

## 1GR-FE ENGINE MECHANICAL CAMSHAFT REMOVAL

## PROCEDURE

## 1.REMOVE FAN SHROUD

16711

[Click here](#)Engine / Hybrid System>1GR-FE COOLING>RADIATOR>REMOVAL

## 2.REMOVE INTAKE AIR SURGE TANK

17129

[Click here](#)Engine / Hybrid System>1GR-FE INTAKE / EXHAUST>INTAKE MANIFOLD>REMOVAL

## 3.REMOVE NO. 1 FUEL PIPE SUB-ASSEMBLY AND NO. 2 FUEL PIPE SUB-ASSEMBLY

23801P

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

## 4.REMOVE IGNITION COIL ASSEMBLY

19500

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

## 5.REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY

11201

[Click here](#)Engine / Hybrid System>1GR-FE ENGINE MECHANICAL>ENGINE UNIT>DISASSEMBLY

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

11202

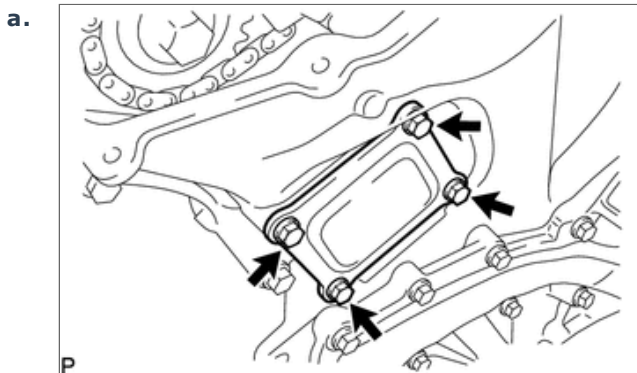
[Click here](#)Engine / Hybrid System>1GR-FE ENGINE MECHANICAL>ENGINE UNIT>DISASSEMBLY

## 7.SET NO. 1 CYLINDER TO TDC/COMPRESSION

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

## 8.REMOVE TIMING CHAIN COVER PLATE

11324



Remove the 4 bolts, timing chain cover plate and gasket.

## 9.REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY

13540

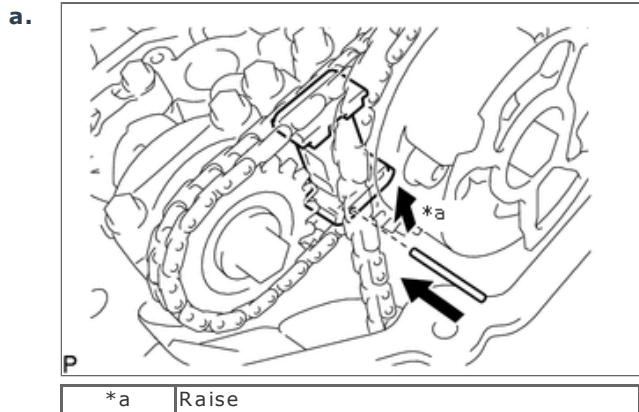
[Click here](#)Engine / Hybrid System>1GR-FE ENGINE MECHANICAL>ENGINE UNIT>DISASSEMBLY

## 10.REMOVE NO. 2 CAMSHAFT

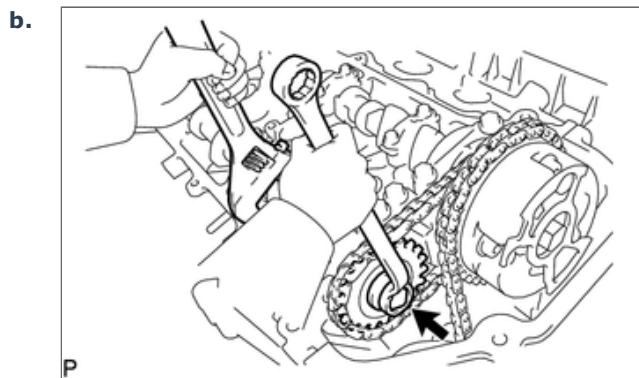
13512

## NOTICE:

As the thrust clearance of the No. 2 camshaft is small, the camshaft must be kept level while it is being removed. If the No. 2 camshaft is not kept level, the portion of the cylinder head which receives the shaft thrust may crack or be damaged, causing the No. 2 camshaft to seize or break. To avoid this, make sure the following steps are carried out.



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.

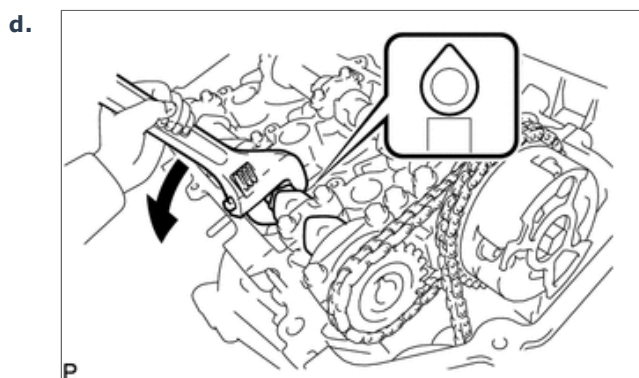


Hold the hexagonal portion of the No. 2 camshaft with a wrench and remove the bolt.

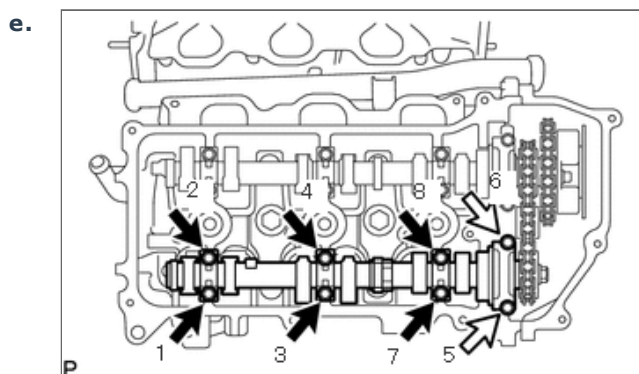
**NOTICE:**

Do not damage the surrounding parts.

- c. Separate the camshaft timing sprocket from the No. 2 camshaft.



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

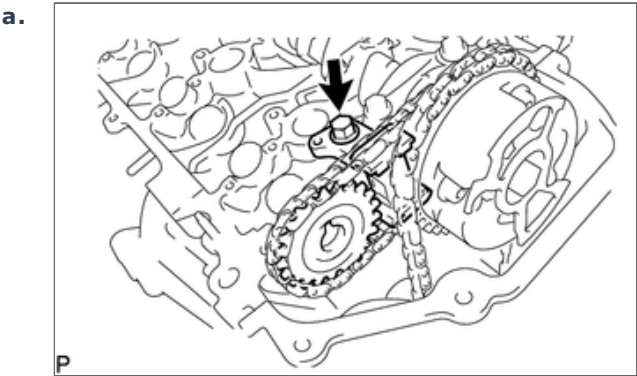


Uniformly loosen the 8 bolts in several steps in the sequence shown in the illustration and remove the bolts.

- f. Remove the 4 camshaft bearing caps and No. 2 camshaft.

**11.REMOVE NO. 2 CHAIN TENSIONER ASSEMBLY**

13550



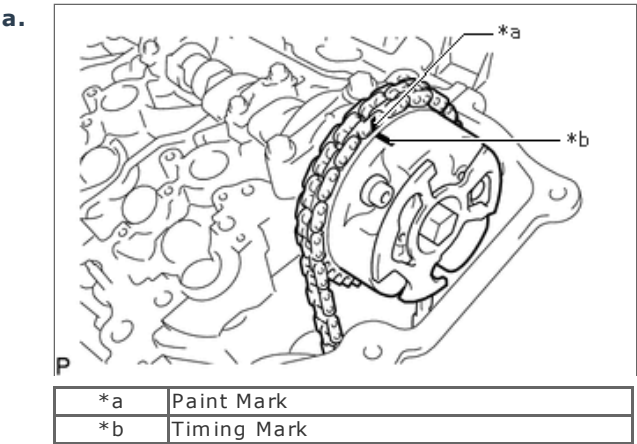
Remove the bolt, No. 2 chain tensioner assembly and camshaft timing sprocket.

**12.REMOVE CAMSHAFT**

13511

**NOTICE:**

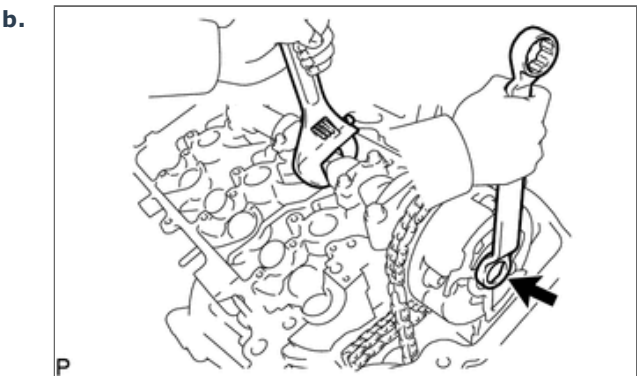
As the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being removed. If the camshaft is not kept level, the portion of the cylinder head which receives the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, make sure the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



Mark the chain link of the chain sub-assembly with paint.

**HINT:**

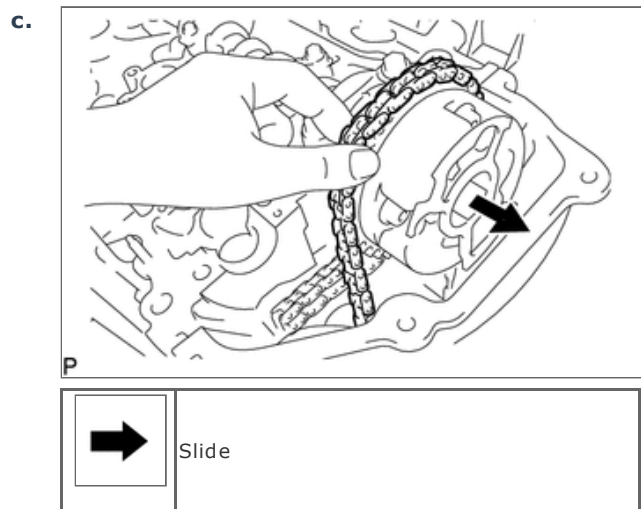
Place the paint mark on the chain link at the location of the timing mark of the camshaft timing gear assembly.



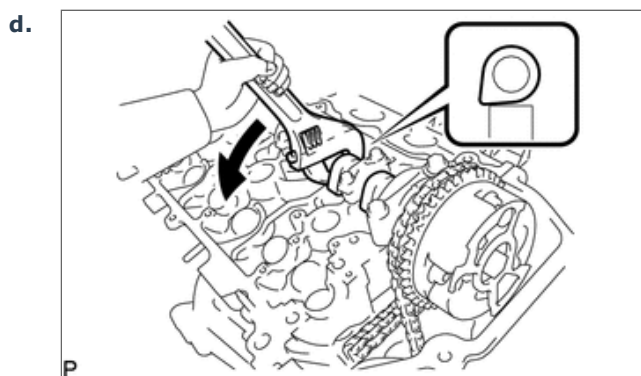
Hold the hexagonal portion of the camshaft with a wrench and loosen the bolt.

**NOTICE:**

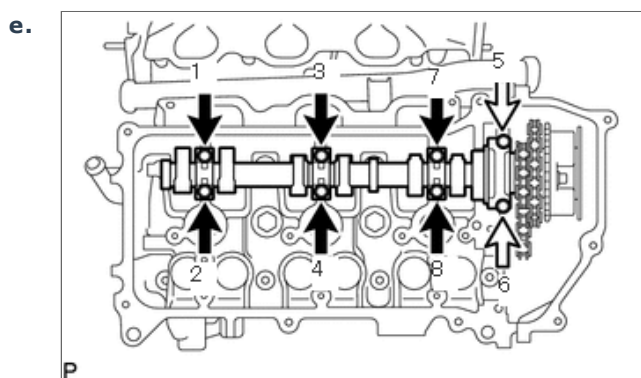
- Do not damage the surrounding parts.
- Do not disassemble the camshaft timing gear assembly.



Slide the camshaft timing gear assembly and separate the chain sub-assembly from the camshaft timing gear assembly.



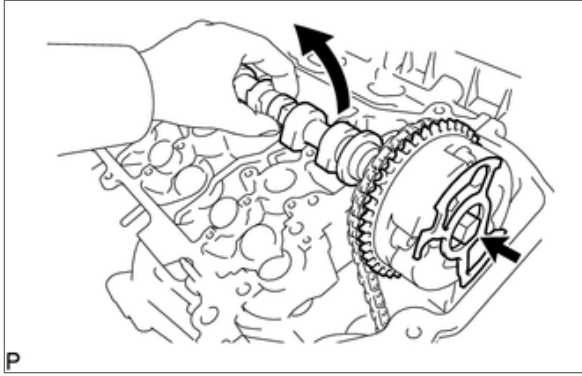
Rotate the camshaft counterclockwise and set it as shown in the illustration.



Uniformly loosen the 8 bolts in several steps in the sequence shown in the illustration and remove the bolts.

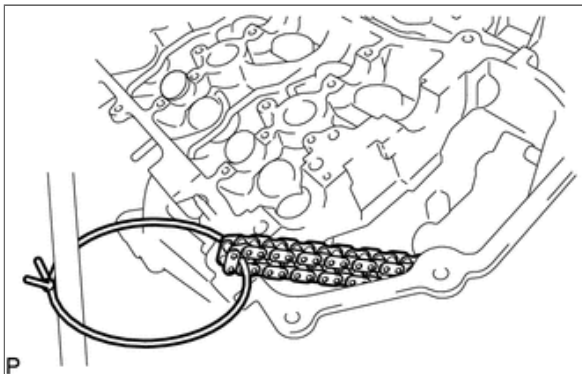
- f. Remove the 4 camshaft bearing caps.

g.



Remove the bolt with the camshaft lifted up, and then remove the camshaft and camshaft timing gear assembly together with the No. 2 chain sub-assembly.

h.



Tie the chain sub-assembly with a string as shown in the illustration.

**NOTICE:**

Be careful not to drop anything inside the timing chain cover sub-assembly.



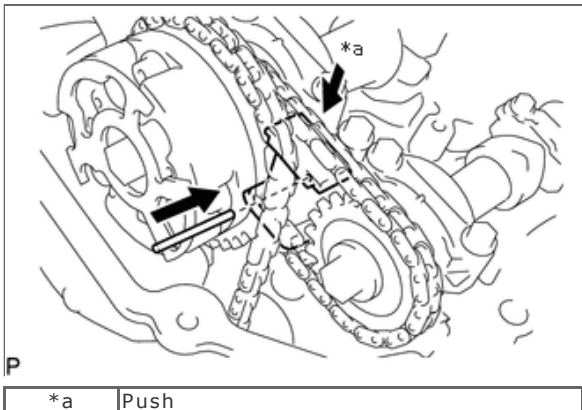
**13.REMOVE NO. 4 CAMSHAFT SUB-ASSEMBLY**

13054

**NOTICE:**

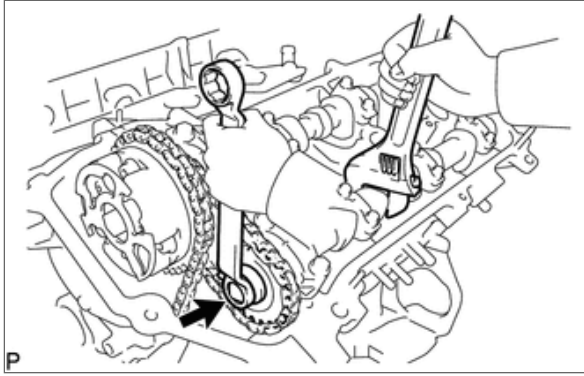
As the thrust clearance of the No. 4 camshaft sub-assembly is small, the No. 4 camshaft sub-assembly must be kept level while it is being removed. If the No. 4 camshaft sub-assembly is not kept level, the portion of the cylinder head which receives the shaft thrust may crack or be damaged, causing the No. 4 camshaft sub-assembly to seize or break. To avoid this, make sure the following steps are carried out.

a.



While pushing down 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.



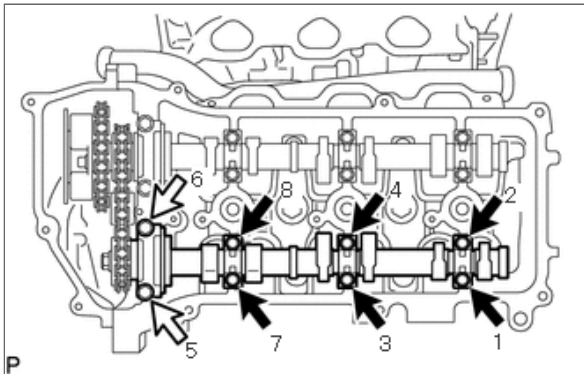
Hold the hexagonal portion of the No. 4 camshaft sub-assembly with a wrench and remove the bolt.

**NOTICE:**

Do not damage the surrounding parts.

c. Separate the camshaft timing sprocket from the No. 4 camshaft sub-assembly.

d.



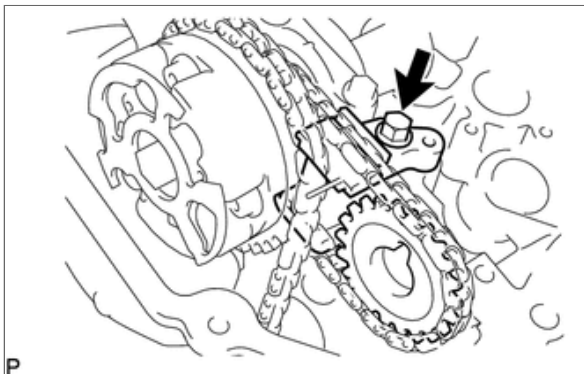
Uniformly loosen the 8 bolts in several steps in the sequence shown in the illustration and remove the bolts.

e. Remove the 4 camshaft bearing caps and No. 4 camshaft sub-assembly.

**14.REMOVE NO. 3 CHAIN TENSIONER ASSEMBLY**

13560A

a.



Remove the bolt, No. 3 chain tensioner assembly and camshaft timing sprocket.

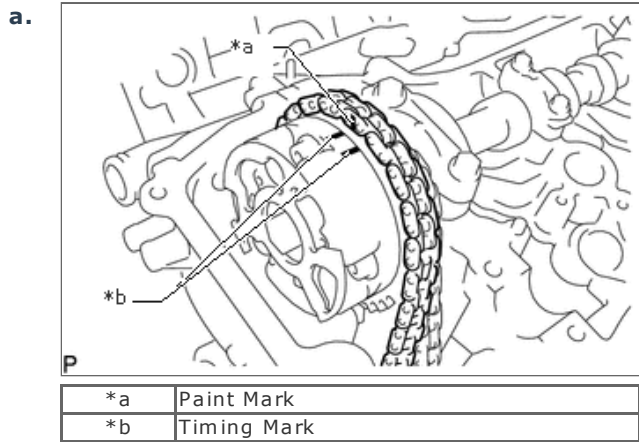
**15.REMOVE NO. 3 CAMSHAFT SUB-ASSEMBLY**

13053

**NOTICE:**

As the thrust clearance of the No. 3 camshaft sub-assembly is small, the No. 3 camshaft sub-assembly must be kept level while it is being removed. If the No. 3 camshaft sub-assembly is not kept level, the portion of the cylinder head which receives the shaft thrust may crack or be damaged, causing the No. 3 camshaft sub-assembly to seize or break. To avoid this, make sure the following steps are carried out.

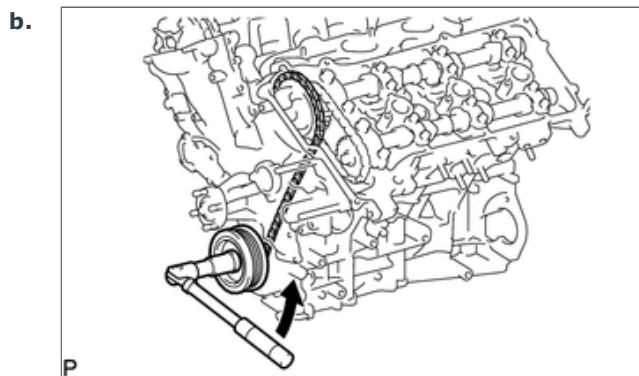




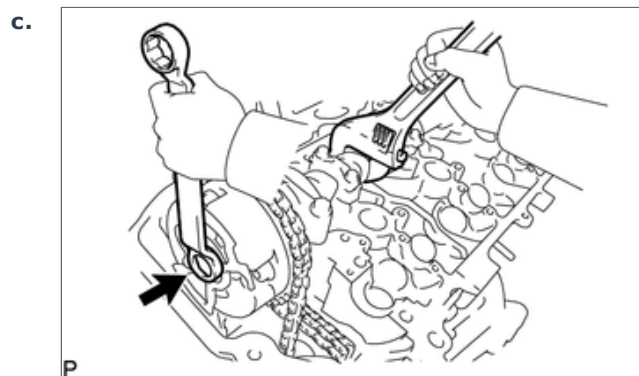
Mark the chain link of the chain sub-assembly with paint.

**HINT:**

Place the paint mark on the chain link at the location of the timing mark of the camshaft timing gear assembly.



Release the chain tension between the camshaft timing gear assembly (for bank 2) and crankshaft timing sprocket by turning the crankshaft counterclockwise slightly.

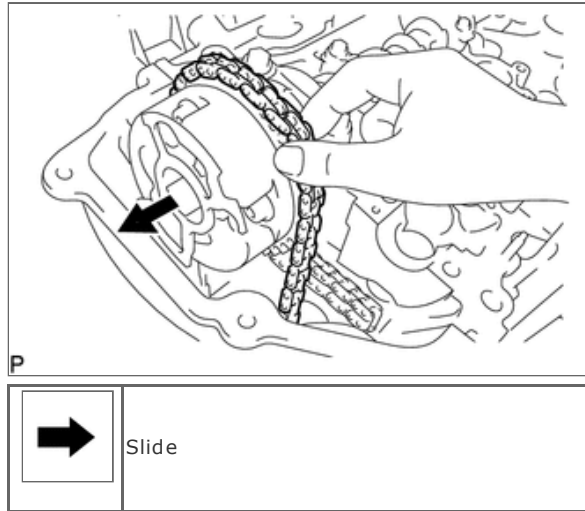


Hold the hexagonal portion of the No. 3 camshaft sub-assembly with a wrench and loosen the bolt.

**NOTICE:**

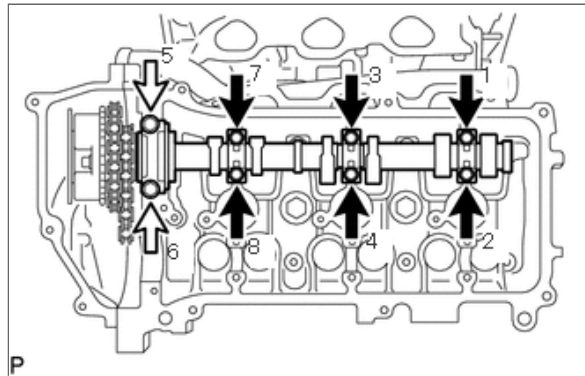
- Do not damage the surrounding parts.
- Do not disassemble the camshaft timing gear assembly.

d.



Slide the camshaft timing gear assembly and separate the chain sub-assembly from the camshaft timing gear assembly.

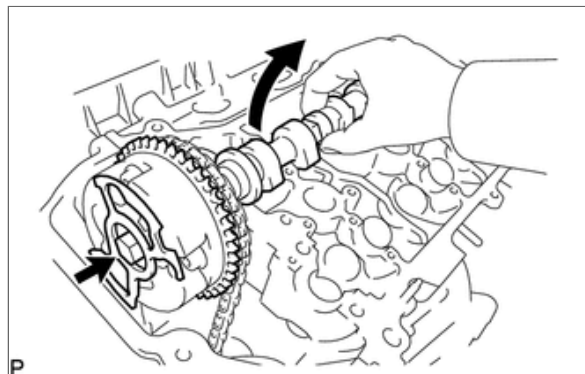
e.



Uniformly loosen the 8 bolts in several steps in the sequence shown in the illustration and remove the bolts.

f. Remove the 4 camshaft bearing caps.

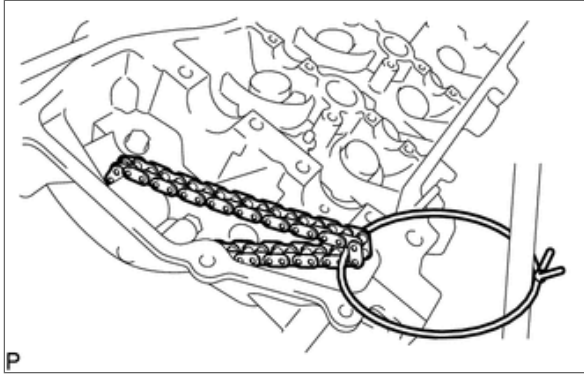
g.



Remove the bolt with the No. 3 camshaft sub-assembly lifted up, and then remove the No. 3 camshaft sub-assembly and camshaft timing gear assembly together with the No. 2 chain sub-assembly.



**h.**



Tie the chain sub-assembly with a string as shown in the illustration.

**NOTICE:**

Be careful not to drop anything inside the timing chain cover sub-assembly.