

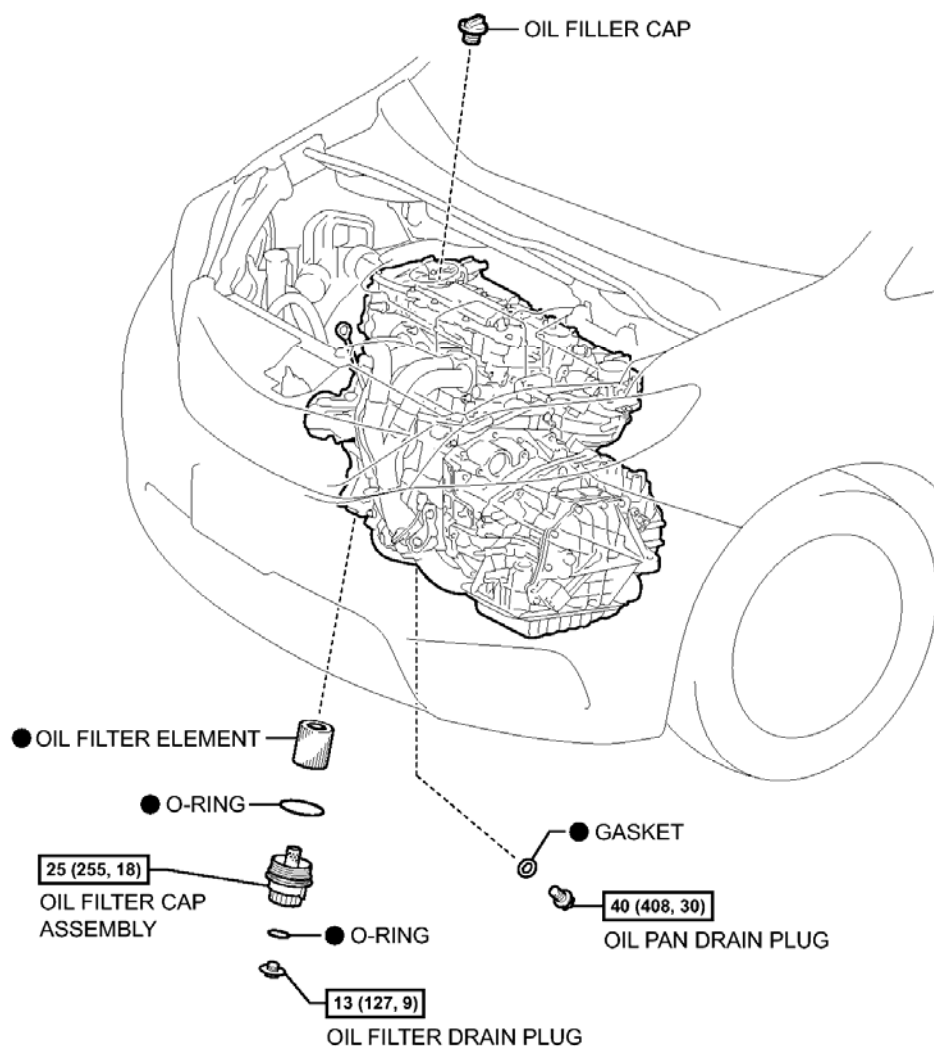
ENGINE

Lubrication System [1AR-FE] (Service Information) - Sienna

OIL AND OIL FILTER

COMPONENTS

ILLUSTRATION



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

● Non-reusable part

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Fig. 1: Oil And 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 gasket, and drain the engine oil into a container.
- c. Clean and install a new gasket and the oil pan drain plug.

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

2. REMOVE OIL FILTER CAP ASSEMBLY

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

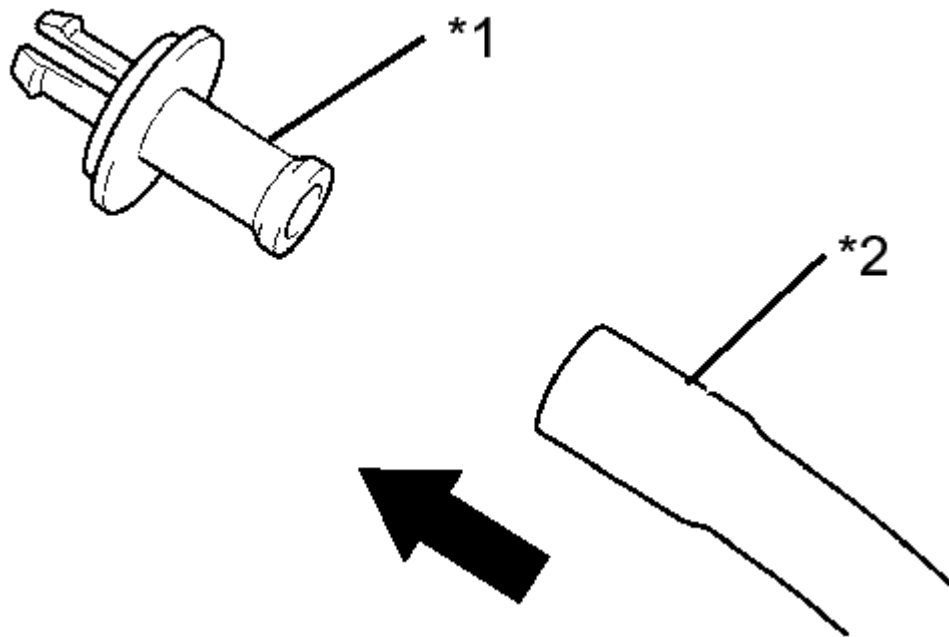


Fig. 2: Connecting Hose To Pipe

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.

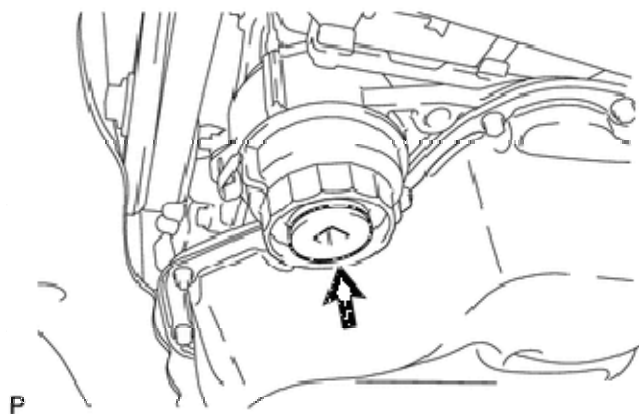
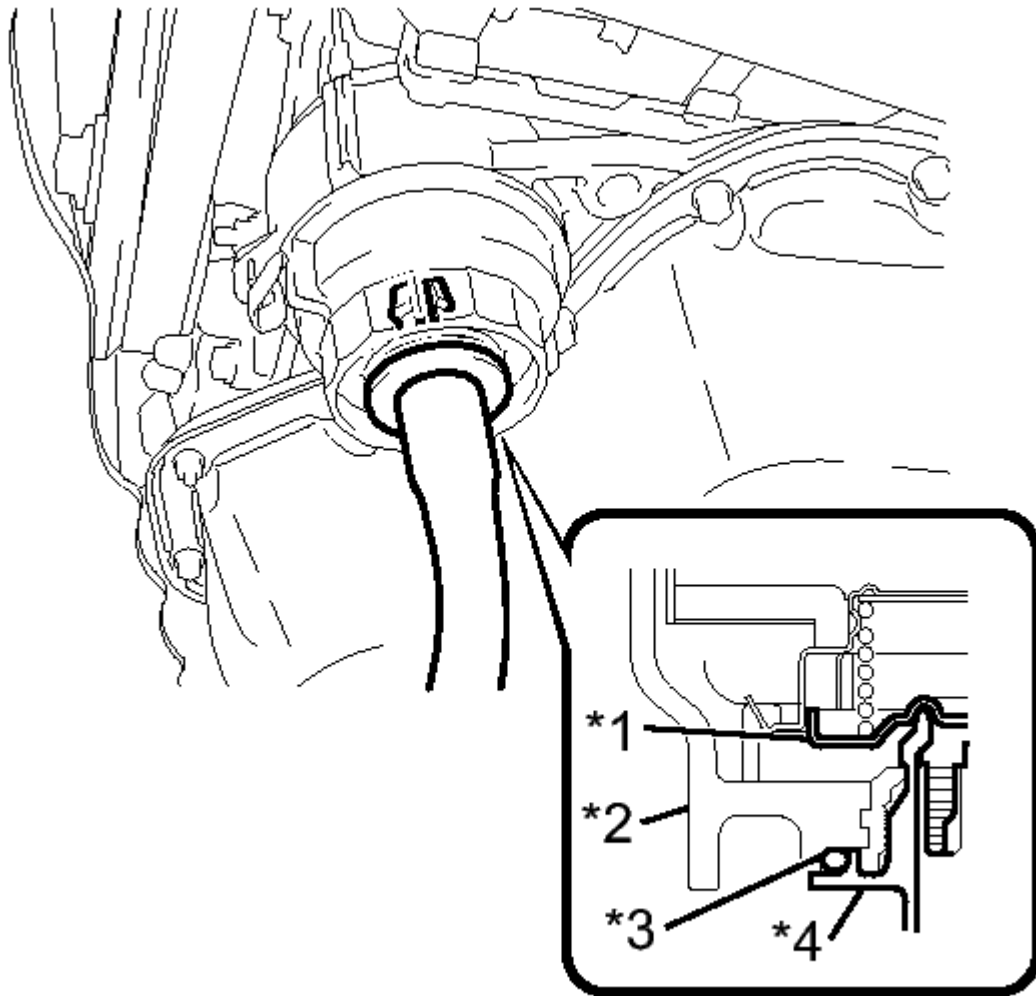


Fig. 3: Identifying Oil Filter Drain Plug

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

- c. Install the pipe to the oil filter cap.



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

TEXT IN ILLUSTRATION

*1	Valve
*2	Cap
*3	O-ring
*4	Pipe

NOTE: If the O-ring is removed with the drain plug, install the O-ring together with the pipe.

HINT:

Use a container to catch the draining oil.

- d. Check that the oil is drained from the oil filter. Then disconnect the pipe as shown in the illustration and remove the O-ring.

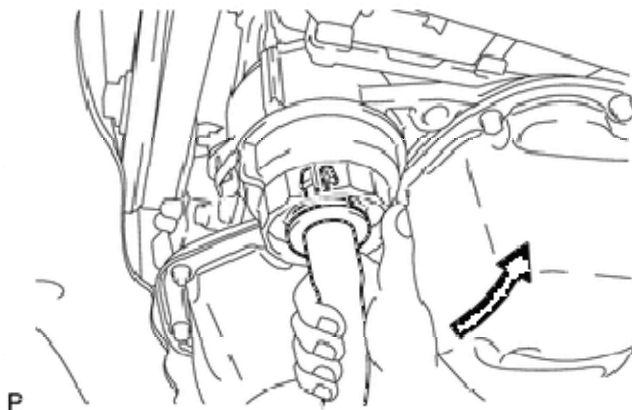


Fig. 5: Disconnecting Pipe

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

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

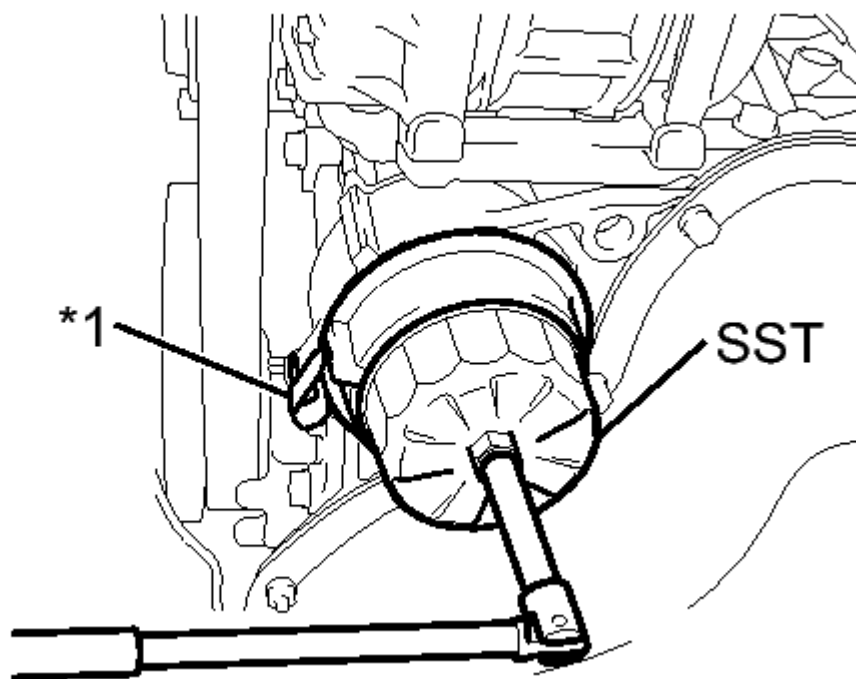


Fig. 6: Identifying Oil Filter Cap And SST

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

TEXT IN ILLUSTRATION

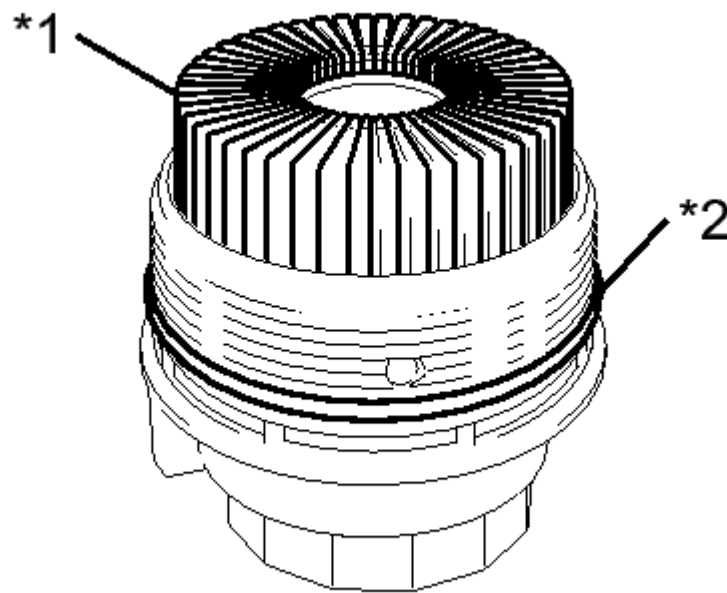
Oil

	Filter
*1	Bracket
	Clip

- SST: 09228-06501

NOTE: Do not remove the oil filter bracket clip.

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



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Fig. 7: Identifying Oil Filter Element & O-Ring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

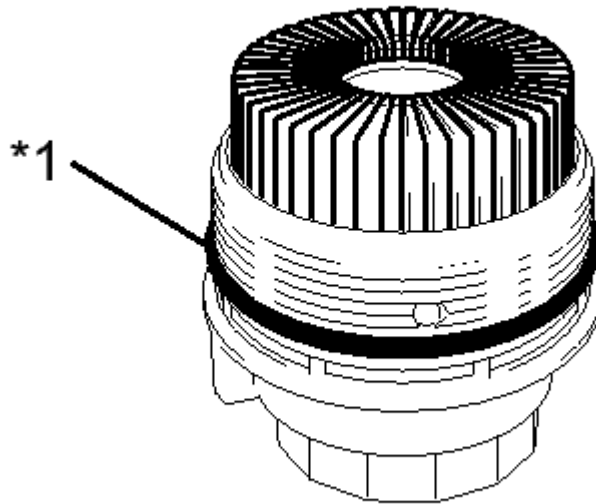
TEXT IN ILLUSTRATION

	Oil
*1	Filter
	Element
*2	O-ring

NOTE: Be sure to remove the cap O-ring by hand, without using any tools, to prevent damage to the cap O-ring groove.

3. INSTALL OIL FILTER CAP ASSEMBLY

- Clean the inside of the oil filter cap, its threads and its O-ring groove.
- Apply a small amount of engine oil to a new O-ring and install it to the oil filter cap.

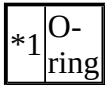


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Fig. 8: Identifying Oil Filter Cap And O-Ring

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

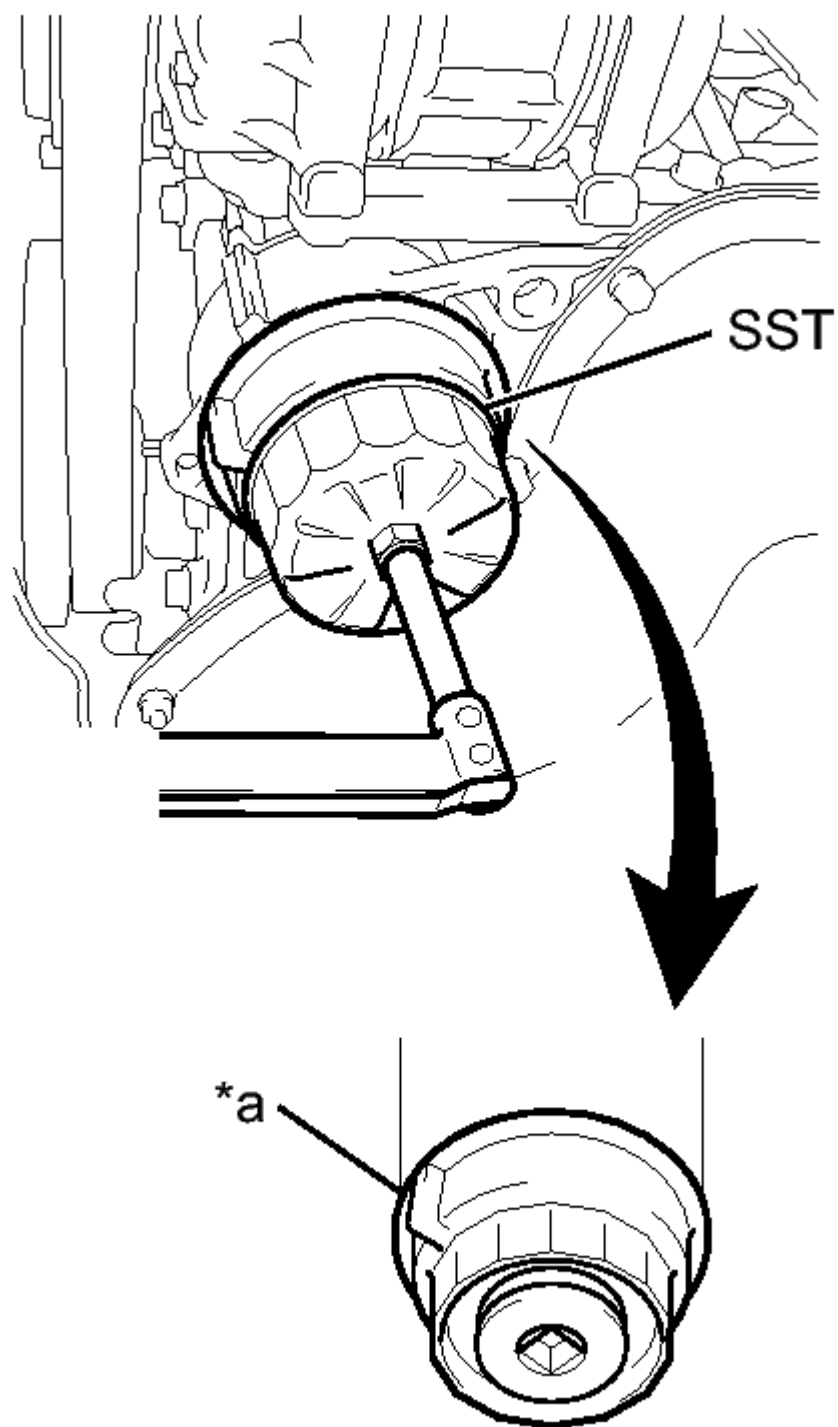
TEXT IN ILLUSTRATION



- c. Set a new oil filter element into the oil filter cap.
- d. Remove any dirt or foreign matter from the installation surface of the engine.
- e. Apply a small amount of engine oil to the O-ring again and temporarily install the oil filter cap.

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

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



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Fig. 9: Identifying Oil Filter Cap And SST
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

No

*a|Clearance|

- SST: 09228-06501

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

NOTE: Make sure that the oil filter is installed securely as shown in the illustration.

- g. Apply a small amount of engine oil to a new drain plug O-ring, and install it to the oil filter cap.

NOTE: Before installing the O-ring, remove any dirt or foreign matter from the installation surface of the oil filter cap.

- h. Install the oil filter drain plug.

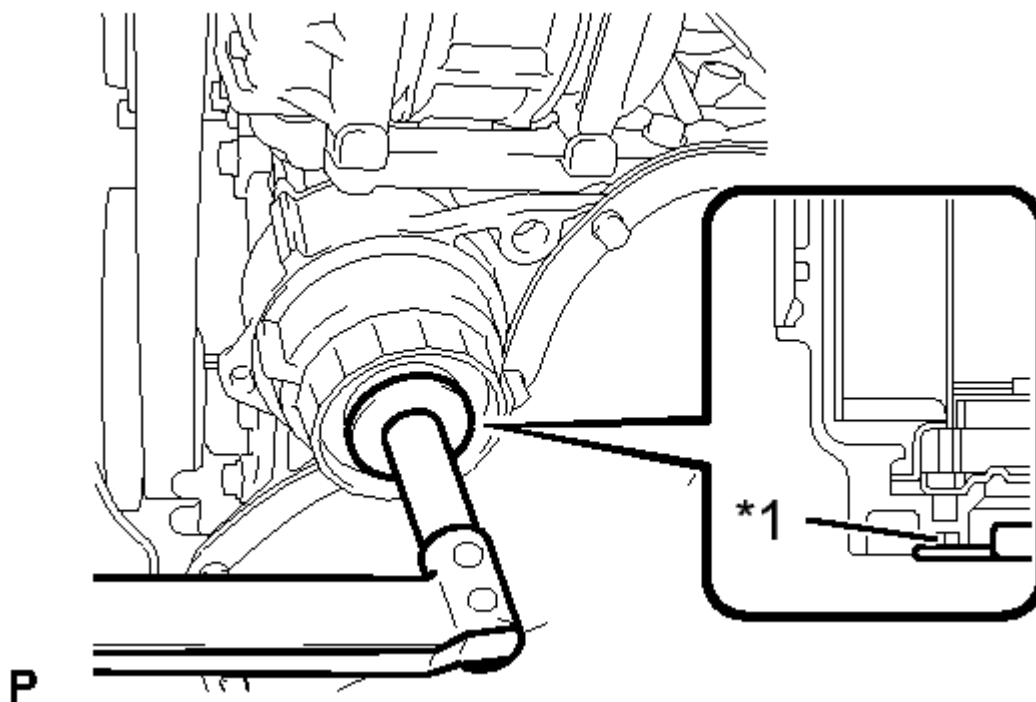


Fig. 10: Identifying Oil Filter Drain Plug O-Ring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*1|O-
ring|

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

NOTE: Be careful that the O-ring does not get caught between any

surrounding parts.

4. ADD ENGINE OIL

- a. Add new oil.

Standard Oil Grade (for USA, Canada)

Oil Grade	Oil Viscosity
ILSAC multigrade engine oil	0W-20

Standard Oil Grade (for Korea)

Oil Grade	Oil Viscosity
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

Item	Specified Condition
Drain and refill with oil filter change	4.4 liters (4.6 US qts, 3.9 Imp. qts)

Drain and refill without oil filter change	4.0 liters (4.2 US qts, 3.5 Imp. qts)
Dry fill	5.3 liters (5.6 US qts, 4.7 Imp. qts)

b. Install the oil filler cap.

5. INSPECT FOR OIL LEAK

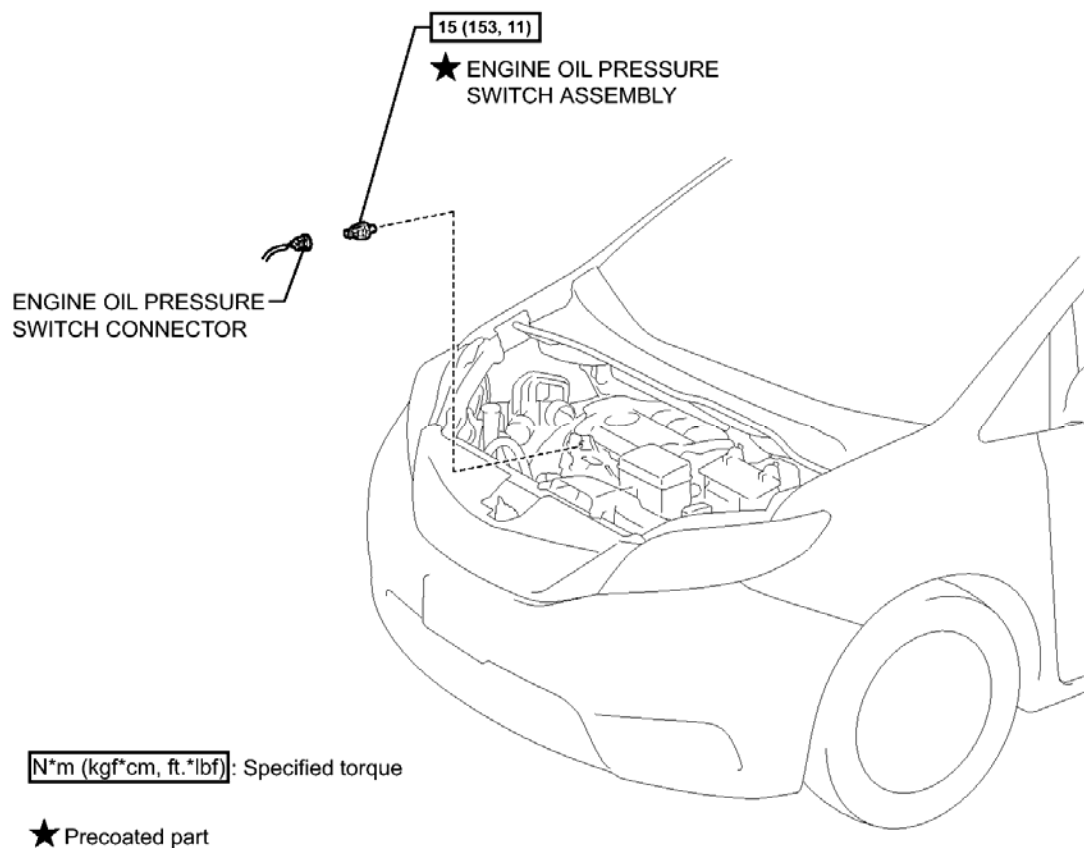
a. Start the engine. Make sure that there are no oil leaks from the areas that were worked on.

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

OIL PRESSURE SWITCH

COMPONENTS

ILLUSTRATION



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Fig. 11: Oil Pressure Switch Replacement Components With Torque Specifications
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

REMOVAL

1. **REMOVE ENGINE OIL PRESSURE SWITCH ASSEMBLY**
 - a. Disconnect the oil pressure switch connector.
 - b. Using a 24 mm deep socket wrench, remove the oil pressure switch.

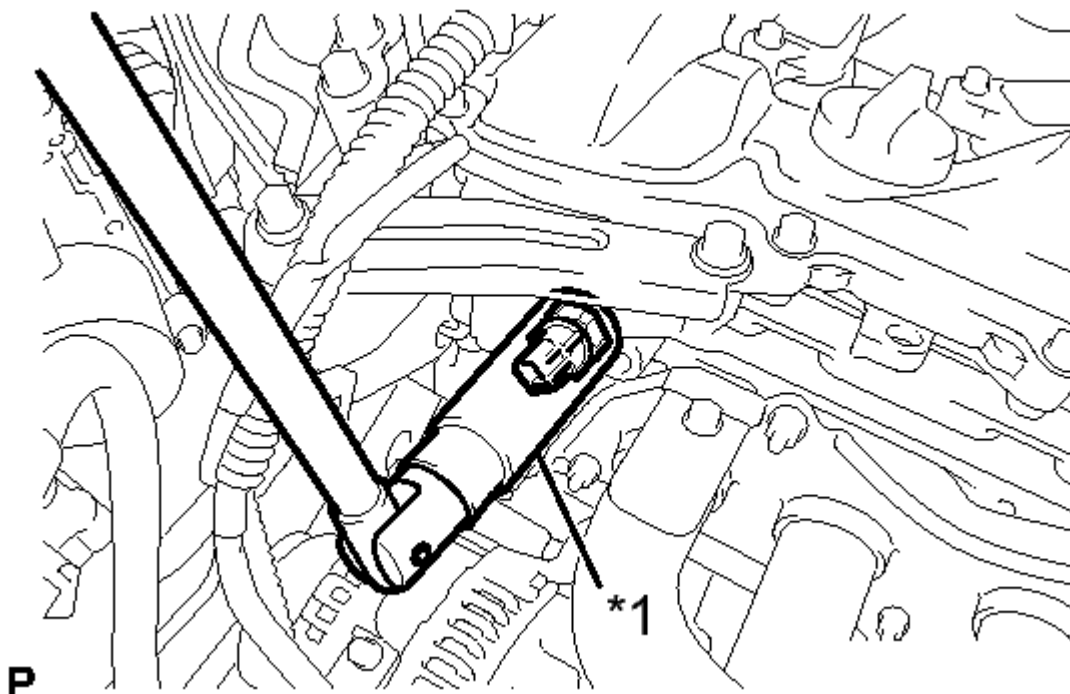


Fig. 12: Identifying Deep Socket Wrench
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

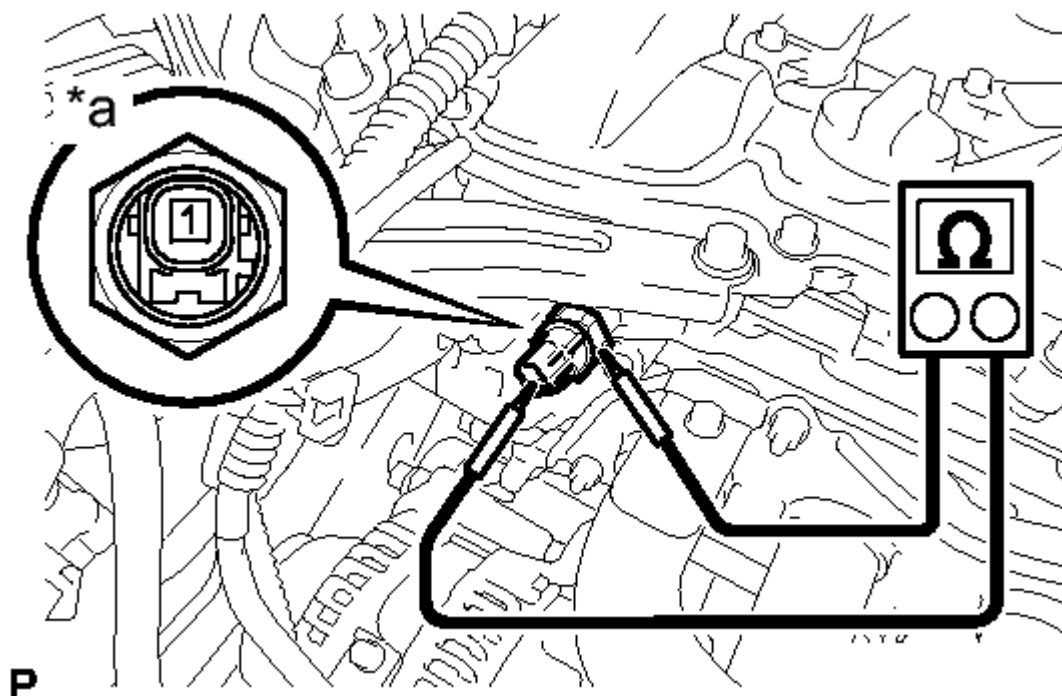
*1	24 mm
	Deep
	Socket
	Wrench

INSPECTION

INSPECTION

1. INSPECT ENGINE OIL PRESSURE SWITCH ASSEMBLY

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



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Fig. 13: Engine Oil Pressure Switch Connector End View
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

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

Tester Connection	Condition	Specified Condition
1 - Body ground	Engine stopped	Below 1 ohms
	Engine idling	10 kohms or higher

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

INSTALLATION

INSTALLATION

1. INSTALL ENGINE OIL PRESSURE SWITCH ASSEMBLY

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

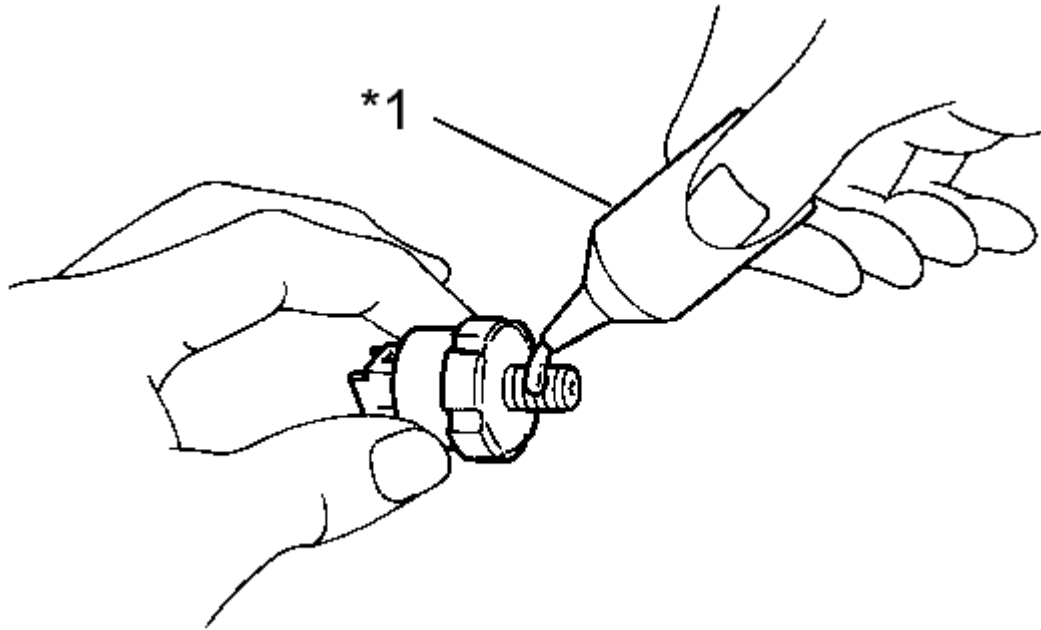


Fig. 14: Applying Adhesive To Oil Pressure Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*1	Adhesive
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Adhesive

Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent.

NOTE: **Do not let adhesive adhere to the oil hole.**

- b. Using a 24 mm deep socket wrench, install the oil pressure switch.

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

NOTE: **Do not start the engine within 1 hour of installation.**

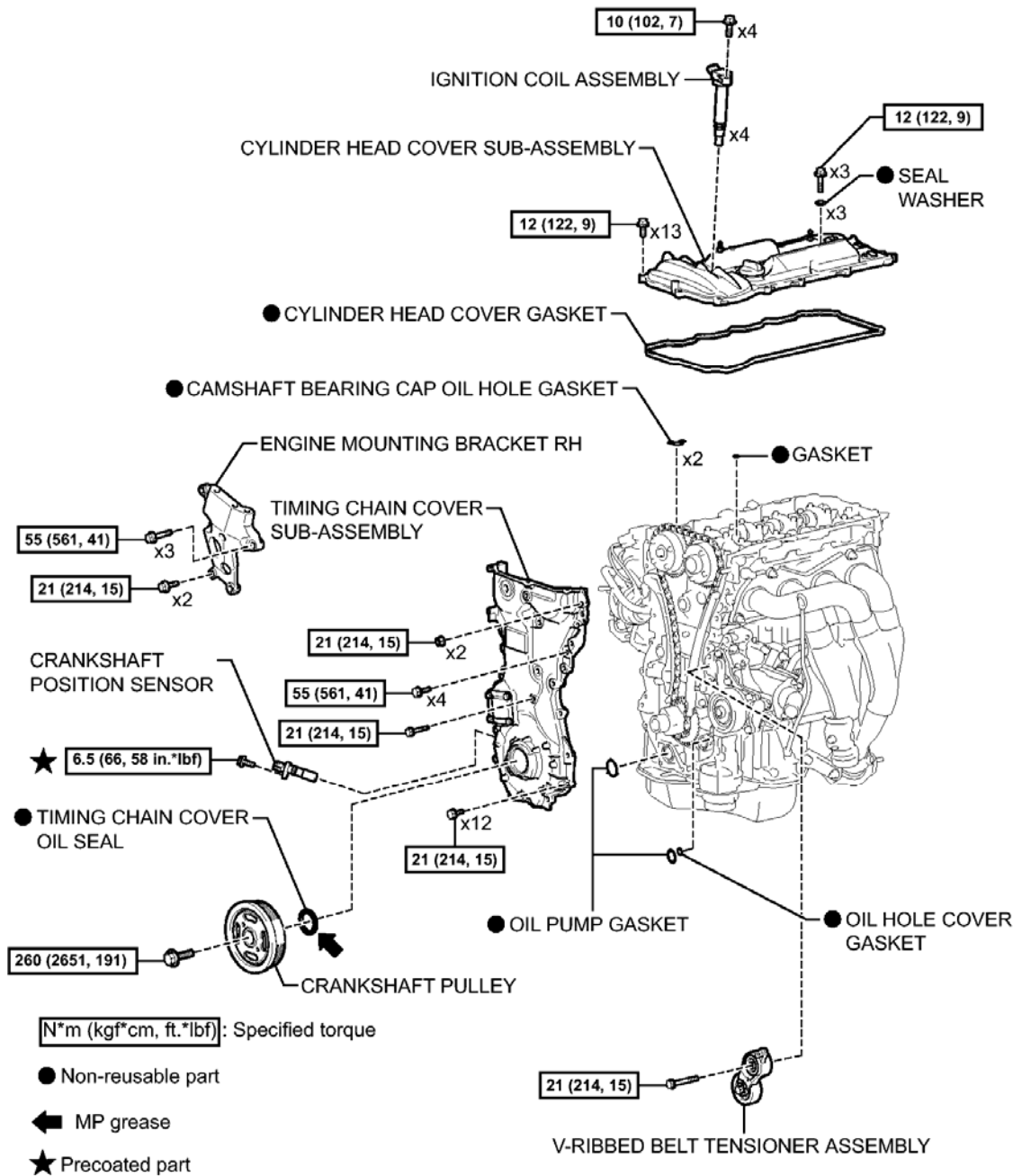
- c. Connect the oil pressure switch connector.

2. INSPECT FOR OIL LEAK See step 5

OIL PUMP

COMPONENTS

ILLUSTRATION



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Fig. 15: Oil Pump Replacement Components With Torque Specifications
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

REMOVAL

NOTE: Do not remove the oil pump or oil pump relief valve from the timing chain cover sub-assembly.

1. REMOVE ENGINE AND TRANSAXLE

Refer to REMOVAL

2. **REMOVE ENGINE WIRE** . Refer to REMOVAL - Step 65
3. **REMOVE IGNITION COIL ASSEMBLY** . Refer to REMOVAL - Step 2
4. **REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY** . Refer to DISASSEMBLY - Step 20
5. **REMOVE CRANKSHAFT POSITION SENSOR** . Refer to REMOVAL - Step 1
6. **REMOVE CRANKSHAFT PULLEY** . Refer to DISASSEMBLY - Step 19
7. **REMOVE ENGINE MOUNTING BRACKET RH**

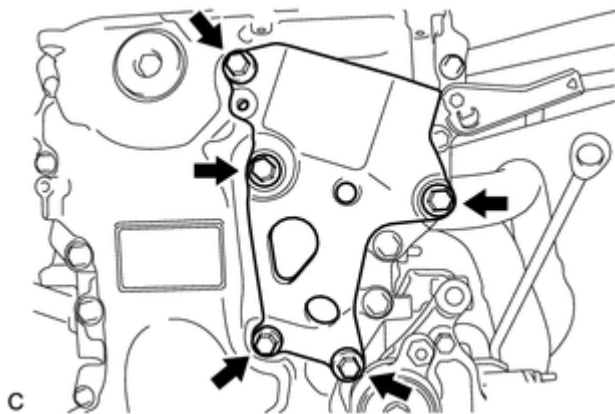
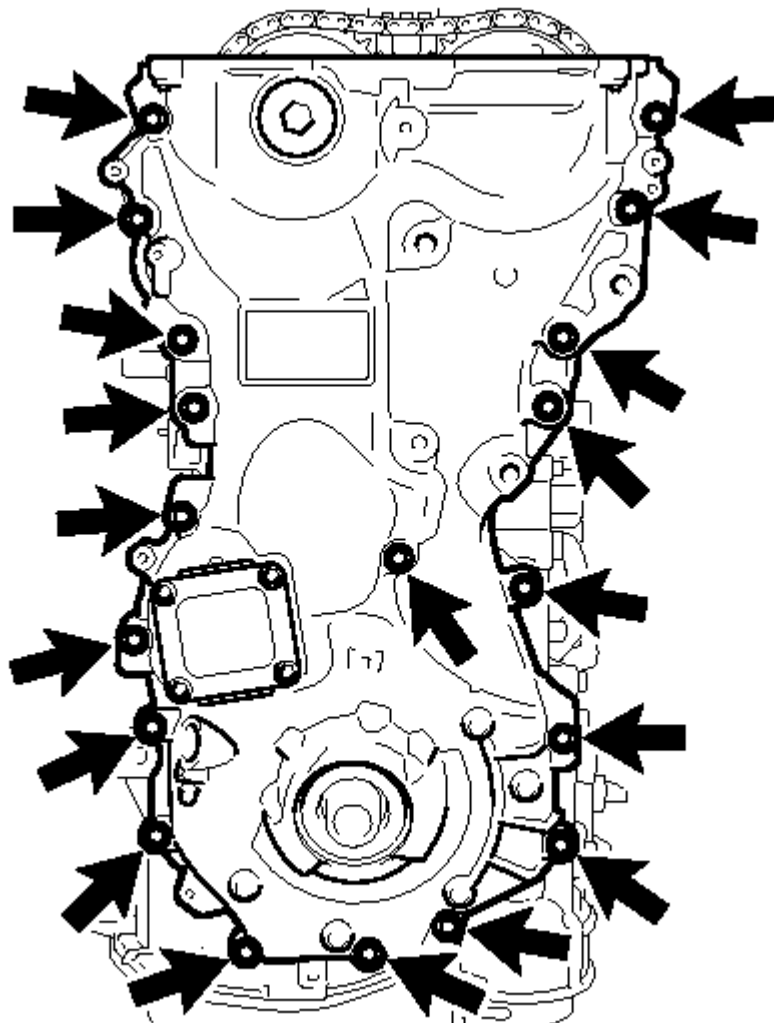


Fig. 16: Identifying Engine Mounting Bracket Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

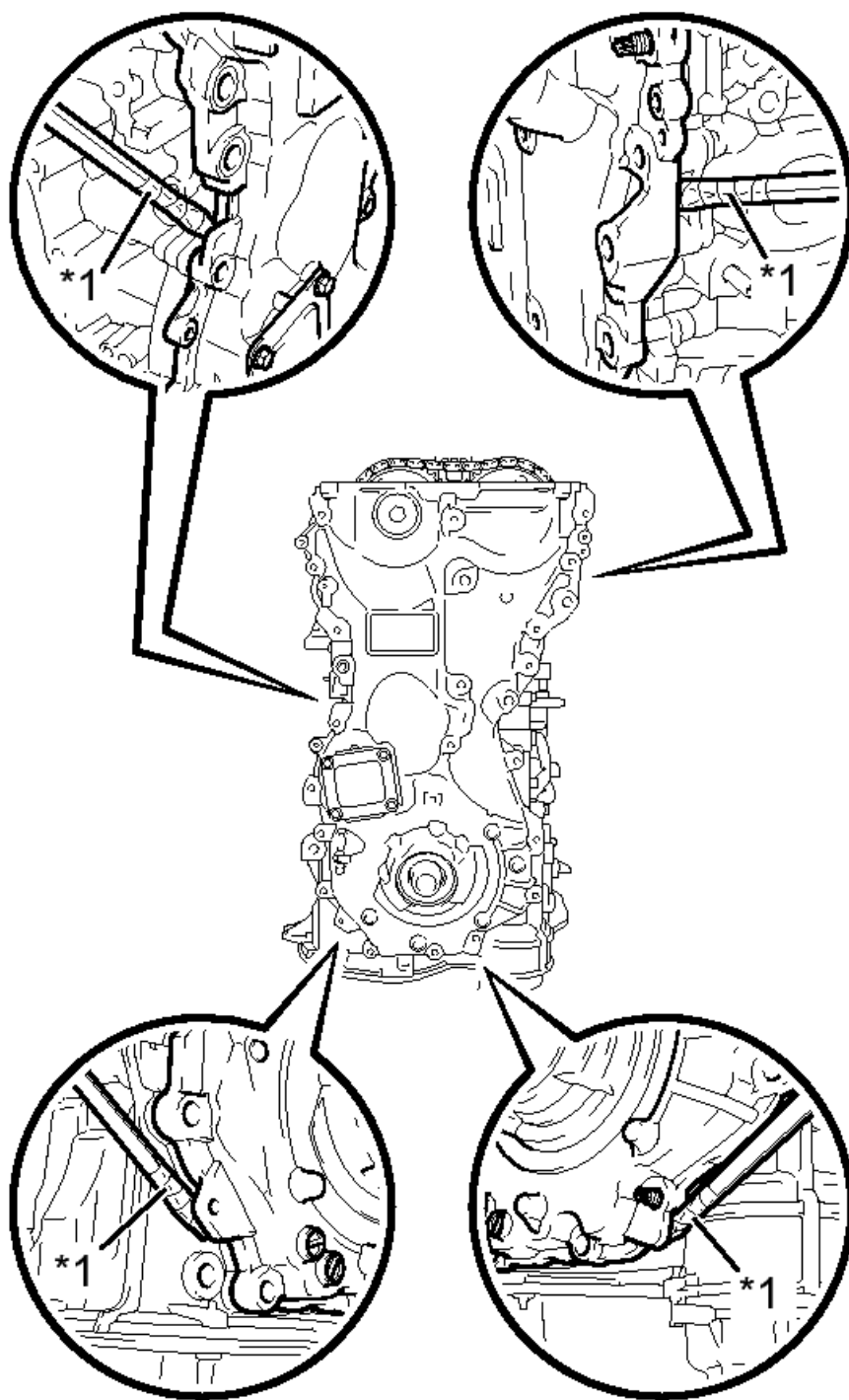
- a. Remove the 5 bolts and engine mounting bracket RH.
8. **REMOVE V-RIBBED BELT TENSIONER ASSEMBLY** . Refer to DISASSEMBLY - Step 15
9. **REMOVE TIMING CHAIN COVER SUB-ASSEMBLY**
 - a. Remove the 17 bolts and 2 nuts.



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Fig. 17: Identifying Timing Chain Cover Sub-Assembly Bolts & Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

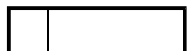
- b. Remove the timing chain cover by prying between the timing chain cover and cylinder head, camshaft housing, cylinder block and stiffening crankcase with a screwdriver as shown in the illustration.



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Fig. 18: Identifying Timing Chain Cover Sub-Assembly Removal Points
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION



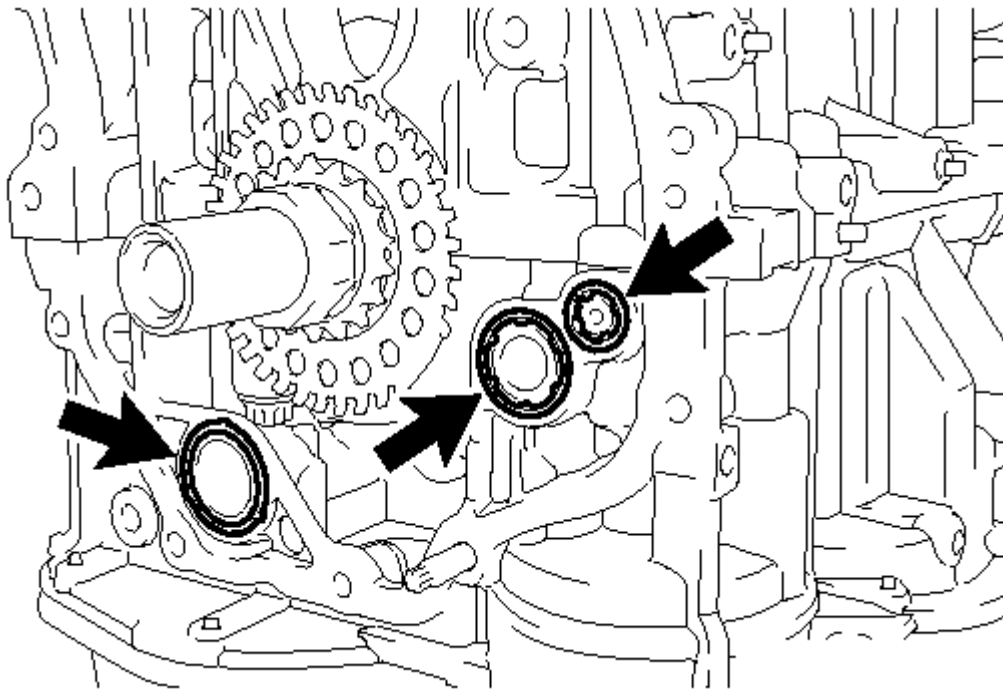
*1	Protective Tape
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NOTE: Be careful not to damage the contact surfaces of the cylinder head, camshaft housing, cylinder block, stiffening crankcase and chain cover.

HINT:

Tape the screwdriver tip before use.

- c. Remove the 3 gaskets from the stiffening crankcase.

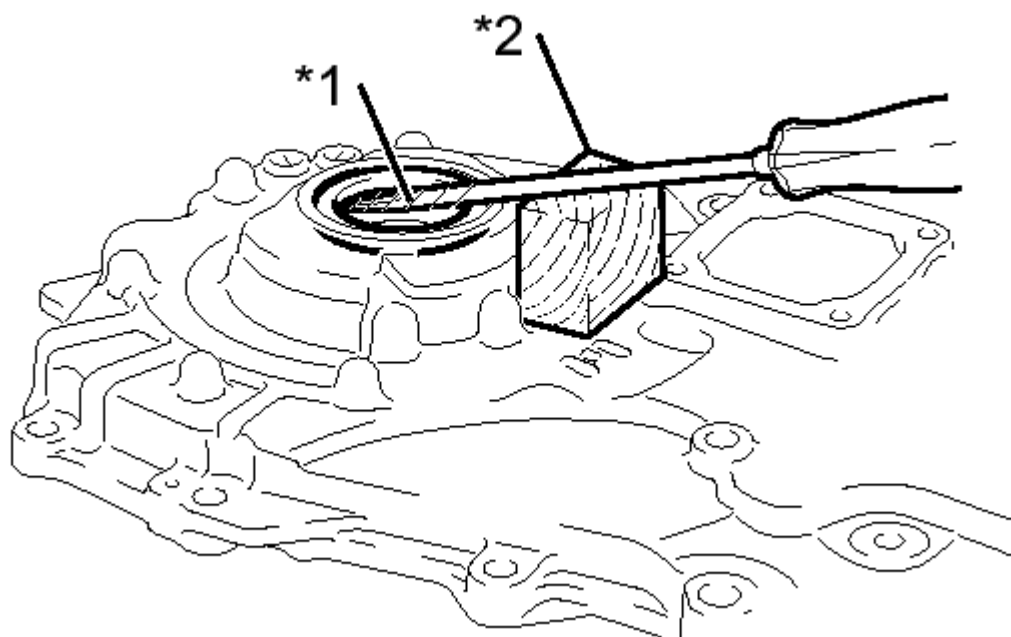


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Fig. 19: Identifying Gaskets

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

10. REMOVE TIMING CHAIN COVER OIL SEAL



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Fig. 20: Removing Timing Chain Cover Oil Seal Using Screwdriver & Wooden Block
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- a. Using a screwdriver and wooden block, pry out the oil seal.

TEXT IN ILLUSTRATION

*1	Protective Tape
*2	Wooden Block

NOTE: Do not damage the surface of the oil seal press fit hole.

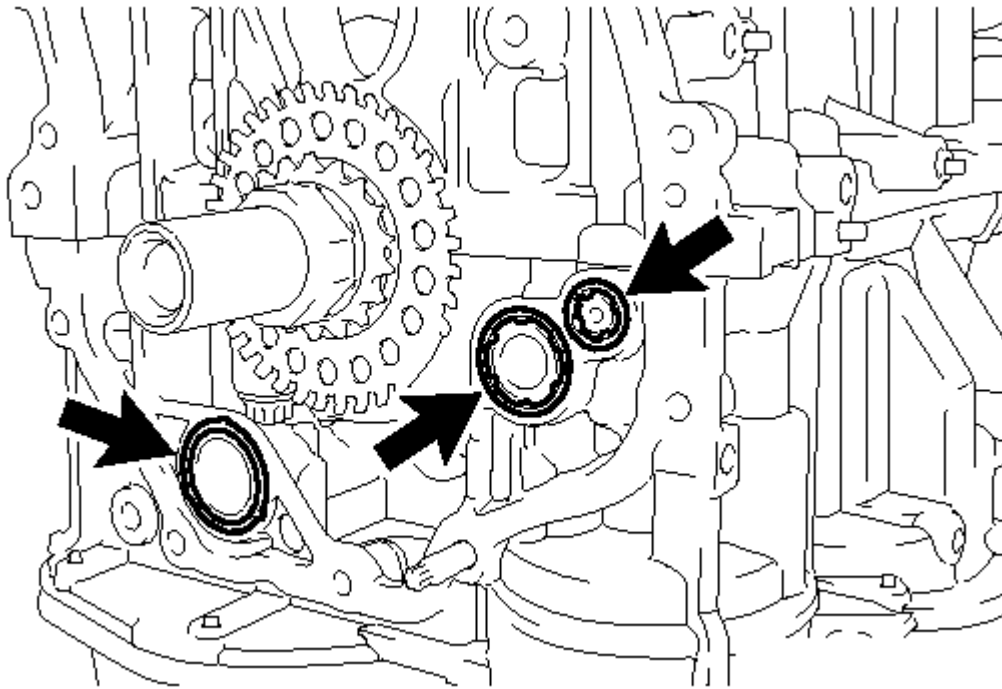
HINT:

Tape the screwdriver tip before use.

INSTALLATION

INSTALLATION

1. INSTALL TIMING CHAIN COVER SUB-ASSEMBLY

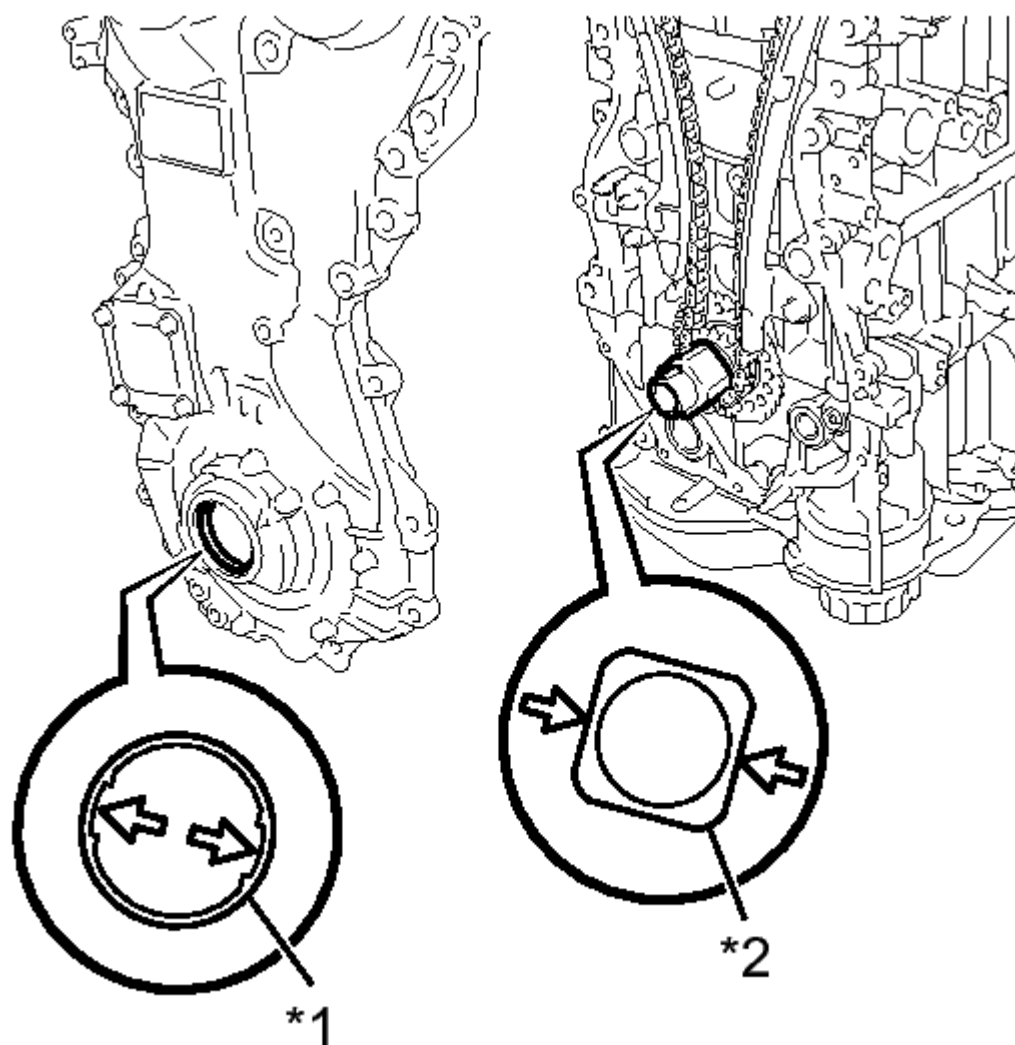


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Fig. 21: Identifying Gaskets

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

- a. Apply a light coat of engine oil to 3 new gaskets.
- b. Install the 3 gaskets to the stiffening crankcase.
- c. Align the drive rotor spline and the crankshaft timing sprocket as shown in the illustration.



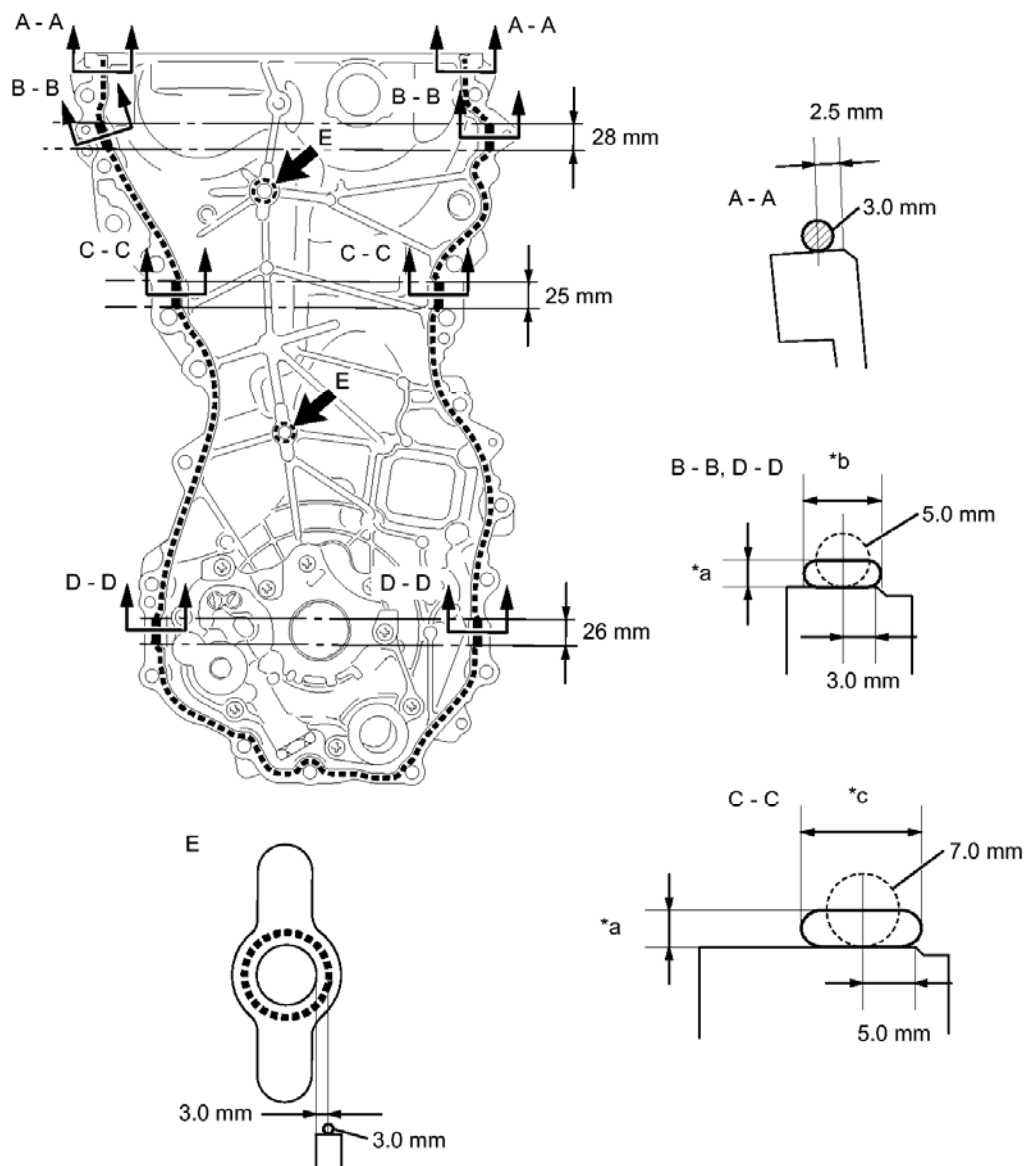
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Fig. 22: Identifying Drive Rotor Spline & Crankshaft Timing Sprocket
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*1	Drive Rotor Spline
*2	Crankshaft Timing Sprocket

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



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Fig. 23: Identifying Timing Chain Cover Seal Applying Area
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*a	3.0 mm or more	*b	7.0 mm or more
*c	13.0 mm or more	-	-

Seal packing

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

Seal Packing Application Chart

Area	Seal Packing Diameter (Round)	Distance from Edge of Cover to Center of Seal Packing	Seal Packing Application Length
	Seal Packing Dimension (Flat)		
Dashed Line	3.0 mm (0.118 in.)	2.5 mm (0.0984 in.)	-
	-		
A - A	3.0 mm (0.118 in.)	2.5 mm (0.0984 in.)	-
	-		
B - B	5.0 mm (0.197 in.)	3.0 mm (0.118 in.)	28 mm (1.10 in.)
	7.0 mm (0.276 in.) or more wide and 3.0 mm (0.118 in.) or more thick		
C - C	7.0 mm (0.276 in.)	5.0 mm (0.197 in.)	25 mm (0.984 in.)
	13.0 mm (0.512 in.) or more wide and 3.0 mm (0.118 in.) or more thick		
D - D	5.0 mm (0.197 in.)	3.0 mm (0.118 in.)	26 mm (1.02 in.)
	7.0 mm (0.276 in.) or more wide and		

	3.0 mm (0.118 in.) or more thick	in.)	
E	3.0 mm (0.118 in.)	3.0 mm (0.118 in.)	-
	-		

NOTE:

- When there is oil on the contact surfaces, clean the surfaces with non-residue solvent before applying seal packing.
- Install the timing chain cover within 3 minutes and tighten the bolts within 10 minutes after applying seal packing.
- After applying seal packing to the timing chain cover, install the engine mounting bracket within 10 minutes.
- Do not apply oil for at least 4 hours after the installation.
- Do not start the engine for at least 4 hours after the installation.

e. Temporarily install the timing chain cover with the 17 bolts and 2 nuts.

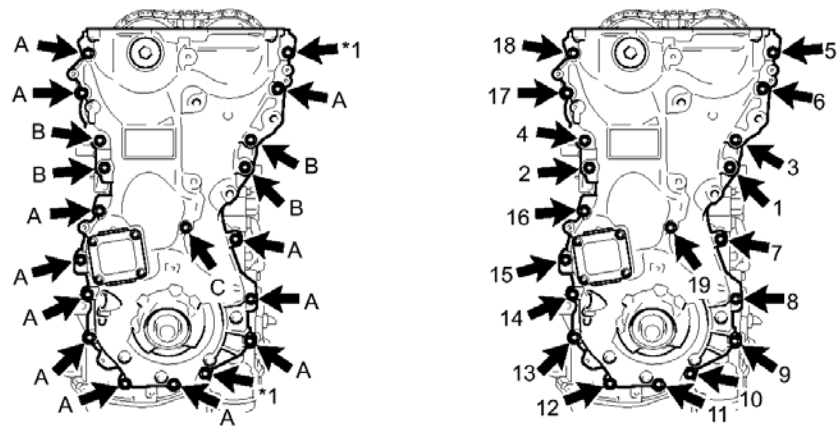


Fig. 24: Identifying Timing Chain Cover Bolts & Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*1 Nut - -

Bolt Length

Item	Length	Thread Diameter
Bolt A	30 mm (1.18 in.)	8 mm (0.315 in.)

Bolt B	35 mm (1.38 in.)	10 mm (0.394 in.)
Bolt C	45 mm (1.77 in.)	8 mm (0.315 in.)

NOTE: Make sure there is no oil on the bolts. If there is oil on the bolts, clean them before installing them.

- f. Tighten the 17 bolts and 2 nuts in several steps, in the sequence shown in the illustration.

Bolt A, C, Nut

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

Bolt B

Torque: 55 N*m (561 kgf*cm, 41 ft.*lbf)

2. INSTALL ENGINE MOUNTING BRACKET RH

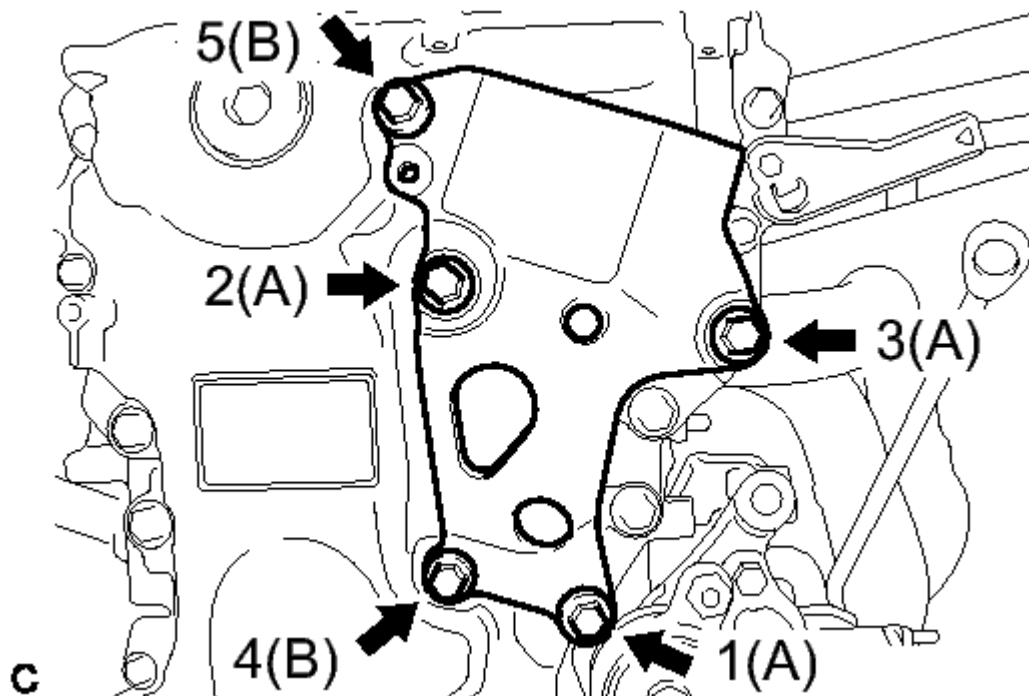


Fig. 25: Identifying Engine Mounting Bracket RH Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- a. Install the engine mounting bracket RH with the 5 bolts in the order shown in the illustration.

Bolt A

Torque: 55 N*m (561 kgf*cm, 41 ft.*lbf)

Bolt B

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

NOTE: **After applying seal packing to the timing chain cover, install the engine mounting bracket within 10 minutes.**

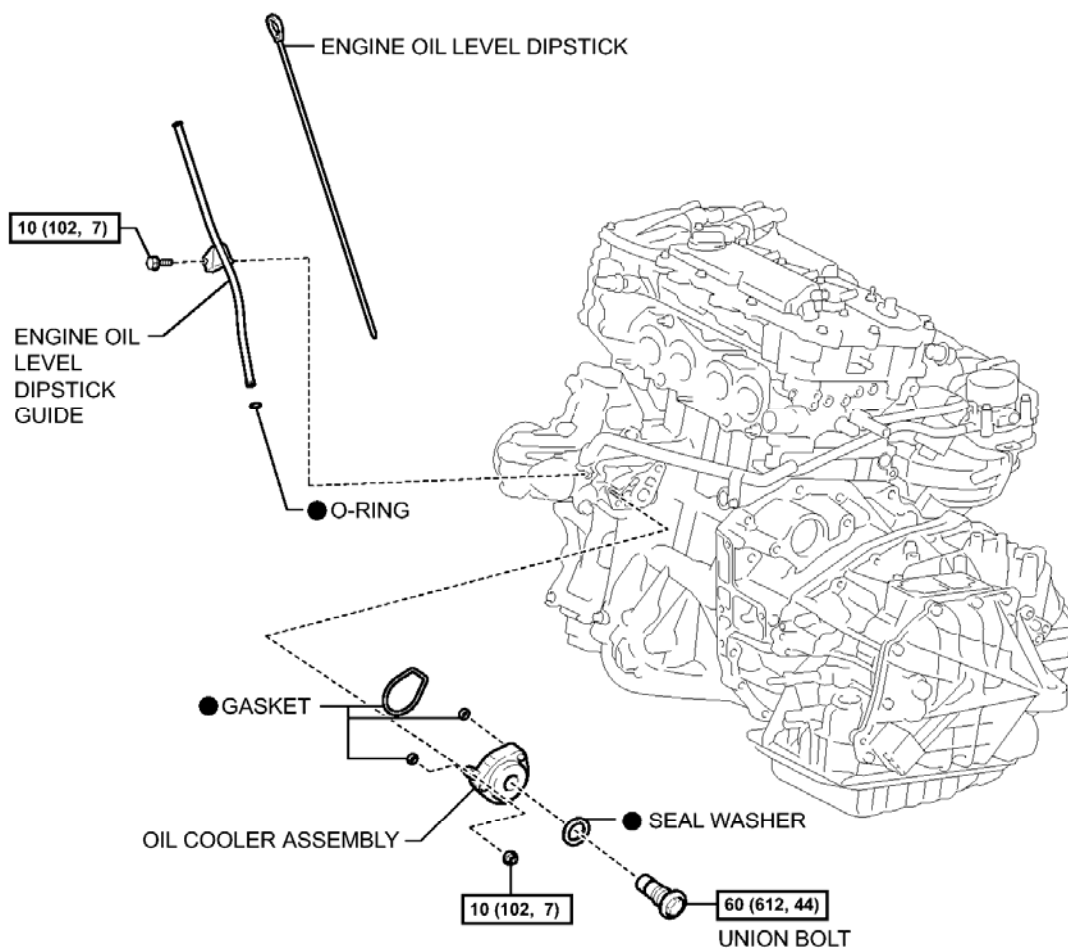
3. **INSTALL TIMING CHAIN COVER OIL SEAL** . Refer to **INSTALLATION - Step 1**
4. **INSTALL CRANKSHAFT PULLEY** . Refer to **REASSEMBLY - Step 43**
5. **INSTALL CRANKSHAFT POSITION SENSOR** . Refer to **INSTALLATION - Step 1**
6. **INSTALL V-RIBBED BELT TENSIONER ASSEMBLY** . Refer to **REASSEMBLY - Step 48**
7. **INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY** . Refer to **REASSEMBLY - Step 42**
8. **INSTALL IGNITION COIL ASSEMBLY** . Refer to **INSTALLATION - Step 2**
9. **INSTALL ENGINE WIRE** . Refer to **INSTALLATION - Step 5**
10. **INSTALL ENGINE AND TRANSAXLE**

Refer to **INSTALLATION**

ENGINE OIL COOLER

COMPONENTS

ILLUSTRATION



$\boxed{\text{N}\cdot\text{m (kgf}\cdot\text{cm, ft.}\cdot\text{lb)}}\text{: Specified torque}$

● Non-reusable part

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Fig. 26: Engine Oil Cooler Replacement Components With Torque Specifications
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

REMOVAL

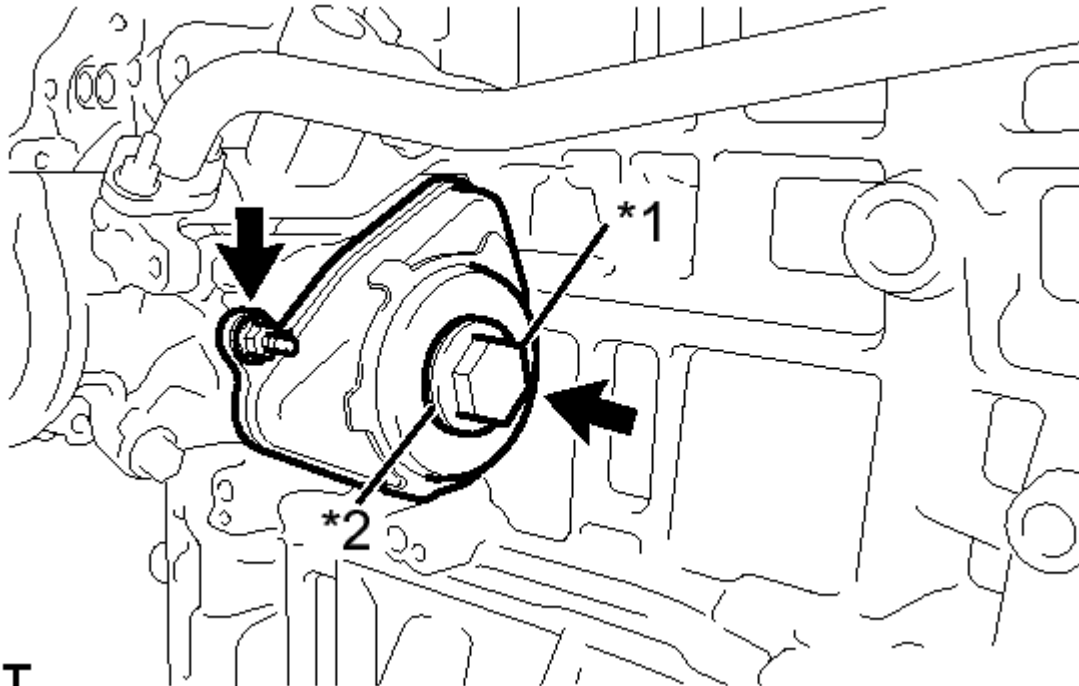
1. REMOVE EXHAUST MANIFOLD

Refer to **REMOVAL**

2. DRAIN ENGINE OIL See step 1

3. DRAIN ENGINE COOLANT . Refer to **REPLACEMENT - Step 2**

4. **REMOVE ENGINE OIL LEVEL DIPSTICK GUIDE** . Refer to **REMOVAL - Step 1**
5. **REMOVE OIL COOLER ASSEMBLY**



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Fig. 27: Identifying Oil Cooler Assembly Nut, Union Bolt & Seal Washer
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- a. Remove the nut, union bolt, seal washer and oil cooler.

TEXT IN ILLUSTRATION

*1	Union Bolt
*2	Seal Washer

- b. Remove the 3 gaskets from the oil cooler.

INSPECTION

INSPECTION

1. INSPECT ENGINE OIL COOLER

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

If cracks or damage are found, replace the engine oil cooler.

INSTALLATION

INSTALLATION

1. INSTALL OIL COOLER ASSEMBLY

- Clean the oil cooler contact surface on the cooler mounting.
- Apply a light coat of engine oil to 3 new gaskets.
- Install the 3 new gaskets to the oil cooler.
- Temporarily install the oil cooler with the union bolt, nut and a new seal washer.
- Tighten the bolt and nut in several steps, in the sequence shown in the illustration.

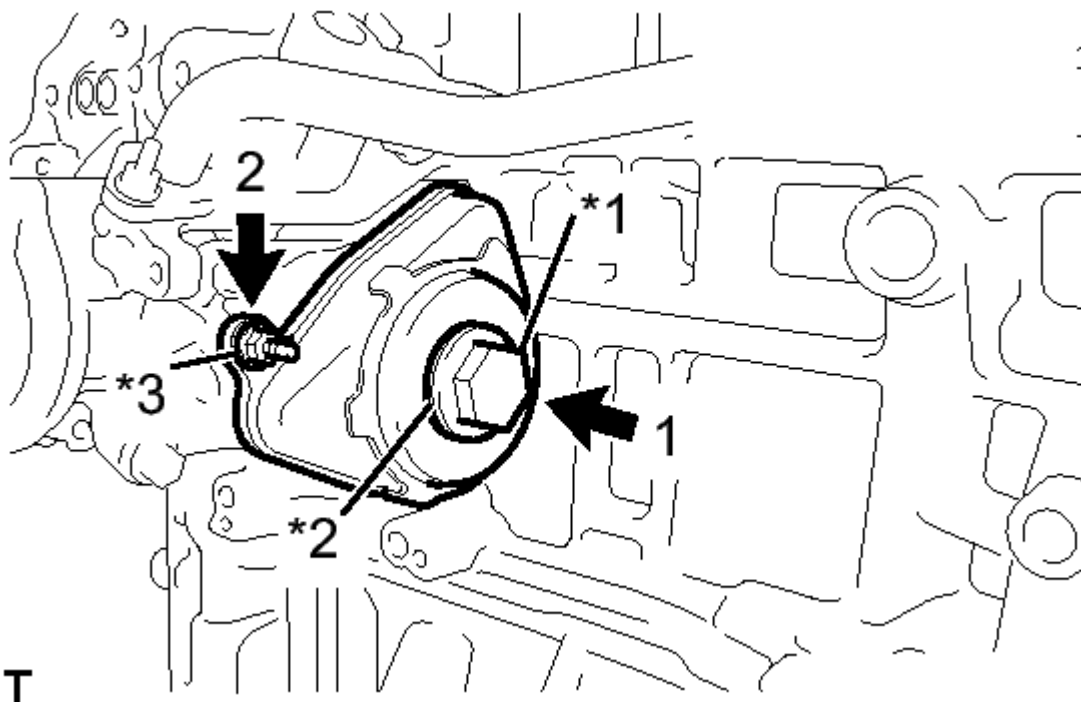


Fig. 28: Identifying Oil Cooler Assembly Union Bolt, Nut & Seal Washer
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*1	Union Bolt
*2	Seal Washer
*3	Nut

Union Bolt

Torque: 60 N*m (612 kgf*cm, 44 ft.*lbf)

Nut

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

2. **INSTALL ENGINE OIL LEVEL DIPSTICK GUIDE** . Refer to **INSTALLATION - Step 17**
3. **INSTALL EXHAUST MANIFOLD**

Refer to **INSTALLATION**

4. **ADD ENGINE OIL** See step 4
5. **ADD ENGINE COOLANT** . Refer to **REPLACEMENT - Step 3**
6. **INSPECT FOR OIL LEAK** See step 5
7. **INSPECT ENGINE OIL LEVEL** . Refer to **ON-VEHICLE INSPECTION - Step 1**