RX-7 Factory Service Material

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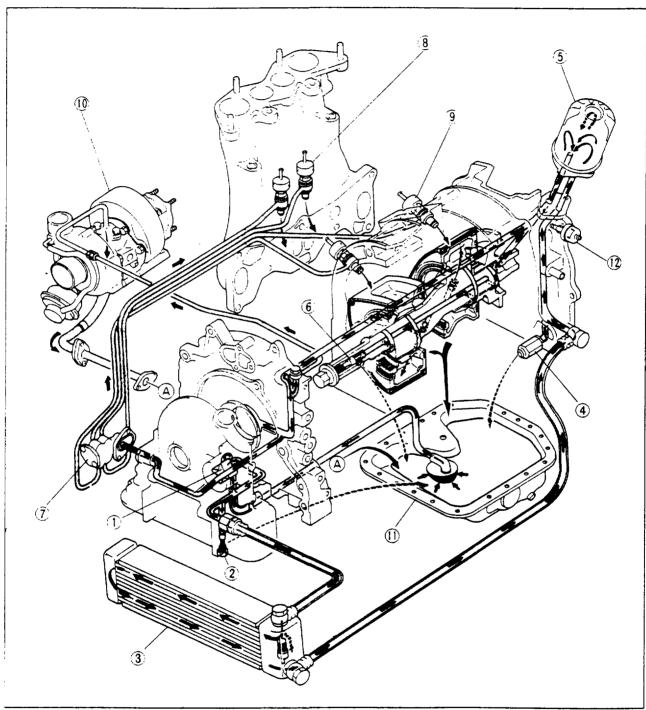
LUBRICATION SYSTEM

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2 OUTLINE

OUTLINE

STRUCTURAL VIEW



- 1. Oil pump 2. Oil pressure control valve
- 3. Oil cooler
- 4. Oil pressure regulator valve
- 5. Oil filter
- 6. Eccentric shaft bypass valve

- 7. Metering oil pump 8. Manifold oil nozzle
- 9. Housing oil nozzle
- 10. Turbocharger
- 11. Oil pan
- 12. Oil pressure gauge

SPECIFICATIONS

Items		Engine models	Turbo	Non-Turbo			
Lubrication system		Forced-fed					
	Туре		Trochoid				
Oil pump	Number of rotors		2				
	Diameter x width of	rotor mm (in)	50 x 17.5 (1.97 x 0.69)	50 x 12.5 (1.97 x 0.49)			
Control valve	relief pressure	kPa (kg/cm², psi)	1,080 (11.0, 156)				
	Туре		Air cooled, with	bypass valve			
Oil cooler	Relief temperature	°C (°F)	60—65 (140—149) or below				
	Relief pressure differ	ential kPa (kg/cm², psi)	349 (3.56, 50) at 60°C (140°F)				
Regulator vai	ve relief pressure	kPa (kg/cm², psi)	490 (5	0, 71)			
0169	Туре		Full-flow, paper element				
Oil filter Relief pressure differential		ential kPa (kg/cm², psi)	98 (1.0	0, 14)			
Eccentric sha	aft bypass valve relief	temperature °C (°F)	60 (140)	or below			
	Total (dry engine)	liters (US qt, Imp qt)	5.8 (6.1, 5.1)				
0	Oil pan	liters (US qt, Imp qt)	4 4 (4.7, 3.9)				
Oil capacity	Oil cooler	liters (US qt, Imp qt)	0.8 (0.85, 0.70)				
	Oil filter	liters (US at, Imp at)	0.3 (0.32, 0.26)				
Engine oil gr	Engine oil grade (API service)		"Fuel efficient" SF (Do not use synthetic oil)				

87U02X-001

RECOMMENDED SAE VISCOSITY NUMBERS

Temperature	(°C)	-30	-20	-10	0	10	20	30	40	50
	(°F)	-20	0	20	40	(60	80	100	120
	_		5W - 30		>					
Engine oil					10W -	- 30		\longrightarrow		
						10W - 4	Ю	10W - 50		
	+					20W - 4	10	20W - 50		

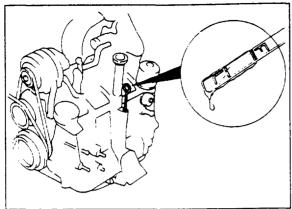
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Temperature range anticipated before next oil change, °C (°F)

TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
Engine hard starting	Improper engine oil Insufficient engine oil	Replace Add oil	2— 3 2— 5
Excessive oil con- sumption	Oil working up or working down Oil leak	Refer to Section 1 As described below	
Oil leakage	Loose drain plug or damaged washer Faulty seal at oil pan Damaged front cover Loose front cover bolt or oil pan bolt Damaged sealing rubber, "O" ring, or front cover	Tighten or replace Repair Replace Tighten	2-10 2-9 -
	gasket Malfunction of oil seal Loose oil filter Loose or damaged oil level sensor or oil pressure gauge Damaged oil cooler or oil cooler hose	Replace Replace Tighten Tighten or replace Replace	- 2- 7 - 2-16
Oil pressure drop*	Oil leak Insufficient oil Worn or damaged oil pump gear Clogged oil strainer Malfunction of oil pressure control valve Malfunction of oil cooler bypass valve Malfunction of oil pressure regulator valve Clogged oil filter Malfunction of eccentric shaft bypass valve Excessive oil clearance between eccentric shaft and main bearing	As described above Add oil Replace Clean Replace Replace Replace Replace Replace Replace Replace Replace Replace	2- 5 2-15 - 2- 7 2-16 - 2- 7 2-17
Oil pressure gauge does not work	Oil pressure drop Malfunction of oil pressure gauge unit Malfunction of electrical system	As described above Refer to Section 15 Refer to Section 15	
Oil level warning light illuminates when engine is running	Insufficient oil Malfunction of oil level sensor Malfunction of electrical system	Add oil Refer to Section 15 Refer to Section 15	2- 5

^{*} Oil pressure becomes low when the engine is cold because the eccentric shaft bypass valve operates.

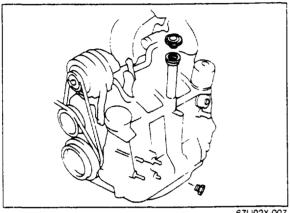


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INSPECTION

ENGINE OIL

- 1. Be sure the vehicle is on level ground.
- 2. Warm up the engine.
- 3. Wait for five minutes after turning off the engine.
- 4. Check the engine oil level and condition with the oil level gauge.
- 5. If necessary, add oil or replace.



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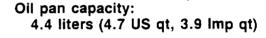
Replacement

- 1. Warm up the engine.
- 2. Remove the oil filler cap and remove the drain plug.

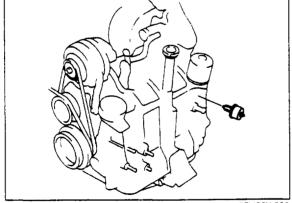
Warning

Wait a while if the engine is too hot. Use caution when draining.

- 3. Clean and install the drain plug with a new gasket.
- 4. Refill the engine with the specified oil to the "F" mark on the level gauge.
- 5. Refit the oil filler cap securely.



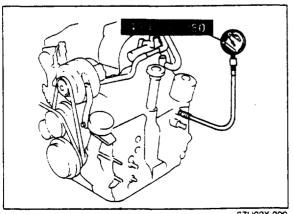
- 6. Start the engine and check for leaks.
- 7. Stop the engine and recheck the level.



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OIL PRESSURE

- 1. Remove the oil pressure gauge unit.
- 2. Install the oil pressure gauge (49 0187 280) tester.

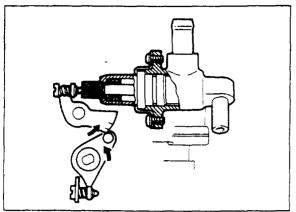


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- 3. Start the engine and let it warm up to operating temperature.
- 4. Run the engine at 3,000 rpm and note the gauge reading.

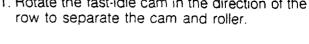
Standard oil pressure: 441—539 kPa (4.5—5.5 kg/cm², 64—78 psi)

5. If the pressure does not come up to the specified pressure, check for the cause, and repair. (Refer to Troubleshooting Guide.)

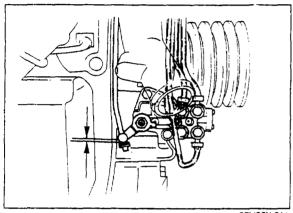


METERING OIL PUMP Rod Clearance

1. Rotate the fast-idle cam in the direction of the arrow to separate the cam and roller.



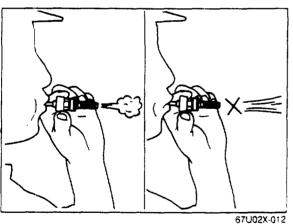




2. Check the clearance of the rod and the lever. If necessary, adjust the clearance with washers.

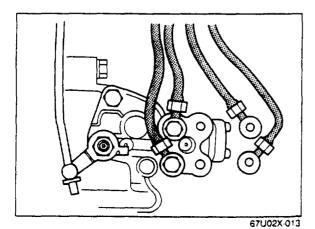
Clearance: 0-1 mm (0-0.04 in)





Oil Nozzle

- 1. Remove the housing oil nozzles from the rotor housing and remove the manifold oil nozzle from the intake manifold.
- 2. Check that air passes in only one direction. If not so, replace the oil nozzle.

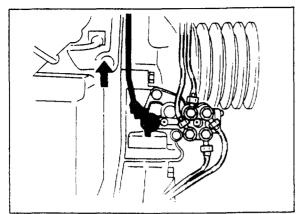


Oil Discharge

- 1. Warm up the engine.
- 2. Connect a tachometer to the engine.
- 3. Disconnect two housing oil hoses from the meter oil pump.

Caution Only disconnect two hoses at one time.

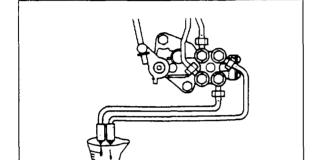
4. Connect suitable hoses to the metering oil pump for measurement.



4. Pull the metering oil pump rod up to its maximum.

Caution

Make sure to lift the rod fully while the engine is running.



67U02X-014

- 5. Run the engine at 2,000 rpm and measure the amount of oil discharged in 5 minutes.
- 6. Measure the manifold metering oil discharge in the same manner.

Standard discharge:

Turbo: 5.2-6.6 cc (0.32-0.40 cu in)

/2,000 rpm—5 min.

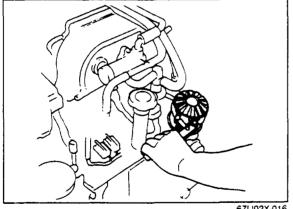
Non-Turbo: 4.2-5.6 cc (0.26-0.34 cu in) /2,000 rpm—5 min.



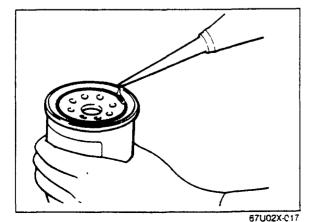
OIL FILTER

REPLACEMENT

- 1. Remove the oil filter with a suitable wrench.
- 2. Clean the mounting surface.



67U02X-016



3. Apply a small amount of engine oil to the rubber seal of the new filter.

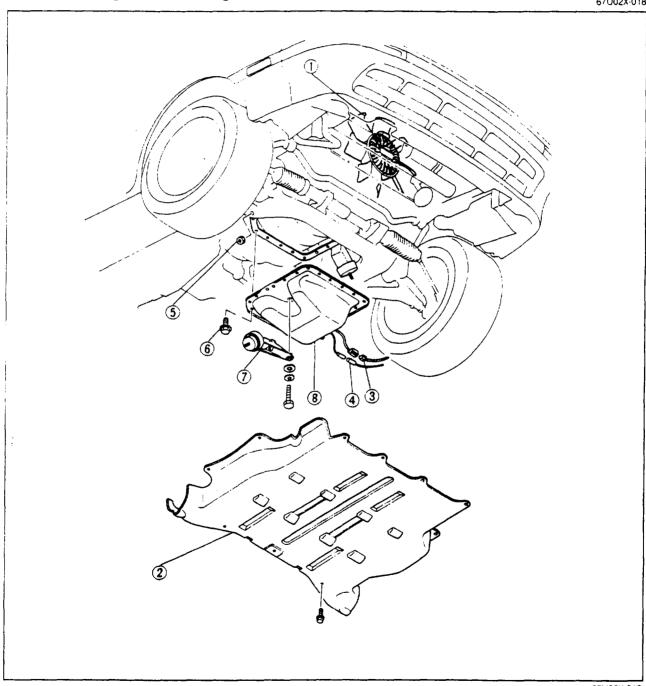
- 4. Install the oil filter and tighten it thoroughly by hand
- 5. Start the engine and check for leaks.
- 6. Check the oil level.

OIL PAN

REMOVAL AND INSTALLATION

- 1. Disconnect the negative battery cable.
- 2. Drain the engine oil.
- 3. Remove in the sequence shown in the figure.
- 4. Install in the reverse order of removal.
- 5. Add the prescribed amount of oil.
- 6. Check the engine for oil leakage and level.

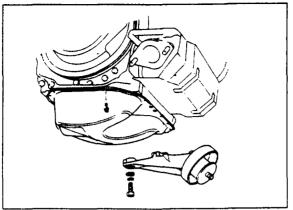
67U02X-018



- 1. Cooling fan
- 2. Engine under cover
- 3. Oil level sensor connector
- 4. Oil thermo unit connector

- 5. Engine mount nut
- 6. Oil pan mounting bolt
- 7. Right engine mount
- 8. Oil pan





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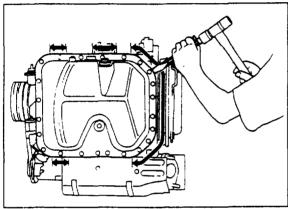
Removal Note

Oil pan attaching bolt

- 1. Remove the engine mounting nuts and lift the engine 40-60 mm (1.6-2.4 in).
- 2. Remove the oil pan attaching bolts.

Warning

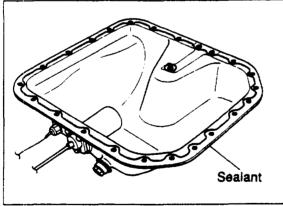
Be sure the vehicle is securely supported and the engine is securely hung.



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Oil pan

To separate the oil pan, insert a flat-tipped screw driver or a suitable tool into only the areas shown in the figure.



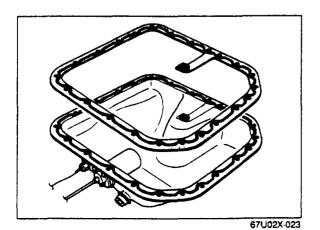
67U02X-022

Installation Note

1. Clean the mating surface of the housings and oil pan.

2. (Without gasket)

Apply a 4—6 mm (0.16—0.24 in) diameter bead of the sealant (8527 77 739) around the rim of the oil pan as shown in the figure. It should be continuously rimmed inside the bolt holes, and the ends should overlap.

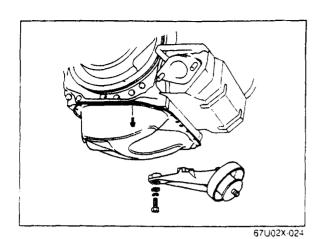


(With gasket)

Apply a 4-6 mm (0.16-0.24 in) diameter bead of sealant (8527 77 739, or suitable silicone base sealant) around the rim of the oil pan and the housing side of the new gasket. It should be continuously rimmed inside the bolt holes, and the ends should overlap.

Caution

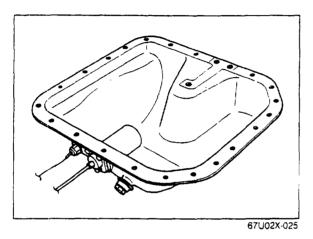
Install the oil pan within 30 minutes after the sealant is applied.



3. Install the oil pan and the right engine mount together, and tighten the bolts gradually.

Oil pan bolt tightening torque: 8—11 N·m (0.8—1.1 m-kg, 69—95 in-lb)

Engine mount bolt tightening torque: 63-93 N·m (6.4-9.5 m, 46-69 ft-lb)



INSPECTION

Check the following points. Repair or replace if necessary.

- 1. Cracks, distortion, damage
- 2 Damaged drain plug threads

OIL PUMP

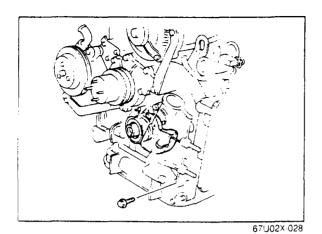
REMOVAL AND INSTALLATION

- 1. Disconnect the negative battery cable.
- 2. Drain the engine oil.
- 3. Remove in the sequence shown in the figure.

4. Install in the reverse order of removal. 67U02X-026

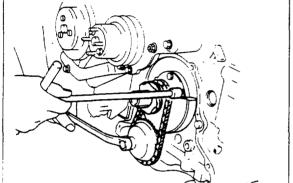
- 1. Cooling fan
- 2. Air pump drive belt
- 3. Alternator drive belt
- 4. P/S pump and drive belt
- 5. A/C compressor and drive belt
- 6. Crank angle sensor
- 7. A/C compressor P/S pump bracket
- 8. Oil pipe
- 9. Metering oil pump

- 10. Oil pan (Refer to page 2-8.)
- 11. Eccentric shaft pulley lock bolt
- 12. Eccentric shaft bypass valve and spring
- 13. Eccentric shaft pulley
- 14. Front cover
- 15. Distributor drive gear
- 16. Oil pump drive gear and driven gear, and chain
- 17. Oil pump



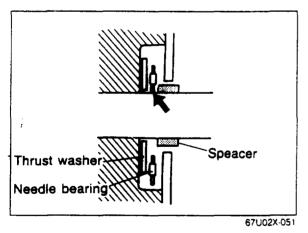
Removal Note Front cover

- 1. Turn the eccentric shaft so that the balance weight is in the lower position to provide clearance between the balance weight and water pump.
- 2. Remove the front cover.



Oil pump lock nut

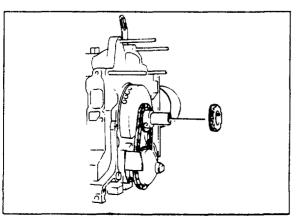
To loosen the oil pump lock nut, lock the balance weight.



Installation Note

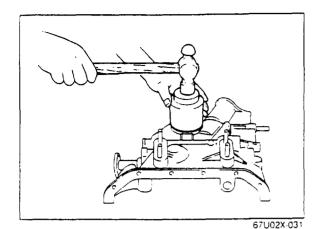
Caution

Before tightening the eccentric shaft lock bolt, do not move the eccentric shaft and the balance weight to prevent the needle bearing from being wedged by the spacer.



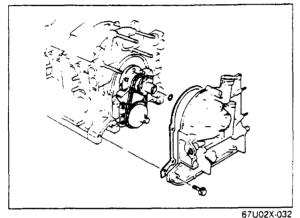
Distributor drive gear

Install the distributor drive gear so that the chamfer surface faces the front housing.



Front cover

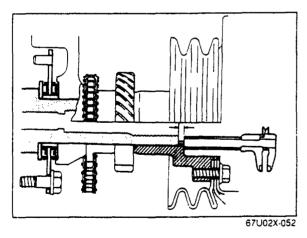
- 1. Replace the front oil seal.
 - (1) Press out the oil seal.
 - (2) Apply engine oil to the front cover and new oil seal.
 - (3) Press the oil seal into the front cover.
 - (4) Apply engine oil to the oil seal lip.



- Apply petroleum jelly to the new "O" ring and install it in the oil passage hole.
 - 3. Install the front cover with a new gasket.

Tightening torque: 16—22 N·m (1.6—2.3 m-kg, 12—17 ft-lb)

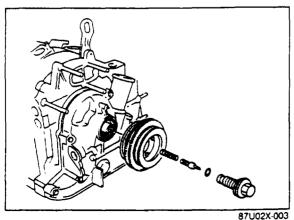
4. Cut away the part of the gasket which projects out from the oil pan.



Eccentric shaft pulley lock bolt

- 1. Check the pulley boss protrusion from the eccentric shaft end.
 - (1) Temporarily install the lock bolt, and tighten it by hand only.
 - (2) Remove the lock bolt, and measure the pulley boss protrusion. If it is over the limit, the needle bearing may be wedged by the spacer. Remove and reassemble the needle bearing correctly.

Protrusion limit: 2.44 mm (0.0961 in)



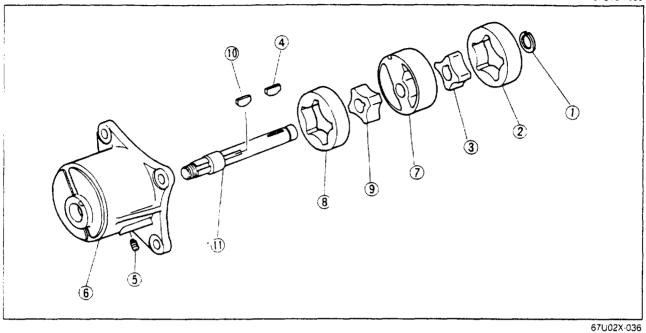
- Apply a sealing agent to the flange surface of the bolt.
- 3. Apply a tightening agent to the threads of the bolt.
- 4. Apply engine oil to the new "O" ring and install it on the bolt.
- 5. Install the new pulley lock bolt.

Tightening torque: 108—132 N·m (11.0—13.5 m-kg, 80—98 ft-lb)

DISASSEMBLY AND ASSEMBLY

- 1. Disassemble in the sequence shown in the figure.
- 2. Assemble in the reverse order of disassembly.

67U02X-035



1. Snap ring

2. Rear outer rotor

3. Rear inner rotor

4. Kev

5. Screw

6. Body

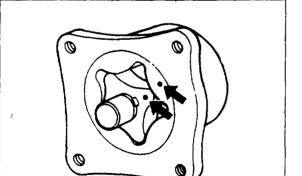
7. Middle plate

8. Front outer rotor

9. Front inner rotor

10. Key

11. Shaft



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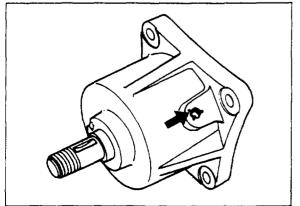
Caution Do not confuse the front and rear rotors.

Assembly Note Outer rotor and inner rotor

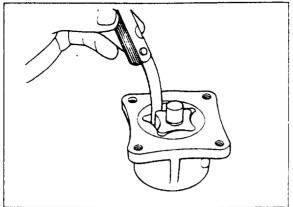
Install the outer and inner rotors at front and rear so that the tally marks on the rotors go toward the front housing.



Crimp the screw after installing it.







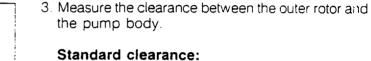
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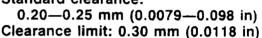
INSPECTION

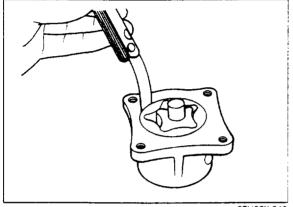
- 1. Inspect the oil pump parts for wear or damage, and replace if necessary.
- 2. Measure the clearance between the lobes of rotors with a feeler gauge.

Standard clearance:

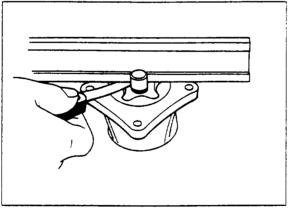
0.03-0.12 mm (0.0012-0.0047 in) Clearance limit: 0.15 mm (0.0059 in)



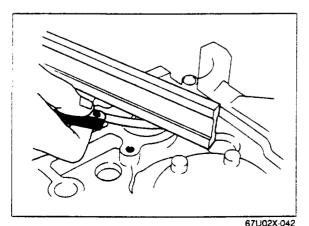




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- 4. Inspect the end float of the rotors.
 - (1) Measure the sinking of the rotor from the pump body.



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- (2) Measure the sinking of the rotor sliding surface from the pump mounting surface.
- (3) Add the two sinking amounts. If necessary, grind the pump body, or replace it.

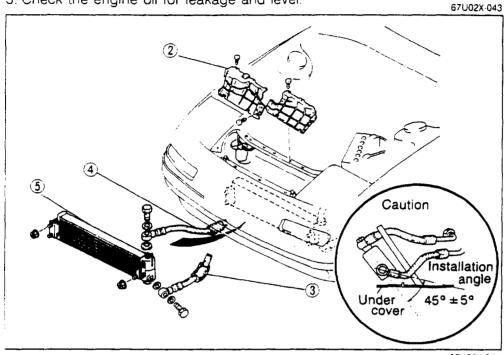
Standard end float:

0.03-0.13 mm (0.0012-0.0051 in) End float limit: 0.15 mm (0.0059 in)

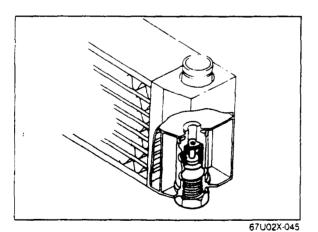
OIL COOLER

REMOVAL AND INSTALLATION

- 1. Remove in the sequence shown in the figure.
- 2. Install in the reverse order of removal.
- 3. Check the engine oil for leakage and level.



- 1. Under cover
- 2. Radiator grill upper cover
- 3. Oil inlet hose
- 4. Oil outlet hose
- 5. Oil cooler



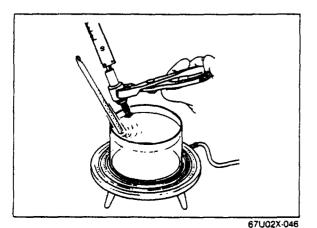
67U02X-044

INSPECTION Oil Cooler

Visually check the oil cooler for damage, cracks or leakage. Repair or replace if necessary.

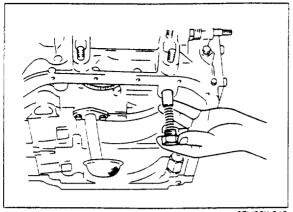
Oil Cooler Bypass Valve

 Remove the bypass valve from the bottom of the oil cooler.



- 2. Place the bypass valve in oil and heat the oil gradually.
- 3. Check the protrusion of the valve at 65°C (149°F).

Protrusion: 5 mm (0.2 in) min.

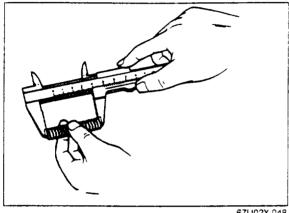


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OIL PRESSURE CONTROL VALVE

REMOVAL AND INSTALLATION

- 1. Remove the parts in the following order:
 - (1) Oil pan (Refer to page 2-8.)
 - (2) Cap bolt and spring
 - (3) Control plunger
- 2. Install in the reverse order.
- 3. Check the engine oil for leakage and level.

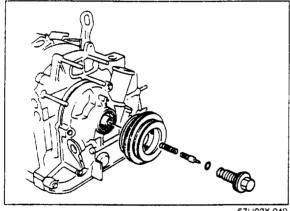


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INSPECTION

- 1. Check each part for damage or scoring. Replace if necessary.
- 2. Measure the free length of the spring, and if necessary, replace it.

Standard free length: 73.0 mm (2.87 in)

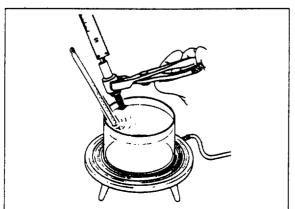


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ECCENTRIC SHAFT BYPASS VALVE

REMOVAL AND INSTALLATION

- 1. Remove the parts in the following order:
 - (1) Cooling fan
 - (2) Drive belts
 - (3) Eccentric shaft lock bolt
 - (4) Bypass valve and spring
- 2. Install in the reverse order. (Refer to page 2-13 when installing eccentric shaft pulley.)
- 3. Check the engine oil for leakage and level.



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INSPECTION

- 1. Place the eccentric shaft bypass valve in oil and heat up the oil gradually.
- 2. Check the protrusion of the valve at 60°C (140°F).

Protrusion: 6 mm (0.24 in) min.