1GR-FE ENGINE MECHANICAL ENGINE UNIT DISASSEMBLY

PROCEDURE

83520 1.REMOVE OIL PRESSURE SENDER GAUGE ASSEMBLY (w/ Oil Pressure Gauge)

Click hereEngine / Hybrid System>1GR-FE LUBRICATION>OIL PRESSURE SENSOR>REMOVAL

2.REMOVE ENGINE OIL PRESSURE SWITCH ASSEMBLY (w/o Oil Pressure Gauge) 83530

Click hereEngine / Hybrid System>1GR-FE LUBRICATION>OIL PRESSURE SWITCH>REMOVAL

■ 3.REMOVE ENGINE COOLANT TEMPERATURE SENSOR

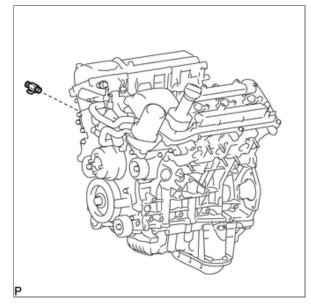
89422

Click hereEngine / Hybrid System>1GR-FE ENGINE CONTROL>ENGINE COOLANT TEMPERATURE SENSOR>REMOVAL

4.REMOVE CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY

11415

a.



Remove the cylinder block water drain cock sub-assembly.

5.REMOVE VVT SENSOR (for Bank 1)

11301M

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

6.REMOVE VVT SENSOR (for Bank 2)

11301M

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

7.REMOVE CRANKSHAFT POSITION SENSOR

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

8.REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (for Bank 1)

15330B

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

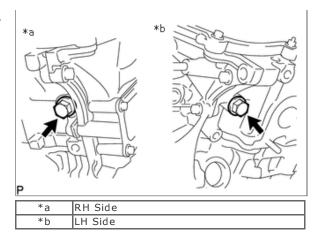
9.REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (for Bank 2)

15330B

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

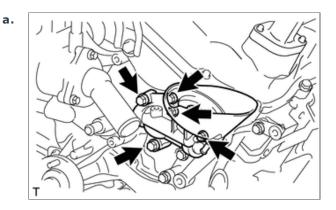
■ 10.REMOVE OIL CONTROL VALVE FILTER

15678A



Remove the 2 unions, 2 oil control valve filters and 2 gaskets.

778
777
710
7



■ 15.REMOVE OIL FILTER BRACKET SUB-ASSEMBLY

Remove the 3 bolts, 2 nuts, oil filter bracket sub-assembly and O-ring.

16.REMOVE NO. 1 WATER BY-PASS HOSE

a. Slide the 2 hose clamps and remove the No. 1 water by-pass hose.

17.REMOVE NO. 2 WATER BY-PASS HOSE 16264

a. Slide the 2 hose clamps and remove the No. 2 water by-pass hose.

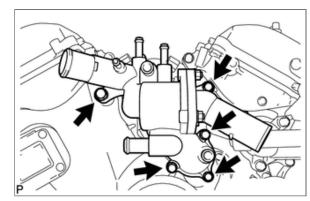
■ 18.REMOVE NO. 3 WATER BY-PASS HOSE

a. Slide the 2 hose clamps and remove the No. 3 water by-pass hose.

19.REMOVE WATER INLET HOUSING

16323

a.



Remove the 5 bolts, water inlet housing, O-ring and gasket.

20.REMOVE REAR WATER BY-PASS JOINT

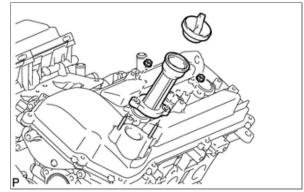
16356

Click hereEngine / Hybrid System>1GR-FE LUBRICATION>OIL PUMP>REMOVAL

21.REMOVE OIL FILLER CAP SUB-ASSEMBLY

12108

a.



Remove the oil filler cap sub-assembly.

22.REMOVE OIL FILLER CAP HOUSING

12185

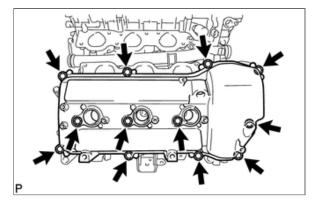
a. Remove the 2 nuts, oil filler cap housing and gasket.

23.REMOVE SPARK PLUG

19100P

Click hereEngine / Hybrid System>1GR-FE ENGINE CONTROL>IGNITION COIL AND SPARK PLUG>REMOVAL

24.REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY



Remove the 10 bolts, 3 seal washers, 2 nuts, cylinder head cover sub-assembly and gasket.

25.REMOVE PCV VALVE SUB-ASSEMBLY

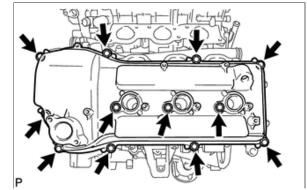
12204

Click hereEngine / Hybrid System>1GR-FE EMISSION CONTROL>PCV VALVE>REMOVAL

26.REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY LH

11202

a.



Remove the 10 bolts, 3 seal washers, 2 nuts, cylinder head cover sub-assembly LH and gasket.

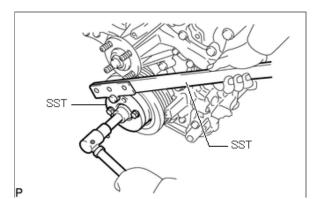
27.SET NO. 1 CYLINDER TO TDC/COMPRESSION

Click hereEngine / Hybrid System>1GR-FE ENGINE MECHANICAL>VALVE CLEARANCE>ADJUSTMENT

28.REMOVE CRANKSHAFT PULLEY

13471

a.

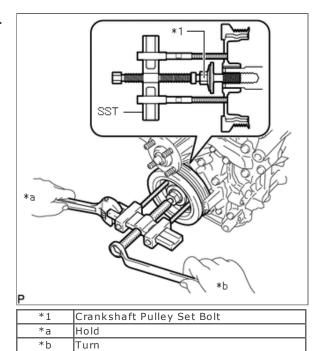


Using SST, hold the crankshaft pulley and loosen the crankshaft pulley set bolt.

SST 09213-54015 (91651-60855) 09330-00021

b. Screw the crankshaft pulley set bolt into the crankshaft by 2 or 3 threads.

c.



Using the crankshaft pulley set bolt and SST, remove the crankshaft pulley.

SS1

09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05031)

29.REMOVE OIL PAN DRAIN PLUG

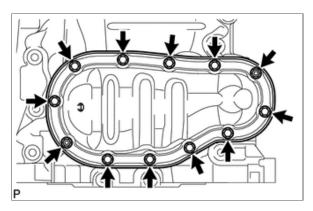
12101A

a. Remove the oil pan drain plug and gasket.

30.REMOVE NO. 2 OIL PAN SUB-ASSEMBLY

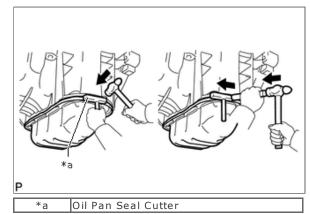
12102A

a.



Remove the 10 bolts and 2 nuts.

b.



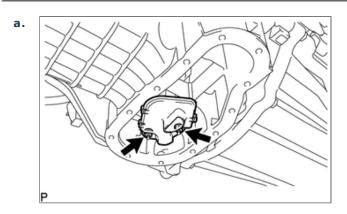
Insert the blade of an oil pan seal cutter between the oil pan sub-assembly and No. 2 oil pan sub-assembly. Cut through the applied sealer and remove the No. 2 oil pan sub-assembly.

NOTICE:

Be careful not to damage the contact surfaces of the oil pan sub-assembly and No. 2 oil pan sub-assembly.

31.REMOVE OIL STRAINER SUB-ASSEMBLY

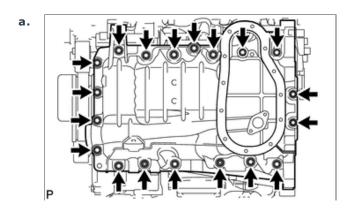
15104



Remove the 2 nuts, oil strainer sub-assembly and gasket.

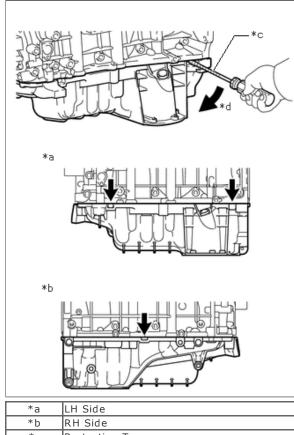
32.REMOVE OIL PAN SUB-ASSEMBLY

12101



Remove the 17 bolts and 2 nuts.



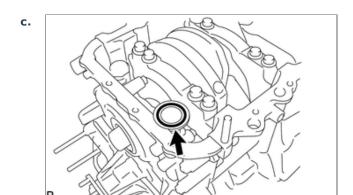


*a	LH Side
*b	RH Side
*c	Protective Tape
* d	Pry

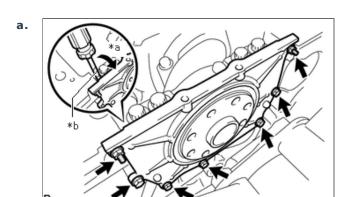
Using a screwdriver, remove the oil pan sub-assembly by prying between the oil pan sub-assembly and cylinder block sub-assembly as shown in the illustration.

Be careful not to damage the contact surfaces of the cylinder block sub-assembly and oil pan sub-assembly.

Tape the screwdriver tip before use.



Remove the O-ring from the timing chain cover sub-assembly.



Remove the 5 bolts and 2 nuts.

Protective Tape

b. Using a screwdriver, remove the engine rear oil seal retainer by prying between the engine rear oil seal retainer and crankshaft bearing cap.

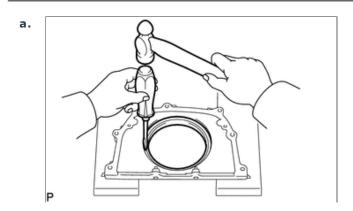
HINT:

*a *b

Tape the screwdriver tip before use.

34.REMOVE ENGINE REAR OIL SEAL

11381A

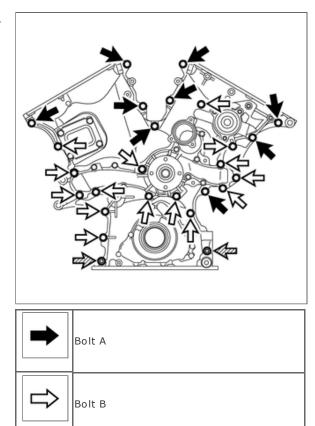


Using a screwdriver and hammer, tap out the engine rear oil seal.

NOTICE:

Be careful not to damage the engine rear oil seal retainer.

35.REMOVE TIMING CHAIN COVER SUB-ASSEMBLY

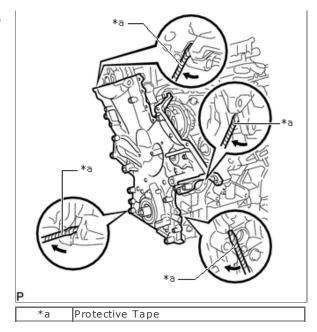


Remove the 24 bolts and 2 nuts.

Nut

b.

껳



Using a screwdriver wrapped in protective tape, remove the timing chain cover sub-assembly by prying the points in the illustration.

NOTICE:

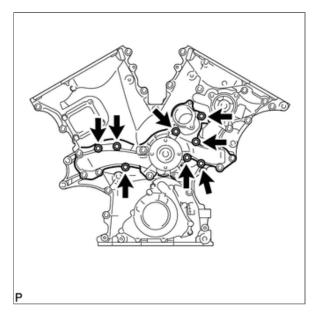
Do not damage the surrounding parts.

HINT:

Tape the screwdriver tip before use.

16100

a.



Remove the 8 bolts, engine water pump assembly and gasket.

■ 37.REMOVE TIMING CHAIN COVER PLATE

11324

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

38.REMOVE FRONT CRANKSHAFT OIL SEAL

11301C

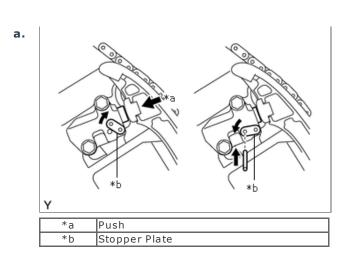
Click hereEngine / Hybrid System>1GR-FE ENGINE MECHANICAL>FRONT CRANKSHAFT OIL SEAL>REMOVAL

■ 39.REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY

13540

NOTICE:

- Never rotate the crankshaft with the No. 1 chain tensioner assembly removed.
- When rotating the camshaft with the timing chain removed, rotate the crankshaft counterclockwise 40° from TDC first.



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. Remove the 2 bolts and No. 1 chain tensioner assembly.

40.REMOVE CHAIN TENSIONER SLIPPER

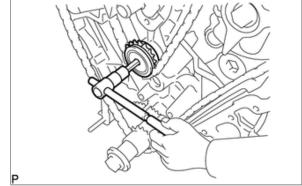
13559

a. Remove the chain tensioner slipper.

41.REMOVE IDLE SPROCKET ASSEMBLY

13530

a.

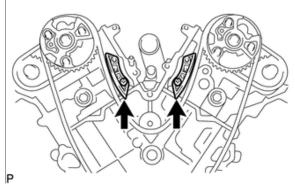


Using a 10 mm hexagon wrench, remove the No. 2 idle gear shaft, idle sprocket assembly and No. 1 idle gear shaft.

42.REMOVE NO. 2 CHAIN VIBRATION DAMPER

13562

a.



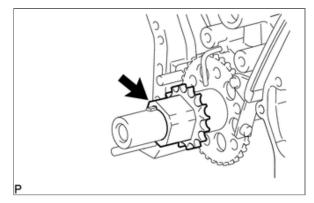
Remove the 2 No. 2 chain vibration dampers.

43.REMOVE CHAIN SUB-ASSEMBLY

13506

a. Remove the chain sub-assembly.

44.REMOVE CRANKSHAFT TIMING SPROCKET



Remove the crankshaft timing sprocket.

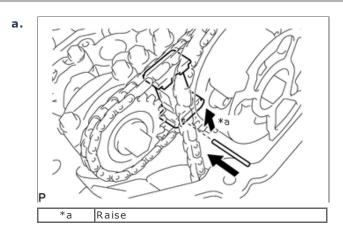
45.REMOVE NO. 1 CHAIN VIBRATION DAMPER

13561

a.

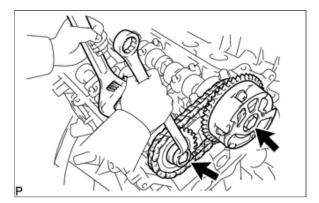
Remove the 2 bolts and No. 1 chain vibration damper.

46.REMOVE CAMSHAFT TIMING GEARS AND NO. 2 CHAIN (for Bank 1)



While raising 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.



Hold the hexagonal portion of the No. 2 camshaft with a wrench and remove the 2 bolts, camshaft timing gear sub-assembly, camshaft timing sprocket and No. 2 chain sub-assembly.

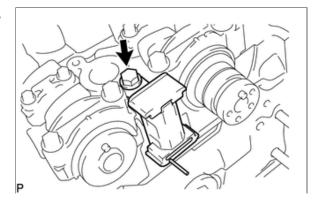
NOTICE:

- · Do not damage the surrounding parts.
- Do not disassemble the camshaft timing gear sub-assembly.

47.REMOVE NO. 2 CHAIN TENSIONER ASSEMBLY

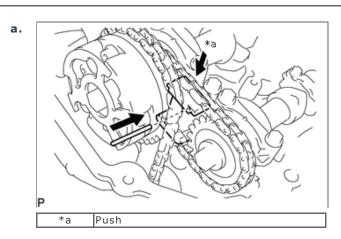
13550

a.



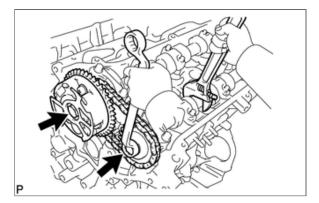
Remove the bolt and No. 2 chain tensioner assembly.

48.REMOVE CAMSHAFT TIMING GEARS AND NO. 2 CHAIN (for Bank 2)



While raising 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.



Hold the hexagonal portion of the No. 4 camshaft sub-assembly with a wrench and remove the 2 bolts, camshaft timing gear sub-assembly, camshaft timing sprocket and No. 2 chain sub-assembly.

NOTICE:

- · Do not damage the surrounding parts.
- Do not disassemble the camshaft timing gear sub-assembly.

49.REMOVE NO. 3 CHAIN TENSIONER ASSEMBLY

13560A

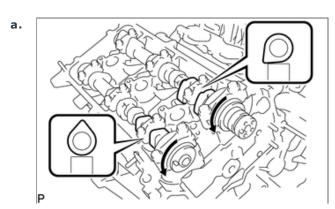
a.

Remove the bolt and No. 3 chain tensioner assembly.

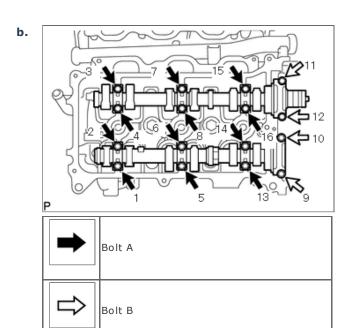
50.REMOVE CAMSHAFT BEARING CAP (for Bank 1)

NOTICE:

As the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being removed. 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.



Rotate the camshaft and No. 2 camshaft counterclockwise and set the camshaft and No. 2 camshaft as shown in the illustration.



Uniformly loosen the 16 bolts in the sequence shown in the illustration and remove the bolts and 8 camshaft bearing caps.

■ 51.REMOVE CAMSHAFT 13511

a. Remove the camshaft.

■ 52.REMOVE NO. 2 CAMSHAFT

13512

a. Remove the No. 2 camshaft.

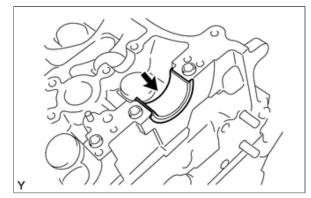
53.REMOVE NO. 1 CAMSHAFT BEARING

11811

a.

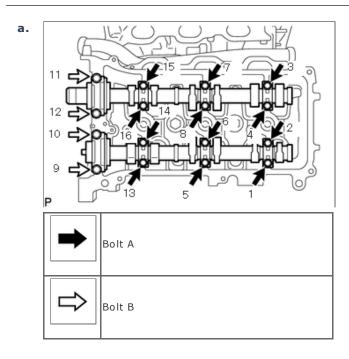
Remove the No. 1 camshaft bearing from the camshaft bearing cap.

■ 54.REMOVE NO. 2 CAMSHAFT BEARING



Remove the No. 2 camshaft bearing from the cylinder head sub-assembly.

55.REMOVE CAMSHAFT BEARING CAP (for Bank 2)



Uniformly loosen the 16 bolts in the sequence shown in the illustration and remove the bolts and 8 camshaft bearing caps.

56.REMOVE NO. 3 CAMSHAFT SUB-ASSEMBLY

13053

a. Remove the No. 3 camshaft sub-assembly.

57.REMOVE NO. 4 CAMSHAFT SUB-ASSEMBLY

13054

a. Remove the No. 4 camshaft sub-assembly.

58.REMOVE CYLINDER HEAD SUB-ASSEMBLY

11101

Click hereEngine / Hybrid System>1GR-FE ENGINE MECHANICAL>CYLINDER HEAD GASKET>REMOVAL

■ 59.REMOVE CYLINDER HEAD GASKET

11115

Click hereEngine / Hybrid System>1GR-FE ENGINE MECHANICAL>CYLINDER HEAD GASKET>REMOVAL

60.REMOVE CYLINDER HEAD LH

Click hereEngine / Hybrid System>1GR-FE ENGINE MECHANICAL>CYLINDER HEAD GASKET>REMOVAL

62.REMOVE NO. 1 WATER OUTLET PIPE

16332

Click hereEngine / Hybrid System>1GR-FE ENGINE CONTROL>KNOCK SENSOR>REMOVAL

■ 63.REMOVE KNOCK SENSOR

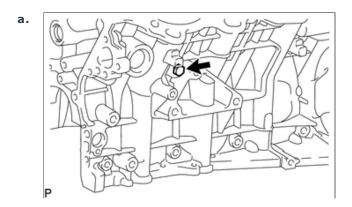
89615

Click hereEngine / Hybrid System>1GR-FE ENGINE CONTROL>KNOCK SENSOR>REMOVAL

■ 64.REMOVE TAPER SCREW PLUG

NOTICE:

It is not necessary to remove a taper screw plug unless it is being replaced.

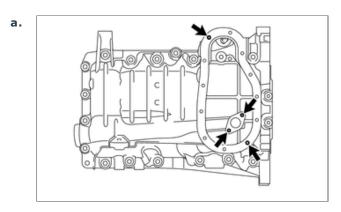


Remove the taper screw plug.

65.REMOVE STUD BOLT

NOTICE:

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



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

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