

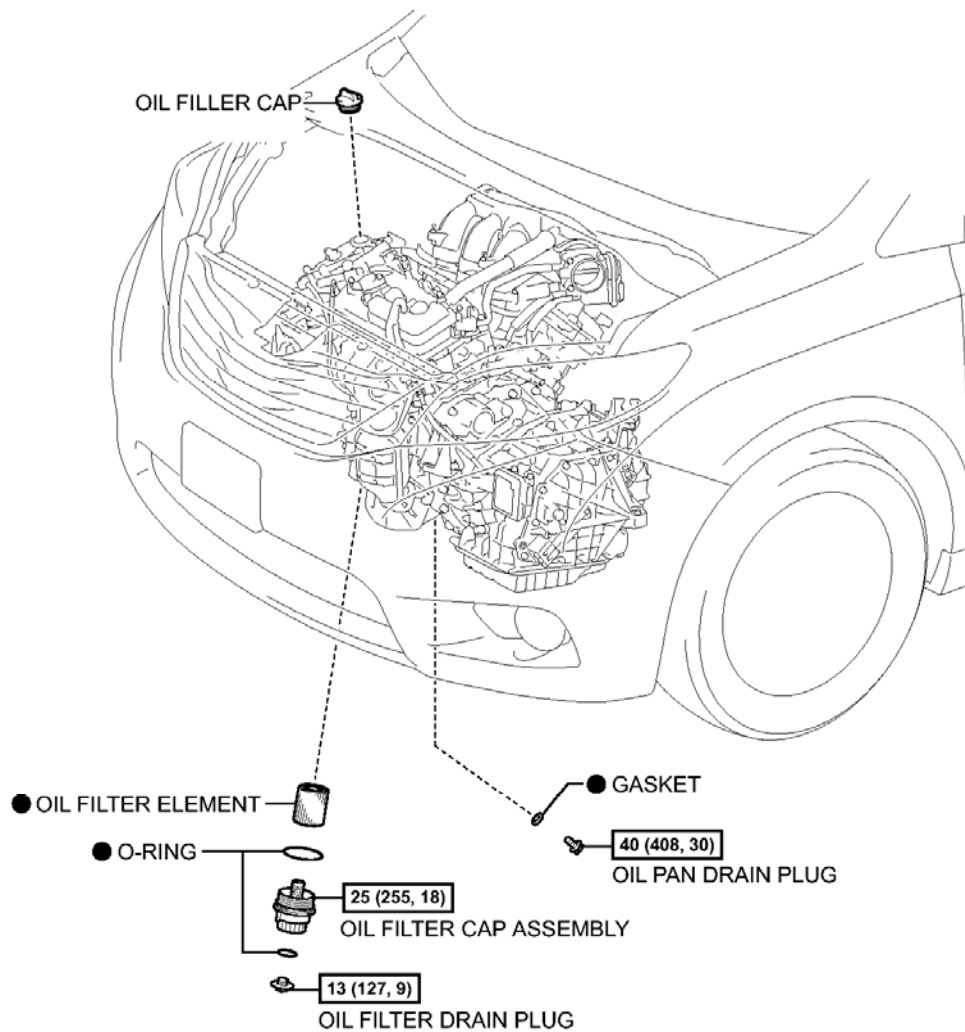
ENGINE

Lubrication System [2GR-FE] (Service Information) - Sienna

OIL AND OIL FILTER

COMPONENTS

ILLUSTRATION



[N*m (kgf*cm, ft.*lbf)]: Specified torque

● Non-reusable part

P

Fig. 1: Oil & Filter Replacement Components With Torque Specifications
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REPLACEMENT

REPLACEMENT

WARNING:

- Prolonged and repeated contact with engine oil will result in the removal of natural oils from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.
- Precautions should be taken when replacing engine oil to minimize the risk of your skin making contact with used engine oil. Protective clothing and gloves that cannot be penetrated by oil should be worn. In case of accidental contact, wash your skin thoroughly with soap and water, or use waterless hand cleaner, to remove any used engine oil. Never use gasoline, thinners, or solvents to wash your skin.
- In order to protect the environment, used oil and used oil filters must be disposed of at designated disposal sites only.

1. DRAIN ENGINE OIL

- a. Remove the oil filler cap.
- b. Remove the oil pan drain plug and drain the oil into a container.
- c. Clean the oil pan drain plug.
- d. Install the oil pan drain plug with a new gasket.

Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)

2. REMOVE OIL FILTER ELEMENT

- a. Connect the hose with an inside diameter of 15 mm (0.591 in.) to the pipe.

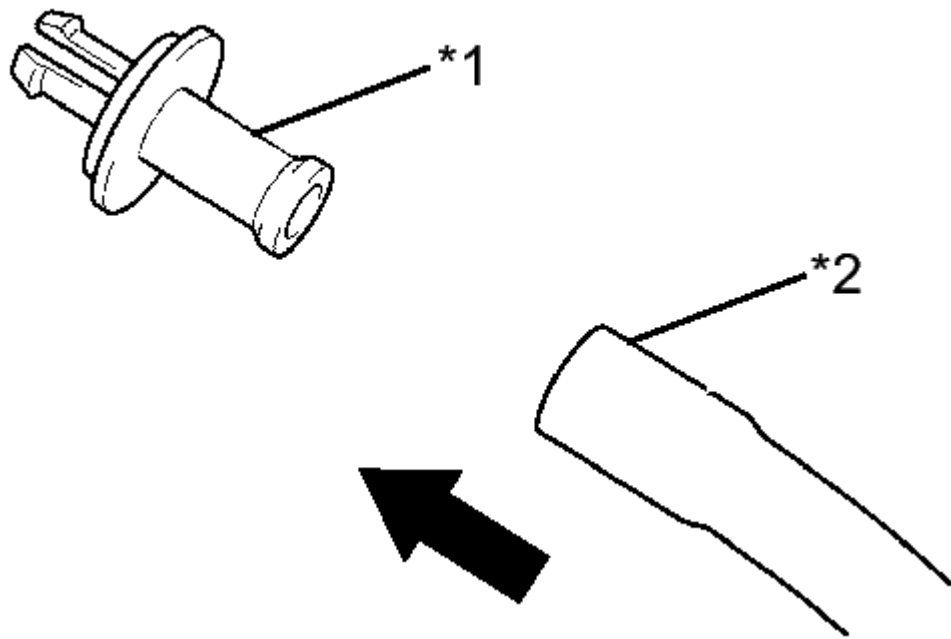
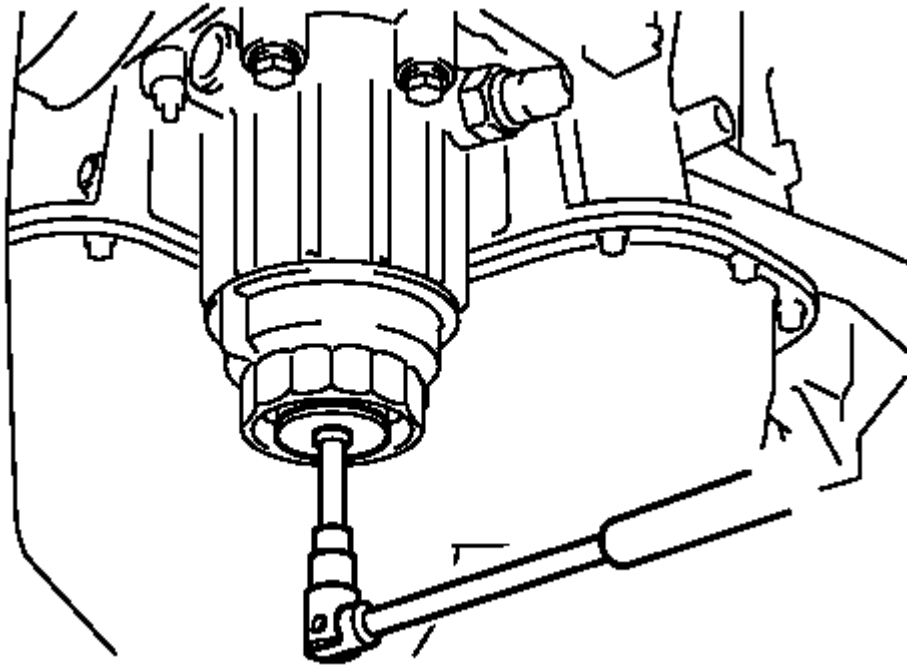


Fig. 2: Connecting Hose To Pipe
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*1	Pipe
*2	Hose

- b. Remove the oil filter drain plug from the oil filter cap.



Y

Fig. 3: Removing Oil Filter Drain Plug

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

- c. Insert the pipe with the hose into the oil filter cap.

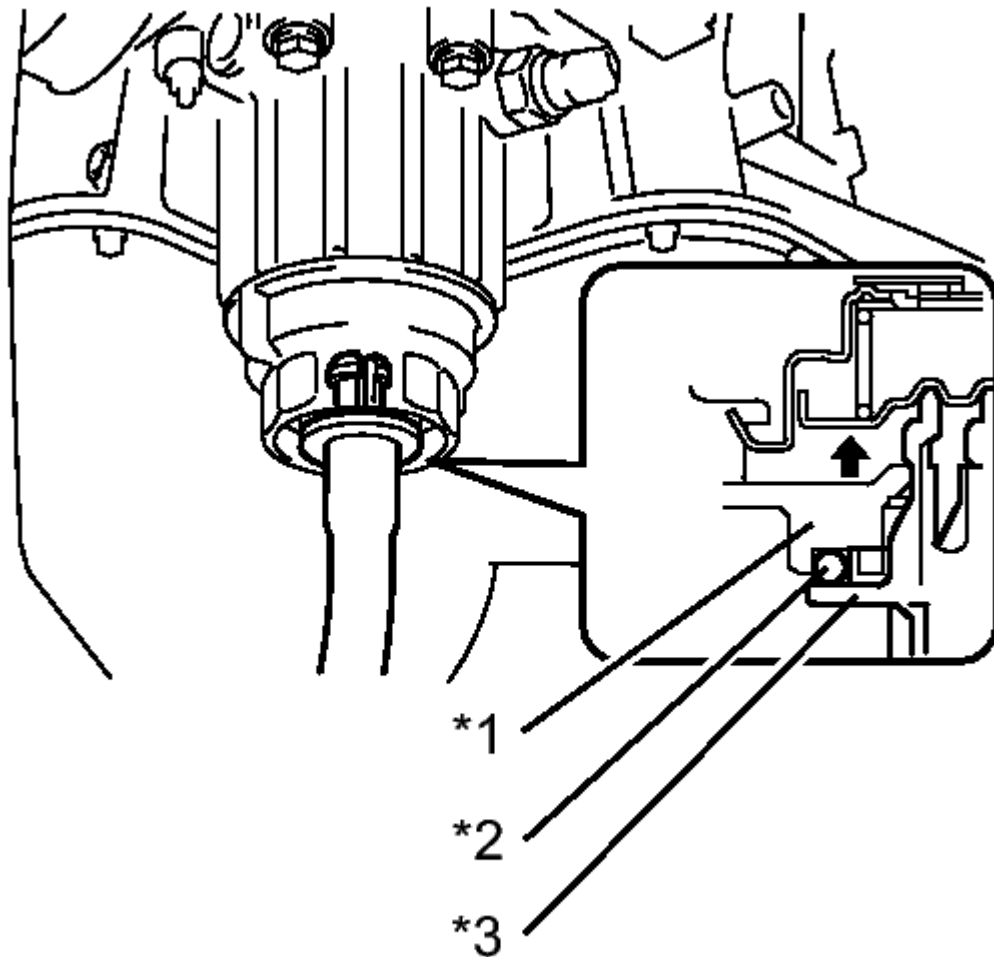


Fig. 4: Identifying Oil Filter Assembly Cap, O-Ring & Pipe
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

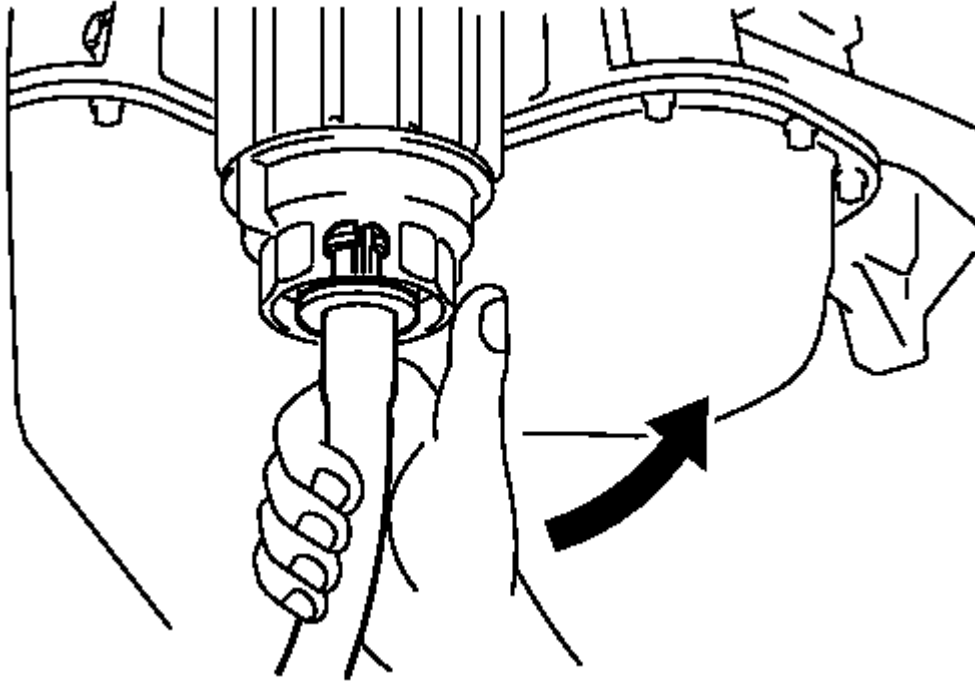
	Oil
*1	Filter Cap
*2	O- ring
*3	Pipe

NOTE: Be sure to insert the pipe with the O-ring installed on the oil filter cap.

HINT:

Place the hose end into a container before draining oil from the hose.

- d. Make sure that oil is completely drained, and remove the pipe and O-ring.



Y

Fig. 5: Removing Pipe And O-Ring

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

HINT:

Be sure to turn the pipe in the direction of the arrow to remove it.

- e. Using SST, remove the oil filter cap.

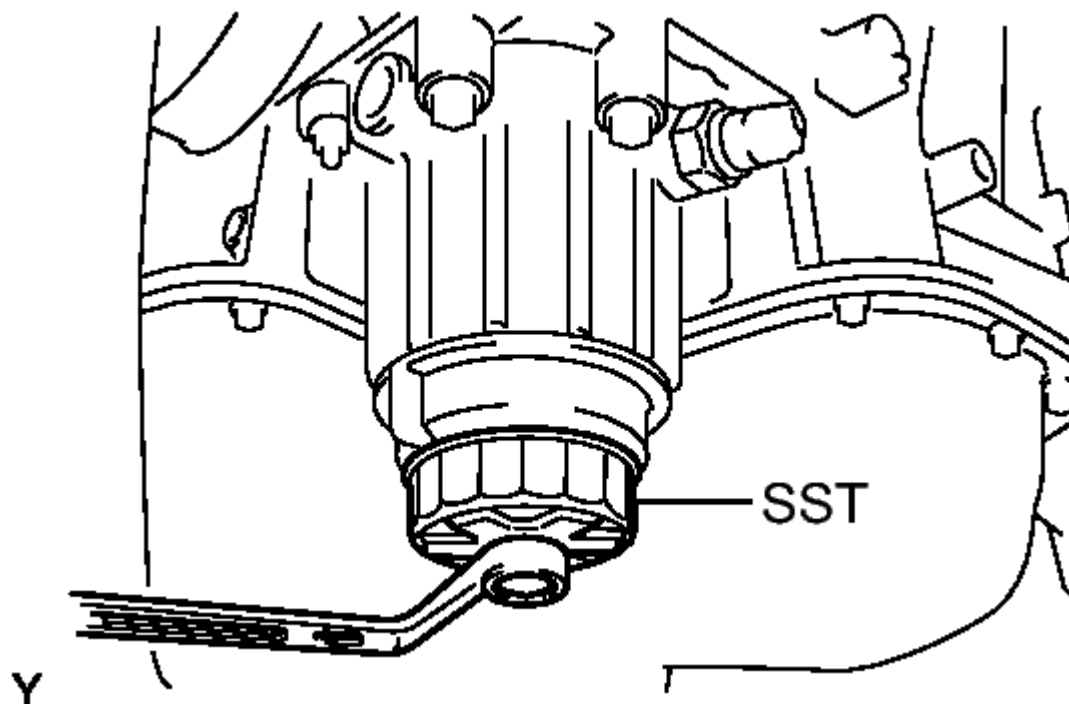
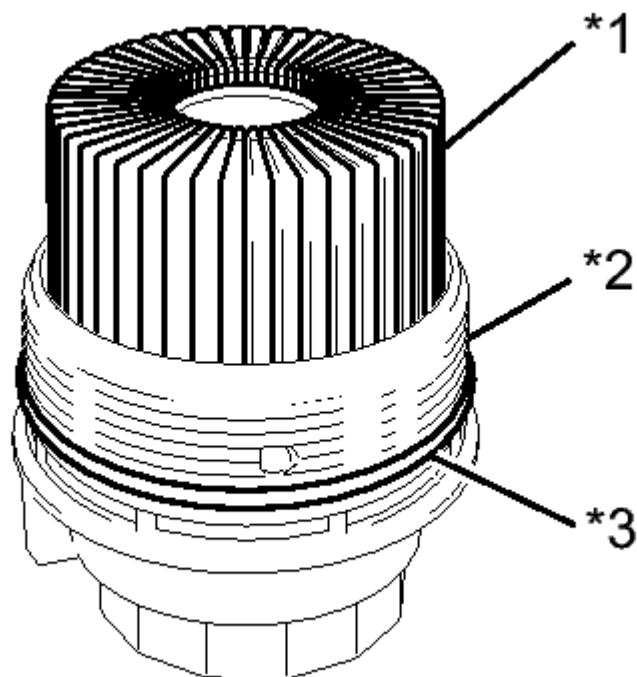


Fig. 6: Removing Oil Filter Cap

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

- SST: 09228-06501

f. Remove the oil filter element and O-ring from the oil filter cap.



P

Fig. 7: Identifying Oil Filter Cap, Element & O-Ring

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

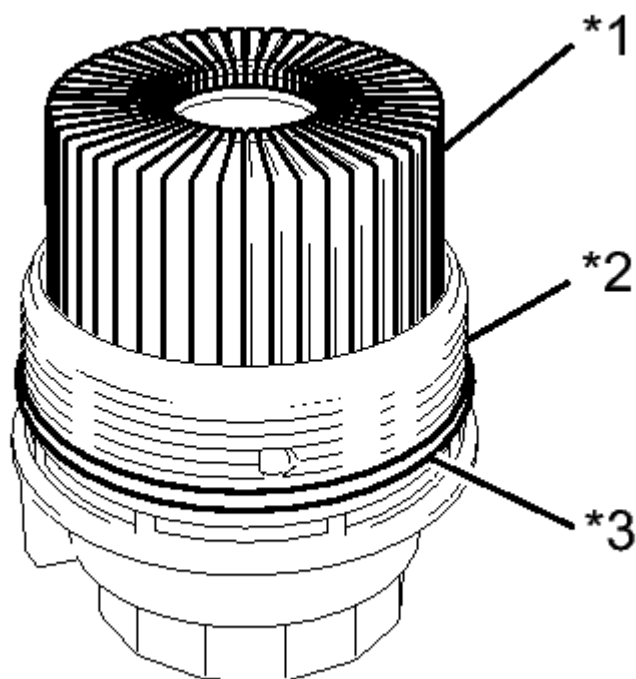
TEXT IN ILLUSTRATION

	Oil
*1	Filter
	Element
	Oil
*2	Filter
	Cap
*3	O-ring

NOTE: Do not use any tools to remove the O-ring in order to prevent the oil filter cap from being damaged. Be sure to remove it by hand.

3. INSTALL OIL FILTER ELEMENT

- a. Clean the inside of the oil filter cap, threads and O-ring groove.



P

Fig. 8: Identifying Oil Filter Cap, Element & O-Ring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

	Oil
*1	Filter
	Element
	Oil
*2	Filter

	Cap
*3	O-ring

- b. Apply a light coat of engine oil to a new O-ring and install it to the oil filter cap.

NOTE: Make sure that the O-ring does not get twisted on the groove.

- c. Install a new oil filter element to the oil filter cap.
d. Remove all dirt and foreign matter from the installation surface and the inside of the oil filter cap on the engine side.
e. Apply a light coat of engine oil to the O-ring again and install the oil filter cap.

NOTE: Make sure that the O-ring does not get caught between the parts.

- f. Using SST, install the oil filter cap.

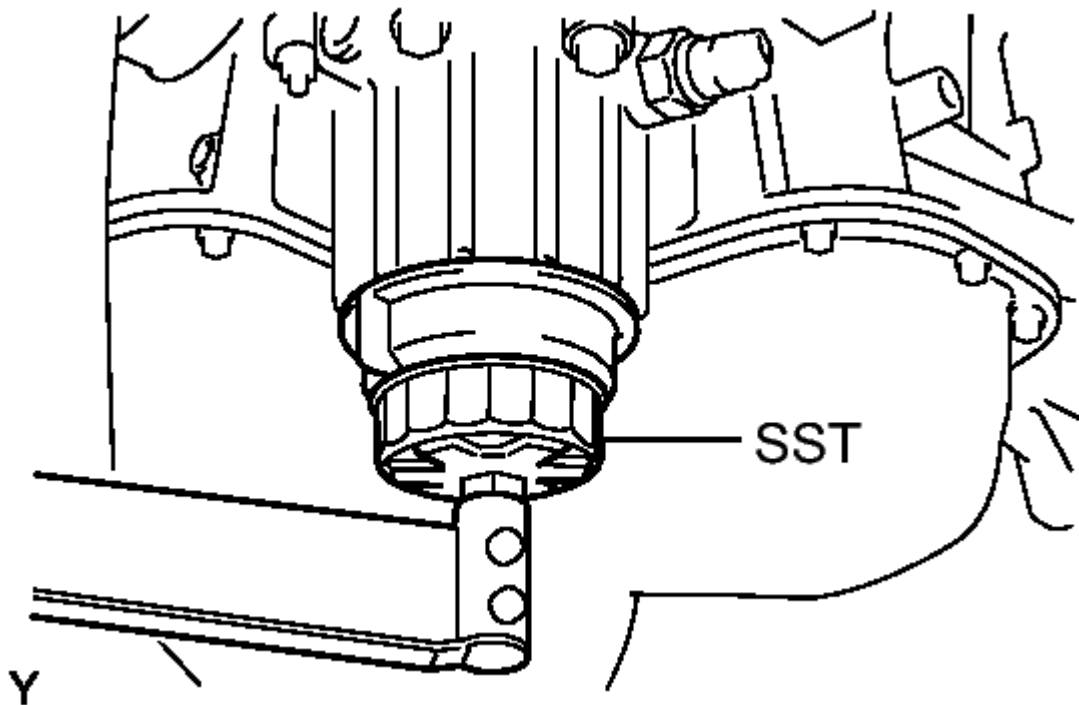


Fig. 9: Installing Oil Filter Cap

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

- SST: 09228-06501

Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)

NOTE: Make sure that there is no clearance between the parts after tightening the oil filter cap.

- g. Apply a light coat of engine oil to a new O-ring and install it to the oil filter cap.

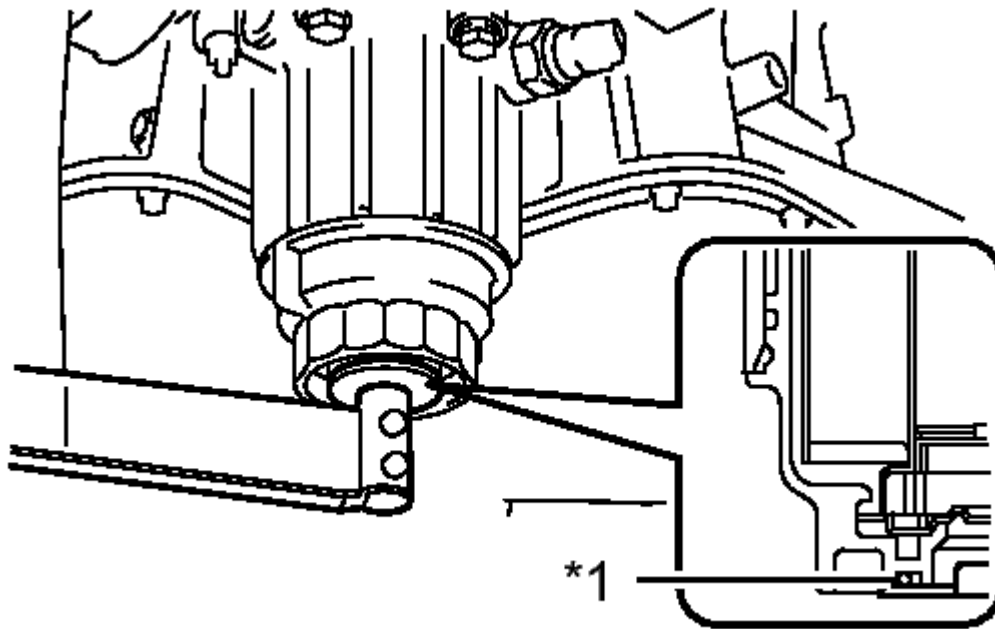


Fig. 10: Identifying Oil Filter Cap O-Ring
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*1	O-ring
----	--------

NOTE: Remove all dirt and foreign matter from the installation surface.

- h. Install the oil filter drain plug to the oil filter cap.

Torque: 13 N*m (127 kgf*cm, 9 ft.*lbf)

NOTE: Make sure that the O-ring does not get caught between the parts.

4. ADD ENGINE OIL

- a. Add new engine oil.

Standard Oil Grade (for USA, Canada)

Oil grade	Oil Viscosity (SAE)

ILSAC multigrade engine oil	0W-20
-----------------------------------	-------

Standard Oil Grade (for Mexico, Korea)

Oil grade	Oil Viscosity (SAE)
API grade SL "Energy- Conserving", SM "Energy- Conserving", SN "Resource- Conserving" or ILSAC multigrade engine oil	0W-20 5W-20 5W-30 10W-30
API grade SL, SM or SN multigrade engine oil	15W-40 20W-50

Standard Capacity (w/ Oil Cooler)

Item	Standard Condition
Drain and refill with oil filter change	6.1 liters (6.4 US qts, 5.4 Imp. qts)
Drain and refill without oil filter change	5.7 liters (6.0 US qts, 5.0 Imp. qts)
	7.1 liters

Dry fill	(7.5 US qts, 6.2 Imp. qts)
----------	----------------------------------

Standard Capacity (w/o Oil Cooler)

Item	Standard Condition
Drain and refill with oil filter change	6.1 liters (6.4 US qts, 5.4 Imp. qts)
Drain and refill without oil filter change	5.7 liters (6.0 US qts, 5.0 Imp. qts)
Dry fill	6.8 liters (7.2 US qts, 6.0 Imp. qts)

b. Install the oil filler cap.

5. INSPECT FOR OIL LEAK

a. Start the engine. Check for engine oil leaks from the connected parts of the oil filter cap and oil filter drain plug.

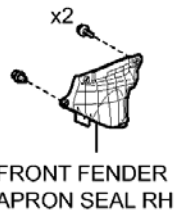
6. INSPECT ENGINE OIL LEVEL . Refer to ON-VEHICLE INSPECTION - Step 1

OIL PRESSURE SWITCH

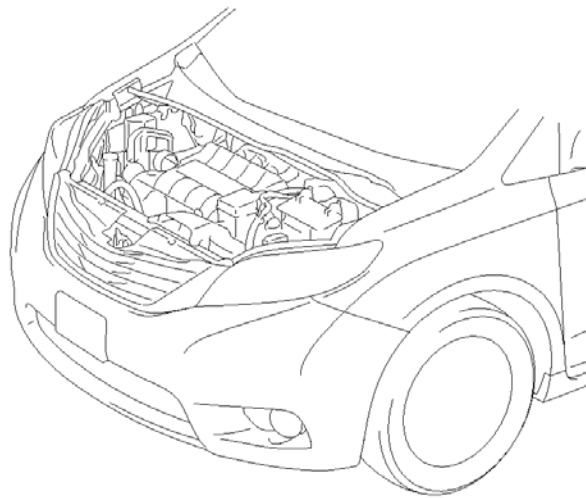
COMPONENTS

ILLUSTRATION

w/ Oil Cooler:



FRONT FENDER
APRON SEAL RH



w/o Oil Cooler:

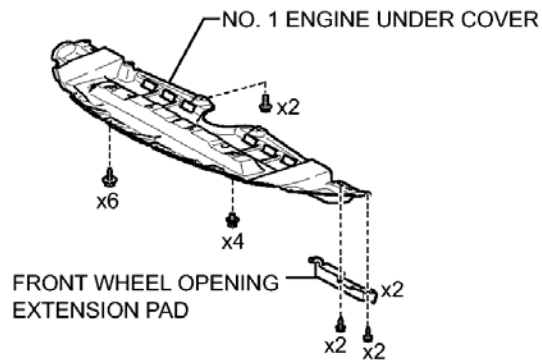
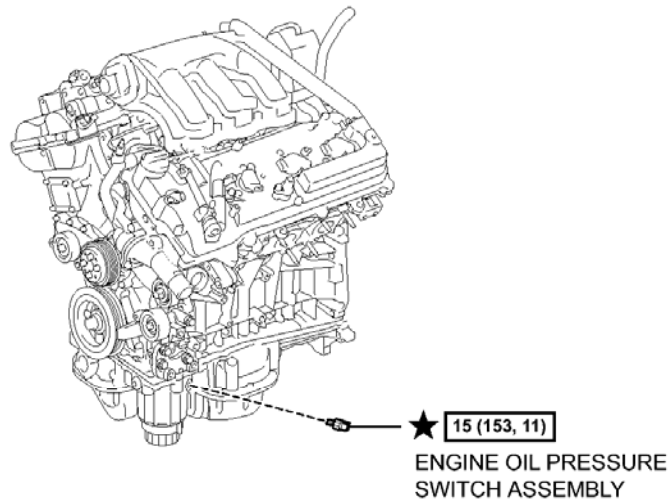


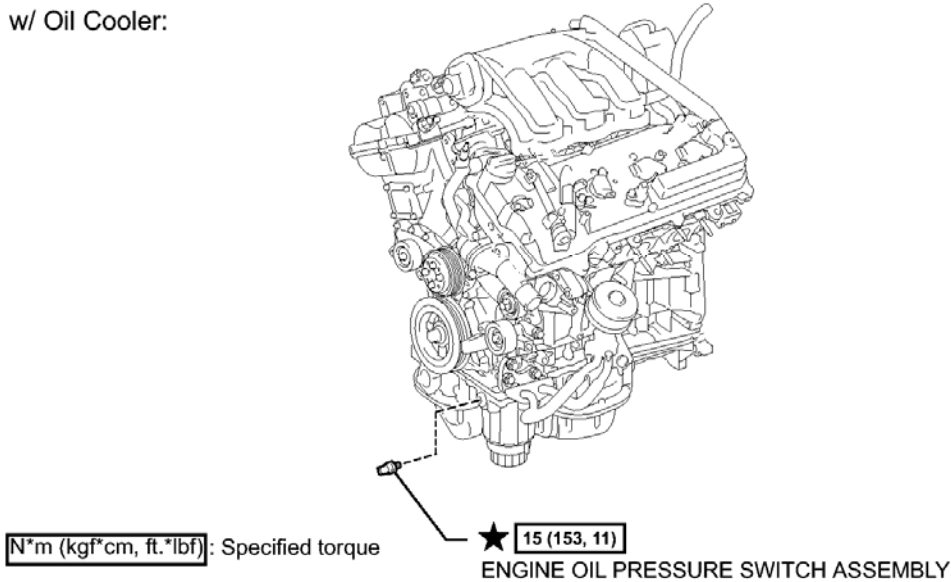
Fig. 11: Oil Pressure Switch Replacement Components (1 of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION

w/o Oil Cooler:



w/ Oil Cooler:



★ Precoated part

T

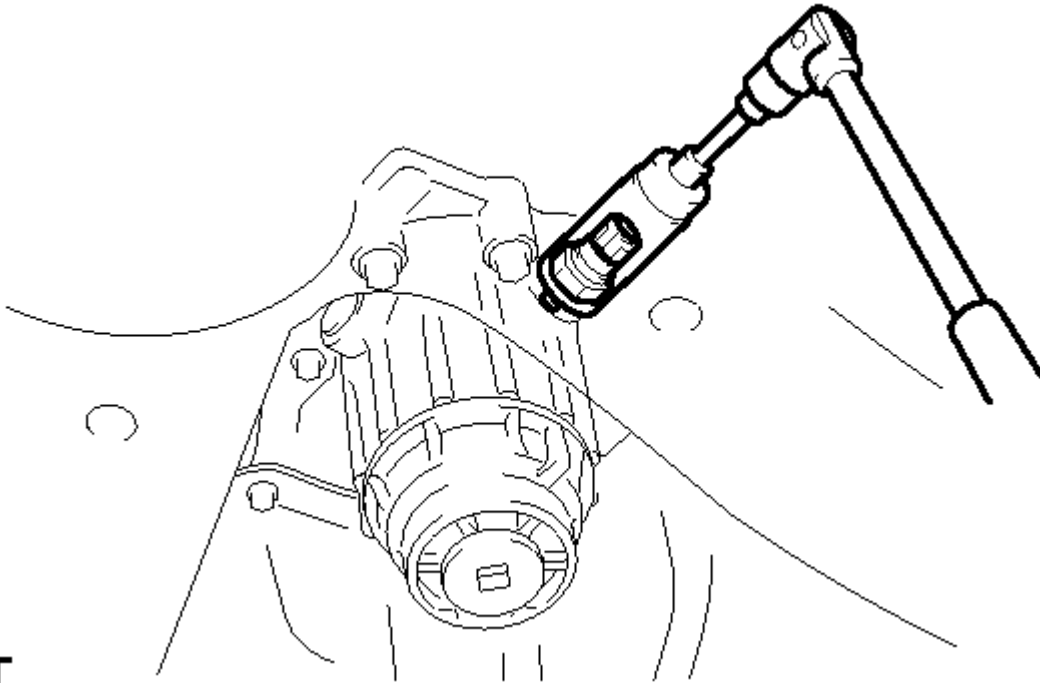
Fig. 12: Oil Pressure Switch Replacement Components With Torque Specifications (2 of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

REMOVAL

1. REMOVE FRONT WHEEL RH (w/ Oil Cooler)
2. REMOVE NO. 1 ENGINE UNDER COVER (w/o Oil Cooler) . Refer to **REMOVAL - Step 4**
3. REMOVE FRONT FENDER APRON SEAL RH (w/ Oil Cooler) . Refer to **REMOVAL - Step 10**
4. REMOVE ENGINE OIL PRESSURE SWITCH ASSEMBLY (w/o Oil Cooler)
 - a. Disconnect the engine oil pressure switch assembly connector.

- b. Using a deep socket wrench, remove the engine oil pressure switch assembly.



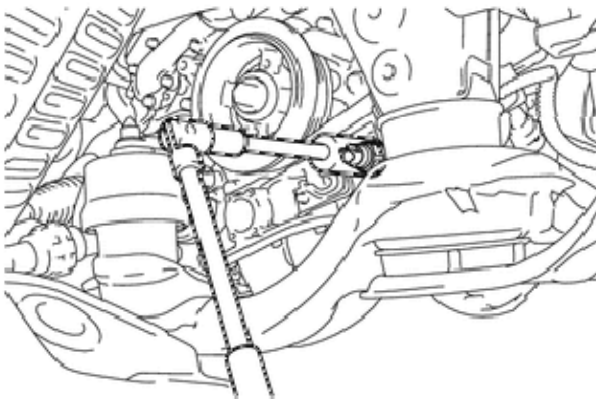
T

Fig. 13: Installing Oil Pressure Switch

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

5. REMOVE ENGINE OIL PRESSURE SWITCH ASSEMBLY (w/ Oil Cooler)

- a. Disconnect the engine oil pressure switch assembly connector.
- b. Using a deep socket wrench, remove the engine oil pressure switch assembly.



P

Fig. 14: Installing Oil Pressure Switch

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

INSPECTION

INSPECTION

1. INSPECT ENGINE OIL PRESSURE SWITCH ASSEMBLY

- Disconnect the engine oil pressure switch assembly connector.
- Start the engine.
- Measure the resistance according to the value(s) in the table below.

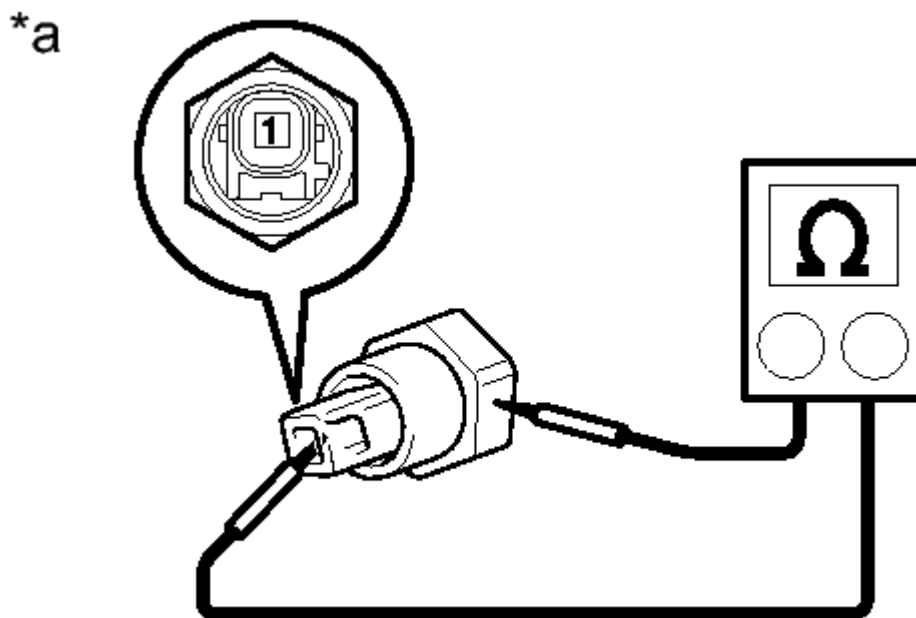


Fig. 15: Oil Pressure Switch Assembly Connector End View
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard Resistance

Tester Connection	Condition	Specified Condition
1 - Switch body	Idling	10 kohms or higher
1 - Switch body	Engine stopped	Below 1 ohms

TEXT IN ILLUSTRATION

*a	Component without harness connected (Engine Oil Pressure Switch)
----	--

Assembly)

If the result is not as specified, replace the engine oil pressure switch assembly.

- d. Reconnect the engine oil pressure switch assembly connector.

INSTALLATION

INSTALLATION

1. INSTALL ENGINE OIL PRESSURE SWITCH ASSEMBLY (w/o Oil Cooler)

- a. Apply adhesive to 2 or 3 threads of the engine oil pressure switch assembly.

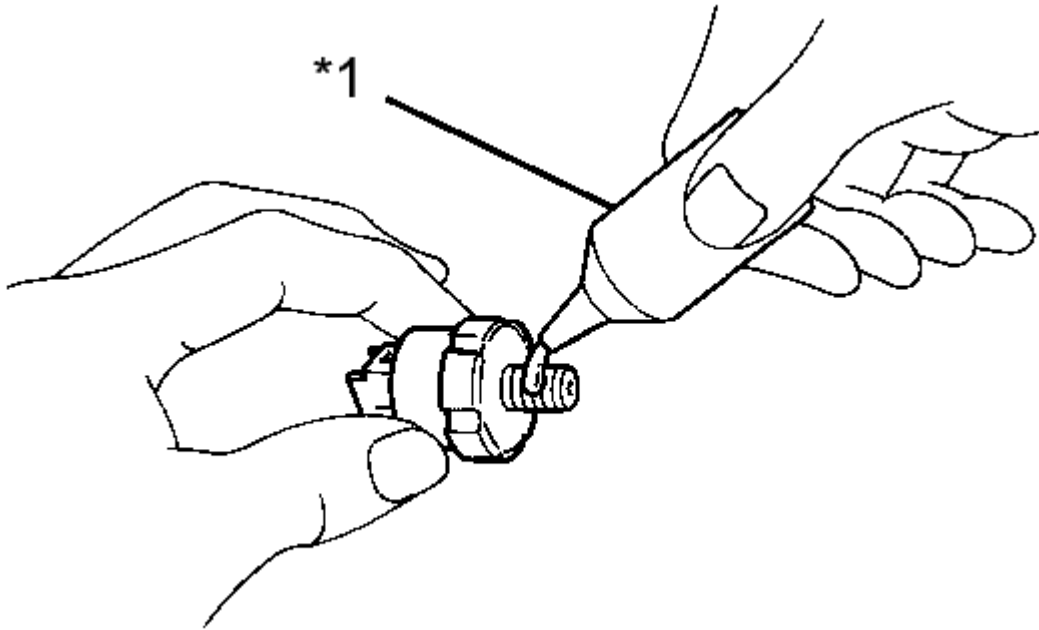


Fig. 16: Applying Adhesive To Engine Oil Pressure Switch Assembly (w/ Oil Cooler)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*1 Adhesive

Adhesive

Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

- b. Using a deep socket wrench, install the engine oil pressure switch assembly.

Torque: 15 N*m (153 kgf*cm, 11 ft.*lbf)

NOTE: Do not start the engine for at least 1 hour after installation.

c. Connect the engine oil pressure switch assembly connector.

2. INSTALL ENGINE OIL PRESSURE SWITCH ASSEMBLY (w/ Oil Cooler)

a. Apply adhesive to 2 or 3 threads of the engine oil pressure switch assembly.

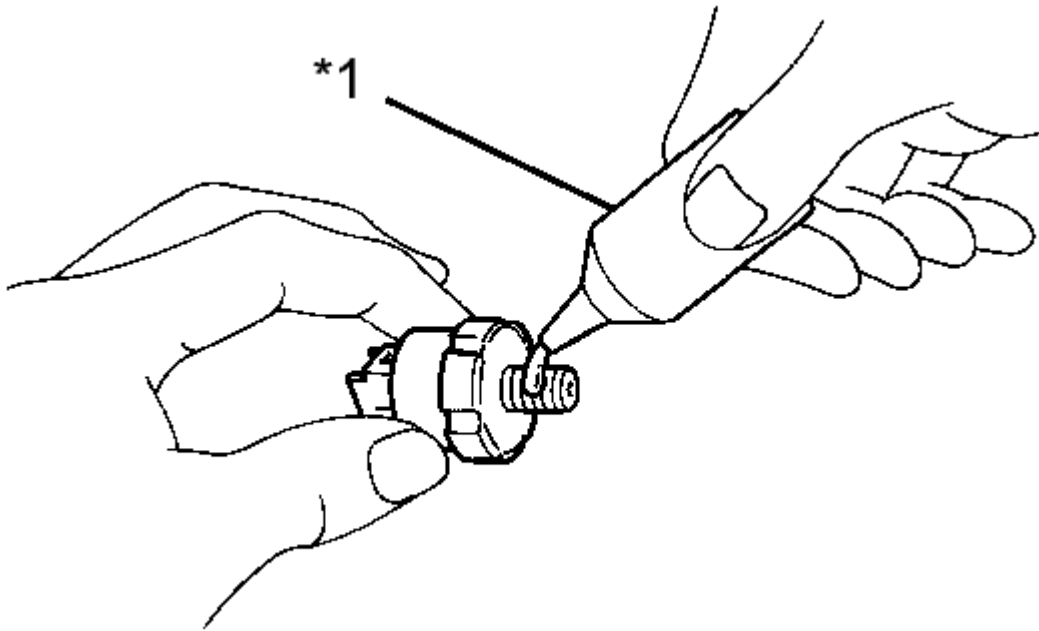


Fig. 17: Applying Adhesive To Engine Oil Pressure Switch Assembly (w/ Oil Cooler)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*1 Adhesive

Adhesive

Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

b. Using a deep socket wrench, install the engine oil pressure switch assembly.

Torque: 15 N*m (153 kgf*cm, 11 ft.*lbf)

NOTE: Do not start the engine for at least 1 hour after installation.

c. Connect the engine oil pressure switch assembly connector.

3. INSPECT FOR OIL LEAK

a. Start the engine.

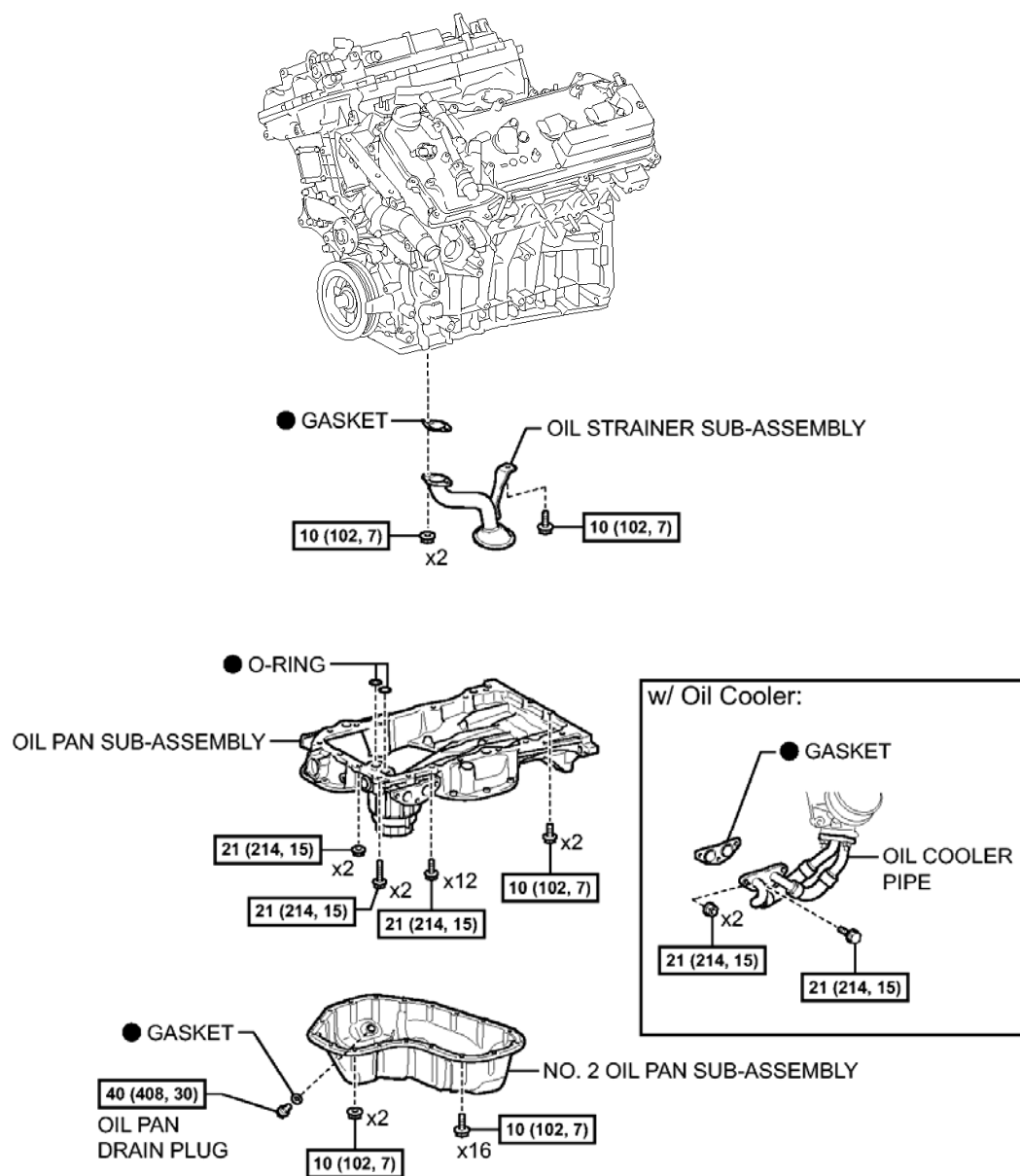
- b. Check for engine oil leaks from the engine oil pressure switch assembly.
- 4. **CHECK ENGINE OIL LEVEL** . Refer to **ON-VEHICLE INSPECTION - Step 1**
- 5. **INSTALL FRONT FENDER APRON SEAL RH (w/ Oil Cooler)** . Refer to **INSTALLATION - Step 97**
- 6. **INSTALL NO. 1 ENGINE UNDER COVER (w/o Oil Cooler)** . Refer to **INSTALLATION - Step 16**
- 7. **INSTALL FRONT WHEEL RH (w/ Oil Cooler)**

Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)

OIL PUMP

COMPONENTS

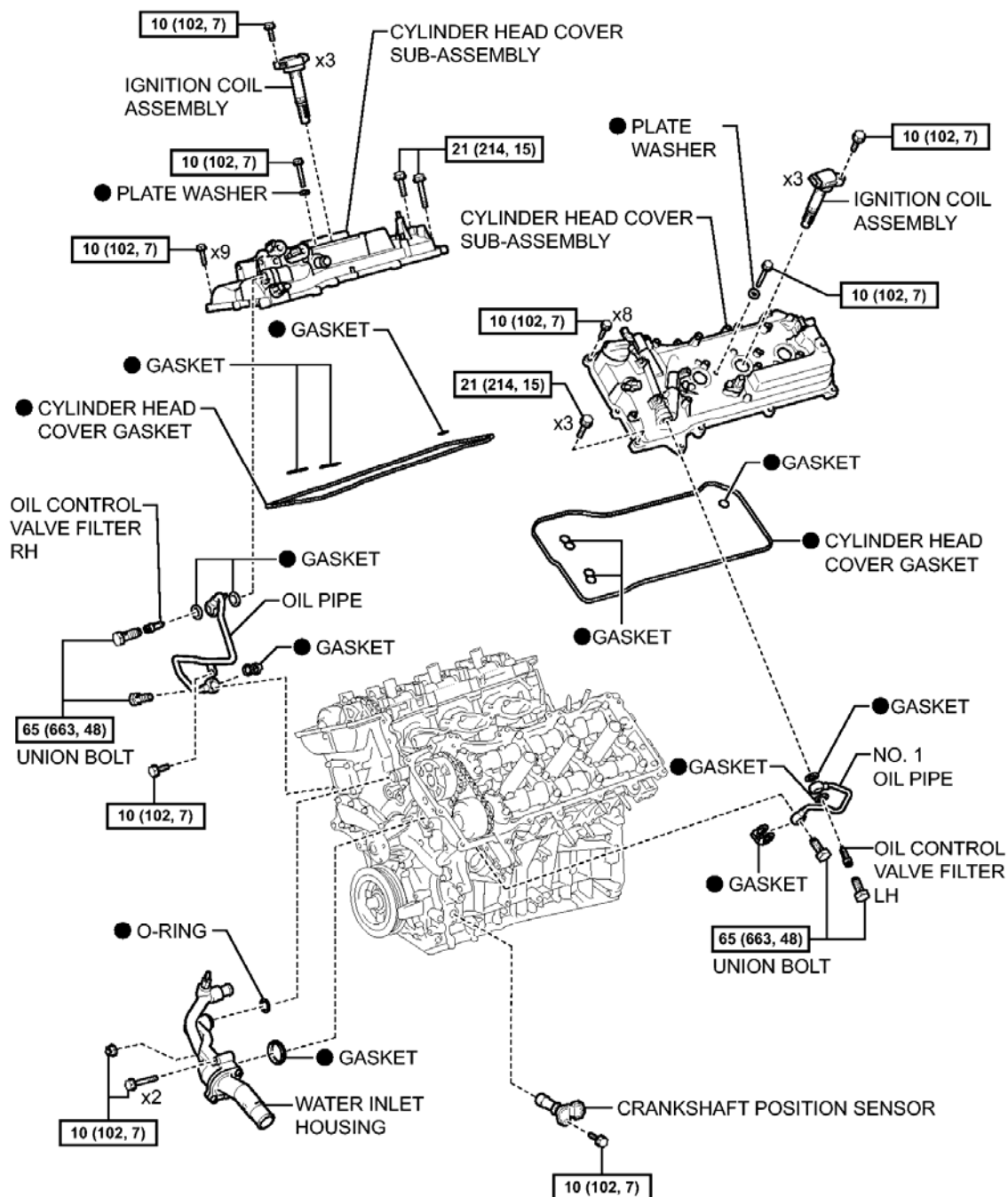
ILLUSTRATION



P

Fig. 18: Oil Pump Replacement Components With Torque Specifications (1 of 4)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION



[N*m (kgf*cm, ft.*lbf)]: Specified torque

● Non-reusable part

P

Fig. 19: Oil Pump Replacement Components With Torque Specifications (2 of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION

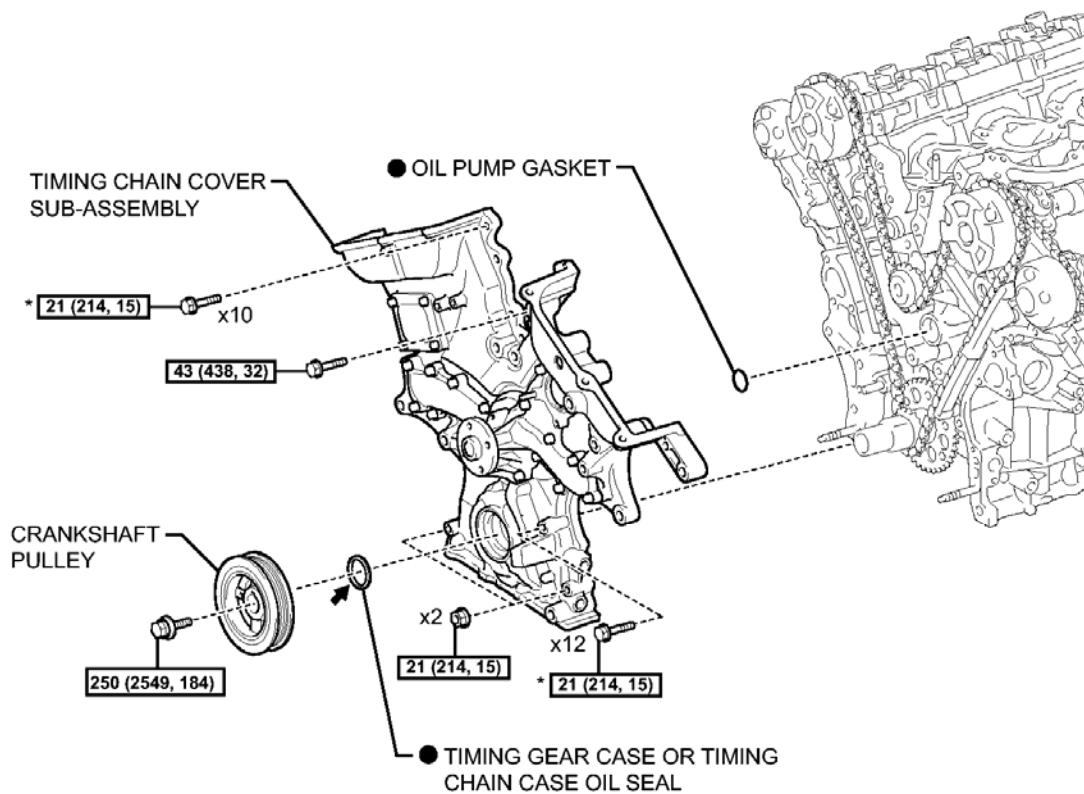
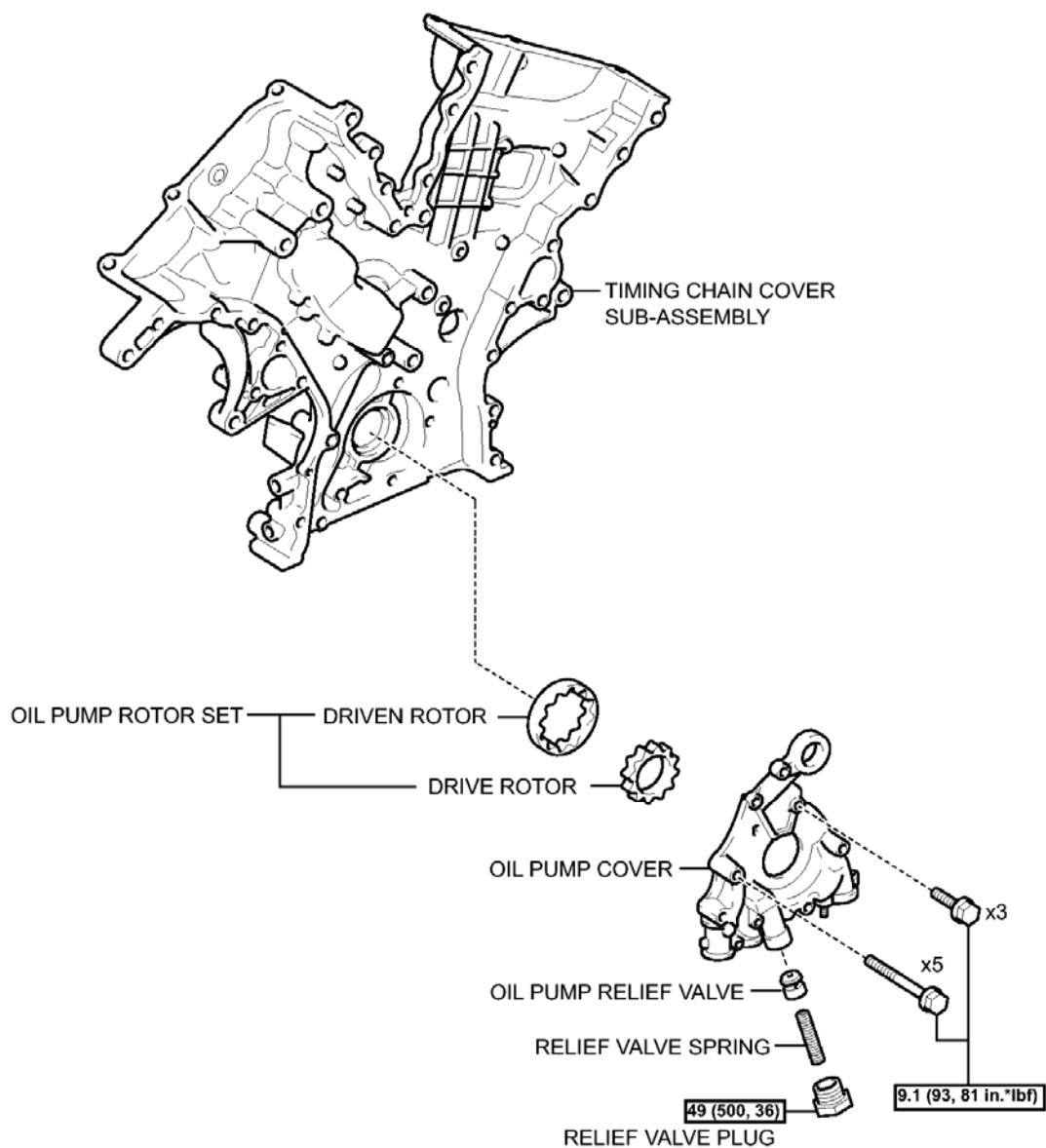


Fig. 20: Oil Pump Replacement Components With Torque Specifications (3 of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION



[N*m (kgf*cm, ft.*lbf)]: Specified torque

P

Fig. 21: Oil Pump Replacement Components With Torque Specifications (4 of 4)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

REMOVAL

1. REMOVE ENGINE ASSEMBLY

Refer to **REMOVAL**

2. **REMOVE IGNITION COIL ASSEMBLY** . Refer to **REMOVAL - Step 3**
3. **REMOVE CRANKSHAFT POSITION SENSOR** . Refer to **REMOVAL - Step 2**
4. **REMOVE NO. 1 OIL PIPE** . Refer to **DISASSEMBLY - Step 8**
5. **REMOVE OIL PIPE** . Refer to **DISASSEMBLY - Step 9**
6. **REMOVE CRANKSHAFT PULLEY** . Refer to **REMOVAL - Step 4**
7. **SEPARATE OIL COOLER PIPE (w/ oil cooler)**
 - a. Remove the bolt and 2 nuts, and disconnect the oil cooler pipe from the oil pan sub-assembly.

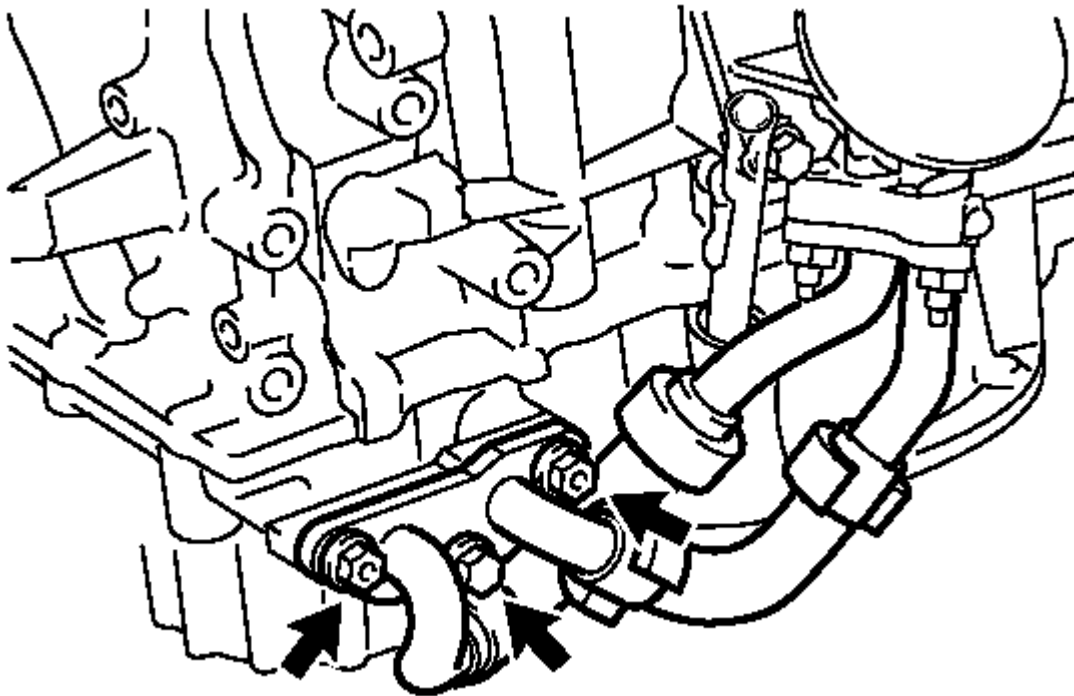
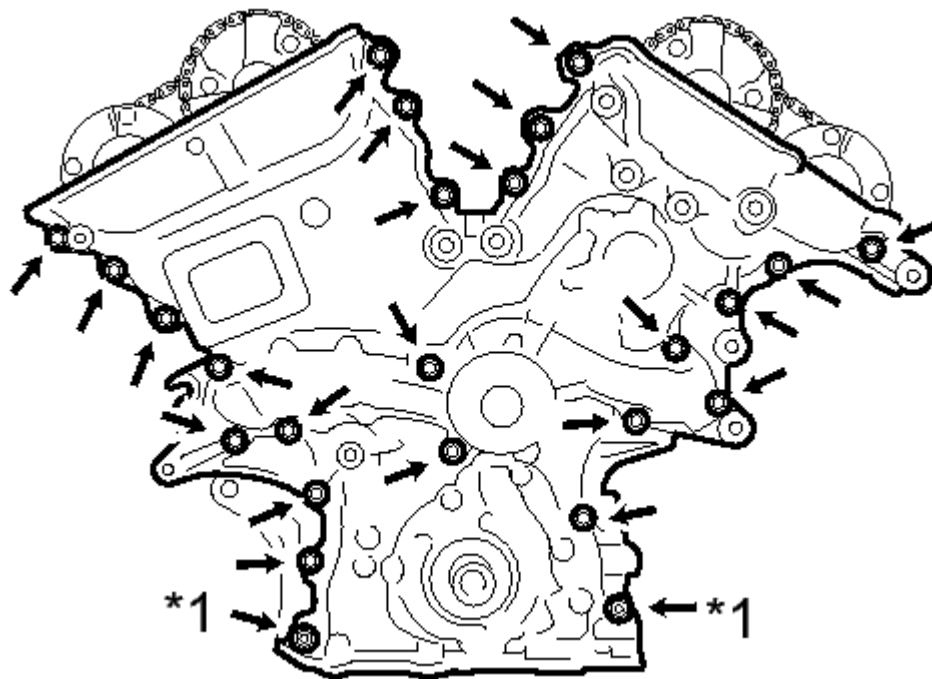


Fig. 22: Identifying Nuts

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

- b. Remove the gasket from the oil pan sub-assembly.
8. **REMOVE WATER INLET HOUSING** . Refer to **DISASSEMBLY - Step 18**
9. **REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY (for Bank 1)** . Refer to **DISASSEMBLY - Step 20**
10. **REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY (for Bank 2)** . Refer to **DISASSEMBLY - Step 21**
11. **REMOVE NO. 2 OIL PAN SUB-ASSEMBLY** . Refer to **DISASSEMBLY - Step 22**
12. **REMOVE OIL STRAINER SUB-ASSEMBLY** . Refer to **DISASSEMBLY - Step 23**
13. **REMOVE OIL PAN SUB-ASSEMBLY** . Refer to **DISASSEMBLY - Step 24**
14. **REMOVE TIMING CHAIN COVER SUB-ASSEMBLY**
 - a. Remove the 23 bolts and 2 nuts shown in the illustration.



Y

Fig. 23: Identifying Timing Chain Cover Sub-Assembly Bolts & Nuts
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*1	Nut
----	-----

- b. Remove the timing chain cover by prying between the timing chain cover and cylinder head or cylinder block with a screwdriver.

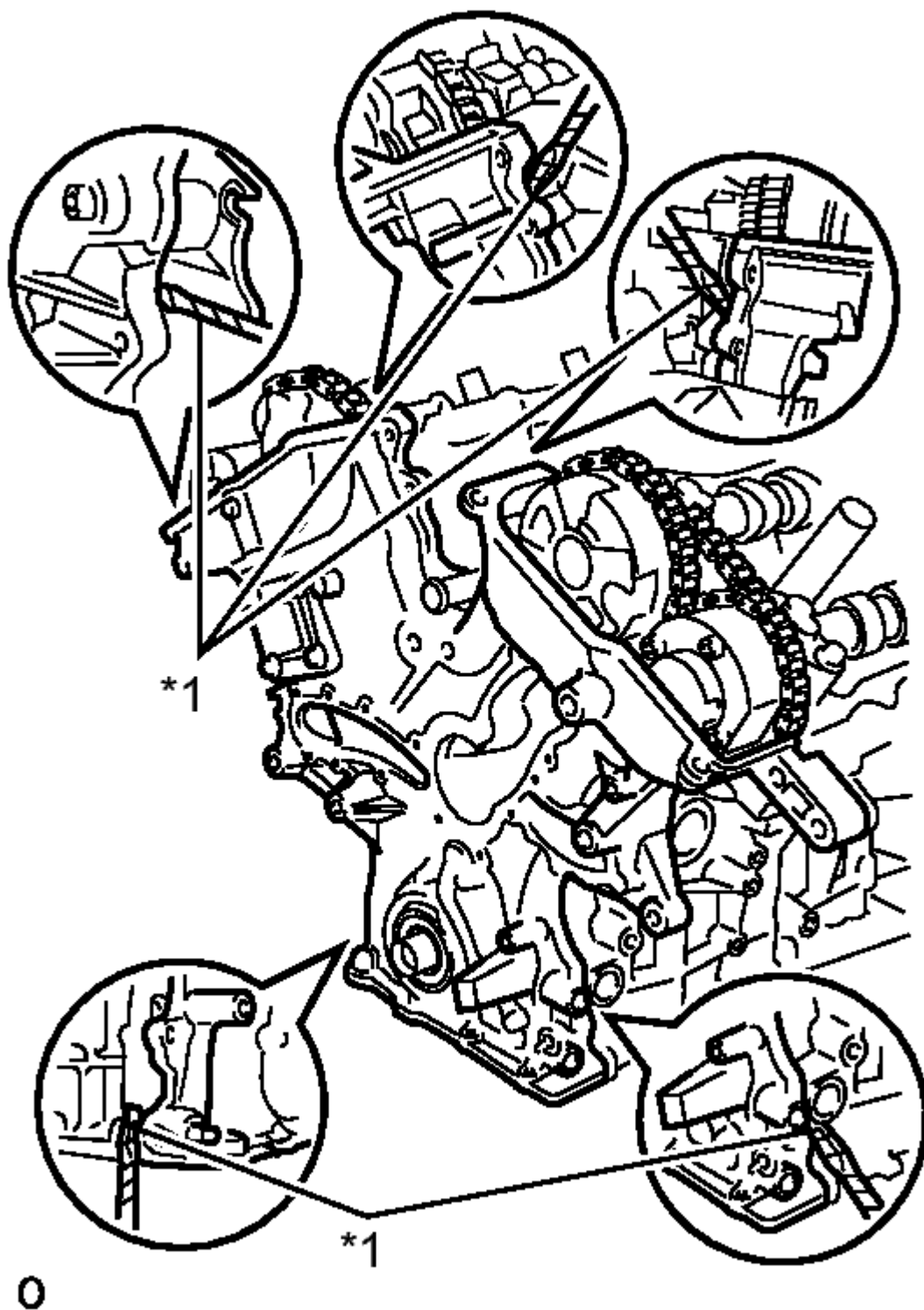


Fig. 24: Identifying Timing Chain Cover Sub-Assembly Prying Points
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

Protective

*1 Tape

NOTE: Be careful not to damage the contact surfaces of the cylinder head, cylinder block and chain cover.

HINT:

Tape the screwdriver tip before use.

- c. Remove the gasket.

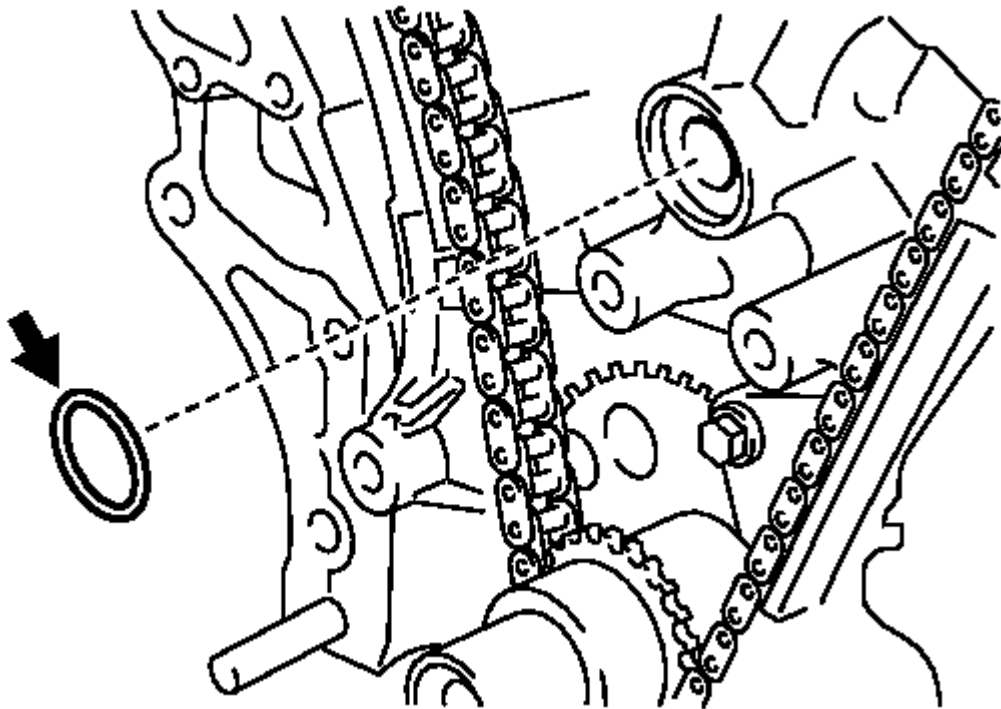
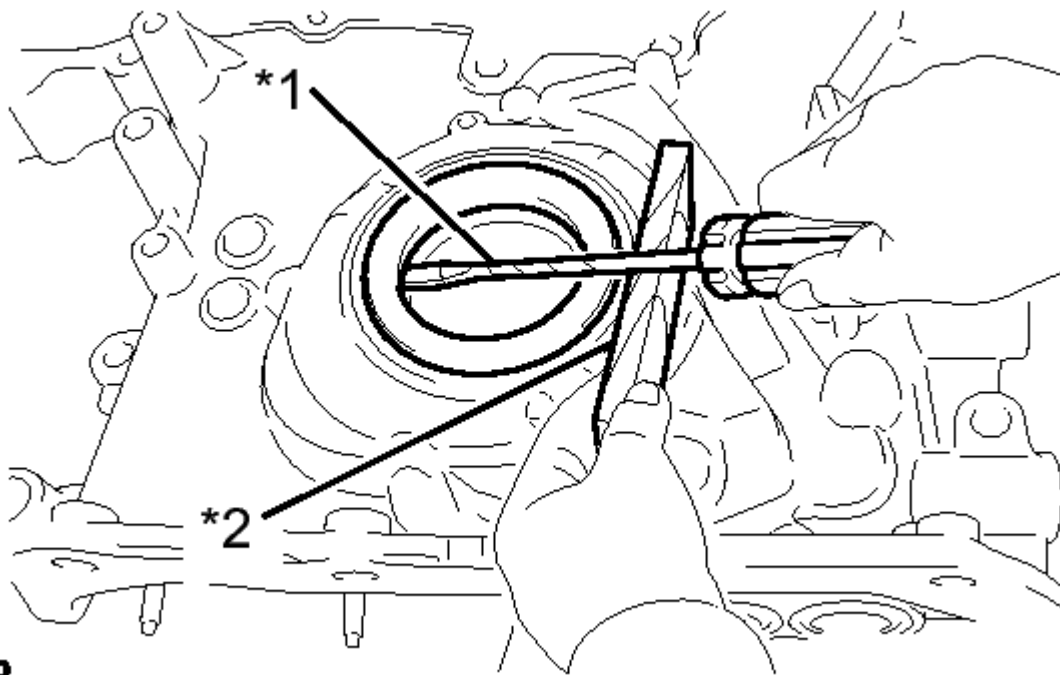


Fig. 25: Identifying Gasket

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

15. REMOVE TIMING GEAR CASE OR TIMING CHAIN CASE OIL SEAL

- a. Using a screwdriver, pry out the oil seal.



P

Fig. 26: Removing Oil Seal With Screwdriver & Wooden Block
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*1	Protective Tape
*2	Wooden Block

HINT:

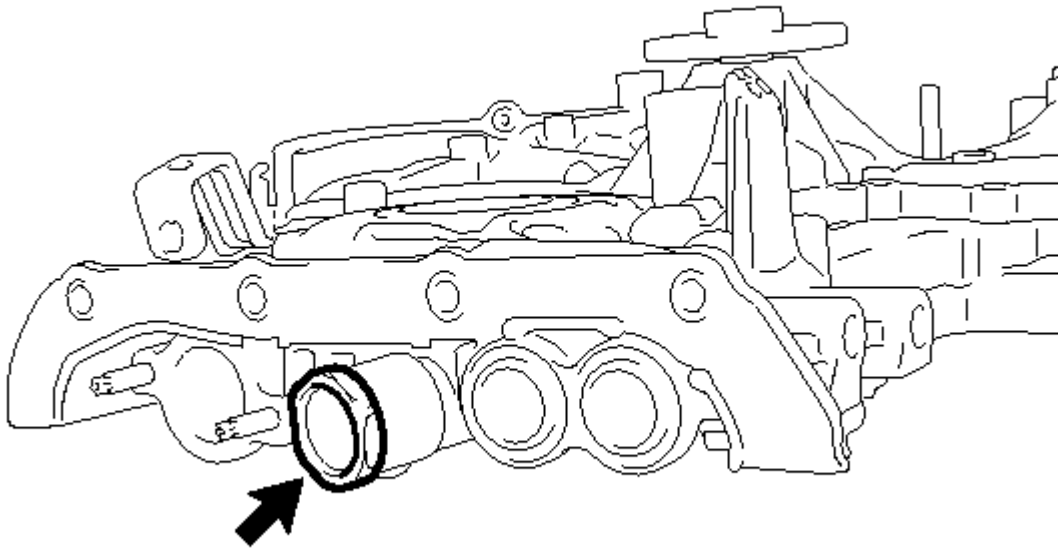
Tape the screwdriver tip before use.

DISASSEMBLY

DISASSEMBLY

1. REMOVE OIL PUMP RELIEF VALVE

- a. Using a 27 mm socket wrench, remove the relief valve plug.



P

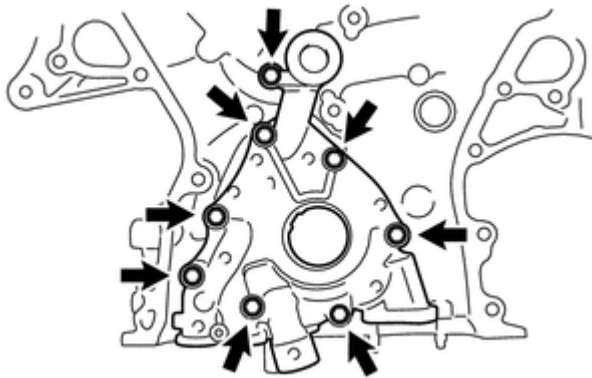
Fig. 27: Identifying Oil Pump Relief Valve Plug

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

- b. Remove the relief valve spring and oil pump relief valve.

2. REMOVE OIL PUMP COVER

- a. Remove the 8 bolts, oil pump cover and oil pump rotor set.



Y

Fig. 28: Identifying Oil Pump Cover Bolts

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

INSPECTION

INSPECTION

1. INSPECT OIL PUMP RELIEF VALVE

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

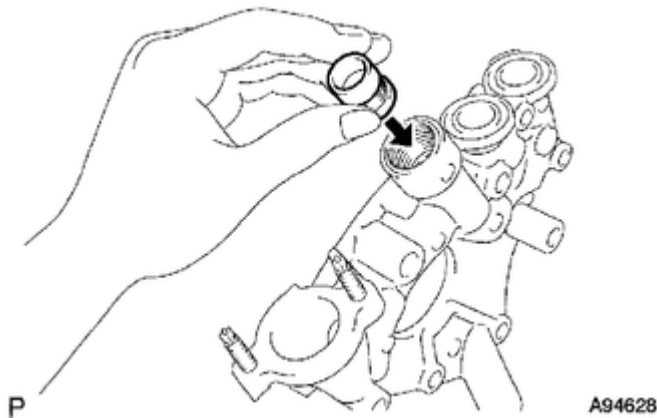


Fig. 29: Inspecting Oil Pump Relief Valve
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If the valve does not fall smoothly, replace the oil pump relief valve. If necessary, replace the timing chain cover sub-assembly.

2. INSPECT OIL PUMP ROTOR SET

- a. Install the rotors to the timing chain cover with the rotors marks facing up. Check that the rotors rotate smoothly.

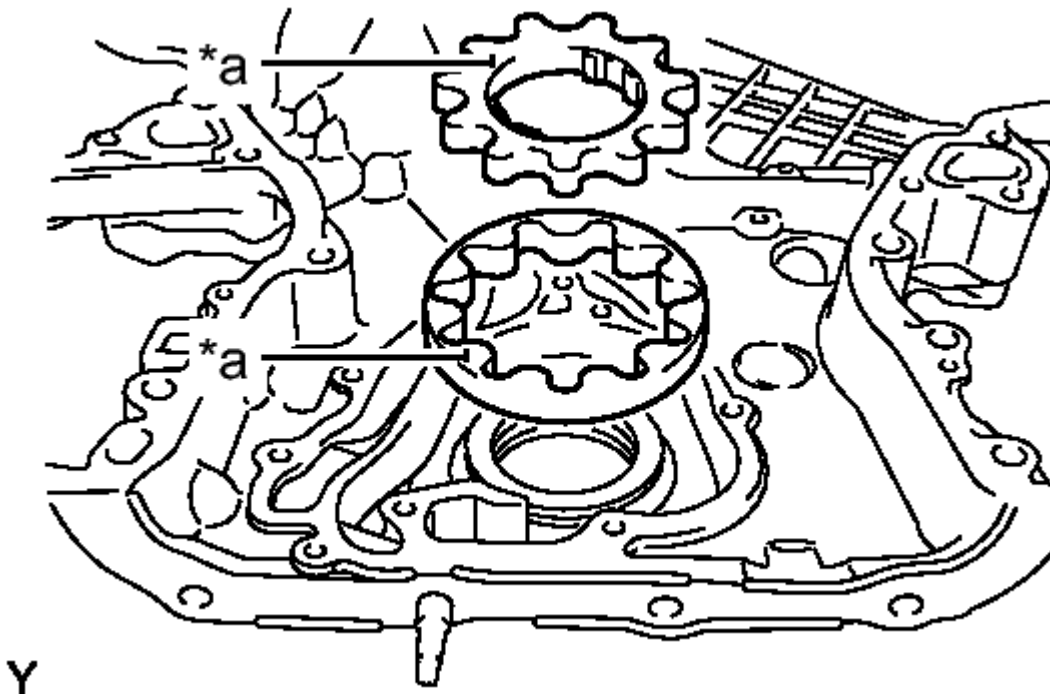


Fig. 30: Identifying Oil Pump Rotor Position
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*aMark

- b. Check the tip clearance.

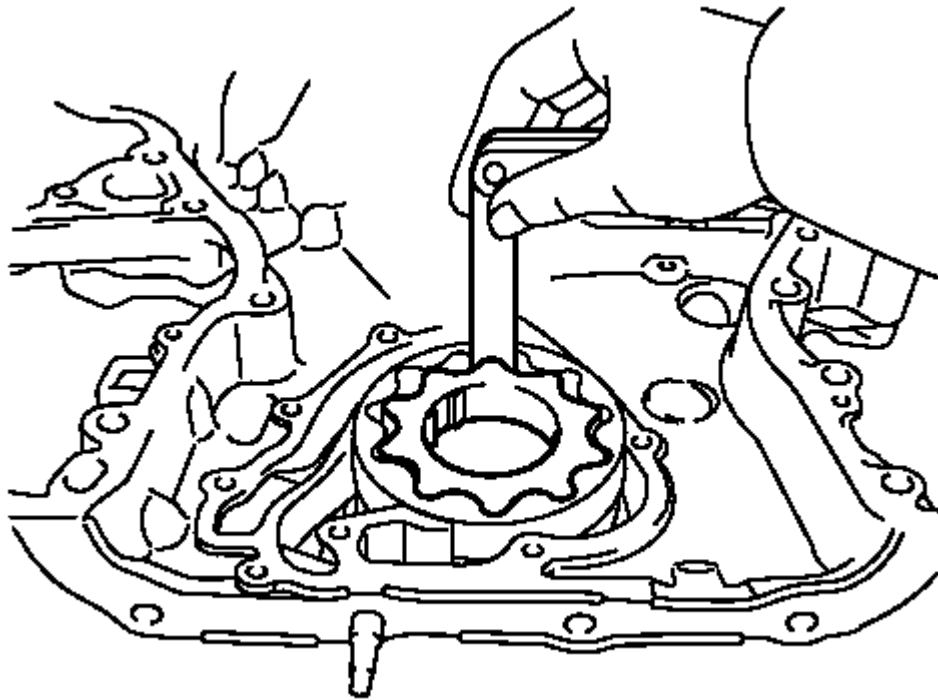


Fig. 31: Measuring Clearance Between Drive Rotor And Driven Rotor Tips
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1. Using a feeler gauge, measure the clearance between the drive and driven rotor tips, as shown in the illustration.

Tip Clearance

Standard

0.060 to 0.160 mm (0.00236 to 0.00630 in.)

Maximum

0.160 mm (0.00630 in.)

If the tip clearance is greater than the maximum, replace the timing chain cover sub-assembly.

- c. Check the side clearance.

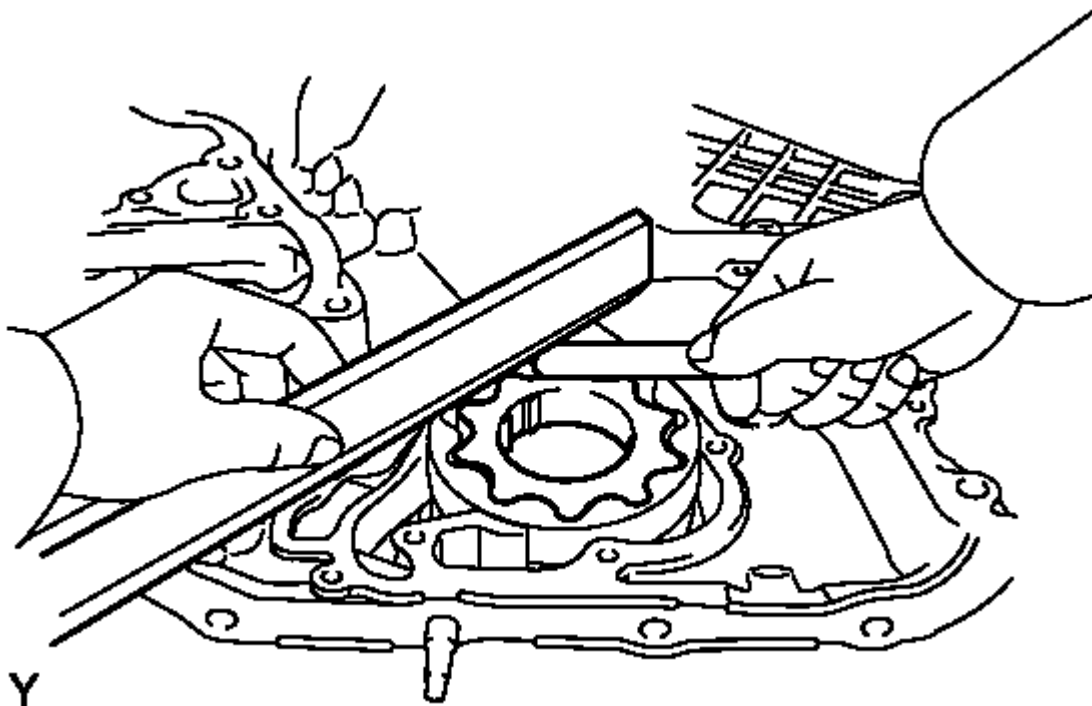


Fig. 32: Checking Side Clearance

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

1. Using a feeler gauge and precision straightedge, measure the clearance between the rotors and precision straightedge, as shown in the illustration.

Slide Clearance

Standard

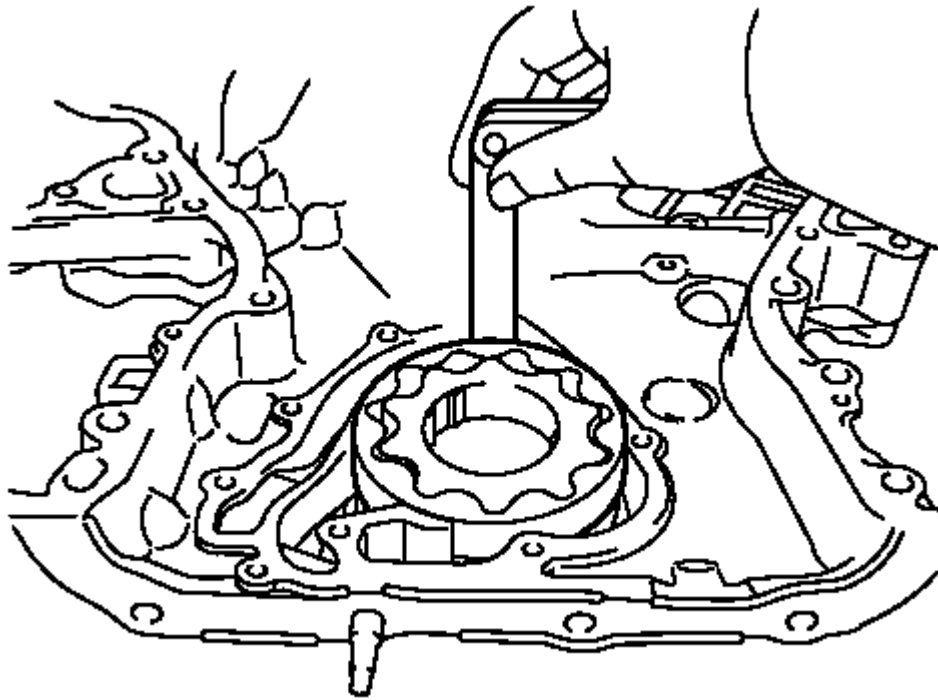
0.030 to 0.090 mm (0.00118 to 0.00354 in.)

Maximum

0.090 mm (0.00354 in.)

If the side clearance is greater than the maximum, replace the timing chain cover sub-assembly.

- d. Check the body clearance.



Y

Fig. 33: Checking Body Clearance

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

1. Using a feeler gauge, measure the clearance between the timing chain cover and driven rotor, as shown in the illustration.

Body Clearance

Standard

0.250 to 0.325 mm (0.00984 to 0.0128 in.)

Maximum

0.325 mm (0.0128 in.)

If the body clearance is greater than the maximum, replace the timing chain cover sub-assembly.

REASSEMBLY

REASSEMBLY

1. INSTALL OIL PUMP COVER

- a. Coat the drive and driven rotors with engine oil and place them into the timing chain cover with the marks facing up (oil pump cover side). Check that the rotors rotate smoothly.

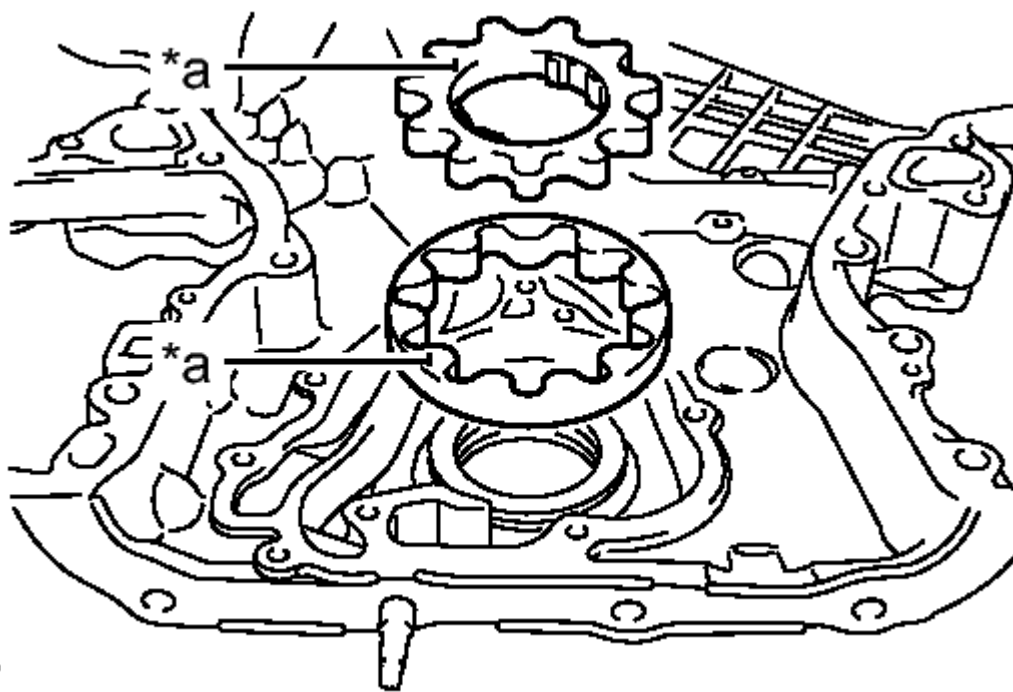


Fig. 34: Identifying Oil Pump Rotor Position
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*a|Mark

- b. Install the oil pump cover with the 8 bolts.

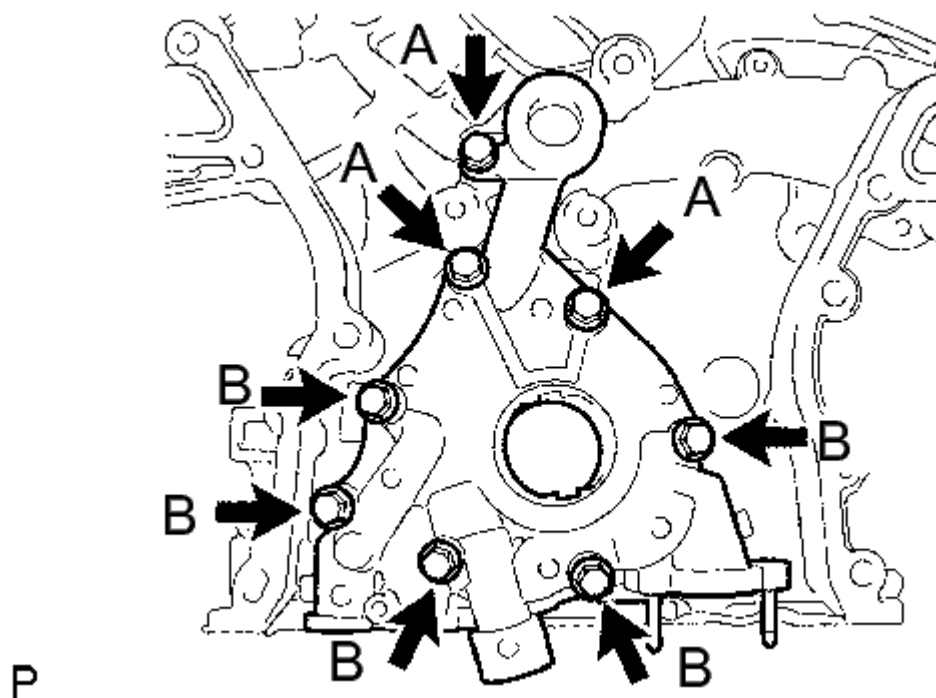


Fig. 35: Identifying Oil Pump Cover With Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

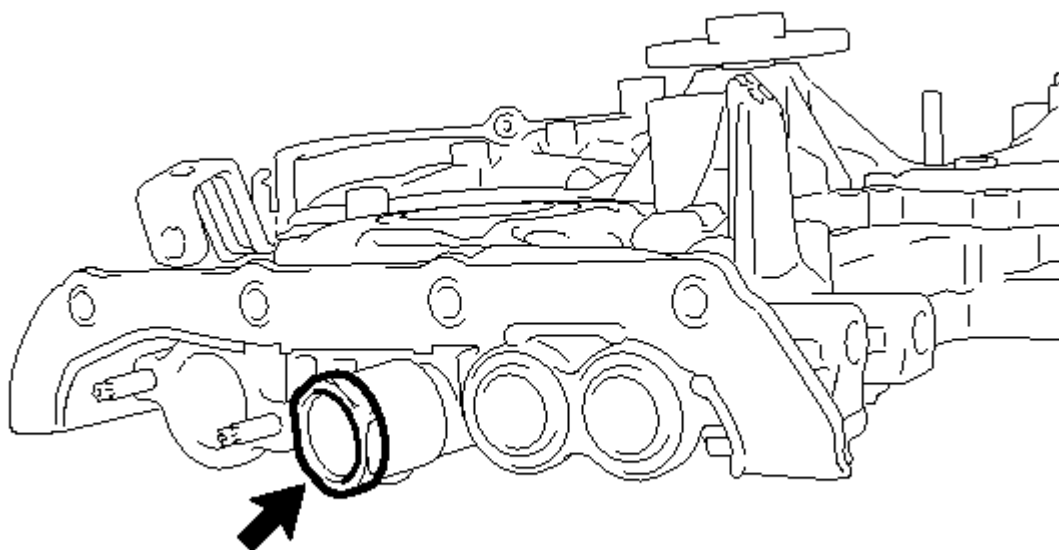
BOLT LENGTH

Item	Length
Bolt A	22 mm (0.866 in.)
Bolt B	40 mm (1.58 in.)

Torque: 9.1 N*m (93 kgf*cm, 81 in.*lbf)

2. INSTALL OIL PUMP RELIEF VALVE

- a. Coat the oil pump relief valve with engine oil.



P

Fig. 36: Identifying Oil Pump Relief Valve Plug
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Insert the oil pump relief valve and relief valve spring into the oil pump cover hole.
- c. Using a 27 mm socket wrench, install the relief valve plug.

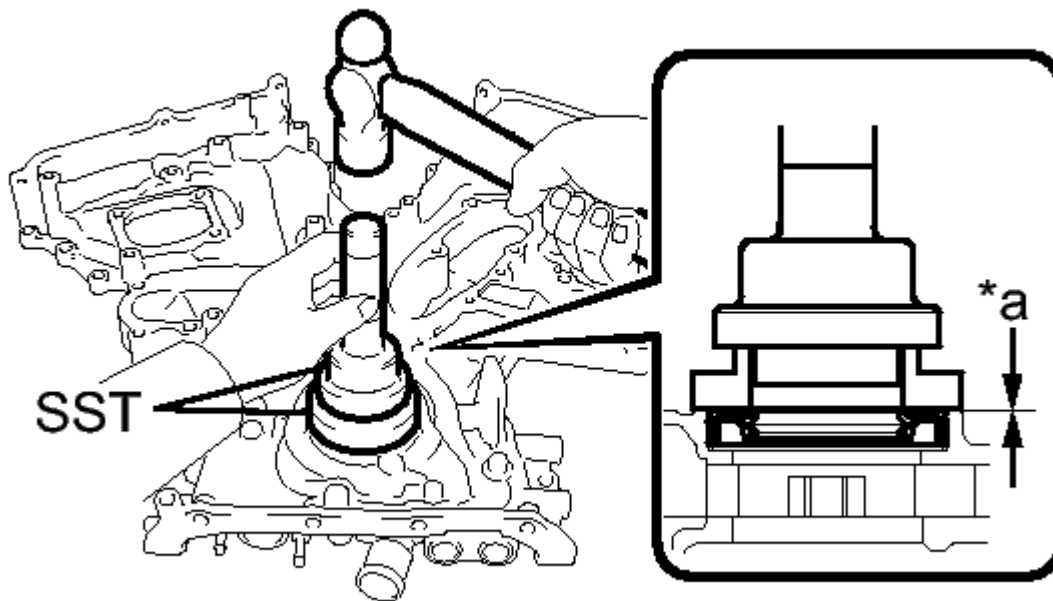
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

INSTALLATION

INSTALLATION

1. INSTALL TIMING GEAR CASE OR TIMING CHAIN CASE OIL SEAL

- Apply MP grease to a new timing chain case oil seal lip.
- Using SST, tap in a new oil seal until its surface is flush with the timing chain cover edge.



P

Fig. 37: Installing Oil Seal Using SST

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

- SST: 09223-22010
- SST: 09506-35010

Oil seal tap in depth

0 to 1.0 mm (0 to 0.0393 in.)

TEXT IN ILLUSTRATION

Oil seal *a tap in depth

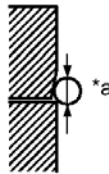
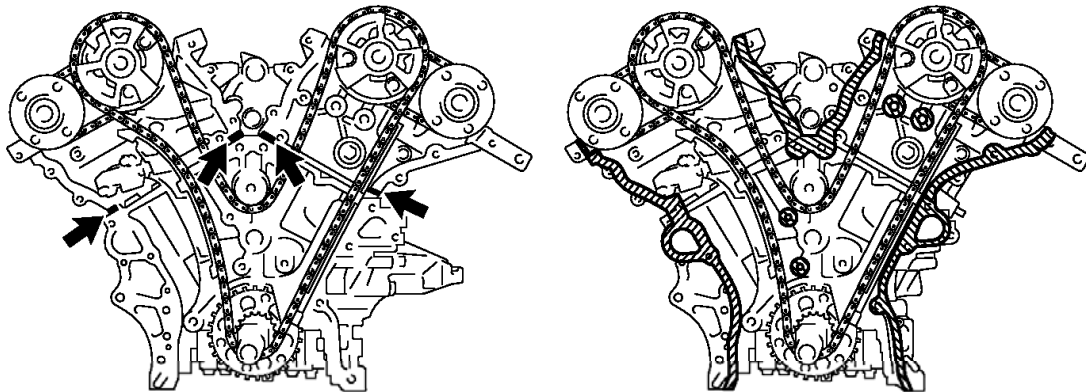
NOTE:

- Keep the lip free from foreign matter.
- Do not tap on the oil seal at an angle.

- Make sure that the oil seal edge does not stick out of the timing chain cover.

2. INSTALL TIMING CHAIN COVER SUB-ASSEMBLY

- Apply seal packing in a continuous line to the engine unit as shown in the following illustration.



0

Fig. 38: Identifying Timing Chain Cover Sub-Assembly Seal Applying Area
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*a	Seal Packing Diameter: 3.0 mm or more	Seal Packing
	Be sure to clean and degrease the contact surfaces	--

Seal packing

Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

Seal diameter

3.0 mm (0.118 in.) or more

NOTE:

- Be sure to clean and degrease the contact surfaces.
- If there is oil on the contact surfaces, wipe them with an oil-free cloth before applying seal packing.
- Install the timing chain cover sub-assembly within 3 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after installing the timing chain cover sub-assembly.

b. Apply seal packing in a line to the timing chain cover as shown in the following illustration.

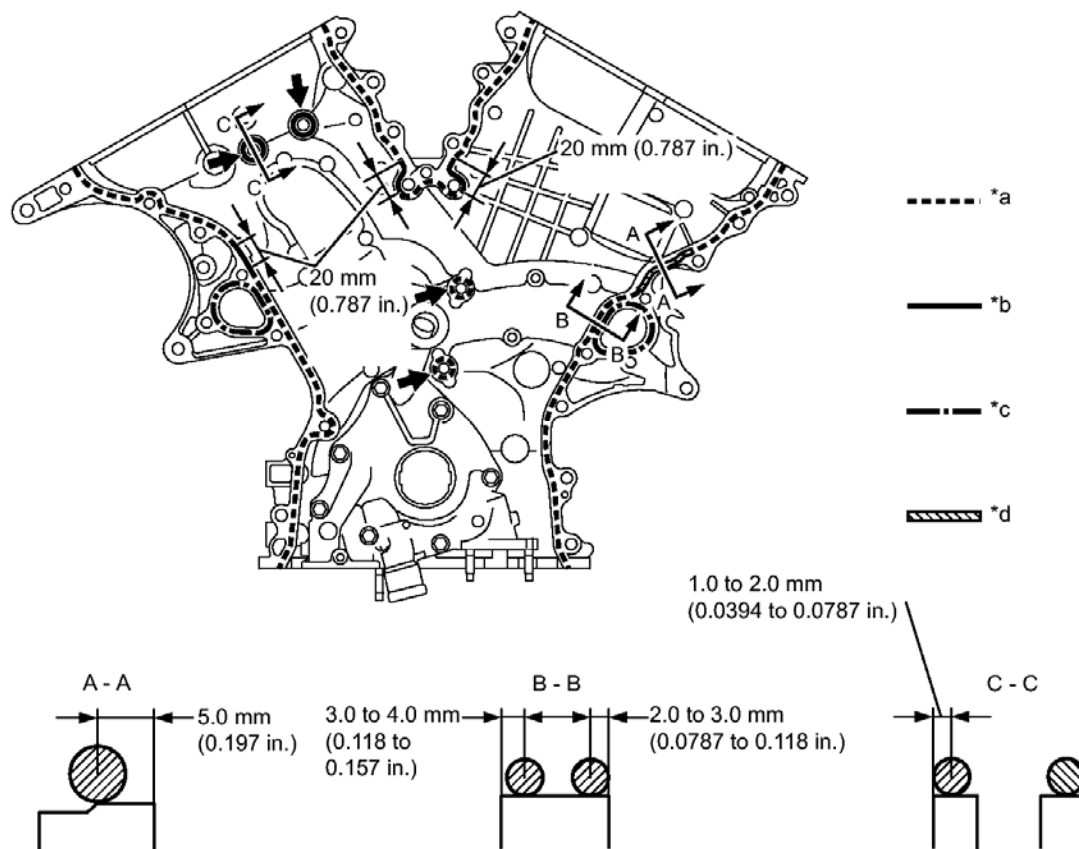


Fig. 39: Identifying Timing Chain Cover Seal Packing Applying Areas
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION



*a Dashed line area: (Seal Packing: Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent)	*b Continuous line area: (Seal Packing: Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent)
*c Alternate long and short dashed line area: (Seal Packing: Toyota Genuine Seal Packing 1282B, Three Bond 1282B or equivalent)	*d Diagonal line area: (Seal Packing: Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent)
Be sure to apply seal packing	- -

Seal packing

Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

Toyota Genuine Seal Packing 1282B, Three Bond 1282B or equivalent

NOTE:

- If there is oil on the contact surfaces, wipe them with an oil-free cloth before applying seal packing.
- Install the timing chain cover sub-assembly within 3 minutes and tighten the bolts within 15 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after installing the timing chain cover sub-assembly.

Seal Packing Application Chart

Area	Seal Packing Diameter	Application Position from Inside Seal Line
Continuous Line Area	4.5 mm (0.177 in.) or more	1.0 to 2.0 mm (0.0394 to 0.0787 in.)
Alternate Long and Short Dashed Line Area	3.5 mm (0.138 in.) or more	2.0 to 3.0 mm (0.0787 to 0.118 in.)
Dashed Line Area	3.5 mm (0.138 in.) or more	3.0 to 4.0 mm (0.118 to 0.158 in.)
Diagonal Line Area	6.0 mm (0.236 in.) or more	5.0 mm (0.197 in.)

- c. Install a new gasket.

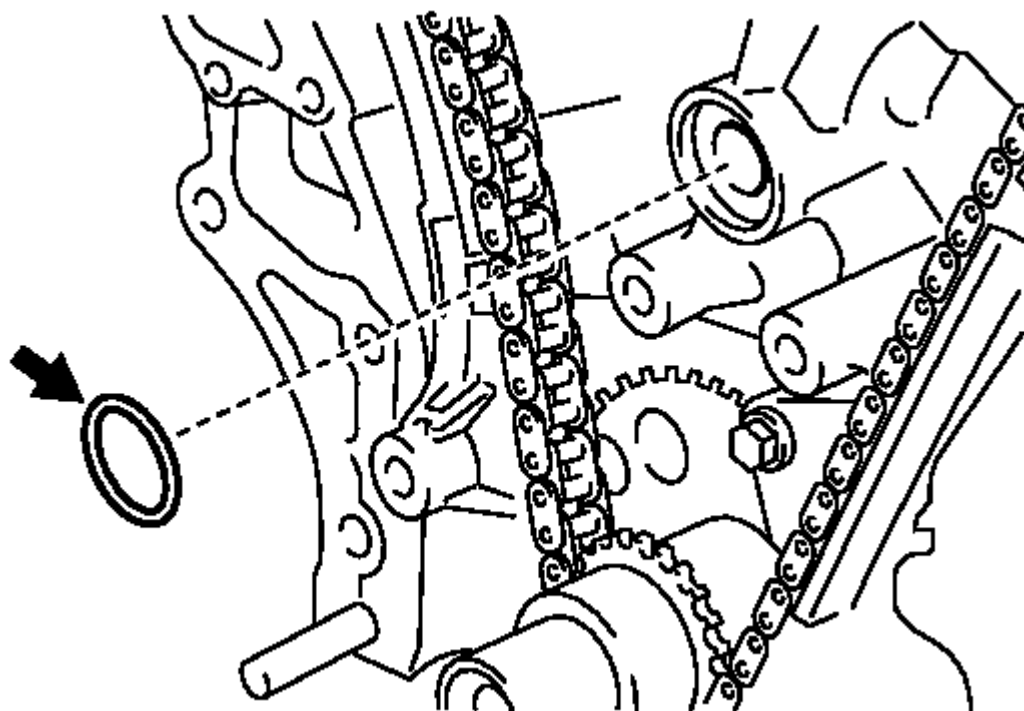


Fig. 40: Identifying Gasket

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

- d. Align the oil pump's drive rotor spline and the crankshaft as shown in the illustration. Install the oil pump and timing chain cover to the crankshaft.

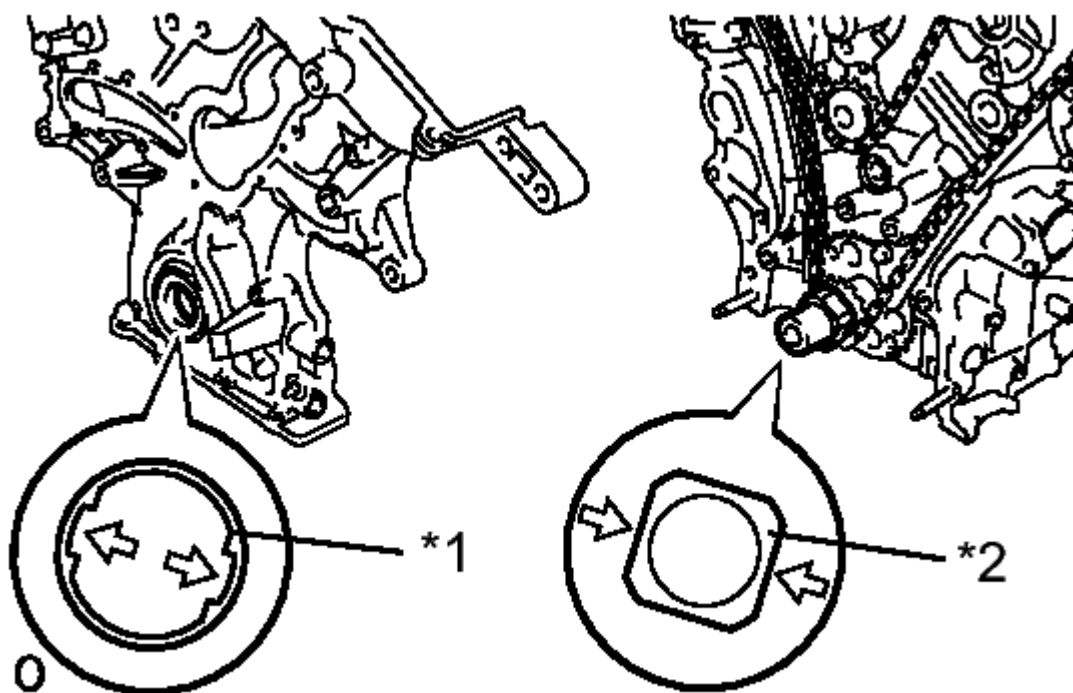


Fig. 41: Identifying Oil Pump Drive Spline & Crankshaft Position
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

	Drive
*1	Rotor Spline
*2	Crankshaft

- e. Temporarily tighten the timing chain cover with the 23 bolts and 2 nuts.

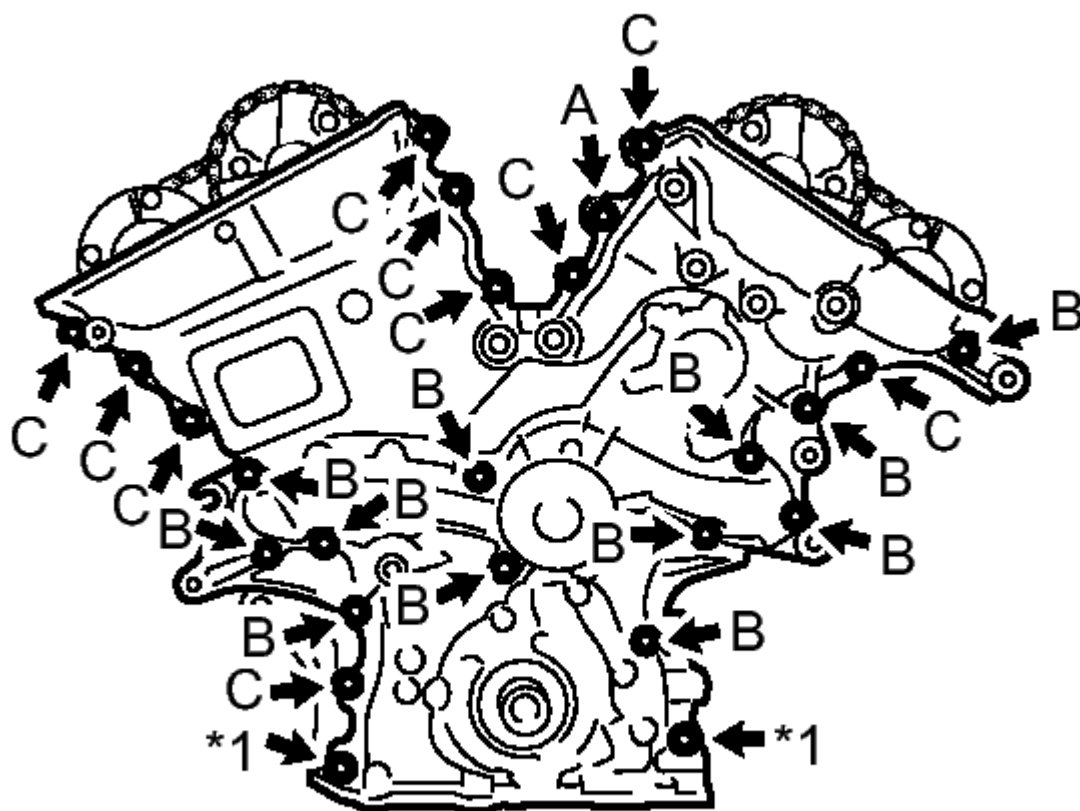


Fig. 42: Identifying Timing Chain Cover Nuts & Bolts
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*1	Nut
----	-----

BOLT LENGTH

Item	Length
Bolt A	40 mm (1.57 in.)
Bolt B	55 mm (2.17 in.)
Bolt	25 mm

C	(0.984 in.)
---	----------------

NOTE: Make sure that there is no oil on the threads of bolt B and C.

- f. Fully tighten the bolts in area 1 and area 2.

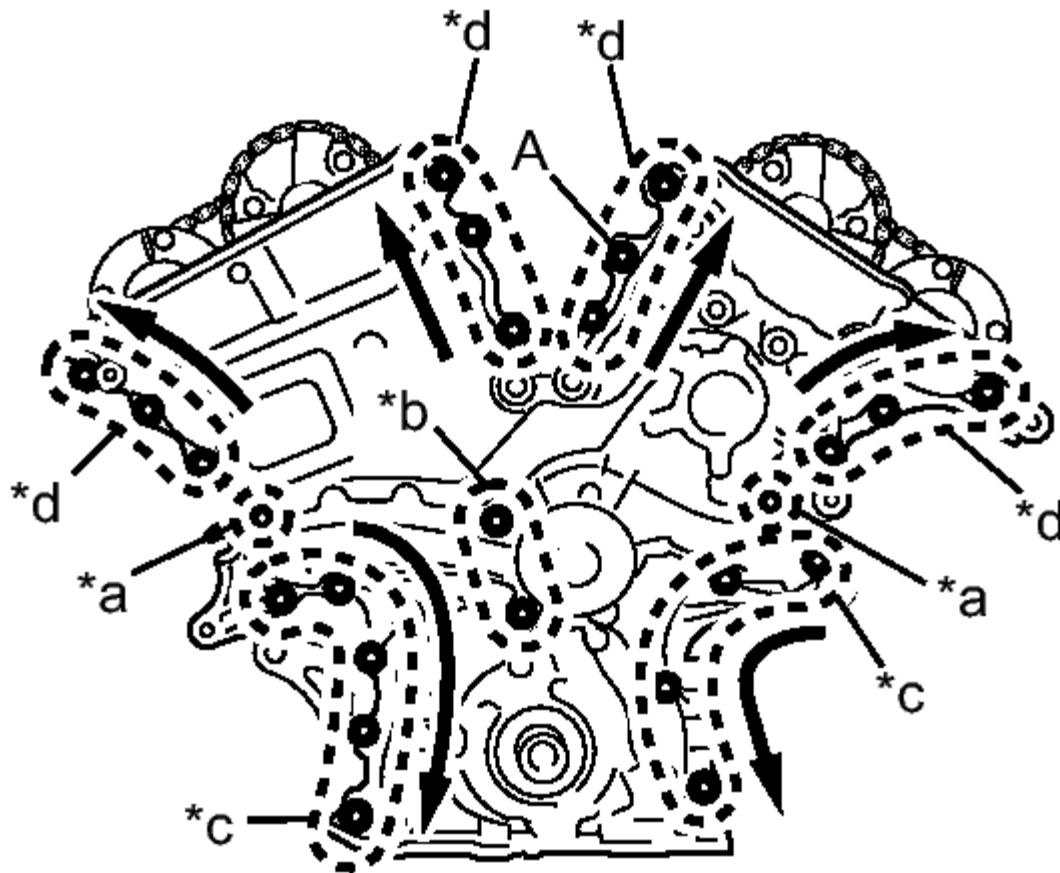


Fig. 43: Tightening Timing Chain Cover Nuts & Bolts Areas
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*a	Area 1
*b	Area 2

*c	Area 3
*d	Area 4

Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

- g. Fully tighten the bolts and nuts in area 3.

Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

HINT:

Tighten the bolts and nuts from top to bottom as shown in the illustration.

- h. Fully tighten the bolts in area 4.

Bolt A

Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)

Except bolt A

Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

HINT:

Tighten the bolts from bottom to top as shown in the illustration.

3. **INSTALL OIL PAN SUB-ASSEMBLY** . Refer to **REASSEMBLY - Step 37**
4. **INSTALL OIL STRAINER SUB-ASSEMBLY** . Refer to **REASSEMBLY - Step 38**
5. **INSTALL NO. 2 OIL PAN SUB-ASSEMBLY** . Refer to **REASSEMBLY - Step 39**
6. **INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY (for Bank 2)** . Refer to **REASSEMBLY - Step 41**
7. **INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY (for Bank 1)** . Refer to **REASSEMBLY - Step 42**
8. **INSTALL WATER INLET HOUSING** . Refer to **REASSEMBLY - Step 34**
9. **INSTALL OIL COOLER PIPE (w/ oil cooler)**
 - a. Install a new gasket to the oil pan sub-assembly.
 - b. Install the oil cooler pipe with the bolt and 2 nuts.

Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

10. **INSTALL CRANKSHAFT PULLEY** . Refer to **INSTALLATION - Step 2**

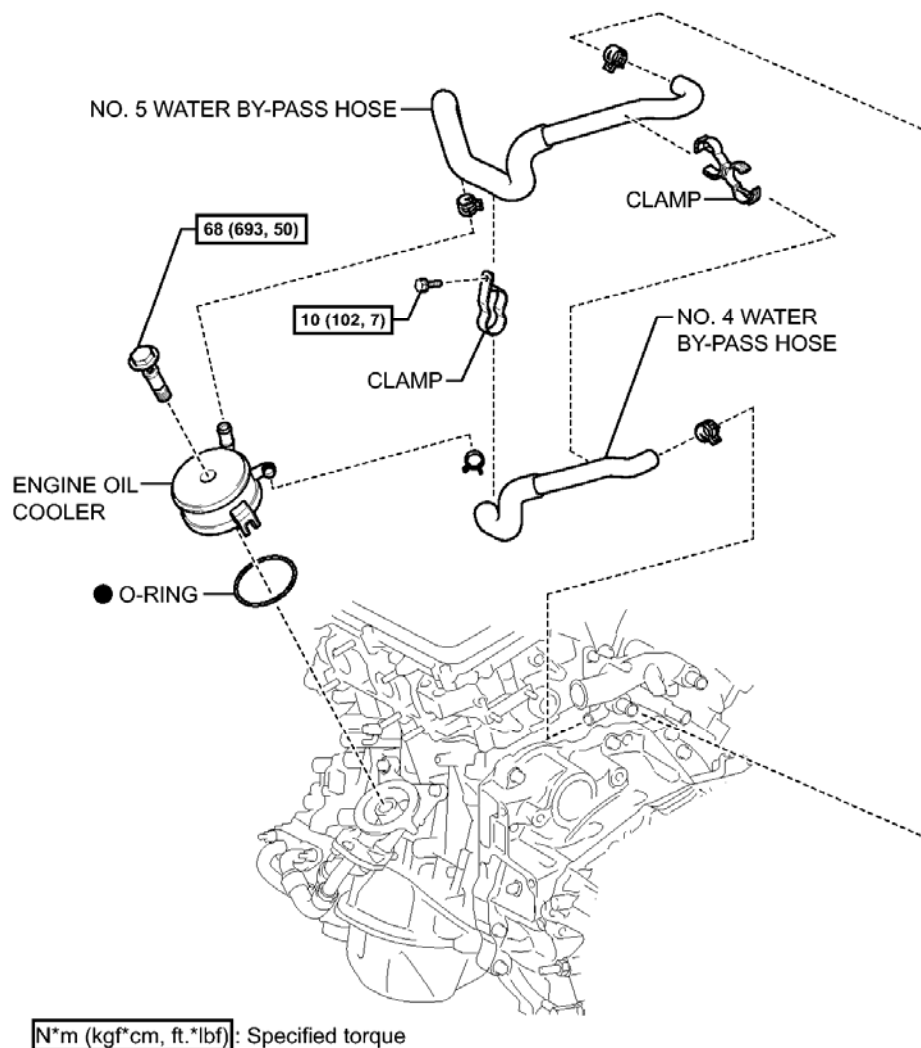
11. **INSTALL OIL PIPE** . Refer to **REASSEMBLY - Step 52**
12. **INSTALL NO. 1 OIL PIPE** . Refer to **REASSEMBLY - Step 51**
13. **INSTALL CRANKSHAFT POSITION SENSOR** . Refer to **INSTALLATION - Step 1**
14. **INSTALL IGNITION COIL ASSEMBLY** . Refer to **INSTALLATION - Step 2**
15. **INSTALL ENGINE ASSEMBLY**

Refer to **INSTALLATION**

ENGINE OIL COOLER

COMPONENTS

ILLUSTRATION



P

Fig. 44: Engine Oil Cooler Replacement Components With Torque Specifications
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

REMOVAL

1. **DRAIN ENGINE COOLANT** . Refer to **REPLACEMENT - Step 3**
2. **DRAIN ENGINE OIL** See step 1
3. **REMOVE EXHAUST MANIFOLD ASSEMBLY LH**

Refer to **REMOVAL**

4. REMOVE ENGINE OIL COOLER

- a. Remove the bolt, 2 clamps and 4 clips, and disconnect the 2 water by-pass hoses.

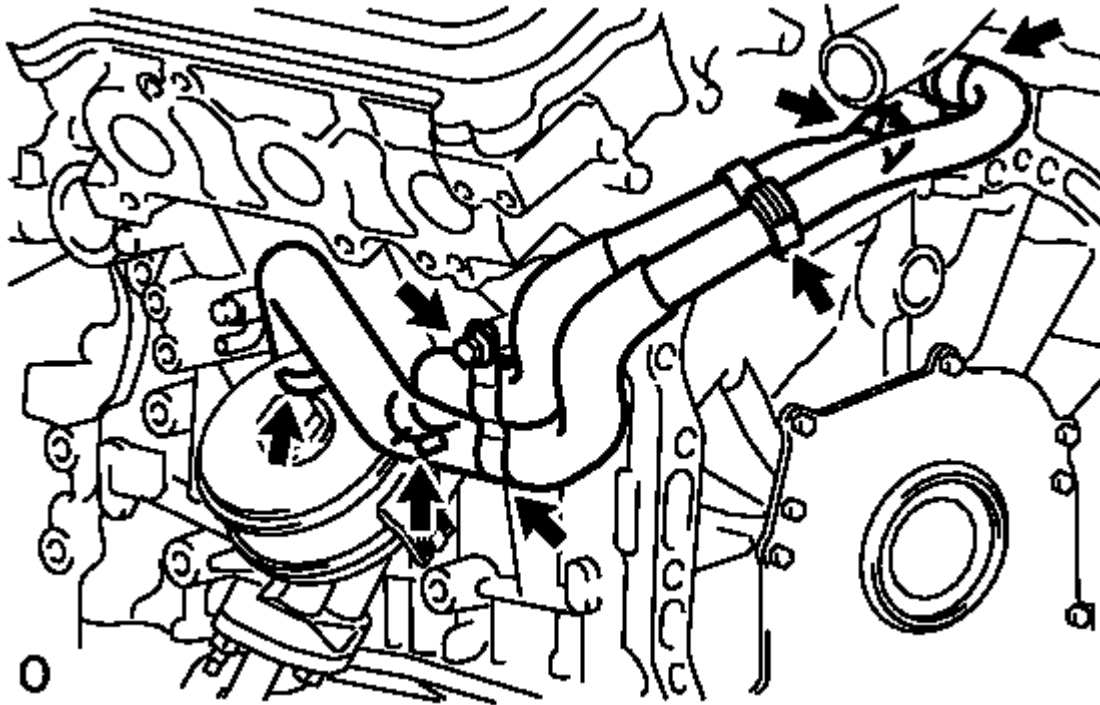


Fig. 45: Identifying Bolt, Clamps, And Clips

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

- b. Remove the oil cooler union bolt, oil cooler and O-ring.

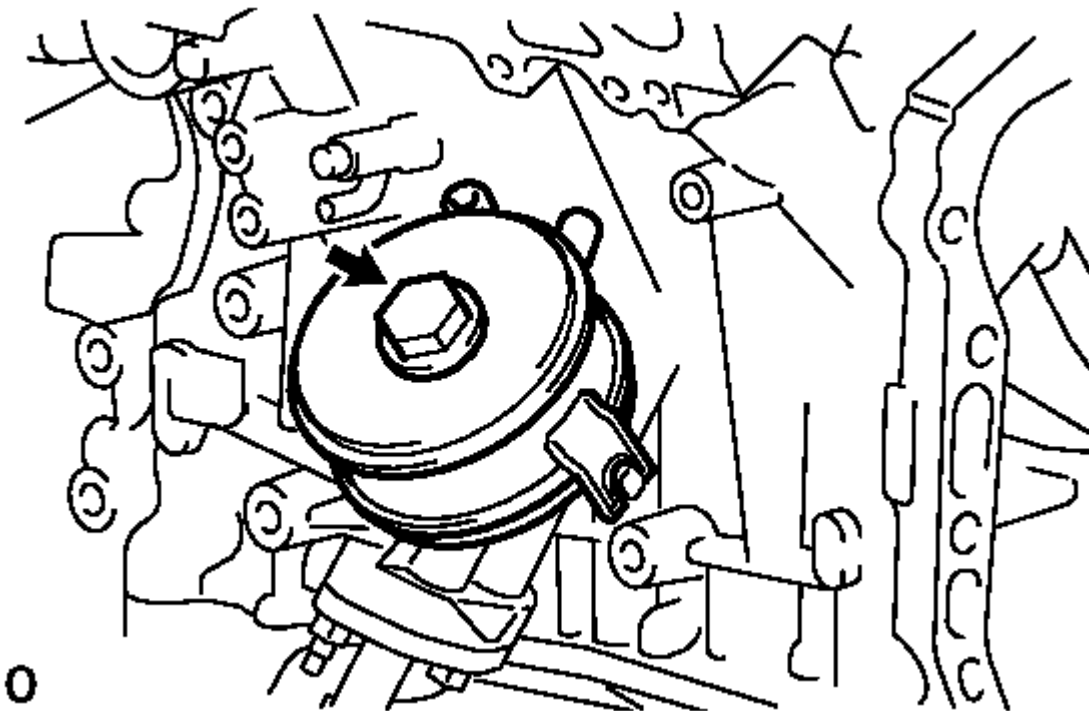


Fig. 46: Identifying Oil Cooler Union Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

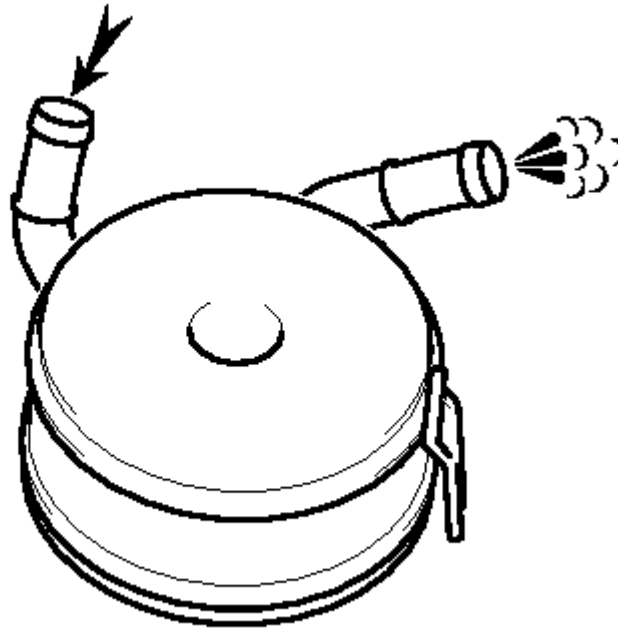
INSPECTION

1. INSPECT ENGINE OIL COOLER

- a. Visually check the engine oil cooler for cracks or damage.

If necessary, replace the engine oil cooler.

- b. Blow air into the engine oil cooler to check for clogging.



C

Fig. 47: Blowing Air Into Engine Oil Cooler
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If necessary, replace the engine oil cooler.

INSTALLATION

INSTALLATION

1. INSTALL ENGINE OIL COOLER

- Clean the oil cooler contact surface on the cooler mounting.
- Install a new O-ring to the oil cooler.
- Install the oil cooler with the oil cooler union bolt.

Torque: 68 N*m (693 kgf*cm, 50 ft.*lbf)

- Install the 2 water by-pass hoses with the bolt, 2 clamps and 4 clips.

Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

2. INSTALL EXHAUST MANIFOLD ASSEMBLY LH

Refer to **INSTALLATION**

- 3. ADD ENGINE COOLANT** . Refer to **REPLACEMENT - Step 4**
- 4. ADD ENGINE OIL** See step 4

5. **INSPECT FOR COOLANT LEAK** . Refer to **ON-VEHICLE INSPECTION - Step 1**
6. **INSPECT FOR OIL LEAK**
 - a. Start the engine.
 - b. Check for engine oil leaks from the oil cooler assembly and the oil cooler union bolt.
7. **CHECK ENGINE OIL LEVEL** . Refer to **ON-VEHICLE INSPECTION - Step 1**