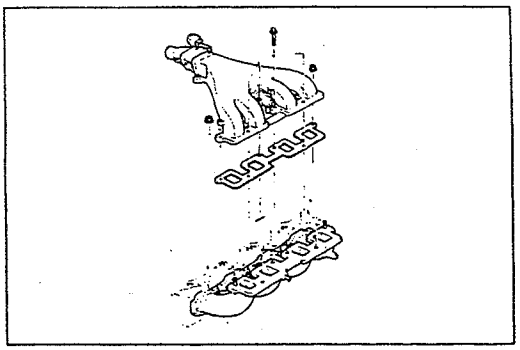
1. Cooling fan drive belt
2. Cooling fan pulley
3. Heater pipe (Rear side)
4. Oil level gauge and guide tube
5. Starter motor
▲ 6. Exhaust actuator
7. Stiffener
8. Water drain cock
9. Oil pressure warning switch and nipple
10. Engine mounting bracket and mounting rubber
▲ 11. Upper intake manifold
▲ 12. Fuel injection pipe with clip
13. Fuel leak hose (leak off pipe to injection pump)
14. Compressor
15. Alternator and adjusting plate
16. Water by-pass hose
17. Water inlet pipe
18. Water inlet suction pipe
19. Turbocharger heat protector Upper and lower
20. Exhaust adapter
21. Turbocharger oil return pipe
22. Turbocharger oil feed pipe
▲ 23. Turbocharger
24. Exhaust manifold heat protector
25. Oil filter with oil cooler
26. Exhaust manifold
27. Compressor bracket
28. Alternator bracket
29. Power steering oil pump
30. Power steering oil pump bracket
31. Engine mounting bracket with mounting rubber

Important Operations



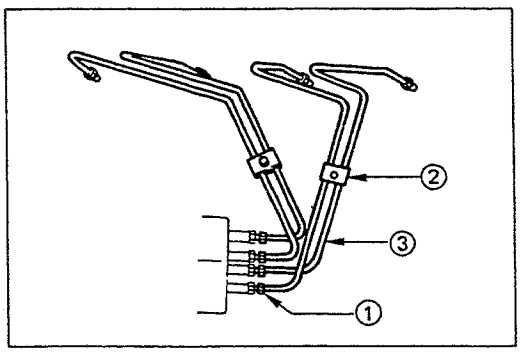
▲ Exhaust Actuator

1) Disconnect the control wire ① from the exhaust actuator.
2) Remove the actuator ② from the cylinder body.



▲ Upper Intake Manifold (4JB1T)

1) Disconnect the PCV hose from the cylinder head cover.
2) Disconnect the intake duct and intake rubber hose from the turbocharger.
3) Remove the upper intake manifold from the lower intake manifold with intake duct, and the PCV hose.



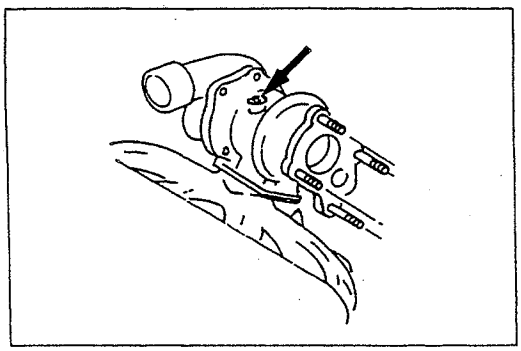
▲ Fuel Injection Pipe with Clip

1) Loosen the injection pipe sleeve nuts at the delivery valve side ①.

   Do not apply excessive force to the injection pipes.
2) Loosen the injection pipe clips ②.
3) Remove the injection pipes ③.

Note:

Plug the delivery holder ports with the shipping caps to prevent the entry of foreign material.

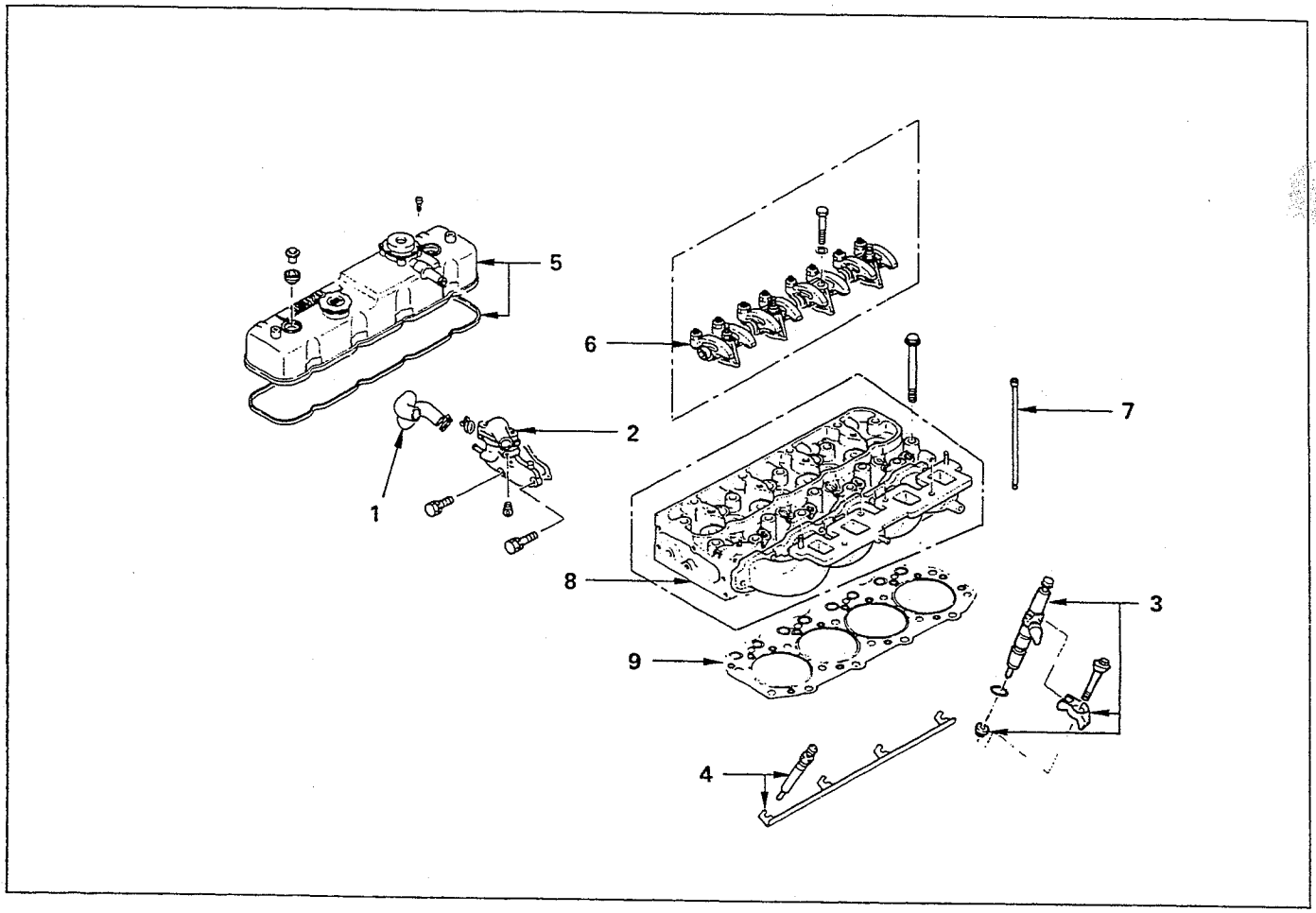


▲ Turbocharger

Plug the turbocharger body oil ports after removing the turbocharger assembly to prevent the entry of foreign material.

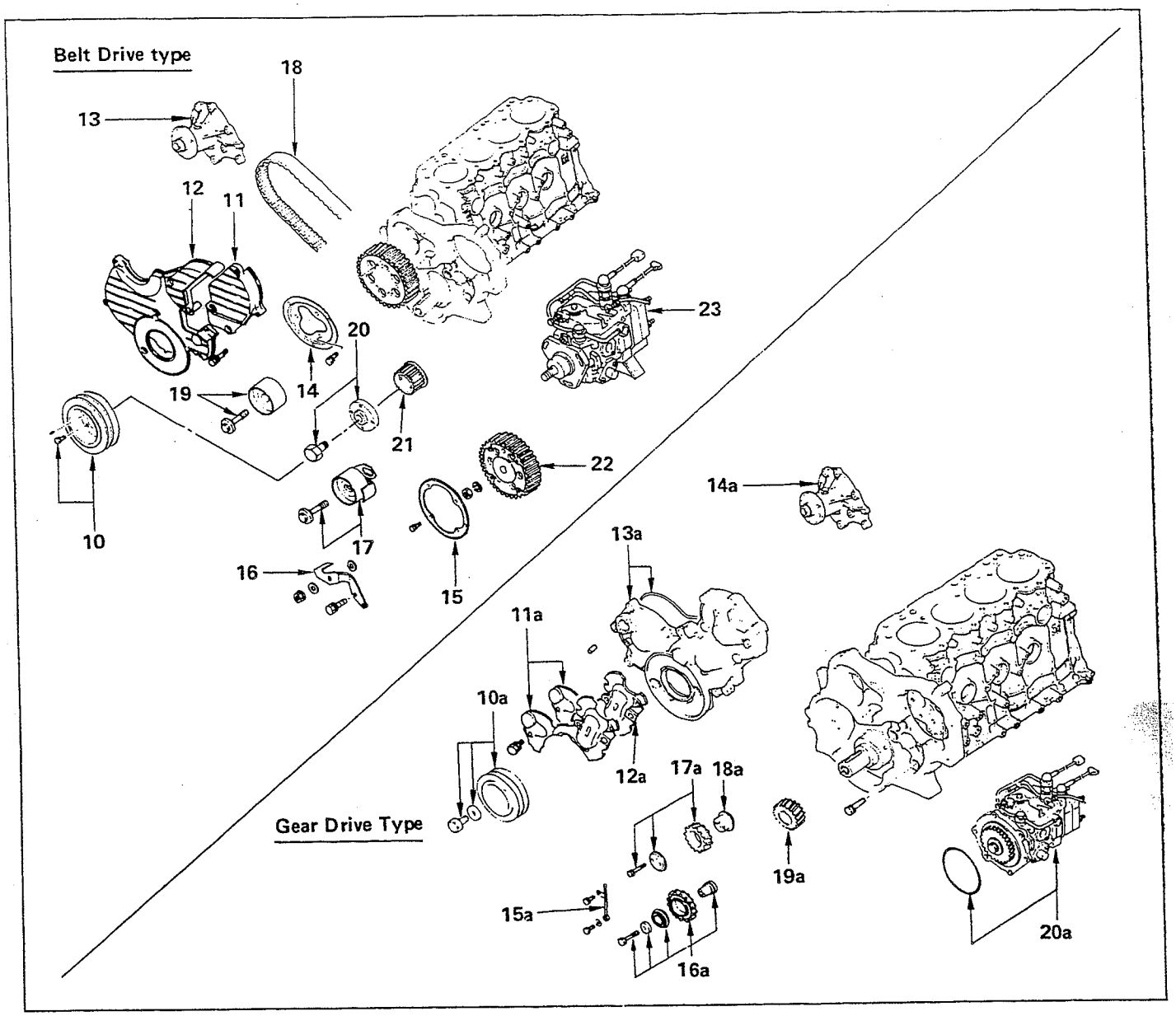
INTERNAL PARTS

MAJOR COMPONENTS



Disassembly Steps-1

1. Water bypass pipe
2. Thermostat housing with thermo switch
3. ▲ Injection nozzle holder
4. Glow plug and glow plug connector
5. Cylinder head cover
6. ▲ Rocker arm shaft and rocker arm
7. Push rod
8. ▲ Cylinder head
9. Cylinder head gasket



Disassembly Steps-2

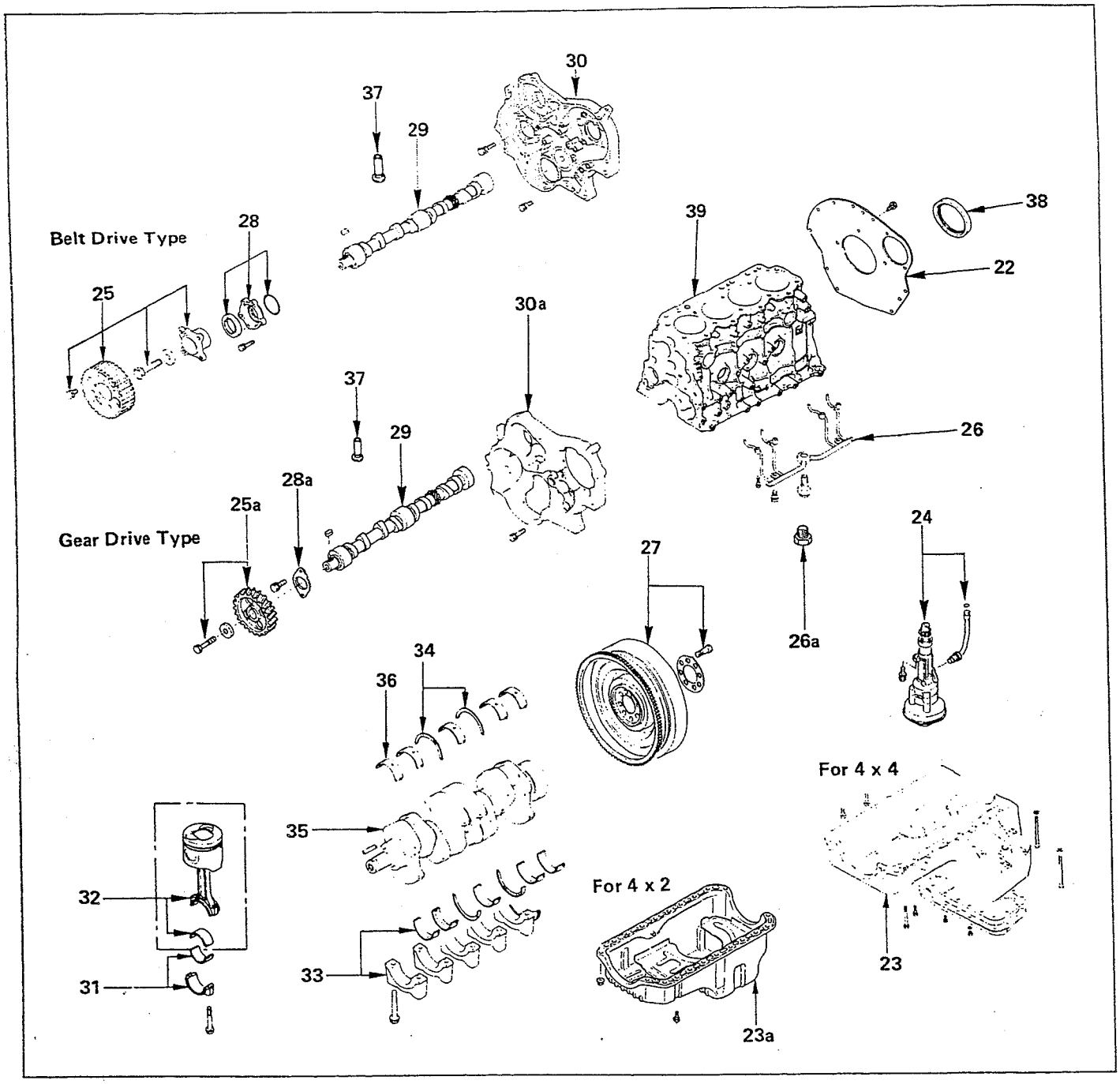
Belt Drive Type

▲ 10. Crankshaft damper pulley
11. Timing pulley housing upper cover
12. Timing pulley housing lower cover
13. Water pump
14. Camshaft timing pulley flange
15. Injection pump timing pulley flange
16. Timing belt tension adjusting lever
17. Timing belt tensioner
18. Timing belt
19. Tension idler
▲ 20. Crankshaft timing pulley center
▲ 21. Crankshaft timing pulley
▲ 22. Injection pump timing pulley
▲ 23. Injection pump

Gear Drive Type

▲ 10a Crankshaft damper pulley
11a Gear case upper cover and lower cover
12a Space rubber
13a Timing gear case cover
14a Water pump
15a Timing gear oil pipe
16a Idler gear "B" and shaft
▲ 17a Idler gear "A"
18a Idler gear shaft
19a Crankshaft timing gear
▲ 20a Injection pump
21a —
22a —
23a —

Inverted Engine



Disassembly Steps-3

22. Cylinder body rear plate
23. Oil pan
23a Oil pan (For 4JA1)
24. Oil pump with oil pipe
▲ 25. Camshaft timing pulley
▲ 25a Camshaft timing gear
▲ 26. Piston cooling oil pipe
26a Oil jet plug (For 4JB1)
▲ 27. Flywheel
28. Oil seal retainer
28a Camshaft thrust plate
▲ 29. Camshaft
30. Timing pulley housing
30a Timing gear case
▲ 31. Connecting rod bearing cap with lower bearing
▲ 32. Piston and connecting rod with upper bearing
▲ 33. Crankshaft bearing cap with lower bearing
34. Crankshaft thrust bearing
35. Crankshaft
▲ 36. Crankshaft upper bearing
▲ 37. Tappet
▲ 38. Crankshaft rear oil seal
39. Cylinder body

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Important Operations

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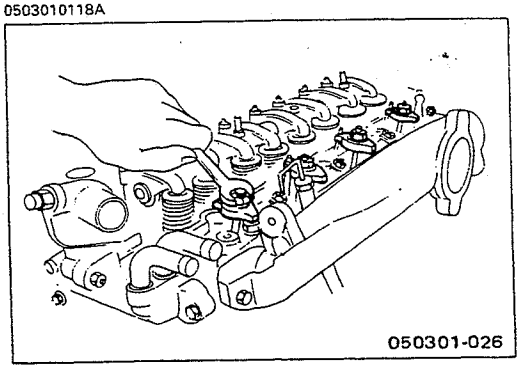

▲ Injection Nozzle Holder

1. Remove the nozzle holder bracket nuts.

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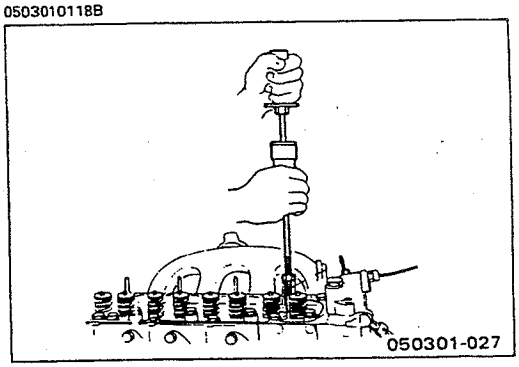

2. Use the nozzle holder remover and the sliding hammer to remove the nozzle holder together with the holder bracket.

Nozzle Holder Remover:5-8840-2034-0
Sliding Hammer:5-8840-0019-0

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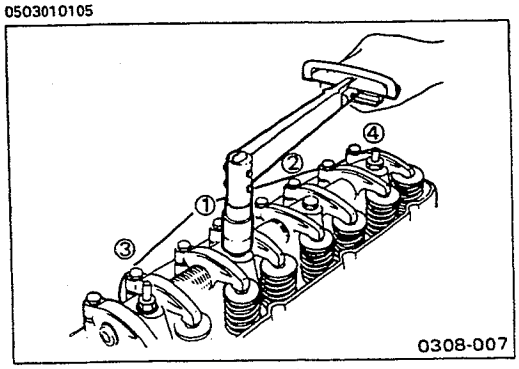

▲ Rocker Arm Shaft and Rocker Arm

Loosen the rocker arm shaft bracket bolts in numerical order a little at a time.

Note:

Failure to loosen the rocker arm shaft bracket bolts in numerical order a little at a time will adversely effect the rocker arm shaft.

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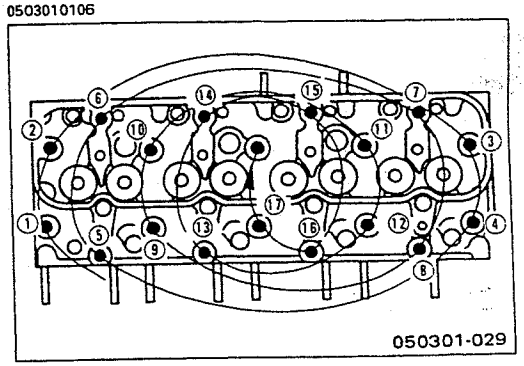

▲ Cylinder Head

Loosen the cylinder head bolts in numerical order a little at a time.

Note:

Failure to loosen the cylinder head bolts in numerical order a little at a time will adversely effect the cylinder head lower surface.

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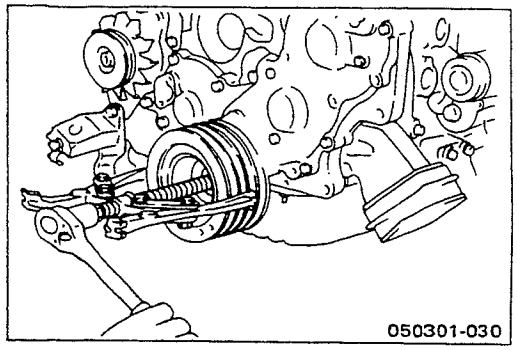

▲ Crankshaft Damper Pulley

Use the damper pulley remover to remove the damper pulley.

Damper pulley Remover: 5-8840-0086-0

Note:

Hold the flywheel ring gear stationary to prevent the crankshaft from turning when removing the crankshaft pulley.

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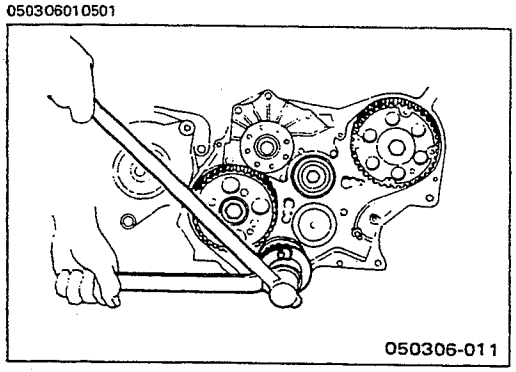

▲ Crankshaft Timing Pulley Center (For Belt Drive)

1. Use the fixing wrench to prevent the crankshaft from turning.

   Fixing Wrench: 5-8840-0161-0
2. Remove the timing pulley center from the crankshaft.

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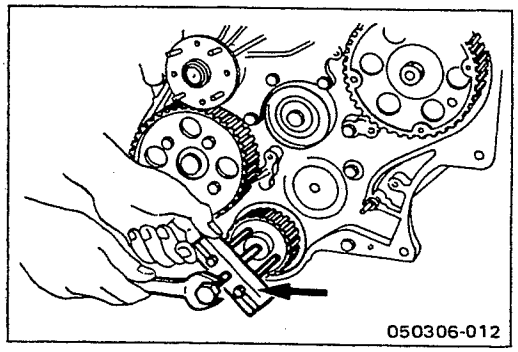

▲ Crankshaft Timing Pulley (For Belt Drive)

1. Block the crankshaft with a piece of hard wood.
2. Use the crankshaft timing pulley puller to remove the timing pulley.

   Crankshaft Timing Pulley Puller: 5-8840-2035-0

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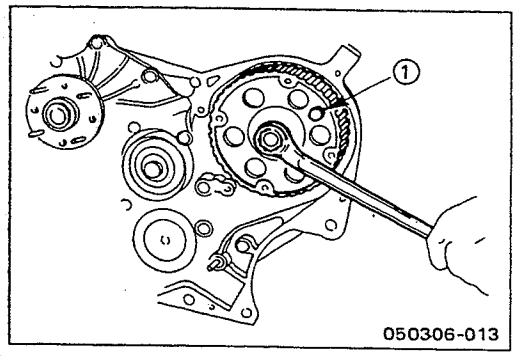

▲ Injection Pump Timing Pulley (For Belt Drive)

1. Install the stopper bolt ① to the timing pulley to prevent it from turning.

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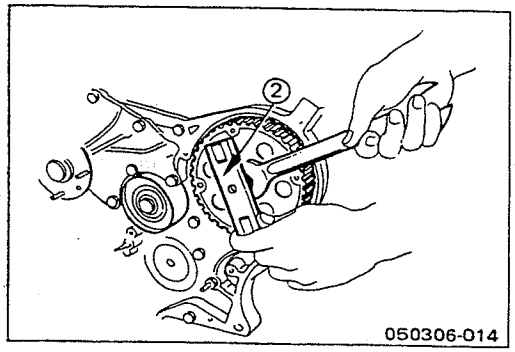
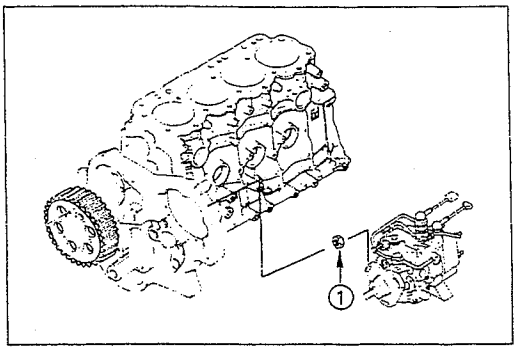


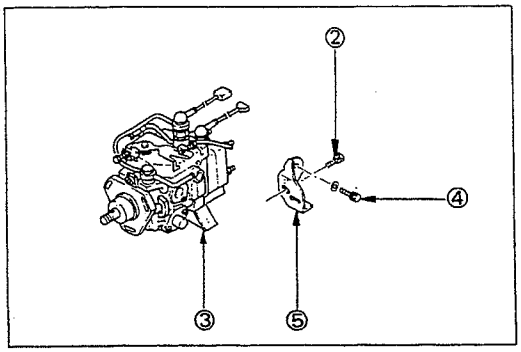
2. Use the timing pulley remover ② to remove the injection pump timing pulley.

   Timing Pulley Puller: 5-8840-0086-0
3. Remove the stopper bolt.



▲ **Injection Pump (For Belt Drive)**

1. Remove the three injection pump bracket nuts ① at the rear of the timing pulley housing.



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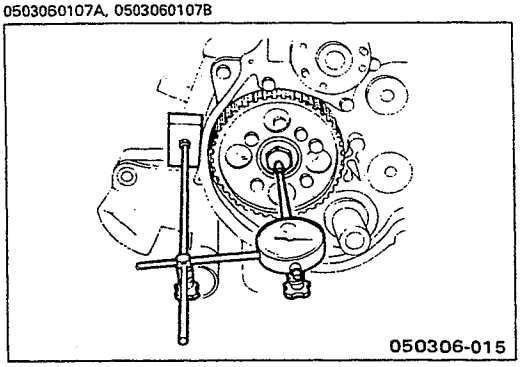
2. Remove the injection pump rear bracket bolts ② from the injection pump bracket ③.
3. Remove the injection pump rear bracket bolts ④ and the bracket ⑤ from the cylinder body.
4. Pull the injection pump free toward the rear of the engine.

Note:

Plug the injection pump delivery holder ports with the shipping caps (or the equivalent) to prevent the entry of foreign material.



▲ **Oil Pump with Oil Pipe (For Belt Drive)**

▲ **Camshaft Timing Pulley (For Belt Drive)**

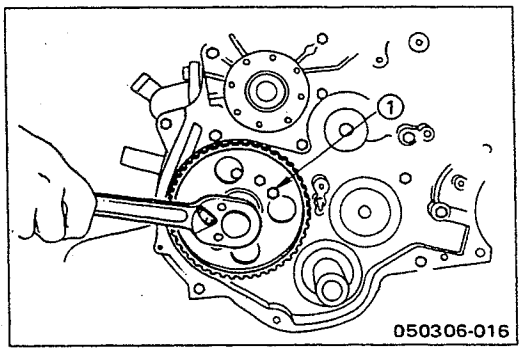
1. Use a dial indicator to measure the camshaft end play.

   This must be done before removing the oil pipe.

   If the camshaft end play exceeds the specified limit, the camshaft and/or the driven gear must be replaced.

Camshaft End Play — mm(in)

Standard	Limit
0.08 (0.003)	0.2 (0.008)



2. Remove the oil pump with oil pipe.
3. Install the stopper bolt ① to the timing pulley to prevent it from turning.

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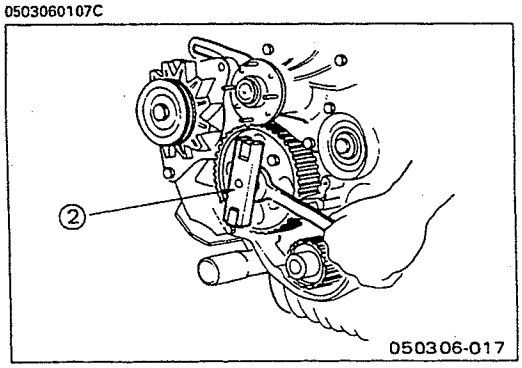

4. Use the timing pulley puller ② to remove the pulley.

   Camshaft Timing Pulley Puller: 5-8840-0086-0

5. Remove the stopper bolt.

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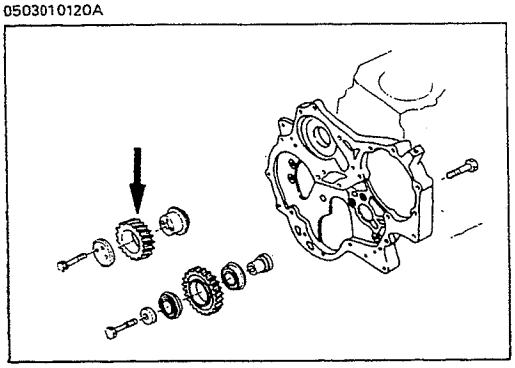

▲ Idler Gear "A" (For Gear Drive)

1. Measure the camshaft timing gear backlash and the crankshaft timing gear backlash before removing the idler gear.
2. Measure the idler gear end play before removing the idler gear.

Note:

Refer to the following items for details on the backlash and end play measurement procedures.

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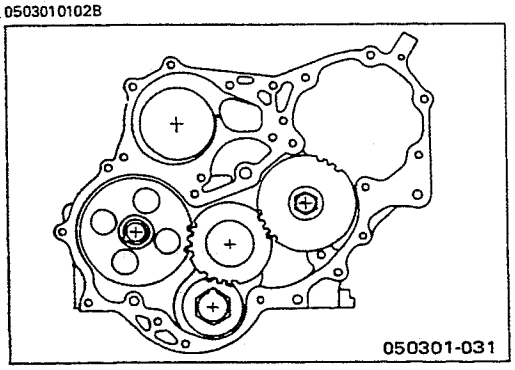

Timing Gear Backlash Measurement (For Gear Drive)

1) Set a dial indicator to the timing gear to measured.

   Hold both the gear to be checked and the adjoining gear stationary.

2) Move the gear to be checked as far as possible to both the right and the left.

   Take the dial indicator reading.

   If the measured value exceeds the specified limit, the timing gear must be replaced.

Timing Gear Backlash mm(in)

Standard	Limit
0.10—0.17 (0.0039—0.0067)	0.30 (0.012)

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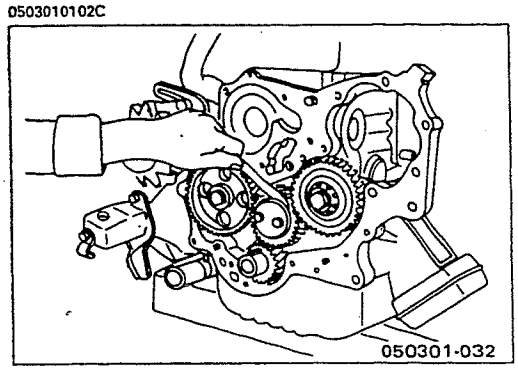


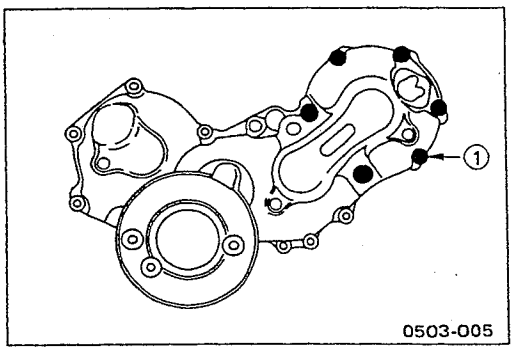
Idler Gear "A" End Play Measurement (For Gear Drive)

Insert a feeler gauge between the idler gear and the thrust collar to measure the gap and determine the idler gear end play.

If the measured value exceeds the specified limit, the thrust collar must be replaced.

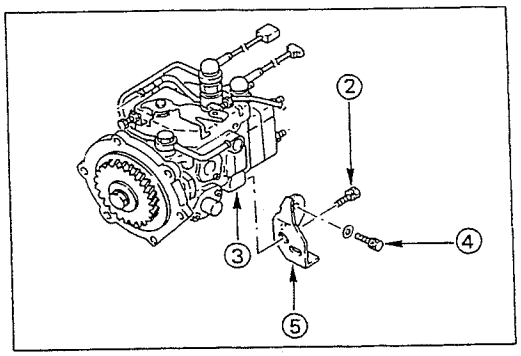
Idler Gear End Play mm(in)

Standard	Limit
0.07 (0.0028)	0.2 (0.0079)



▲ Injection Pump (For Gear Drive)

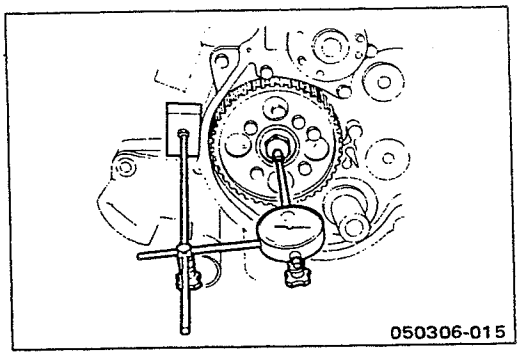
1. Remove the six injection pump bracket bolts ① from the timing gear case.



2. Remove the injection pump rear bracket bolts ② from the injection pump bracket ③.
3. Remove the injection pump rear bracket bolts ④ and the bracket ⑤ from the cylinder body.
4. Pull the injection pump along with the injection pump timing gear free toward the rear of the engine.

Note:

Plug the injection pump delivery holder ports with the shipping caps (or the equivalent) to prevent the entry of foreign material.



▲ Camshaft Timing Gear (For Gear Drive)

1. Use a dial indicator to measure the camshaft end play.

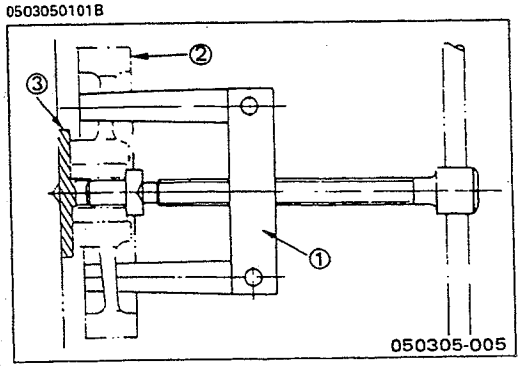
   This must be done before removing the camshaft gear.

   If the camshaft end play exceeds the specified limit, the thrust plate must be replaced.

Camshaft End Play mm(in)

Standard	Limit
0.050 — 0.114 (0.002 — 0.0044)	0.20 (0.008)

0503050101B



2. Remove the camshaft timing gear bolt from the camshaft.

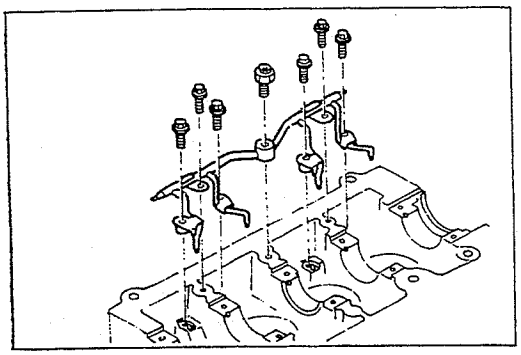
Note:

Hold the camshaft stationaly to prevent the camshaf from turning.

3. Use the universal puller ① to pull out the camshaf timing gear ②.

   Universal Puller: 5-8521-0002-0

4. Remove the thrust plate ③.

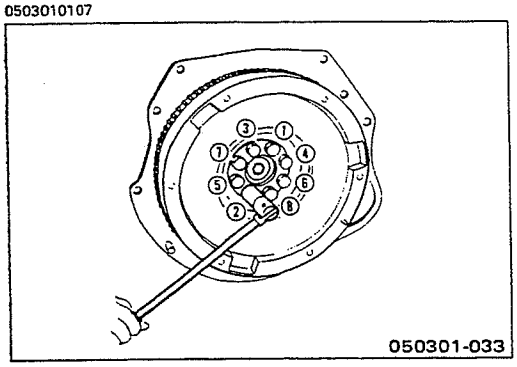


0503010107

▲ Piston Cooling Oil Pipe (4JA1, 4JB1T, 4JB1TC)

The oiling jet uses thin steel tubing which is easily bent. Accidental contact between the oiling jet and the cylinder body, piston, or a tool will damage the oiling jet.

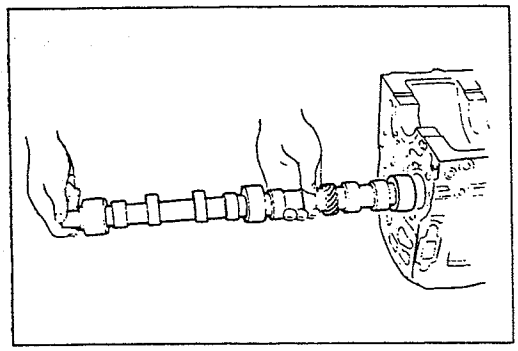
Never attempt to repair a damaged oiling jet. Replace it with a new one.



▲ Flywheel

Block the crankshaft with a piece of hard wood to prevent the flywheel from turning.

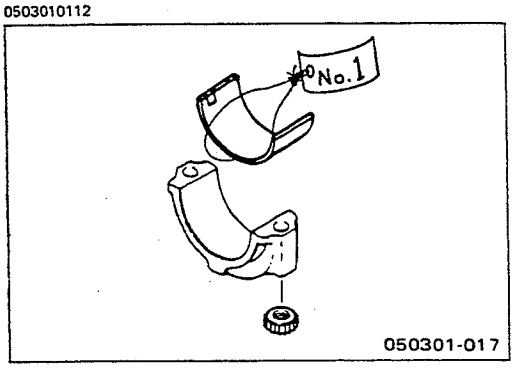
Loosen the flywheel bolts in numerical order a little at a time.



0503010112

▲ Camshaft

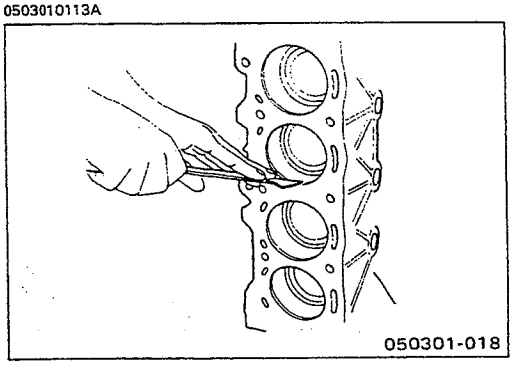
Jiggle the camshaft with your hand as you pull it free from the front of the engine.



0503010113A

▲ Connecting Rod Bearing Cap with Lower Bearing

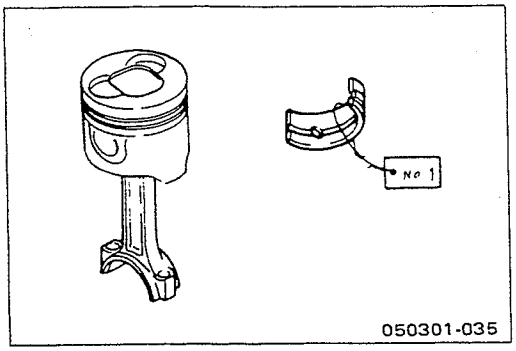
If the connecting rod lower bearings are to be reinstalled, mark their fitting positions by tagging each bearing with the cylinder number from which it was removed.



▲ Piston and Connecting Rod with Upper Bearing

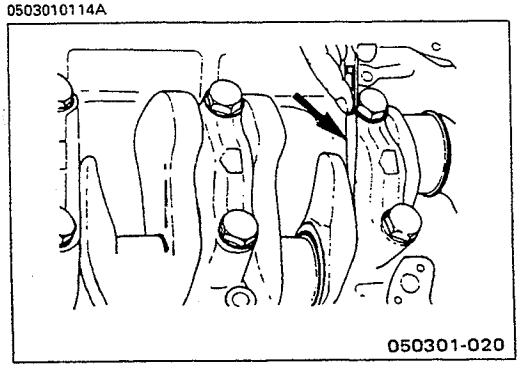
1) Remove carbon deposits from the upper portion of the cylinder wall with a scraper before removing the piston and connecting rod.
2) Move the piston to the top of the cylinder and tap it with a hammer grip or similar object from the connecting rod lower side to drive it out.

0503010113B



If the connecting rod upper bearings are to be reinstalled, mark their fitting positions by tagging each bearing with the cylinder number from which it was removed.

0503010114A



▲ Crankshaft Bearing Cap with Lower Bearing

1) Measure the crankshaft end play at the center journal of the crankshaft.

   Do this before removing the crankshaft bearing caps.

   If the measured value exceeds the specified limit, the crankshaft thrust bearing must be replaced.

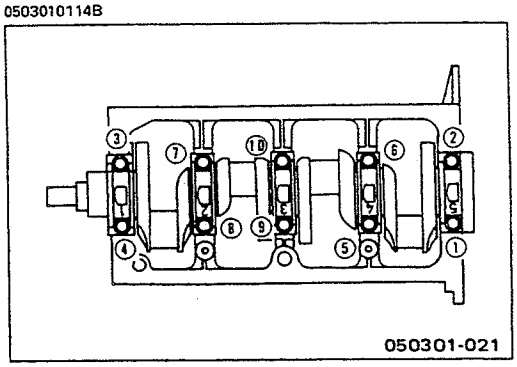
Crankshaft End Play mm(in)

Standard	Limit
0.10 (0.004)	0.30 (0.012)

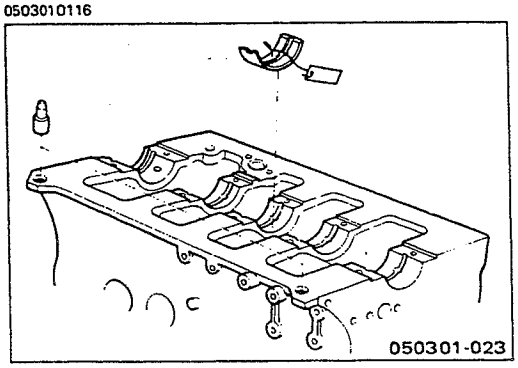
2) Loosen the crankshaft bearing cap bolts in numerical order a little at a time.

   If the crankshaft bearings are to be reinstalled, mark their fitting positions by tagging each bearing with the cylinder number from which it was removed.

0503010114B



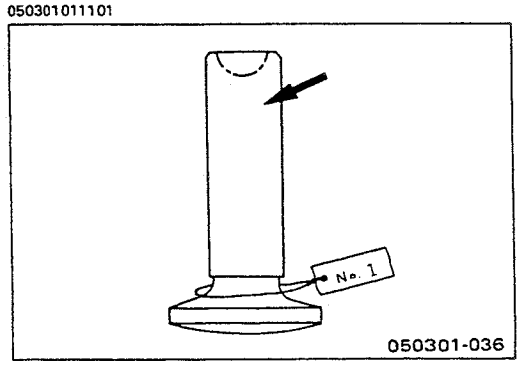
0503010116



▲ Crankshaft Upper Bearing

If the crankshaft upper bearings are to be reinstalled, mark their fitting positions by tagging each bearing with the cylinder number from which it was removed.

0503010111O1



▲ Tappet

If the tappets are to be reinstalled, mark their fitting positions by tagging each tappet with the cylinder number from which it was removed.

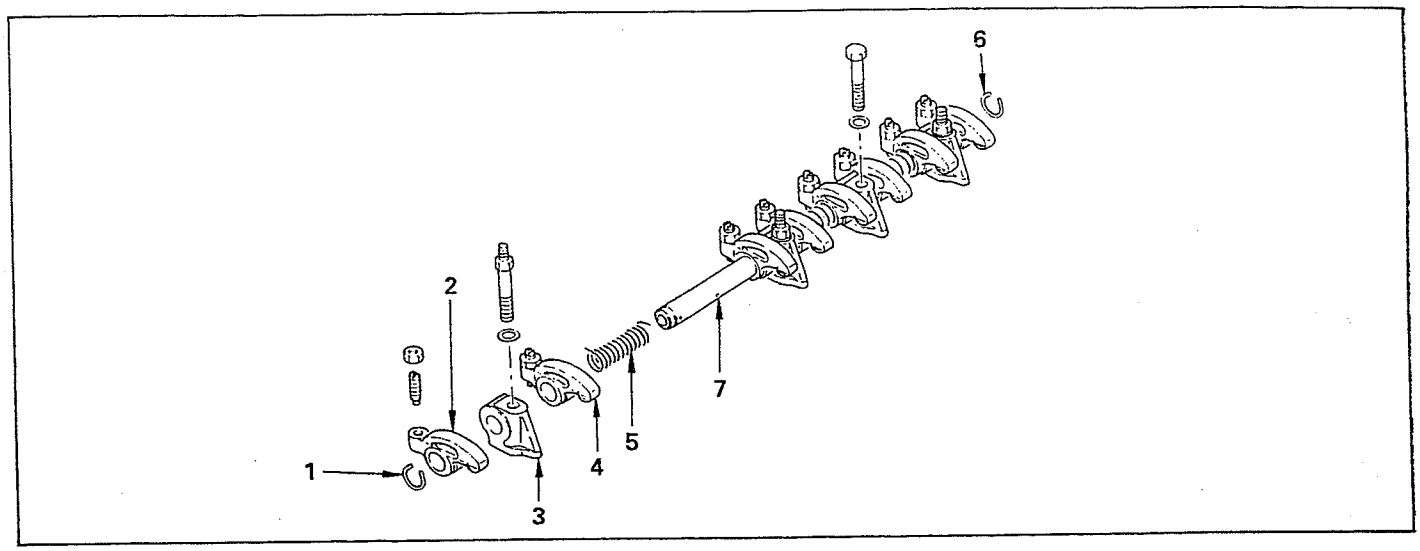
0503011501

▲ Crankshaft Rear Oil Seal

Be careful not to scratch the crankshaft rear oil seal fitting surfaces during the removal procedure.

050302A
MINOR COMPONENTS

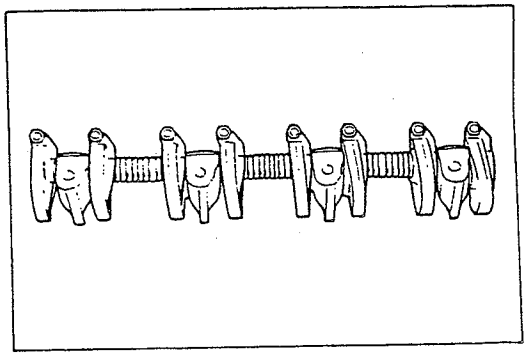
ROCKER ARM SHAFT AND ROCKER ARM



0503000028
Disassembly Steps

▲ 1. Rocker arm shaft snap ring
▲ 2. Rocker arm
▲ 3. Rocker arm shaft bracket
4. Rocker arm
5. Rocker arm shaft spring
6. Rocker arm shaft snap ring
7. Rocker arm shaft

Important Operations



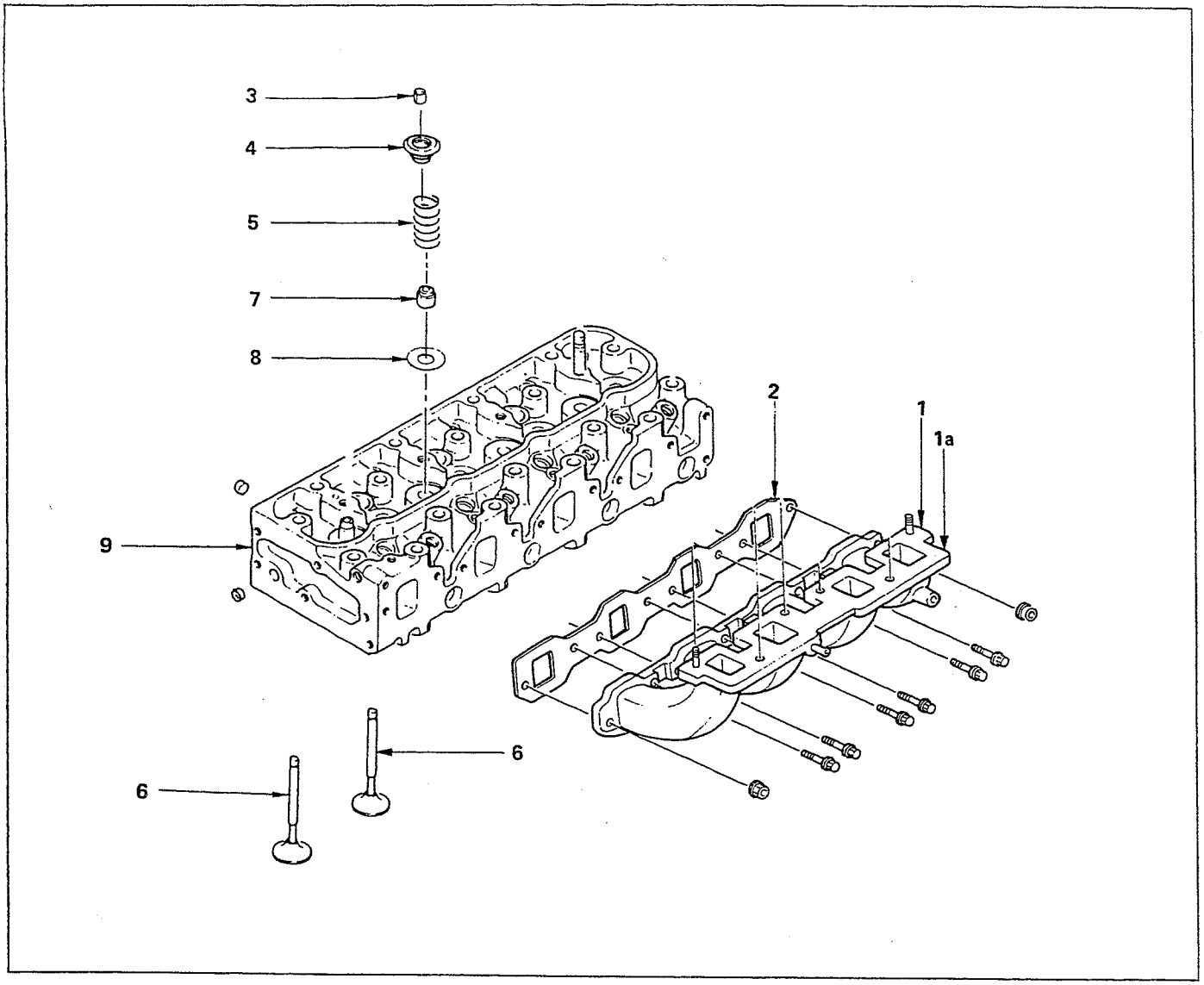
▲ Rocker Arm Shaft Snap Ring
▲ Rocker Arm
▲ Rocker Arm Shaft Bracket

1) Use a pair of pliers to remove the snap rings.
2) Remove the rocker arms.
3) Remove the rocker arm shaft brackets.
If the rocker arms and rocker arm shaft brackets are to be reinstalled, mark their installation positions by tagging each rocker arm and rocker arm shaft bracket with the cylinder number from which it was removed.

050303A

CYLINDER HEAD

This illustration is based on the 4JB1T engine.



050303B

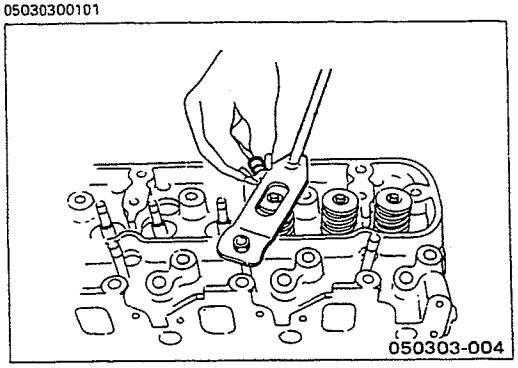
Disassembly Steps

1. Lower intake manifold (4JB1T)
1a Intake Manifold (Except 4JB1T)
2. Intake manifold gasket
▲ 3. Split collar
4. Valve spring upper seat
5. Valve spring
▲ 6. Intake and exhaust valves
7. Valve stem oil seal
8. Valve spring lower seat
9. Cylinder head

05030301

Important Operations

05030300101



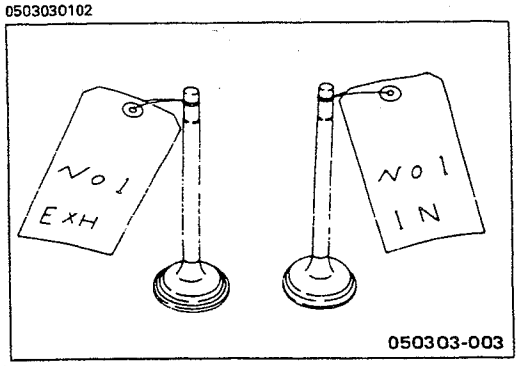
▲ Split Collar

1) Place the cylinder head on a flat wooden surface.
2) Use the spring compressor to remove the split collars.

   Do not allow the valve to fall from the cylinder head.

   Spring Compressor: 9-8523-1423-0 (J-29760)

0503030102



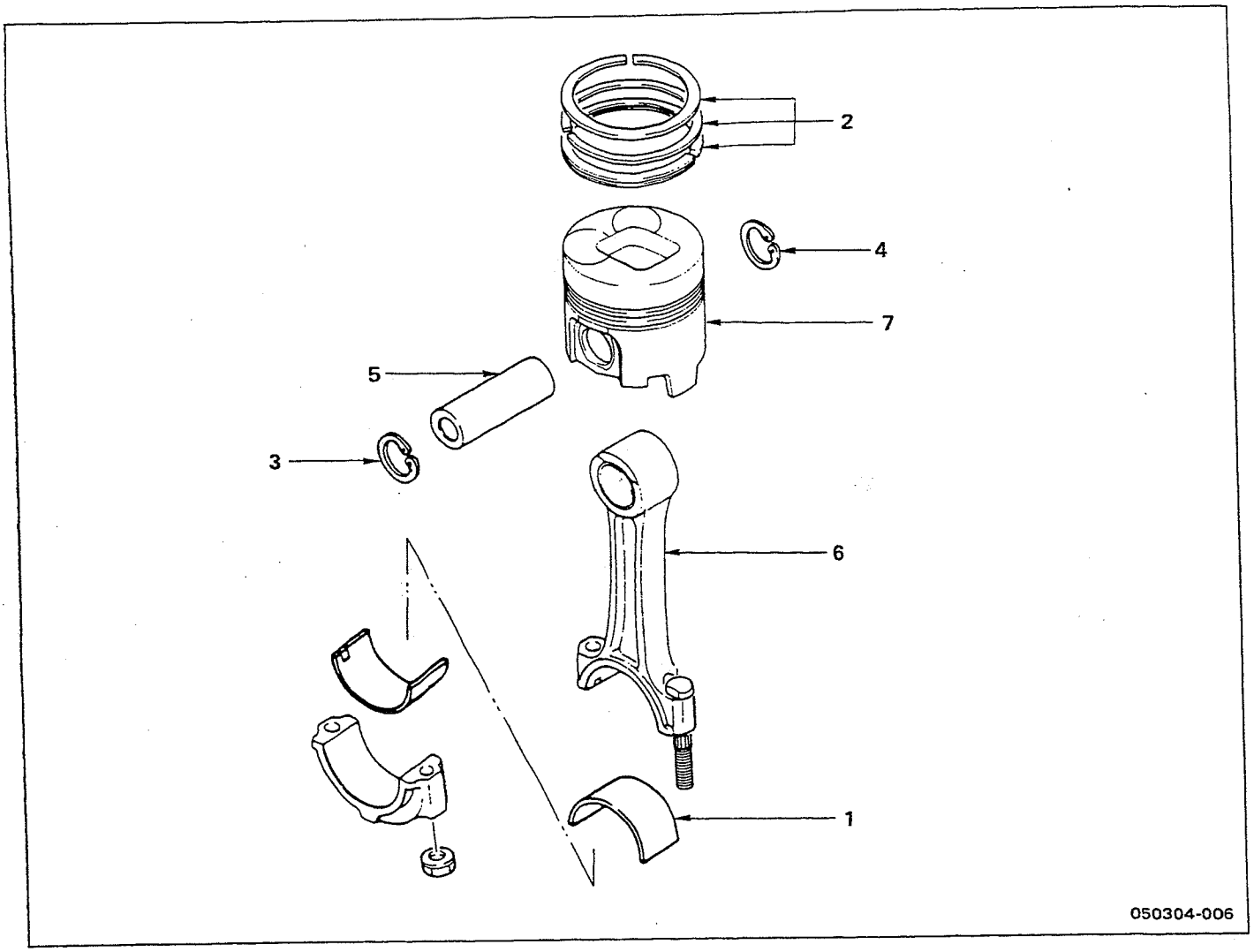
▲ Intake and Exhaust Valve

If the intake and exhaust valves are to be reinstalled, mark their installation positions by tagging each valve with the cylinder number from which it was removed.

If the intake and exhaust valves are to be replaced, the valve guides must also be replaced.

050304A

PISTON AND CONNECTING ROD



050304B

Disassembly Steps

- ▲ 1. Connecting rod bearing
- ▲ 2. Piston ring
- ▲ 3. Piston pin snap ring
- ▲ 4. Piston pin snap ring
- ▲ 5. Piston pin
- 6. Connecting rod
- ▲ 7. Piston