This file is available for free download at http://www.iluvmyrx7.com

This file was not scanned to deprive Mazda of any money - it was scanned due to the rareness of the original manuals and the overwhelming need of the RX-7 owner to have this information so that they can accurately troubleshoot problems. Perhaps if Mazda’s dealerships could support the Rotary Engine it wouldn’t be so necessary for the owners to do so.

Many thanks to Lenny Terris for scanning this.
Before beginning any service procedure, refer to the 1994 RX-7 Body Electrical Troubleshooting Manual; see section S for air bag system service warnings and section J1 for audio antitheft system alarm conditions.

LUBRICATION SYSTEM

INDEX .............................................. D - 2
OUTLINE ........................................... D - 3
SPECIFICATIONS ............................... D - 3
TROUBLESHOOTING GUIDE ................. D - 4
OIL PRESSURE ................................. D - 5
  PREPARATION ............................... D - 5
  INSPECTION ............................... D - 5
ENGINE OIL ...................................... D - 6
  INSPECTION ............................... D - 6
  REPLACEMENT .............................. D - 6
OIL FILTER ....................................... D - 7
  REPLACEMENT .............................. D - 7
OIL COOLER ...................................... D - 8
  REMOVAL / INSTALLATION ............... D - 8
OIL PAN .......................................... D - 9
  PREPARATION ............................... D - 9
  REMOVAL / INSTALLATION ............... D -10
OIL PRESSURE CONTROL VALVE ............ D -13
  REMOVAL / INSTALLATION ............... D -13
METERING OIL PUMP ......................... D -14
  PREPARATION ............................... D -14
  INSPECTION ............................... D -15
OIL PUMP ........................................ D -17
  DISASSEMBLY/ASSEMBLY ................. D -17
  INSPECTION ............................... D -18
1. Oil filter
   Replacement .................. page D-7
2. Oil cooler
   Removal / installation .......... page D-8
3. Oil pan
   Removal / Installation .......... page D-10
4. Metering oil pump
   Inspection .................... page D-14

ENGINE OIL SPECIFICATION
API SERVICE SG, SH (EO II)
ILSAC (Mineral oil only)
TOTAL CAPACITY:
4.9L (5.2 US qt, 4.3 Imp) except R1 model
5.4L (5.7 US qt, 4.8 Imp) R1 model
## OUTLINE

### SPECIFICATIONS

<table>
<thead>
<tr>
<th>Item</th>
<th>Engine model</th>
<th>13B Turbo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lubrication system</td>
<td></td>
<td>Force-fed</td>
</tr>
<tr>
<td>Oil pump</td>
<td>Type</td>
<td>Trochoid</td>
</tr>
<tr>
<td>Number of rotors</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Diameter x width of rotor</td>
<td>mm (in)</td>
<td>50 x 17.5 {1.97 x 0.69}</td>
</tr>
<tr>
<td>Control valve relief pressure</td>
<td>kPa (kgf·cm², psi)</td>
<td>1080 {110, 156}</td>
</tr>
<tr>
<td>Oil cooler</td>
<td>Type</td>
<td>Air-cooled, with bypass valve</td>
</tr>
<tr>
<td>Relief temperature</td>
<td>°C (°F)</td>
<td>60–85 {140–149} or below</td>
</tr>
<tr>
<td>Relief pressure differential</td>
<td>kPa (kgf·cm², psi)</td>
<td>349 {3.56, 50} at 60°C {149°F}</td>
</tr>
<tr>
<td>Regulator valve relief pressure</td>
<td>kPa (kgf·cm², psi)</td>
<td>780 {8.0, 110}</td>
</tr>
<tr>
<td>Oil filter</td>
<td>Type</td>
<td>Full-flow, paper element</td>
</tr>
<tr>
<td>Relief pressure differential</td>
<td>kPa (kgf·cm², psi)</td>
<td>98 {10, 14}</td>
</tr>
<tr>
<td>Eccentric shaft bypass valve relief temperature</td>
<td>°C (°F)</td>
<td>60 {140} or below</td>
</tr>
<tr>
<td>Engine oil</td>
<td>Total (dry engine)</td>
<td>4.9 {5.2, 4.3} ... except R1 model</td>
</tr>
<tr>
<td></td>
<td>Oil replacement</td>
<td>3.6 {3.8, 3.2}</td>
</tr>
<tr>
<td></td>
<td>Oil replacement (with filter)</td>
<td>3.8 {4.0, 3.3}</td>
</tr>
<tr>
<td></td>
<td>Oil filter</td>
<td>Factoryinstalled</td>
</tr>
<tr>
<td></td>
<td>Grade</td>
<td>Service part</td>
</tr>
<tr>
<td></td>
<td></td>
<td>API Service SG, SH (ECII) ILSAC (Mineral oil only)</td>
</tr>
</tbody>
</table>

### Recommended SAE Viscosity

<table>
<thead>
<tr>
<th>Temperature (°F)</th>
<th>5W-30</th>
<th>10W-30</th>
</tr>
</thead>
<tbody>
<tr>
<td>-30</td>
<td>-20</td>
<td>0</td>
</tr>
<tr>
<td>-20</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>0</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>10</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>20</td>
<td>120</td>
<td>140</td>
</tr>
</tbody>
</table>

*Anticipated ambient temperature range before the succeeding oil change, °C (°F)*
# TROUBLESHOOTING GUIDE

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Action</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine hard starting</td>
<td>Improper oil</td>
<td>Replace</td>
<td>D-6</td>
</tr>
<tr>
<td></td>
<td>Insufficient oil</td>
<td>Add oil</td>
<td></td>
</tr>
<tr>
<td>Excessive oil consumption</td>
<td>Malfunction of metering oil pump mechanical component</td>
<td>Inspect</td>
<td>D-14</td>
</tr>
<tr>
<td></td>
<td>Faulty oil nozzle</td>
<td>Inspect</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oil leakage</td>
<td>Repair</td>
<td>D-17</td>
</tr>
<tr>
<td></td>
<td>Loose drain plug or damaged washer</td>
<td>Tighten or replace</td>
<td>D-9</td>
</tr>
<tr>
<td></td>
<td>Faulty seal at oil pan</td>
<td>Repair</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Damaged front cover</td>
<td>Replace</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loose front cover bolt or oil pan bolt</td>
<td>Tighten</td>
<td>D-7</td>
</tr>
<tr>
<td></td>
<td>Damaged sealing rubber, O-ring, or front cover gasket</td>
<td>Replace</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Malfunction of oil seal</td>
<td>Replace</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loose oil filter</td>
<td>Tighten or replace</td>
<td>D-8</td>
</tr>
<tr>
<td></td>
<td>Loose or damaged oil level sensor or oil pressure gauge</td>
<td>Replace</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Damaged oil cooler or oil cooler hose</td>
<td>Replace</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Damaged oil tube</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil leakage</td>
<td>Oil leakage</td>
<td>Repair</td>
<td>D-6</td>
</tr>
<tr>
<td></td>
<td>Insufficient oil</td>
<td>Add oil</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Worn or damaged oil pump gear</td>
<td>Refer to Section C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clogged oil strainer</td>
<td>Clean</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Malfunction of oil pressure control valve</td>
<td>Replace</td>
<td>D-13</td>
</tr>
<tr>
<td></td>
<td>Malfunction of oil pressure regulator valve</td>
<td>Replace</td>
<td>D-9</td>
</tr>
<tr>
<td></td>
<td>Clogged oil filter</td>
<td>Replace</td>
<td>D-7</td>
</tr>
<tr>
<td></td>
<td>Malfunction of eccentric shaft bypass valve</td>
<td>Refer to Section C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Excessive oil clearance between eccentric shaft and main bearing</td>
<td>Refer to Section C</td>
<td></td>
</tr>
<tr>
<td>Oil pressure drop*</td>
<td>Oil leakage</td>
<td>Repair</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Insufficient oil</td>
<td>Add oil</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Worn or damaged oil pump gear</td>
<td>Refer to Section C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clogged oil strainer</td>
<td>Clean</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Malfunction of oil pressure control valve</td>
<td>Replace</td>
<td>D-13</td>
</tr>
<tr>
<td></td>
<td>Malfunction of oil pressure regulator valve</td>
<td>Replace</td>
<td>D-9</td>
</tr>
<tr>
<td></td>
<td>Clogged oil filter</td>
<td>Replace</td>
<td>D-7</td>
</tr>
<tr>
<td></td>
<td>Malfunction of eccentric shaft bypass valve</td>
<td>Refer to Section C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Excessive oil clearance between eccentric shaft and main bearing</td>
<td>Refer to Section C</td>
<td></td>
</tr>
<tr>
<td>Oil pressure gauge does not work</td>
<td>Oil pressure drop</td>
<td>As described above</td>
<td>D-5</td>
</tr>
<tr>
<td></td>
<td>Malfunction of oil pressure gauge unit</td>
<td>Refer to Section T</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Malfunction of electrical system</td>
<td>Refer to Section T</td>
<td></td>
</tr>
<tr>
<td>Oil level warning indicator illuminates when engine is running</td>
<td>Insufficient oil</td>
<td>Add oil</td>
<td>D-6</td>
</tr>
<tr>
<td></td>
<td>Malfunction of oil level sensor</td>
<td>Refer to Section T</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Malfunction of electrical system</td>
<td>Refer to Section T</td>
<td></td>
</tr>
<tr>
<td>Poor acceleration</td>
<td>Malfunction of metering oil pump electrical component</td>
<td>Inspect</td>
<td>D-14</td>
</tr>
<tr>
<td>Rough idle</td>
<td>Malfunction of metering oil pump electrical component</td>
<td>Inspect</td>
<td>D-14</td>
</tr>
</tbody>
</table>

* Oil pressure becomes low when the engine is cold because the eccentric shaft bypass valve operates.
OIL PRESSURE

Warning
- Continuous exposure with USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after this work.

PREPARATION

SST

49 0187 280
Gauge, oil-pressure
For inspection of oil pressure

INSPECTION

1. Disconnect the connector and remove the oil pressure sensor.

2. Install the SST.
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.

   Oil pressure: 340 kPa (3.5 kgf·cm², 50 psi) min

5. If the pressure is not as specified, check for the cause and repair. (Refer to Troubleshooting Guide.)
6. Remove the SST.

7. Apply sealant to the oil pressure sensor threads. Do not allow sealant in the pressure sensor hole.
8. Install the oil pressure sensor.

   Tightening torque:
   11–15 N·m (1.1–1.6 kgf·m, 8–11 ft·lbf)

9. Connect the sensor connector.
ENGINE OIL

INSPECTION
1. Be sure the vehicle is on level ground.
2. Warm up the engine to normal operating temperature and stop it.
3. Wait for five minutes.
4. Remove the dipstick and check the oil level and condition.
5. Add or replace oil as necessary.

Note
- The distance between the L and F marks on the dipstick represents 1.7 L [1.8 US qt, 1.5 Imp qt].

REPLACEMENT

Warning
- When the engine and the oil are hot, they can badly burn. Don't burn yourself with either.

1. Warm up the engine to the normal operating temperature and stop it.
2. Remove the oil filler cap and the oil drain plug.
3. Drain the oil into a container.
4. Install a new gasket and the drain plug.

Tightening torque:
30–41 N·m [3.0–4.2 kgf·m, 22–30 ft·lbf]

5. Refill the engine with the specified type and amount of engine oil.

Oil capacity:

<table>
<thead>
<tr>
<th></th>
<th>L (US qt, Imp qt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (dry engine)</td>
<td>4.9 [5.2, 4.3]...except R1 model</td>
</tr>
<tr>
<td></td>
<td>5.4 [5.7, 4.8]...R1 model</td>
</tr>
<tr>
<td>Engine oil replacement</td>
<td>3.6 [3.8, 3.2]</td>
</tr>
<tr>
<td>Engine oil replacement (with oil filter)</td>
<td>3.8 [4.0, 3.3]</td>
</tr>
</tbody>
</table>

6. Refit the oil filler cap.
7. Run the engine a few minutes and stop it.
8. Recheck the oil level and add oil if necessary.
OIL FILTER

REPLACEMENT
1. Remove the oil filter by using the oil filter wrench.
2. Using a clean rag, wipe the mounting surface of the engine.
3. Apply a small amount of clean engine oil to the rubber seal of the new filter.
4. Install the oil filter and tighten it until the rubber seal contacts the base, and then tighten the filter an additional 1-1/6 turns by hand.
5. Start the engine and inspect for leaks around the filter seal.
6. Stop the engine and check the oil level; add oil if necessary.

Note
• The factory installed oil filter and the service part filter are different.

Service oil filter capacity:
0.17 L {0.18 US qt, 0.15 Imp qt}
OIL COOLER

REMOVAL / INSTALLATION
1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.

Note
(In case of two oil cooler are equipped)
- LH oil cooler is shown.
  Remove / install RH oil cooler in same procedure.

1. Light bezel
2. Brake pipe air duct
3. Oil cooler hoses
   Removal Note ......................... page D-9
4. Oil cooler
   Removal Note ........................ page D-9
5. Air duct (oil cooler)
OIL COOLER, OIL PAN

Removal Note
Oil cooler hose
Remove the clip and disconnect the oil cooler hose, using a drain pan to catch the oil.

Oil cooler
1. Remove the light bezel.
2. Remove the mounting bracket nuts.
3. Remove the oil cooler.

Steps After Installation
Fill the engine with the specified amount and type of engine oil. (Refer to page D-6.)

OIL PAN
PREPARATION
SST

<table>
<thead>
<tr>
<th>49 G017 5A0</th>
<th>For support of engine</th>
<th>49 G017 501</th>
<th>For support of engine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support, engine</td>
<td></td>
<td>Bar (Part of 49 G017 5A0)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>49 G017 502</th>
<th>For support of engine</th>
<th>49 G017 503</th>
<th>For support of engine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support (Part of 49 G017 5A0)</td>
<td></td>
<td>Hook (Part of 49 G017 5A0)</td>
<td></td>
</tr>
</tbody>
</table>
REMOVAL / INSTALLATION
1. Disconnect the negative battery cable.
2. Remove the undercover.
3. Drain the engine oil.
4. Remove in the order shown in the figure, referring to Removal Note.
5. Install in the reverse order of removal, referring to Installation Note.

1. Undercover
2. Stabilizer
3. Engine mount bracket
   Removal Note ................................ page D-11
4. Steering gear box
5. Crossmember
   Removal Note ................................. page D-11
6. Oil pan
   Removal Note ................................. page D-11
   Installation Note ............................. page D-12
Removal Note

Engine mount bracket
1. Assemble the SST and connect the hook to the front engine hanger.

2. Remove the engine mounting nuts.
3. Turn the bolt of the SST clockwise to lift the engine.

Crossmember
1. Remove the power steering oil hose bracket from the crossmember.
2. Remove the bolts and nuts (arrows) and the crossmember.

Oil pan
1. Remove the engine mount brackets from the engine.
2. Disconnect the oil level sensor connector and remove it from the harness bracket.
3. Remove the oil pan mounting bolts.

Caution
- Pry tools can easily scratch the oil pan contact surfaces. Prying off the oil pan can also easily bend the oil pan flange. Refer to the following instructions before removing the oil pan.

4. Insert a screwdriver only between the points shown in the figure to pry the oil pan loose.
OIL PAN

Installation Note
Oil pan
1. Remove all foreign material from the oil pan contact surfaces.

Caution
• If the bolts are reused, remove the old sealant from the bolt threads. Tightening bolts with old sealant on them may cause cracking inside the bolt holes.

2. Apply silicone sealant to the contact surfaces of the oil pan and the engine side of the new gasket.
3. Install the oil pan within five minutes of applying the sealant.

Tightening torque:
8.9–11.7 N·m (90–120 kgf·cm, 79–104 in·lbf)

Steps After Installation
Fill the engine with the specified amount and type of engine oil. (Refer to page D-6.)
OIL PRESSURE CONTROL VALVE

REMOVAL / INSTALLATION
1. Remove the parts in the following order.
   (1) Oil pan (Refer to page D–9.)
   (2) Cap bolt and spring
   (3) Control plunger
2. Install in the reverse order.
3. Check the engine for oil leakage and check the oil level.

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

Free length: 73.0 mm (2.87 in)
METERING OIL PUMP

PREPARATION
SST

<table>
<thead>
<tr>
<th>49 H018 9A1</th>
<th>For diagnosis of metering oil pump system</th>
<th>49 B019 9A0</th>
<th>System Selector</th>
<th>For diagnosis of metering oil pump system</th>
</tr>
</thead>
</table>

Malfunctions related to the metering oil pump may be described as electrical component problems and mechanical component problems.

Electrical Component Related Problem
1. Check for service codes by using the SST. (Refer to section F.)
2. If service code No. 20, 26, 27 or 37 appears, check the metering oil pump following the diagnosis chart below.

Diagnosis Chart

<table>
<thead>
<tr>
<th>Service Code No.</th>
<th>Possible Cause</th>
<th>Action</th>
</tr>
</thead>
</table>
| 20 (Metering oil pump position sensor) | • Open or short circuit in position sensor wiring  
• Open or short circuit in wiring between powertrain control module and position sensor  
• Loose connection of position sensor or powertrain control module | Perform Inspection 2 (page D-16) |
| 26 (Metering oil pump control system) | • Open or short circuit in wiring between powertrain control module and stepping motor  
• Loose connection of metering oil pump or powertrain control module  
• Damaged stepping motor  
• Insufficient powertrain control module voltage | Perform Inspection 1 (page D-15) |
| 27 (Metering oil pump control system) | • Open or short circuit in wiring between powertrain control module and stepping motor  
• Loose connection of metering oil pump or powertrain control module  
• Damaged stepping motor  
• Position sensor inaccurate  
• Insufficient powertrain control module voltage | Perform Inspection 1 (page D-15) |
| 37 (Battery positive voltage drop) | • Malfunction of charging system | Refer to Section G |

Control Module Terminal

D-14
INSPECTION
1. Metering oil pump control system

Stepping motor resistance
Measure the resistance at the following terminals. Is voltage as shown? (Reading must be A or B)

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Reading</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ B1 to S1 - S3</td>
<td>Open</td>
<td>16-31 Ω</td>
<td></td>
</tr>
<tr>
<td>+ B2 to S2 - S4</td>
<td>Open</td>
<td>16-31 Ω</td>
<td></td>
</tr>
<tr>
<td>+ B1 to S2 - S4</td>
<td>16-31 Ω</td>
<td>Open</td>
<td></td>
</tr>
<tr>
<td>+ B2 to S1 - S3</td>
<td>16-31 Ω</td>
<td>Open</td>
<td></td>
</tr>
</tbody>
</table>

YES

NO Replace metering oil pump

Harness terminal voltage
Turn ignition switch ON; is battery positive voltage indicated at terminals +B1 and +B2 of harness with connector disconnected?

YES

NO Repair or replace wiring harness

Harness and connector continuity
Is there continuity between stepping motor and powertrain control module as shown?

<table>
<thead>
<tr>
<th>Stepping motor</th>
<th>Powertrain control module</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1 (B/O)</td>
<td>4I</td>
</tr>
<tr>
<td>S2 (B/L)</td>
<td>4J</td>
</tr>
<tr>
<td>S3 (B/LG)</td>
<td>4K</td>
</tr>
<tr>
<td>S4 (B/Y)</td>
<td>4L</td>
</tr>
</tbody>
</table>

YES

NO Repair or replace wiring harness

Powertrain control module terminal voltage (stepping motor)
Turn ignition switch ON; is battery positive voltage indicated at terminals 4I, 4J, 4K, and 4L?

Note
This test must be done with connector connected.

NO Replace powertrain control module

YES

Powertrain control module terminal voltage (position sensor)
Turn ignition switch ON: Is approx 1-2.2V indicated at terminal 3A?

YES

NO

Is approx 1.1V indicated at idle?

YES

NO

Does voltage increase from approx 1.1V then return to approx 1.1V when accelerating and decelerating engine?

YES

NO Replace metering oil pump

Position sensor operation
Cancel memory of malfunctions by disconnecting negative battery cable for 20 seconds; then reconnect it
Warm up engine until coolant temperature reaches 80°C (176°F) and let it idle for 15 minutes
Does service code No. 26 or 27 appear?

NO

YES Replace metering oil pump

Metering oil pump control system OK

D-15
2. Metering oil pump position sensor

**Position sensor resistance**

<table>
<thead>
<tr>
<th>Is resistance between terminals Vc and E as specified?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance: $1-2 , \text{k}\Omega$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Is resistance of terminal (Vc-E) and (Vc-Vo) as specified?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance: $0.4-12 , \text{k}\Omega$</td>
</tr>
</tbody>
</table>

YES  NO  Replace metering oil pump

**Harness and connector continuity**

<table>
<thead>
<tr>
<th>Is there continuity between position sensor and powertrain control module as shown?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position sensor</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Vc (BR/W)</td>
</tr>
<tr>
<td>Vc (G/B)</td>
</tr>
<tr>
<td>E (BR/B)</td>
</tr>
</tbody>
</table>

YES  NO  Repair or replace wiring harness

**Harness short circuit**

<table>
<thead>
<tr>
<th>Is there short or ground between Vc and 3A of wiring harness?</th>
</tr>
</thead>
</table>

YES  NO  Repair or replace wiring harness

**Control unit terminal voltage**

<table>
<thead>
<tr>
<th>Turn ignition switch ON; is there approx. 1-4.2V indicated at terminal 3A?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancel memory of malfunctions by disconnecting negative battery cable for 20 seconds; then reconnect it.</td>
</tr>
<tr>
<td>Does service code No. 20 appear?</td>
</tr>
</tbody>
</table>

NO  YES  Replace metering oil pump  YES  Replace powertrain control module

**Position sensor operation**

<table>
<thead>
<tr>
<th>Cancel memory of malfunctions by disconnecting negative battery cable for 20 seconds; then reconnect it.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warm up engine until coolant temperature reaches $80^\circ \text{C}$ ($176^\circ \text{F}$) and let it idle 15 minutes</td>
</tr>
<tr>
<td>Does service code No. 20 appear?</td>
</tr>
</tbody>
</table>

NO  YES  Replace metering oil pump

Metering oil pump control system OK

**Mechanical Component Related Problem**

Excessive oil consumption may be caused by a metering oil pump malfunction. Before replacing the metering oil pump, refer to "Oil leakage" in the Troubleshooting Guide (page D-4) and perform the electrical component inspection (pages D-15 and D-16).
Oil nozzle
1. Remove the oil nozzles from the rotor housing and the intake manifold.
2. Verify that air passes in only one direction as shown. If not so, replace the oil nozzle.

OIL PUMP
DISASSEMBLY / ASSEMBLY
1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly, referring to Assembly Note.

1. Snap ring
2. Rear outer rotor
   Assembly Note
   page D-18
3. Rear inner rotor
   Assembly Note
   page D-18
4. Key
5. Screw
   Assembly Note
   page D-19
6. Body
7. Center plate
8. Front outer rotor
   Assembly Note
   page D-18
9. Front inner rotor
   Assembly Note
   page D-18
10. Key
11. Shaft
OIL PUMP

INSPECTION
1. Inspect the oil pump parts for wear and damage. Replace as necessary.
2. Measure the clearance between the lobes of rotors by using a feeler gauge.

   Standard clearance:
   0.03–0.12 mm (0.0012–0.0047 in)
   Maximum: 0.15 mm (0.0059 in)

3. Measure the clearance between the outer rotor and the pump body.

   Standard clearance:
   0.20–0.25 mm (0.0079–0.098 in)
   Maximum: 0.30 mm (0.0118 in)

4. Inspect the side clearance of the rotors.
   (1) Using a straightedge and a feeler gauge, measure the depth of the rotor in the pump body.

   (2) Measure the depth of the rotor sliding surface from the pump mounting surface.
   (3) Add these two depth to obtain the side clearance.
   (4) If not as specified, grind or replace the pump body.

   Standard end clearance:
   0.03–0.125 mm (0.0012–0.0049 in)
   Maximum: 0.15 mm (0.0059 in)

Assembly Note
Outer rotor and inner rotor
Install the front and rear outer and inner rotors so that the tally marks on the rotors face the front housing.
OIL PUMP

Screw
To prevent the screw from loosening, stake it after installation.