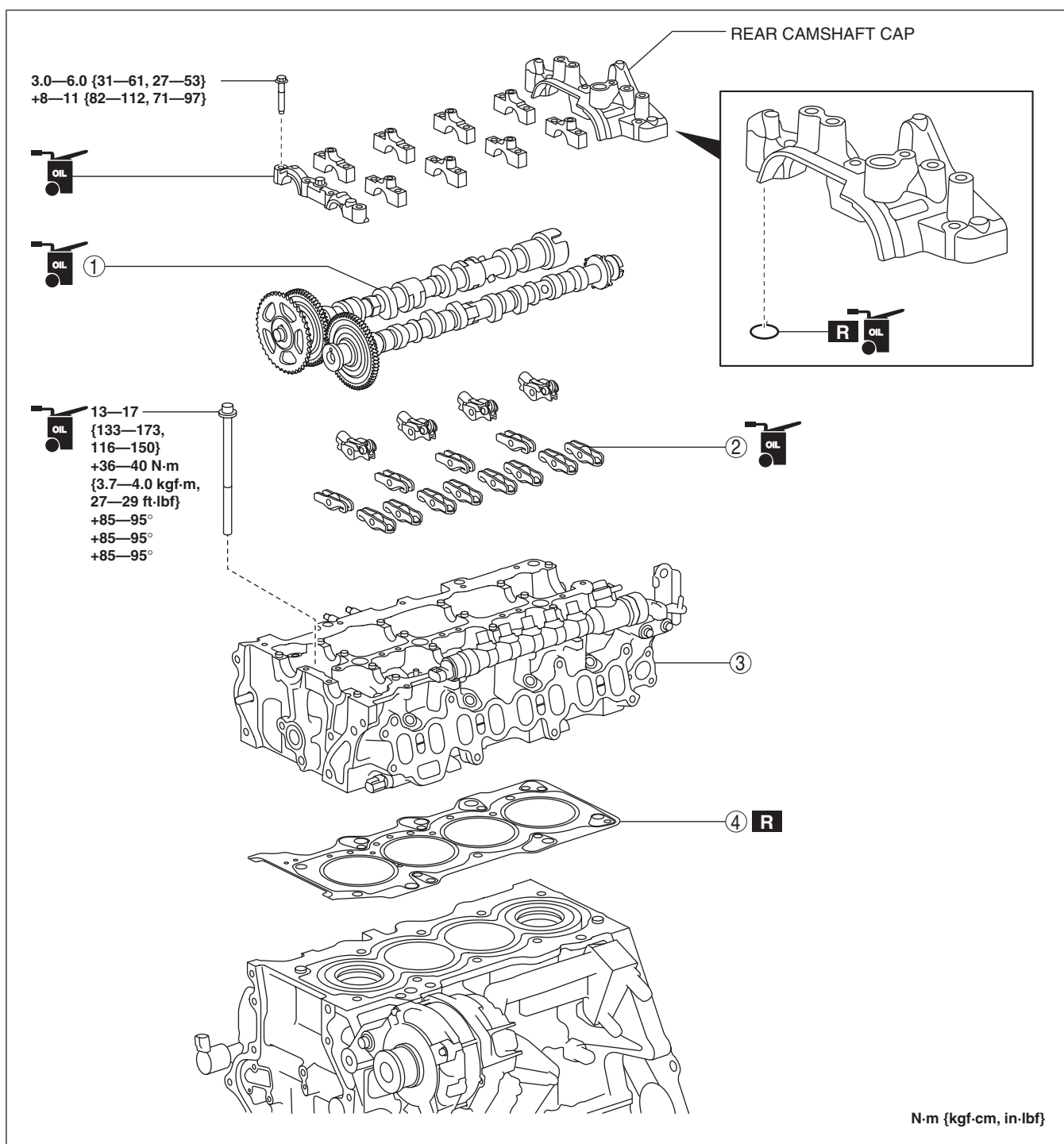


Warning

- **A hot engine can cause severe burns. Turn off the engine and wait until it is cool before servicing.**
- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**
- **Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the “Fuel Line Safety Procedure”. (See BEFORE SERVICE PRECAUTION [SKYACTIV-D 2.2].)**

1. Disconnect the negative battery cable. (See NEGATIVE BATTERY CABLE DISCONNECTION/CONNECTION [SKYACTIV-D 2.2].)
2. Remove the engine cover. (See ENGINE COVER REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
3. Remove the fuel injectors. (See FUEL INJECTOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
4. Remove the front under cover No.2. (See FRONT UNDER COVER No.2 REMOVAL/INSTALLATION.)
5. Remove the splash shield (RH). (See SPLASH SHIELD REMOVAL/INSTALLATION.)
6. Remove the drive belt. (See DRIVE BELT REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
7. Drain the engine oil. (See ENGINE OIL REPLACEMENT [SKYACTIV-D 2.2].)
8. Drain the engine coolant. (See ENGINE COOLANT REPLACEMENT [SKYACTIV-D 2.2].)
9. Disconnect the upper radiator hose.
10. Remove the intake manifold. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
11. Disconnect the catalytic converter from the middle pipe, and remove the catalytic converter. (See EXHAUST SYSTEM REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
12. Remove the turbocharger. (See TURBOCHARGER REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
13. Remove the lower case. (See LOWER CASE REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
14. Remove the vacuum pump. (See VACUUM PUMP REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
15. Remove the supply pump. (See SUPPLY PUMP REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
16. Remove the CMP sensor. (See CAMSHAFT POSITION (CMP) SENSOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
17. Disconnect the heater hose.
18. Remove the oil pan. (See OIL PAN REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
19. Remove the timing chain and chain guide. (See TIMING CHAIN REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
20. Remove in the order indicated in the table.
21. Install in the reverse order of removal.
22. Refill with the specified type and amount of the engine oil. (See ENGINE OIL REPLACEMENT [SKYACTIV-D 2.2].)
23. Refill the engine coolant. (See ENGINE COOLANT REPLACEMENT [SKYACTIV-D 2.2].)
24. Start the engine, and inspect and adjust the following:
 - Leakage of engine oil, engine coolant.
 - Engine oil amount.
 - Runout and contact of pulley and belt.
 - Idle speed. (See ENGINE TUNE-UP [SKYACTIV-D 2.2].)
 - Compression pressure (See COMPRESSION INSPECTION [SKYACTIV-D 2.2].)



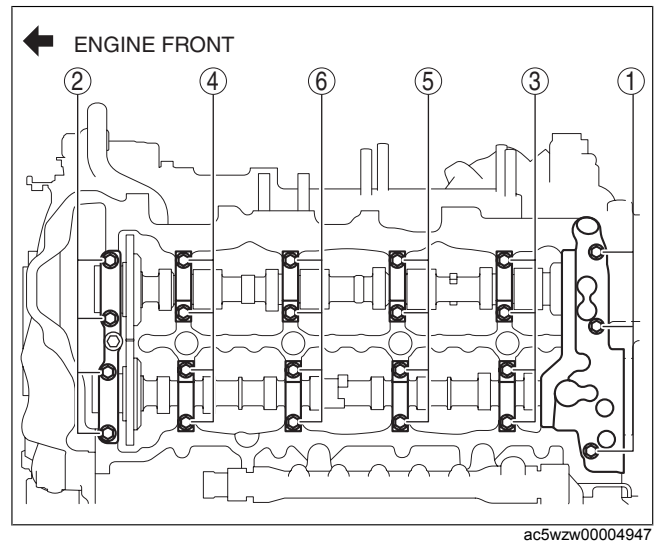
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1	Camshaft (See Camshaft Removal Note.) (See Camshaft Installation Note.)
2	Rocker arm (See Rocker Arm Removal Note.) (See Rocker Arm Installation Note.)

3	Cylinder head (See Cylinder Head Removal Note.) (See Cylinder Head Installation Note.)
4	Cylinder head gasket

Camshaft Removal Note

1. Loosen the camshaft cap installation bolts in a few passes in the order shown in the figure and remove the camshaft caps.
2. Remove the camshaft.



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Rocker Arm Removal Note

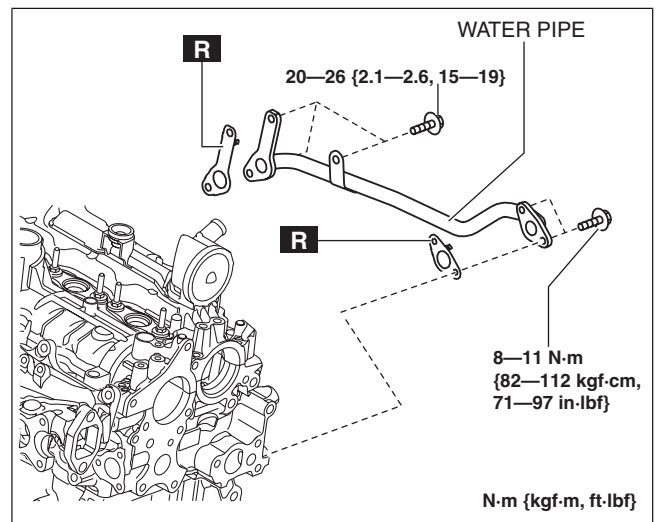
1. Keep the rocker arms in the order of removal to enable reassembly in their original positions.

Cylinder Head Removal Note

1. Remove the water pipe as shown in the figure.
2. Temporarily install the oil pan to support the engine from under the vehicle.

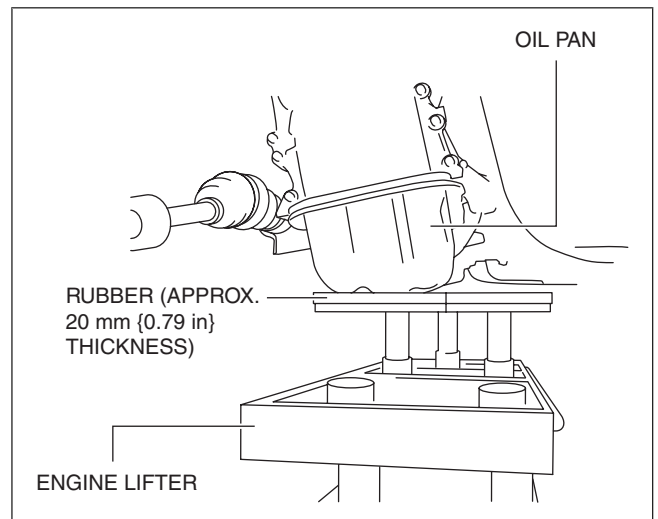
Caution

- To prevent deformation of the oil pan, support the engine using the following methods.
 - When using an engine lifter, insert rubber of appropriate size (approx. 20 mm {0.79 in} thickness) between the engine lifter and the oil pan to support the oil pan.
 - When using a garage jack, place rubber of appropriate size (approx. 20 mm {0.79 in} thickness) on a batten which is large enough to cover and support the oil pan.



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3. Support the engine (oil pan) using a commercially available engine lifter or garage jack.
4. Remove the **SST** (49 L017 5A0) that suspended the engine and set it aside.

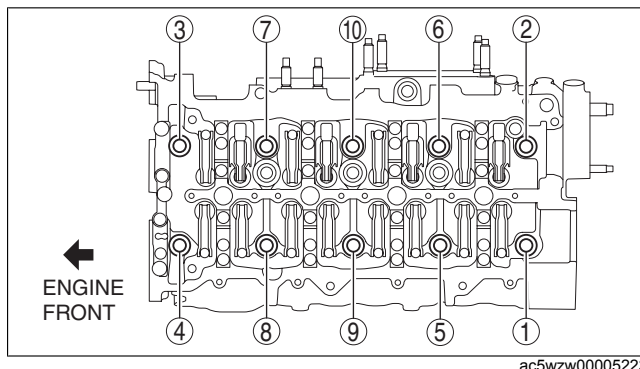


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- Loosen the cylinder head installation bolts in two or three passes in the order shown in the figure and remove them.

Caution

- The end of the glow plug protrudes from the cylinder head (tightened surface of cylinder block). When removing/installing the cylinder head and placing the cylinder head on a workbench, be careful not to allow the end of the glow plug to contact the cylinder block or workbench. Otherwise, the end of the glow plug could be damaged.



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- Remove the cylinder head.

Cylinder Head Installation Note

Caution

- The end of the glow plug protrudes from the cylinder head (tightened surface of cylinder block). When removing/installing the cylinder head and placing the cylinder head on a workbench, be careful not to allow the end of the glow plug to contact the cylinder block or workbench. Otherwise, the end of the glow plug could be damaged.
- If the following condition is met, replace the cylinder head bolts.
 - Length exceeds maximum specification

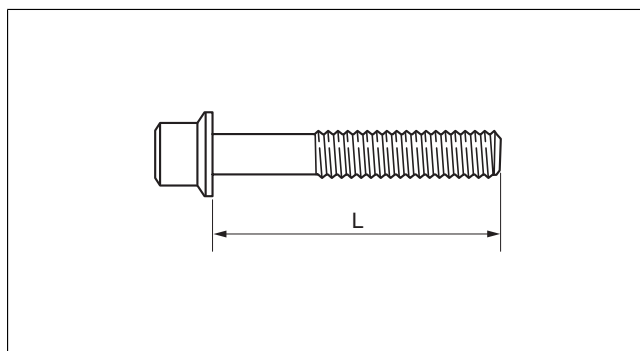
Cylinder head bolt length L

L: 169.2—169.8 mm {6.662—6.685 in}

Cylinder head bolt length L maximum

L: 170.5 mm {6.713 in}

- When a cylinder head bolt is reused, apply engine oil to any part of the following:
 - Bolt seating surface
 - Cylinder head seating surface



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- Tighten the cylinder head bolts in the order shown in the following 5 steps.

Tightening torque

Step 1: 13—17 N·m {133—173 kgf·cm, 116—150 in·lbf}

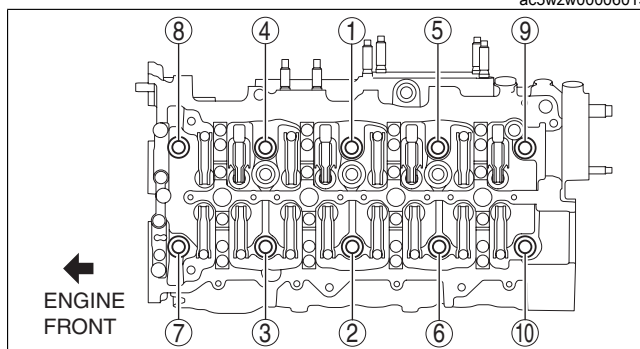
Step 2: 36—40 N·m {3.7—4.0 kgf·m, 27—29 ft·lbf}

Step 3: 85—95°

Step 4: 85—95°

Step 5: 85—95°

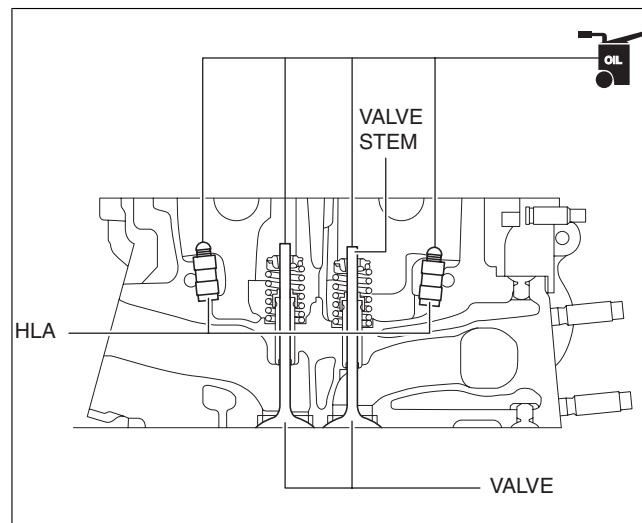
- Install the **SST** which was set aside and secure the engine.
- Remove the engine lifter or garage jack.
- Remove the temporarily assembled oil pan.



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Rocker Arm Installation Note

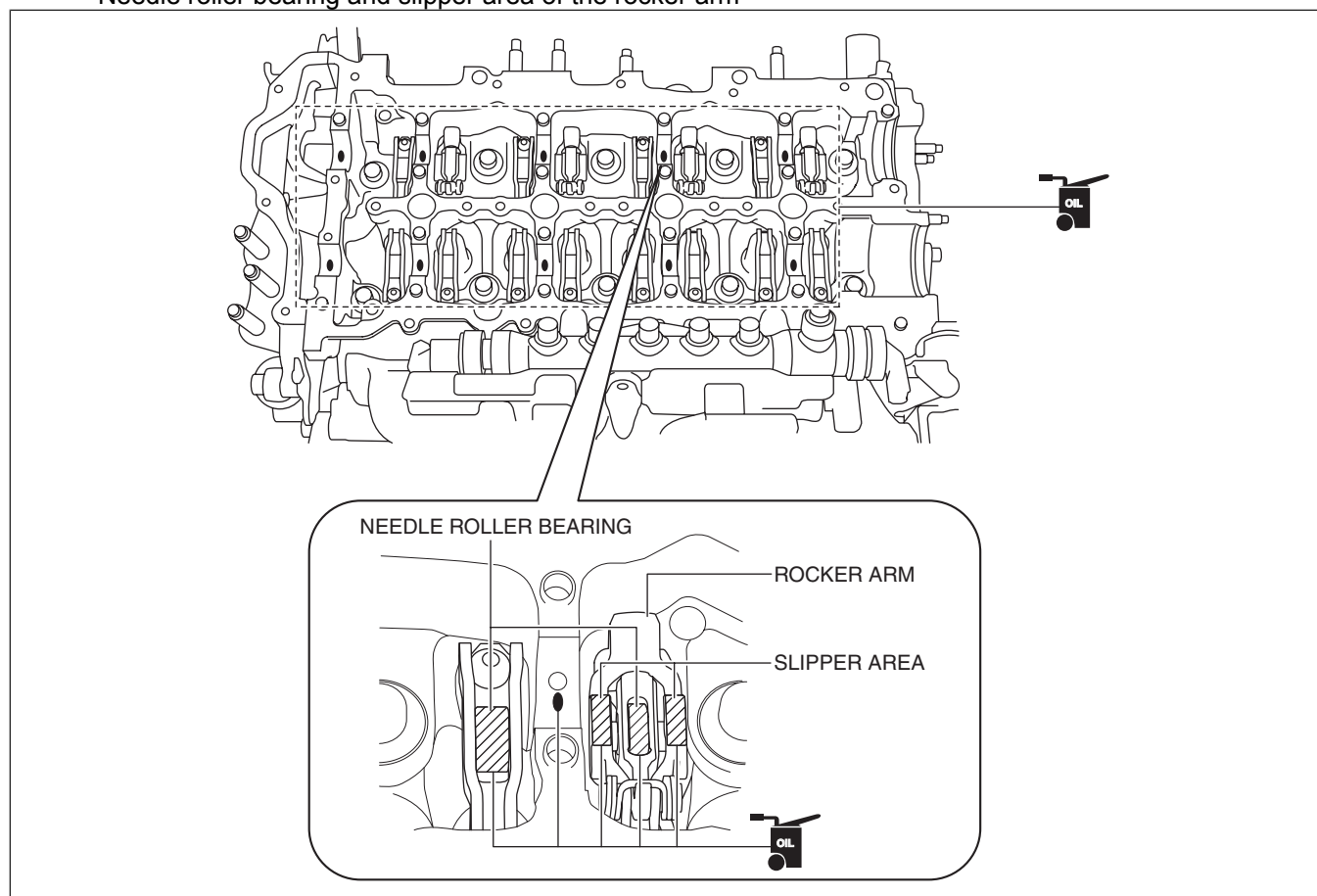
1. Apply engine oil to the HLAs and the end of the valve stems.
2. Install the rocker arms to the same positions as before removal.



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Camshaft Installation Note

1. Apply gear oil (SAE No. 90 or equivalent) or engine oil to the following locations.
 - Each journal of the cylinder heads
 - Needle roller bearing and slipper area of the rocker arm



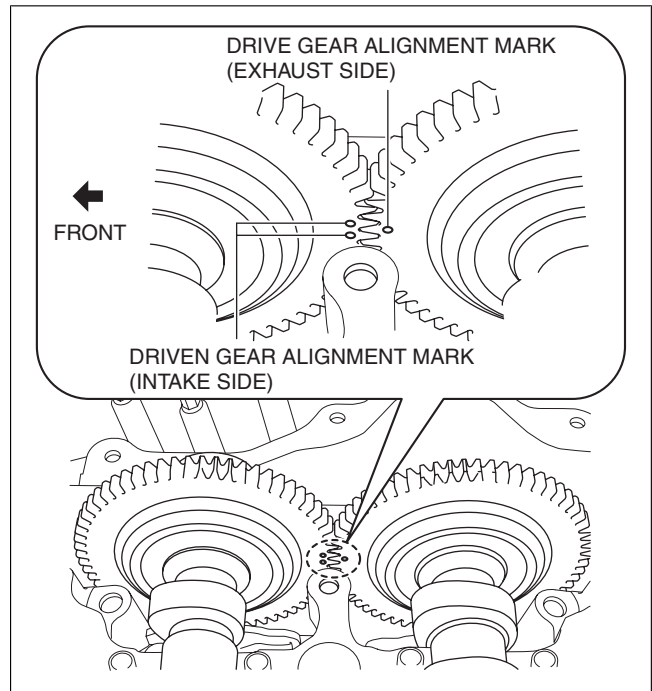
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2. Apply gear oil (SAE 90 or equivalent) or engine oil to the following locations of each camshaft.
 - Gear sliding surfaces
 - Thrust surface of front journal

Note

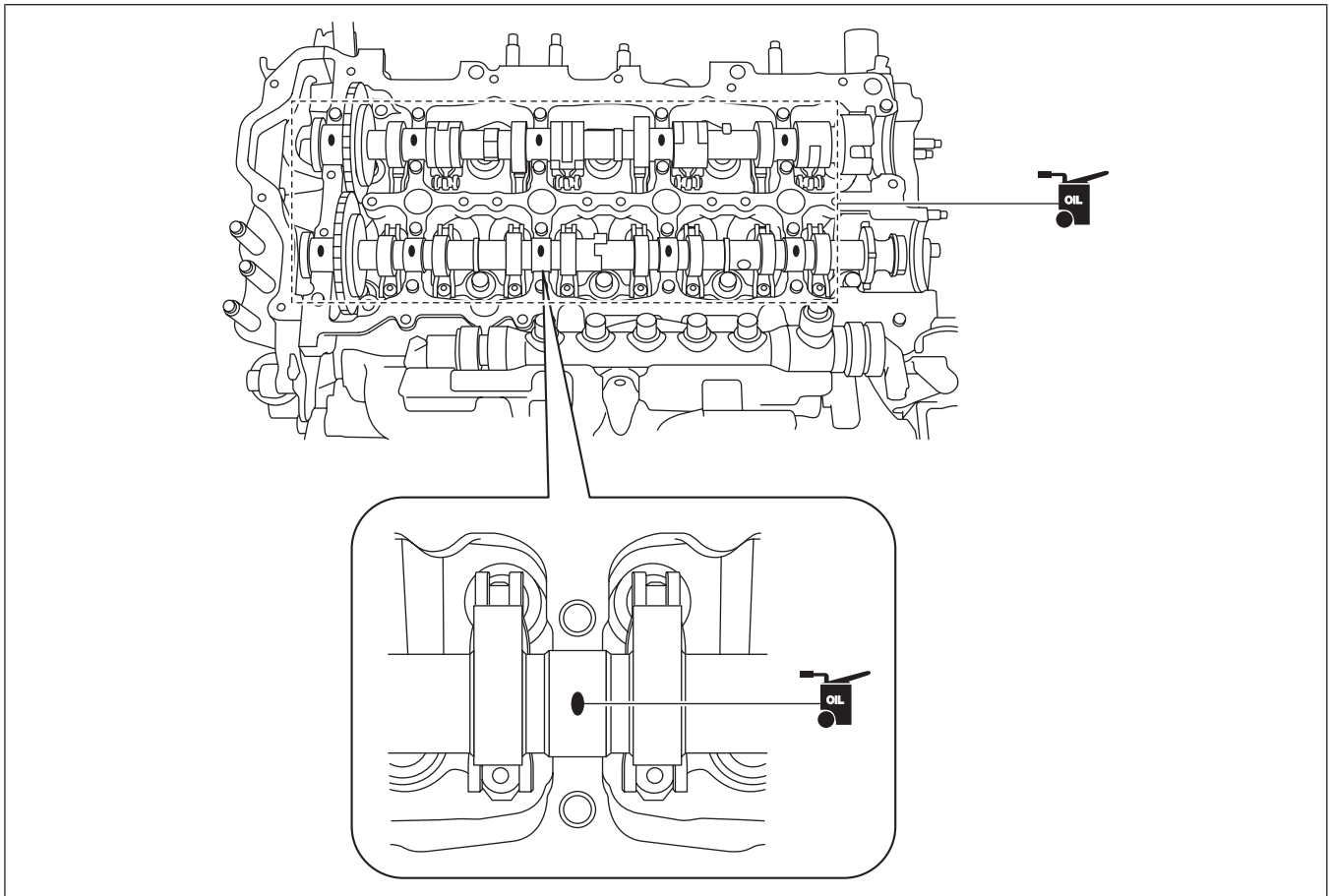
- If oil is applied to the front camshaft cap, oil should not be applied to the thrust surface of the front journal.

3. Place the camshaft on the cylinder head and align the alignment marks for each gear as shown in the figure.



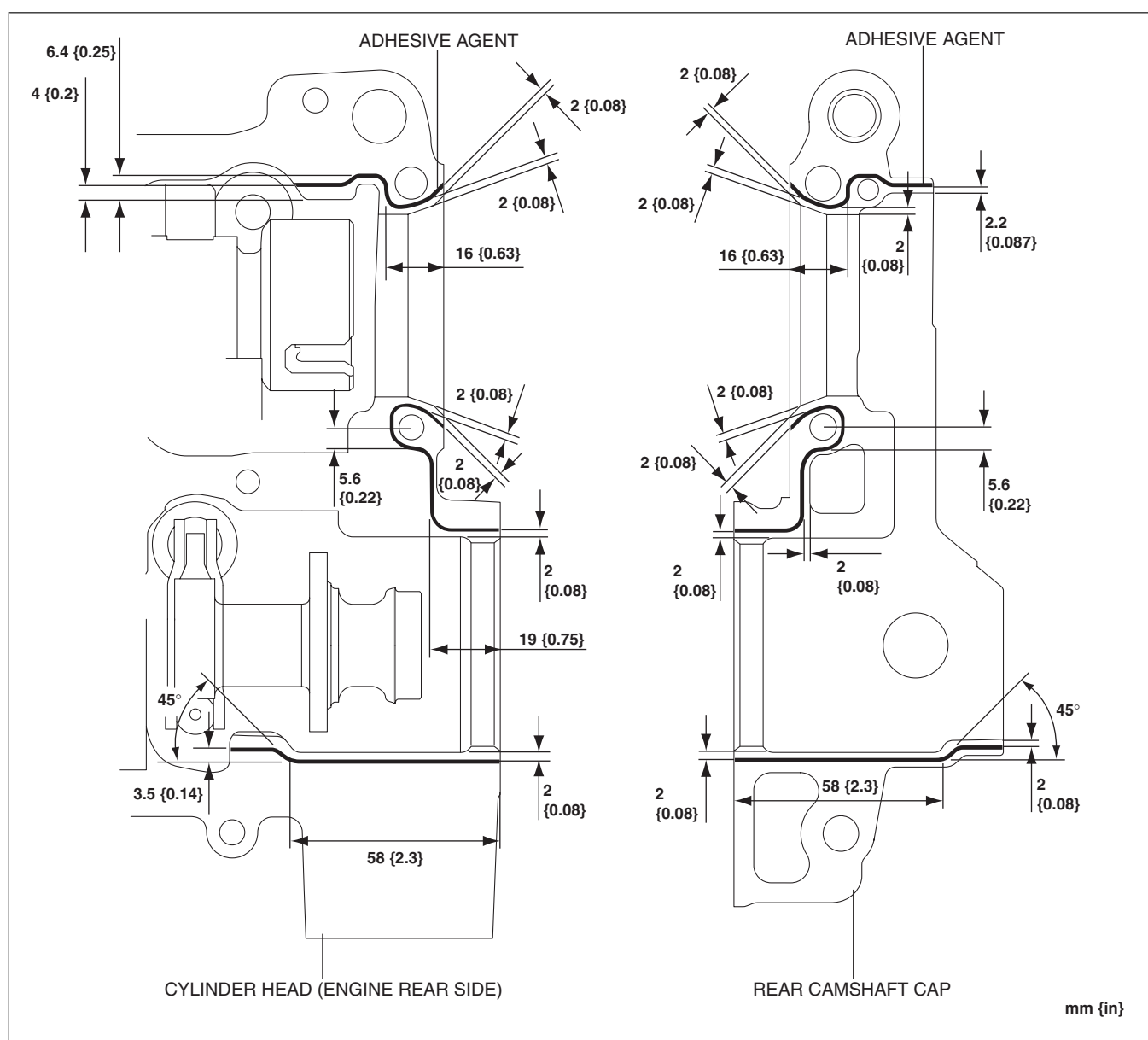
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4. As shown in the figure, apply gear oil (SAE No. 90 or equivalent) or engine oil to the center area of each journal of the camshaft.

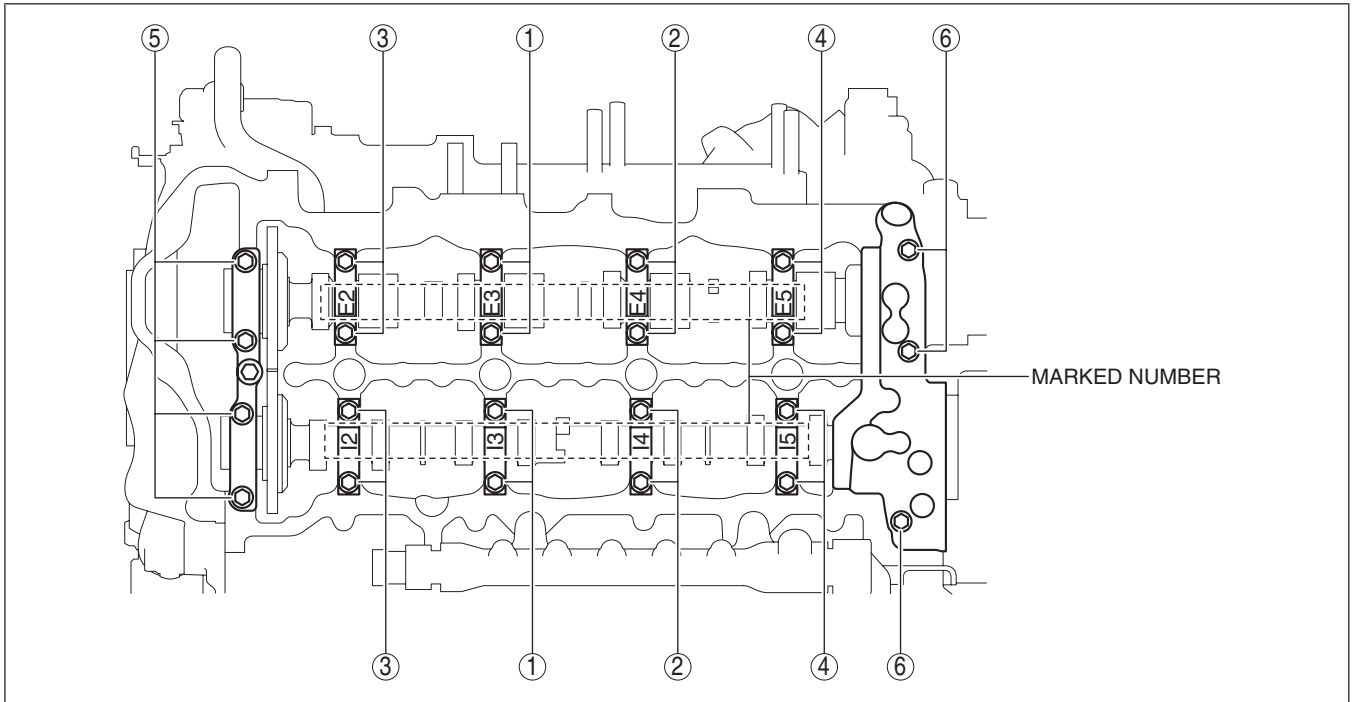


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5. Apply adhesive agent (Loctite#962T) to the rear side of the cylinder head or rear camshaft cap.



8. Install the camshaft caps in the marked number order, and temporarily tighten the camshaft cap installation bolts in two or three passes evenly.
9. Tighten the camshaft cap installation bolts in two steps in the order shown in the figure.



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Tightening torque

First step: 3.0—6.0 N·m {31—61 kgf·cm, 27—53 in·lbf}

Second step: 8—11 N·m {82—112 kgf·cm, 71—97 in·lbf}