

2010 ENGINE**Engine Mechanical (Service Information) - xD****ENGINE****ON-VEHICLE INSPECTION****ON-VEHICLE INSPECTION**

1. **INSPECT ENGINE COOLANT** . Refer to **ON-VEHICLE INSPECTION - Step 3**
2. **INSPECT ENGINE OIL** . Refer to **ON-VEHICLE INSPECTION - Step 2**
3. **INSPECT BATTERY** . Refer to **ON-VEHICLE INSPECTION - Step 1**
4. **INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY**
 - a. Remove the air cleaner filter element sub-assembly.
 - b. Visually check that there is no dirt, blockage, or damage to the air cleaner filter element.

HINT:

- If there is any dirt or a blockage in the air cleaner filter element, clean it with compressed air.
- If any dirt or a blockage remains even after cleaning the air cleaner filter element with compressed air, replace it.

5. **INSPECT SPARK PLUGS** . Refer to **ON-VEHICLE INSPECTION - Step 2**
6. **INSPECT IGNITION TIMING**
 - a. When using a Techstream:
 1. Warm up and stop the engine.
 2. Connect the Techstream to the DLC3.
 3. Turn the ignition switch ON.
 4. Select the following menu items:

Powertrain / Engine and ECT / Active Test /Connect the TC and TE1 / ON.

HINT:

Refer to the Techstream operator's manual for further details.

5. Inspect the ignition timing during idling.

Ignition timing

8 to 12 degrees BTDC

NOTE:

- **Turn all the electrical systems and the A/C OFF.**

- **Inspect the ignition timing with the cooling fan OFF.**
 - **When checking the ignition timing, shift the transmission to the neutral position.**
6. Select the following menu items: Connect the TC and TE1 / OFF
 7. Turn the ignition switch OFF.
 8. Disconnect the Techstream from the DLC3.
- b. When not using a Techstream:
1. Remove No. 2 cylinder head cover. Refer to **REMOVAL - Step 1** .
 2. Pull out the wire harness (brown) shown in the illustration.

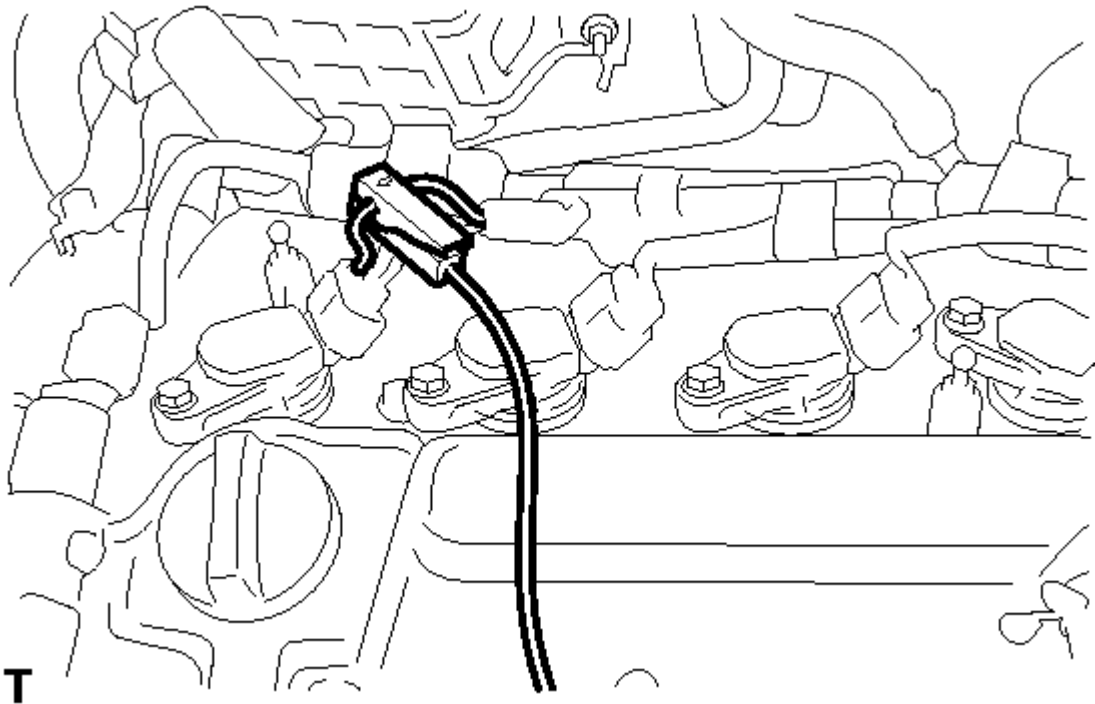


Fig. 1: Connecting Clip Of Timing Light To Wire Harness
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: After checking, wrap the wire harness with tape.

3. Warm up and stop the engine.
4. Connect the clip of the timing light to the wire harness.

NOTE: Use a timing light that detects the first signal.

5. Turn the ignition switch ON.
6. Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.

DLC3

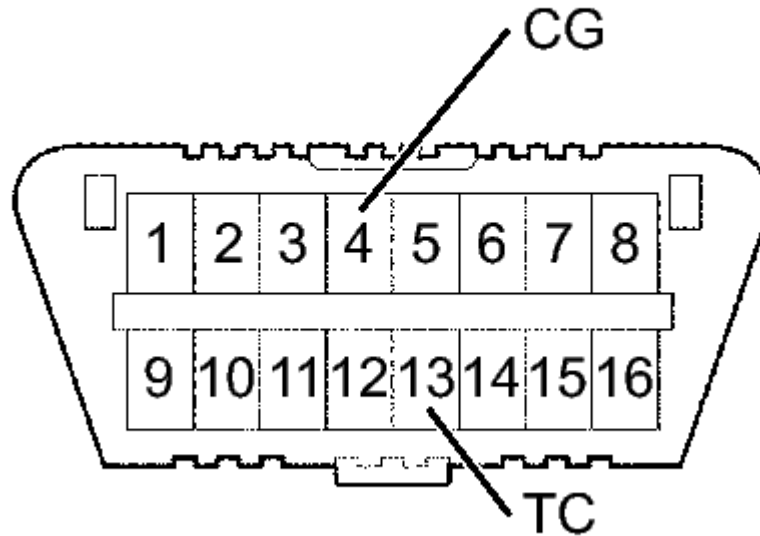


Fig. 2: Identifying DLC3 Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- SST: 09843-18040

NOTE: Examine the terminal numbers before connecting them.
Connecting the wrong terminals can damage the engine.

7. Inspect the ignition timing during idling.

Ignition timing

8 to 12 degrees BTDC

NOTE:

- Turn all the electrical systems and the A/C OFF.
- Inspect the ignition timing with the cooling fan OFF.
- When checking the ignition timing, shift the transmission to the neutral position.

8. Disconnect terminals 13 (TC) and 4 (CG) of the DLC3.
9. Turn the ignition switch OFF.
10. Remove the timing light.
11. Install No. 2 cylinder head cover. Refer to **INSTALLATION - Step 3**.

7. INSPECT ENGINE IDLING SPEED

- a. When using a Techstream:

1. Warm up and stop the engine.
2. Connect the Techstream to the DLC3.
3. Turn the ignition switch on (IG).
4. Select the following menu items: Powertrain / Engine and ECT / Data List / Av Engine Speed of All Cyl.

HINT:

Refer to the Techstream operator's manual for further details.

5. Inspect the engine idling speed.

Idling speed

650 to 750 RPM for manual transaxle

650 to 750 RPM for automatic transaxle

NOTE:

- Turn all the electrical systems and the A/C OFF.
- Inspect the idling speed with the cooling fan OFF.
- When checking the idling speed, shift the transmission to either the neutral position or the parking position.

6. Turn the ignition switch off.
 7. Disconnect the Techstream from the DCL3.
- b. When not using a Techstream.
1. Warm up and stop the engine.
 2. Install SST to terminal 9 (TAC) of the DLC3, then connect a tachometer.

DLC3

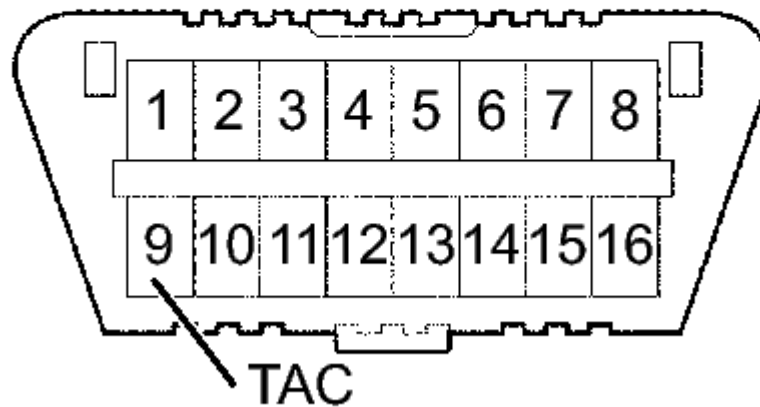


Fig. 3: Identifying DLC3 Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- SST: 09843-18040

NOTE: Examine the terminal numbers before connecting them.
Connecting the wrong terminals can damage the engine.

3. Turn the ignition switch ON.
4. Inspect the engine idling speed.

Idling speed

650 to 750 RPM for manual transaxle

650 to 750 RPM for automatic transaxle

5. Turn the ignition switch OFF.
6. Disconnect the tachometer.
7. Remove SST from terminal 9 (TAC).

8. INSPECT COMPRESSION

- a. Warm up and stop the engine.
- b. Remove No. 2 cylinder head cover. Refer to **REMOVAL - Step 1**.
- c. Remove the 4 ignition coils. Refer to **REMOVAL - Step 2**.
- d. Remove the 4 spark plugs.

- e. Disconnect the 4 fuel injector connectors.
- f. Inspect the cylinder compression pressure.

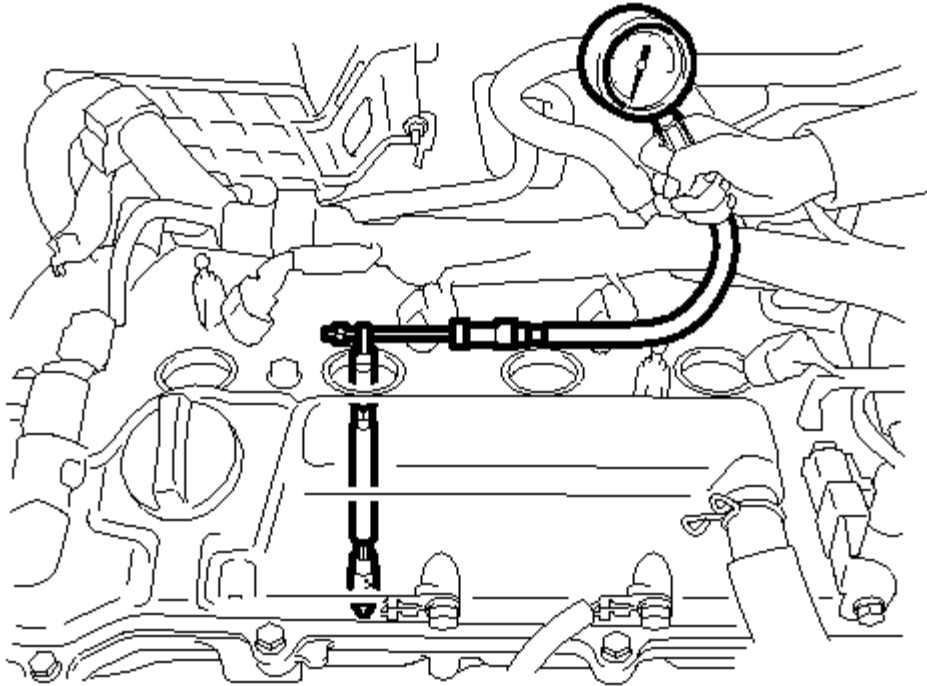


Fig. 4: Inspecting Cylinder Compression Pressure
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1. Insert a compression gauge into the spark plug hole.
2. Fully open the throttle.
3. While cranking the engine, measure the compression pressure.

Compression

1471 kPa (15.0 kgf/cm² , 213 psi)

Minimum pressure

1079 kPa (11.0 kgf/cm² , 156 psi)

Difference between each cylinder

98 kPa (1.0 kgf/cm² , 14 psi) or less

NOTE:

- Use a fully-charged battery so the engine speed can be increased to 250 RPM or more.
- Inspect the other cylinders in the same way.

- **Measure the compression in as short a time as possible.**

4. If the cylinder compression is low, pour a light coat of engine oil into the cylinder through the spark plug hole, then inspect it again.

HINT:

- If adding oil increases the compression, the piston rings and/or cylinder bore may be worn or damaged.
 - If the pressure stays low, the valve may be stuck or seated improperly, or there may be leakage from the gasket.
- g. Connect the 4 fuel injector connectors.
 - h. Install the 4 spark plugs.

Torque: 20 N*m (204 kgf*cm, 15 in.*lbf)

- i. Install the 4 ignition coils. Refer to **INSTALLATION - Step 2**.
- j. Install No. 2 cylinder head cover. Refer to **INSTALLATION - Step 3**.

9. INSPECT CO/HC

- a. Start the engine.
- b. Run the engine at 2500 RPM for approximately 180 seconds.
- c. Insert the CO/HC meter testing probe at least 40 cm (1.3 ft) into the tailpipe while idling.
- d. Check the CO/HC concentration during idling and when running at 2500 RPM.

HINT:

When doing the 2 mode (with the engine idling/running at 2500 RPM) test, the measuring procedures are determined by applicable local regulations.

If the CO/HC concentration does not comply with the regulations, troubleshoot in the order given below.

1. Check the heated oxygen sensor operation. Refer to **INSPECTION**.
2. See the table below for possible causes, then inspect the applicable parts and repair them if necessary.

CO	HC	Problems	Possible Causes
			a. Faulty ignition: • Incorrect timing • Fouled, shorted or improperly

2010 Scion xD

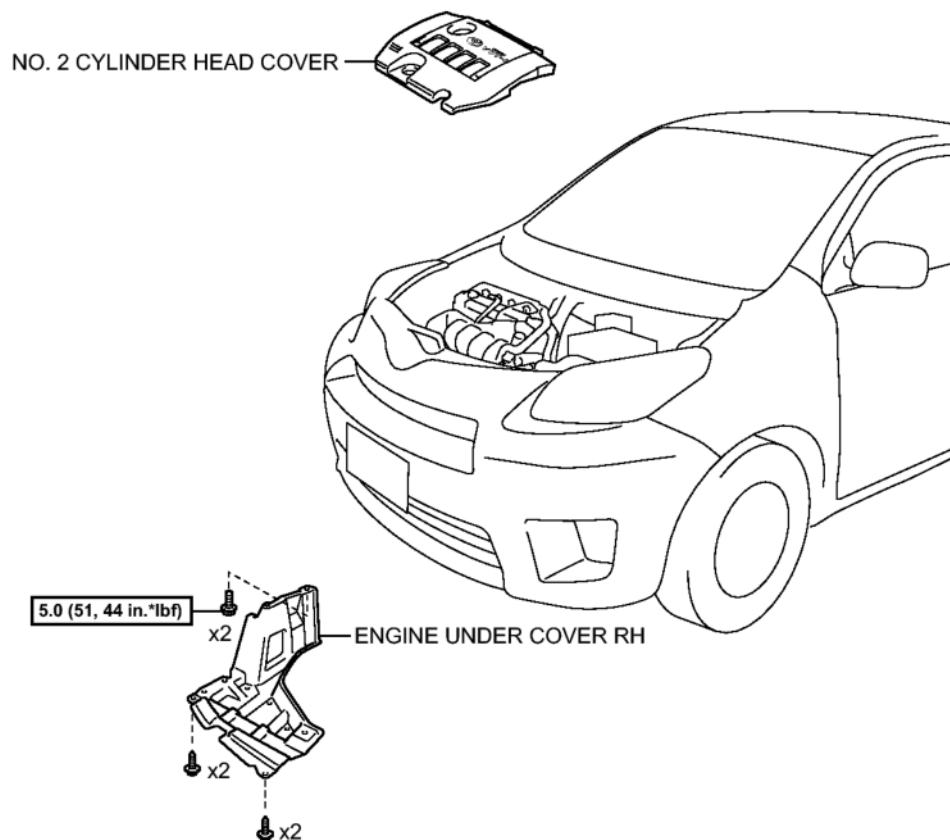
2010 ENGINE Engine Mechanical (Service Information) - xD

Normal	High	Rough idling	gapped plugs b. Incorrect valve clearance c. Leakage from intake and exhaust valves d. Leakage from cylinders
Low	High	Rough idling (Fluctuating HC reading)	a. Vacuum leaks: • PCV hoses • Intake manifold • Throttle body • Brake booster line b. Lean mixture causing misfire
High	High	Rough idling (Black smoke from exhaust)	a. Restricted air cleaner filter element b. Plugged PCV valve c. Faulty EFI systems: • Faulty pressure regulator • Faulty engine coolant temperature sensor • Faulty mass air flow meter • Faulty ECM • Faulty injectors • Throttle body

DRIVE BELT

COMPONENTS

ILLUSTRATION

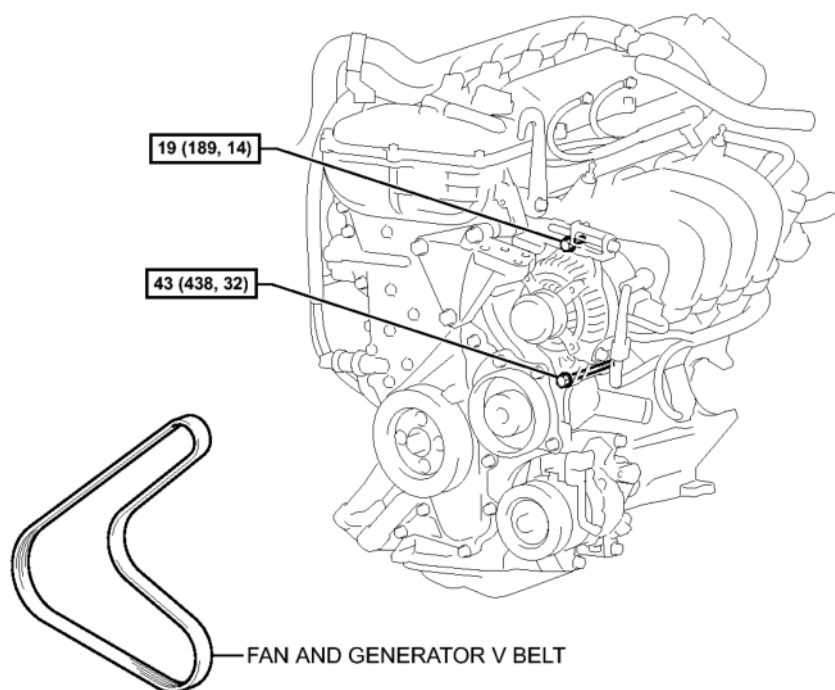


N*m (kgf*cm, ft*lbf) : Specified torque



Fig. 5: Identifying Drive Belt Components With Torque Specification (1 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION



N*m (kgf*cm, ft*lb) : Specified torque

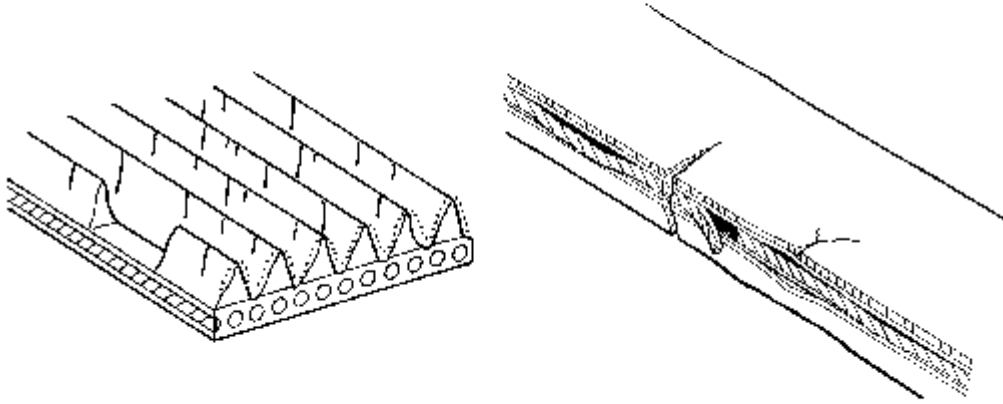
P

Fig. 6: Identifying Drive Belt Components With Torque Specifications (2 Of 2)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ON-VEHICLE INSPECTION

ON-VEHICLE INSPECTION

1. INSPECT FAN & GENERATOR V BELT



B00543

Fig. 7: Inspecting Fan And Generator V Belt

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

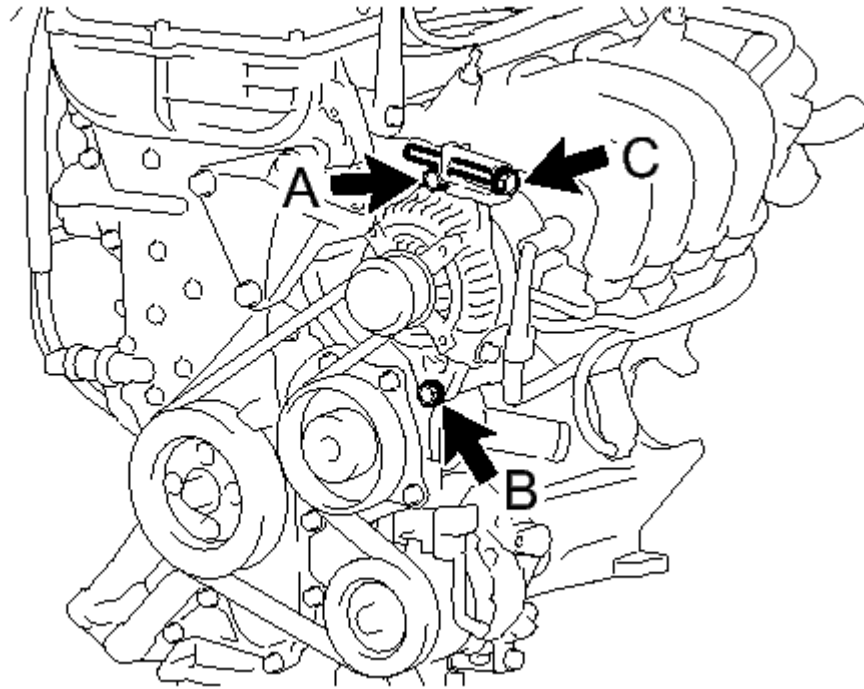
- a. Visually check the belt for excessive wear, frayed cords etc. If any defects are found, replace the belt.

HINT:

- If any defects are found, replace the belt.
- If the belt has pieces missing from the ribs, it should be replaced.

REMOVAL**REMOVAL**

1. **REMOVE ENGINE UNDER COVER RH**
2. **REMOVE NO. 2 CYLINDER HEAD COVER** . Refer to **REMOVAL - Step 1**
3. **REMOVE FAN & GENERATOR V BELT**
 - a. Loosen bolts A and B.

**P****Fig. 8: Locating Generator Bolts****Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.**

- b. Turn adjusting bolt C to release the tension and remove the V belt from the pulleys.
- c. Remove the fan and generator V belt.

INSTALLATION

INSTALLATION

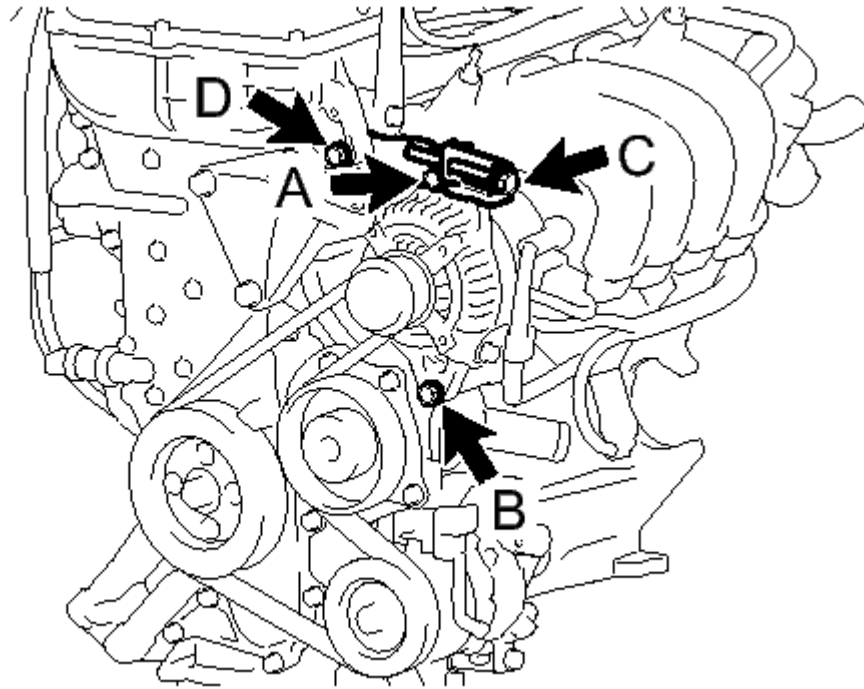
1. INSTALL FAN & GENERATOR V BELT

- a. Provisionally install the fan and generator V belt onto each pulley.

NOTE: **Make sure that the V belt is securely fitted into the rib groove of the pulley.**

2. ADJUST FAN & GENERATOR V BELT

- a. Turn adjusting bolt C and adjust the tension of the V belt.

**P****Fig. 9: Locating Generator Bolts**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: Check that bolt D is tightened to the specified torque of 19 N*m (189 kgf*cm, 14 ft.*lbf).

- b. Tighten fixing bolts A and B.

Torque: 19 N*m (189 kgf*cm, 14 in.*lbf)

for bolt A

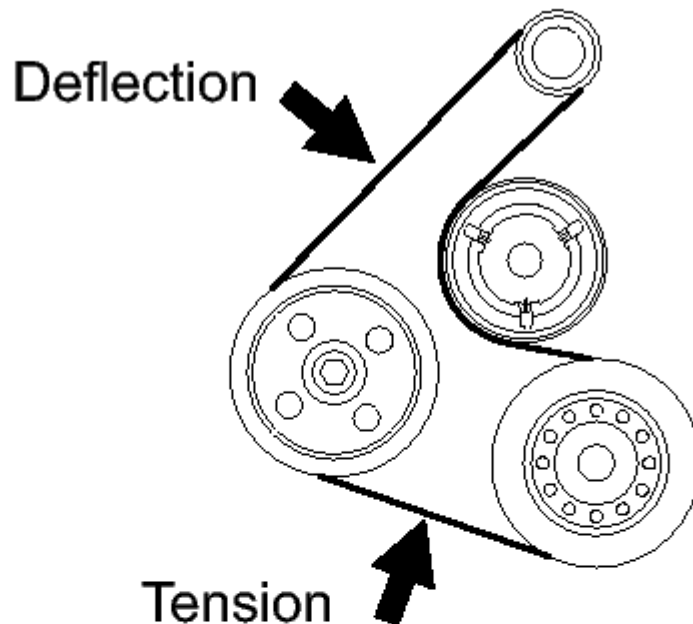
Torque: 43 N*m (438 kgf*cm, 32 in.*lbf)

for bolt B

3. INSPECT FAN & GENERATOR V BELT

- a. Check the V belt deflection and tension.

w/ Air Conditioning System:



w/o Air Conditioning System:

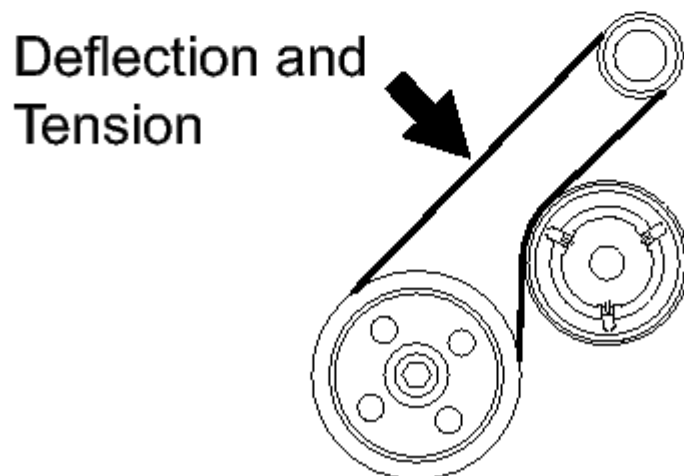
**P**

Fig. 10: View Of Drive Belt And Pulley

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Deflection



Item	Specified Condition
New belt	7.5 to 8.6 mm (0.296 to 0.338 in.)
Used belt	8.0 to 10.0 mm (0.315 to 0.397 in.)

Tension

Item	Specified Condition
New belt	637 to 735 N (65 to 75 kg, 143 to 165 ld)
Used belt	392 to 588 N (40 to 60 kg, 88 to 132 ld)

If the belt deflection is not as specified, adjust it.

HINT:

- When inspecting the V belt deflection, apply 98 N (10 kgf) tensile force to it.
- After installing a new belt, run the engine for approximately 5 minutes and then re-adjust the tension to (new belt) specifications.
- Check the V-ribbed belt deflection and tension at the specified point.
- V-ribbed belt tension and deflection should be checked after 2 revolutions of the engine.
- V-ribbed belt tension and deflection should be checked at TDC crank angle and cold condition.
- When adjusting a belt, adjust its deflection and tension to the intermediate values of the specification.
- When reinstalling a belt which has been used for over 5 minutes, adjust its deflection and tension to the used belt specification.
- When using a belt tension gauge, confirm its accuracy by using a master gauge first.
- If use a sonic tension meter.

Input Data for Sonic Tension Meter

Weight

15 g/rib*m

Width

6 ribs

Span

188 mm (w/ A/C)

282 mm (w/o A/C)

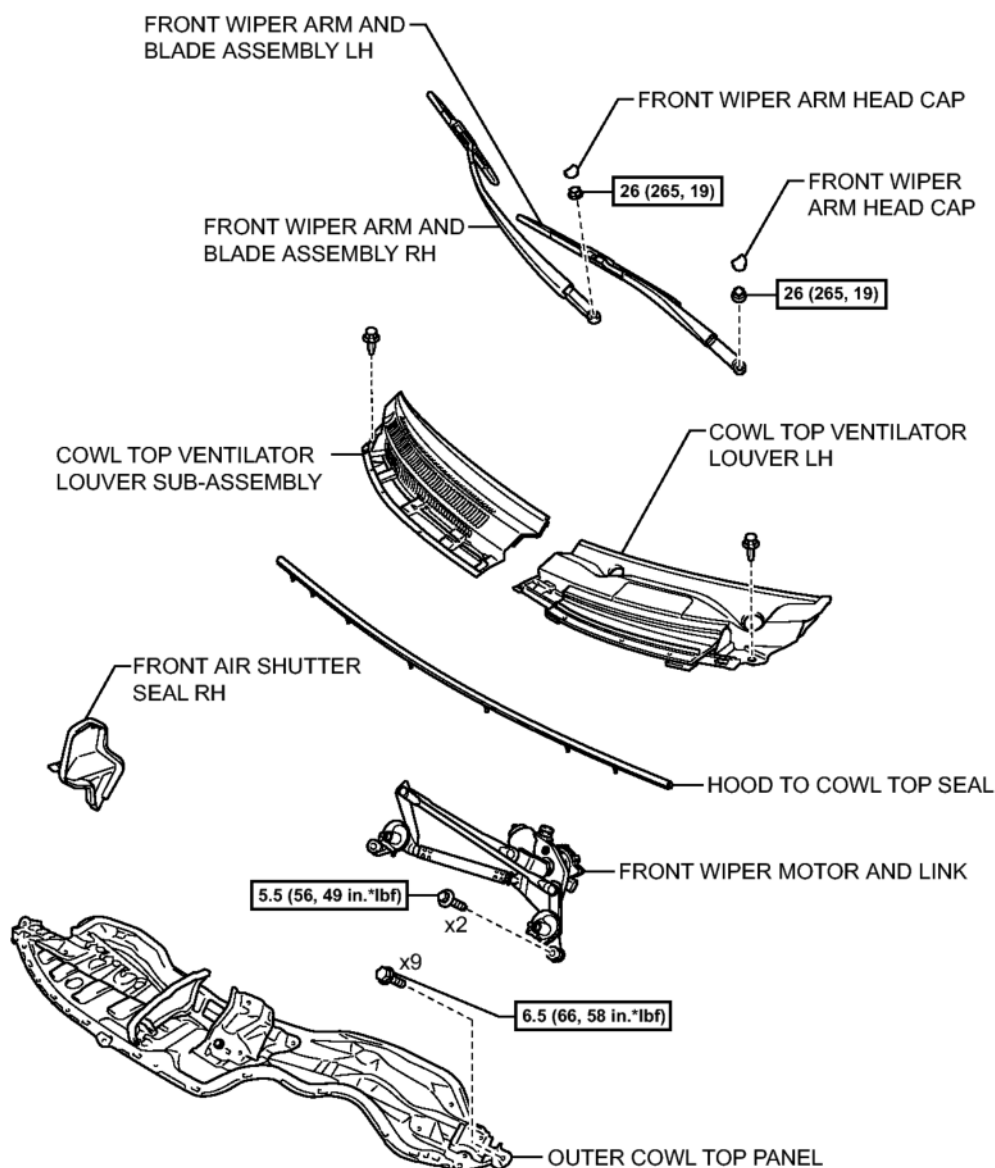
4. INSTALL ENGINE UNDER COVER RH

5. INSTALL NO. 2 CYLINDER HEAD COVER . Refer to **INSTALLATION - Step 3**

CAMSHAFT

COMPONENTS

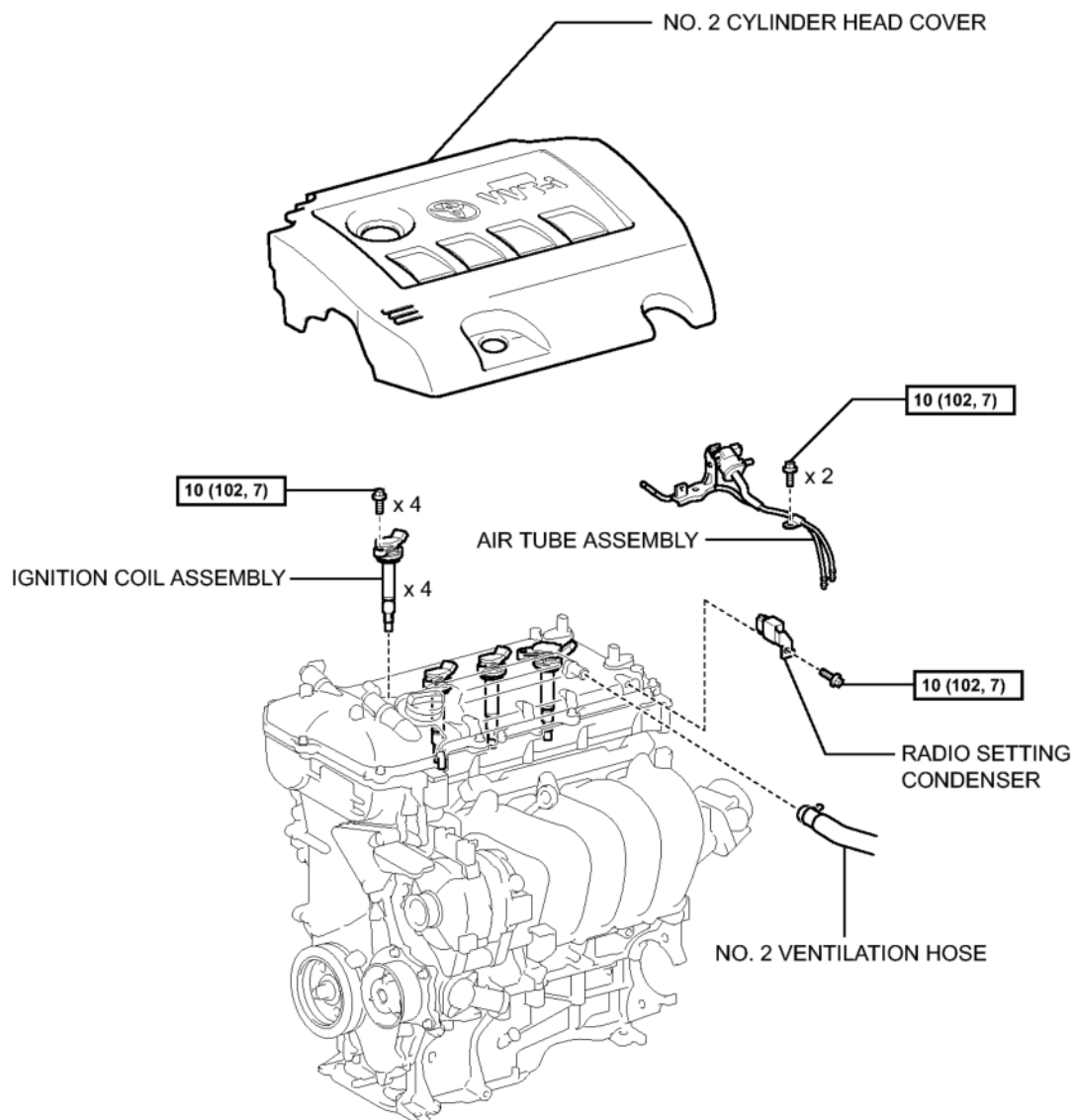
ILLUSTRATION



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

Fig. 11: Identifying Camshaft Components With Torque Specifications (1 Of 4)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

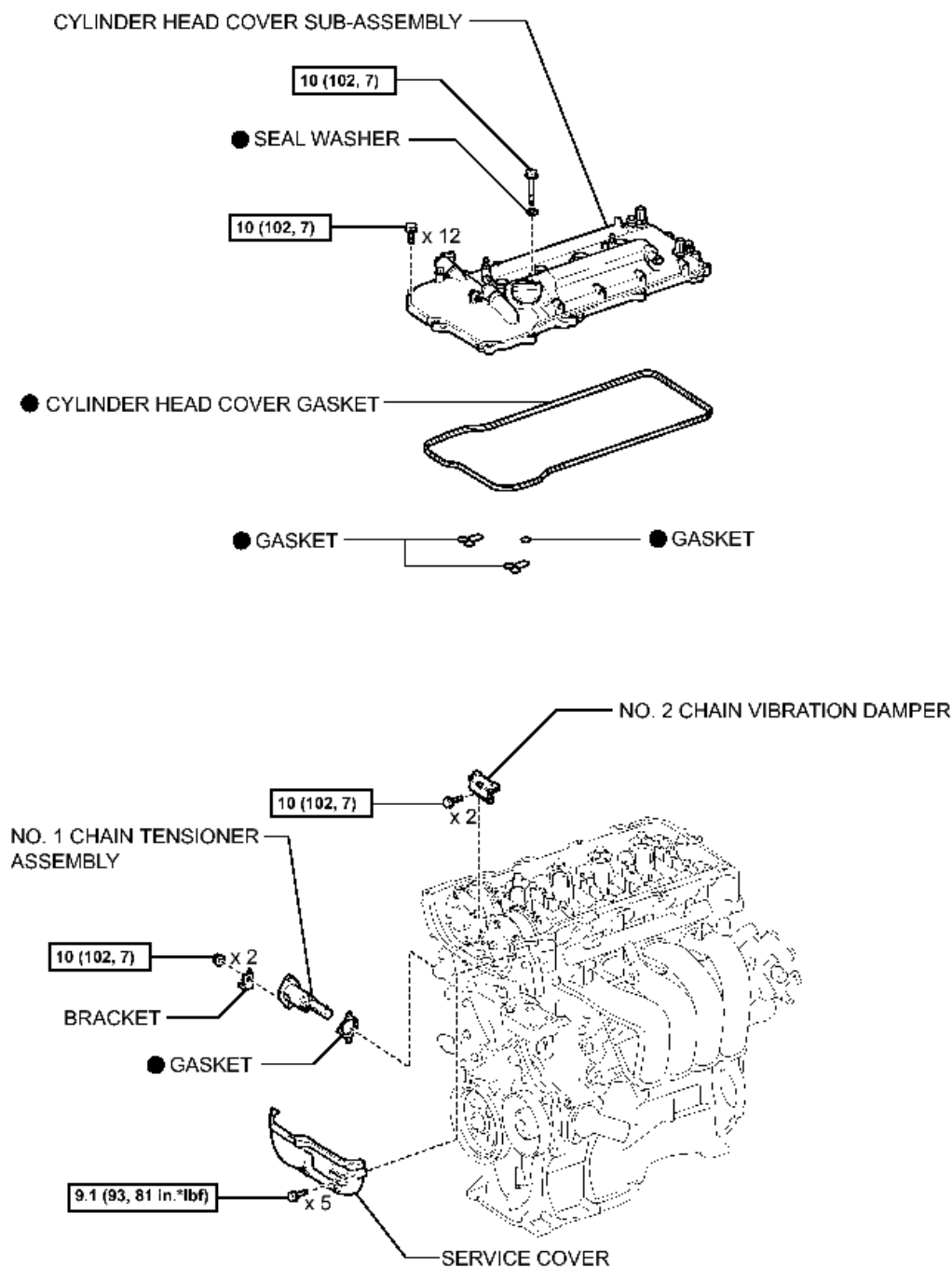
ILLUSTRATION



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

Fig. 12: Identifying Camshaft Components With Torque Specifications (2 Of 4)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION

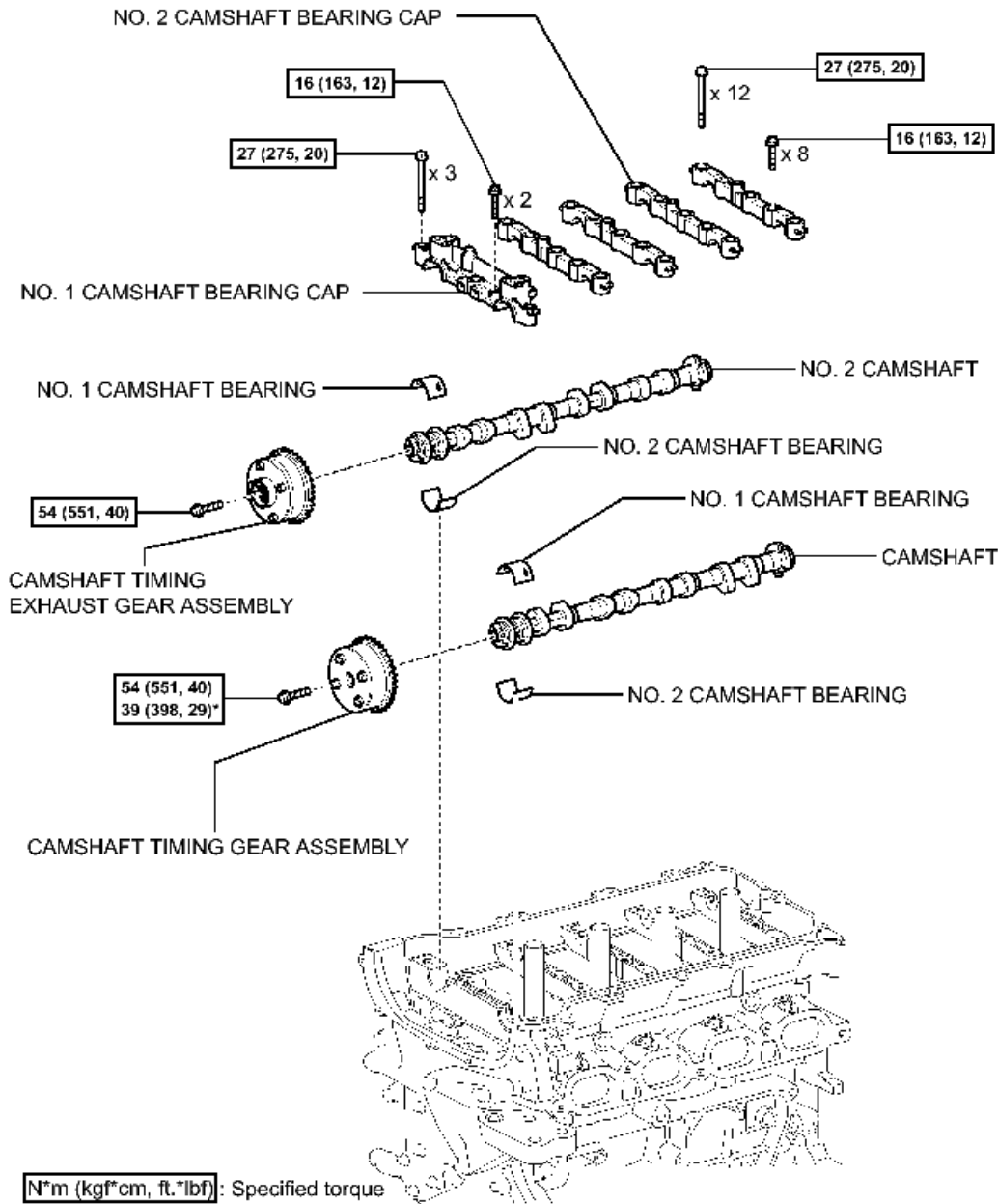


[N*m (kgf*cm, ft.*lbf)]: Specified torque

● Non-reusable part

c
Fig. 13: Identifying Camshaft Components With Torque Specifications (3 Of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION



* For use with SST

Fig. 14: Identifying Camshaft Components With Torque Specifications (4 Of 4)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

REMOVAL

1. REMOVE FRONT WIPER ARM HEAD CAP . Refer to **REMOVAL - Step 1**

2. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH** . Refer to **REMOVAL - Step 2**
3. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH** . Refer to **REMOVAL - Step 3**
4. **REMOVE HOOD TO COWL TOP SEAL** . Refer to **REMOVAL - Step 4**
5. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY** . Refer to **REMOVAL - Step 5**
6. **REMOVE COWL TOP VENTILATOR LOUVER LH** . Refer to **REMOVAL - Step 6**
7. **REMOVE FRONT WIPER MOTOR AND LINK** . Refer to **REMOVAL - Step 7**
8. **REMOVE FRONT AIR SHUTTER SEAL RH** See step 17
9. **REMOVE OUTER COWL TOP PANEL** See step 18
10. **REMOVE NO. 2 CYLINDER HEAD COVER** . Refer to **REMOVAL - Step 1**
11. **REMOVE IGNITION COIL ASSEMBLY** See step 1
12. **REMOVE RADIO SETTING CONDENSER** See step 2
13. **DISCONNECT NO. 2 VENTILATION HOSE**
 - a. Disconnect the No. 2 ventilation hose.

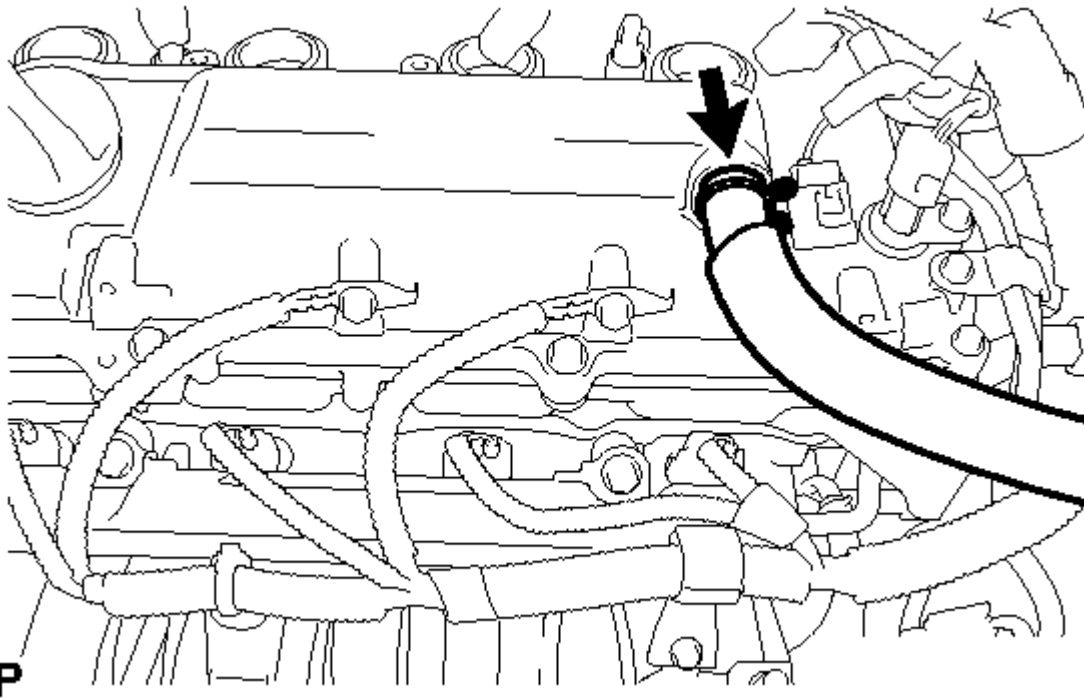


Fig. 15: Locating No. 2 Ventilation Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

14. **DISCONNECT ENGINE WIRE**
 - a. Remove the 2 bolts, 5 connectors, 5 clamps and disconnect the engine wire.

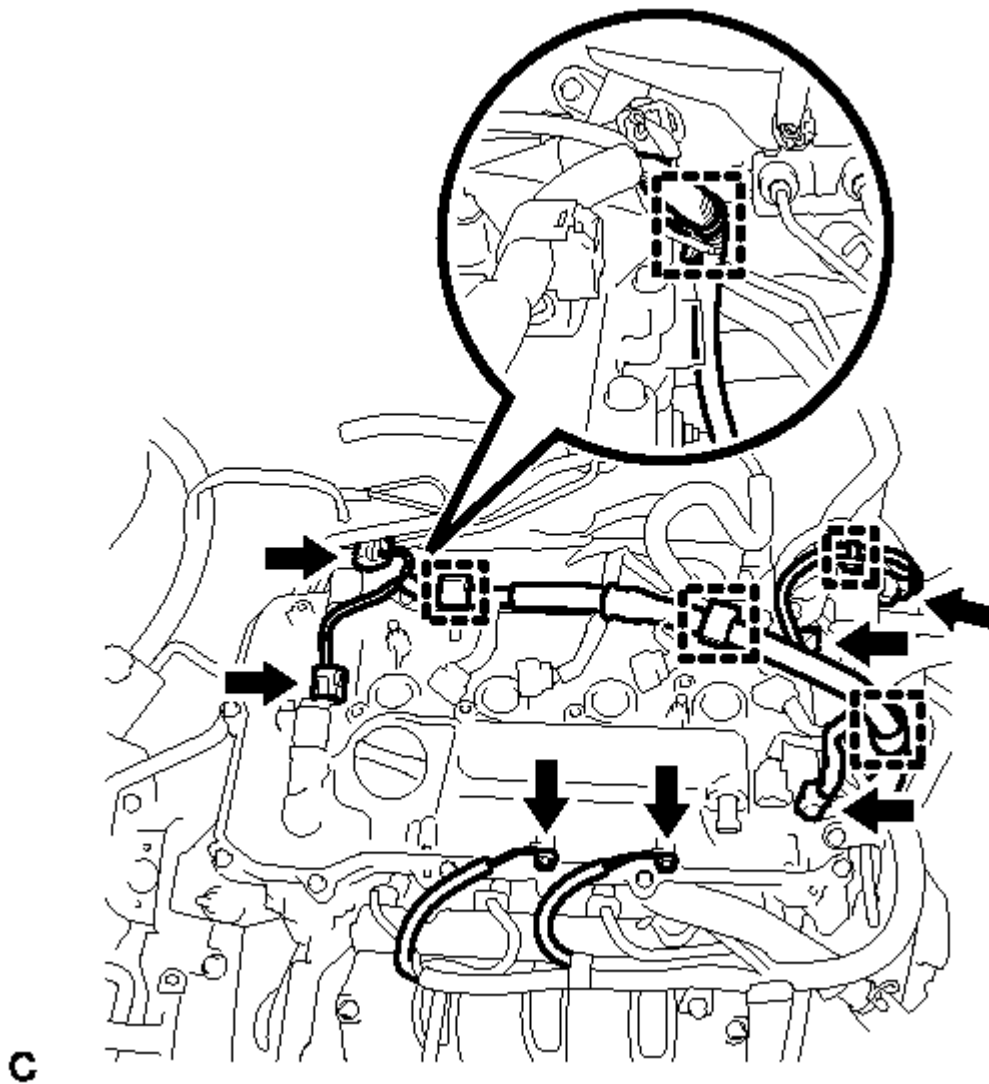
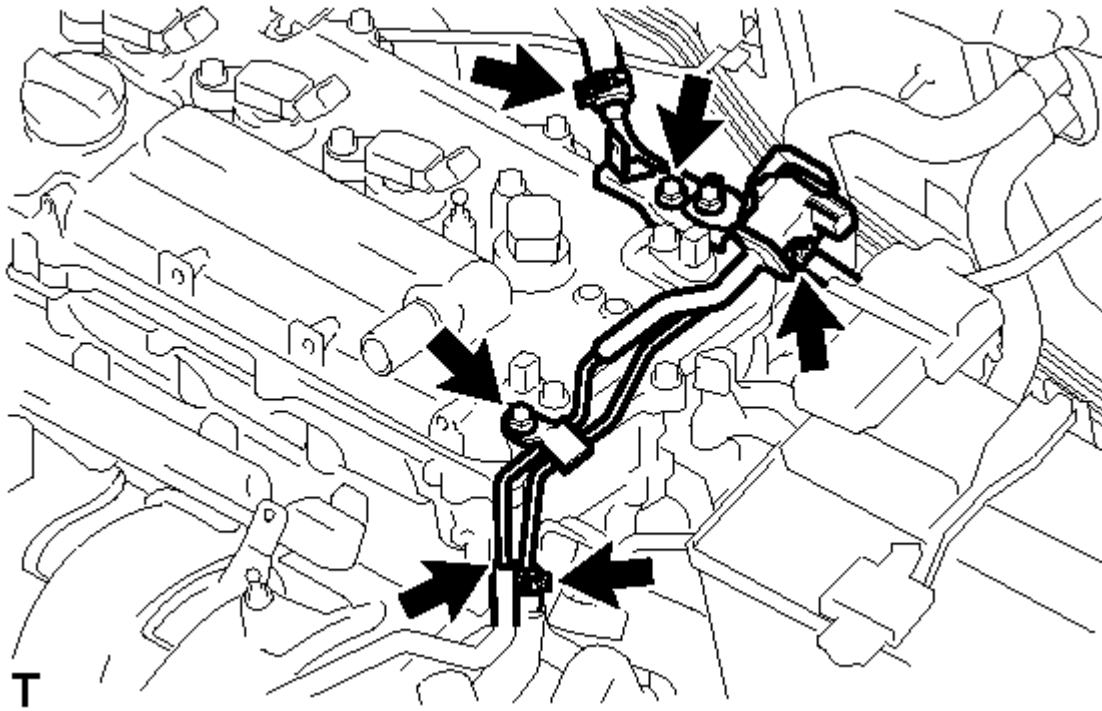


Fig. 16: Identifying Engine Wire Bolts, Connectors & Clamps
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

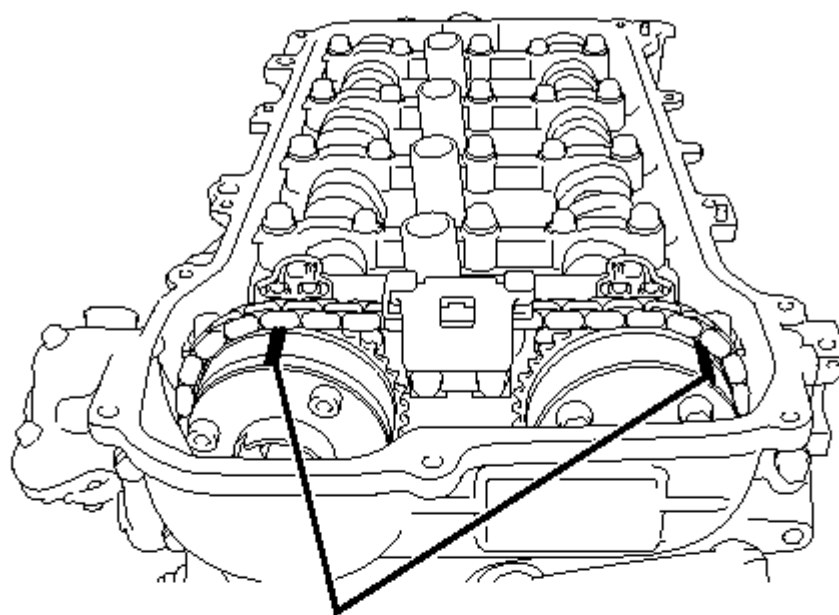
15. REMOVE AIR TUBE ASSEMBLY

- a. Remove the 2 bolts, 4 hoses and air tube assembly.

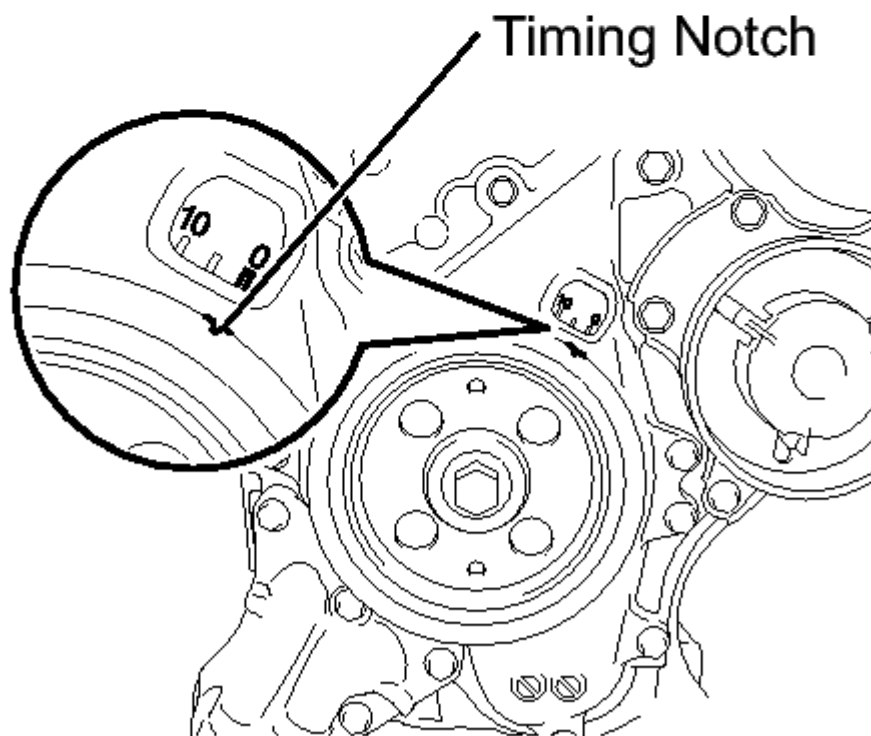


T
Fig. 17: Identifying Air Tube Assembly Bolts & Hoses
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

16. **REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY** See step 7
17. **REMOVE CYLINDER HEAD COVER GASKET** See step 8
18. **SET NO. 1 CYLINDER TO TDC / COMPRESSION**
 - a. Turn the crankshaft pulley until its timing notch (groove) and the timing mark "0" of the timing chain cover are aligned.



Matchmark



Timing Notch

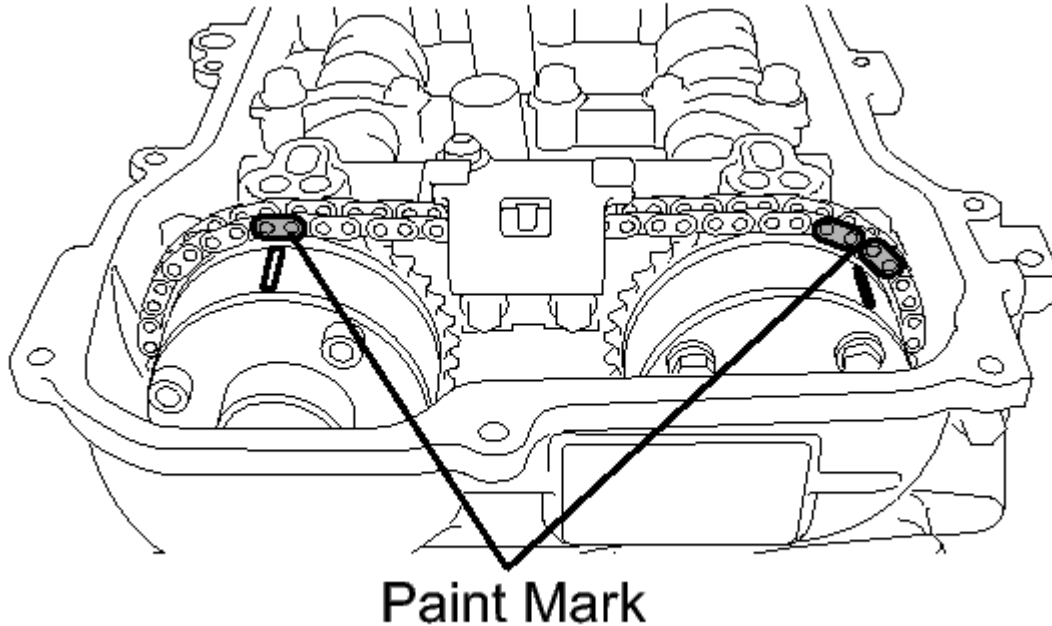
T

Fig. 18: Aligning Crankshaft Pulley & Timing Chain Cover
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Check that each matchmark of the camshaft timing gear and camshaft timing exhaust gear are aligned with each matchmark located as shown in the illustration. If not, turn the crankshaft 1

revolution (360°) to align the timing marks as shown in the illustration.

- c. Place paint marks on the chain in alignment with the timing marks on the camshaft timing gear and camshaft timing exhaust gear.



C

Fig. 19: Identifying Paint Marks On Camshaft Timing Gear
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

19. REMOVE SERVICE COVER

- a. Remove the 5 bolts and service cover.

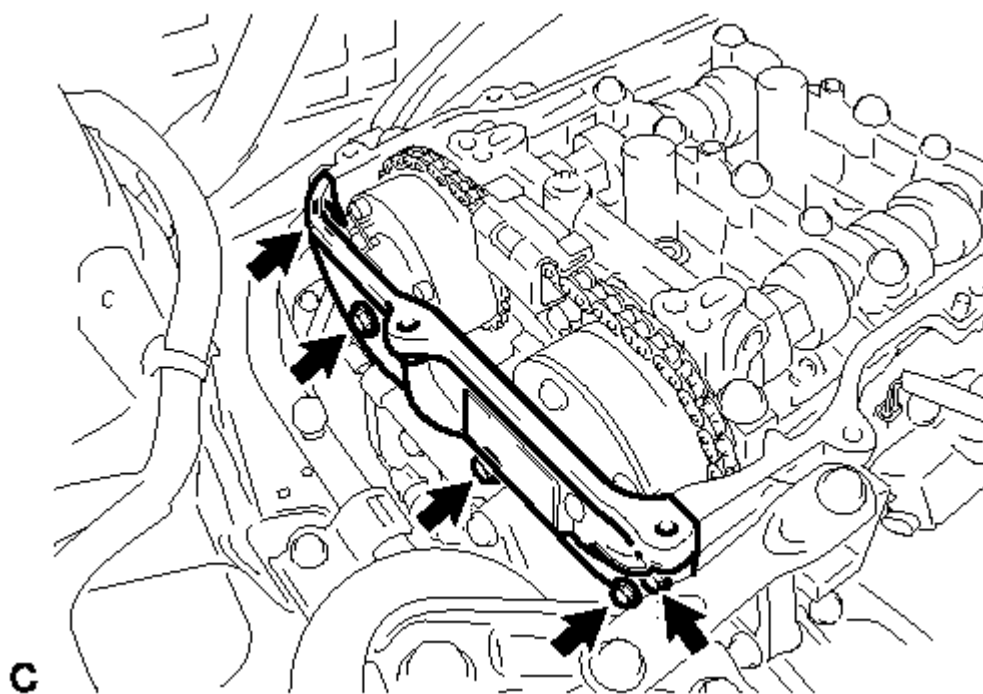


Fig. 20: Identifying Service Cover Bolts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using a screwdriver with its tip taped, pry at the areas shown in the illustration and remove the service cover.

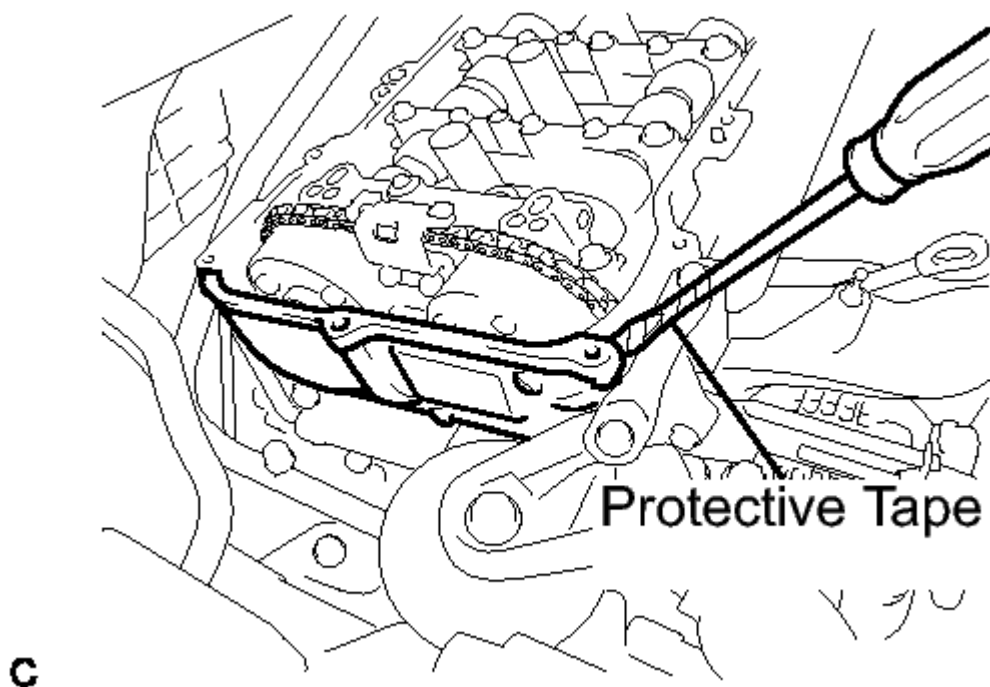


Fig. 21: Removing Service Cover

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: Do not damage the service cover or the contact surfaces of the timing chain cover.

20. REMOVE NO. 2 CHAIN VIBRATION DAMPER

- a. Remove the 2 bolts and No. 2 chain vibration damper from the camshaft bearing cap.

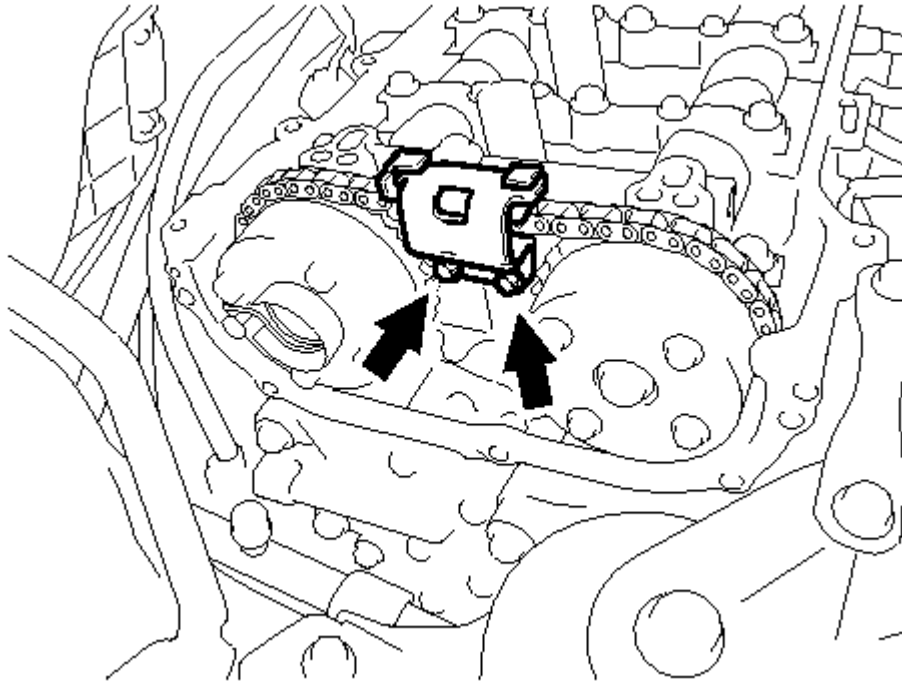


Fig. 22: Identifying Chain Vibration Damper & Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

21. REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY See step 11

22. REMOVE CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY

- a. While holding the hexagonal portion of the camshaft with a wrench, remove the camshaft timing exhaust gear bolt.

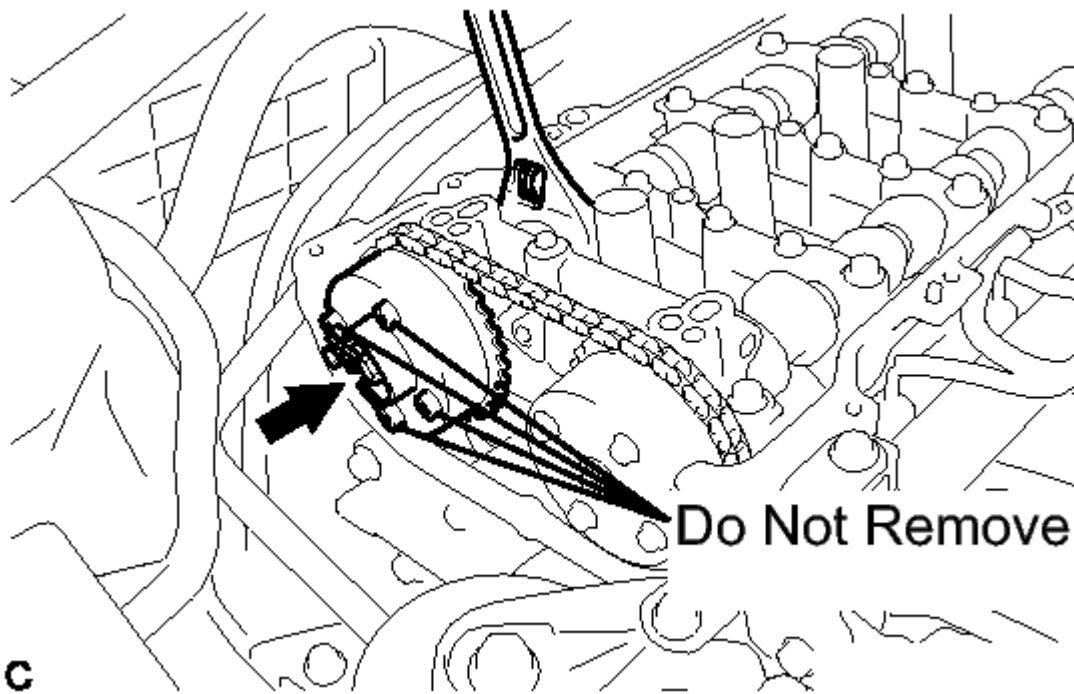


Fig. 23: Removing Camshaft Timing Exhaust Gear Bolt

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: Be sure not to remove the other 4 bolts. If any of them is removed, replace the camshaft timing exhaust gear assembly.

- b. Hold the hexagonal portion of the intake camshaft with a wrench and turn it slightly counterclockwise to release the chain.

NOTE: Do not turn the intake camshaft more than necessary.

HINT:

Be sure to loosen the chain because the camshaft timing exhaust gear assembly cannot be removed with the chain tensioned.

- c. Remove the camshaft timing exhaust gear assembly.

NOTE: Keep the camshaft timing exhaust gear assembly horizontal while removing it from the camshaft.

23. INSPECT CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY

- a. Temporarily install the camshaft timing exhaust gear assembly.
 1. Align the knock pin on the No. 2 camshaft with the pin hole in the camshaft timing exhaust gear assembly and temporarily install the camshaft timing exhaust gear assembly to the No. 2 camshaft with the bolt.

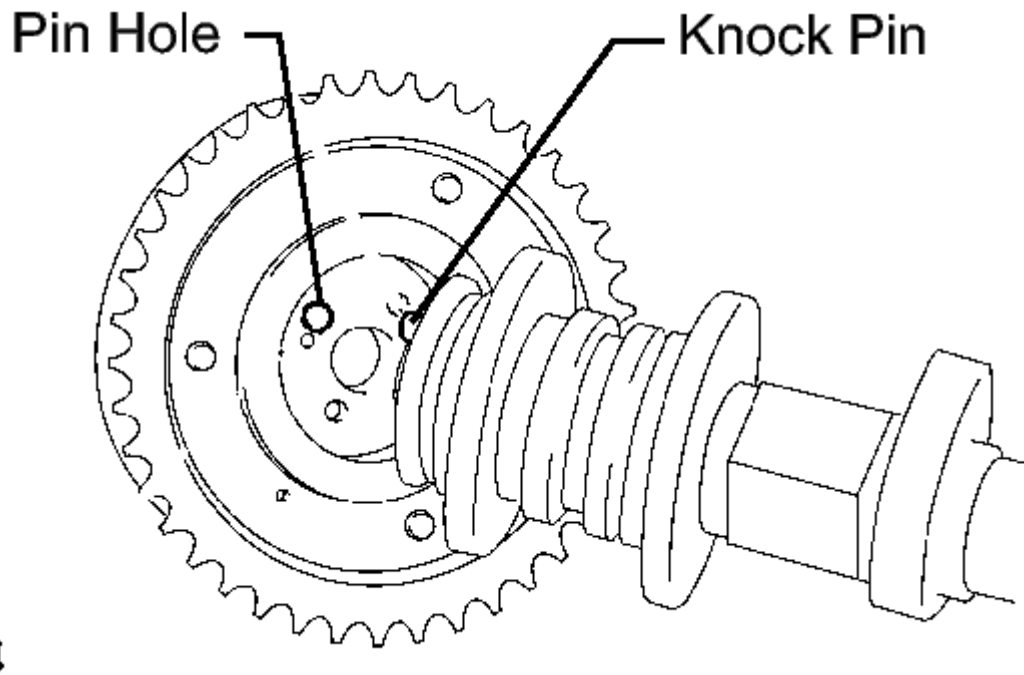


Fig. 24: Aligning Knock Pin & Pin Hole

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- Do not install the chain onto the gear at this step.
- Do not allow the chain to interfere with the gear when installing the gear assembly.

- b. Inspect the camshaft timing exhaust gear lock.
 1. Check that the camshaft timing exhaust gear is locked.
- c. Inspect camshaft timing exhaust gear operation.
 1. After cleaning and degreasing the exhaust side VVT oil hole on the No. 1 camshaft bearing cap, completely seal the oil hole with adhesive tape or equivalent as shown in the illustration to prevent air from leaking.

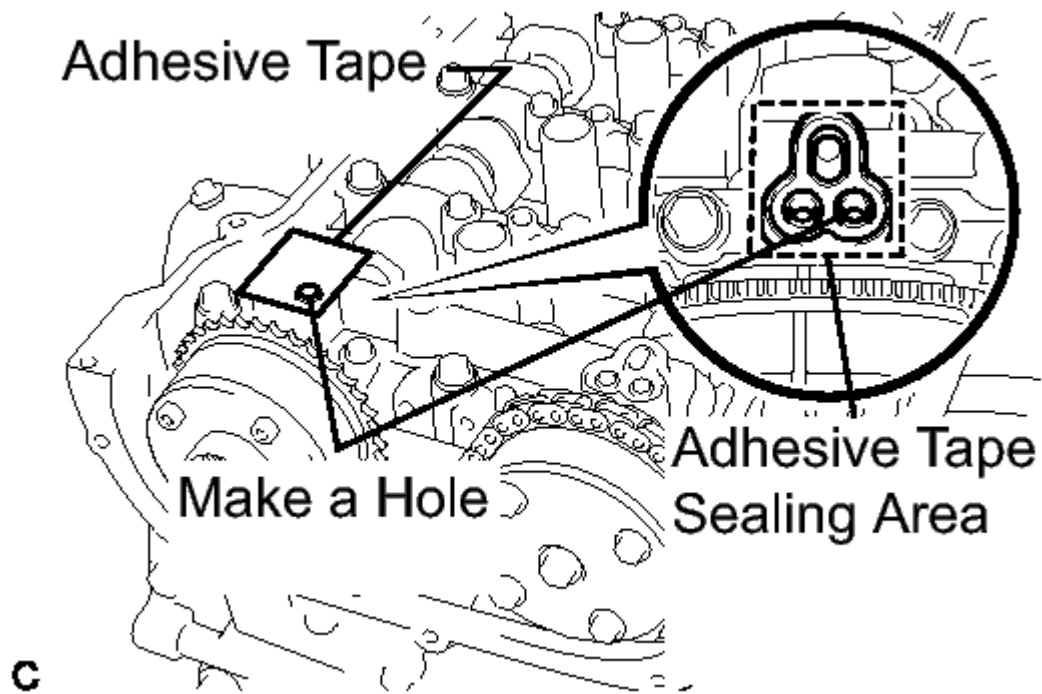


Fig. 25: Sealing Oil Hole

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: Be sure to seal the oil hole completely because air leaks due to insufficient sealing will prevent the lock pin from being released.

2. Make a hole in the adhesive tape covering the oil hole as shown in the illustration. (Procedure B)
3. Apply approximately 200 kPa (2.0 kgf/cm², 28 psi.) of air pressure to the hole made in procedure B to release the lock pin.

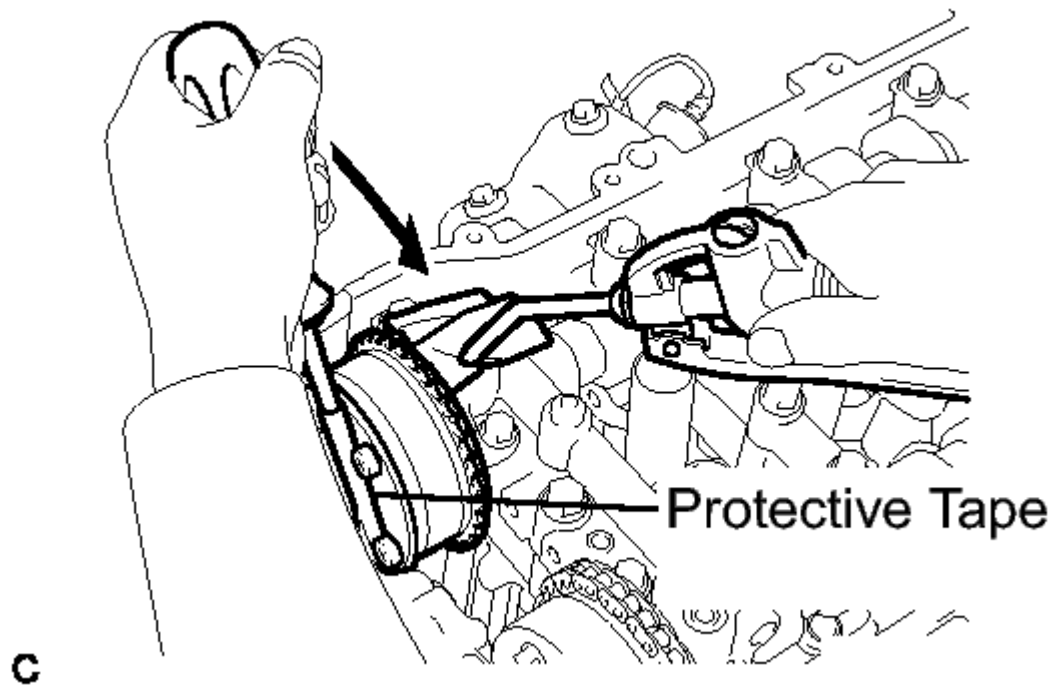


Fig. 26: Releasing Lock Pin

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- If air leaks out, reattach the adhesive tape.
- Cover the oil hole with a piece of cloth when applying air pressure to prevent oil from spraying.

4. Using a screwdriver with its tip taped, forcibly turn the camshaft timing exhaust gear in the retard direction (clockwise).

NOTE:

- Be sure to keep the camshaft timing exhaust gear in the retard direction. If the gear is released, it will return to the advanced position automatically due to the force from the spring.
- Do not damage the camshaft timing exhaust gear.

HINT:

Depending on the air pressure applied, the camshaft timing exhaust gear may turn in the retard direction without assistance by hand.

5. Using a screwdriver with its tip taped, turn the camshaft timing exhaust gear within its movable range (20°) 2 or 3 times without turning it to the most advanced position. Check that the camshaft timing gear turns smoothly.

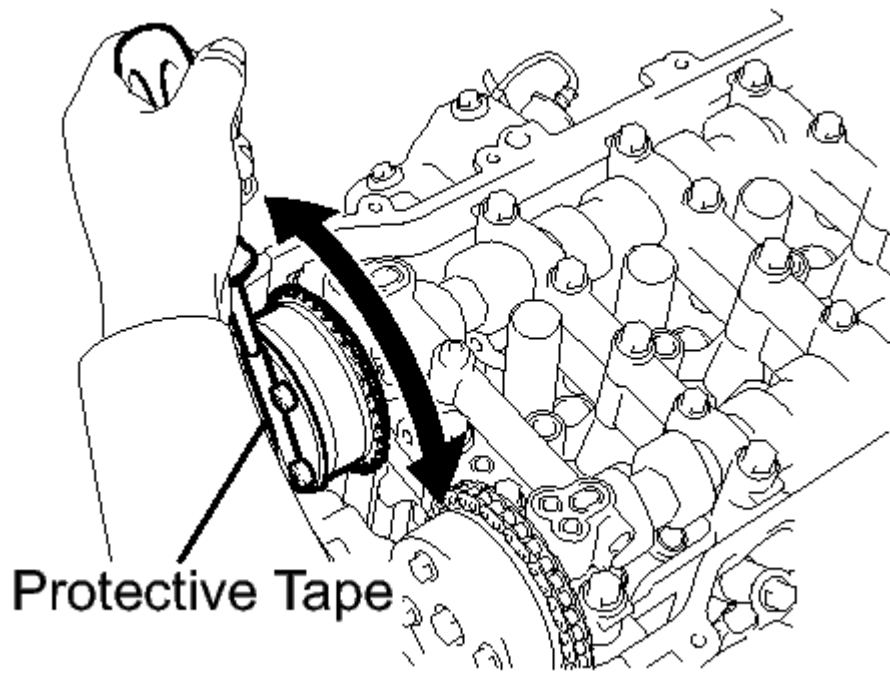


Fig. 27: Turning Camshaft Timing Exhaust Gear
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. Lock the camshaft timing exhaust gear.

NOTE: Check that the camshaft timing exhaust gear assembly locks at the most advanced position (the most advanced position of its movable range) and cannot be rotated any further.

7. Remove the adhesive tape from the No. 1 camshaft bearing cap.
- d. Remove the camshaft timing exhaust gear assembly.
1. Remove the temporarily installed camshaft timing exhaust gear assembly.

24. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY

- a. Inspect the camshaft timing gear lock.
 1. Check that the camshaft timing gear is locked.
- b. Inspect camshaft timing gear operation.
 1. After cleaning and degreasing the intake side VVT oil hole on the No. 1 camshaft bearing cap, completely seal the oil hole with adhesive tape or equivalent as shown in the illustration to prevent air from leaking.

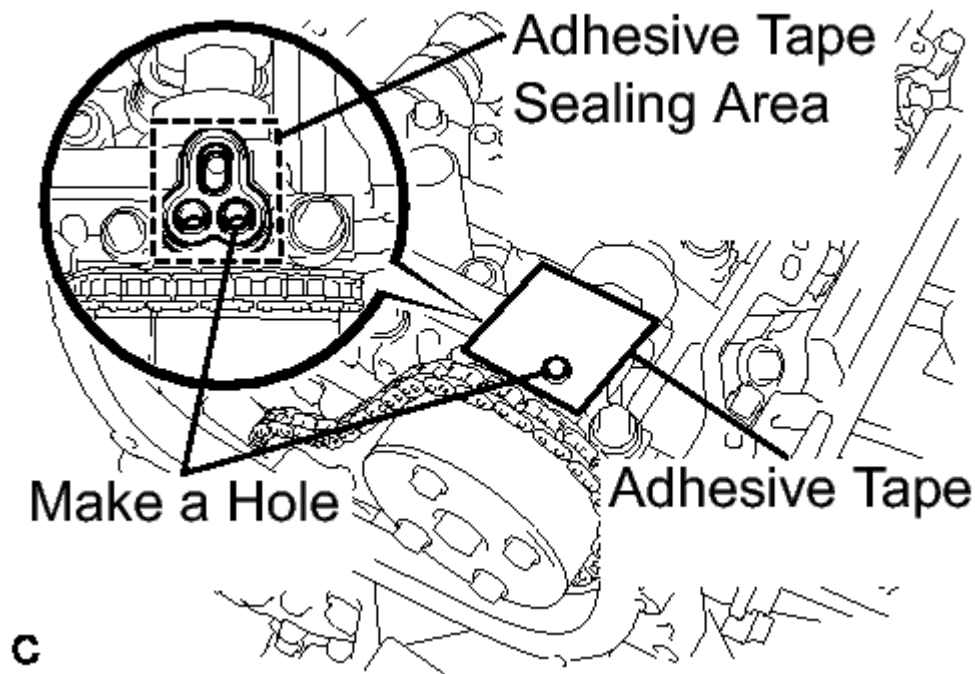
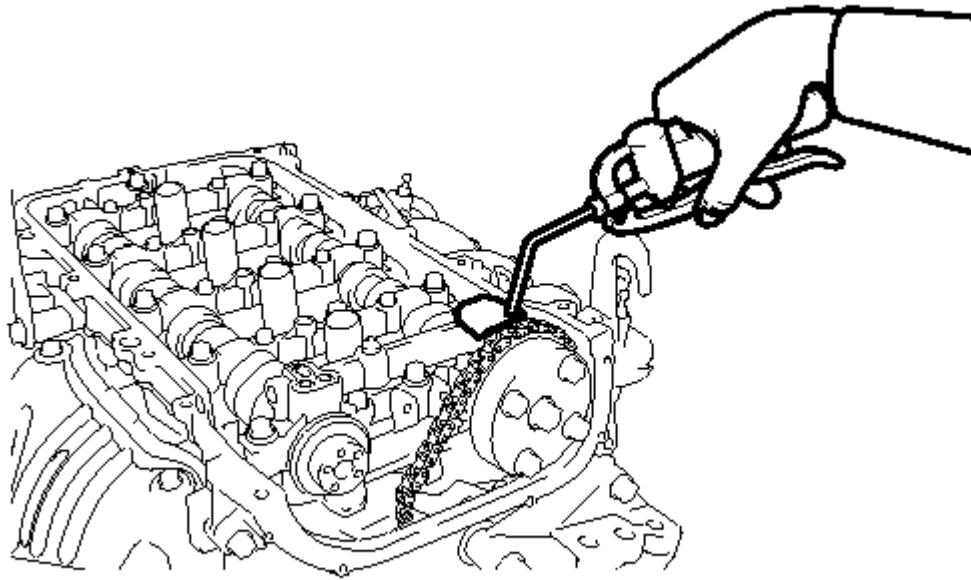


Fig. 28: Sealing Oil Hole

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: Be sure to seal the oil hole completely because air leaks due to insufficient sealing will prevent the lock pin from being released.

2. Make a hole in the adhesive tape covering the oil hole as shown in the illustration. (Procedure A)
3. Apply approximately 150 kPa (1.5 kgf/cm², 22 psi.) of air pressure to the hole made in procedure A to release the lock pin.

**C****Fig. 29: Releasing Lock Pin**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- If air leaks out, reattach the adhesive tape.
- Cover the oil hole with a piece of cloth when applying air pressure to prevent oil from spraying.

4. Forcibly turn the camshaft timing gear in the advance direction (counterclockwise).

HINT:

Depending on the air pressure applied, the camshaft timing gear may turn in the advance direction without assistance by hand.

5. Turn the camshaft timing gear within its movable range (27.5°) 2 or 3 times without turning it to the most retarded position. Check that the camshaft timing gear turns smoothly.

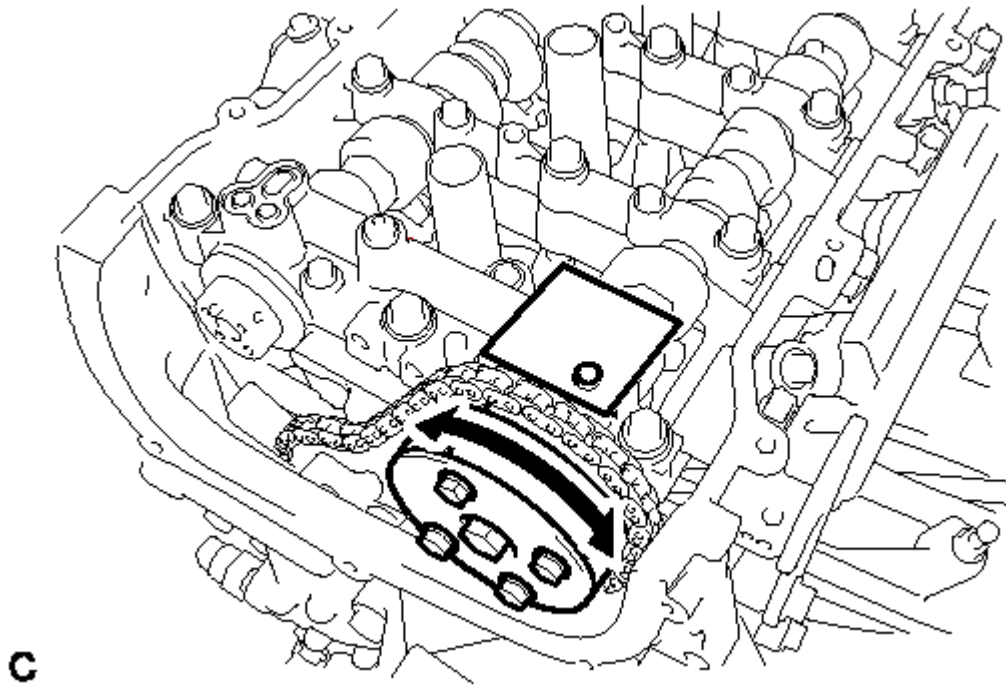


Fig. 30: Turning Camshaft Timing Gear

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- Do not lock the camshaft timing gear assembly.
- If camshaft timing gear assembly is locked, release the lock pin again.

6. Remove the adhesive tape from the No. 1 camshaft bearing cap.

25. REMOVE CAMSHAFT TIMING GEAR ASSEMBLY

- a. While holding the hexagonal portion of the camshaft with a wrench, remove the camshaft timing gear assembly bolt with SST.

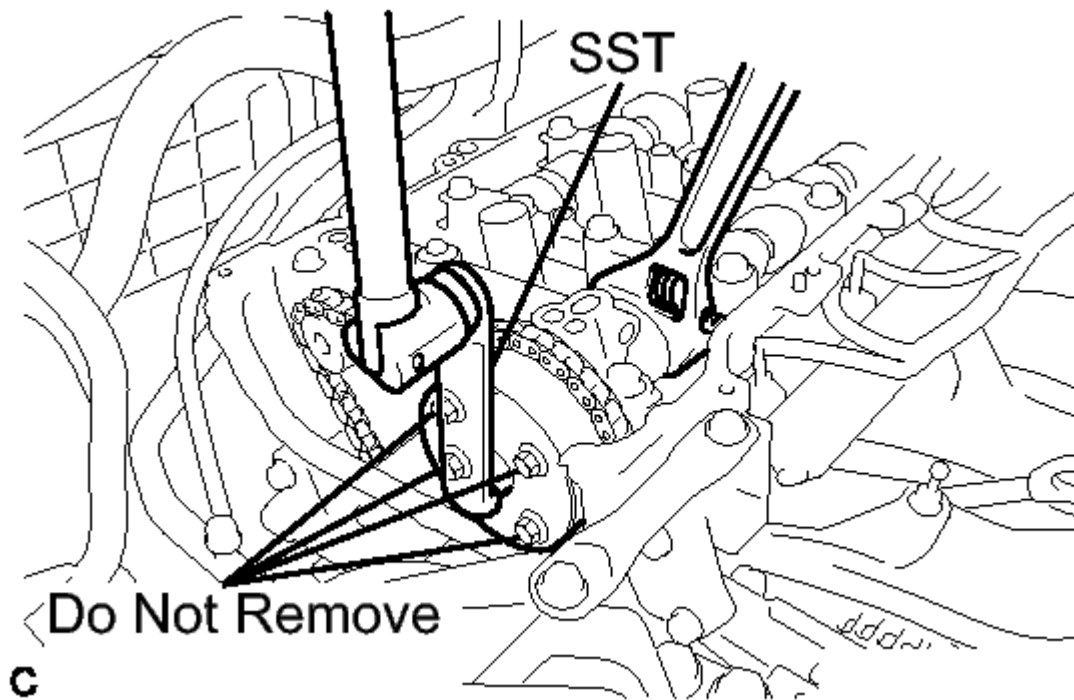


Fig. 31: Removing Camshaft Timing Gear Assembly Bolt

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- SST: 09249-37010

NOTE:

- Before removing the camshaft timing gear, make sure that the lock pin has been released.
- Be sure not to remove the other 4 bolts.
- If the camshaft timing gear assembly is to be reused, be sure to use it with the lock pin released.

- b. Release the chain and remove the camshaft timing gear assembly.

NOTE:

Keep the camshaft timing gear assembly horizontal while removing it from the camshaft.

- c. Suspend the chain with a string or equivalent.

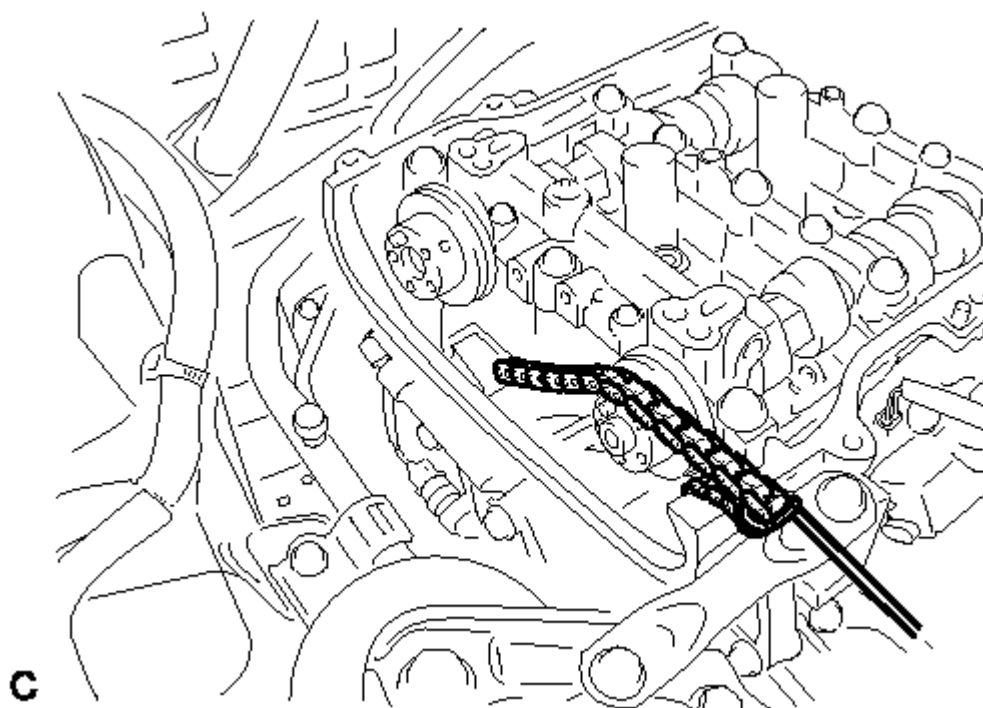


Fig. 32: Suspending Chain

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

26. REMOVE CAMSHAFT BEARING CAP

- a. Uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.

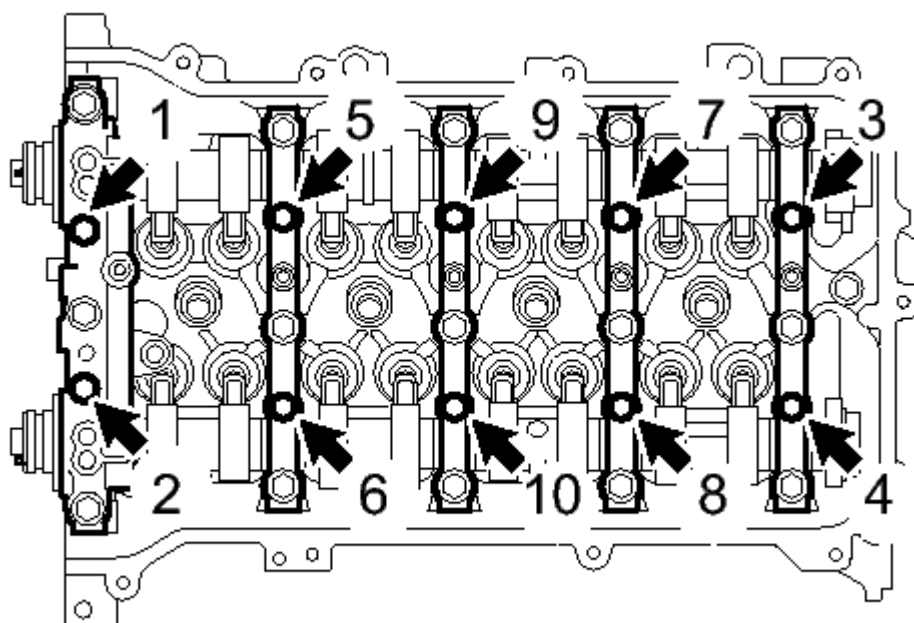


Fig. 33: Identifying Bearing Cap Bolt Removal Sequence

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: Be sure not to loosen the other 15 bearing cap bolts in this step.

HINT:

Arrange the removed parts in the correct order.

- b. Remove the 15 bolts and bearing caps in the order shown in the illustration. Immediately after removing bearing caps, install service bolts and spacers in the order shown in the illustration.

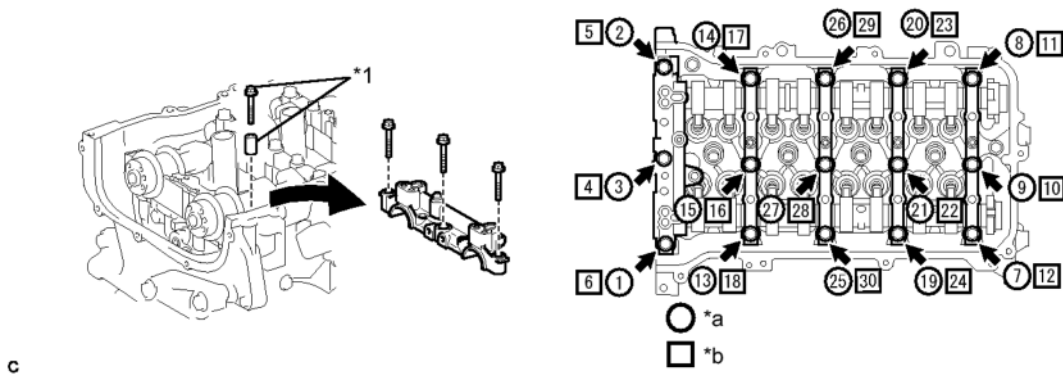


Fig. 34: Identifying Bearing Cap, Bolt & Spacer Sequences
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*1	Service Bolt and Spacer (used to temporarily secure the camshaft housing)	-	-
*a	The removal order of the parts	*b	The installation order of the bolts and spacers for temporarily tightening the camshaft housing

Torque: 27 N*m (275 kgf*cm, 20 in.*lbf)

NOTE:

- If the bolts are loosened all at once, FIPG on the camshaft housing and cylinder head may peel off, resulting in oil oozing. Therefore, be sure to install the service bolts and spacers to one bearing cap at a time.
- Do not install the bearing caps when installing the service bolts and spacers.

HINT:

- Arrange the removed parts in the correct order.
- Part number for the service bolts used to temporarily secure the camshaft housing: 91551-G0875 (15 bolts)
- Part number for the service spacers used to temporarily secure the camshaft housing: 90387-12048 (15 spacers)

27. REMOVE CAMSHAFT

- a. Remove the camshaft from the camshaft housing.

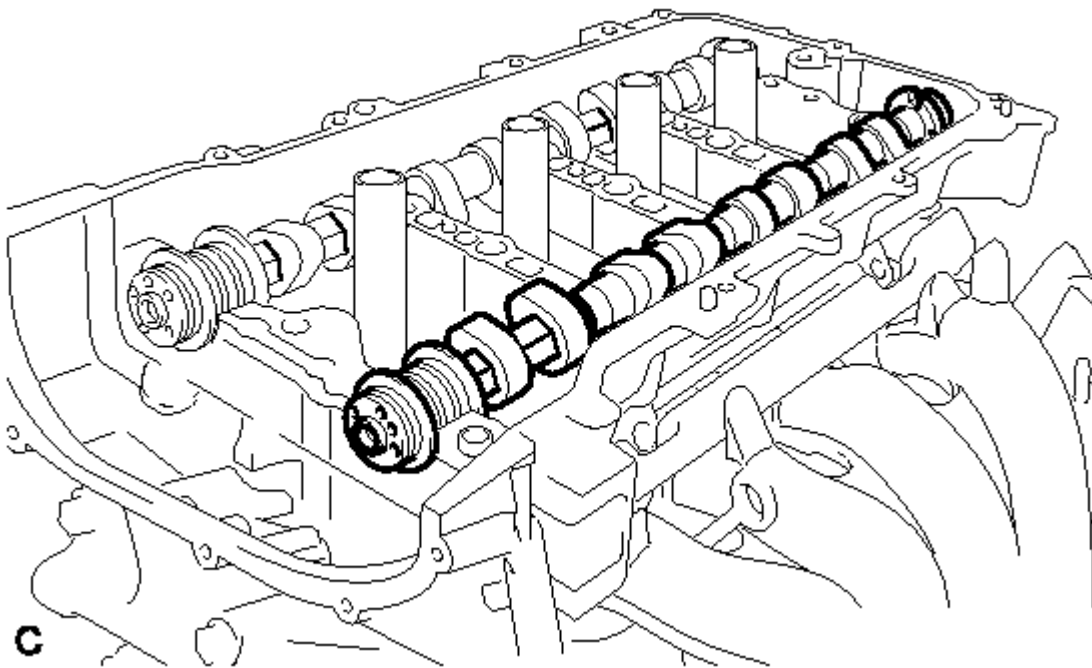


Fig. 35: View Of Camshaft

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

28. REMOVE NO. 2 CAMSHAFT

- a. Remove the No. 2 camshaft from the camshaft housing.

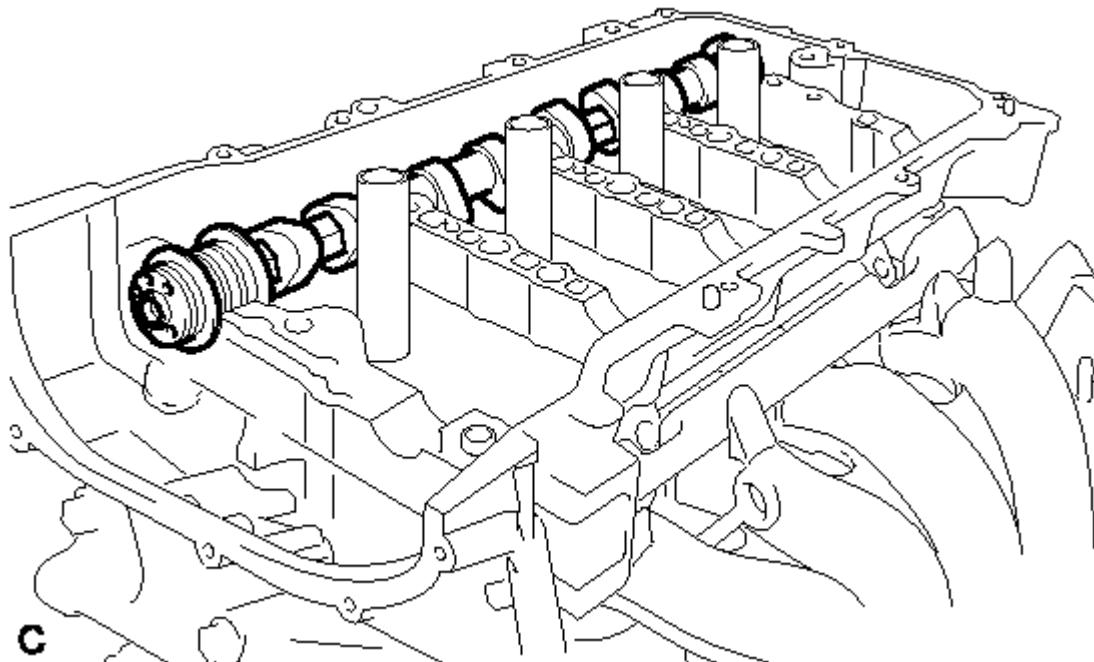


Fig. 36: View Of No. 2 Camshaft

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

29. REMOVE NO. 1 CAMSHAFT BEARING

- a. Remove the 2 No. 1 camshaft bearings from the No. 1 camshaft bearing cap.

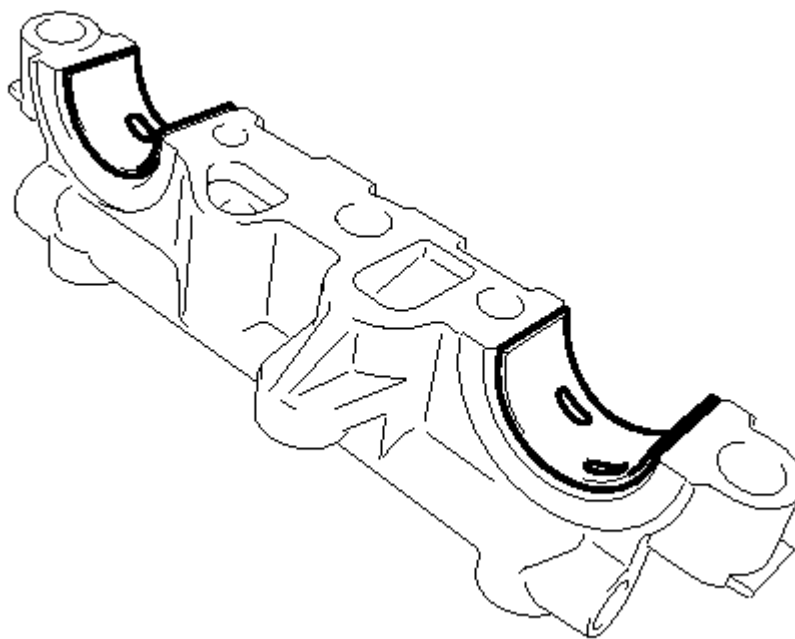


Fig. 37: Identifying No. 1 Camshaft Bearings

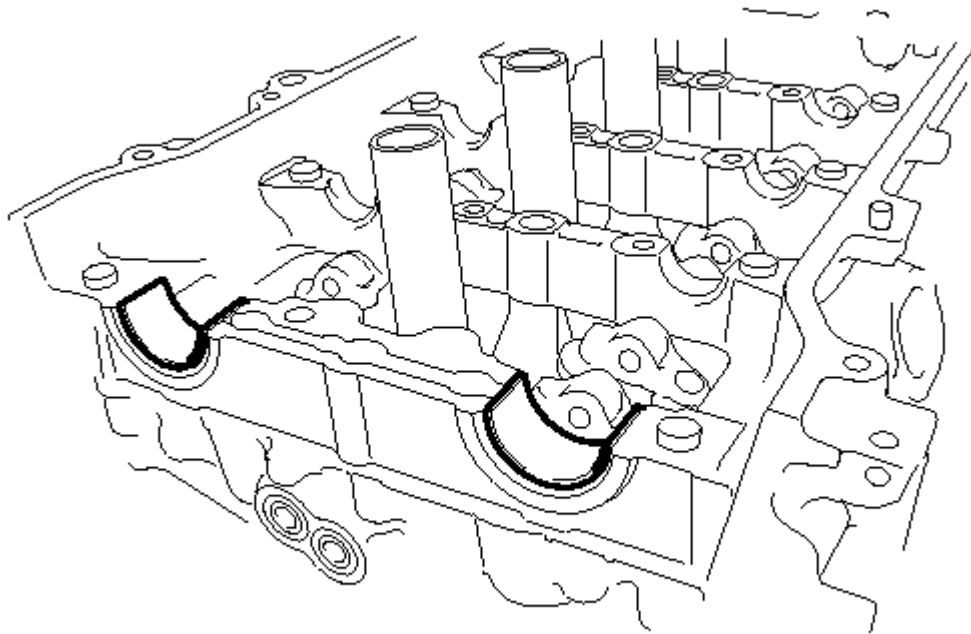
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

Arrange the removed parts in the correct order.

30. REMOVE NO. 2 CAMSHAFT BEARING

- a. Remove the 2 No. 2 camshaft bearings from the camshaft housing.



T

Fig. 38: Identifying No. 2 Camshaft Bearings

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

Arrange the removed parts in the correct order.

INSTALLATION

INSTALLATION

1. INSTALL NO. 1 CAMSHAFT BEARING

- a. Clean the both surfaces of the 2 No. 1 camshaft bearings.

NOTE: Do not apply engine oil to the bearings or the contact surfaces.

- b. Install the 2 No. 1 camshaft bearings to the No. 1 camshaft bearing cap.

- c. Using vernier calipers, measure the distance between the bearing cap's edge and the camshaft bearing's edge.

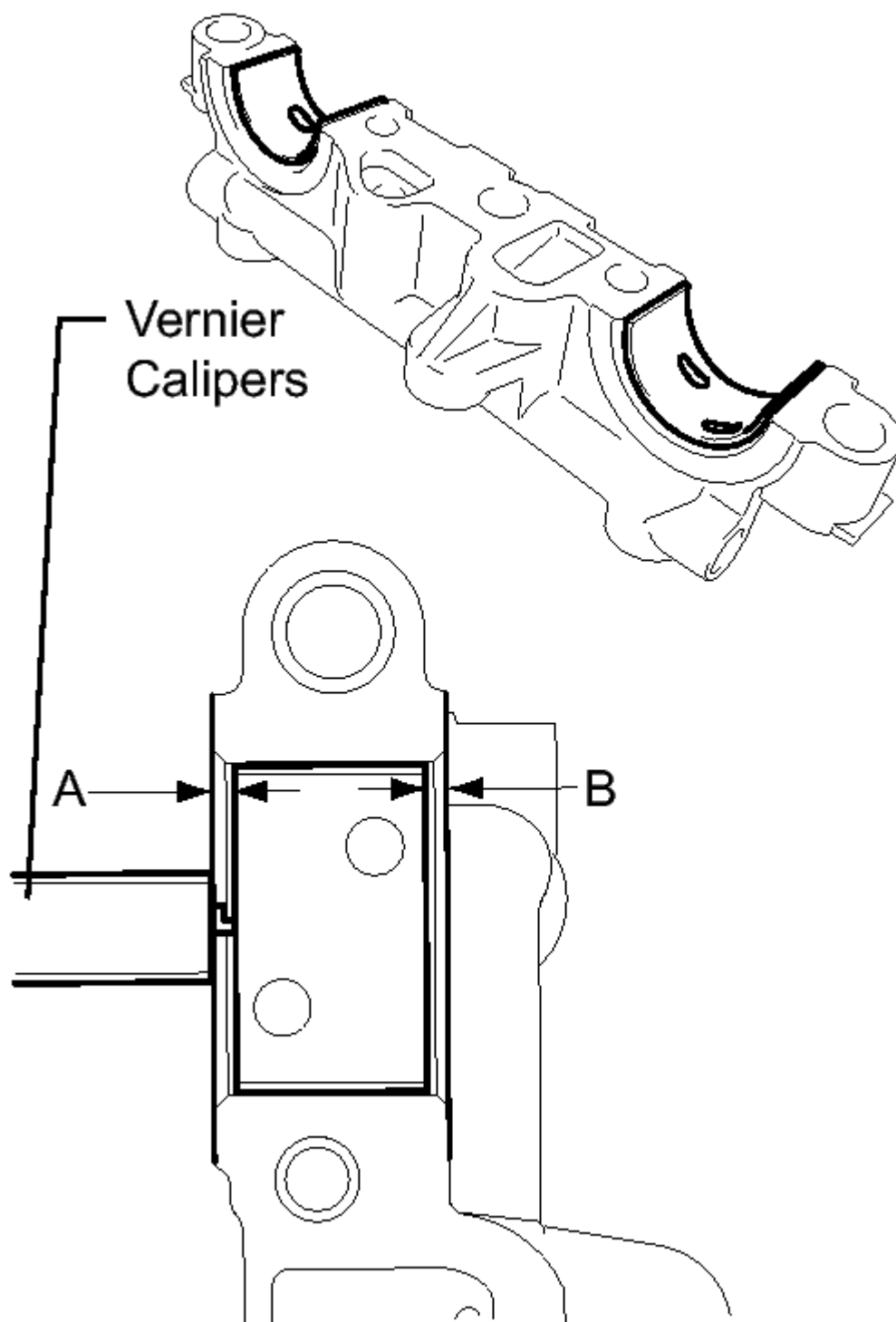


Fig. 39: Identifying Bearing Cap Edge Dimension
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Dimension (A - B)

0.7 mm (0.0276 in.) or less

NOTE: **Position the bearing to the center of the bearing cap by measuring dimension A - B.**

2. INSTALL NO. 2 CAMSHAFT BEARING

- a. Clean both surfaces of the 2 No. 2 camshaft bearings.

NOTE: **Do not apply engine oil to the bearings or the contact surfaces.**

- b. Install the 2 No. 2 camshaft bearings.
- c. Using vernier calipers, measure the distance between the bearing cap's edge and the camshaft bearing's edge.

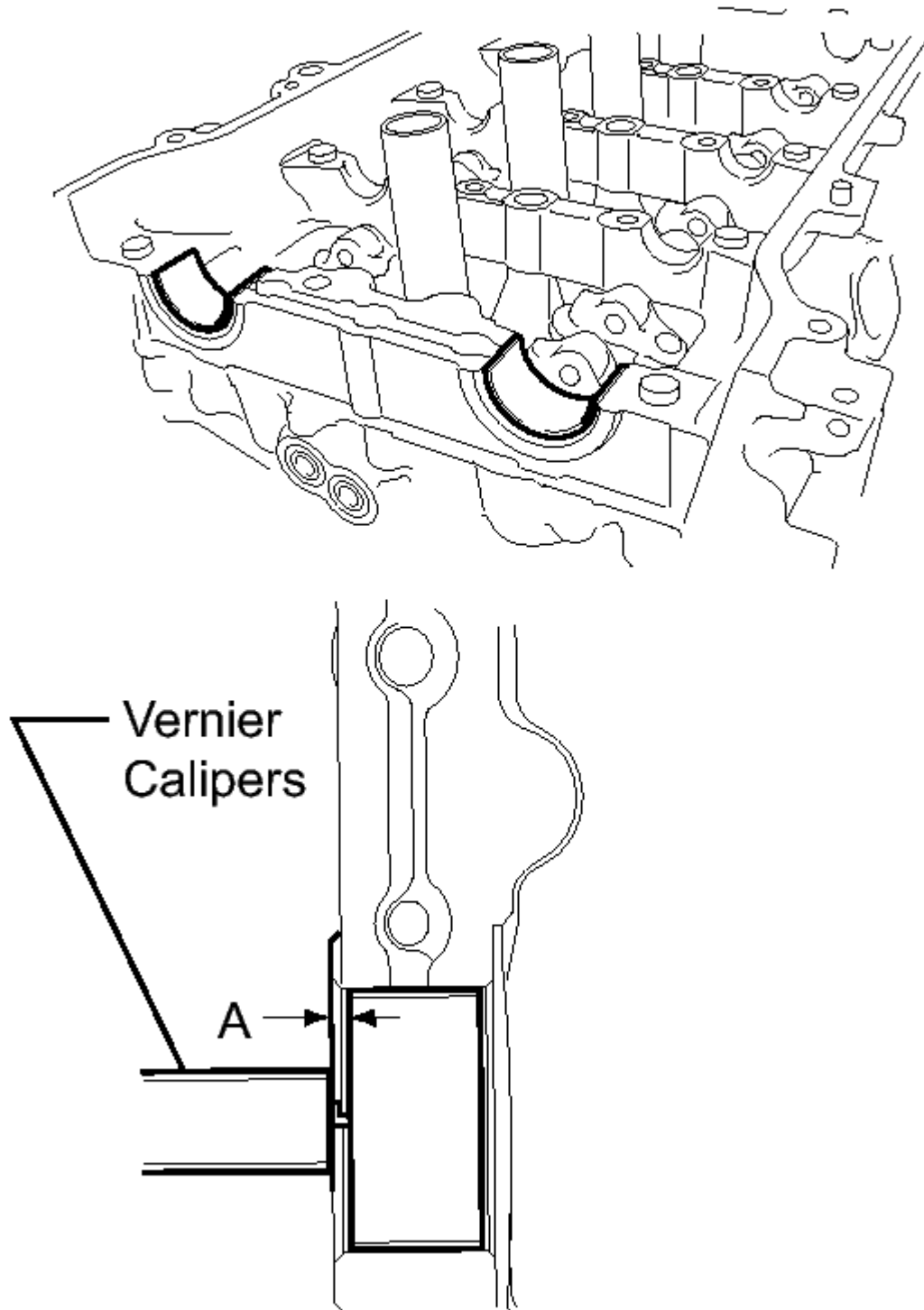


Fig. 40: Measuring Distance Between Bearing Cap Edge & Camshaft Bearing Edge
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

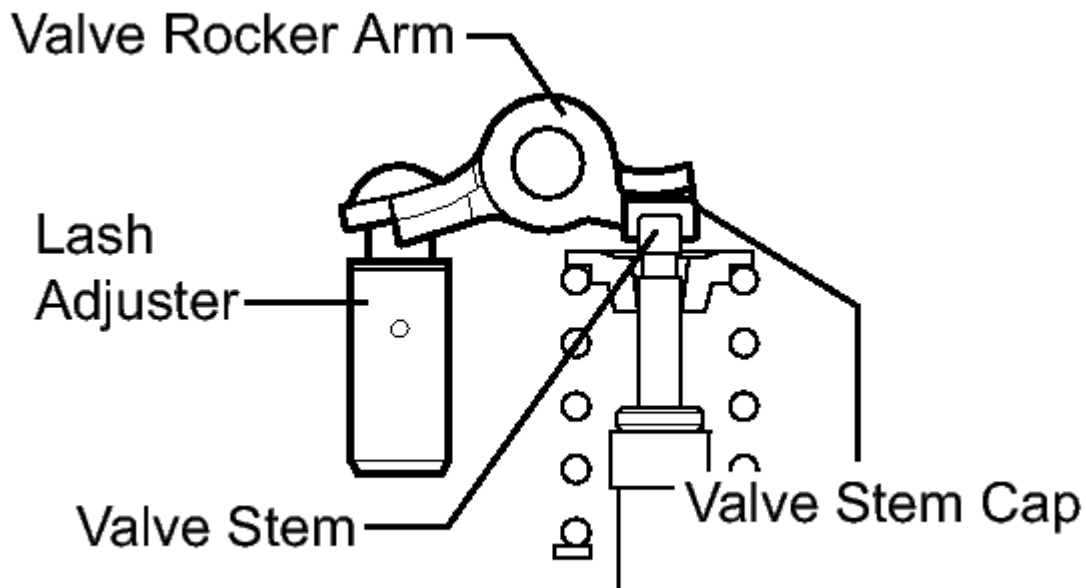
Dimension (A)

1.05 to 1.75 mm (0.042 to 0.068 in.)

NOTE: Position the bearing to the center of the bearing cap by measuring dimension A.

3. INSTALL NO. 2 CAMSHAFT

- a. Make sure that the valve rocker arm is installed as shown in the illustration.



P

Fig. 41: View Of Valve Rocker Arm Installation

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Clean the camshaft journals.
- c. Apply a light coat of engine oil to the camshaft journals, camshaft housings and bearing caps.
- d. Install the No. 2 camshaft to the camshaft housing.

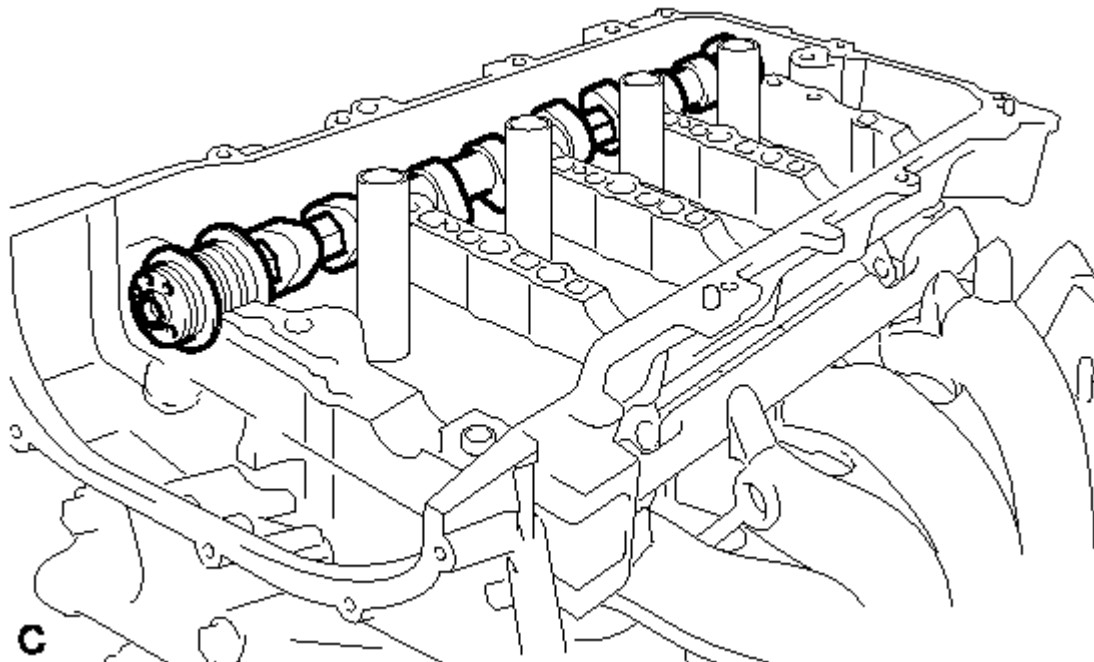


Fig. 42: View Of No. 2 Camshaft

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. INSTALL CAMSHAFT

- Make sure that the valve rocker arm is installed as shown in the illustration.

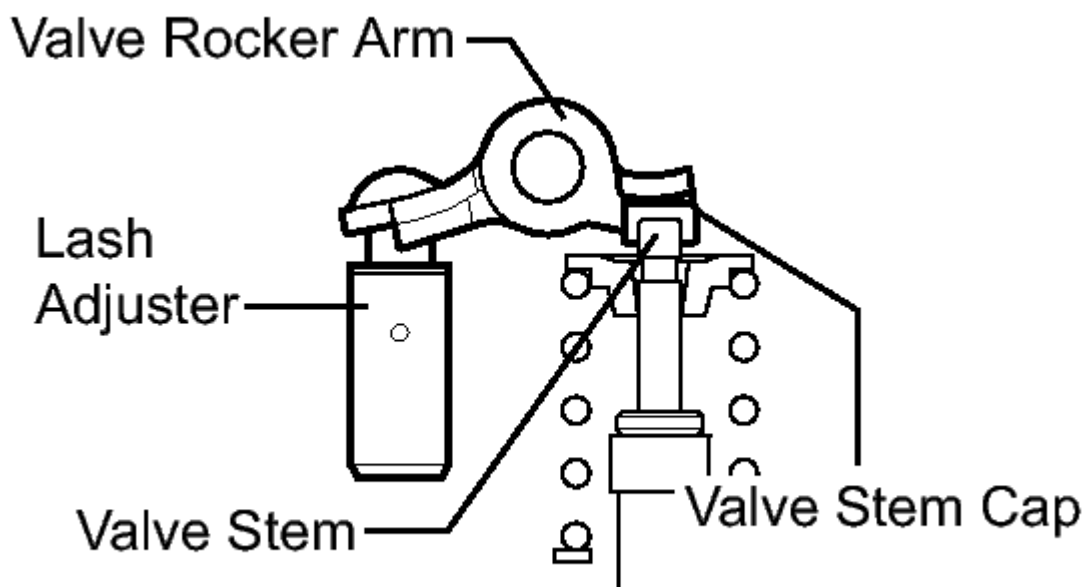


Fig. 43: View Of Valve Rocker Arm Installation

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Clean the camshaft journals.
- c. Apply a light coat of engine oil to the camshaft journals, camshaft housings and bearing caps.
- d. Install the camshaft to the camshaft housing.

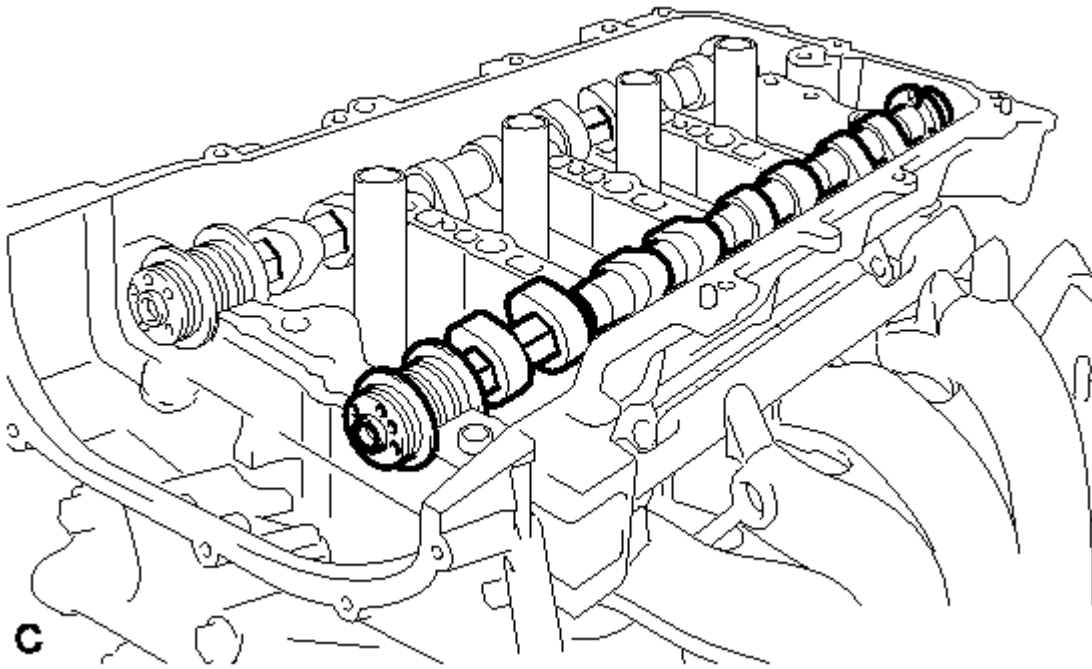


Fig. 44: View Of Camshaft

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. INSTALL CAMSHAFT BEARING CAP

- a. Check the marks and numbers on the camshaft bearing caps, and then remove the service bolts and spacers in the order shown in the illustration. Immediately after removing the service bolts and spacers in the location for bearing caps, install the bearing caps with the bolts in the order shown in the illustration.

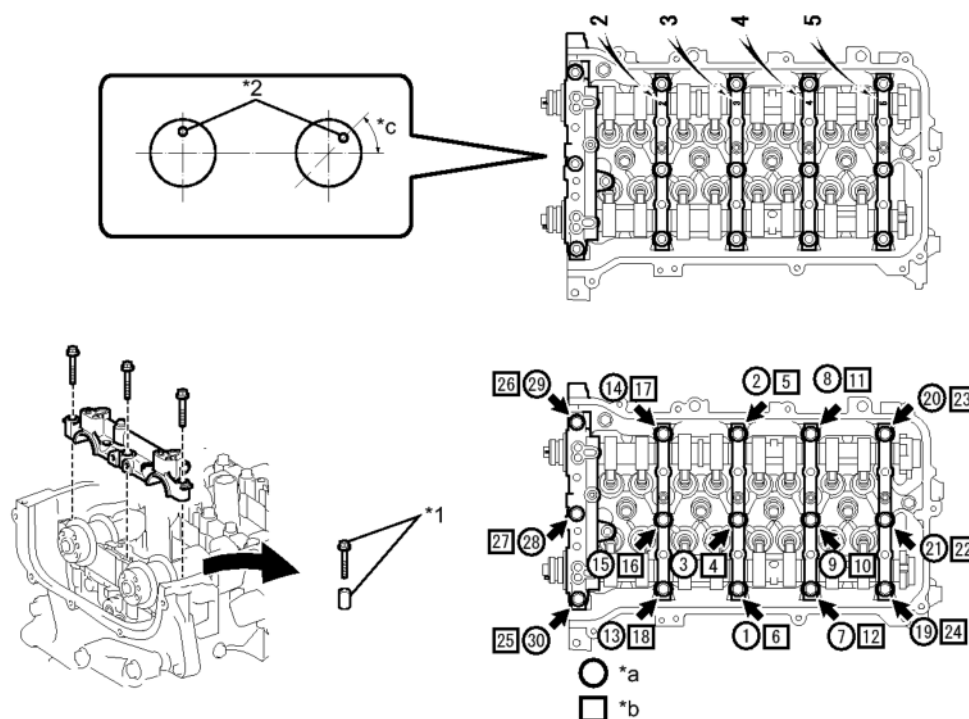


Fig. 45: Identifying Bearing Cap, Bolt & Spacer Sequences
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TEXT IN ILLUSTRATION

*1	Service Bolt and Spacer (used to temporarily secure the camshaft housing)	*2	Knock Pin
*a	The removal order of the bolts and spacers for temporarily tightening the camshaft housing	*b	The installation order of the parts
*c	50°	-	-

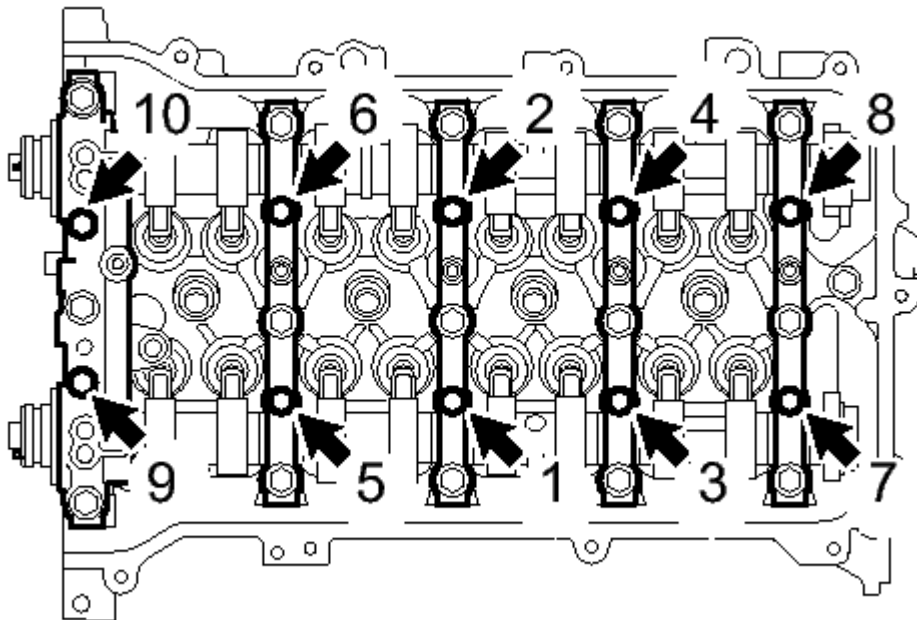
Torque: 27 N*m (275 kgf*cm, 20 in.*lbf)

NOTE: If the bolts are loosened all at once, FIPG on the camshaft housing and cylinder head may peel off, resulting in oil oozing. Therefore, be sure to remove the service bolt and spacer from one bearing cap at a time.

HINT:

Make sure that the knock pin of the camshaft is positioned as shown in the illustration.

- b. Tighten the 10 bolts in the order shown in the illustration.



T

Fig. 46: Identifying Bearing Cap Bolt Tightening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Torque: 16 N*m (163 kgf*cm, 12 in.*lbf)

- c. Check the torque of each bolt again.
- 6. INSTALL CAMSHAFT TIMING GEAR ASSEMBLY**
- a. Check that the knock pin is installed on the camshaft.
 - b. Hold up the chain and align the matchmark on the camshaft timing gear assembly and the paint mark on the chain.

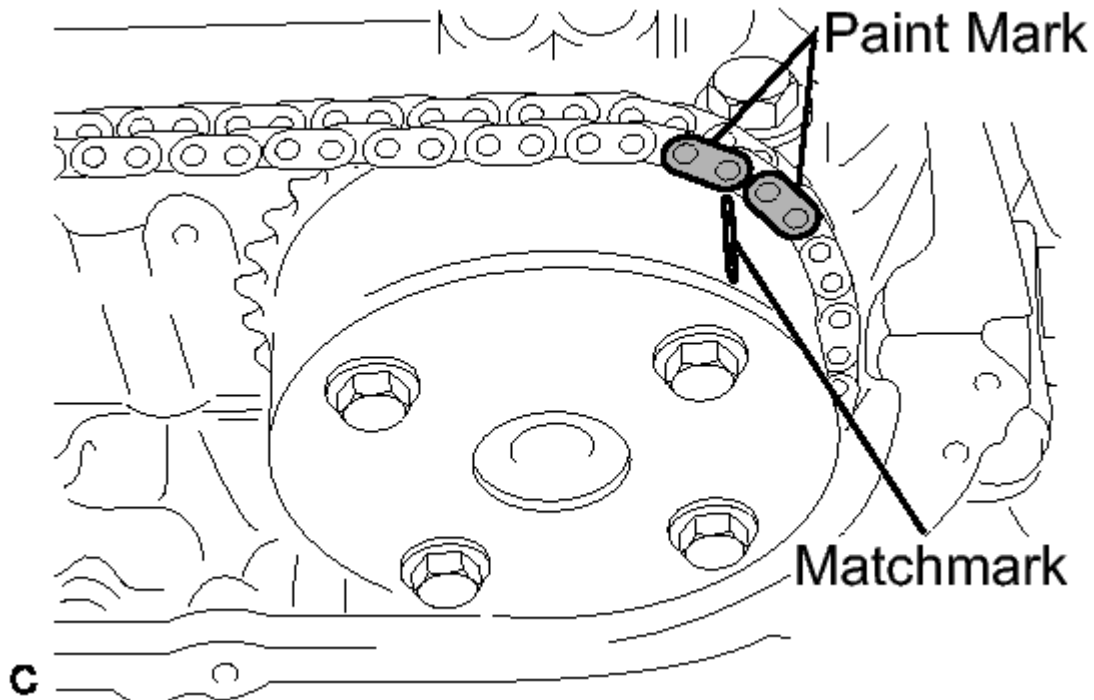


Fig. 47: Aligning Camshaft Timing Gear Assembly & Chain
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Put the camshaft timing gear and camshaft together with the knock pin and key groove misaligned, as shown in the illustration.

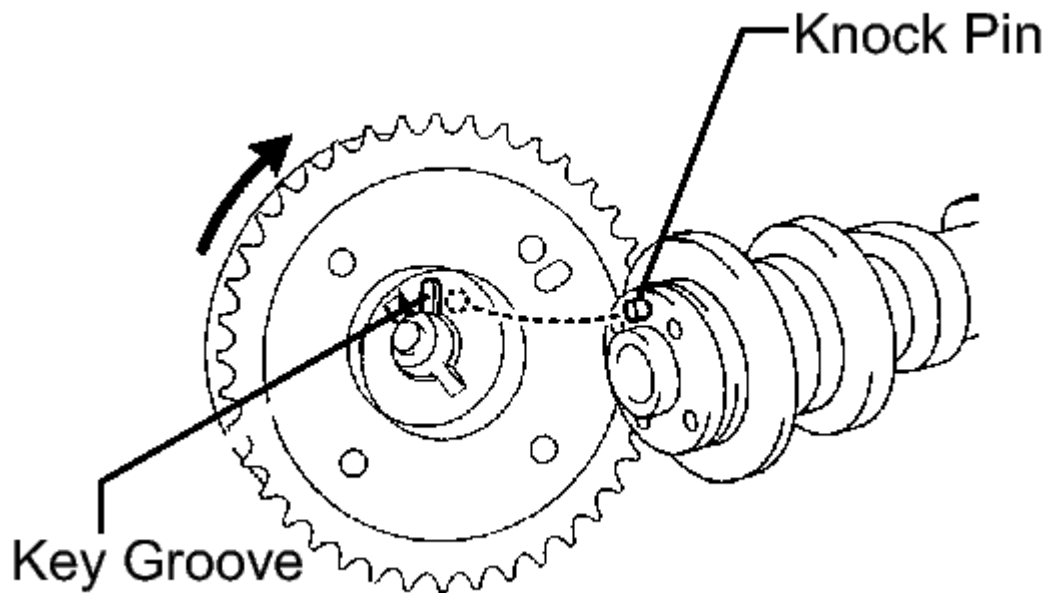
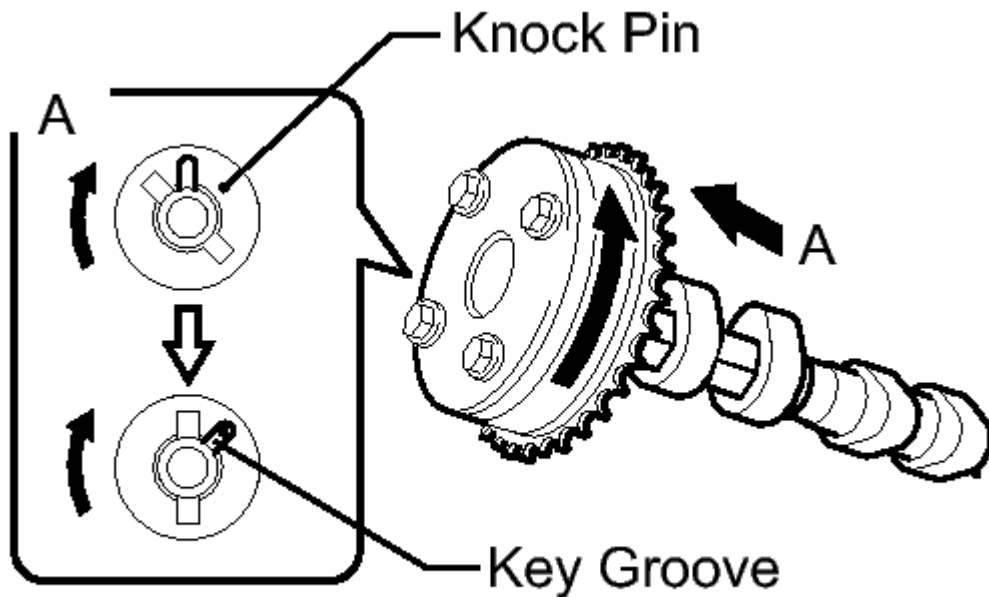


Fig. 48: Identifying Knock Pin & Key Groove

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: Do not forcefully push in the camshaft timing gear assembly. This may cause the camshaft knock pin tip to damage the installation surface of the camshaft timing gear assembly.

- d. Turn the camshaft timing gear as shown in the illustration while pushing it gently against the camshaft. Push further at the position where the pin fits into the groove.



T

Fig. 49: Turning Camshaft Timing Gear

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: Do not turn the camshaft timing gear in the retard direction (the right angle).

- e. Check that there is no clearance between the camshaft timing gear and camshaft flange.

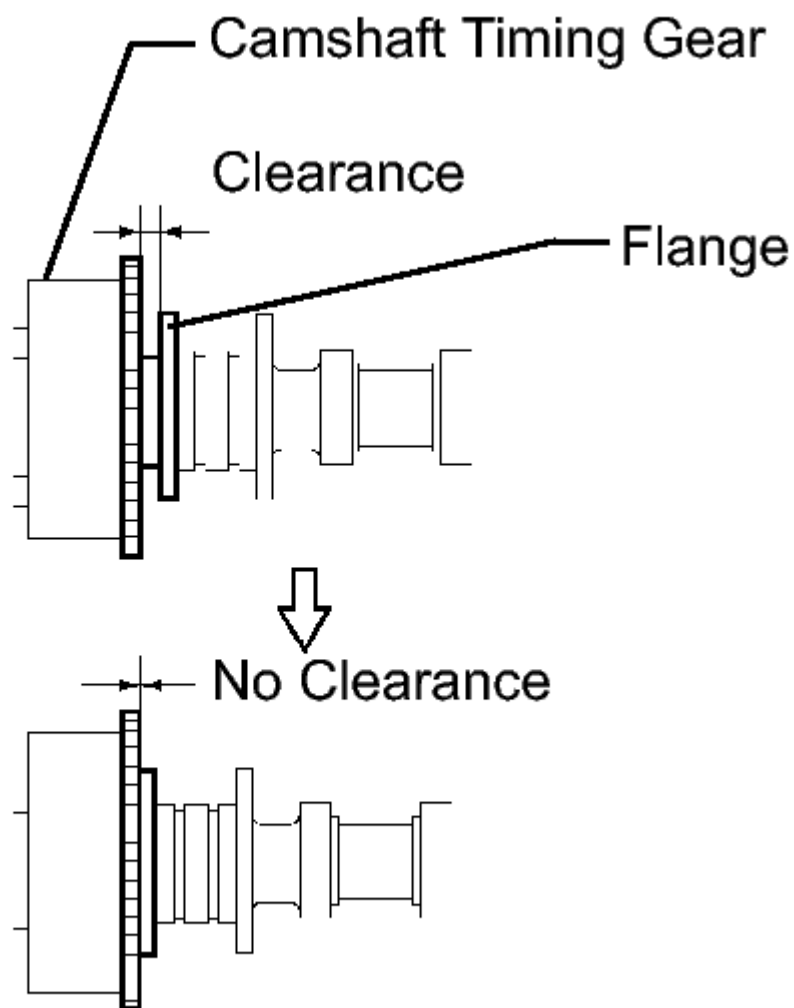


Fig. 50: Checking For Clearance Between Camshaft Timing Gear & Camshaft Flange
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- f. Using SST and a wrench, hold the hexagonal portion of the camshaft and fix the camshaft timing gear assembly to the camshaft with the bolt.

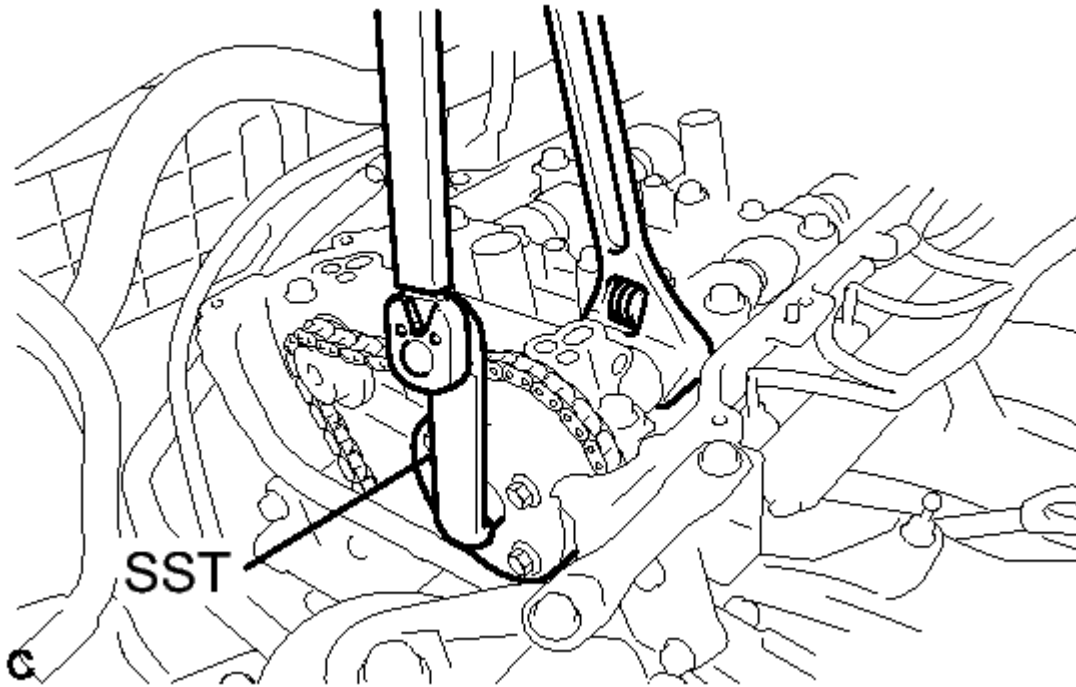


Fig. 51: Fixing Camshaft Timing Gear Assembly To Camshaft
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- SST: 09249-37010

without SST

Torque: 54 N*m (551 kgf*cm, 40 in.*lbf)

with SST

Torque: 39 N*m (398 kgf*cm, 29 in.*lbf)

NOTE: When tightening the bolts, do not allow the camshaft timing gear assembly to rotate.

HINT:

- The "with SST" torque value can be obtained by using a torque wrench with a fulcrum length of 260 mm (10.24 in.) and SST of 100 mm (3.94 in.). Refer to **PRECAUTION** .
 - This torque value is effective when SST is parallel to the torque wrench.
- g. Check that the camshaft timing gear can move to the retard angle side (the right direction) and is locked in the most retarded position.

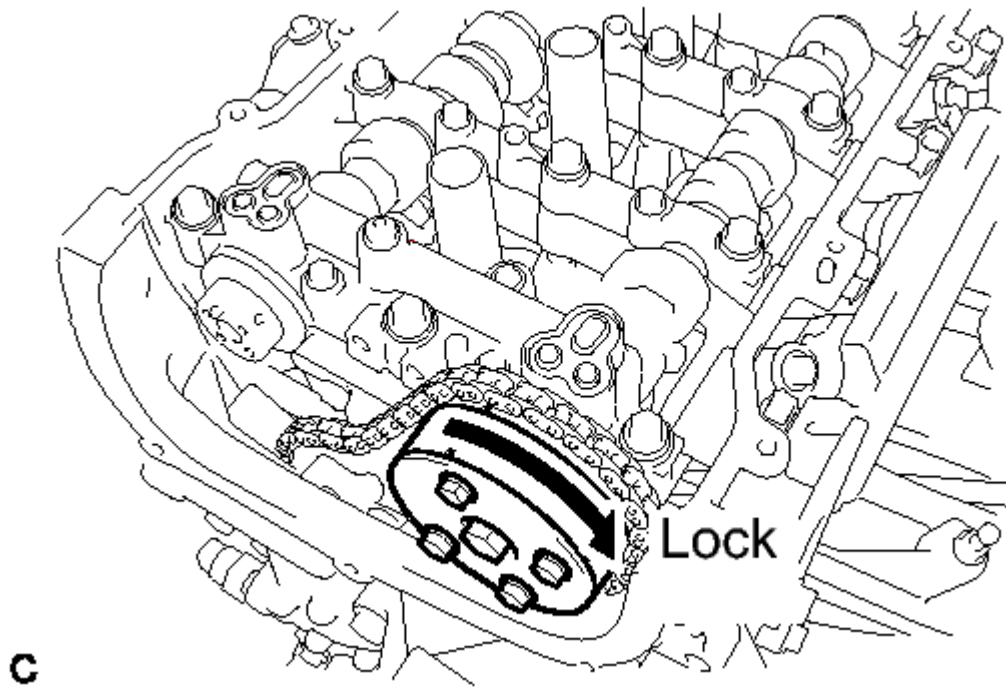


Fig. 52: Checking Camshaft Timing Gear Movement
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. INSTALL CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY

- a. Check that the knock pin is installed on the camshaft.
- b. Hold up the chain and align the matchmark on the camshaft timing gear assembly and the paint mark on the chain.

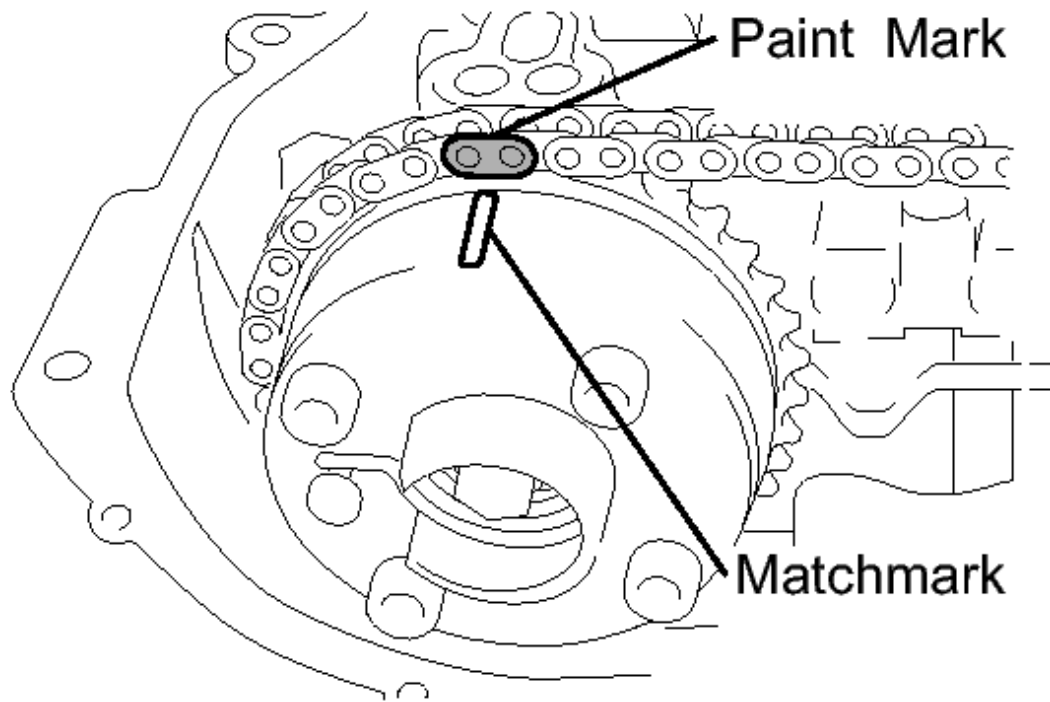


Fig. 53: Aligning Matchmark On Camshaft Timing Gear Assembly & Paint Mark On Chain
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Put the camshaft timing exhaust gear and camshaft together by aligning the key groove and knock pin.

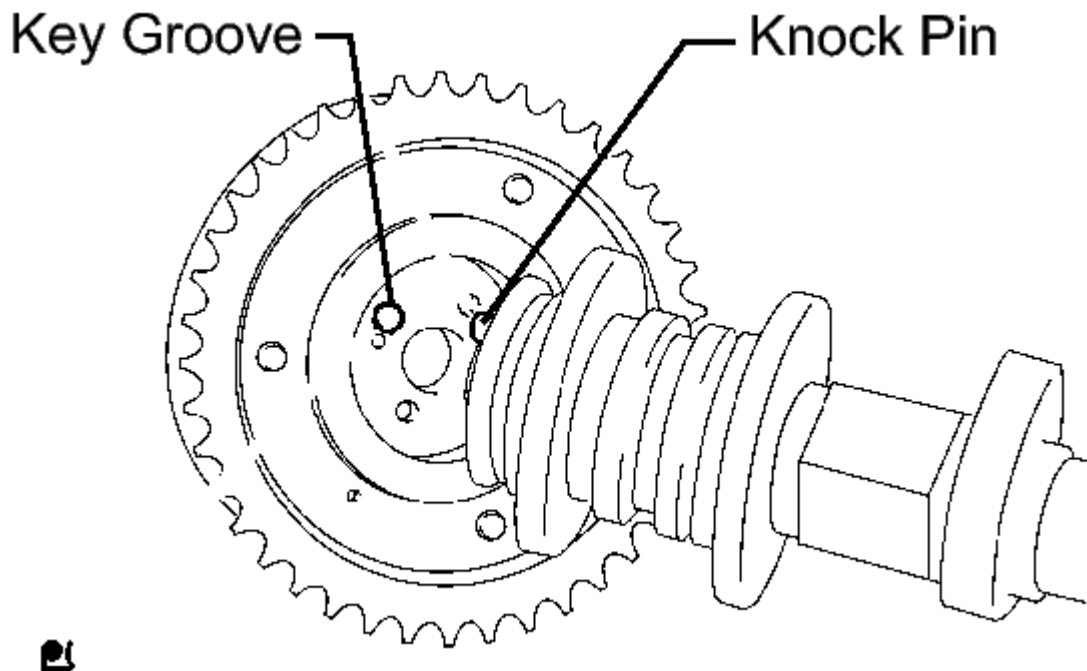


Fig. 54: Identifying Key Groove & Knock Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: Do not forcefully push in the camshaft timing exhaust gear assembly. This may cause the camshaft knock pin tip to damage the installation surface of the camshaft timing exhaust gear assembly.

- d. Using a wrench, hold the hexagonal portion of the No. 2 camshaft and fix the camshaft timing exhaust gear assembly to the No. 2 camshaft with the bolt.

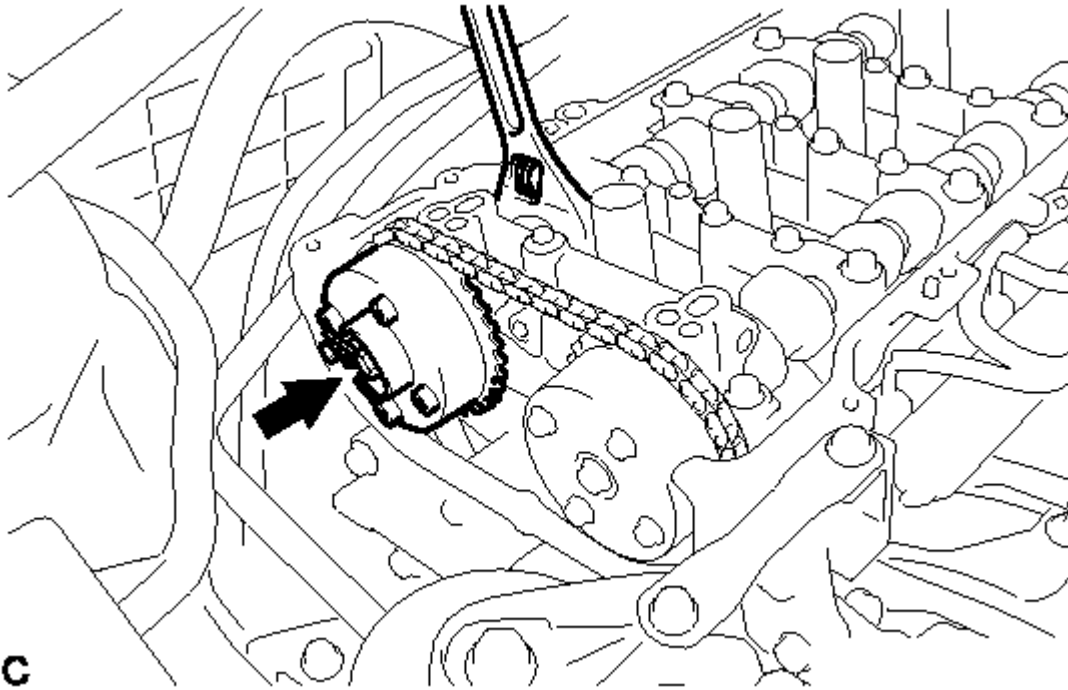


Fig. 55: Fixing Camshaft Timing Exhaust Gear Assembly To No. 2 Camshaft
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Torque: 54 N*m (551 kgf*cm, 40 in.*lbf)

8. INSTALL NO. 2 CHAIN VIBRATION DAMPER

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

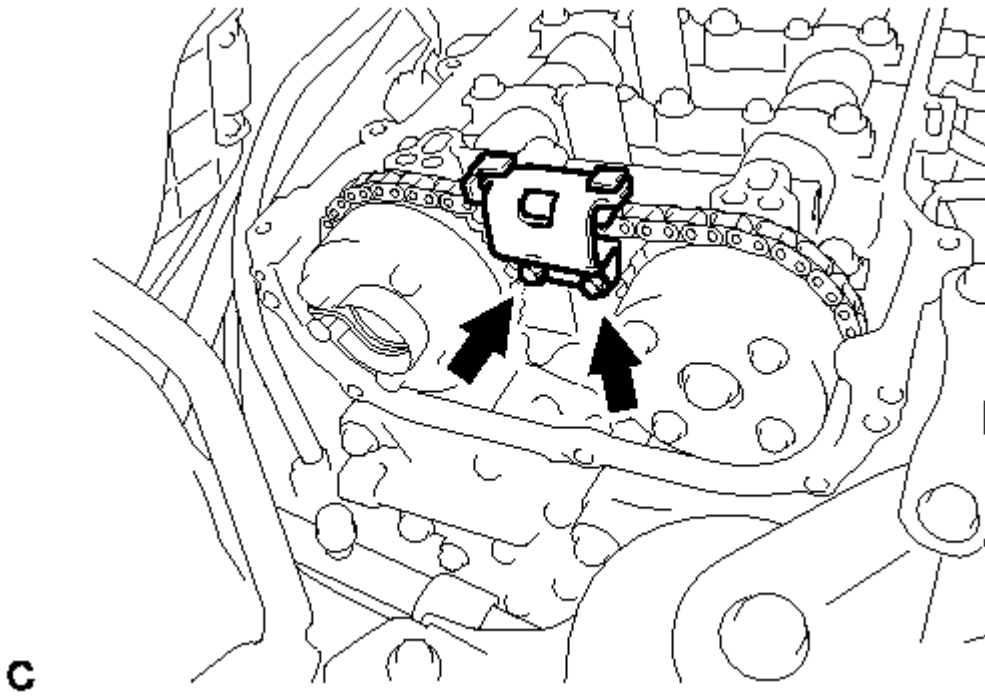


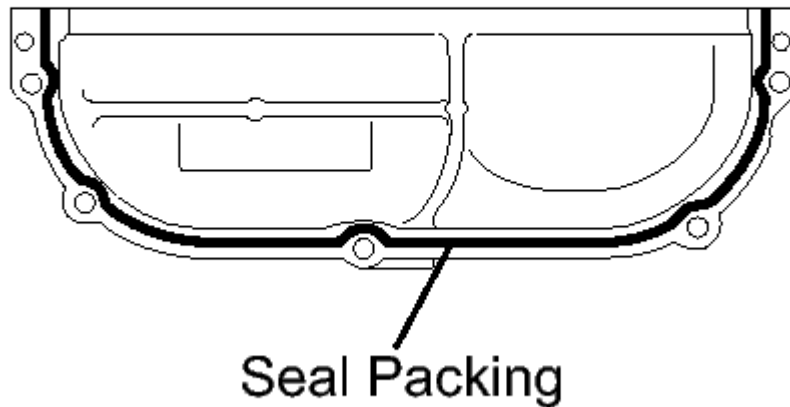
Fig. 56: Identifying Chain Vibration Damper & Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Torque: 10 N*m (102 kgf*cm, 7 in.*lbf)

9. INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY See step 39

10. INSTALL SERVICE COVER

- a. Remove any old packing material from the contact surface.
- b. Make sure to clean and degrease the fitting surfaces of the service cover and timing chain cover so that they are free of grease, water or any contamination.
- c. Apply a continuous bead of seal packing (Diameter 5.0 mm (0.197 in.)) as shown in the illustration.

**C****Fig. 57: Identifying Seal Packing**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

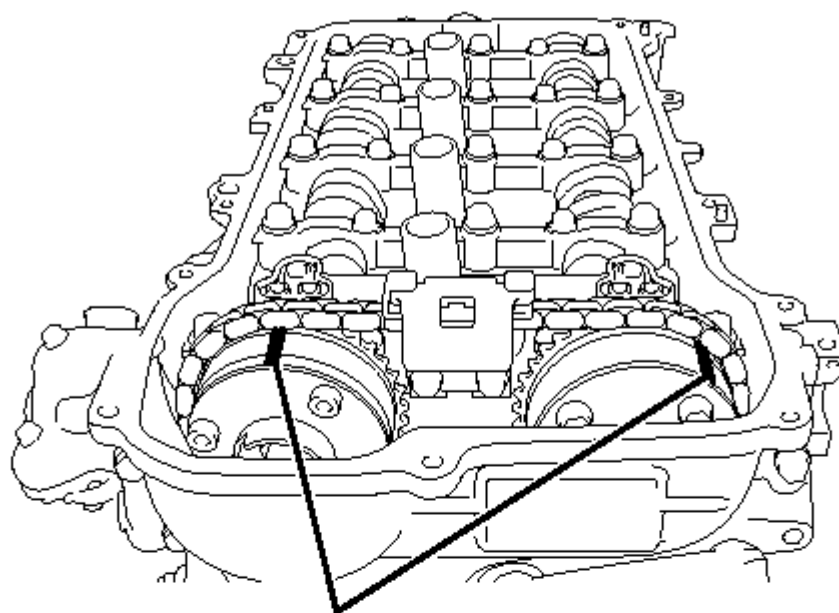
NOTE:

- Remove any oil from the contact surface.
- Install the service cover within 3 minutes after applying seal packing.
- Do not add engine oil within 2 hours after installing the service cover.

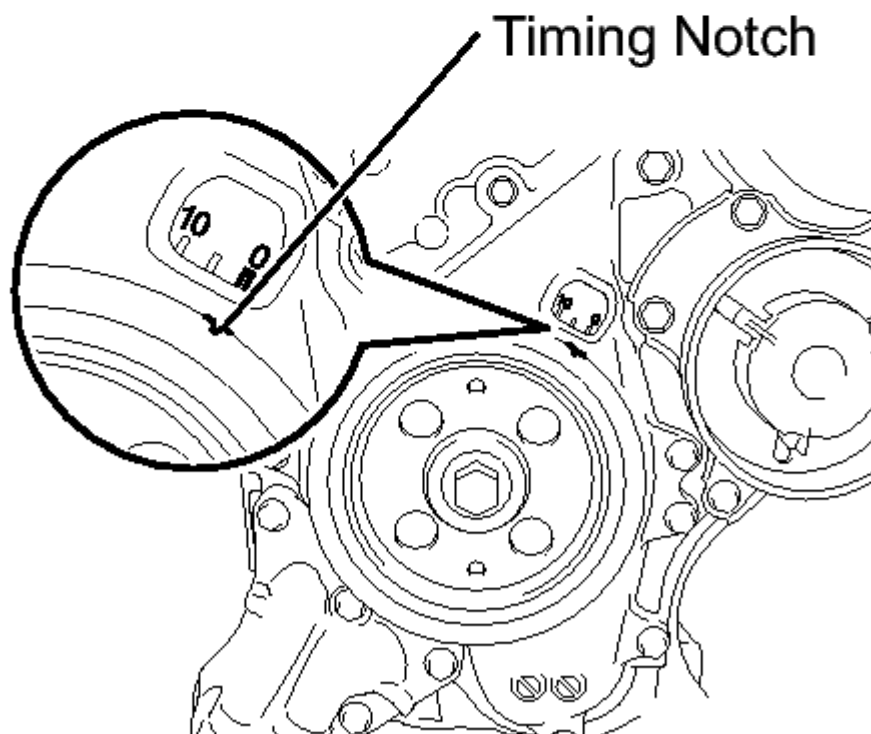
- d. Install the service cover to the timing chain cover with the 5 bolts.

Torque: 9.1 N*m (93 kgf*cm, 81 ft.*lbf)**11. SET NO. 1 CYLINDER TO TDC / COMPRESSION**

- a. Turn the crankshaft pulley until its timing notch (groove) and the timing mark "0" of the timing chain cover are aligned.



Matchmark



Timing Notch

T

Fig. 58: Aligning Crankshaft Pulley & Timing Chain Cover
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Check that each matchmark of the camshaft timing gear and camshaft timing exhaust gear are aligned with each matchmark located as shown in the illustration. If not, turn the crankshaft 1

revolution (360°) to align the timing marks as shown in the illustration.

12. **INSTALL CYLINDER HEAD COVER GASKET** See step 41
13. **INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY** See step 42
14. **INSTALL AIR TUBE ASSEMBLY**
 - a. Install the air tube assembly with the 2 bolts.

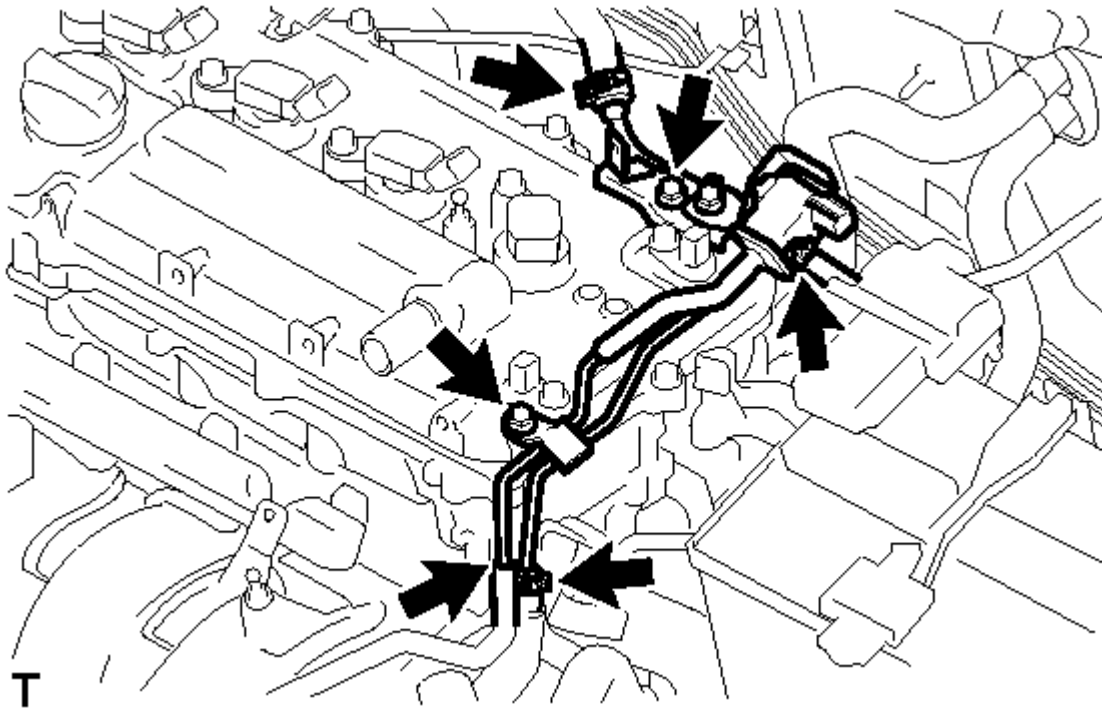


Fig. 59: Identifying Air Tube Assembly Bolts & Hoses
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Torque: 10 N*m (102 kgf*cm, 7 in.*lbf)

- b. Connect the 4 hoses.
15. **CONNECT ENGINE WIRE**
 - a. Connect the 5 connectors and install the wire harness with the 2 bolts and 5 clamps.

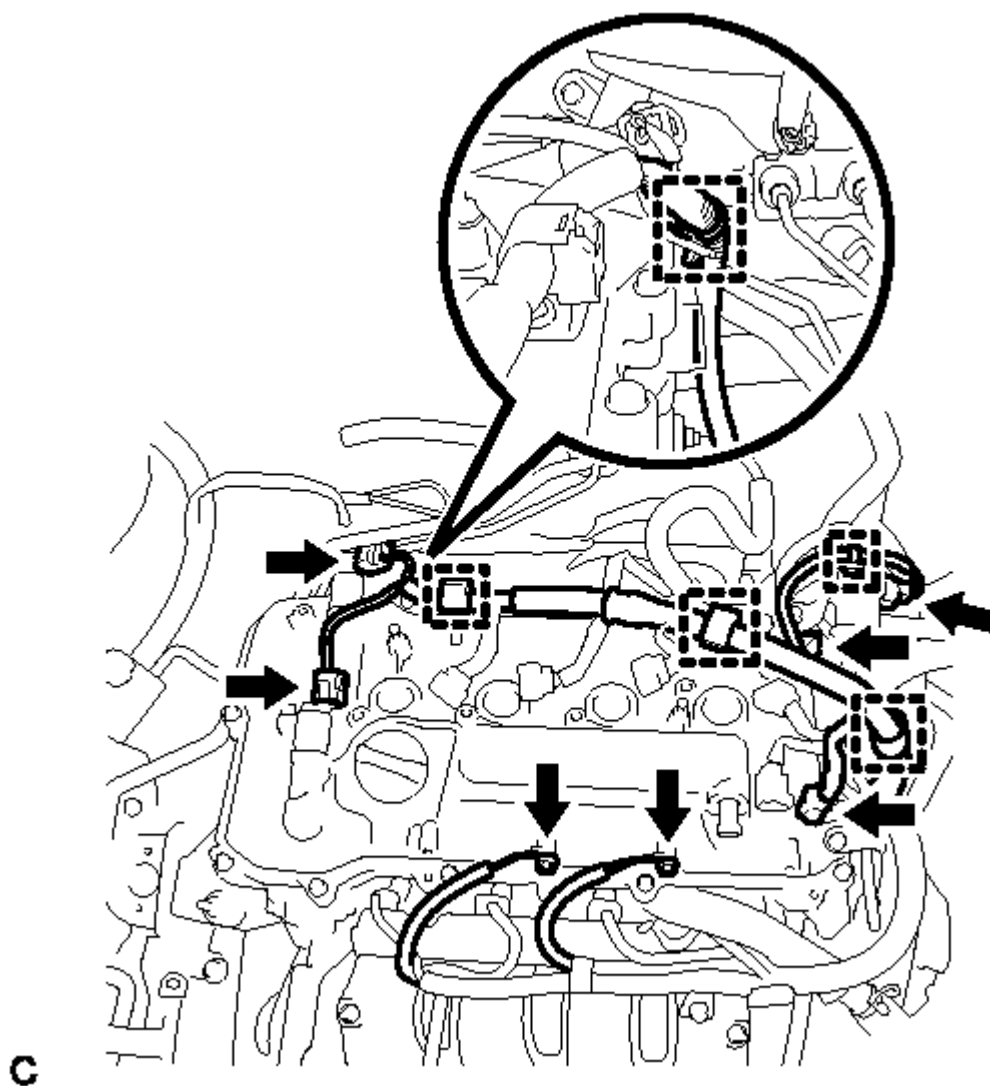


Fig. 60: Identifying Engine Wire Bolts, Connectors & Clamps
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Torque: 8.4 N*m (86 kgf*cm, 74 ft.*lbf)

16. CONNECT NO. 2 VENTILATION HOSE

- a. Connect the No. 2 ventilation hose.

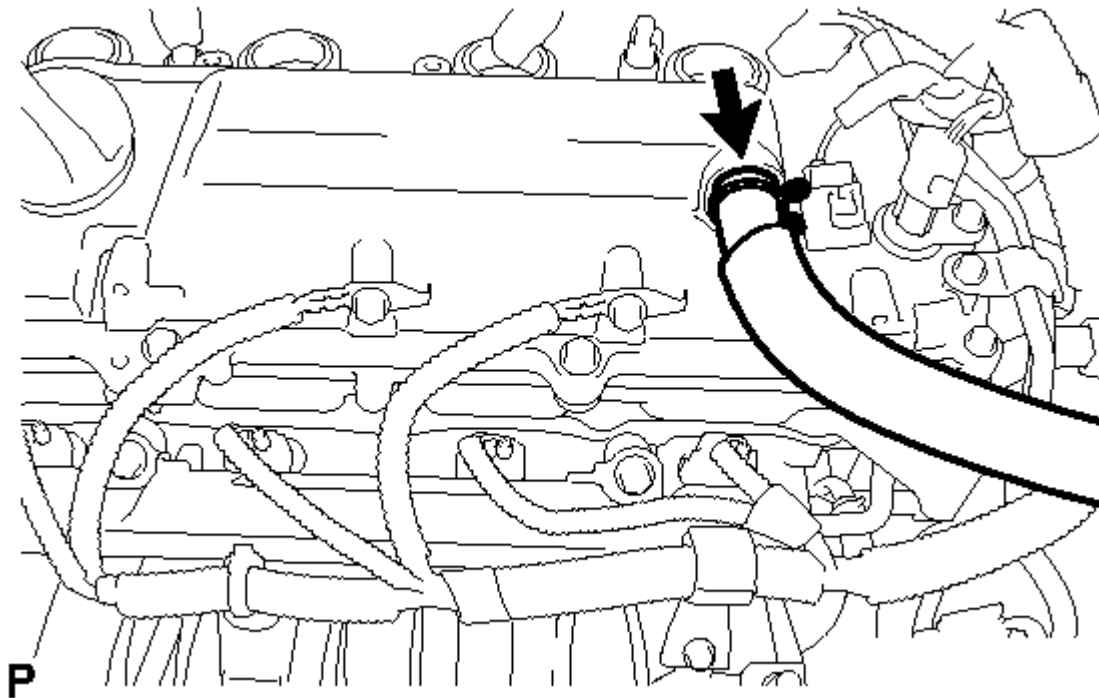


Fig. 61: Locating No. 2 Ventilation Hose

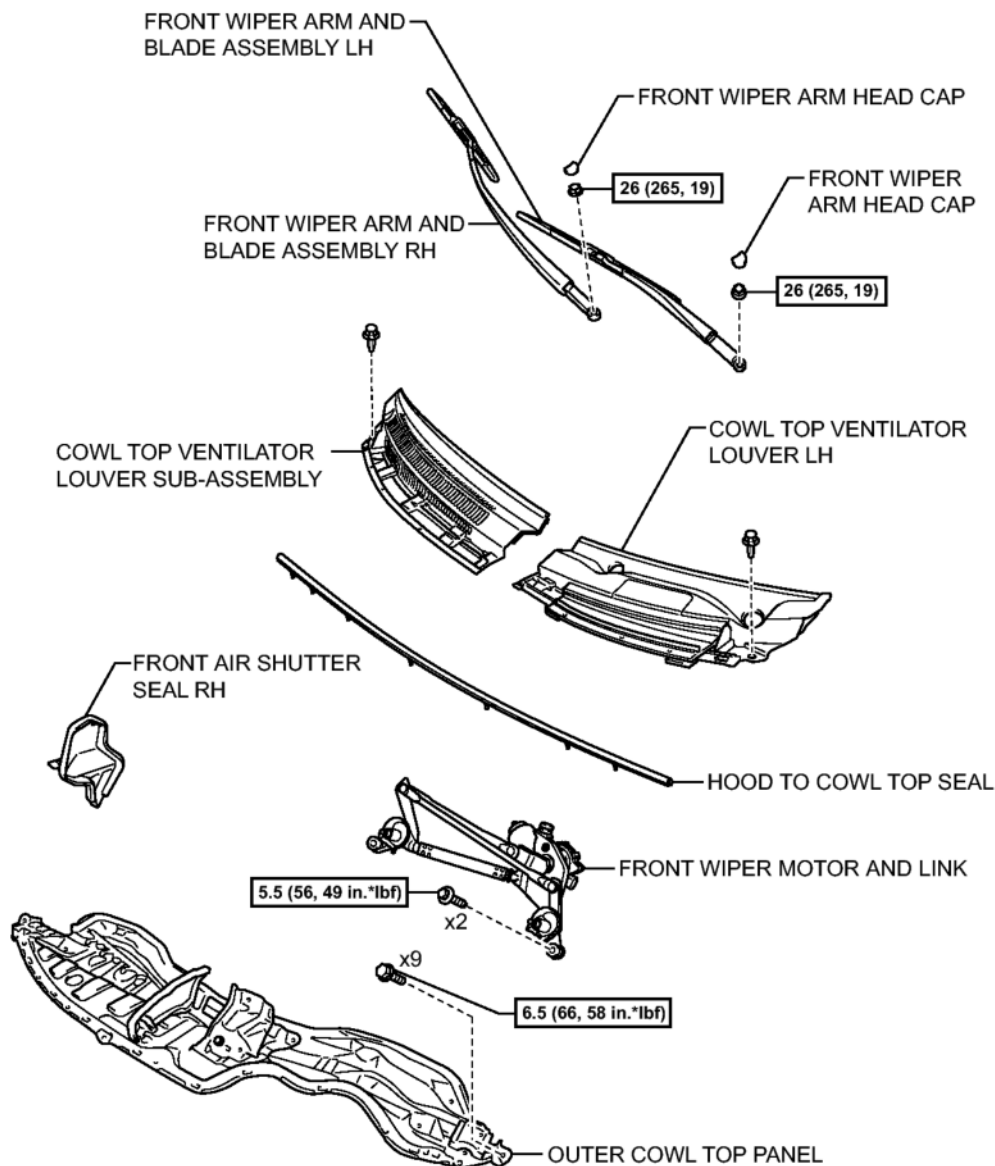
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

17. **INSTALL RADIO SETTING CONDENSER** See step 24
18. **INSTALL IGNITION COIL ASSEMBLY** See step 25
19. **INSPECT FOR ENGINE OIL LEAK**
20. **INSTALL NO. 2 CYLINDER HEAD COVER** . Refer to **INSTALLATION - Step 3**
21. **INSTALL OUTER COWL TOP PANEL** See step 76
22. **INSTALL FRONT AIR SHUTTER SEAL RH** See step 77
23. **INSTALL FRONT WIPER MOTOR AND LINK** . Refer to **INSTALLATION - Step 2**
24. **INSTALL COWL TOP VENTILATOR LOUVER LH** . Refer to **INSTALLATION - Step 3**
25. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY** . Refer to **INSTALLATION - Step 4**
26. **INSTALL HOOD TO COWL TOP SEAL** . Refer to **INSTALLATION - Step 5**
27. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH** . Refer to **INSTALLATION - Step 6**
28. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH** . Refer to **INSTALLATION - Step 7**
29. **INSTALL FRONT WIPER ARM HEAD CAP** . Refer to **INSTALLATION - Step 8**
30. **INSPECT IGNITION TIMING** See step 6
31. **INSPECT ENGINE IDLING SPEED** See step 7

CYLINDER HEAD GASKET

COMPONENTS

ILLUSTRATION



N*m (kgf*cm, ft*lb) : Specified torque

Y

Fig. 62: Identifying Cylinder Head Gasket Components With Torque Specifications (1 Of 18)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION

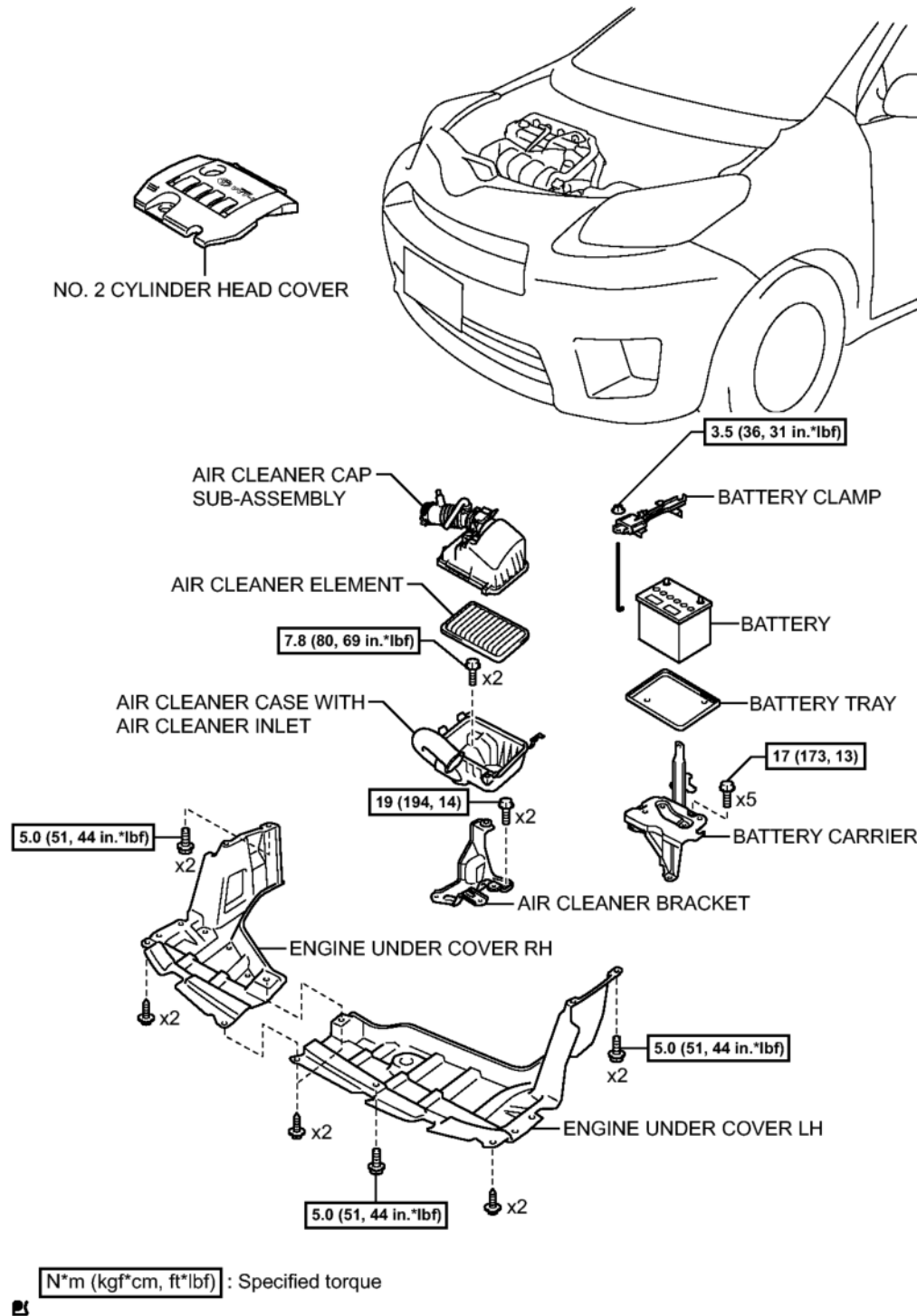


Fig. 63: Identifying Cylinder Head Gasket Components With Torque Specifications (2 Of 18)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION

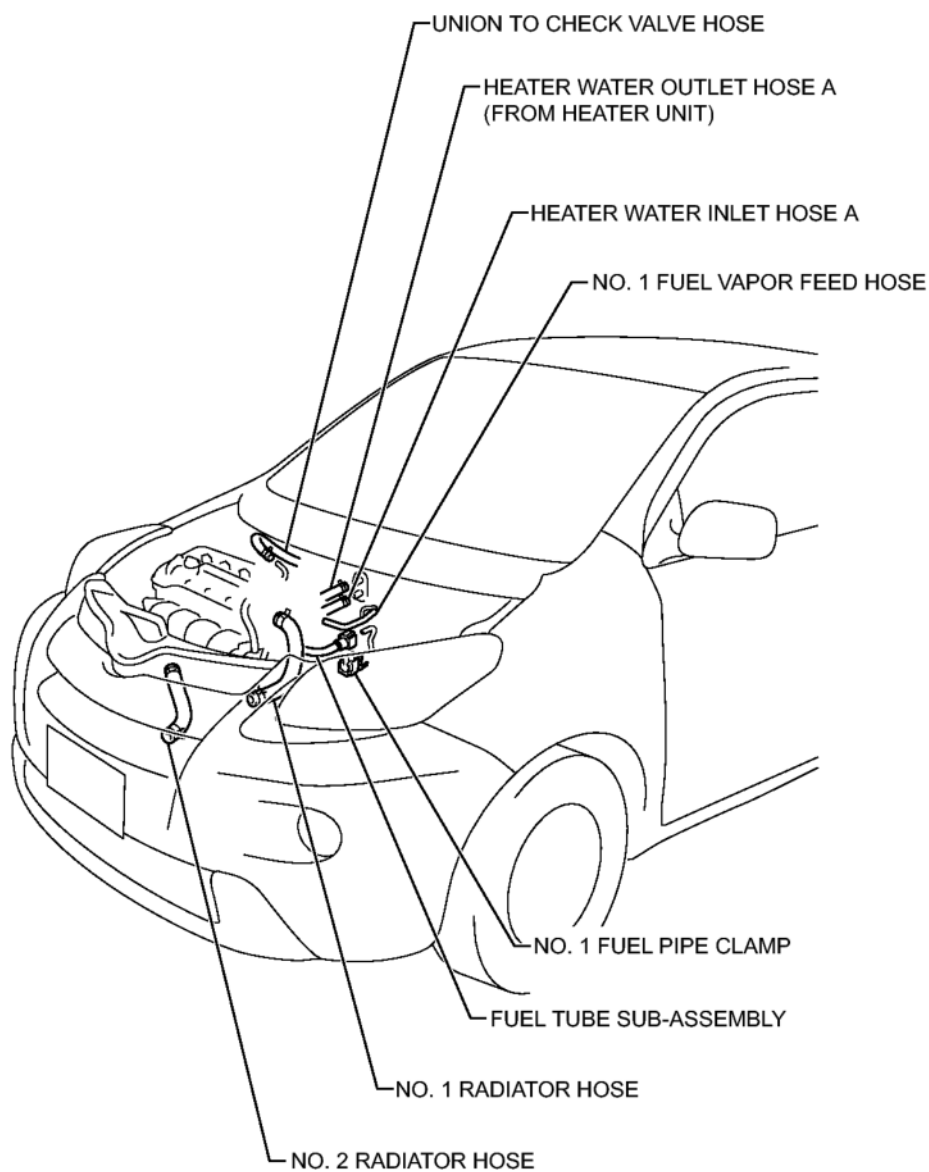
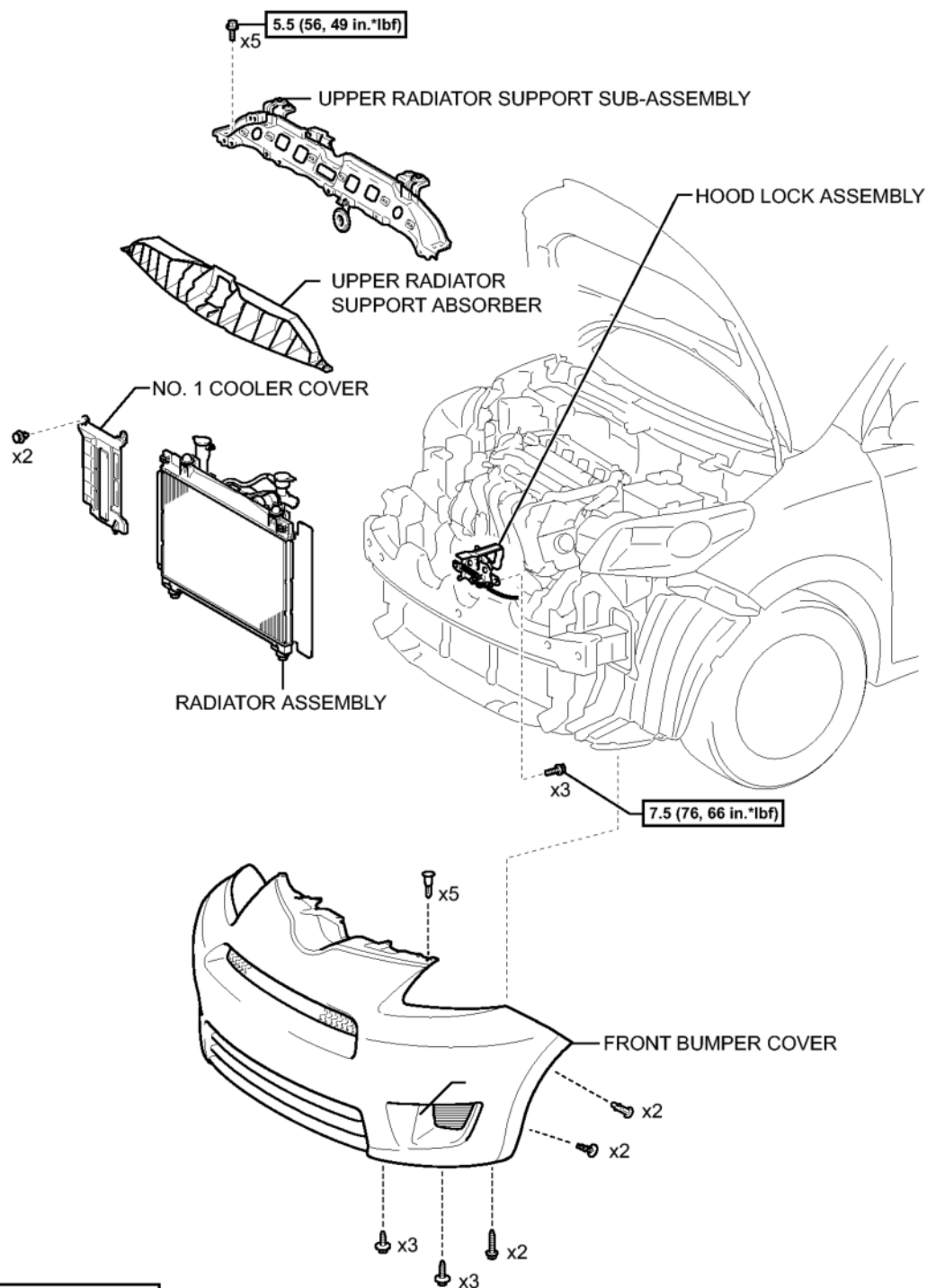


Fig. 64: Identifying Cylinder Head Gasket Components (3 Of 18)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION

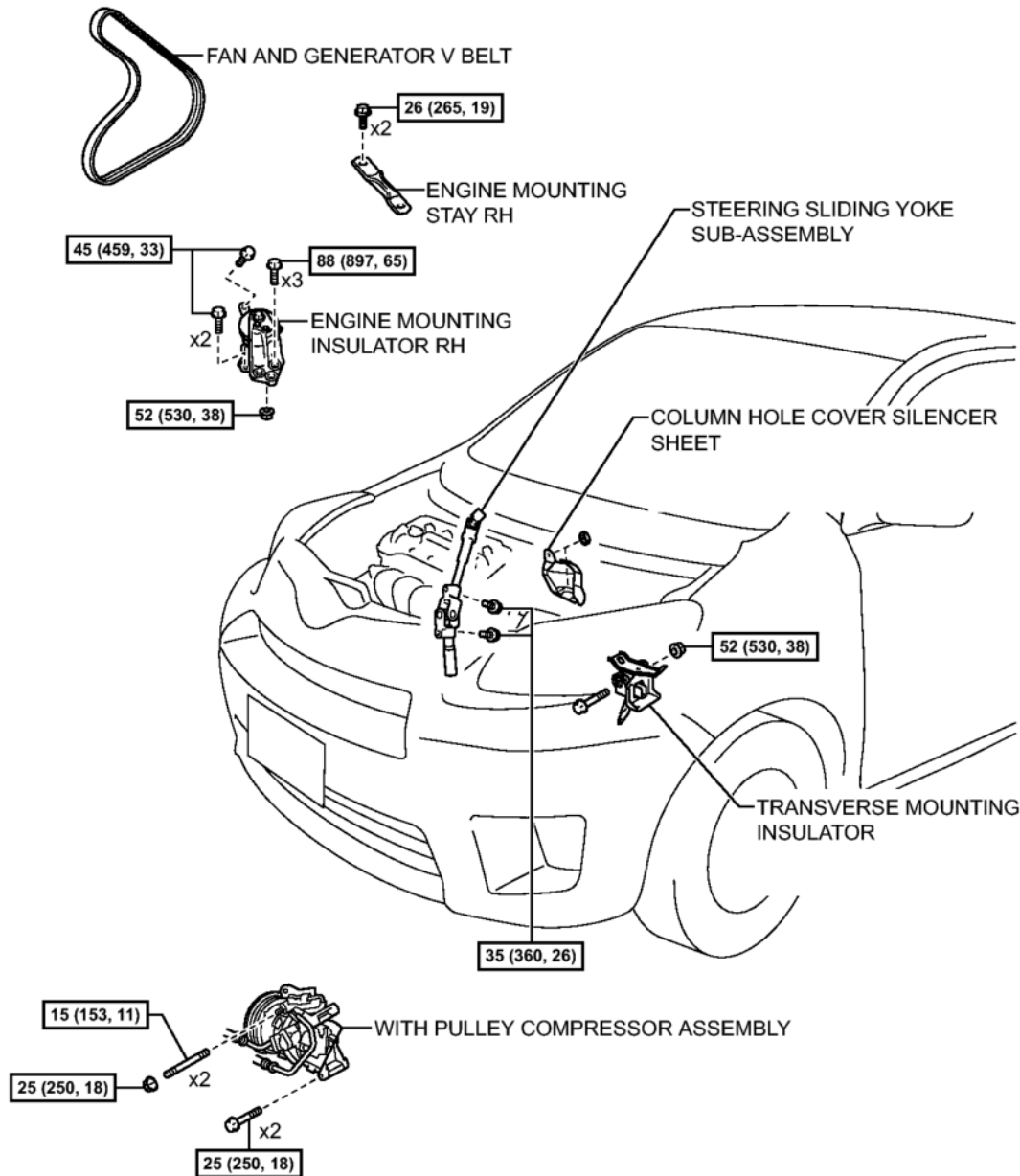


N*m (kgf*cm, ft*lbf) : Specified torque

T

Fig. 65: Identifying Cylinder Head Gasket Components With Torque Specifications (4 Of 18)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION

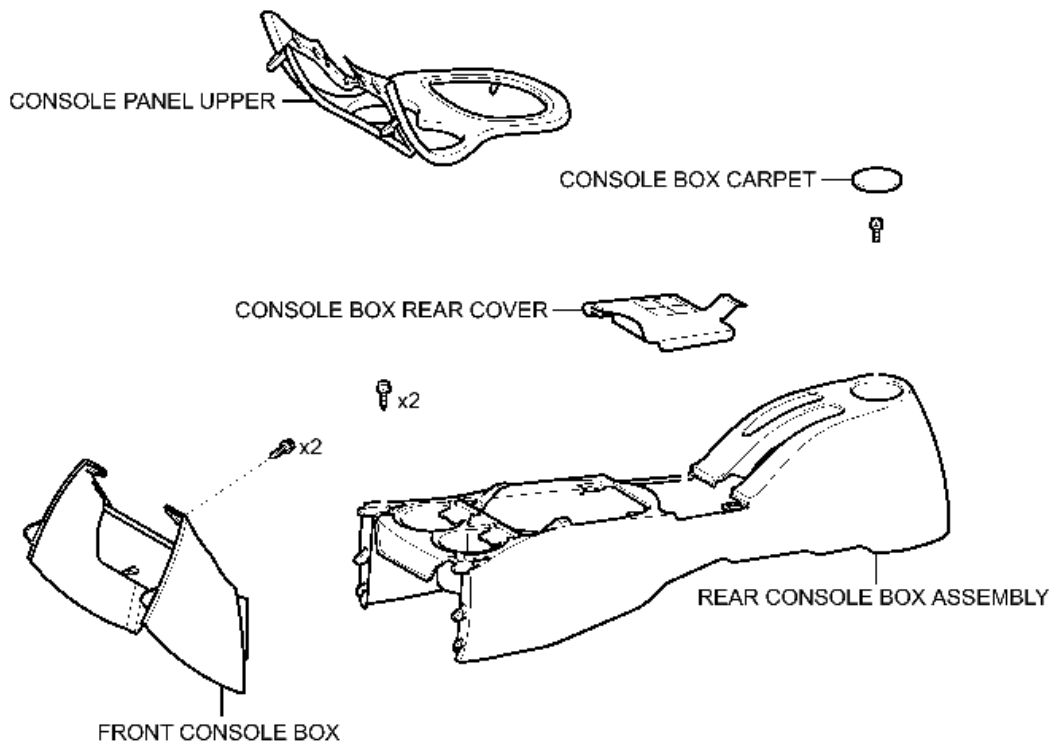
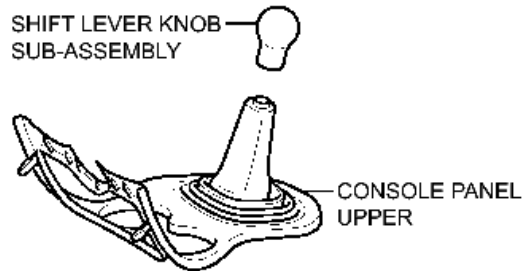


N*m (kgf*cm, ft*lb) : Specified torque

Fig. 66: Identifying Cylinder Head Gasket Components With Torque Specifications (5 Of 18)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION

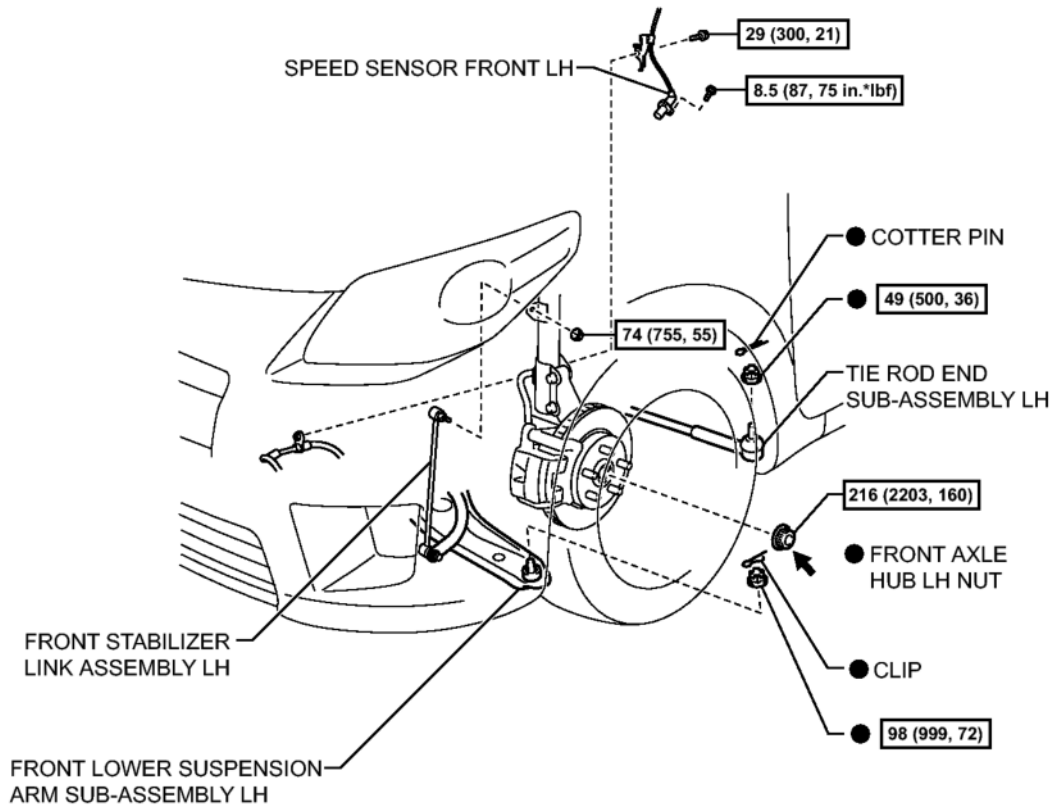
for Manual Transaxle:



T

Fig. 67: Identifying Cylinder Head Gasket Components (6 Of 18)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION



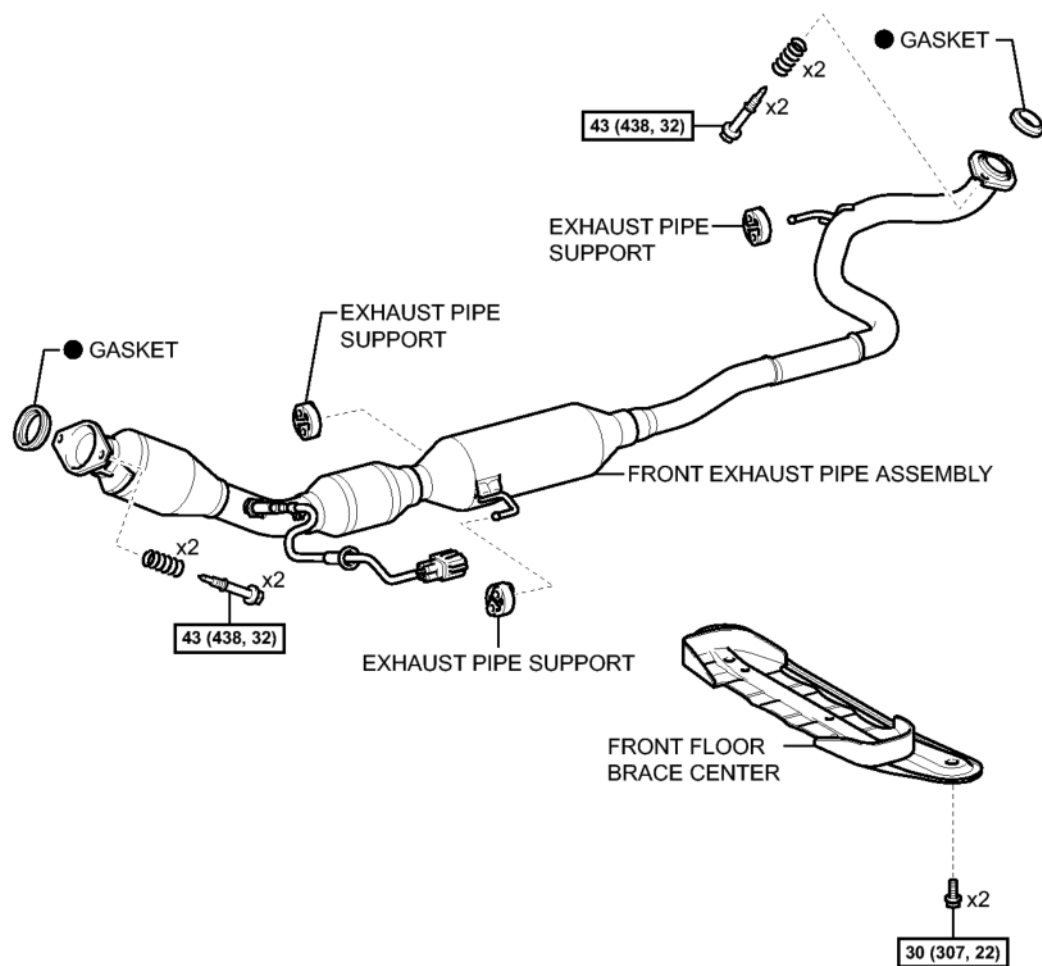
N*m (kgf*cm, ft*lb) : Specified torque ● Non-reusable part

⬅ Do not apply lubricants to the threaded parts

Y

Fig. 68: Identifying Cylinder Head Gasket Components With Torque Specifications (7 Of 18)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION

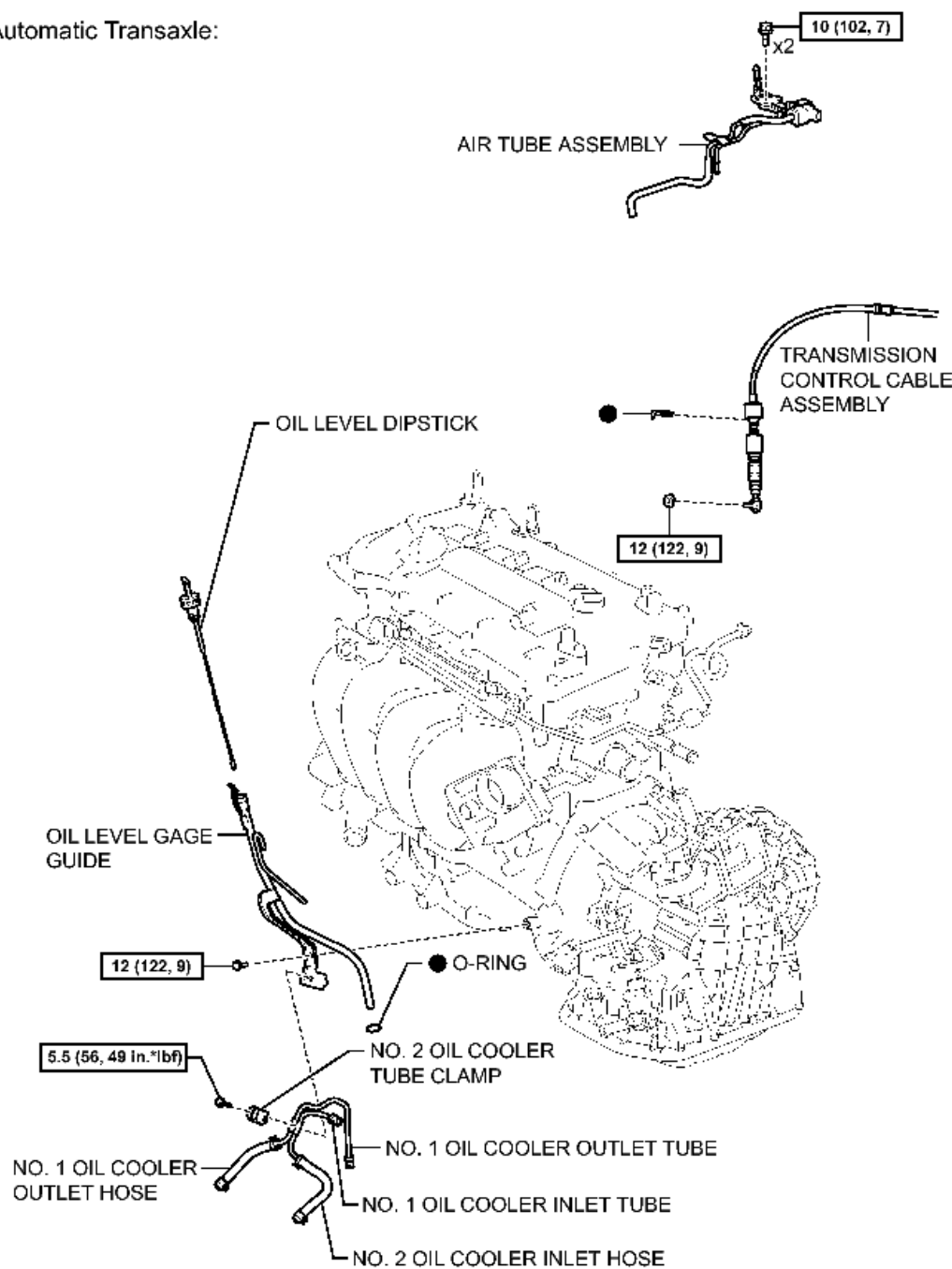


T

Fig. 69: Identifying Cylinder Head Gasket Components With Torque Specifications (8 Of 18)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION

for Automatic Transaxle:



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

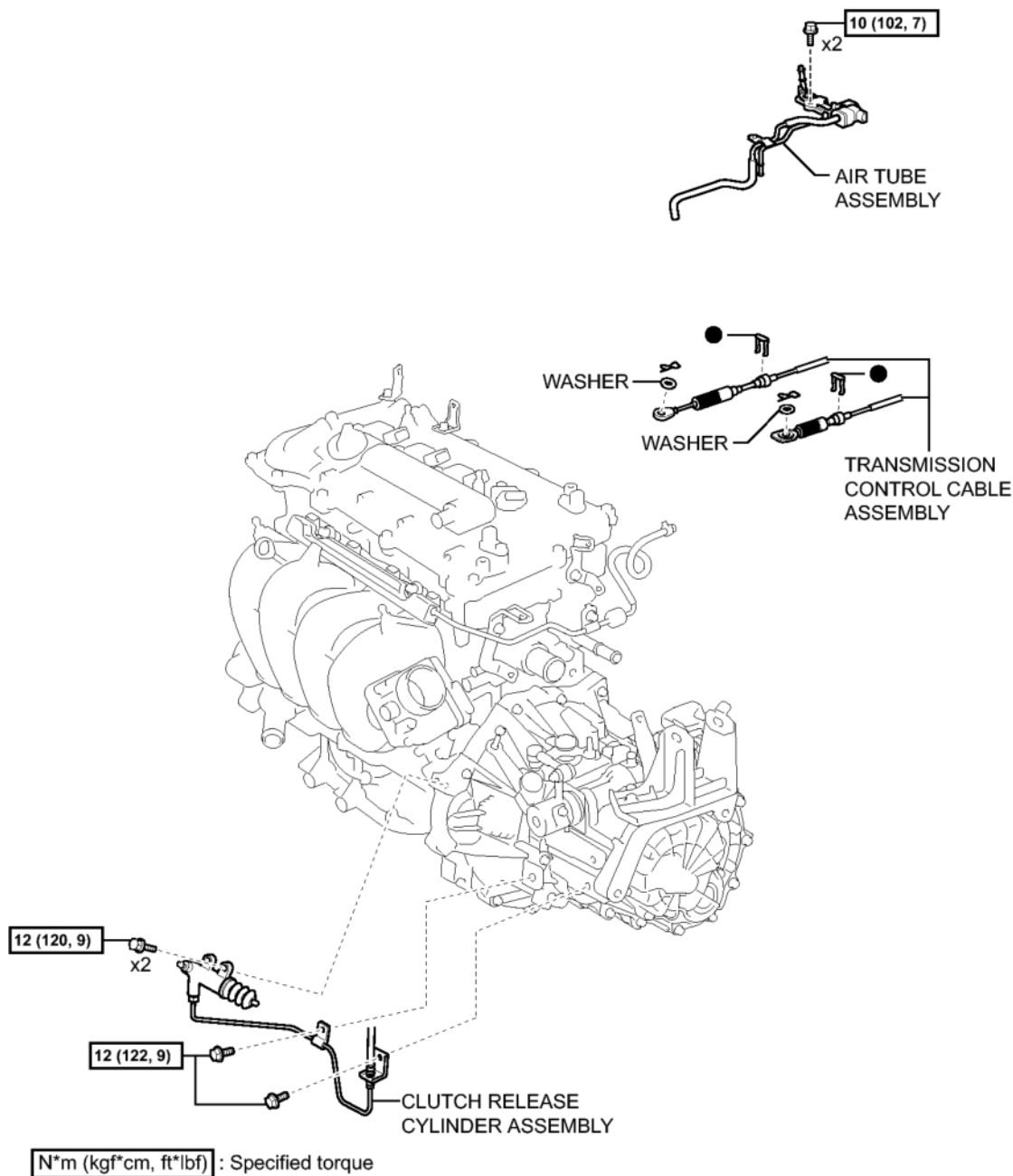
● Non-reusable part

Y

Fig. 70: Identifying Cylinder Head Gasket Components With Torque Specifications (9 Of 18)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION

for Manual Transaxle:



Y

Fig. 71: Identifying Cylinder Head Gasket Components With Torque Specifications (10 Of 18)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION