

2004 ENGINE

Lubrication - RAV4

OIL AND FILTER

INSPECTION

1. CHECK ENGINE OIL QUALITY

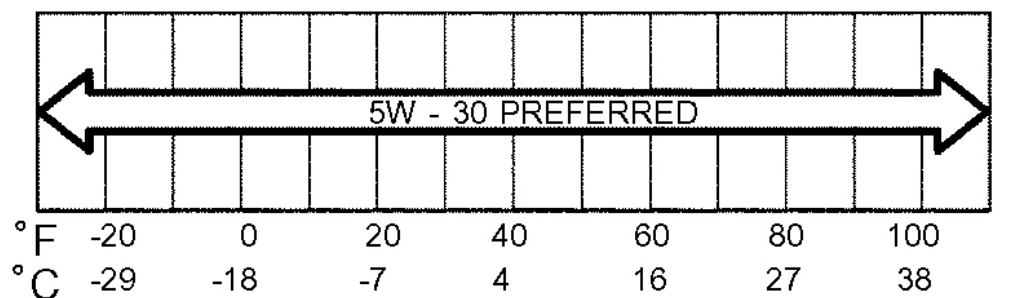
Check the oil for deterioration, entry of water, discoloring or thinning.

If the quality is visibly poor, replace the oil.

Oil grade:

API grade SL, Energy-Conserving or ILSAC multi-grade engine oil. SAE 5W-30 is the best choice for your vehicle, for good fuel economy, and good starting in cold weather.

Recommended Viscosity (SAE):



TEMPERATURE RANGE ANTICIPATED BEFORE NEXT OIL CHANGE

P

G02925728

Fig. 1: Identifying Recommended Viscosity (SAE) Graph
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. CHECK ENGINE OIL LEVEL

After warming up the engine and then 5 minutes after the engine stop, oil level should be between the upper and lower marks on the dipstick.

If low, check for leakage and add oil up to the upper dot mark.

NOTE: Do not fill with engine oil above the upper dot mark.

3. REMOVE OIL PRESSURE SWITCH AND INSTALL OIL PRESSURE GAUGE

- a. Remove the oil pressure switch.

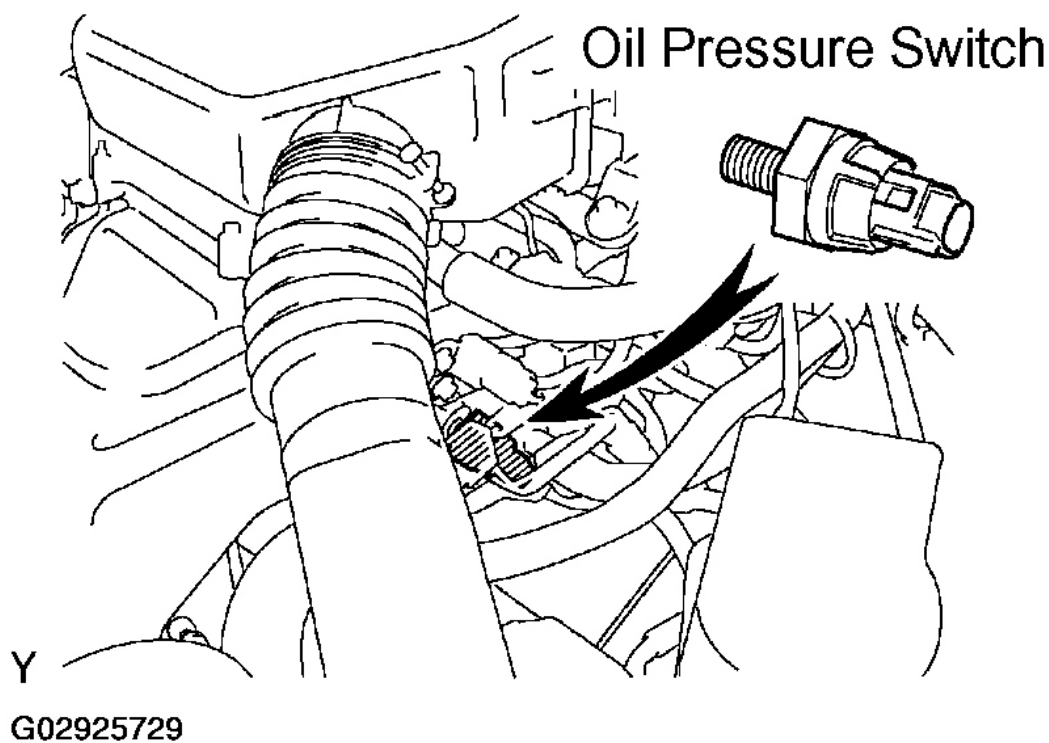


Fig. 2: Removing Oil Pressure Switch

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the oil pressure gauge.

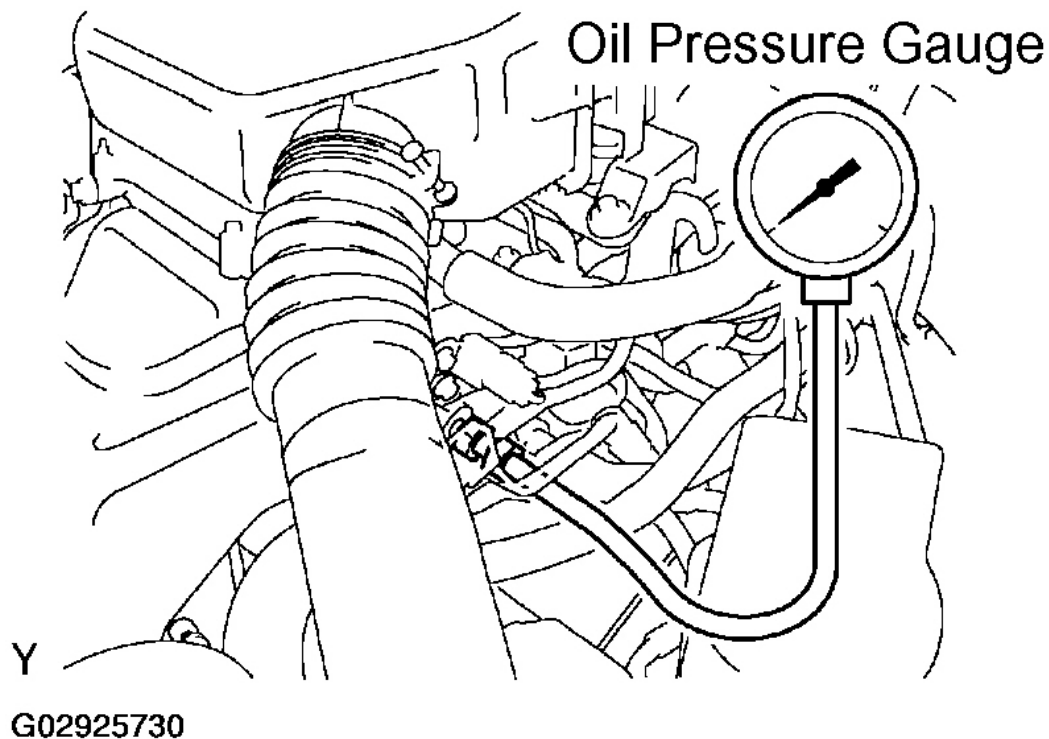


Fig. 3: Installing Oil Pressure Gauge

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

5. CHECK OIL PRESSURE

Oil pressure:

ENGINE RPM AND OIL PRESSURE SPECIFICATION

Idle	29 kPa (0.3 kgf/cm ² , 4.3 psi) or more
3,000 RPM	245 to 539 kPa (2.5 to 5.5 kgf/cm ² , 36 to 78 psi)

6. REMOVE OIL PRESSURE GAUGE AND REINSTALL OIL PRESSURE SWITCH

- Remove the oil pressure gauge.
- Apply adhesive to 2 or 3 threads of the oil pressure switch.

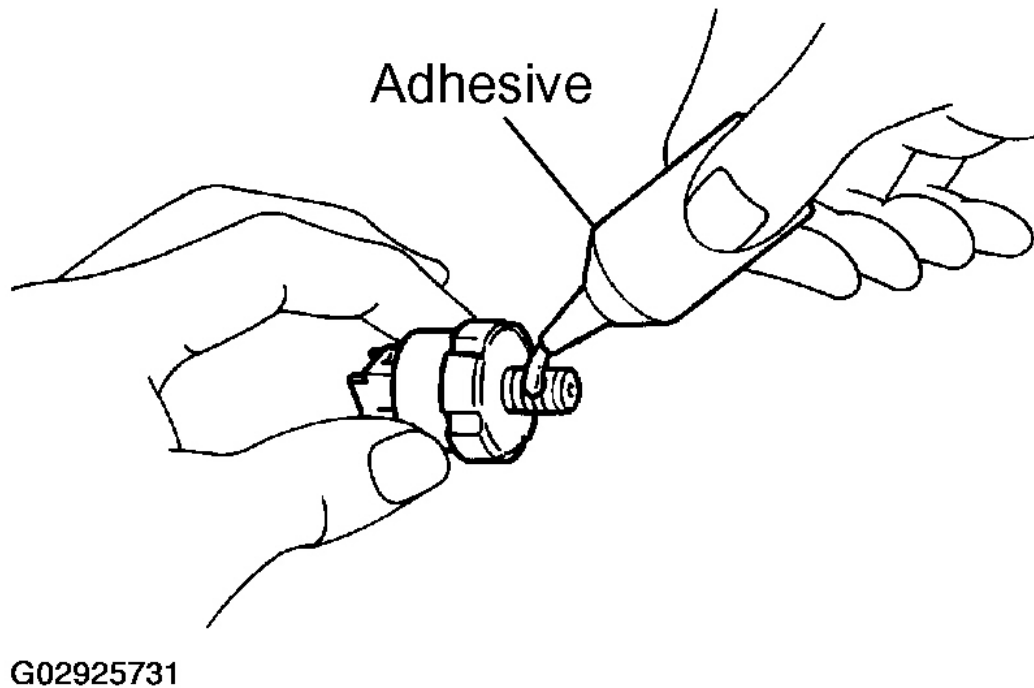


Fig. 4: Applying Adhesive To Oil Pressure Switch Threads
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Adhesive:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

- c. Install the oil pressure switch.

Torque: 13 N.m (133 kgf.cm, 10 ft.lbf)

7. START ENGINE AND CHECK FOR OIL LEAKS

REPLACEMENT

CAUTION:

- Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.
- Exercise caution in order to minimize the length and frequency of contact of your skin to used oil. Wear protective clothing and gloves. Wash your skin thoroughly with soap and water, or use water-less

hand cleaner, to remove any used engine oil. Do not use gasoline, thinners, or solvents.

- In order to preserve the environment, used oil and used oil filter must be disposed of only at designated disposal sites.

1. REMOVE ENGINE UNDER COVER

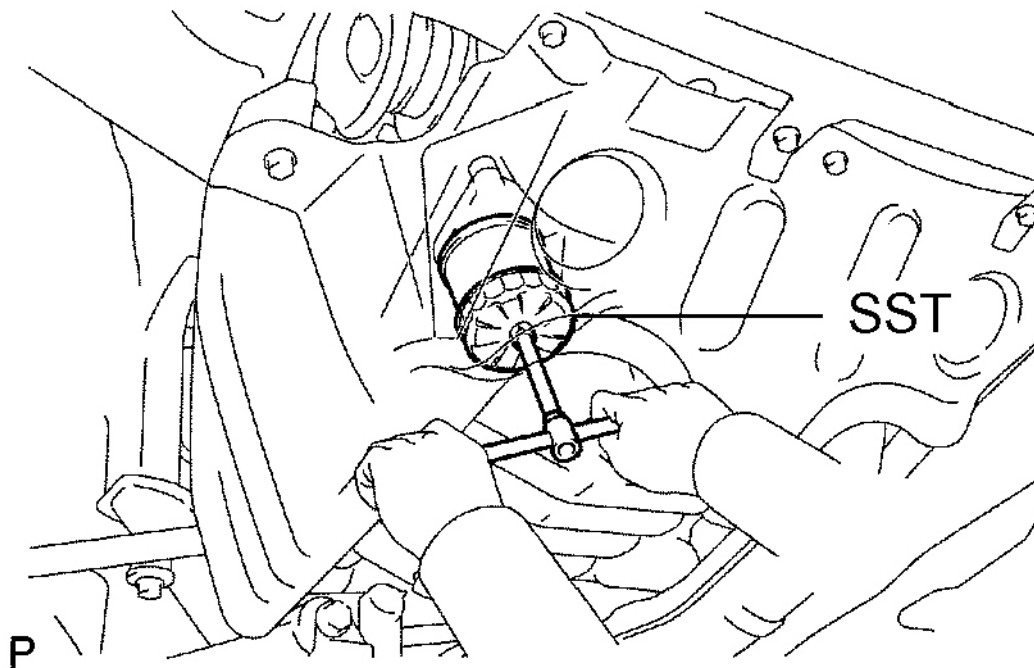
2. DRAIN ENGINE OIL

- a. Remove the oil filter cap.
- b. Remove the oil drain plug, and drain the oil into a container.

3. REPLACE OIL FILTER

- a. Using SST, remove the oil filter.

SST 09228-06501



G02925732

Fig. 5: Removing Oil Filter Using SST

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Check and clean the oil filter installation surface.
- c. Check the part number of the new oil filter is as same as old one.

- d. Apply clean engine oil to the gasket of a new oil filter.
- e. Lightly screw the oil filter into place, and tighten it until the gasket contacts the seat.

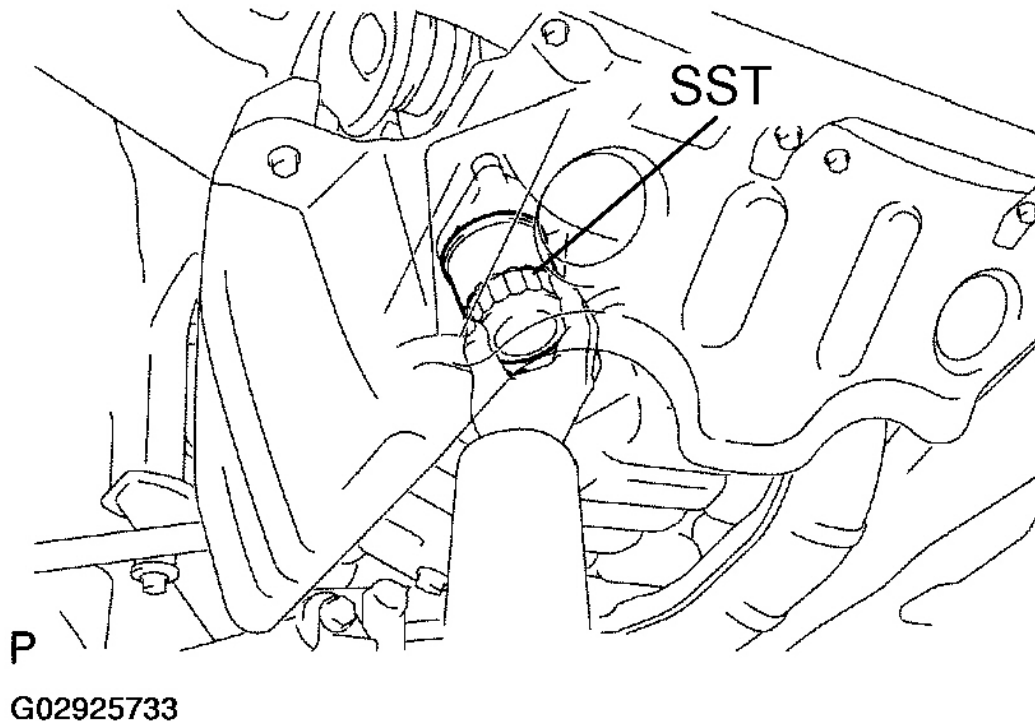


Fig. 6: Screwing Oil Filter Into Place

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- f. Using SST, tighten it an additional $\frac{3}{4}$ turn.

SST 09228-06501

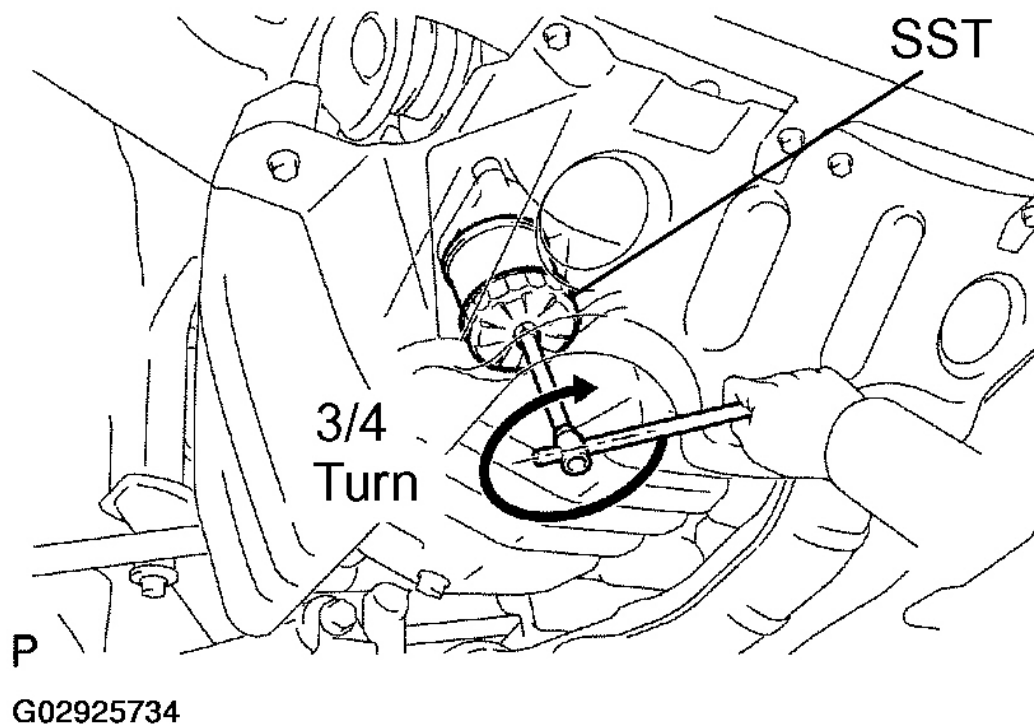


Fig. 7: Tightening Oil Filter Additional 3/4 Turn Using SST
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. REFILL WITH ENGINE OIL

- Clean and install the oil drain plug with a new gasket.

Torque: 24.5 N.m (250 kgf.cm, 18 ft.lbf)

- Fill with fresh engine oil.

Capacity:

ENGINE OIL CAPACITY SPECIFICATION

Drain and refill w/Oil filter change	3.8 liters (4.0 US qts, 3.3 Imp. qts)
Drain and refill w/o Oil filter change	3.6 liters (3.8 US qts, 3.2 Imp. qts)
Dry fill	4.3 liters (4.5 US qts, 3.8 Imp. qts)

- Install the oil filter cap.

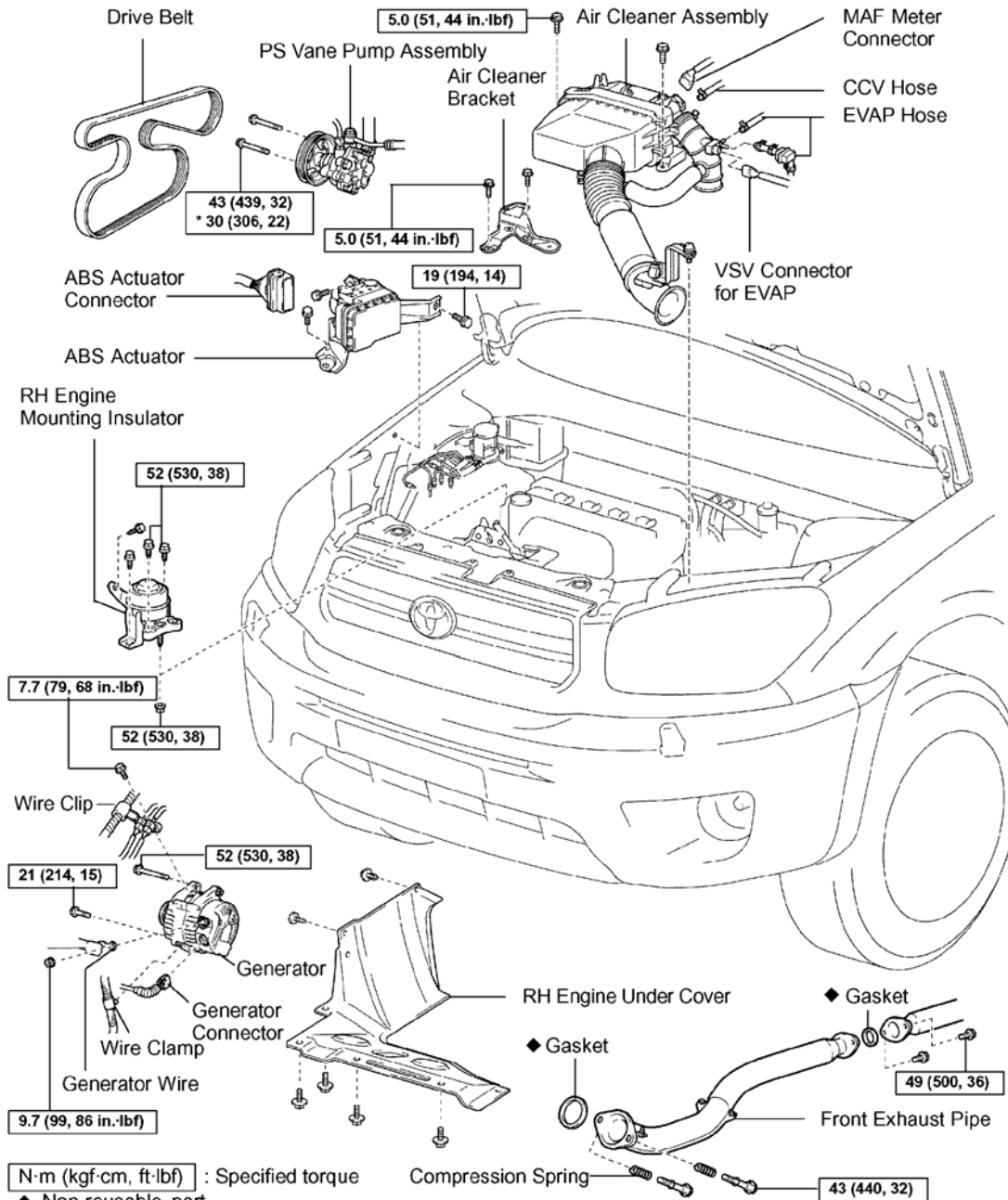
5. START ENGINE AND CHECK FOR OIL LEAKS

6. INSTALL CENTER ENGINE UNDER COVER

7. RECHECK ENGINE OIL LEVEL

OIL PUMP

COMPONENTS



2004 Toyota RAV4
2004 ENGINE Lubrication - RAV4

Fig. 8: Oil Pump Components (1 Of 3)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2004 Toyota RAV4

2004 ENGINE Lubrication - RAV4

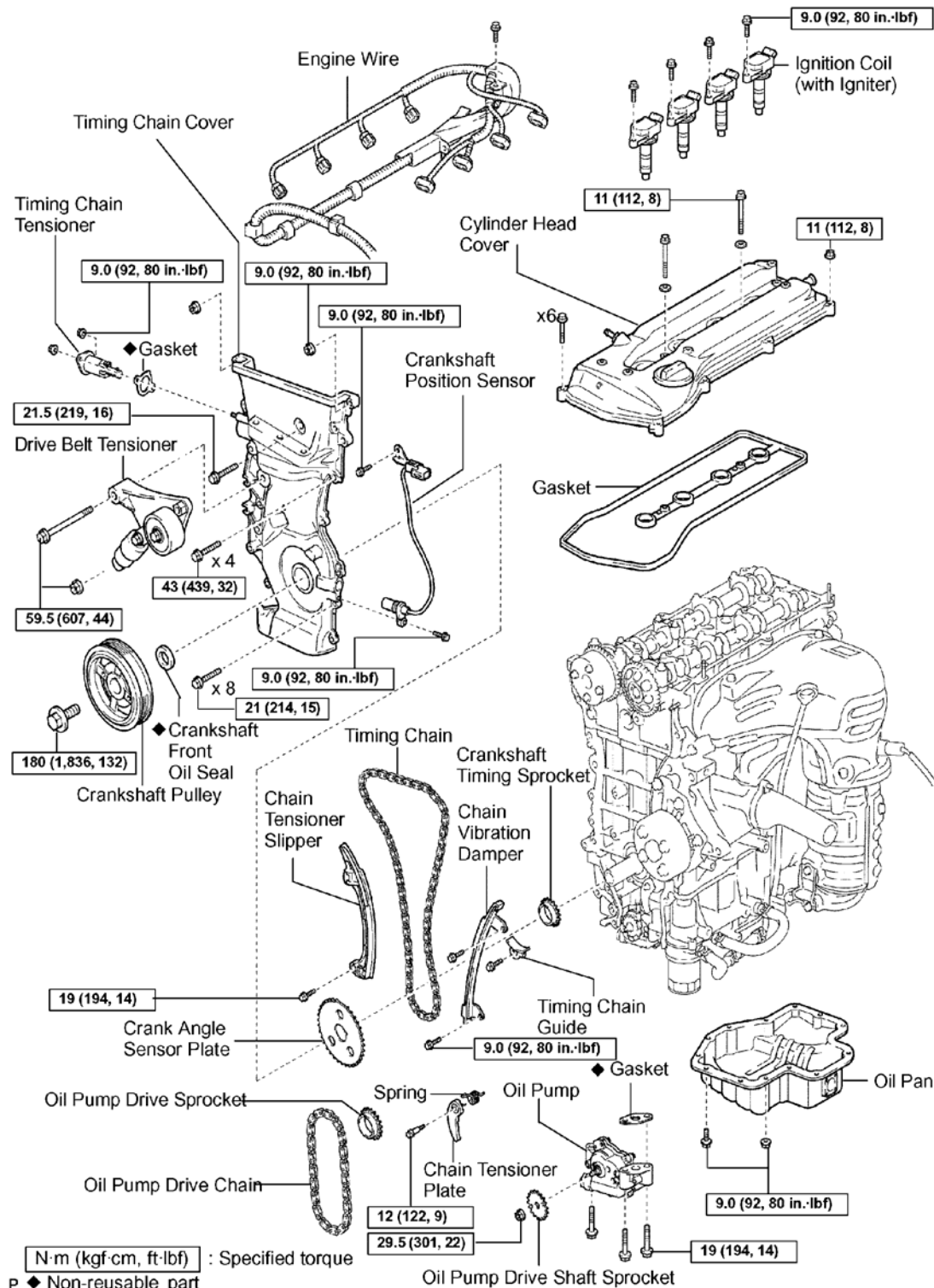
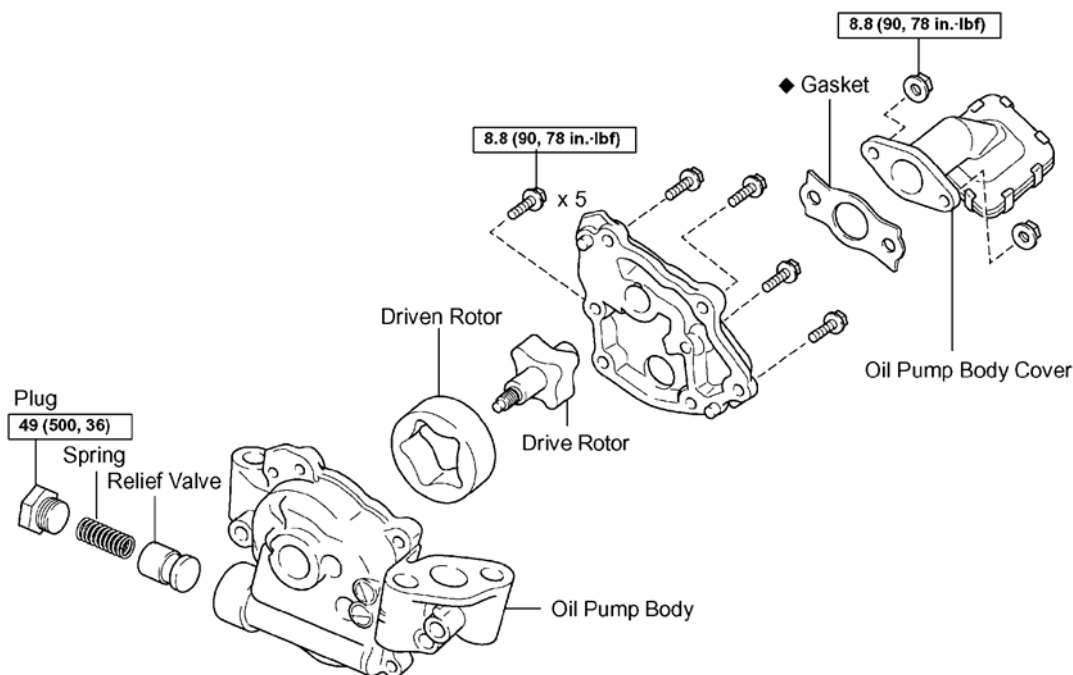


Fig. 9: Oil Pump Components (2 Of 3)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



N·m (kgf·cm, ft·lbf) : Specified torque

N ◆ Non-reusable part

G02925737

Fig. 10: Oil Pump Components (3 Of 3)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **DRAIN ENGINE OIL**
2. **REMOVE FRONT EXHAUST PIPE**

Remove 4 bolts, 2 compression springs, 2 gaskets and front exhaust pipe.

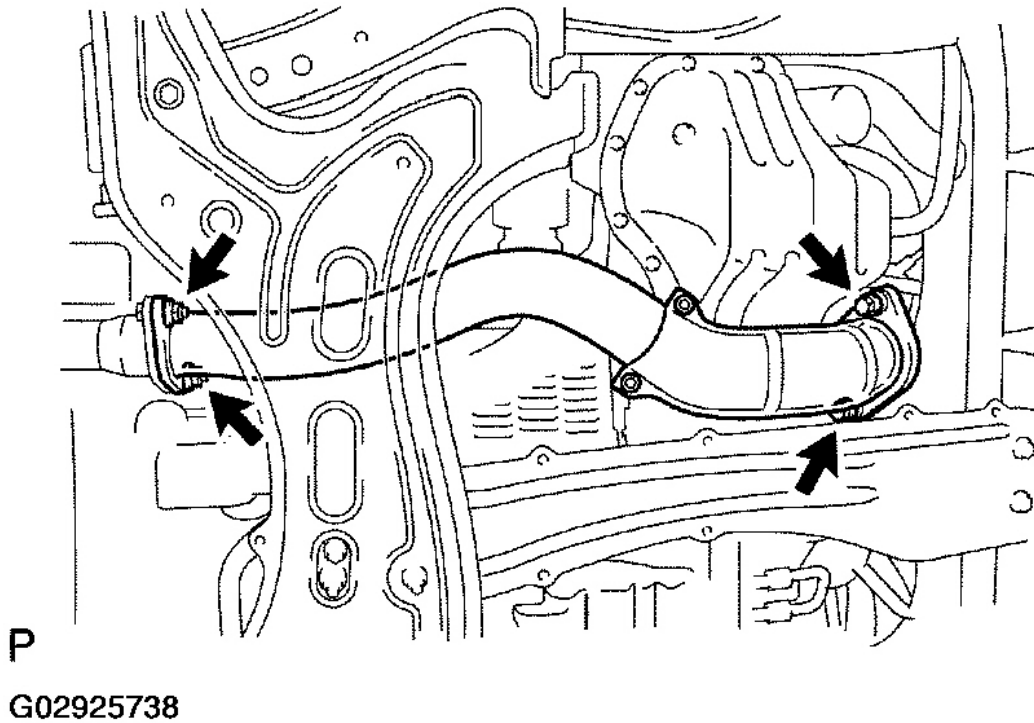
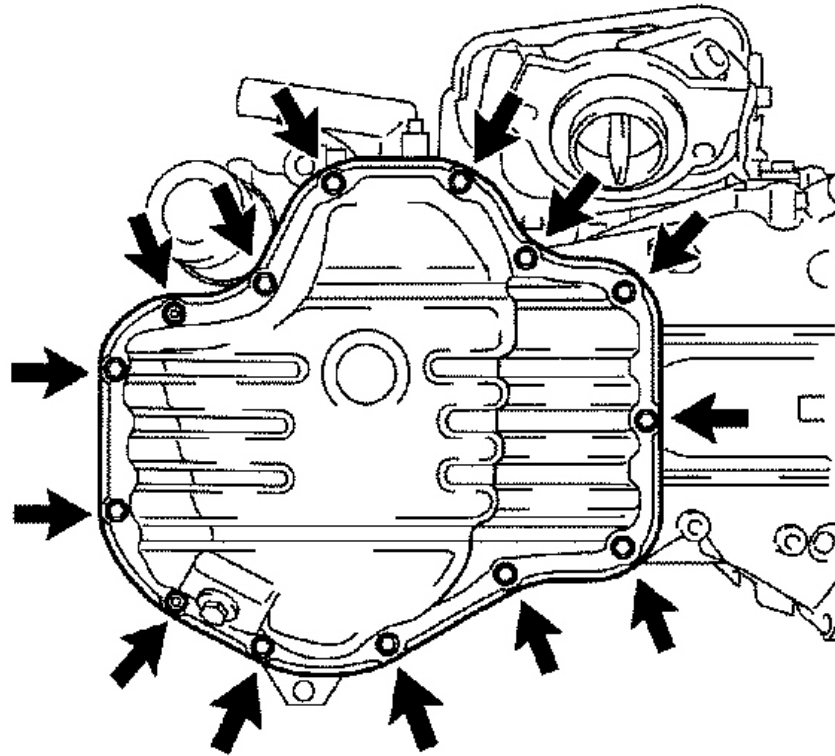


Fig. 11: Removing Front Exhaust Pipe & Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. REMOVE RH ENGINE UNDER COVER
4. REMOVE OIL PAN
 - a. Remove the 12 bolts and 2 nuts.



P

G02925739

Fig. 12: Removing Bolts & Nuts From Oil Pan

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Insert the blade of SST between the crank case and oil pan, and timing chain cover and oil pan, cut off applied sealer and remove the oil pan.

SST 09032-00100

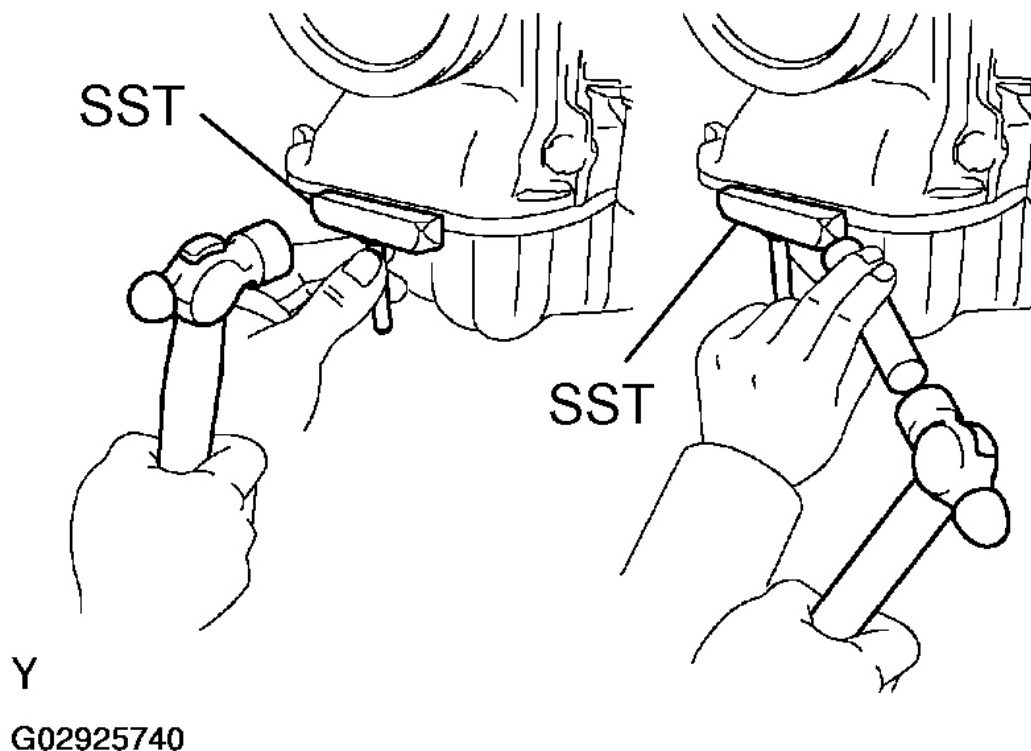


Fig. 13: Inserting Blade Of SST Between Crank Case & Oil Pan, Timing Chain Cover & Oil Pan

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: Be careful not to damage the contact surface of the timing chain cover, crank case and oil pan.

5. REMOVE AIR CLEANER ASSEMBLY (See REMOVAL)
6. REMOVE ABS ACTUATOR (See REMOVAL)
7. REMOVE RH ENGINE MOUNTING INSULATOR (See REMOVAL)
8. REMOVE TIMING CHAIN AND CRANKSHAFT TIMING SPROCKET (See REMOVAL)
9. REMOVE OIL PUMP DRIVE CHAIN AND SPROCKETS
 - a. Set the crankshaft key into the left horizontal position.

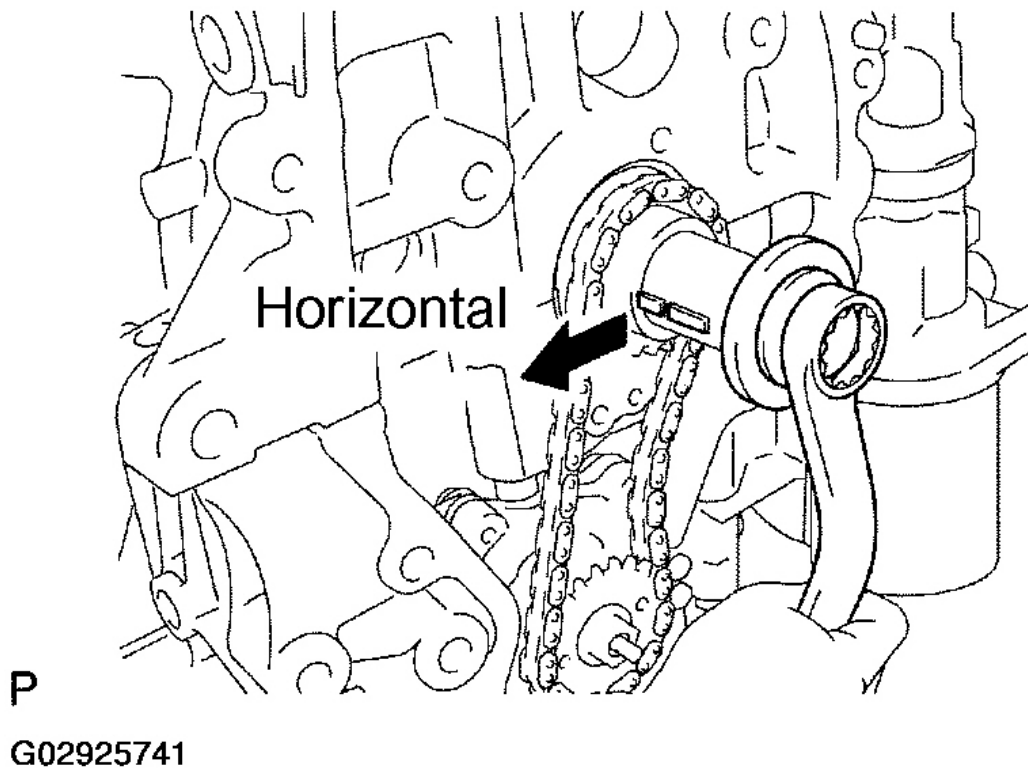


Fig. 14: Setting Crankshaft Key Into Left Horizontal Position
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Remove the bolt, chain tensioner plate and spring.
- c. Using a screwdriver, hold the oil pump drive shaft sprocket as shown in **Fig. 15** .
- d. Remove the nut, 2 sprockets and drive chain.

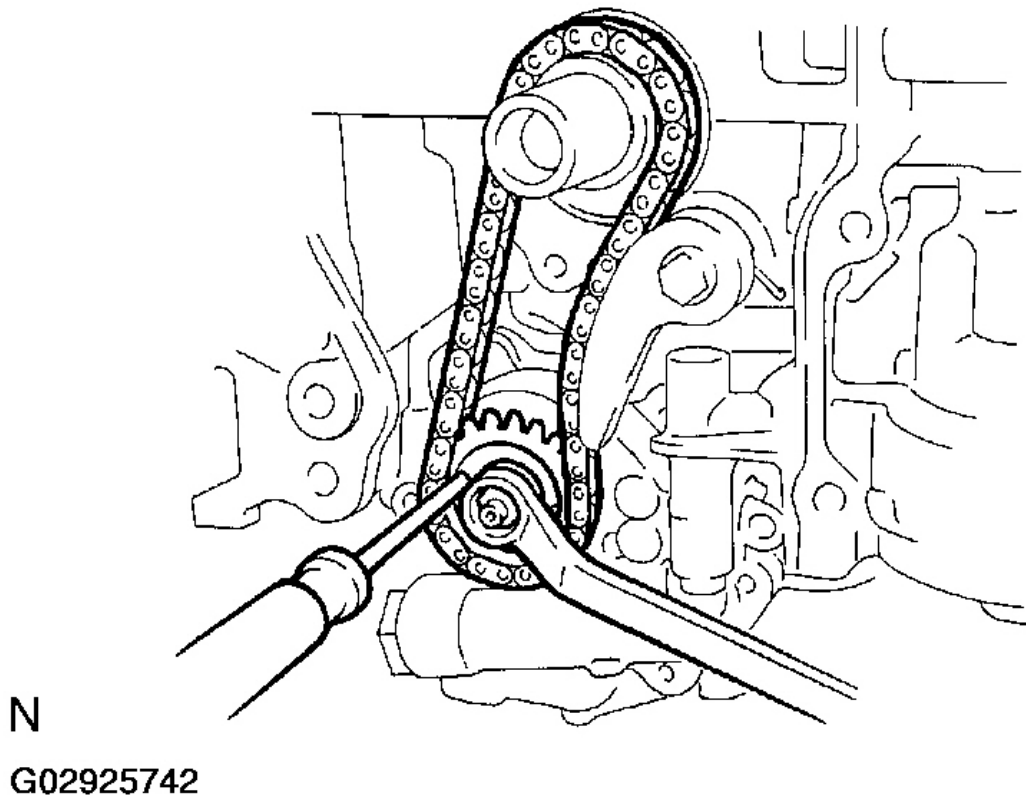
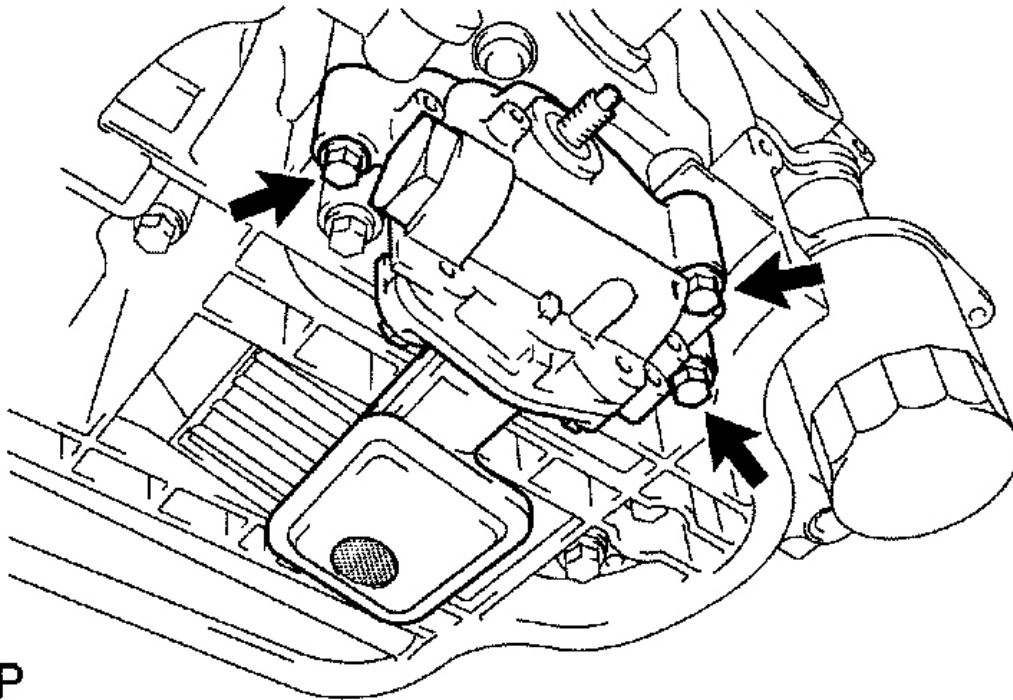


Fig. 15: Removing Oil Pump Drive Chain And Sprockets
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. REMOVE OIL PUMP

Remove the 3 bolts, oil pump and gasket.



P

G02925743

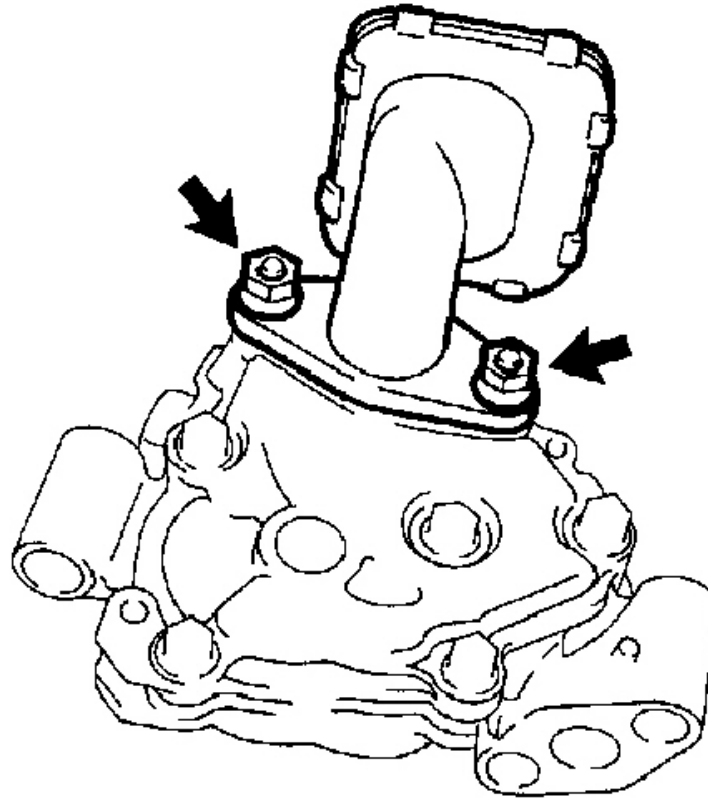
Fig. 16: Removing Oil Pump & Bolts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DISASSEMBLY

1. REMOVE OIL PUMP STRAINER SET

Remove the 2 nuts and oil pump strainer.



N

G02925744

Fig. 17: Removing Oil Pump Strainer & Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. REMOVE RELIEF VALVE

- a. Using a socket wrench (27 mm), remove the plug.
- b. Remove the valve spring and relief valve.

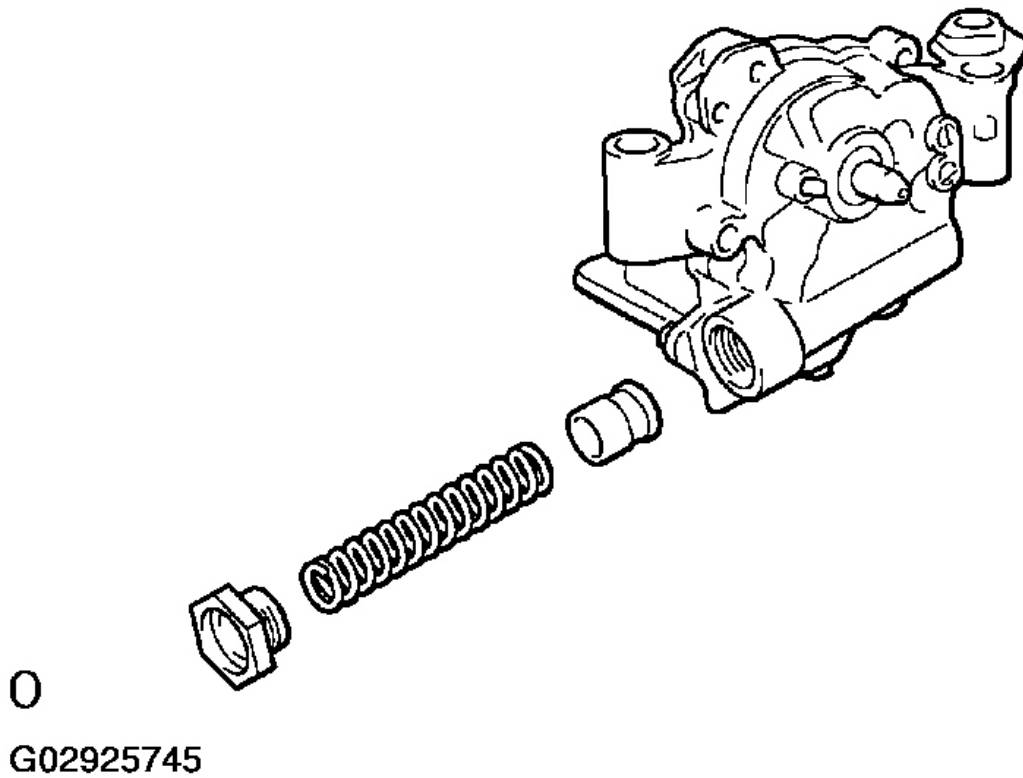
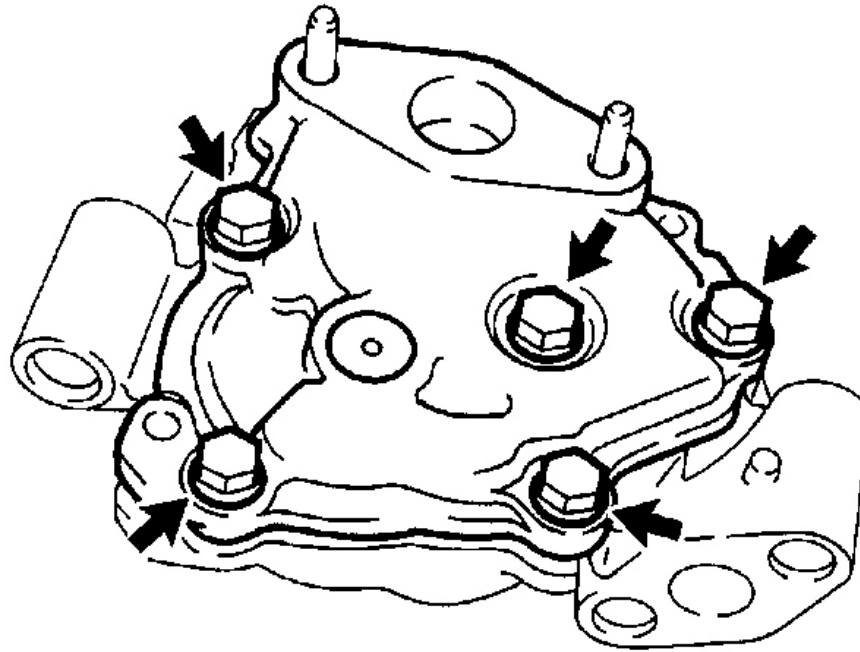


Fig. 18: Removing Valve Spring & Relief Valve
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. REMOVE OIL PUMP BODY COVER

Remove the 5 bolts and oil pump body cover.



N

G02925746

Fig. 19: Removing Oil Pump Body Cover & Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

1. INSPECT OIL JET

Check the oil jet for damage or clogging. If necessary, replace the cylinder block.

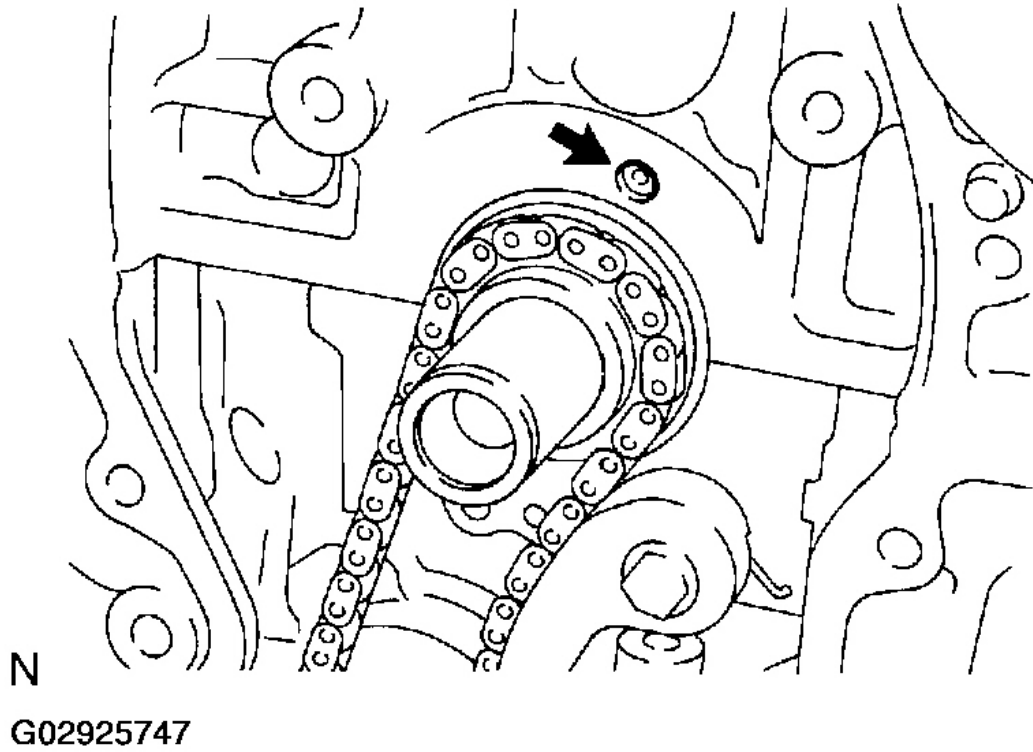
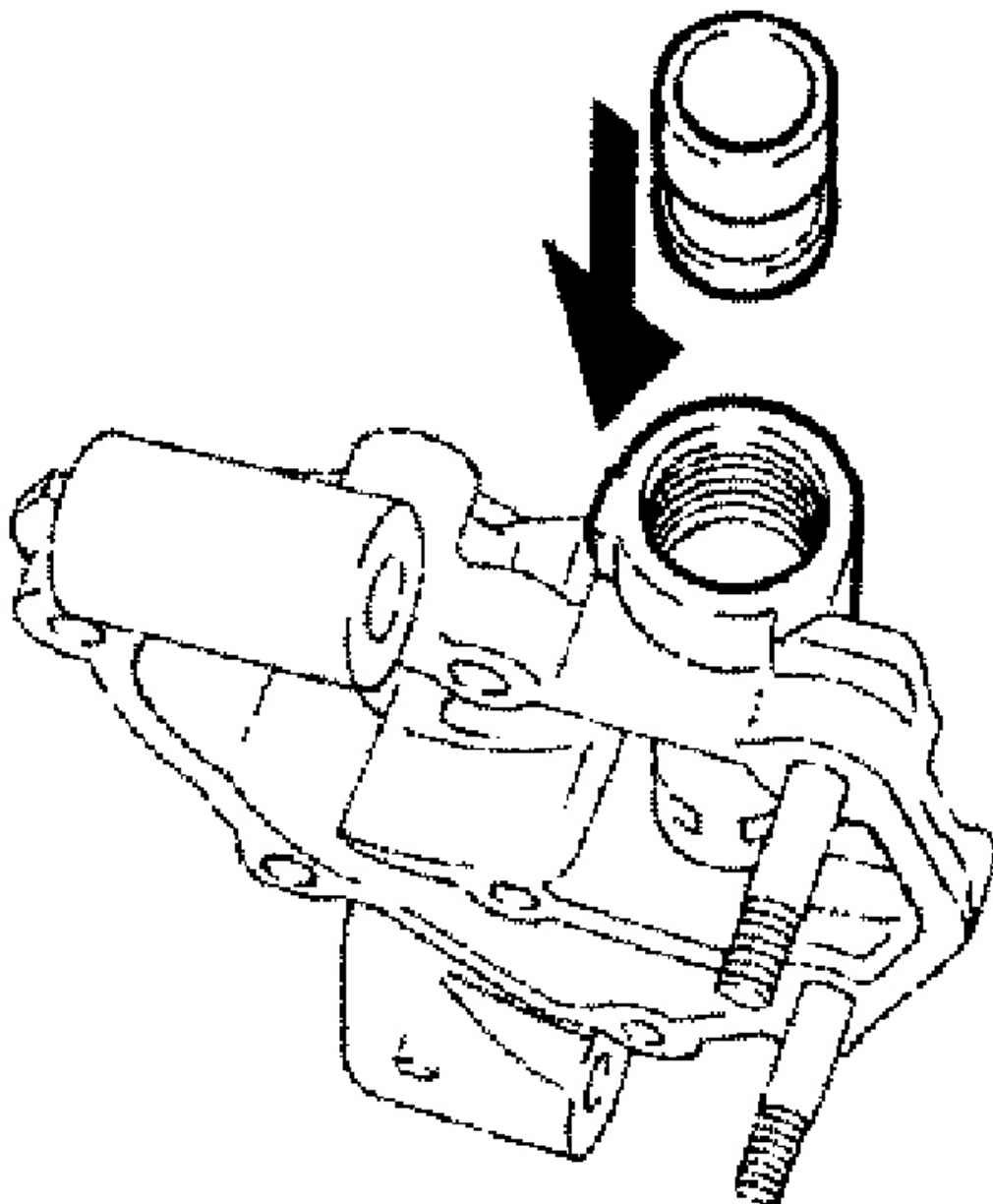


Fig. 20: Inspecting Oil Jet

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. INSPECT RELIEF VALVE

Coat the valve with engine oil and check that it falls smoothly into the valve hole by its own weight.



G02925748

Fig. 21: Inspecting Relief Valve

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If it does not, replace the relief valve. If necessary, replace the oil pump assembly.

3. INSPECT DRIVE AND DRIVEN ROTORS

- a. Place the drive and driven rotors into the oil pump body (see **REASSEMBLY**).
- b. Inspect for the tip clearance.

Using a feeler gauge, measure the clearance between the drive and driven rotor tips.

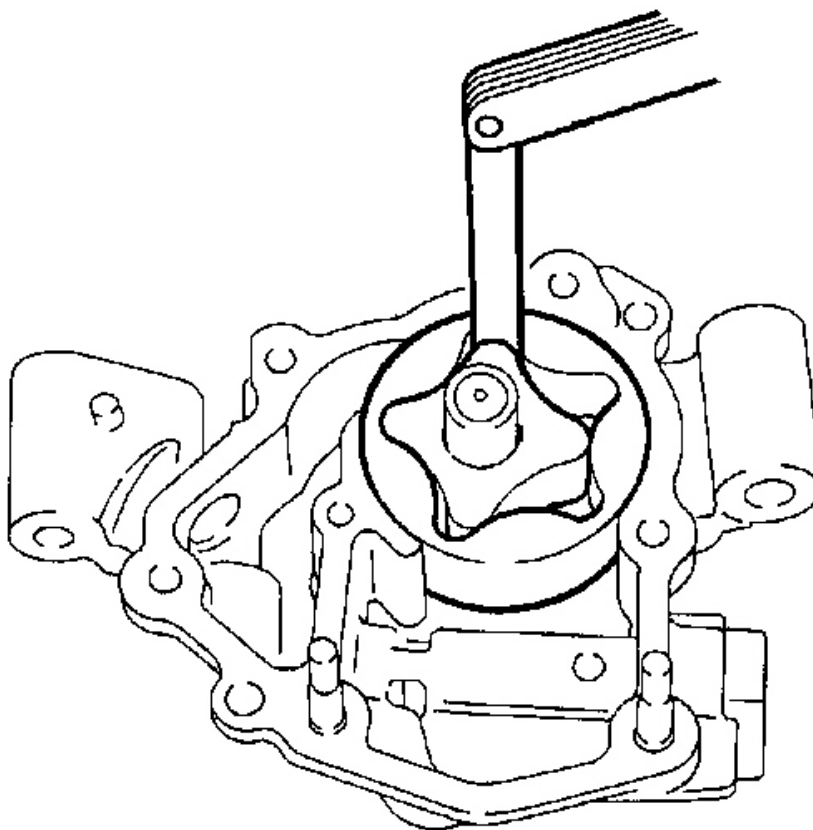
**N****G02925749**

Fig. 22: Inspecting Drive And Driven Rotor (Tip Clearance)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard tip clearance:

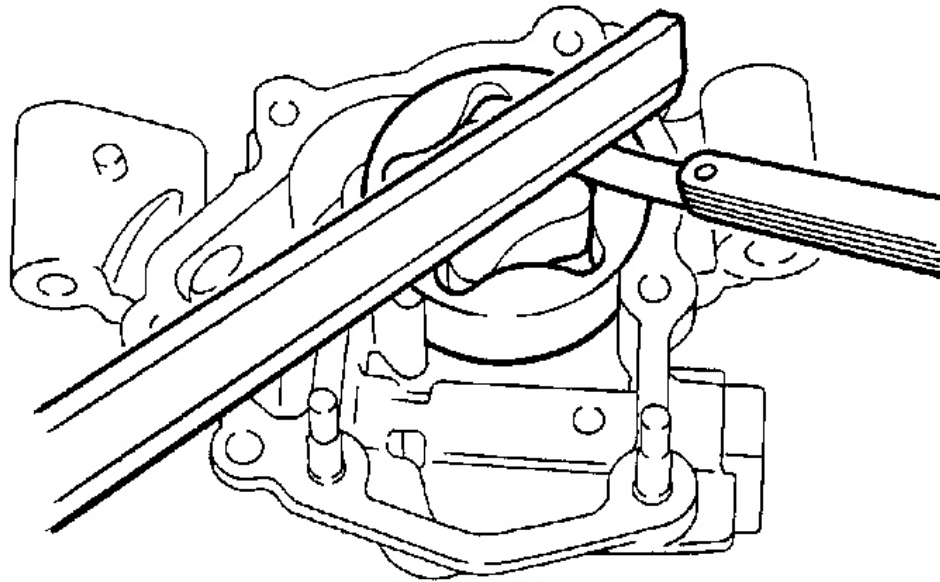
0.080 to 0.160 mm (0.0031 to 0.0063 in.)

Maximum tip clearance: 0.35 mm (0.0138 in.)

If the tip clearance is greater than the maximum, replace the rotors as a set.

- c. Inspect for the side clearance.

Using a feeler gauge and precision straight edge, measure the clearance between the rotors and precision straight edge.



N

G02925750

Fig. 23: Inspecting Drive And Driven Rotors (Side Clearance)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard side clearance:

0.030 to 0.085 mm (0.0012 to 0.0033 in.)

Maximum side clearance: 0.16mm (0.0063 in.)

If the side clearance is greater than the maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.

- d. Inspect for the body clearance.

Using a feeler gauge, measure the clearance between the driven rotor and body.

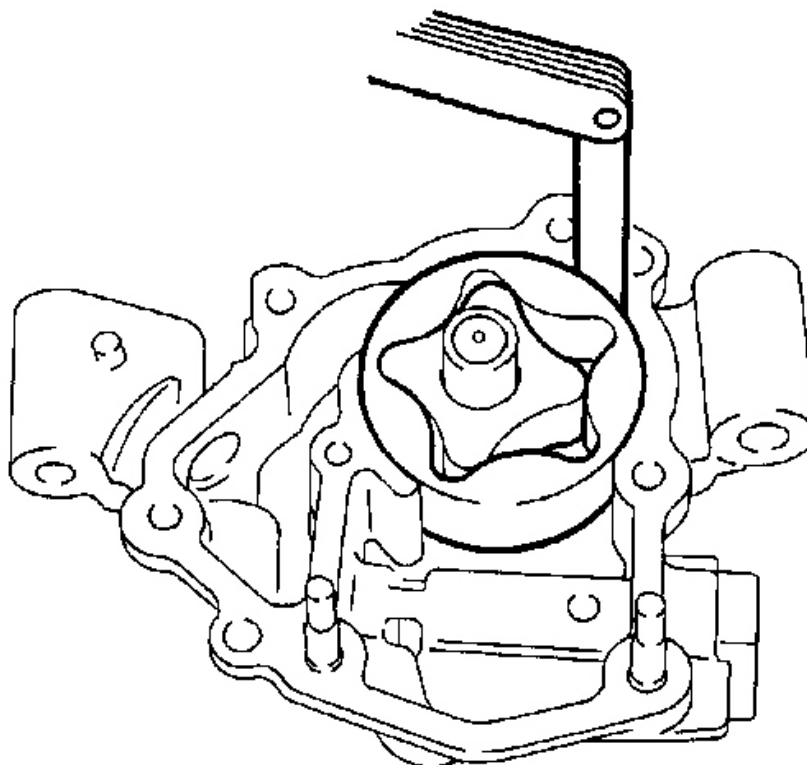
**N****G02925751**

Fig. 24: Inspecting Drive And Driven Rotors (Body Clearance)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard body clearance:

0.100 to 0.170 mm (0.0039 to 0.067 in.)

Maximum body clearance: 0.325 mm (0.0128 in.)

If the body clearance is greater than the maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.

4. INSPECT OIL PUMP DRIVE CHAIN AND OIL PUMP SPROCKETS

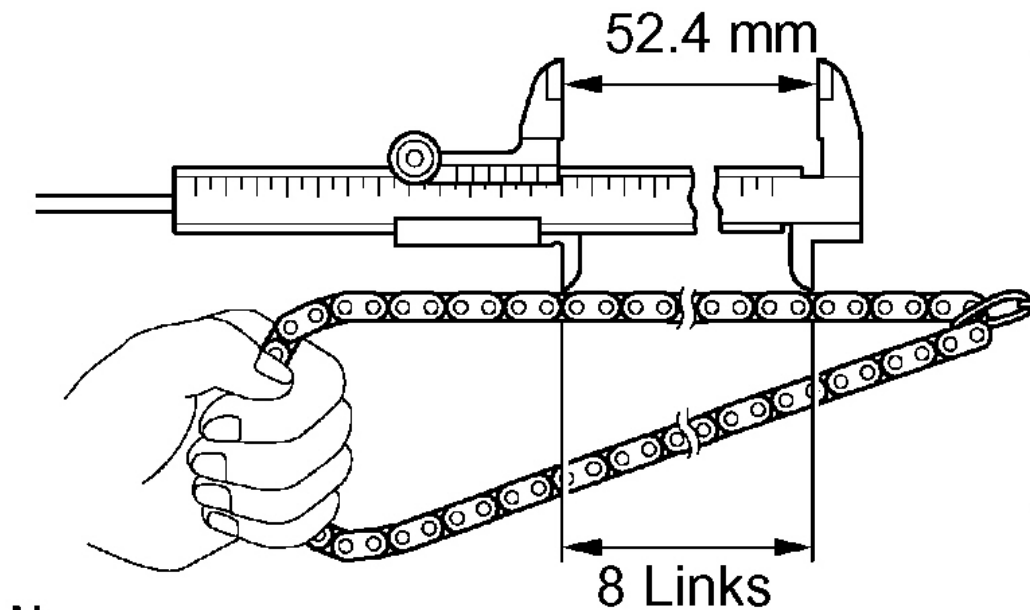
- a. Using vernier calipers, measure the length of the 8 links with the chain dully stretched.

Maximum chain elongation: 52.4 mm (2.063 in.)

If the elongation is greater than the maximum, replace the chain.

HINT:

Make the same measurements pulling at 3 or more places selected at random.

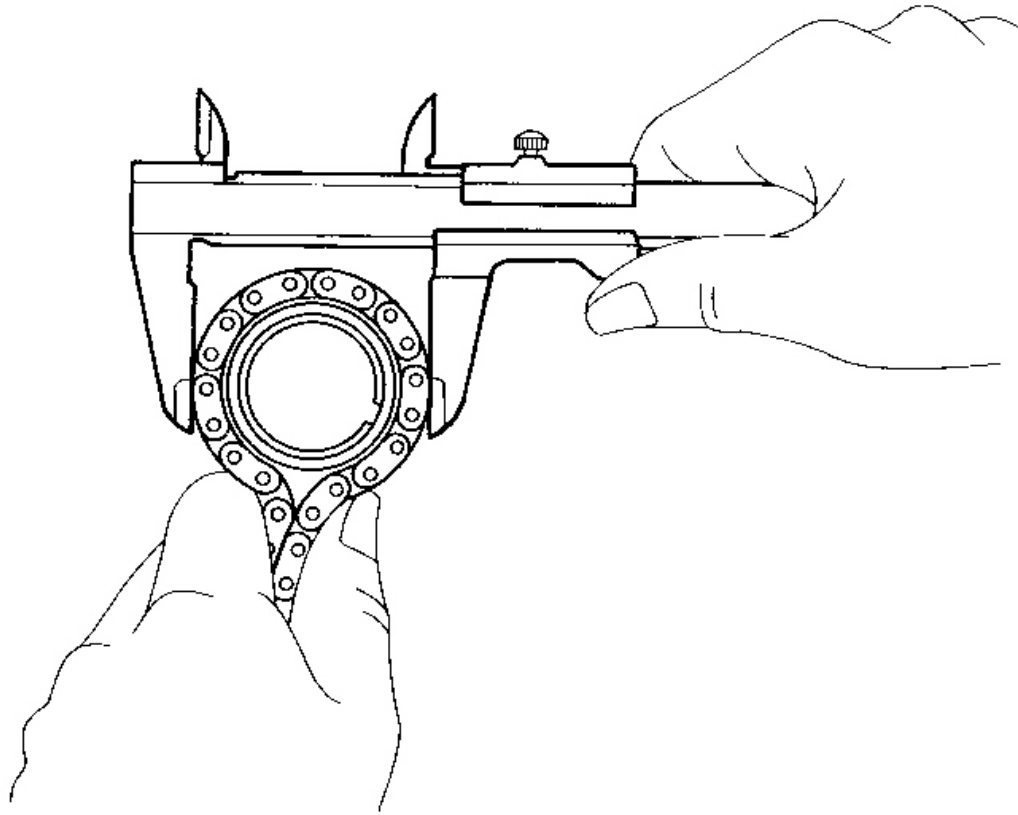


N

G02925752

Fig. 25: Measuring Links Length With Chain Dully Stretched
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Wrap the chain around the oil pump sprocket.
c. Using vernier calipers, measure the sprocket diameter with the chain.



G02925753

Fig. 26: Measuring Sprocket Diameter With Chain
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: Vernier calipers must contact the chain rollers for measuring.

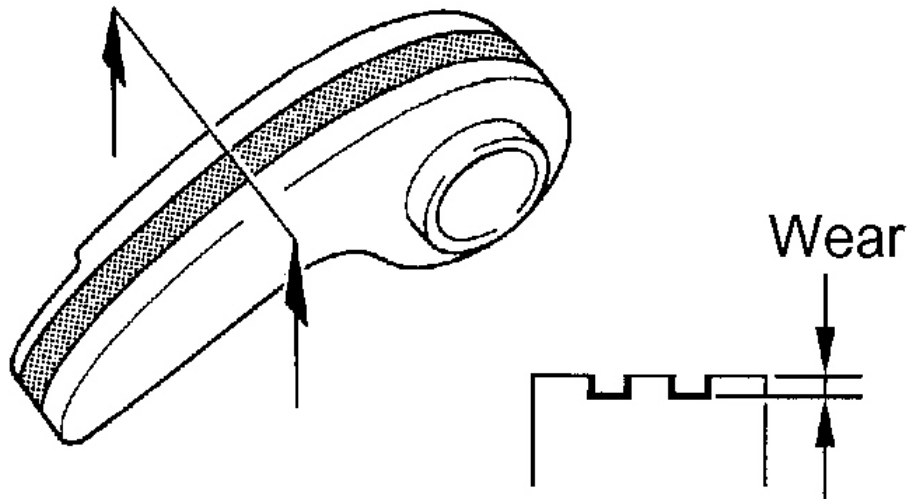
Minimum sprockets diameter (w/chain):

48.2 mm (1.898 in.)

If the diameter is less than the minimum, replace the chain and 2 sprockets.

5. INSPECT CHAIN TENSIONER PLATE

Measure the chain tensioner plate wear.



N

G02925754

Fig. 27: Measuring Chain Tensioner Plate Wear
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Maximum wear: 0.5 mm (0.020 in.)

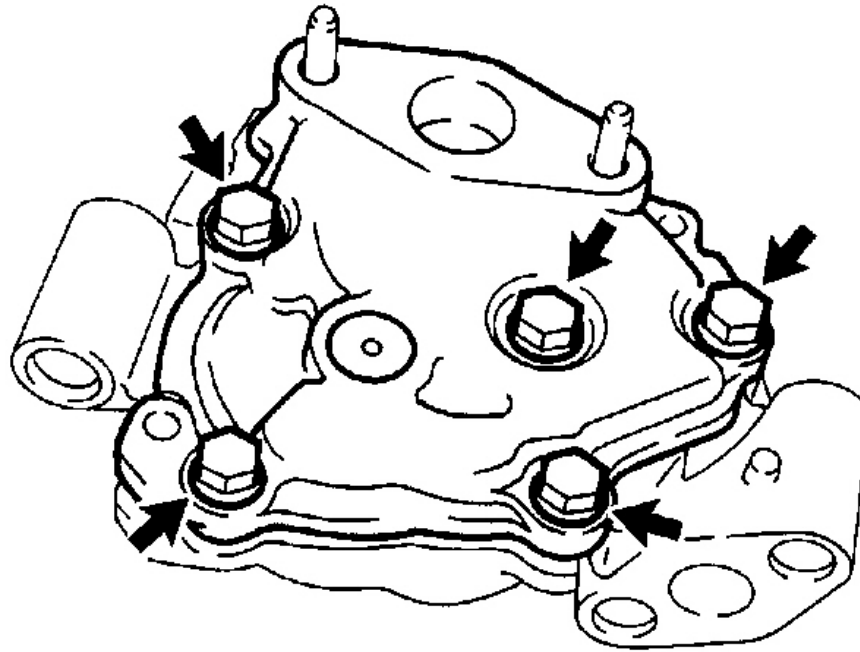
If the wear is greater than the maximum, replace the chain tensioner plate.

REASSEMBLY

1. INSTALL OIL PUMP BODY COVER

Install the pump body cover with the 5 bolts.

Torque: 8.8 N.m (90 kgf.cm, 78 in.lbf)



N

G02925755

Fig. 28: Installing Oil Pump Body Cover With Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. INSTALL RELIEF VALVE

- a. Coat the relief valve with engine oil.
- b. Insert the relief valve and spring into the pump body hole.

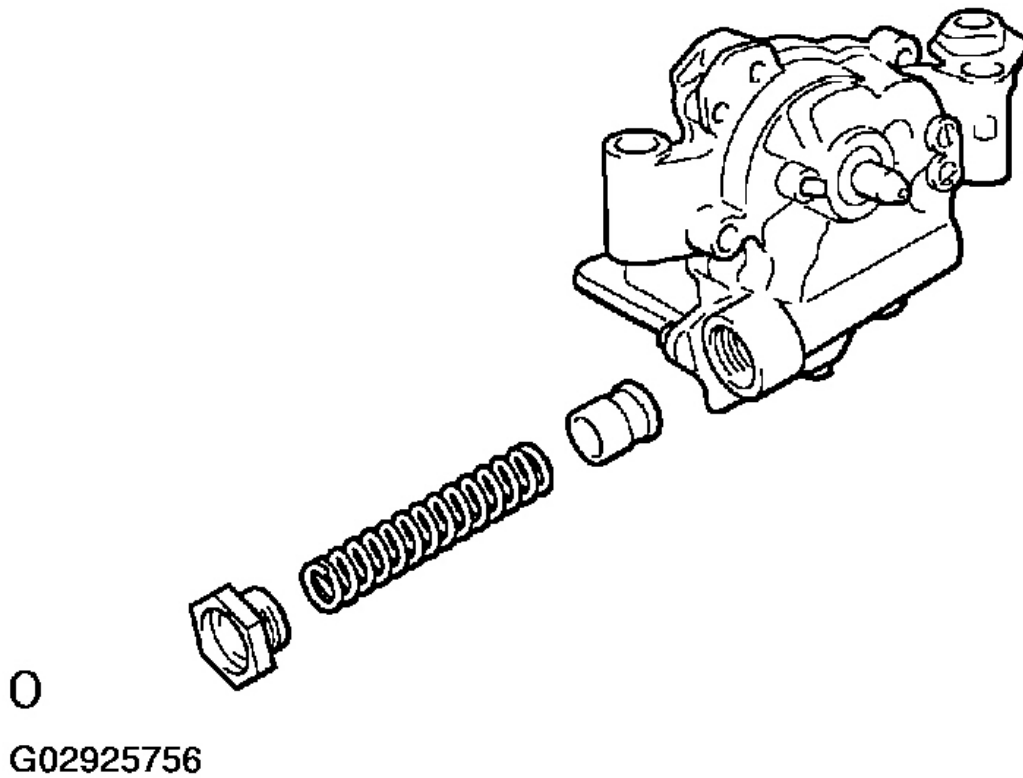


Fig. 29: Installing Relief Valve & Spring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

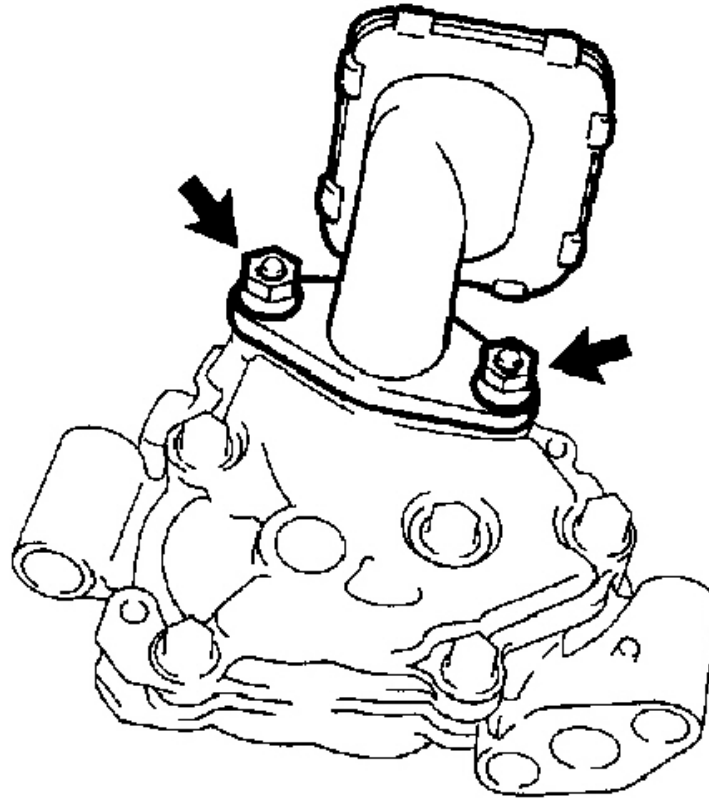
- c. Using a socket wrench (27 mm), install the plug.

Torque: 49 N.m (500 kgf.cm, 36 ft.lbf)

3. INSTALL OIL PUMP STRAINER SET

- a. Place a new gasket on the oil pump.
- b. Install the oil strainer with the 2 nuts.

Torque: 8.8 N.m (90 kgf.cm, 78 in.lbf)



N

G02925757

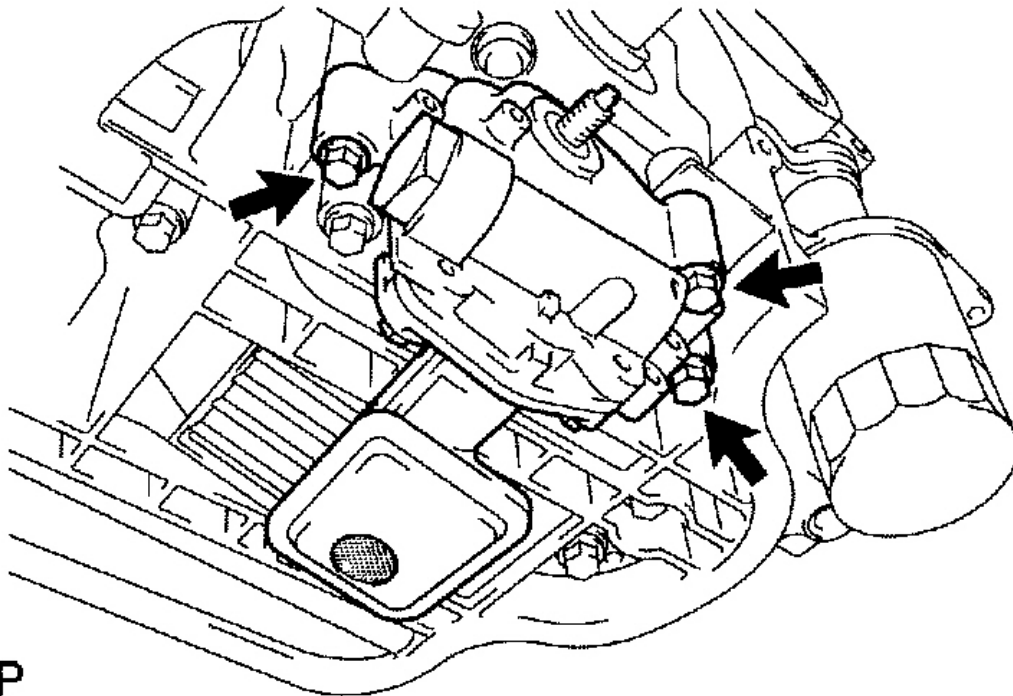
Fig. 30: Installing Oil Pump Strainer & Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. INSTALL OIL PUMP

Install a new gasket and the oil pump with the 3 bolts.

Torque: 19 N.m (194 kgf.cm, 14 ft.lbf)



P

G02925758

Fig. 31: Installing Oil Pump With Bolts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. INSTALL DRIVE CHAIN AND SPROCKETS

- a. Set the crankshaft key into the left horizontal position and turn the cutout of the drive shaft to the top.

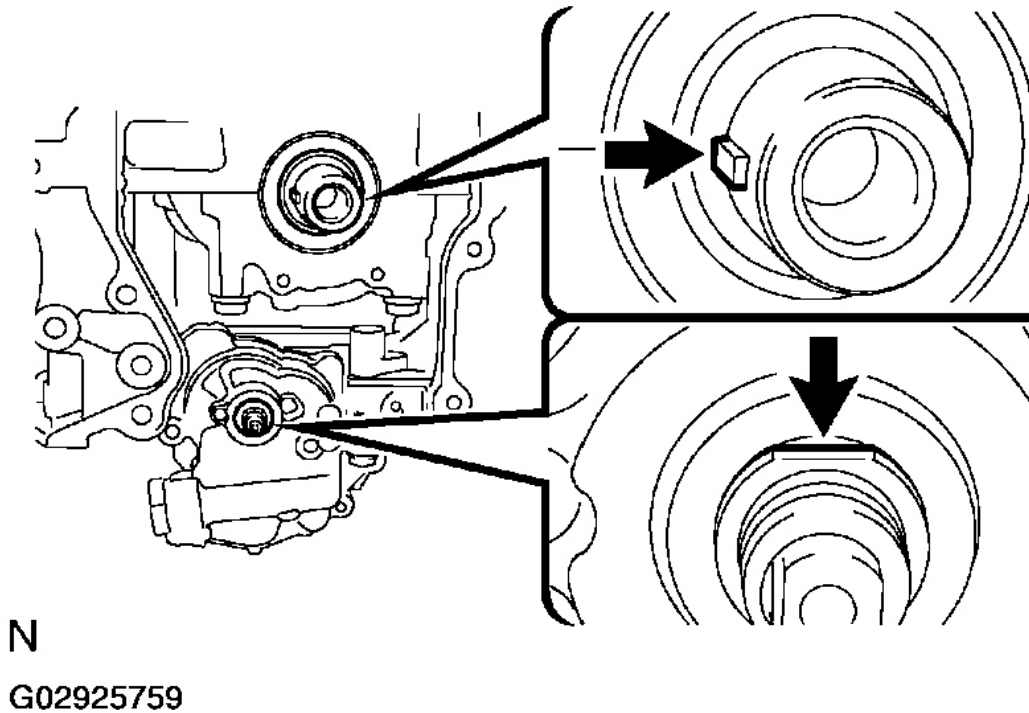


Fig. 32: Setting Crankshaft Key Into Left Horizontal Position
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Set the chain on the 2 sprockets as shown in **Fig. 33** .

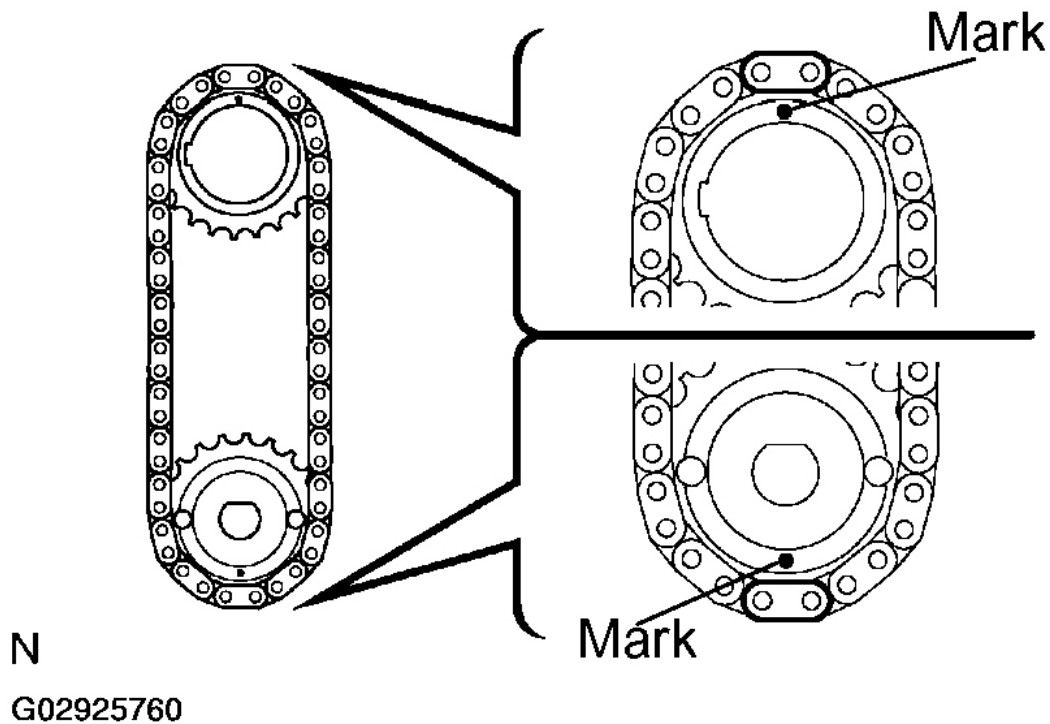


Fig. 33: Setting Chain On Sprockets

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

- Set the mark on the oil pump drive sprocket at the colored link in the chain.
 - Set the mark on the oil pump drive shaft sprocket at the colored link.
- c. Install the chain and 2 sprockets with the nut.

Torque: 29.5 N.m (301 kgf.cm, 22 ft.lbf)

3. INSTALL CHAIN TENSIONER

Install the spring and plate with the bolt.

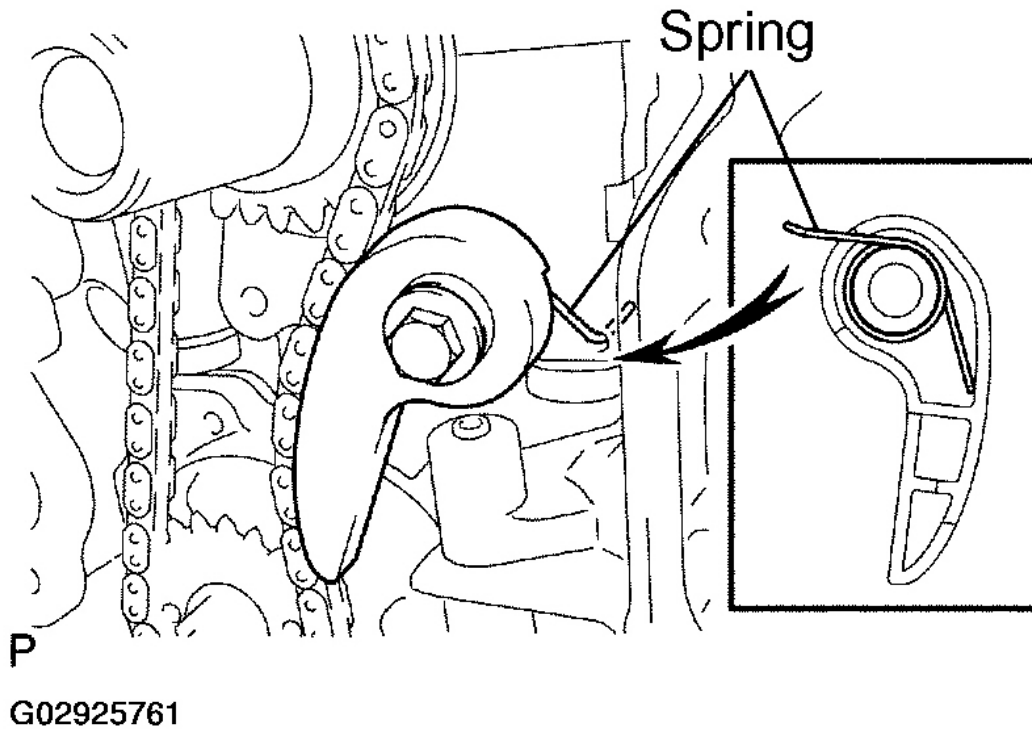


Fig. 34: Installing Chain Tensioner

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Torque: 12 N.m (122 kgf.cm, 9 ft.lbf)

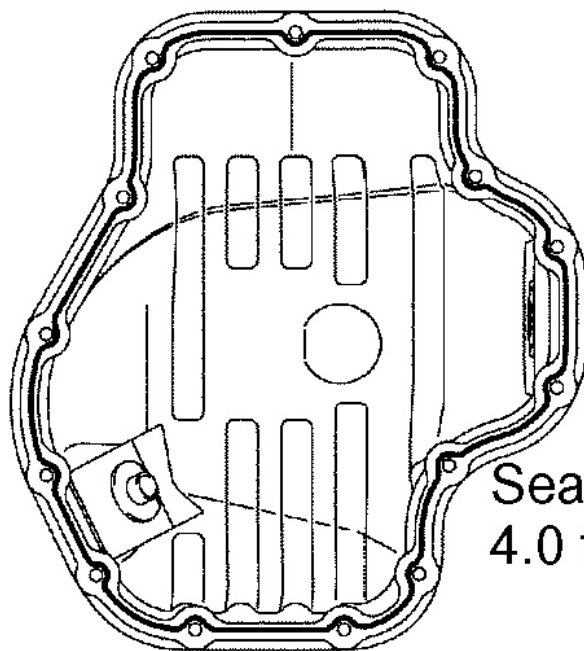
4. INSTALL OIL PAN

- a. Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the timing chain/crank case and oil pan.
 - Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing grooves.
 - Thoroughly clean all components to remove all the loose material.
 - Using a non-residue solvent, clean both sealing surfaces.

NOTE: Do not use a solvent which will affect the painted surfaces.

- b. Apply seal packing to the oil pan as shown in **Fig. 35** .

Seal packing: Part No. 08826-00080 or equivalent



Seal Width:
4.0 to 4.5 mm

P

G02925762

Fig. 35: Identifying Seal Width

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- Install a nozzle that has been cut to a 4.0 to 4.5 mm (0.16 to 0.18 in.) opening.

HINT:

Avoid applying an excessive amount to the surface.

- Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

c. Install the oil pan with the 12 bolts and 2 nuts.

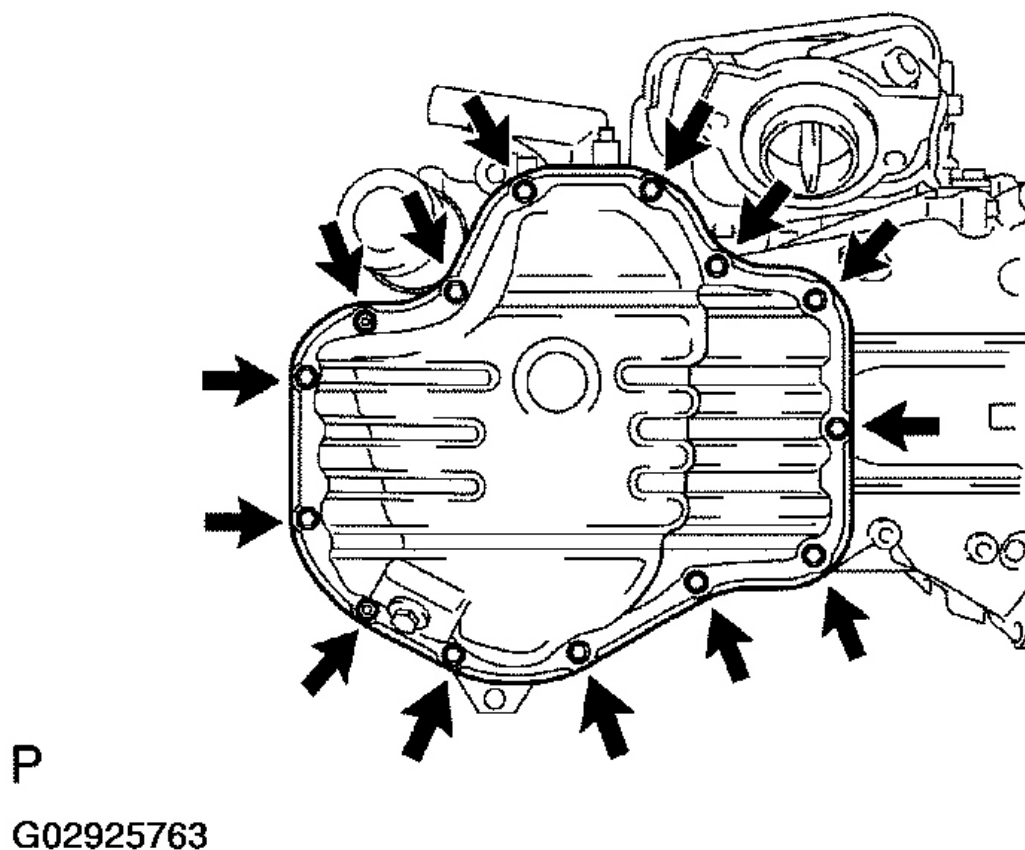


Fig. 36: Installing Oil Pan, Bolts & Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Torque: 9.0 N.m (92 kgf.cm, 80 in.lbf)

5. **INSTALL CRANKSHAFT TIMING SPROCKET AND TIMING CHAIN (See INSTALLATION)**
6. **INSTALL RH ENGINE MOUNTING INSULATOR (See INSTALLATION)**
7. **INSTALL ABS ACTUATOR (See INSTALLATION)**
8. **INSTALL AIR CLEANER ASSEMBLY (See INSTALLATION)**
9. **INSTALL FRONT EXHAUST PIPE**

Install 2 new gaskets and front exhaust pipe with the 2 compression springs and 4 bolts.

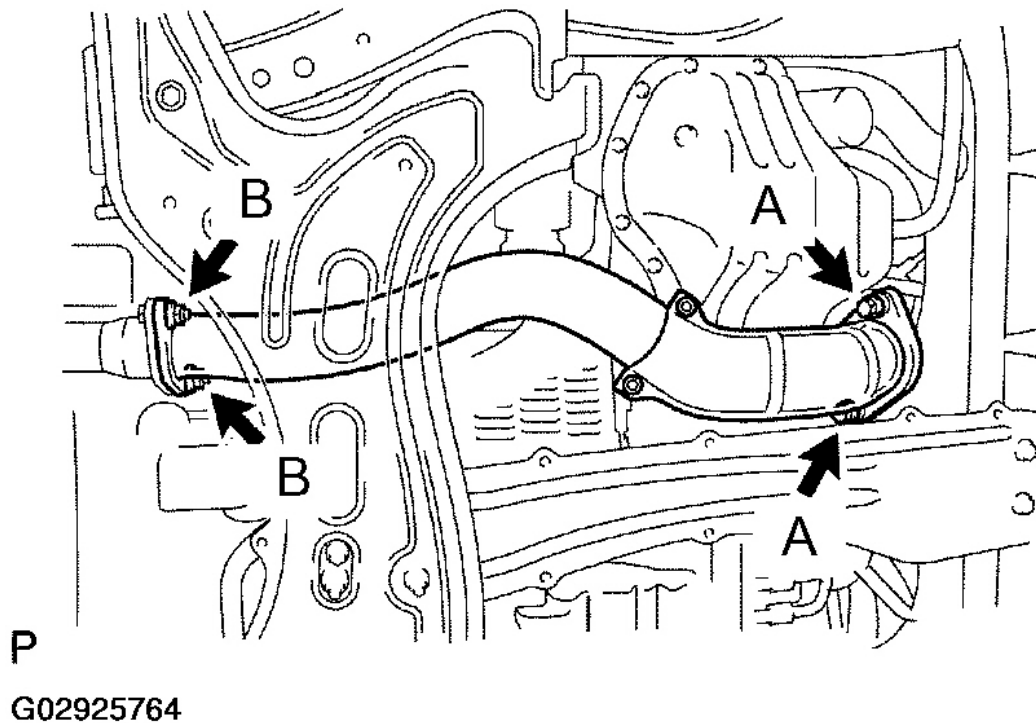


Fig. 37: Installing Front Exhaust Pipe, Gaskets, Compression Springs & Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Torque:

43 N.m (440 kgf.cm, 32 ft.lbf) for bolt A

49 N.m (500 kgf.cm, 36 ft.lbf) for bolt B

- 10. INSTALL ENGINE UNDER COVER**
- 11. FILL ENGINE WITH OIL**
- 12. START ENGINE AND CHECK FOR LEAKS**
- 13. RECHECK ENGINE OIL LEVEL**