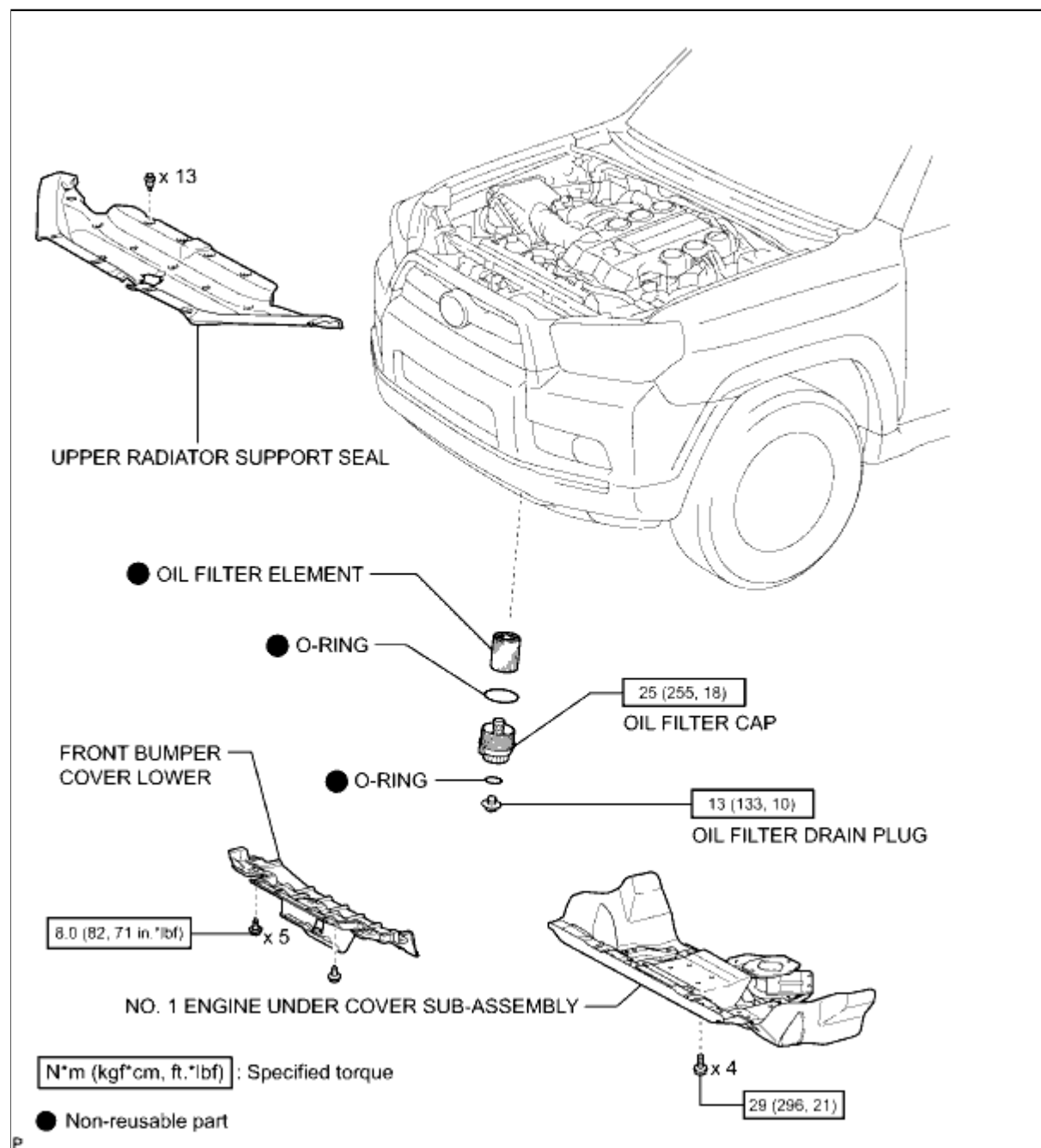


<b>Last Modified:</b> 5-10-2010	6.4 K	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM000002B8L00DX
<b>Title:</b> 1GR-FE LUBRICATION: ENGINE OIL COOLER: COMPONENTS (2010 4Runner)		

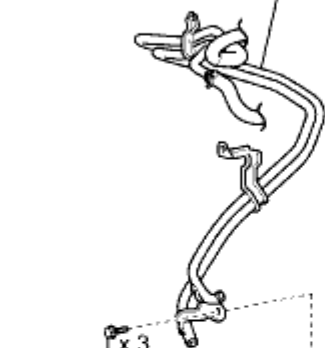
## COMPONENTS

## ILLUSTRATION



## ILLUSTRATION

WATER BY-PASS PIPE  
SUB-ASSEMBLY



x 3  
10 (102, 7)

21 (214, 15)

21 (214, 15)

OIL FILTER BRACKET

NO. 9 WATER BY-PASS HOSE

● GASKET

NO. 8 WATER BY-PASS HOSE

● SEAL WASHER

68 (693, 50)  
OIL COOLER  
UNION BOLT

OIL COOLER ASSEMBLY

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

● Non-reusable part

P

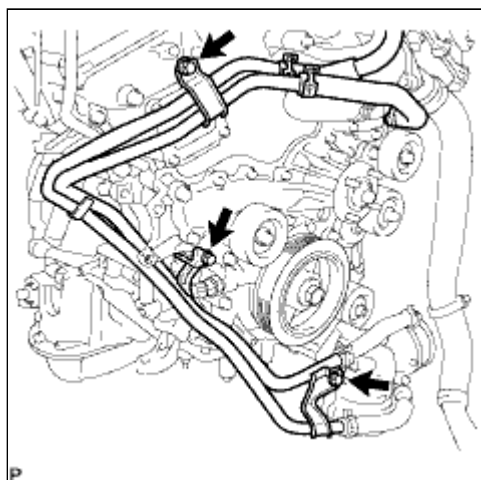


TOYOTA

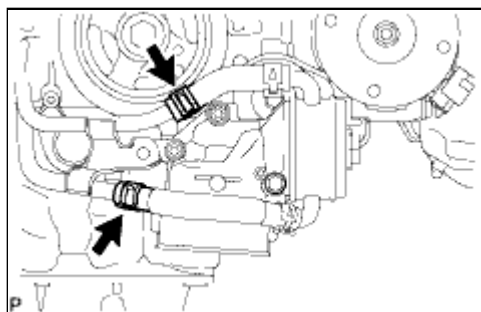
<b>Last Modified:</b> 5-10-2010	6.4 A	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM00000172000IX
<b>Title:</b> 1GR-FE LUBRICATION: ENGINE OIL COOLER: REMOVAL (2010 4Runner)		

## REMOVAL

1. REMOVE FRONT BUMPER COVER LOWER INFO
2. REMOVE NO. 1 ENGINE UNDER COVER SUB-ASSEMBLY INFO
3. REMOVE UPPER RADIATOR SUPPORT SEAL INFO
4. DRAIN ENGINE COOLANT INFO
5. DRAIN ENGINE OIL INFO
6. REMOVE OIL FILTER ELEMENT INFO
7. DISCONNECT WATER BY-PASS PIPE SUB-ASSEMBLY

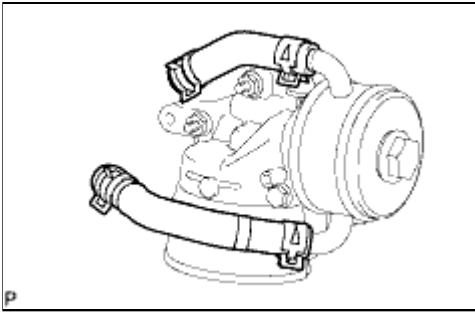


(a) Remove the 3 bolts.

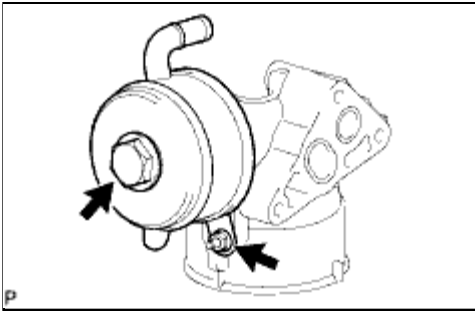


(b) Disconnect the 2 hoses and water by-pass pipe.

8. REMOVE OIL FILTER BRACKET INFO
9. REMOVE OIL COOLER ASSEMBLY



(a) Remove the 2 hoses.



(b) Remove the bolt, nut and oil cooler.

(c) Remove the seal washer from the bolt.

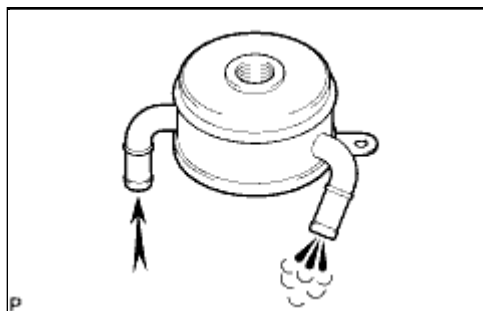


TOYOTA

<b>Last Modified:</b> 5-10-2010	6.4 G	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM00000172N00IX
<b>Title:</b> 1GR-FE LUBRICATION: ENGINE OIL COOLER: INSPECTION (2010 4Runner)		

## **INSPECTION**

### **1. INSPECT OIL COOLER ASSEMBLY**



- (a) Check the oil cooler for damage and clogging.  
If necessary, replace the oil cooler.

<b>Last Modified:</b> 5-10-2010	6.4 A	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM00000172M00IX
<b>Title:</b> 1GR-FE LUBRICATION: ENGINE OIL COOLER: INSTALLATION (2010 4Runner)		

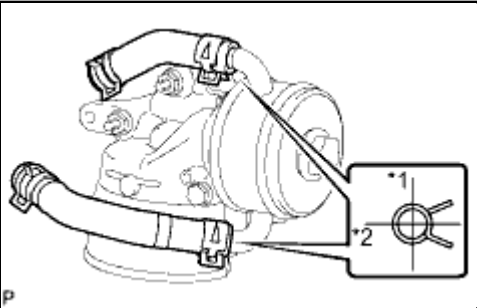
# INSTALLATION

## 1. INSTALL OIL COOLER ASSEMBLY

- (a) Install a new seal washer to the bolt.
- (b) Install the oil cooler with the bolt and nut.

**for bolt - Torque: 68 N·m (693 kgf·cm, 50ft·lbf)**  
**for nut - Torque: 10 N·m (102 kgf·cm, 7ft·lbf)**

- (c) Install the 2 hoses.



### Text in Illustration

* 1	Upward
* 2	Rearward

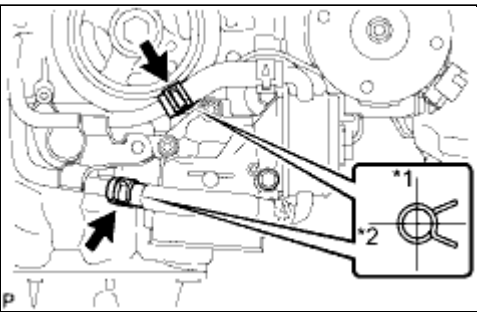
**HINT:**

The direction of the hose clamp is indicated in the illustration.

## 2. INSTALL OIL FILTER BRACKET INFO

## 3. CONNECT WATER BY-PASS PIPE SUB-ASSEMBLY

- (a) Connect the 2 hoses and water by-pass pipe.



### Text in Illustration

* 1	Upward
* 2	Rearward

**HINT:**

The direction of the hose clamp is indicated in the illustration.

- (b) Install the 3 bolts.  
**Torque: 10 N·m (102 kgf·cm, 7ft·lbf)**

## 4. INSTALL OIL FILTER ELEMENT INFO

**5. ADD ENGINE OIL** 

**6. CHECK ENGINE OIL LEVEL** 

**7. ADD ENGINE COOLANT** 

**8. INSPECT FOR ENGINE OIL LEAK** 

**9. INSPECT FOR COOLANT LEAK** 

**10. INSTALL UPPER RADIATOR SUPPORT SEAL** 

**11. INSTALL NO. 1 ENGINE UNDER COVER SUB-ASSEMBLY** 

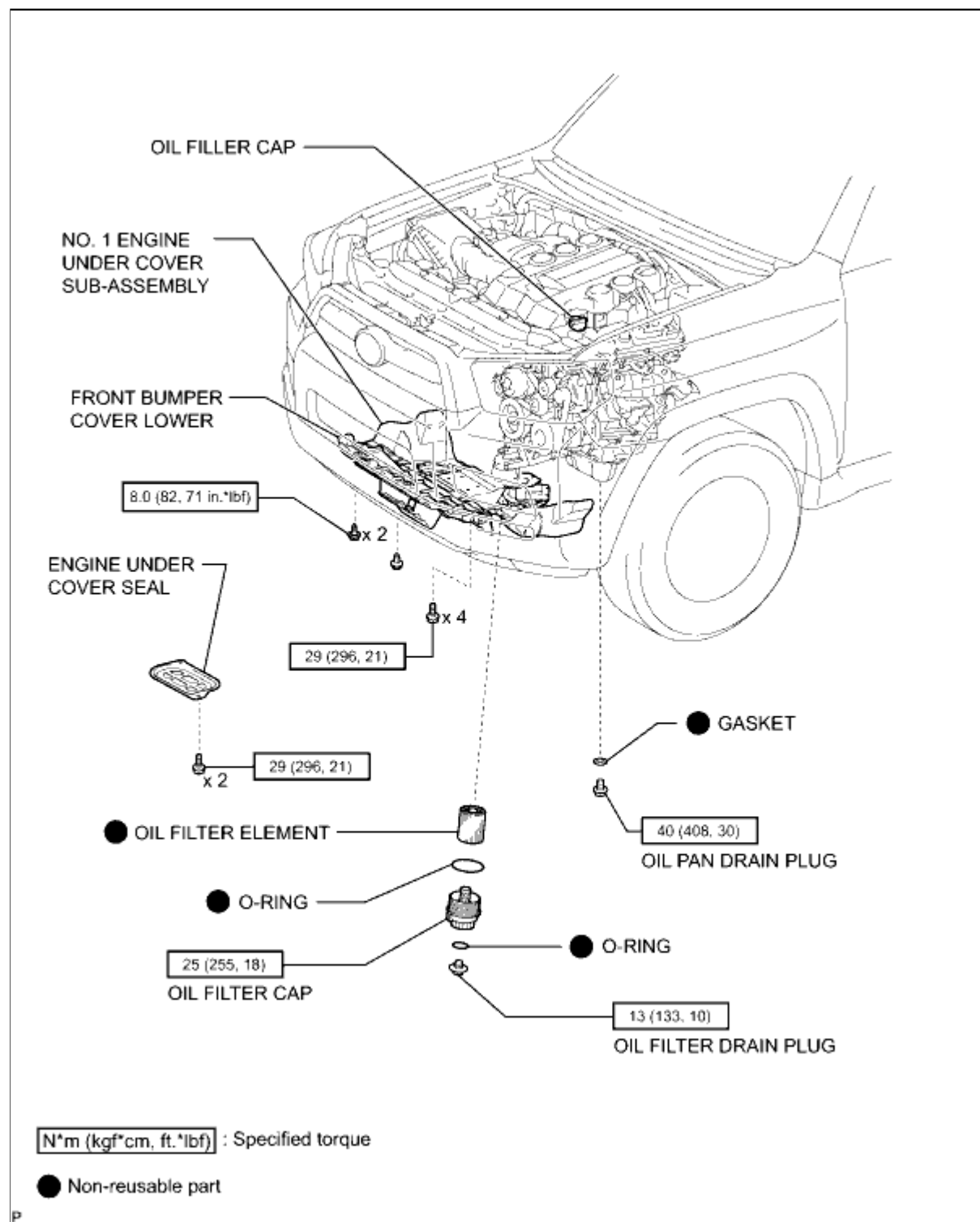
**12. INSTALL FRONT BUMPER COVER LOWER** 



<b>Last Modified:</b> 5-10-2010	6.4 K	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM00000201H01HX
<b>Title:</b> 1GR-FE LUBRICATION: OIL AND OIL FILTER: COMPONENTS (2010 4Runner)		

## COMPONENTS

## ILLUSTRATION







TOYOTA

<b>Last Modified:</b> 5-10-2010	6.4 A	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM00000201G01KX
<b>Title:</b> 1GR-FE LUBRICATION: OIL AND OIL FILTER: REPLACEMENT (2010 4Runner)		

## **REPLACEMENT**

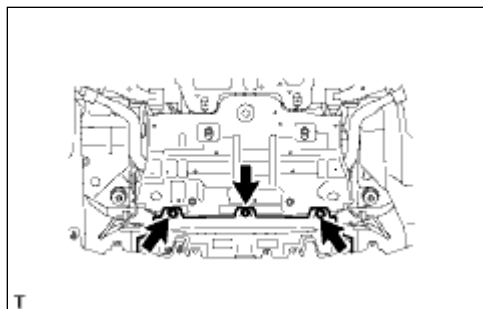
### **CAUTION:**

- 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. The skin should be washed with soap and water, or use waterless hand cleaner, to remove any used engine oil thoroughly. Do not use gasoline, thinners, or solvents.
- In order to protect the environment, used oil and used oil filters must be disposed of at designated disposal sites.

### **1. REMOVE ENGINE UNDER COVER SEAL**

- (a) Remove the 2 bolts and engine under cover seal.

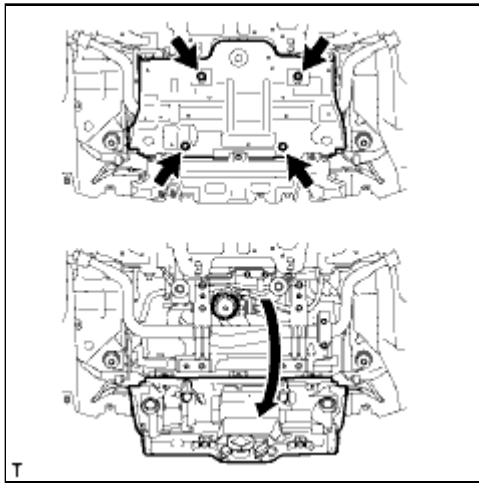
### **2. DISCONNECT FRONT BUMPER COVER LOWER**



- (a) Remove the 2 bolts and clip and disconnect the front bumper cover lower.

### **3. DISCONNECT NO. 1 ENGINE UNDER COVER SUB-ASSEMBLY**

- (a) Remove the 4 bolts and open the No. 1 engine under cover as shown in the illustration.

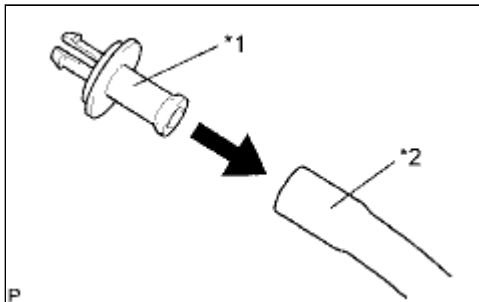


#### 4. DRAIN ENGINE OIL

- Remove the oil filler cap.
- Remove the oil pan drain plug and drain the engine oil into a container.
- Install a new gasket and the oil pan drain plug.

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

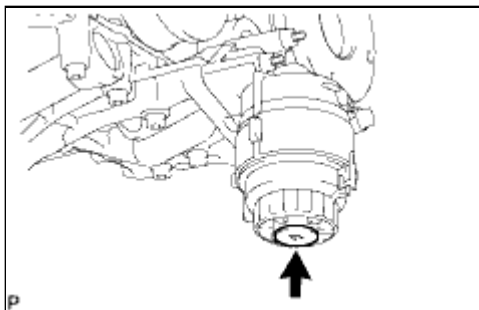
#### 5. REMOVE OIL FILTER ELEMENT



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

#### Text in Illustration

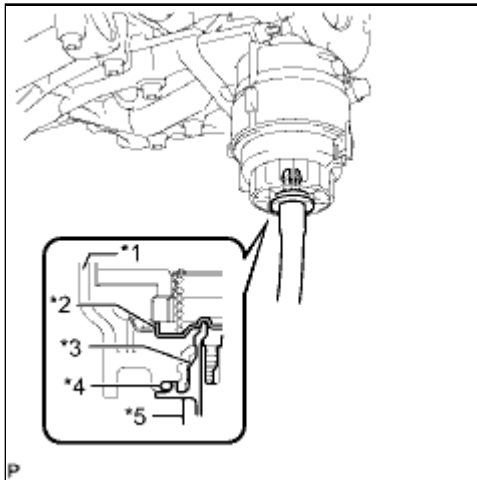
* 1	Pipe
* 2	Hose



- Remove the oil filter drain plug.

- Install the pipe to the oil filter cap.

## Text in Illustration



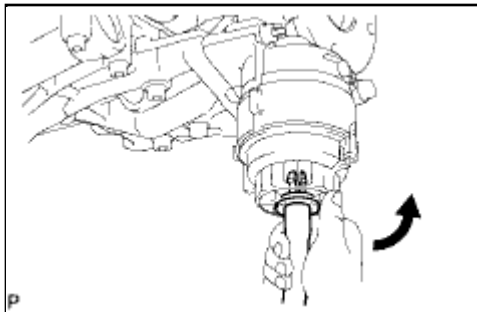
*1	Cap
*2	Valve
*3	Pipe
*4	O - Ring
*5	Hose

### **HINT:**

Use a container to catch the draining oil.

### **NOTICE:**

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

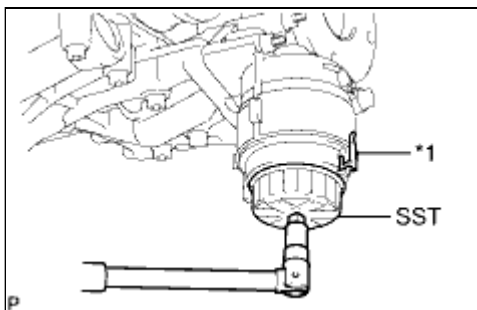


(d) Check that oil is drained from the oil filter. Then, disconnect the pipe and remove the O-ring as shown in the illustration.

(e) Using SST, remove the oil filter cap.

**SST: 09228-06501**

## Text in Illustration

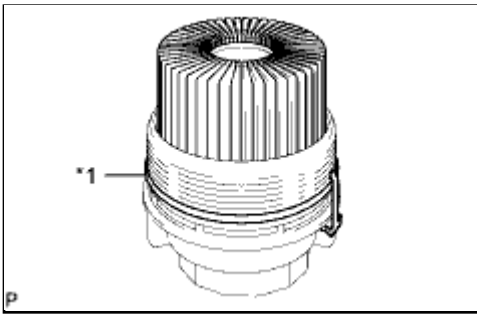


*1	Oil Filter Bracket Clip
----	-------------------------

### **NOTICE:**

Do not remove the oil filter bracket clip.

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



## Text in Illustration

* 1	O - Ring
-----	----------

### NOTICE:

Be sure to remove the O-ring (for the cap) by hand, without using any tools, to prevent damage to the groove for the O-ring in the cap.

## 6. INSTALL OIL FILTER ELEMENT

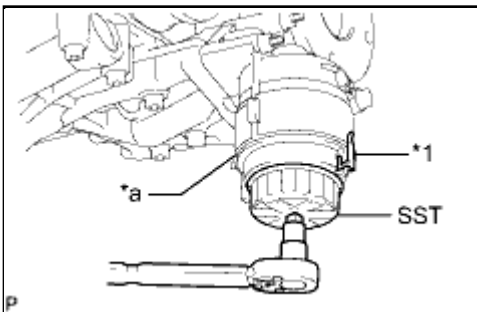
- Clean the inside of the oil filter cap, the threads and O -ring groove.
- Apply a small amount of engine oil to a new O-ring and install the O -ring to the oil filter cap.
- Set a new oil filter element on the oil filter cap.
- Remove any dirt or foreign matter from the installation surface of the engine.
- Apply a small amount of engine oil to the O-ring again and temporarily install the oil filter cap.

- Using SST, tighten the oil filter cap.

**SST: 09228-06501**

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

## Text in Illustration



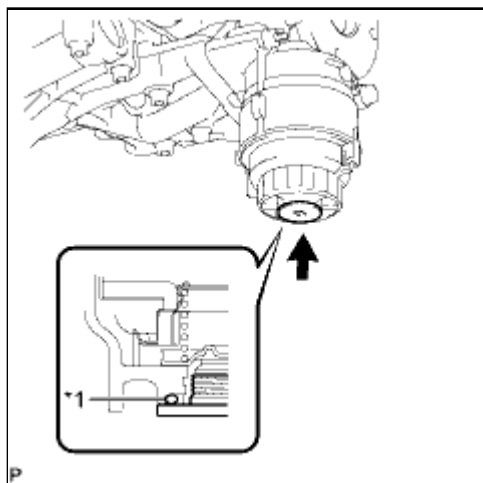
* 1	Oil Filter Bracket Clip
* a	No Clearance

### NOTICE:

- When tightening the oil filter cap, do not remove the oil filter bracket clip.
- Make sure that the oil filter is installed securely as shown in the illustration.
- Make sure that the O-ring does not get caught between the parts.

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

## Text in Illustration



* 1	O - Ring
-----	----------

**NOTICE:**

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.

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

**NOTICE:**

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

## 7. ADD ENGINE OIL

(a) Add fresh oil.

Standard Engine Oil (for USA):

OIL GRADE	OIL VISCOSITY (SAE)
ILSAC multigrade engine oil	0W-20

Standard Engine Oil (for Canada):

OIL GRADE	OIL VISCOSITY (SAE)
ILSAC multigrade engine oil	0W-20 5W-20

Standard Oil Capacity:

ITEM	SPECIFIED CONDITION
Drain and refill without oil filter change	5.7 liters (6.0 US qts, 5.0 Imp. qts)
Drain and refill with oil filter change	6.2 liters (6.6 US qts, 5.5 Imp. qts)
Dry fill	7.1 liters (7.5 US qts, 6.2 Imp. qts)

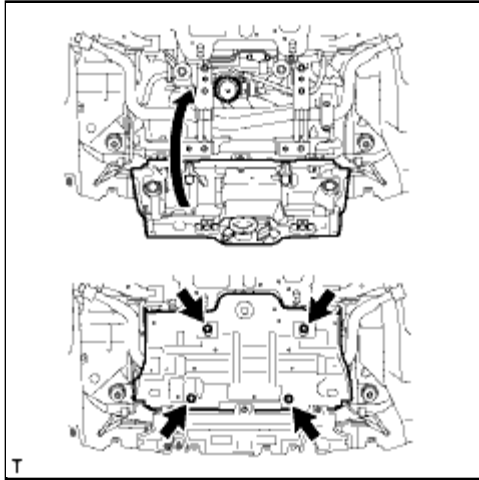
## 8. CHECK ENGINE OIL LEVEL



## 9. INSPECT FOR ENGINE OIL LEAK

(a) Start the engine. Make sure that there are no oil leaks from the area that was worked on.

## 10. CONNECT NO. 1 ENGINE UNDER COVER SUB-ASSEMBLY



(a) Install the 4 bolts to close the No. 1 engine under cover.

**Torque: 29 N·m (296 kgf·cm, 21ft·lbf)**

## 11. CONNECT FRONT BUMPER COVER LOWER

(a) Connect the front bumper cover lower with the 2 bolts and clip.

**Torque: 8.0 N·m (82 kgf·cm, 71in·lbf)**

## 12. INSTALL ENGINE UNDER COVER SEAL

(a) Install the engine under cover seal with the 2 bolts.

**Torque: 29 N·m (296 kgf·cm, 21ft·lbf)**

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<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM0000017MF012X
<b>Title:</b> 1GR-FE LUBRICATION: LUBRICATION SYSTEM: ON-VEHICLE INSPECTION (2010 4Runner)		

# ON-VEHICLE INSPECTION

## 1. CHECK OIL QUALITY

(a) Check the oil for deterioration, water contamination, discoloring or thinning.

If the quality is visibly poor, replace the oil and oil filter element [INFO](#) .

## 2. CHECK ENGINE OIL LEVEL

(a) Warm up the engine, and then stop the engine and wait for 5 minutes.

(b) Check that the engine oil level is between the low level and full level marks on the dipstick.

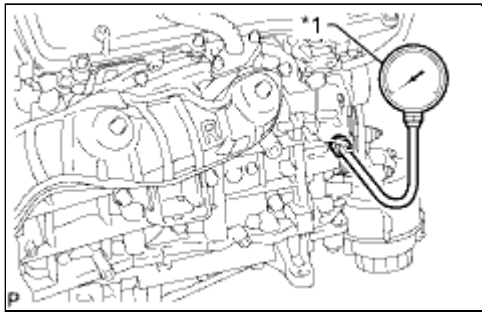
If low, check for leakage and add oil up to the full level mark.

### NOTICE:

**Do not fill engine oil above the full level mark.**

## 3. INSPECT OIL PRESSURE

(a) Remove the oil pressure switch [INFO](#) .



(b) Install an oil pressure gauge.

### Text in Illustration

*1	Oil Pressure Gauge
----	--------------------

(c) Warm up the engine.

(d) Inspect the oil pressure.

Standard Oil Pressure:

CONDITION	SPECIFIED CONDITION
Idling	29 kPa (0.3 kgf/cm <sup>2</sup> , 4.2 psi) or higher
3000 rpm	294 to 588 kPa (3.0 to 6.0 kgf/cm <sup>2</sup> , 43 to 85 psi)

If the pressure is not as specified, check the oil pump [INFO](#) .

(e) Remove the oil pressure gauge.

(f) Install the oil pressure switch [INFO](#) .



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<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM000003PKS009X
<b>Title:</b> 2TR-FE LUBRICATION: LUBRICATION SYSTEM: ON-VEHICLE INSPECTION (2010 4Runner)		

ON-VEHICLE INSPECTION

1. INSPECT ENGINE OIL LEVEL

- (a) Warm up the engine, stop the engine and wait 5 minutes.
- (b) Check that the oil level is between the dipstick low level mark and full level mark.  
If the level is low, check for leakage and add oil up to the full level mark.

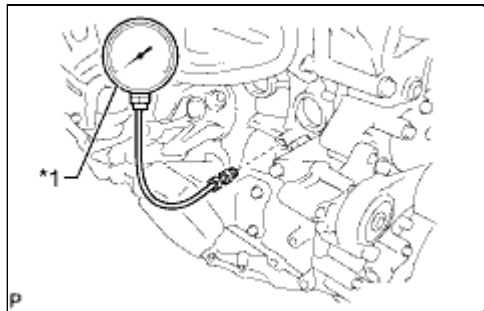
**NOTICE:**  
Do not fill engine oil above the full level mark.

2. INSPECT ENGINE OIL QUALITY

- (a) Check the oil for deterioration, water contamination, discoloration or thinning. If the quality is visibly poor, replace the oil and filter INFO.

3. INSPECT OIL PRESSURE

- (a) Remove the oil pressure switch assembly INFO.



- (b) Install an oil pressure gauge.

Text in Illustration

*1	Oil Pressure Gauge
----	--------------------

- (c) Warm up the engine.
- (d) Measure the oil pressure.

Standard Oil Pressure:

CONDITION	SPECIFIED CONDITION
Idle	29 kPa (0.3 kgf/cm <sup>2</sup> , 4.2 psi) or higher
3000 rpm	160 to 490 kPa (1.6 to 5.0 kgf/cm <sup>2</sup> , 23 to 71 psi)

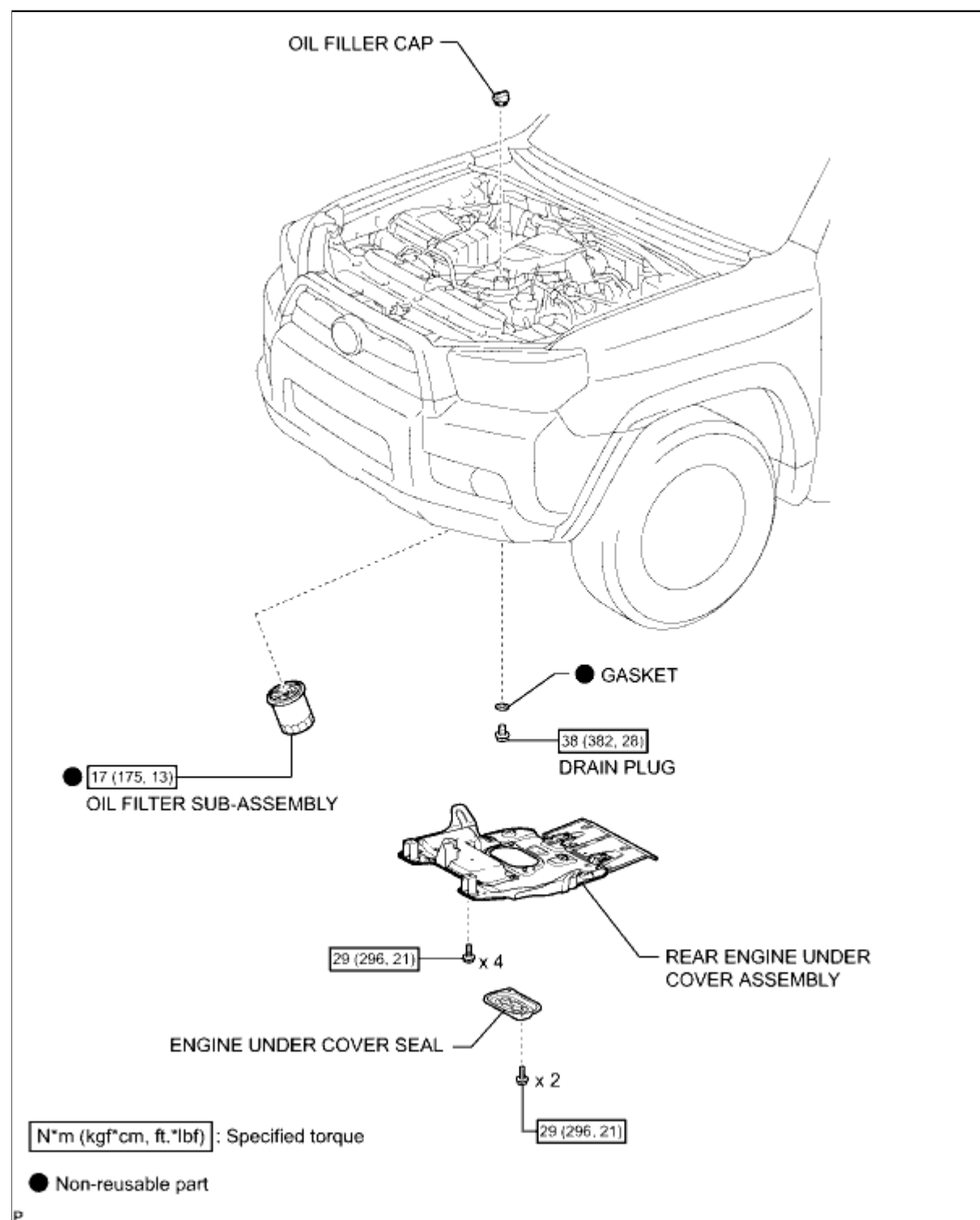
If the oil pressure is not as specified, check the oil pump INFO.

- (e) Remove the oil pressure gauge.
- (f) Install the oil pressure switch assembly INFO.

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<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM000000YM600GX
<b>Title:</b> 2TR-FE LUBRICATION: OIL AND OIL FILTER: COMPONENTS (2010 4Runner)		

## COMPONENTS

## ILLUSTRATION





TOYOTA

<b>Last Modified:</b> 5-10-2010	6.4 A	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM000000YM500JX
<b>Title:</b> 2TR-FE LUBRICATION: OIL AND OIL FILTER: REPLACEMENT (2010 4Runner)		

## **REPLACEMENT**

### **CAUTION:**

- Prolonged and repeated contact with engine oil will result in the loss of natural oil from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.
- Wear protective clothing and gloves. Avoid contact with used oil. If contact occurs, wash the area thoroughly with soap and waterless hand cleaner. Never use gasoline, thinners, or solvents to wash the skin.
- In order to protect the environment, dispose of used oil and used oil filters at designated disposal sites only.

### **1. REMOVE ENGINE UNDER COVER SEAL**

- Remove the 2 bolts and engine under cover seal.

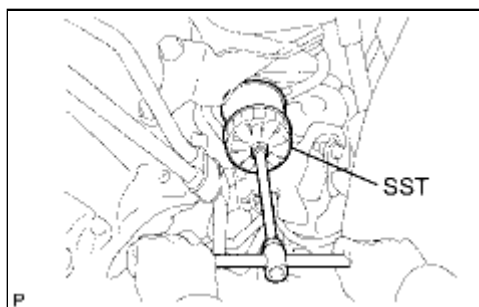
### **2. DRAIN ENGINE OIL**

- Remove the oil filler cap.
- Remove the oil drain plug and gasket, and drain the oil into a container.

### **3. REMOVE REAR ENGINE UNDER COVER ASSEMBLY**



### **4. REMOVE OIL FILTER SUB-ASSEMBLY**

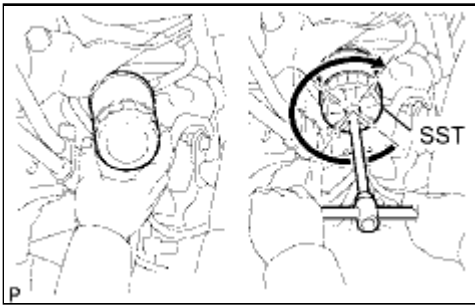


- Using SST, remove the oil filter.

**SST: 09228-07501**

### **5. INSTALL OIL FILTER SUB-ASSEMBLY**

- Check and clean the oil filter installation surface.
- Apply clean engine oil to the gasket of a new oil filter.
- Lightly screw the oil filter into place by hand. Tighten it until the gasket contacts the seat.



(d) Using SST, tighten the oil filter.

**SST: 09228-07501**

(1) Depending on the work space available, choose from the following.

If enough space is available, use a torque wrench to tighten the oil filter.

**Torque: 17 N·m (175 kgf·cm, 13ft·lbf)**

If enough space is not available to use a torque wrench, tighten the oil filter a 3/4 turn by hand or use a common wrench.

## 6. ADD ENGINE OIL

(a) Clean and install the oil drain plug and a new gasket.

**Torque: 38 N·m (382 kgf·cm, 28ft·lbf)**

(b) Add fresh engine oil.

Standard Engine Oil (for USA):

OIL GRADE	OIL VISCOSITY (SAE)
ILSAC multigrade engine oil	0W-20

Standard Capacity:

ITEM	SPECIFIED CONDITION
Drain and refill without oil filter change	5.1 liters (5.4 US qts, 4.5 Imp. qts)
Drain and refill with oil filter change	5.8 liters (6.1 US qts, 5.1 Imp. qts)
Dry fill	6.1 liters (6.4 US qts, 5.4 Imp. qts)

(c) Install the oil filler cap.

## 7. INSPECT FOR OIL LEAK

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

## 8. INSPECT ENGINE OIL LEVEL

INFO

## 9. INSTALL REAR ENGINE UNDER COVER ASSEMBLY

INFO

## 10. INSTALL ENGINE UNDER COVER SEAL

(a) Install the engine under cover seal with the 2 bolts.

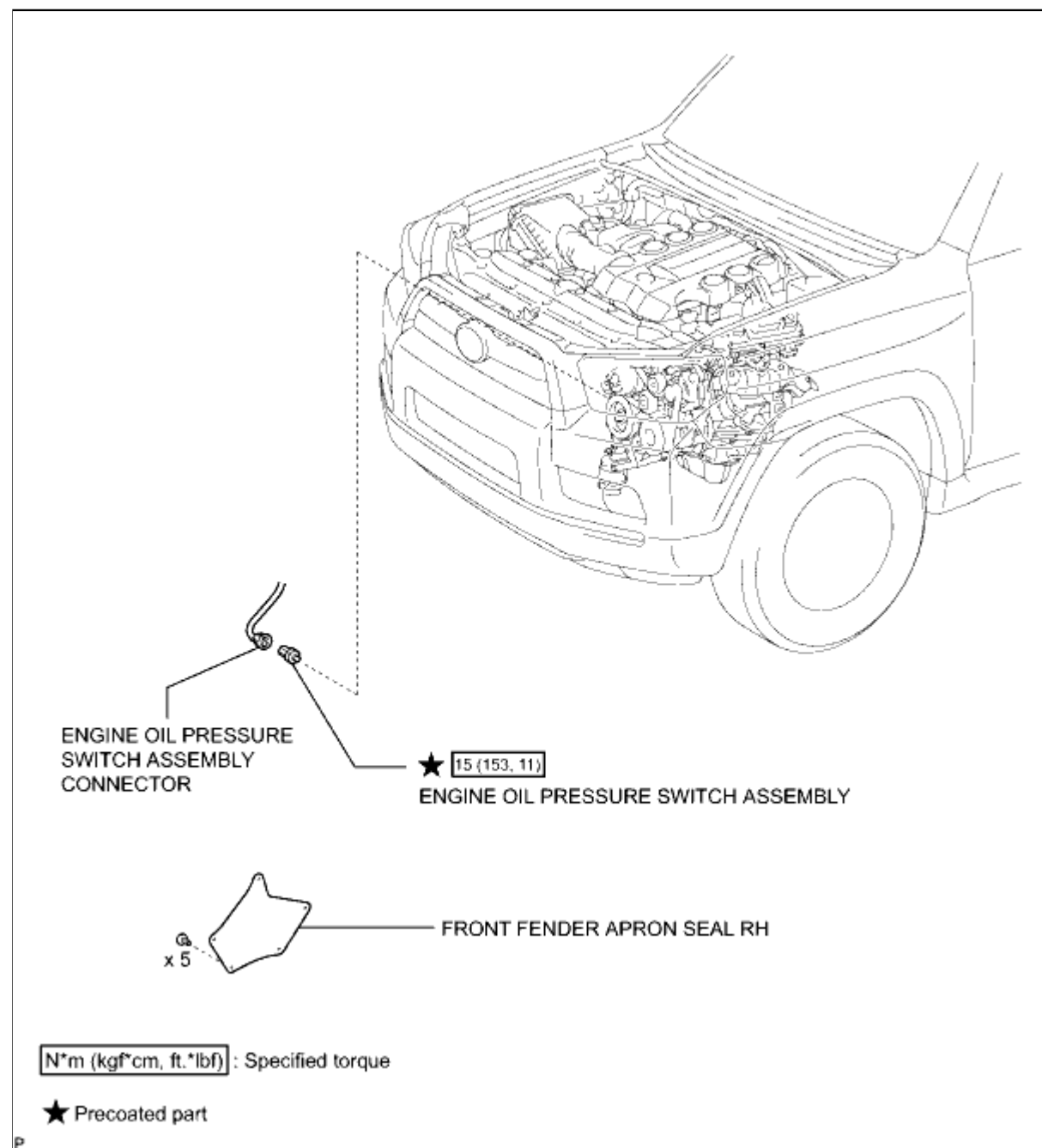
**Torque: 29 N·m (296 kgf·cm, 21ft·lbf)**



<b>Last Modified:</b> 5-10-2010	6.4 K	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM000002ZAW008X
<b>Title:</b> 1GR-FE LUBRICATION: OIL PRESSURE SWITCH: COMPONENTS (2010 4Runner)		

## COMPONENTS

## ILLUSTRATION

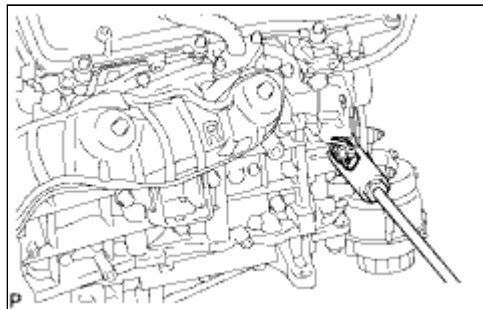


<b>Last Modified:</b> 5-10-2010	6.4 A	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM000002ZAX008X
<b>Title:</b> 1GR-FE LUBRICATION: OIL PRESSURE SWITCH: REMOVAL (2010 4Runner)		

## **REMOVAL**

**1. REMOVE FRONT FENDER APRON SEAL RH** 

**2. 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.



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<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM0000046WQ001X
<b>Title:</b> 1GR-FE LUBRICATION: OIL PRESSURE SWITCH: INSPECTION (2010 4Runner)		

## **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.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 - Body ground	Engine stopped	Below 1 $\Omega$
	Engine idling	10 k $\Omega$ or higher

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

- (d) Connect the oil pressure switch connector.



<b>Last Modified:</b> 5-10-2010	6.4 A	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM000002ZAU008X
<b>Title:</b> 1GR-FE LUBRICATION: OIL PRESSURE SWITCH: INSTALLATION (2010 4Runner)		

## INSTALLATION

### 1. INSTALL ENGINE OIL PRESSURE SWITCH ASSEMBLY

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

Adhesive:

Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

#### **NOTICE:**

**Do not apply adhesive to the oil inlet port of the oil pressure switch.**

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

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

#### **NOTICE:**

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

(c) Connect the oil pressure switch connector.

### 2. INSPECT FOR ENGINE OIL LEAK

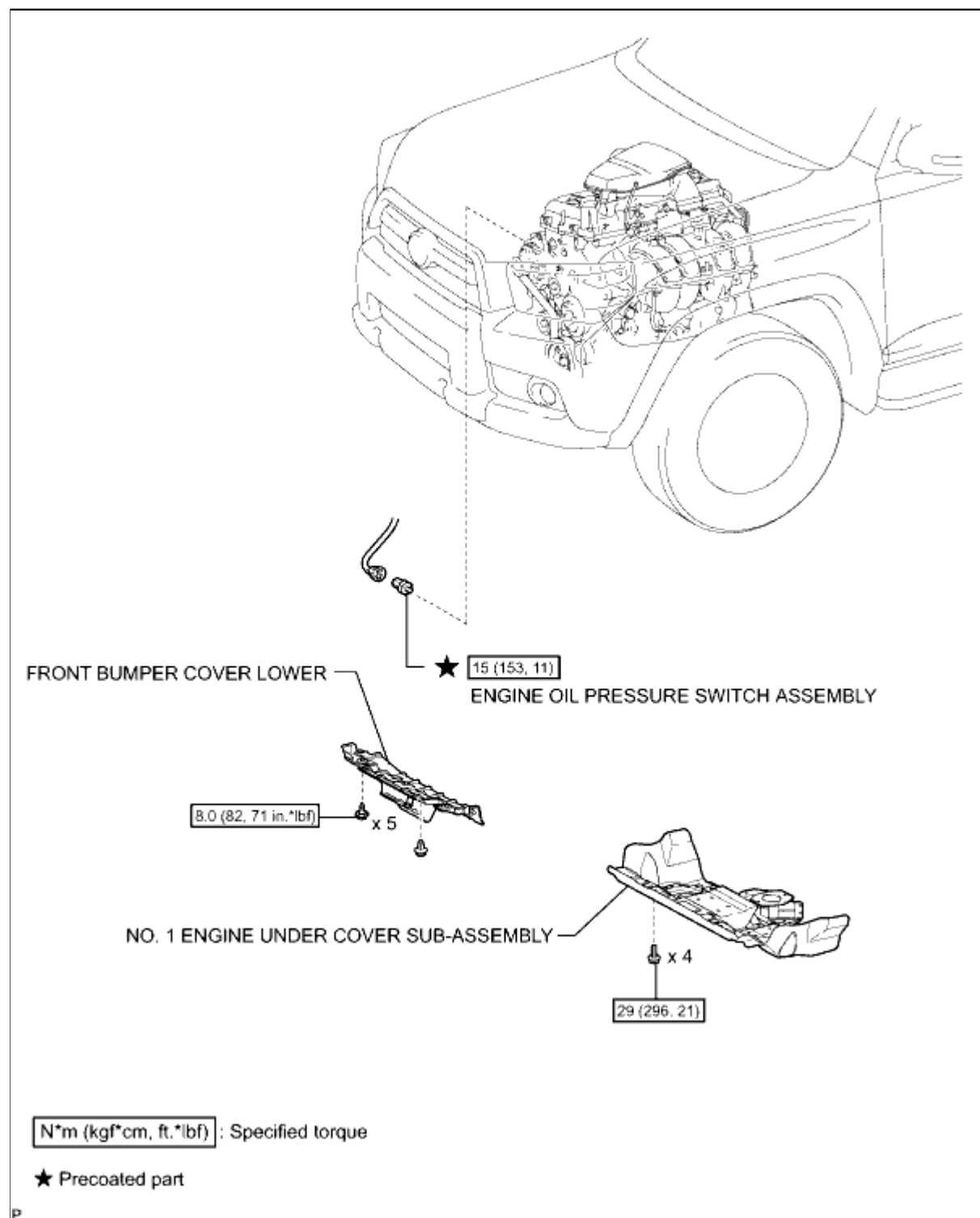
### 3. INSTALL FRONT FENDER APRON SEAL RH



<b>Last Modified:</b> 5-10-2010	6.4 K	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM000003PJO009X
<b>Title:</b> 2TR-FE LUBRICATION: OIL PRESSURE SWITCH: COMPONENTS (2010 4Runner)		

## COMPONENTS

## ILLUSTRATION





TOYOTA

<b>Last Modified:</b> 5-10-2010	6.4 G	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM000004BIS000X
<b>Title:</b> 2TR-FE LUBRICATION: OIL PRESSURE SWITCH: ON-VEHICLE INSPECTION (2010 4Runner)		

## **ON-VEHICLE 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.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
1 - Body ground	Engine stopped	Below 1 $\Omega$
	Engine idling	10 k $\Omega$ or higher

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



<b>Last Modified:</b> 5-10-2010	6.4 A	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM000003PJP009X
<b>Title:</b> 2TR-FE LUBRICATION: OIL PRESSURE SWITCH: REMOVAL (2010 4Runner)		

## **REMOVAL**

### **1. REMOVE FRONT BUMPER COVER LOWER**

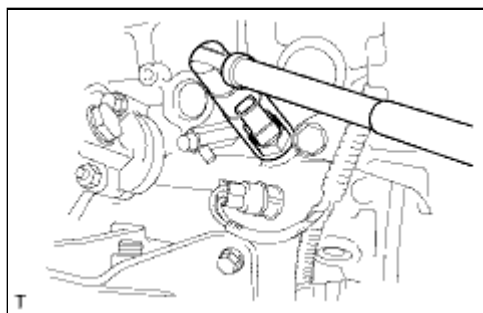


### **2. REMOVE NO. 1 ENGINE UNDER COVER SUB-ASSEMBLY**



### **3. 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.

<b>Last Modified:</b> 5-10-2010	6.4 A	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM000003PJM009X
<b>Title:</b> 2TR-FE LUBRICATION: OIL PRESSURE SWITCH: INSTALLATION (2010 4Runner)		

## INSTALLATION

### 1. INSTALL ENGINE OIL PRESSURE SWITCH ASSEMBLY

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

Adhesive:

TOYOTA Genuine Adhesive 1344, Three Bond 1344 or equivalent

#### **NOTICE:**

**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, 11ft·lbf)**

#### **NOTICE:**

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

(c) Connect the oil pressure switch connector.

### 2. INSPECT FOR OIL LEAK

### 3. INSPECT ENGINE OIL LEVEL

### 4. INSTALL NO. 1 ENGINE UNDER COVER SUB-ASSEMBLY

### 5. INSTALL FRONT BUMPER COVER LOWER

<b>Last Modified:</b> 5-10-2010	6.4 A	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM000002BZE00TX
<b>Title:</b> 1GR-FE LUBRICATION: OIL PUMP: REMOVAL (2010 4Runner)		

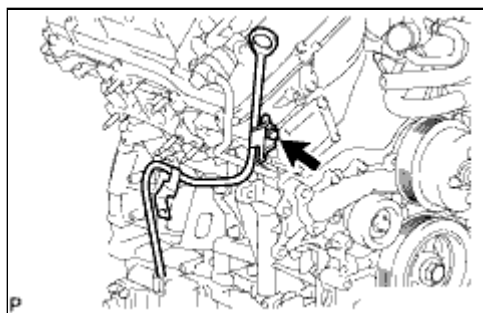
## REMOVAL

### 1. REMOVE ENGINE ASSEMBLY

(a) Remove the engine assembly .

### 2. REMOVE IGNITION COIL ASSEMBLY

### 3. REMOVE ENGINE OIL LEVEL DIPSTICK GUIDE

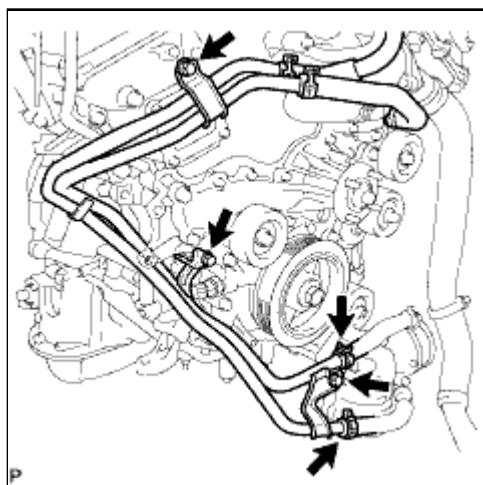


(a) Remove the dipstick.

(b) Remove the bolt and dipstick guide.

(c) Remove the O-ring from the dipstick guide.

### 4. REMOVE WATER BY-PASS PIPE SUB-ASSEMBLY

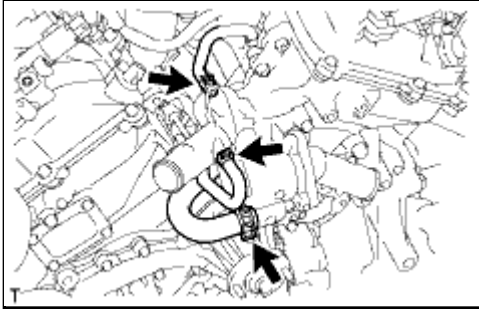


(a) Disconnect the 2 hoses.

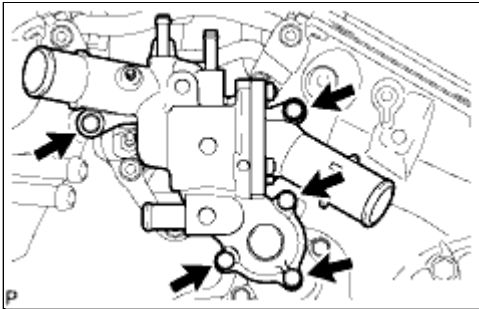
(b) Remove the 3 bolts and water by-pass pipe.

### 5. REMOVE WATER INLET HOUSING

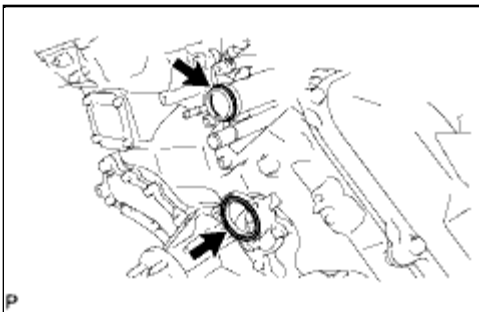




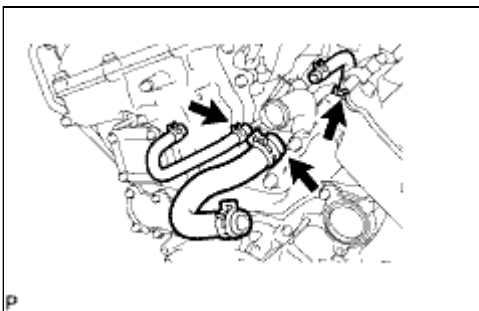
(a) Disconnect the 3 water by-pass hoses.



(b) Remove the 5 bolts and water inlet housing.

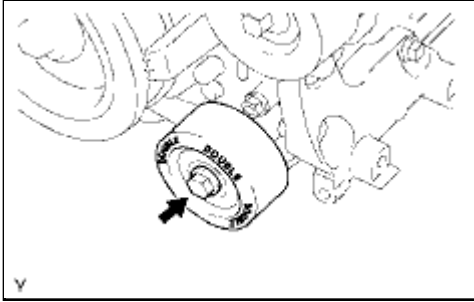


(c) Remove the O-ring and gasket from the water outlet pipe and water pump.



(d) Remove the 3 water by-pass hoses.

## 6. REMOVE NO. 1 IDLER PULLEY SUB-ASSEMBLY

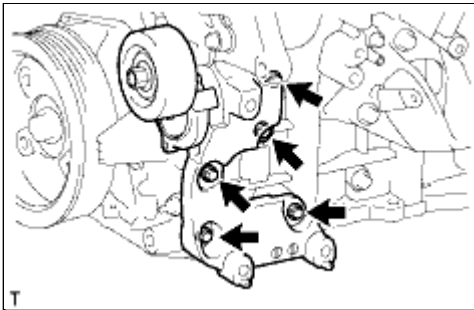


(a) Remove the bolt and No. 1 idler pulley.

## 7. REMOVE NO. 2 IDLER PULLEY SUB-ASSEMBLY

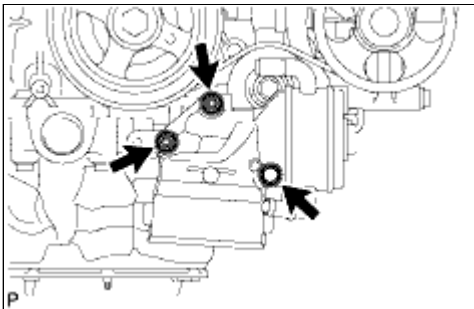


## 8. REMOVE V-RIBBED BELT TENSIONER ASSEMBLY



(a) Remove the 5 bolts and V-ribbed belt tensioner.

## 9. REMOVE OIL FILTER BRACKET



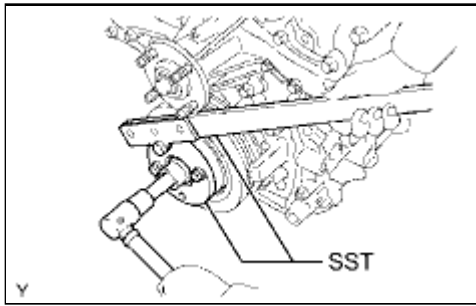
(a) Remove the 2 nuts, bolt, oil filter bracket and gasket.

## 10. REMOVE CRANKSHAFT PULLEY

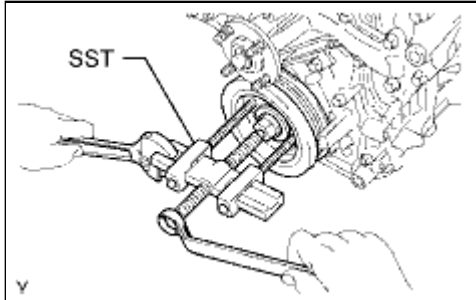
(a) Using SST, hold the crankshaft pulley and loosen the pulley bolt. Continue to loosen the bolt until only 2 or 3 threads are screwed into the crankshaft.

**SST: 09213-54015**

91651-60855



**SST: 09330-00021**



(b) Using the pulley set bolt and SST, remove the crankshaft pulley and pulley bolt.

**SST: 09950-50013**

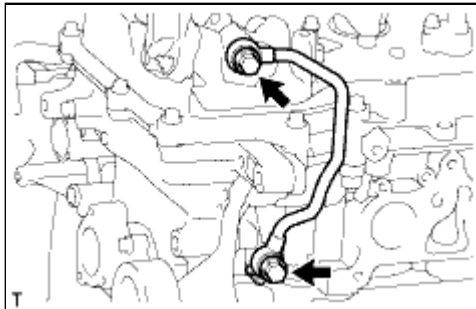
09951-05010

09952-05010

09953-05020

09954-05031

## 11. REMOVE NO. 1 OIL PIPE

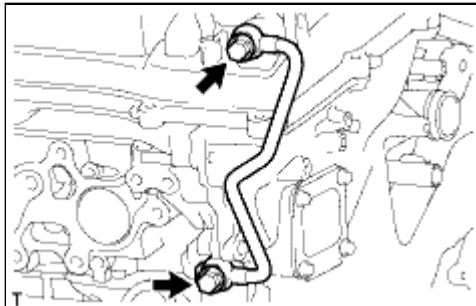


(a) Remove the 2 oil pipe unions, oil control valve filter LH, 3 gaskets and No. 1 oil pipe.

### NOTICE:

**Do not touch the mesh when removing the oil control valve filter.**

## 12. REMOVE NO. 2 OIL PIPE



(a) Remove the 2 oil pipe unions, oil control valve filter RH, 3 gaskets and No. 2 oil pipe.

### NOTICE:

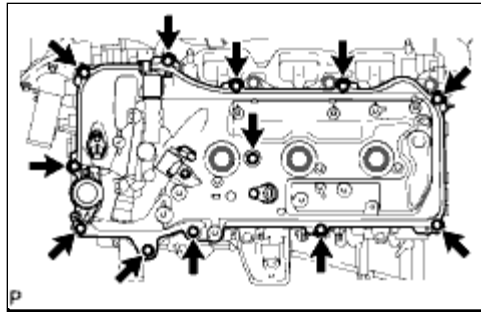
**Do not touch the mesh when removing the oil control valve filter.**

### 13. REMOVE REAR CYLINDER HEAD COVER

### 14. DISCONNECT FUEL PIPE SUB-ASSEMBLY

- (a) Remove the 2 bolts and disconnect the fuel pipe.

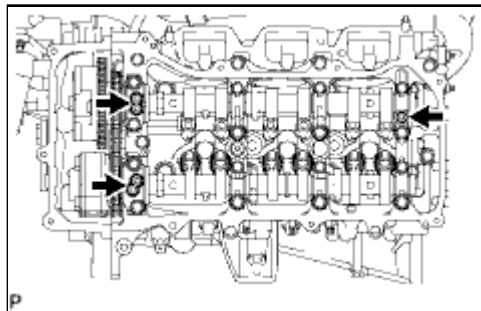
### 15. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY LH



- (a) Remove the 12 bolts, seal washer, cylinder head cover and gasket.

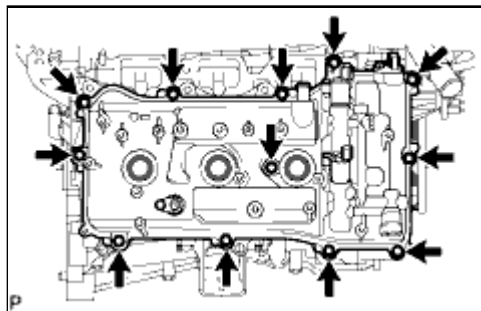
#### HINT:

**Make sure the removed parts are returned to the same places they were removed from.**



- (b) Remove the 3 gaskets.

### 16. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY

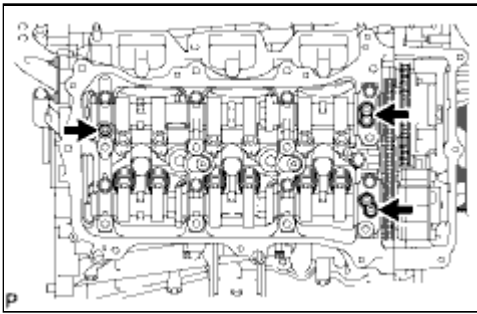


- (a) Remove the 12 bolts, seal washer, cylinder head cover and gasket.

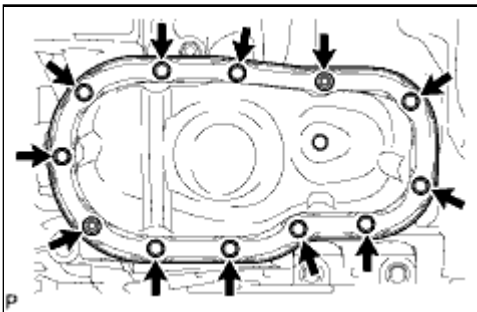
#### HINT:

**Make sure the removed parts are returned to the same places they were removed from.**

- (b) Remove the 3 gaskets.



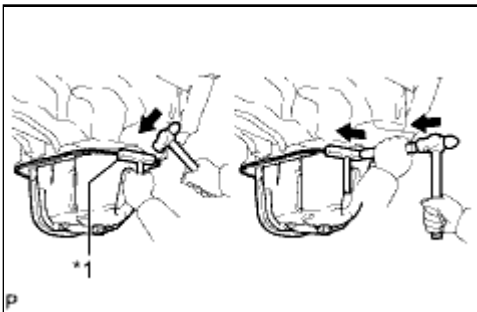
## 17. REMOVE NO. 2 OIL PAN SUB-ASSEMBLY



(a) Remove the 10 bolts and 2 nuts.

### **HINT:**

**Make sure the removed parts are returned to the same places they were removed from.**



(b) Insert the blade of an oil pan seal cutter between the oil pans. Cut through the applied sealer and remove the No. 2 oil pan.

### **Text in Illustration**

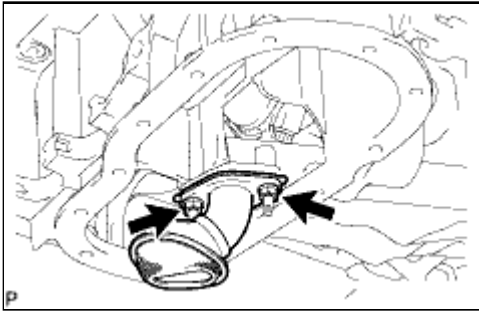
* 1	Oil Pan Seal Cutter
-----	---------------------

### **NOTICE:**

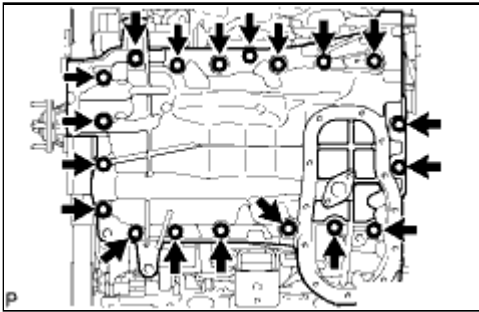
**Be careful not to damage the contact surfaces of the oil pans.**

## 18. REMOVE OIL STRAINER SUB-ASSEMBLY

(a) Remove the 2 nuts, oil strainer and gasket.



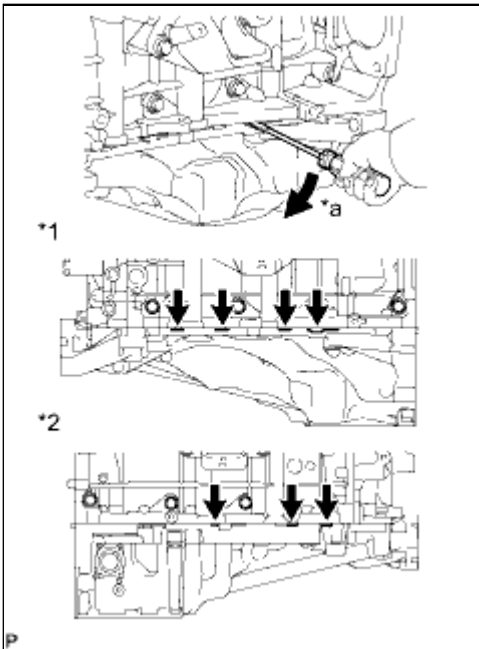
## 19. REMOVE OIL PAN SUB-ASSEMBLY



(a) Remove the 17 bolts and 2 nuts.

### **HINT:**

**Make sure the removed parts are returned to the same places they were removed from.**



(b) Using a screwdriver, remove the oil pan by prying between the oil pan and cylinder block as shown in the illustration.

### **Text in Illustration**

* 1	LH Side
* 2	RH Side
* a	Pry

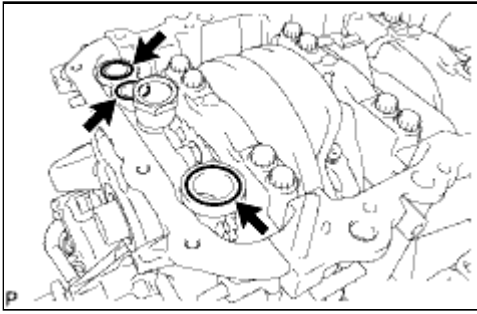
### **HINT:**

**Tape the screwdriver tip before use.**

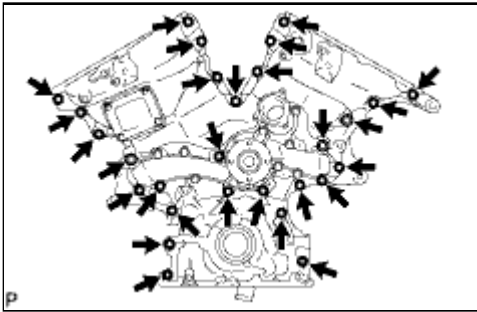
### **NOTICE:**

**Be careful not to damage the contact surfaces of the cylinder block and oil pan.**

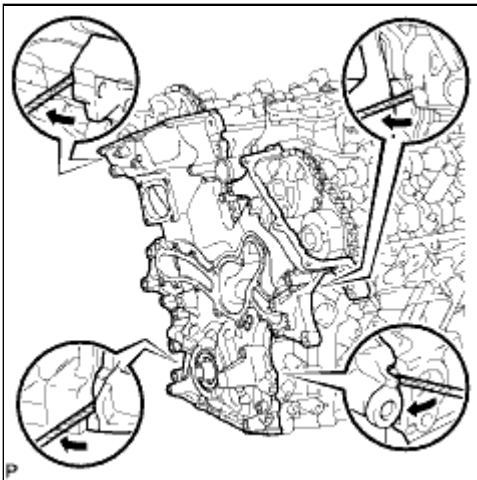
(c) Remove the 3 O-rings from the timing chain cover.



## 20. REMOVE TIMING CHAIN COVER SUB-ASSEMBLY



(a) Remove the 26 bolts and the 2 nuts.



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

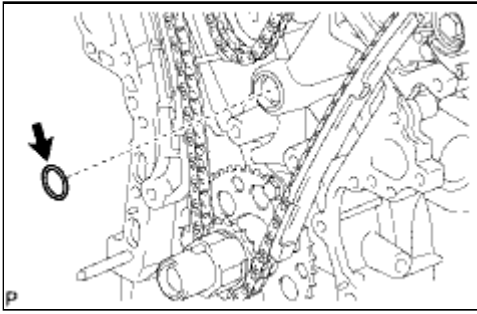
### **HINT:**

**Tape the screwdriver tip before use.**

### **NOTICE:**

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

(c) Remove the oil pump gasket from the cylinder block.



## 21. REMOVE FRONT CRANKSHAFT OIL SEAL

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

### **HINT:**

**Tape the screwdriver tip before use.**

### **NOTICE:**

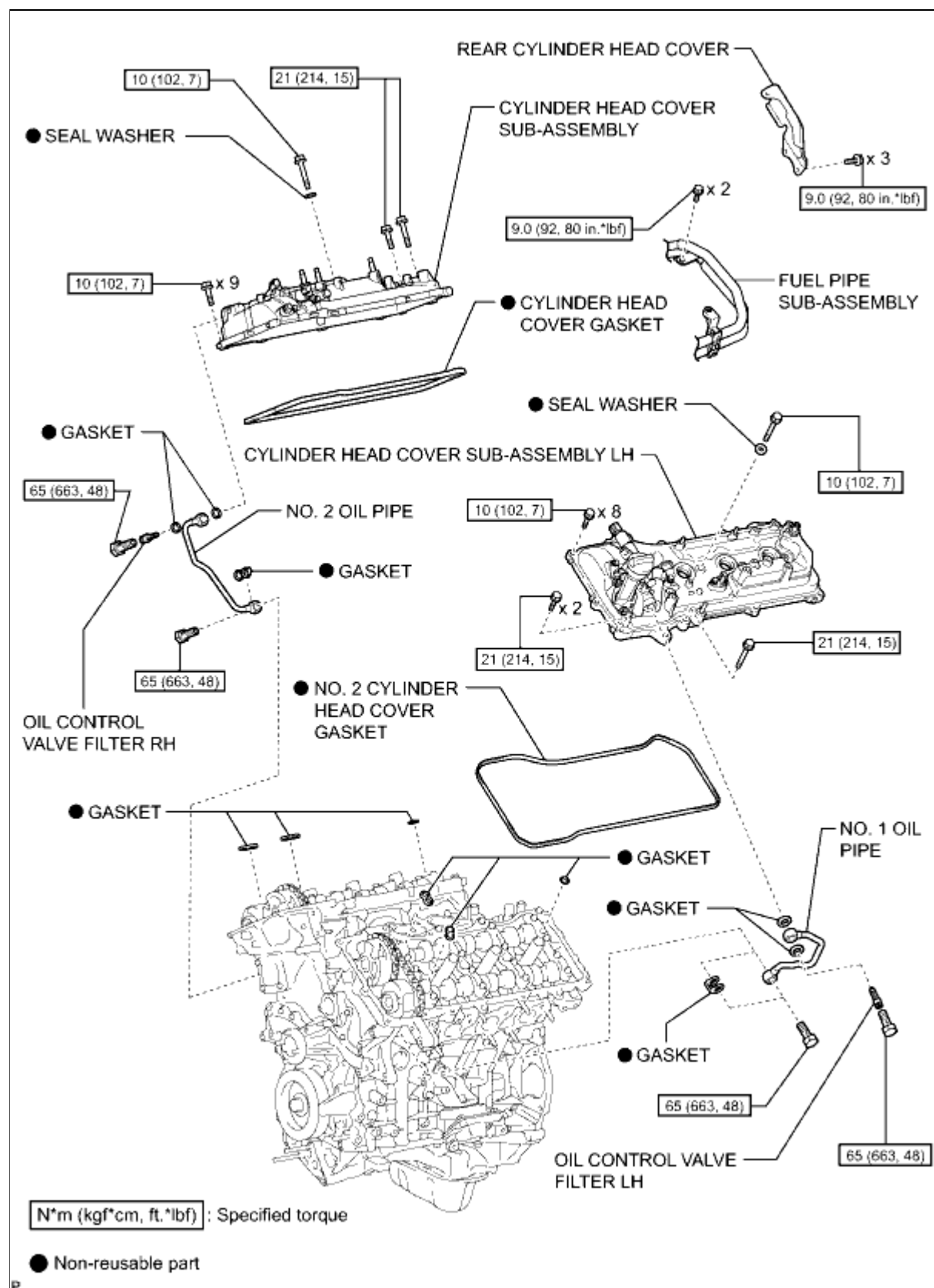
**Do not damage the surface of the oil seal press fit hole.**



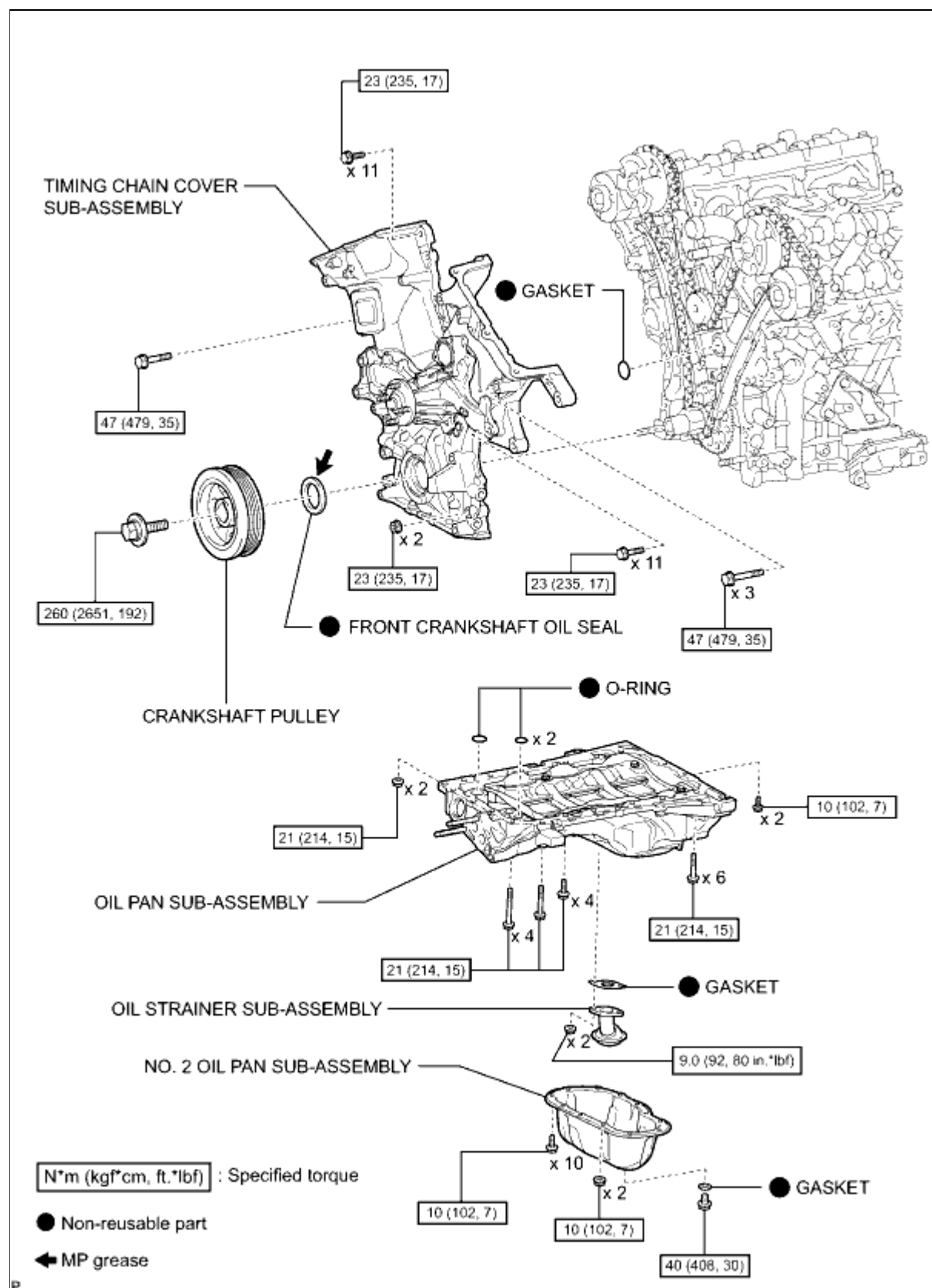




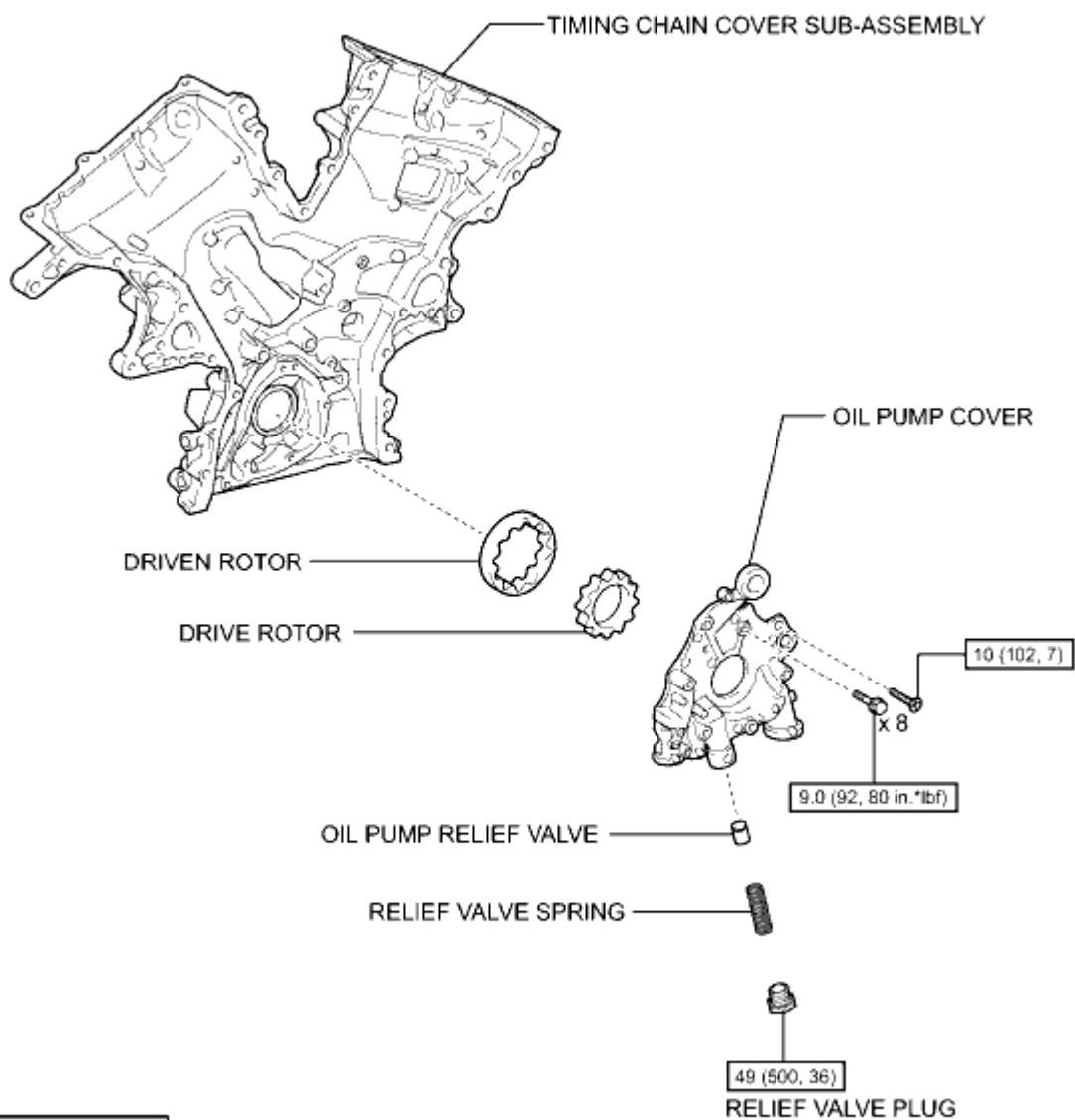
## ILLUSTRATION



## ILLUSTRATION



## ILLUSTRATION

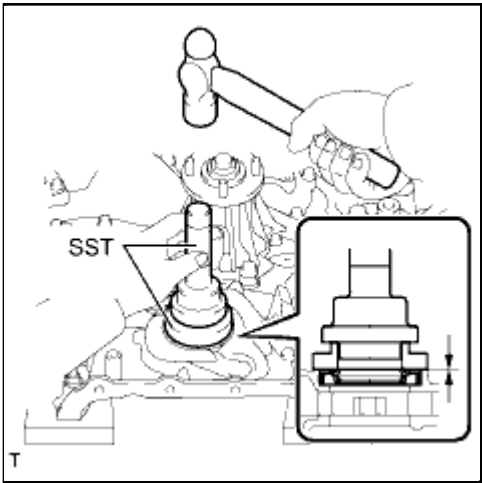


N\*m (kgf\*cm, ft.\*lbf) : Specified torque

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<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM000002BZB00TX
<b>Title:</b> 1GR-FE LUBRICATION: OIL PUMP: INSTALLATION (2010 4Runner)		

INSTALLATION

1. INSTALL FRONT CRANKSHAFT OIL SEAL



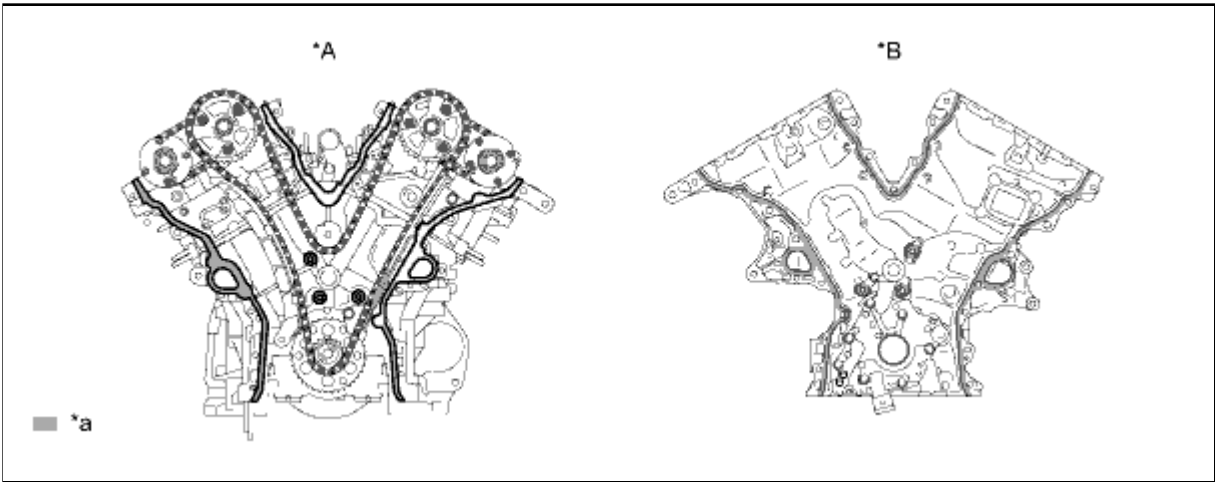
(a) Using SST and a hammer, tap in a new oil seal until its surface is flush with the timing chain cover edge.

SST: 09223-22010  
SST: 09506-35010

- NOTICE:**
- 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 protrude from the timing chain case.

2. INSTALL TIMING CHAIN COVER SUB-ASSEMBLY

(a) Remove any old packing (FIPG material) and be careful not to drop any oil on the contact surfaces of the timing chain cover, cylinder head and cylinder block.



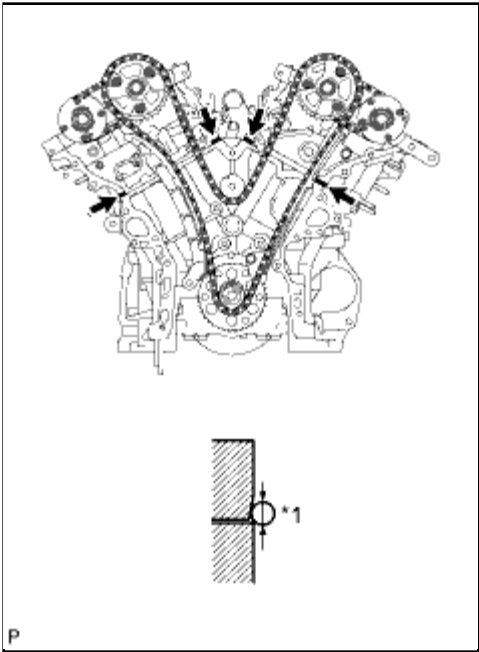
Text in Illustration

*A	Cylinder head and cylinder block side	*B	Timing chain cover side
*a	Clean and degrease	-	-

NOTICE:


Be sure to clean and degrease the contact surfaces, especially the surfaces indicated in the illustration.

- (b) Apply a light coat of engine oil to a new oil pump gasket.
- (c) Install the oil pump gasket.
- (d) Apply seal packing as shown in the illustration.

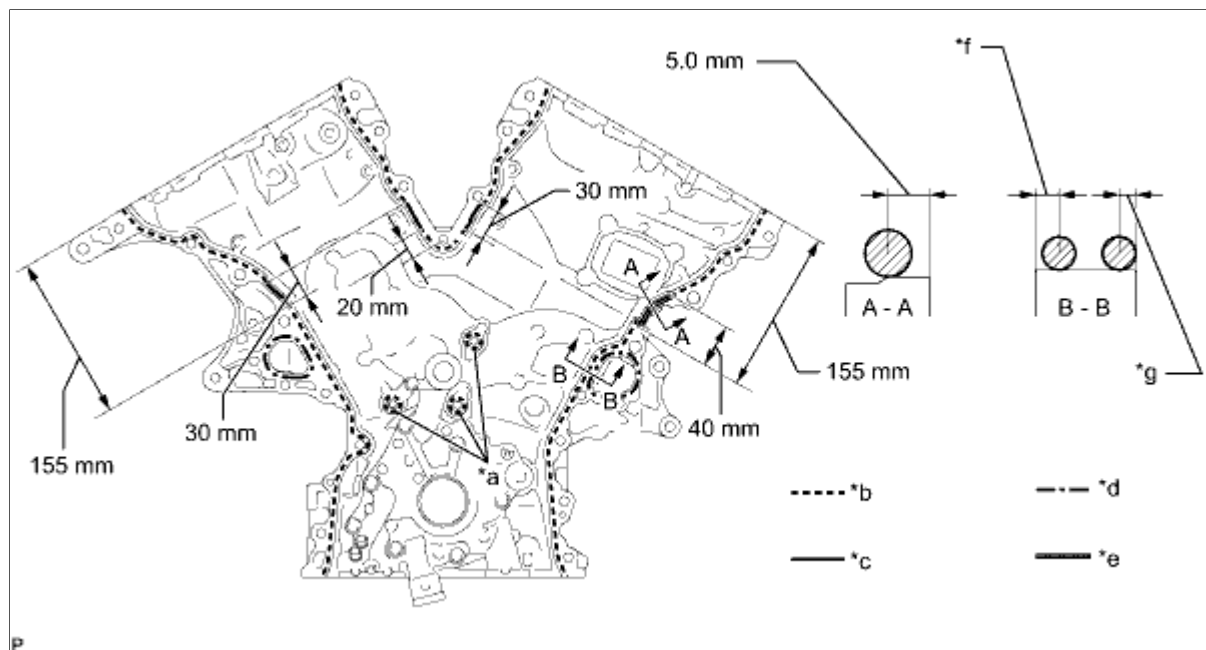


Seal packing:  
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent  
Standard seal diameter:  
3.0 to 4.0 mm (0.118 to 0.157 in.)

Text in Illustration

* 1	Seal Diameter
	Seal Packing

- (e) Apply seal packing to the timing chain cover in a continuous line as shown in the following illustration.
- Seal packing:  
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent  
Toyota Genuine Seal Packing 1282B, Three Bond 1282B or equivalent



# Text in Illustration

*a	Be sure to apply seal packing	*b	Dashed line area (Seal packing: Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent)
*c	Continuous line area (Seal packing: Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent)	*d	Alternate long and short dashed line area (Seal packing: Toyota Genuine Seal Packing 1282B, Three Bond 1282B or equivalent)
*e	Diagonal line area (Seal packing: Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent)	*f	3.0 to 4.0 mm
*g	2.0 to 3.0 mm	-	-

## NOTICE:

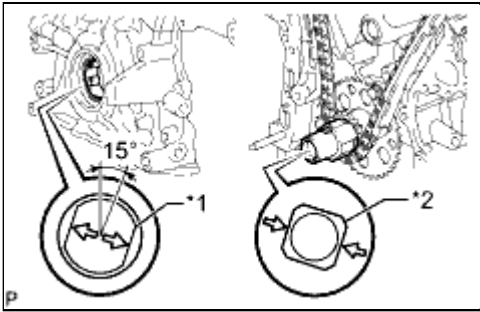
- When the contact surfaces are wet, wipe them with an oil-free cloth before applying seal packing.
- Install the chain cover within 3 minutes and tighten the bolts within 10 minutes after applying seal packing.

Application Specification:

AREA	SEAL PACKING DIAMETER	APPLICATION POSITION FROM INSIDE SEAL LINE
Continuous Line Area	4.5 mm (0.177 in.) or more	3.0 to 4.0 mm (0.118 to 0.158 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.)

AREA	SEAL PACKING DIAMETER	APPLICATION POSITION FROM INSIDE SEAL LINE
Diagonal Line Area	6.0 mm (0.236 in.) or more	5.0 mm (0.197 in.)

(f) Align the oil pump drive rotor spline and crankshaft as shown in the illustration. Install the drive rotor and chain cover to the crankshaft.



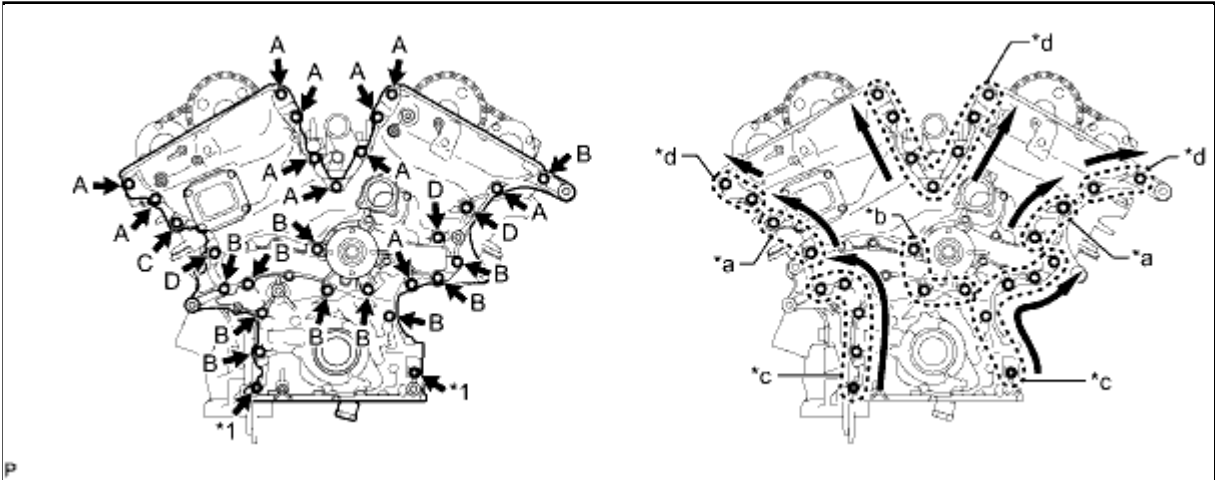
### Text in Illustration

*1	Drive Rotor Spline
*2	Crankshaft

(g) Install the timing chain cover with the 26 bolts, labeled A, B, C and D, and the 2 nuts. Tighten the bolts and nuts uniformly in several steps.

Standard Bolt:

ITEM	LENGTH
Bolt A	25 mm (0.984 in.)
Bolt B	55 mm (2.17 in.)
Bolt C	35 mm (1.38 in.)
Bolt D	65 mm (2.56 in.)



### Text in Illustration

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



*a	Area 1	*b	Area 2
*c	Area 3	*d	Area 4

**NOTICE:**

**Make sure that there is no oil on the bolt threads.**

(h) Tighten the bolts in area 1.

**Torque: 47 N·m (479 kgf·cm, 35ft·lbf)**

**HINT:**

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

(i) Tighten the bolts in area 2.

**Torque: 23 N·m (235 kgf·cm, 17ft·lbf)**

(j) Tighten the bolts in area 3.

**Torque: 23 N·m (235 kgf·cm, 17ft·lbf)**

**HINT:**

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

(k) Tighten the bolts in area 4.

**Torque: 23 N·m (235 kgf·cm, 17ft·lbf)**

**HINT:**

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

**NOTICE:**

- Do not start the engine for at least 2 hours after installation.
- Wipe off any seal packing that seeped out around the surfaces of the oil pan and head cover and make sure that there is no seal packing seeping out around the edges.

**3. INSTALL OIL PAN SUB-ASSEMBLY**

(a) Remove any old packing (FIPG material) and be careful not to drop any oil on the contact surfaces of the cylinder block, rear oil seal retainer and oil pan.

(b) Install a new 3 O-rings to the timing chain cover.

(c) Apply seal packing in a continuous line as shown in the illustration.

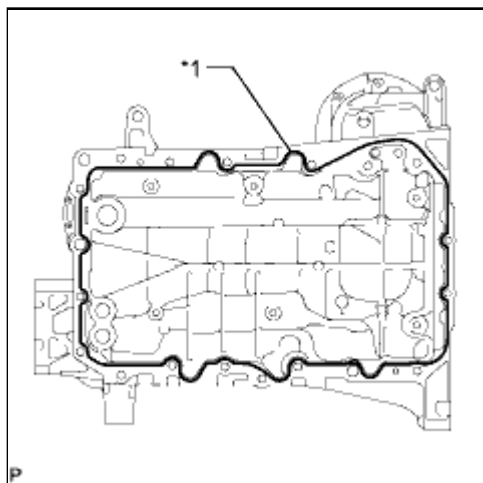
Seal packing:

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

Standard seal diameter:

3.0 to 4.0 mm (0.118 to 0.157 in.)

**Text in Illustration**



*1	Seal Packing
----	--------------

**NOTICE:**

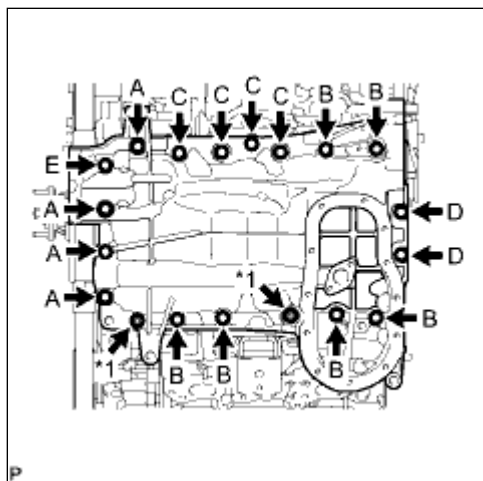
- Remove any oil from the contact surface.
- Install the oil pan within 3 minutes after applying seal packing.

(d) Install the oil pan with the 17 bolts (A, B, C, D and E) and 2 nuts. Tighten the bolts and nuts uniformly in several steps.

**for bolt A, B, C and E, and nut - Torque: 21 N·m (214 kgf·cm, 15ft·lbf)**

**for bolt D - Torque: 10 N·m (102 kgf·cm, 7ft·lbf)**

Standard Bolt:



ITEM	LENGTH
Bolt A	60 mm (2.36 in.)
Bolt B	45 mm (1.77 in.)
Bolt C	25 mm (0.984 in.)
Bolt D	16 mm (0.630 in.)
Bolt E	70 mm (2.76 in.)

**Text in Illustration**

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

**NOTICE:**

**Do not start the engine for at least 2 hours after installing.**

**4. INSTALL OIL STRAINER SUB-ASSEMBLY**

(a) Install a new gasket and the oil strainer with the 2 nuts.

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

**5. INSTALL NO. 2 OIL PAN SUB-ASSEMBLY**

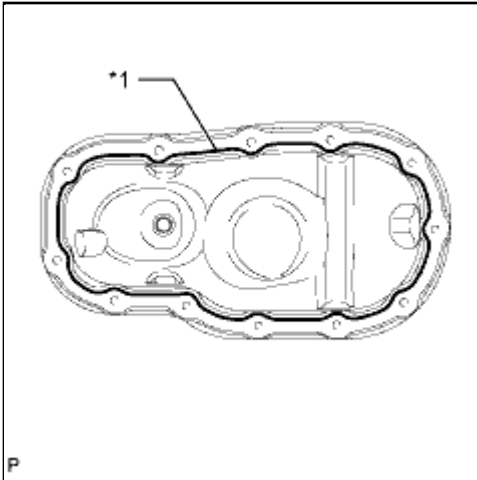
(a) Apply seal packing in a continuous line as shown in the illustration.

Seal packing:

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

Standard seal diameter:

3.0 to 4.0 mm (0.118 to 0.157 in.)



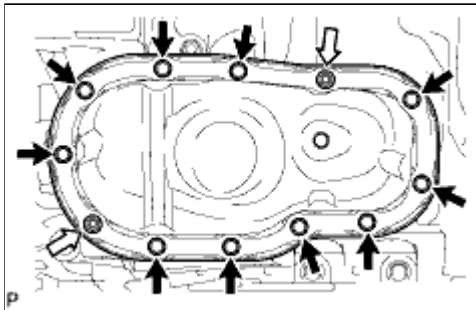
## Text in Illustration

*1	Seal Packing
----	--------------

### NOTICE:

- Remove any oil from the contact surface.
- Install the No. 2 oil pan within 3 minutes after applying seal packing.

(b) Install the No. 2 oil pan with the 10 bolts and 2 nuts. Tighten the bolts and nuts uniformly in several steps.



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

## Text in Illustration

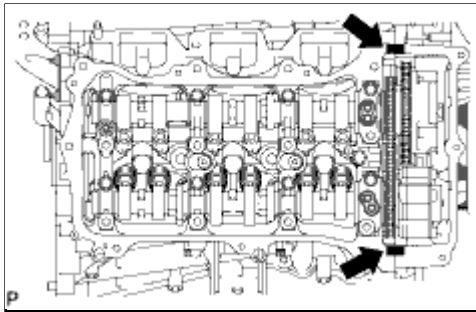
	Bolt
	Nut

### NOTICE:

- Tighten the nuts first. After tightening the bolts, check that the nuts and bolts are tightened to the specified torque.
- Do not start the engine for at least 2 hours after the installation.

## 6. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY

- (a) Remove any old packing (FIPG material) and be careful not to drop any oil on the contact surfaces of the cylinder head, timing chain cover and cylinder head cover.
- (b) Apply seal packing as shown in the illustration.




Seal packing:

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

Standard seal diameter:

2.0 to 3.0 mm (0.0787 to 0.118 in.)

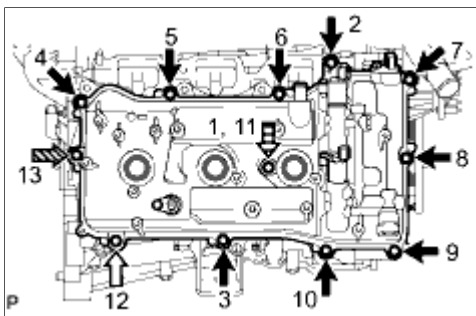
#### Text in Illustration

	Seal Packing
---	--------------

#### NOTICE:

- Remove any oil from the contact surface.
- Install the cylinder head cover within 3 minutes and tighten the bolts within 15 minutes after applying seal packing.

- (c) Install 3 new gaskets.
- (d) Install a new gasket to the cylinder head cover.
- (e) Install the seal washers to the bolts.



- (f) Temporarily install the cylinder head cover with the 12 bolts. Tighten the bolts uniformly in several steps.





**for bolt A and D - Torque: 10 N·m (102 kgf·cm, 7ft·lbf)**

**for bolt B and C - Torque: 21 N·m (214 kgf·cm, 15ft·lbf)**

Standard Bolt:

ITEM	LENGTH
A	25 mm (0.984 in.)
B	35 mm (1.38 in.)
C	65 mm (2.56 in.)
D	60 mm (2.36 in.)

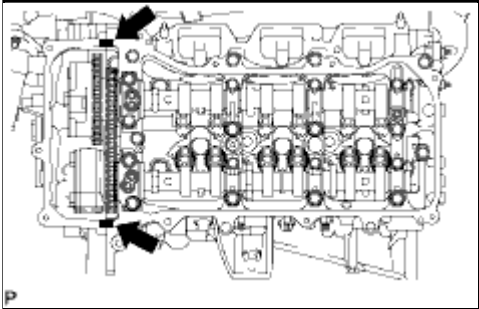
Text in Illustration

	Bolt A
	Bolt B
	Bolt C
	Bolt D

**NOTICE:**  
 Do not start the engine for at least 2 hours after installation.

7. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY LH

- (a) Remove any old packing (FIPG material) and be careful not to drop any oil on the contact surfaces of the cylinder head, timing chain cover and cylinder head cover.
- (b) Apply seal packing as shown in the illustration.



Seal packing:  
 Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent  
 Standard seal diameter:  
 2.0 to 3.0 mm (0.0787 to 0.118 in.)

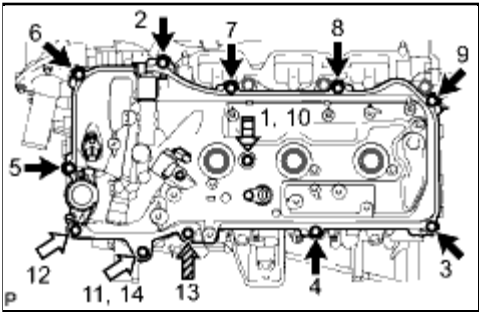
Text in Illustration

	Seal Packing
---	--------------

**NOTICE:**

- Remove any oil from the contact surface.
- Install the cylinder head cover within 3 minutes and tighten the bolts within 15 minutes after applying seal packing.

- (c) Install 3 new gaskets.
- (d) Install a new gasket to the cylinder head cover.
- (e) Install the seal washers to the bolts.



- (f) Temporarily install the cylinder head cover with the 12 bolts. Tighten the bolts uniformly in several steps.



**for bolt A and D - Torque: 10 N·m (102 kgf·cm, 7ft·lbf)**



**for bolt B and C - Torque: 21 N·m (214 kgf·cm, 15ft·lbf)**

Standard Bolt:

ITEM	LENGTH
A	25 mm (0.984 in.)
B	35 mm (1.38 in.)
C	70 mm (2.76 in.)
D	60 mm (2.36 in.)

**Text in Illustration**

	Bolt A
	Bolt B

	Bolt C
	Bolt D

**NOTICE:**

**Do not start the engine for at least 2 hours after installation.**

## 8. CONNECT FUEL PIPE SUB-ASSEMBLY

- (a) Connect the fuel pipe with the 2 bolts.

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

## 9. INSTALL REAR CYLINDER HEAD COVER

### 10. INSTALL NO. 2 OIL PIPE

- (a) Make sure that there is no foreign matter on the mesh of the oil control valve filter RH.

**NOTICE:**

**Do not touch the mesh when installing the oil control valve filter.**

- (b) Install a new gasket and temporarily install the oil pipe (on the cylinder head side) with the oil check valve bolt.
- (c) Install the oil control valve filter RH to the oil pipe union. Install new gaskets and temporarily install the oil pipe (on the head cover side).
- (d) Tighten the oil pipe union (on the cylinder head side).

**Torque: 65 N·m (663 kgf·cm, 48ft·lbf)**

**NOTICE:**

**If the link that connects the gaskets is broken, remove the connecting link by using side cutters or a similar tool.**

- (e) Tighten the oil pipe union (on the head cover side).

**Torque: 65 N·m (663 kgf·cm, 48ft·lbf)**

### 11. INSTALL NO. 1 OIL PIPE

- (a) Make sure that there is no foreign matter on the mesh of the oil control valve filter LH.

**NOTICE:**

**Do not touch the mesh when installing the oil control valve filter.**

- (b) Install a new gasket and temporarily install the oil pipe (on the cylinder head side) with the oil check valve bolt.
- (c) Install the oil control valve filter LH to the oil pipe union. Install new gaskets and temporarily install the oil pipe (on the head cover side).
- (d) Tighten the oil pipe union (on the cylinder head side).

**Torque: 65 N·m (663 kgf·cm, 48ft·lbf)**

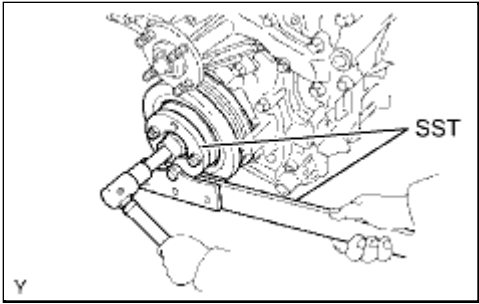
**NOTICE:**

If the link that connects the gaskets is broken, remove the connecting link by using side cutters or a similar tool.

(e) Tighten the oil pipe union (on the head cover side).

Torque: 65 N·m (663 kgf·cm, 48ft·lbf)

12. INSTALL CRANKSHAFT PULLEY



(a) Using SST, install the crankshaft pulley with the pulley set bolt.

SST: 09213-54015

91651-60855

SST: 09330-00021

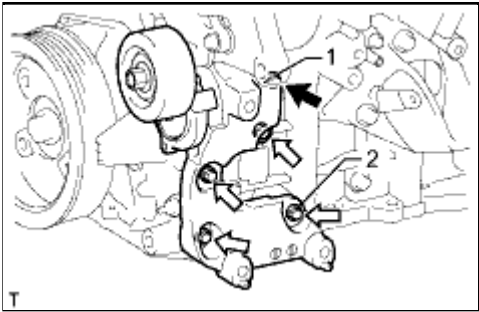
Torque: 260 N·m (2651 kgf·cm, 192ft·lbf)

13. INSTALL OIL FILTER BRACKET

(a) Install the oil filter bracket and a new gasket with the 2 nuts and bolt.

Torque: 21 N·m (214 kgf·cm, 15ft·lbf)

14. INSTALL V-RIBBED BELT TENSIONER ASSEMBLY



(a) Temporarily install the V-ribbed belt tensioner with the 5 bolts.

Standard Bolt:

ITEM	LENGTH
A	70 mm (2.76 in.)
B	33 mm (1.30 in.)

Text in Illustration

	Bolt A
---	--------





Bolt B

(b) Tighten bolts 1 and 2 in numerical order.

**Torque: 36 N·m (367 kgf·cm, 27ft·lbf)**

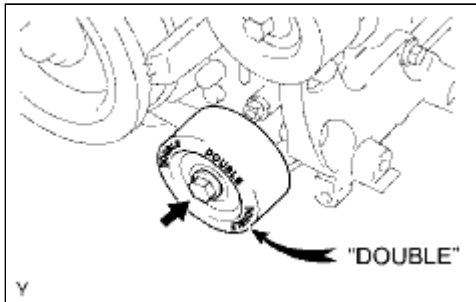
(c) Tighten the other bolts.

**Torque: 36 N·m (367 kgf·cm, 27ft·lbf)**

#### 15. INSTALL NO. 2 IDLER PULLEY SUB-ASSEMBLY



#### 16. INSTALL NO. 1 IDLER PULLEY SUB-ASSEMBLY



(a) Install the No. 1 idler pulley with the bolt.

**Torque: 54 N·m (551 kgf·cm, 40ft·lbf)**

#### HINT:

"DOUBLE" is marked on the No. 1 idler pulley to distinguish it from the No. 2 idler pulley.

#### 17. INSTALL WATER INLET HOUSING

(a) Install the 3 water by-pass hoses.

(b) Apply soapy water to a new O-ring and install the O-ring to the water outlet pipe.

(c) Install a new O-ring to the water outlet pipe.

(d) Install a new gasket to the water pump.

(e) Install the water inlet with the 5 bolts.

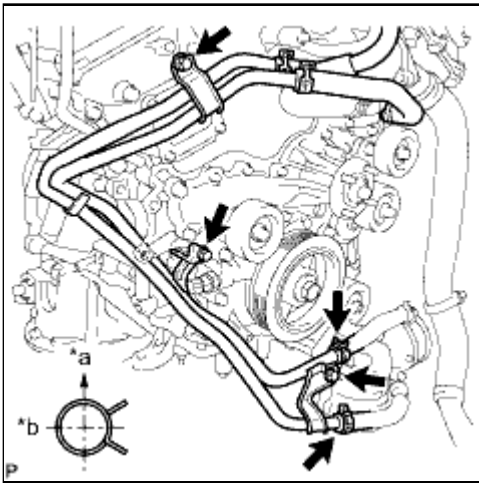
**Torque: 10 N·m (102 kgf·cm, 7ft·lbf)**

(f) Connect the 3 water by-pass hoses.

#### 18. INSTALL WATER BY-PASS PIPE SUB-ASSEMBLY

(a) Install the water by-pass pipe with the 3 bolts.

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



(b) Connect the 2 hoses.

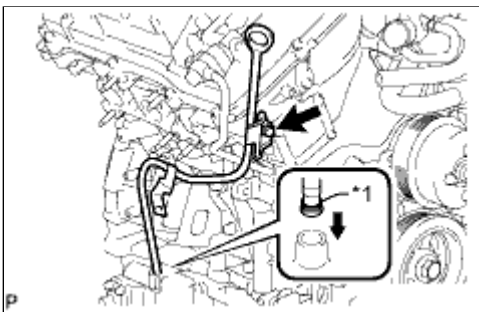
#### Text in Illustration

* a	Upward
* b	Rearward

#### HINT:

The direction of the hose clamp is indicated in the illustration.

### 19. INSTALL ENGINE OIL LEVEL DIPSTICK GUIDE



(a) Install a new O-ring to the dipstick guide.

#### Text in Illustration

* 1	New O - Ring
-----	--------------

(b) Apply a light coat of engine oil to the O-ring.

(c) Push the dipstick guide end into the guide hole.

(d) Install the dipstick guide with the bolt.

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

(e) Install the dipstick.

### 20. INSTALL IGNITION COIL ASSEMBLY

INFO

### 21. INSTALL ENGINE ASSEMBLY

(a) Install the engine assembly

INFO

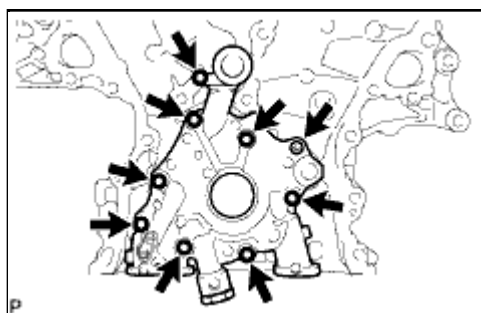


TOYOTA

<b>Last Modified:</b> 5-10-2010	6.4 A	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM0000017M500IX
<b>Title:</b> 1GR-FE LUBRICATION: OIL PUMP: DISASSEMBLY (2010 4Runner)		

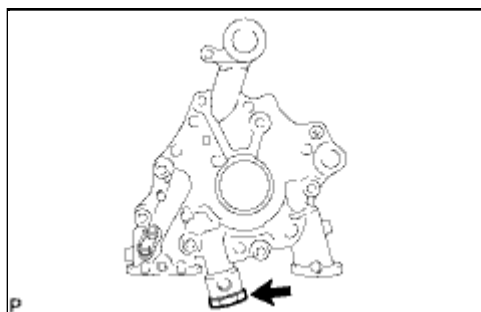
## **DISASSEMBLY**

### **1. REMOVE OIL PUMP COVER**



(a) Remove the 8 bolts, screw, oil pump cover, drive rotor and driven rotor.

### **2. REMOVE OIL PUMP RELIEF VALVE**



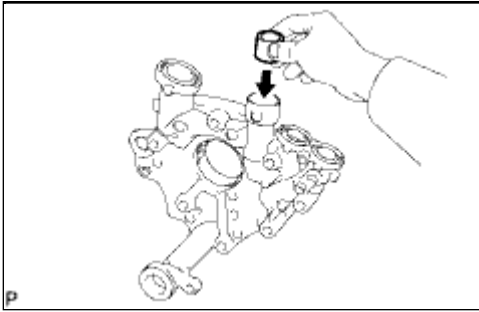
(a) Remove the relief valve plug.

(b) Remove the spring and relief valve.

<b>Last Modified:</b> 5-10-2010	6.4 G	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM0000017M200IX
<b>Title:</b> 1GR-FE LUBRICATION: OIL PUMP: INSPECTION (2010 4Runner)		

## INSPECTION

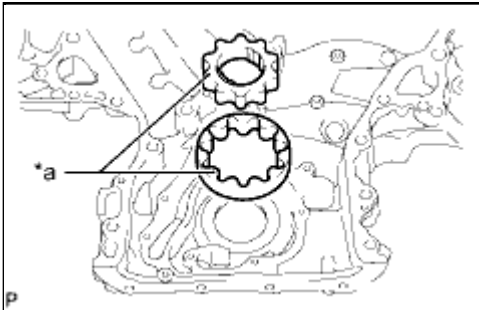
### 1. INSPECT OIL PUMP RELIEF VALVE



- (a) Coat the valve with engine oil, then check that it falls smoothly into the valve hole by its own weight.

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

### 2. INSPECT OIL PUMP ROTOR SET

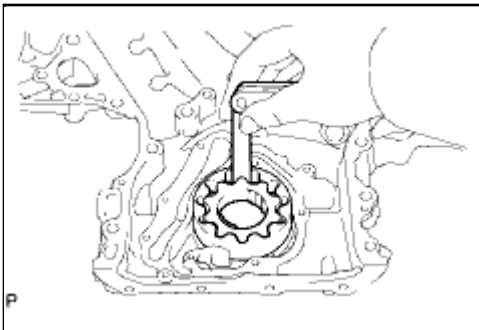


- (a) Place the drive and driven rotors into the timing chain cover with the marks facing upward.

#### Text in Illustration

*a	Mark
----	------

- (b) Check the rotor tip clearance.



- (1) Using a feeler gauge, measure the clearance between the drive and driven rotor tips.

Standard tip clearance:

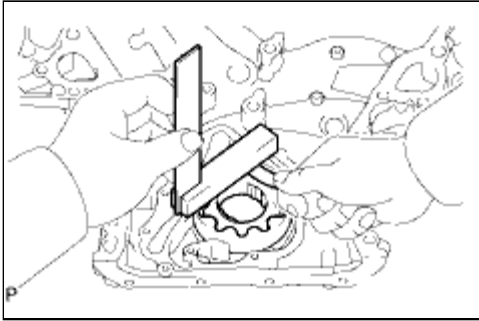
0.06 to 0.16 mm (0.00236 to 0.00630 in.)

Maximum tip clearance:

0.16 mm (0.00630 in.)

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

- (c) Check the rotor side clearance.



- (1) Using a feeler gauge and steel square, measure the clearance between the rotors and precision straightedge.

Standard side clearance:

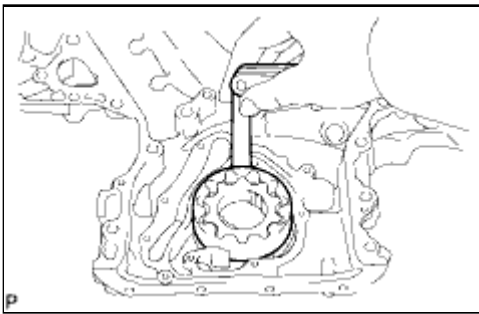
0.030 to 0.075 mm (0.00118 to 0.00295 in.)

Maximum side clearance:

0.075 mm (0.00295 in.)

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

(d) Check the rotor body clearance.



- (1) Using a feeler gauge, measure the clearance between the driven rotor and body.

Standard body clearance:

0.250 to 0.325 mm (0.00984 to 0.0128 in.)

Maximum body clearance:

0.325 mm (0.0128 in.)

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

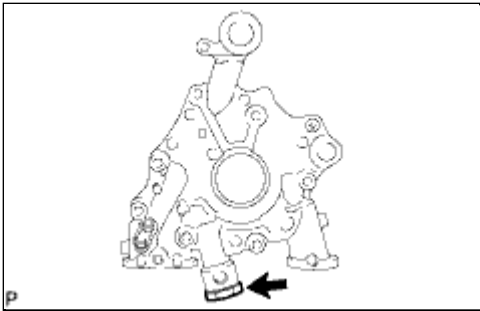


<b>Last Modified:</b> 5-10-2010	6.4 A	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM0000017M600IX
<b>Title:</b> 1GR-FE LUBRICATION: OIL PUMP: REASSEMBLY (2010 4Runner)		

# **REASSEMBLY**

## **1. INSTALL OIL PUMP RELIEF VALVE**

(a) Coat the relief valve with engine oil and insert the relief valve and spring into the valve hole.

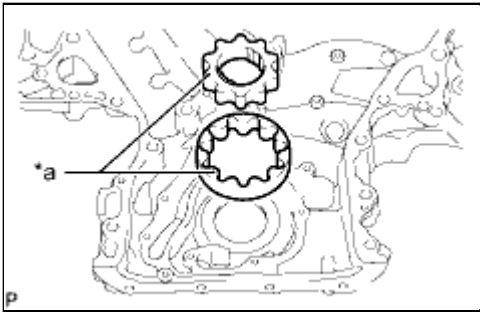


(b) Install the relief valve plug.

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

## **2. INSTALL OIL PUMP COVER**

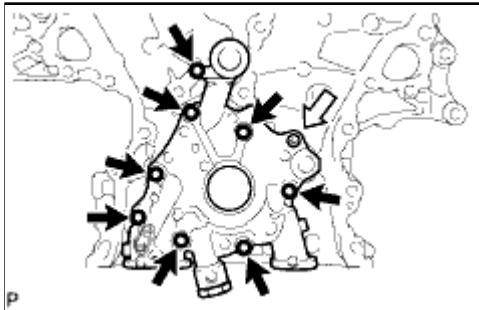
(a) Apply fresh engine oil to the drive and driven rotors.



(b) Place the drive and driven rotors into the timing chain cover with the marks facing the oil pump cover side.

### **Text in Illustration**

* a	Mark
-----	------





(c) Install the oil pump cover with the 8 bolts and screw.

**for screw - Torque: 10 N·m (102 kgf·cm, 7ft·lbf)**

**for bolt - Torque: 9.0 N·m (92 kgf·cm, 80in·lbf)**

**Text in Illustration**

	Bolt
	Screw



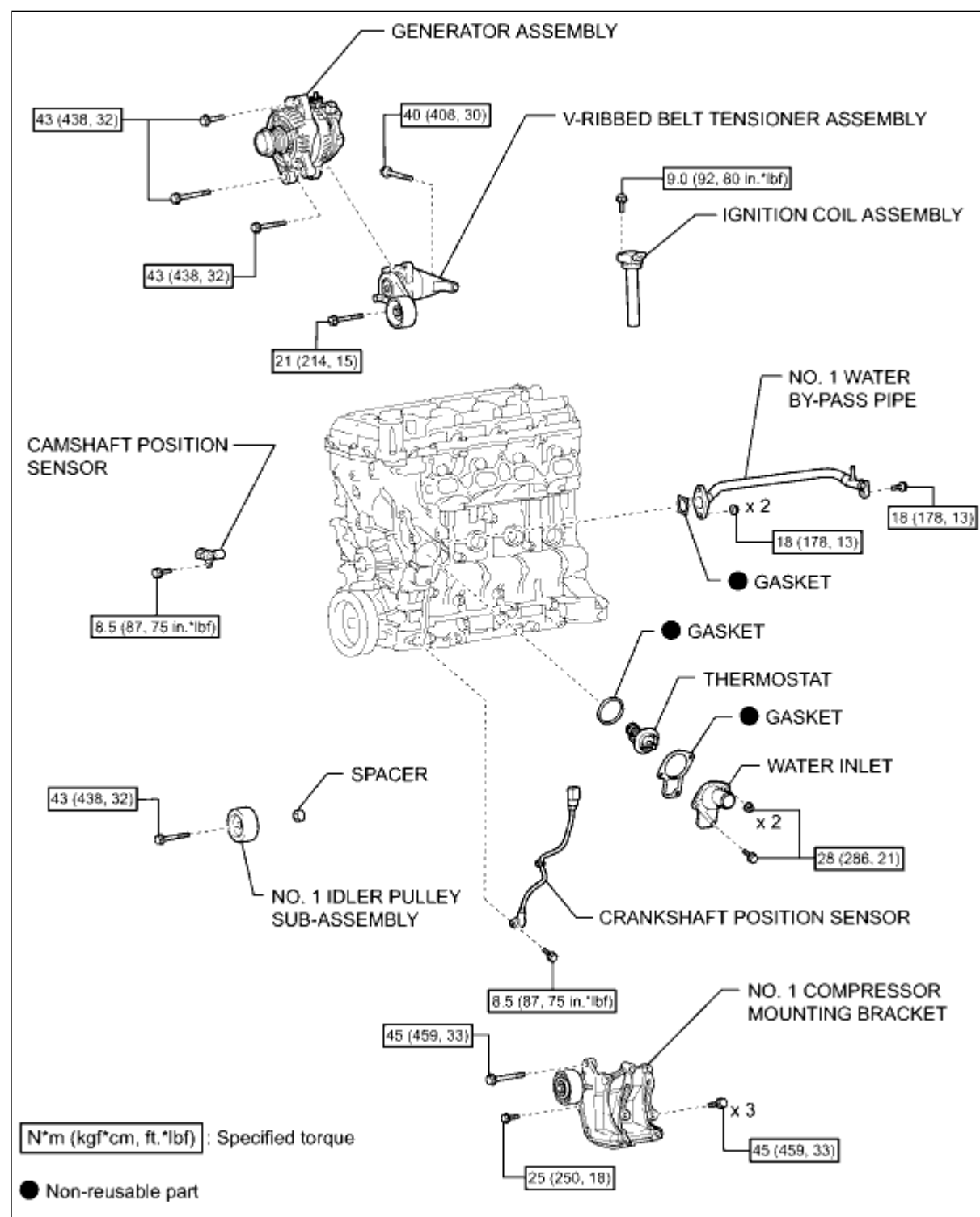
<b>Last Modified:</b> 5-10-2010	6.4 K	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM000000YM900MX
<b>Title:</b> 2TR-FE LUBRICATION: OIL PUMP: COMPONENTS (2010 4Runner)		

<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM000000YM900MX
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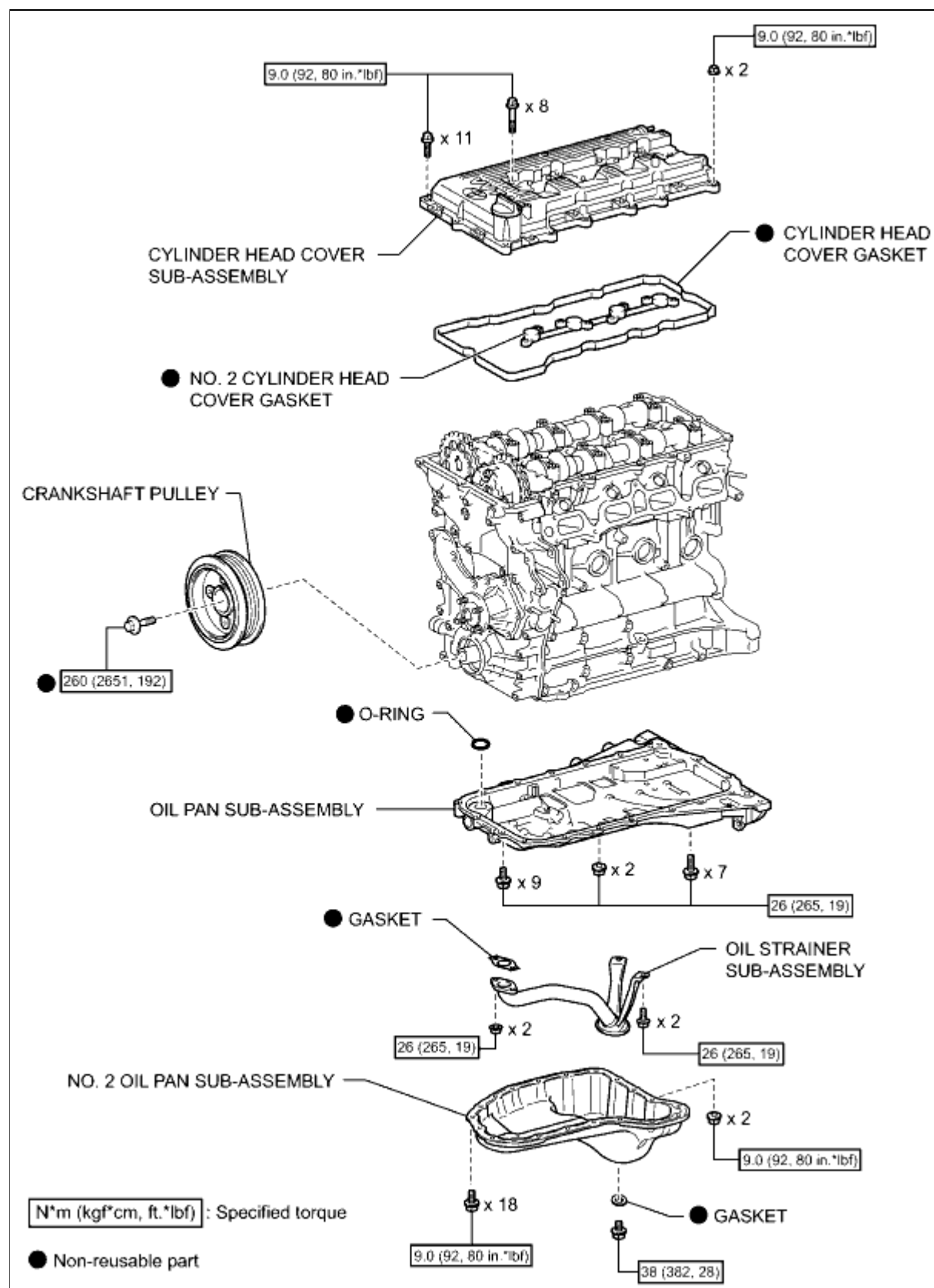
**Title:** 2TR-FE LUBRICATION: OIL PUMP: COMPONENTS (2010 4Runner)

## COMPONENTS

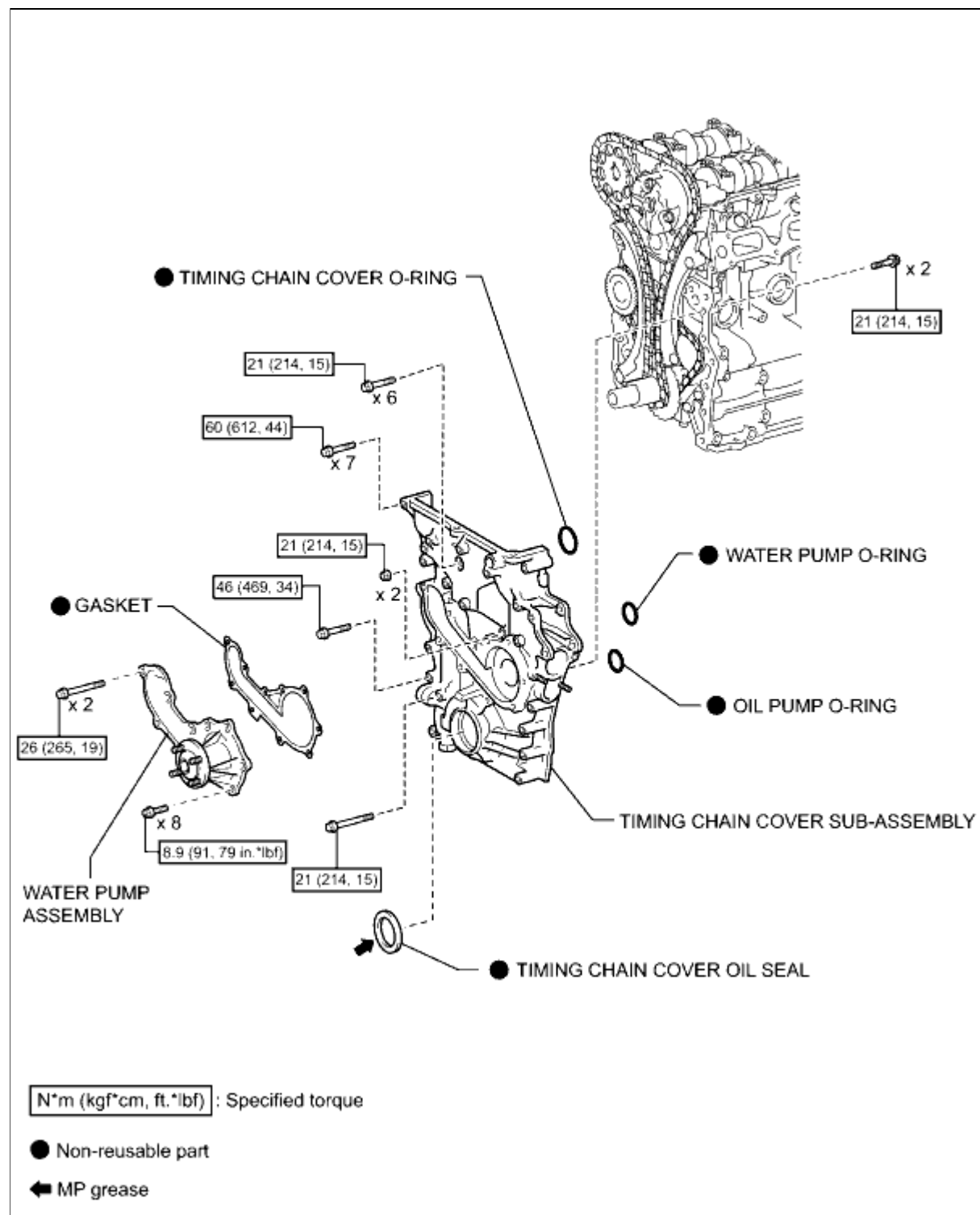
## ILLUSTRATION



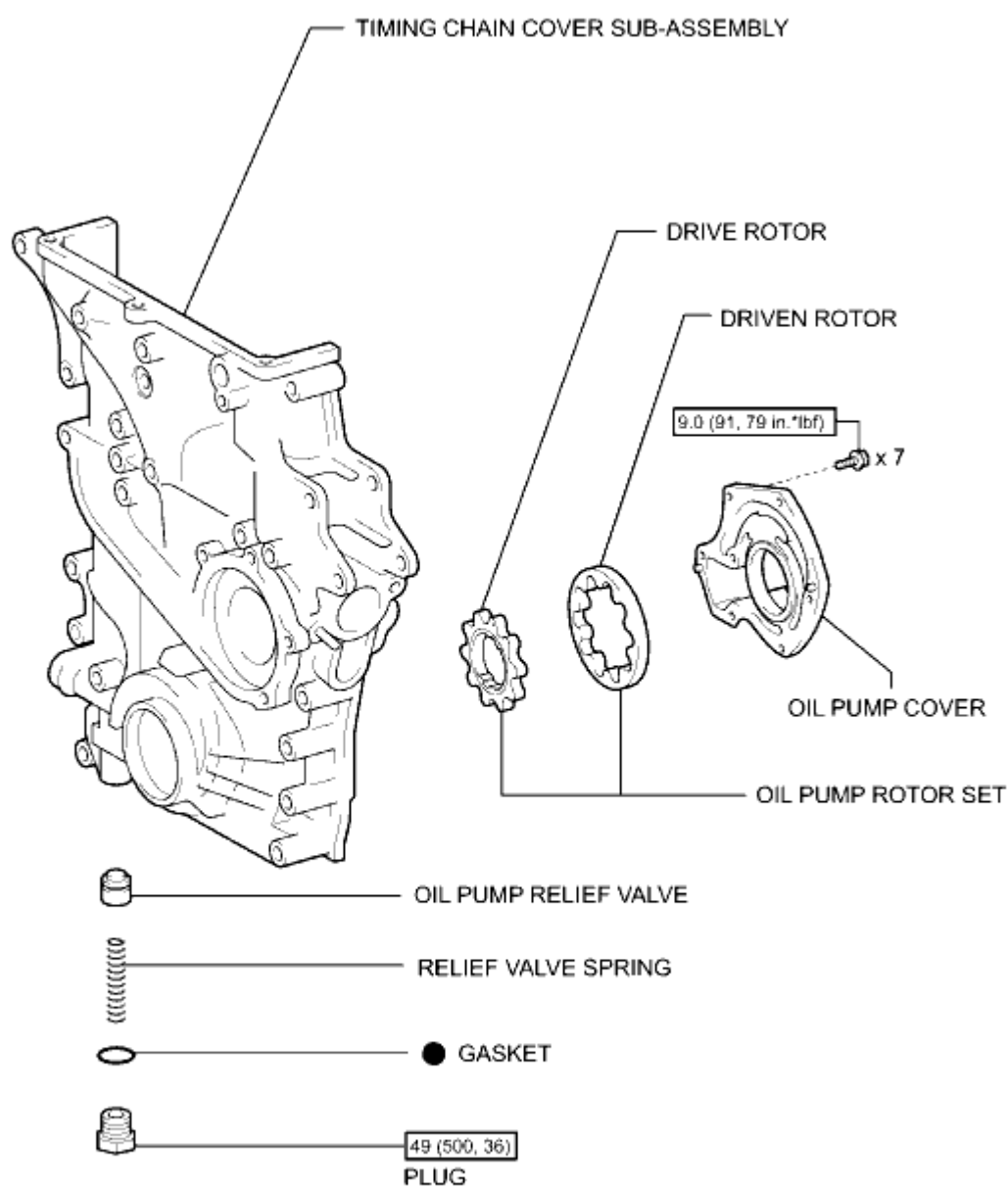
## ILLUSTRATION



## ILLUSTRATION



## ILLUSTRATION




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

● Non-reusable part

<b>Last Modified:</b> 5-10-2010	6.4 A	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM000000YMA00RX
<b>Title:</b> 2TR-FE LUBRICATION: OIL PUMP: REMOVAL (2010 4Runner)		

## REMOVAL

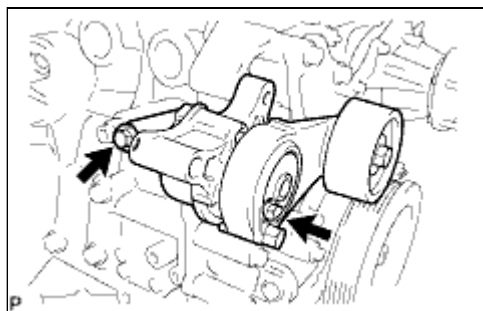
### 1. REMOVE ENGINE ASSEMBLY

(a) Remove the engine from the vehicle .

### 2. REMOVE IGNITION COIL ASSEMBLY

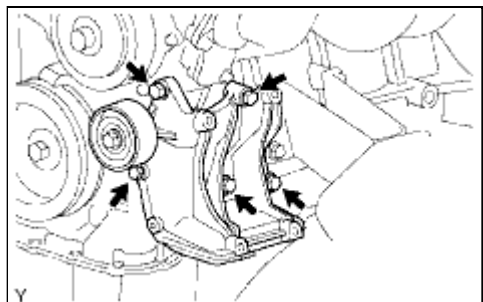
### 3. REMOVE GENERATOR ASSEMBLY

### 4. REMOVE V-RIBBED BELT TENSIONER ASSEMBLY



(a) Remove the 2 bolts and belt tensioner.

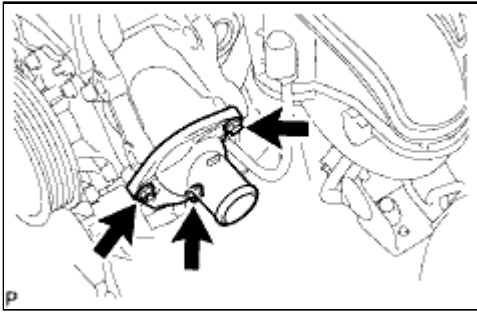
### 5. REMOVE NO. 1 COMPRESSOR MOUNTING BRACKET



(a) Remove the 5 bolts and compressor mounting bracket.

### 6. REMOVE WATER INLET

(a) Remove the bolt, 2 nuts, water inlet and gasket.

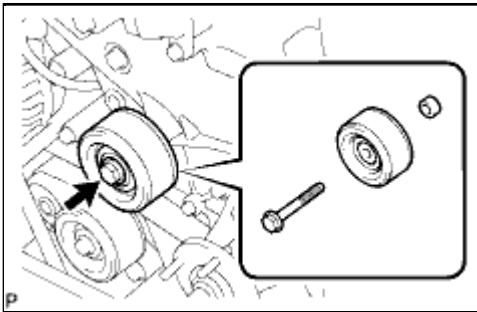


## 7. REMOVE THERMOSTAT INFO

## 8. REMOVE INTAKE MANIFOLD

(a) Remove the intake manifold INFO.

## 9. REMOVE NO. 1 IDLER PULLEY SUB-ASSEMBLY

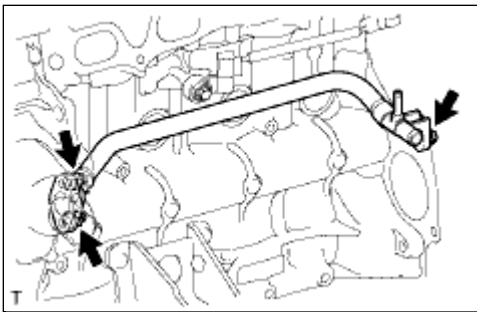


(a) Remove the bolt, idler pulley and spacer.

## 10. REMOVE CAMSHAFT POSITION SENSOR INFO

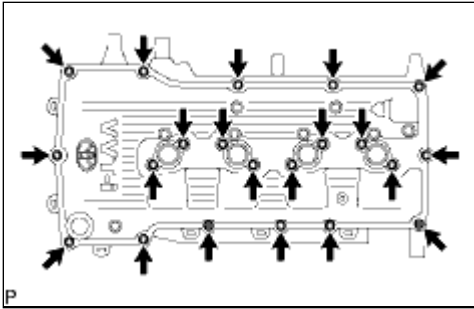
## 11. REMOVE CRANKSHAFT POSITION SENSOR INFO

## 12. REMOVE NO. 1 WATER BY-PASS PIPE



(a) Remove the 2 nuts, bolt, water by-pass pipe and gasket.

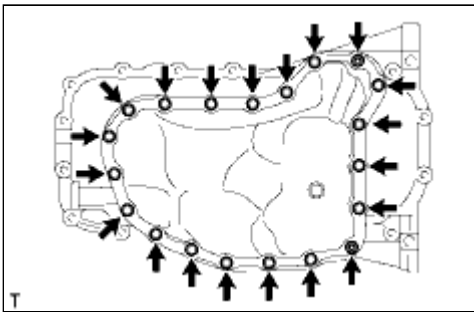
## 13. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY



(a) Remove the 19 bolts, 2 nuts, head cover and 2 gaskets.

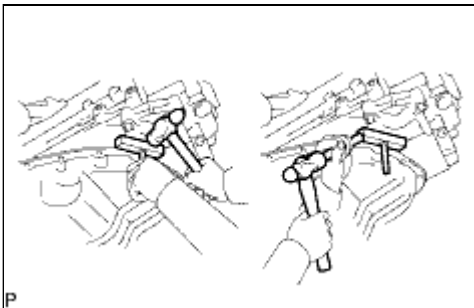
#### 14. REMOVE CRANKSHAFT PULLEY INFO

#### 15. REMOVE NO. 2 OIL PAN SUB-ASSEMBLY



(a) Remove the drain plug and gasket.

(b) Remove the 18 bolts and 2 nuts.



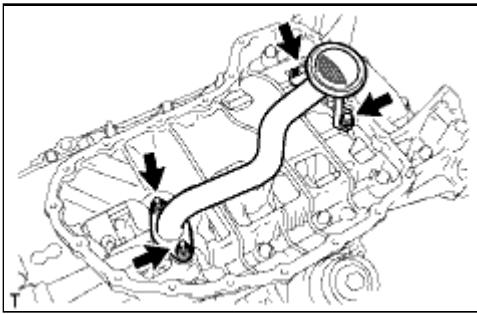
(c) Insert the blade of an oil pan seal cutter between the oil pans. Cut through the applied sealer and remove the oil pan.

#### **NOTICE:**

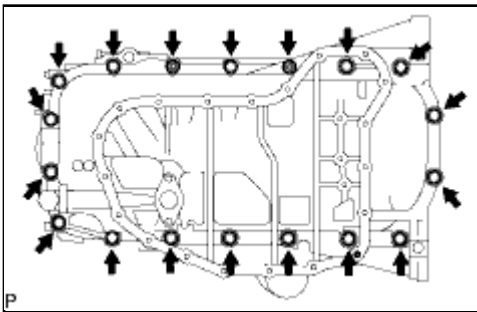
**Be careful not to damage the contact surfaces of the oil pans.**

#### 16. REMOVE OIL STRAINER SUB-ASSEMBLY

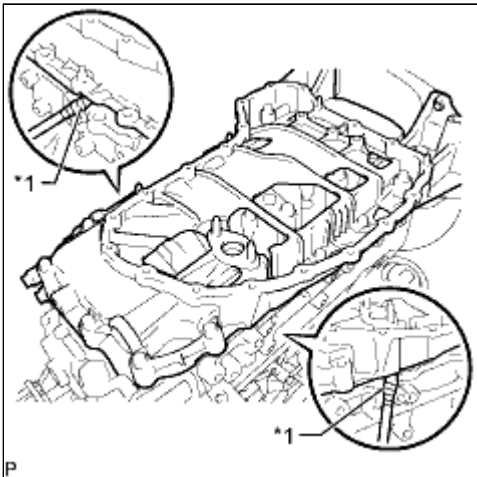
(a) Remove the 2 bolts, 2 nuts, oil strainer and gasket.



## 17. REMOVE OIL PAN SUB-ASSEMBLY



(a) Remove the 16 bolts and 2 nuts.



(b) Remove the oil pan by prying between the oil pan and cylinder block with a screwdriver.

### Text in Illustration

*1	Protective Tape
----	-----------------

#### **HINT:**

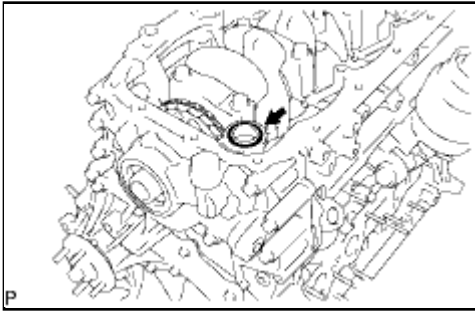
**Tape the screwdriver tip before use.**

#### **NOTICE:**

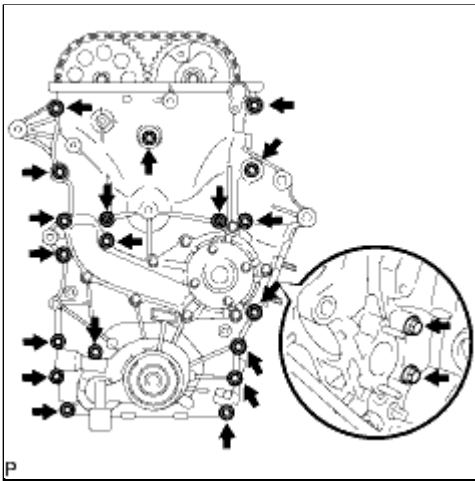
**Be careful not to damage the contact surfaces of the cylinder block and oil pan.**

(c) Remove the O-ring.



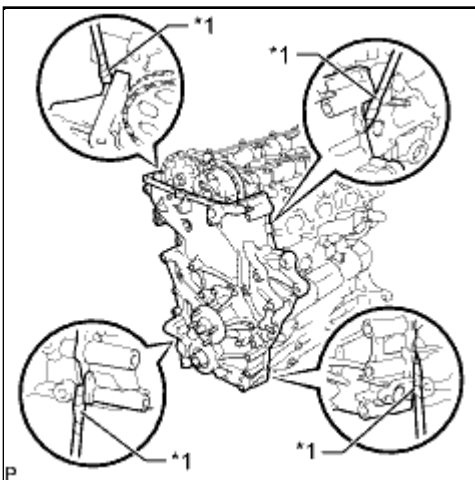


## 18. REMOVE TIMING CHAIN COVER SUB-ASSEMBLY



(a) Remove the 19 bolts and 2 nuts shown in the illustration.

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



### Text in Illustration

*1	Protective Tape
----	-----------------

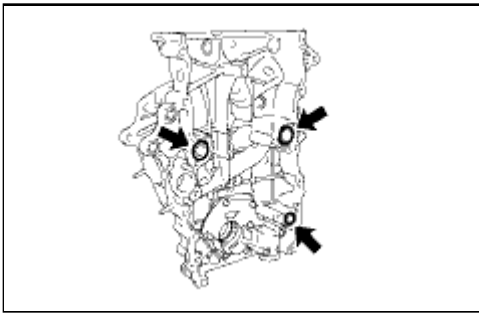
#### HINT:

**Tape the screwdriver tip before use.**

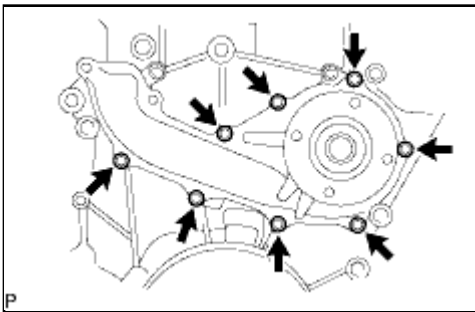
#### **NOTICE:**

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

(c) Remove the 3 O-rings.

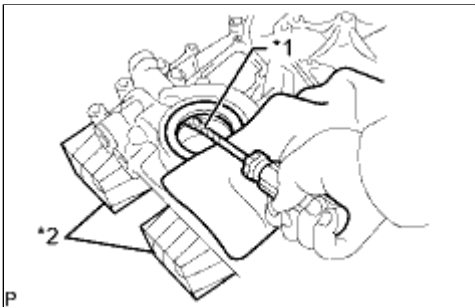


## 19. REMOVE WATER PUMP ASSEMBLY



(a) Remove the 8 bolts, water pump and gasket.

## 20. REMOVE TIMING CHAIN COVER OIL SEAL



(a) Place the timing chain cover on wooden blocks.

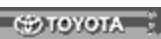
### Text in Illustration

*1	Protective Tape
*2	Wooden Block

(b) Using a screwdriver pry out the oil seal.

### **HINT:**

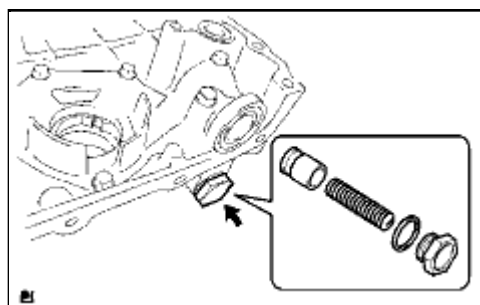
**Tape the screwdriver tip before use.**



<b>Last Modified:</b> 5-10-2010	6.4 A	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM00000465F001X
<b>Title:</b> 2TR-FE LUBRICATION: OIL PUMP: DISASSEMBLY (2010 4Runner)		

## **DISASSEMBLY**

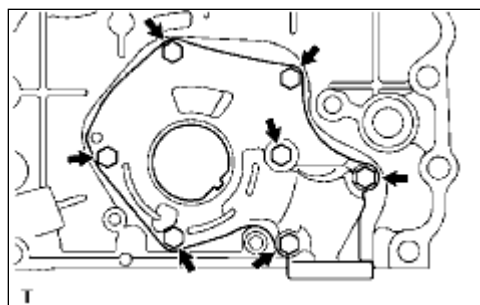
### **1. REMOVE OIL PUMP RELIEF VALVE**



(a) Using a 27 mm socket wrench, remove the relief valve plug and gasket.

(b) Remove the valve spring and oil pump relief valve.

### **2. REMOVE OIL PUMP COVER**



(a) Remove the 7 bolts and oil pump cover.

### **3. REMOVE OIL PUMP ROTOR SET**

(a) Remove the oil pump rotor set from the timing chain cover.

<b>Last Modified:</b> 5-10-2010	6.4 A	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM000000YM700RX
<b>Title:</b> 2TR-FE LUBRICATION: OIL PUMP: INSTALLATION (2010 4Runner)		

## **INSTALLATION**

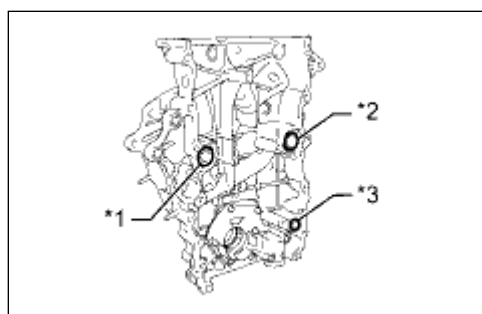
### **1. INSTALL WATER PUMP ASSEMBLY**

(a) Install a new gasket and the water pump with the 8 bolts.

**Torque: 8.9 N·m (91 kgf·cm, 79in·lbf)**

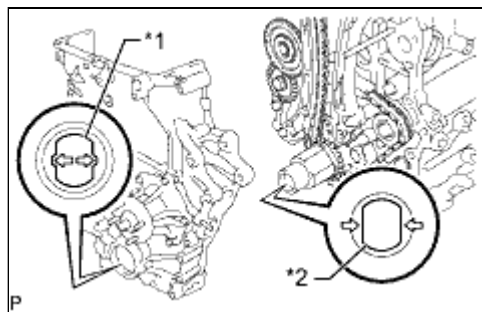
### **2. INSTALL TIMING CHAIN COVER SUB-ASSEMBLY**

(a) Install 3 new O-rings to the timing chain cover as shown in the illustration.



#### **Text in Illustration**

* 1	New Water Pump O -ring
* 2	New Timing Chain Cover O -ring
* 3	New Oil Pump O -ring

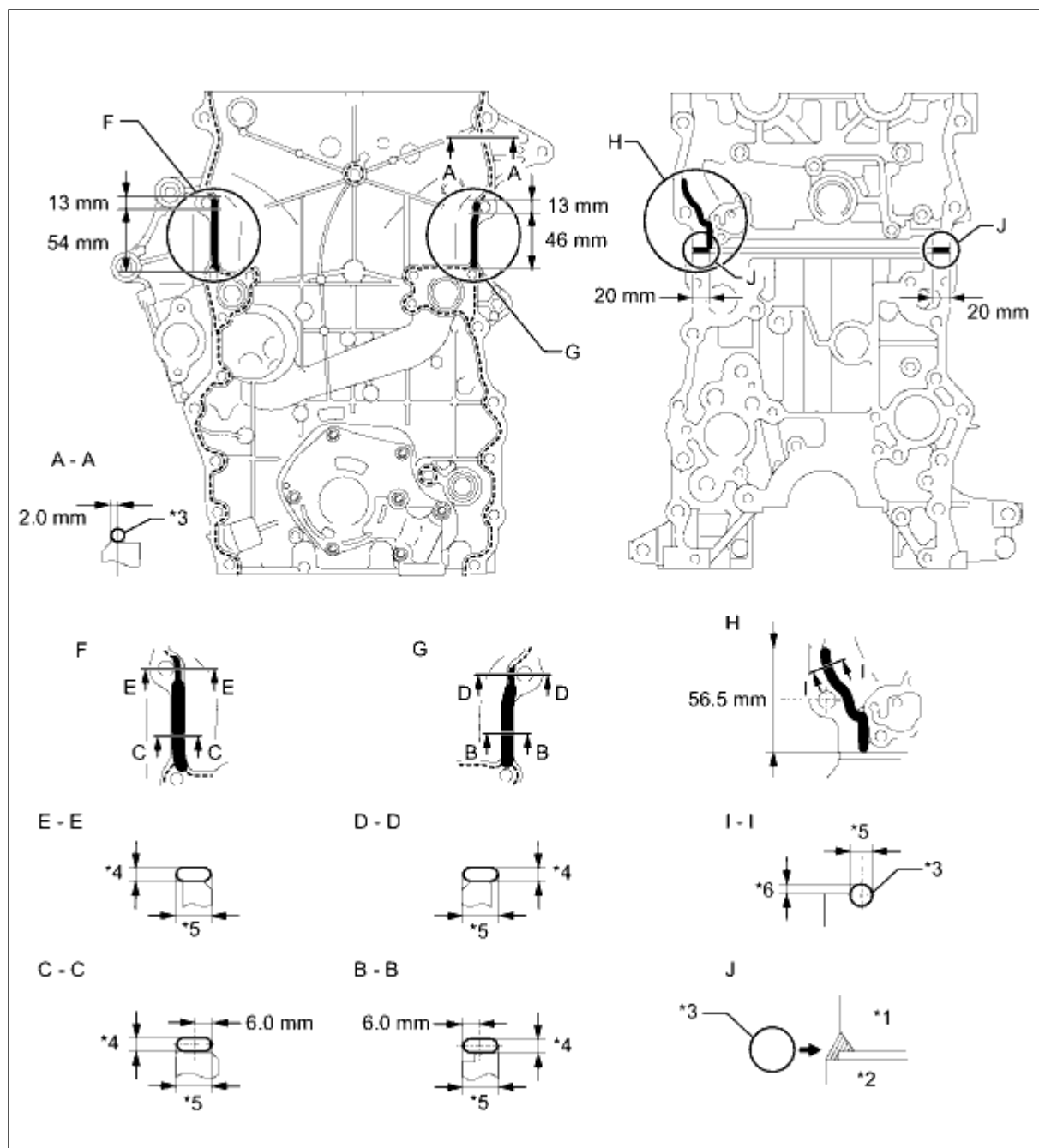


(b) Align the drive rotor spline of the oil pump and crankshaft timing gear as shown in the illustration.

#### **Text in Illustration**

* 1	Drive Rotor Spline
* 2	Crankshaft Timing Gear

(c) Apply seal packing to the timing chain cover in a continuous line as shown in the following illustration.



#### Text in Illustration

*1	Cylinder Head	*2	Cylinder Block
*3	Seal Packing	*4	Seal Packing Thickness
*5	Seal Packing Width	*6	Protrusion

Seal packing:

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

Application Specification:

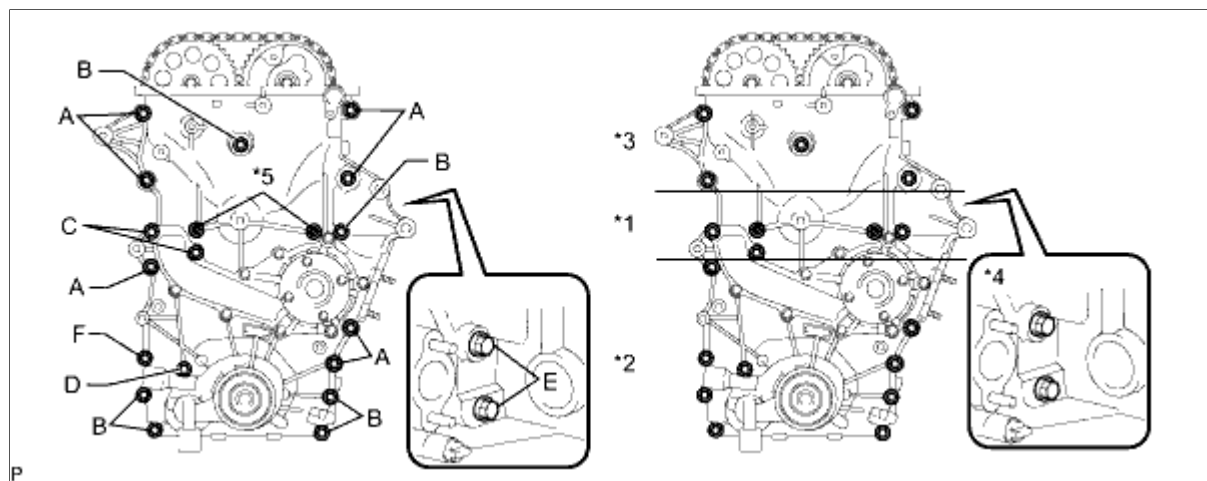
AREA	SEAL PACKING DIAMETER	DISTANCE FROM EDGE OF COVER	SEAL PACKING APPLICATION	PROTRUSION FROM CYLINDER
------	--------------------------	--------------------------------	-----------------------------	-----------------------------

		TO CENTER OF SEAL PACKING	LENGTH	HEAD
A - A (Dashed line)	2.5 to 4.0 mm (0.0984 to 0.157 in.)	2.0 mm (0.0787 in.)	-	-
B - B (Continuous line)	10 to 14 mm (0.394 to 0.551 in.) wide and 2.5 to 4.0 mm (0.0984 to 0.157 in.) thick	6.0 mm (0.236 in.)	46 mm (1.81 in.) from top of bolt hole	-
C - C (Continuous line)	10 to 14 mm (0.394 to 0.551 in.) wide and 2.5 to 4.0 mm (0.0984 to 0.157 in.) thick	6.0 mm (0.236 in.)	54 mm (2.13 in.) from top of bolt hole	-
D - D (Continuous line)	9.0 to 13 mm (0.354 to 0.512 in.) wide and 2.5 to 4.0 mm (0.0984 to 0.157 in.) thick	-	13 mm (0.512 in.) from top of bolt hole	-
E - E (Continuous line)	9.0 to 13 mm (0.354 to 0.512 in.) wide and 2.5 to 4.0 mm (0.0984 to 0.157 in.) thick	-	13 mm (0.512 in.) from top of bolt hole	-
I - I (Continuous line)	8.0 mm (0.315 in.)	-	56.5 mm (2.22 in.) from bottom of cylinder head	2.0 to 3.0 mm (0.0787 to 0.118 in.)
J	10 mm (0.394 in.)	-	20 mm (0.787 in.)	-

**NOTICE:**

- Remove any oil from the contact surface.
- When the contact surfaces are wet, wipe them with an oil-free cloth before applying seal packing.
- Install the timing chain cover within 3 minutes and tighten the bolts within 15 minutes after applying seal packing.
- Do not start the engine for at least 4 hours after the installation.

(d) Temporarily install the timing chain cover with the 19 bolts and 2 nuts.



#### Text in Illustration

* 1	Area 1	* 2	Area 2
* 3	Area 3	* 4	Area 4
* 5	Nut	-	-

Bolt Length:

ITEM	LENGTH	THREAD DIAMETER
Bolt A	75 mm (2.95 in.)	10 mm (0.394 in.)
Bolt B	75 mm (2.95 in.)	8 mm (0.315 in.)
Bolt C	90 mm (3.54 in.)	8 mm (0.315 in.)
Bolt D	95 mm (3.74 in.)	8 mm (0.315 in.)
Bolt E	35 mm (1.38 in.)	8 mm (0.315 in.)
Bolt F	75 mm (2.95 in.)	10 mm (0.394 in.)

(e) Excluding the bolts labeled A and F, tighten the bolts and nuts in this order: Area 1, Area 3, Area 2.

**for bolt C - Torque: 26 N·m (265 kgf·cm, 19ft·lbf)**

**for bolt B, D and nut - Torque: 21 N·m (214 kgf·cm, 15ft·lbf)**

(f) Tighten the bolts labeled A in this order: Area 2 and Area 3.

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

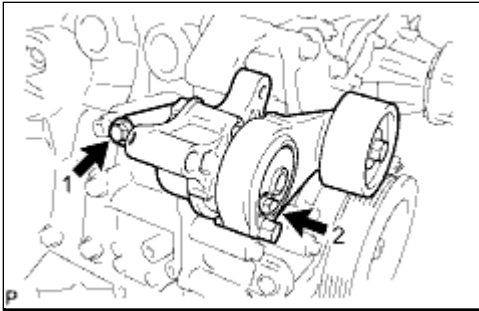
(g) Tighten the bolts labeled F.

**Torque: 46 N·m (469 kgf·cm, 34ft·lbf)**

(h) Tighten the bolts labeled E in Area 4.

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

### 3. INSTALL V-RIBBED BELT TENSIONER ASSEMBLY



(a) Temporarily install the belt tensioner with the 2 bolts.

**HINT:**

**Make sure that the flanges of the bolts are contacting the tensioner surface.**

(b) Install the tensioner by tightening the 2 bolts in the order shown in the illustration.

**for bolt 1 - Torque: 40 N·m (408 kgf·cm, 30ft·lbf)**

**for bolt 2 - Torque: 21 N·m (214 kgf·cm, 15ft·lbf)**

#### 4. INSTALL OIL PAN SUB-ASSEMBLY

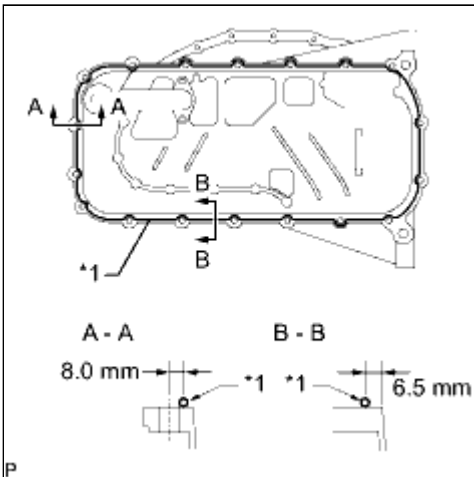
(a) Install a new O-ring.

(b) Apply seal packing in a continuous line as shown in the illustration.

Seal packing:

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

Application Specification:



AREA	SEAL PACKING DIAMETER	DISTANCE FROM EDGE OF COVER OR CENTER OF BOLT HOLE TO CENTER OF SEAL PACKING
A - A	2.0 to 3.0 mm (0.0787 to 0.118 in.)	8.0 mm (0.315 in.)
B - B	2.0 to 3.0 mm (0.0787 to 0.118 in.)	6.5 mm (0.256 in.)

#### Text in Illustration

* 1	Seal Packing
-----	--------------

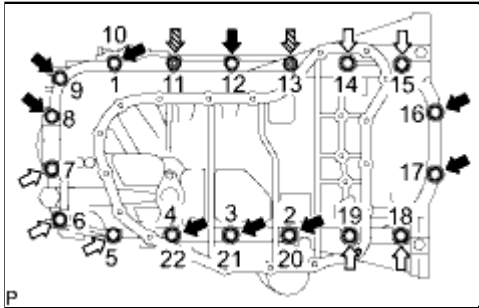
**NOTICE:**

- Remove any oil from the contact surface.
- Install the oil pan within 3 minutes after applying seal packing.



- Do not start the engine for at least 4 hours after the installation.




(c) Temporarily install the oil pan with the 16 bolts and 2 nuts.



Bolt Length:

ITEM	LENGTH
Bolt A	20 mm (0.787 in.)
Bolt B	40 mm (1.57 in.)

**Text in Illustration**

	Bolt A
	Bolt B
	Nut

(d) Uniformly tighten the 16 bolts and 2 nuts in the order shown in the illustration.

**Torque: 26 N·m (265 kgf·cm, 19ft·lbf)**

**5. INSTALL OIL STRAINER SUB-ASSEMBLY**

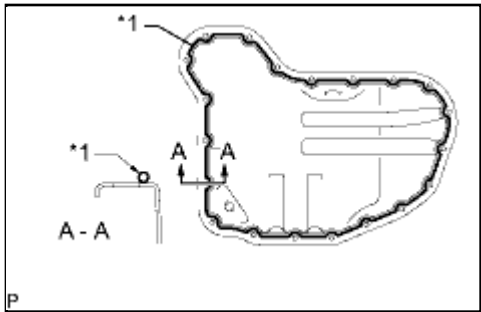
(a) Install a new gasket and the oil strainer with the 2 bolts and 2 nuts.

**Torque: 26 N·m (265 kgf·cm, 19ft·lbf)**

**6. INSTALL NO. 2 OIL PAN SUB-ASSEMBLY**

(a) Apply seal packing in a continuous line as shown in the illustration.

Seal packing:  
 Toyota Genuine Seal Packing Black, Three Bond 1207B or  
 equivalent  
 Seal packing diameter:  
 3.0 to 4.0 mm (0.118 to 0.157 in.)

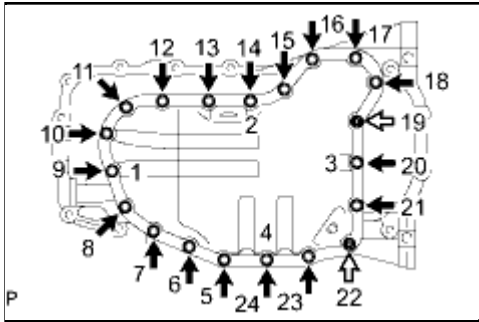


### Text in Illustration


*1	Seal Packing
----	--------------

- NOTICE:**
- Remove any oil from the contact surface.
  - Install the oil pan within 3 minutes after applying seal packing.
  - Do not start the engine for at least 4 hours after the installation.

(b) Temporarily install the oil pan with the 18 bolts and 2 nuts.



### Text in Illustration

	Bolt
	Nut

(c) Uniformly tighten the 20 bolts and 2 nuts in the order shown in the illustration.

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

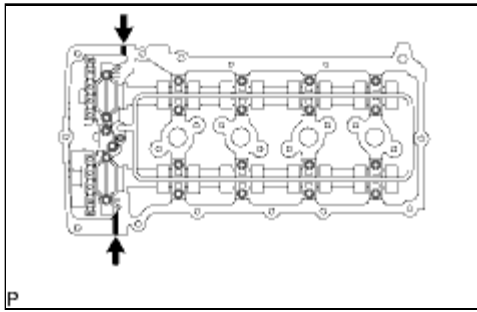
(d) Install a new gasket and the drain plug.

**Torque: 38 N·m (382 kgf·cm, 28ft·lbf)**

### 7. INSTALL TIMING CHAIN COVER OIL SEAL INFO

### 8. INSTALL CRANKSHAFT PULLEY INFO

## 9. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY



(a) Install 2 new cover gaskets to the head cover.

(b) Apply seal packing to the places shown in the illustration.


Seal packing:

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

Seal packing diameter:

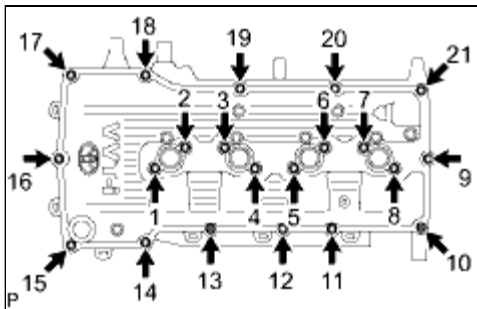
4.0 mm (0.157 in.)

### Text in Illustration

	Seal Packing
---	--------------

### NOTICE:

- Remove any oil from the contact surface.
- Install the head cover within 3 minutes after applying seal packing.
- Do not start the engine for at least 4 hours after the installation.



(c) Temporarily install the head cover with the 19 bolts and 2 nuts.

(d) Uniformly tighten the 19 bolts and 2 nuts in the order shown in the illustration.

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

(e) In numerical order, confirm that the bolts labeled 1 to 8 are tightened to the specified torque.  
Tighten the bolts as necessary.

## 10. INSTALL NO. 1 WATER BY-PASS PIPE

(a) Install a new gasket and the water by-pass pipe with the 2 nuts and bolt.

**Torque: 18 N·m (178 kgf·cm, 13ft·lbf)**

#### 11. INSTALL CRANKSHAFT POSITION SENSOR

#### 12. INSTALL CAMSHAFT POSITION SENSOR

#### 13. INSTALL NO. 1 IDLER PULLEY SUB-ASSEMBLY

(a) Install the spacer and idler pulley with the bolt.

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

#### 14. INSTALL THERMOSTAT

#### 15. INSTALL WATER INLET

(a) Install a new gasket and water inlet with the 2 nuts and bolt.

**Torque: 28 N·m (286 kgf·cm, 21ft·lbf)**

#### 16. INSTALL NO. 1 COMPRESSOR MOUNTING BRACKET

##### NOTICE:

**In order to prevent misalignment, which causes belt rattle, the 5 bolts must be tightened exactly as described in the procedures below.**

(a) Temporarily install the mounting bracket with the 5 bolts.

##### Text in Illustration

*1	Bolt B
*2	Mounting Bracket
*a	No Clearance
*b	Front

##### HINT:

**Make sure the flanges of the bolts are contacting the bracket surface.**

(b) Make sure there is no clearance between the cylinder block and bracket as shown in the illustration. Then install the bolt labeled B.

**Torque: 45 N·m (459 kgf·cm, 33ft·lbf)**

(c) Tighten the bolts labeled A and C.

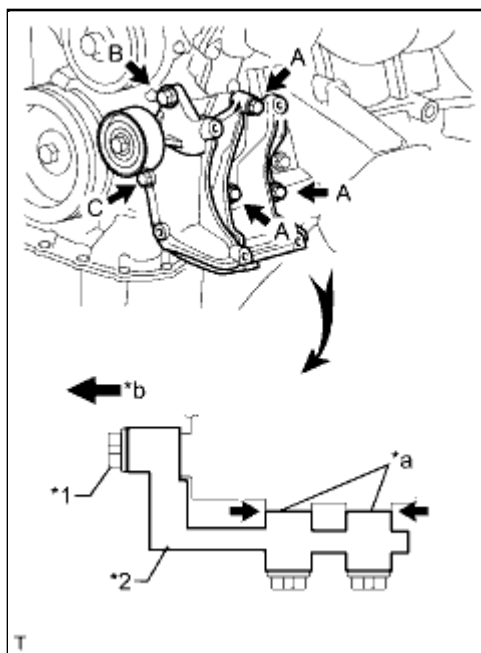
**for bolt A - Torque: 45 N·m (459 kgf·cm, 33ft·lbf)**

**for bolt C - Torque: 25 N·m (250 kgf·cm, 18ft·lbf)**

#### 17. INSTALL GENERATOR ASSEMBLY

#### 18. INSTALL INTAKE MANIFOLD

(a) Install the intake manifold  .



## 19. INSTALL IGNITION COIL ASSEMBLY

INFO

## 20. INSTALL ENGINE ASSEMBLY

(a) Install the engine to the vehicle

INFO

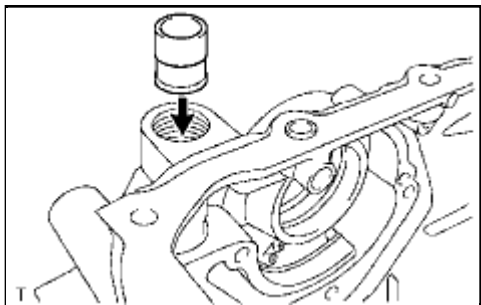


TOYOTA

<b>Last Modified:</b> 5-10-2010	6.4 G	<b>From:</b> 200908
<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM000000YM800QX
<b>Title:</b> 2TR-FE LUBRICATION: OIL PUMP: INSPECTION (2010 4Runner)		

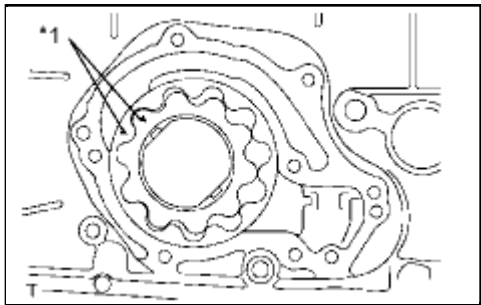
# INSPECTION

## 1. INSPECT OIL PUMP RELIEF VALVE



- (a) Coat the relief valve with engine oil and drop it into the relief valve hole. Check that the relief valve falls in smoothly by its own weight.
- If the valve does not fall smoothly, replace the relief valve. If necessary, replace the timing chain cover sub-assembly.

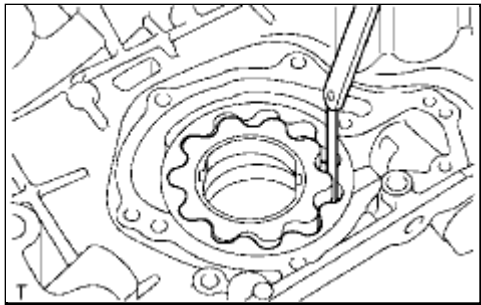
## 2. INSPECT OIL PUMP ROTOR SET



- (a) Install the rotors to the oil pump body with the marks facing outward. Check that the rotors revolve smoothly.

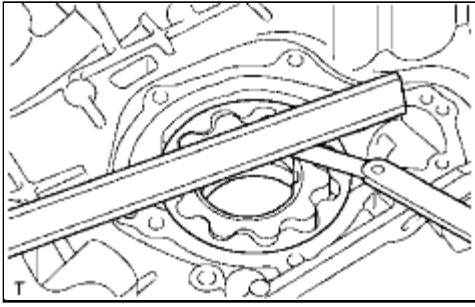
### Text in Illustration

*1	Alignment Mark
----	----------------



- (b) Check the tip clearance.
- (1) Using a feeler gauge, measure the clearance between the drive and driven rotor tips as shown in the illustration.
- Standard tip clearance:  
0.040 to 0.160 mm (0.00157 to 0.00630 in.)
- Maximum tip clearance:  
0.26 mm (0.0102 in.)
- If the tip clearance is more than the maximum, replace the timing chain cover sub-assembly.

- (c) Check the side clearance.



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

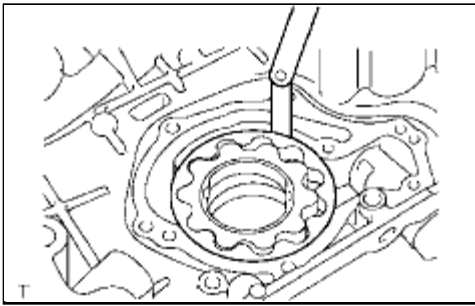
Standard side clearance:

0.025 to 0.075 mm (0.000984 to 0.00295 in.)

Maximum side clearance:

0.130 mm (0.00512 in.)

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



- (d) Check the body clearance.

- (1) Using a feeler gauge, measure the clearance between the oil pump body and driven rotor as shown in the illustration.

Standard body clearance:

0.025 to 0.325 mm (0.000984 to 0.0128 in.)

Maximum body clearance:

0.425 mm (0.0167 in.)

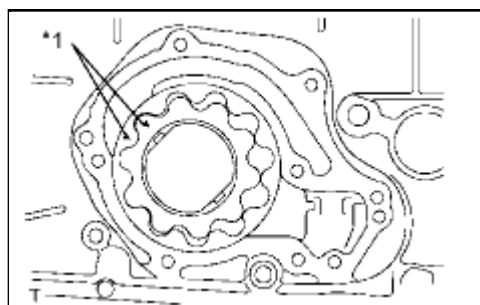
If the body clearance is more than the maximum, replace the timing chain cover sub-assembly.



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<b>Model Year:</b> 2010	<b>Model:</b> 4Runner	<b>Doc ID:</b> RM00000465G001X
<b>Title:</b> 2TR-FE LUBRICATION: OIL PUMP: REASSEMBLY (2010 4Runner)		

## **REASSEMBLY**

### **1. INSTALL OIL PUMP ROTOR SET**

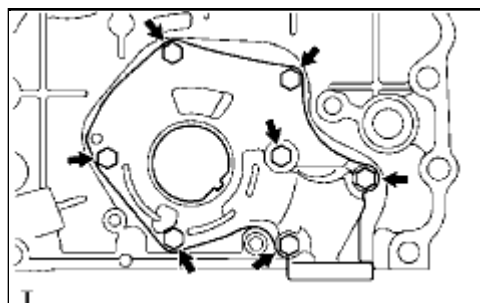


- (a) Coat the oil pump rotor set with engine oil and place it into the pump body with the marks facing outward (oil pump cover side). Check that the rotors revolve smoothly.

#### **Text in Illustration**

*1	Alignment Mark
----	----------------

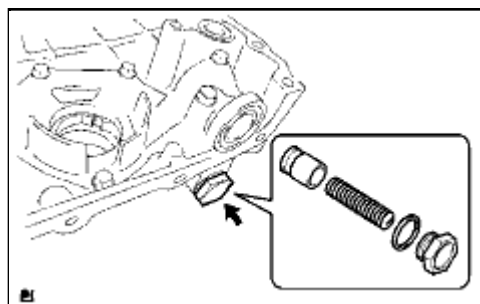
### **2. INSTALL OIL PUMP COVER**



- (a) Install the oil pump cover with the 7 bolts.

**Torque: 9.0 N·m (91 kgf·cm, 79in·lbf)**

### **3. INSTALL OIL PUMP RELIEF VALVE**



- (a) Coat the relief valve with engine oil.

- (b) Insert the relief valve and spring into the pump body hole.  
(c) Install a new gasket to the plug.  
(d) Using a 27 mm socket wrench, install the plug.



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

