

CAUTION / NOTICE / HINT**HINT:**

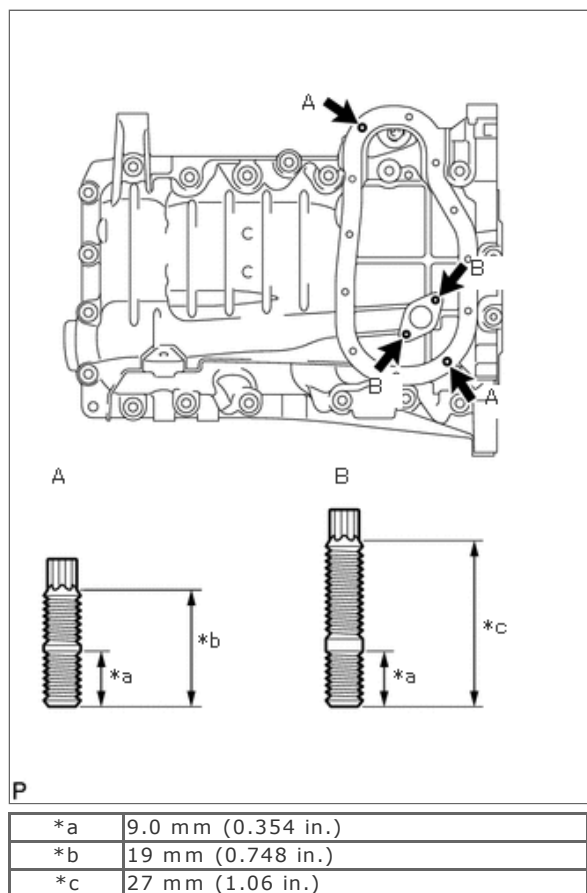
- Thoroughly clean all parts to be assembled.
- Before installing the parts, apply new engine oil to all sliding and rotating surfaces.
- Replace all gaskets, O-rings and oil seals with new ones.

PROCEDURE**1.INSTALL STUD BOLT****NOTICE:**

If a stud bolt is deformed or its threads are damaged, replace it.

- 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.



Using an E6 "TORX" wrench, install the 4 stud bolts.

Torque:

4.0 N*m (41 kgf*cm, 35 in.*lbf)

2.INSTALL TAPER SCREW PLUG

11432A

- a. Clean the taper screw plug and plug hole.

- b. Apply adhesive to 2 or 3 threads of the taper screw plug end.

Adhesive:

Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent

- c. Install the taper screw plug.

Torque:

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

NOTICE:

- Install the taper screw plug within 3 minutes after applying adhesive.
- Do not expose the taper screw plug to coolant within 1 hour of the installation.



3.INSTALL KNOCK SENSOR

89615

Click here [Engine / Hybrid System>1GR-FE ENGINE CONTROL>KNOCK SENSOR>INSTALLATION](#)



4.INSTALL NO. 1 WATER OUTLET PIPE

16332

Click here [Engine / Hybrid System>1GR-FE ENGINE CONTROL>KNOCK SENSOR>INSTALLATION](#)



5.INSTALL NO. 2 CYLINDER HEAD GASKET

11116

Click here [Engine / Hybrid System>1GR-FE ENGINE MECHANICAL>CYLINDER HEAD GASKET>INSTALLATION](#)



6.INSTALL CYLINDER HEAD LH

11102

Click here [Engine / Hybrid System>1GR-FE ENGINE MECHANICAL>CYLINDER HEAD GASKET>INSTALLATION](#)



7.INSTALL CYLINDER HEAD GASKET

11115

Click here [Engine / Hybrid System>1GR-FE ENGINE MECHANICAL>CYLINDER HEAD GASKET>INSTALLATION](#)



8.INSTALL CYLINDER HEAD SUB-ASSEMBLY

11101

Click here [Engine / Hybrid System>1GR-FE ENGINE MECHANICAL>CYLINDER HEAD GASKET>INSTALLATION](#)



9.INSTALL NO. 4 CAMSHAFT SUB-ASSEMBLY

13054

- a. Apply new engine oil to the thrust portion and journals of the No. 4 camshaft sub-assembly.
- b. Install the No. 4 camshaft sub-assembly to the cylinder head LH.



10.INSTALL NO. 3 CAMSHAFT SUB-ASSEMBLY

13053

- a. Apply new engine oil to the thrust portion and journals of the No. 3 camshaft sub-assembly.
- b. Install the No. 3 camshaft sub-assembly to the cylinder head LH.

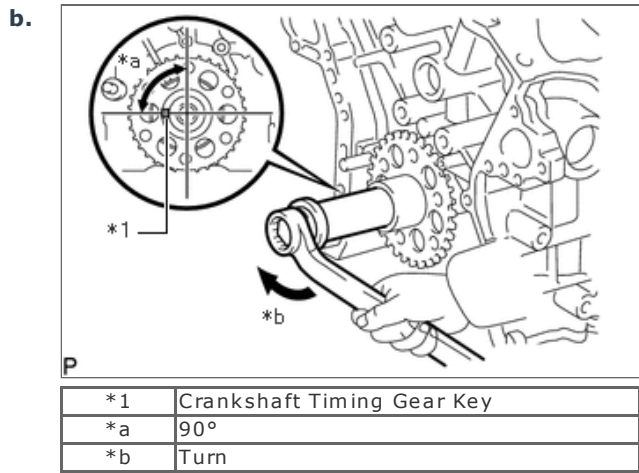


11.INSTALL CAMSHAFT BEARING CAP (for Bank 2)

NOTICE:

As the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being installed. If the camshaft is not kept level, the portion of the cylinder head which receives the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, make sure the following steps are carried out.

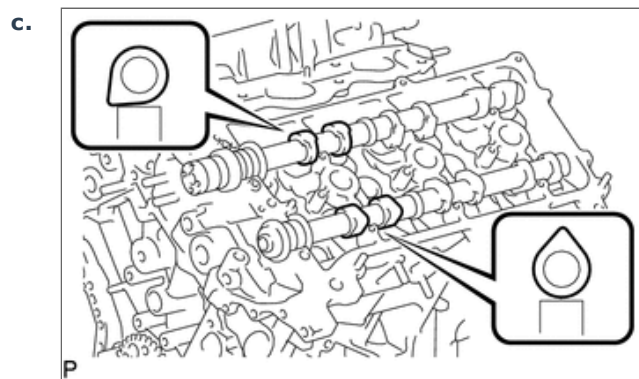
- a. Temporarily install the crankshaft pulley set bolt.



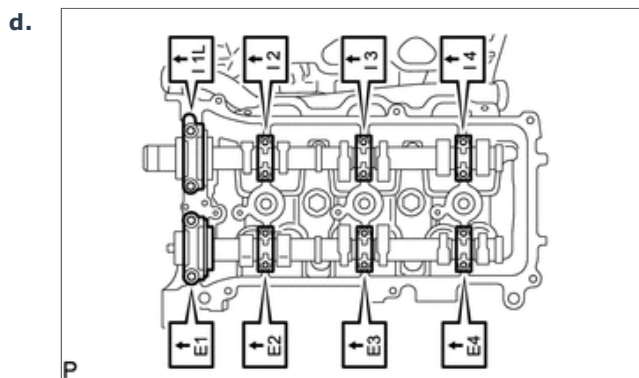
Turn the crankshaft and set the crankshaft timing gear key to the left horizontal position.

NOTICE:

Having the crankshaft at the wrong angle can cause the piston head and valve head to come into contact with each other when the camshaft is installed, causing damage. Always set the crankshaft to the correct angle.



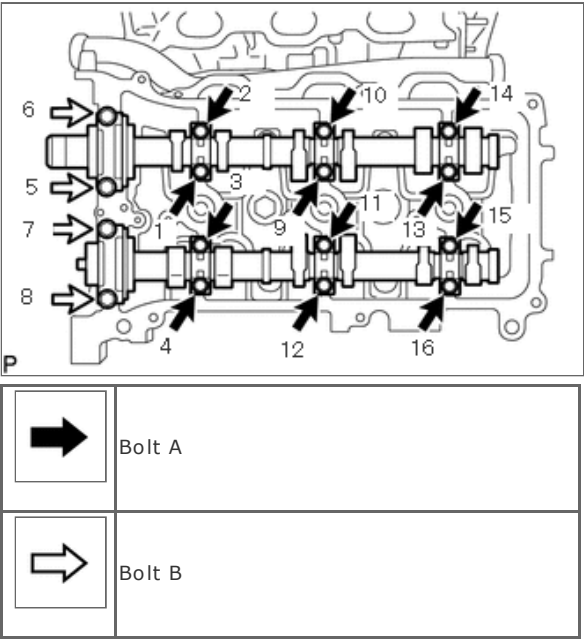
Set the No. 3 camshaft sub-assembly and No. 4 camshaft sub-assembly as shown in the illustration.



Check the numbers on the camshaft bearing caps and the installation direction before temporarily placing each cap.

e. Apply a light coat of engine oil to the threads and under the heads of the bolts.

f.



Install and uniformly tighten the 16 bolts in several steps in the order shown in the illustration.

Torque:
for bolt A : 9.0 N*m (92 kgf*cm, 80 in.*lbf)
for bolt B : 24 N*m (245 kgf*cm, 18 ft.*lbf)

Standard Bolt Length:

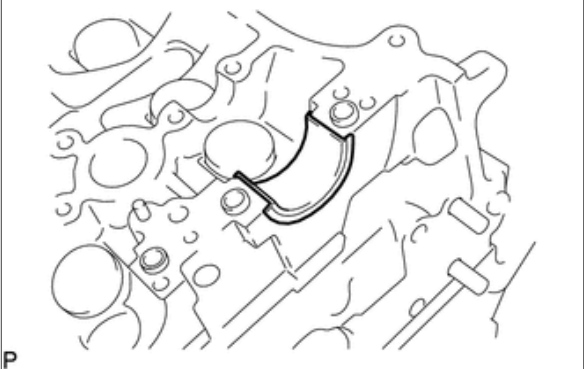
Item	Specified Condition
Bolt A	39 mm (1.54 in.)
Bolt B	50 mm (1.97 in.)

g. Remove the crankshaft pulley set bolt.

12.INSTALL NO. 2 CAMSHAFT BEARING

11821

a.

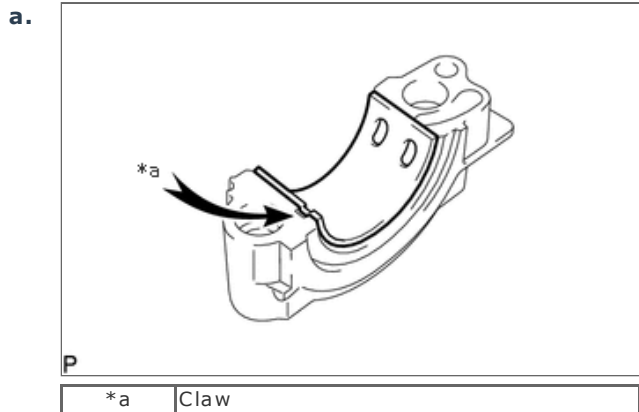


Install the No. 2 camshaft bearing to the cylinder head sub-assembly.

NOTICE:
Clean the backside of the No. 2 camshaft bearing and the contact surface of the cylinder head sub-assembly and prevent oil from adhering to them.

13.INSTALL NO. 1 CAMSHAFT BEARING

11811



Align the claw of the No. 1 camshaft bearing with the groove of the camshaft bearing cap and push in the No. 1 camshaft bearing.

NOTICE:

- Install the No. 1 camshaft bearing while aligning it with the oil hole in the camshaft bearing cap.
- Clean the backside of the No. 1 camshaft bearing and the contact surface of the camshaft bearing cap and prevent oil from adhering to them.

14.INSTALL NO. 2 CAMSHAFT

13512

- Apply new engine oil to the thrust portion and journals of the No. 2 camshaft.
- Install the No. 2 camshaft to the cylinder head sub-assembly.

15.INSTALL CAMSHAFT

13511

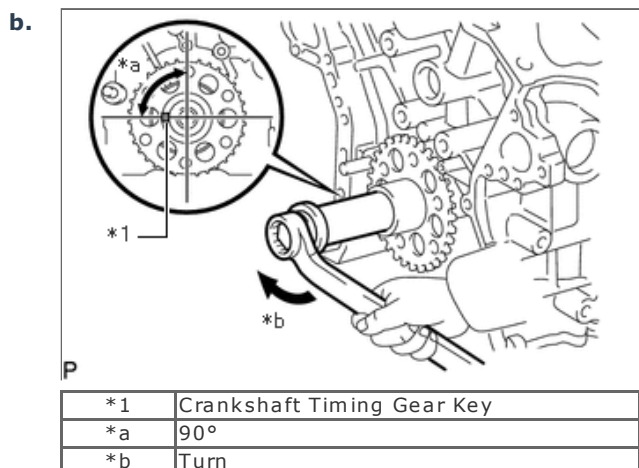
- Apply new engine oil to the thrust portion and journals of the camshaft.
- Install the camshaft to the cylinder head sub-assembly.

16.INSTALL CAMSHAFT BEARING CAP (for Bank 1)

NOTICE:

As the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being installed. If the camshaft is not kept level, the portion of the cylinder head which receives the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, make sure the following steps are carried out.

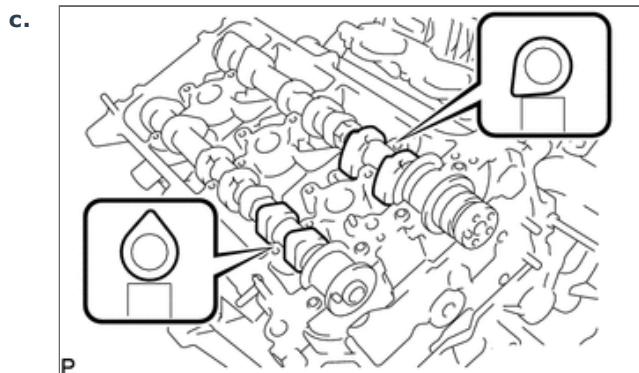
- Temporarily install the crankshaft pulley set bolt.



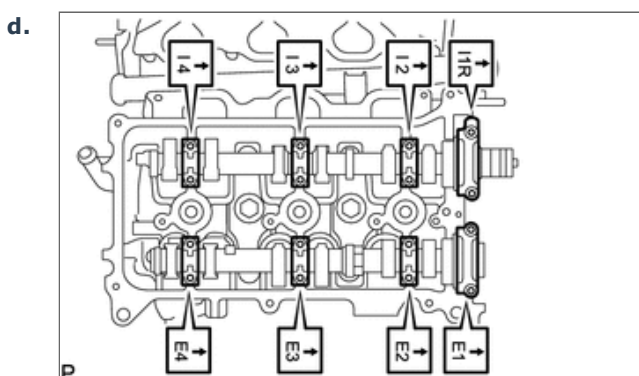
Turn the crankshaft and set the crankshaft timing gear key to the left horizontal position.

NOTICE:

Having the crankshaft at the wrong angle can cause the piston head and valve head to come into contact with each other when the camshaft is installed, causing damage. Always set the crankshaft to the correct angle.

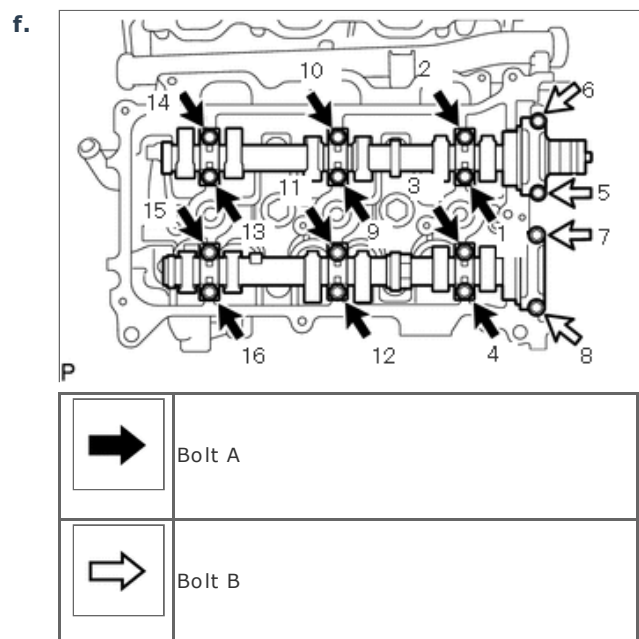


Set the camshaft and No. 2 camshaft as shown in the illustration.



Check the numbers on the camshaft bearing caps and the installation direction before temporarily placing each cap.

e. Apply a light coat of engine oil to the threads and under the heads of the bolts.



Install and uniformly tighten the 16 bolts in several steps in the order shown in the illustration.

Torque:

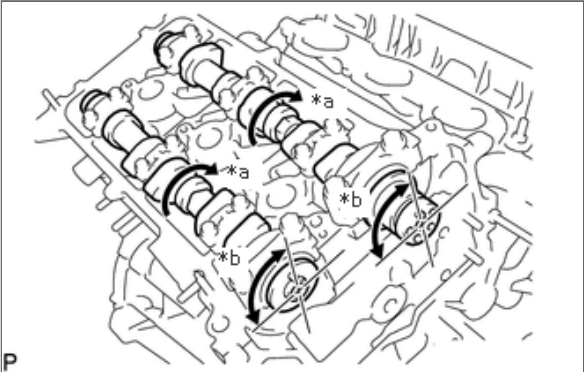
for bolt A : 9.0 N*m (92 kgf*cm, 80 in.*lbf)

for bolt B : 24 N*m (245 kgf*cm, 18 ft.*lbf)

Standard Bolt Length:

Item	Specified Condition
Bolt A	39 mm (1.54 in.)
Bolt B	50 mm (1.97 in.)

g.



P

*a	Turn
*b	90°

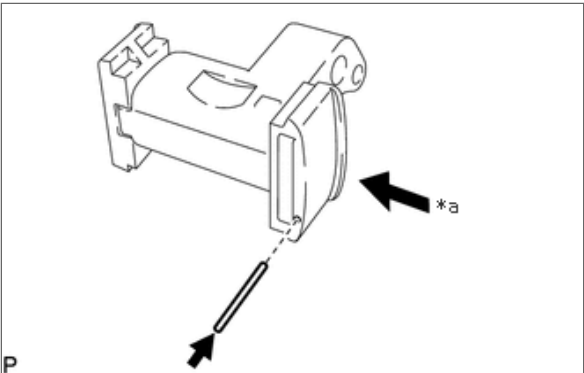
Turn the camshafts clockwise until the camshaft knock pin is at a position 90° from the cylinder head sub-assembly.

- h. Remove the crankshaft pulley set bolt.

17.INSTALL NO. 3 CHAIN TENSIONER ASSEMBLY

13560A

a.



P

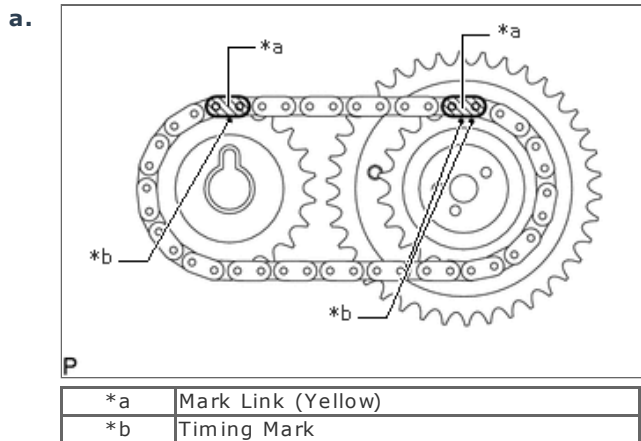
*a	Push
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While pushing in the No. 3 chain tensioner assembly, insert a pin with a diameter of 1.0 mm (0.0394 in.) into the hole to fix the No. 3 chain tensioner assembly in place.

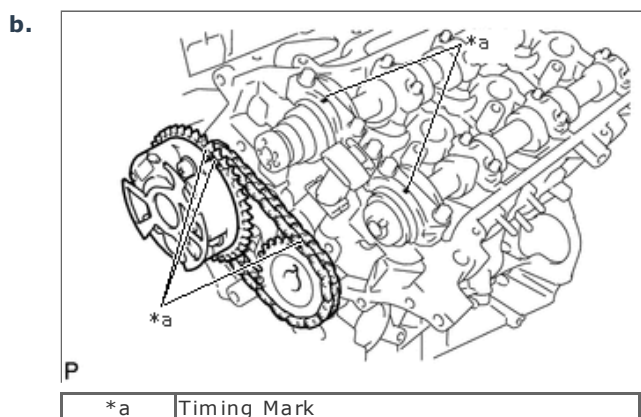
- b. Install the No. 3 chain tensioner assembly with the bolt.

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

18.INSTALL CAMSHAFT TIMING GEARS AND NO. 2 CHAIN (for Bank 2)



Align the mark links (yellow) of the No. 2 chain sub-assembly with the timing marks of the camshaft timing gear assembly and camshaft timing sprocket.

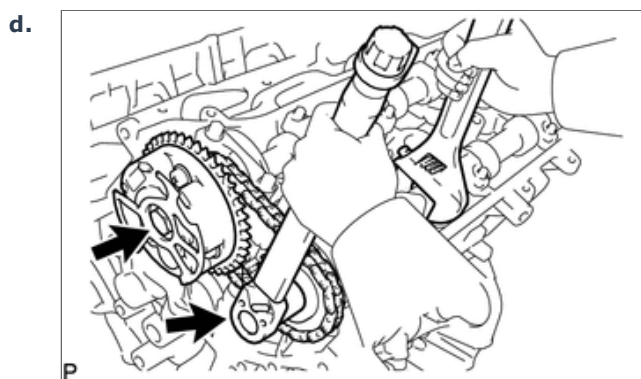


Align the timing marks on the camshaft timing gear assembly and camshaft timing sprocket with the timing marks on the camshaft bearing caps, and install the camshaft timing gear assembly and camshaft timing sprocket together with the No. 2 chain sub-assembly.

- c. Temporarily install the camshaft timing gear assembly and camshaft timing sprocket with the 2 bolts.

NOTICE:

Do not push the camshaft timing gear assembly onto the No. 3 camshaft sub-assembly forcibly when installing it.

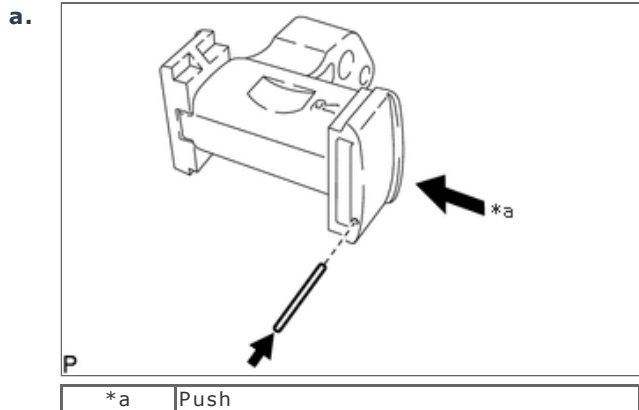


Hold the hexagonal portion of the No. 4 camshaft sub-assembly with a wrench and tighten the 2 bolts.

Torque:

100 N*m (1020 kgf*cm, 74 ft.*lbf)

- e. Remove the pin from the No. 3 chain tensioner assembly.



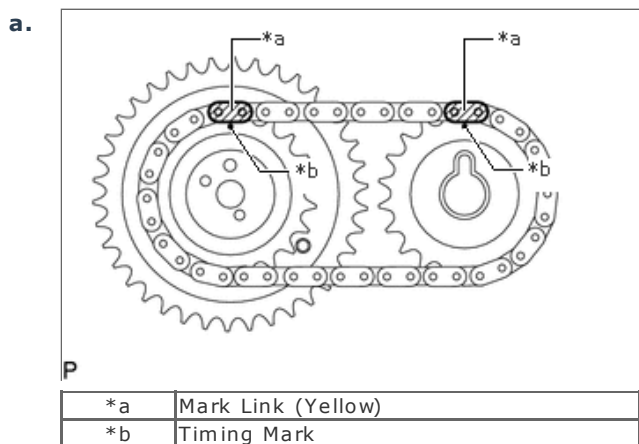
While pushing in the No. 2 chain tensioner assembly, insert a pin with a diameter of 1.0 mm (0.0394 in.) into the hole to fix the No. 2 chain tensioner assembly in place.

- b. Install the No. 2 chain tensioner assembly with the bolt.

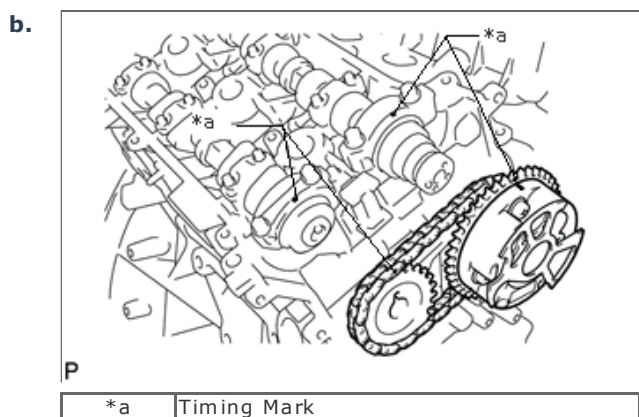
Torque:

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

20.INSTALL CAMSHAFT TIMING GEARS AND NO. 2 CHAIN (for Bank 1)



Align the mark links (yellow) of the No. 2 chain sub-assembly with the timing marks of the camshaft timing gear assembly and camshaft timing sprocket.

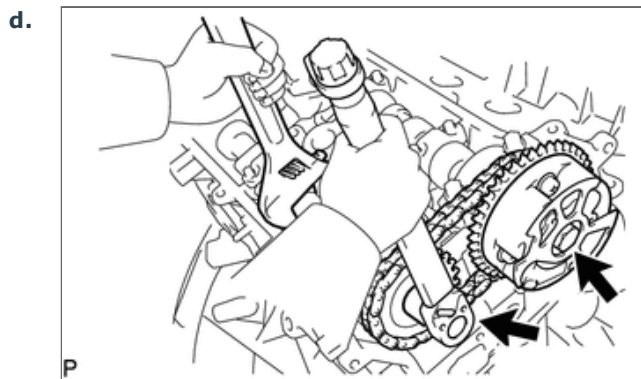


Align the timing marks on the camshaft timing gear assembly and camshaft timing sprocket with the timing marks on the camshaft bearing caps, and install the camshaft timing gear assembly and camshaft timing sprocket together with the No. 2 chain sub-assembly.

- c. Temporarily install the camshaft timing gear assembly and camshaft timing sprocket with the 2 bolts.

NOTICE:

Do not push the camshaft timing gear assembly onto the camshaft forcibly when installing it.



Hold the hexagonal portion of the No. 2 camshaft with a wrench and tighten the 2 bolts.

Torque:

100 N*m (1020 kgf*cm, 74 ft.*lbf)

- e. Remove the pin from the No. 2 chain tensioner assembly.

21.INSTALL NO. 1 CHAIN VIBRATION DAMPER

13561

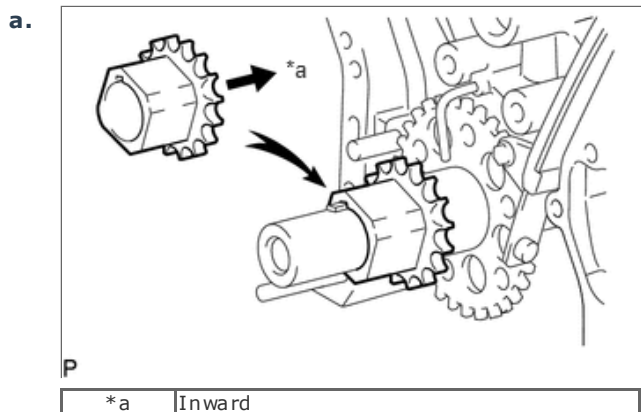
- a. Install the No. 1 chain vibration damper with the 2 bolts.

Torque:

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

22.INSTALL CRANKSHAFT TIMING SPROCKET

13521



Align the crankshaft timing gear key with the groove of the crankshaft timing sprocket and install the crankshaft timing sprocket as shown in the illustration.

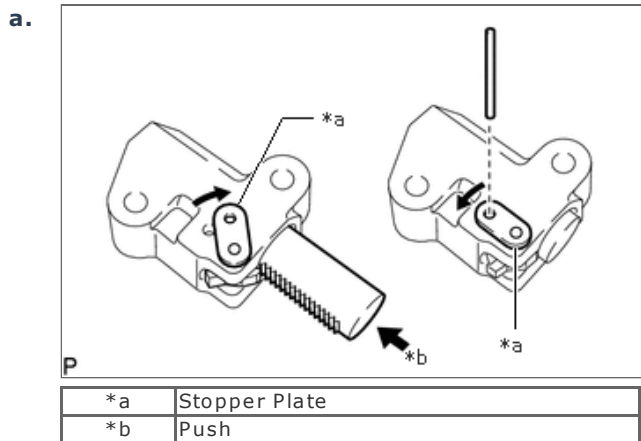
23.INSTALL CHAIN TENSIONER SLIPPER

13559

- a. Install the chain tensioner slipper.

24.INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY

13540



While turning the stopper plate of the No. 1 chain tensioner assembly clockwise, push in the plunger of the No. 1 chain tensioner assembly as shown in the illustration.

- b. While turning the stopper plate of the No. 1 chain tensioner assembly counterclockwise, insert a bar with a diameter of 3.5 mm (0.138 in.) into the holes in the stopper plate and No. 1 chain tensioner assembly to fix the stopper plate in place.

- c. Install the No. 1 chain tensioner assembly with the 2 bolts.

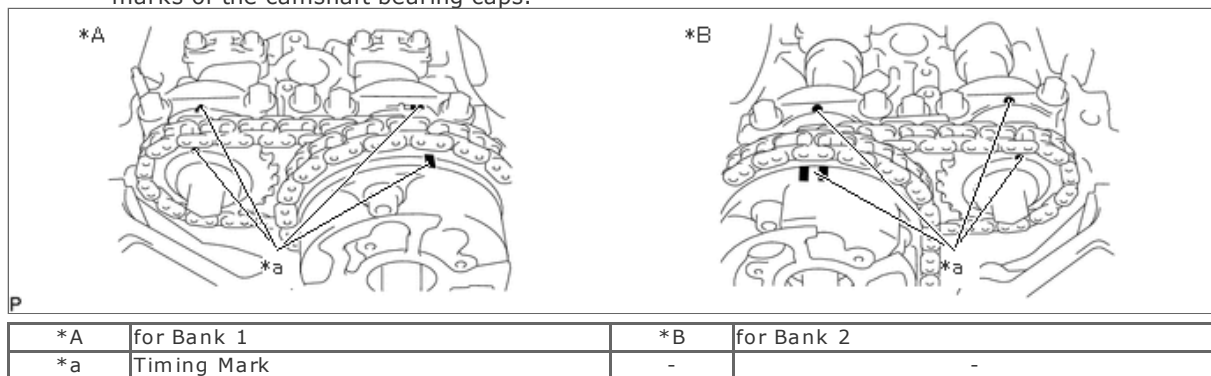
Torque:

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

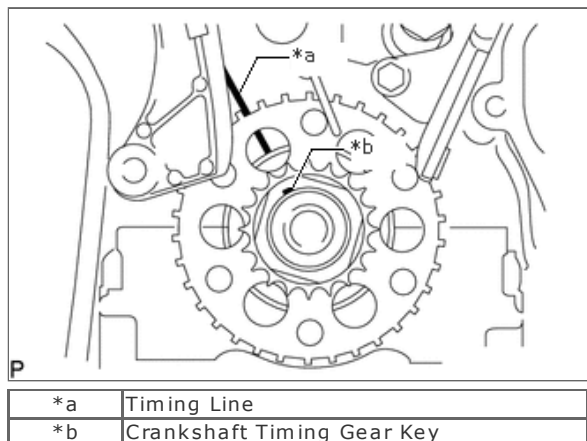
25.SET NO. 1 CYLINDER TO TDC/COMPRESSION

- a. Set the No. 1 cylinder to TDC/compression.

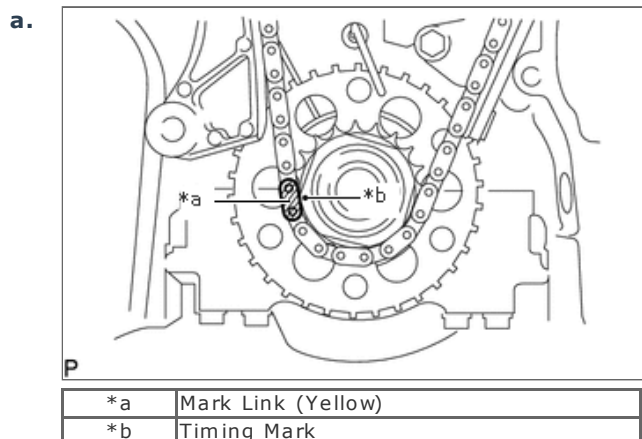
- i. Align the timing marks of the camshaft timing gear assemblies and camshaft timing sprockets with the timing marks of the camshaft bearing caps.



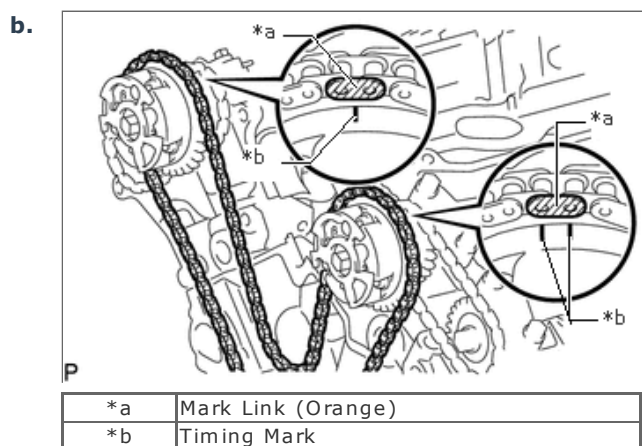
- ii.



Temporarily install the crankshaft pulley set bolt and turn the crankshaft to align the crankshaft timing gear key with the timing line of the cylinder block sub-assembly.



Align the mark link (yellow) of the chain sub-assembly with the timing mark of the crankshaft timing sprocket.



Align the mark links (orange) of the chain sub-assembly with the timing marks of the camshaft timing gear assemblies and install the chain sub-assembly.

27.INSTALL NO. 2 CHAIN VIBRATION DAMPER

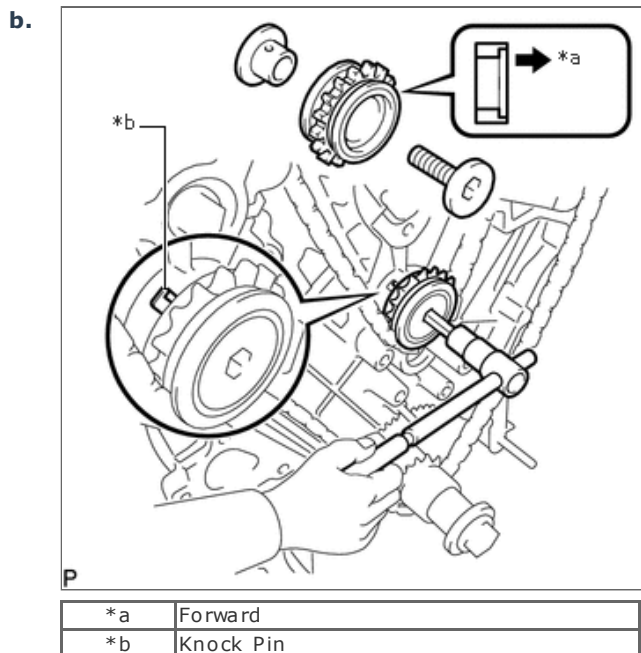
- a. Install the 2 No. 2 chain vibration dampers.

28.INSTALL IDLE SPROCKET ASSEMBLY

- a. Apply a light coat of engine oil to the rotating surface of the No. 1 idle gear shaft.

HINT:

Check for foreign matter on the No. 1 idle gear shaft and No. 2 idle gear shaft.



Temporarily install the No. 1 idle gear shaft and idle sprocket assembly together with the No. 2 idle gear shaft while aligning the knock pin of the No. 1 idle gear shaft with the knock pin groove of the cylinder block sub-assembly.

NOTICE:

Make sure the idle sprocket assembly is installed facing the proper direction.

- c. Using a 10 mm hexagon wrench, tighten the No. 2 idle gear shaft.

Torque:

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

- d. Remove the bar from the No. 1 chain tensioner assembly.

29.INSTALL ENGINE WATER PUMP ASSEMBLY

16100

- a. Install a new gasket and the engine water pump assembly with the 8 bolts.

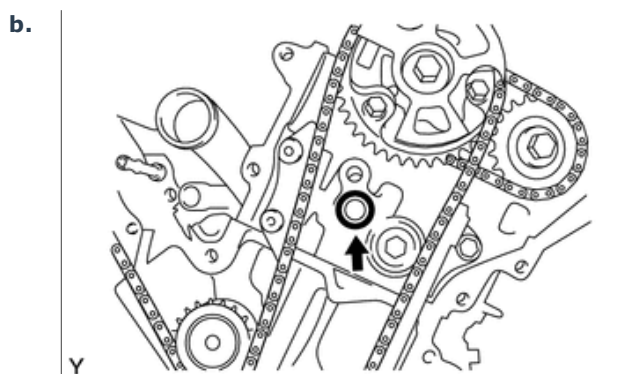
Torque:

11 N*m (112 kgf*cm, 8 ft.*lbf)

30.INSTALL TIMING CHAIN COVER SUB-ASSEMBLY

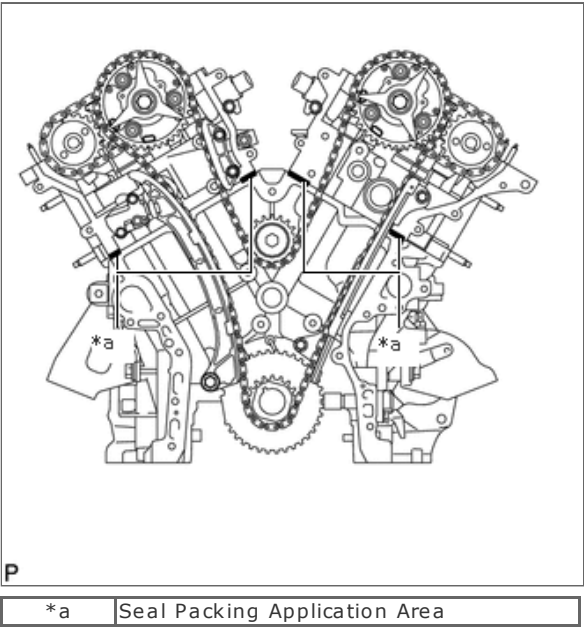
11302

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



Install a new O-ring to the cylinder head LH as shown in the illustration.

c.

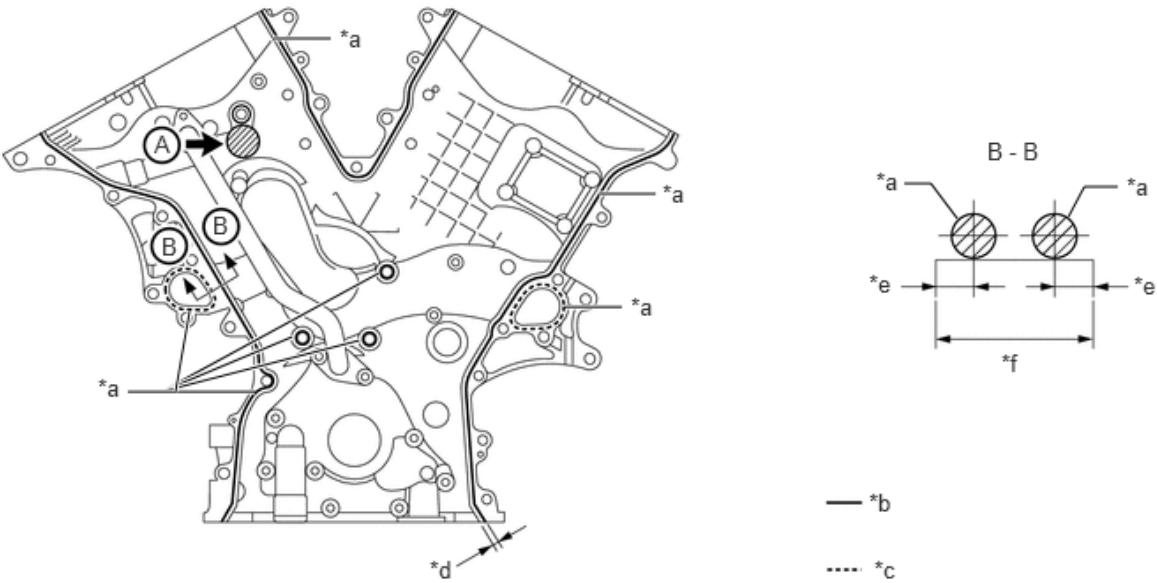


Apply seal packing as shown in the illustration.

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.)

d. Apply seal packing as shown in the illustration.



*a	Seal Packing	*b	Continuous Line Area
*c	Dashed Line Area	*d	3.0 to 4.0 mm (0.118 to 0.157 in.)
*e	3.5 to 4.0 mm (0.138 to 0.157 in.)	*f	16.7 mm (0.657 in.)

Seal packing:
Continuous line area:
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent
Dashed line area:
Toyota Genuine Seal Packing 1282B, Three Bond 1282B or equivalent

Standard seal diameter:
3.5 to 4.5 mm (0.138 to 0.177 in.)

NOTICE:

- Install the timing chain cover sub-assembly within 3 minutes after applying seal packing. After installing it, the bolts and nuts must be tightened within 15 minutes. Otherwise, the seal packing must be removed and reapplied.
- Do not apply seal packing to "A" shown in the illustration.

e.

*a	15°
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Align the width of the joint portion of the oil pump drive rotor and the crankshaft timing gear, and then install the timing chain or belt cover sub-assembly.

f.

	Bolt A
	Bolt B
	Nut

Install the timing chain cover sub-assembly with the 24 bolts and 2 nuts. Tighten the bolts and nuts uniformly in several steps.

Torque:
 for nut : 23 N*m (235 kgf*cm, 17 ft.*lbf)
 for bolt : 21 N*m (214 kgf*cm, 15 ft.*lbf)

NOTICE:

- Install the timing chain cover sub-assembly 15 minutes or more after installing the engine water pump assembly.
- Make sure that there is no oil on the bolt threads.

Standard Bolt Length:

Item	Specified Condition
Bolt A	25 mm (0.984 in.)
Bolt B	55 mm (2.17 in.)

31.INSTALL FRONT CRANKSHAFT OIL SEAL

11301C

Click hereEngine / Hybrid System>1GR-FE ENGINE MECHANICAL>FRONT CRANKSHAFT OIL SEAL>INSTALLATION

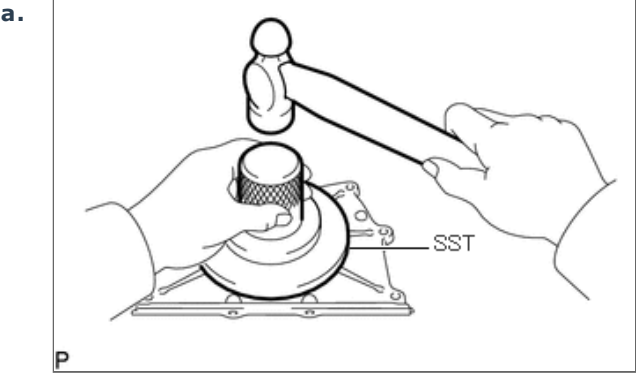
32.INSTALL TIMING CHAIN COVER PLATE

11324

Click hereEngine / Hybrid System>1GR-FE ENGINE MECHANICAL>CAMSHAFT>INSTALLATION

33.INSTALL ENGINE REAR OIL SEAL

11381A



Using SST and a hammer, tap in a new engine rear oil seal until its surface is flush with the engine rear oil seal retainer edge.

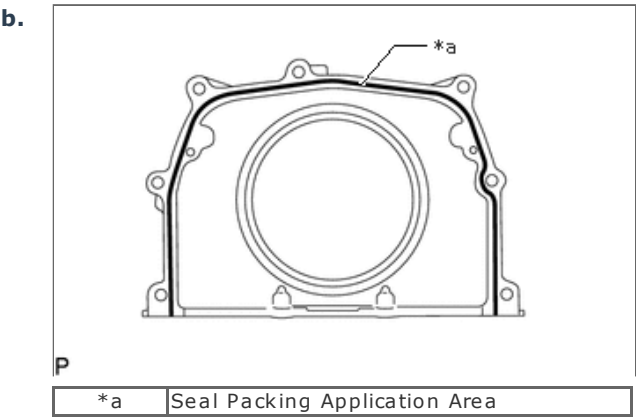
SST
09223-78010

- b. Apply MP grease to the lip of the engine rear oil seal.

34.INSTALL ENGINE REAR OIL SEAL RETAINER

11381

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



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.)

NOTICE:

Parts must be assembled within 3 minutes of application. Otherwise the seal packing must be removed and reapplied.

- c. Install the engine rear oil seal retainer with the 5 bolts and 2 nuts.

Torque:

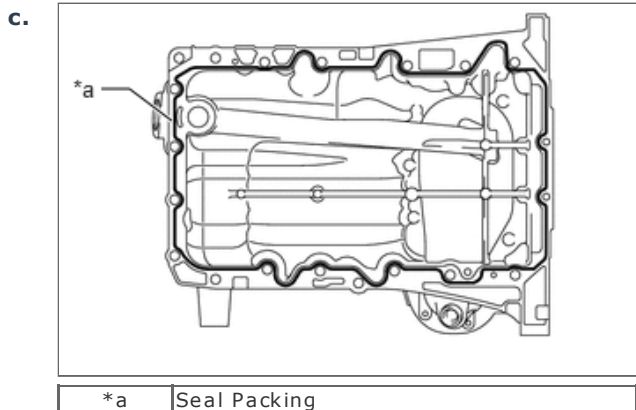
for nut : 9.0 N*m (92 kgf*cm, 80 in.*lbf)

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

35.INSTALL OIL PAN SUB-ASSEMBLY

12101

- 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 sub-assembly.
- b. Install a new O-ring to the timing chain cover.



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

Seal packing:

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

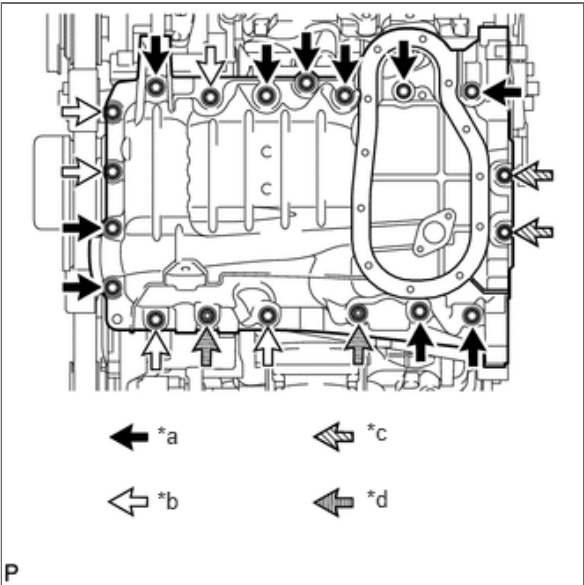
Standard seal diameter:

3.0 to 4.0 mm (0.118 to 0.157 in.)

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 2 hours after installing.

d.



*a	Bolt A
*b	Bolt B
*c	Bolt C
*d	Nut

Install the oil pan sub-assembly with the 17 bolts (A, B and C) and 2 nuts. Tighten the bolts and nuts uniformly in several steps.

Torque:
for bolt A, B and nut : 21 N*m (214 kgf*cm, 15 ft.*lbf)
for bolt C : 10 N*m (102 kgf*cm, 7 ft.*lbf)

Standard Bolt:

Item	Quantity	Length
Bolt A	10	45 mm (1.77 in.)
Bolt B	5	25 mm (0.984 in.)
Bolt C	2	14 mm (0.551 in.)

36.INSTALL OIL STRAINER SUB-ASSEMBLY

15104

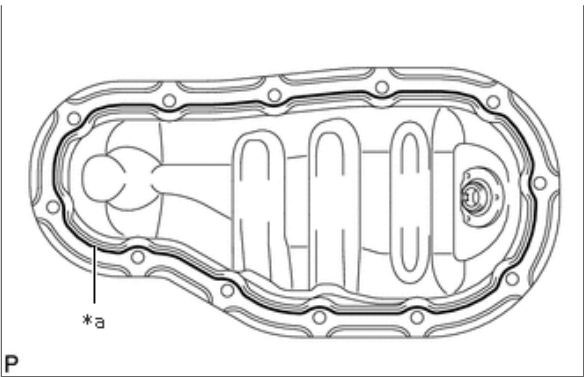
a. Install a new gasket and the oil strainer sub-assembly with the 2 nuts.

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

37.INSTALL NO. 2 OIL PAN SUB-ASSEMBLY

12102A

a.



*a	Seal Packing
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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.)

NOTICE:

- Remove any oil from the contact surface.
- Install the No. 2 oil pan sub-assembly within 3 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after installation.

- b. Install the No. 2 oil pan sub-assembly with the 10 bolts and 2 nuts. Tighten the bolts and nuts uniformly in several steps.

Torque:

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

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

38.INSTALL OIL PAN DRAIN PLUG

12101A

- a. Install a new gasket and the oil pan drain plug.

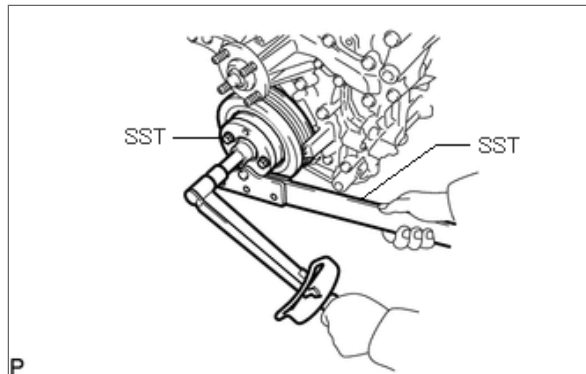
Torque:

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

39.INSTALL CRANKSHAFT PULLEY

13471

a.



Using SST, install the crankshaft pulley with the crankshaft pulley set bolt.

SST

09213-54015 (91651-60855)

09330-00021

Torque:

250 N*m (2549 kgf*cm, 184 ft.*lbf)

40.SET NO. 1 CYLINDER TO TDC/COMPRESSION

[Click here](#)Engine / Hybrid System>1GR-FE ENGINE MECHANICAL>VALVE CLEARANCE>ADJUSTMENT

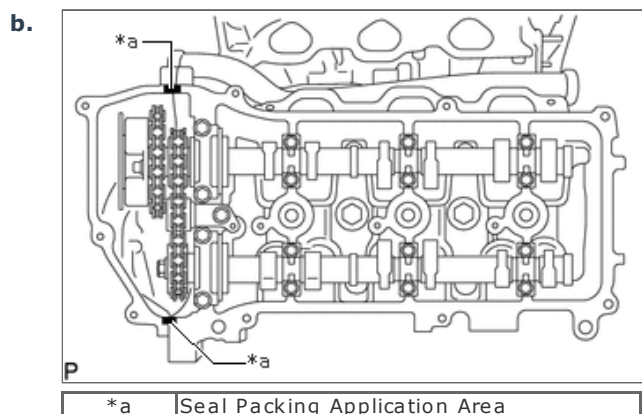
41.INSPECT VALVE CLEARANCE

[Click here](#)Engine / Hybrid System>1GR-FE ENGINE MECHANICAL>VALVE CLEARANCE>ADJUSTMENT

42.ADJUST VALVE CLEARANCE

[Click here](#)Engine / Hybrid System>1GR-FE ENGINE MECHANICAL>VALVE CLEARANCE>ADJUSTMENT

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



Apply seal packing as shown in the illustration.

Seal packing:

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

Standard seal diameter:

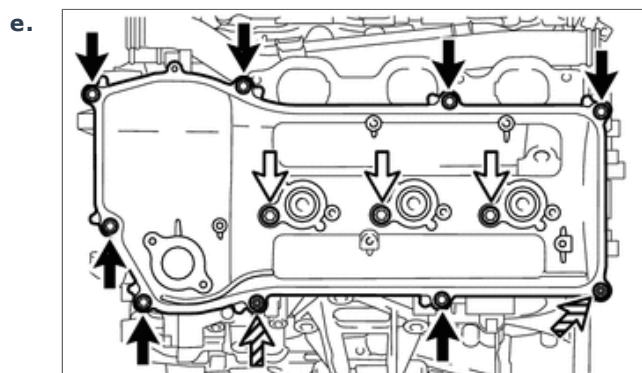
2.0 to 3.0 mm (0.0787 to 0.118 in.)




NOTICE:

- Remove any oil from the contact surface.
- Install the cylinder head cover sub-assembly LH within 3 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after the installation.

- c. Install a new gasket to the cylinder head cover sub-assembly LH.

- d. Install the seal washers to the bolts.



	Bolt A
	Bolt B
	Nut

Temporarily install the cylinder head cover sub-assembly LH with the 10 bolts and 2 nuts. Tighten the bolts and nuts uniformly in several steps.

Torque:

for bolt A : 10 N*m (102 kgf*cm, 7 ft.*lbf)

for bolt B and nut : 9.0 N*m (92 kgf*cm, 80 in.*lbf)

Standard Bolt Length:

Item	Specified Condition
Bolt A	25 mm (0.984 in.)
Bolt B	60 mm (2.36 in.)

44.INSTALL PCV VALVE SUB-ASSEMBLY

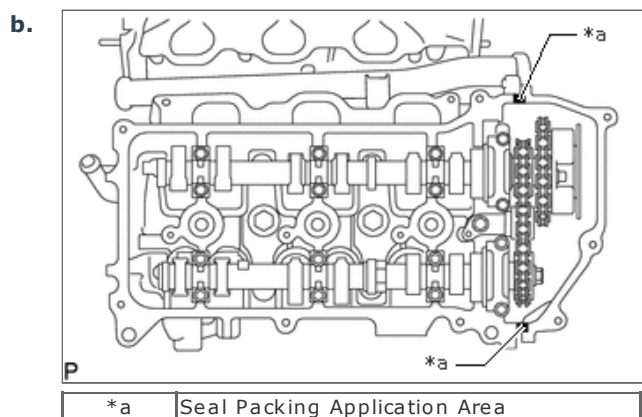
12204

[Click here](#)Engine / Hybrid System>1GR-FE EMISSION CONTROL>PCV VALVE>INSTALLATION

45.INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY

11201

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



Apply seal packing as shown in the illustration.

Seal packing:

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

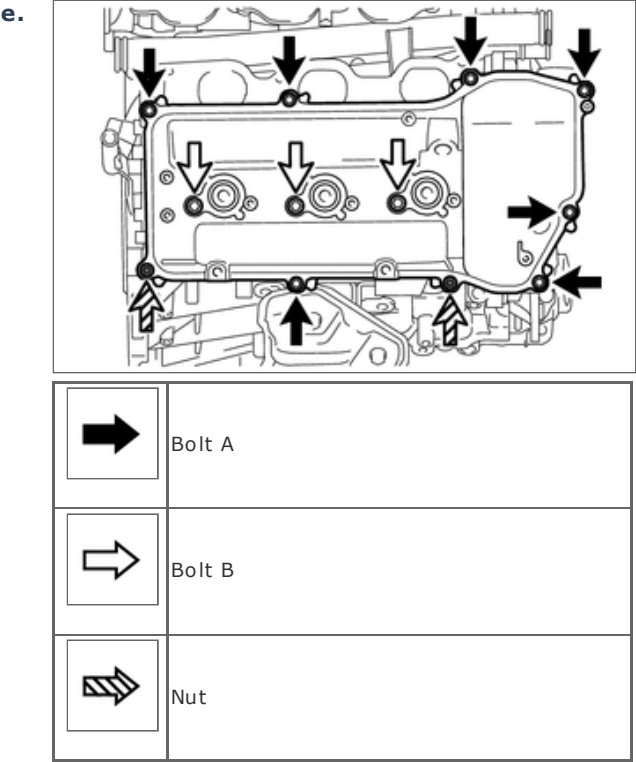
Standard seal diameter:

2.0 to 3.0 mm (0.0787 to 0.118 in.)

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 2 hours after the installation.

- c. Install a new gasket to the cylinder head cover sub-assembly.
- d. Install the seal washers to the bolts.



Temporarily install the cylinder head cover sub-assembly with the 10 bolts and 2 nuts. Tighten the bolts and nuts uniformly in several steps.

Torque:
for bolt A : 10 N*m (102 kgf*cm, 7 ft.*lbf)
for bolt B and nut : 9.0 N*m (92 kgf*cm, 80 in.*lbf)

Standard Bolt Length:

Item	Specified Condition
Bolt A	25 mm (0.984 in.)
Bolt B	60 mm (2.36 in.)

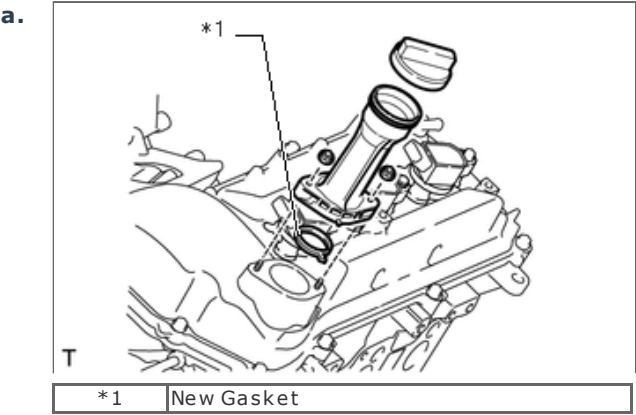
46.INSTALL SPARK PLUG

19100P

[Click here](#)Engine / Hybrid System>1GR-FE ENGINE CONTROL>IGNITION COIL AND SPARK PLUG>INSTALLATION

47.INSTALL OIL FILLER CAP HOUSING

12185



Install a new gasket and the oil filler cap housing with the 2 nuts.

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

48.INSTALL OIL FILLER CAP SUB-ASSEMBLY

12108

- a. Install the oil filler cap sub-assembly.

49.INSTALL REAR WATER BY-PASS JOINT

16356

[Click here](#)Engine / Hybrid System>1GR-FE LUBRICATION>OIL PUMP>INSTALLATION

50.INSTALL WATER INLET HOUSING

16323

- a. Install a new O-ring and a new gasket.

HINT:

Apply soapy water to a new O-ring.

- b. Install the water inlet housing with the 5 bolts.

Torque:

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

NOTICE:

Make sure that the O-rings do not become trapped.

51.INSTALL NO. 3 WATER BY-PASS HOSE

16267

- a. Install the No. 3 water by-pass hose, and slide the 2 hose clamps to secure the hoses.

52.INSTALL NO. 2 WATER BY-PASS HOSE

16264

- a. Install the No. 2 water by-pass hose, and slide the 2 hose clamps to secure the hoses.

53.INSTALL NO. 1 WATER BY-PASS HOSE

16261

- a. Install the No. 1 water by-pass hose, and slide the 2 hose clamps to secure the hoses.

54.INSTALL OIL FILTER BRACKET SUB-ASSEMBLY

15609

- a. Install a new O-ring to the timing chain cover sub-assembly.

- b. Install the oil filter bracket sub-assembly with the 3 bolts and 2 nuts.

Torque:

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

55.INSTALL OIL COOLER ASSEMBLY

15710

[Click here](#)Engine / Hybrid System>1GR-FE LUBRICATION>ENGINE OIL COOLER>INSTALLATION

56.INSTALL OIL COOLER HOSE

15777

[Click here](#)Engine / Hybrid System>1GR-FE LUBRICATION>ENGINE OIL COOLER>INSTALLATION

57.INSTALL NO. 2 OIL COOLER HOSE

15778

[Click here](#)Engine / Hybrid System>1GR-FE LUBRICATION>ENGINE OIL COOLER>INSTALLATION

58.INSTALL OIL FILTER SUB-ASSEMBLY

15601

59.INSTALL OIL CONTROL VALVE FILTER

15678A

a.

P

*1	New Gasket
*a	Mesh Part
	Adhesive

Make sure that the mesh is free from damage and foreign matter.

- b. Install 2 new gaskets to 2 new oil control valve filters.
- c. Install the 2 oil control filters into the 2 new unions.
- d. Apply adhesive to 2 or 3 threads of the unions.

Adhesive:

Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent
- e. Install the 2 unions to the cylinder head sub-assembly and cylinder head LH.

Torque:

62 N*m (632 kgf*cm, 46 ft.*lbf)

60.INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (for Bank 2)

15330B

Click hereEngine / Hybrid System>1GR-FE ENGINE CONTROL>CAMSHAFT OIL CONTROL VALVE>INSTALLATION

61.INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (for Bank 1)

15330B

Click hereEngine / Hybrid System>1GR-FE ENGINE CONTROL>CAMSHAFT OIL CONTROL VALVE>INSTALLATION

62.INSTALL CRANKSHAFT POSITION SENSOR

Click hereEngine / Hybrid System>1GR-FE ENGINE CONTROL>CRANKSHAFT POSITION SENSOR>INSTALLATION

63.INSTALL VVT SENSOR (for Bank 2)

11301M

Click hereEngine / Hybrid System>1GR-FE ENGINE CONTROL>CAMSHAFT POSITION SENSOR>INSTALLATION

64.INSTALL VVT SENSOR (for Bank 1)

11301M

Click hereEngine / Hybrid System>1GR-FE ENGINE CONTROL>CAMSHAFT POSITION SENSOR>INSTALLATION

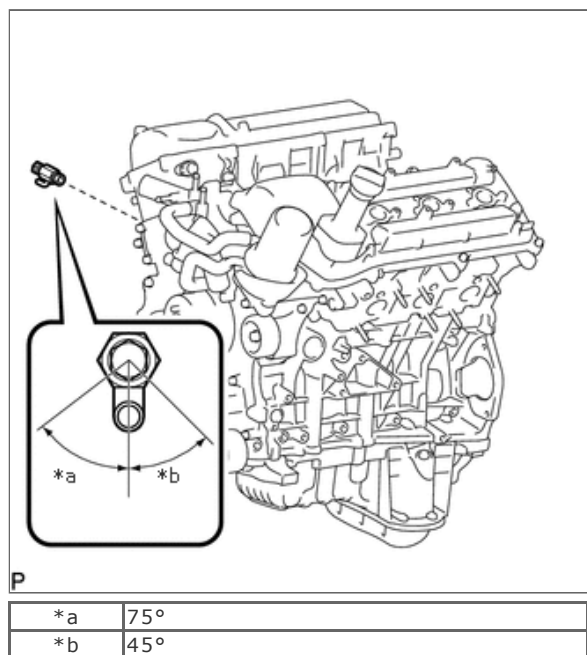
65.INSTALL CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY

11415

- a. Remove any oil from the threads of the cylinder block water drain cock sub-assembly.
- b. Apply adhesive to 2 or 3 threads at the end of the cylinder block water drain cock sub-assembly.

Adhesive:
Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent

c.



Install the cylinder block water drain cock sub-assembly.

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

NOTICE:

- Install the cylinder block water drain cock sub-assembly within 3 minutes after applying adhesive.
- Do not expose the cylinder block water drain cock sub-assembly to engine coolant within 1 hour after installing.

d. Rotate the cylinder block water drain cock sub-assembly clockwise as shown in the illustration.

NOTICE:

- Do not rotate the cylinder block water drain cock sub-assembly by more than 1 revolution (360°) after tightening the cylinder block water drain cock sub-assembly to the specified torque.
- Do not loosen the cylinder block water drain cock sub-assembly after setting it correctly.

66.INSTALL ENGINE COOLANT TEMPERATURE SENSOR

89422C

[Click here](#)Engine / Hybrid System>1GR-FE ENGINE CONTROL>ENGINE COOLANT TEMPERATURE SENSOR>INSTALLATION

67.INSTALL OIL PRESSURE SENDER GAUGE ASSEMBLY (w/ Oil Pressure Gauge)

83520

[Click here](#)Engine / Hybrid System>1GR-FE LUBRICATION>OIL PRESSURE SENSOR>INSTALLATION

68.INSTALL ENGINE OIL PRESSURE SWITCH ASSEMBLY (w/o Oil Pressure Gauge)

83530

[Click here](#)Engine / Hybrid System>1GR-FE LUBRICATION>OIL PRESSURE SWITCH>INSTALLATION