2008 ENGINE

2ZR-FE Engine Mechanical - xD

ENGINE

ON-VEHICLE INSPECTION

1. **INSPECT ENGINE COOLANT** (See **ON-VEHICLE INSPECTION**)
2. **INSPECT ENGINE OIL** (See **ON-VEHICLE INSPECTION**)
3. **INSPECT BATTERY** (See **ON-VEHICLE INSPECTION**)
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** (See **ON-VEHICLE INSPECTION**)
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 (See **REMOVAL**).
2. Pull out the wire harness (brown) shown in the illustration.

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.

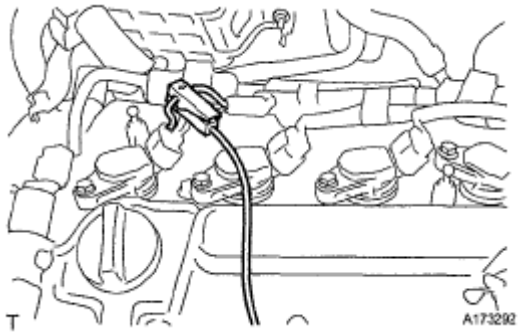


Fig. 1: Connecting Clip Of Timing Light To Wire Harness
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

SST 09843-18040

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

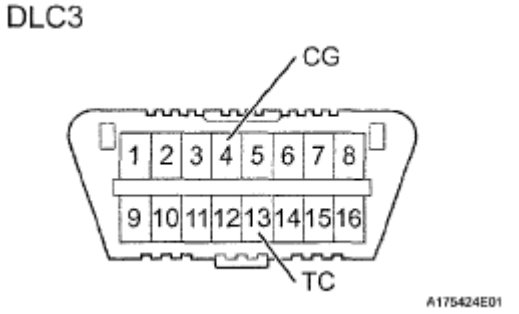


Fig. 2: Identifying DLC3 Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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 (See **INSTALLATION**).

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.

   SST 09843-18040

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

DLC3

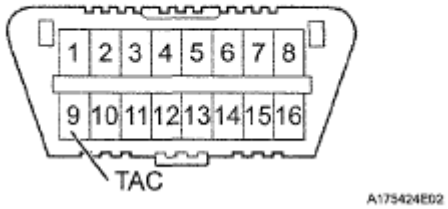


Fig. 3: Identifying DLC3 Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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 (See **REMOVAL**).
   c. Remove the 4 ignition coils (See **REMOVAL**).
   d. Remove the 4 spark plugs.
   e. Disconnect the 4 fuel injector connectors.
   f. Inspect the cylinder compression pressure.

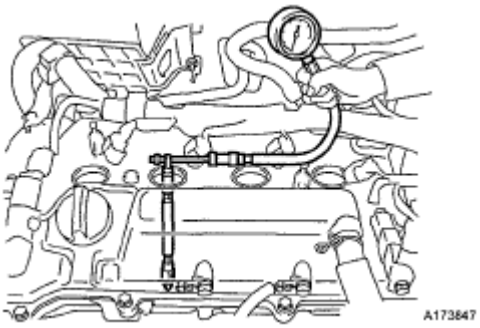


Fig. 4: Inspecting Cylinder Compression Pressure
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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/cm^2 , 213 psi)

   Minimum pressure: 1079 kPa (11.0 kgf/cm^2 , 156 psi)

   Difference between each cylinder: 98 kPa (1.0 kgf/cm^2 , 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 ft.*lbf)

i. Install the 4 ignition coils (See **INSTALLATION**).
j. Install No. 2 cylinder head cover (See **INSTALLATION**).

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 (see **INSPECTION**).
   2. See the table below for possible causes, then inspect the applicable parts and repair them if necessary.

POSSIBLE CAUSES CHART

CO	HC	Problems	Possible Causes
Normal	High	Rough idling	1. Faulty ignition: o Incorrect timing o Fouled, shorted or improperly gapped plugs 2. Incorrect valve clearance 3. Leakage from intake and exhaust valves 4. Leakage from cylinders
Low	High	Rough idling (Fluctuating HC reading)	1. Vacuum leaks: o PCV hoses o Intake manifold o Throttle body o Brake booster line 2. Lean mixture causing misfire
High	High	Rough idling (Black smoke from exhaust)	1. Restricted air cleaner filter element 2. Plugged PCV valve 3. Faulty EFI systems: o Faulty pressure regulator o Faulty engine coolant temperature sensor

			○ Faulty mass air flow meter ○ Faulty ECM ○ Faulty injectors ○ Throttle body

DRIVE BELT

COMPONENTS

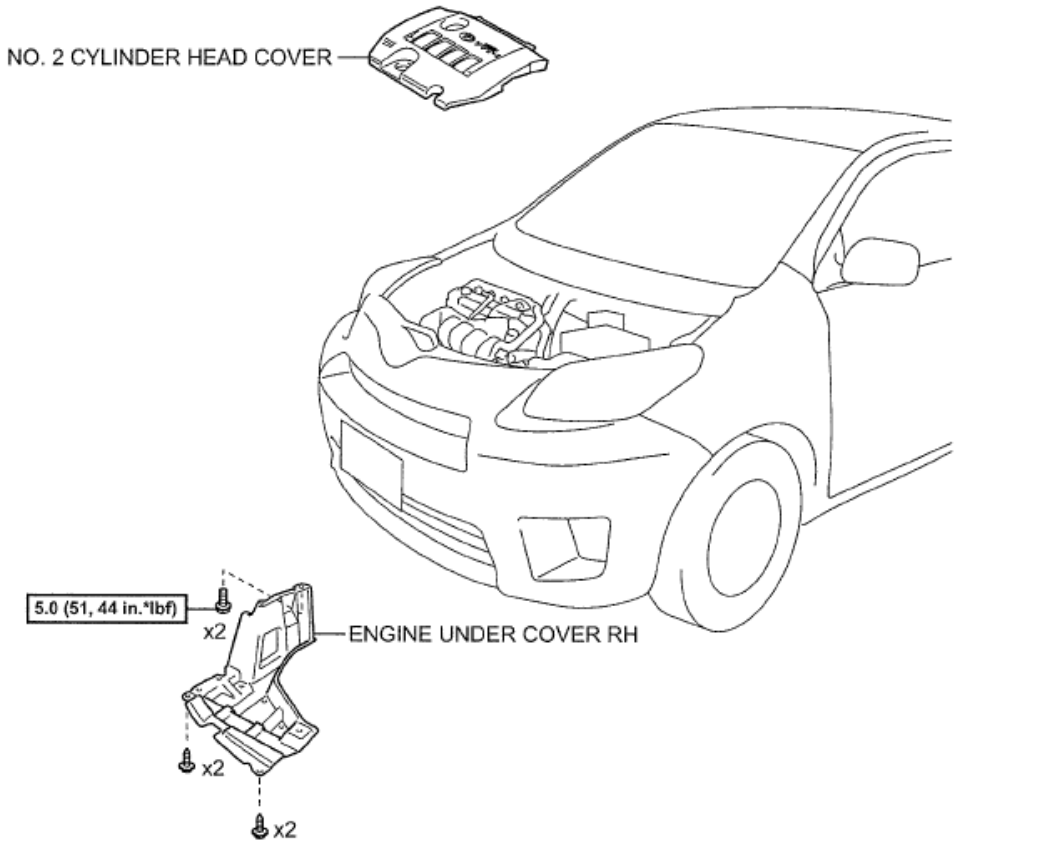


Fig. 5: Identifying Drive Belt Components And Torque Specifications (1 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

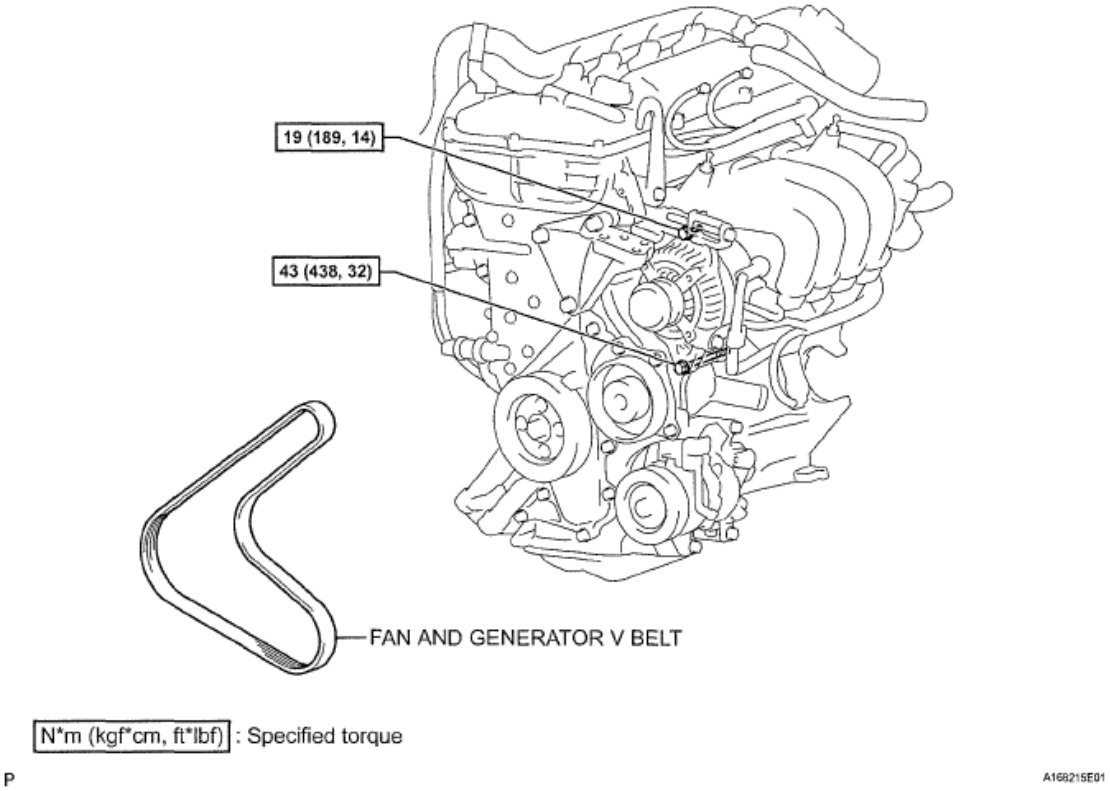


Fig. 6: Identifying Drive Belt Components And Torque Specifications (2 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ON-VEHICLE INSPECTION

1. **INSPECT FAN AND GENERATOR V BELT**
   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.

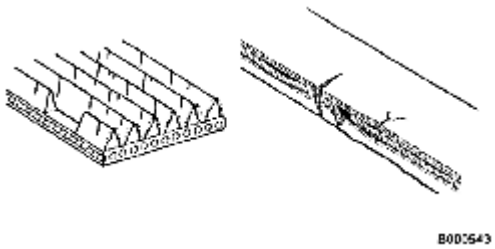


Fig. 7: Identifying Fan And Generator V Belt Damage Condition
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **REMOVE ENGINE UNDER COVER RH**
2. **REMOVE NO. 2 CYLINDER HEAD COVER** (See **REMOVAL**)
3. **REMOVE FAN AND GENERATOR V BELT**
   a. Loosen bolts A and B.

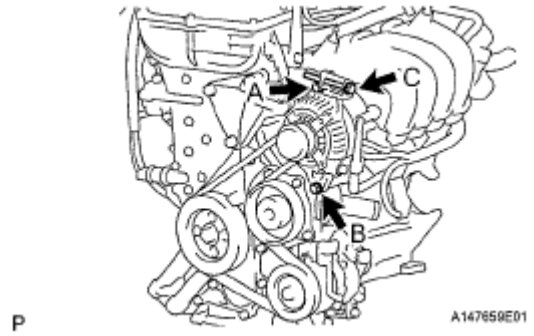


Fig. 8: Locating Generator Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   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

1. **INSTALL FAN AND 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 AND GENERATOR V BELT**
   a. Turn adjusting bolt C and adjust the tension of the V belt.

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 ft.*lbf) for bolt A

43 N*m (438 kgf*cm, 32 ft.*lbf) for bolt B

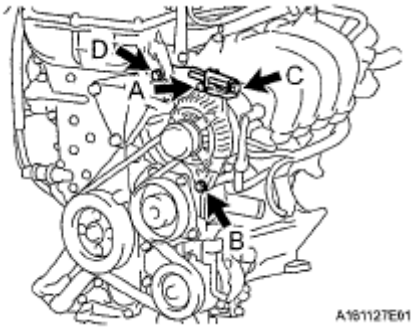
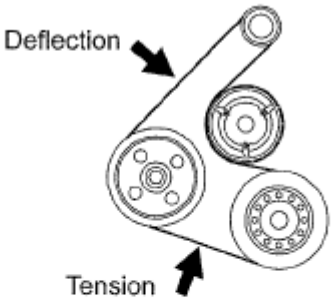


Fig. 9: Locating Generator Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **INSPECT FAN AND GENERATOR V BELT**
   a. Check the V belt deflection and tension. Deflection

w/ Air Conditioning System:



w/o Air Conditioning System:

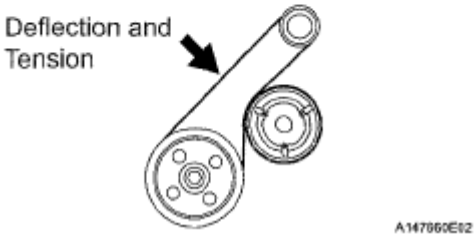


Fig. 10: View Of Drive Belt And Pulley
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ITEM SPECIFIED CONDITION CHART

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 CHART

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

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-adust 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** (See **INSTALLATION**)

CAMSHAFT

COMPONENTS

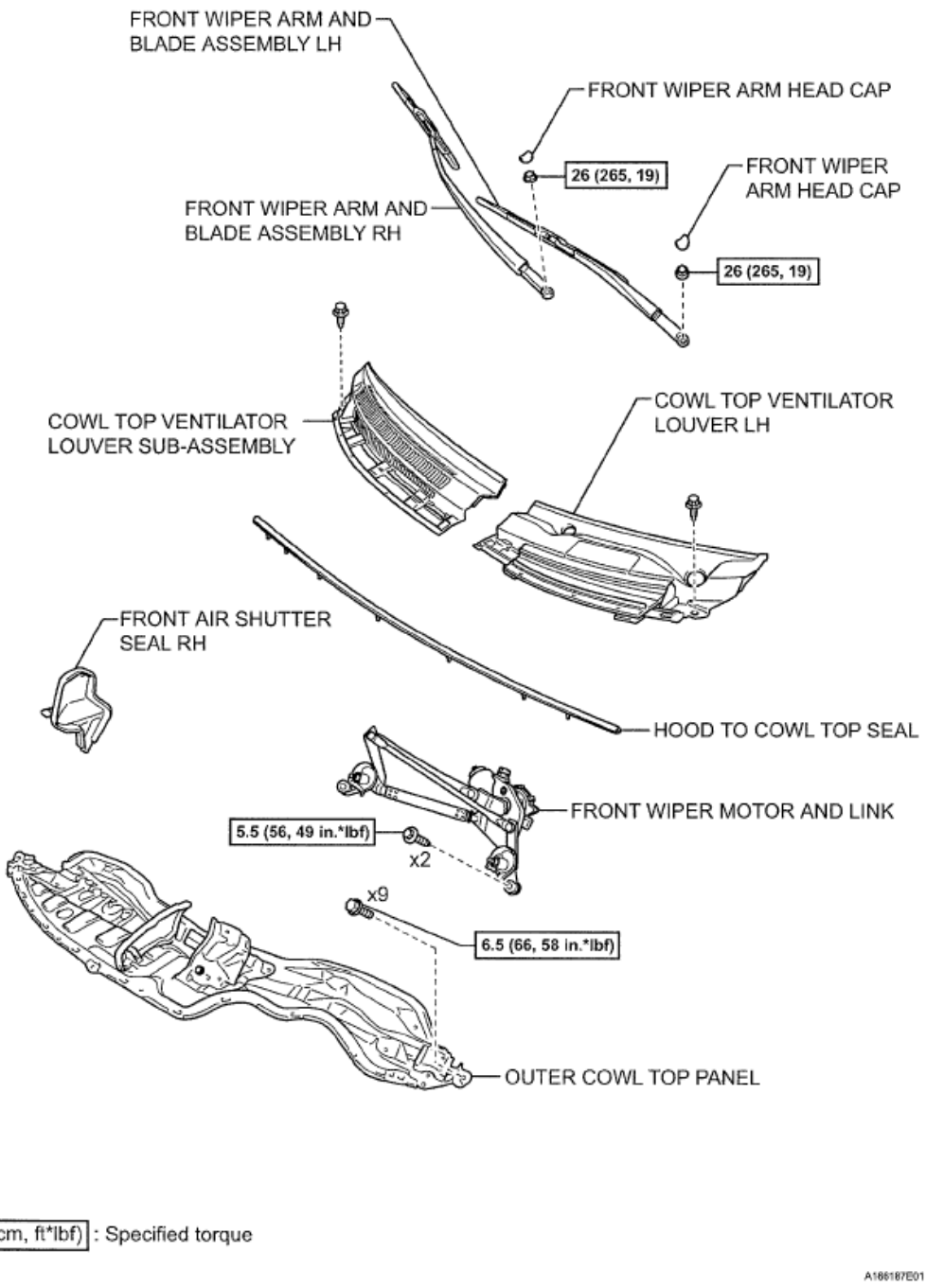


Fig. 11: Identifying Camshaft Components And Torque Specifications (1 Of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

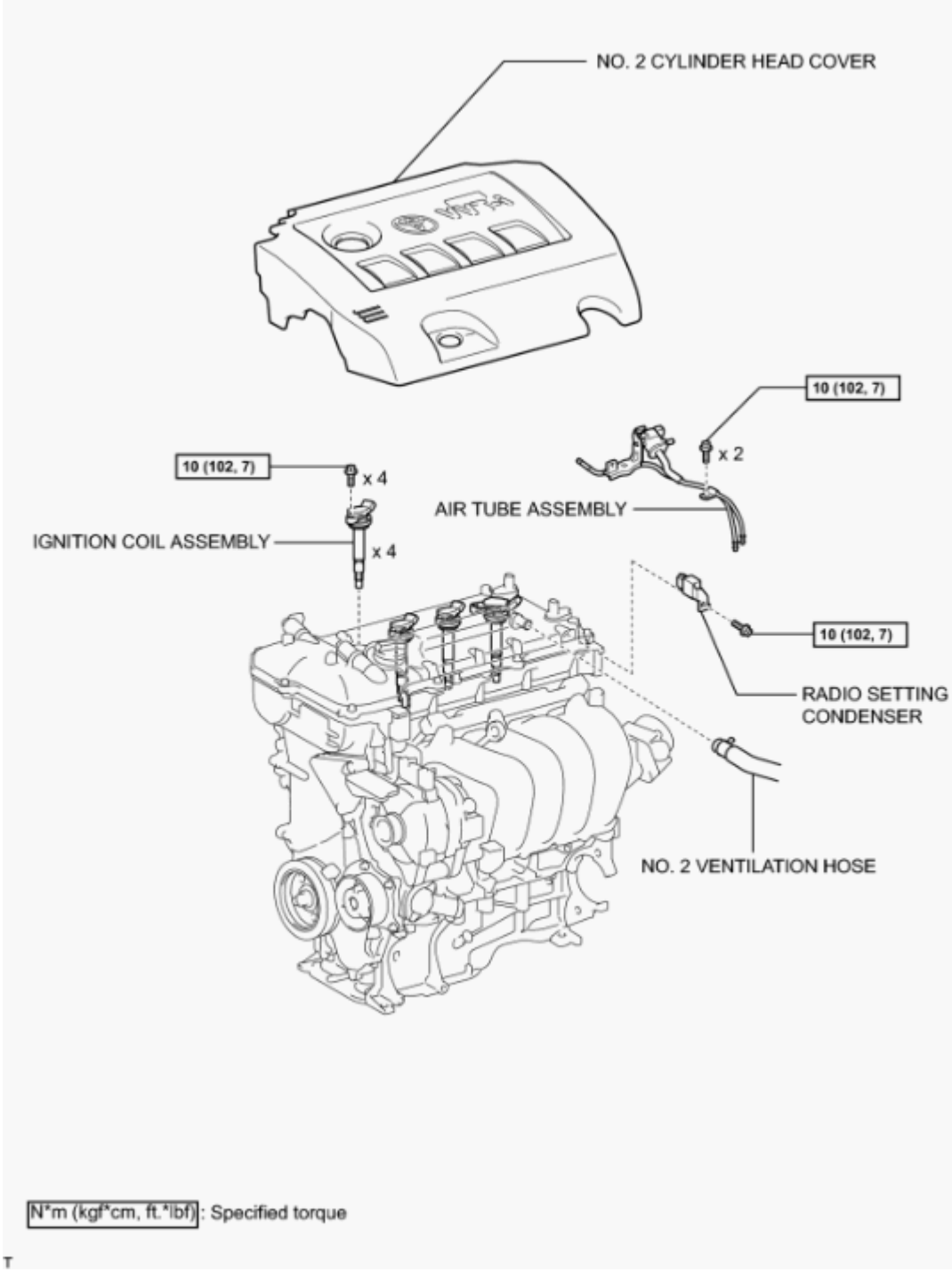


Fig. 12: Identifying Camshaft Components And Torque Specifications (2 Of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

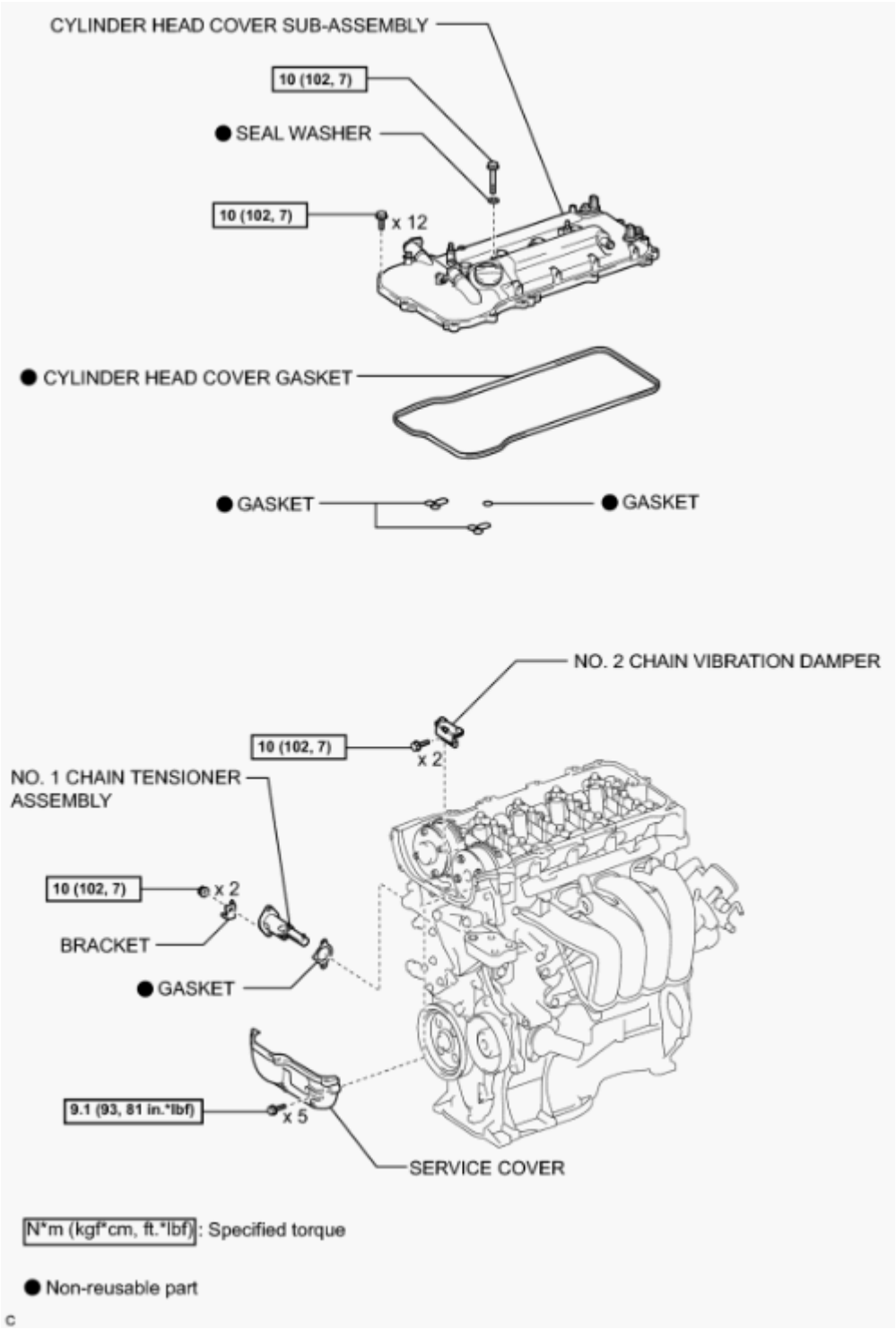


Fig. 13: Identifying Camshaft Components And Torque Specifications (3 Of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

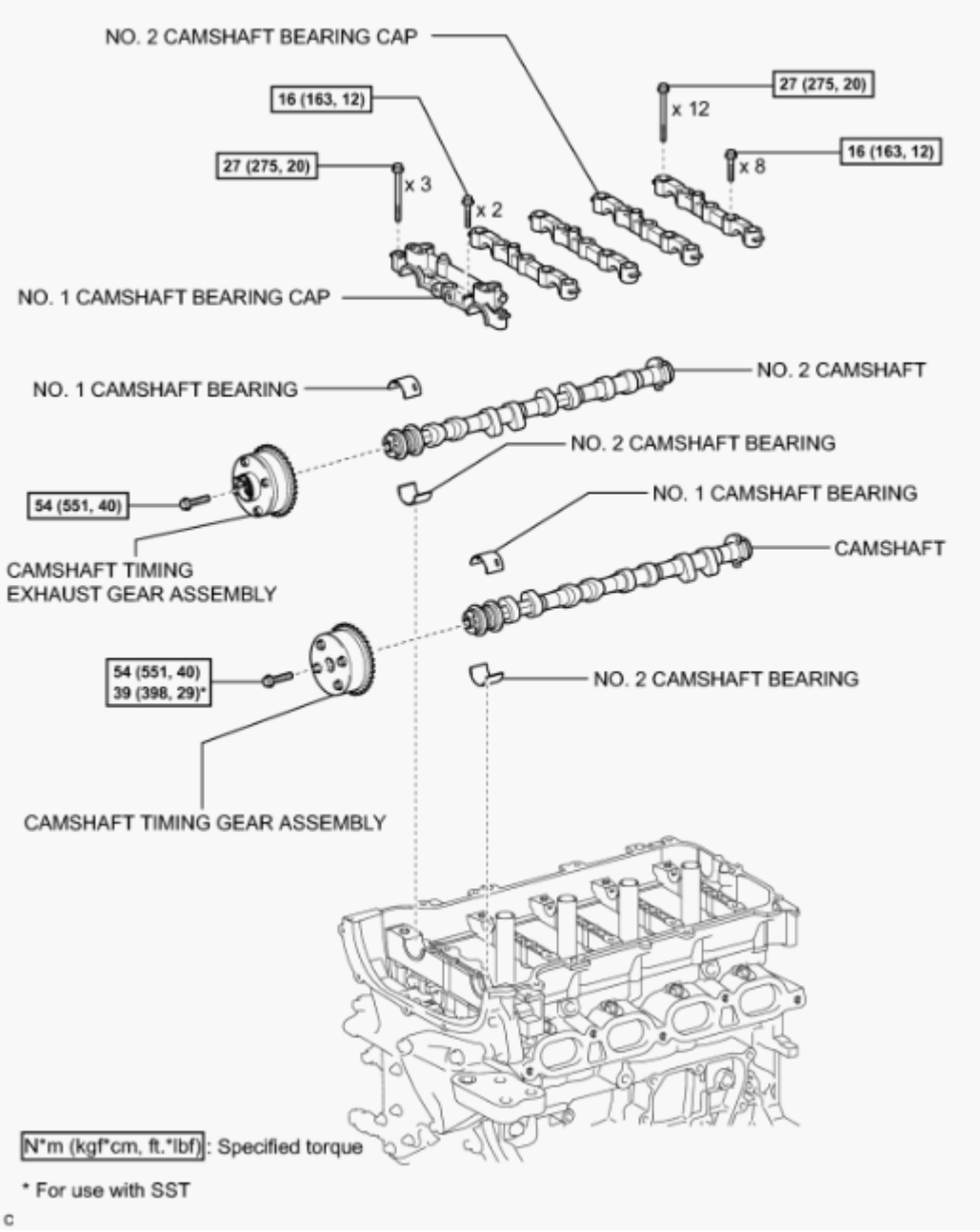


Fig. 14: Identifying Camshaft Components And Torque Specifications (4 Of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **REMOVE FRONT WIPER ARM HEAD CAP** . Refer to **REMOVAL** .
2. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH** . Refer to **REMOVAL** .
3. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH** . Refer to **REMOVAL** .
4. **REMOVE HOOD TO COWL TOP SEAL** . Refer to **REMOVAL** .
5. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY** . Refer to **REMOVAL** .

6. **REMOVE COWL TOP VENTILATOR LOUVER LH** . Refer to **REMOVAL** .
7. **REMOVE FRONT WIPER MOTOR AND LINK** (See **REMOVAL**)
8. **REMOVE FRONT AIR SHUTTER SEAL RH** . Refer to **REMOVAL** .
9. **REMOVE OUTER COWL TOP PANEL** . Refer to **REMOVAL** .
10. **REMOVE NO. 2 CYLINDER HEAD COVER** . Refer to **REMOVAL** .
11. **REMOVE IGNITION COIL ASSEMBLY** . Refer to **REMOVAL**.
12. **REMOVE RADIO SETTING CONDENSER** . Refer to **REMOVAL**.
13. **DISCONNECT NO. 2 VENTILATION HOSE**
    a. Disconnect the No. 2 ventilation hose.

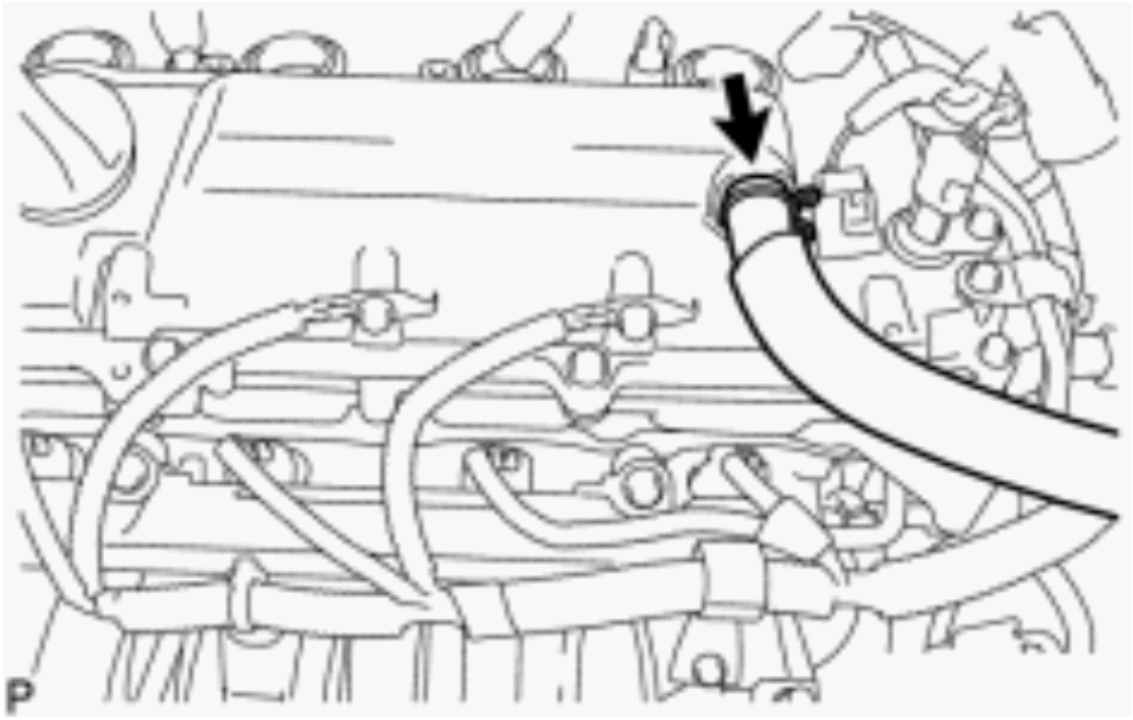


Fig. 15: Locating No. 2 Ventilation Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

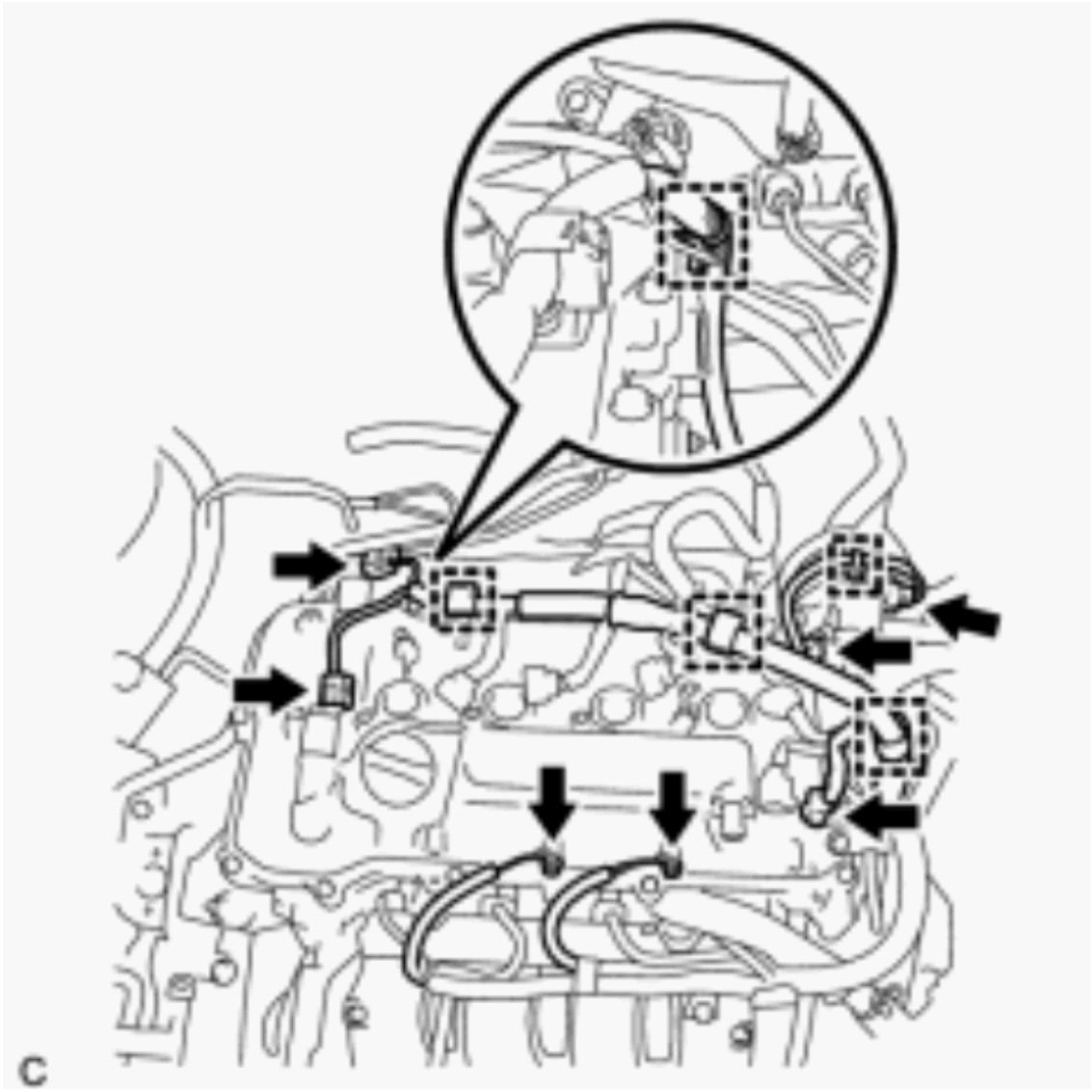


Fig. 16: Identifying Engine Wire
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

15. **REMOVE AIR TUBE ASSEMBLY**
    a. Remove the 2 bolts, 4 hoses and air tube assembly.

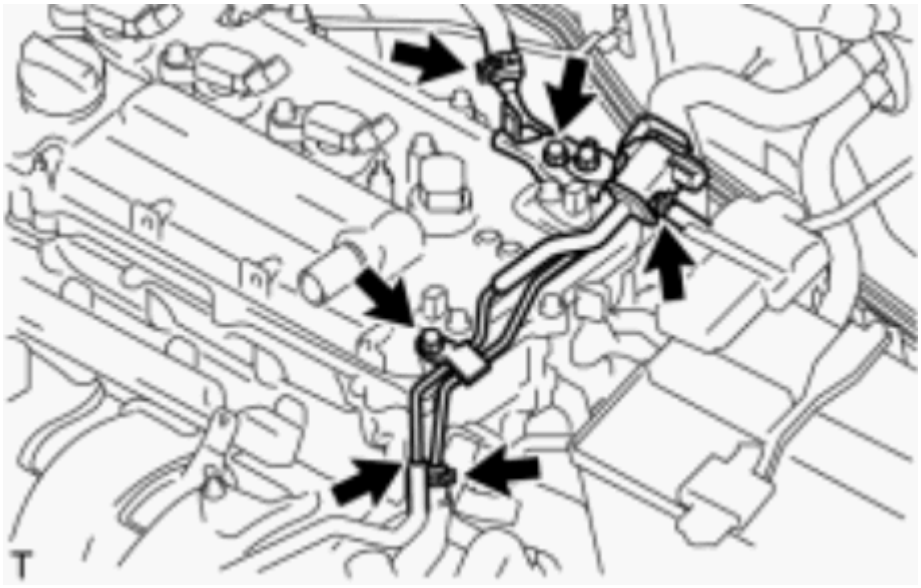


Fig. 17: Identifying Air Tube Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

16. **REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY** . Refer to **DISASSEMBLY**.
17. **REMOVE CYLINDER HEAD COVER GASKET** . Refer to **DISASSEMBLY**.
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.

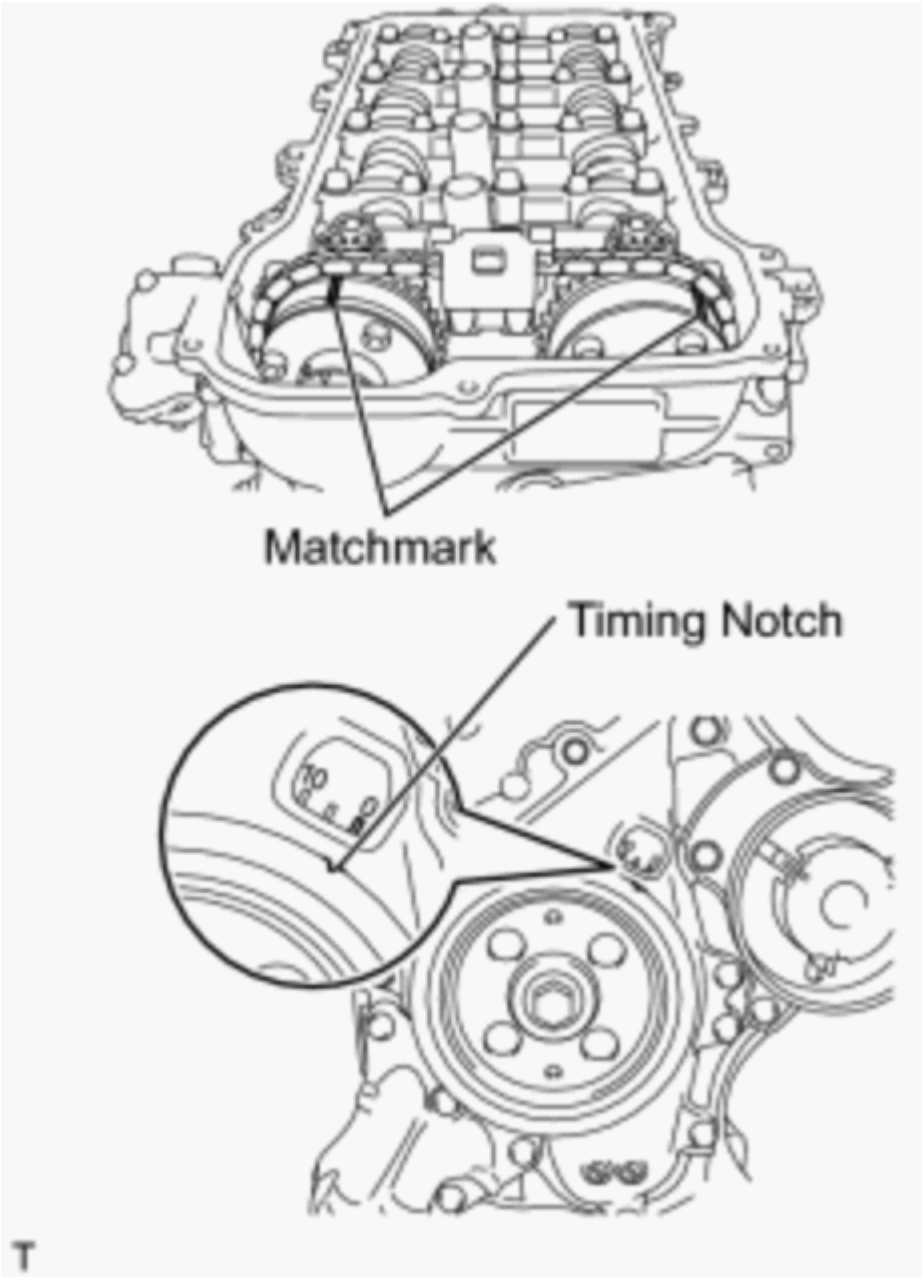


Fig. 18: Aligning Matchmarks
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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 mark 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.

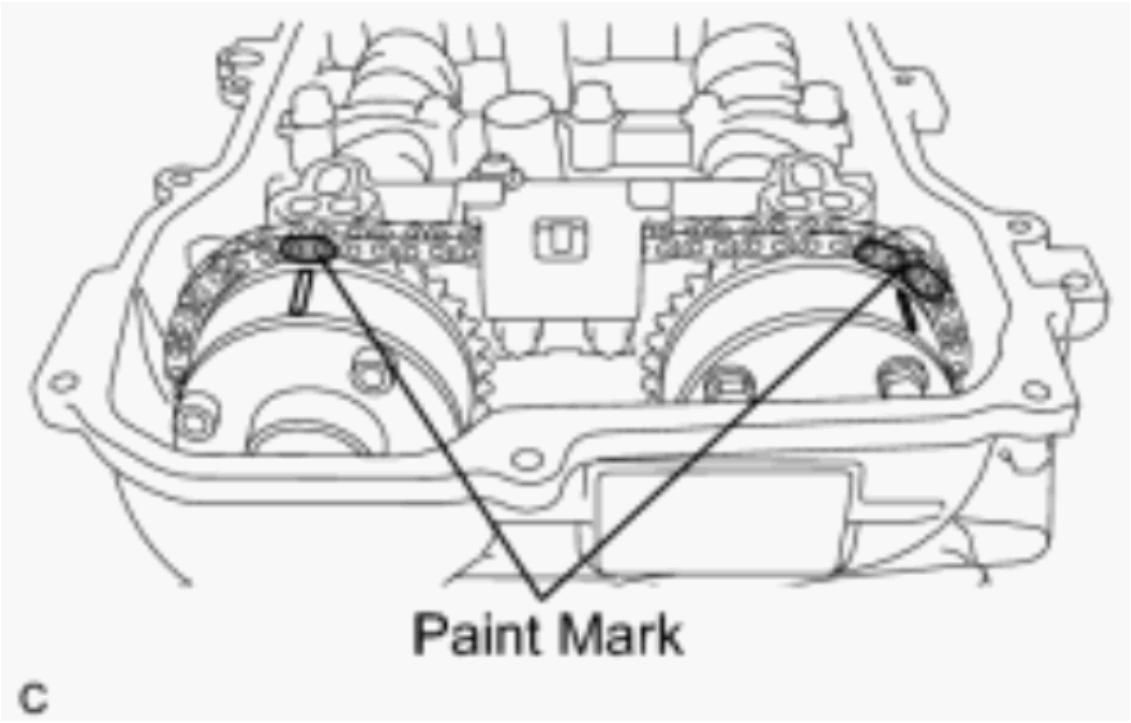


Fig. 19: Identifying Paint Marks
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

19. **REMOVE SERVICE COVER**
    a. Remove the 5 bolts and service cover.

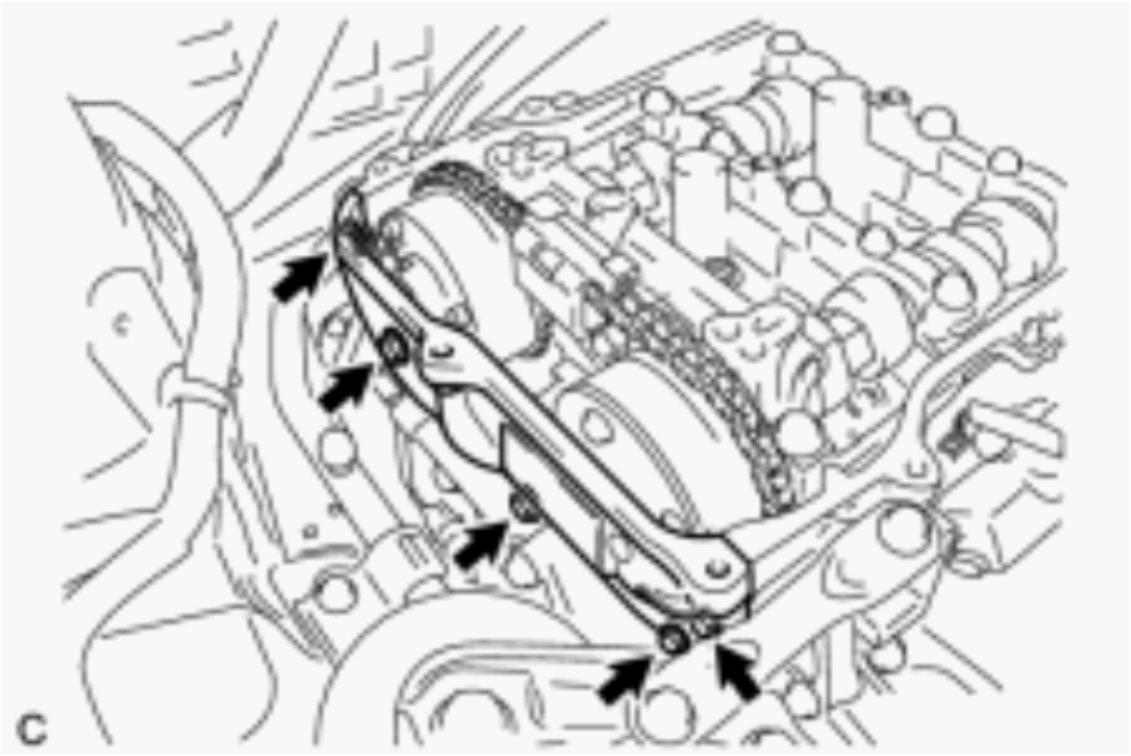


Fig. 20: Identifying Service Cover Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

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

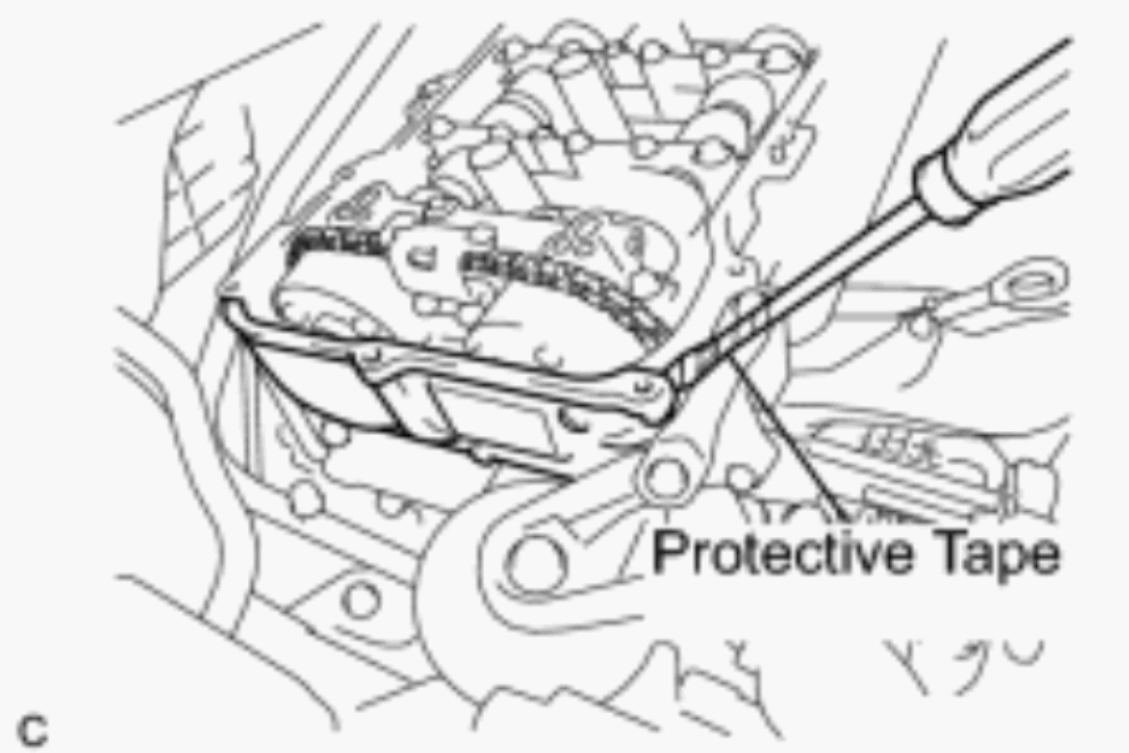


Fig. 21: Identifying Protective Tape On Screwdriver
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

20. **REMOVE NO. 2 CHAIN VIBRATION DAMPER**
    a. Remove the 2 bolts and No. 2 chain vibration damper from the camshaft bearing cap.

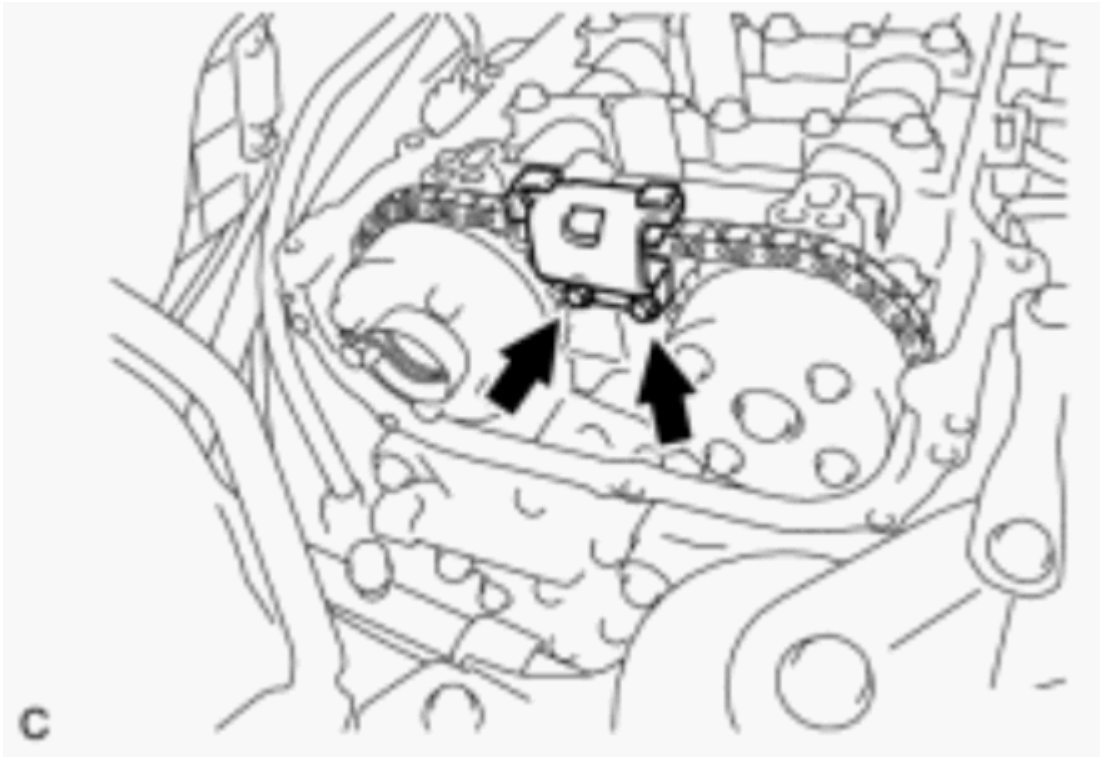


Fig. 22: Locating No. 2 Chain Vibration Damper
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

21. **REMOVE NO. CHAIN TENSIONER ASSEMBLY** . Refer to **DISASSEMBLY**.
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.

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

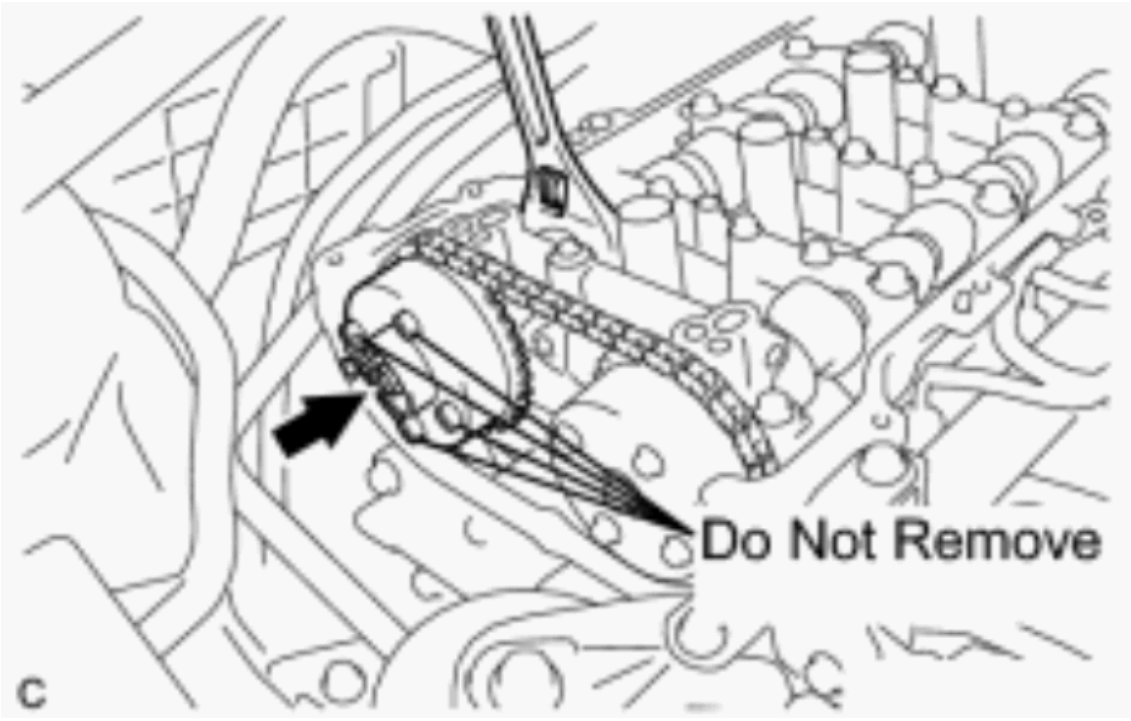


Fig. 23: Identifying Camshaft Timing Exhaust Gear Assembly Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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 tensioner.

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.

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.**

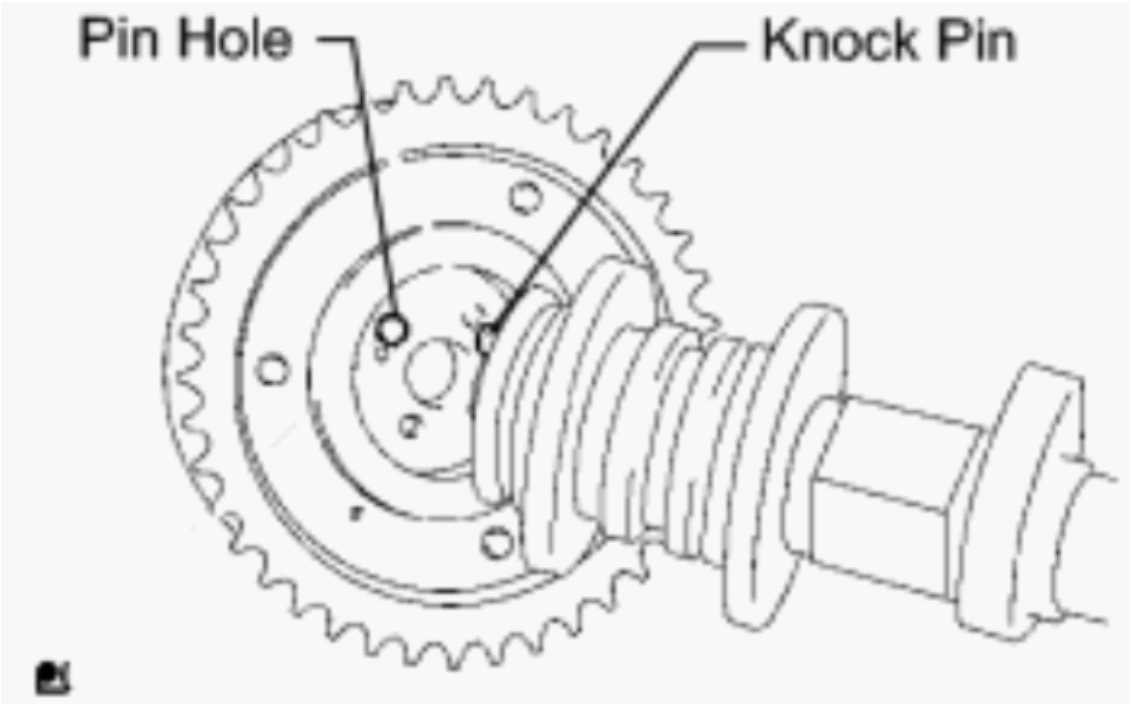


Fig. 24: Locating Knock Pin And Pin Hole
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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.

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

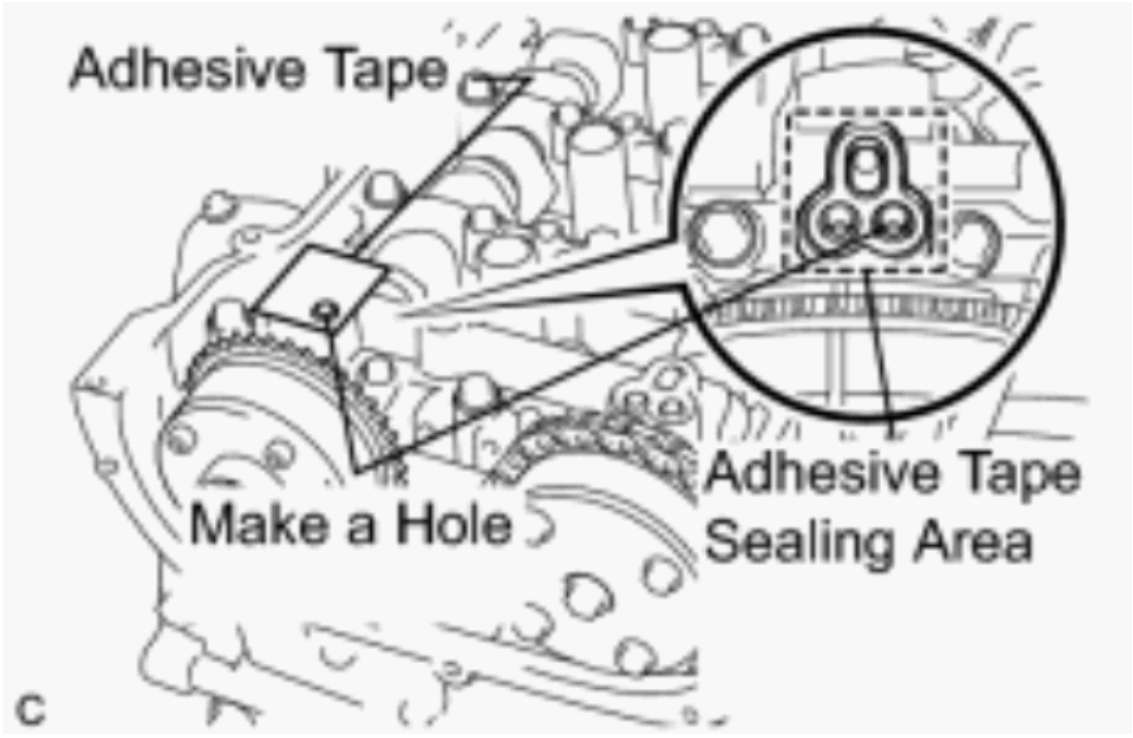


Fig. 25: Camshaft Timing Exhaust Gear Operation
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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/cm 2, 28 psi.) of air pressure to the hole made in procedure B to release the lock pin.

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.**

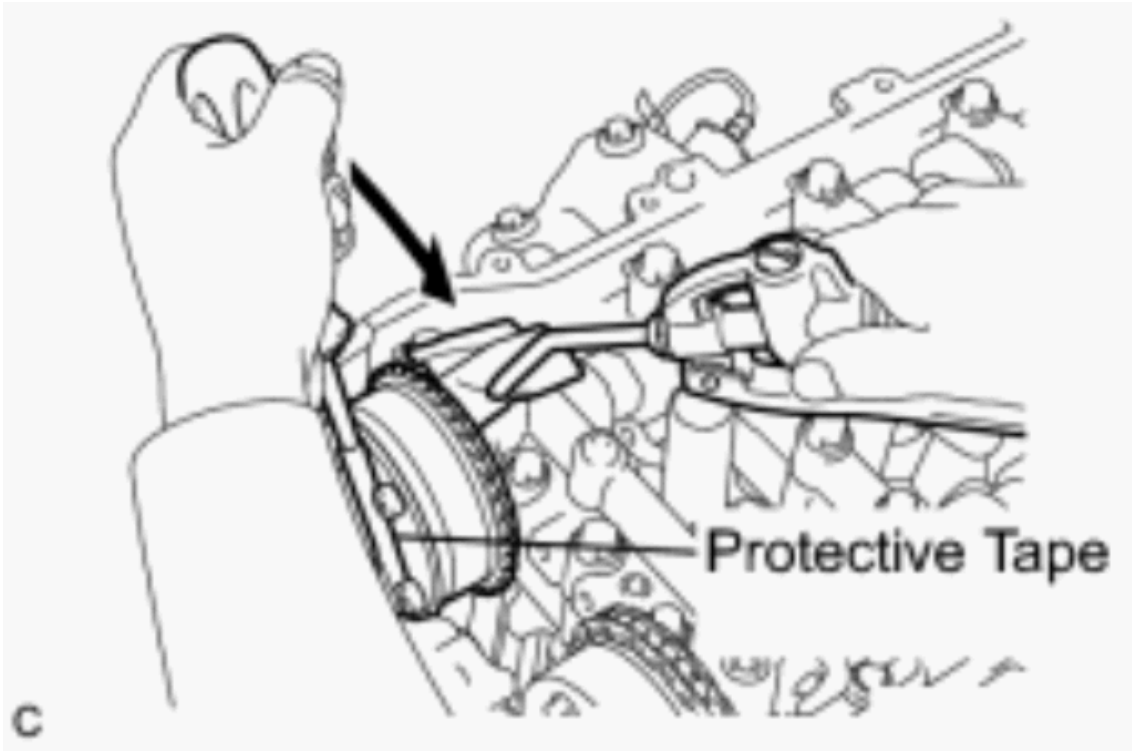


Fig. 26: Identifying Hole In Adhesive Tape
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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.

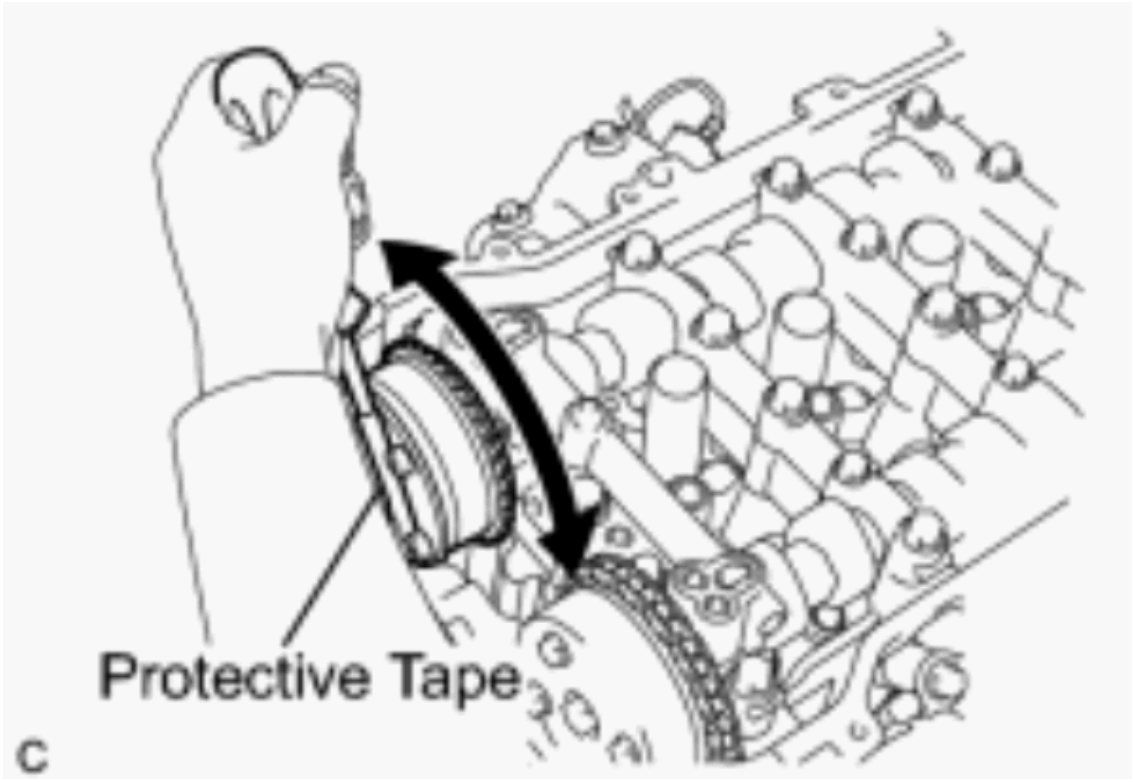


Fig. 27: Turning Camshaft Timing Gear Turns Smoothly With Screwdriver Tip Taped.
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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.

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

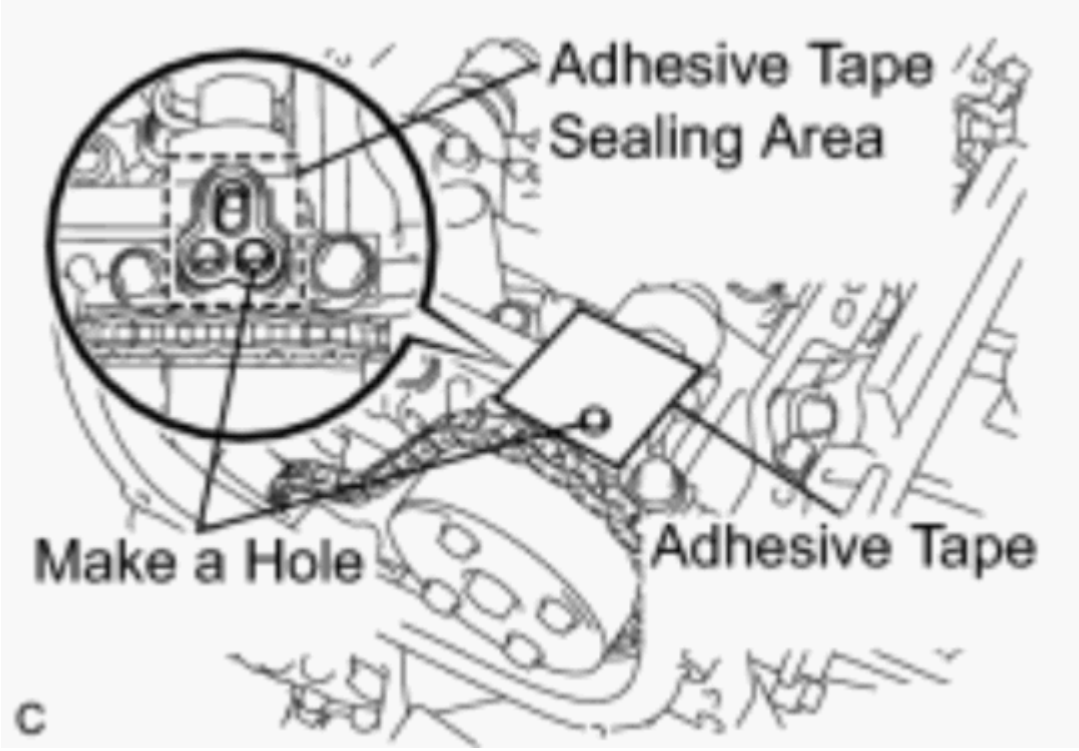


Fig. 28: Adhesive Tape Sealing Area
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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/cm 2, 22psi.) of air pressure to the hole made in procedure A to release the lock pin.

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.**

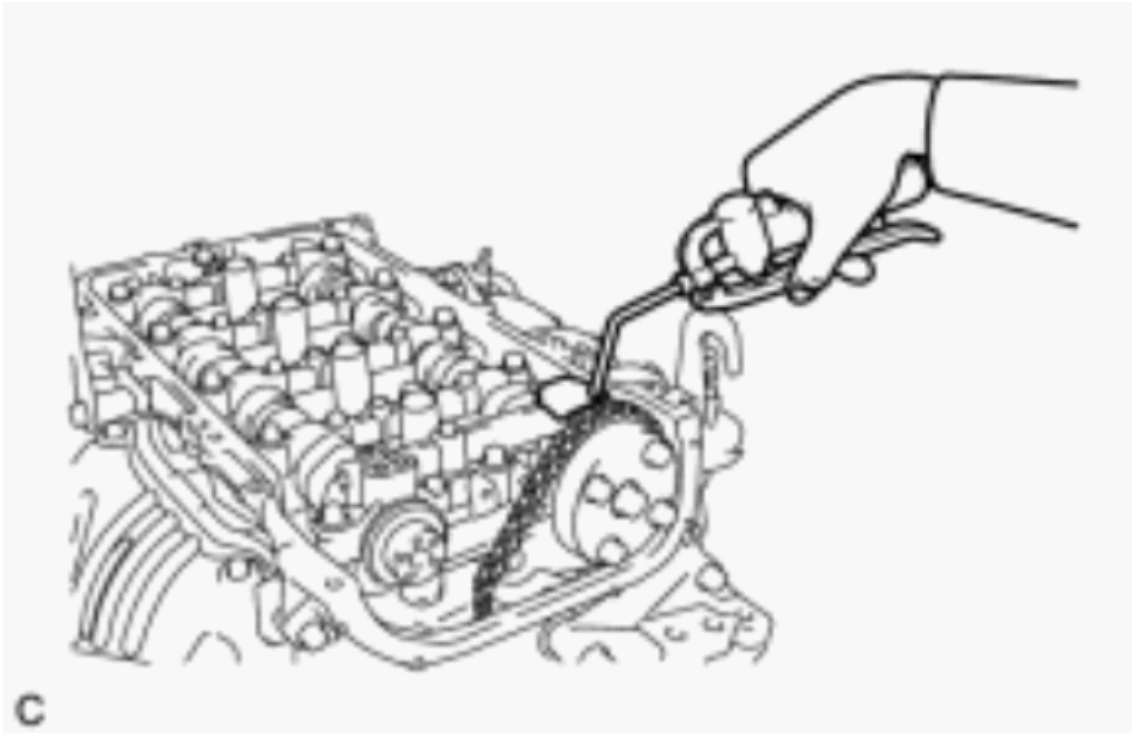


Fig. 29: Air Pressure
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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.

NOTE:

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

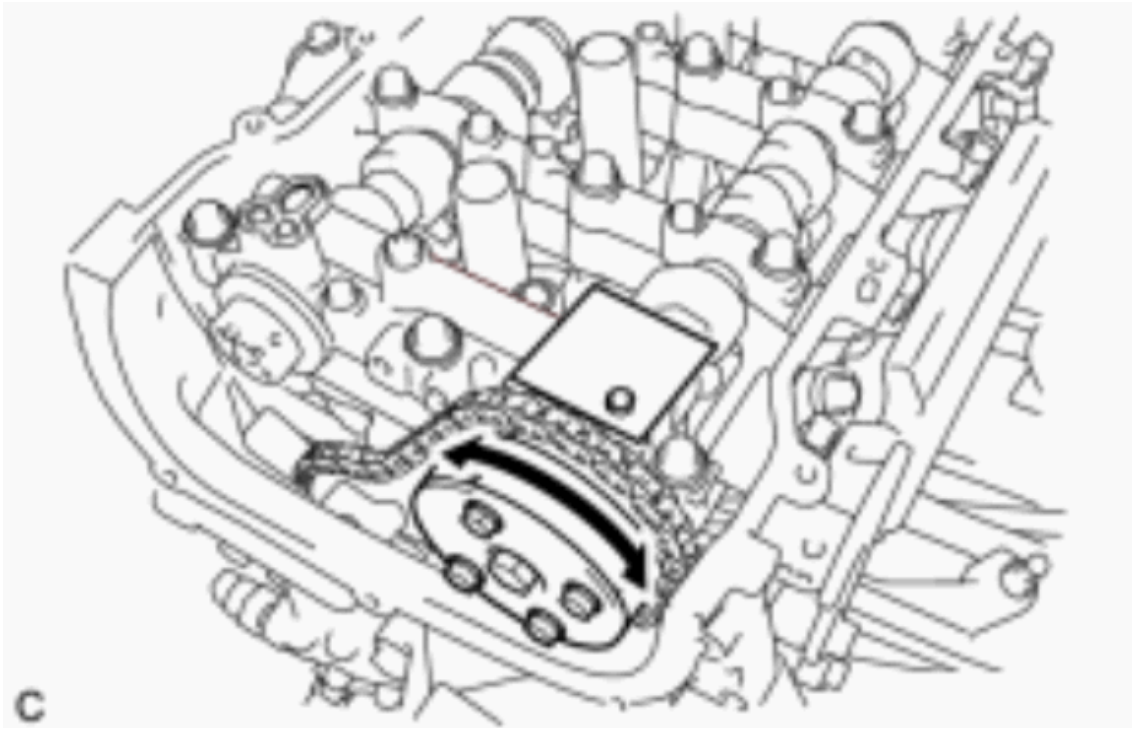


Fig. 30: Identifying Camshaft Timing Gear Turns Smoothly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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.

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.**

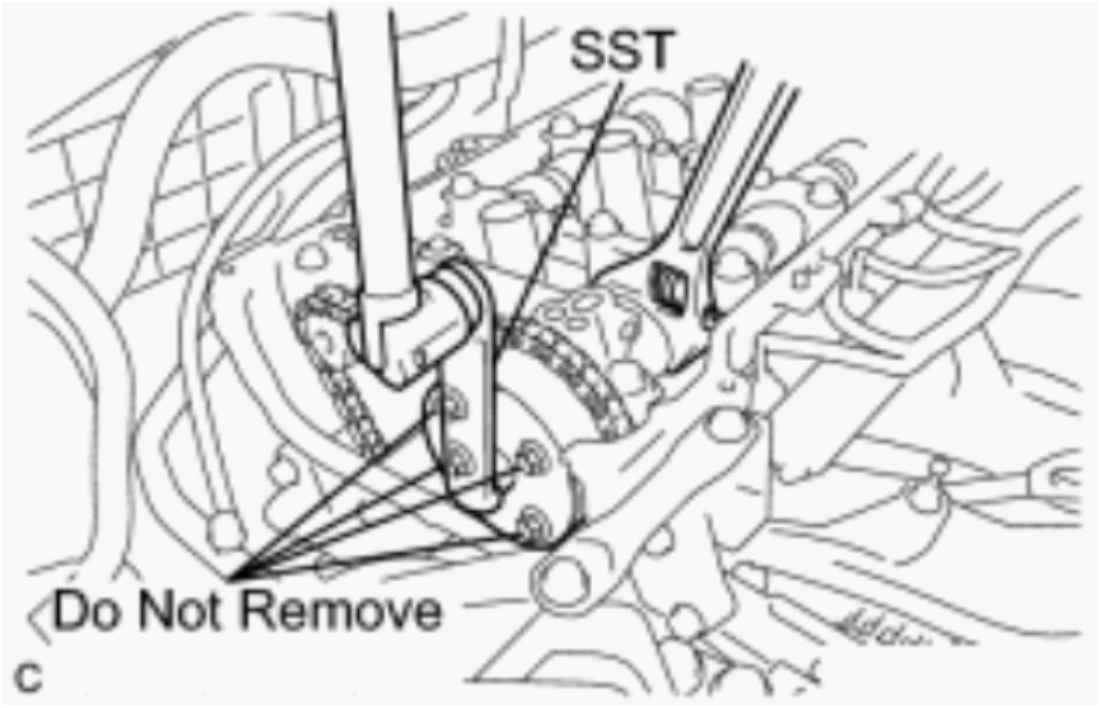


Fig. 31: Removing Camshaft Timing Gear Assembly Bolt With SST
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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.

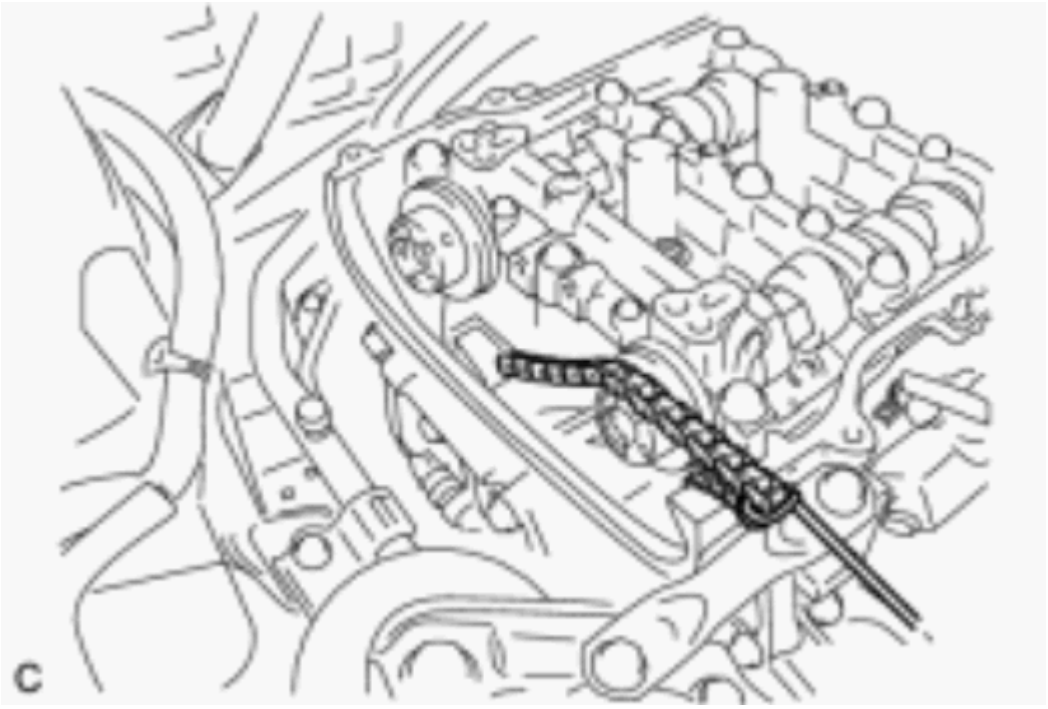


Fig. 32: Identifying Chain
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

26. **REMOVE CAMSHAFT BEARING CAP**
    a. Uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.

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

HINT: Arrange the removed parts in the correct order.

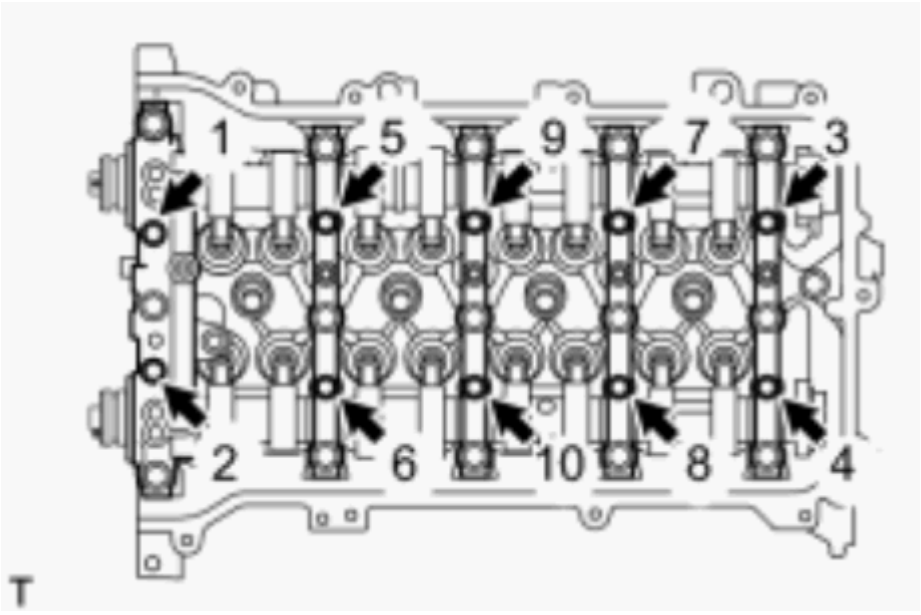


Fig. 33: Identifying Camshaft Bearing Cap In Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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.

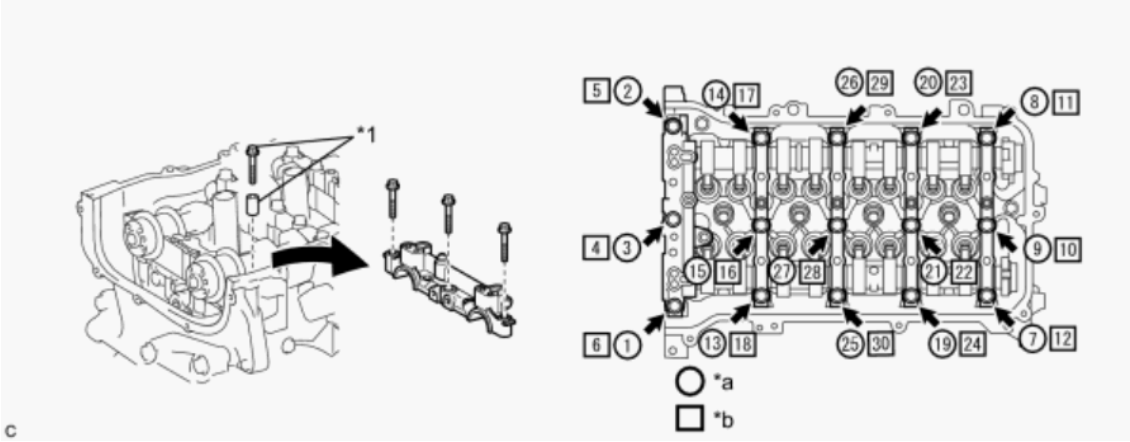


Fig. 34: Removing Camshaft Bearings In Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

*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, 20ft*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**
    1. Remove the camshaft from the camshaft housing.

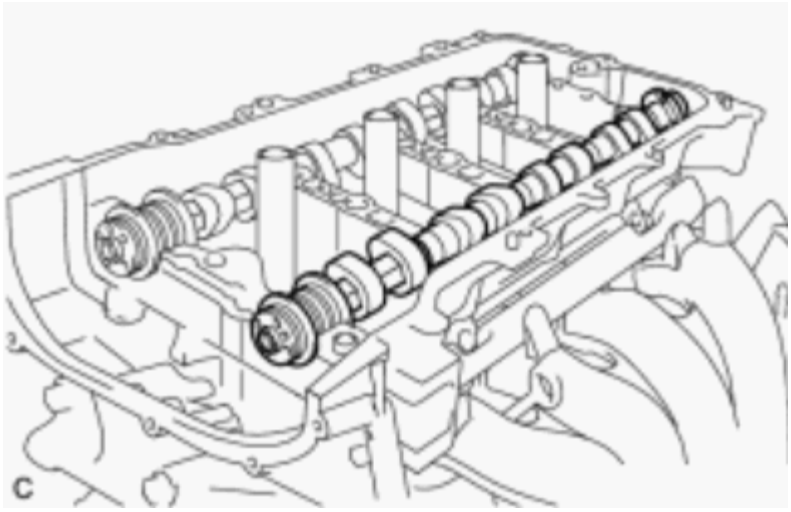


Fig. 35: Identifying Camshaft Housing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

28. **REMOVE NO. 2 CAMSHAFT**
    a. Remove the No. 2 camshaft from the camshaft housing.

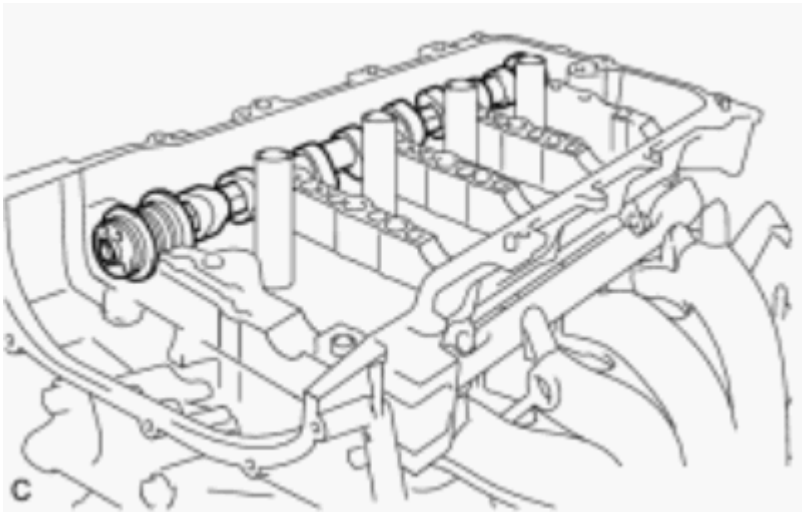


Fig. 36: Identifying No. 2 Camshaft Housing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

29. **REMOVE NO. 1 CAMSHAFT BEARING**
    a. Remove the 2 No. 1 camshaft bearings from the No. 1 camshaft bearing cap.

    HINT:

    Arrange the removed parts in the correct order.

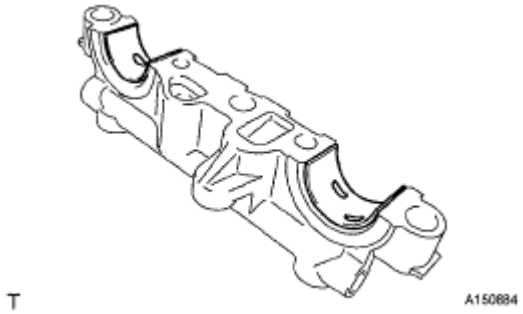


Fig. 37: Identifying No. 1 Camshaft Bearings
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

30. **REMOVE NO. 2 CAMSHAFT BEARING**
    a. Remove the 2 No. 2 camshaft bearings from the camshaft housing.

       HINT:

       Arrange the removed parts in the correct order.

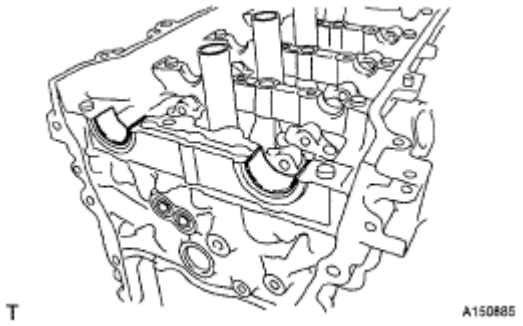


Fig. 38: Identifying No. 2 Camshaft Bearings
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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.

       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.

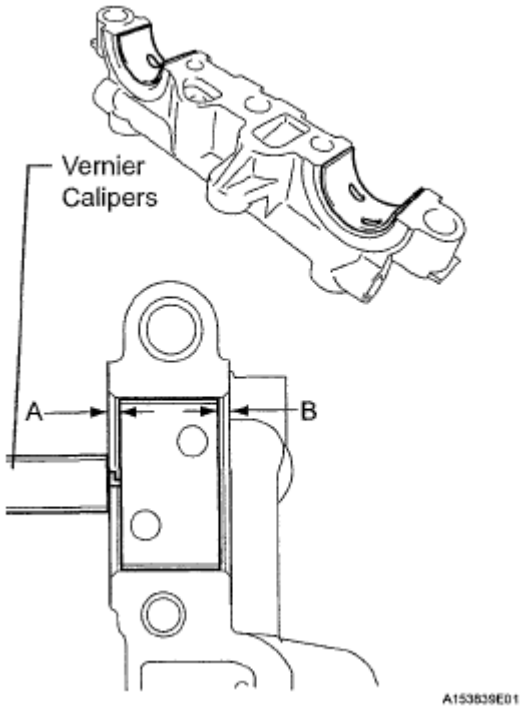


Fig. 39: Identifying Bearing Cap's Edge Dimension
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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.

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.

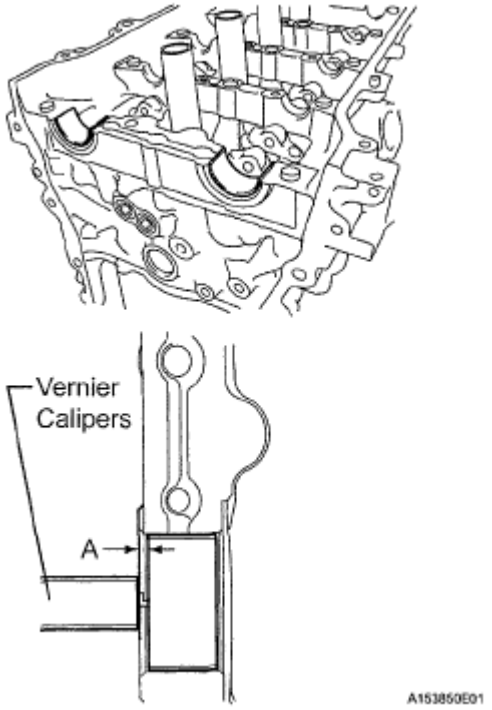


Fig. 40: Identifying Bearing Cap's Edge Dimension
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **INSTALL NO. 2 CAMSHAFT**
   a. Make sure that the valve rocker arm is installed as shown in the illustration.

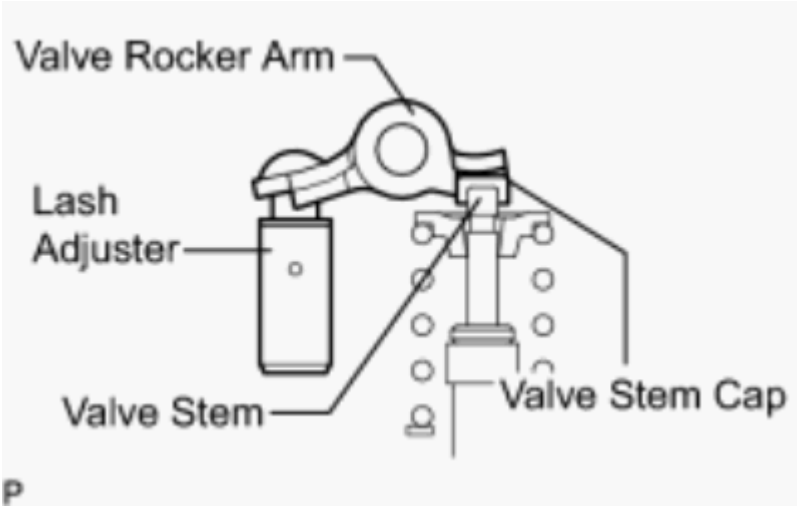


Fig. 41: Identifying Valve Rocker Arm
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   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.

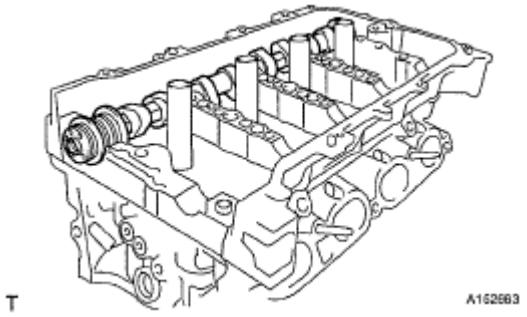


Fig. 42: Identifying No. 2 Camshaft
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. **INSTALL CAMSHAFT**
   a. Make sure that the valve rocker arm is installed as shown in the illustration.

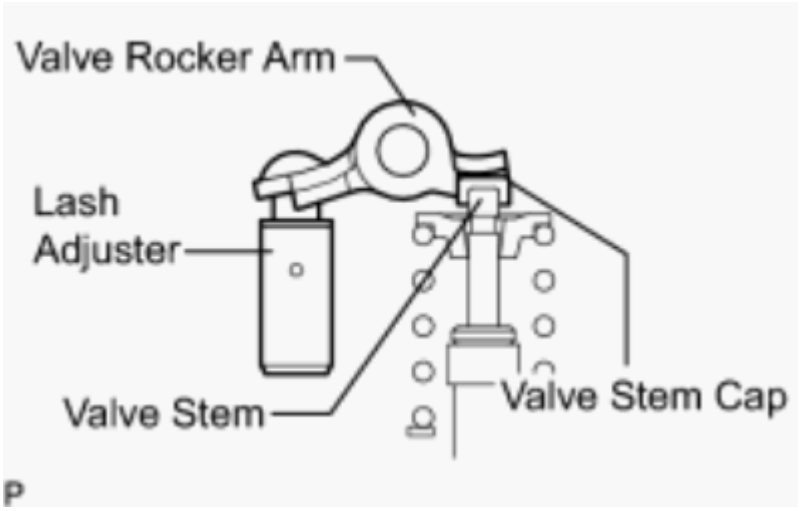


Fig. 43: Identifying Valve Rocker Arm
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   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.

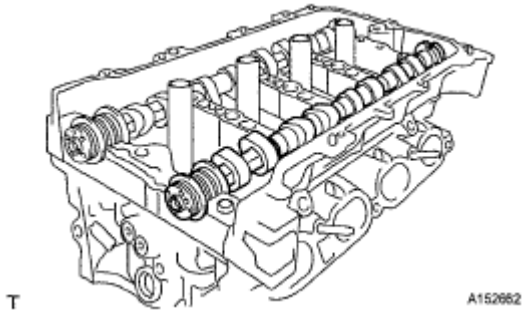


Fig. 44: Identifying Camshaft
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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.

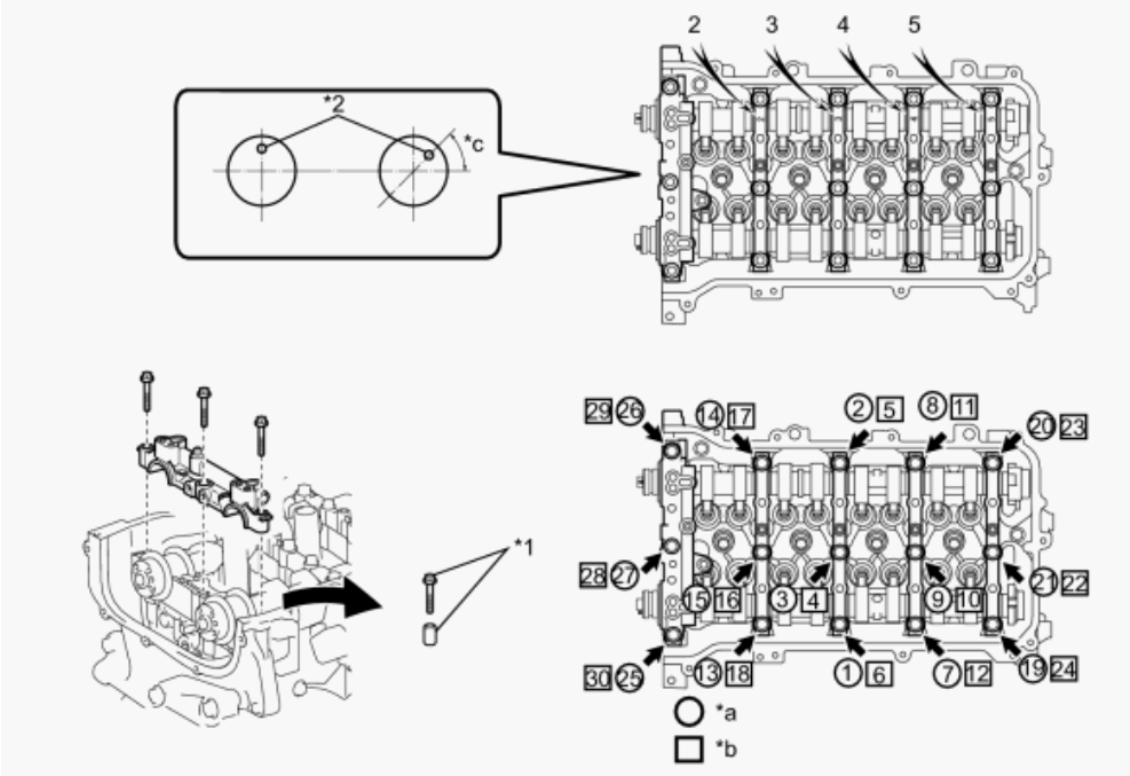


Fig. 45: Identifying Bearing Caps In Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

*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, 20ft*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.

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

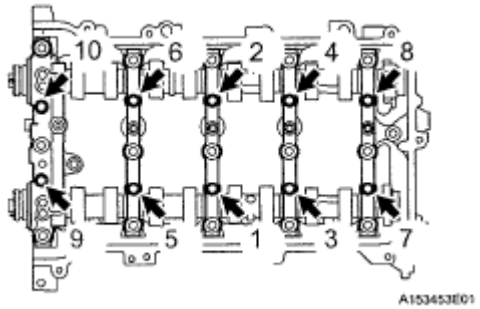


Fig. 46: Locating Bolts And Tightening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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.

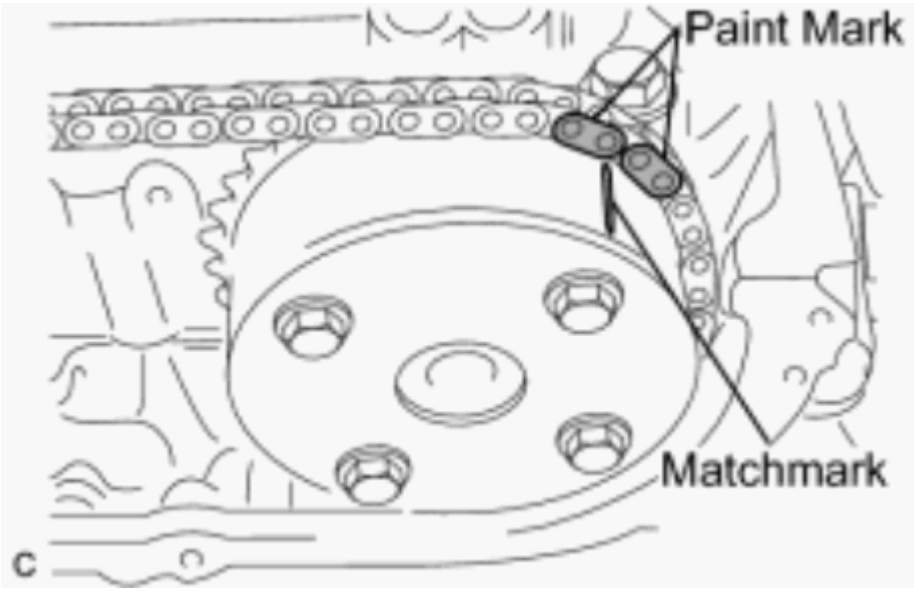


Fig. 47: Aligning Matchmark

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.

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

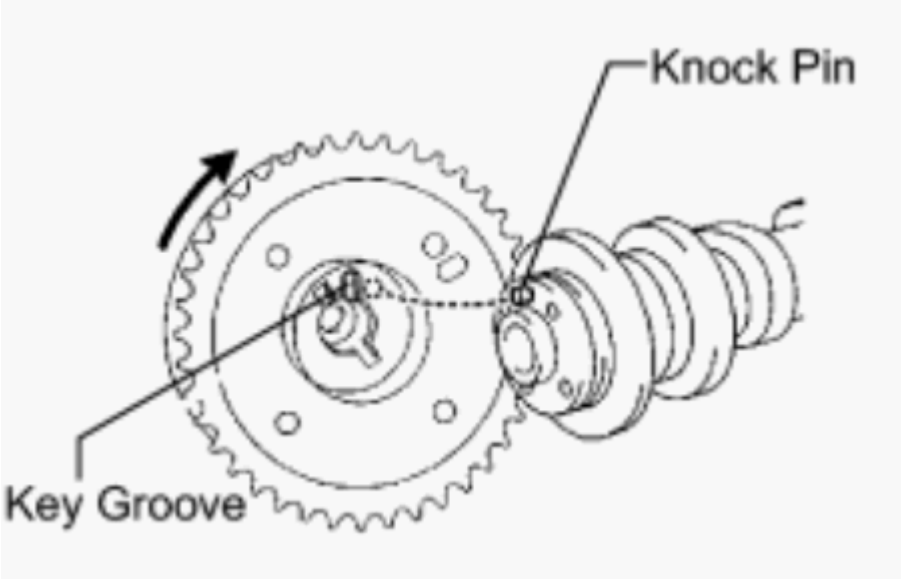


Fig. 48: Identifying Knock Pin And Key Groove
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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.

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

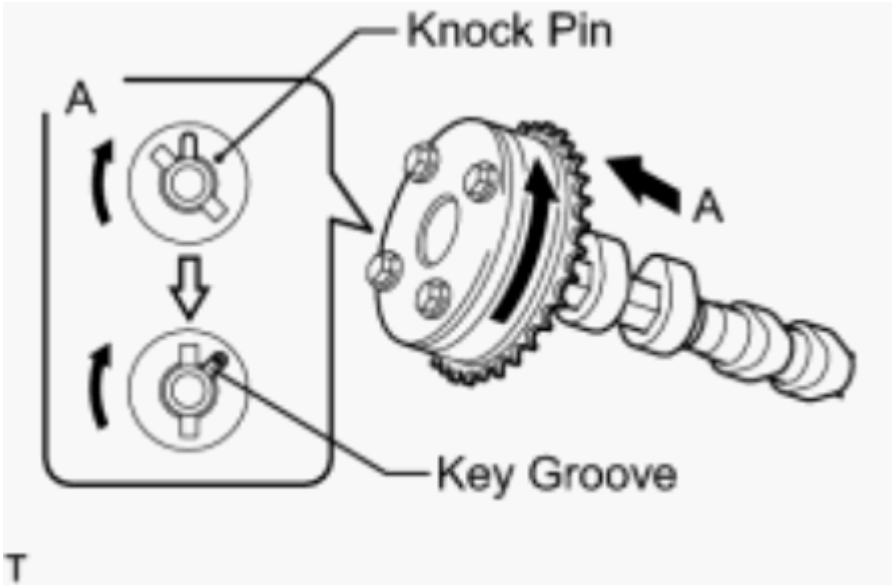


Fig. 49: Turning Camshaft Timing Gear
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

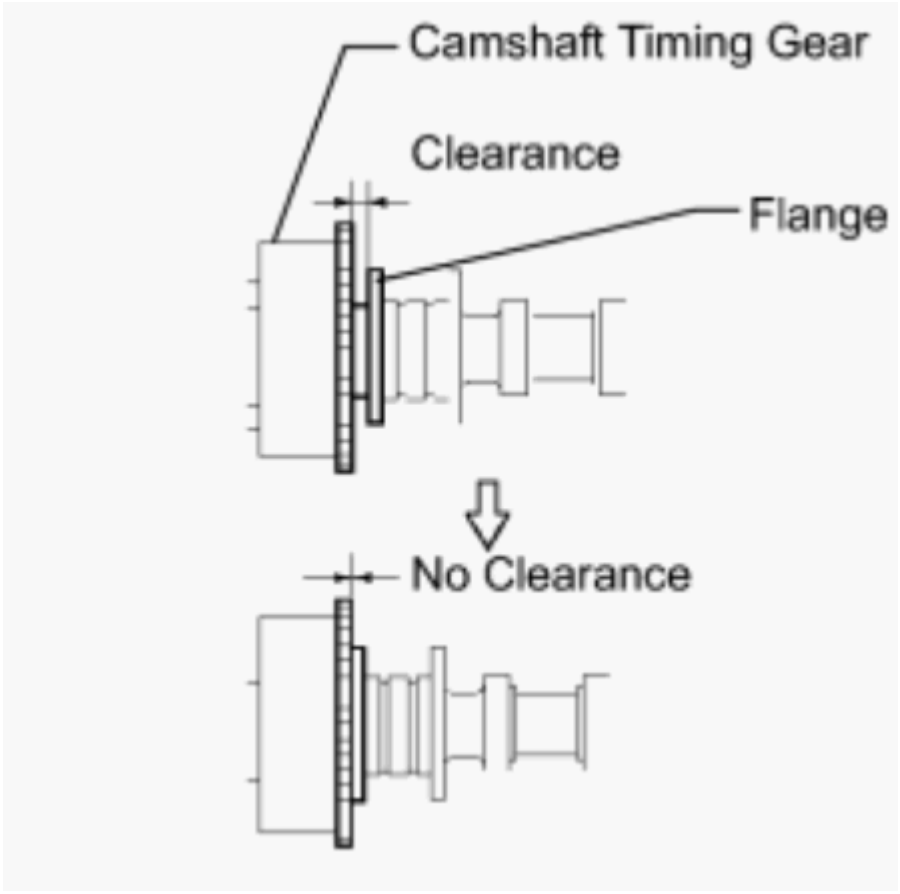


Fig. 50: Identifying No Clearance Between Camshaft Timing Gear And Camshaft Flange

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.

SST: 09249-37010

without SST - Torque: 54 N*m (551 kgf*cm, 40ft*lbf)

with SST - Torque: 39 N*m (398 kgf*cm, 29ft*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.

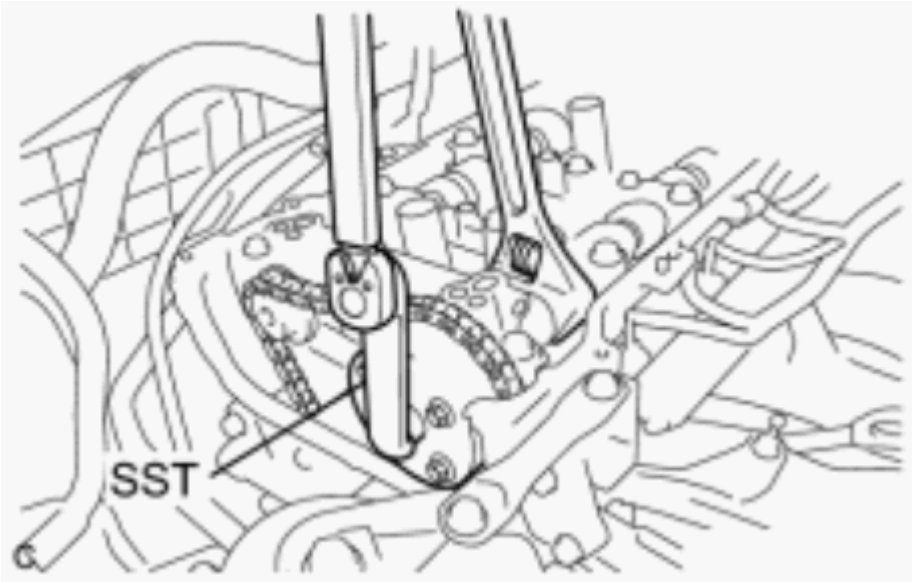


Fig. 51: Using SST To Fix Camshaft Timing Gear Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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.

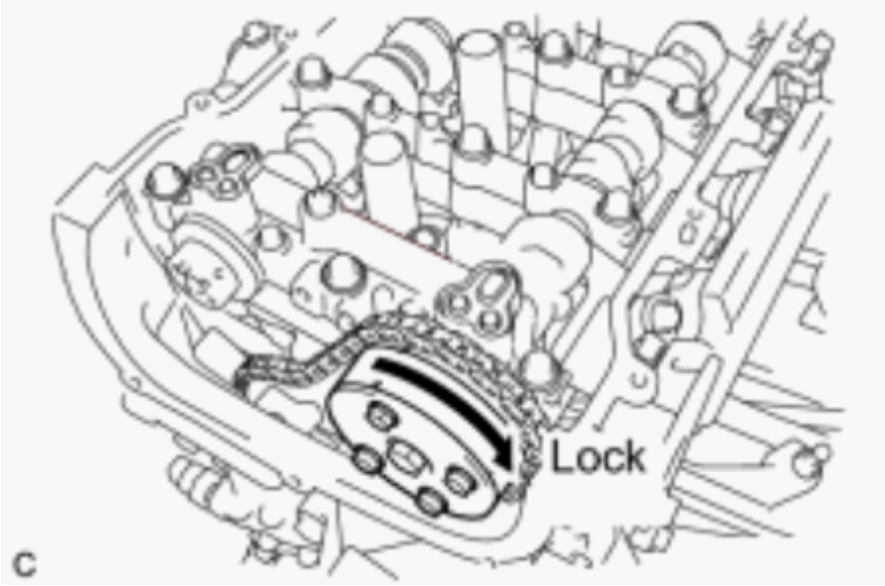


Fig. 52: Locking Camshaft Timing Gear
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. **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.

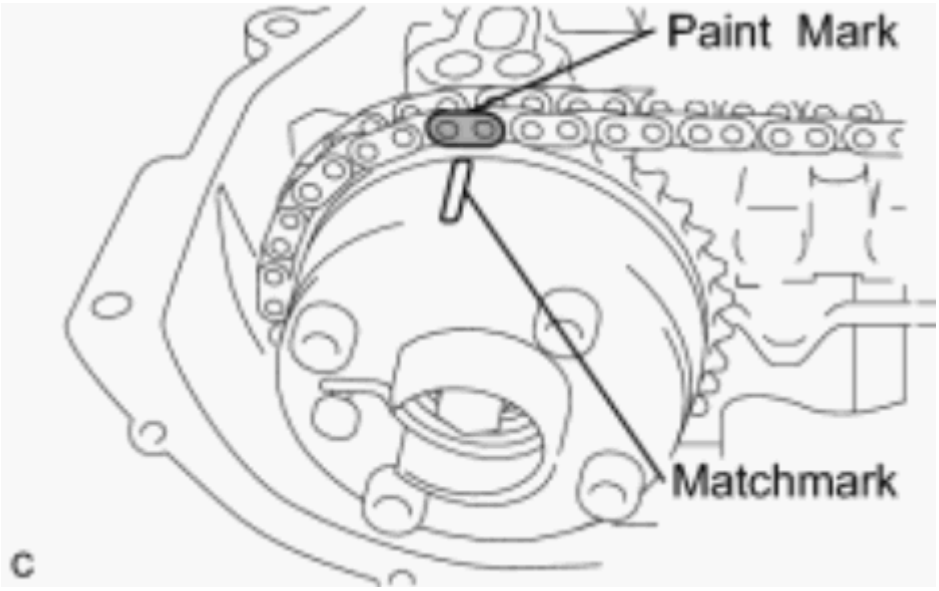


Fig. 53: Identifying Matchmark
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

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

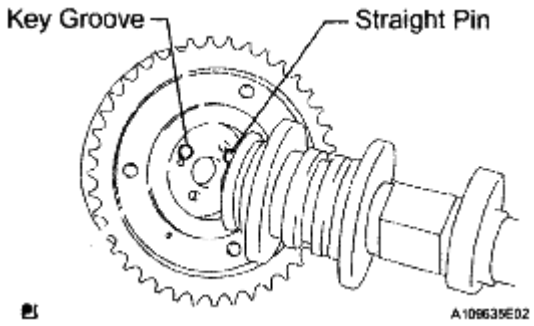


Fig. 54: Identifying Key Groove And Straight Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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.

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

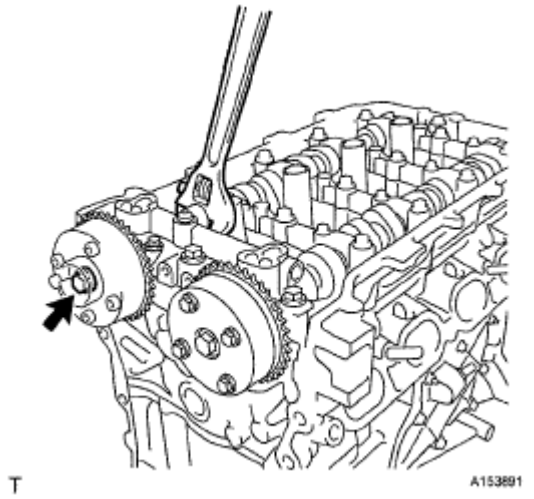


Fig. 55: Locating Flange Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. **INSTALL NO. 2 CHAIN VIBRATION DAMPER**
   a. Install the No. 2 chain vibration damper with the 2 bolts.

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

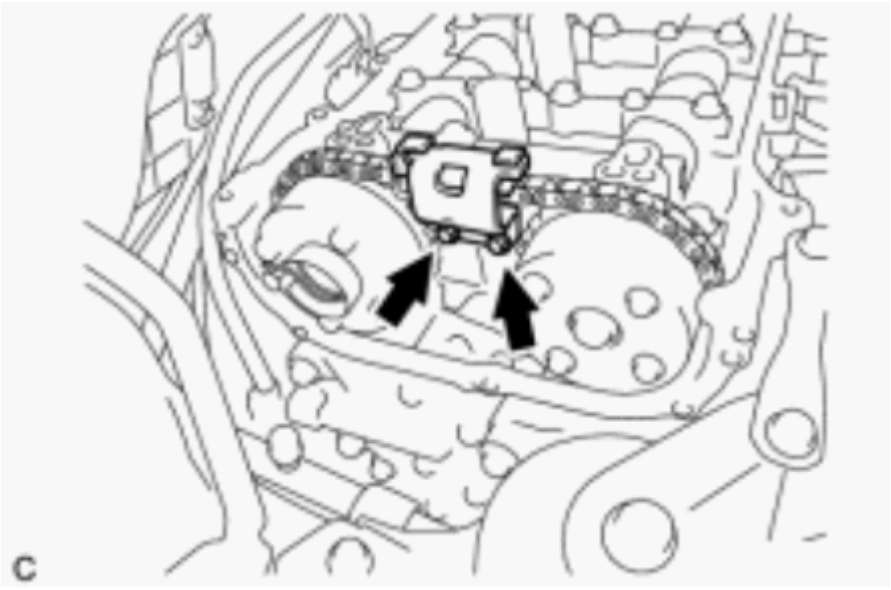


Fig. 56: Identifying Chain Vibration Damper
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. **INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY** . Refer to **REASSEMBLY**.
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.

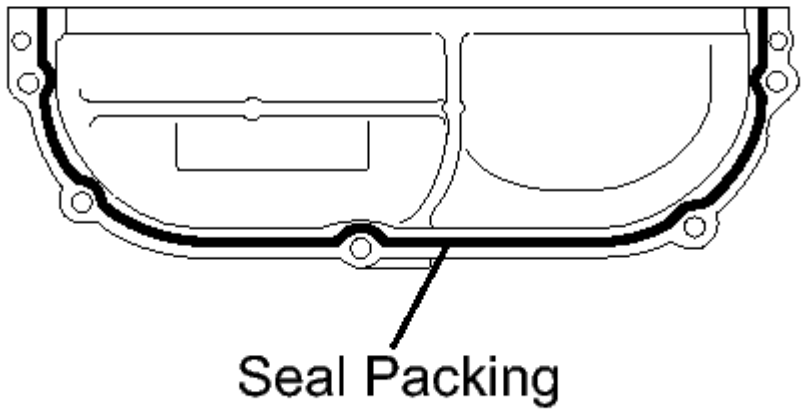


Fig. 57: Identifying Seal Packing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

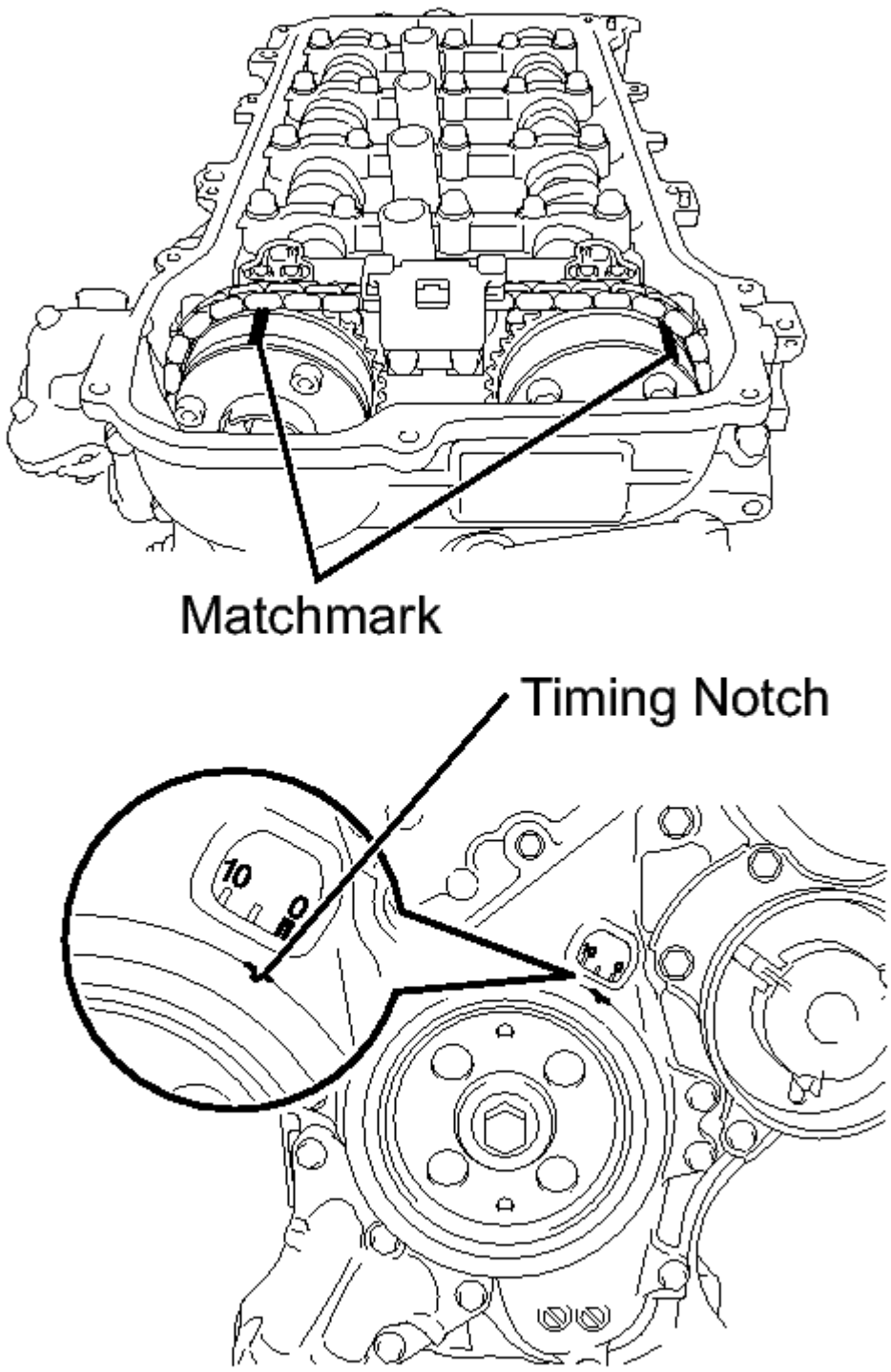
NOTE:

- **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.



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** . Refer to **REASSEMBLY**.
13. **INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY** . Refer to **REASSEMBLY**.
14. **INSTALL AIR TUBE ASSEMBLY**
    a. Install the air tube assembly with the 2 bolts.

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

    b. Connect the 4 hoses.

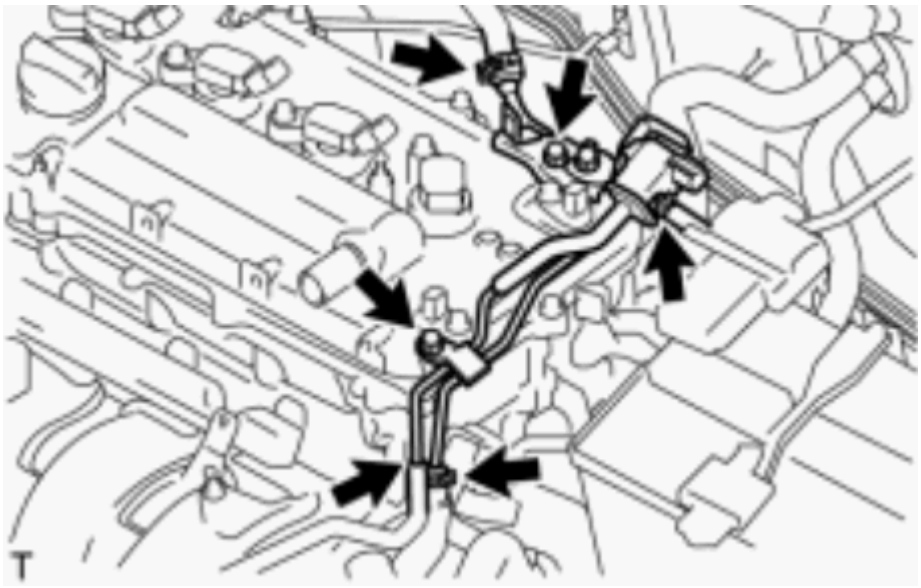


Fig. 59: Identifying Air Tube Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

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

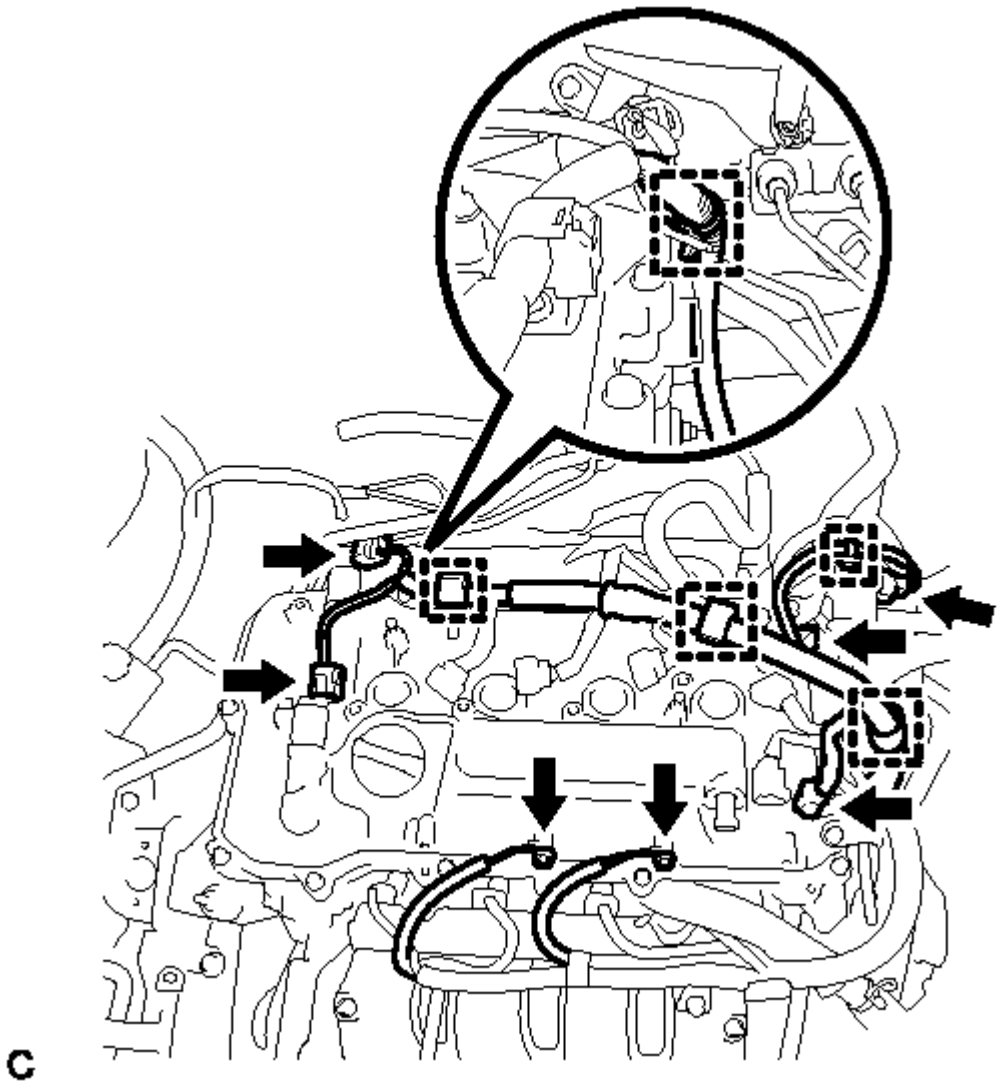


Fig. 60: Identifying Engine Wire Bolts, Connectors & Clamps
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

16. **CONNECT NO. 2 VENTILATION HOSE**
    a. Connect the No. 2 ventilation hose.

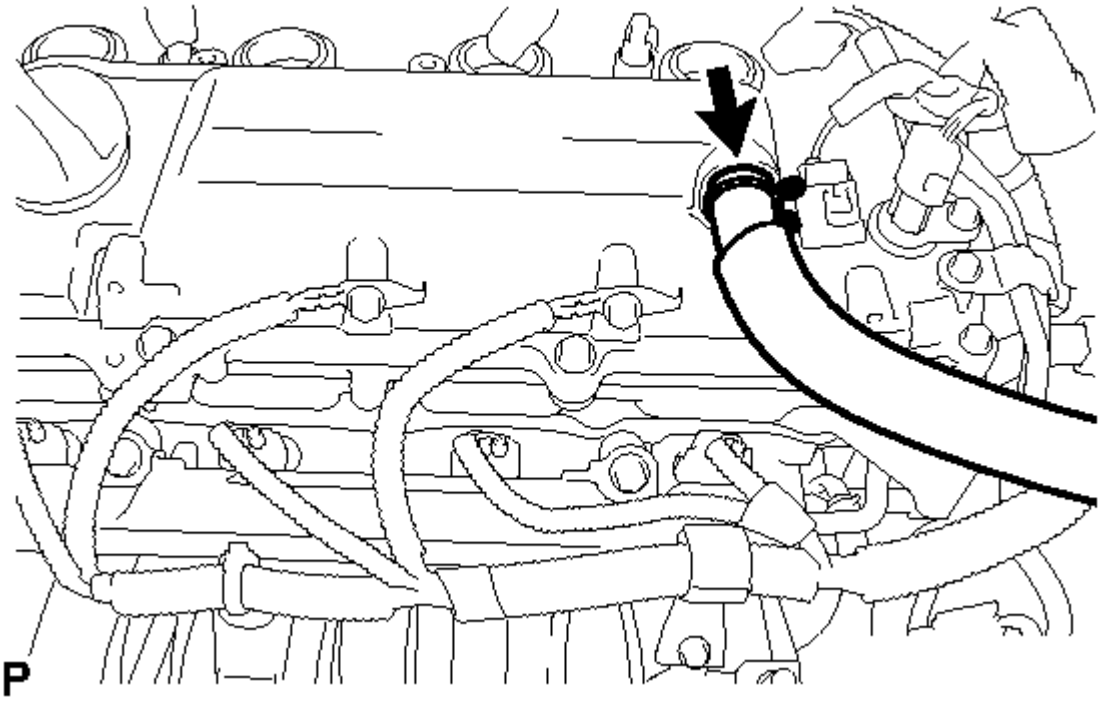


Fig. 61: Locating No. 2 Ventilation Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

CYLINDER HEAD GASKET

COMPONENTS

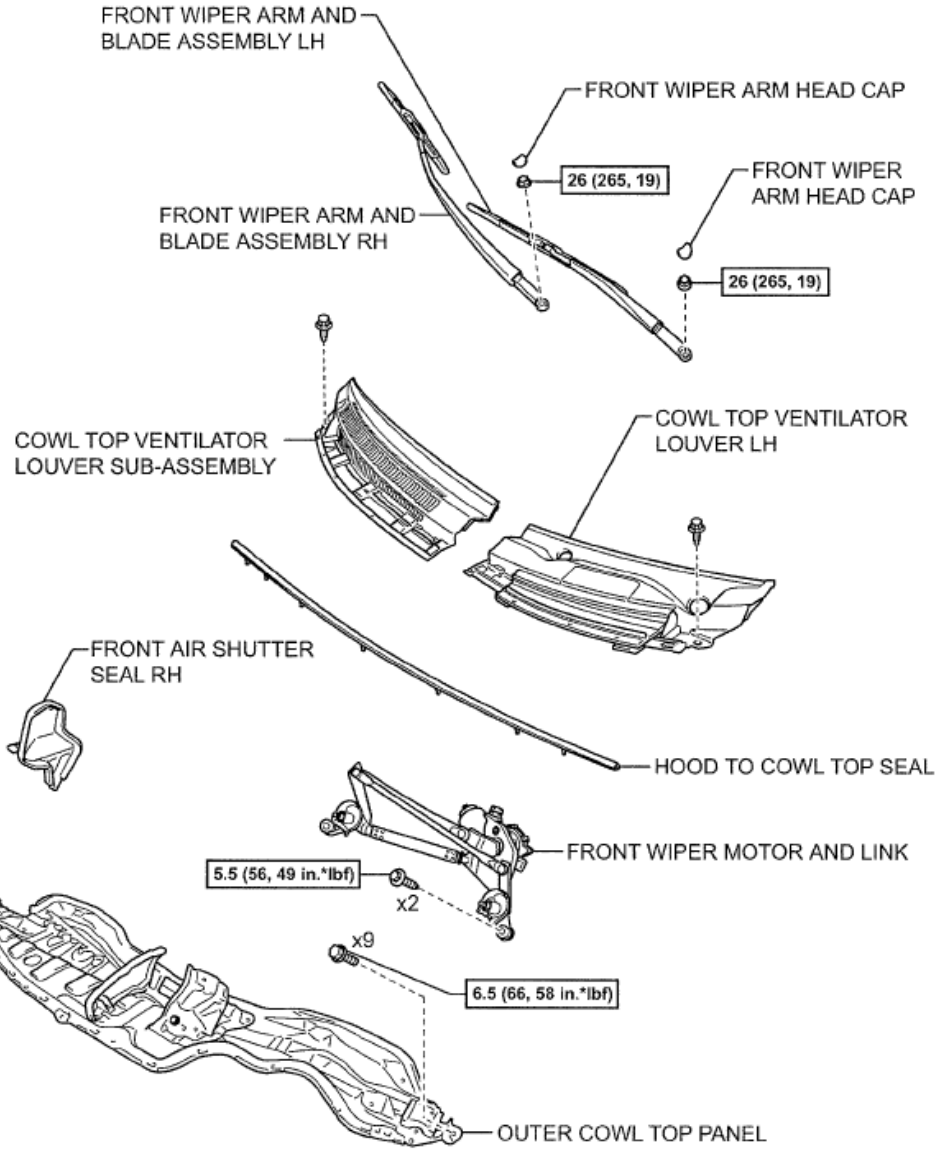


Fig. 62: Identifying Cylinder Head Gasket Components And Torque Specifications (1 Of 18)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

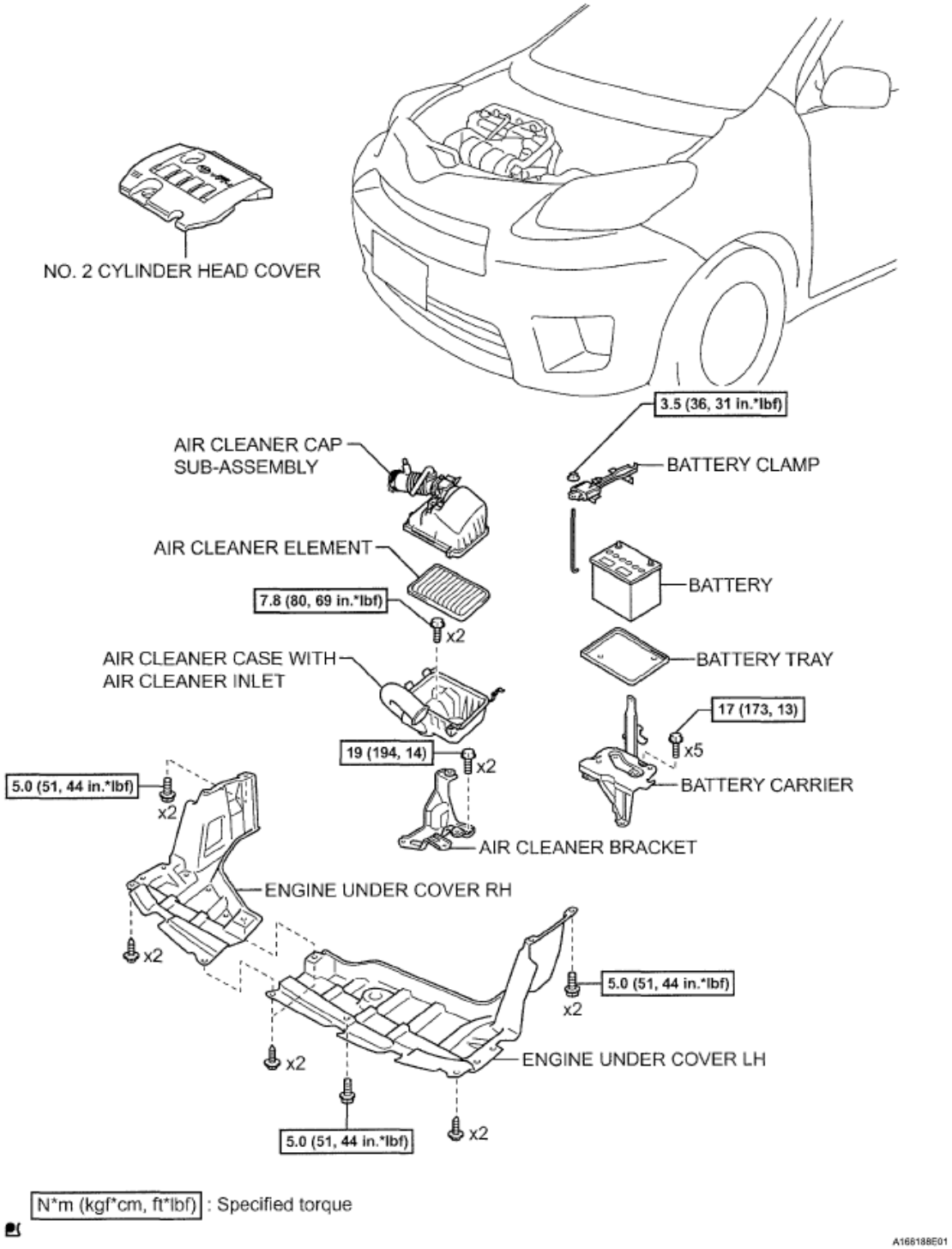


Fig. 63: Identifying Cylinder Head Gasket Components And Torque Specifications (2 Of 18)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

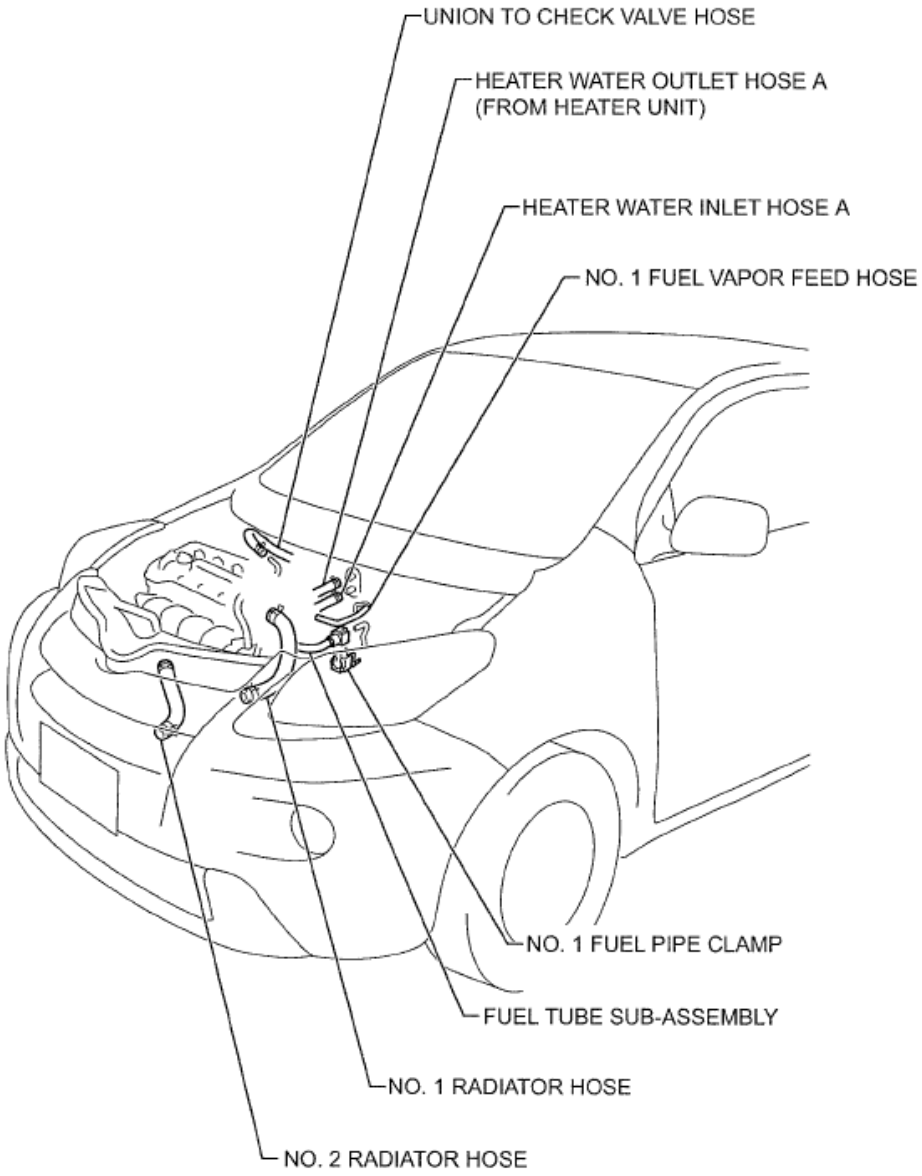


Fig. 64: Identifying Cylinder Head Gasket Components (3 Of 18)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

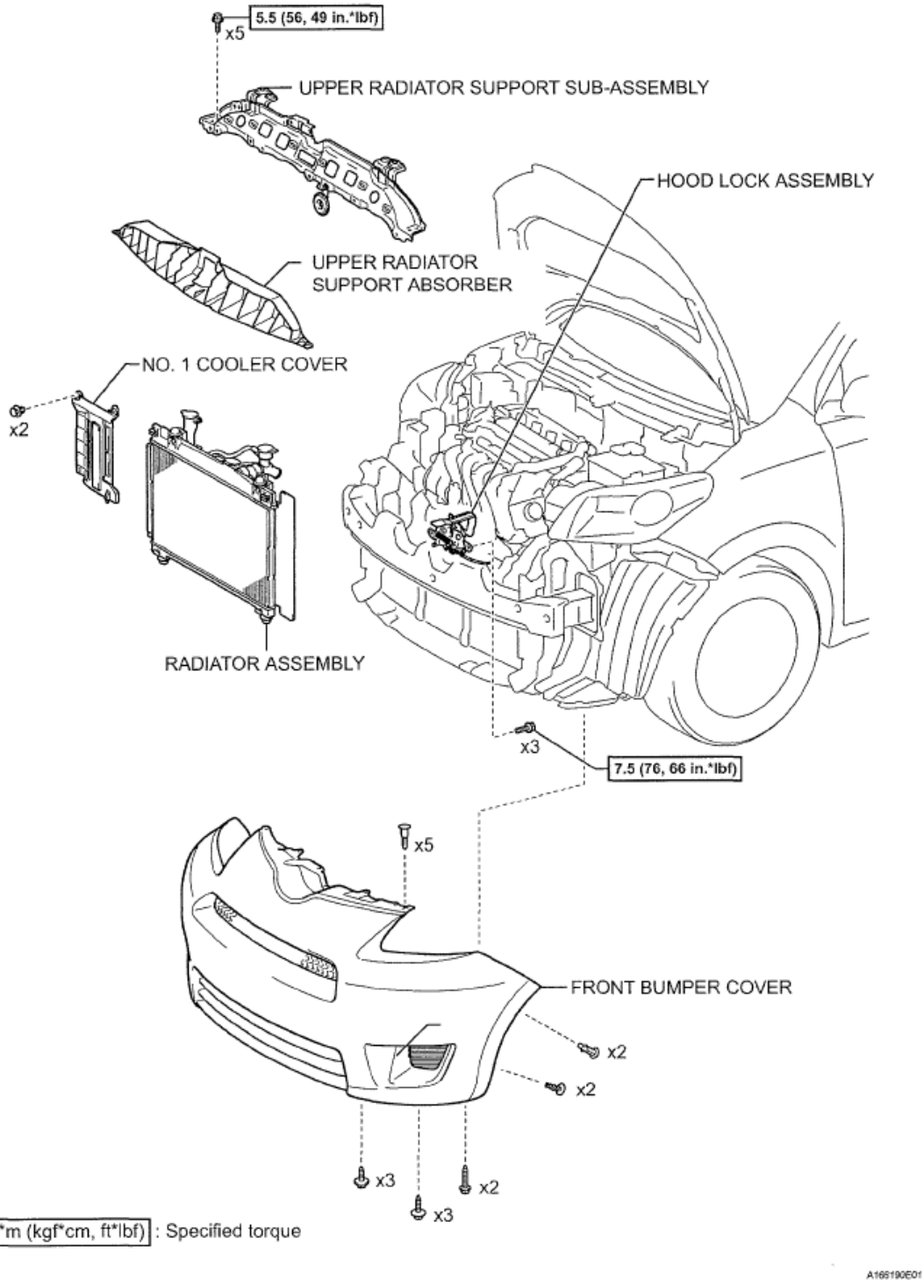


Fig. 65: Identifying Cylinder Head Gasket Components And Torque Specifications (4 Of 18)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

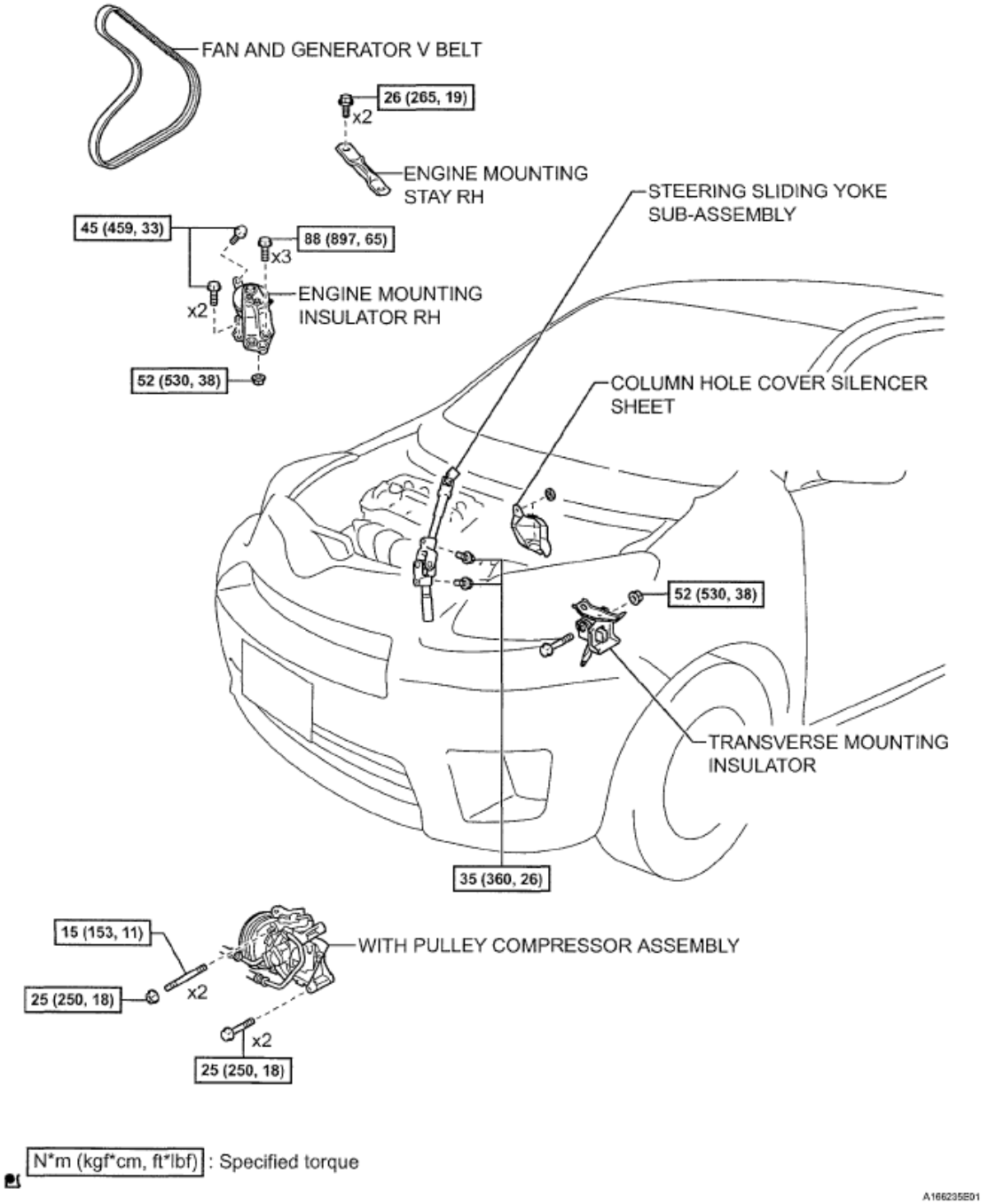


Fig. 66: Identifying Cylinder Head Gasket Components And Torque Specifications (5 Of 18)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

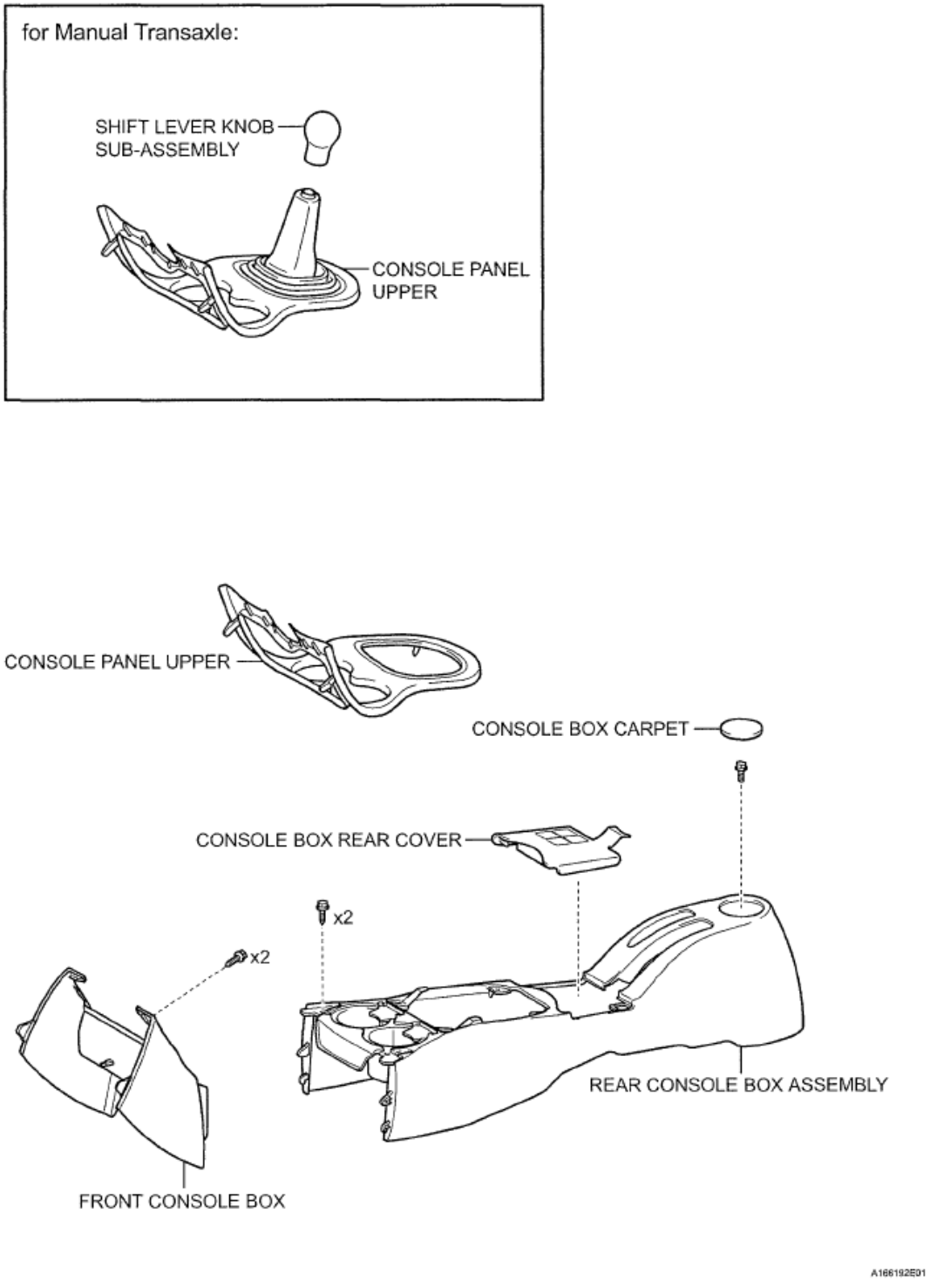


Fig. 67: Identifying Cylinder Head Gasket Components (6 Of 18)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

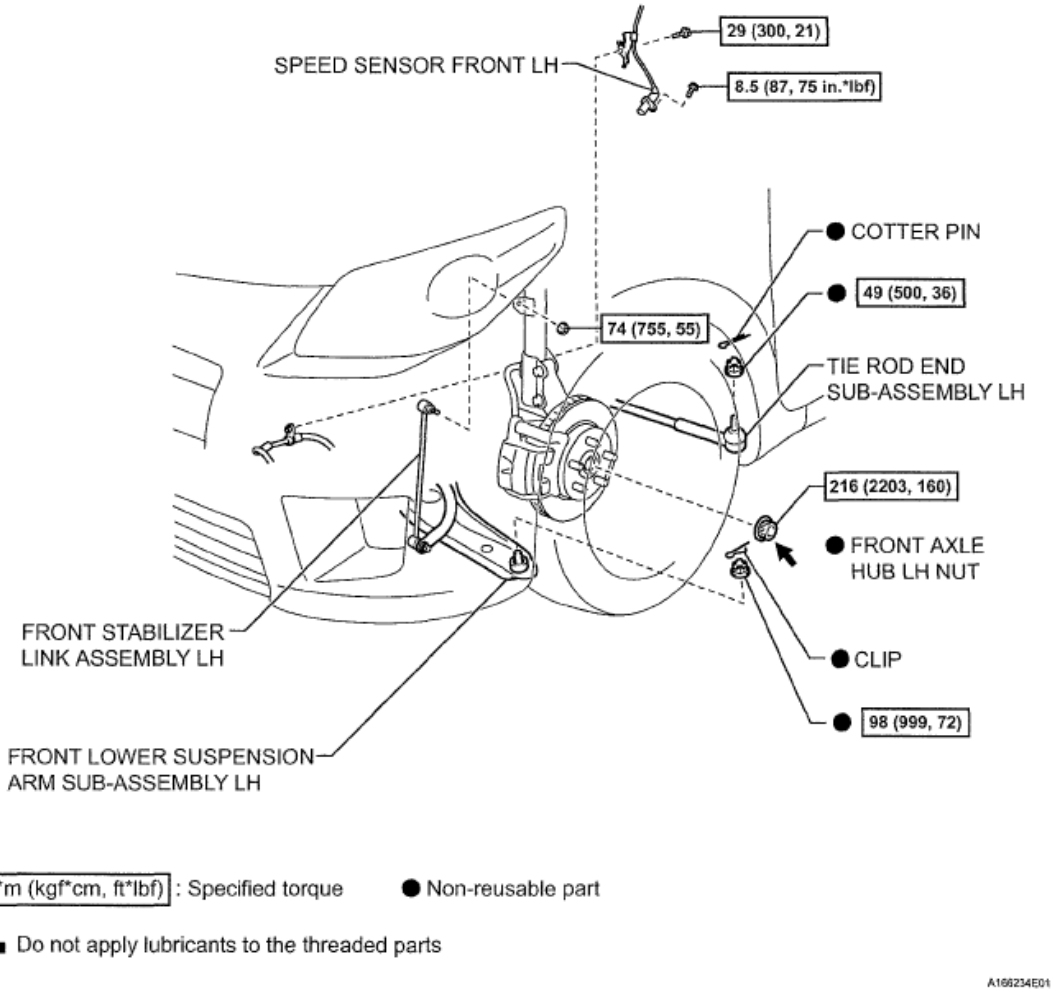


Fig. 68: Identifying Cylinder Head Gasket Components And Torque Specifications (7 Of 18)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

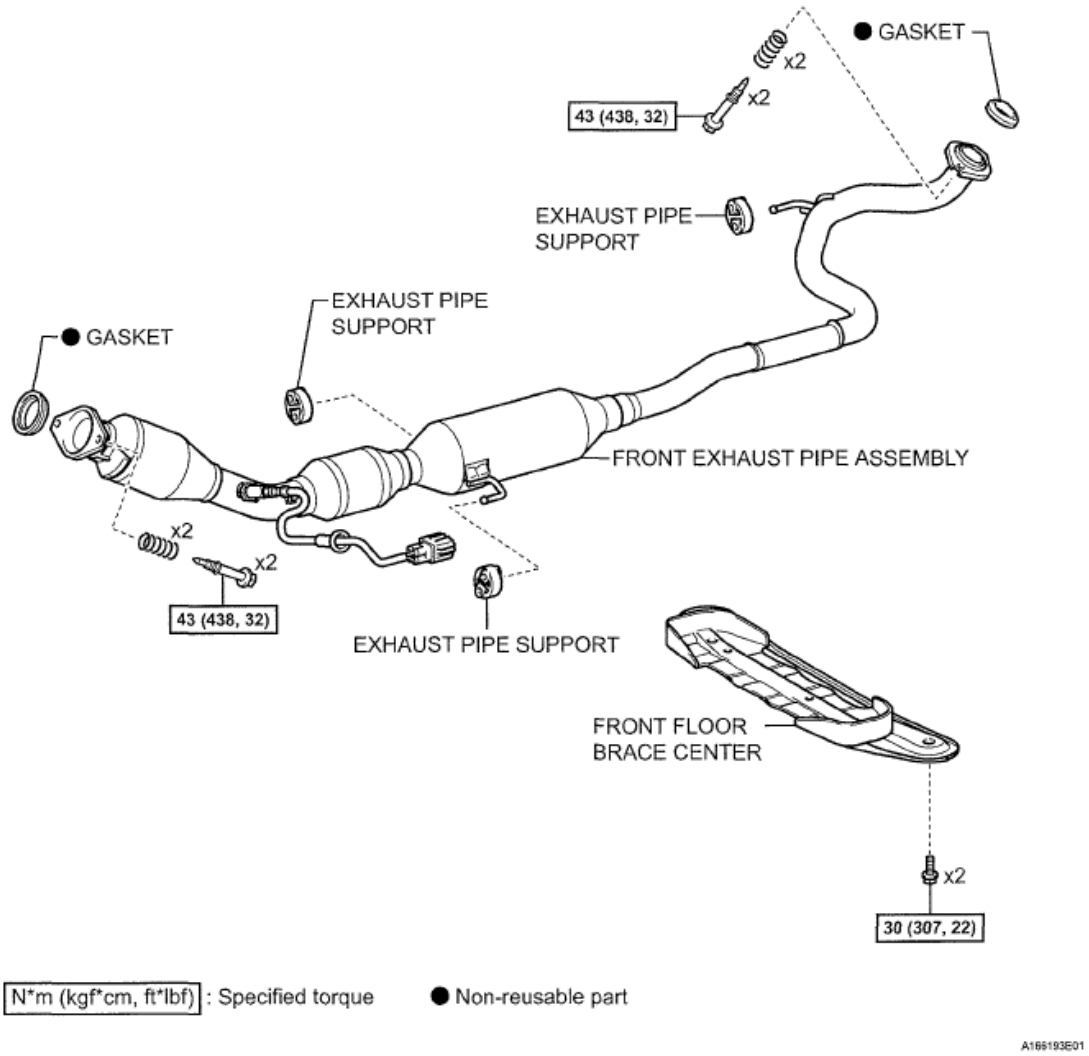


Fig. 69: Identifying Cylinder Head Gasket Components And Torque Specifications (8 Of 18)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

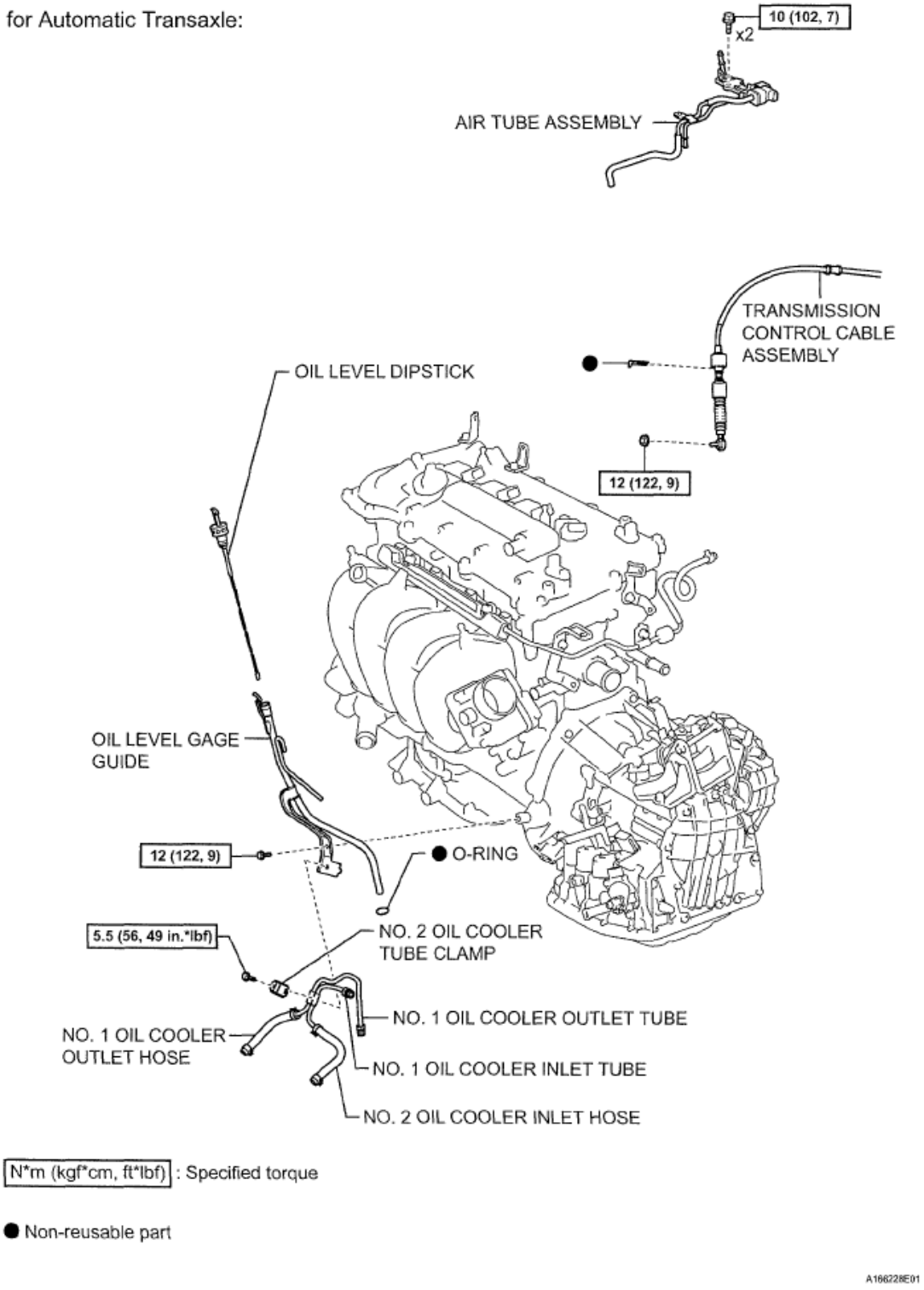


Fig. 70: Identifying Cylinder Head Gasket Components And Torque Specifications (9 Of 18)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

for Manual Transaxle:

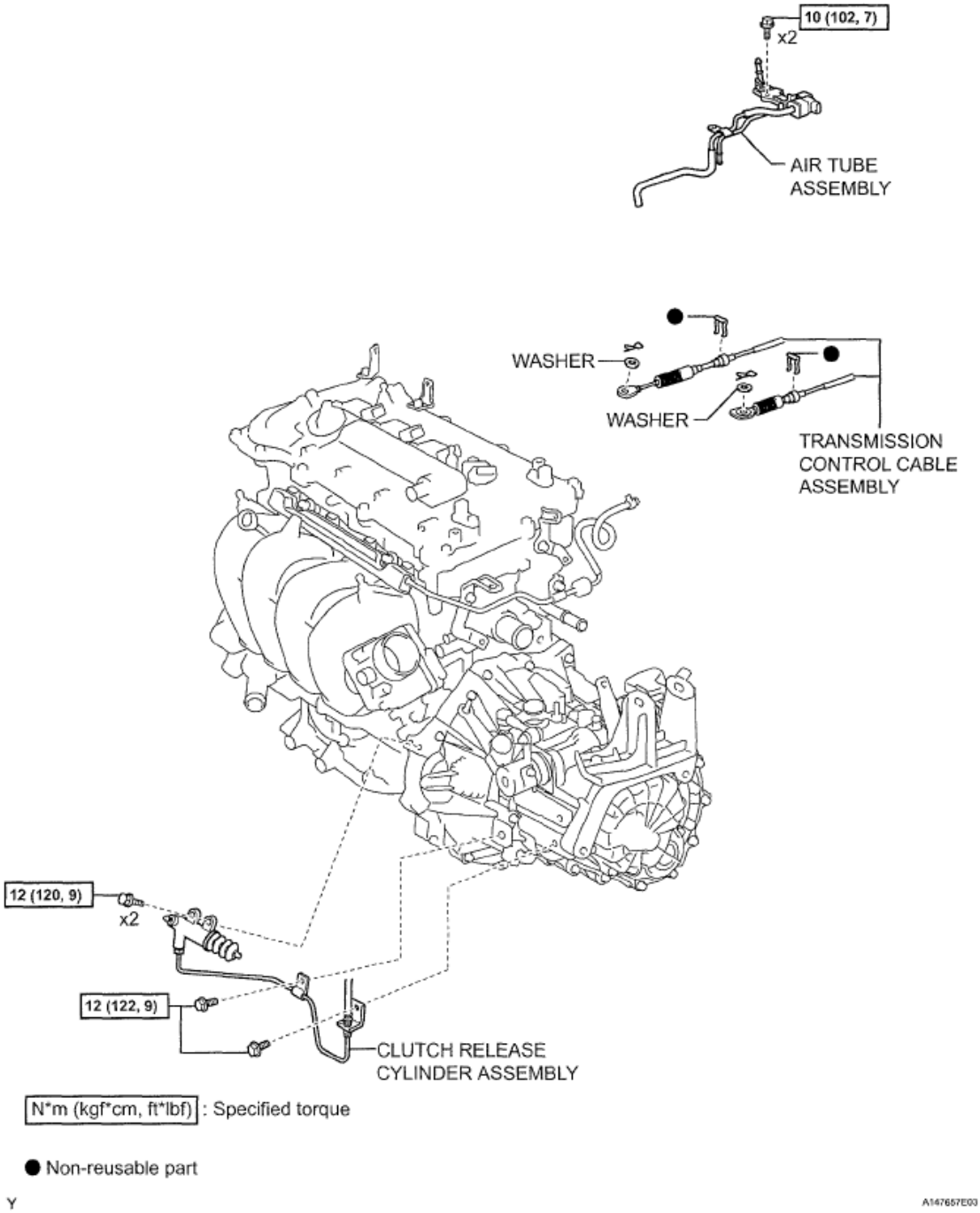


Fig. 71: Identifying Cylinder Head Gasket Components And Torque Specifications (10 Of 18)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

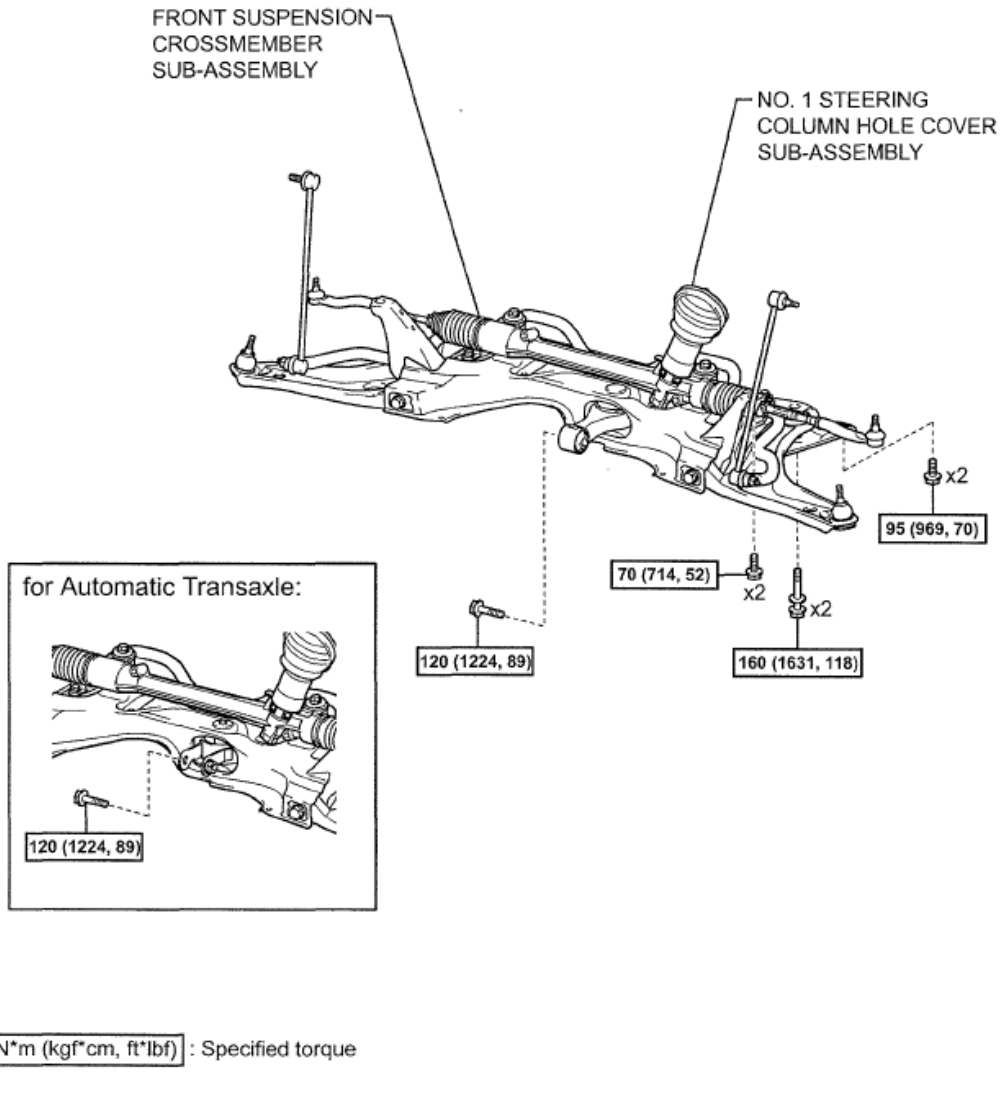


Fig. 72: Identifying Cylinder Head Gasket Components And Torque Specifications (11 Of 18)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

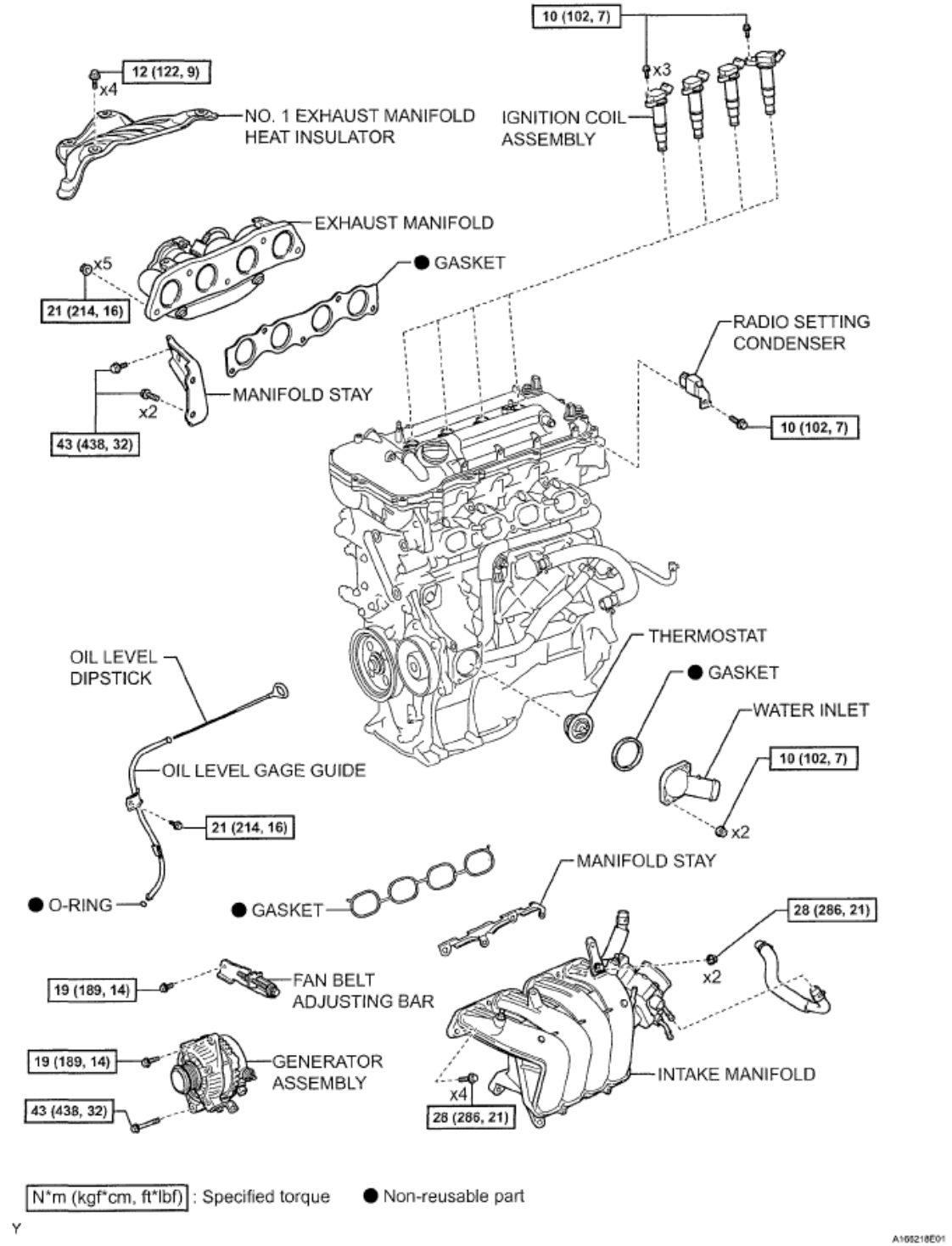


Fig. 73: Identifying Cylinder Head Gasket Components And Torque Specifications (12 Of 18)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

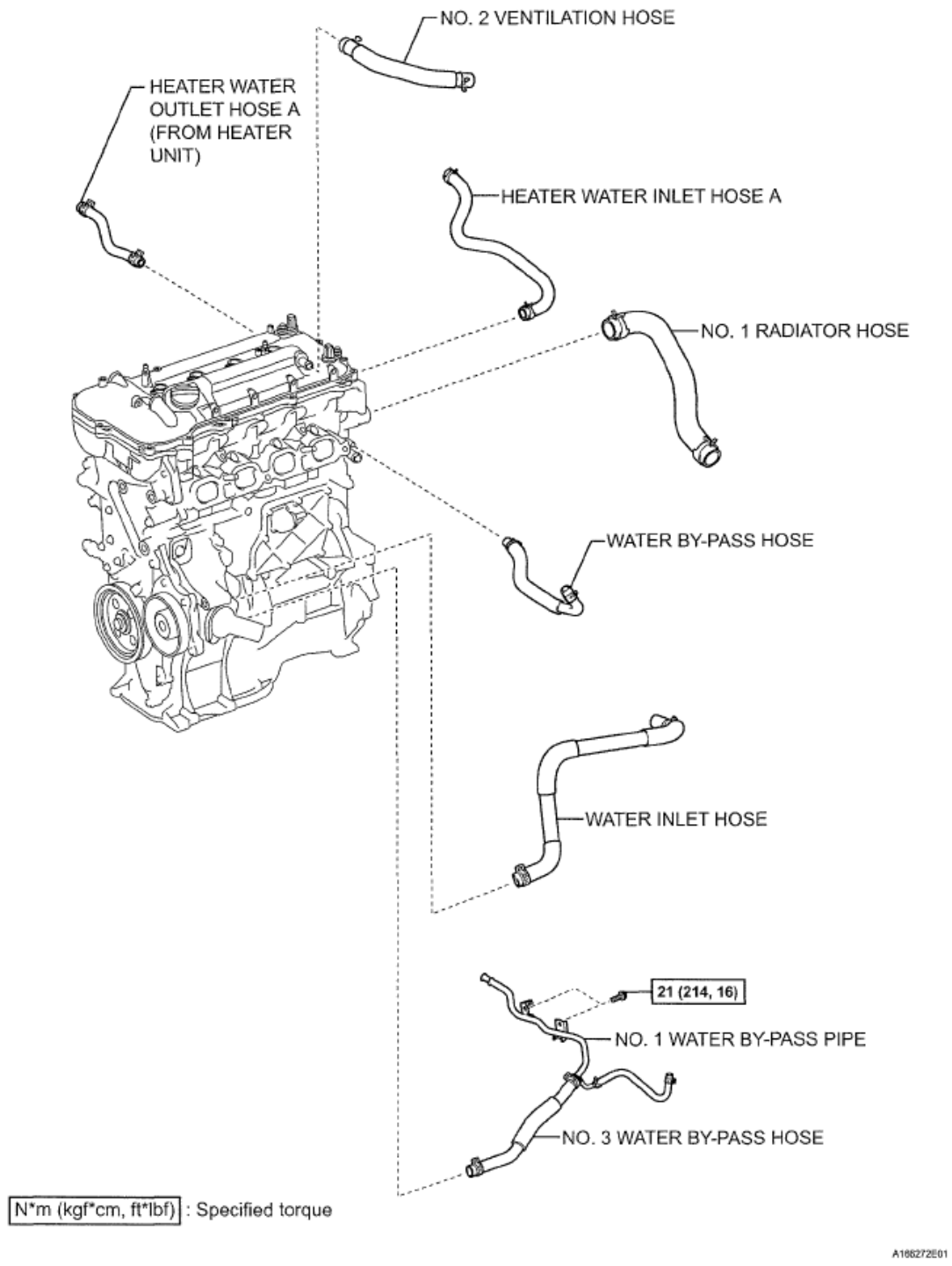


Fig. 74: Identifying Cylinder Head Gasket Components And Torque Specifications (13 Of 18)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

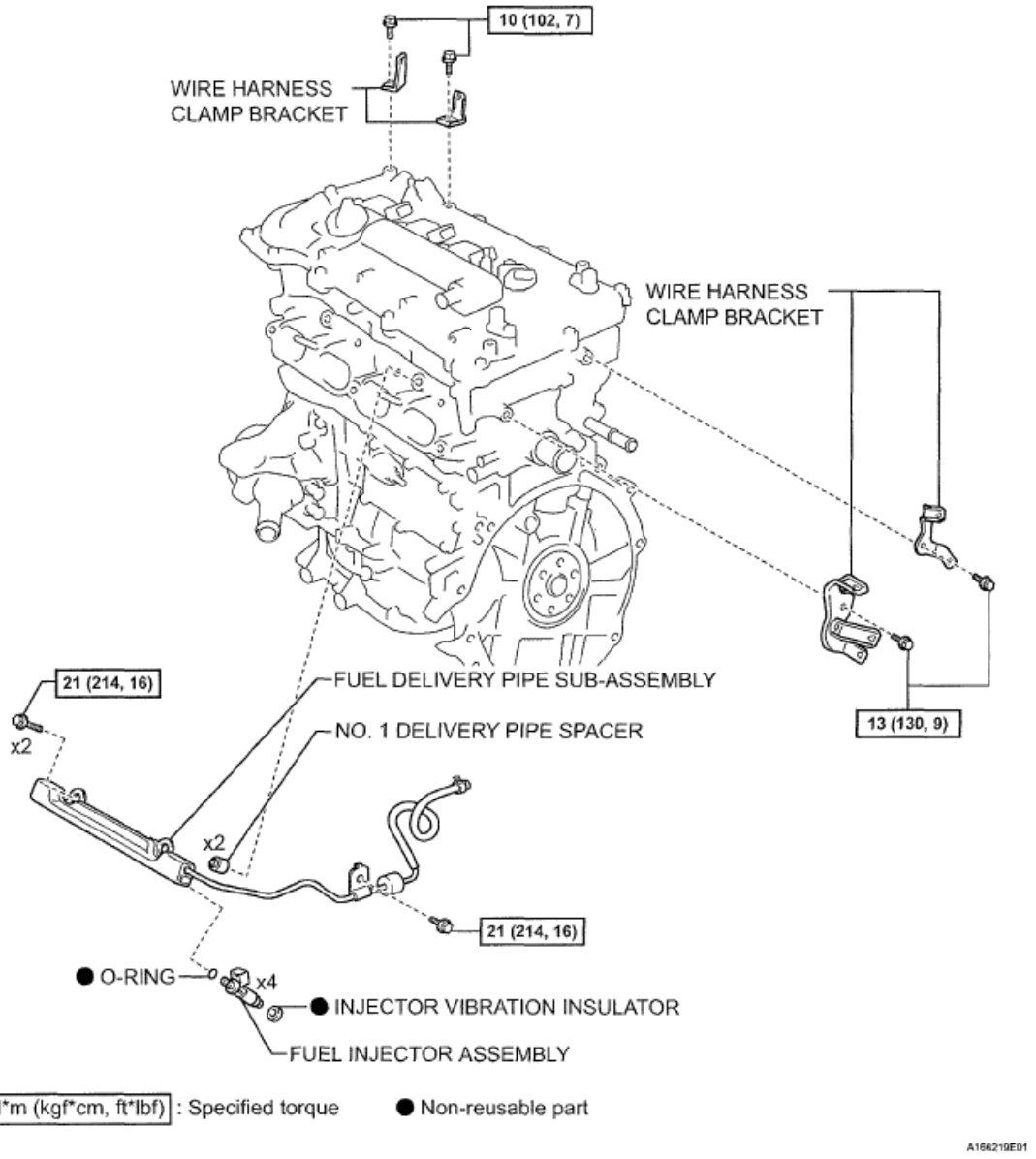


Fig. 75: Identifying Cylinder Head Gasket Components And Torque Specifications (14 Of 18)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

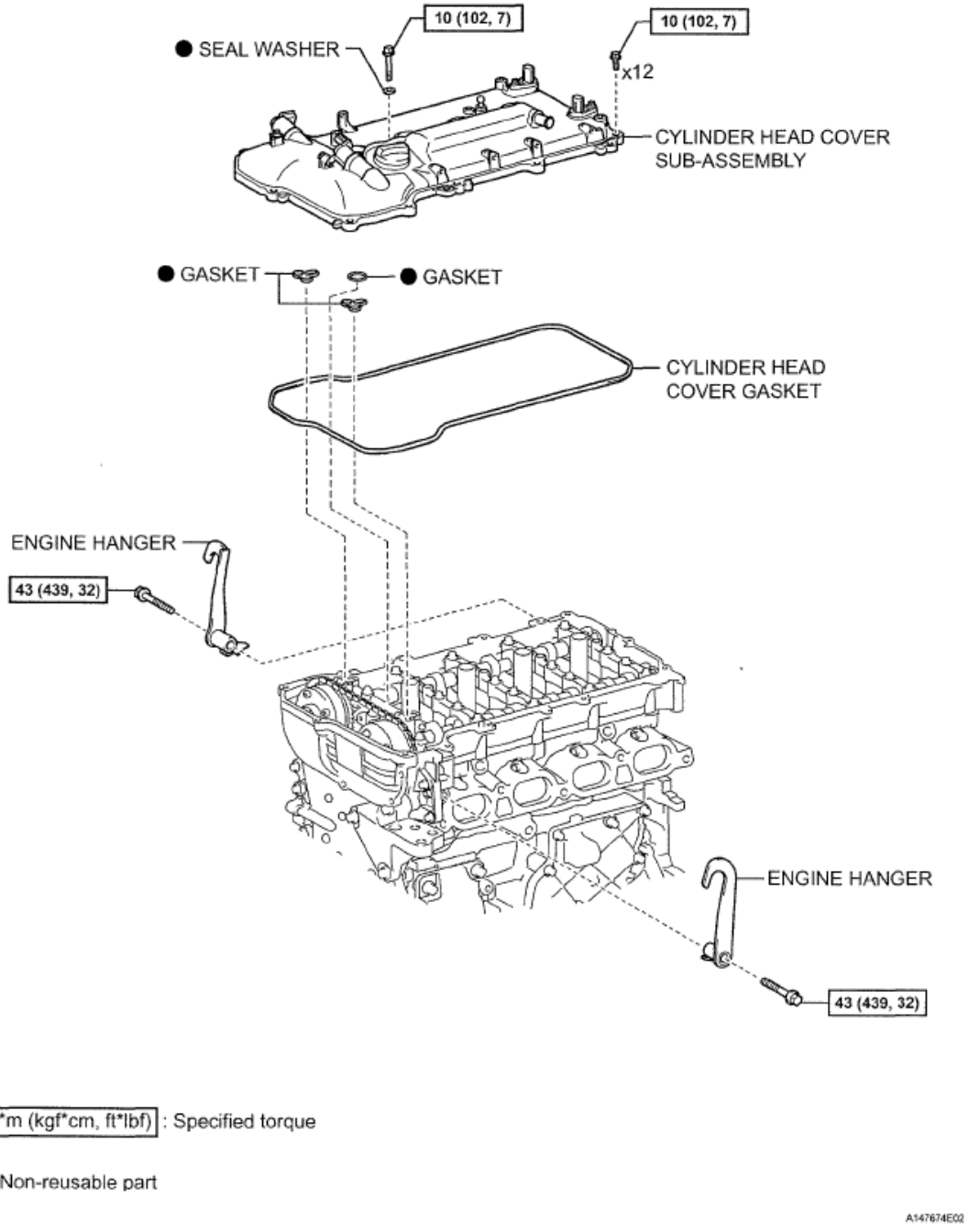


Fig. 76: Identifying Cylinder Head Gasket Components And Torque Specifications (15 Of 18)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

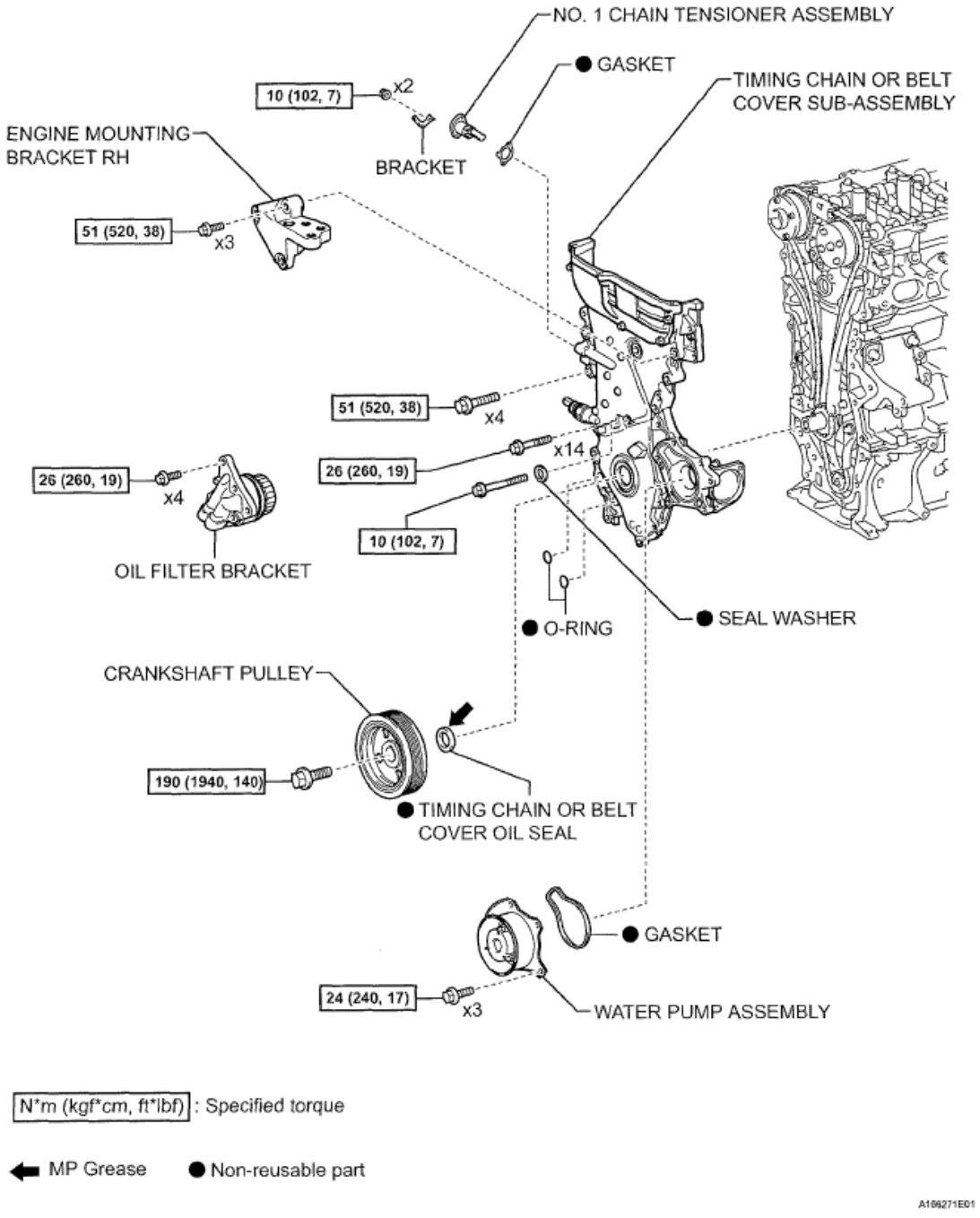


Fig. 77: Identifying Cylinder Head Gasket Components And Torque Specifications (16 Of 18)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

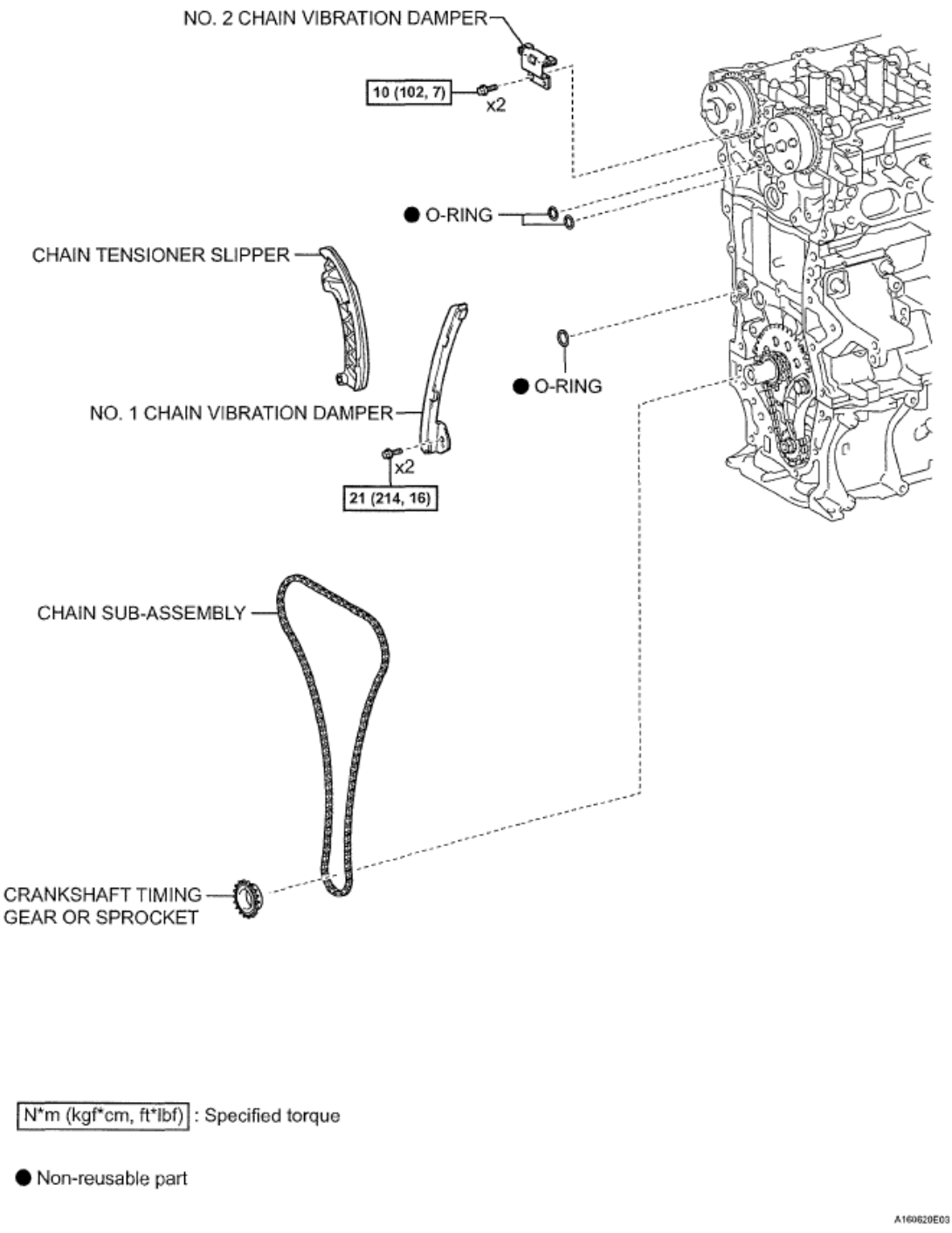


Fig. 78: Identifying Cylinder Head Gasket Components And Torque Specifications (17 Of 18)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

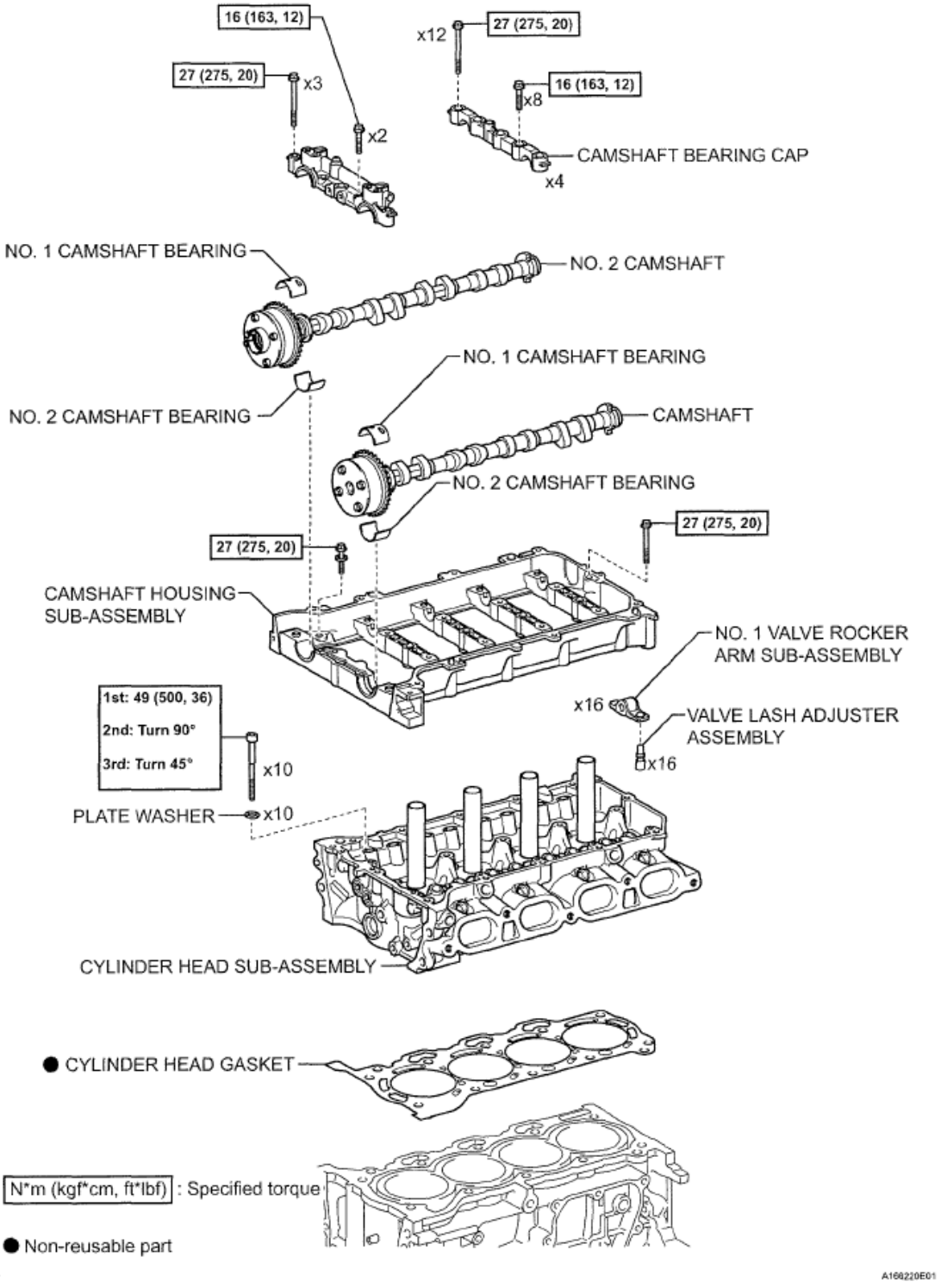


Fig. 79: Identifying Cylinder Head Gasket Components And Torque Specifications (18 Of 18)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **DISCHARGE FUEL SYSTEM PRESSURE**

   (See **PRECAUTION**)

2. **REMOVE BATTERY** (See **REMOVAL**)
3. **REMOVE BATTERY TRAY**
4. **REMOVE FRONT WHEELS**
5. **REMOVE ENGINE UNDER COVER LH**
6. **REMOVE ENGINE UNDER COVER RH**
7. **DRAIN ENGINE COOLANT** (See **REPLACEMENT**)
8. **DRAIN ENGINE OIL** (See **REPLACEMENT**)
9. **REMOVE FRONT WIPER ARM HEAD CAP** (See **REMOVAL**)
10. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH** (See **REMOVAL**)
11. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH** (See **REMOVAL**)
12. **REMOVE HOOD TO COWL TOP SEAL** (See **REMOVAL**)
13. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY** (See **REMOVAL**)
14. **REMOVE COWL TOP VENTILATOR LOUVER LH** (See **REMOVAL**)
15. **REMOVE FRONT WIPER MOTOR AND LINK** (See **REMOVAL**)
16. **REMOVE FRONT AIR SHUTTER SEAL RH** (See **REMOVAL**)
17. **REMOVE OUTER COWL TOP PANEL** (See **REMOVAL**)
18. **REMOVE AIR CLEANER ASSEMBLY** (See **REMOVAL**)
19. **REMOVE AIR CLEANER BRACKET** (See **REMOVAL**)
20. **REMOVE BATTERY CARRIER** (See **REMOVAL**)
21. **REMOVE NO. 2 CYLINDER HEAD COVER** (See **REMOVAL**)
22. **REMOVE FAN AND GENERATOR V BELT** (See **REMOVAL**)
23. **REMOVE NO. 2 RADIATOR HOSE** (See **REMOVAL**)
24. **DISCONNECT NO. 1 RADIATOR HOSE** (See **REMOVAL**)
25. **REMOVE FRONT BUMPER COVER** (See **REMOVAL**)
26. **DISCONNECT NO. 1 OIL COOLER OUTLET HOSE (for Automatic Transaxle)** (See **REMOVAL**)
27. **DISCONNECT NO. 2 OIL COOLER INLET HOSE (for Automatic Transaxle)** (See **REMOVAL**)
28. **REMOVE HOOD LOCK ASSEMBLY** (See **REMOVAL**)
29. **REMOVE NO. 1 COOLER COVER** (See **REMOVAL**)
30. **REMOVE UPPER RADIATOR SUPPORT ABSORBER** (See **DISASSEMBLY**)
31. **REMOVE UPPER RADIATOR SUPPORT SUB-ASSEMBLY** (See **REMOVAL**)
32. **REMOVE RADIATOR ASSEMBLY** (See **REMOVAL**)
33. **SEPARATE WITH PULLEY COMPRESSOR ASSEMBLY** (See **REMOVAL**)
34. **SEPARATE TRANSMISSION CONTROL CABLE ASSEMBLY (for Automatic Transaxle)** (See **REMOVAL**)

35. **SEPARATE TRANSMISSION CONTROL CABLE ASSEMBLY (for Manual Transaxle)** (See **REMOVAL**)
36. **SEPARATE UNION TO CHECK VALVE HOSE** (See **REMOVAL**)
37. **SEPARATE NO. 1 FUEL VAPOR FEED HOSE** (See **REMOVAL**)
38. **DISCONNECT ENGINE WIRE** (See **REMOVAL**)
39. **DISCONNECT HEATER WATER OUTLET HOSE A (FROM HEATER UNIT)** (See **REMOVAL**)
40. **DISCONNECT HEATER WATER INLET HOSE A** (See **REMOVAL**)
41. **DISCONNECT FUEL TUBE SUB-ASSEMBLY (for Manual Transaxle)** (See **REMOVAL**)
42. **SEPARATE CLUTCH RELEASE CYLINDER ASSEMBLY (for Manual Transaxle)** (See **REMOVAL**)
43. **REMOVE COLUMN HOLE COVER SILENCER SHEET** (See **REMOVAL**)
44. **SEPARATE STEERING SLIDING YOKE SUB-ASSEMBLY** (See **REMOVAL**)
45. **SEPARATE NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY** (See **REMOVAL**)
46. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle)** (See **REMOVAL**)
47. **REMOVE CONSOLE PANEL UPPER** (See **REMOVAL**)
48. **REMOVE CONSOLE BOX REAR COVER** (See **REMOVAL**)
49. **REMOVE CONSOLE BOX CARPET** (See **REMOVAL**)
50. **REMOVE REAR CONSOLE BOX ASSEMBLY** (See **REMOVAL**)
51. **REMOVE FRONT CONSOLE BOX** (See **REMOVAL**)
52. **REMOVE FRONT FLOOR BRACE CENTER** (See **REMOVAL**)
53. **REMOVE FRONT EXHAUST PIPE ASSEMBLY** (See **REMOVAL**)
54. **REMOVE FRONT AXLE SHAFT LH NUT** (See **REMOVAL**)
55. **REMOVE FRONT AXLE SHAFT RH NUT**

    HINT:

    The removal procedure for the RH side is the same as that for the LH side.

56. **SEPARATE SPEED SENSOR FRONT LH** (See **REMOVAL**)
57. **SEPARATE SPEED SENSOR FRONT RH**

    HINT:

    The separation procedure for the RH side is the same as that for the LH side.

58. **SEPARATE TIE ROD END SUB-ASSEMBLY LH** (See **REMOVAL**)
59. **SEPARATE TIE ROD END SUB-ASSEMBLY RH**

    HINT:

The separation procedure for the RH side is the same as that for the LH side.

60. **SEPARATE FRONT STABILIZER LINK ASSEMBLY LH** (See **REMOVAL**)
61. **SEPARATE FRONT STABILIZER LINK ASSEMBLY RH**

HINT:

The separation procedure for the RH side is the same as that for the LH side.

62. **SEPARATE FRONT LOWER SUSPENSION ARM SUB-ASSEMBLY LH** (See **REMOVAL**)
63. **SEPARATE FRONT LOWER SUSPENSION ARM SUB-ASSEMBLY RH**

HINT:

The separation procedure for the RH side is the same as that for the LH side.

64. **SEPARATE FRONT AXLE ASSEMBLY LH** (See **REMOVAL**)
65. **SEPARATE FRONT AXLE ASSEMBLY RH**

HINT:

The separation procedure for the RH side is the same as that for the LH side.

66. **REMOVE ENGINE ASSEMBLY WITH TRANSAXLE** (See **REMOVAL**)
67. **REMOVE FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY** (See **REMOVAL**)
68. **REMOVE NO. 1 OIL COOLER INLET TUBE (for Automatic Transaxle)** (See **REMOVAL**)
69. **REMOVE NO. 1 OIL COOLER OUTLET TUBE (for Automatic Transaxle)** (See **REMOVAL**)
70. **REMOVE NO. 2 OIL COOLER TUBE CLAMP (for Automatic Transaxle)** (See **REMOVAL**)
71. **REMOVE TRANSMISSION OIL LEVEL GAGE SUB-ASSEMBLY (for Automatic Transaxle)**
72. **SEPARATE TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY (for Automatic Transaxle)** (See **REMOVAL**)
73. **REMOVE IGNITION COIL ASSEMBLY** (See **REMOVAL**)
74. **REMOVE RADIO SETTING CONDENSER** (See **REMOVAL**)
75. **REMOVE NO. 2 VENTILATION HOSE** (See **REMOVAL**)
76. **REMOVE HEATER WATER OUTLET HOSE A (FROM HEATER UNIT)** (See **REMOVAL**)
77. **REMOVE HEATER WATER INLET HOSE A** (See **REMOVAL**)
78. **REMOVE NO. 1 RADIATOR HOSE** (See **REMOVAL**)
79. **REMOVE INTAKE MANIFOLD** (See **REMOVAL**)
80. **REMOVE FUEL DELIVERY PIPE SUB-ASSEMBLY** (See **REMOVAL**)
81. **REMOVE NO. 1 DELIVERY PIPE SPACER** (See **REMOVAL**)
82. **REMOVE INJECTOR VIBRATION INSULATOR** (See **REMOVAL**)
83. **REMOVE FUEL INJECTOR ASSEMBLY** (See **REMOVAL**)

84. **REMOVE GENERATOR ASSEMBLY** (See **REMOVAL**)
85. **REMOVE FAN BELT ADJUSTING BAR** (See **REMOVAL**)
86. **REMOVE OIL LEVEL DIPSTICK**
87. **REMOVE OIL LEVEL GAGE GUIDE** (See **REMOVAL**)
88. **REMOVE WATER BY-PASS HOSE** (See **REMOVAL**)
89. **REMOVE WATER INLET HOSE** (See **REMOVAL**)
90. **REMOVE NO. 1 WATER BY-PASS PIPE** (See **REMOVAL**)
91. **REMOVE AIR TUBE ASSEMBLY** (See **REMOVAL**)
92. **REMOVE NO. 1 EXHAUST MANIFOLD HEAT INSULATOR** (See **REMOVAL**)
93. **REMOVE MANIFOLD STAY** (See **REMOVAL**)
94. **REMOVE EXHAUST MANIFOLD** (See **REMOVAL**)
95. **REMOVE WIRE HARNESS CLAMP BRACKET** (See **REMOVAL**)
96. **REMOVE WATER INLET** (See **REMOVAL**)
97. **REMOVE THERMOSTAT** (See **REMOVAL**)
98. **REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY** (See **DISASSEMBLY**)
99. **SET NO. 1 CYLINDER TO TDC / COMPRESSION** (See **DISASSEMBLY**)
100. **REMOVE CRANKSHAFT PULLEY** (See **DISASSEMBLY**)
101. **REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY** (See **DISASSEMBLY**)
102. **REMOVE TIMING CHAIN OR BELT COVER SUB-ASSEMBLY** (See **DISASSEMBLY**)
103. **REMOVE TIMING CHAIN OR BELT COVER OIL SEAL** (See **REMOVAL**)
104. **REMOVE NO. 2 CHAIN VIBRATION DAMPER** (See **DISASSEMBLY**)
105. **REMOVE CHAIN TENSIONER SLIPPER** (See **DISASSEMBLY**)
106. **REMOVE NO. 1 CHAIN VIBRATION DAMPER** (See **DISASSEMBLY**)
107. **REMOVE CHAIN SUB-ASSEMBLY** (See **DISASSEMBLY**)
108. **REMOVE CRANKSHAFT TIMING GEAR OR SPROCKET** (See **DISASSEMBLY**)
109. **REMOVE CAMSHAFT BEARING CAP**
    a. Uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.

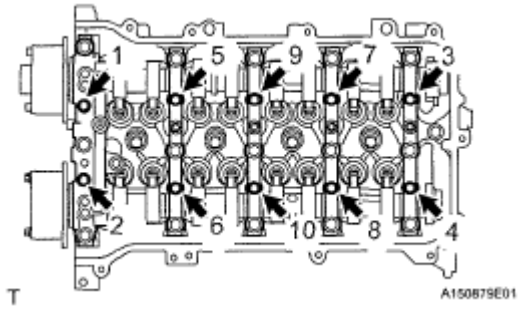


Fig. 80: Identifying Bearing Cap Bolts And Loosening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Uniformly loosen and remove the 15 bearing cap bolts in the sequence shown in the illustration.

NOTE:

- **Uniformly loosen the bolts while keeping the camshaft level.**
- **If the camshaft bearing cap bolts hare been loosened, reapply seal packing between the camshaft housing and cylinder head.**

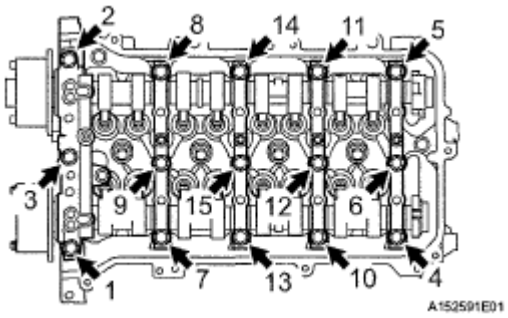


Fig. 81: Identifying Bearing Cap Bolts And Loosening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Remove the 5 bearing caps.

HINT:

Arrange the removed parts in the correct order.

110. **REMOVE CAMSHAFT**

a. Remove the camshaft from the camshaft housing.

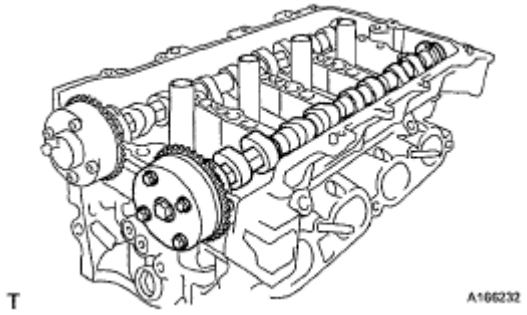


Fig. 82: Identifying Camshaft
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

111. **REMOVE NO. 2 CAMSHAFT**

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

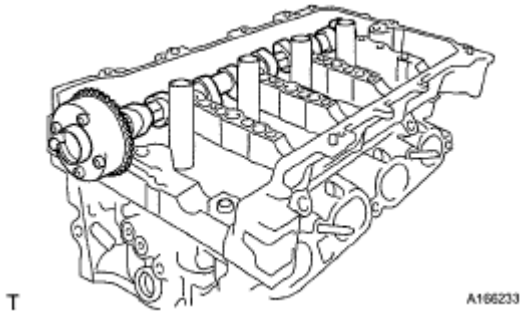


Fig. 83: Identifying No. 2 Camshaft
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

112. **REMOVE NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY**

a. Remove the 16 valve rocker arms.

HINT:

Arrange the removed parts in the correct order.

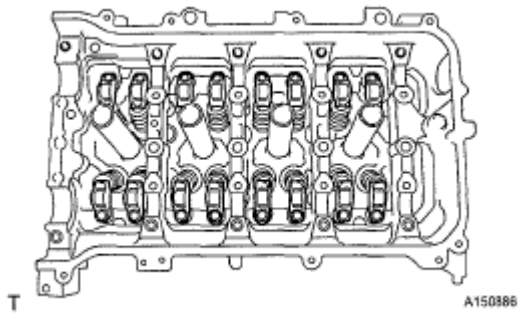


Fig. 84: Identifying Valve Rocker Arms
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

113. **REMOVE VALVE LASH ADJUSTER ASSEMBLY**

a. Remove the 16 valve lash adjusters from the cylinder head.

HINT:

Arrange the removed parts in the correct order.

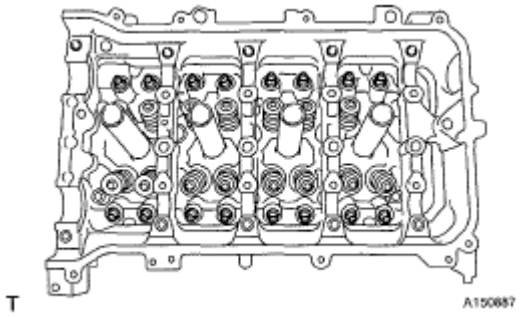


Fig. 85: Identifying Valve Lash Adjusters
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

114. **REMOVE NO. 1 CAMSHAFT BEARING**

a. Remove the 2 No. 1 camshaft bearings.

HINT:

Arrange the removed parts in the correct order.

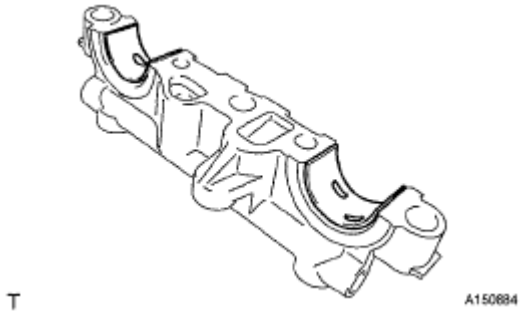


Fig. 86: Identifying No. 1 Camshaft Bearings
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

115. **REMOVE NO. 2 CAMSHAFT BEARING**

a. Remove the 2 No. 2 camshaft bearings.

HINT:

Arrange the removed parts in the correct order.

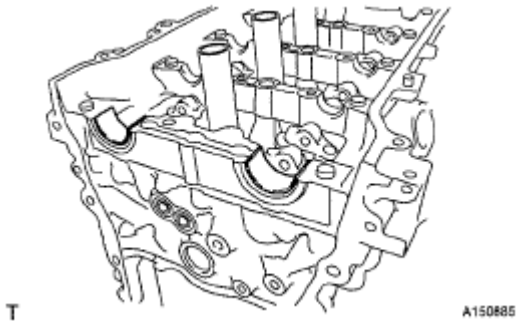


Fig. 87: Identifying No. 2 Camshaft Bearings
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

116. **REMOVE CAMSHAFT HOUSING SUB-ASSEMBLY**

a. Remove the 2 bolts.

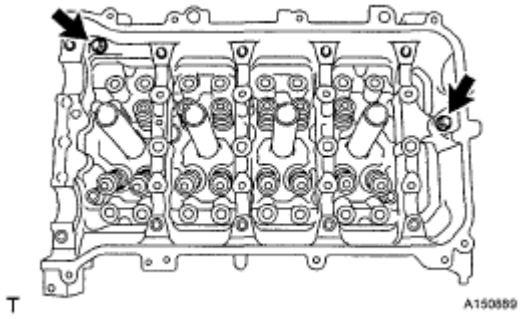


Fig. 88: Locating Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Remove the camshaft housing by prying between the cylinder head and camshaft housing with a screwdriver.

NOTE: Be careful not to damage the contact surfaces of the cylinder head and camshaft housing.

HINT:

Tape the screwdriver tip before use.

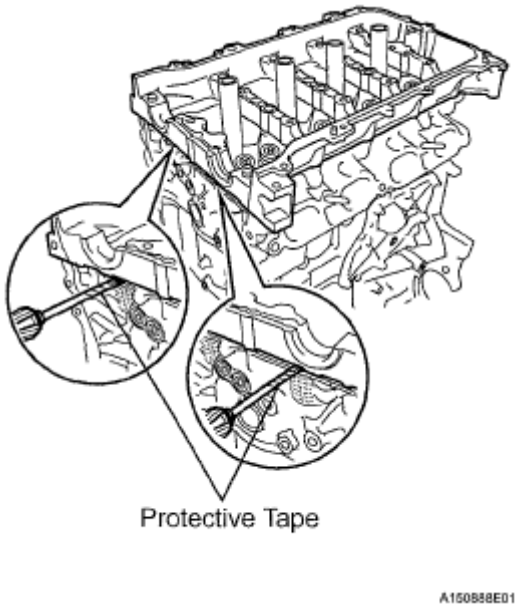


Fig. 89: Removing Camshaft Housing By Prying
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

117. **REMOVE CYLINDER HEAD SUB-ASSEMBLY**

a. Using several steps, loosen and remove the 10 cylinder head bolts uniformly with a 10 mm bi-hexagon wrench in the sequence shown in the illustration.

Remove the 10 cylinder head bolts and the plate washers.

NOTE:

- **Do not drop the washers into the cylinder head.**
- **Head warpage or cracking could result from removing bolts in the wrong order.**

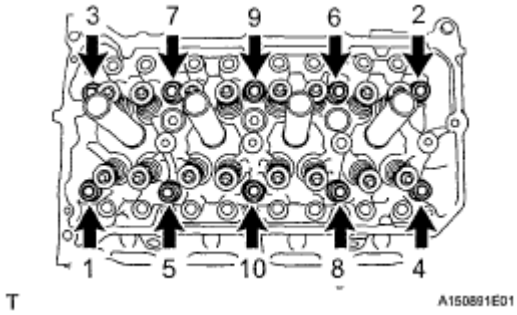


Fig. 90: Locating Cylinder Head Bolts And Loosening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Remove the cylinder head sub-assembly.

118. **REMOVE CYLINDER HEAD GASKET**

a. Remove the cylinder head gasket from the cylinder block.

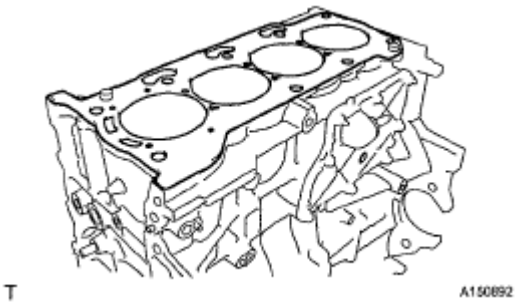


Fig. 91: Identifying Cylinder Head Gasket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. **INSTALL CYLINDER HEAD GASKET**
   a. Place a new cylinder head gasket on the cylinder block with the Lot No. stamp facing upward.

NOTE:

- **Remove any oil from the contact surface.**
- **Pay attention to the mounting orientation of the cylinder head gasket.**
- **Do not damage the cylinder gasket when installing the cylinder head onto the cylinder block.**

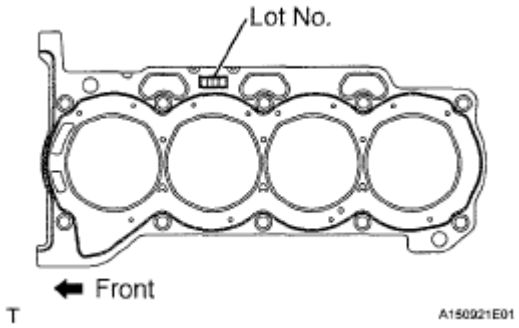


Fig. 92: Identifying Cylinder Head Gasket Lot No. Stamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **INSTALL CYLINDER HEAD SUB-ASSEMBLY**

HINT:

The cylinder head bolts are tightened in 2 successive steps.

a. Apply a light coat of engine oil to the threads of the cylinder head bolts.

b. Using several steps, install and tighten the 10 cylinder head bolts and plate washers uniformly with a 10 mm bi-hexagon wrench in the sequence shown in the illustration.

Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

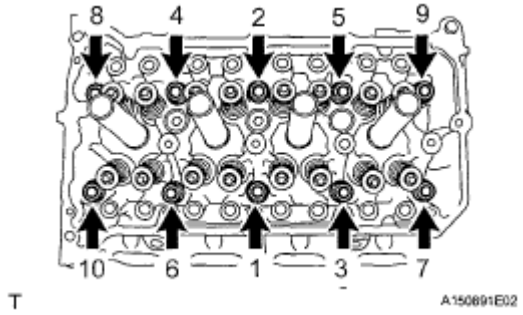


Fig. 93: Locating Cylinder Head Bolts And Tightening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Mark the front of the cylinder head bolt with paint.
d. Retighten the cylinder head bolts by additional 90° and one more additional 45° as shown in the illustration.

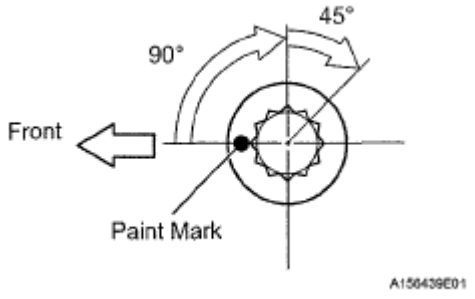


Fig. 94: Identifying Cylinder Head Bolt Tightening Direction
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

e. Check that the paint mark is now at a 135° angle from the front.

3. **INSTALL VALVE LASH ADJUSTER ASSEMBLY**

NOTE:

- **Keep the lash adjuster free of dirt and foreign objects.**
- **Only use clean engine oil.**

a. Place the lash adjuster into a container filled with engine oil.
b. Insert the SST's tip into the lash adjuster's plunger and use the tip to press down on the check ball inside the plunger.

SST 09276-75010

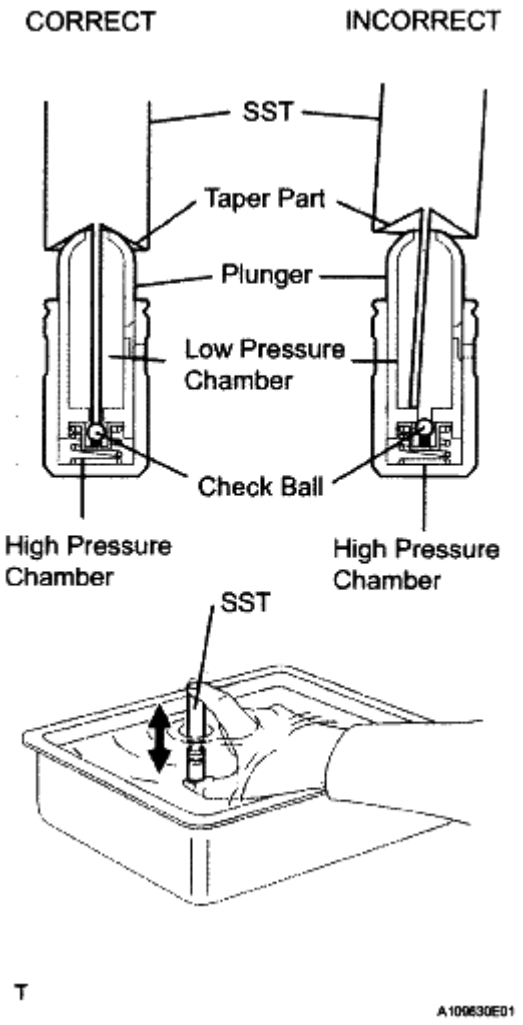


Fig. 95: Checking Lash Adjuster
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Squeeze the SST and lash adjuster together to move the plunger up and down 5 or 6 times.
d. Check the movement of the plunger and bleed the air.

OK: Plunger moves up and down.

NOTE: When bleeding air from the high-pressure chamber, make sure that the tip of the SST is actually pressing the check ball as shown in the illustration. If the check ball is not pressed, air will not bleed.

e. After bleeding the air, remove the SST. Then, try to press the plunger quickly and firmly with a finger.

OK: Plunger is very difficult to move.

If the result is not as specified, replace the lash adjuster.

f. Install the lash adjusters.

NOTE: Install the lash adjuster into its original position.

4. **INSTALL NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY**
   a. Apply engine oil to the lash adjuster tip and valve stem cap end.
   b. Install the valve rocker arms as shown in the illustration.

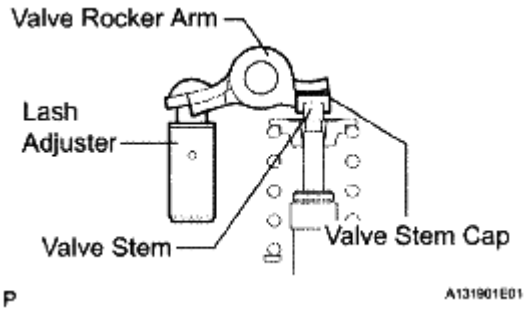


Fig. 96: Identifying Valve Rocker Arm
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. **INSTALL NO. 1 CAMSHAFT BEARING**
   a. Clean the both surfaces of the bearing.
   b. Install the 2 No. 1 camshaft bearings.
   c. Using vernier calipers, measure the distance between the bearing cap's edge and the camshaft bearing's edge.

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.

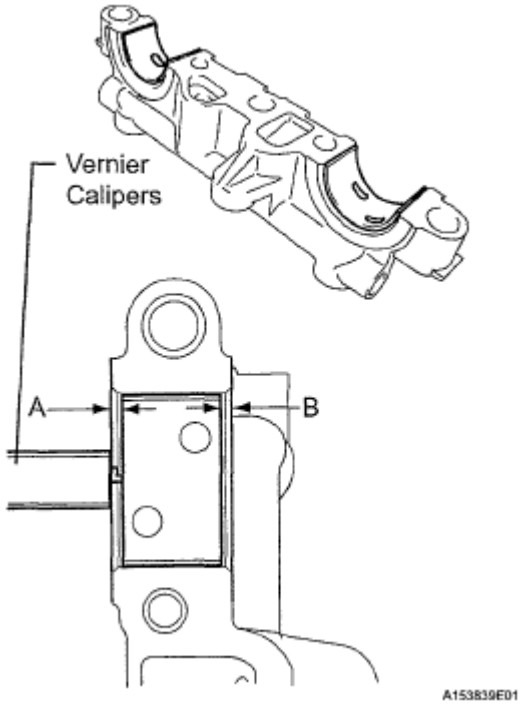


Fig. 97: Identifying Bearing Cap's Edge Dimension
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. **INSTALL NO. 2 CAMSHAFT BEARING**
   a. Clean both surfaces of the bearing.
   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.

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.

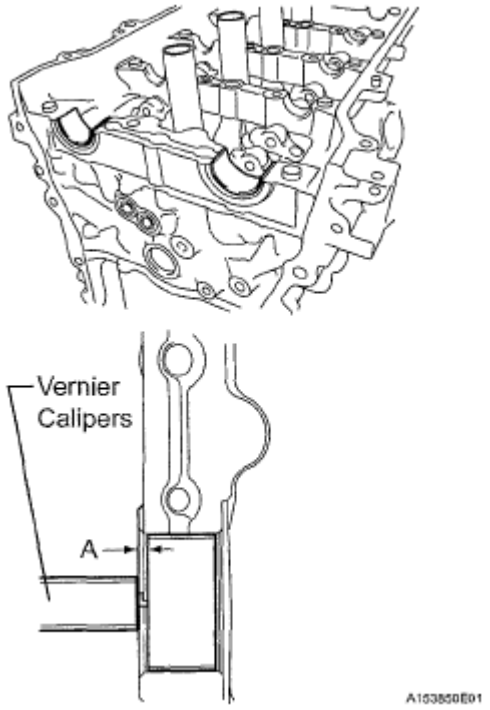


Fig. 98: Identifying Bearing Cap's Edge Dimension
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. **INSTALL NO. 2 CAMSHAFT**
   a. Clean the camshaft journals.
   b. Apply a light coat of engine oil to the camshaft journals, camshaft housings and bearing caps.
   c. Install the No. 2 camshaft to the camshaft housing.

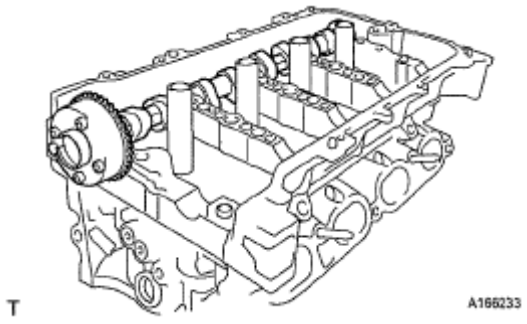


Fig. 99: Identifying No. 2 Camshaft
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. **INSTALL CAMSHAFT**
   a. Clean the camshaft journals.

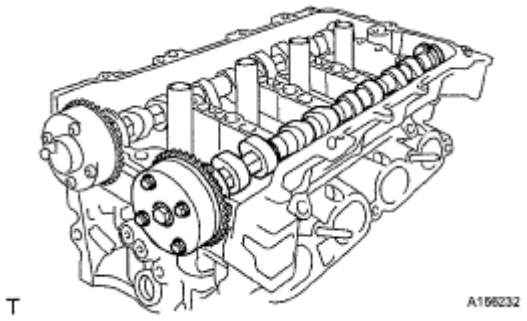


Fig. 100: Identifying Camshaft
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

9. **INSTALL CAMSHAFT BEARING CAP**
   a. Apply engine oil to the camshaft journals, camshaft housing and bearing caps.
   b. Check the marks and numbers on the camshaft bearing caps and place them in the proper position and direction.

      HINT:

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

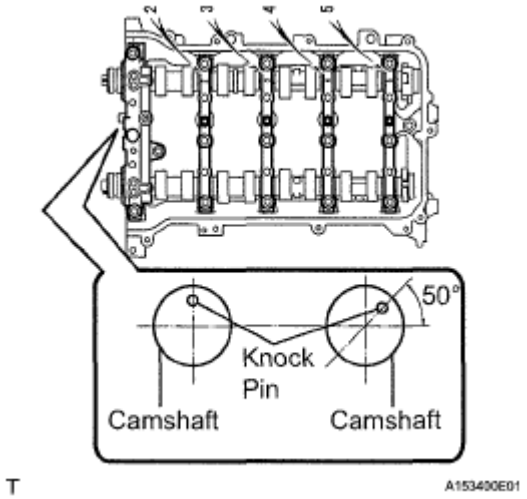


Fig. 101: Identifying Knock Pin Of Camshaft
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   c. Tighten the 10 bolts in the order shown in the illustration.

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

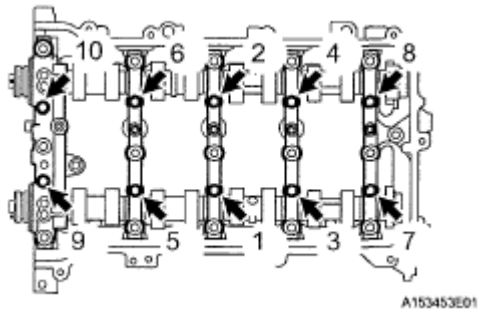


Fig. 102: Locating Bolts And Tightening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. **INSTALL CAMSHAFT HOUSING SUB-ASSEMBLY**
    a. Make sure that the valve rocker arm is installed as shown in the illustration.

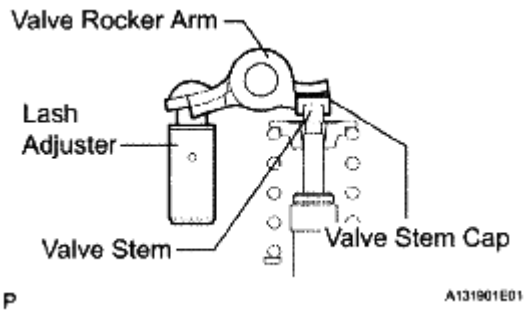


Fig. 103: Identifying Valve Rocker Arm
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

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

Seal diameter: 3.5 to 4.0 mm (0.138 to 0.158 in.)

NOTE:

- **Remove any oil from the contact surface.**
- **Install the camshaft housing sub-assembly RH within 3 minutes of applying the seal packing.**
- **Do not start the engine for at least 2 hours after installing.**

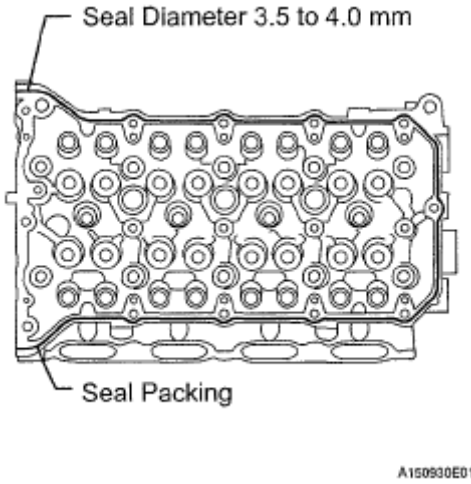


Fig. 104: Applying Seal Packing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Set the camshaft and No. 2 camshaft as shown in the illustration.
d. Install the camshaft housing and tighten the 17 bolts in the order shown in the illustration.

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

NOTE:

- **After installing the camshaft housing, make sure that the cam lobes are positioned as shown in the illustration.**
- **If any of the bolts are loosened during installation, remove the camshaft housing, clean the installation surfaces, and reapply seal packing.**
- **If the camshaft housing is removed because any of the bolts are loosened during installation, make sure that the previously applied seal packing does not enter any oil passages.**
- **After installing the camshaft housing, wipe off any seal packing that seeped out from between the housing and the cylinder head.**

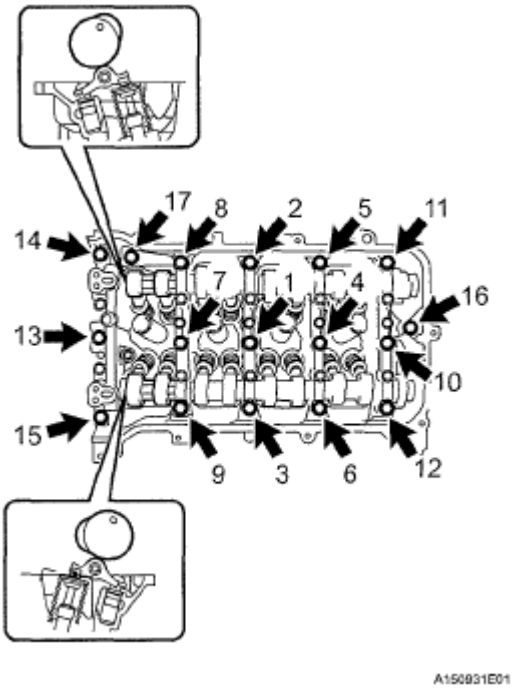


Fig. 105: Locating Camshaft Housing Bolts And Tightening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. **INSTALL CRANKSHAFT TIMING GEAR OR SPROCKET** (See **REASSEMBLY**)
12. **INSTALL NO. 1 CHAIN VIBRATION DAMPER** (See **REASSEMBLY**)
13. **INSTALL CHAIN SUB-ASSEMBLY** (See **REASSEMBLY**)
14. **INSTALL CHAIN TENSIONER SLIPPER** (See **REASSEMBLY**)
15. **INSTALL NO. 2 CHAIN VIBRATION DAMPER** (See **REASSEMBLY**)
16. **INSTALL TIMING CHAIN OR BELT COVER OIL SEAL** (See **INSTALLATION**)
17. **INSTALL TIMING CHAIN OR BELT COVER SUB-ASSEMBLY** (See **REASSEMBLY**)
18. **INSTALL CRANKSHAFT PULLEY** (See **REASSEMBLY**)
19. **INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY** (See **REASSEMBLY**)
20. **INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY** (See **REASSEMBLY**)
21. **INSTALL THERMOSTAT** (See **INSTALLATION**)
22. **INSTALL WATER INLET** (See **INSTALLATION**)
23. **INSTALL WIRE HARNESS CLAMP BRACKET** (See **REASSEMBLY**)
24. **INSTALL EXHAUST MANIFOLD** (See **REASSEMBLY**)
25. **INSTALL MANIFOLD STAY** (See **INSTALLATION**)
26. **INSTALL NO. 1 EXHAUST MANIFOLD HEAT INSULATOR** (See **INSTALLATION**)
27. **INSTALL AIR TUBE ASSEMBLY** (See **INSTALLATION**)
28. **INSTALL NO. 1 WATER BY-PASS PIPE** (See **INSTALLATION**)

29. **INSTALL WATER INLET HOSE** (See **INSTALLATION**)
30. **INSTALL WATER BY-PASS HOSE** (See **INSTALLATION**)
31. **INSTALL OIL LEVEL GAGE GUIDE** (See **INSTALLATION**)
32. **INSTALL OIL LEVEL DIPSTICK**
33. **INSTALL FAN BELT ADJUSTING BAR** (See **INSTALLATION**)
34. **INSTALL GENERATOR ASSEMBLY** (See **INSTALLATION**)
35. **INSTALL FUEL INJECTOR** (See **INSTALLATION**)
36. **INSTALL INJECTOR VIBRATION INSULATOR** (See **INSTALLATION**)
37. **INSTALL NO. 1 DELIVERY PIPE SPACER** (See **INSTALLATION**)
38. **INSTALL FUEL DELIVERY PIPE SUB-ASSEMBLY** (See **INSTALLATION**)
39. **INSTALL INTAKE MANIFOLD** (See **INSTALLATION**)
40. **INSTALL NO. 1 RADIATOR HOSE** (See **INSTALLATION**)
41. **INSTALL HEATER WATER INLET HOSE A** (See **INSTALLATION**)
42. **INSTALL HEATER WATER OUTLET HOSE A (FROM HEATER UNIT)** (See **INSTALLATION**)
43. **INSTALL NO. 2 VENTILATION HOSE** (See **INSTALLATION**)
44. **INSTALL RADIO SETTING CONDENSER** (See **INSTALLATION**)
45. **INSTALL IGNITION COIL ASSEMBLY** (See **INSTALLATION**)
46. **INSTALL TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY (for Automatic Transaxle)** (See **INSTALLATION**)
47. **INSTALL TRANSMISSION OIL LEVEL GAGE SUB-ASSEMBLY (for Automatic Transaxle)**
48. **INSTALL NO. 1 OIL COOLER OUTLET TUBE (for Automatic Transaxle)** (See **INSTALLATION**)
49. **INSTALL NO. 1 OIL COOLER INLET TUBE (for Automatic Transaxle)** (See **INSTALLATION**)
50. **INSTALL NO. 2 OIL COOLER TUBE CLAMP (for Automatic Transaxle)** (See **INSTALLATION**)
51. **INSTALL FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY** (See **INSTALLATION**)
52. **INSTALL ENGINE ASSEMBLY WITH TRANSAXLE** (See **INSTALLATION**)
53. **INSTALL FRONT AXLE ASSEMBLY LH** (See **INSTALLATION**)
54. **INSTALL FRONT AXLE ASSEMBLY RH**

    HINT:

    The installation procedure for the RH side is the same as that for the LH side.

55. **INSTALL FRONT LOWER SUSPENSION ARM SUB-ASSEMBLY LH** (See **INSTALLATION**)
56. **INSTALL FRONT LOWER SUSPENSION ARM SUB-ASSEMBLY RH**

    HINT:

The installation procedure for the RH side is the same as that for the LH side.

57. **INSTALL FRONT STABILIZER LINK ASSEMBLY LH** (See **INSTALLATION**)
58. **INSTALL FRONT STABILIZER LINK ASSEMBLY RH**

HINT:

The installation procedure for the RH side is the same as that for the LH side.

59. **INSTALL TIE ROD END SUB-ASSEMBLY LH** (See **INSTALLATION**)
60. **INSTALL TIE ROD END SUB-ASSEMBLY RH**

HINT:

The installation procedure for the RH side is the same as that for the LH side.

61. **INSTALL SPEED SENSOR FRONT LH** (See **INSTALLATION**)
62. **INSTALL SPEED SENSOR FRONT RH**

HINT:

The installation procedure for the RH side is the same as that for the LH side.

63. **INSTALL FRONT AXLE SHAFT LH NUT** (See **INSTALLATION**)
64. **INSTALL FRONT AXLE SHAFT RH NUT**

HINT:

The installation procedure for the RH side is the same as that for the LH side.

65. **INSTALL FRONT EXHAUST PIPE ASSEMBLY** (See **INSTALLATION**)
66. **INSTALL FRONT FLOOR BRACE CENTER** (See **INSTALLATION**)
67. **INSTALL FRONT CONSOLE BOX** (See **INSTALLATION**)
68. **INSTALL REAR CONSOLE BOX ASSEMBLY** (See **INSTALLATION**)
69. **INSTALL CONSOLE BOX CARPET** (See **INSTALLATION**)
70. **INSTALL CONSOLE BOX REAR COVER** (See **INSTALLATION**)
71. **INSTALL CONSOLE PANEL UPPER** (See **INSTALLATION**)
72. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle)** (See **INSTALLATION**)
73. **INSTALL NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY** (See **INSTALLATION**)
74. **INSTALL STEERING SLIDING YOKE SUB-ASSEMBLY** (See **INSTALLATION**)
75. **INSTALL COLUMN HOLE COVER SILENCER SHEET** (See **INSTALLATION**)

76. **INSTALL CLUTCH RELEASE CYLINDER ASSEMBLY (for Manual Transaxle)** (See **INSTALLATION**)
77. **CONNECT FUEL TUBE SUB-ASSEMBLY** (See **INSTALLATION**)
78. **CONNECT HEATER WATER INLET HOSE A** (See **INSTALLATION**)
79. **CONNECT HEATER WATER OUTLET HOSE A (FROM HEATER UNIT)** (See **INSTALLATION**)
80. **CONNECT ENGINE WIRE** (See **INSTALLATION**)
81. **INSTALL NO. 1 FUEL VAPOR FEED HOSE** (See **INSTALLATION**)
82. **INSTALL UNION TO CHECK VALVE HOSE** (See **INSTALLATION**)
83. **INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY (for Automatic Transaxle)** (See **INSTALLATION**)
84. **INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY (for Manual Transaxle)** (See **INSTALLATION**)
85. **INSTALL WITH PULLEY COMPRESSOR ASSEMBLY** (See **INSTALLATION**)
86. **INSTALL RADIATOR ASSEMBLY** (See **INSTALLATION**)
87. **INSTALL UPPER RADIATOR SUPPORT SUB-ASSEMBLY** (See **INSTALLATION**)
88. **INSTALL UPPER RADIATOR SUPPORT ABSORBER** (See **REASSEMBLY**)
89. **INSTALL NO. 1 COOLER COVER** (See **INSTALLATION**)
90. **INSTALL HOOD LOCK ASSEMBLY** (See **INSTALLATION**)
91. **CONNECT NO. 1 RADIATOR HOSE** (See **INSTALLATION**)
92. **CONNECT NO. 2 OIL COOLER INLET HOSE (for Automatic Transaxle)** (See **INSTALLATION**)
93. **CONNECT NO. 1 OIL COOLER OUTLET HOSE (for Automatic Transaxle)** (See **INSTALLATION**)
94. **INSTALL NO. 2 RADIATOR HOSE** (See **INSTALLATION**)
95. **INSTALL FRONT BUMPER COVER** (See **INSTALLATION**)
96. **INSTALL FAN AND GENERATOR V BELT** (See **INSTALLATION**)
97. **ADJUST FAN AND GENERATOR V BELT** (See **INSTALLATION**)
98. **INSPECT FAN AND GENERATOR V BELT** (See **INSTALLATION**)
99. **INSTALL NO. 2 CYLINDER HEAD COVER** (See **INSTALLATION**)
100. **INSTALL BATTERY CARRIER** (See **INSTALLATION**)
101. **INSTALL AIR CLEANER BRACKET** (See **INSTALLATION**)
102. **INSTALL AIR CLEANER ASSEMBLY** (See **INSTALLATION**)
103. **INSTALL OUTER COWL TOP PANEL** (See **INSTALLATION**)
104. **INSTALL FRONT AIR SHUTTER SEAL RH** (See **INSTALLATION**)
105. **INSTALL FRONT WIPER MOTOR AND LINK** (See **INSTALLATION**)
106. **INSTALL COWL TOP VENTILATOR LOUVER LH** (See **INSTALLATION**)
107. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY** (See **INSTALLATION**)
108. **INSTALL HOOD TO COWL TOP SEAL** (See **INSTALLATION**)

109. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH** (See **INSTALLATION**)
110. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH** (See **INSTALLATION**)
111. **INSTALL FRONT WIPER ARM HEAD CAP** (See **INSTALLATION**)
112. **INSTALL BATTERY TRAY**
113. **INSTALL BATTERY** (See **INSTALLATION**)
114. **ADD ENGINE COOLANT** (See **REPLACEMENT**)
115. **ADD ENGINE OIL** (See **REPLACEMENT**)
116. **INSPECT FOR FUEL LEAK**
117. **INSPECT FOR ENGINE OIL LEAK**
118. **INSPECT FOR EXHAUST GAS LEAK**
119. **INSPECT FOR ENGINE COOLANT LEAK** (See **ON-VEHICLE INSPECTION**)
120. **INSTALL ENGINE UNDER COVER RH**
121. **INSTALL ENGINE UNDER COVER LH**
122. **INSTALL FRONT WHEELS** (See **INSTALLATION**)
123. **INSPECT IGNITION TIMING** (See **ON-VEHICLE INSPECTION**)
124. **INSPECT ENGINE IDLING SPEED** (See **ON-VEHICLE INSPECTION**)
125. **INSPECT CO/HC** (See **ON-VEHICLE INSPECTION**)
126. **INSPECT FRONT WHEEL ALIGNMENT**

    (See **ADJUSTMENT**)

127. **INSPECT ABS SENSOR SIGNAL (w/ ABS)**

    (See **TEST MODE PROCEDURE**)

128. **INSPECT VSC SENSOR SIGNAL (w/ VSC)**

    (See **TEST MODE PROCEDURE**)

CYLINDER HEAD

COMPONENTS

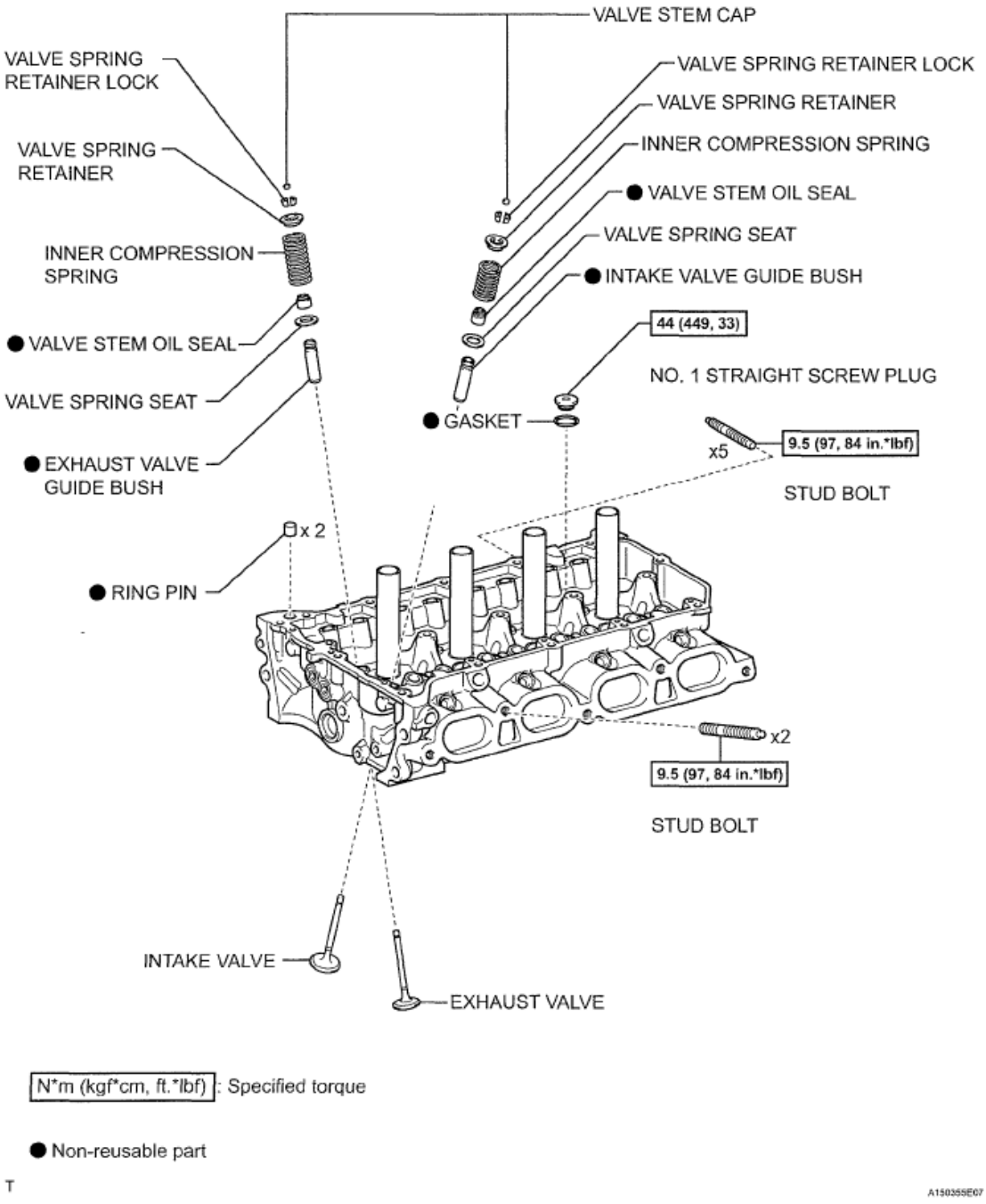


Fig. 106: Identifying Cylinder Head Components And Torque Specifications
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DISASSEMBLY

1. **REMOVE VALVE STEM CAP**
   a. Remove the 16 valve stem caps from the cylinder head.

      HINT:

Arrange the removed parts in the correct order.

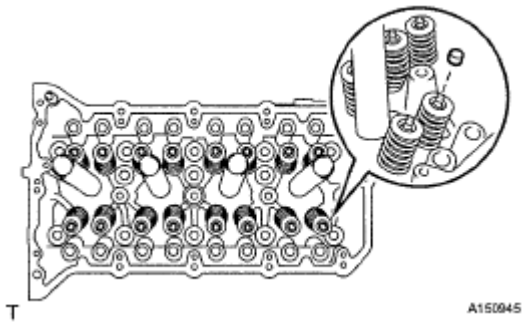


Fig. 107: Identifying Valve Stem Caps
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **REMOVE INTAKE VALVE**
   a. Using SST and wooden blocks, compress and remove the 2 valve retainer locks.

      SST 09202-70020(09202-00010)

      HINT:

      Arrange the removed parts in the correct order.

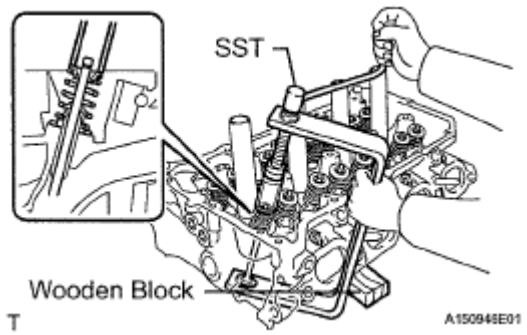


Fig. 108: Compressing Valve Retainer Locks
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Remove the retainer, valve spring and valve.

      HINT:

      Arrange the removed parts in the correct order.

3. **REMOVE EXHAUST VALVE**
   a. Using SST and wooden blocks, compress and remove the 2 valve retainer locks.

      SST 09202-70020 (09202-00010)

HINT:

Arrange the removed parts in the correct order.

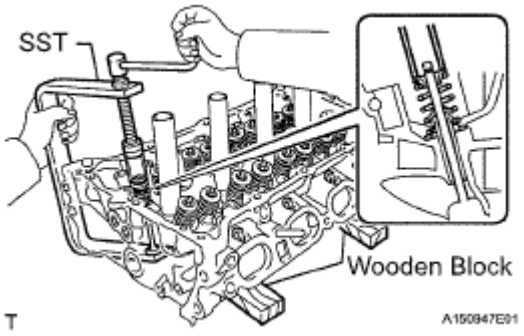


Fig. 109: Compressing Valve Retainer Locks
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Remove the retainer, valve spring and valve.

HINT:

Arrange the removed parts in the correct order.

4. **REMOVE VALVE STEM OIL SEAL**
   a. Using needle-nose pliers, remove the oil seals.

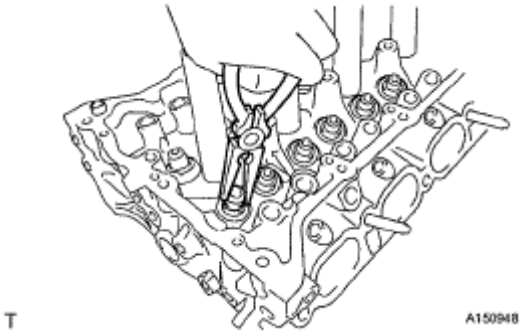


Fig. 110: Removing Oil Seals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. **REMOVE VALVE SPRING SEAT**
   a. Using compressed air and a magnetic finger, remove the valve spring seats by applying air onto them.

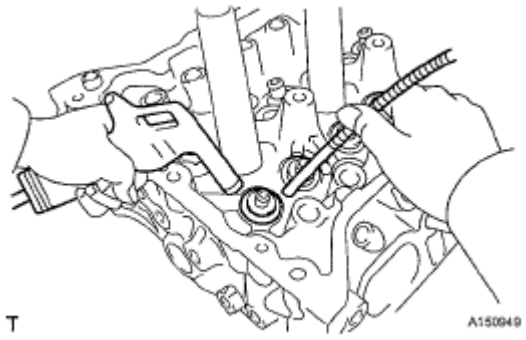


Fig. 111: Removing Valve Spring Seats By Applying Air
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. **REMOVE NO. 1 STRAIGHT SCREW PLUG**
   a. Using a 10 mm straight hexagon wrench, remove the 3 screw plugs and 3 gaskets.

NOTE: If water leaks from the straight screw plug or the plug is corroded, replace it.

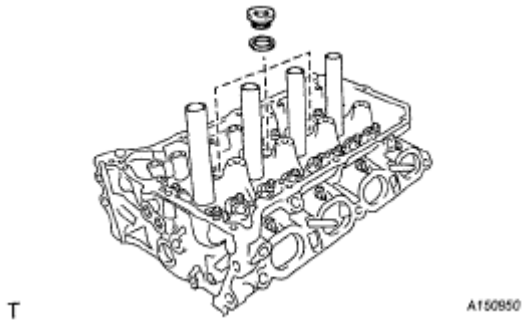


Fig. 112: Identifying Screw Plugs And Gaskets
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

1. **INSPECT CYLINDER HEAD FOR FLATNESS**
   a. Using a precision straight edge and a feeler gauge, measure the surface contacting the cylinder block and the manifolds for warpage.

Maximum warpage

ITEM SPECIFIED CONDITION CHART

Item	Specified Condition
Cylinder block side	0.05 mm (0.0020 in.)
Intake manifold side	0.10 mm (0.0039 in.)
Exhaust manifold side	0.10 mm (0.0039 in.)

If the warpage is greater than the maximum, replace the cylinder head.

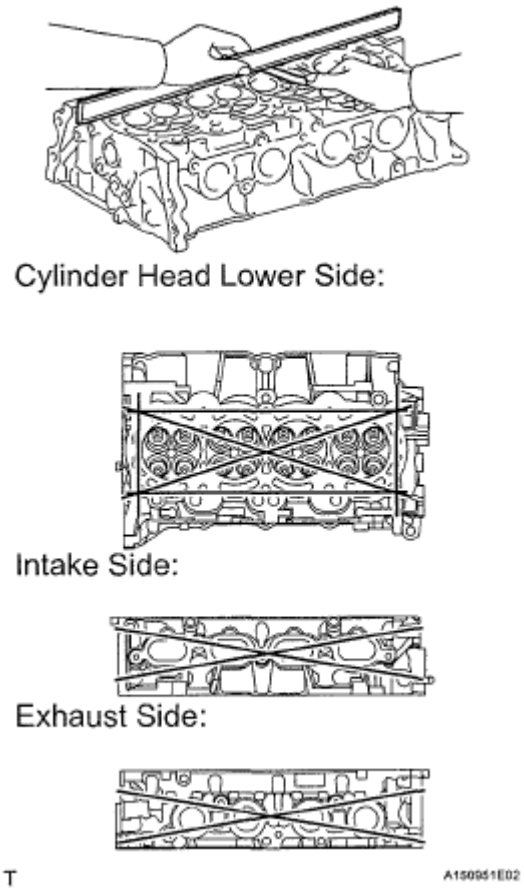


Fig. 113: Measuring Surface Contacting Cylinder Block And Manifolds For Warpage
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **INSPECT CYLINDER HEAD FOR CRACKS**
   a. Using a dye penetrant, check the intake ports, exhaust ports and cylinder surface for cracks. If cracked, replace the cylinder head.

Fig. 114: Inspecting Cylinder Head For Cracks
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **INSPECT VALVE SEATS**
   a. Apply a light coat of Prussian Blue to the valve face.
   b. Lightly press the valve face against the valve seat.
   c. Check the valve face and valve seat according to the following procedure:
      1. If Prussian Blue appears 360° around the valve face, the valve face is concentric. If not, replace the valve.
      2. If Prussian Blue appears 360° around the valve seat, the guide and valve face are concentric. If not, resurface the valve seat.

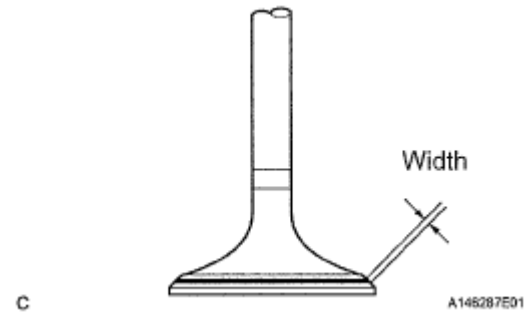


Fig. 115: Identifying Valve Seats Width
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

      3. Check that the valve seat contact is in the middle of the valve face with the valve seat width between 1.0 and 1.4 mm (Intake side (0.039 to 0.055 in.)).
      4. Check that the valve seat contact is in the middle of the valve face with the valve seat width between 1.0 and 1.4 mm (Exhaust side (0.039 to 0.055 in.)).

4. **INSPECT CAMSHAFT THRUST CLEARANCE**
   a. Install the camshafts (See **INSTALLATION**).
   b. Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.

Standard thrust clearance

ITEM SPECIFIED CONDITION CHART

Item	Specified Condition
Intake	0.06 to 0.155 mm (0.0024 to 0.0061 in.)
Exhaust	0.06 to 0.155 mm (0.0024 to 0.0061 in.)

Maximum thrust clearance

ITEM SPECIFIED CONDITION CHART

Item	Specified Condition
Intake	0.17 mm (0.0067 in.)
Exhaust	0.17 mm (0.0067 in.)

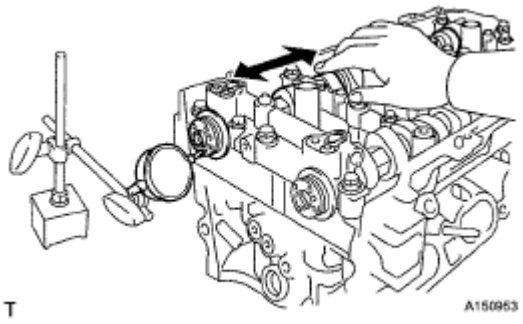


Fig. 116: Measuring Thrust Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If the thrust clearance is greater than the maximum, replace the camshaft housing. If the thrust surface is damaged, replace the camshaft.

5. **INSPECT CAMSHAFT OIL CLEARANCE**
   a. Clean the bearing caps and camshaft journals.
   b. Place the camshafts on the camshaft housing.
   c. Lay a strip of Plastigage across each of the camshaft journals.

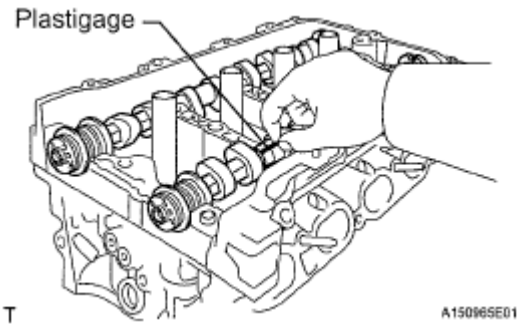


Fig. 117: Laying Strip Of Plastigage Across Of Camshaft Journals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   d. Install the bearing caps (See **INSTALLATION**).

NOTE: Do not turn the camshaft.

   e. Remove the bearing caps (See **REMOVAL**).
   f. Measure the Plastigage at its widest point.

Standard oil clearance

ITEM SPECIFIED CONDITION CHART

Item	Specified Condition
Camshaft No. 1 journals	0.030 to 0.063 mm (0.0012 to 0.0024 in.)

Camshaft other journals	0.035 to 0.072 mm (0.0014 to 0.0028 in.)

Maximum oil clearance

ITEM SPECIFIED CONDITION CHART

Item	Specified Condition
Camshaft No. 1 journals	0.085 mm (0.0033 in.)
Camshaft other journals	0.09 mm (0.0035 in.)

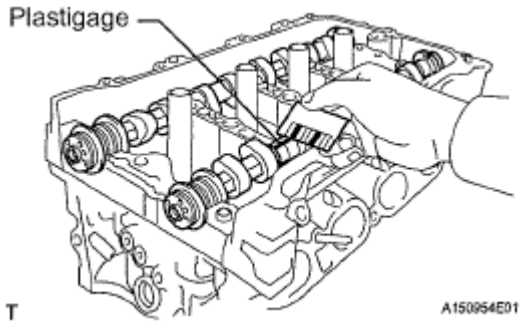


Fig. 118: Measuring Plastigage At Its Widest Point
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: Completely remove the Plastigage after the inspection.

If the oil clearance is greater than the maximum, replace the camshaft. If necessary, replace the cylinder head.

6. **INSPECT COMPRESSION SPRING**
   a. Using vernier calipers, measure the free length of the valve spring.

Free length: 53.36 mm (2.1008 in.)

If the free length is not as specified, replace the valve spring.

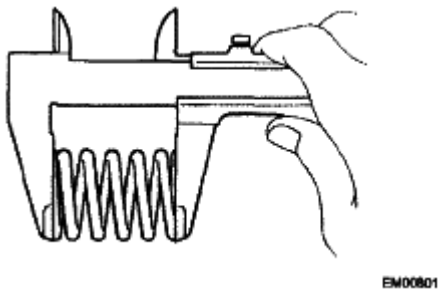


Fig. 119: Measuring Free Length Of Valve Spring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Using steel squares, measure the deviation of the valve spring.

Maximum deviation: 1.0 mm (0.0394 in.)

If the deviation is greater than the maximum, replace the valve spring.

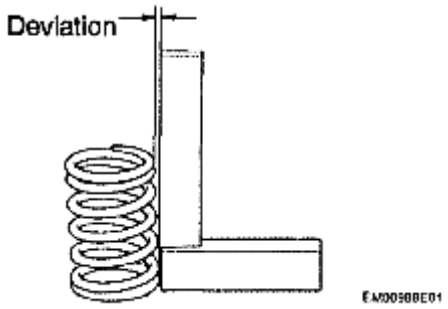


Fig. 120: Measuring Deviation Of Valve Spring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. **INSPECT INTAKE VALVE**
   a. Using a gasket scraper, scrape off any carbon on the valve head.

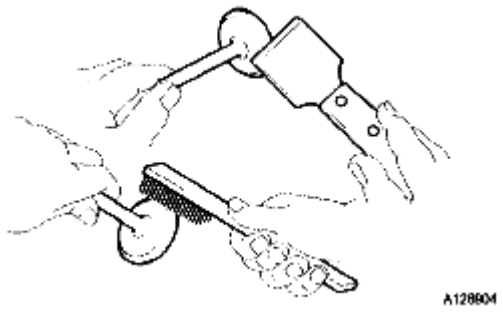


Fig. 121: Cleaning Carbon On Valve Head
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Using vernier calipers, measure the overall length of the valve.

Standard overall length: 109.34 mm (4.3047 in.)

Minimum overall length: 108.84 mm (4.2850 in.)

If the overall length is less than the minimum, replace the valve.

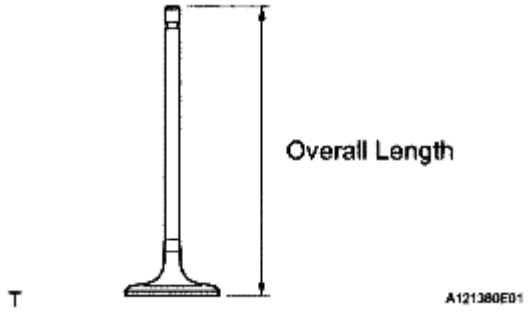


Fig. 122: Identifying Overall Length Of Valve
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Using a micrometer, measure the diameter of the valve stem.

Valve stem diameter: 5.470 to 5.485 mm (0.2154 to 0.2159 in.)

If the valve stem diameter is not as specified, check the oil clearance.

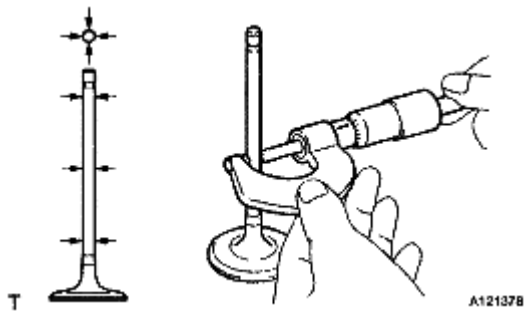


Fig. 123: Measuring Diameter Of Valve Stem
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Using vernier calipers, measure the valve head margin thickness.

Standard margin thickness: 1.0 mm (0.0571 in.)

Minimum margin thickness: 0.5 mm (0.0197 in.)

If the margin thickness is less than the minimum, replace the valve.

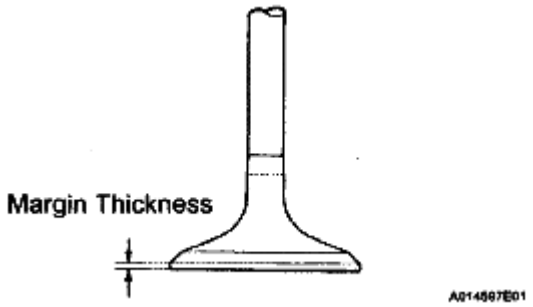


Fig. 124: Identifying Margin Thickness Of Valve Head
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. **INSPECT EXHAUST VALVE**
   a. Using a gasket scraper, scrape off any carbon on the valve head.

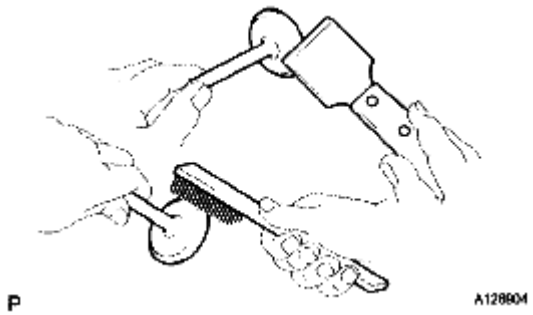


Fig. 125: Cleaning Carbon On Valve Head
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Using vernier calipers, measure the overall length of the valve.

Standard overall length: 108.25 mm (4.2618 in.)

Minimum overall length: 107.75 mm (4.2421 in.)

If the overall length is less than the minimum, replace the valve.

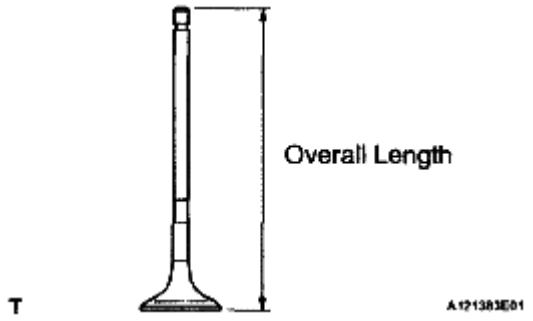


Fig. 126: Identifying Overall Length Of Valve

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

c. Using a micrometer, measure the diameter of the valve stem.

Valve stem diameter: 5.465 to 5.480 mm (0.2152 to 0.2157 in.)

If the valve stem diameter is not as specified, check the oil clearance.

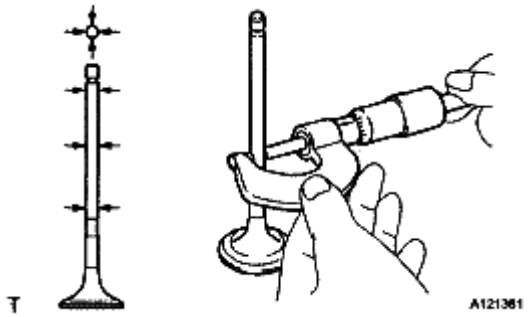


Fig. 127: Measuring Diameter Of Valve Stem
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Using vernier calipers, measure the valve head margin thickness.

Standard margin thickness: 1.01 mm (0.0398 in.)

Minimum margin thickness: 0.5 mm (0.0197 in.)

If the margin thickness is less than the minimum, replace the valve.

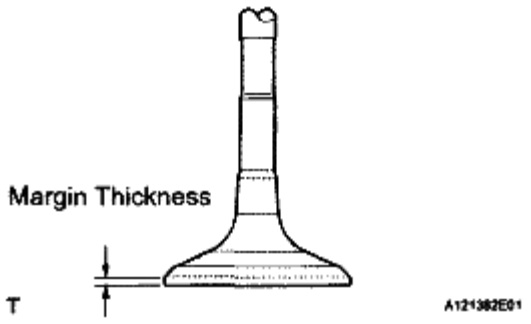


Fig. 128: Identifying Valve Head Margin Thickness
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. **INSPECT VALVE GUIDE BUSH OIL CLEARANCE**

a. Using a caliper gauge, measure the inside diameter of the guide bush.

Bushing inside diameter: 5.510 to 5.530 mm (0.2169 to 0.2177 in.)

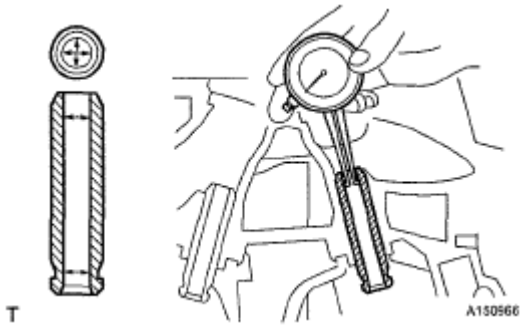


Fig. 129: Measuring Inside Diameter Of Guide Bush
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Subtract the valve stem diameter measurement from the guide bush inside diameter measurement.

Standard oil clearance

ITEM SPECIFIED CONDITION CHART

Item	Specified Condition
Intake	0.025 to 0.060 mm (0.0010 to 0.0024 in.)
Exhaust	0.030 to 0.065 mm (0.0012 to 0.0026 in.)

Maximum oil clearance

ITEM SPECIFIED CONDITION CHART

Item	Specified Condition
Intake	0.080 mm (0.0031 in.)
Exhaust	0.085 mm (0.0035 in.)

If the clearance is greater than the maximum, replace the valve and guide bush.

REPLACEMENT

1. **REPLACE INTAKE VALVE GUIDE BUSH**
   a. Heat the cylinder head to between 80 and 100°C (176 to 212°F).
   b. Place the cylinder head on wooden blocks.
   c. Using SST and a hammer, tap out the guide bush.

SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)

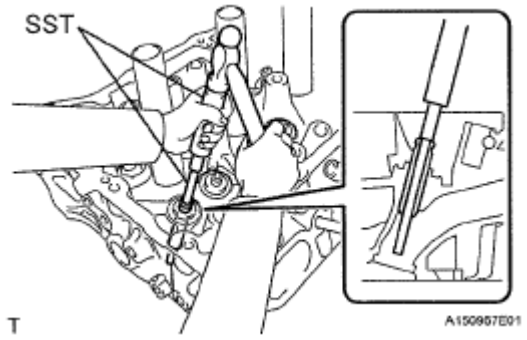


Fig. 130: Tapping Out Guide Bush
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Using a caliper gauge, measure the bush bore diameter of the cylinder head.

Cylinder bore diameter: 10.285 to 10.306 mm (0.4049 to 0.4057 in.)

Select a new guide bush (STD or O/S 0.05)

BUSH BORE DIAMETER CHART

Bush Size	Bush Bore Diameter
STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)

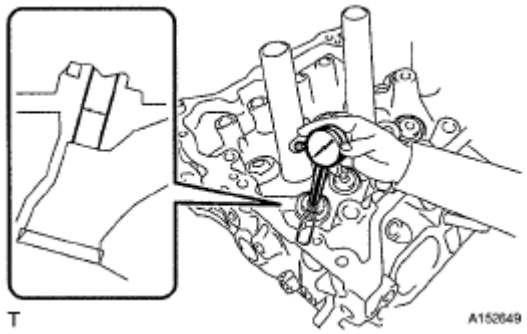


Fig. 131: Measuring Bush Bore Diameter Of Cylinder Head
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If the bush bore diameter of the cylinder head is greater than 10.306 mm (0.4057 in.), machine the bush bore to the dimension of 10.335 to 10.356 mm (0.4069 to 0.4077 in.) to install an O/S 0.05 valve guide bush. If the bush bore diameter of the cylinder head is greater than 10.356 mm (0.4077 in.), replace the cylinder head.

e. Heat the cylinder head to 80 to 100°C (176 to 212°F).
f. Place the cylinder head on wooden blocks.
g. Using SST and a hammer, tap in a new guide bush to the specified protrusion height.

SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)

Protrusion height: 9.9 to 10.3 mm (0.3898 to 0.4055 in.)

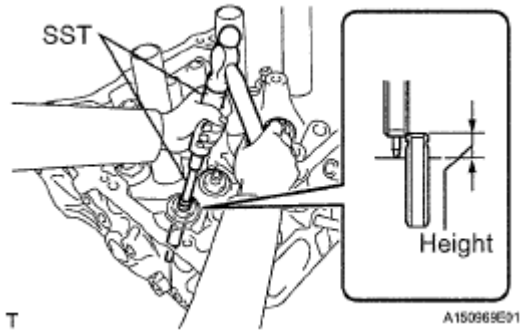


Fig. 132: Tapping Guide Bush
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

h. Using a sharp 5.5 mm reamer, ream the guide bush to obtain the standard specified clearance between the guide bush and valve stem.

Standard oil clearance: 0.025 to 0.060 mm (0.0010 to 0.0024 in.)

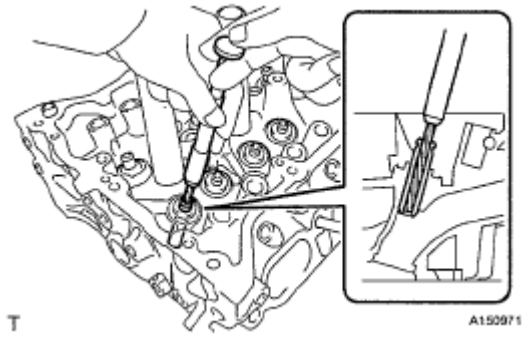


Fig. 133: Reaming Guide Bush
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **REPLACE EXHAUST VALVE GUIDE BUSH**
   a. Heat the cylinder head to between 80 and 100°C (176 to 212°F).
   b. Place the cylinder head on wooden blocks.
   c. Using SST and a hammer, tap out the guide bush.

SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)

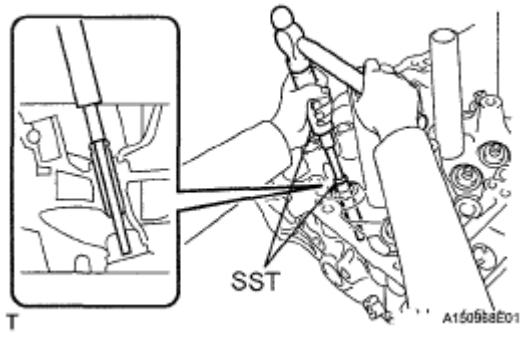


Fig. 134: Tapping Out Guide Bush
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Using a caliper gauge, measure the bush bore diameter of the cylinder head.

Diameter: 10.285 to 10.306 mm (0.4049 to 0.4057 in.)

Select a new guide bush (STD or O/S 0.05)

BUSH BORE DIAMETER CHART

Bush Size	Bush Bore Diameter
STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)

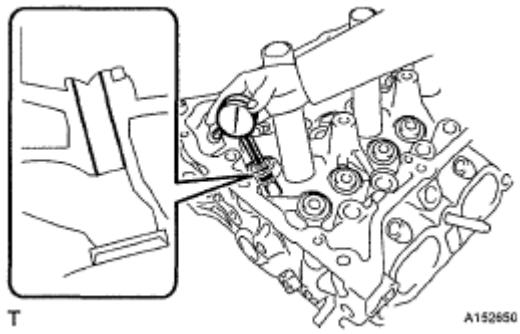


Fig. 135: Measuring Bush Bore Diameter Of Cylinder Head
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If the bush bore diameter of the cylinder head is greater than 10.306 mm (0.4057 in.), machine the bush bore to the dimension of 10.335 to 10.356 mm (0.4069 to 0.4077 in.) to install an O/S 0.05 valve guide bush. If the bush bore diameter of the cylinder head is greater than 10.356 mm (0.4077 in.), replace the cylinder head.

e. Heat the cylinder head to between 80 and 100°C (176 to 212°F).
f. Place the cylinder head on wooden blocks.
g. Using SST and a hammer, tap in a new guide bush to the specified protrusion height.

SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)

Protrusion height: 11.15 to 11.55 mm (0.4390 to 0.4547 in.)

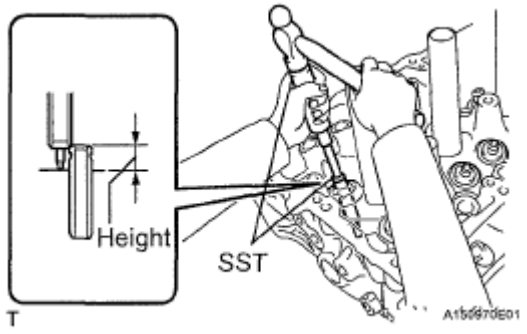


Fig. 136: Tapping Guide Bush
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

h. Using a sharp 5.5 mm reamer, ream the guide bush to obtain the standard specified clearance between the guide bush and valve stem.

Standard oil clearance: 0.030 to 0.065 mm (0.0012 to 0.0026 in.)

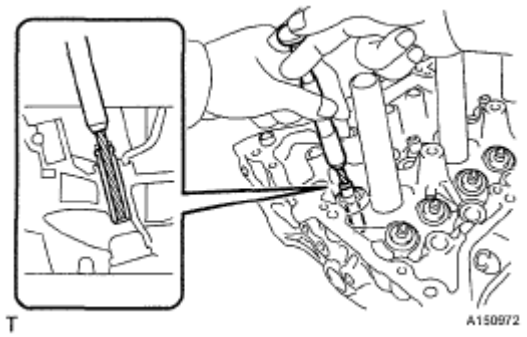


Fig. 137: Reaming Guide Bush
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **REPLACE RING PIN**

NOTE: It is not necessary to remove the ring pin unless it is being replaced.

a. Remove the 2 ring pins.
b. Using a plastic-faced hammer, tap in 2 new ring pins to the specified protrusion height.

Protrusion height: 6.5 to 7.5 mm (0.26 to 0.30 in.)

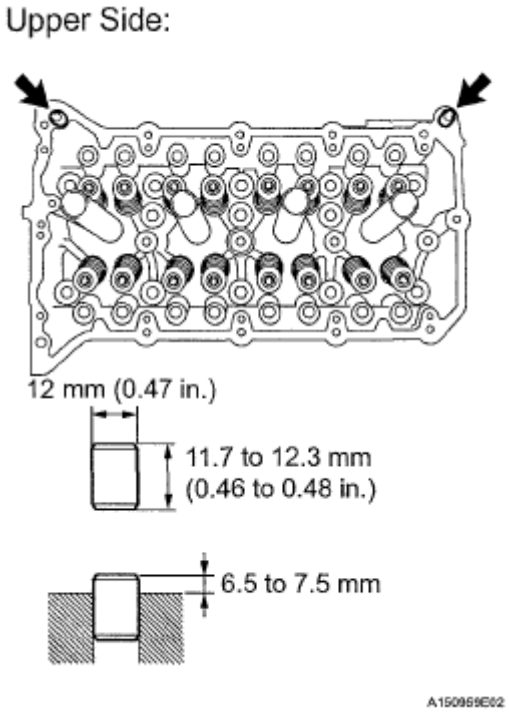


Fig. 138: Locating Ring Pins
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. **REPLACE STUD BOLT**

NOTE: If the stud bolt is deformed or the threads are damaged, replace it.

a. Remove the stud bolts.

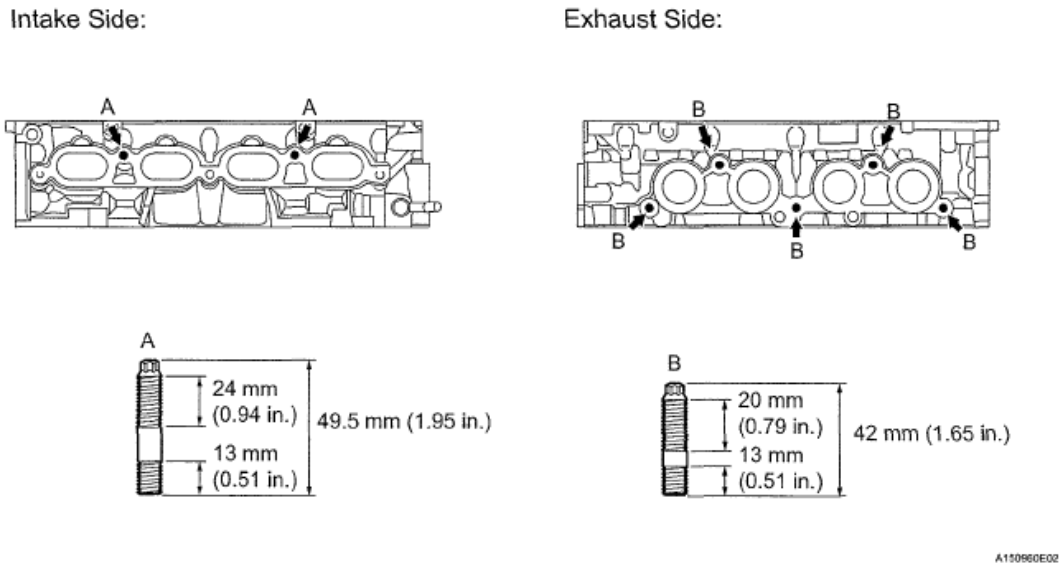


Fig. 139: Locating Stud Bolts

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

b. Using E8 "TORX" socket, install the stud bolts.

Torque: 9.5 N*m (97 kgf*cm, 84 in.*lbf)

REASSEMBLY

1. **INSTALL NO. 1 STRAIGHT SCREW PLUG**
   a. Using a 10 mm straight hexagon wrench, install 3 new gaskets and the 3 straight screw plugs.

   Torque: 44 N*m (449 kgf*cm, 33 ft.*lbf)

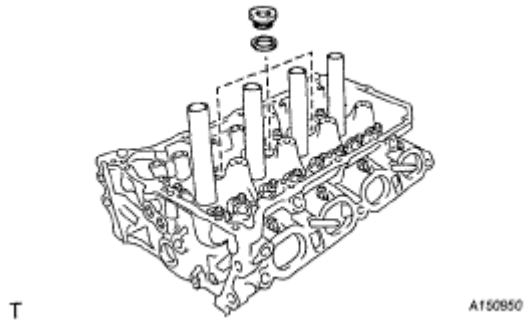


Fig. 140: Identifying Screw Plugs And Gaskets
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **INSTALL VALVE SPRING SEAT**
   a. Install the valve spring seats onto the cylinder head.
3. **INSTALL VALVE STEM OIL SEAL**
   a. Apply a light coat of engine oil to a new oil seal.

   NOTE: Pay close attention when installing the intake and exhaust oil seals. For example, installing the intake oil seal onto the exhaust side or installing the exhaust oil seal onto the intake side can cause installation problems later.

   HINT:

   The intake valve oil seal is gray and the exhaust valve oil seal is black.

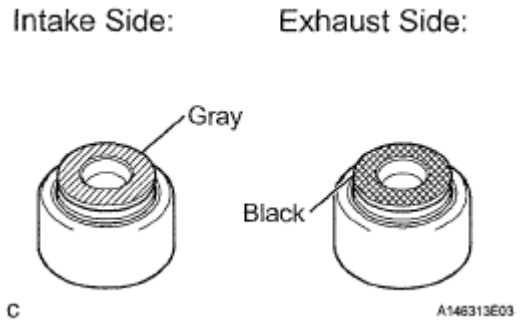


Fig. 141: Identifying Oil Seal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Using SST, push in the oil seal.

SST 09201-41020

NOTE: Failure to use SST will cause the seal to be damaged or improperly seated.

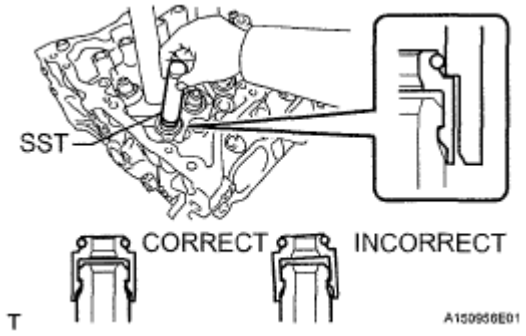


Fig. 142: Pushing Oil Seal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. **INSTALL INTAKE VALVE**
   a. When installing the intake valves onto the cylinder head, check the marks on the end of the valve stem.

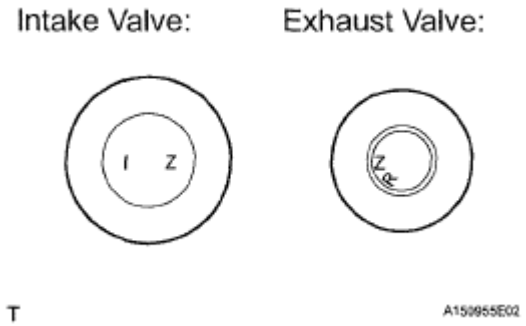


Fig. 143: Identifying Intake And Exhaust Valve
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Sufficiently apply engine oil to the tip area of the intake valve shown in the illustration.

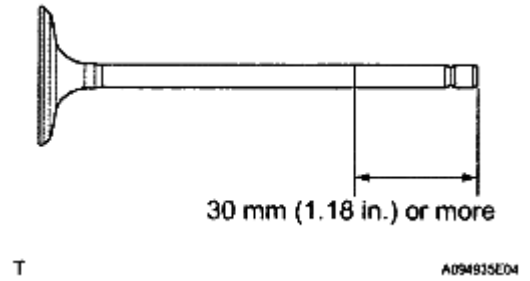


Fig. 144: Identifying Tip Area Of Valve
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Install the valve, compression spring and spring retainer onto the cylinder head.

NOTE: Install the same parts in the same combination onto the original locations.

d. Using SST and wooden blocks, compress the spring and install the 2 retainer locks.

SST 09202-70020 (09202-00010)

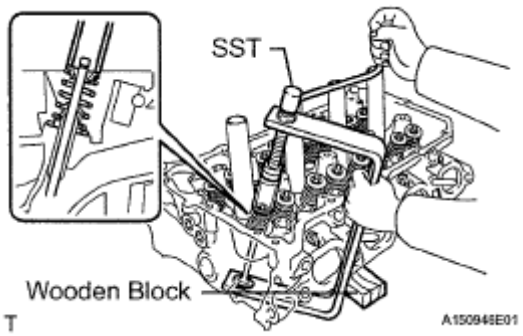


Fig. 145: Compressing Spring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

e. Using a plastic-faced hammer, lightly tap the valve stem tip to ensure a proper fit.

NOTE:

- **Be careful not to damage the valve stem tip.**
- **Be careful not to damage the retainer.**

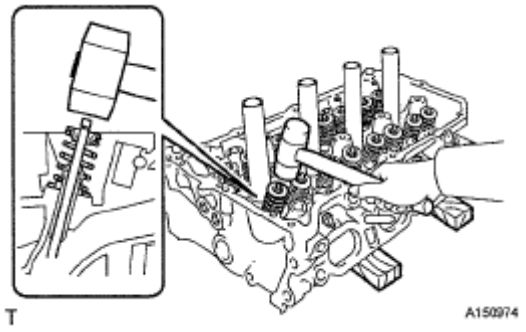


Fig. 146: Tapping Valve Stem Tip
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. **INSTALL EXHAUST VALVE**
   a. When installing the exhaust valves onto the cylinder head, check the marks on the end of the valve stem.

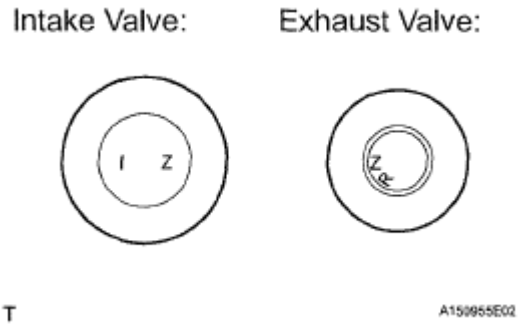


Fig. 147: Identifying Intake And Exhaust Valve
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Sufficiently apply engine oil to the tip area of the exhaust valve, as shown in the illustration.

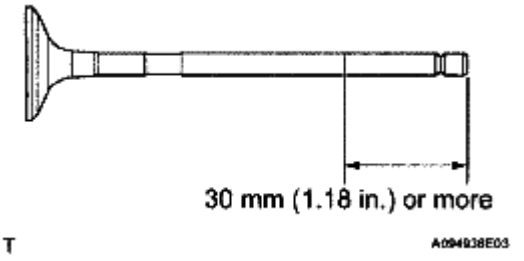


Fig. 148: Identifying Tip Area Of Valve
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   c. Install the valve, compression spring and spring retainer onto the cylinder head.

NOTE: Install the same parts in the same combination onto the original

locations.

d. Using SST and wooden blocks, compress the spring and install the 2 retainer locks.

SST 09202-70020(09202-00010)

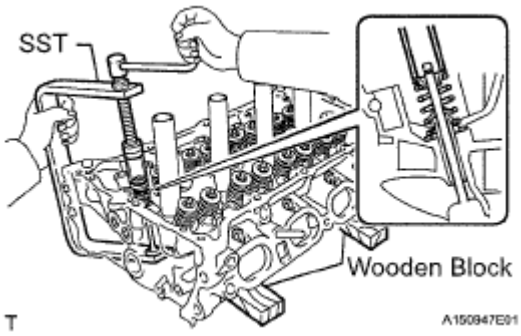


Fig. 149: Compressing Valve Retainer Locks
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

e. Using a plastic-faced hammer, lightly tap the valve stem tip to ensure a proper fit.

NOTE:

- **Be careful not to damage the valve stem tip.**
- **Be careful not to damage the retainer.**

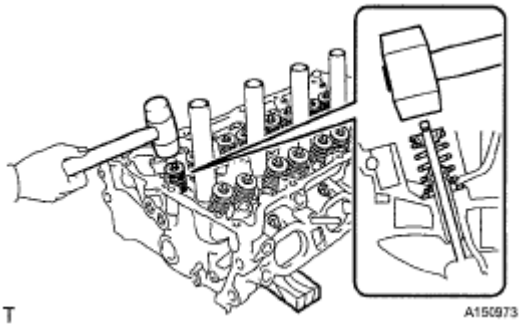


Fig. 150: Tapping Valve Stem Tip
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. **INSTALL VALVE STEM CAP**
   a. Apply a light coat of engine oil to the valve stem caps.

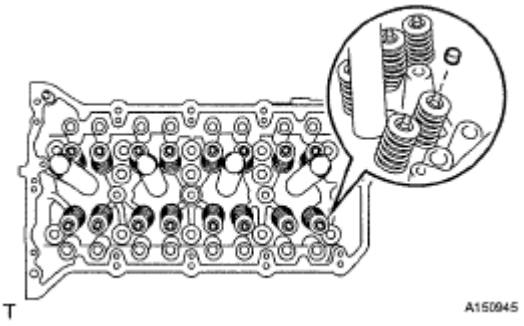


Fig. 151: Identifying Valve Stem Caps
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Install the 16 valve stem caps onto the cylinder head.

REPAIR

1. **REPAIR VALVE SEATS**

NOTE:

- **Repair the seat while checking the seating position.**
- **Keep the lip free from foreign matter.**

a. Using a 45° cutter, resurface the valve seat so that the valve seat width is more than the specification listed below.

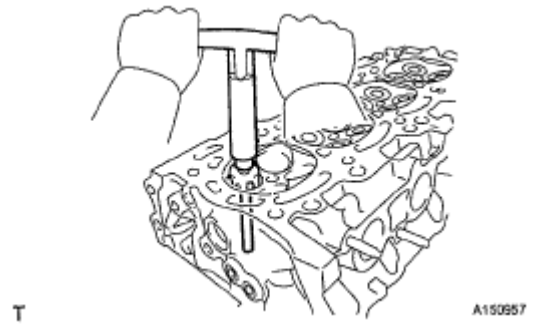


Fig. 152: Grinding Valve Seat Using Cutter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Using 30° and 75° cutters, correct the valve seat so that the valve contacts the entire circumference of the seat. The contact should be in the center of the valve seat, and the valve seat width should be maintained within the specified range around the entire circumference of the seat.

Valve seat width

ITEM SPECIFIED CONDITION CHART

Item	Specified Condition

Intake Side	1.0 to 1.4 mm (0.039 to 0.055 in.)
Exhaust Side	1.0 to 1.4 mm (0.039 to 0.055 in.)

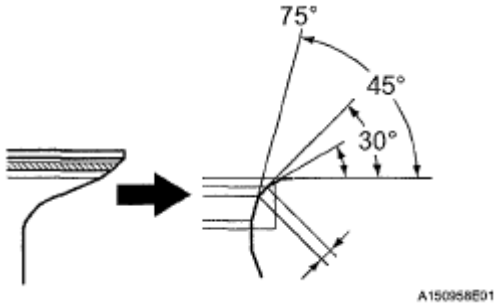


Fig. 153: Identifying Valve Seat Angle
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Handrub the valve and valve seat with an abrasive compound.
d. Check the valve seating position.

CYLINDER BLOCK

COMPONENTS

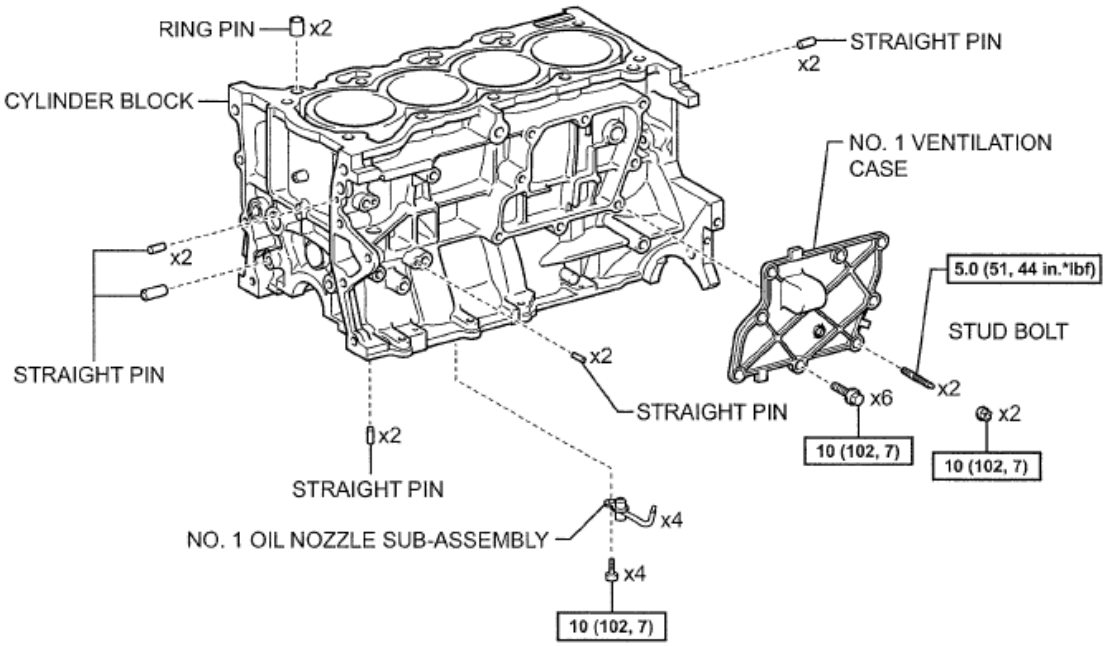


Fig. 154: Identifying Cylinder Block Components And Torque Specifications (1 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

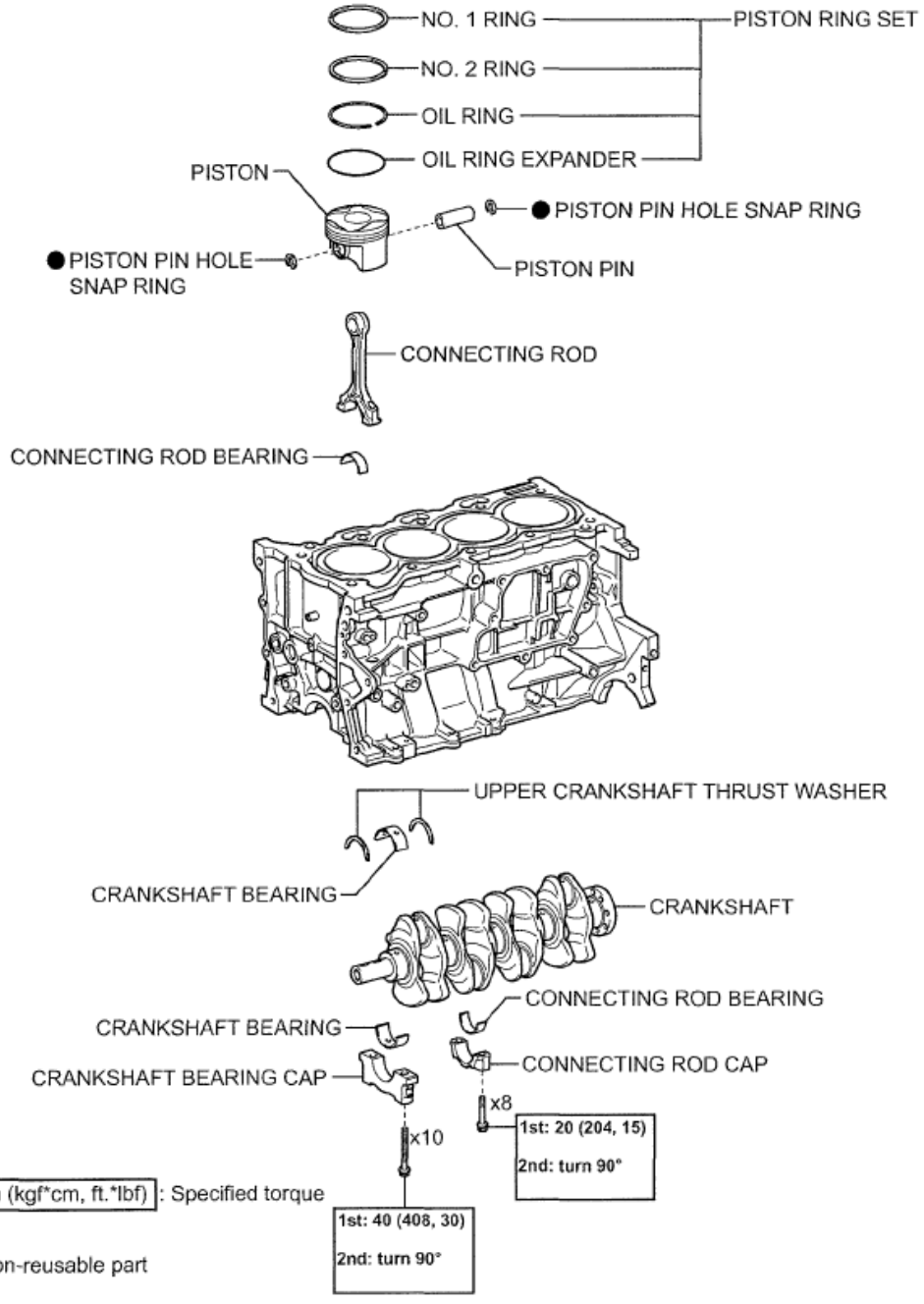


Fig. 155: Identifying Cylinder Block Components And Torque Specifications (2 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DISASSEMBLY

1. **REMOVE NO. 1 VENTILATION CASE**

a. Remove the 6 bolts and 2 nuts.

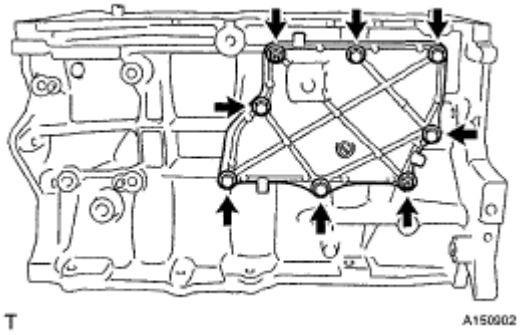


Fig. 156: Locating Bolts And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Remove the No. 1 ventilation case by prying between the No. 1 ventilation case and cylinder block with a screwdriver as shown the illustration.

NOTE: Be careful not to damage the contact surfaces of the cylinder block and No. 1 ventilation case.

HINT:

Tape the screwdriver tip before use.

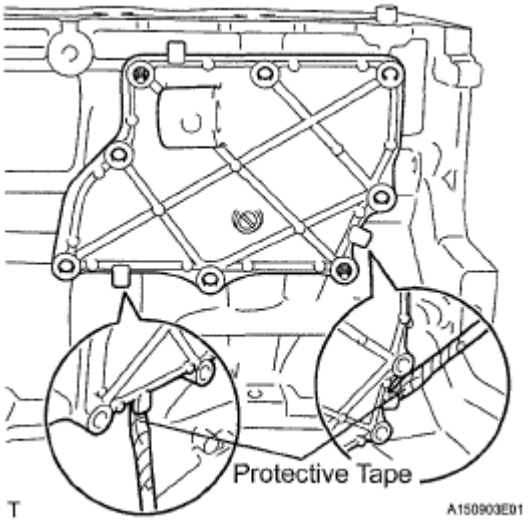


Fig. 157: Prying No. 1 Ventilation Case
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **REMOVE PISTON SUB-ASSEMBLY WITH CONNECTING ROD**
   a. Using a ridge reamer, remove all carbon from the top of the cylinder.

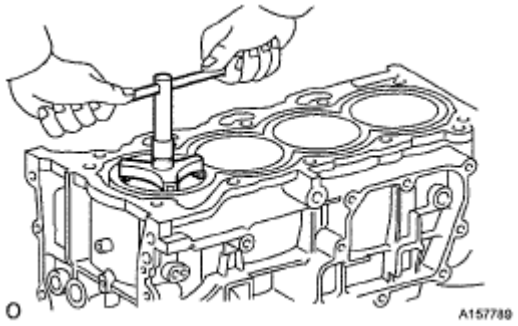


Fig. 158: Removing Carbon From Top Of Cylinder
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Check that the alignment mark on the connecting rod and cap are aligned to ensure correct reassembly.

HINT:

The alignment mark on the connecting rods and caps are provided to ensure correct reassembly.

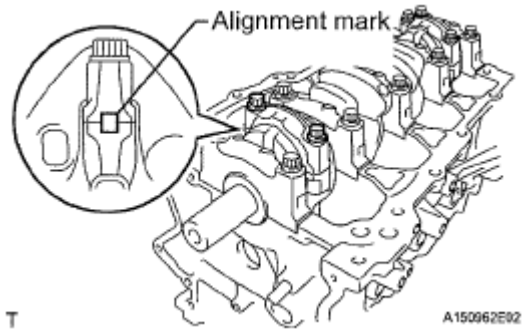


Fig. 159: Identifying Alignment Mark On Connecting Rod And Cap
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Using SST, uniformly loosen the 2 bolts.

SST 09205-16010

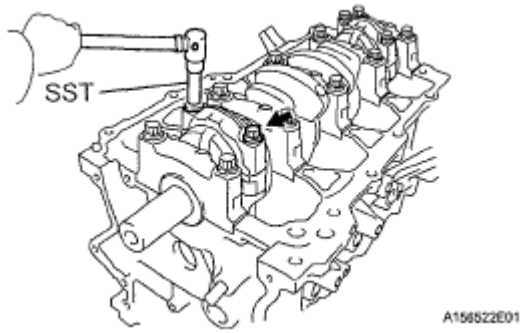


Fig. 160: Loosening Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Using the 2 loose connecting rod cap bolts, remove the connecting rod cap and lower bearing by wiggling the connecting rod cap right and left.

HINT:

Keep the lower bearing inserted in the connecting rod cap.

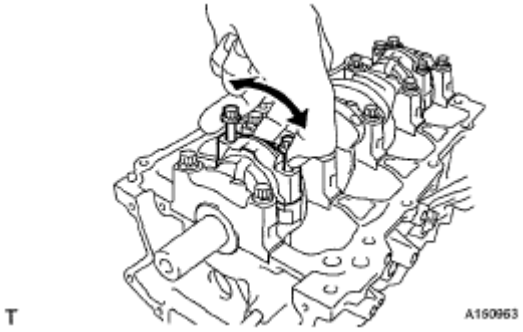


Fig. 161: Loosening Connecting Rod Cap Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

e. Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.

HINT:

- Keep the bearing, connecting rod and cap together.
- Arrange the piston and connecting rod assemblies in the correct order.

3. **REMOVE CONNECTING ROD BEARING**
   a. Remove the connecting rod bearings.

   HINT:

   Arrange the removed parts in the correct order.

4. **REMOVE PISTON RING SET**
   a. Using a piston ring expander, remove the 2 compression rings.

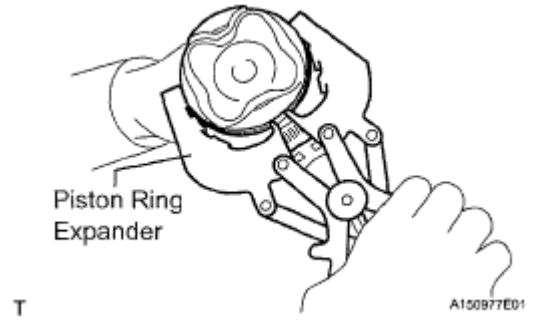


Fig. 162: Removing Compression Rings
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Remove the oil ring rail and oil ring expander by hand.

HINT:

Arrange the removed parts in the correct order.

5. **REMOVE PISTON PIN HOLE SNAP RING**
   a. Using a screwdriver, pry out the 2 snap rings.

Fig. 163: Prying Out Snap Rings
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. **REMOVE PISTON SUB-ASSEMBLY WITH PIN**
   a. Gradually heat each piston to between 80 and 90°C (176 to 194°F).

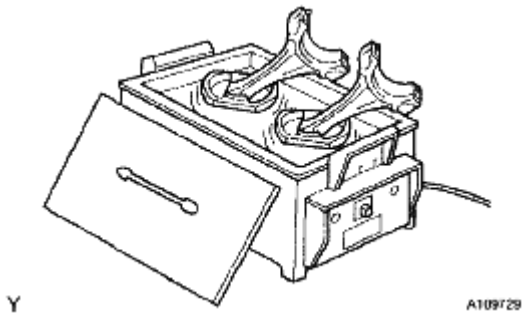


Fig. 164: Heating Piston
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Using a plastic hammer and brass bar, lightly tap out the piston pin and remove the connecting rod.

HINT:

- The piston and pin are a matched set.
- Arrange the pistons, pins, rings, connecting rods and bearings in the correct order.

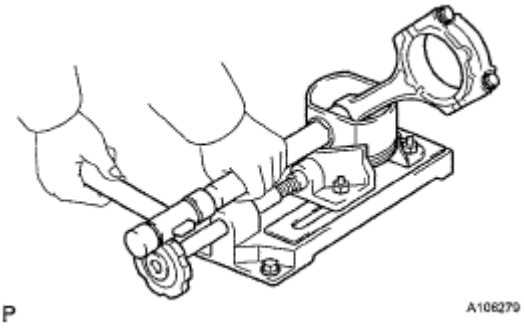


Fig. 165: Tapping Out Piston Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. **REMOVE CRANKSHAFT**

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

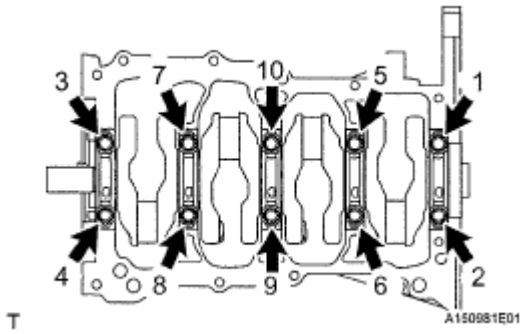


Fig. 166: Locating Main Bearing Cap Bolts And Loosening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Use 2 loose main bearing cap bolts to remove the 5 main bearing caps and 5 lower bearings.

NOTE: Insert the bolts into the caps in turn. Ease the cap out by gently pulling up and applying force toward the front and back sides of the cylinder block, as shown in the illustration. Take care not to damage the contact surfaces of the cap and cylinder block.

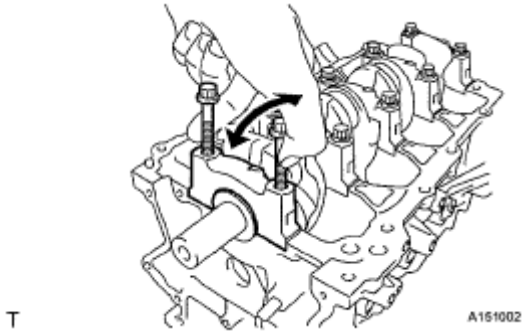


Fig. 167: Loosening Main Bearing Cap Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

- Keep the lower bearing and main bearing cap together.
- Arrange the main bearing caps in the correct order.

c. Lift out the crankshaft.

8. **REMOVE UPPER CRANKSHAFT THRUST WASHER**

a. Remove the upper crankshaft thrust washers from the cylinder block.

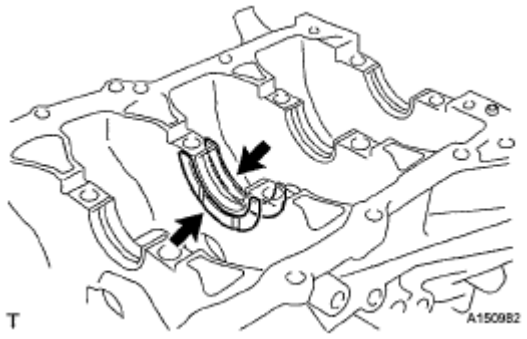


Fig. 168: Locating Upper Crankshaft Thrust Washers
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. **REMOVE CRANKSHAFT BEARING**

a. Remove the 5 upper main bearings from the cylinder block.

HINT:

Arrange the bearings in the correct order.

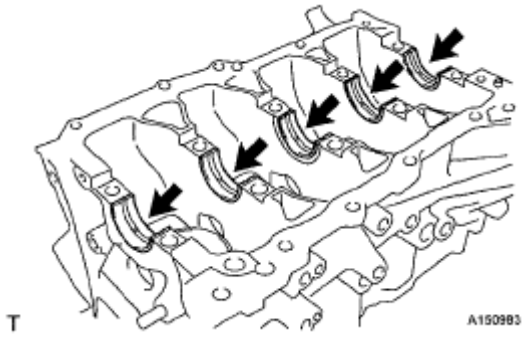


Fig. 169: Locating Upper Main Bearings
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Remove the 5 lower main bearings from the 5 main bearing caps.

HINT:

Arrange the bearings in the correct order.

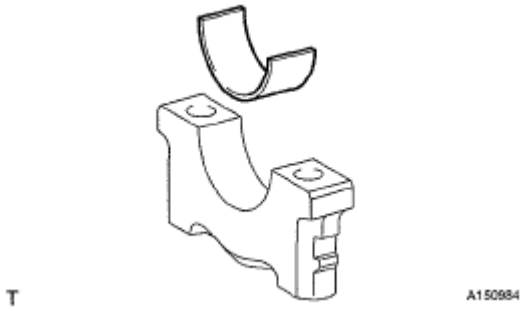


Fig. 170: Identifying Lower Main Bearing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. **REMOVE NO. 1 OIL NOZZLE SUB-ASSEMBLY**
    a. Using a socket hexagon wrench 5, remove the bolts and oil nozzles.

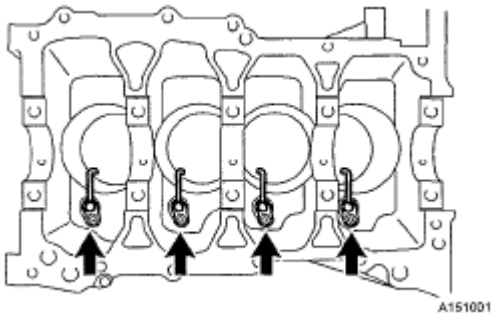


Fig. 171: Locating Bolts And Oil Nozzles
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. **CLEAN CYLINDER BLOCK**

NOTE: If the cylinder is washed at high temperatures, the cylinder liner will stick out beyond the cylinder block. Always wash the cylinder block at a temperature of 45°C (113°F) or less.

INSPECTION

1. **INSPECT CONNECTING ROD THRUST CLEARANCE**
   a. Install the connecting rod cap (See **REASSEMBLY**).
   b. Using a dial indicator, measure the thrust clearance while moving the connecting rod back and forth.

      Standard thrust clearance: 0.160 to 0.342 mm (0.0063 to 0.0135 in.)

      Maximum thrust clearance: 0.342 mm (0.0135 in.)

      If the thrust clearance is greater than the maximum, replace the connecting rod. If necessary, replace the crankshaft.

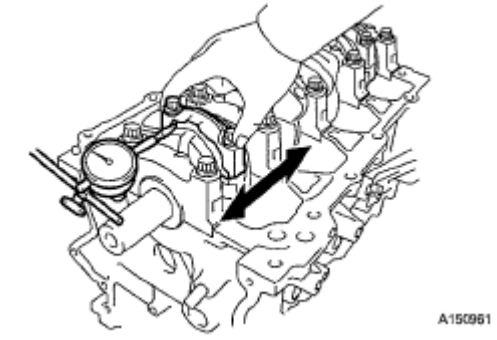


Fig. 172: Measuring Thrust Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **INSPECT CONNECTING ROD OIL CLEARANCE**
   a. Clean the crank pin and bearing.
   b. Check the crank pin and bearing for pitting and scratches.
   c. Lay a strip of Plastigage on the crank pin.

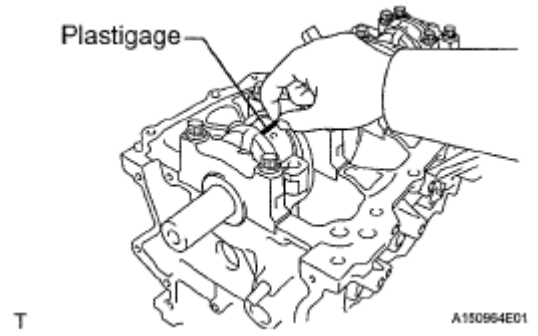


Fig. 173: Laying Strip Of Plastigage On Crank Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   d. Check that the front mark of the connecting rod cap is facing forward.

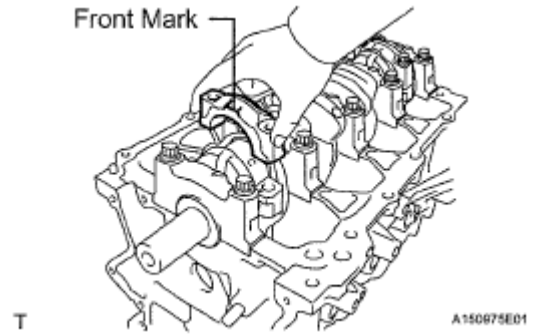


Fig. 174: Identifying Front Mark Of Connecting Rod Cap
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   e. Install the connecting rod cap (See **REASSEMBLY**).

NOTE: Do not turn the crankshaft.

   f. Remove the 2 bolts and connecting rod cap (See **DISASSEMBLY**).
   g. Measure the Plastigage at its widest point.

Standard oil clearance: 0.030 to 0.062 mm (0.0012 to 0.0024 in.)

Maximum oil clearance: 0.07 mm (0.0028 in.)

If the oil clearance is greater than the maximum, replace the connecting rod bearings. If necessary,

inspect the crankshaft.

NOTE: Completely remove the Plastigage after the measurement.

HINT:

If replacing a bearing, replace it with one that has the same number as its respective connecting rod cap. Each bearing's standard thickness is indicated by a 1, 2, or 3 mark on its surface.

Standard connecting rod large end bore diameter

MARK SPECIFIED CONDITION CHART

Mark	Specified Condition
Mark 1	47.000 to 47.008 mm (1.8504 to 1.8507 in.)
Mark 2	47.009 to 47.016 mm (1.8507 to 1.8510 in.)
Mark 3	47.017 to 47.024 mm (1.8511 to 1.8513 in.)

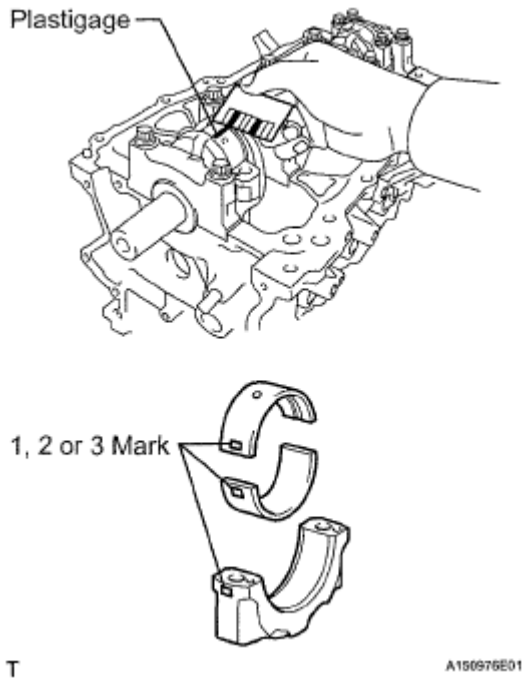


Fig. 175: Measuring Plastigage At Its Widest Point
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard connecting rod bearing thickness

MARK SPECIFIED CONDITION CHART

Mark	Specified Condition
Mark 1	1.489 to 1.493 mm (0.0586 to 0.0588 in.)
Mark 2	1.494 to 1.497 mm (0.0588 to 0.0589 in.)

Mark 3	1.498 to 1.501 mm (0.0590 to 0.0591 in.)

Standard crankshaft pin diameter

MARK SPECIFIED CONDITION CHART

Mark	Specified Condition
Mark 1, 2, 3	43.992 to 44.000 mm (1.7320 to 1.7323 in.)

3. **INSPECT CYLINDER BLOCK FOR WARPAGE**
   a. Using a precision straightedge and feeler gauge, measure the warpage of the surface that is in contact with the cylinder head gasket.

   Maximum warpage: 0.05 mm (0.0020 in.)

   If the warpage is greater than the maximum, replace the cylinder block.

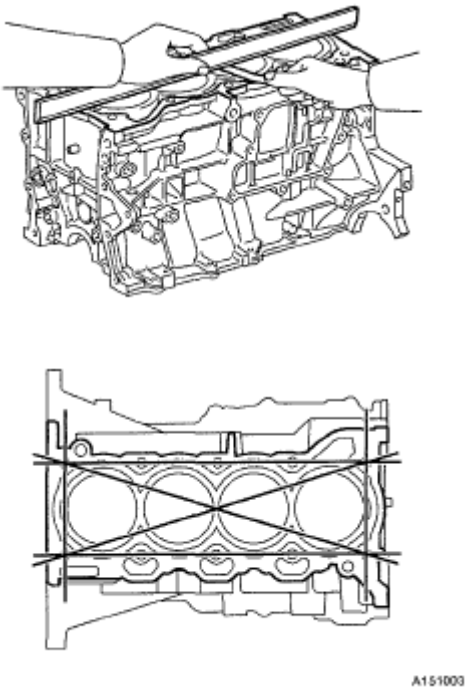


Fig. 176: Measuring Warpage Of Surface
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. **INSPECT CYLINDER BORE**
   a. Using a cylinder gauge, measure the cylinder bore diameter at positions A and B in both thrust and axial directions.

   Standard diameter: 80.500 to 80.513 mm (3.1693 to 3.1698 in.)

   Maximum diameter: 80.633 mm (3.1745 in.)

If the average diameter of the 4 positions is greater than the maximum, replace the cylinder block.

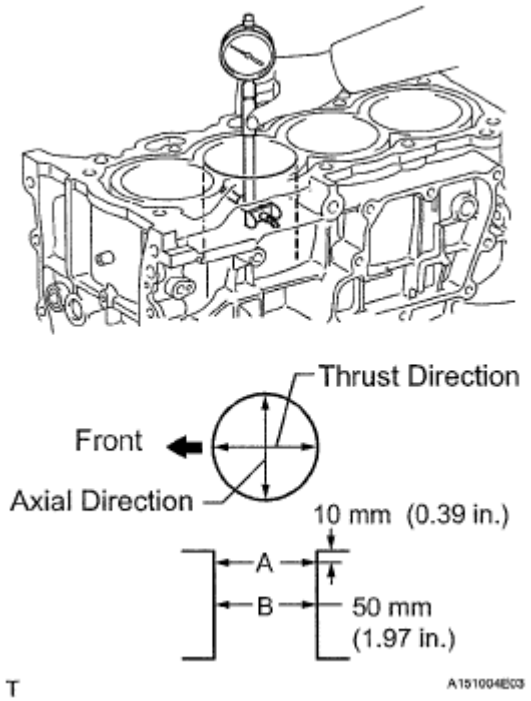


Fig. 177: Measuring Cylinder Bore Diameter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. **INSPECT PISTON SUB-ASSEMBLY WITH PIN**
   a. Using a gasket scraper, remove the carbon from the piston top.

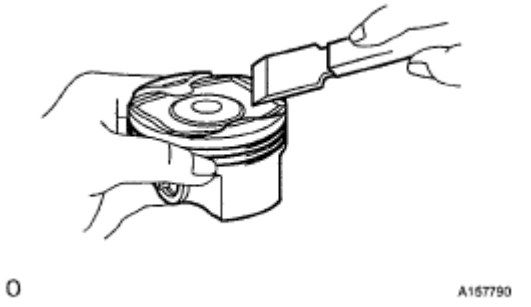


Fig. 178: Removing Carbon From Piston Top
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Using a groove cleaning tool or broken ring, clean the piston ring grooves.

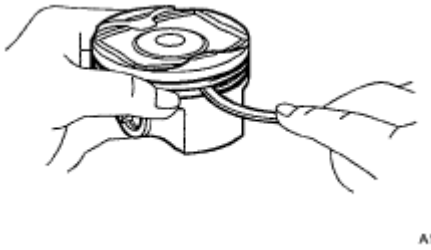


Fig. 179: Cleaning Piston Ring Grooves
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Using a brush and solvent, thoroughly clean the piston.

NOTE: Do not use a wire brush.

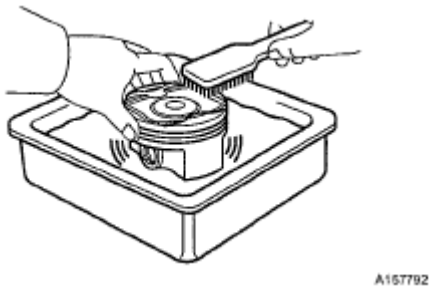


Fig. 180: Cleaning Piston
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Using a micrometer, measure the piston diameter at right angles to the piston pin hole, and at a point 10.3 mm (0.4055 in.) from the base of the piston head.

Standard piston diameter: 80.471 to 80.491 mm (3.1681 to 3.1689 in.)

If the diameter is not as specified, replace the piston.

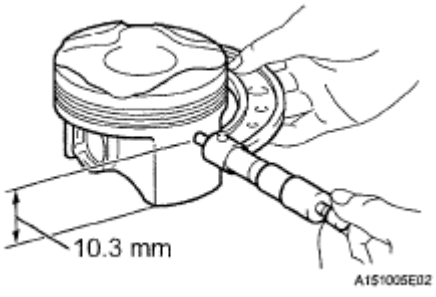


Fig. 181: Measuring Piston Diameter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. **INSPECT PISTON OIL CLEARANCE**

a. Subtract the piston diameter measurement from the cylinder bore diameter measurement.

Standard oil clearance: 0.009 to 0.042 mm (0.0004 to 0.0017 in.)

Maximum oil clearance: 0.09 mm (0.0035 in.)

If the oil clearance is greater than the maximum, replace all pistons. If necessary, replace the cylinder block.

7. **INSPECT RING GROOVE CLEARANCE**
   a. Using a feeler gauge, measure the clearance between a new piston ring and the wall of the ring groove.

Standard ring groove clearance

ITEM SPECIFIED CONDITION CHART

Item	Specified Condition
No. 1 Ring	0.02 to 0.07 mm (0.0008 to 0.0028 in.)
No. 2 Ring	0.02 to 0.06 mm (0.0008 to 0.0024 in.)
Oil Ring	0.02 to 0.065 mm (0.0008 to 0.0026 in.)

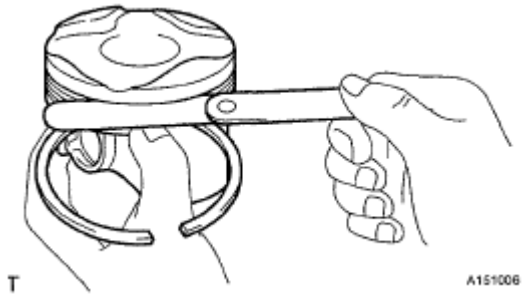


Fig. 182: Measuring Clearance Between Piston Ring And Wall Of Ring Groove
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If the groove clearance is not as specified, replace the piston.

8. **INSPECT PISTON RING END GAP**
   a. Using a piston, push the piston ring a little beyond the bottom of the ring travel, 50 mm (1.97 in.) from the top of the cylinder block.

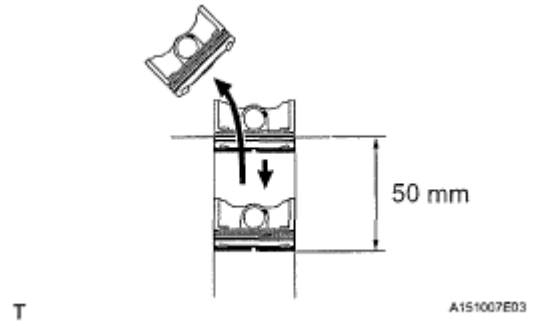


Fig. 183: Pushing Piston Ring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Using a feeler gauge, measure the end gap.

Standard end gap

ITEM SPECIFIED CONDITION CHART

Item	Specified Condition
No. 1 Ring	0.2 to 0.3 mm (0.0079 to 0.0118 in.)
No. 2 Ring	0.35 to 0.5 mm (0.0138 to 0.0197 in.)
Oil Ring	0.1 to 0.4 mm (0.0039 to 0.0157 in.)

Maximum end gap

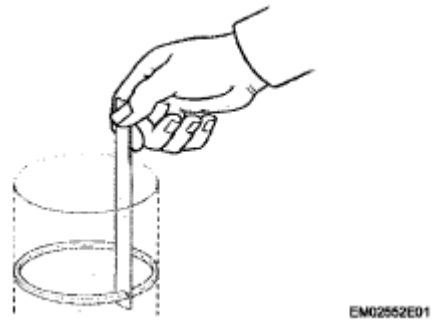


Fig. 184: Measuring Ring End Gap
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ITEM SPECIFIED CONDITION CHART

Item	Specified Condition
No. 1 Ring	0.5 mm (0.0197 in.)
No. 2 Ring	0.7 mm (0.0276 in.)
Oil Ring	0.7 mm (0.0276 in.)

If the end gap is greater than the maximum, replace the piston ring. If the end gap is greater than the maximum, even with a new piston ring, replace the cylinder block.

9. **INSPECT PISTON PIN OIL CLEARANCE**

a. Using a caliper gauge, measure the piston pin bore diameter.

Standard piston pin bore diameter: 20.006 to 20.015 mm (0.7876 to 0.7880 in.)

ITEM SPECIFIED CONDITION CHART

Item	Specified Condition
A	20.006 to 20.009 mm (0.7876 to 0.7878 in.)
B	20.010 to 20.012 mm (0.7878 to 0.7879 in.)
C	20.013 to 20.015 mm (0.7879 to 0.7880 in.)

If the diameter is not as specified, replace the piston.

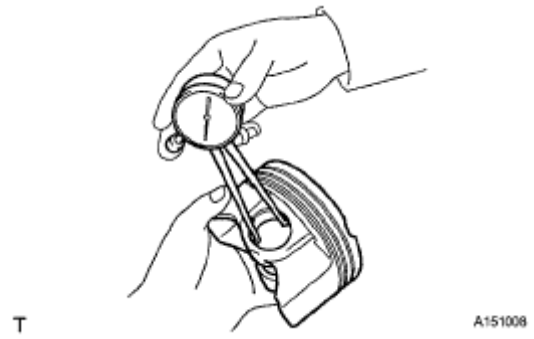


Fig. 185: Measuring Piston Pin Bore Diameter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Using a micrometer, measure the piston pin diameter.

Standard piston pin diameter: 20.004 to 20.013 mm (0.7876 to 0.7879 in.)

ITEM SPECIFIED CONDITION CHART

Item	Specified Condition
A	20.004 to 20.007 mm (0.7876 to 0.7877 in.)
B	20.008 to 20.010 mm (0.7877 to 0.7878 in.)
C	20.011 to 20.013 mm (0.7878 to 0.7879 in.)

If the diameter is not as specified, replace the piston pin.

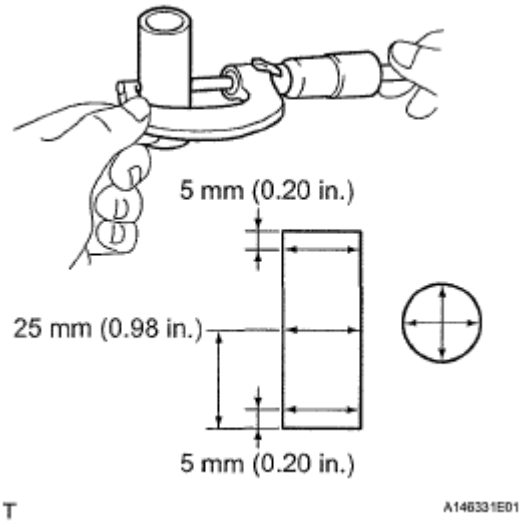


Fig. 186: Measuring Piston Pin Diameter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Using a caliper gauge, measure the connecting rod small end bore diameter.

Standard connecting rod small end bore diameter: 20.012 to 20.021 mm (0.7879 to 0.7882 in.)

ITEM SPECIFIED CONDITION CHART

Item	Specified Condition
A	20.012 to 20.015 mm (0.7879 to 0.7880 in.)
B	20.016 to 20.018 mm (0.7880 to 0.7881 in.)
C	20.019 to 20.021 mm (0.7881 to 0.7882 in.)

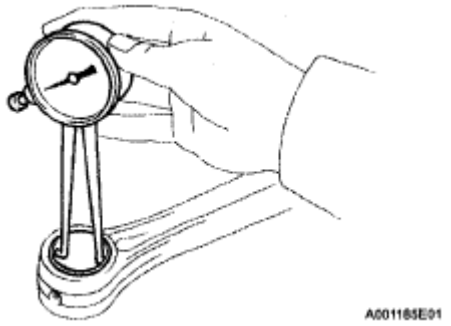


Fig. 187: Measuring Connecting Rod Small End Bore Diameter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If the diameter is not as specified, replace the connecting rod.

d. Subtract the piston pin diameter measurement from the piston pin bore diameter measurement.

Standard oil clearance: -0.001 to 0.005 mm (-0.00004 to 0.0002 in.)

Maximum oil clearance: 0.008 mm (0.0003 in.)

If the oil clearance is greater than the maximum, replace the connecting rod. If necessary, replace the piston and piston pin as a set.

e. Subtract the piston pin diameter measurement from the connecting rod small end bore diameter measurement.

Standard oil clearance: 0.005 to 0.011 mm (0.0002 to 0.0004 in.)

Maximum oil clearance: 0.014 mm (0.0006 in.)

If the oil clearance is greater than the maximum, replace the connecting rod. If necessary, replace the connecting rod and piston pin as a set.

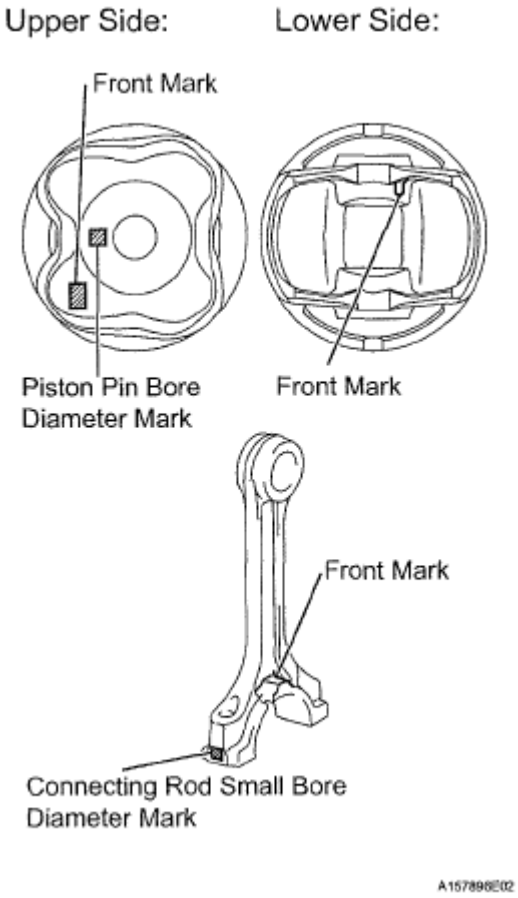


Fig. 188: Identifying Connecting Rod Small End Bore Diameter Mark
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. **INSPECT CONNECTING ROD BOLT**
    a. Using vernier calipers, measure the diameter of the unthreaded portion of the the bolt.

Standard diameter: 6.6 to 6.7 mm (0.2598 to 0.2638 in.)

Minimum diameter: 6.4 mm (0.2520 in.)

If the diameter is less than the minimum, replace the connecting rod bolt.

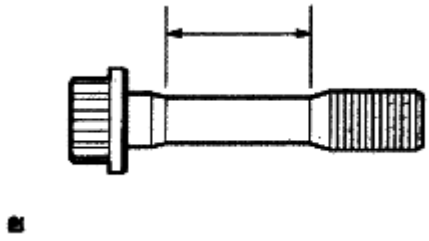


Fig. 189: Identifying Unthreaded Portion Of Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. **INSPECT CONNECTING ROD SUB-ASSEMBLY**
    a. Using a connecting rod aligner and feeler gauge, check the connecting rod alignment.
        1. Check for misalignment.

           Maximum misalignment: 0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

           If the misalignment is greater than the maximum, replace the connecting rod.

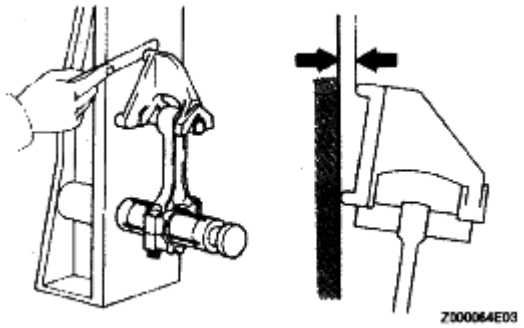


Fig. 190: Checking Connecting Rod Alignment
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

        2. Check for twist.

           Maximum twist: 0.15 mm (0.0059 in.) per 100 mm (3.94 in.)

           If the twist is greater than the maximum, replace the connecting rod.

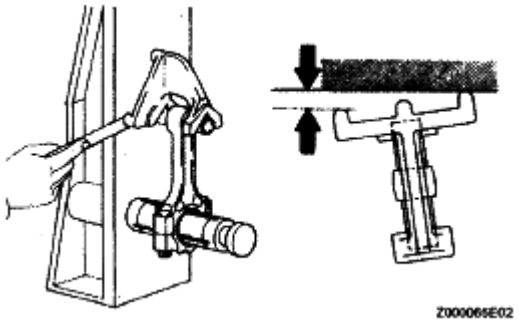


Fig. 191: Checking Connecting Rod Twist
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

12. **INSPECT CRANKSHAFT**
    a. Using a dial indicator and V-blocks, measure the circle runout as shown in the illustration.

       Maximum circle runout: 0.03 mm (0.0012 in.)

       If the runout is greater than the maximum, replace the crankshaft.

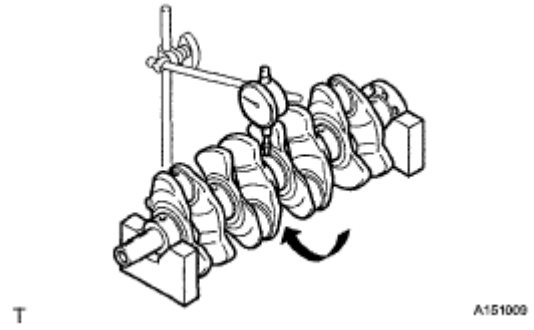


Fig. 192: Measuring Circle Runout
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    b. Using a micrometer, measure the diameter of each main journal.

       Standard diameter: 47.988 to 48.000 mm (1.8893 to 1.8898 in.)

       If the diameter is not as specified, check the crankshaft oil clearance.

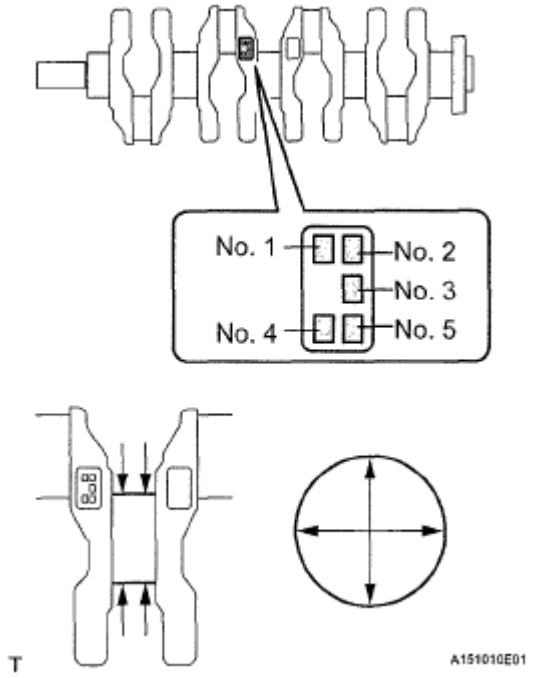


Fig. 193: Identifying Diameter Of Main Journal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Check each main journal for taper and distortion as shown in the illustration.

Maximum taper and distortion: 0.004 mm (0.0002 in.)

If the taper and distortion are greater than the maximum, replace the crankshaft.

Standard diameter (Reference)

MARK SPECIFIED CONDITION CHART

Mark	Specified Condition
0	47.999 to 48.000 mm (1.8897 to 1.8898 in.)
1	47.997 to 47.998 mm (1.8896 to 1.8897 in.)
2	47.995 to 47.996 mm (1.8896 to 1.8896 in.)
3	47.993 to 47.994 mm (1.8895 to 1.8895 in.)
4	47.991 to 47.992 mm (1.8894 to 1.8894 in.)
5	47.988 to 47.990 mm (1.8893 to 1.8894 in.)

d. Using a micrometer, measure the diameter of each crank pin.

Standard diameter: 43.992 to 44.000 mm (1.7320 to 1.7323 in.)

If the diameter is not as specified, check the connecting rod oil clearance.

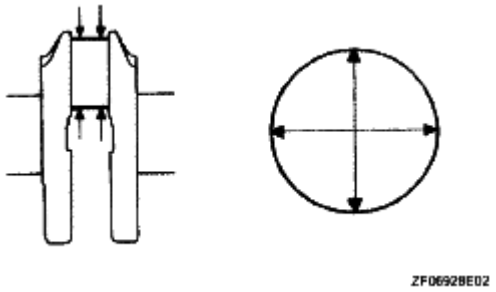


Fig. 194: Identifying Diameter Of Crank Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

e. Inspect each crank pin for taper and distortion as shown in the illustration.

Maximum taper and distortion: 0.004 mm (0.0002 in.)

If the taper and distortion are greater than the maximum, replace the crankshaft.

13. **INSPECT CRANKSHAFT THRUST CLEARANCE**
    a. Install the main bearing cap (See **REASSEMBLY**).
    b. Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

Standard thrust clearance: 0.04 to 0.14 mm (0.0016 to 0.0055 in.)

Maximum thrust clearance: 0.18 mm (0.0070 in.)

If the thrust clearance is greater than the maximum, replace the thrust washers as a set.

HINT:

The thrust washer thickness is 2.43 to 2.48 mm (0.0957 to 0.0976 in.).

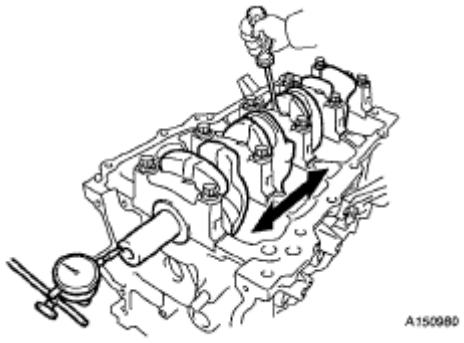


Fig. 195: Measuring Thrust Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

14. **INSPECT CRANKSHAFT OIL CLEARANCE**
    a. Check the crank journal and bearing for pitting and scratches.
    b. Install the crankshaft bearing (See **REASSEMBLY**).
    c. Place the crankshaft on the cylinder block.
    d. Lay a strip of Plastigage across each journal.
    e. Examine the front marks and numbers and install the bearing caps onto the cylinder block.

    HINT:

    A number is marked on each main bearing cap to indicate the installation position.

    f. Install the main bearing cap (See **REASSEMBLY**).

    NOTE: Do not turn the crankshaft.

    g. Remove the main bearing caps (See **DISASSEMBLY**).
    h. Measure the Plastigage at its widest point.

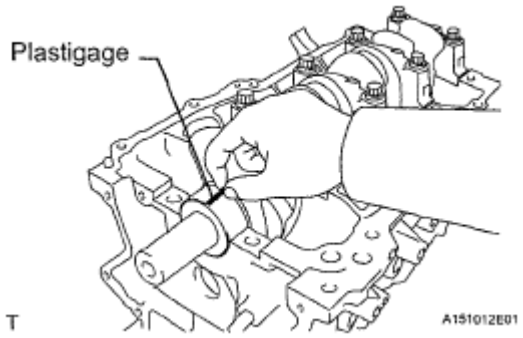


Fig. 196: Measuring Plastigage At Its Widest Point (1 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

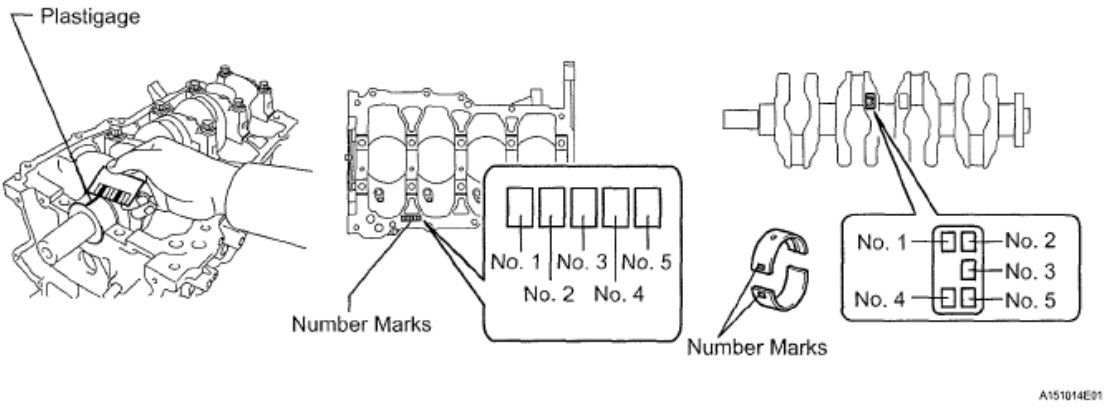


Fig. 197: Measuring Plastigage At Its Widest Point (2 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard oil clearance: 0.016 to 0.039 mm (0.0006 to 0.0015 in.)

Maximum oil clearance: 0.050 mm (0.0020 in.)

If the oil clearance is greater than the maximum, replace the crankshaft bearing. If necessary, replace the crankshaft.

NOTE: Remove the Plastigage completely after the measurement.

HINT:

- If replacing a bearing, select a new one with the same number. If the number of the bearing cannot be determined, calculate the correct bearing number by adding together the numbers imprinted on the cylinder block and crankshaft. Then select a new bearing with the calculated number according to the chart below. There are 4 sizes of standard bearings, marked "1", "2", "3" and "4".
- EXAMPLE: Cylinder block "3" + Crankshaft "5" = Total number 8 (Use bearing "3")

CYLINDER BLOCK SPECIFICATIONS

Cylinder block + Crankshaft	0 to 2	3 to 5	6 to 8	9 to 11
Bearing to be used	"1"	"2"	"3"	"4"

Standard cylinder block journal bore diameter

MARK SPECIFIED CONDITION CHART

Mark	Specified Condition
0	52.000 to 52.003 mm (2.0472 to 2.0474 in.)
1	52.003 to 52.005 mm (2.0474 to 2.0474 in.)
2	52.005 to 52.007 mm (2.0474 to 2.0475 in.)
3	52.007 to 52.010 mm (2.0475 to 2.0476 in.)
4	52.010 to 52.012 mm (2.0476 to 2.0477 in.)
5	52.012 to 52.014 mm (2.0477 to 2.0478 in.)
6	52.014 to 52.016 mm (2.0478 to 2.0479 in.)

Standard crankshaft journal diameter

MARK SPECIFIED CONDITION CHART

Mark	Specified Condition
0	47.999 to 48.000 mm (1.8897 to 1.8898 in.)
1	47.997 to 47.998 mm (1.8896 to 1.8897 in.)
2	47.995 to 47.996 mm (1.8896 to 1.8896 in.)
3	47.993 to 47.994 mm (1.8895 to 1.8895 in.)
4	47.991 to 47.992 mm (1.8894 to 1.8894 in.)
5	47.988 to 47.990 mm (1.8893 to 1.8894 in.)

Standard bearing center wall thickness

MARK SPECIFIED CONDITION CHART

Mark	Specified Condition
1	1.994 to 1.997 mm (0.0785 to 0.0786 in.)
2	1.998 to 2.000 mm (0.0787 to 0.0787 in.)
3	2.001 to 2.003 mm (0.0788 to 0.0789 in.)
4	2.004 to 2.006 mm (0.0789 to 0.0790 in.)

15. **INSPECT CYLINDER HEAD SET BOLT**

a. Using vernier calipers, measure the tension portion diameter of the bolts.

Standard bolt length: 84.3 to 85.7 mm (3.3189 to 3.3740 in.)

Maximum bolt length: 86.7 mm (3.4134 in.)

If the bolt length is greater than the maximum, replace the bolt.

b. Using vernier calipers, measure the minimum diameter of the elongated thread at the measuring point.

Standard outside diameter: 9.77 to 9.96 mm (0.3846 to 0.3921 in.)

Minimum outside diameter: 9.1 mm (0.3583 in.)

HINT:

Using a straightedge, visually check for thinner areas of the threaded part of the crankshaft bearing cap bolt.

If the diameter is less than the minimum, replace the bolt.

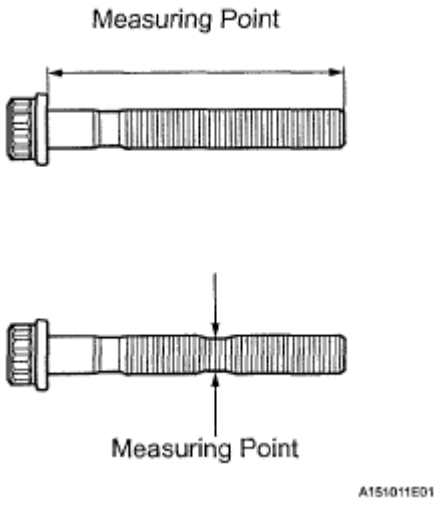


Fig. 198: Identifying Bolt Length Dimension
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

16. **INSPECT NO. 1 OIL NOZZLE SUB-ASSEMBLY**
    a. Check the oil nozzles for damage or clogging.

    HINT:

    If there is damage or clogging, replace the oil nozzle.

REPLACEMENT

1. **REPLACE RING PIN**

NOTE: It is not necessary to remove the ring pins unless they are being replaced.

a. Using a plastic hammer, tap in the 2 new ring pins.

Standard protrusion: 7.5 to 8.5 mm (0.295 to 0.335 in.)

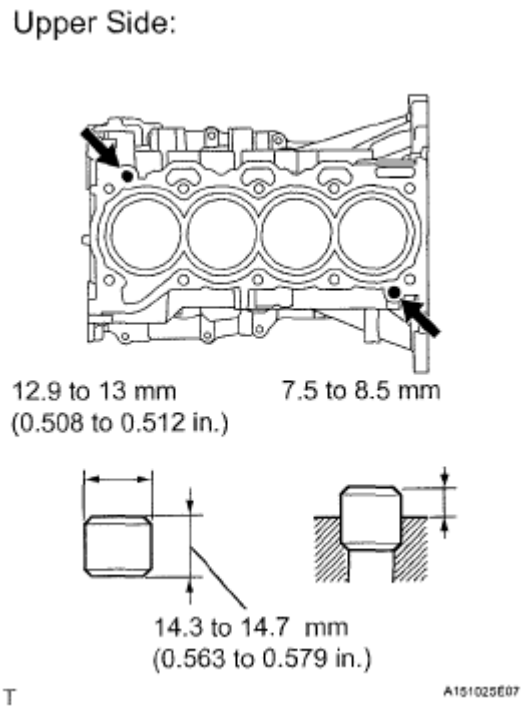


Fig. 199: Locating Ring Pins
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **REPLACE STUD BOLT**

NOTE: If a stud bolt is deformed or the threads are damaged, replace it.

a. Using "TORX" socket E6, install the stud bolt as shown in the illustration.

Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

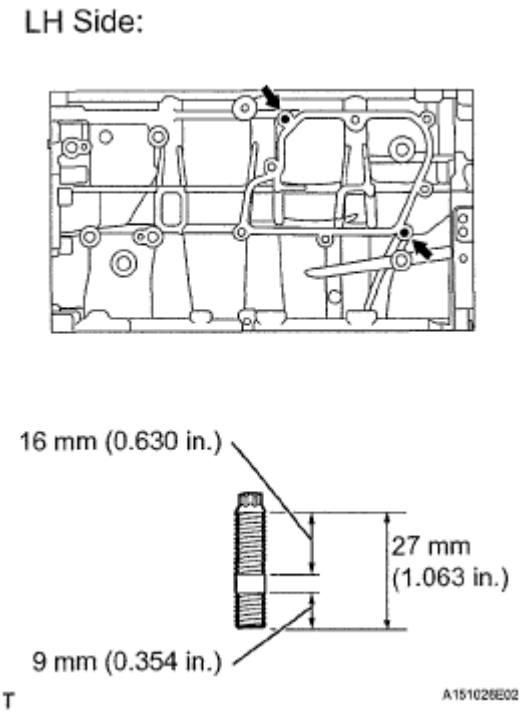


Fig. 200: Installing Stud Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **REPLACE STRAIGHT PIN**

NOTE: It is not necessary to remove the straight pins unless they are being replaced.

a. Using a plastic hammer, tap in the straight pin.

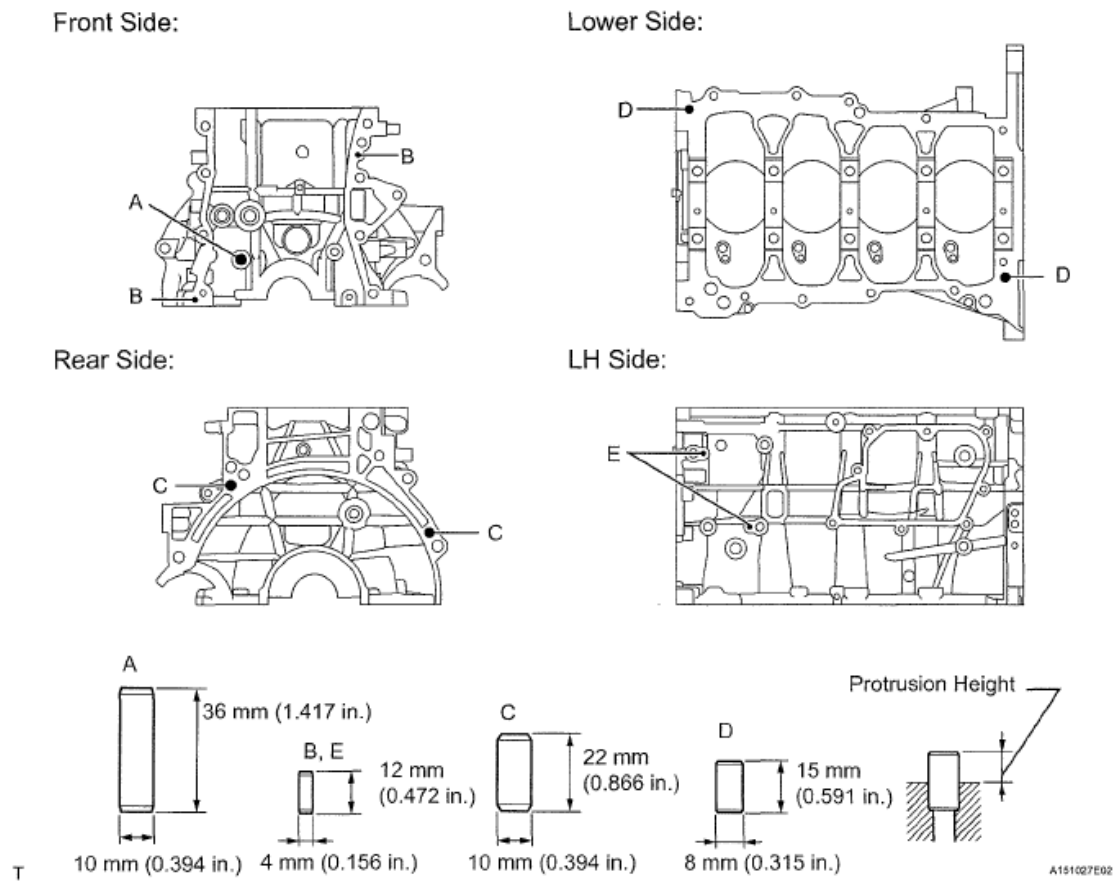


Fig. 201: Locating Straight Pin Location
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard protrusion

STANDARD PROTRUSION

Item	Protrusion
Pin A	18.5 to 19.5 mm (0.729 to 0.768 in.)
Pin B	5.0 to 7.0 mm (0.197 to 0.276 in.)
Pin C	11.0 to 13.0 mm (0.433 to 0.512 in.)
Pin D	5.0 to 7.0 mm (0.197 to 0.276 in.)
Pin E	5.0 to 6.0 mm (0.197 to 0.236 in.)

REASSEMBLY

1. **INSTALL NO. 1 OIL NOZZLE SUB-ASSEMBLY**
   a. Using a socket hexagon wrench 5, install the oil nozzles with the bolts.

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

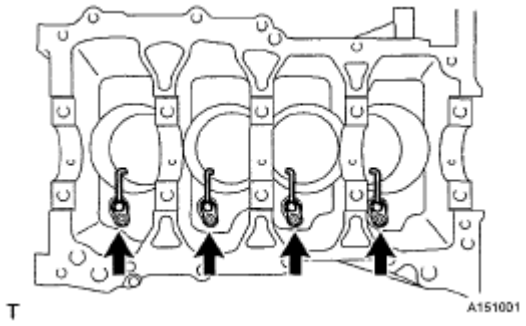


Fig. 202: Locating Bolts And Oil Nozzles
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **INSTALL PISTON SUB-ASSEMBLY WITH PIN**
   a. Using a screwdriver, install a new snap ring at one end of the piston pin hole.

      HINT:

      Make sure that the end gap of the snap ring is not aligned with the service hole on the piston.

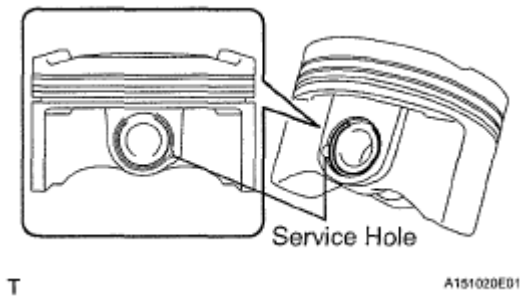


Fig. 203: Identifying Piston Pin Hole
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Gradually heat the piston to between 80 and 90°C (176 to 194°F).
   c. Align the front marks of the piston and connecting rod, and push in the piston by hand.

      HINT:

      The piston and pin are a matched set.

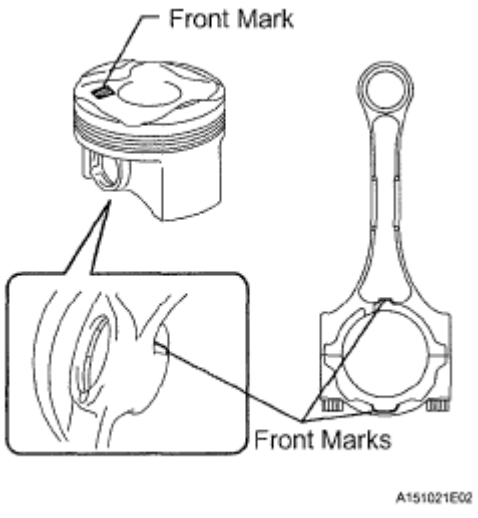


Fig. 204: Identifying Front Marks Of Piston And Connecting Rod
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Using a screwdriver, install a new snap ring on the other end of the piston pin hole.

HINT:

Make sure that the end gap of the snap ring is not aligned with the service hole on the piston.

e. Check the fitting condition between the piston and piston pin by moving the piston back and forth on the piston pin.

Fig. 205: Checking Fitting Condition Between Piston And Piston Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **INSTALL PISTON RING SET**
   a. Install the oil ring expander and oil ring rail by hand.

NOTE:

- **Install the expander and oil ring so that their ring ends are at opposite sides.**
- **Securely install the expander onto the inner groove of the oil**

ring.

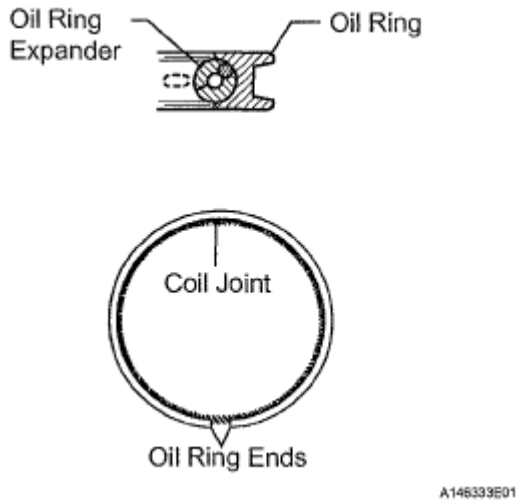


Fig. 206: Identifying Oil Ring Expander And Oil Ring Rail
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Using a piston ring expander, install the 2 compression rings so that the paint marks are positioned as shown in the illustration.

NOTE:

- **Install the compression ring No. 1 with the code mark (A1) facing upward.**
- **Install the compression ring No. 2 with the code mark (A2) facing upward.**
- **Paint marks can only be checked on new piston rings. When reusing piston rings, check each piston ring profile in order to install them into the correct positions.**

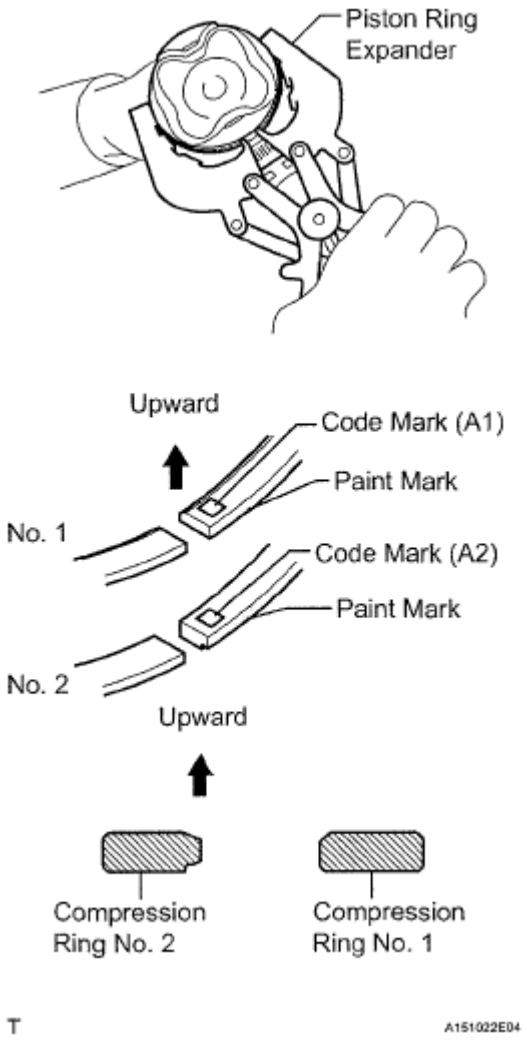


Fig. 207: Installing Piston Ring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Position the piston rings so that the ring ends are as shown in the illustration.

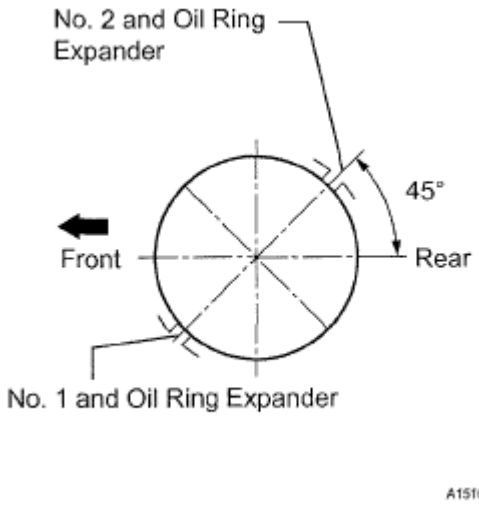


Fig. 208: Identifying Piston Ring Gap Direction
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. **INSTALL CRANKSHAFT BEARING**
   a. Install the upper bearing (for except No. 3 journal).
      1. Install the upper bearing with the oil groove on the cylinder block.
      2. Using vernier calipers, measure the distance between the cylinder block edge and the upper bearing edge.

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

Dimension (A): 0.5 to 1.0 mm (0.020 to 0.039 in.)

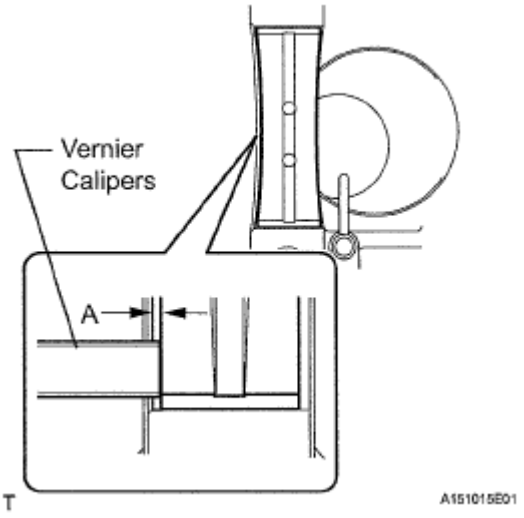


Fig. 209: Identifying Distance Between Cylinder Block Edge And Upper Bearing Edge
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Install the upper bearing (for No. 3 journal).
   1. Install the upper bearing with an oil groove on the cylinder block.
   2. Using vernier calipers, measure the distance between the cylinder block edge and the upper bearing's edge.

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

Dimension (A - B): 0.5 mm (0.0196 in.) or less

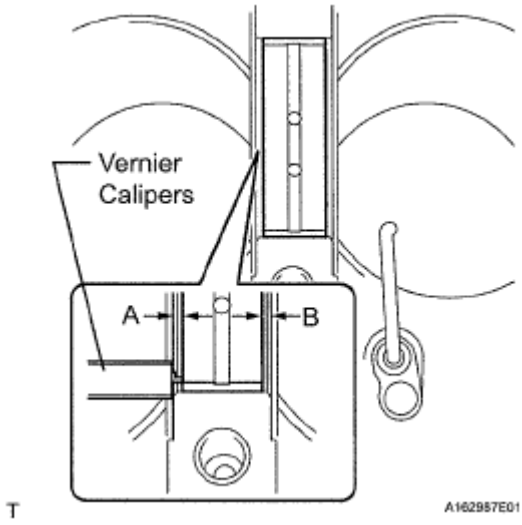


Fig. 210: Identifying Distance Between Cylinder Block Edge And Upper Bearing's Edge
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Install the lower bearing.
   1. Install the lower bearing onto the bearing cap.
   2. Using vernier calipers, measure the distance between the bearing cap edge and the lower bearing edge.

Dimension (A - B): 0.5 mm (0.0196 in.) or less

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

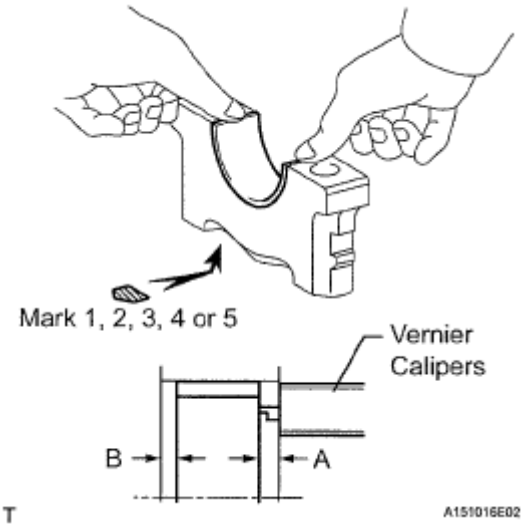


Fig. 211: Identifying Distance Between Bearing Cap Edge And Lower Bearing Edge
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. **INSTALL UPPER CRANKSHAFT THRUST WASHER**
   a. Install the 2 thrust washers under the No. 3 journal of the cylinder block with the oil grooves facing outward.

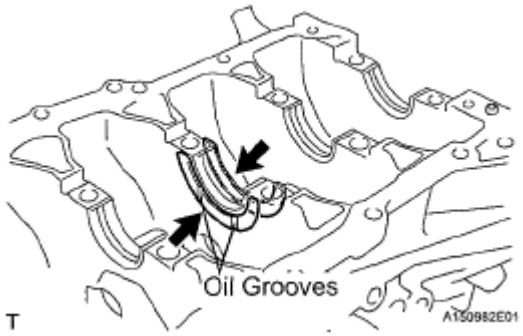


Fig. 212: Locating Thrust Washers
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Apply engine oil to the crankshaft thrust washer.
6. **INSTALL CRANKSHAFT**
   a. Apply engine oil to the upper bearing and install the crankshaft on the cylinder block.
   b. Apply engine oil to the lower bearing.
   c. Examine the front marks and install the bearing caps on the cylinder block.

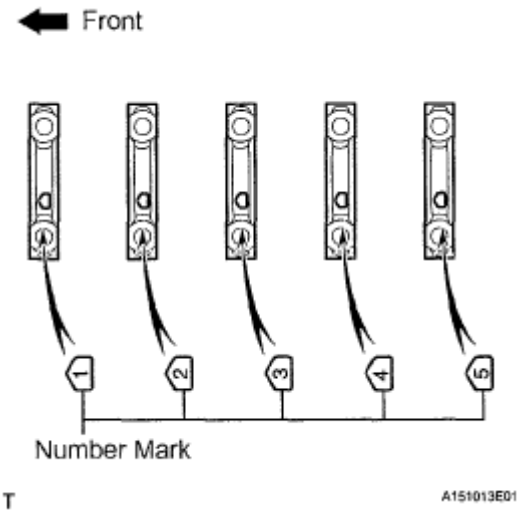


Fig. 213: Identifying Marks On Bearing Caps
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Apply a light coat of engine oil to the threads and under the bearing cap bolts.
e. Temporarily install the 10 main bearing cap bolts.

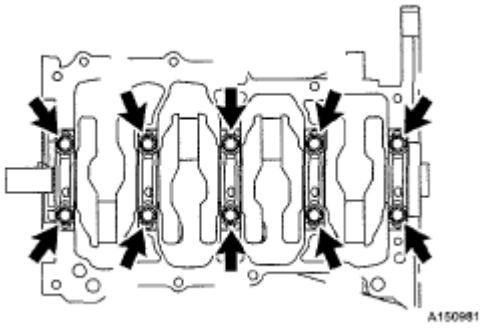


Fig. 214: Locating Main Bearing Cap Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

f. Insert the main bearing cap with your hand until the clearance between the main bearing cap and the cylinder block is less than 5 mm (0.20 in.).

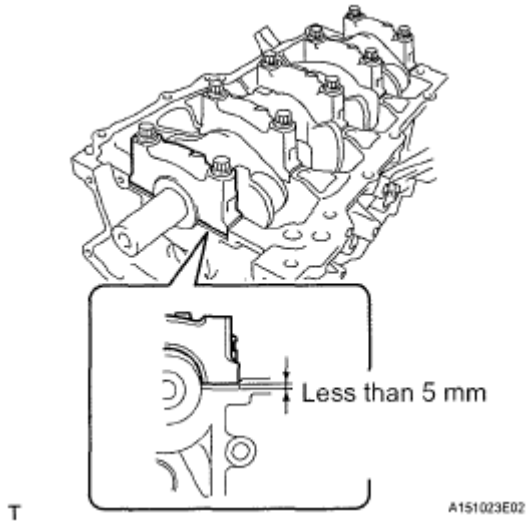


Fig. 215: Identifying Clearance Between Main Bearing Cap And Cylinder Block
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

g. Using a plastic hammer, lightly tap the bearing cap to ensure a proper fit.

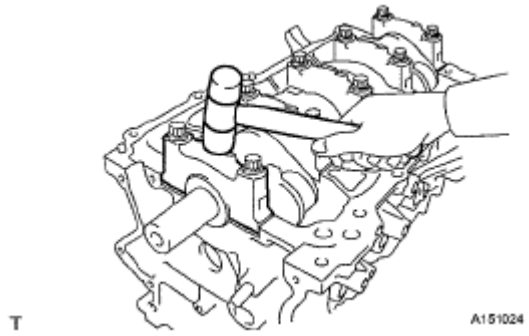


Fig. 216: Tapping Bearing Cap
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

h. Install the crankshaft bearing cap bolts.

NOTE: The main bearing cap bolts are tightened in 2 progressive steps.

i. Step 1
   1. Install and uniformly tighten the 10 main bearing cap bolts in the sequence shown in the illustration.

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

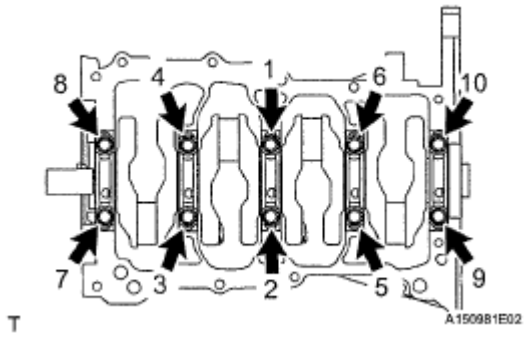


Fig. 217: Locating Main Bearing Cap Bolts And Tightening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

j. Step 2
   1. Mark the front of the bearing cap bolts with paint.
   2. Further tighten the bearing cap bolts by 90° in the numerical order shown in the previous illustration.

k. Check that the paint mark is now at a 90° angle to the front.

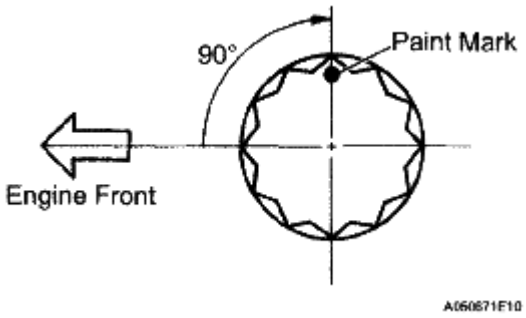


Fig. 218: Identifying Bearing Cap Bolts Tightening Direction
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

l. Check that the crankshaft turns smoothly.
m. Check the crankshaft thrust clearance (See **INSPECTION**).

7. **INSTALL CONNECTING ROD BEARING**
   a. Install the connecting rod bearing onto the connecting rod and bearing cap.
   b. Using vernier calipers, measure the distance between the connecting rod and connecting rod bearing, and the connecting rod cap and connecting rod bearing.

Dimension (A - B): 0.7 mm (0.0276 in.) or less

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

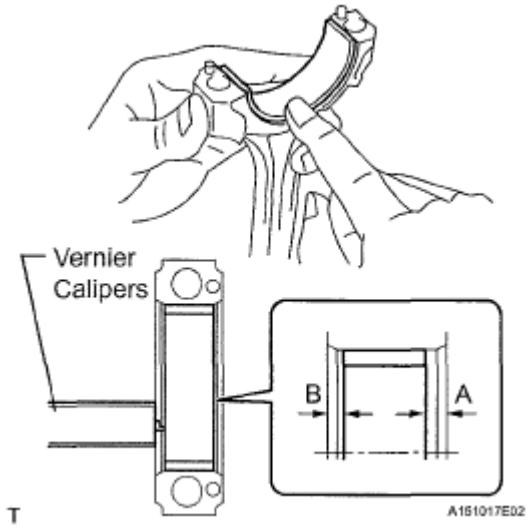


Fig. 219: Identifying Distance Between Connecting Rod And Connecting Rod Bearing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. **INSTALL PISTON SUB-ASSEMBLY WITH CONNECTING ROD**
   a. Apply engine oil to the cylinder walls, the pistons, and the surfaces of the connecting rod bearings.
   b. Position the piston rings so that the ring ends are as shown in the illustration.

NOTE: Do not align the ring ends.

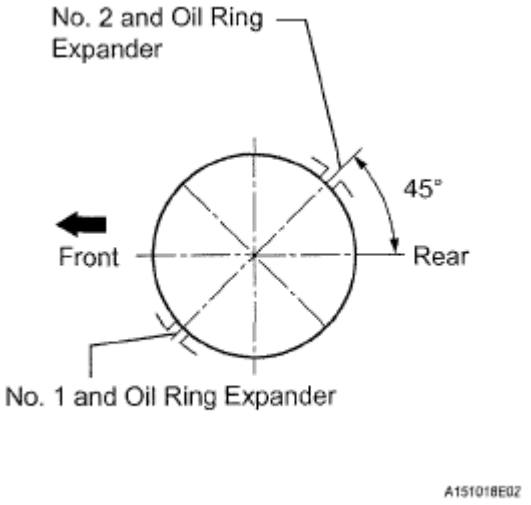


Fig. 220: Identifying Piston Ring Gap Direction
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   c. Using a piston ring compressor, push the correctly numbered piston and connecting rod assembly into the cylinder with the front mark of the piston facing forward.

NOTE:
- **When inserting the piston with connecting rod, do not allow it to**

make contact with the oil nozzle.

- **Match the numbered connecting rod cap with the connecting rod.**

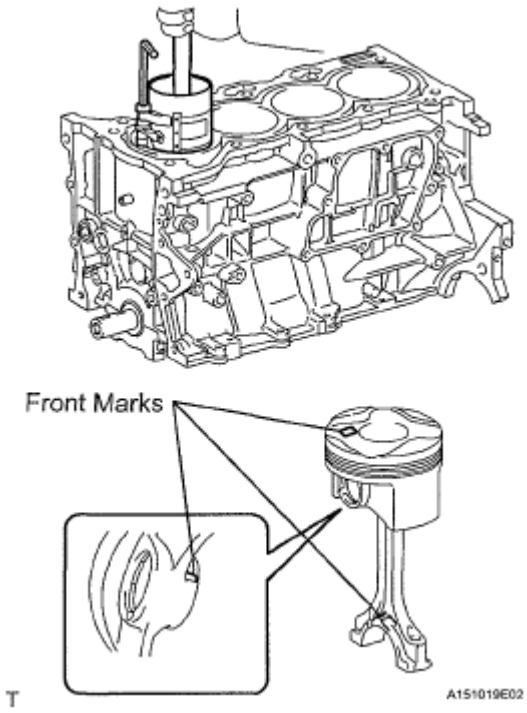


Fig. 221: Pushing Piston And Connecting Rod Assembly Into Cylinder
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Check that the protrusion of the connecting rod cap is facing in the correct direction.

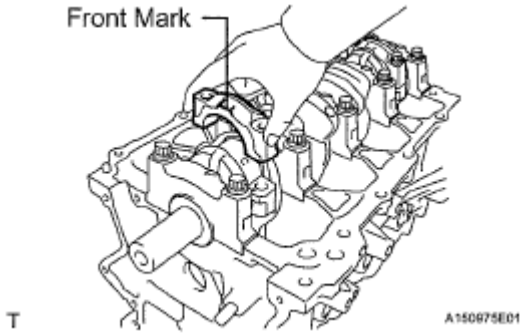


Fig. 222: Identifying Front Mark Of Connecting Rod Cap
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

e. Apply a light coat of engine oil to the threads and under the heads of the connecting rod cap bolts.
f. Install the connecting cap bolts.

NOTE: The connecting cap bolts should be tightened in 2 progressive steps.

g. Step 1

1. Using SST, install and alternately tighten the bolts of the connecting rod cap in several steps.

SST 09205-16010

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

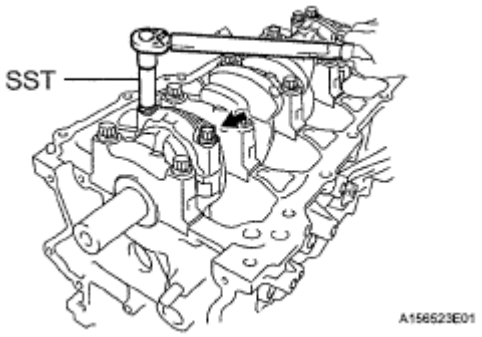


Fig. 223: Tightening Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

h. Step 2

1. Mark the front of the connecting rod cap bolts with paint.
2. Further tighten the cap bolts by 90° as shown in the illustration.

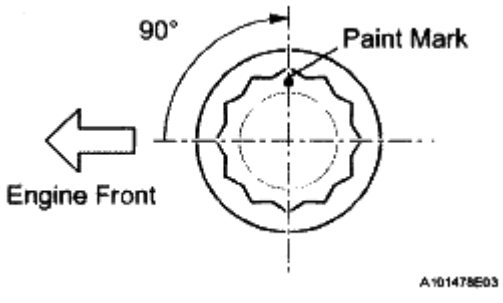


Fig. 224: Identifying Bolt Tightening Direction
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

i. Check that the crankshaft turns smoothly.
j. Check the connecting rod thrust clearance (See **INSPECTION**).

9. **INSTALL NO. 1 VENTILATION CASE**

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

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

Seal diameter: 2.0 mm (0.0787 in.)

NOTE:

- **Remove any oil from the contact surface.**
- **Install the oil pan within 3 minutes and tighten the bolts and nuts within 15 minutes of applying seal packing.**
- **Do not start the engine for at least 2 hours after installing.**

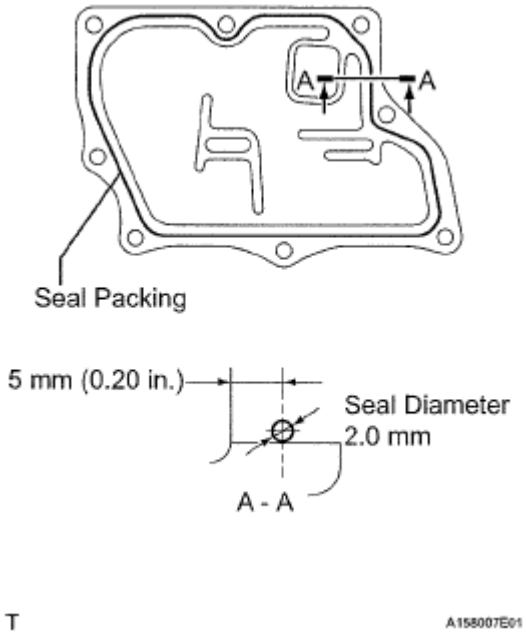


Fig. 225: Applying Seal Packing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Install the No. 1 ventilation case with the 6 bolts and 2 nuts.

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

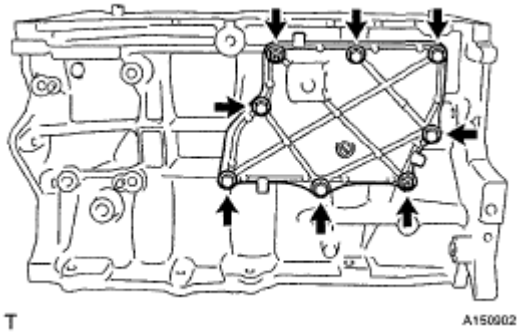


Fig. 226: Locating No. 1 Ventilation Case Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

FRONT CRANKSHAFT OIL SEAL

COMPONENTS

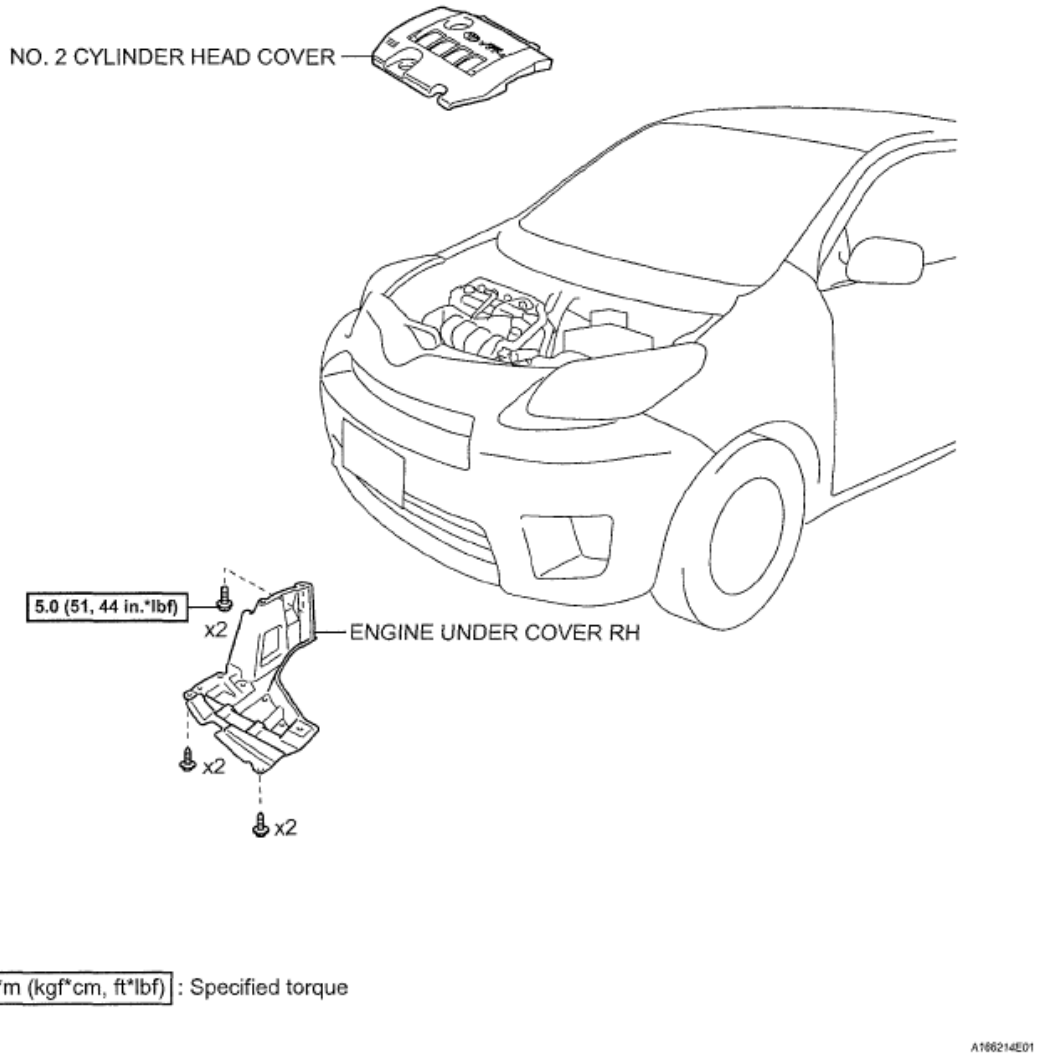


Fig. 227: Identifying Front Crankshaft Oil Seal Components And Torque Specifications (1 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

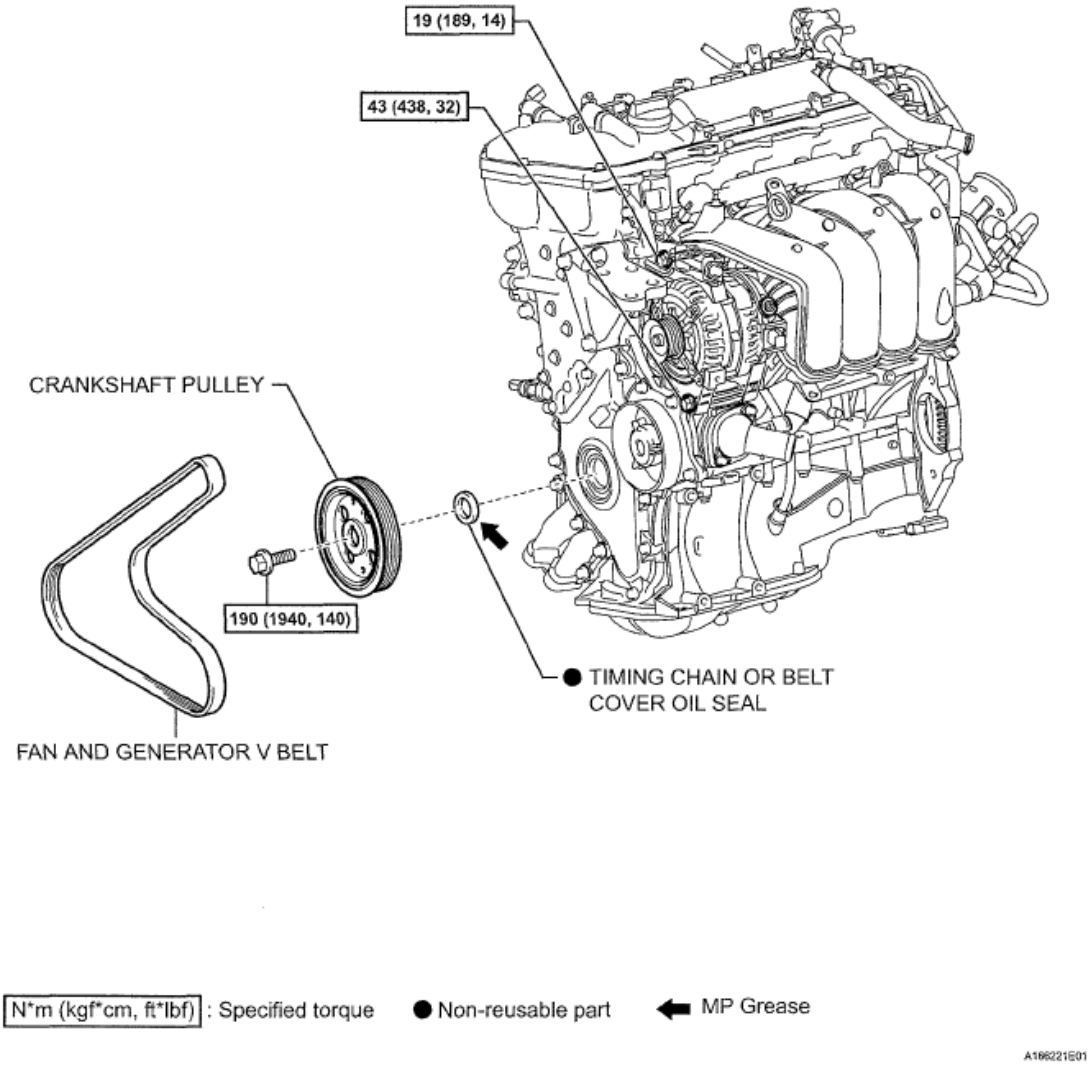


Fig. 228: Identifying Front Crankshaft Oil Seal Components And Torque Specifications (2 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **REMOVE ENGINE UNDER COVER RH**
2. **REMOVE NO. 2 CYLINDER HEAD COVER** (See **REMOVAL**)
3. **REMOVE FAN AND GENERATOR V BELT** (See **REMOVAL**)
4. **REMOVE CRANKSHAFT PULLEY**
   a. Using SST, hold the pulley in place and loosen the pulley bolt.

      SST 09213-58013 (91651-60855), 09330-00021

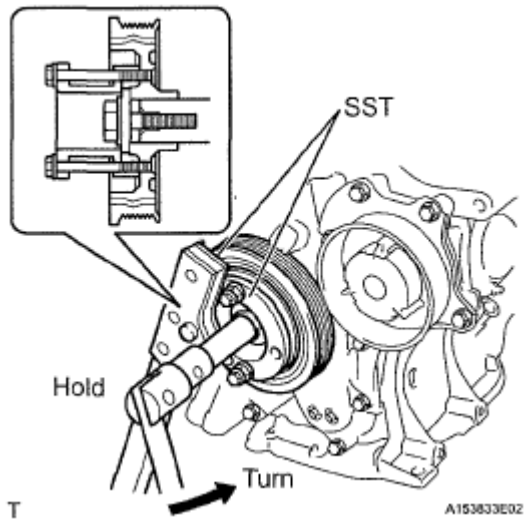


Fig. 229: Loosening Pulley Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Using SST, remove the pulley bolt and pulley.

SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021)

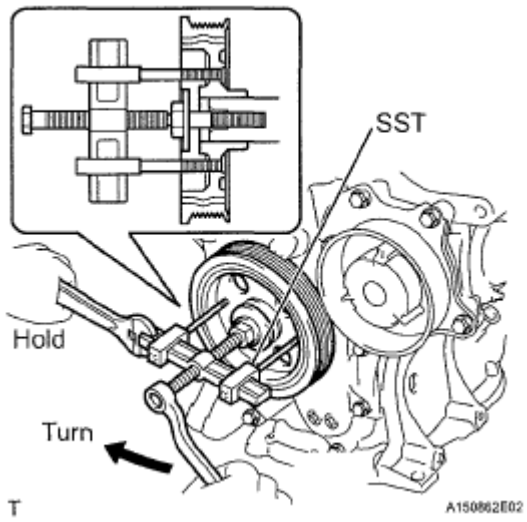


Fig. 230: Removing Pulley Bolt And Pulley
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. **REMOVE TIMING CHAIN OR BELT COVER OIL SEAL**
   a. Using a knife, cut off the oil seal lip.
   b. Using a screwdriver with its tip taped, pry out the oil seal.

NOTE: After the removal, check the crankshaft for damage. If it is damaged, smooth the surface with 400-grit sandpaper.

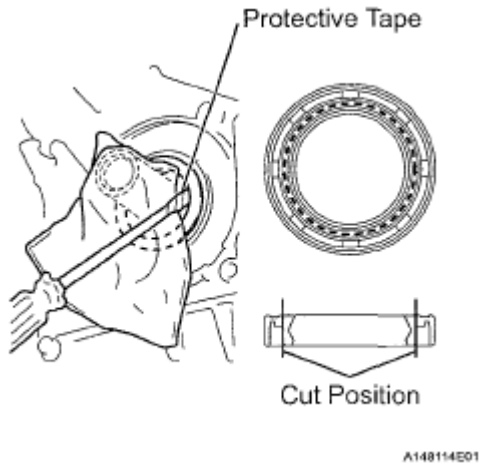


Fig. 231: Prying Out Oil Seal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. **INSTALL TIMING CHAIN OR BELT COVER OIL SEAL**
   a. Apply MP grease to a new oil seal lip.
   b. Using SST and a hammer, tap the oil seal until its surface is flush with the timing chain cover edge.

   SST 09223-22010

   NOTE:
   - **Do not tap the oil seal at an angle.**
   - **Keep the lip free of foreign matter.**

   HINT:

   The pressing-in depth should be within the range of -1 mm and 1 mm from the chain cover edge.

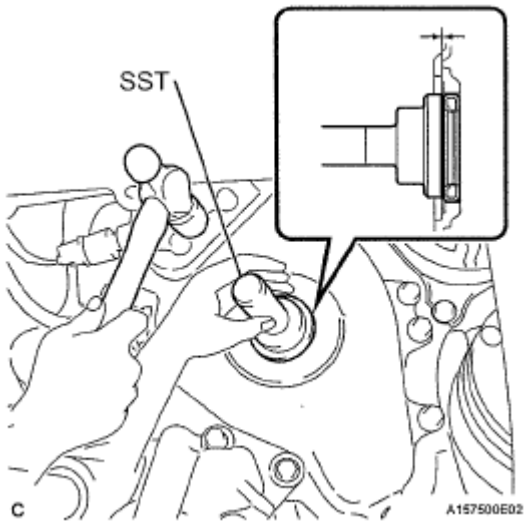


Fig. 232: Installing Oil Seal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **INSTALL CRANKSHAFT PULLEY**
   a. Align the pulley set key with the key groove of the pulley.
   b. Using SST, hold the pulley in place and tighten the bolt.

   SST 09213-58013 (91651-60855), 09330-00021

   Torque: 190 N*m (1940 kgf*cm, 140 ft.*lbf)

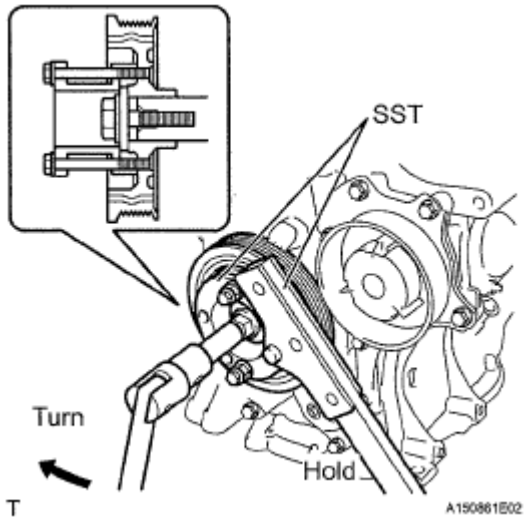


Fig. 233: Tightening Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **INSTALL FAN AND GENERATOR V BELT** (See **INSTALLATION**)
4. **ADJUST FAN AND GENERATOR V BELT** (See **INSTALLATION**)

5. **INSPECT FAN AND GENERATOR V BELT** (See **INSTALLATION**)
6. **INSTALL NO. 2 CYLINDER HEAD COVER** (See **INSTALLATION**)
7. **INSPECT FOR ENGINE OIL LEAK**
8. **INSTALL ENGINE UNDER COVER RH**

REAR CRANKSHAFT OIL SEAL

COMPONENTS

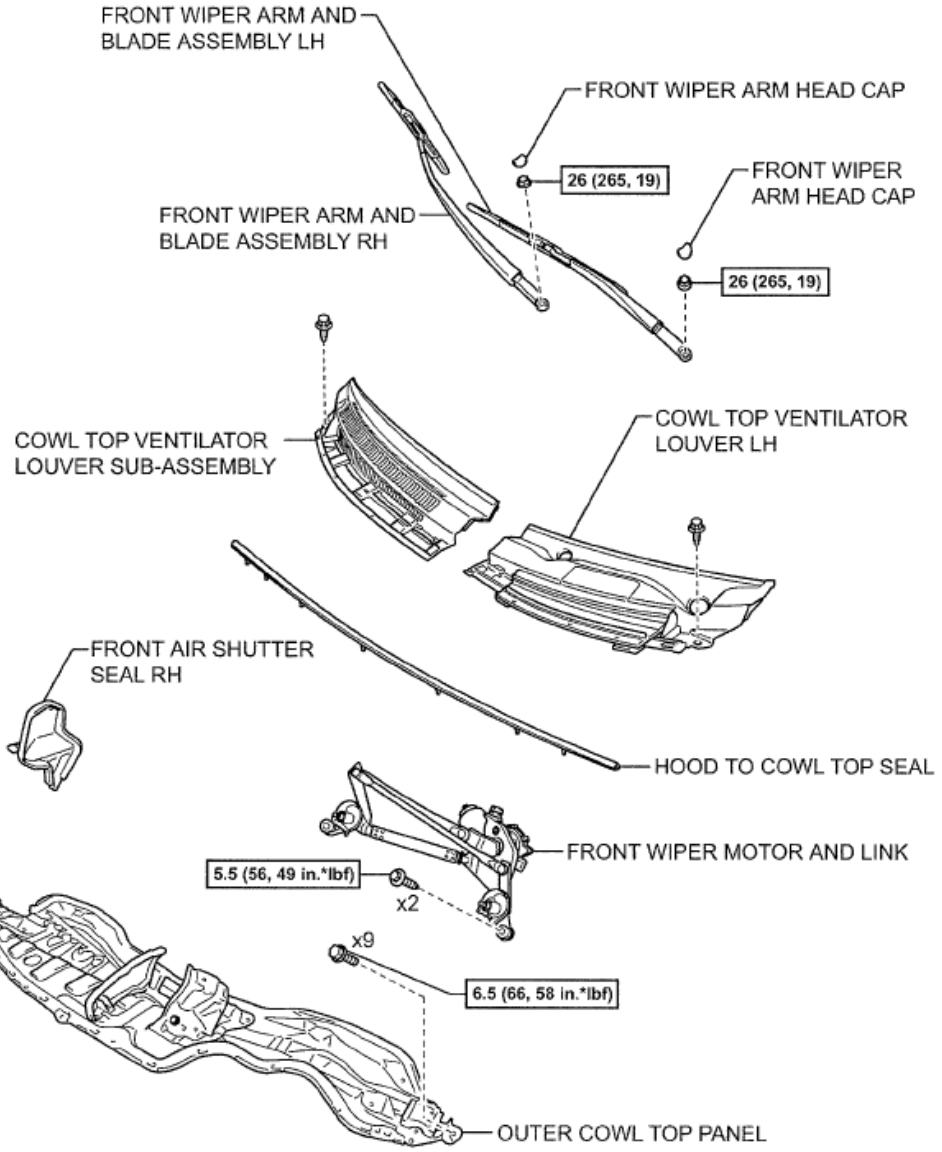


Fig. 234: Identifying Rear Crankshaft Oil Seal Components And Torque Specifications (1 Of 13)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

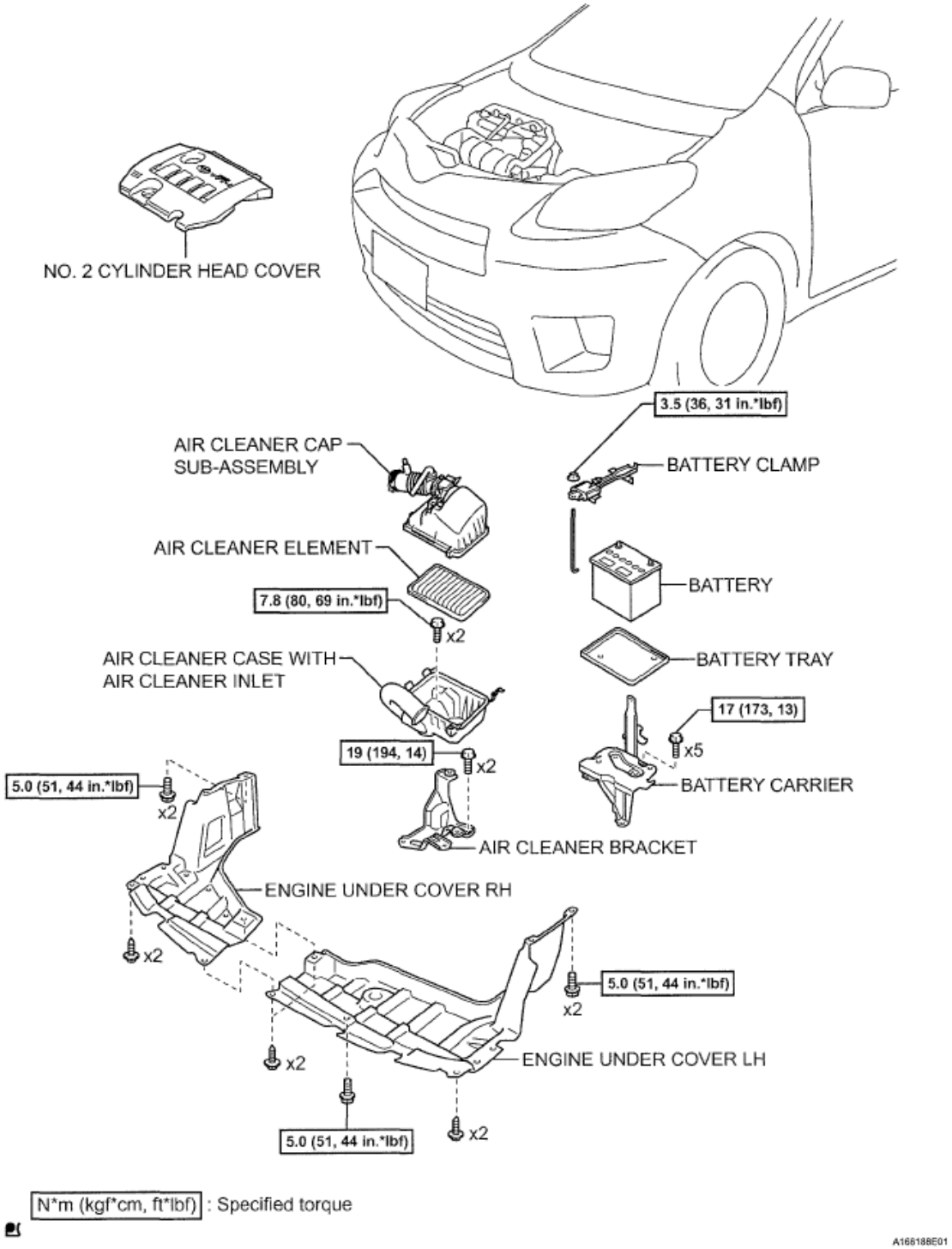


Fig. 235: Identifying Rear Crankshaft Oil Seal Components And Torque Specifications (2 Of 13)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

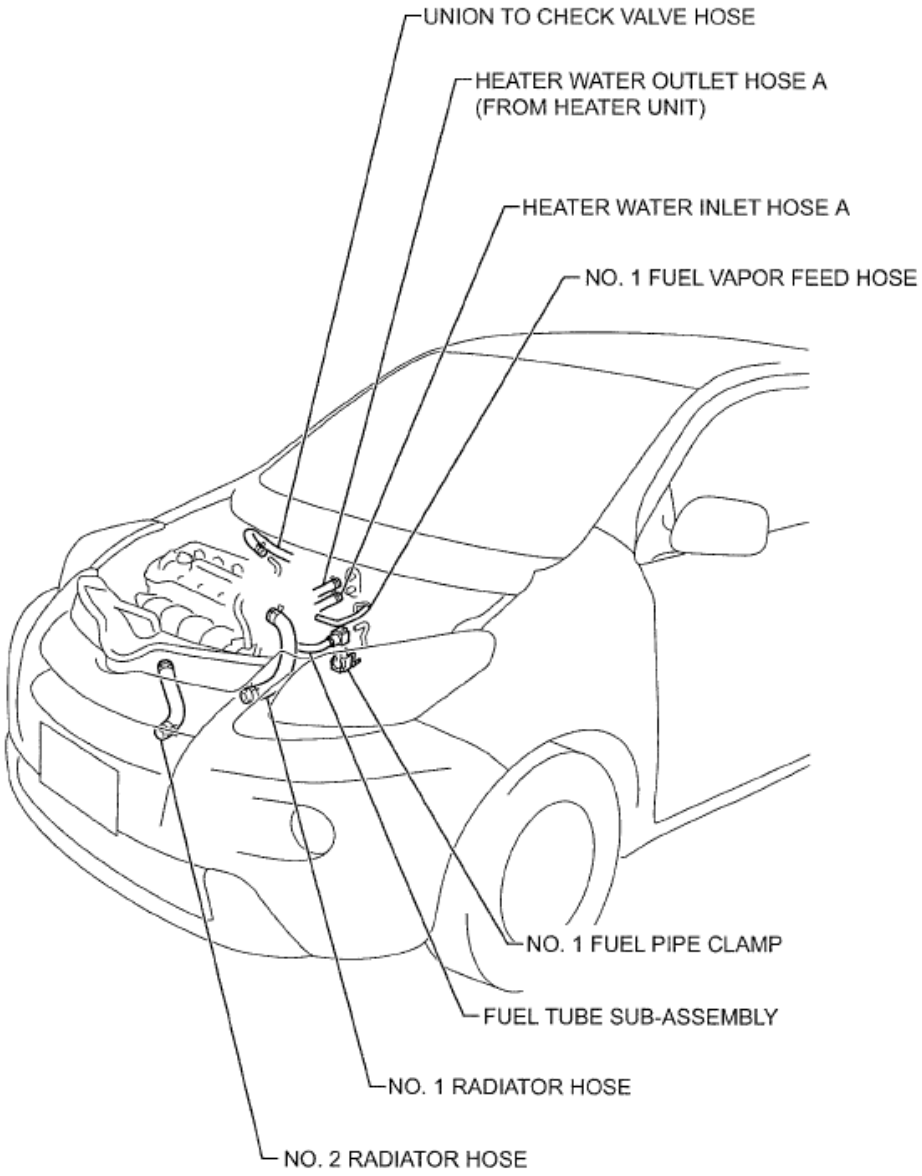


Fig. 236: Identifying Rear Crankshaft Oil Seal Components (3 Of 13)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

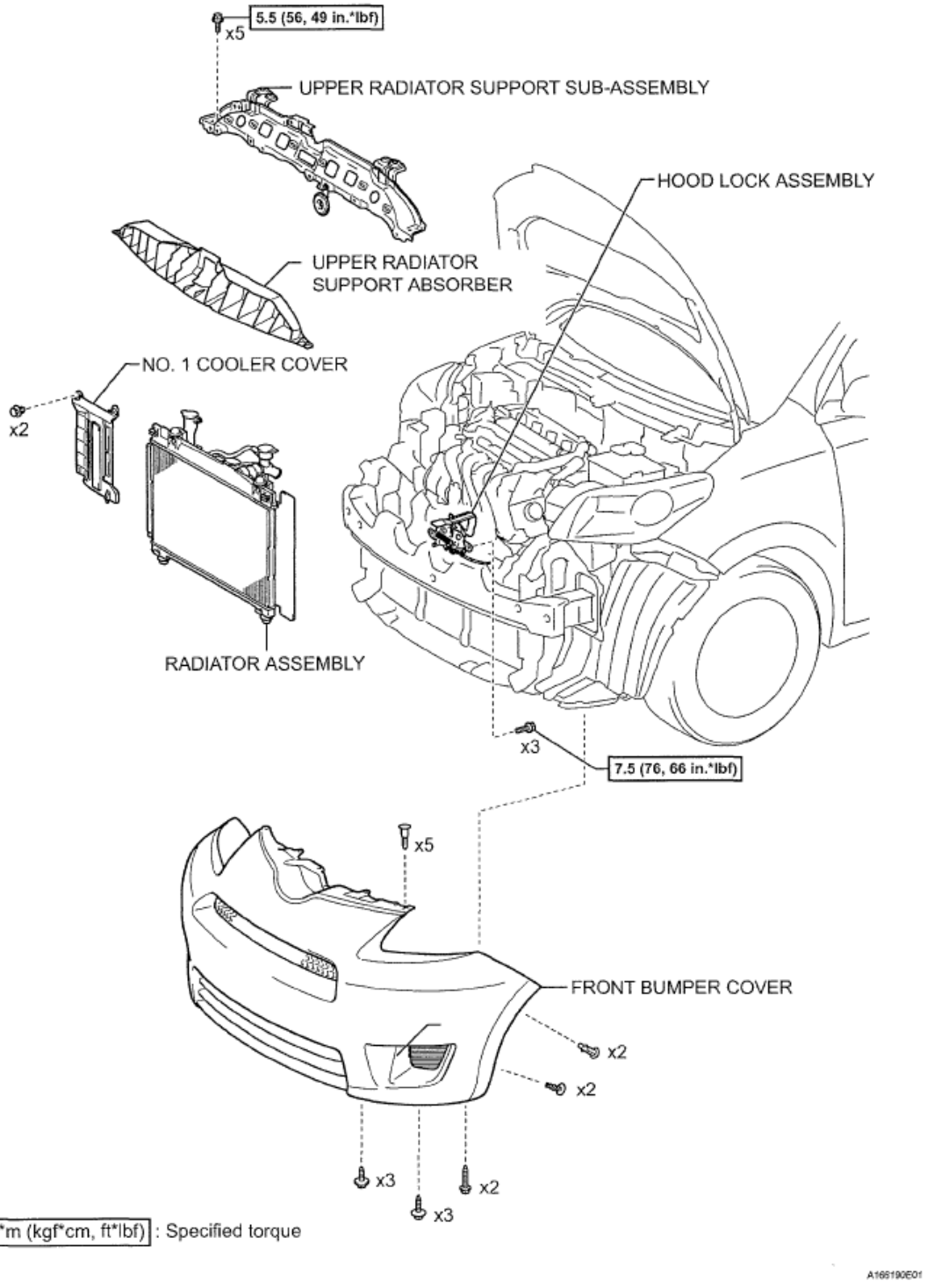


Fig. 237: Identifying Rear Crankshaft Oil Seal Components And Torque Specifications (4 Of 13)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

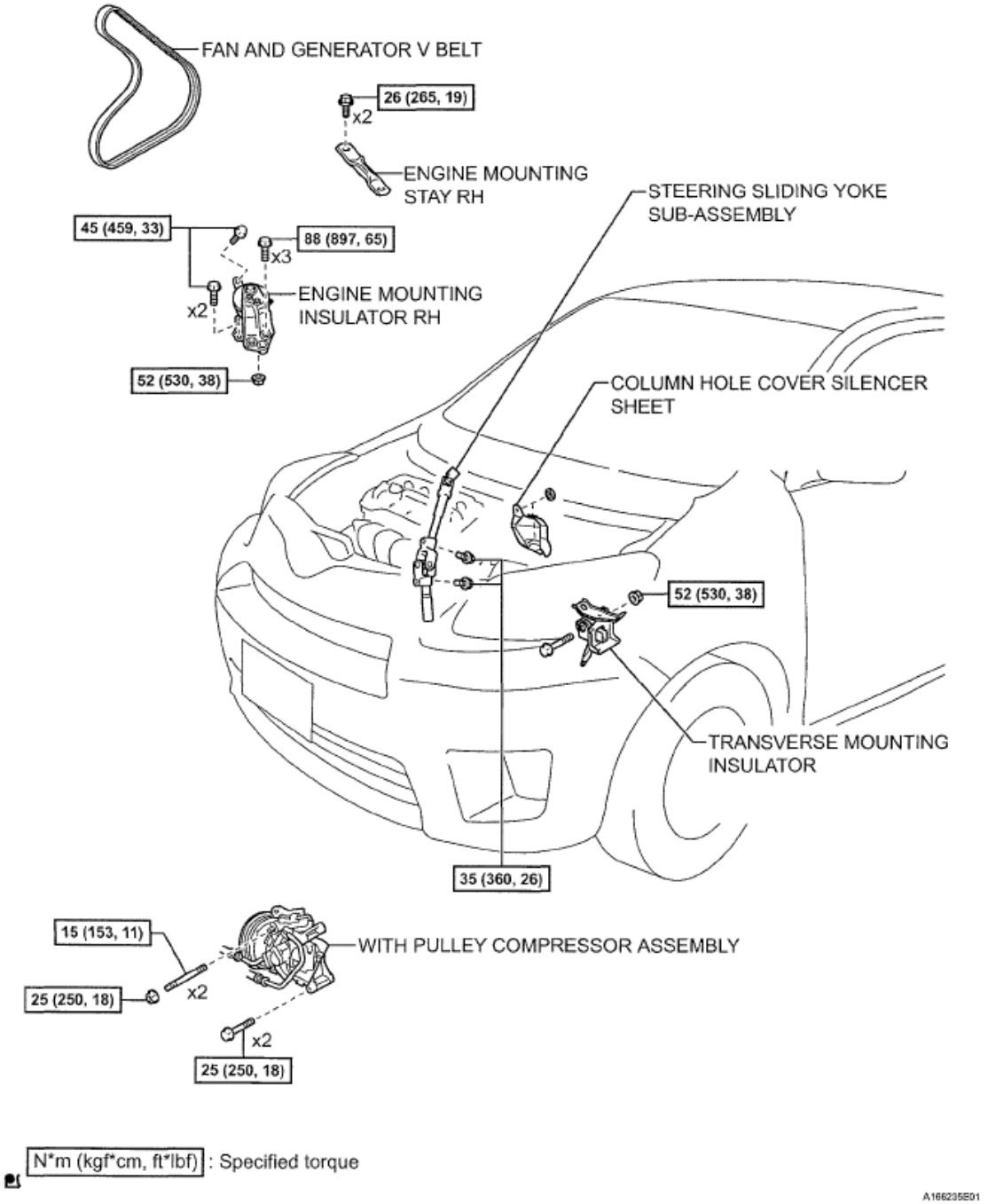


Fig. 238: Identifying Rear Crankshaft Oil Seal Components And Torque Specifications (5 Of 13)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

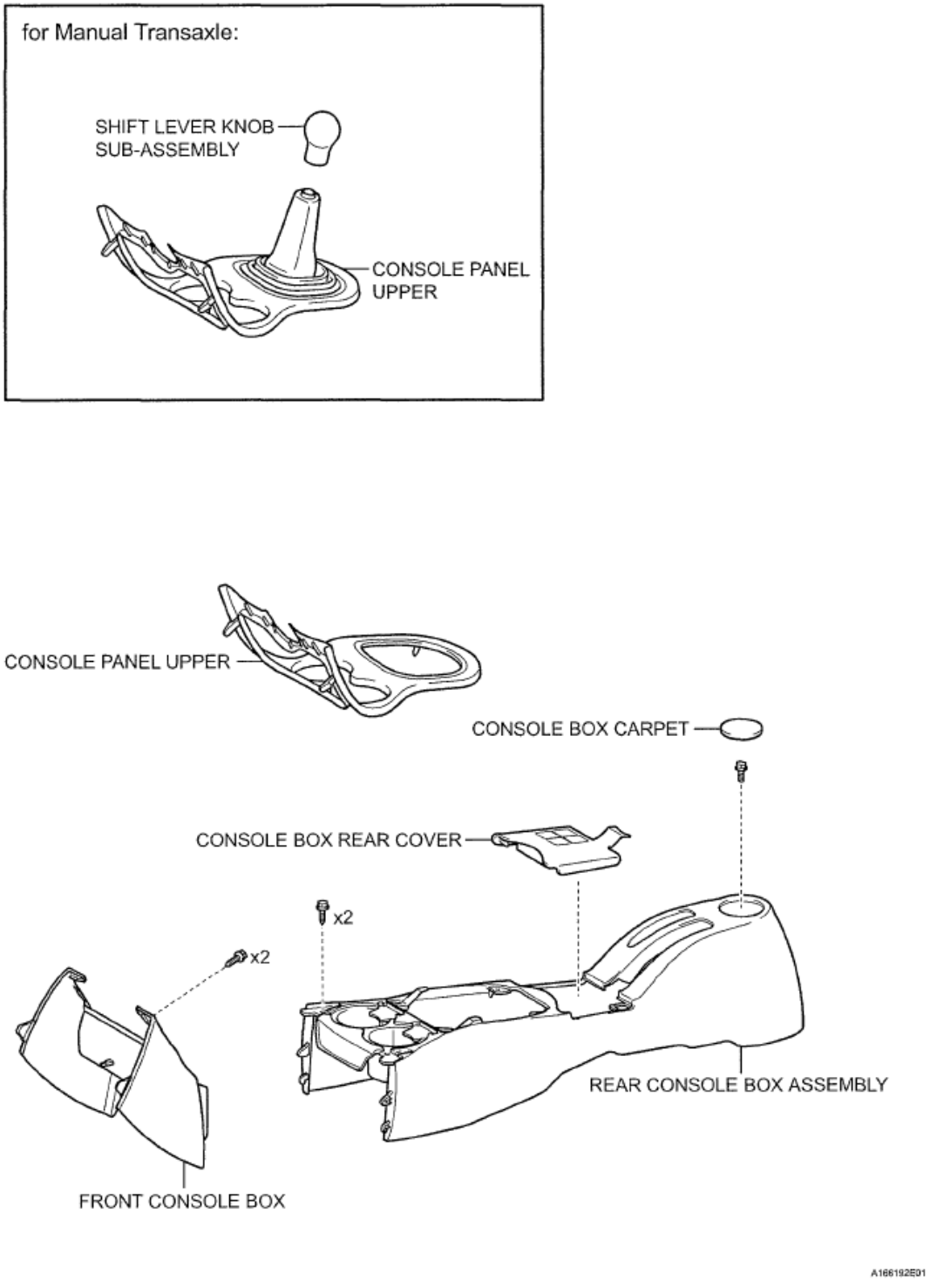


Fig. 239: Identifying Rear Crankshaft Oil Seal Components (6 Of 13)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

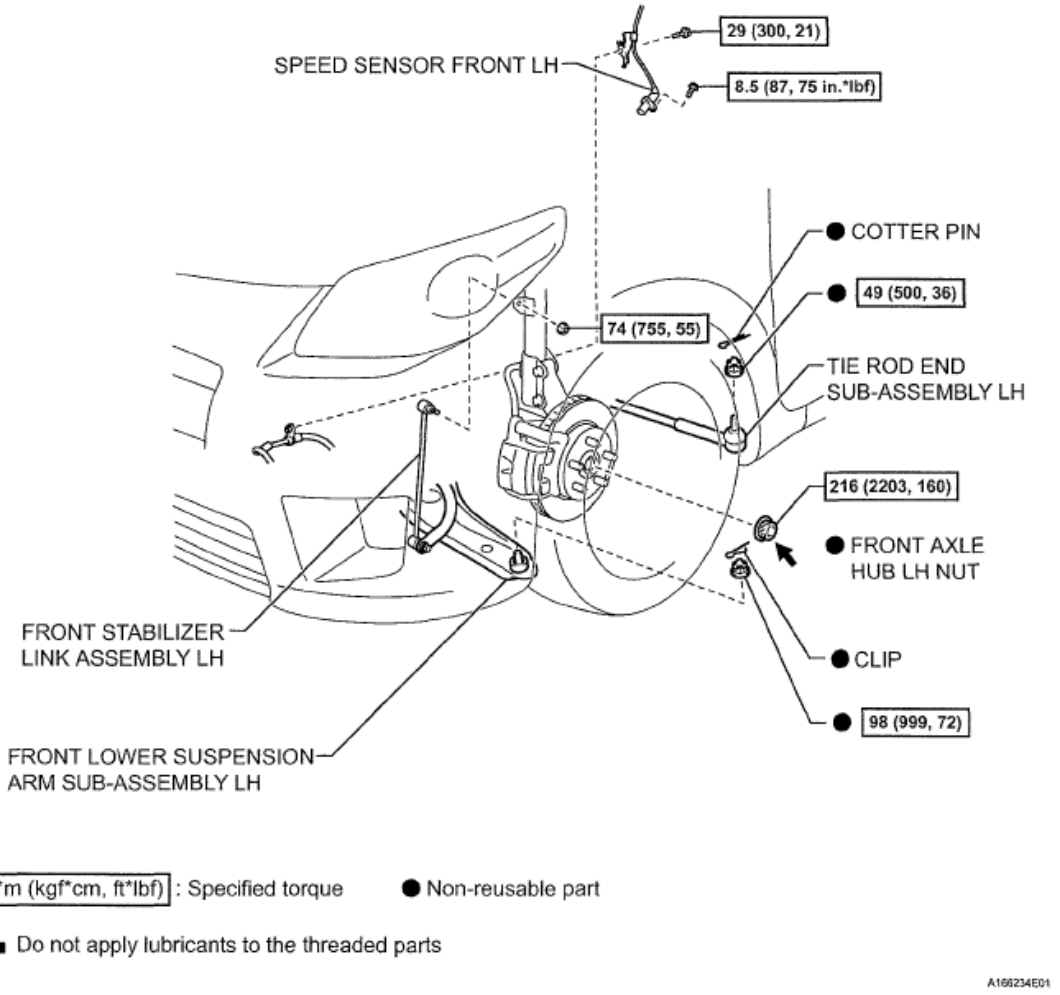


Fig. 240: Identifying Rear Crankshaft Oil Seal Components And Torque Specifications (7 Of 13)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

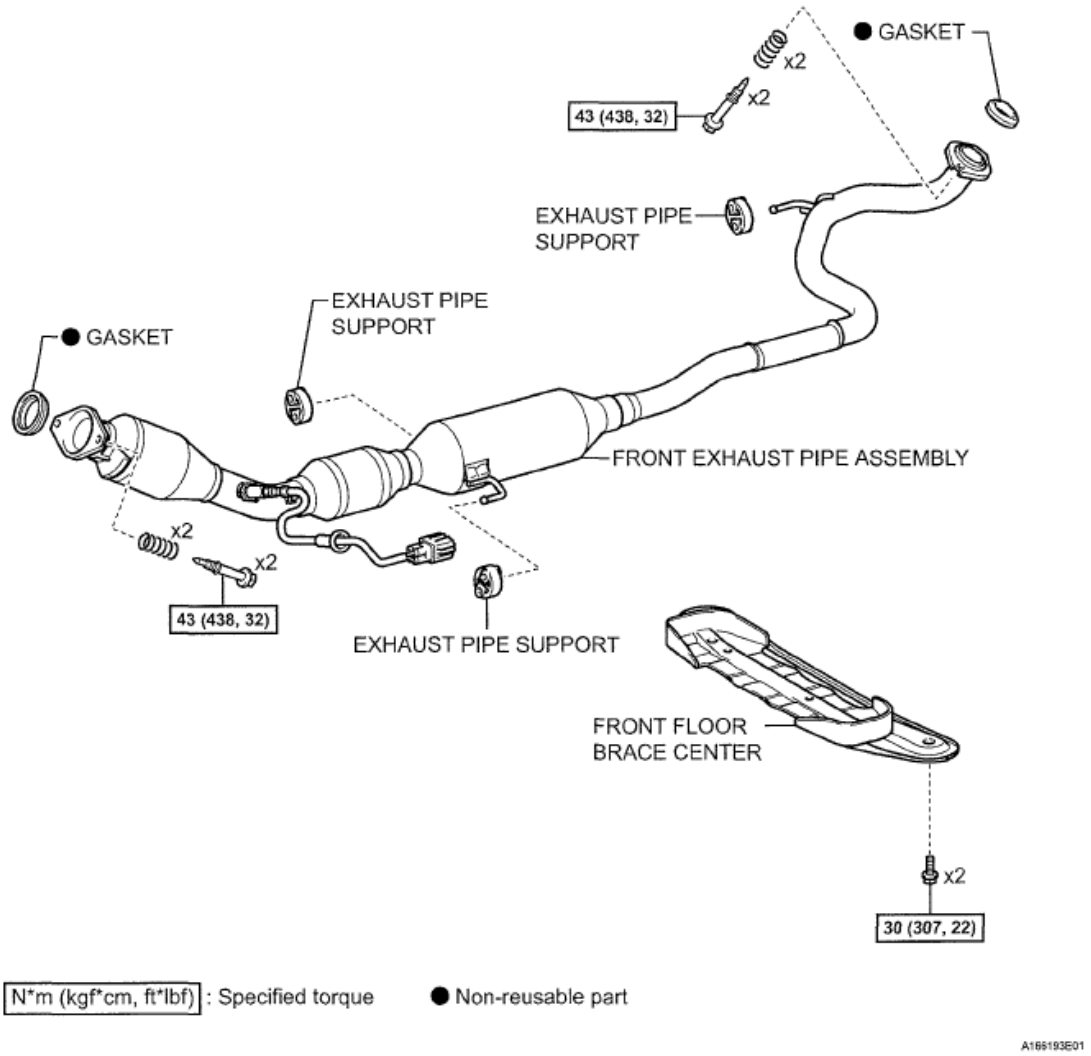


Fig. 241: Identifying Rear Crankshaft Oil Seal Components And Torque Specifications (8 Of 13)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

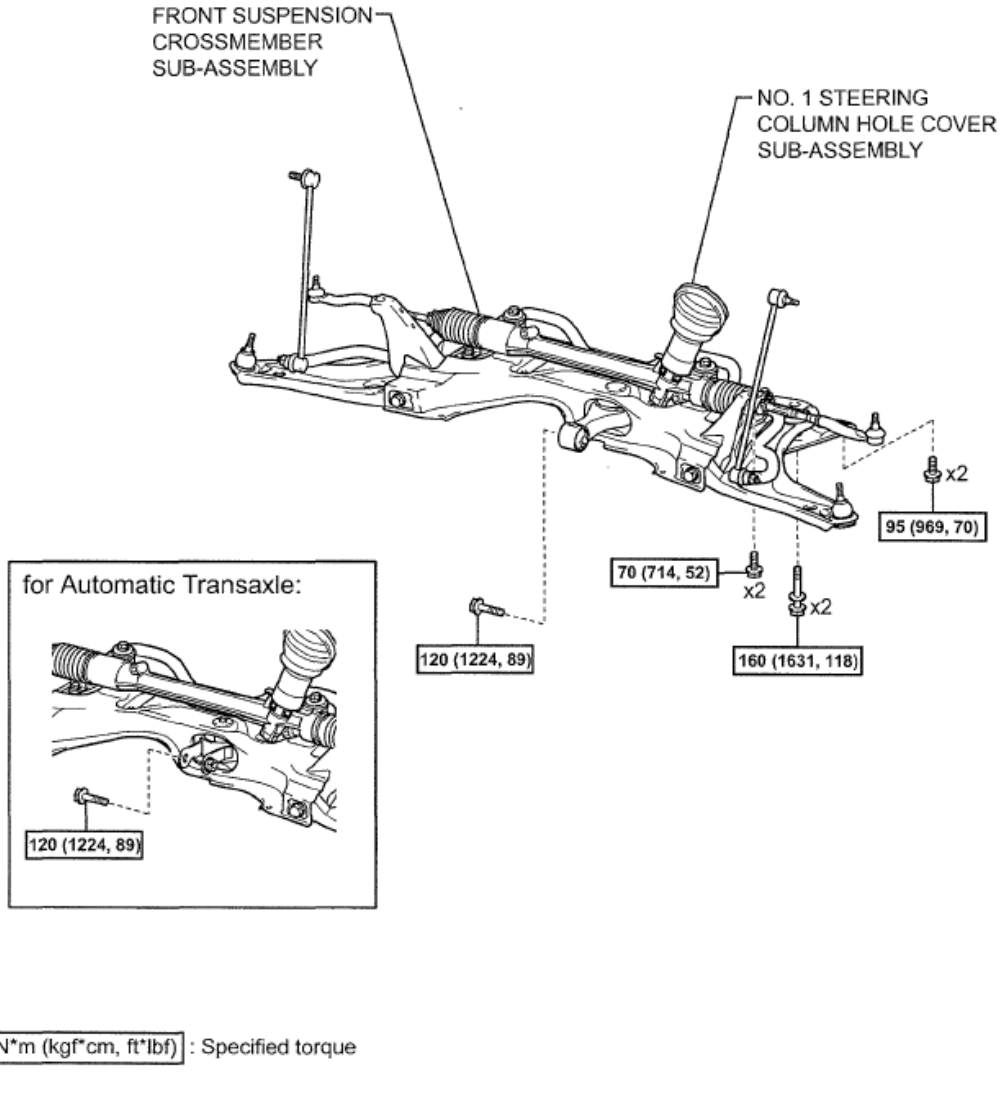


Fig. 242: Identifying Rear Crankshaft Oil Seal Components And Torque Specifications (9 Of 13)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

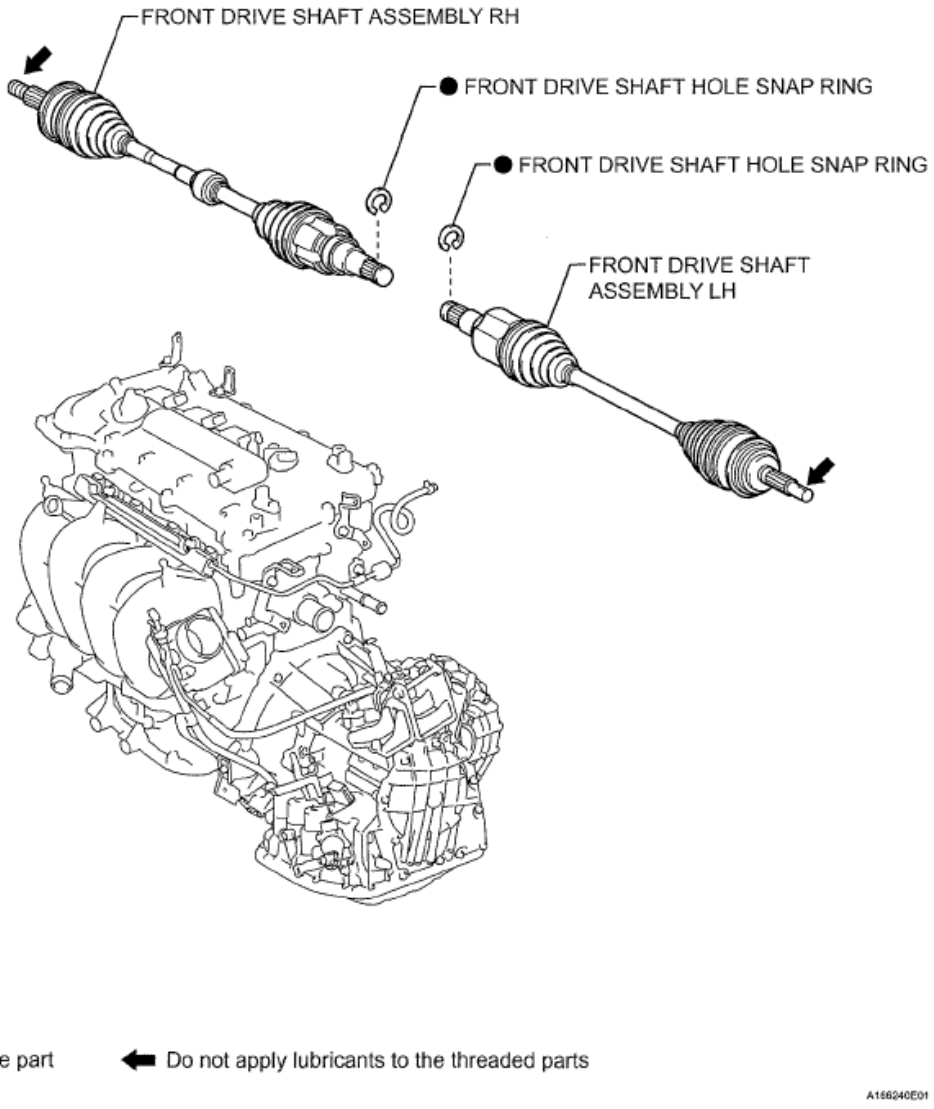


Fig. 243: Identifying Rear Crankshaft Oil Seal Components (10 Of 13)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

for Automatic Transaxle:

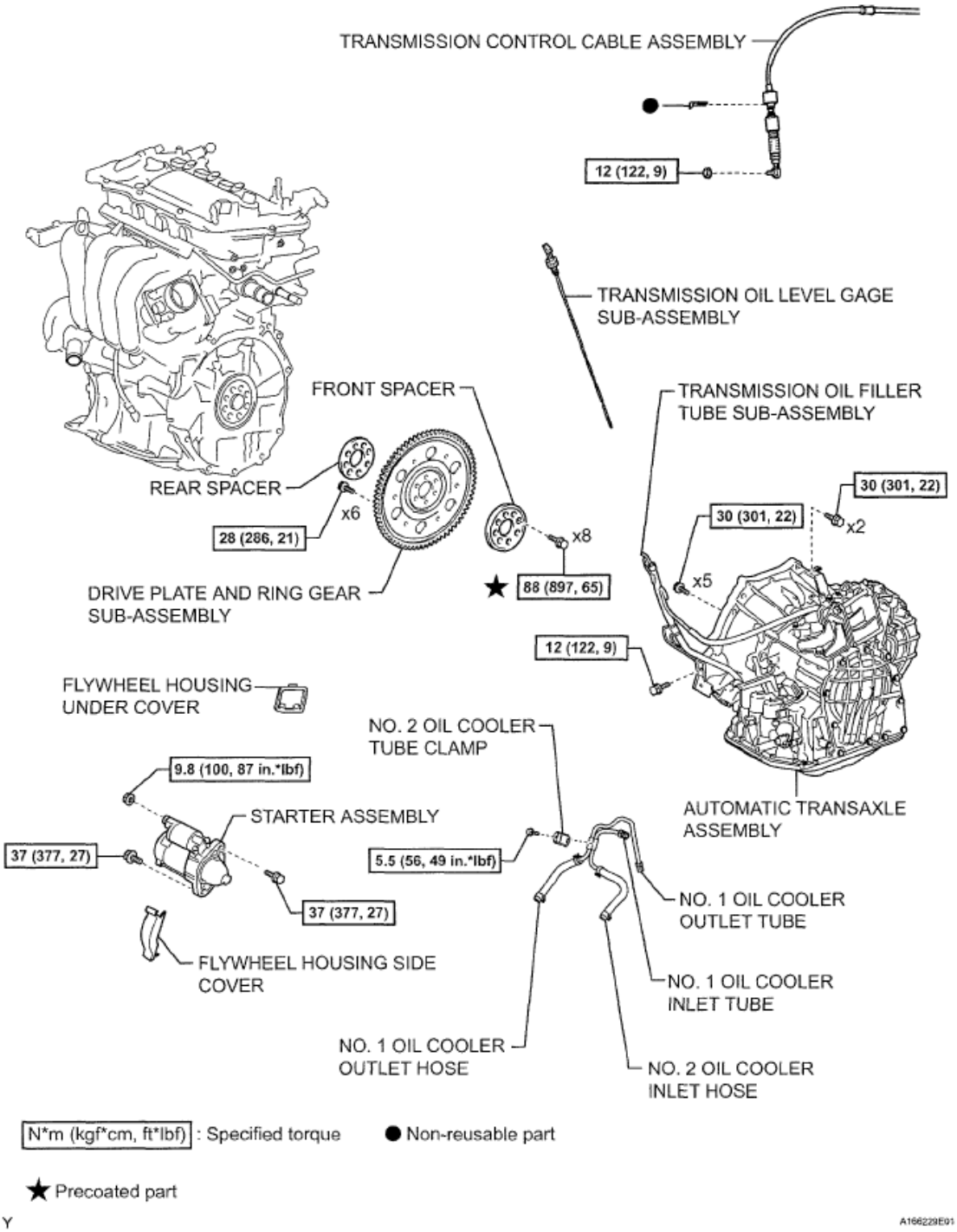


Fig. 244: Identifying Rear Crankshaft Oil Seal Components And Torque Specifications (11 Of 13)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

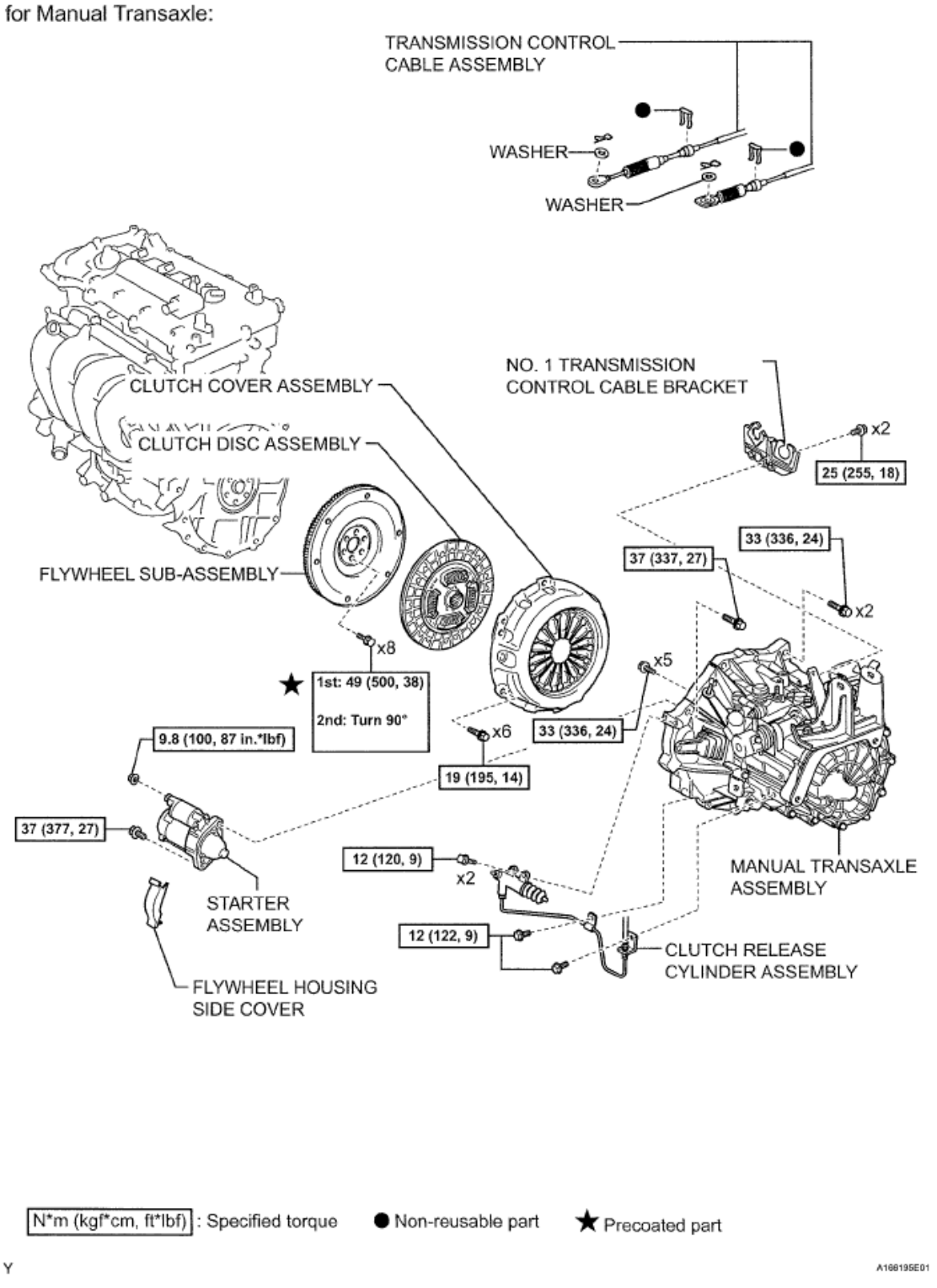


Fig. 245: Identifying Rear Crankshaft Oil Seal Components And Torque Specifications (12 Of 13)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

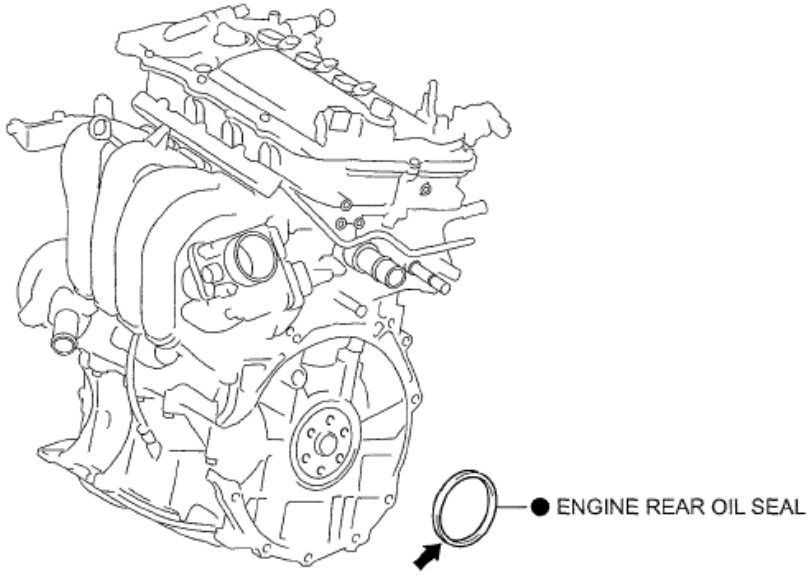


Fig. 246: Identifying Rear Crankshaft Oil Seal Components (13 Of 13)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **DISCHARGE FUEL SYSTEM PRESSURE**

   (See **PRECAUTION**)

2. **REMOVE BATTERY** (See **REMOVAL**)
3. **REMOVE BATTERY TRAY**
4. **REMOVE FRONT WHEELS**
5. **REMOVE ENGINE UNDER COVER LH**
6. **REMOVE ENGINE UNDER COVER RH**
7. **DRAIN ENGINE COOLANT** (See **REPLACEMENT**)
8. **DRAIN MANUAL TRANSAXLE OIL (for Manual Transaxle)**
9. **DRAIN AUTOMATIC TRANSAXLE OIL (for Automatic Transaxle)**
10. **REMOVE FRONT WIPER ARM HEAD CAP** (See **REMOVAL**)
11. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH** (See **REMOVAL**)
12. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH** (See **REMOVAL**)
13. **REMOVE HOOD TO COWL TOP SEAL** (See **REMOVAL**)
14. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY** (See **REMOVAL**)

15. **REMOVE COWL TOP VENTILATOR LOUVER LH** (See **REMOVAL**)
16. **REMOVE FRONT WIPER MOTOR AND LINK** (See **REMOVAL**)
17. **REMOVE FRONT AIR SHUTTER SEAL RH** (See **REMOVAL**)
18. **REMOVE OUTER COWL TOP PANEL** (See **REMOVAL**)
19. **REMOVE AIR CLEANER ASSEMBLY** (See **REMOVAL**)
20. **REMOVE AIR CLEANER BRACKET** (See **REMOVAL**)
21. **REMOVE BATTERY CARRIER** (See **REMOVAL**)
22. **REMOVE NO. 2 CYLINDER HEAD COVER** (See **REMOVAL**)
23. **REMOVE FAN AND GENERATOR V BELT** (See **REMOVAL**)
24. **REMOVE NO. 2 RADIATOR HOSE** (See **REMOVAL**)
25. **REMOVE FRONT BUMPER COVER** (See **REMOVAL**)
26. **DISCONNECT NO. 1 RADIATOR HOSE** (See **REMOVAL**)
27. **DISCONNECT NO. 1 OIL COOLER OUTLET HOSE (for Automatic Transaxle)** (See **REMOVAL**)
28. **DISCONNECT NO. 2 OIL COOLER INLET HOSE (for Automatic Transaxle)** (See **REMOVAL**)
29. **REMOVE HOOD LOCK ASSEMBLY** (See **REMOVAL**)
30. **REMOVE NO. 1 COOLER COVER** (See **REMOVAL**)
31. **REMOVE UPPER RADIATOR SUPPORT ABSORBER** (See **DISASSEMBLY**)
32. **REMOVE UPPER RADIATOR SUPPORT SUB-ASSEMBLY** (See **REMOVAL**)
33. **REMOVE RADIATOR ASSEMBLY** (See **REMOVAL**)
34. **SEPARATE WITH PULLEY COMPRESSOR ASSEMBLY** (See **REMOVAL**)
35. **SEPARATE TRANSMISSION CONTROL CABLE ASSEMBLY (for Automatic Transaxle)** (See **REMOVAL**)
36. **SEPARATE TRANSMISSION CONTROL CABLE ASSEMBLY (for Manual Transaxle)** (See **REMOVAL**)
37. **SEPARATE UNION TO CHECK VALVE HOSE** (See **REMOVAL**)
38. **SEPARATE NO. 1 FUEL VAPOR FEED HOSE** (See **REMOVAL**)
39. **DISCONNECT ENGINE WIRE** (See **REMOVAL**)
40. **DISCONNECT HEATER WATER OUTLET HOSE A(FROM HEATER UNIT)** (See **REMOVAL**)
41. **DISCONNECT HEATER WATER INLET HOSE A** (See **REMOVAL**)
42. **DISCONNECT FUEL TUBE SUB-ASSEMBLY** (See **REMOVAL**)
43. **SEPARATE CLUTCH RELEASE CYLINDER ASSEMBLY (for Manual Transaxle)** (See **REMOVAL**)
44. **REMOVE COLUMN HOLE COVER SILENCER SHEET** (See **REMOVAL**)
45. **SEPARATE STEERING SLIDING YOKE SUB-ASSEMBLY** (See **REMOVAL**)
46. **SEPARATE NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY** (See **REMOVAL**)
47. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle)** (See **REMOVAL**)
48. **REMOVE CONSOLE PANEL UPPER** (See **REMOVAL**)

49. **REMOVE CONSOLE BOX REAR COVER** (See **REMOVAL**)
50. **REMOVE CONSOLE BOX CARPET** (See **REMOVAL**)
51. **REMOVE REAR CONSOLE BOX ASSEMBLY** (See **REMOVAL**)
52. **REMOVE FRONT CONSOLE BOX** (See **REMOVAL**)
53. **REMOVE FRONT FLOOR BRACE CENTER** (See **REMOVAL**)
54. **REMOVE FRONT EXHAUST PIPE ASSEMBLY** (See **REMOVAL**)
55. **REMOVE FRONT AXLE SHAFT LH NUT** (See **REMOVAL**)
56. **REMOVE FRONT AXLE SHAFT RH NUT**

    HINT:

    The removal procedure for the RH side is the same as that for the LH side.

57. **SEPARATE SPEED SENSOR FRONT LH** (See **REMOVAL**)
58. **SEPARATE SPEED SENSOR FRONT RH**

    HINT:

    The removal procedure for the RH side is the same as that for the LH side.

59. **SEPARATE TIE ROD END SUB-ASSEMBLY LH** (See **REMOVAL**)
60. **SEPARATE TIE ROD END SUB-ASSEMBLY RH**

    HINT:

    The removal procedure for the RH side is the same as that for the LH side.

61. **SEPARATE FRONT STABILIZER LINK ASSEMBLY LH** (See **REMOVAL**)
62. **SEPARATE FRONT STABILIZER LINK ASSEMBLY RH**

    HINT:

    The removal procedure for the RH side is the same as that for the LH side.

63. **SEPARATE FRONT LOWER SUSPENSION ARM SUB-ASSEMBLY LH** (See **REMOVAL**)
64. **SEPARATE FRONT LOWER SUSPENSION ARM SUB-ASSEMBLY RH**

    HINT:

    The removal procedure for the RH side is the same as that for the LH side.

65. **SEPARATE FRONT AXLE ASSEMBLY LH** (See **REMOVAL**)
66. **SEPARATE FRONT AXLE ASSEMBLY RH**

HINT:

The removal procedure for the RH side is the same as that for the LH side.

67. **REMOVE FRONT DRIVE SHAFT ASSEMBLY LH** (See **DISASSEMBLY**)
68. **REMOVE FRONT DRIVE SHAFT ASSEMBLY RH** (See **DISASSEMBLY**)
69. **REMOVE FLYWHEEL HOUSING UNDER COVER (for Automatic Transaxle)** (See **REMOVAL**)
70. **REMOVE DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT (for Automatic Transaxle)** (See **REMOVAL**)
71. **REMOVE ENGINE ASSEMBLY WITH TRANSAXLE** (See **REMOVAL**)
72. **REMOVE FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY** (See **REMOVAL**)
73. **REMOVE FLYWHEEL HOUSING SIDE COVER** (See **REMOVAL**)
74. **REMOVE STARTER ASSEMBLY** (See **REMOVAL**)
75. **REMOVE NO. 1 OIL COOLER INLET TUBE (for Automatic Transaxle)** (See **REMOVAL**)
76. **REMOVE NO. 1 OIL COOLER OUTLET TUBE (for Automatic Transaxle)** (See **REMOVAL**)
77. **REMOVE NO. 2 OIL COOLER TUBE CLAMP (for Automatic Transaxle)** (See **REMOVAL**)
78. **REMOVE TRANSMISSION OIL LEVEL GAGE SUB-ASSEMBLY (for Automatic Transaxle)**
79. **SEPARATE TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY (for Automatic Transaxle)** (See **REMOVAL**)
80. **REMOVE AUTOMATIC TRANSAXLE ASSEMBLY (for Automatic Transaxle)** (See **REMOVAL**)
81. **REMOVE NO. 1 TRANSMISSION CONTROL CABLE BRACKET (for Manual Transaxle)** (See **REMOVAL**)
82. **REMOVE MANUAL TRANSAXLE ASSEMBLY (for Manual Transaxle)** (See **REMOVAL**)
83. **REMOVE CLUTCH COVER ASSEMBLY (for Manual Transaxle)** (See **REMOVAL**)
84. **REMOVE CLUTCH DISC ASSEMBLY (for Manual Transaxle)**
85. **REMOVE DRIVE PLATE AND RING GEAR SUB-ASSEMBLY (for Automatic Transaxle)** (See **REMOVAL**)
86. **REMOVE FLYWHEEL SUB-ASSEMBLY (for Manual Transaxle)** (See **REMOVAL**)
87. **REMOVE ENGINE REAR OIL SEAL**
    a. Using a knife, cut off the oil seal lip.
    b. Using a screwdriver with its tip taped, pry out the oil seal.

NOTE: After removing the oil seal, check the crankshaft for damage.

If it is damaged, smooth the surface with 400-grit sandpaper.

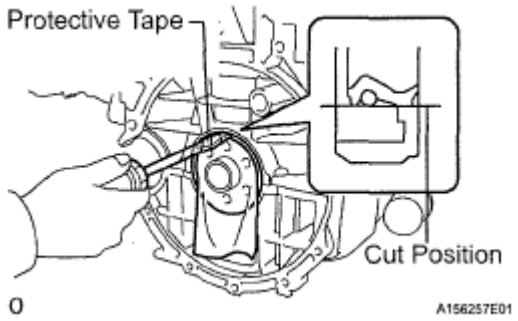


Fig. 247: Prying Out Oil Seal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. **INSTALL ENGINE REAR OIL SEAL**
   a. Apply MP grease to a new oil seal lip.
   b. Using SST and a hammer, evenly tap the oil seal until its surface is flush with the rear oil seal retainer edge.

      SST 09223-15030, 09950-70010 (09951-07100)

      NOTE:
      - **Keep the lip free from foreign materials.**
      - **Do not tap on the oil seal at an angle.**

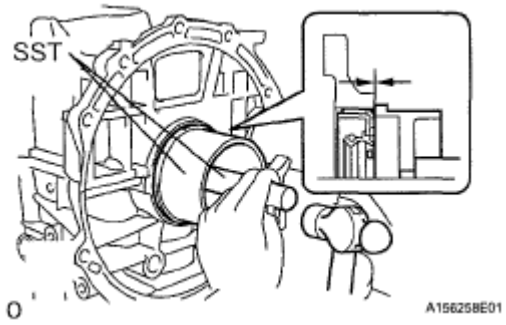


Fig. 248: Installing Oil Seal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

      - **Wipe off extra grease on the crankshaft.**

      HINT:

      The pressing-in depth should be within the range of -1 mm and 1 mm from the rear oil seal retainer edge.

2. **INSTALL DRIVE PLATE AND RING GEAR SUB-ASSEMBLY (for Automatic Transaxle)** (See

INSTALLATION)

3. **INSTALL AUTOMATIC TRANSAXLE ASSEMBLY (for Automatic Transaxle)** (See INSTALLATION)
4. **INSTALL TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY (for Automatic Transaxle)** (See INSTALLATION)
5. **INSTALL TRANSMISSION OIL LEVEL GAGE SUB-ASSEMBLY (for Automatic Transaxle)**
6. **INSTALL NO. 1 OIL COOLER OUTLET TUBE (for Automatic Transaxle)** (See INSTALLATION)
7. **INSTALL NO. 1 OIL COOLER INLET TUBE (for Automatic Transaxle)** (See INSTALLATION)
8. **INSTALL NO. 2 OIL COOLER TUBE CLAMP (for Automatic Transaxle)** (See INSTALLATION)
9. **INSTALL FLYWHEEL SUB-ASSEMBLY (for Manual Transaxle)** (See INSTALLATION)
10. **INSTALL CLUTCH DISC ASSEMBLY (for Manual Transaxle)** (See INSTALLATION)
11. **INSTALL CLUTCH COVER ASSEMBLY (for Manual Transaxle)** (See INSTALLATION)
12. **INSPECT AND ADJUST CLUTCH COVER ASSEMBLY (for Manual Transaxle)** (See INSTALLATION)
13. **INSTALL MANUAL TRANSAXLE ASSEMBLY (for Manual Transaxle)** (See INSTALLATION)
14. **INSTALL NO. 1 TRANSMISSION CONTROL CABLE BRACKET (for Manual Transaxle)** (See INSTALLATION)
15. **INSTALL STARTER ASSEMBLY** (See INSTALLATION)
16. **INSTALL FLYWHEEL HOUSING SIDE COVER** (See INSTALLATION)
17. **INSTALL FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY** (See INSTALLATION)
18. **INSTALL ENGINE ASSEMBLY WITH TRANSAXLE** (See INSTALLATION)
19. **INSTALL DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT (for Automatic Transaxle)** (See INSTALLATION)
20. **INSTALL FLYWHEEL HOUSING UNDER COVER (for Automatic Transaxle)** (See INSTALLATION)
21. **INSTALL FRONT DRIVE SHAFT ASSEMBLY LH** (See INSTALLATION)
22. **INSTALL FRONT DRIVE SHAFT ASSEMBLY RH** (See INSTALLATION)
23. **INSTALL FRONT AXLE ASSEMBLY LH** (See INSTALLATION)
24. **INSTALL FRONT AXLE ASSEMBLY RH**

    HINT:

    The installation procedure for the RH side is the same as that for the LH side.

25. **INSTALL FRONT LOWER SUSPENSION ARM SUB-ASSEMBLY LH** (See INSTALLATION)
26. **INSTALL FRONT LOWER SUSPENSION ARM SUB-ASSEMBLY RH**

    HINT:

    The installation procedure for the RH side is the same as that for the LH side.

27. **INSTALL FRONT STABILIZER LINK ASSEMBLY LH** (See **INSTALLATION**)
28. **INSTALL FRONT STABILIZER LINK ASSEMBLY RH**

    HINT:

    The installation procedure for the RH side is the same as that for the LH side.

29. **INSTALL TIE ROD END SUB-ASSEMBLY LH** (See **INSTALLATION**)
30. **INSTALL TIE ROD END SUB-ASSEMBLY RH**

    HINT:

    The installation procedure for the RH side is the same as that for the LH side.

31. **INSTALL SPEED SENSOR FRONT LH** (See **INSTALLATION**)
32. **INSTALL SPEED SENSOR FRONT RH**

    HINT:

    The installation procedure for the RH side is the same as that for the LH side.

33. **INSTALL FRONT AXLE SHAFT LH NUT** (See **INSTALLATION**)
34. **INSTALL FRONT AXLE SHAFT RH NUT**

    HINT:

    The installation procedure for the RH side is the same as that for the LH side.

35. **INSTALL FRONT EXHAUST PIPE ASSEMBLY** (See **INSTALLATION**)
36. **INSTALL FRONT FLOOR BRACE CENTER** (See **INSTALLATION**)
37. **INSTALL FRONT CONSOLE BOX** (See **INSTALLATION**)
38. **INSTALL REAR CONSOLE BOX ASSEMBLY** (See **INSTALLATION**)
39. **INSTALL CONSOLE BOX REAR COVER** (See **INSTALLATION**)
40. **INSTALL CONSOLE BOX CARPET** (See **INSTALLATION**)
41. **INSTALL CONSOLE PANEL UPPER** (See **INSTALLATION**)
42. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle)** (See **INSTALLATION**)
43. **INSTALL NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY** (See **INSTALLATION**)
44. **INSTALL STEERING SLIDING YOKE SUB-ASSEMBLY** (See **INSTALLATION**)
45. **INSTALL COLUMN HOLE COVER SILENCER SHEET** (See **INSTALLATION**)
46. **INSTALL CLUTCH RELEASE CYLINDER ASSEMBLY (for Manual Transaxle)** (See **INSTALLATION**)

47. **CONNECT FUEL TUBE SUB-ASSEMBLY** (See **INSTALLATION**)
48. **CONNECT HEATER WATER INLET HOSE A** (See **INSTALLATION**)
49. **CONNECT HEATER WATER OUTLET HOSE A(FROM HEATER UNIT)** (See **INSTALLATION**)
50. **CONNECT ENGINE WIRE** (See **INSTALLATION**)
51. **INSTALL NO. 1 FUEL VAPOR FEED HOSE** (See **INSTALLATION**)
52. **INSTALL UNION TO CHECK VALVE HOSE** (See **INSTALLATION**)
53. **INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY (for Automatic Transaxle)** (See **INSTALLATION**)
54. **INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY (for Manual Transaxle)** (See **INSTALLATION**)
55. **INSTALL WITH PULLEY COMPRESSOR ASSEMBLY** (See **INSTALLATION**)
56. **INSTALL RADIATOR ASSEMBLY** (See **INSTALLATION**)
57. **INSTALL UPPER RADIATOR SUPPORT SUB-ASSEMBLY** (See **INSTALLATION**)
58. **INSTALL UPPER RADIATOR SUPPORT ABSORBER** (See **REASSEMBLY**)
59. **INSTALL NO. 1 COOLER COVER** (See **INSTALLATION**)
60. **INSTALL HOOD LOCK ASSEMBLY** (See **INSTALLATION**)
61. **CONNECT NO. 2 OIL COOLER INLET HOSE (for Automatic Transaxle)** (See **INSTALLATION**)
62. **CONNECT NO. 1 OIL COOLER OUTLET HOSE (for Automatic Transaxle)** (See **INSTALLATION**)
63. **CONNECT NO. 1 RADIATOR HOSE** (See **INSTALLATION**)
64. **INSTALL NO. 2 RADIATOR HOSE** (See **INSTALLATION**)
65. **INSTALL FRONT BUMPER COVER** (See **INSTALLATION**)
66. **INSTALL FAN AND GENERATOR V BELT** (See **INSTALLATION**)
67. **ADJUST FAN AND GENERATOR V BELT** (See **INSTALLATION**)
68. **INSPECT FAN AND GENERATOR V BELT** (See **INSTALLATION**)
69. **INSTALL NO. 2 CYLINDER HEAD COVER** (See **INSTALLATION**)
70. **INSTALL BATTERY CARRIER** (See **INSTALLATION**)
71. **INSTALL AIR CLEANER BRACKET** (See **INSTALLATION**)
72. **INSTALL AIR CLEANER ASSEMBLY** (See **INSTALLATION**)
73. **INSTALL OUTER COWL TOP PANEL** (See **INSTALLATION**)
74. **INSTALL FRONT AIR SHUTTER SEAL RH** (See **INSTALLATION**)
75. **INSTALL FRONT WIPER MOTOR AND LINK** (See **INSTALLATION**)
76. **INSTALL COWL TOP VENTILATOR LOUVER LH** (See **INSTALLATION**)
77. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY** (See **INSTALLATION**)
78. **INSTALL HOOD TO COWL TOP SEAL** (See **INSTALLATION**)
79. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH** (See **INSTALLATION**)
80. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH** (See **INSTALLATION**)

81. **INSTALL FRONT WIPER ARM HEAD CAP**
82. **INSTALL BATTERY TRAY**
83. **INSTALL BATTERY** (See **INSTALLATION**)
84. **ADD ENGINE COOLANT** (See **REPLACEMENT**)
85. **ADD AUTOMATIC TRANSAXLE OIL (for Automatic Transaxle)**
86. **INSPECT AUTOMATIC TRANSAXLE OIL (for Automatic Transaxle)** (See **ON-VEHICLE INSPECTION**)
87. **ADD MANUAL TRANSAXLE OIL (for Manual Transaxle)**
88. **INSPECT MANUAL TRANSAXLE OIL (for Manual Transaxle)** (See **ON-VEHICLE INSPECTION**)
89. **INSPECT FOR FUEL LEAK**
90. **INSPECT FOR ENGINE OIL LEAK**
91. **INSPECT FOR EXHAUST GAS LEAK**
92. **INSPECT FOR ENGINE COOLANT LEAK** (See **ON-VEHICLE INSPECTION**)
93. **INSTALL ENGINE UNDER COVER RH**
94. **INSTALL ENGINE UNDER COVER LH**
95. **INSTALL FRONT WHEELS** (See **INSTALLATION**)
96. **INSPECT IGNITION TIMING** (See **ON-VEHICLE INSPECTION**)
97. **INSPECT ENGINE IDLING SPEED** (See **ON-VEHICLE INSPECTION**)
98. **INSPECT CO/HC** (See **ON-VEHICLE INSPECTION**)
99. **INSPECT FRONT WHEEL ALIGNMENT**

    (See **ADJUSTMENT**)

100. **INSPECT ABS SENSOR SIGNAL (w/ ABS)**

     (See **TEST MODE PROCEDURE**)

101. **INSPECT VSC SENSOR SIGNAL (w/ VSC)**

     (See **TEST MODE PROCEDURE**)

ENGINE ASSEMBLY

COMPONENTS

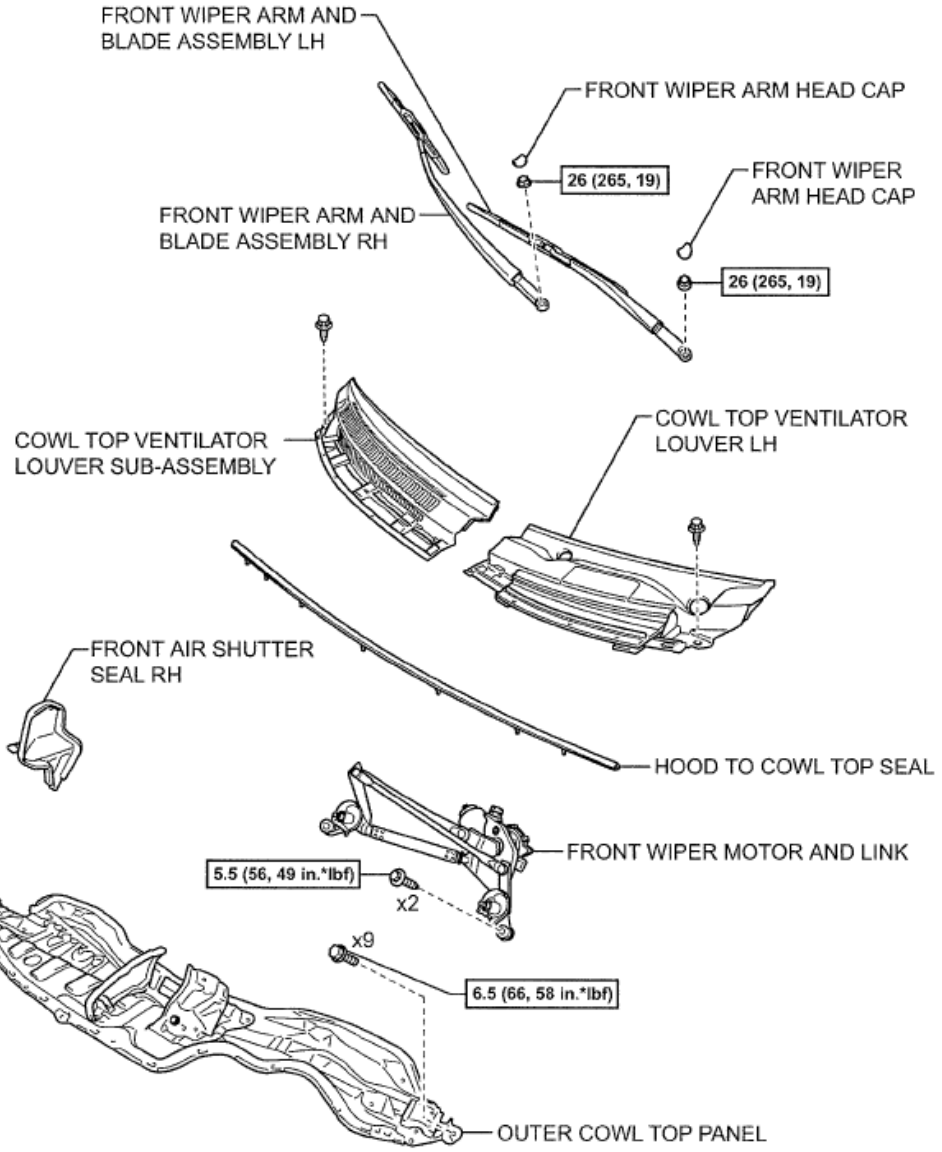


Fig. 249: Identifying Engine Assembly Components And Torque Specifications (1 Of 12)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

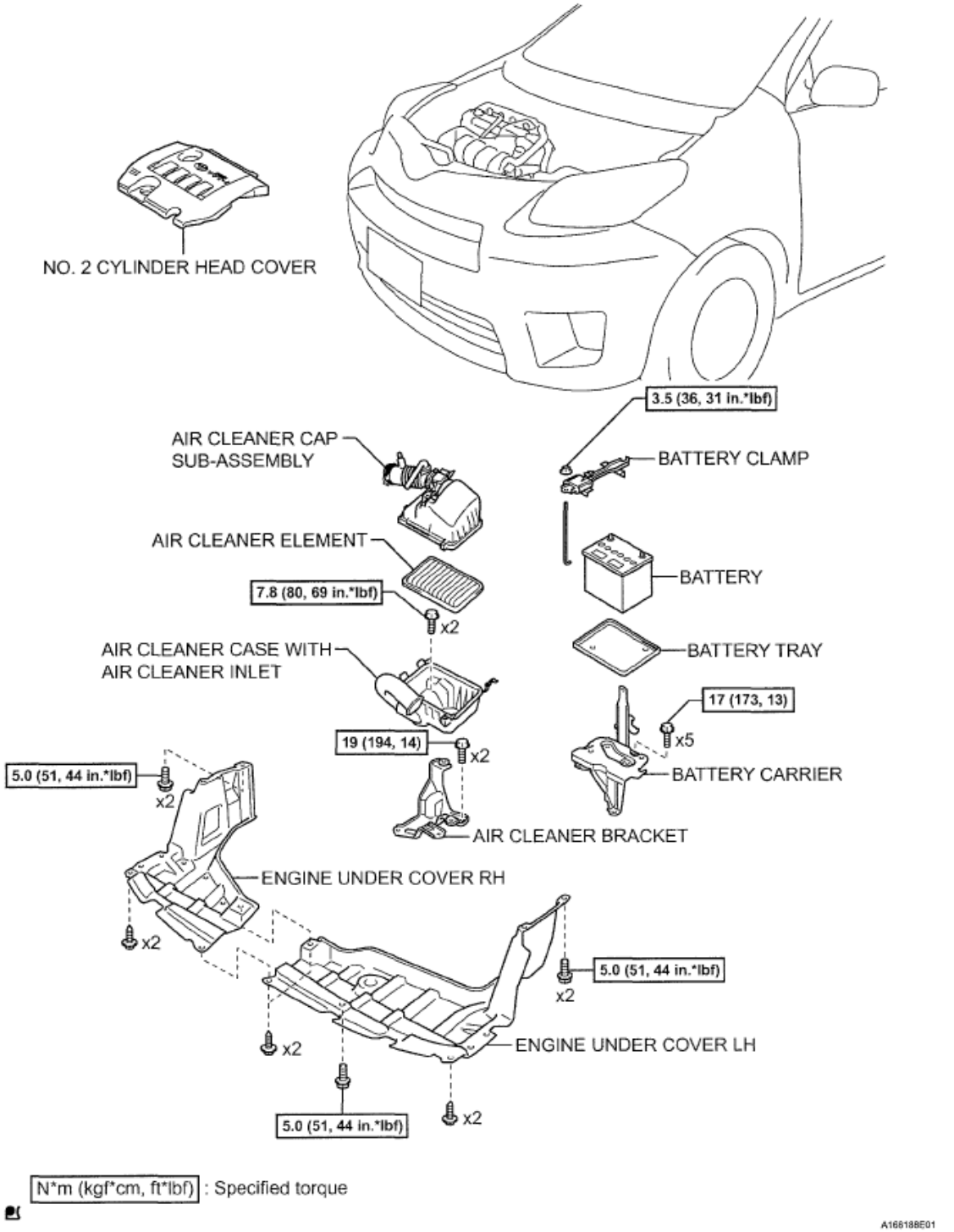


Fig. 250: Identifying Engine Assembly Components And Torque Specifications (2 Of 12)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

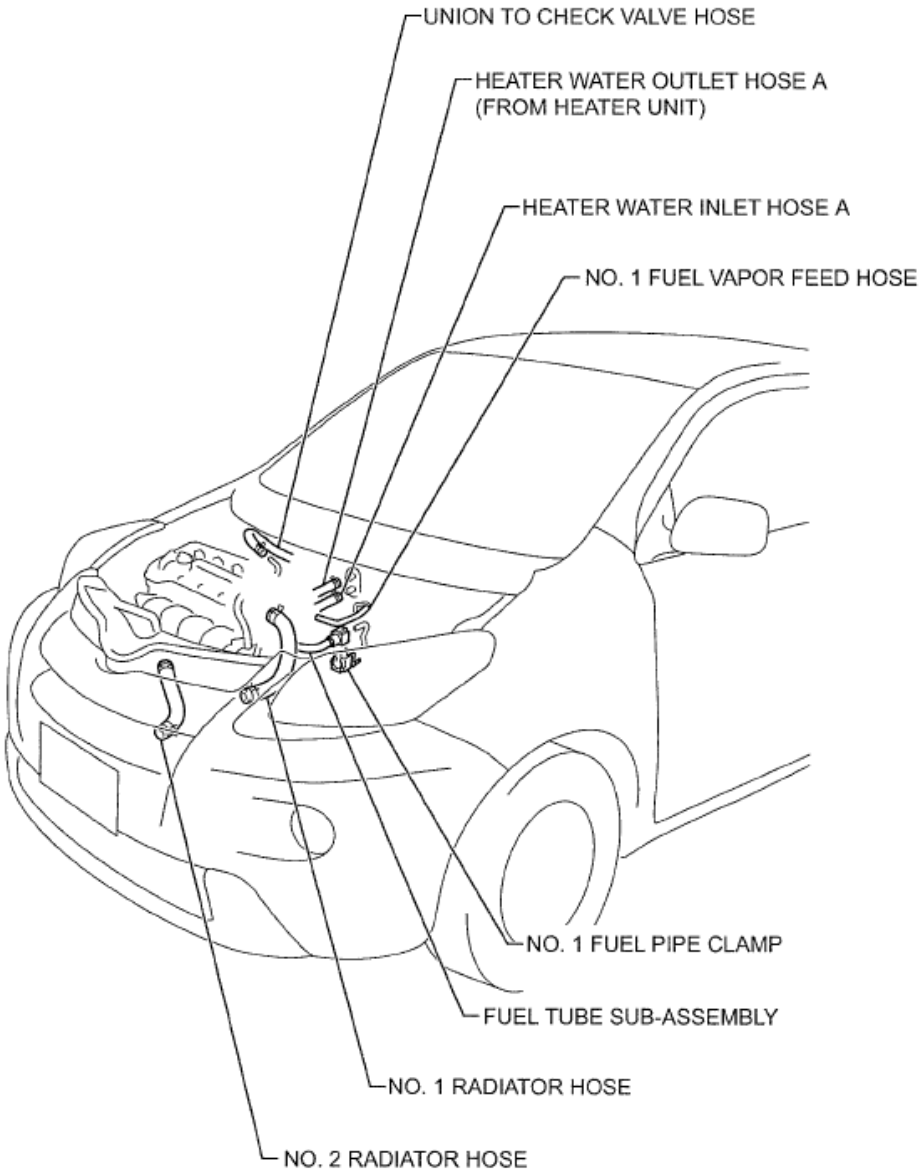


Fig. 251: Identifying Engine Assembly Components (3 Of 12)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

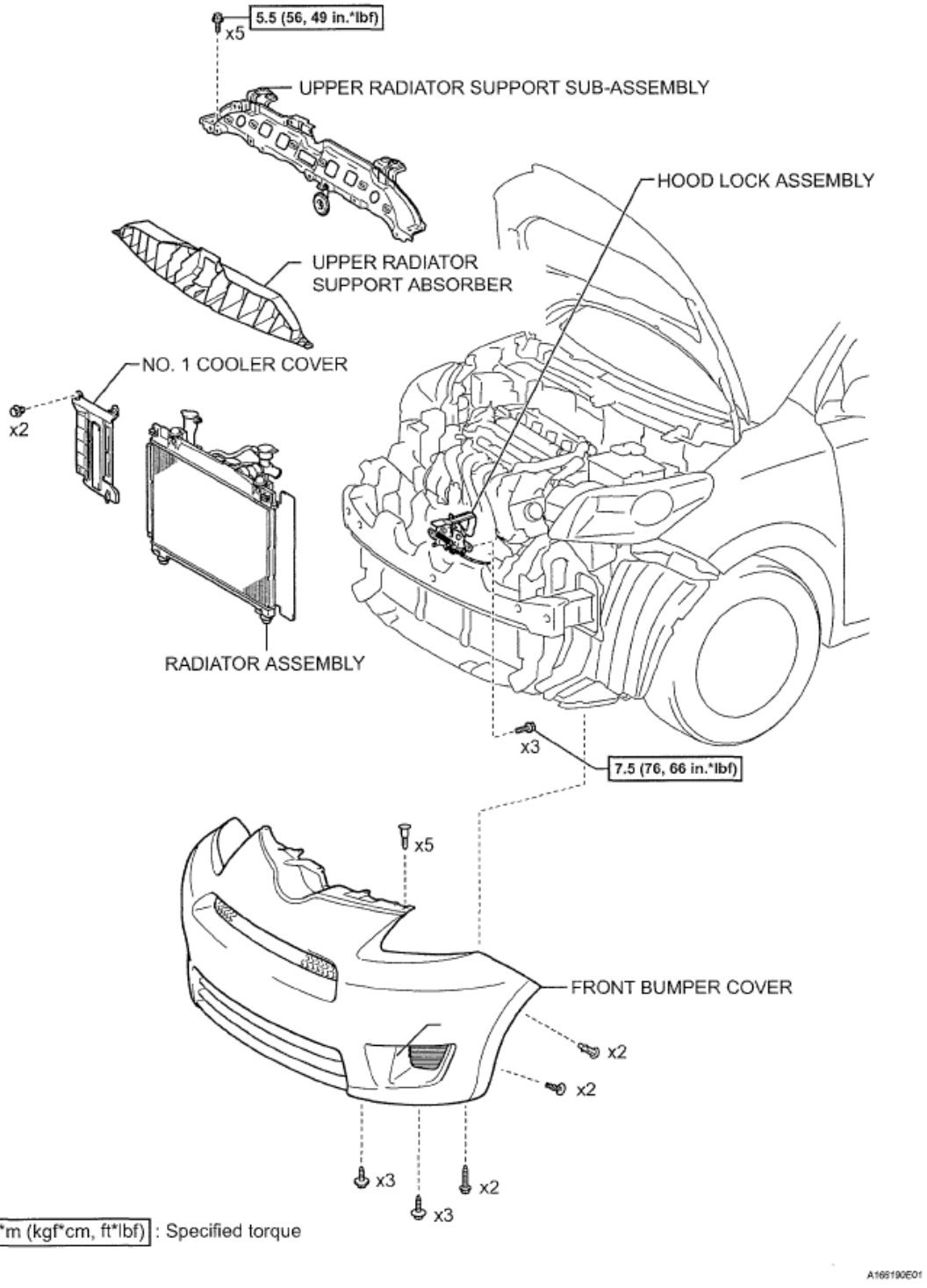


Fig. 252: Identifying Engine Assembly Components And Torque Specifications (4 Of 12)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

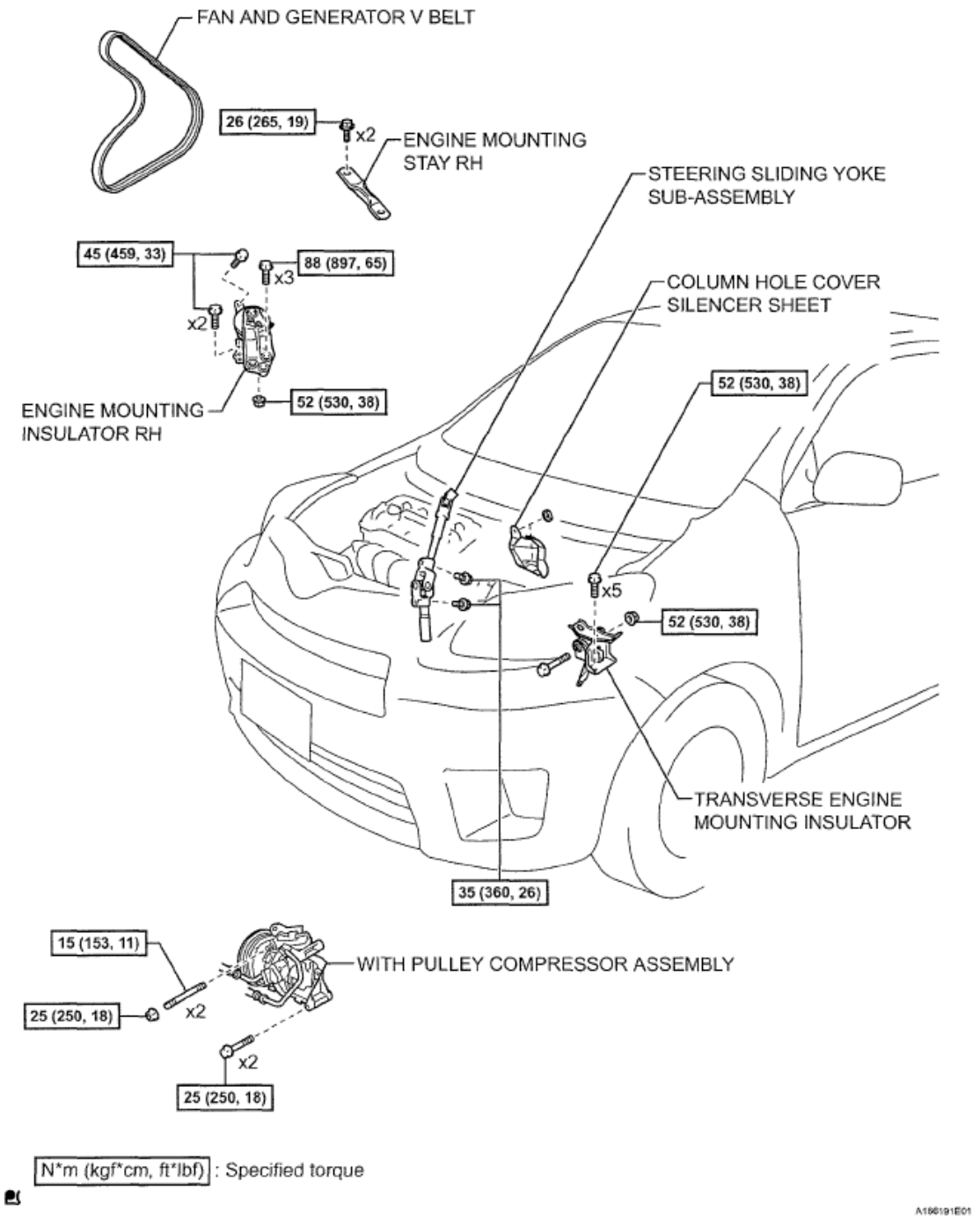
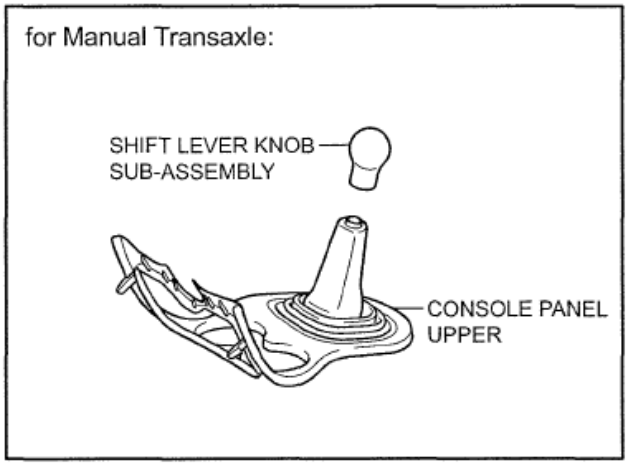


Fig. 253: Identifying Engine Assembly Components And Torque Specifications (5 Of 12)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



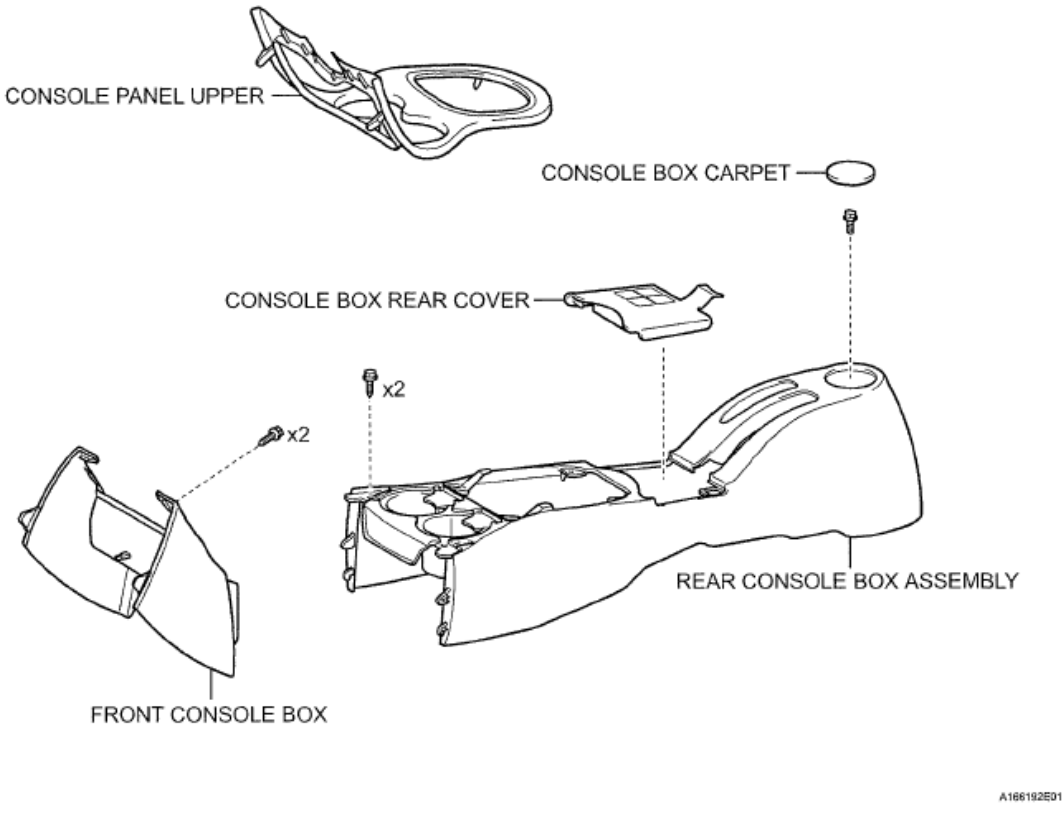


Fig. 254: Identifying Engine Assembly Components (6 Of 12)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

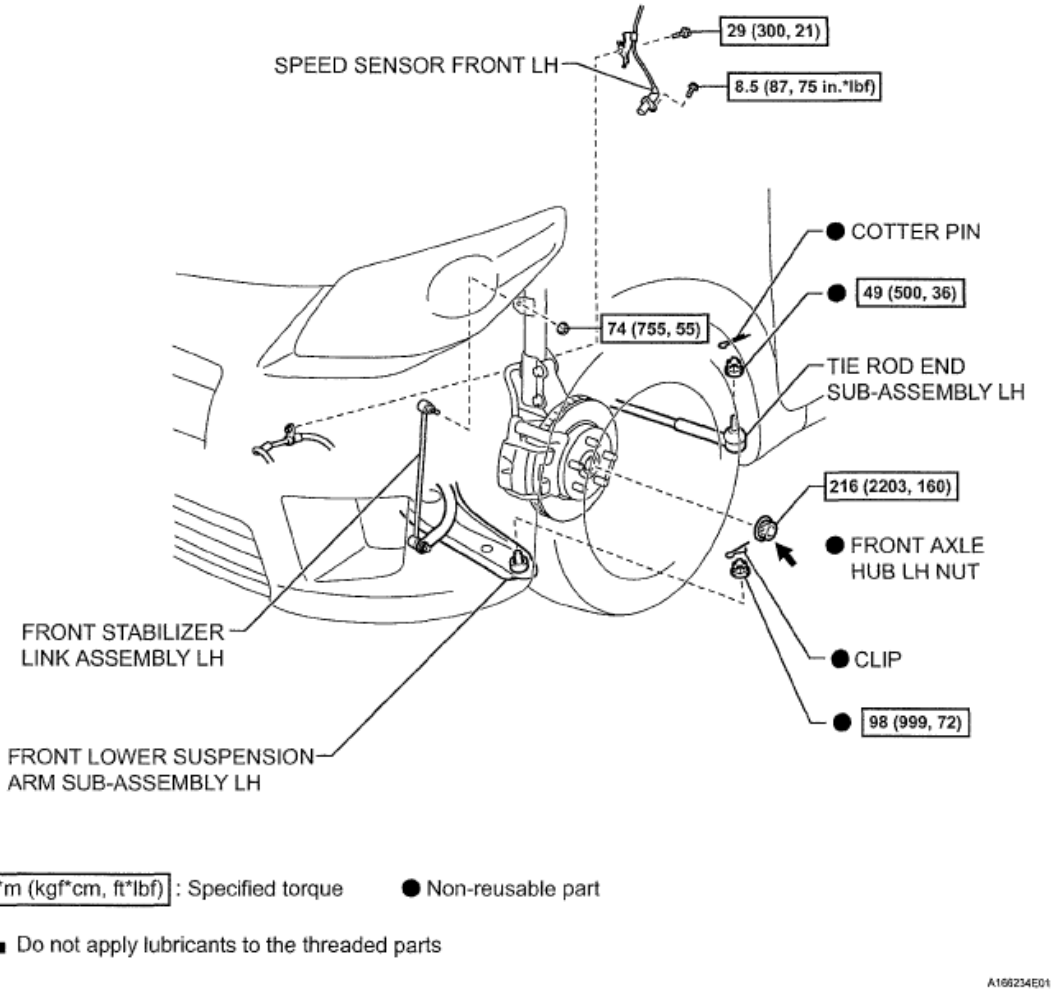


Fig. 255: Identifying Engine Assembly Components And Torque Specifications (7 Of 12)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

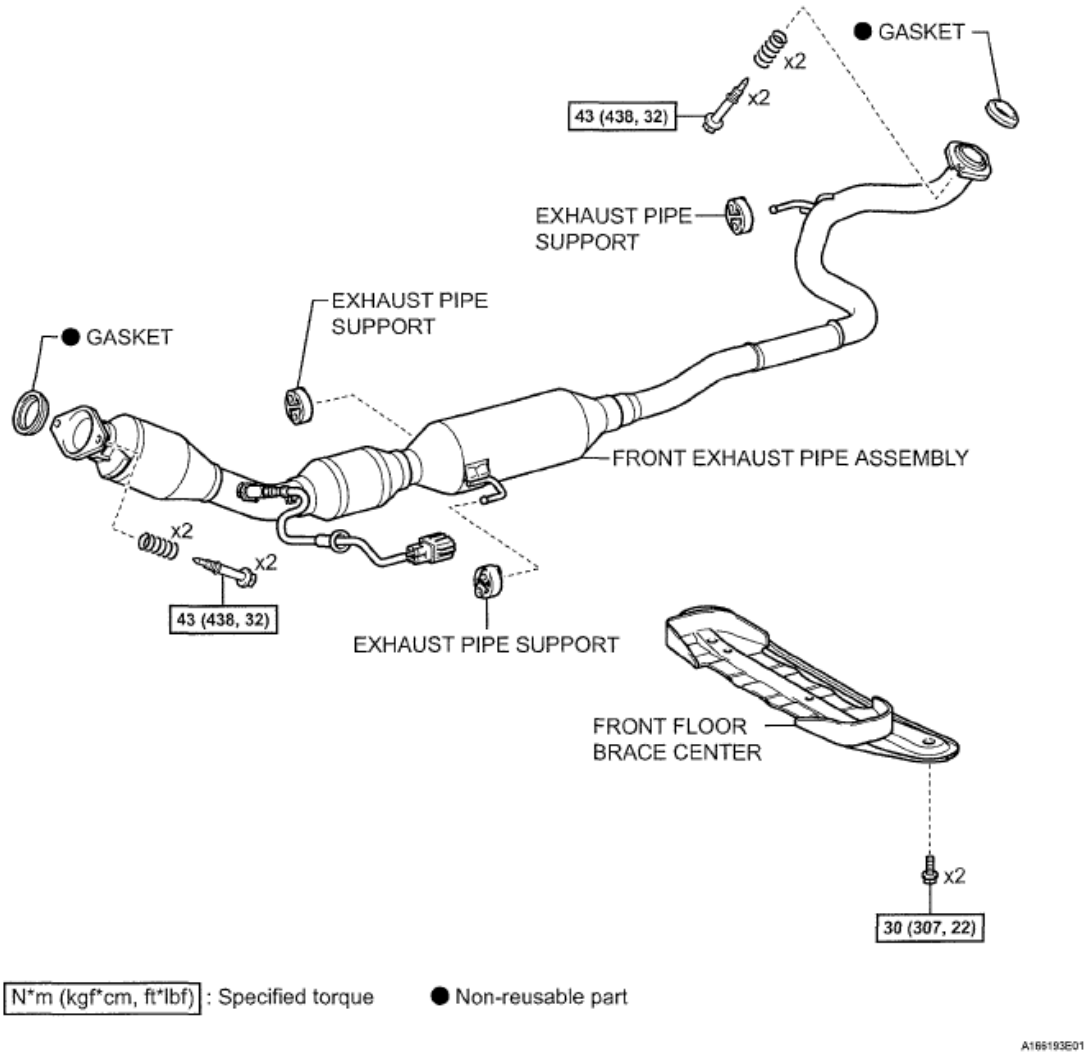


Fig. 256: Identifying Engine Assembly Components And Torque Specifications (8 Of 12)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

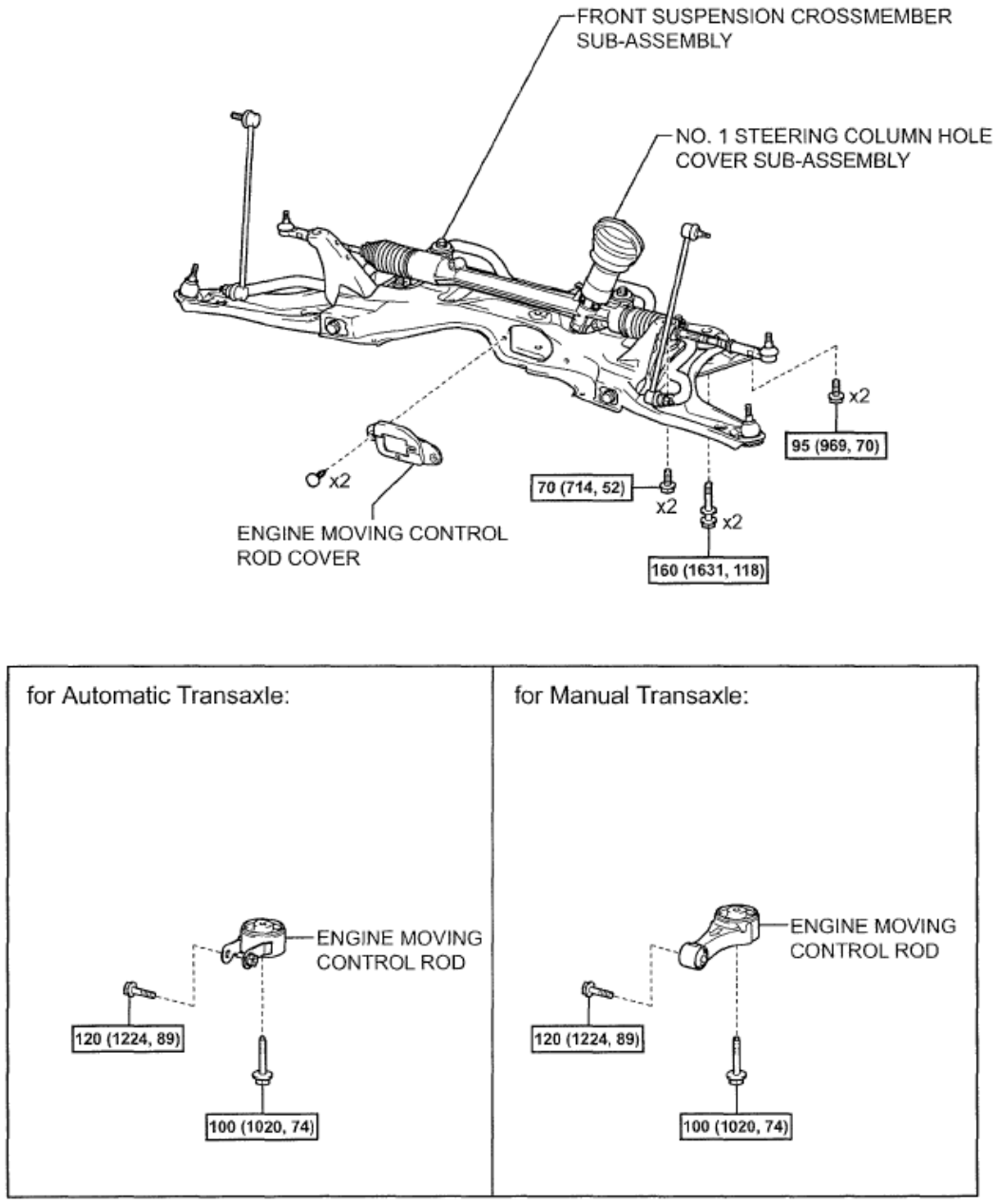


Fig. 257: Identifying Engine Assembly Components And Torque Specifications (9 Of 12)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

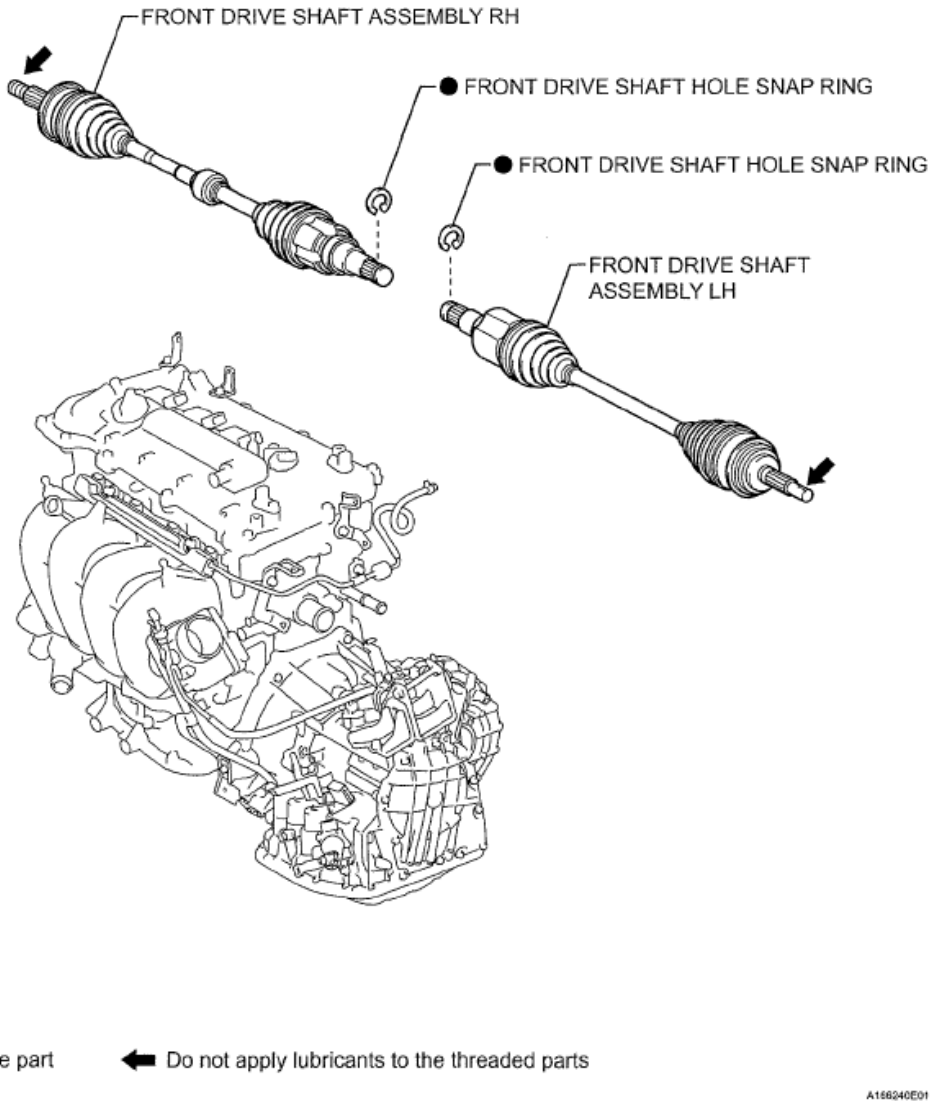


Fig. 258: Identifying Engine Assembly Components (10 Of 12)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

for Automatic Transaxle:

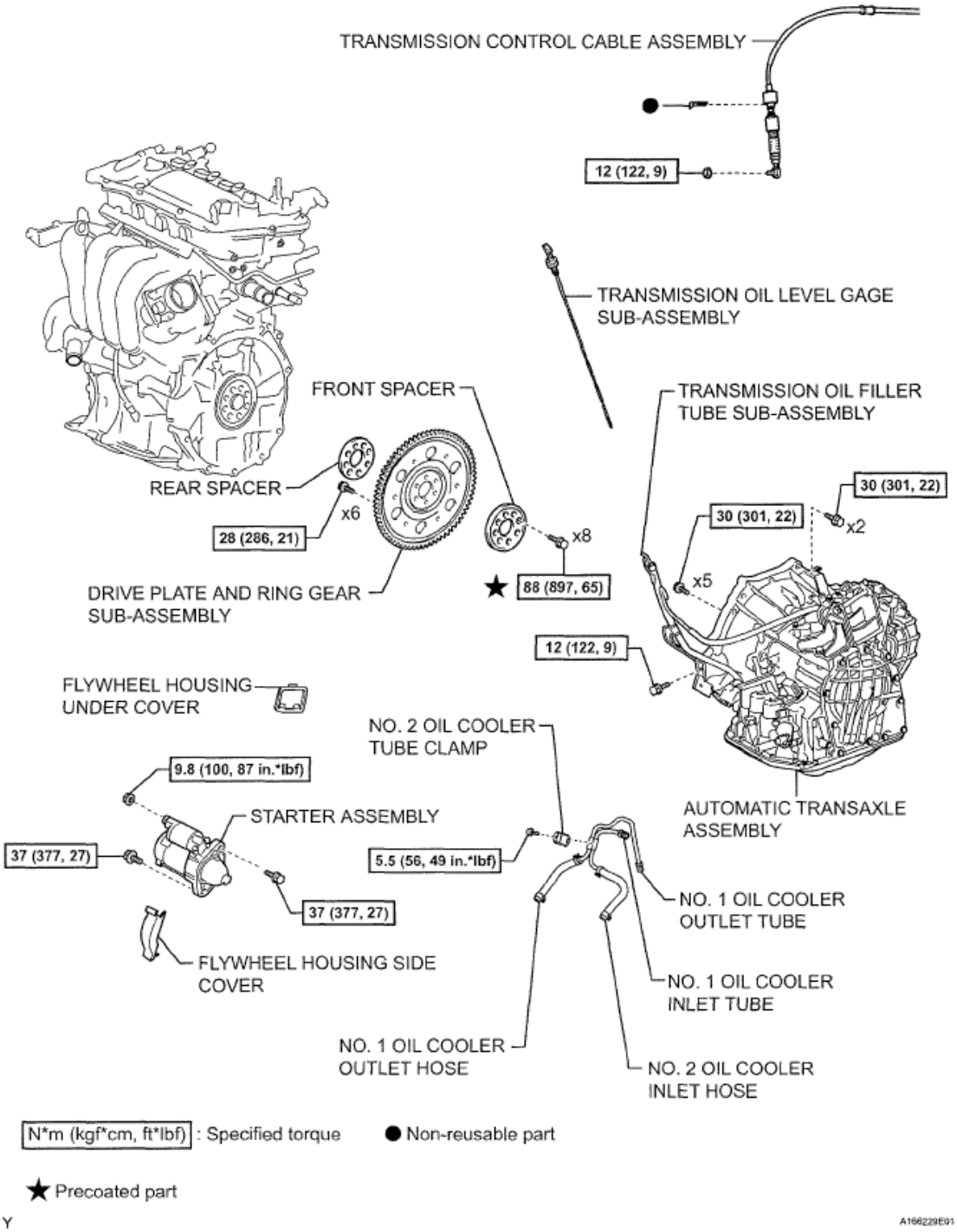


Fig. 259: Identifying Engine Assembly Components And Torque Specifications (11 Of 12)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

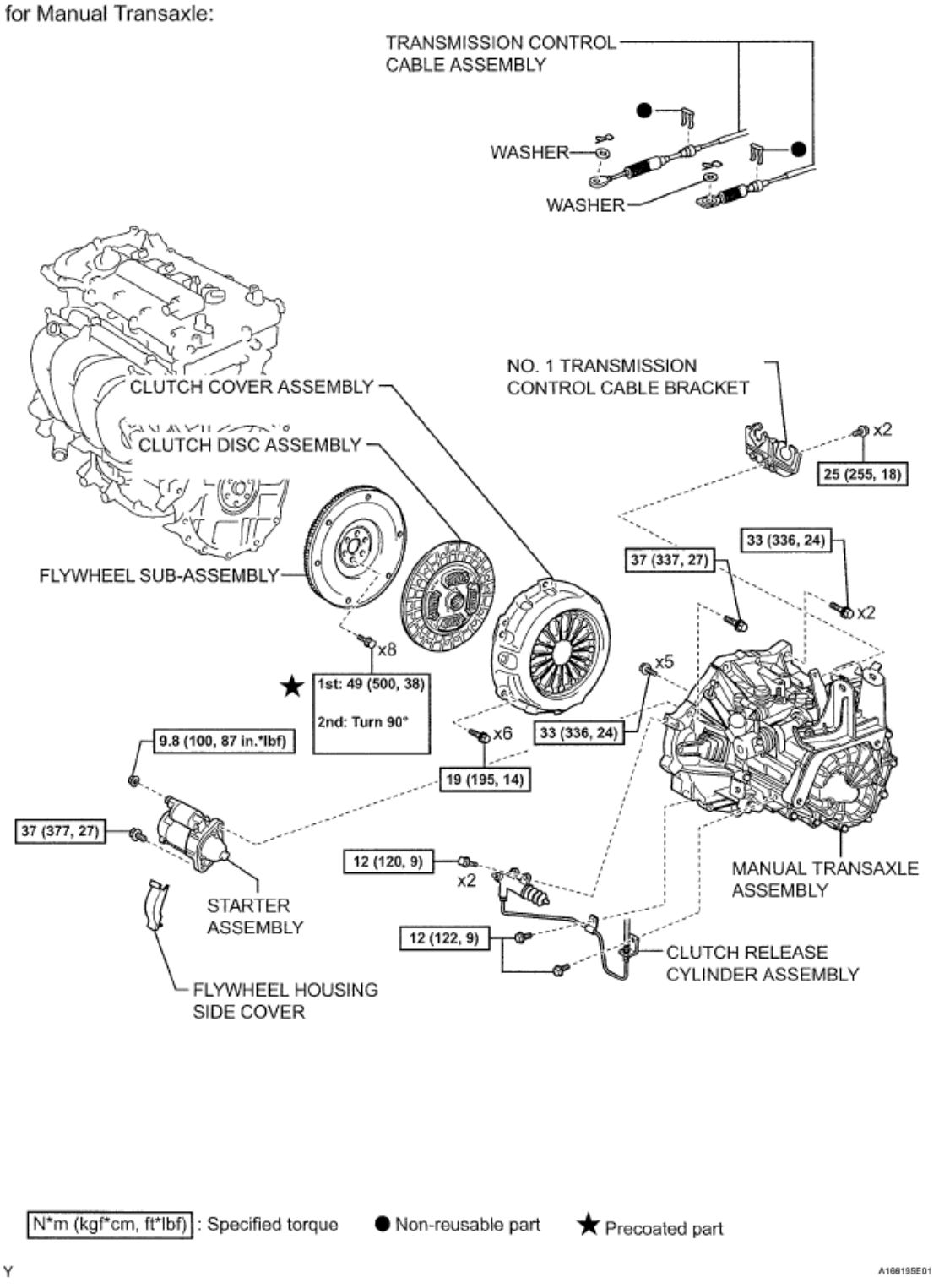


Fig. 260: Identifying Engine Assembly Components And Torque Specifications (12 Of 12)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **DISCHARGE FUEL SYSTEM PRESSURE**

   (See **PRECAUTION**)

2. **REMOVE BATTERY**
   a. Disconnect the cable from the battery terminal.
   b. Loosen the nut and remove the battery clamp.
   c. Remove the battery.
3. **REMOVE BATTERY TRAY**
4. **REMOVE FRONT WHEELS**
5. **REMOVE ENGINE UNDER COVER LH**
6. **REMOVE ENGINE UNDER COVER RH**
7. **DRAIN ENGINE COOLANT** (See **REPLACEMENT**)
8. **DRAIN MANUAL TRANSAXLE OIL (for Manual Transaxle)**
9. **DRAIN AUTOMATIC TRANSAXLE OIL (for Automatic Transaxle)**
10. **REMOVE FRONT WIPER ARM HEAD CAP** (See **REMOVAL**)
11. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH** (See **REMOVAL**)
12. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH** (See **REMOVAL**)
13. **REMOVE HOOD TO COWL TOP SEAL** (See **REMOVAL**)
14. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY** (See **REMOVAL**)
15. **REMOVE COWL TOP VENTILATOR LOUVER LH** (See **REMOVAL**)
16. **REMOVE FRONT WIPER MOTOR AND LINK** (See **REMOVAL**)
17. **REMOVE FRONT AIR SHUTTER SEAL RH**
    a. Disengage the 2 claws and remove the front air shutter seal RH.

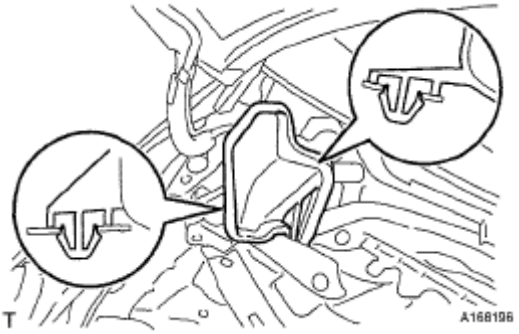


Fig. 261: Identifying Claws Locations
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

18. **REMOVE OUTER COWL TOP PANEL**
    a. Disengage the wire harness clamp.

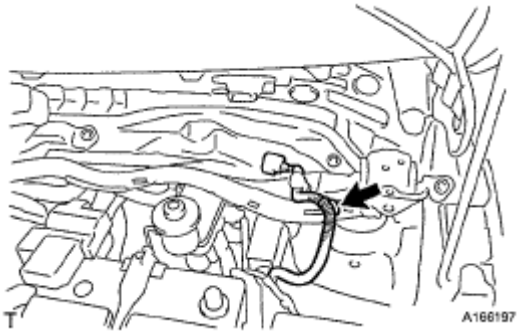


Fig. 262: Locating Wire Harness Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Remove the 9 bolts and remove the outer cowl top panel.

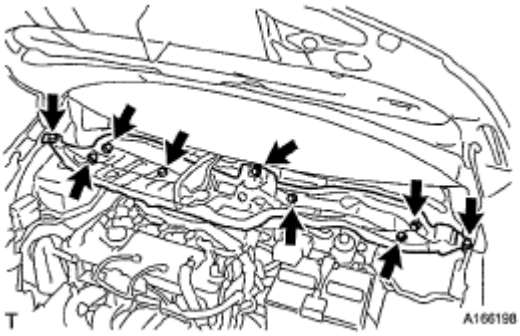


Fig. 263: Locating Bolts And Outer Cowl Top Panel
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

19. **REMOVE AIR CLEANER ASSEMBLY**
    a. Separate the intake air flow meter connector and 2 wire harness clamps.

Fig. 264: Locating Clamps
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Separate the ventilation hose from the air cleaner hose.
c. Unfasten the 2 clamps.
d. Remove the air cleaner cap sub-assembly with air cleaner hose.
e. Remove the air cleaner element.
f. Separate the wire harness clamp from the air cleaner case.

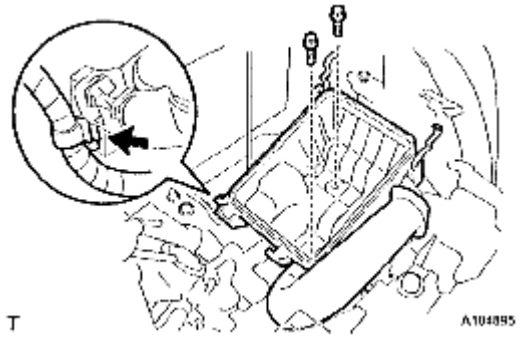


Fig. 265: Identifying Bolts And Air Cleaner Case With Air Cleaner Inlet
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

g. Remove the 2 bolts and remove the air cleaner case with air cleaner inlet.

20. **REMOVE AIR CLEANER BRACKET**
a. Separate the wire harness clamp from the air cleaner bracket.

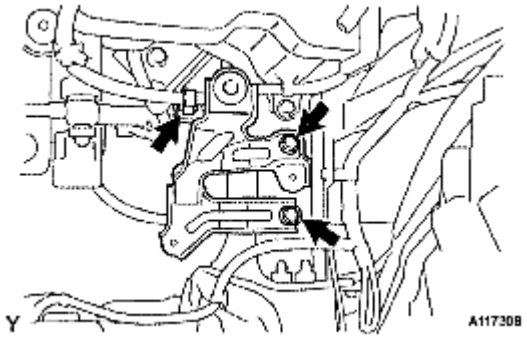


Fig. 266: Locating Bolts And Air Cleaner Bracket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Remove the 2 bolts and remove the air cleaner bracket.

21. **REMOVE BATTERY CARRIER**
a. Separate the wire harness clamp from the battery carrier.

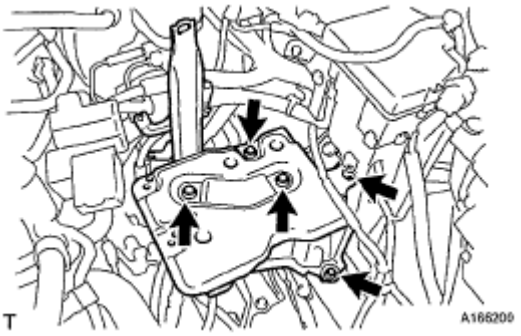


Fig. 267: Locating Bolts And Battery Carrier
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Remove the 5 bolts and remove the battery carrier.

22. **REMOVE NO. 2 CYLINDER HEAD COVER** (See **REMOVAL**)
23. **REMOVE FAN AND GENERATOR V BELT** (See **REMOVAL**)
24. **REMOVE NO. 2 RADIATOR HOSE**
    a. Loosen the 2 clips and remove the No. 2 radiator hose.

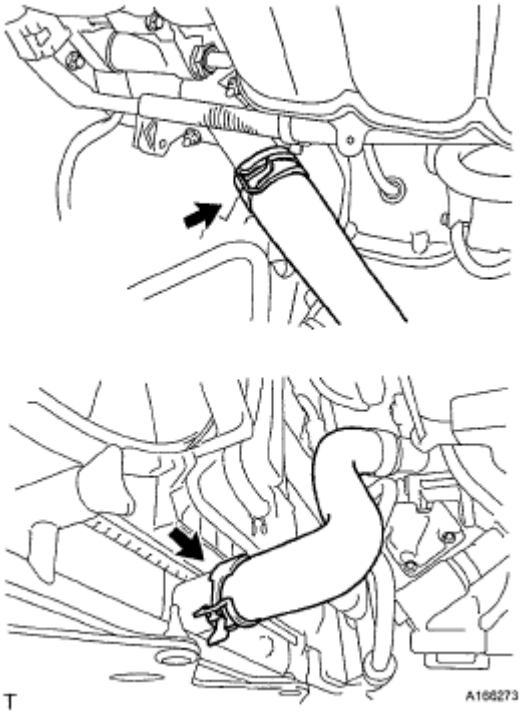


Fig. 268: Locating Clips And No. 2 Radiator Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

25. **REMOVE FRONT BUMPER COVER** (See **REMOVAL**)
26. **DISCONNECT NO. 1 RADIATOR HOSE** (See **REMOVAL**)
27. **DISCONNECT NO. 1 OIL COOLER OUTLET HOSE (for Automatic Transaxle)** (See

REMOVAL)

28. **DISCONNECT NO. 2 OIL COOLER INLET HOSE (for Automatic Transaxle)** (See **REMOVAL**)
29. **REMOVE HOOD LOCK ASSEMBLY** (See **REMOVAL**)
30. **REMOVE NO. 1 COOLER COVER** (See **REMOVAL**)
31. **REMOVE UPPER RADIATOR SUPPORT ABSORBER** (See **DISASSEMBLY**)
32. **REMOVE UPPER RADIATOR SUPPORT SUB-ASSEMBLY** (See **REMOVAL**)
33. **REMOVE RADIATOR ASSEMBLY** (See **REMOVAL**)
34. **SEPARATE WITH PULLEY COMPRESSOR ASSEMBLY** (See **REMOVAL**)
35. **SEPARATE TRANSMISSION CONTROL CABLE ASSEMBLY (for Automatic Transaxle)**
    a. Remove the nut and disconnect the transmission control cable assembly from the control shaft lever.

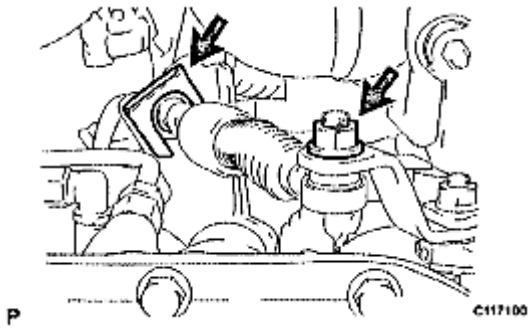


Fig. 269: Locating Nut And Transmission Control Cable Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

36. **SEPARATE TRANSMISSION CONTROL CABLE ASSEMBLY (for Manual Transaxle)**
    a. Remove the 2 clips and the washers, and disconnect the 2 cables from the transaxle.

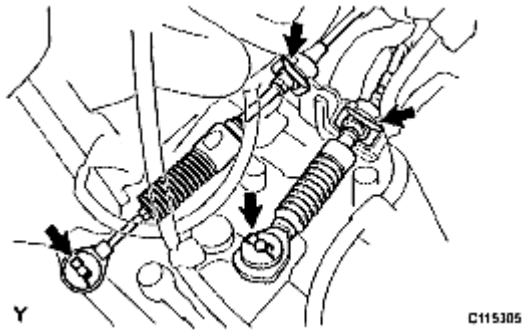


Fig. 270: Locating Clips And Cables
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    b. Remove the 2 clips and disconnect the 2 cables from the control cable bracket.
37. **SEPARATE UNION TO CHECK VALVE HOSE**
    a. Loosen the clip and separate the union to check valve hose.

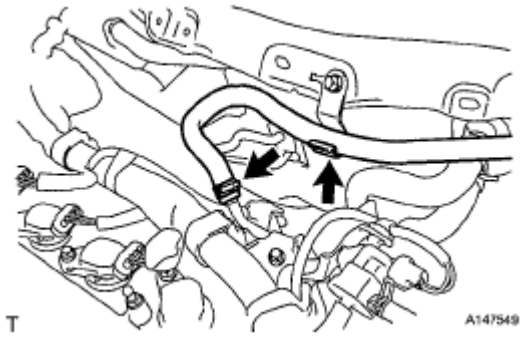


Fig. 271: Locating Clip And Check Valve Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

38. **SEPARATE NO. 1 FUEL VAPOR FEED HOSE**
    a. Separate the No. 1 fuel vapor feed hose from the vacuum switching valve assembly.

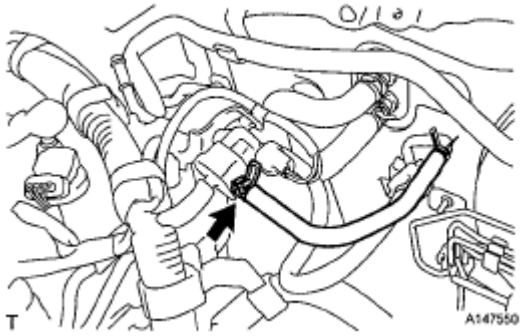


Fig. 272: Locating No. 1 Fuel Vapor Feed Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

39. **DISCONNECT ENGINE WIRE**
    a. Remove the bolt and wire harness clamp and separate the transaxle earth wire (for Automatic Transaxle).

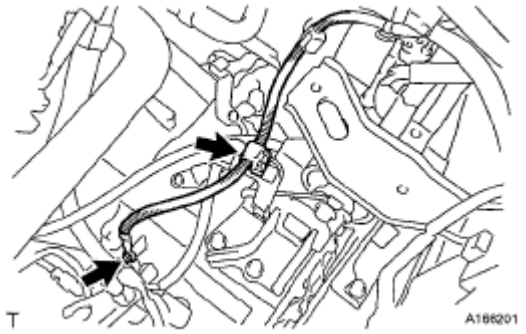


Fig. 273: Locating Bolt And Wire Harness Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Remove the bolt and 2 wire harness clamp and separate the transaxle earth wire (for Manual Transaxle).

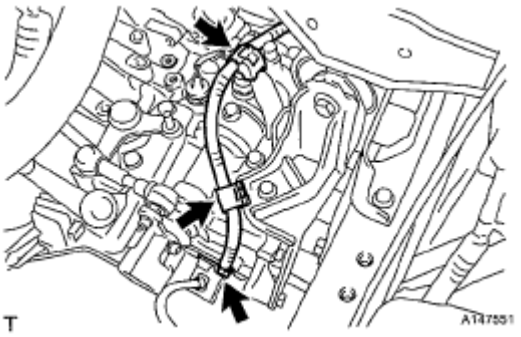


Fig. 274: Locating Bolt And Wire Harness Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Disconnect the 2 connectors.

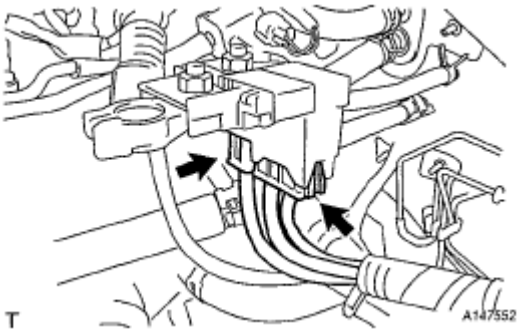


Fig. 275: Locating Connectors
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Pull up the lever and disconnect the connector from the engine control computer.
e. Separate the 2 wire harness clamps.

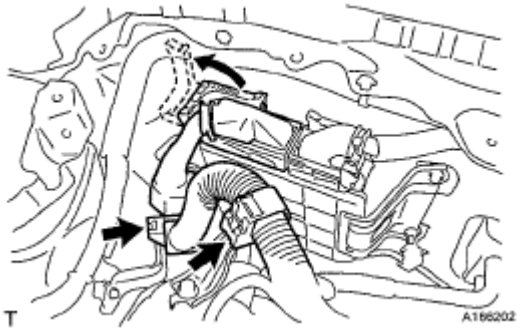


Fig. 276: Locating Wire Harness Clamps
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

f. Remove the 2 connectors and clamp from the engine room junction block and disconnect the 2 wire harness clamps.

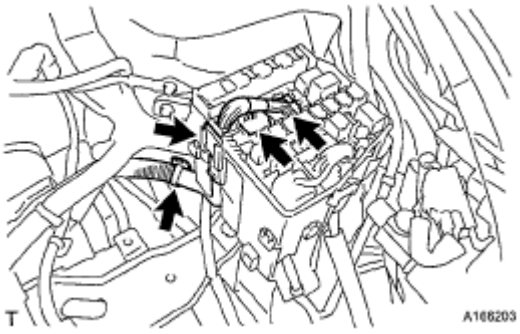


Fig. 277: Locating Connectors And Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

g. Disconnect all wire harnesses and connectors.

NOTE: Make sure that no wire harness is connected between the body and engine.

40. **DISCONNECT HEATER WATER OUTLET HOSE A (FROM HEATER UNIT)**
    a. Disconnect heater water outlet hose A from the heater unit.

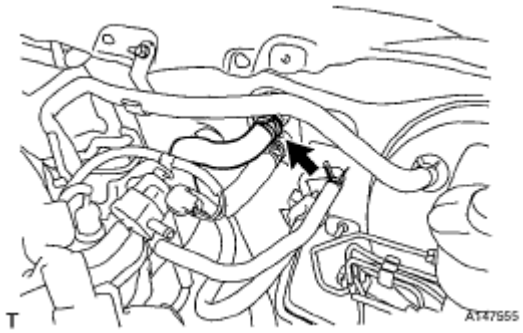


Fig. 278: Locating Heater Water Outlet Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

41. **DISCONNECT HEATER WATER INLET HOSE A**
    a. Disconnect heater water inlet hose A from the heater unit.

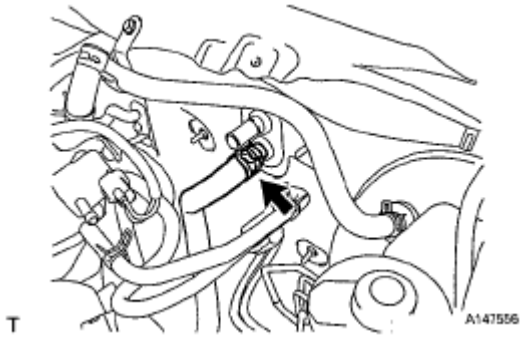


Fig. 279: Locating Heater Water Inlet Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

42. **DISCONNECT FUEL TUBE SUB-ASSEMBLY**
    a. Remove the No. 1 fuel pipe clamp.

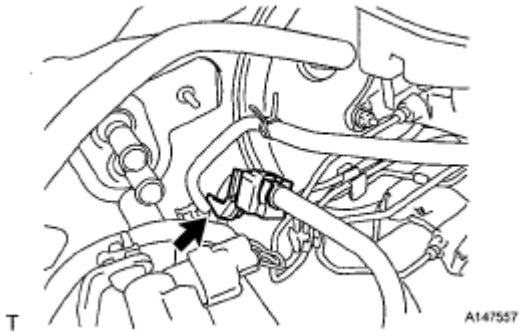


Fig. 280: Locating No. 1 Fuel Pipe Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    b. Pinch the retainer as illustrated, then pull the fuel tube connector out of the pipe.

NOTE:

- **Remove any dirt and foreign matter from the fuel tube connector before performing this work.**
- **Do not allow any scratches or foreign matter on the parts when disconnecting, as the fuel tube connector has the O-rings that seal the pipe.**
- **Perform this work by hand. Do not use any tools.**
- **Do not forcibly bend, twist or turn the nylon tube.**
- **Protect the disconnected parts by covering them with vinyl bags after disconnecting the fuel tube.**
- **If the fuel tube connector and pipe are stuck, push and pull them to release them.**

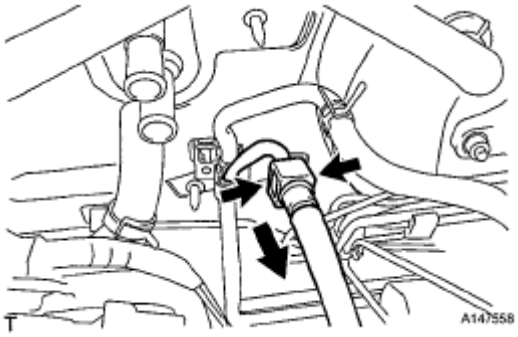


Fig. 281: Identifying Fuel Tube Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

43. **SEPARATE CLUTCH RELEASE CYLINDER ASSEMBLY (for Manual Transaxle)**
    a. Remove the 4 bolts, then separate the clutch release cylinder.

    HINT:

    Suspend the clutch release cylinder with a piece of rope so as not to overload the clutch pipe.

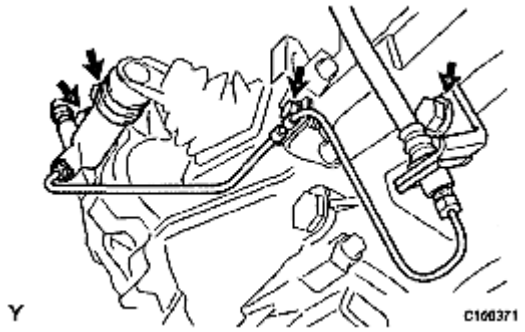


Fig. 282: Locating Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

44. **REMOVE COLUMN HOLE COVER SILENCER SHEET** (See **REMOVAL**)
45. **SEPARATE STEERING SLIDING YOKE SUB-ASSEMBLY** (See **REMOVAL**)
46. **SEPARATE NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY** (See **REMOVAL**)
47. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle)** (See **REMOVAL**)
48. **REMOVE CONSOLE PANEL UPPER** (See **REMOVAL**)
49. **REMOVE CONSOLE BOX REAR COVER** (See **REMOVAL**)
50. **REMOVE CONSOLE BOX CARPET** (See **REMOVAL**)
51. **REMOVE REAR CONSOLE BOX ASSEMBLY** (See **REMOVAL**)
52. **REMOVE FRONT CONSOLE BOX** (See **REMOVAL**)
53. **REMOVE FRONT FLOOR BRACE CENTER** (See **REMOVAL**)
54. **REMOVE FRONT EXHAUST PIPE ASSEMBLY**

a. Disconnect the heated oxygen sensor connector.

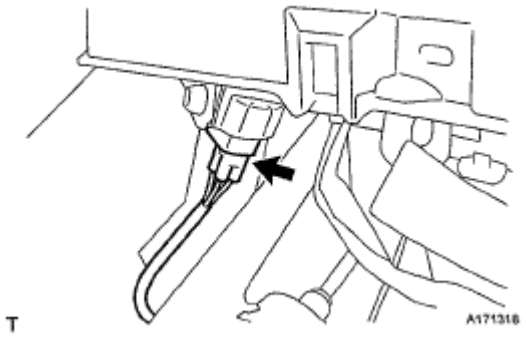


Fig. 283: Locating Heated Oxygen Sensor Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Remove the grommet and pull the sensor connector out of the cabin through the floor panel.
c. Remove the 2 bolts and 2 springs and separate the front exhaust pipe assembly from the exhaust tail pipe assembly.

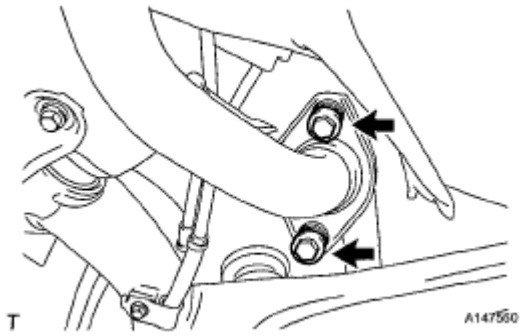


Fig. 284: Locating Bolts And Springs
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Remove the 2 bolts and 2 springs and separate the front exhaust pipe assembly from the exhaust manifold.

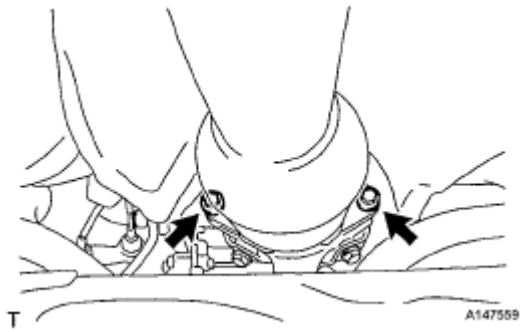


Fig. 285: Locating Bolts And Springs

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

e. Remove the 3 exhaust pipe supports and remove the front exhaust pipe assembly.

55. **REMOVE FRONT AXLE SHAFT LH NUT** (See **REMOVAL**)
56. **REMOVE FRONT AXLE SHAFT RH NUT**

HINT:

The removal procedure for the RH side is the same as that for the LH side.

57. **SEPARATE SPEED SENSOR FRONT LH** (See **REMOVAL**)
58. **SEPARATE SPEED SENSOR FRONT RH**

HINT:

The separation procedure for the RH side is the same as that for the LH side.

59. **SEPARATE TIE ROD END SUB-ASSEMBLY LH** (See **REMOVAL**)
60. **SEPARATE TIE ROD END SUB-ASSEMBLY RH**

HINT:

The separation procedure for the RH side is the same as that for the LH side.

61. **SEPARATE FRONT STABILIZER LINK ASSEMBLY LH** (See **REMOVAL**)
62. **SEPARATE FRONT STABILIZER LINK ASSEMBLY RH**

HINT:

The separation procedure for the RH side is the same as that for the LH side.

63. **SEPARATE FRONT LOWER SUSPENSION ARM SUB-ASSEMBLY LH** (See **REMOVAL**)
64. **SEPARATE FRONT LOWER SUSPENSION ARM SUB-ASSEMBLY RH**

HINT:

The separation procedure for the RH side is the same as that for the LH side.

65. **SEPARATE FRONT AXLE ASSEMBLY LH** (See **REMOVAL**)
66. **SEPARATE FRONT AXLE ASSEMBLY RH**

HINT:

The separation procedure for the RH side is the same as that for the LH side.

67. **REMOVE FRONT DRIVE SHAFT ASSEMBLY LH** (See **DISASSEMBLY**)
68. **REMOVE FRONT DRIVE SHAFT ASSEMBLY RH** (See **DISASSEMBLY**)
69. **REMOVE FLYWHEEL HOUSING UNDER COVER (for Automatic Transaxle)** (See **REMOVAL**)
70. **REMOVE DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT (for Automatic Transaxle)** (See **REMOVAL**)
71. **REMOVE ENGINE ASSEMBLY WITH TRANSAXLE**
    a. Set the engine lifter.

Fig. 286: Identifying Engine Lifter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    b. Remove 2 bolts and remove the engine mounting stay RH.

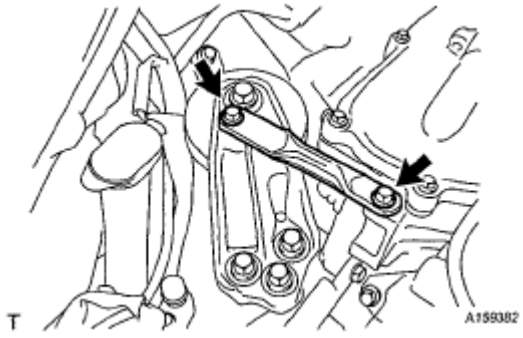


Fig. 287: Locating Bolts And Engine Mounting Stay RH
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    c. Remove the 6 bolts and nut and remove the engine mounting insulator RH.

NOTE: Be sure not to remove the other bolt A.

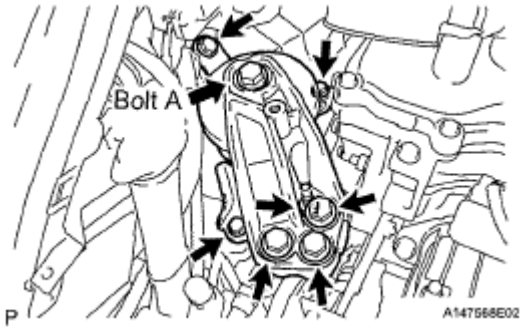


Fig. 288: Locating Bolts And Engine Mounting Insulator RH
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Remove the through bolt and nut and separate the transverse engine mounting insulator.

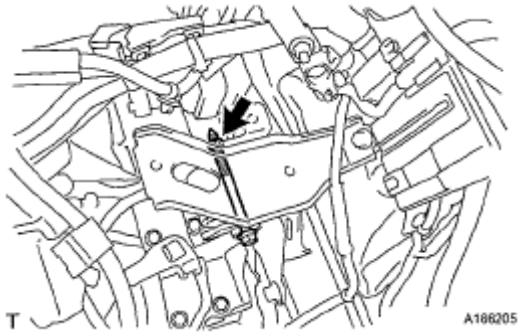


Fig. 289: Locating Through Bolt And Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

e. Remove the 6 bolts and remove the engine assembly with transaxle and front suspension crossmember from the vehicle.

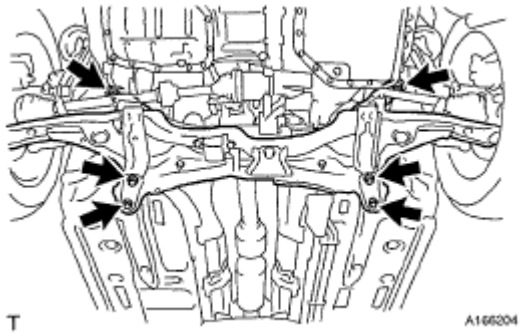


Fig. 290: Locating Bolts And Front Suspension Crossmember
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

72. **REMOVE TRANSVERSE ENGINE MOUNTING INSULATOR**

a. Remove the 5 bolts and remove the transverse engine mounting insulator.

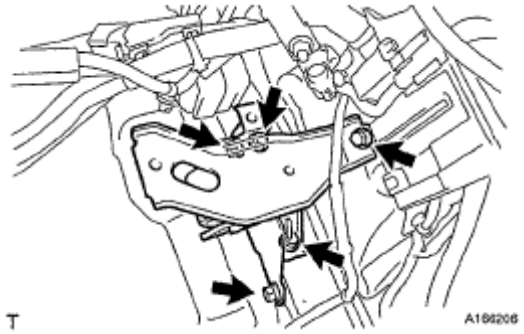


Fig. 291: Locating Bolts And Transverse Engine Mounting Insulator
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

73. **REMOVE FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY**
    a. Remove the bolt and remove the air fuel ratio sensor bracket.
    b. Install the engine hangers with the bolts, as shown in the illustration.

    Torque: 43 N*m (439 kgf*cm, 32 ft.*lbf)

    Part No.: 12281-37020 (engine hanger No. 1)

    12282-37010 (engine hanger No. 2)

    91552-81050 (bolt)

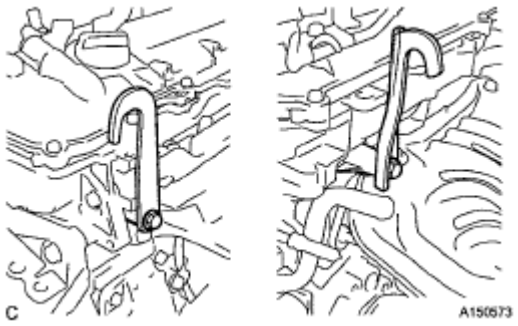


Fig. 292: Identifying Engine Hangers With Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    c. Using an engine sling device and a chain block, suspend the engine assembly with transaxle and front suspension crossmember.
    d. Remove the through bolt from the engine moving control rod and remove the front suspension crossmember.
74. **REMOVE ENGINE MOVING CONTROL ROD COVER** (See **REMOVAL**)
75. **REMOVE ENGINE MOVING CONTROL ROD (for Automatic Transaxle)** (See **REMOVAL**)
76. **REMOVE ENGINE MOVING CONTROL ROD (for Manual Transaxle)** (See **REMOVAL**)

77. **REMOVE FLYWHEEL HOUSING SIDE COVER** (See **REMOVAL**)
78. **REMOVE STARTER ASSEMBLY** (See **REMOVAL**)
79. **REMOVE NO. 1 OIL COOLER INLET TUBE (for Automatic Transaxle)** (See **REMOVAL**)
80. **REMOVE NO. 1 OIL COOLER OUTLET TUBE (for Automatic Transaxle)** (See **REMOVAL**)
81. **REMOVE NO. 2 OIL COOLER TUBE CLAMP (for Automatic Transaxle)** (See **REMOVAL**)
82. **REMOVE TRANSMISSION OIL LEVEL GAGE SUB-ASSEMBLY (for Automatic Transaxle)**
83. **SEPARATE TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY (for Automatic Transaxle)** (See **REMOVAL**)
84. **REMOVE AUTOMATIC TRANSAXLE ASSEMBLY (for Automatic Transaxle)** (See **REMOVAL**)
85. **REMOVE NO. 1 TRANSMISSION CONTROL CABLE BRACKET (for Manual Transaxle)**
    a. Remove the 2 bolts and the control cable bracket.

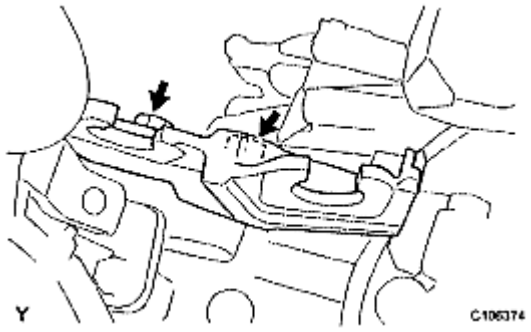


Fig. 293: Locating Bolts And Control Cable Bracket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

86. **REMOVE MANUAL TRANSAXLE ASSEMBLY (for Manual Transaxle)** (See **REMOVAL**)
87. **REMOVE CLUTCH COVER ASSEMBLY (for Manual Transaxle)** (See **REMOVAL**)
88. **REMOVE CLUTCH DISC ASSEMBLY (for Manual Transaxle)**
89. **REMOVE DRIVE PLATE AND RING GEAR SUB-ASSEMBLY (for Automatic Transaxle)**
    a. Hold the crankshaft with SST.

    SST 09213-58013 (91651-60855), 09330-00021

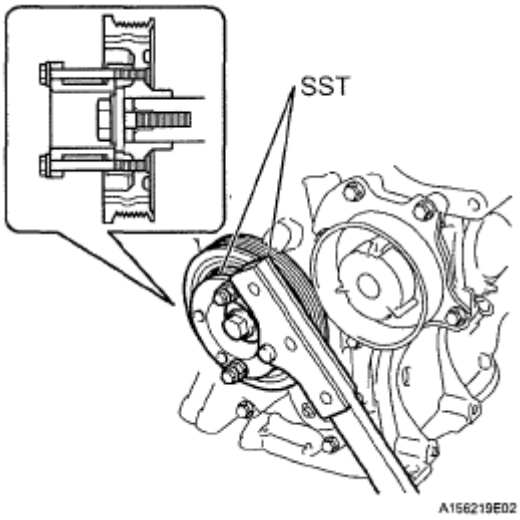


Fig. 294: Holding Crankshaft With SST
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Remove the 8 bolts and remove the rear spacer, drive plate and front spacer.

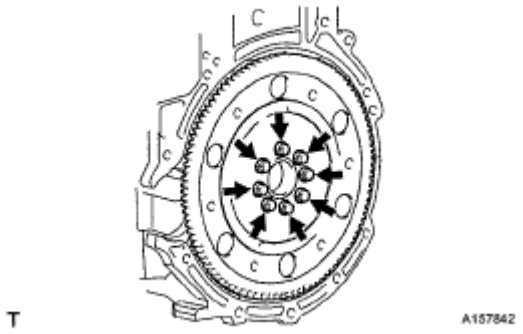


Fig. 295: Locating Bolts And Drive Plate
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

90. **REMOVE FLYWHEEL SUB-ASSEMBLY (for Manual Transaxle)**
    a. Hold the crankshaft with SST.

    SST 09213-58013 (91651-60855), 09330-00021

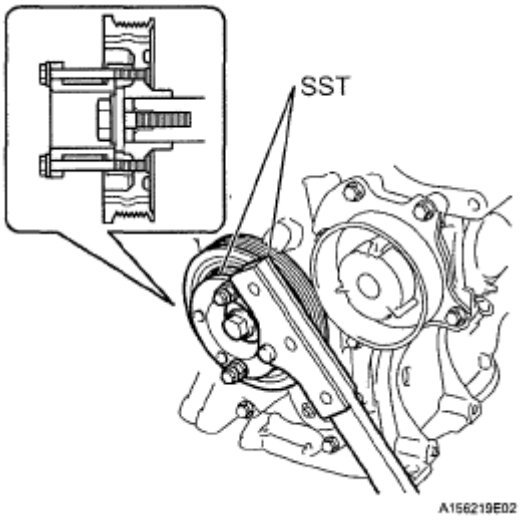


Fig. 296: Holding Crankshaft With SST
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Remove the 8 bolts and remove the flywheel sub-assembly.

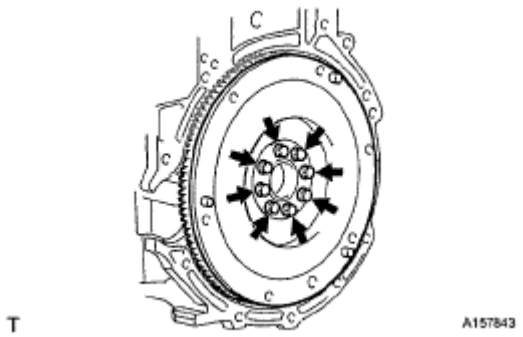


Fig. 297: Locating Bolts And Flywheel Sub-Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. **INSTALL DRIVE PLATE AND RING GEAR SUB-ASSEMBLY (for Automatic Transaxle)**
   a. Using SST, hold the crankshaft.

   SST 09213-58013 (91651-60855), 09330-00021

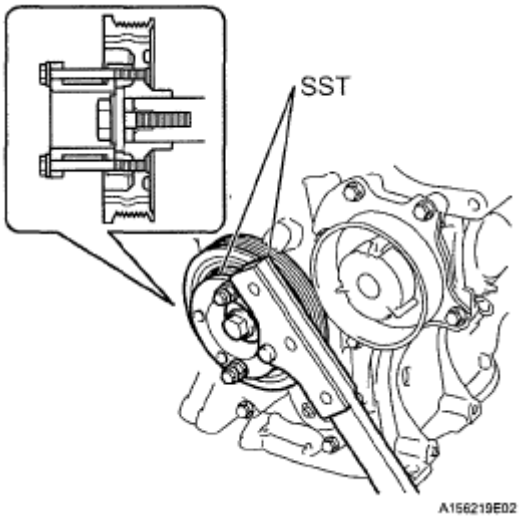


Fig. 298: Holding Crankshaft With SST
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Clean the bolt and the bolt hole.
c. Apply adhesive to 2 or 3 threads of the bolt end.

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

d. Install the front spacer, drive plate and rear spacer with the 8 bolts.

Uniformly tighten the 8 bolts.

Torque: 88 N*m (897 kgf*cm, 65 ft.*lbf)

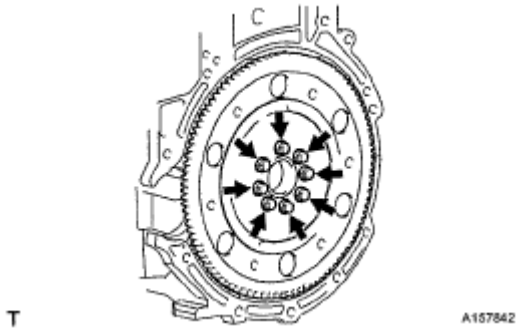


Fig. 299: Locating Bolts And Drive Plate
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **INSTALL AUTOMATIC TRANSAXLE ASSEMBLY (for Automatic Transaxle)** (See **INSTALLATION**)
3. **INSTALL TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY (for Automatic Transaxle)** (See **INSTALLATION**)

4. **INSTALL TRANSMISSION OIL LEVEL GAGE SUB-ASSEMBLY (for Automatic Transaxle)**
5. **INSTALL NO. 1 OIL COOLER OUTLET TUBE (for Automatic Transaxle)** (See **INSTALLATION**)
6. **INSTALL NO. 1 OIL COOLER INLET TUBE (for Automatic Transaxle)** (See **INSTALLATION**)
7. **INSTALL NO. 2 OIL COOLER TUBE CLAMP (for Automatic Transaxle)** (See **INSTALLATION**)
8. **INSTALL FLYWHEEL SUB-ASSEMBLY (for Manual Transaxle)**
   a. Hold the crankshaft with SST.

      SST 09213-58013 (91651-60855), 09330-00021

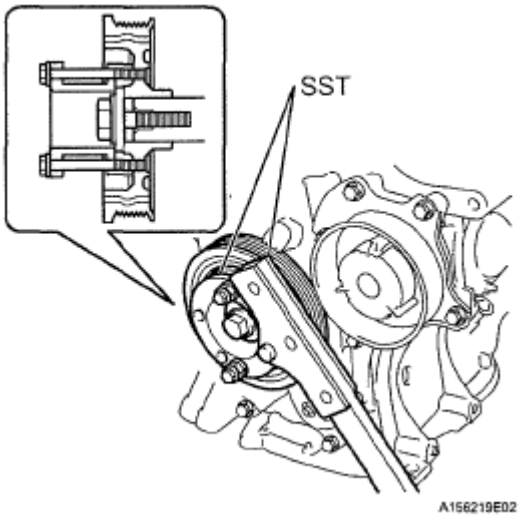


Fig. 300: Holding Crankshaft With SST
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Clean the 8 bolts and their holes.
   c. Apply adhesive to the 2 or 3 end threads of the bolts.

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

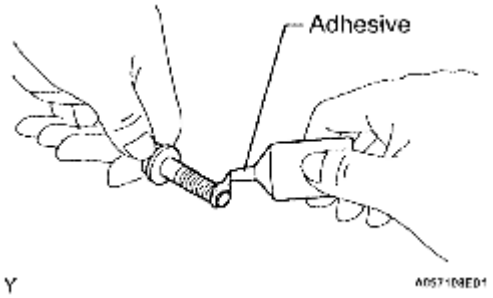


Fig. 301: Applying Adhesive To 2 Or 3 End Threads Of Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Install the flywheel with the 8 bolts in the order shown in the illustration.

Torque: 49 N*m (500 kgf*cm, 38 ft.*lbf)

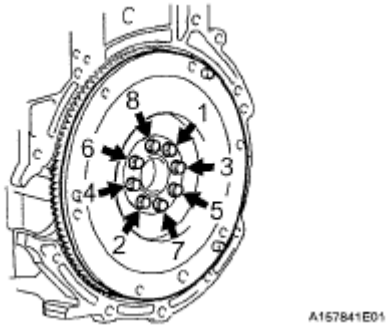


Fig. 302: Locating Flywheel And Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

e. Mark paint marks on the upper edge of the bolt heads.

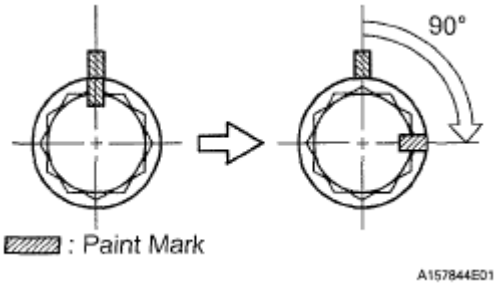


Fig. 303: Identifying Paint Marks On Upper Edge Of Bolt Heads
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

f. Tighten the bolts 90° in the sequence order shown in the illustration.

NOTE: Do not start the engine for at least 1 hour after performing the installation.

9. **INSTALL CLUTCH DISC ASSEMBLY (for Manual Transaxle)** (See **INSTALLATION**)
10. **INSTALL CLUTCH COVER ASSEMBLY (for Manual Transaxle)** (See **INSTALLATION**)
11. **INSPECT AND ADJUST CLUTCH COVER ASSEMBLY (for Manual Transaxle)** (See **INSTALLATION**)
12. **INSTALL MANUAL TRANSAXLE ASSEMBLY (for Manual Transaxle)** (See **INSTALLATION**)
13. **INSTALL NO. 1 TRANSMISSION CONTROL CABLE BRACKET (for Manual Transaxle)**
    a. Install the control cable bracket with 2 bolts.

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

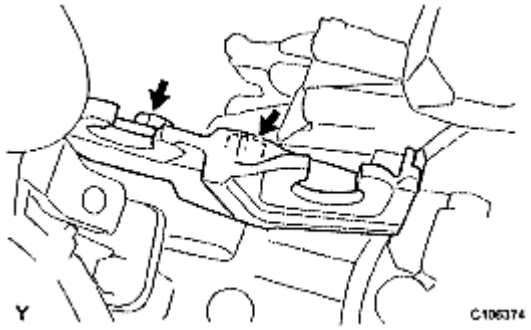


Fig. 304: Locating Bolts And Control Cable Bracket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

14. **INSTALL STARTER ASSEMBLY** (See **INSTALLATION**)
15. **INSTALL FLYWHEEL HOUSING SIDE COVER** (See **INSTALLATION**)
16. **INSTALL ENGINE MOVING CONTROL ROD (for Automatic Transaxle)** (See **INSTALLATION**)
17. **INSTALL ENGINE MOVING CONTROL ROD (for Manual Transaxle)** (See **INSTALLATION**)
18. **INSTALL ENGINE MOVING CONTROL ROD COVER** (See **INSTALLATION**)
19. **INSTALL FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY**
    a. Install the engine moving control rod with the through bolt.

       Torque: 120 N*m (1224 kgf*cm, 89 ft.*lbf)

    b. Remove the 2 bolts and remove the 2 engine hangers.
    c. Install the air fuel ratio sensor bracket with bolt.

       Torque: 43 N*m (439 kgf*cm, 32 ft.*lbf)

20. **INSTALL TRANSVERSE ENGINE MOUNTING INSULATOR**
    a. Install the transverse engine mounting insulator with the 5 bolts.

       Torque: 52 N*m (530 kgf*cm, 38 ft.*lbf)

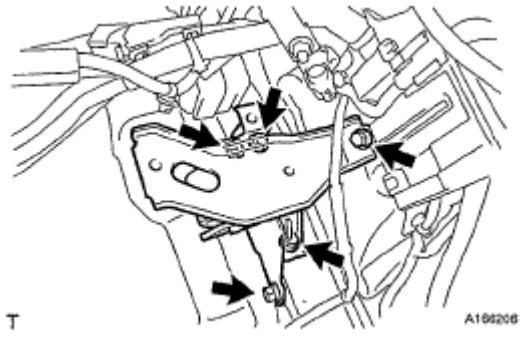


Fig. 305: Locating Bolts And Transverse Engine Mounting Insulator

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

21. **INSTALL ENGINE ASSEMBLY WITH TRANSAXLE**
    a. Set the engine assembly with transaxle and front suspension crossmember on the engine lifter.

Fig. 306: Identifying Engine Lifter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    b. Operate the engine lifter and lift the engine assembly with transaxle and front suspension crossmember to the position where the engine mounting insulator RH and transverse engine mounting insulator can be installed.
    c. Install the transverse engine mounting insulator with the through bolt and nut.

Torque: 52 N*m (530 kgf*cm, 38 ft.*lbf)

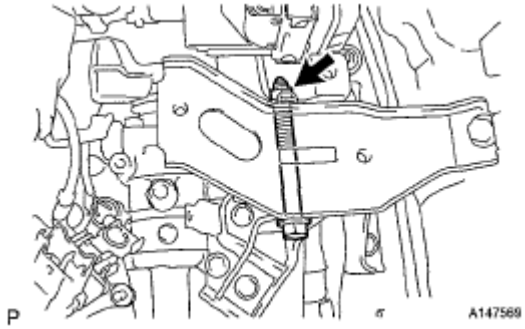


Fig. 307: Locating Through Bolt And Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    d. Install the engine mounting insulator RH with the 6 bolts and nut.

Torque: 88 N*m (897 kgf*cm, 65 ft.*lbf) for Bolt A

45 N*m (459 kgf*cm, 33 ft.*lbf) for Bolt B

52 N*m (530 kgf*cm, 38 ft.*lbf) for Nut C

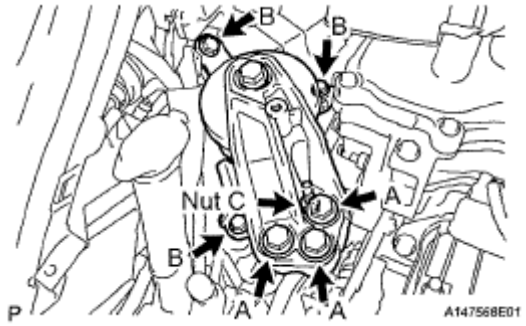


Fig. 308: Locating Engine Mounting Insulator RH And Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

e. Install the engine mounting stay RH with the 2 bolts.

Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)

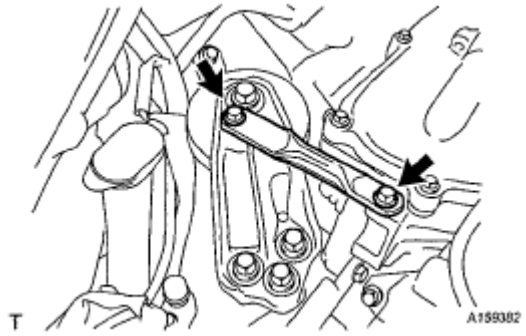


Fig. 309: Locating Bolts And Engine Mounting Stay RH
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

f. Operate the engine lifter and provisionally install the engine assembly with transaxle and front suspension crossmember onto the vehicle with the 6 bolts.
g. Insert SST into the datum holes in the front suspension crossmember RH and LH alternately and tighten bolts A, B and C on both sides in several sequences.

SST 09670-00010

Torque: 70 N*m (714 kgf*cm, 52 ft.*lbf) for Bolt A

160 N*m (1631 kgf*cm, 118 ft.*lbf) for Bolt B

95 N*m (969 kgf*cm, 70 ft.*lbf) for Bolt C

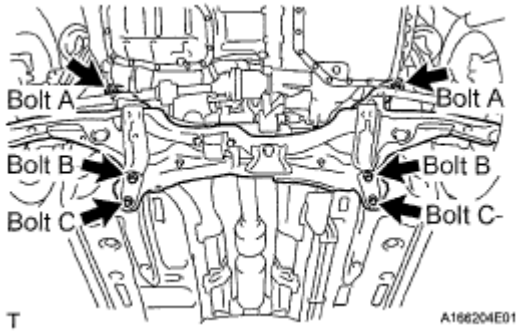


Fig. 310: Locating Front Suspension Crossmember And Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

CAUTION:

- **Insert SST into the datum hole vertically.**
- **If impossible to insert SST vertically, loosen all bolts and th again.**

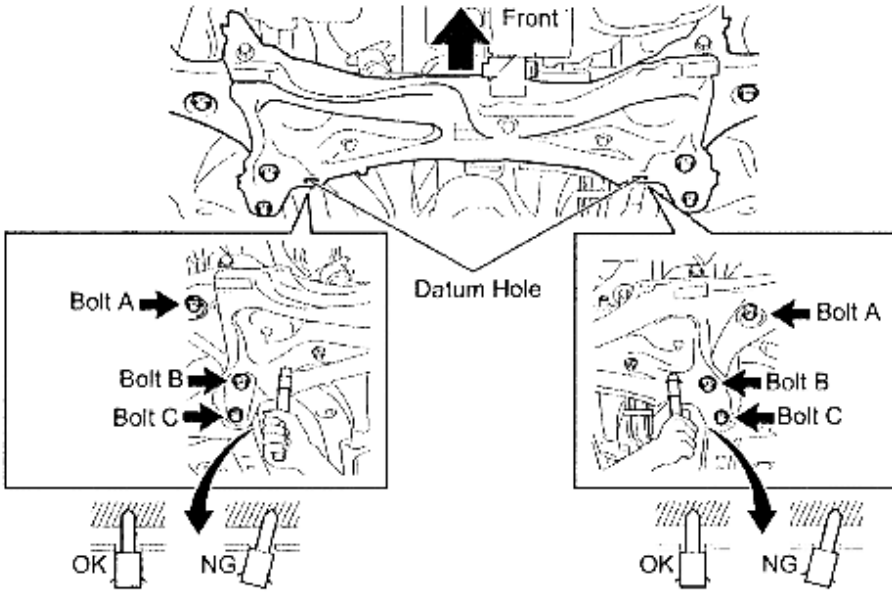


Fig. 311: Inserting SST Into Datum Hole Vertically
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

22. **INSTALL DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT (for Automatic Transaxle)** (See **INSTALLATION**)
23. **INSTALL FLYWHEEL HOUSING UNDER COVER (for Automatic Transaxle)** (See **INSTALLATION**)
24. **INSTALL FRONT DRIVE SHAFT ASSEMBLY LH** (See **INSTALLATION**)
25. **INSTALL FRONT DRIVE SHAFT ASSEMBLY RH** (See **INSTALLATION**)
26. **INSTALL FRONT AXLE ASSEMBLY LH** (See **INSTALLATION**)

27. **INSTALL FRONT AXLE ASSEMBLY RH**

    HINT:

    The installation procedure for the RH side is the same as that for the LH side.

28. **INSTALL FRONT LOWER SUSPENSION ARM SUB-ASSEMBLY LH** (See **INSTALLATION**)
29. **INSTALL FRONT LOWER SUSPENSION ARM SUB-ASSEMBLY RH**

    HINT:

    The installation procedure for the RH side is the same as that for the LH side.

30. **INSTALL FRONT STABILIZER LINK ASSEMBLY LH** (See **INSTALLATION**)
31. **INSTALL FRONT STABILIZER LINK ASSEMBLY RH**

    HINT:

    The installation procedure for the RH side is the same as that for the LH side.

32. **INSTALL TIE ROD END SUB-ASSEMBLY LH** (See **INSTALLATION**)
33. **INSTALL TIE ROD END SUB-ASSEMBLY RH**

    HINT:

    The installation procedure for the RH side is the same as that for the LH side.

34. **INSTALL SPEED SENSOR FRONT LH** (See **INSTALLATION**)
35. **INSTALL SPEED SENSOR FRONT RH**

    HINT:

    The installation procedure for the RH side is the same as that for the LH side.

36. **INSTALL FRONT AXLE SHAFT LH NUT** (See **INSTALLATION**)
37. **INSTALL FRONT AXLE SHAFT RH NUT**

    HINT:

    The installation procedure for the RH side is the same as that for the LH side.

38. **INSTALL FRONT EXHAUST PIPE ASSEMBLY**
    a. Using vernier calipers, measure the free length of the compression spring.

       Minimum length (Front side): 40.5 mm (1.594 in.)

Minimum length (Rear side): 38.5 (1.516 in.)

If the length is not as specified, replace the compression spring.

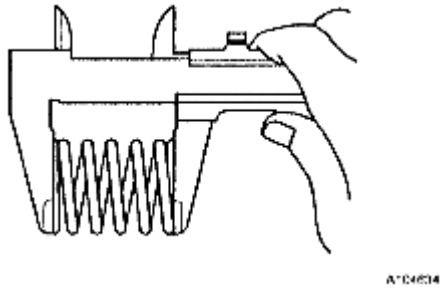


Fig. 312: Measuring Free Length Of Compression Spring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Using a plastic hammer and a wooden block, tap in a new exhaust pipe gasket until its surface is flush with the exhaust manifold.

NOTE:

- **Install the exhaust pipe gasket in the correct direction.**
- **Do not damage the outer surface of the exhaust pipe gasket.**
- **Do not reuse the exhaust pipe gasket.**
- **Do not push in the gasket with the exhaust pipe when connecting it.**

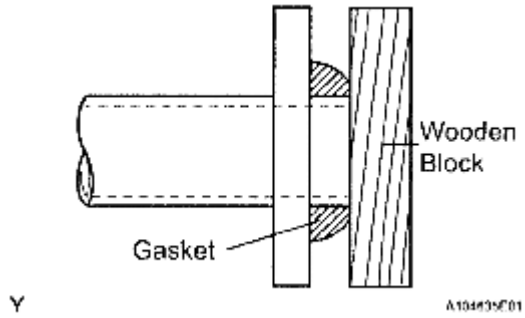


Fig. 313: Identifying Wooden Block And Gasket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Install the 3 exhaust pipe supports.
d. Install the exhaust front pipe assembly and a new exhaust pipe gasket with the 4 compression springs and 4 bolts.

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

e. Pass the sensor connector through the floor panel and install the grommet.
f. Connect the heated oxygen sensor connector.

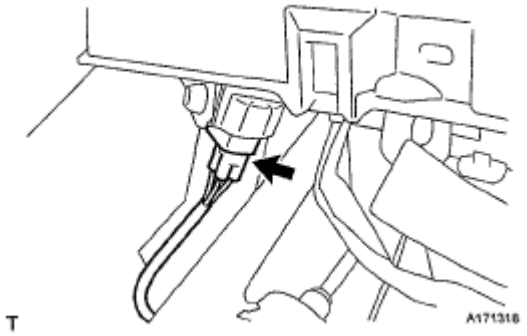


Fig. 314: Locating Heated Oxygen Sensor Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

39. **INSTALL FRONT FLOOR BRACE CENTER** (See **INSTALLATION**)
40. **INSTALL FRONT CONSOLE BOX** (See **INSTALLATION**)
41. **INSTALL REAR CONSOLE BOX ASSEMBLY** (See **INSTALLATION**)
42. **INSTALL CONSOLE BOX REAR COVER** (See **INSTALLATION**)
43. **INSTALL CONSOLE BOX CARPET** (See **INSTALLATION**)
44. **INSTALL CONSOLE PANEL UPPER** (See **INSTALLATION**)
45. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle)** (See **INSTALLATION**)
46. **INSTALL NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY** (See **INSTALLATION**)
47. **INSTALL STEERING SLIDING YOKE SUB-ASSEMBLY** (See **INSTALLATION**)
48. **INSTALL COLUMN HOLE COVER SILENCER SHEET** (See **INSTALLATION**)
49. **INSTALL CLUTCH RELEASE CYLINDER ASSEMBLY (for Manual Transaxle)**
    a. Install the clutch release cylinder and clutch pipe with the 4 bolts.

    Torque: 12 N*m (120 kgf*cm, 9 ft.*lbf) for bolt A

    12 N*m (122 kgf*cm, 9 ft.*lbf) for bolt B

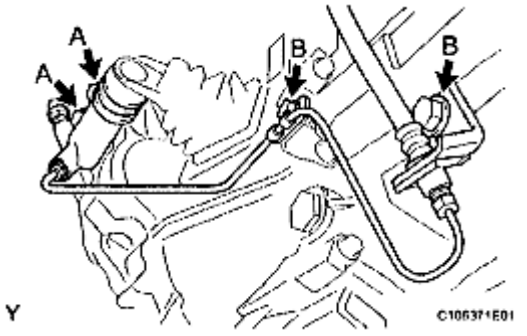


Fig. 315: Locating Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

50. **CONNECT FUEL TUBE SUB-ASSEMBLY**
    a. Connect the fuel tube connector and fuel pipe, and install the No. 1 fuel pipe clamp.

CAUTION: Align the fuel tube connector with the pipe, then push the fuel tube connector in until the retainer makes a click sound. If the connection is tight, apply a small amount of engine oil to the tip of the pipe. After connecting, pull the pipe and connector to make sure that they are securely connected.

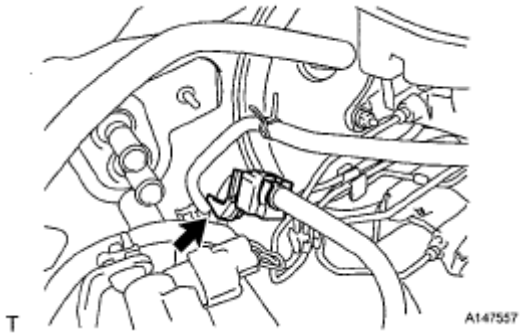


Fig. 316: Locating No. 1 Fuel Pipe Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

51. **CONNECT HEATER WATER INLET HOSE A**
    a. Connect heater water inlet hose A to the heater unit.

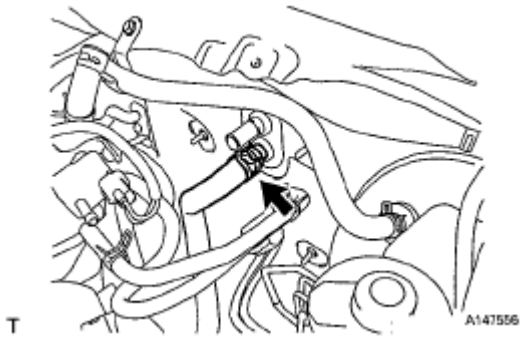


Fig. 317: Locating Heater Water Inlet Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

52. **CONNECT HEATER WATER OUTLET HOSE A (FROM HEATER UNIT)**
    a. Connect heater water outlet hose A to the heater unit.

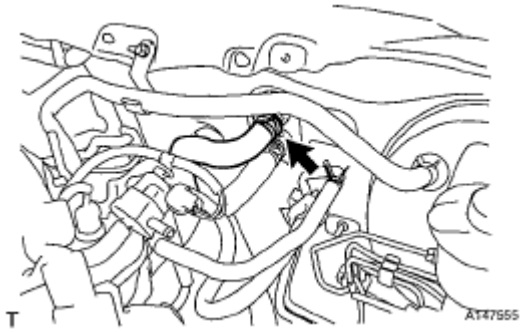


Fig. 318: Locating Heater Water Outlet Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

53. **CONNECT ENGINE WIRE**
    a. Connect the 2 engine wire harness connectors and 2 wire harness clamps to the engine room junction block.

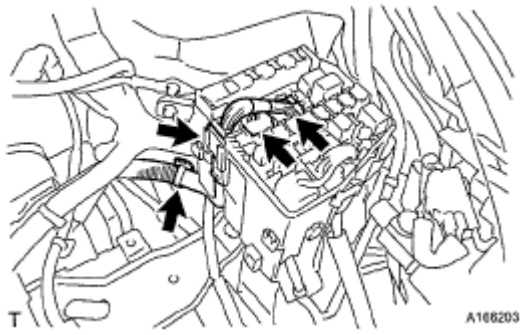


Fig. 319: Locating Connectors And Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    b. Connect the engine wire harness connector to the ECM.
    c. Connect the 2 wire harness clamps.

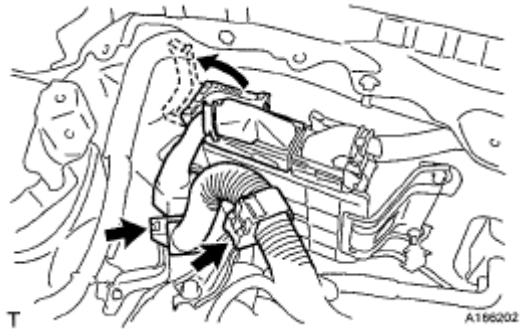


Fig. 320: Locating Wire Harness Clamps
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Connect the 2 connectors.

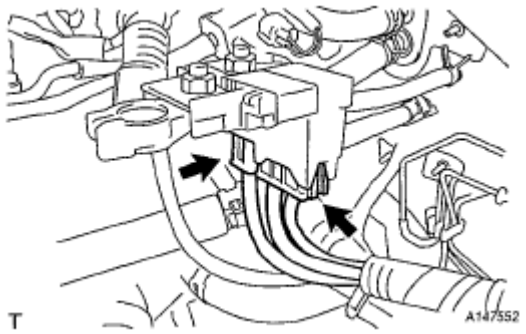


Fig. 321: Locating Connectors
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

e. Install the transaxle earth wire with the bolt and 2 wire harness clamps (for Manual Transaxle).

Torque: 26 N*m (260 kgf*cm, 19 ft.*lbf)

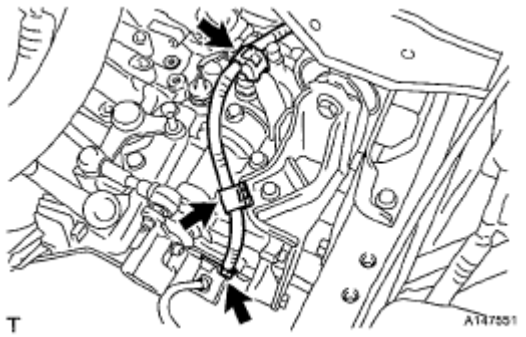


Fig. 322: Locating Bolt And Wire Harness Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

f. Install the transaxle earth wire with the bolt and wire harness clamp (for Automatic Transaxle).

Torque: 8.4 N*m (85 kgf*cm, 74 in.*lbf)

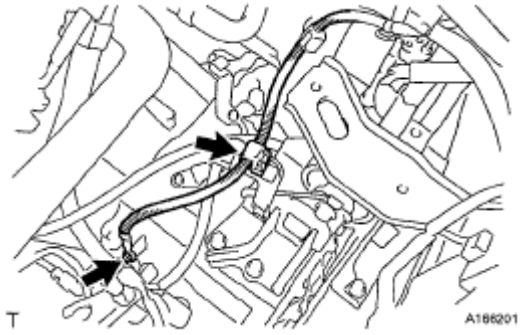


Fig. 323: Locating Bolt And Wire Harness Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

54. **INSTALL NO. 1 FUEL VAPOR FEED HOSE**
    a. Install the No. 1 fuel vapor feed hose into the vacuum switching valve assembly.

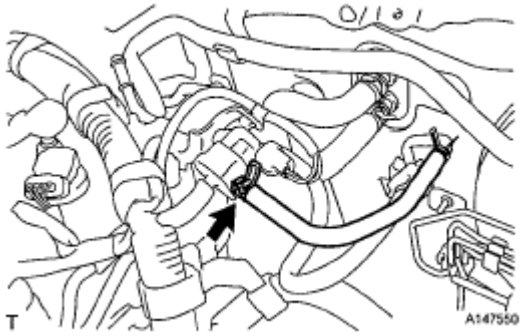


Fig. 324: Locating No. 1 Fuel Vapor Feed Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

55. **INSTALL UNION TO CHECK VALVE HOSE**
    a. Install the union to check valve hose with the clip.

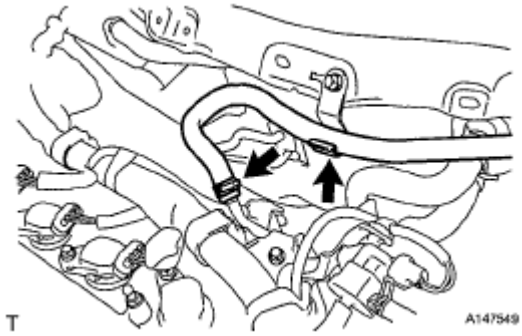


Fig. 325: Locating Clip And Check Valve Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

56. **INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY (for Automatic Transaxle)**
    a. Install the transmission control cable assembly onto the control shaft lever with the nut.

    Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

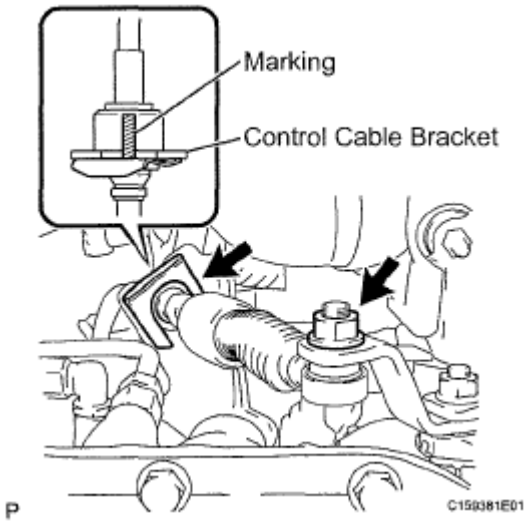


Fig. 326: Locating Transmission Control Cable Assembly And Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Fix the transmission control cable assembly onto the control cable bracket with a new clip.

NOTE: Make sure that the marking on the cable is aligned with the slit in the transmission control cable bracket before installing the cable.

57. **INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY (for Manual Transaxle)**
   a. Install the control cable assembly onto the control cable bracket with 2 new clips.

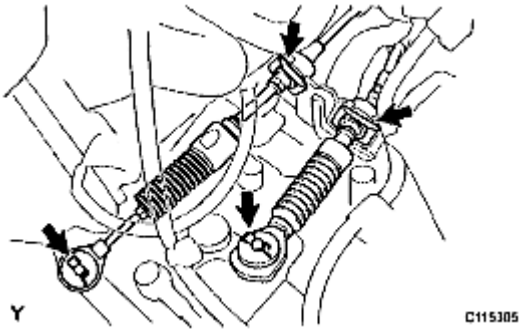


Fig. 327: Locating Clips And Cables
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Connect the control cable assembly and install the 2 washers and 2 clips.
   c. Install the control cable assembly onto the shift lever retainer.

NOTE:
- **Install the cable with the protruding portion of the cable outer facing upward.**
- **After installing, check that the lock of the cable outer is**

protruding beyond portion A. as shown in the illustration.

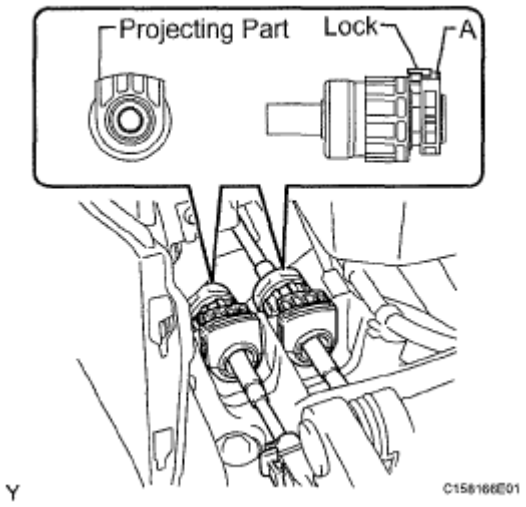


Fig. 328: Identifying Protruding Portion Of Cable
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

58. **INSTALL WITH PULLEY COMPRESSOR ASSEMBLY** (See **INSTALLATION**)
59. **INSTALL RADIATOR ASSEMBLY** (See **INSTALLATION**)
60. **INSTALL UPPER RADIATOR SUPPORT SUB-ASSEMBLY** (See **INSTALLATION**)
61. **INSTALL UPPER RADIATOR SUPPORT ABSORBER** (See **REASSEMBLY**)
62. **INSTALL NO. 1 COOLER COVER** (See **INSTALLATION**)
63. **INSTALL HOOD LOCK ASSEMBLY** (See **INSTALLATION**)
64. **CONNECT NO. 2 OIL COOLER INLET HOSE (for Automatic Transaxle)** (See **INSTALLATION**)
65. **CONNECT NO. 1 OIL COOLER OUTLET HOSE (for Automatic Transaxle)** (See **INSTALLATION**)
66. **CONNECT NO. 1 RADIATOR HOSE** (See **INSTALLATION**)
67. **INSTALL NO. 2 RADIATOR HOSE**
    a. Install the No. 2 radiator hose with the 2 clips.

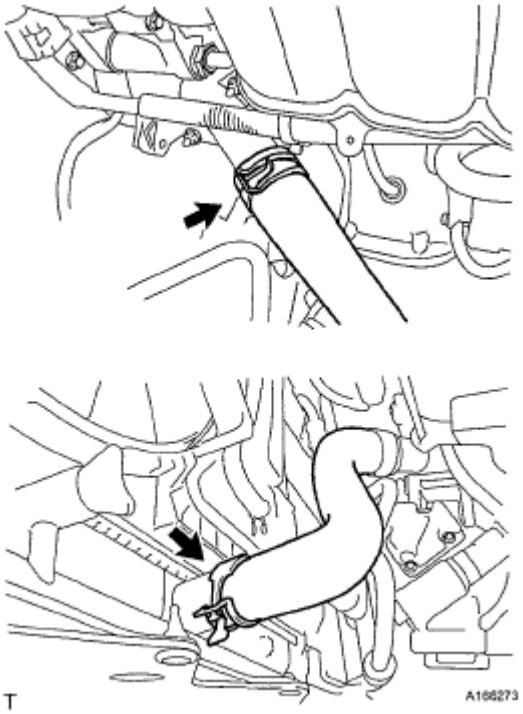


Fig. 329: Locating Clips And No. 2 Radiator Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

68. **INSTALL FRONT BUMPER COVER** (See **INSTALLATION**)
69. **INSTALL FAN AND GENERATOR V BELT** (See **INSTALLATION**)
70. **ADJUST FAN AND GENERATOR V BELT** (See **INSTALLATION**)
71. **INSPECT FAN AND GENERATOR V BELT** (See **INSTALLATION**)
72. **INSTALL NO. 2 CYLINDER HEAD COVER** (See **INSTALLATION**)
73. **INSTALL BATTERY CARRIER**
    a. Install the battery carrier with the 5 bolts.

    Torque: 17 N*m (173 kgf*cm, 13 ft.*lbf)

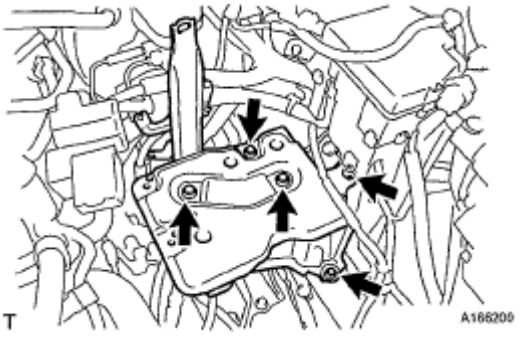


Fig. 330: Locating Bolts And Battery Carrier
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Install the clamp.

74. **INSTALL AIR CLEANER BRACKET**

a. Install the air cleaner bracket with the 2 bolts.

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

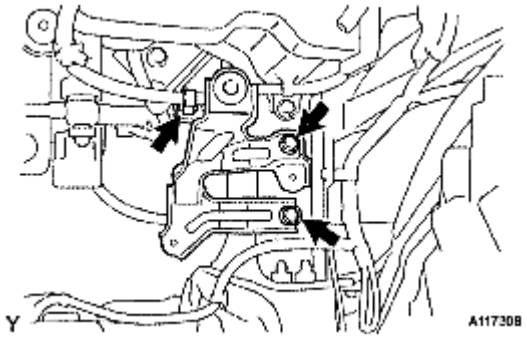


Fig. 331: Locating Bolts And Air Cleaner Bracket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Connect the wire harness clamp to the air cleaner bracket.

75. **INSTALL AIR CLEANER ASSEMBLY**

a. Install the air cleaner case with air cleaner inlet with the 2 bolts.

Torque: 7.8 N*m (80 kgf*cm, 69 in.*lbf)

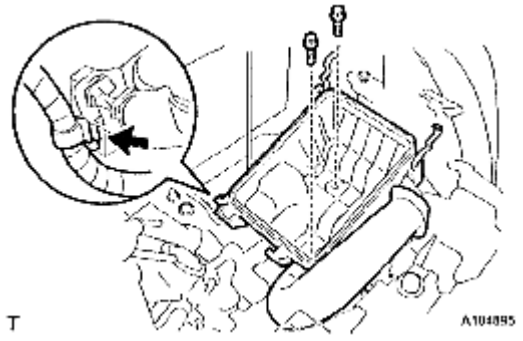


Fig. 332: Identifying Bolts And Air Cleaner Case With Air Cleaner Inlet
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Connect the wire harness to the air cleaner case.
c. Install the air cleaner element.
d. Install and lock the air cleaner cap with air cleaner hose and then tighten the air cleaner hose clamp.

Torque: 3.0 N*m (31 kgf*cm, 27 in.*lbf)

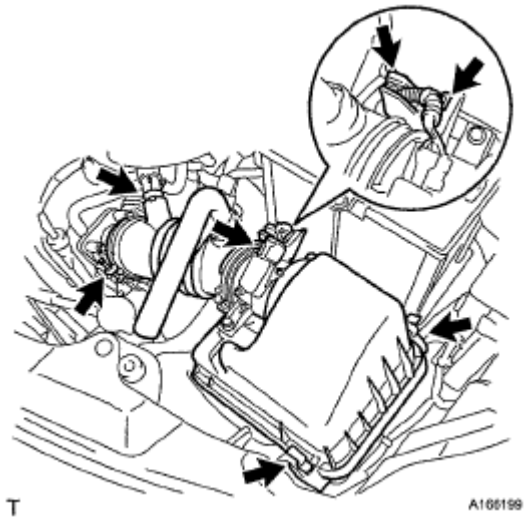


Fig. 333: Locating Clamps
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

e. Connect the ventilation hose to the air cleaner hose.
f. Connect the intake air flow meter connector and 2 wire harness clamps.

76. **INSTALL OUTER COWL TOP PANEL**
    a. Install the outer cowl top panel with the 9 bolts.

    Torque: 6.5 N*m (66 kgf*cm, 58 in.*lbf)

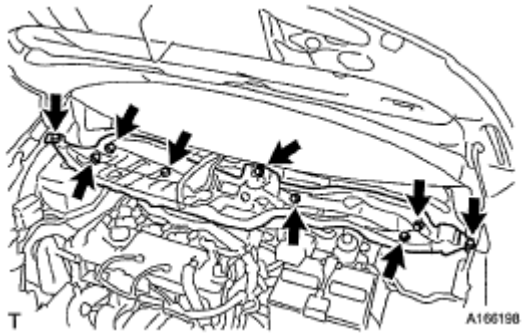


Fig. 334: Locating Bolts And Outer Cowl Top Panel
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    b. Connect the wire harness clamp.

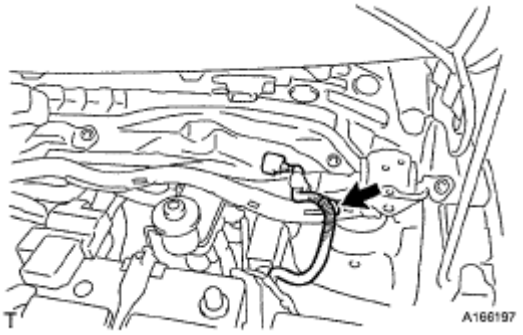


Fig. 335: Locating Wire Harness Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

77. **INSTALL FRONT AIR SHUTTER SEAL RH**
    a. Engage the 2 claws to install the front air shutter seal RH.

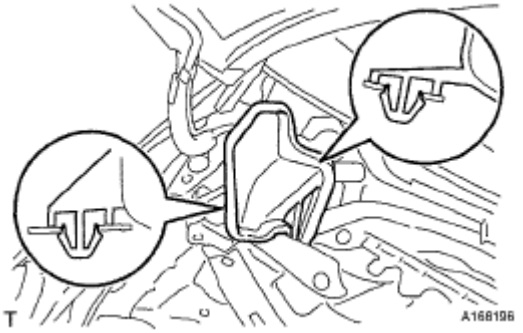


Fig. 336: Identifying Claws Locations
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

78. **INSTALL FRONT WIPER MOTOR AND LINK** (See **INSTALLATION**)
79. **INSTALL COWL TOP VENTILATOR LOUVER LH** (See **INSTALLATION**)
80. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY** (See **INSTALLATION**)
81. **INSTALL HOOD TO COWL TOP SEAL** (See **INSTALLATION**)
82. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH** (See **INSTALLATION**)
83. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH** (See **INSTALLATION**)
84. **INSTALL FRONT WIPER ARM HEAD CAP** (See **INSTALLATION**)
85. **INSTALL BATTERY TRAY**
86. **INSTALL BATTERY**
    a. Install the battery onto the vehicle with the battery clamp.

       Torque: 3.5 N*m (36 kgf*cm, 31 in.*lbf)

    b. Connect the cable to the battery terminal.

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

87. **ADD ENGINE COOLANT** (See **REPLACEMENT**)
88. **ADD AUTOMATIC TRANSAXLE OIL (for Automatic Transaxle)**
89. **INSPECT AUTOMATIC TRANSAXLE OIL (for Automatic Transaxle)** (See **ON-VEHICLE INSPECTION**)
90. **ADD MANUAL TRANSAXLE OIL (for Manual Transaxle)**
91. **INSPECT MANUAL TRANSAXLE OIL (for Manual Transaxle)** (See **ON-VEHICLE INSPECTION**)
92. **INSPECT FOR FUEL LEAK**
93. **INSPECT FOR ENGINE OIL LEAK**
94. **INSPECT FOR EXHAUST GAS LEAK**
95. **INSPECT FOR ENGINE COOLANT LEAK** (See **ON-VEHICLE INSPECTION**)
96. **INSTALL ENGINE UNDER COVER RH**
97. **INSTALL ENGINE UNDER COVER LH**
98. **INSTALL FRONT WHEELS**

    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

99. **INSPECT IGNITION TIMING** (See **ON-VEHICLE INSPECTION**)
100. **INSPECT ENGINE IDLING SPEED** (See **ON-VEHICLE INSPECTION**)
101. **INSPECT CO/HC** (See **ON-VEHICLE INSPECTION**)
102. **INSPECT FRONT WHEEL ALIGNMENT**

     (See **ADJUSTMENT**)

103. **INSPECT ABS SENSOR SIGNAL**

     (See **TEST MODE PROCEDURE**)

104. **INSPECT VSC SENSOR SIGNAL**

     (See **TEST MODE PROCEDURE**)

ENGINE UNIT

COMPONENTS

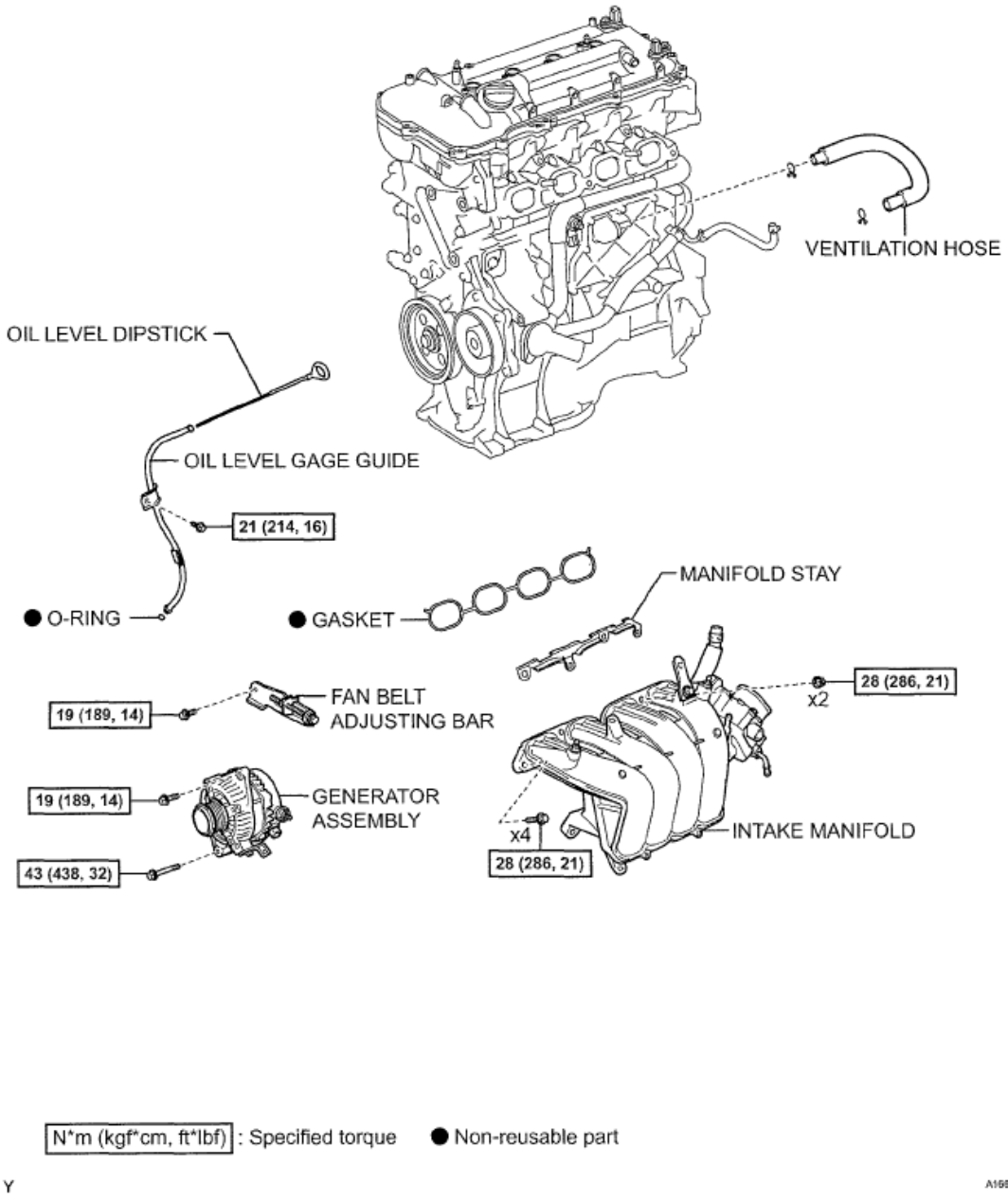


Fig. 337: Identifying Engine Unit Components And Torque Specifications (1 Of 9)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

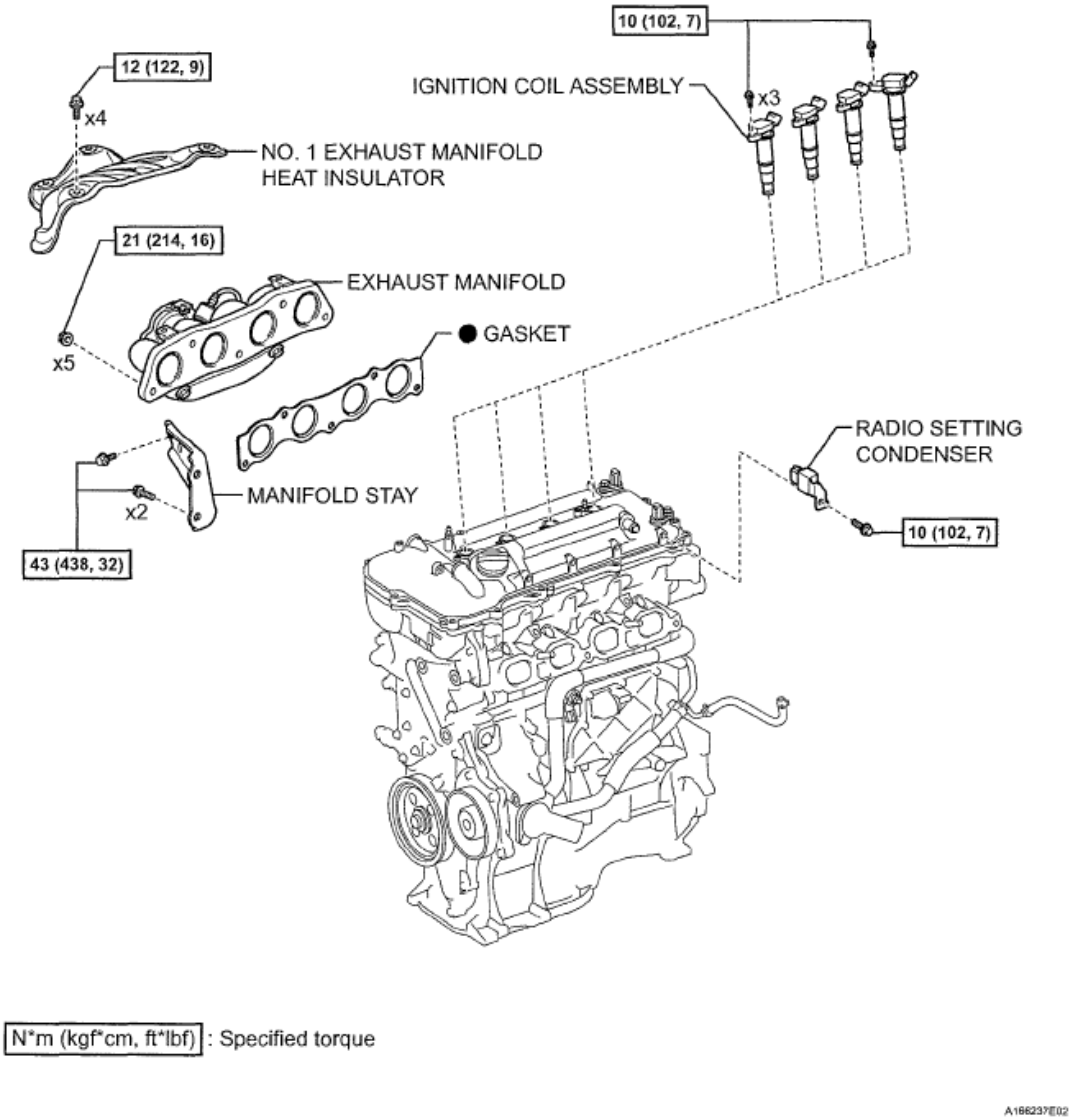


Fig. 338: Identifying Engine Unit Components And Torque Specifications (2 Of 9)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

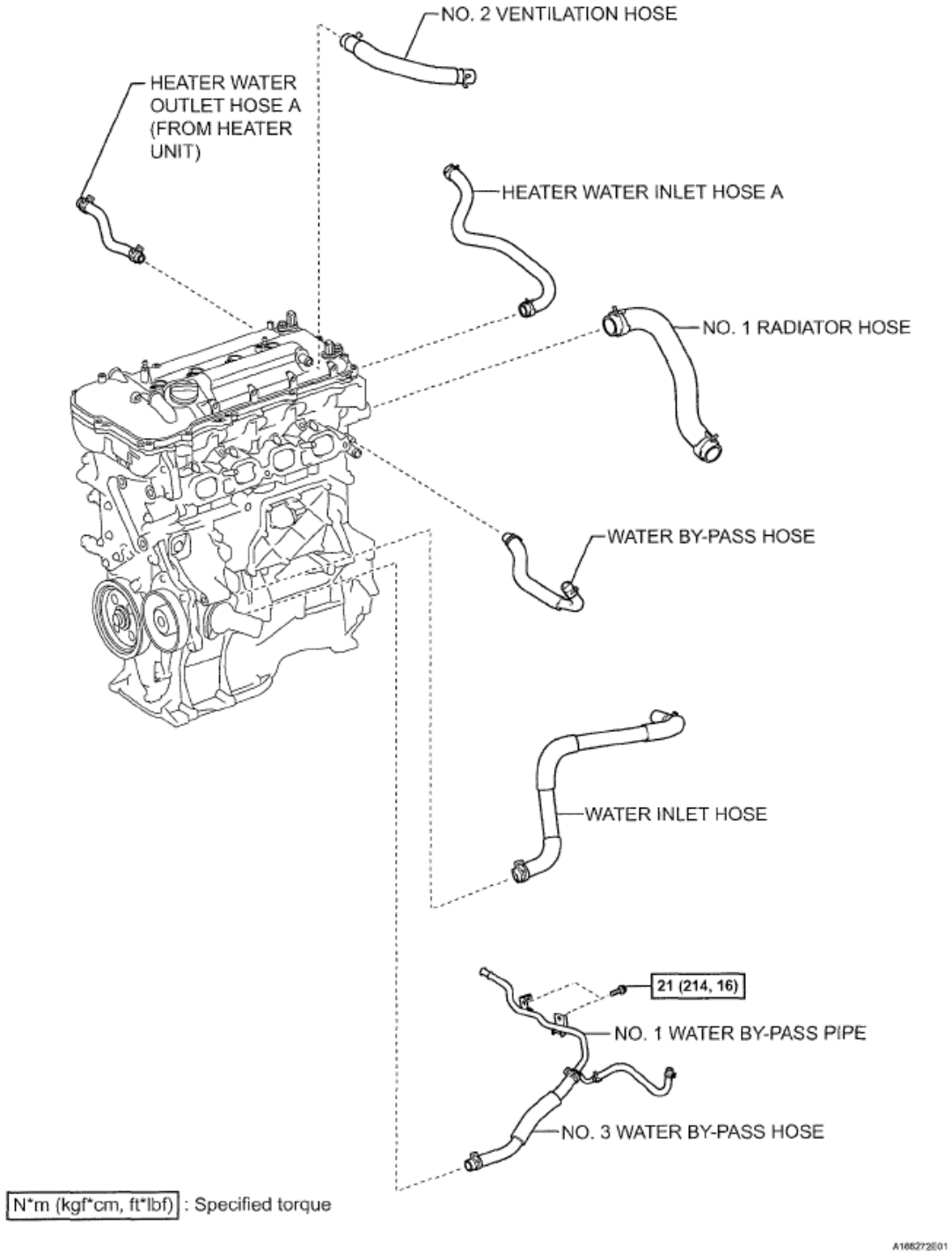


Fig. 339: Identifying Engine Unit Components And Torque Specifications (3 Of 9)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

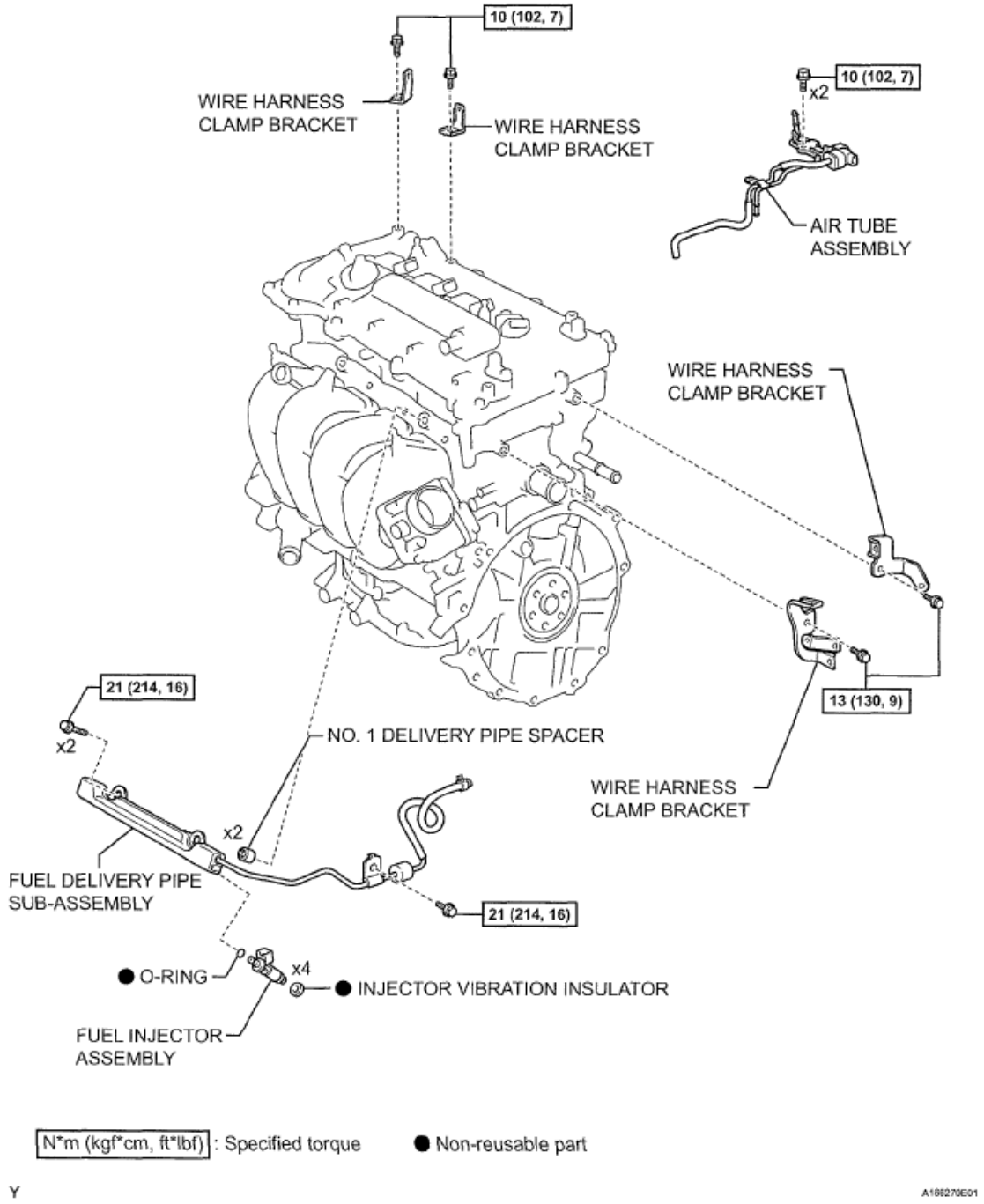


Fig. 340: Identifying Engine Unit Components And Torque Specifications (4 Of 9)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

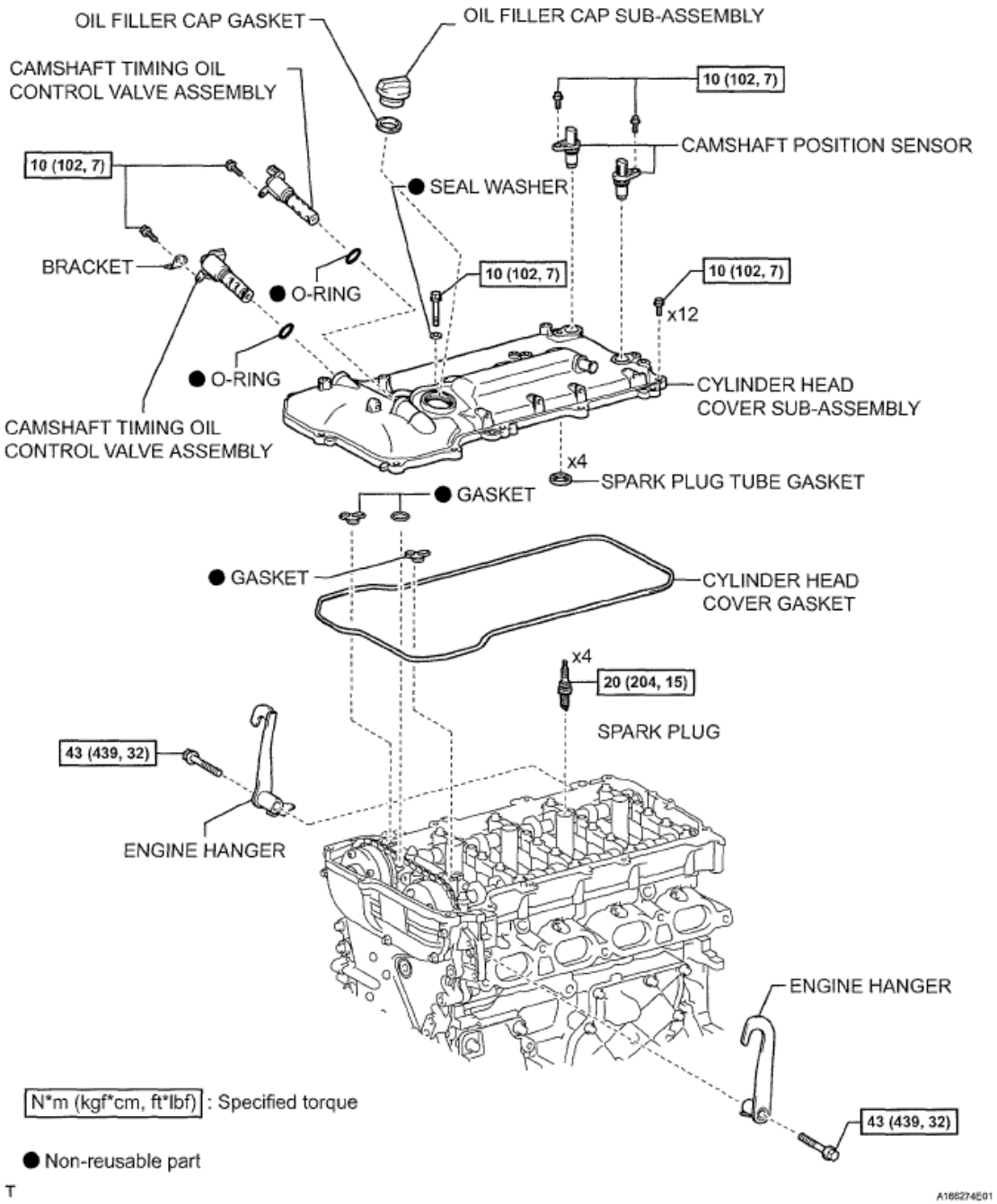


Fig. 341: Identifying Engine Unit Components And Torque Specifications (5 Of 9)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

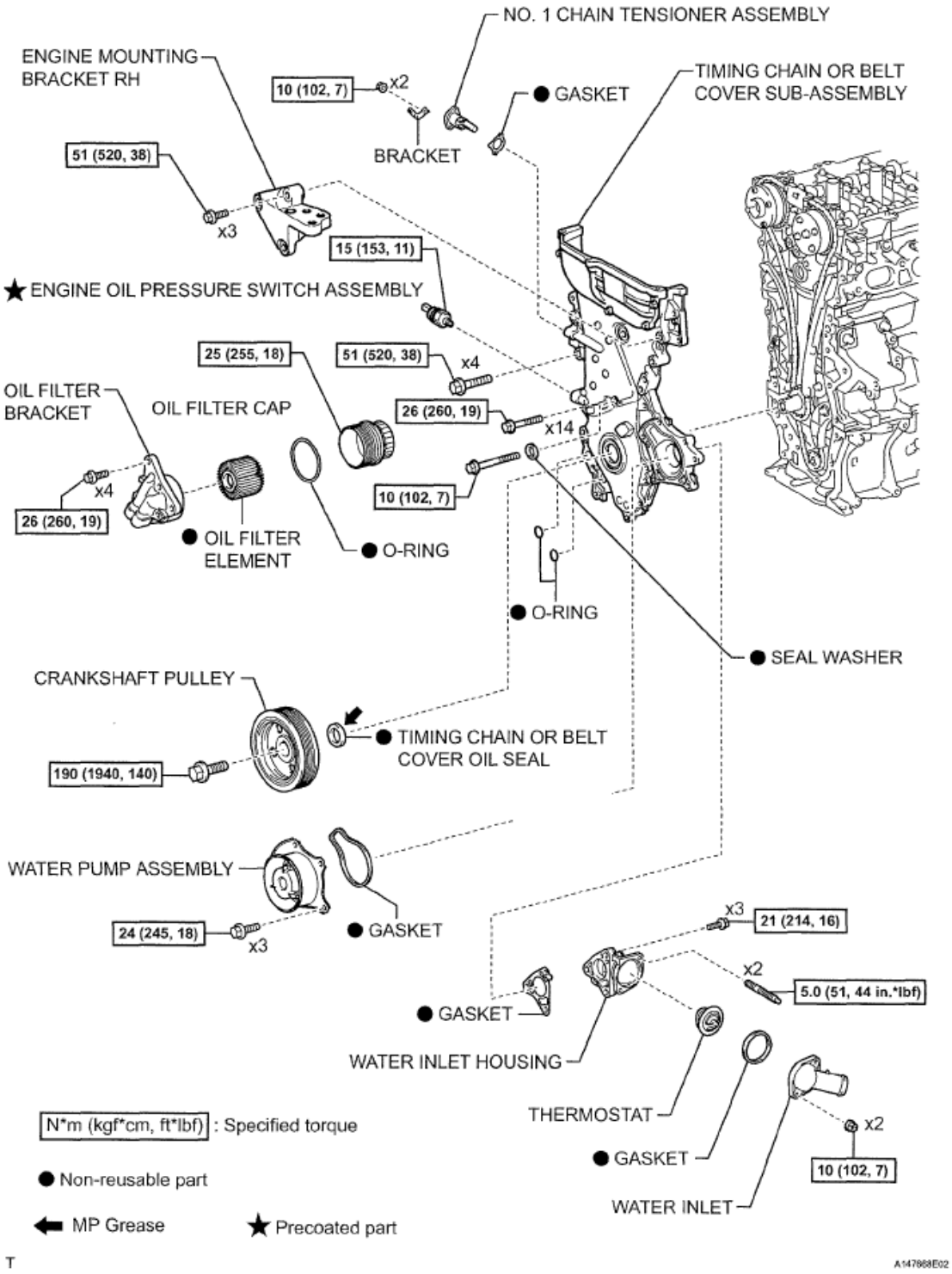


Fig. 342: Identifying Engine Unit Components And Torque Specifications (6 Of 9)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

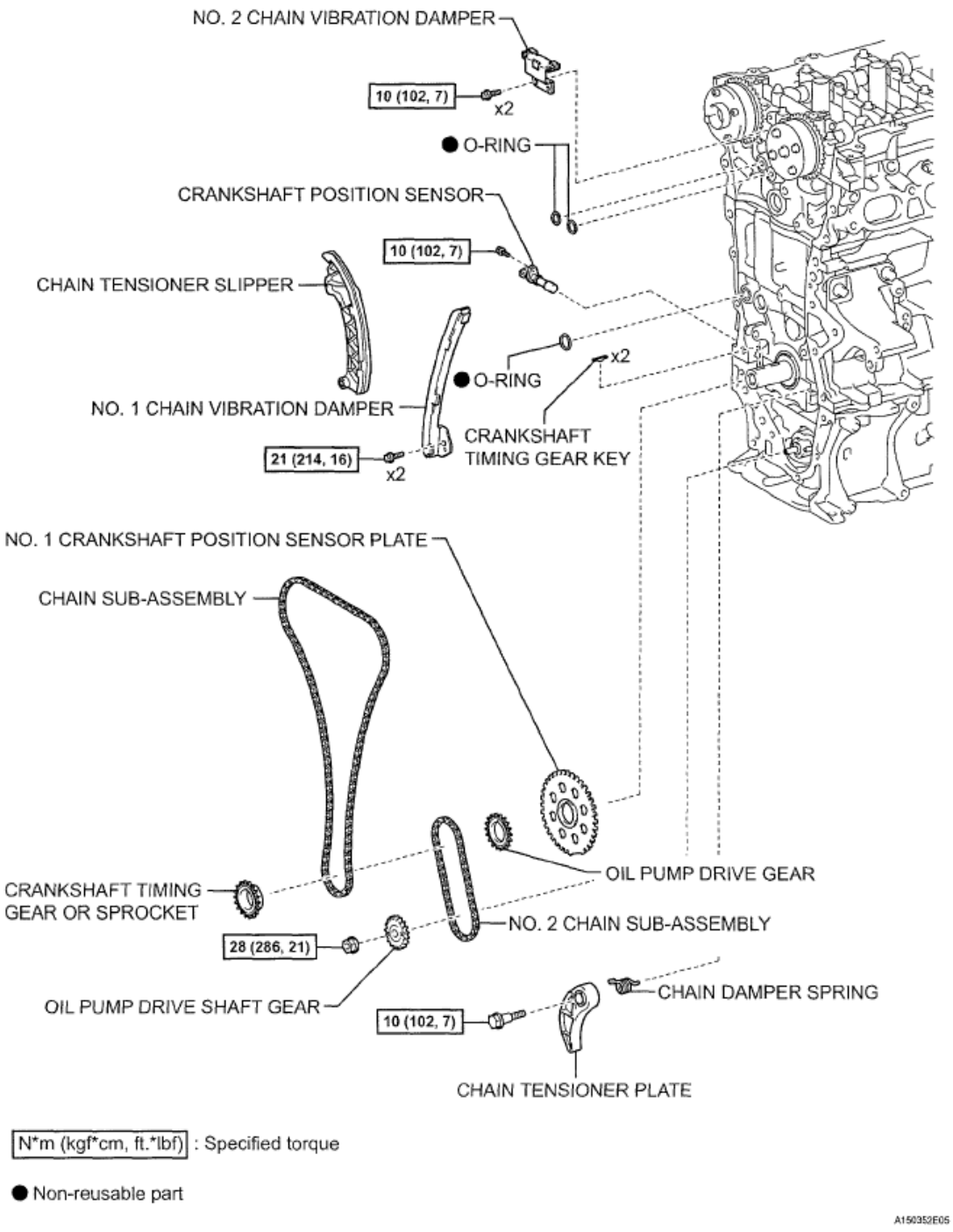


Fig. 343: Identifying Engine Unit Components And Torque Specifications (7 Of 9)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

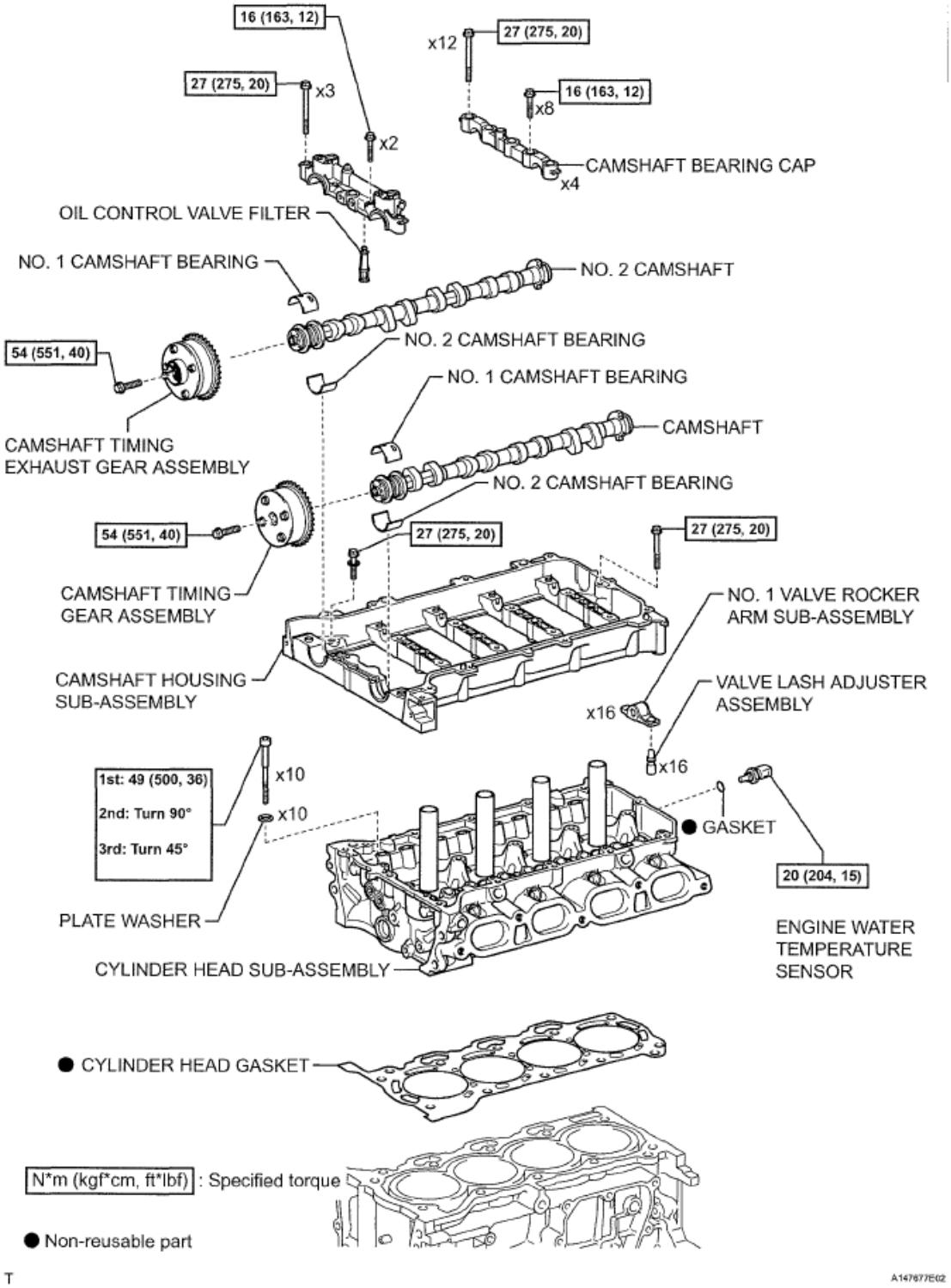


Fig. 344: Identifying Engine Unit Components And Torque Specifications (8 Of 9)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

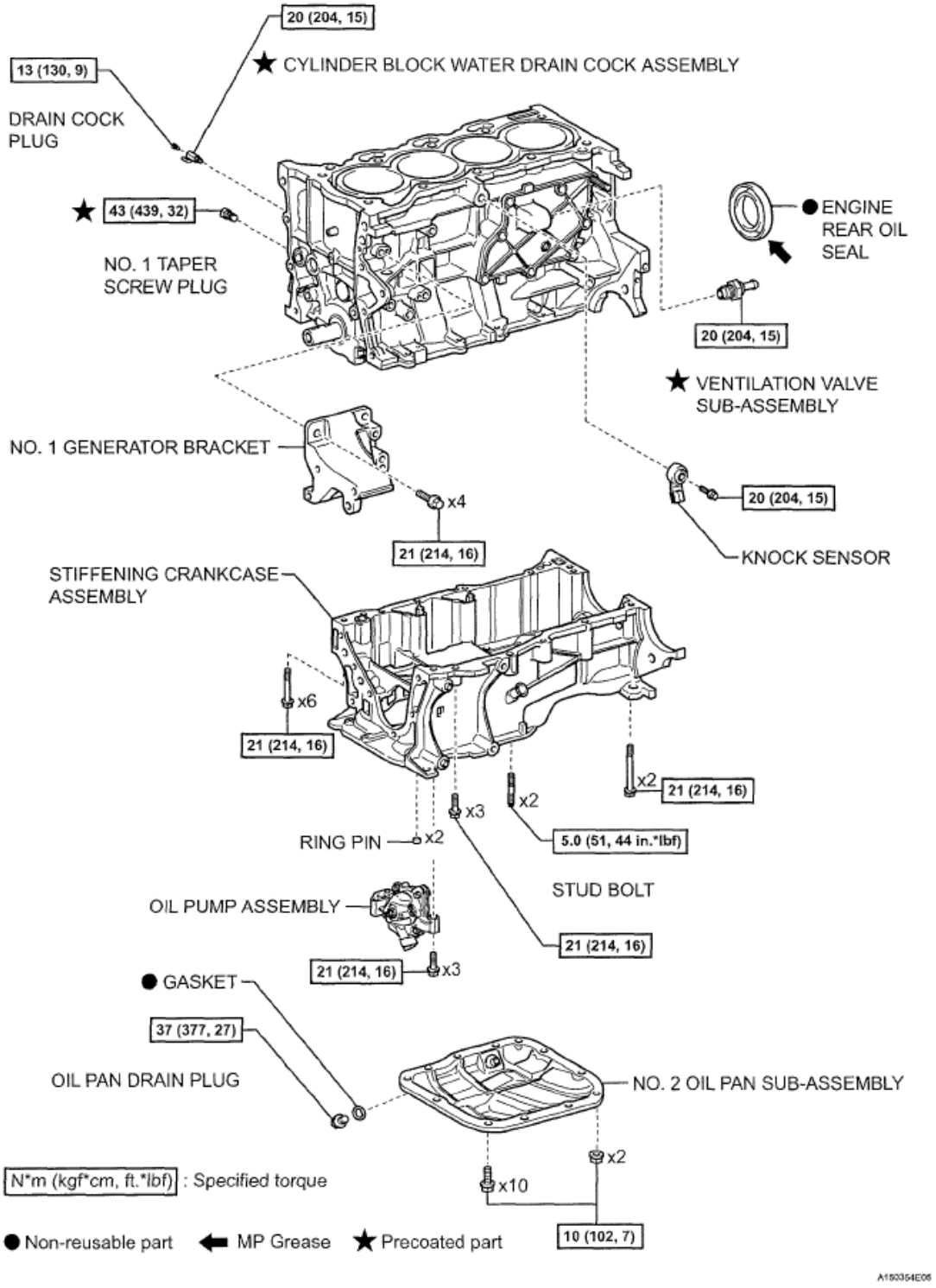


Fig. 345: Identifying Engine Unit Components And Torque Specifications (9 Of 9)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **REMOVE IGNITION COIL ASSEMBLY**
   a. Disconnect the 4 ignition coil assembly connectors.
   b. Remove the 4 bolts and remove the 4 ignition coil assemblies.

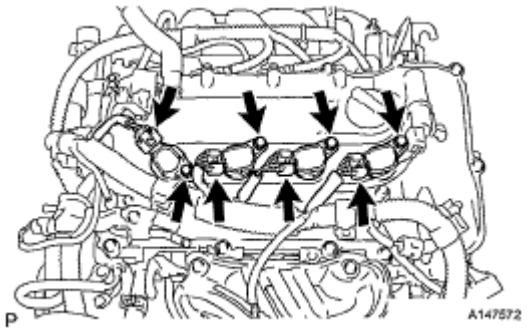


Fig. 346: Locating Bolts And Ignition Coil Assemblies
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **REMOVE RADIO SETTING CONDENSER**
   a. Disconnect the radio setting condenser connector.

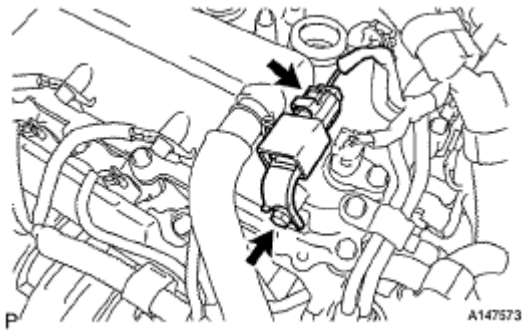


Fig. 347: Locating Radio Setting Condenser Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Remove the bolt and remove the radio setting condenser.
3. **REMOVE ENGINE WIRE**
4. **REMOVE NO. 2 VENTILATION HOSE**
   a. Remove the No. 2 ventilation hose.

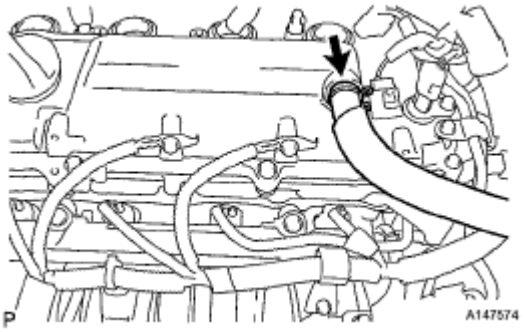


Fig. 348: Locating No. 2 Ventilation Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. **REMOVE HEATER WATER OUTLET HOSE A (FROM HEATER UNIT)**
   a. Loosen the clip and remove heater water outlet hose A.

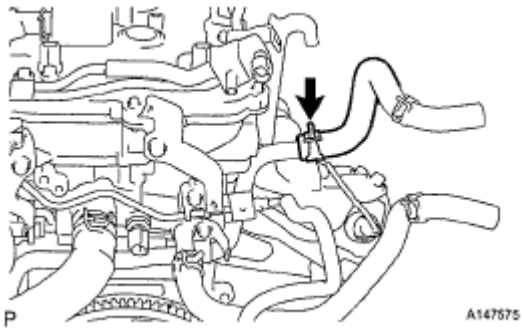


Fig. 349: Locating Clip And Heater Water Outlet Hose A
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. **REMOVE HEATER WATER INLET HOSE A**
   a. Loosen the clip and remove heater water inlet hose A.

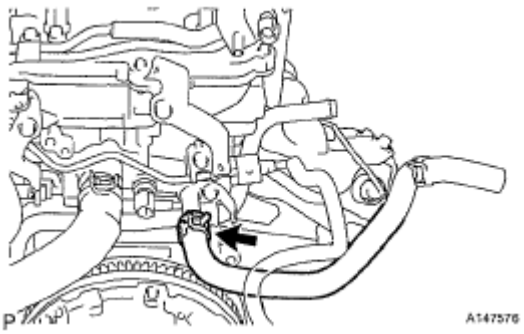


Fig. 350: Locating Clip And Heater Water Inlet Hose A
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. **REMOVE NO. 1 RADIATOR HOSE**

a. Loosen the clip and remove the No. 1 radiator hose.

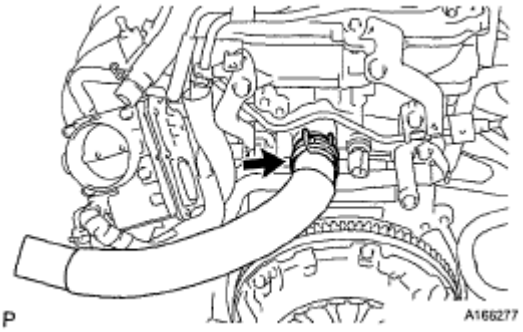


Fig. 351: Locating Clip And No. 1 Radiator Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. **REMOVE INTAKE MANIFOLD**
   a. Loosen the 2 clips and separate the 2 water by-pass hoses.

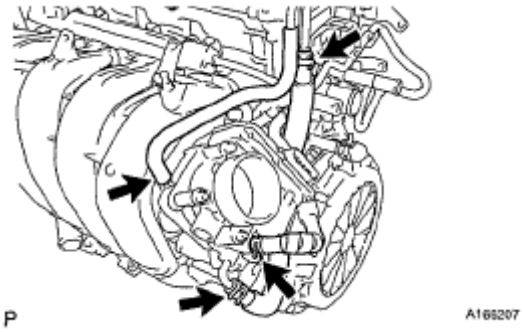


Fig. 352: Locating Clips And Water By-Pass Hoses
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Separate the No. 1 fuel vapor feed hose from the throttle body.
   c. Loosen the clip and separate the No. 1 vacuum transmitting hose.
   d. Separate the ventilation hose.
   e. Separate the wire harness clamp from the intake manifold.

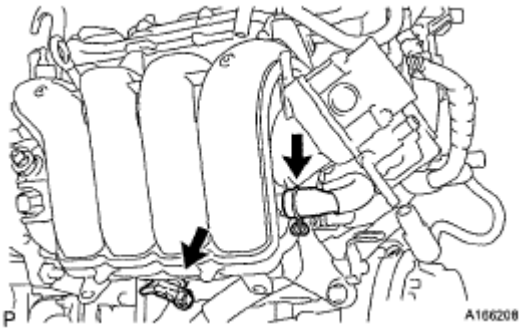


Fig. 353: Locating Wire Harness Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

f. Remove the 4 bolt and 2 nuts and remove the intake manifold and manifold stay.

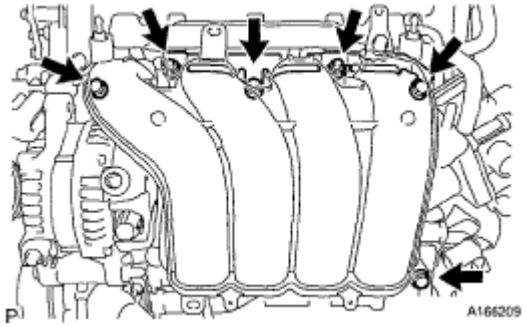


Fig. 354: Locating Bolt And Nuts And Intake Manifold And Manifold Stay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

g. Remove the gasket from the intake manifold.

9. **REMOVE FUEL DELIVERY PIPE SUB-ASSEMBLY**
   a. Remove the 3 bolts and remove the fuel delivery pipe with the 4 fuel injectors.

NOTE: Do not drop the fuel injectors when removing the fuel delivery pipe.

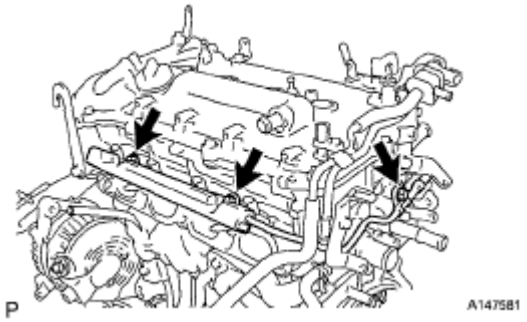


Fig. 355: Locating Bolts And Fuel Delivery Pipe
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. **REMOVE NO. 1 DELIVERY PIPE SPACER** (See **REMOVAL**)
11. **REMOVE INJECTOR VIBRATION INSULATOR** (See **REMOVAL**)
12. **REMOVE FUEL INJECTOR ASSEMBLY** (See **REMOVAL**)
13. **REMOVE GENERATOR ASSEMBLY** (See **REMOVAL**)
14. **REMOVE FAN BELT ADJUSTING BAR**
    a. Remove the bolt and remove the fan belt adjusting bar.

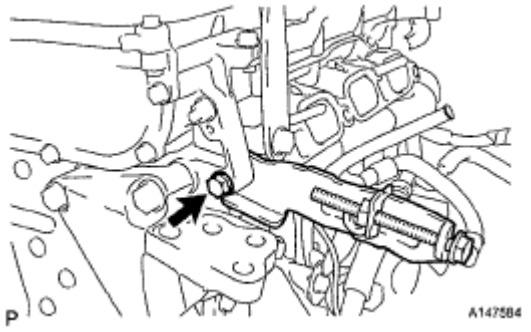


Fig. 356: Locating Bolt And Fan Belt Adjusting Bar
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

15. **REMOVE VENTILATION HOSE**
    a. Remove the ventilation hose.

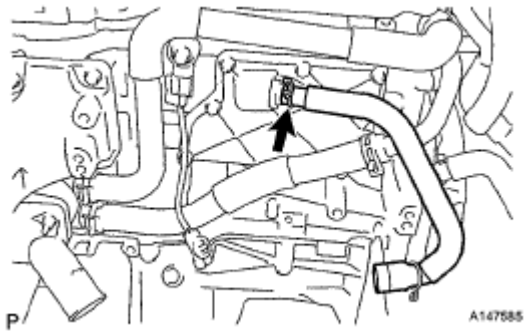


Fig. 357: Locating Ventilation Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

16. **REMOVE OIL LEVEL DIPSTICK**
17. **REMOVE OIL LEVEL GAGE GUIDE**
    a. Remove the bolt and remove the oil level gage guide.

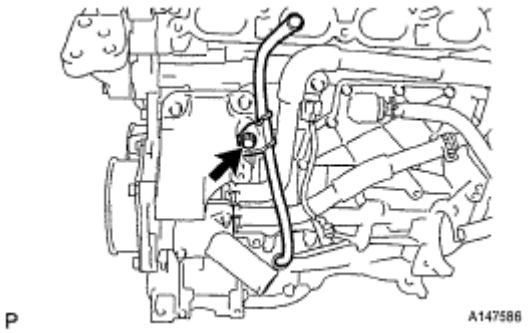


Fig. 358: Locating Bolt And Oil Level Gage Guide
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

18. **REMOVE WATER BY-PASS HOSE**
    a. Loosen the clip and remove the water by-pass hose.

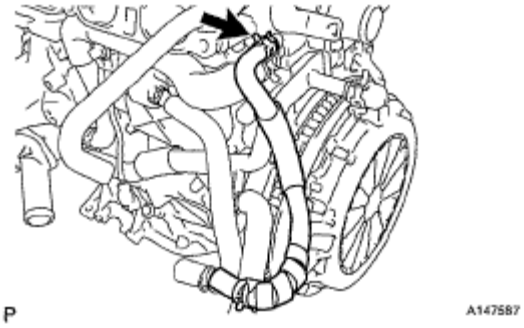


Fig. 359: Locating Clip And Water By-Pass Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

19. **REMOVE WATER INLET HOSE**
    a. Loosen the 2 clips and remove the water inlet hose.

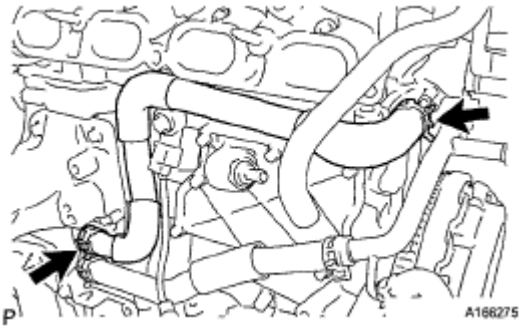


Fig. 360: Locating Clips And Water Inlet Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

20. **REMOVE NO. 1 WATER BY-PASS PIPE**
    a. Loosen the clip and disconnect the No. 3 water bypass hose.
    b. Remove the 2 bolts and remove the water by-pass pipe.

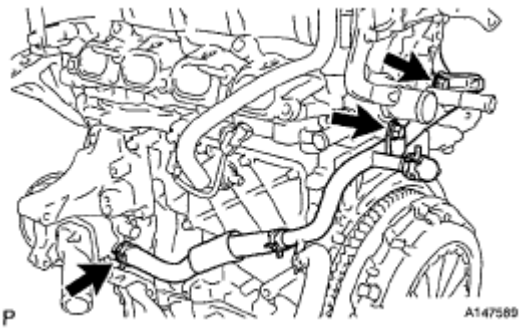


Fig. 361: Locating Bolts And Water By-Pass Pipe
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

21. **REMOVE AIR TUBE ASSEMBLY**
    a. Remove the 2 bolts and remove the air tube assembly.

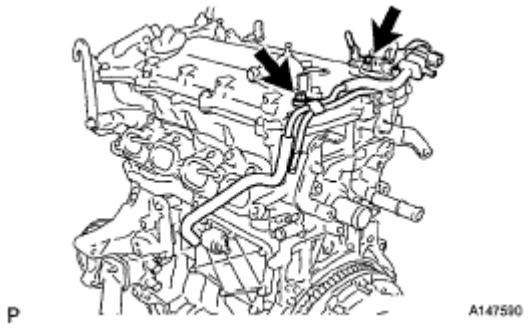


Fig. 362: Locating Bolts And Air Tube Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

22. **REMOVE NO. 1 EXHAUST MANIFOLD HEAT INSULATOR**
    a. Remove the 4 bolts and remove the No. 1 exhaust manifold heat insulator.

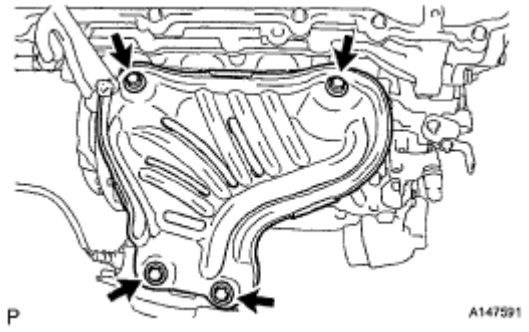


Fig. 363: Locating Bolts And No. 1 Exhaust Manifold Heat Insulator
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

23. **REMOVE MANIFOLD STAY**
    a. Remove the 3 bolts and remove the manifold stay.

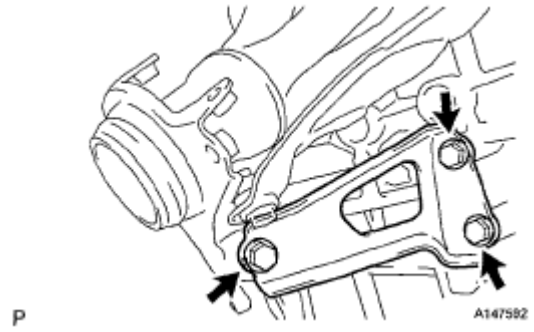


Fig. 364: Locating Bolts And Manifold Stay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

24. **REMOVE EXHAUST MANIFOLD**
    a. Remove the 5 nuts and remove the exhaust manifold.

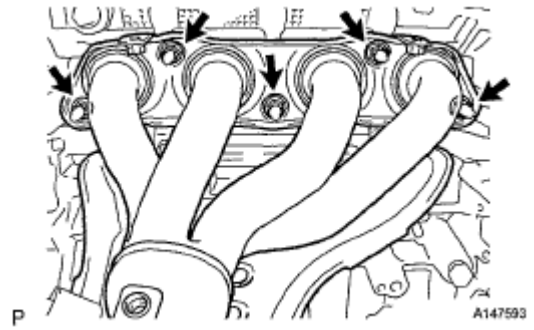


Fig. 365: Locating Nuts And Exhaust Manifold
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

25. **REMOVE WIRE HARNESS CLAMP BRACKET**
    a. Remove the 4 bolts and remove the 4 wire harness clamp brackets.

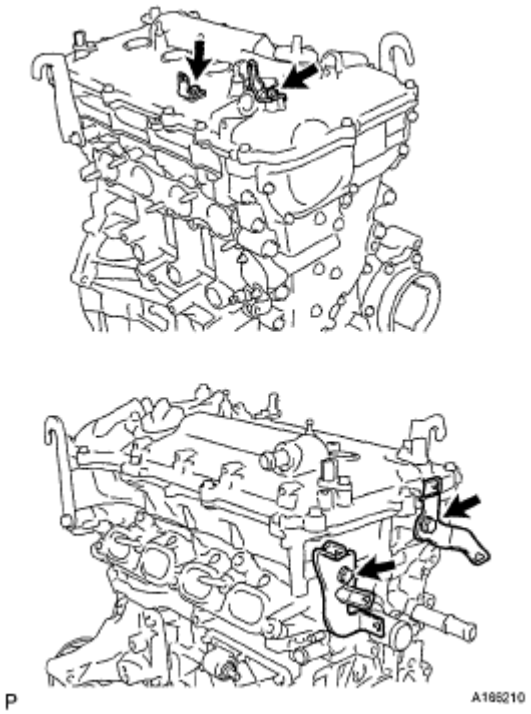


Fig. 366: Locating Bolts And Wire Harness Clamp Brackets
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DISASSEMBLY

1. **REMOVE ENGINE HANGER**
   a. Remove the 2 bolts and 2 engine hangers.

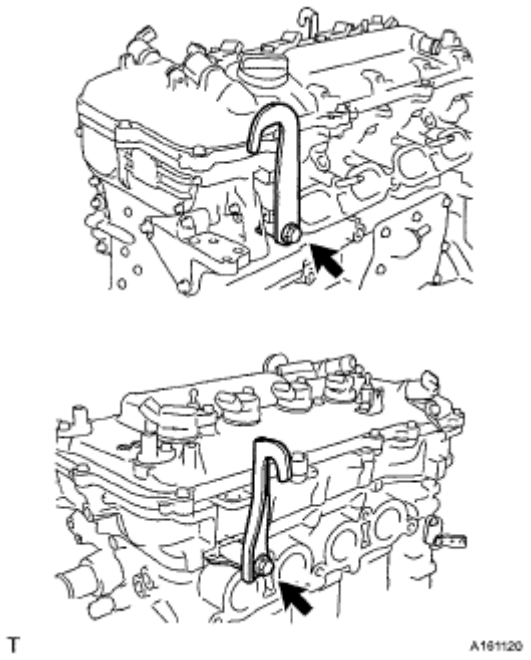


Fig. 367: Locating Bolts And Engine Hangers
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **REMOVE OIL FILLER CAP SUB-ASSEMBLY**
   a. Remove the oil filler cap.

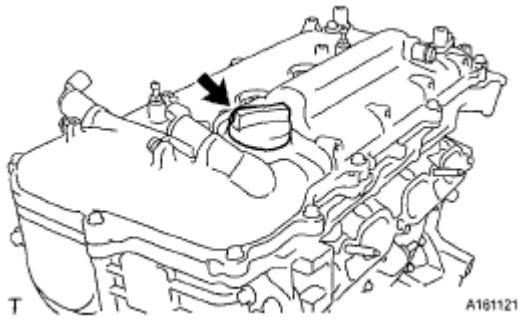


Fig. 368: Locating Oil Filler Cap
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **REMOVE OIL FILLER CAP GASKET**
   a. Remove the oil filler cap gasket.

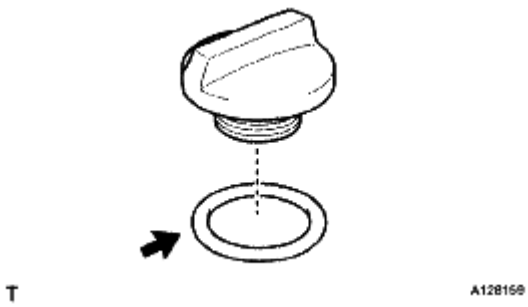


Fig. 369: Locating Oil Filler Cap Gasket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. **REMOVE SPARK PLUG**
   a. Using a 14 mm socket wrench, remove the 4 spark plugs.

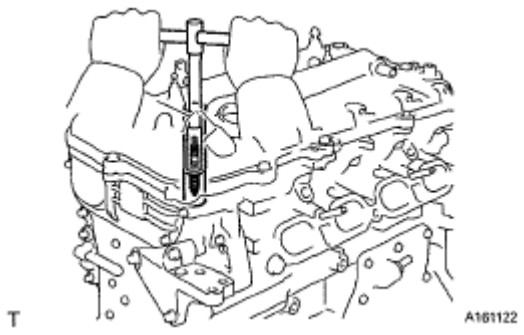


Fig. 370: Removing Spark Plugs
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. **REMOVE CAMSHAFT POSITION SENSOR**
   a. Remove the 2 bolts and 2 sensors.

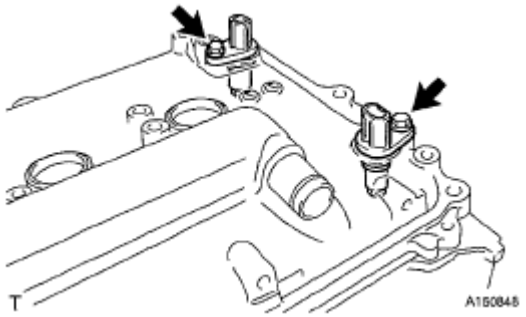


Fig. 371: Locating Bolts And Sensors
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. **REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY**
   a. Remove the 2 bolts, 2 O-rings, bracket and 2 oil control valves.

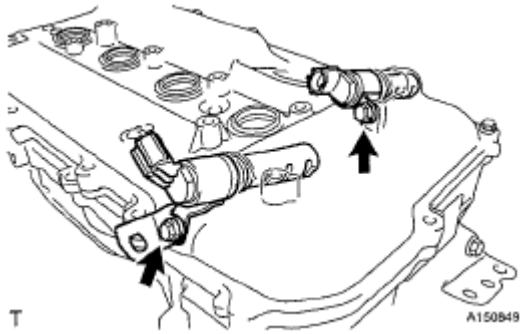


Fig. 372: Locating Bolts, O-Rings, Bracket And Oil Control Valves
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. **REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY**
   a. Remove the 13 bolts, seal washer and cylinder head cover.

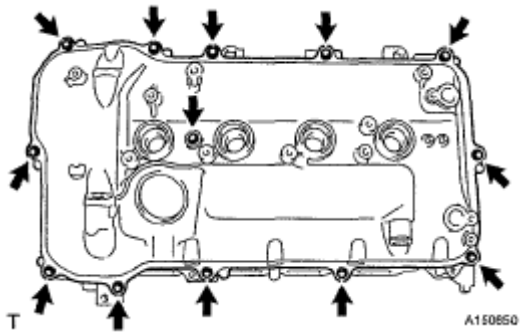


Fig. 373: Locating Bolts, Seal Washer And Cylinder Head Cover
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Remove the 3 gaskets from the camshaft bearing cap.

NOTE: When removing the cylinder head cover, some of the gaskets may stick to it so be careful not to drop any of the gaskets into the engine.

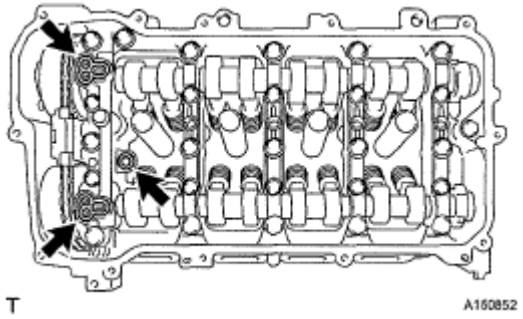


Fig. 374: Locating Gaskets
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. **REMOVE CYLINDER HEAD COVER GASKET**
   a. Remove the cylinder head cover gasket.

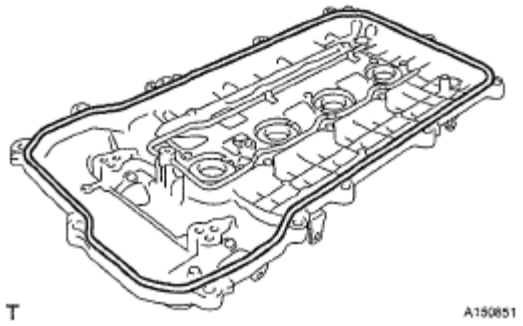


Fig. 375: Identifying Cylinder Head Cover Gasket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. **SET NO. 1 CYLINDER TO TDC / COMPRESSION**
   a. Turn the crankshaft pulley, and align its timing notch with the "0" timing mark on the timing chain cover sub-assembly.
   b. Check that timing marks on both the camshaft timing exhaust gear and camshaft timing gear are facing upward, as shown in the illustration.

      HINT:

      If not, turn the crankshaft 1 complete revolution (360°) and align the marks as above.

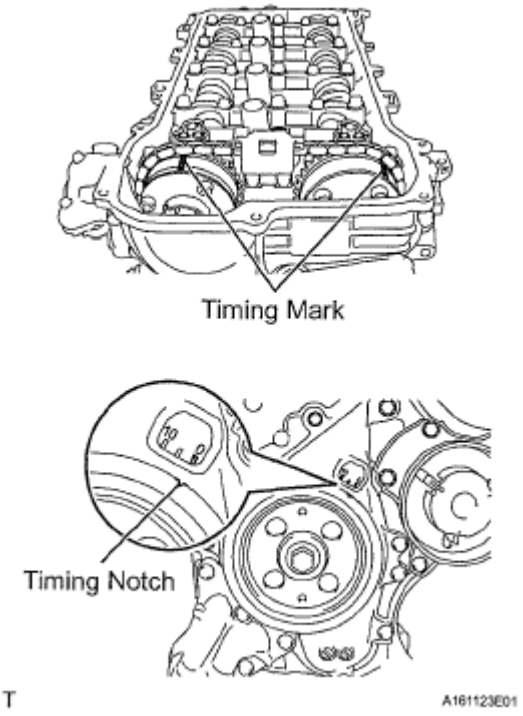


Fig. 376: Identifying Timing Marks On Camshaft Timing Exhaust Gear And Camshaft Timing Gear
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. **REMOVE CRANKSHAFT PULLEY**
    a. Using SST, hold the pulley in place and loosen the pulley bolt.

       SST 09213-58013 (91651-60855), 09330-00021

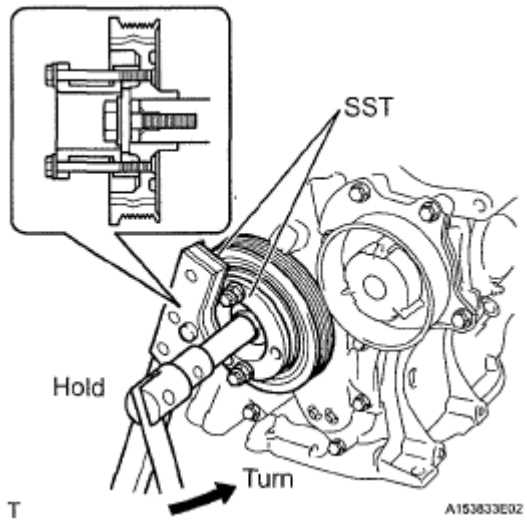


Fig. 377: Loosening Pulley Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Using SST, remove the pulley bolt and pulley.

SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021)

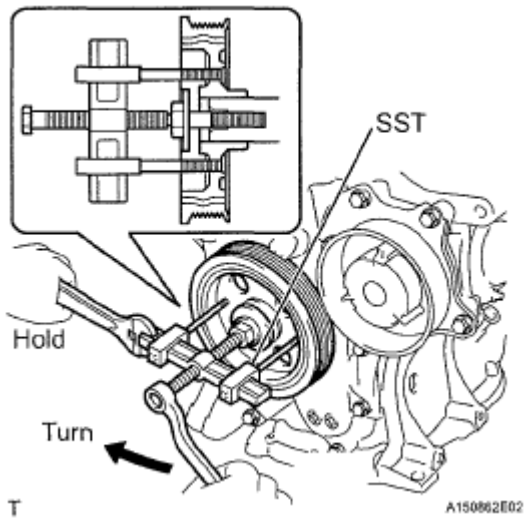


Fig. 378: Removing Pulley Bolt And Pulley
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. **REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY**
    a. Remove the 2 nuts, bracket, No. 1 chain tensioner assembly and gasket.

NOTE: Do not turn the crankshaft after you have removed the chain tensioner.

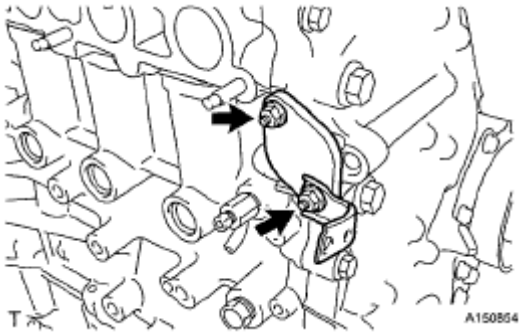


Fig. 379: Locating No. 1 Chain Tensioner Assembly And Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

12. **REMOVE CRANKSHAFT POSITION SENSOR**
    a. Remove the bolt and crankshaft position sensor.

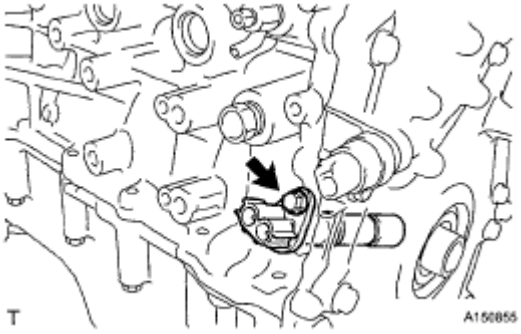


Fig. 380: Locating Bolt And Crankshaft Position Sensor
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

13. **REMOVE ENGINE OIL PRESSURE SWITCH ASSEMBLY**
    a. Using a 24 mm deep socket wrench, remove the engine oil pressure switch assembly.

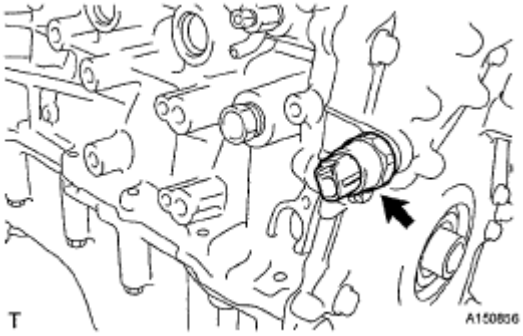


Fig. 381: Locating Engine Oil Pressure Switch Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

14. **REMOVE NO. 1 TAPER SCREW PLUG**

a. Remove the No. 1 taper screw plug.

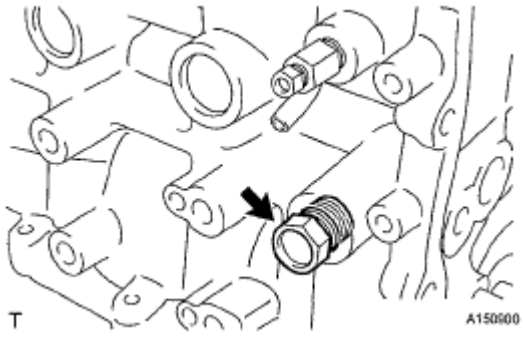


Fig. 382: Locating No. 1 Taper Screw Plug
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

15. **REMOVE KNOCK SENSOR**
    a. Remove the bolt and knock sensor.

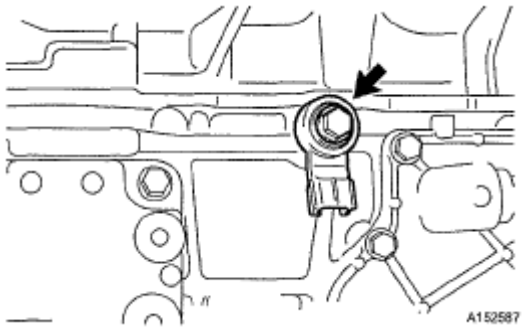


Fig. 383: Locating Bolt And Knock Sensor
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

16. **REMOVE ENGINE WATER TEMPERATURE SENSOR**
    a. Using a 19 mm deep socket wrench, remove the engine water temperature sensor.
    b. Remove the gasket from the engine water temperature sensor.

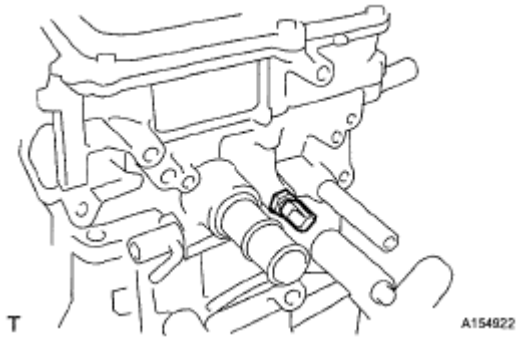


Fig. 384: Identifying Engine Water Temperature Sensor

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

17. **REMOVE OIL FILTER SUB-ASSEMBLY**
    a. Using SST, remove the oil filter cap.

    SST 09228-06501

    HINT:

    Use a container to catch the draining oil. After the oil filter cap is loosened approximately 4 turns and the cap rib is facing straight down, engine oil will begin to drain from the gap between the oil filter cap and oil pan.

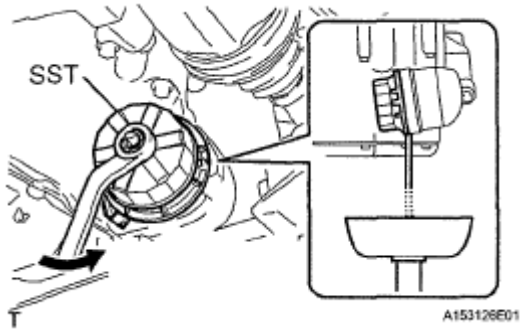


Fig. 385: Removing Oil Filter Cap
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    b. Remove the oil filter element and O-ring from the oil filter cap.

NOTE: Be sure to remove the O-ring (for the cap) by hand, without using any tools, to prevent damage to the O-ring groove on the cap.

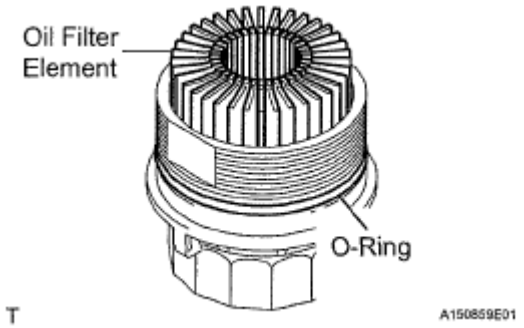


Fig. 386: Identifying Oil Filter Element And O-Ring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

18. **REMOVE WATER INLET**
    a. Remove the 2 nuts and remove the water inlet.

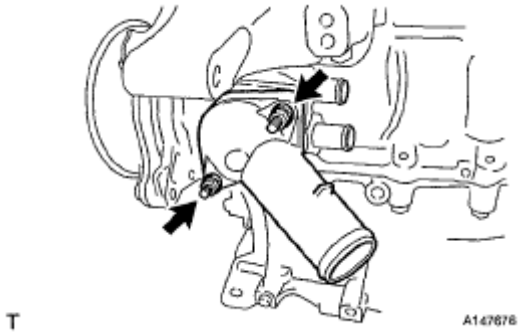


Fig. 387: Locating Nuts And Water Inlet
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

19. **REMOVE THERMOSTAT**
    a. Remove thermostat from the cylinder block.
    b. Remove the gasket from thermostat.

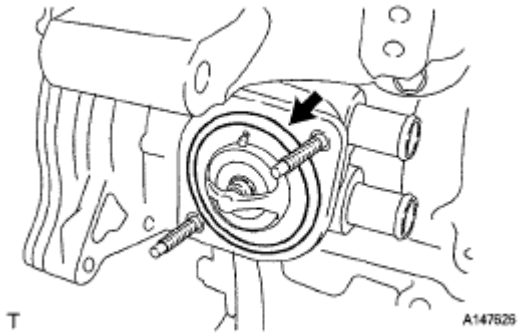


Fig. 388: Locating Gasket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

20. **REMOVE TIMING CHAIN OR BELT COVER SUB-ASSEMBLY**
    a. Remove the 3 bolts and remove the engine mounting bracket RH.

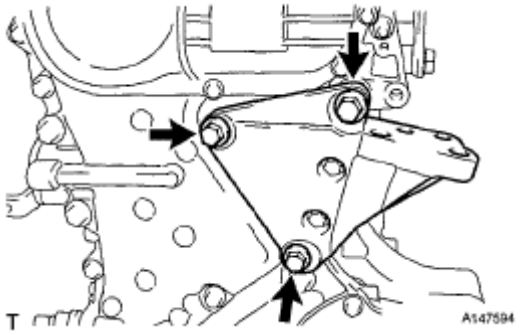


Fig. 389: Locating Bolts And Engine Mounting Bracket RH
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Remove the 4 bolts and remove the oil filter bracket.

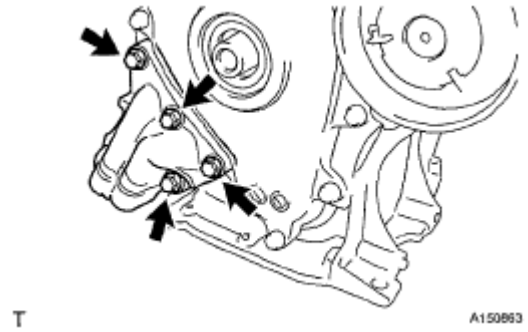


Fig. 390: Locating Bolts And Oil Filter Bracket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Remove the 2 O-rings from the timing chain cover sub-assembly.

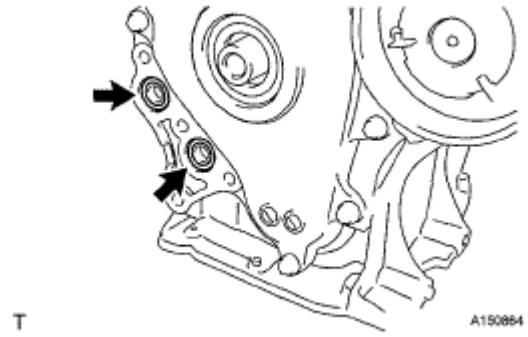


Fig. 391: Locating O-Rings
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Remove the 19 bolts.

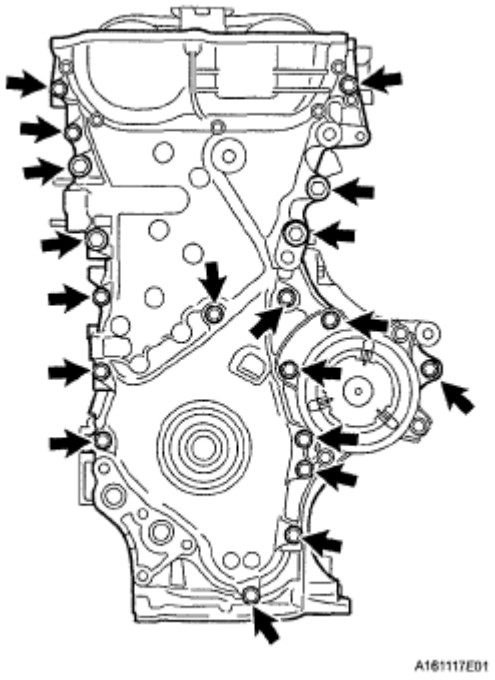


Fig. 392: Locating Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

e. Remove the timing chain or belt cover sub-assembly by prying between the timing chain or belt cover sub-assembly and cylinder head or cylinder block with a screwdriver wrapped in protective tape.

NOTE: Be careful not to damage the contact surfaces of the timing chain or belt cover sub-assembly, cylinder block and cylinder head.

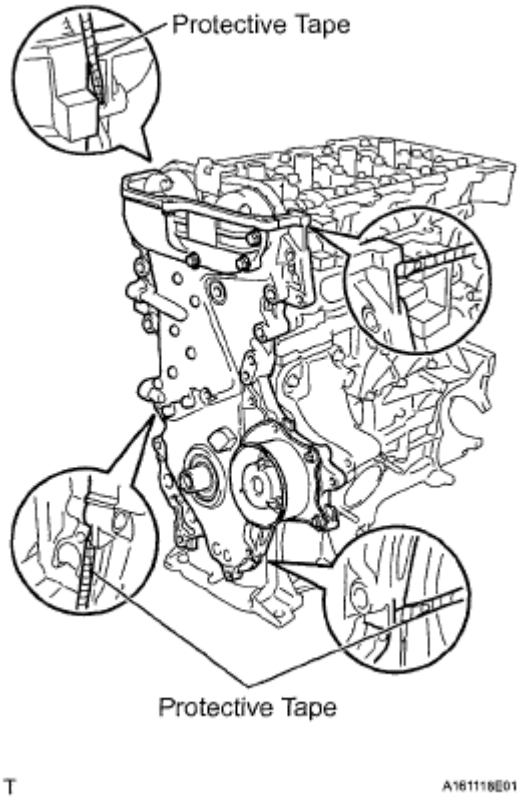


Fig. 393: Prying Timing Chain Or Belt Cover Sub-Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

f. Remove the 3 O-rings from the cylinder head and cylinder block.

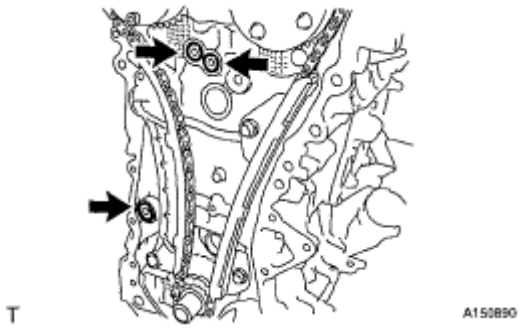


Fig. 394: Locating O-Rings
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

g. Remove the 3 bolts and the water pump assembly.

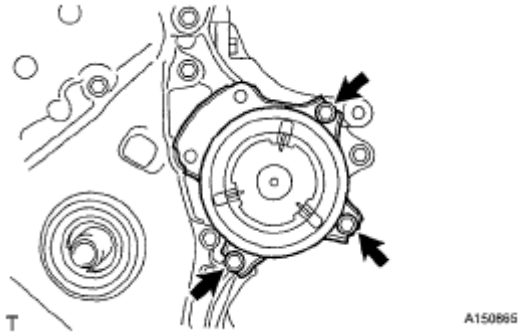


Fig. 395: Locating Bolts And Water Pump Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

h. Remove the gasket from the timing chain or belt cover sub-assembly.

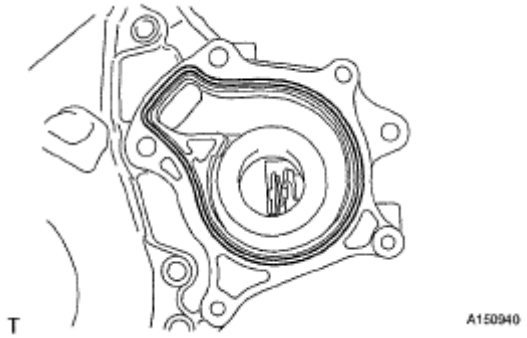


Fig. 396: Identifying Gasket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

21. **REMOVE WATER INLET HOUSING**
    a. Remove the 3 bolts, gasket and water inlet housing.

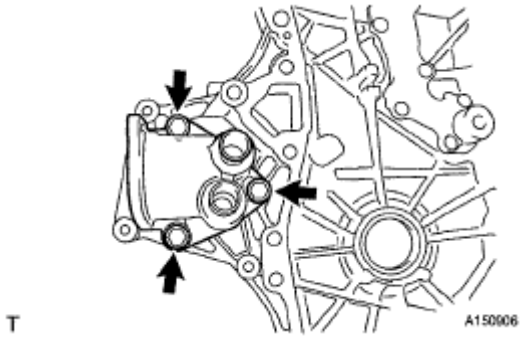


Fig. 397: Locating Bolts, Gasket And Water Inlet Housing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

22. **REMOVE NO. 1 GENERATOR BRACKET**
    a. Remove the 4 bolts and generator bracket.

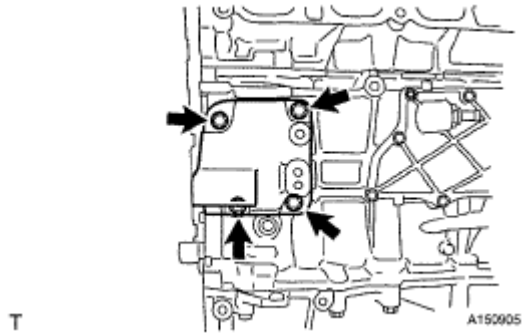


Fig. 398: Locating Bolts And Generator Bracket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

23. **REMOVE NO. 2 CHAIN VIBRATION DAMPER**
    a. Remove the 2 bolts and remove the No. 2 chain vibration damper.

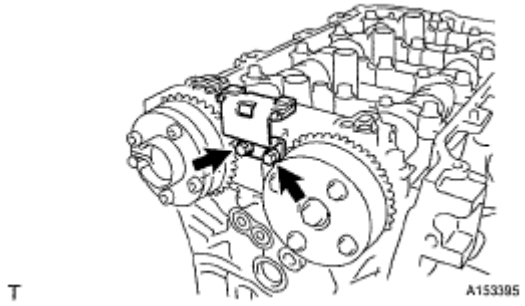


Fig. 399: Locating Bolts And No. 2 Chain Vibration Damper
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

24. **REMOVE CHAIN TENSIONER SLIPPER**
    a. Remove the chain tensioner slipper from the cylinder block.

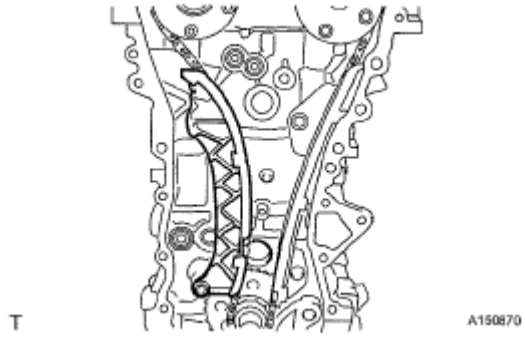


Fig. 400: Identifying Chain Tensioner Slipper
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

25. **REMOVE NO. 1 CHAIN VIBRATION DAMPER**
    a. Remove the 2 bolts and the chain vibration damper.

Fig. 401: Locating Bolts And Chain Vibration Damper
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

26. **REMOVE CHAIN SUB-ASSEMBLY**
    a. Hold the hexagonal portion of the camshaft with a wrench and turn the camshaft timing gear assembly counterclockwise to loosen the chain on the camshaft timing gears.

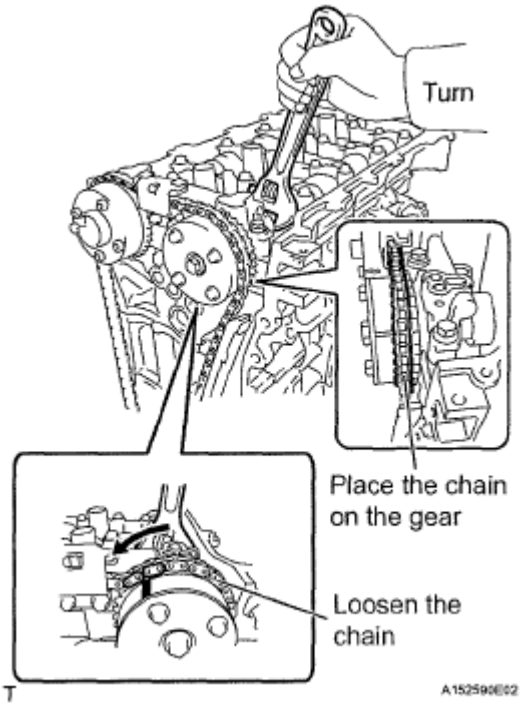


Fig. 402: Holding Hexagonal Portion Of Camshaft With Wrench
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    b. With the chain loosened, release the chain from the camshaft timing gear assembly and rest it on the camshaft timing gear assembly.

    HINT:

    Be sure to release the chain from the sprocket completely.

c. Turn the camshaft clockwise to return it to the original position and remove the chain.

27. **REMOVE CRANKSHAFT TIMING GEAR OR SPROCKET**

a. Remove the crankshaft timing gear or sprocket.

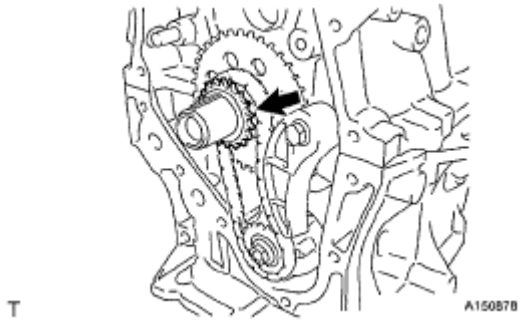


Fig. 403: Locating Crankshaft Timing Gear Or Sprocket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

28. **REMOVE NO. 2 CHAIN SUB-ASSEMBLY**

a. Turn the crankshaft 90° clockwise to align the adjusting hole of the oil pump drive shaft gear with the groove of the oil pump.

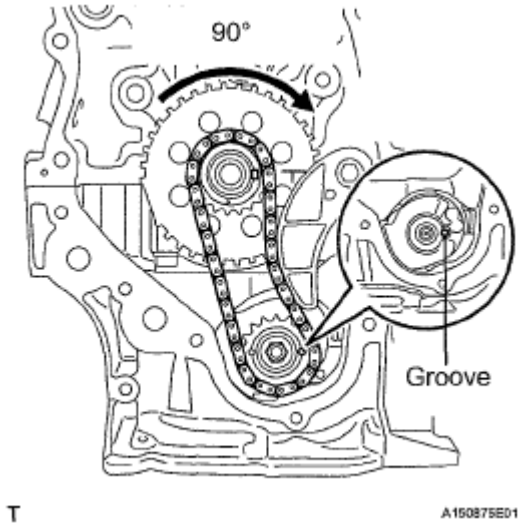


Fig. 404: Turning Crankshaft 90° Clockwise
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Insert a 4 mm diameter bar into the adjusting hole of the oil pump drive shaft gear to lock the gear in position, and then remove the nut.

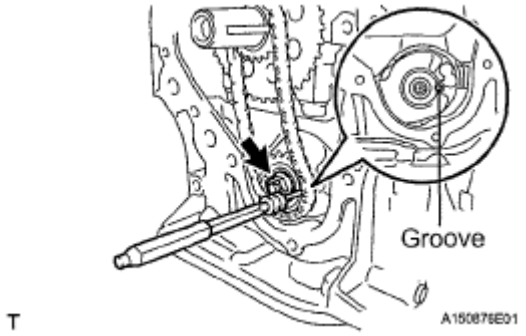


Fig. 405: Identifying Bar Into Adjusting Hole Of Oil Pump Drive Shaft Gear
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Remove the bolt, chain tensioner plate and spring.

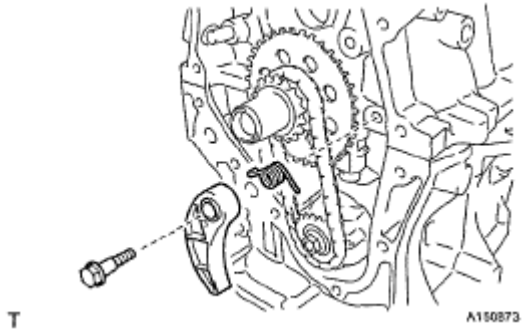


Fig. 406: Identifying Bolt, Chain Tensioner Plate And Spring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Remove the oil pump drive shaft gear, oil pump drive gear and chain.

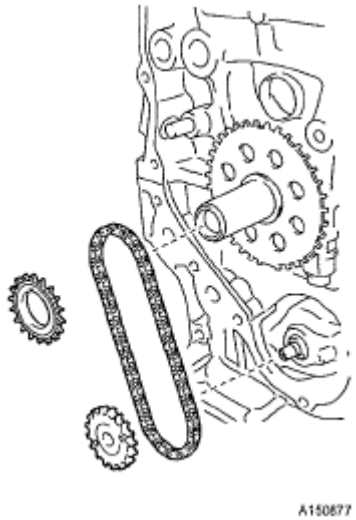


Fig. 407: Identifying Oil Pump Drive Shaft Gear, Oil Pump Drive Gear And Chain
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

29. **REMOVE NO. 1 CRANKSHAFT POSITION SENSOR PLATE**
    a. Remove the No. 1 crankshaft position sensor plate.

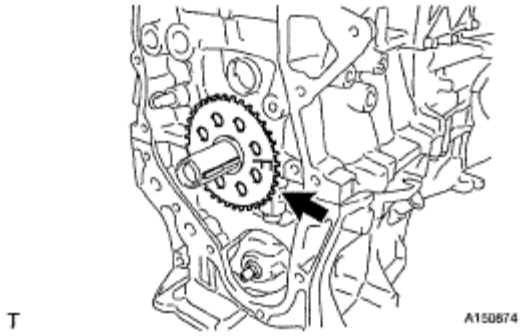


Fig. 408: Identifying No. 1 Crankshaft Position Sensor Plate
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

30. **REMOVE CRANKSHAFT TIMING GEAR KEY**
    a. Using a screwdriver, remove the 2 crankshaft timing gear keys.

    HINT:

    Tape the screwdriver tip before use.

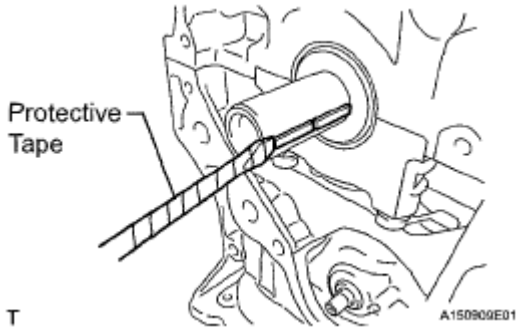


Fig. 409: Removing Crankshaft Timing Gear Keys
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

31. **REMOVE CAMSHAFT TIMING GEAR ASSEMBLY**
    a. Check the lock of the camshaft timing gear.
    b. Release the lock pin.

NOTE: Before removing the camshaft timing gear assembly, make sure that the lock pin has been released.

1. After cleaning and degreasing the VVT oil hole on the intake side of 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.

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

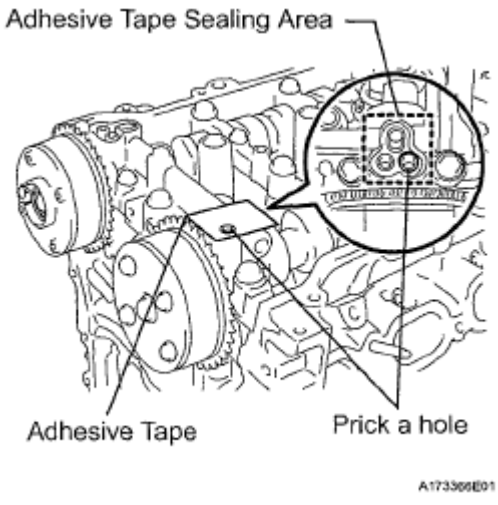


Fig. 410: Identifying Adhesive Tape Sealing Area
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

NOTE:

- **If air leaks out, reattach the adhesive tape.**
- **Cover the oil hole with a shop rag or piece of cloth when applying air pressure to prevent oil from spraying.**
- **Do not lock the camshaft timing gear assembly. If it is locked, release the lock pin again.**

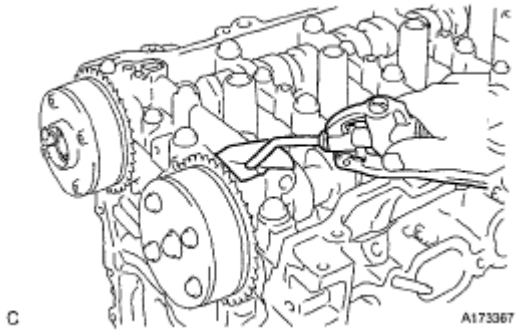


Fig. 411: Applying Air Pressure To Hole

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

HINT:

- The camshaft timing gear assembly may be turned in the advance direction without applying any force.
- If enough air pressure cannot be applied because of air leakage from the port, releasing the lock pin may be difficult.

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

c. Remove the flange bolt while holding the hexagonal portion of the camshaft, and then remove the camshaft timing gear assembly.

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

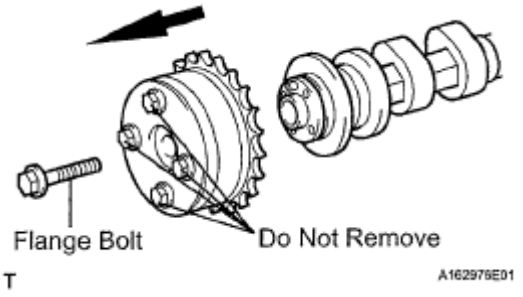


Fig. 412: Identifying Flange Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

32. **REMOVE CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY**

a. Remove the flange bolt while holding the hexagonal portion of the camshaft, and then remove the camshaft timing exhaust gear assembly.

NOTE:

- **Be sure not to remove the other 4 bolts.**
- **Keep the camshaft timing exhaust gear assembly horizontal while removing it from the camshaft.**

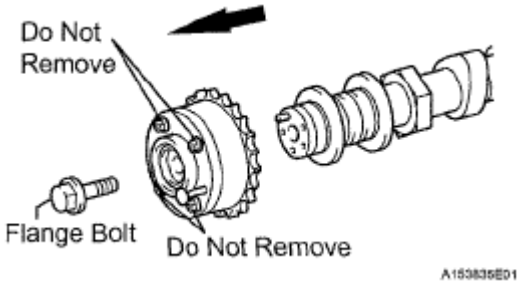


Fig. 413: Identifying Flange Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

33. **REMOVE CAMSHAFT BEARING CAP**
    a. Uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.

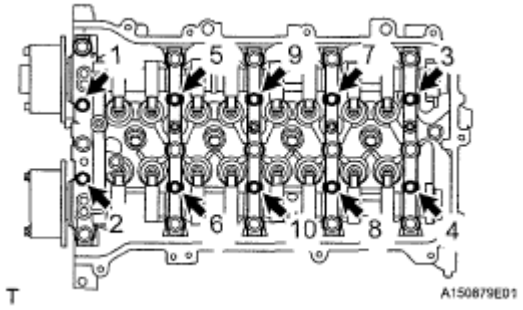


Fig. 414: Locating Bearing Cap Bolts And Removal Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    b. Uniformly loosen and remove the 15 bearing cap bolts in the sequence shown in the illustration.

NOTE: Uniformly loosen the bolts while keeping the camshaft level.

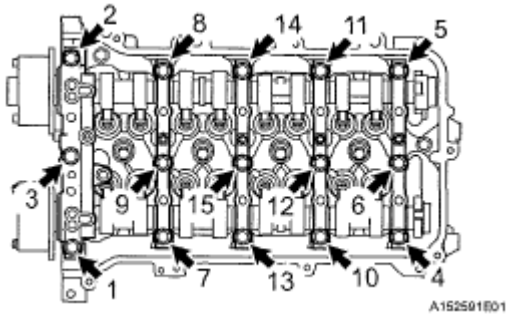


Fig. 415: Locating Bearing Cap Bolts And Loosening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    c. Remove the 5 bearing caps.

HINT:

Arrange the removed parts in the correct order.

d. Remove the camshaft and No. 2 camshaft.

34. **REMOVE CAMSHAFT**

a. Remove the camshaft.

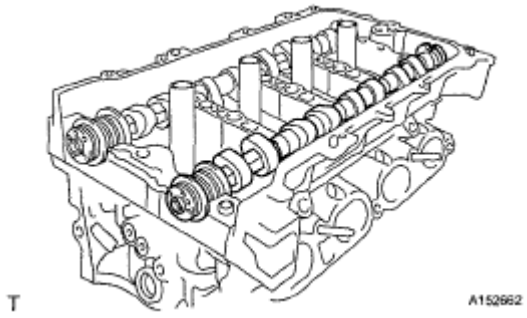


Fig. 416: Identifying Camshaft
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

35. **REMOVE NO. 2 CAMSHAFT**

a. Remove the No. 2 camshaft.

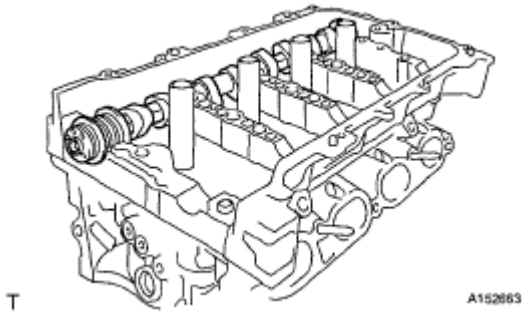


Fig. 417: Identifying No. 2 Camshaft
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

36. **REMOVE NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY**

a. Remove the 16 valve rocker arms.

HINT:

Arrange the removed parts in the correct order.

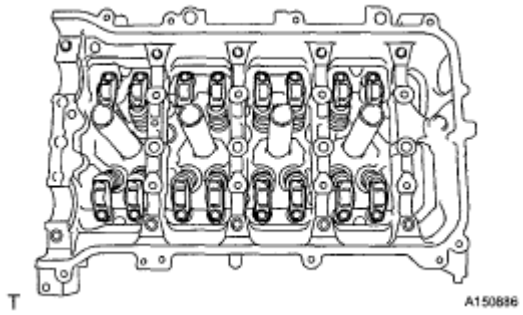


Fig. 418: Identifying Valve Rocker Arms
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

37. **REMOVE VALVE LASH ADJUSTER ASSEMBLY**
    a. Remove the 16 valve lash adjusters from the cylinder head.

    HINT:

    Arrange the removed parts in the correct order.

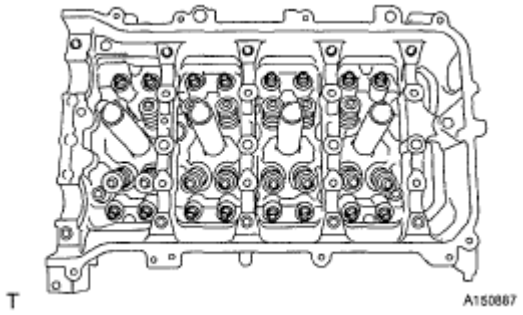


Fig. 419: Identifying Valve Lash Adjusters
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

38. **REMOVE OIL CONTROL VALVE FILTER**
    a. Remove the oil control valve filter.

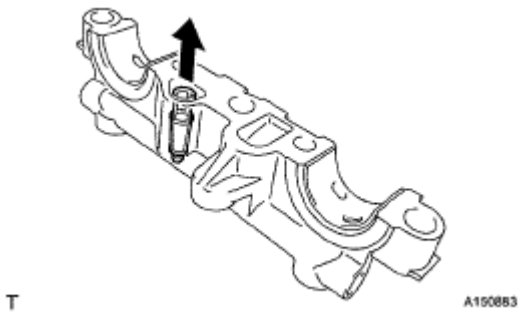


Fig. 420: Removing Oil Control Valve Filter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

39. **REMOVE NO. 1 CAMSHAFT BEARING**
    a. Remove the 2 No. 1 camshaft bearings.

    HINT:

    Arrange the removed parts in the correct order.

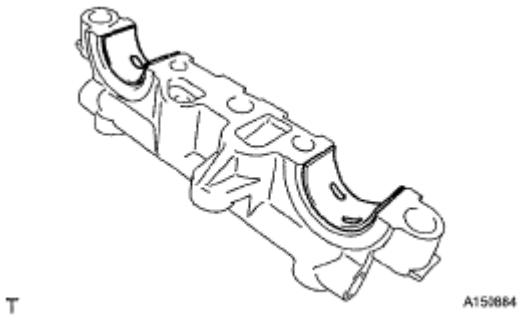


Fig. 421: Identifying No. 1 Camshaft Bearings
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

40. **REMOVE NO. 2 CAMSHAFT BEARING**
    a. Remove the 2 No. 2 camshaft bearings.

    HINT:

    Arrange the removed parts in the correct order.

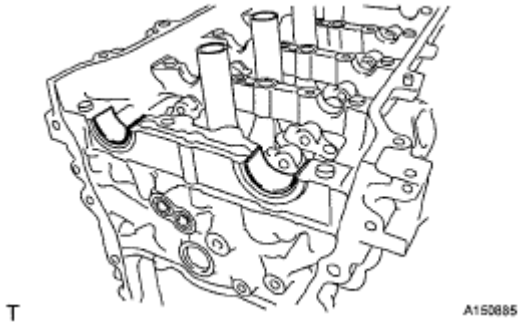


Fig. 422: Identifying No. 2 Camshaft Bearings
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

41. **REMOVE CAMSHAFT HOUSING SUB-ASSEMBLY**
    a. Remove the 2 bolts.

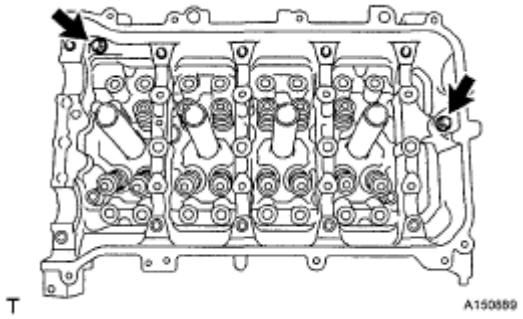


Fig. 423: Locating Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Remove the camshaft housing by prying between the cylinder head and camshaft housing with a screwdriver.

NOTE: Be careful not to damage the contact surfaces of the cylinder head and camshaft housing.

HINT:

Tape the screwdriver tip before use.

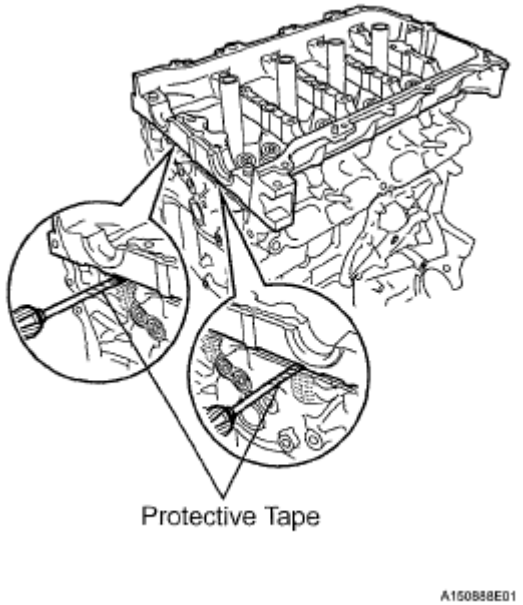


Fig. 424: Removing Camshaft Housing By Prying
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

42. **REMOVE CYLINDER HEAD SUB-ASSEMBLY**

a. Using several steps, loosen and remove the 10 cylinder head bolts uniformly with a 10 mm bi-hexagon wrench in the sequence shown in the illustration.

Remove the 10 cylinder head bolts and the plate washers.

NOTE:

- **Do not drop the washers into the cylinder head.**
- **Head warpage or cracking could result from removing bolts in the wrong order.**

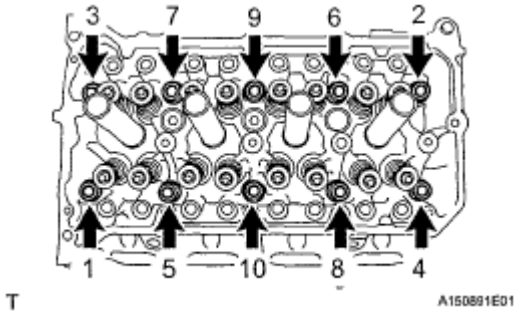


Fig. 425: Locating Cylinder Head Bolts And Loosening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Remove the cylinder head sub-assembly.

43. **REMOVE CYLINDER HEAD GASKET**
44. **REMOVE CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY**
    a. Remove the water drain cock plug from the water drain cock assembly.

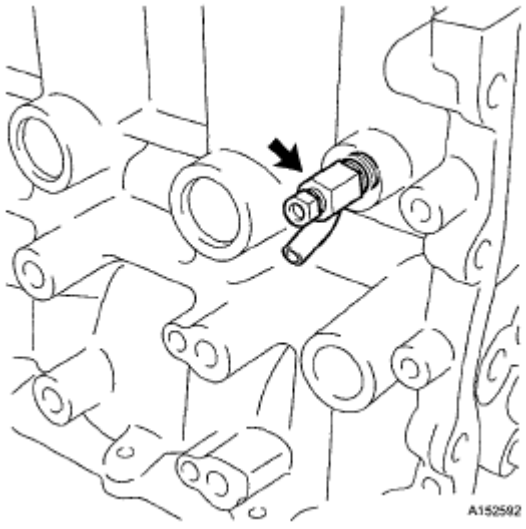


Fig. 426: Locating Water Drain Cock Plug
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Remove the water drain cock assembly from the cylinder block.

45. **REMOVE VENTILATION VALVE SUB-ASSEMBLY**

a. Remove the ventilation valve.

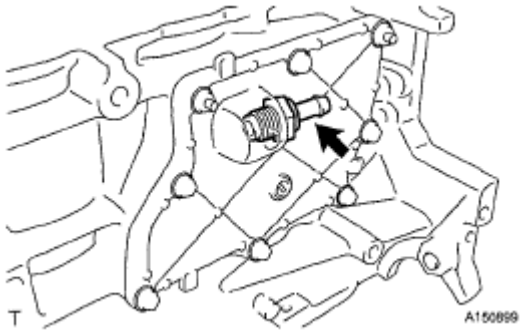


Fig. 427: Locating Ventilation Valve
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

46. **REMOVE OIL PAN DRAIN PLUG**
    a. Remove the oil pan drain plug and gasket.

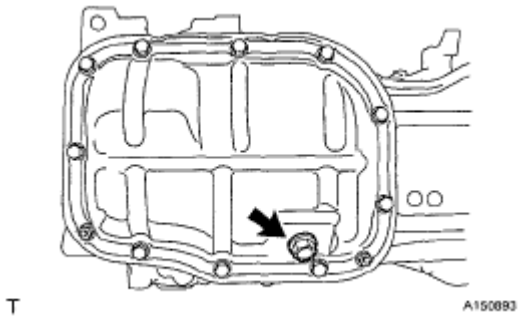


Fig. 428: Locating Oil Pan Drain Plug
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

47. **REMOVE NO. 2 OIL PAN SUB-ASSEMBLY**
    a. Remove the 10 bolts and 2 nuts.

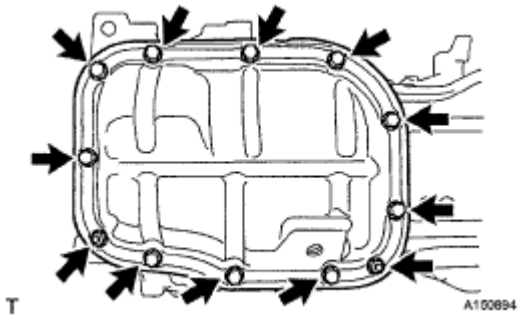


Fig. 429: Locating Bolts And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Install the blade of oil pan seal cutter between the No. 2 oil pan sub-assembly and stiffening crankcase assembly, and cutoff the applied sealer and remove the No. 2 oil pan sub-assembly.

NOTE: Do not damage the No. 2 oil pan sub-assembly or stiffening crankcase assembly.

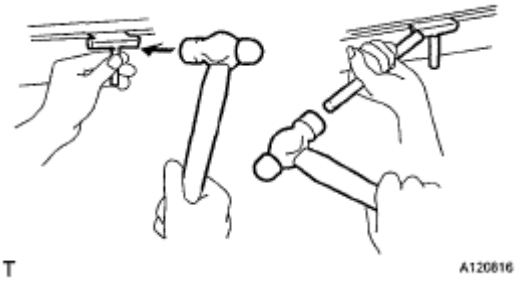


Fig. 430: Inserting Oil Pan Seal Cutter Between No. 2 Oil Pan Sub-Assembly And Stiffening Crankcase Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

48. **REMOVE OIL PUMP ASSEMBLY**
    a. Remove the 3 bolts and remove the oil pump assembly.

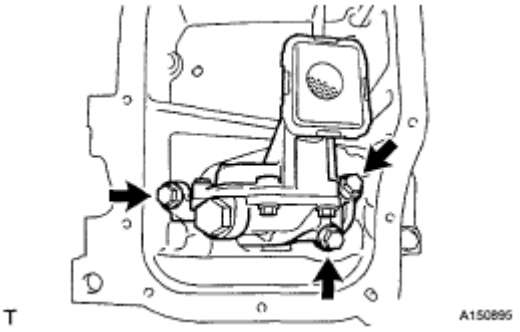


Fig. 431: Locating Bolts And Oil Pump Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

49. **REMOVE STIFFENING CRANKCASE ASSEMBLY**
    a. Remove the 11 bolts.

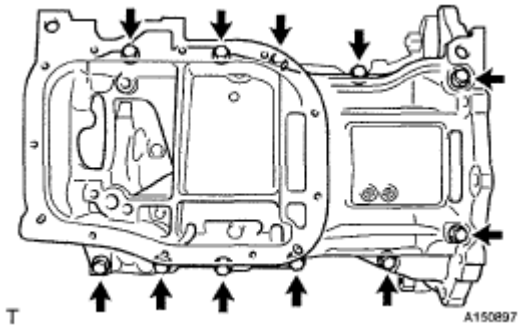


Fig. 432: Locating Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Using a screwdriver with its tip wrapped in protective tape, remove the crankcase by prying between the crankcase and cylinder block.

NOTE: Be careful not to damage the contact surfaces of the crankcase and cylinder block.

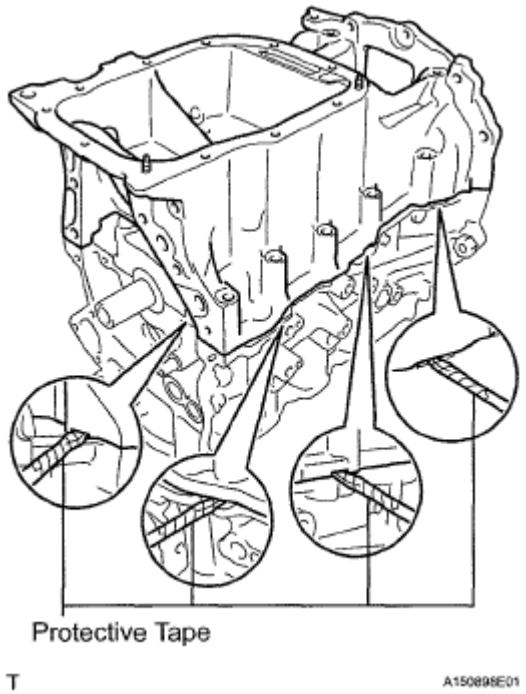


Fig. 433: Removing Crankcase By Prying
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

1. **INSPECT NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY**
   a. Turn the roller by hand to check that it turns smoothly.

HINT:

If the roller does not turn smoothly, replace the valve rocker arm sub-assembly.

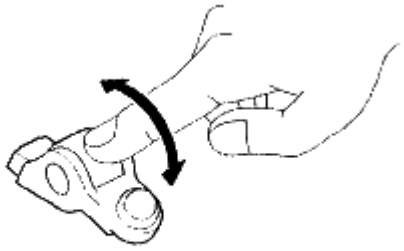


Fig. 434: Inspecting No. 1 Valve Rocker Arm Sub-Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **INSPECT VALVE LASH ADJUSTER ASSEMBLY**

NOTE:

- **Keep the lash adjuster free of dirt and foreign objects.**
- **Only use clean engine oil.**

a. Place the lash adjuster into a container filled with engine oil.
b. Insert the SST's tip into the lash adjuster's plunger and use the tip to press down on the check ball inside the plunger.

SST 09276-75010

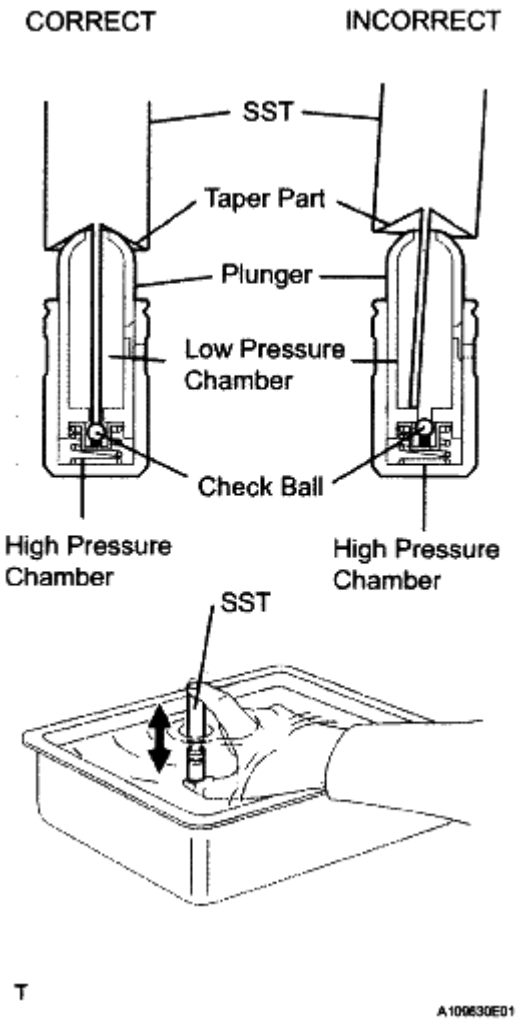


Fig. 435: Checking Lash Adjuster
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Squeeze the SST and lash adjuster together to move the plunger up and down 5 to 6 times.
d. Check the movement of the plunger and bleed it.

OK: Plunger moves up and down.

NOTE: When bleeding the high-pressure chamber, make sure that the tip of the SST is actually pressing the check ball as shown in the illustration. If the check ball is not pressed, the high-pressure chamber will not be bled.

e. After bleeding, remove the SST. Then try to quickly and firmly press the plunger with a finger.

OK: Plunger is very difficult to move.

If the result is not as specified, replace the lash adjuster.

3. **INSPECT CAMSHAFT TIMING GEAR ASSEMBLY**
   a. Install the camshaft timing gear (See **REASSEMBLY**).
   b. Check the lock of the camshaft timing gear.
      1. Confirm that the camshaft timing gear is locked.
   c. Release the lock pin.
      1. Cover the 4 oil paths of the cam journal with vinyl tape as shown in the illustration.

         HINT:

         There are 4 oil paths in the groove of the camshaft. Plug three of the paths with pieces of rubber.

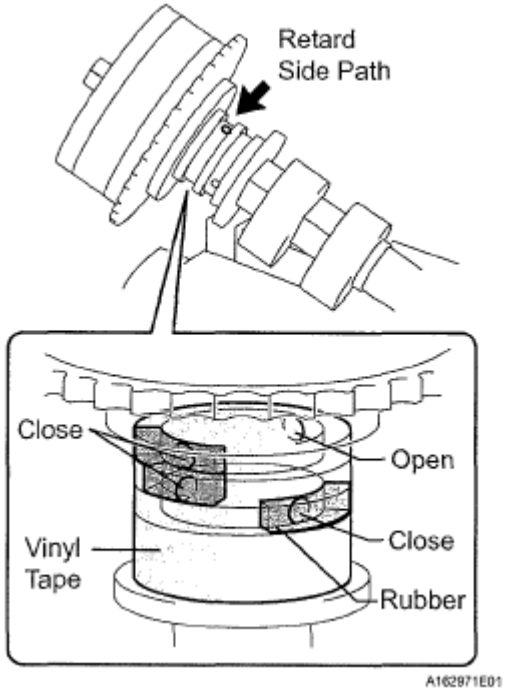


Fig. 436: Locating Retard Side Path
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

      2. Prick a hole in the tape placed on the advance side path. Prick a hole in the tape placed on the retard side path, on the opposite side to that of the advance side path, as shown in the illustration.
      3. While applying approximately 150 kPa (2.0 kgf/cm^2 , 22 psi) of air pressure to the oil paths, forcibly turn the camshaft timing gear assembly in the advance direction (counterclockwise).

CAUTION: Cover the paths with a piece of cloth when applying pressure to keep oil from splashing.

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

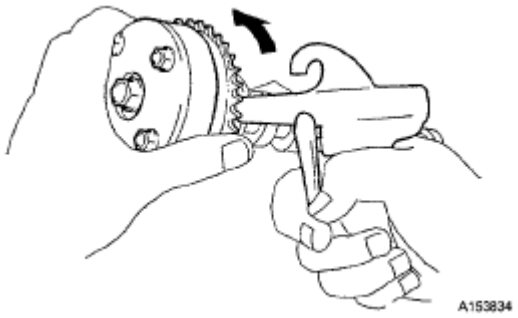


Fig. 437: Applying Air Pressure To Oil Paths
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

- The camshaft timing gear assembly may be turned in the advance direction without applying any force.
- If enough air pressure cannot be applied because of air leakage from the port, releasing the lock pin may be difficult.

d. Check for smooth rotation.
   1. Turn the camshaft timing gear within its movable range (26.5 to 28.5°) 2 or 3 times, but do not turn it to the most retarded position. Make sure that the gear turns smoothly.

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

4. **INSPECT CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY**
   a. Install the camshaft timing gear (See **REASSEMBLY**).
   b. Check the camshaft timing exhaust gear lock.
      1. Make sure that the camshaft timing exhaust gear is locked.
   c. Release the lock pin.
      1. Cover the 4 oil paths of the cam journal with vinyl tape as shown in the illustration.

         HINT:

         4 oil paths are provided in the groove. Plug 2 paths with rubber pieces.

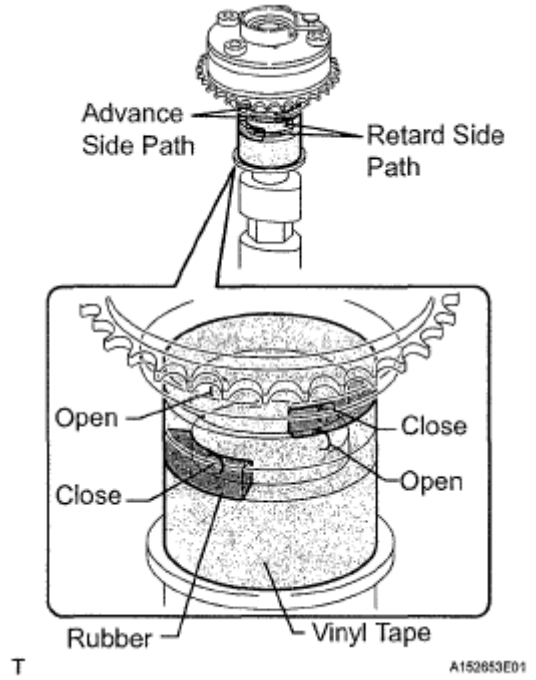


Fig. 438: Identifying Retard And Advance Side Path
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Prick a hole in the tape placed on the advance side path. Prick a hole in the tape placed on the retard side path, on the opposite side to that of the advance side path, as shown in the illustration.
3. Apply approximately 200 kPa (2.0 kgf/cm^2 , 28 psi) of air pressure to the 2 broken paths (the advance side path and the retard side path).

CAUTION: Cover the paths with a piece of cloth when applying pressure to keep oil from splashing.

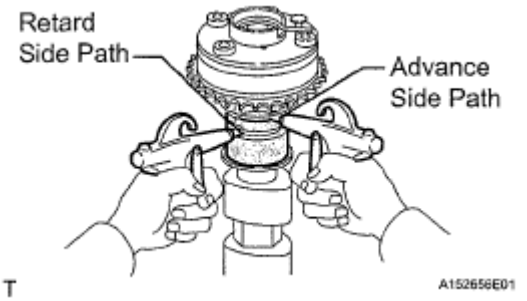


Fig. 439: Applying Air Pressure To Broken Paths
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. Make sure that the camshaft timing exhaust gear turns in the retard direction when reducing the air pressure applied to the advance side path.

HINT:

The lock pin is released and the camshaft timing exhaust gear turns in the retard direction.

5. When the camshaft timing exhaust gear moves to the most retarded position, release the air pressure from the advance side path, and then release the air pressure from the retard side path.

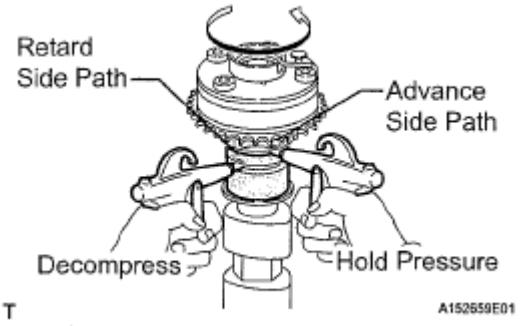


Fig. 440: Applying Air Pressure To Broken Paths
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: Be sure to release the air pressure from the advance side path first. If the air pressure of the retard side path is released first, the camshaft timing exhaust gear may abruptly shift in the advance direction and break the lock pin or other parts.

d. Check for smooth rotation.
   1. Turn the camshaft timing exhaust gear within its movable range (19 to 21°) 2 or 3 times, but do not turn it to the most advanced position. Make sure that the gear turns smoothly.

NOTE: When the air pressure is released from the advance side path and then from the retard side path, the gear automatically returns to the most advanced position due to the advance assist spring operation and locks. Gradually release the air pressure from the retard side path before performing the smooth rotation check.

e. Check the lock at the most advanced position.
   1. Make sure that the camshaft timing exhaust gear is locked at the most advanced position.

5. **INSPECT CHAIN SUB-ASSEMBLY**
   a. Pull the chain with a force of 147 N (15 kgf, 33 lbf) as shown in the illustration.
   b. Using vernier calipers, measure the length of 15 links.

Maximum chain elongation: 115.2 mm (4.535 in.)

NOTE: Perform the measurement at 3 random places. Use the average of the measurements.

If the average elongation is greater than the maximum, replace the chain.

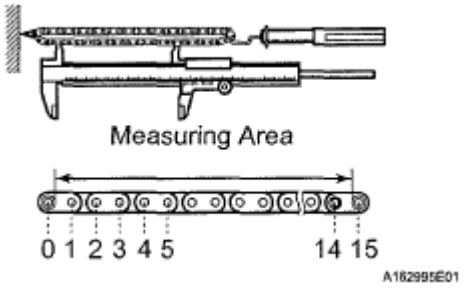


Fig. 441: Measuring Length Of Links
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. **INSPECT NO. 2 CHAIN SUB-ASSEMBLY**
   a. Pull the chain with a force of 147 N (15 kgf, 33 lbf) as shown in the illustration.
   b. Using vernier calipers, measure the length of 15 links.

Maximum chain elongation: 102.1 mm (4.019 in.)

NOTE: Perform the measurement at 3 random places. Use the average of the measurements.

If the average elongation is greater than the maximum, replace the No. 2 chain.

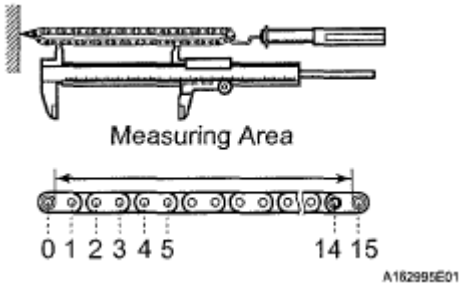


Fig. 442: Measuring Length Of Links
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. **INSPECT OIL PUMP DRIVE GEAR**
   a. Place the chain around the gear.
   b. Using vernier calipers, measure the diameter of the gear and chain.

Minimum gear diameter (with chain): 48.2 mm (1.898 in.)

NOTE: The vernier calipers must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and gear.

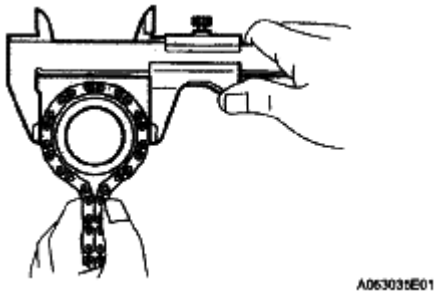


Fig. 443: Measuring Diameter Of Gear And Chain
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. **INSPECT OIL PUMP DRIVE SHAFT GEAR**
   a. Place the chain around the gear.
   b. Using vernier calipers, measure the diameter of the gear and chain.

   Minimum gear diameter (with chain): 48.8 mm (1.922 in.)

   NOTE: The vernier calipers must be in contact with the chain rollers when measuring.

   If the diameter is less than the minimum, replace the chain and gear.

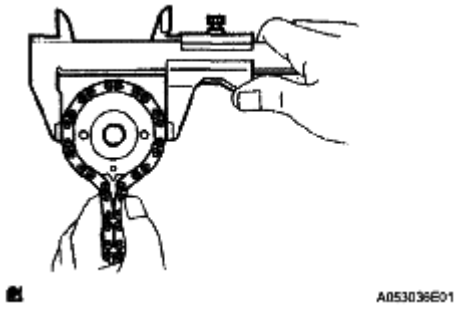


Fig. 444: Measuring Diameter Of Gear And Chain
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. **INSPECT CAMSHAFT TIMING GEAR ASSEMBLY**
   a. Place the chain around the gear.
   b. Using vernier calipers, measure the diameter of the gear and chain.

   Minimum gear diameter (with chain): 96.8 mm (3.811 in.)

NOTE: The vernier calipers must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and gear.

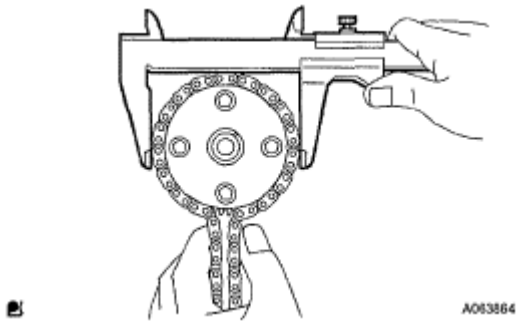


Fig. 445: Measuring Diameter Of Gear And Chain
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. **INSPECT CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY**
    a. Place the chain around the sprocket.
    b. Using vernier calipers, measure the diameter of the sprocket and chain.

    Minimum sprocket diameter (with chain): 96.8 mm (3.811 in.)

    NOTE: The vernier calipers must be in contact with the chain rollers when measuring.

    If the diameter is less than the minimum, replace the chain and sprocket.

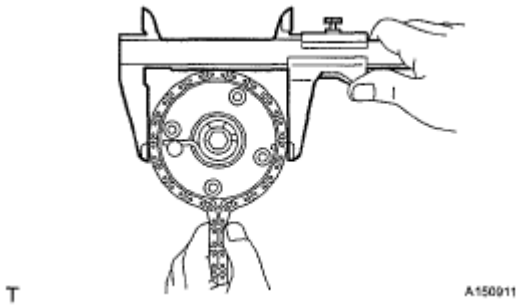


Fig. 446: Measuring Diameter Of Gear And Chain
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. **INSPECT CRANKSHAFT TIMING GEAR**
    a. Place the chain around the gear.
    b. Using vernier calipers, measure the diameter of the gear and chain.

Minimum gear diameter (with chain): 51.1 mm (2.012 in.)

NOTE: The vernier calipers must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and gear.

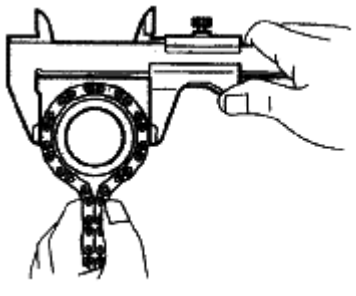


Fig. 447: Measuring Diameter Of Gear And Chain
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

12. **INSPECT CHAIN TENSIONER SLIPPER**
    a. Using vernier calipers, measure the tensioner slipper wear.

    Maximum wear: 1.0 mm (0.039 in.)

    If the wear is greater than the maximum, replace the chain tensioner slipper.

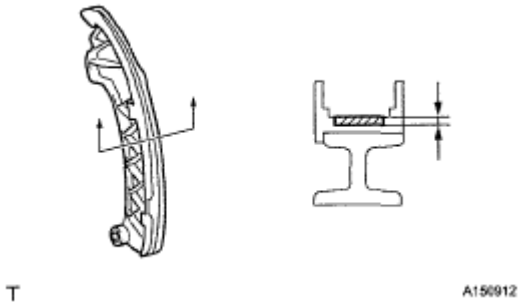


Fig. 448: Identifying Tensioner Slipper Wear Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

13. **INSPECT NO. 1 CHAIN VIBRATION DAMPER**
    a. Using vernier calipers, measure the vibration damper wear.

    Maximum wear: 1.0 mm (0.039 in.)

    If the wear is greater than the maximum, replace the No. 1 chain vibration damper.

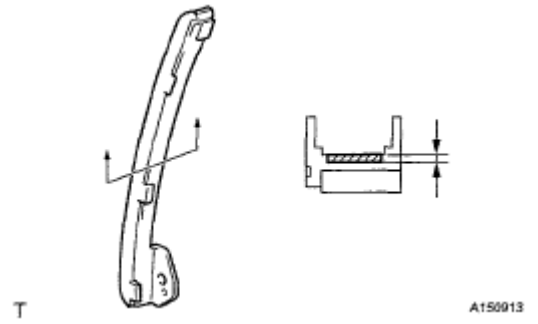


Fig. 449: Identifying Vibration Damper Wear Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

14. **INSPECT NO. 2 CHAIN VIBRATION DAMPER**
    a. Using vernier calipers, measure the vibration damper wear.

       Maximum wear: 1.0 mm (0.039 in.)

       If the wear is greater than the maximum, replace the No. 2 chain vibration damper.

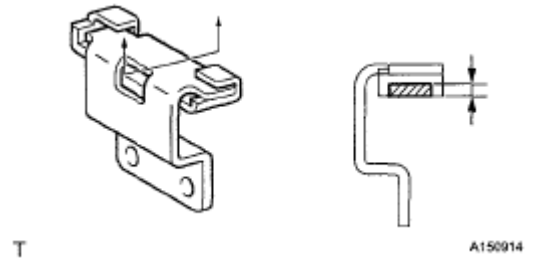


Fig. 450: Identifying Vibration Damper Wear Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

15. **INSPECT CHAIN TENSIONER PLATE**
    a. Using vernier calipers, measure the vibration damper wear.

       Maximum wear: 1.0 mm (0.039 in.)

       If the wear is greater than the maximum, replace the chain tensioner plate.

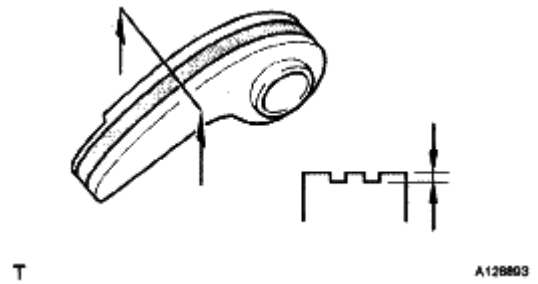


Fig. 451: Identifying Vibration Damper Wear Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

16. **INSPECT NO. 1 CHAIN TENSIONER**
    a. Check that the plunger moves smoothly when the ratchet pawl is raised with your finger.

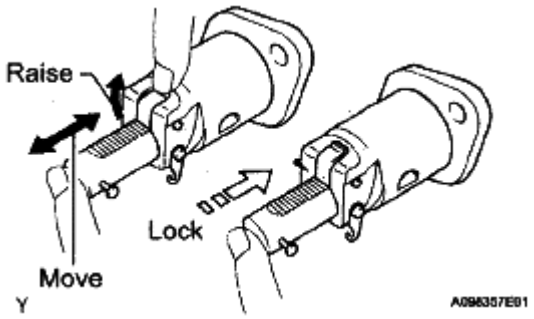


Fig. 452: Checking Plunger Moves
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    b. Release the ratchet pawl, then check that the plunger is locked in place by the ratchet pawl and does not move when pushed with your finger.

17. **INSPECT CAMSHAFT**
    a. Inspect the camshaft for runout.

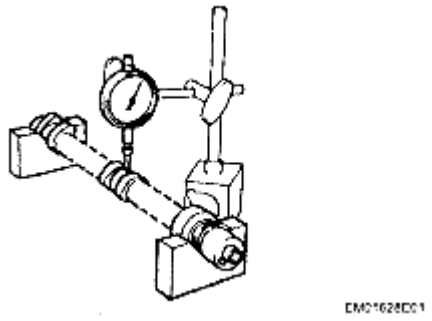


Fig. 453: Inspecting Camshaft For Runout
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

        1. Place the camshaft on V-blocks.
        2. Using a dial indicator, measure the circle runout at the center journal.

           Maximum circle runout: 0.04 mm (0.0016 in.)

           If the circle runout is greater than the maximum, replace the camshaft.

    b. Inspect the cam lobes.
        1. Using a micrometer, measure the cam lobe height.

Standard cam lobe height: 42.816 to 42.916 mm (1.6857 to 1.6896 in.)

Minimum cam lobe height: 42.666 mm (1.6798 in.)

If the cam lobe height is less than the minimum, replace the camshaft.

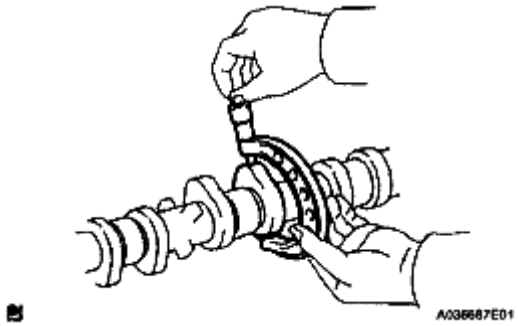


Fig. 454: Measuring Cam Lobe Height
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Inspect the camshaft journals.
   1. Using a micrometer, measure the journal diameter.

Standard journal diameter

STANDARD JOURNAL DIAMETER

Journal Position	Specified Condition
No. 1	34.449 to 34.465 mm (1.3563 to 1.3569 in.)
Other	22.949 to 22.965 mm (0.9035 to 0.9041 in.)

If the journal diameter is not as specified, check the oil clearance (See **INSPECTION**).

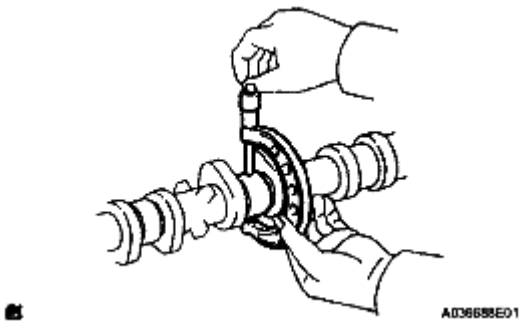


Fig. 455: Measuring Journal Diameter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

18. **INSPECT NO. 2 CAMSHAFT**
    a. Inspect the No. 2 camshaft for runout.

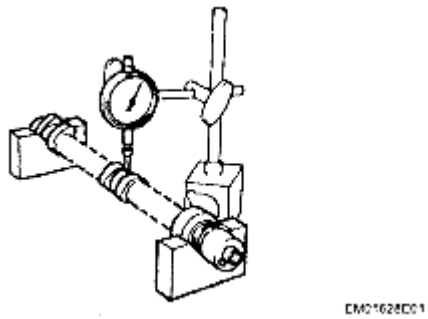


Fig. 456: Checking No. 2 Camshaft For Runout
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1. Place the No. 2 camshaft on V-blocks.
2. Using a dial indicator, measure the circle runout at the center journal.

   Maximum circle runout: 0.04 mm (0.0016 in.)

   If the circle runout is greater than the maximum, replace the No. 2 camshaft.

b. Inspect the cam lobes.
   1. Using a micrometer, measure the cam lobe height.

      Standard cam lobe height: 44.336 to 44.436 mm (1.7455 to 1.7494 in.)

      Minimum cam lobe height: 44.186 mm (1.7396 in.)

      If the cam lobe height is less than the minimum, replace the No. 2 camshaft.

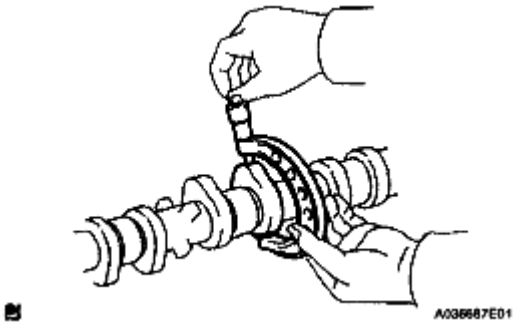


Fig. 457: Measuring Cam Lobe Height
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Inspect the camshaft journals.
   1. Using a micrometer, measure the journal diameter.

      Standard journal diameter

STANDARD JOURNAL DIAMETER

Journal Position	Specified Condition
No. 1	34.449 to 34.465 mm (1.3563 to 1.3569 in.)
Other	22.949 to 22.965 mm (0.9035 to 0.9041 in.)

If the journal diameter is not as specified, check the oil clearance (See **INSPECTION**).

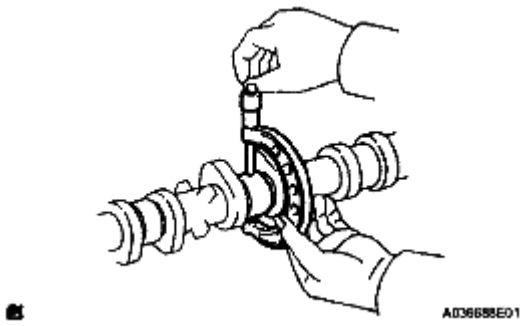


Fig. 458: Measuring Journal Diameter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

19. **INSPECT CYLINDER HEAD SET BOLT**
    a. Using vernier calipers, measure the length of the cylinder head set bolt from the seat to the end.

    Standard bolt length: 146.8 to 148.2 mm (5.7795 to 5.8346 in.)

    Maximum bolt length: 149.2 mm (5.874 in.)

    If the bolt length is greater than the maximum, replace the cylinder head set bolt.

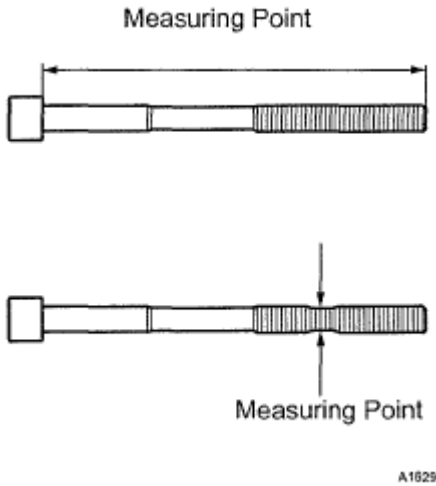


Fig. 459: Identifying Length Of Cylinder Head Set Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Using vernier calipers, measure the minimum diameter of the elongated thread at the measuring point.

Standard outside diameter: 9.77 to 9.96 mm (0.3846 to 0.3921 in.)

Minimum outside diameter: 9.4 mm (0.3701 in.)

HINT:

Using a straightedge, visually check for thinner areas of the threaded part of the cylinder head set bolt.

If the diameter is less than the minimum, replace the cylinder head set bolt.

20. **INSPECT EXHAUST MANIFOLD**

a. Using a precision straightedge and feeler gauge, measure the warpage on the contact surface of the cylinder head.

Maximum warpage: 0.7 mm (0.028 in.)

HINT:

If the warpage is greater than the maximum, replace the manifold.

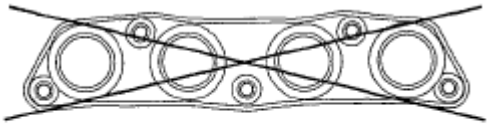


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Fig. 460: Measuring Warpage On Contact Surface Of Cylinder Head
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REPLACEMENT

1. **REPLACE RING PIN**

a. Remove the 2 ring pins.
b. Using a plastic-faced hammer, tap in 2 new ring pins to the crankcase.

Standard protrusion: 3 mm (0.1181 in.)

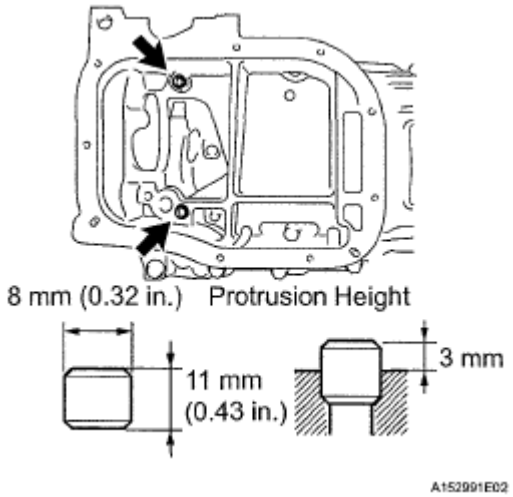

Fig. 461: Locating Ring Pins
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **REPLACE STUD BOLT**
   a. for Crankcase:
      1. Remove the 2 stud bolts.
      2. Using "TORX" socket wrench E5, install the 2 stud bolts as shown in the illustration.

         Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

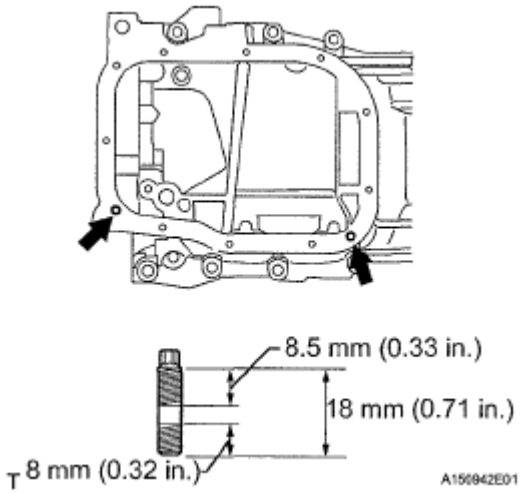

Fig. 462: Locating Stud Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. for water inlet housing:
      1. Remove the 2 stud bolts.
      2. Using a "TORX" socket E5, install the 2 stud bolts as shown in the illustration.

Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

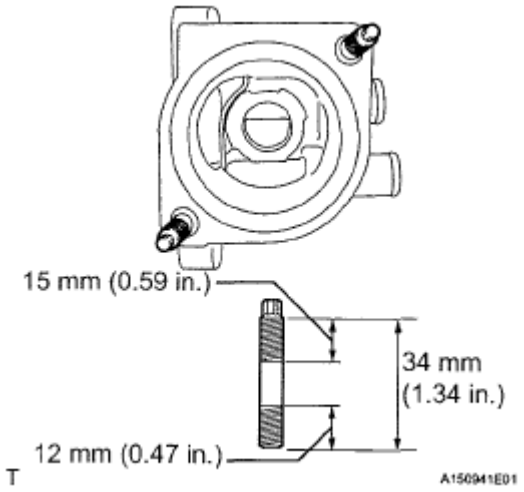

Fig. 463: Identifying Stud Bolts Dimension
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **REPLACE SPARK PLUG TUBE GASKET**
   a. Pry up the claws of the ventilation baffle plate.

NOTE: Do not deform the claws of the baffle plate more than necessary.

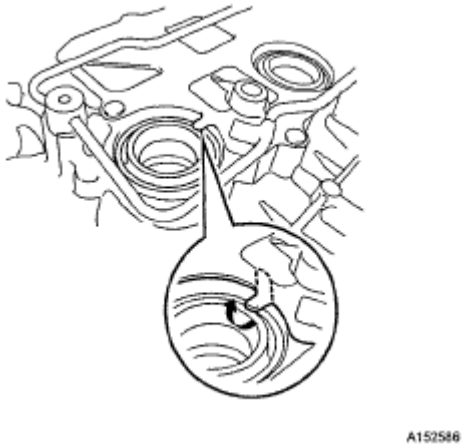

Fig. 464: Identifying Claws Of Baffle Plate
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Remove the 4 gaskets from the cylinder head covers.

NOTE:

- **Try not to deform the plug tube gaskets. The removed gaskets will be used when reinstalling the gaskets.**
- **Do not damage the connection of the cylinder head cover.**

c. Using a cutter, cut off the sealing part of the removed plug tube gasket.

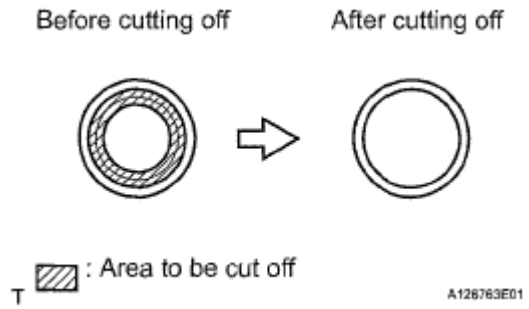

Fig. 465: Identifying Plug Tube Gasket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Using a plug tube gasket which has had the sealing part cut off, uniformly tap in a plug tube gasket all the way.

NOTE:

- **Keep the lip free of foreign matter.**
- **Do not tap on the oil seal at an angle.**

HINT:

If a plug tube gasket that will be used to install a new gasket is deformed, and cannot be positioned on a new gasket, correct the deformation using pliers.

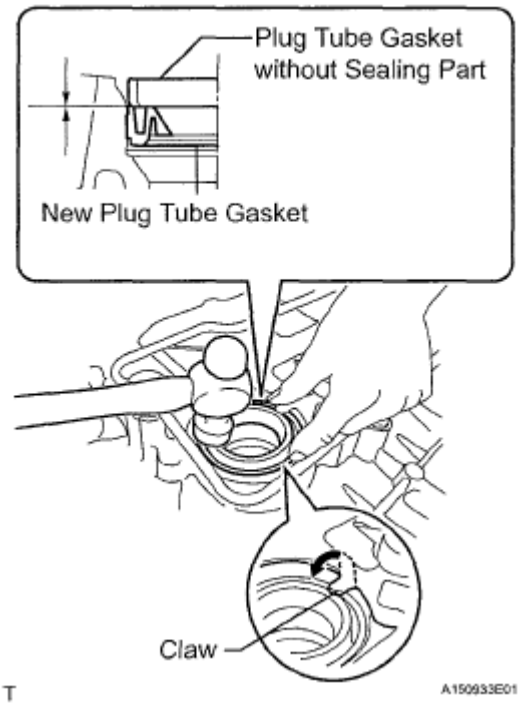

Fig. 466: Installing Plug Tube Gasket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

e. Return the claws of the ventilation baffle plate to their original positions.

4. **REPLACE TIMING CHAIN OR BELT COVER OIL SEAL**

a. Using a screwdriver and hammer, remove the oil seal.

NOTE: Be careful not to damage the timing chain cover sub-assembly.

HINT:

Tape the screwdriver tip before use.

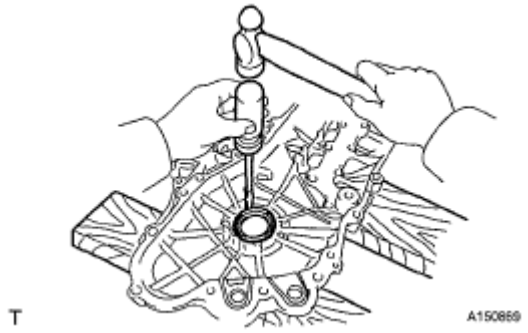

Fig. 467: Removing Oil Seal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Using SST, tap in a new oil seal until its surface is flush with the timing gear case edge.

SST 09223-22010

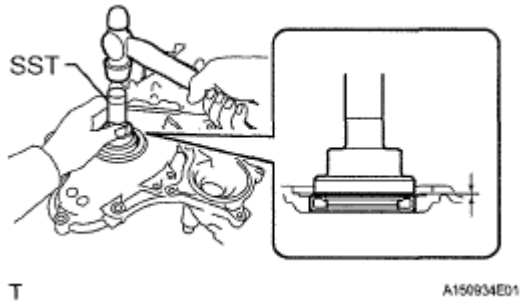

Fig. 468: Installing Oil Seal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Apply a light coat of MP grease to the lip of the oil seal.

NOTE:

- **Keep the lip free of foreign matter.**

- **Do not tap on the oil seal at an angle.**
- **Make sure that the oil seal edge does not stick out of the timing chain cover.**

5. **REPLACE ENGINE REAR OIL SEAL**
   a. Using a knife, cut off the oil seal lip.
   b. Using a screwdriver with its tip taped, pry out the oil seal.

NOTE: **After removing the oil seal, check the crankshaft for damage. If it is damaged, smooth the surface with 400-grit sandpaper.**

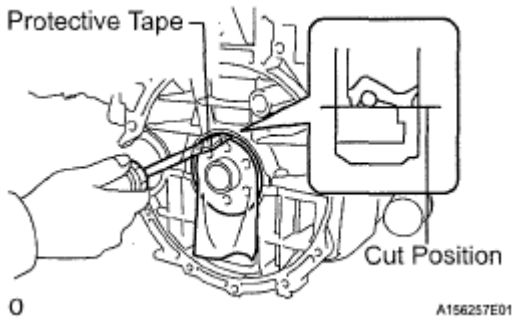

Fig. 469: Prying Out Oil Seal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   c. Apply MP grease to the new oil seal lip.
   d. Using SST and a hammer, evenly tap in a new oil seal until its surface is flush with the rear oil seal retainer edge.

SST 09223-15030, 09950-70010 (09951-07100)

NOTE:
- **Keep the lip free from foreign materials.**
- **Do not tap on the oil seal at an angle.**
- **Wipe off any grease that is on the crankshaft.**

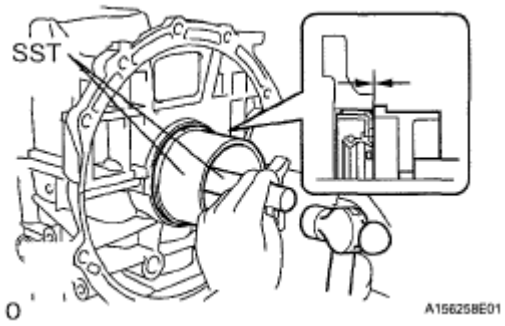

Fig. 470: Installing Oil Seal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REASSEMBLY

1. **INSTALL STIFFENING CRANKCASE ASSEMBLY**
   a. Apply seal packing in a continuous bead (diameter: 2.5 mm (0.098 in.)) to the places shown in the illustration.

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

      NOTE:
      - **Remove any oil from the contact surface.**
      - **Install the crankcase within 3 minutes of applying the seal packing.**
      - **Do not start the engine for at least 2 hours after installing the stiffening crankcase.**

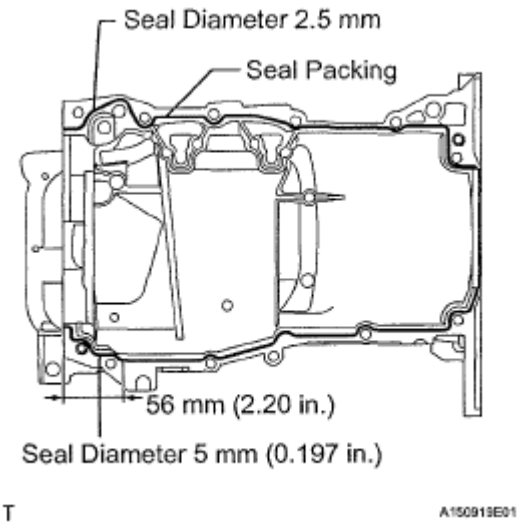

Fig. 471: Applying Seal Packing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Install the stiffening crankcase with the 11 bolts.

      Torque: 21 N*m (214 kgf*cm, 16 ft.*lbf)

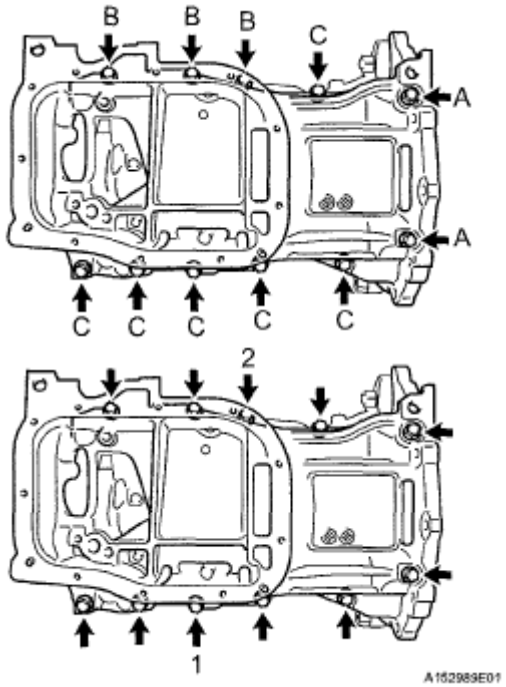

Fig. 472: Locating Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Bolt length

BOLT LENGTH CHART

Item	Length
Bolt A	138 mm (5.43 in.)
Bolt B	35 mm (1.38 in.)
Bolt C	70 mm (2.76 in.)

c. Recheck the torque for bolts 1 and 2.

Torque: 21 N*m (214 kgf*cm, 16 ft.*lbf)

d. Wipe off any excess seal packing with a clean piece of cloth.

2. **INSTALL OIL PUMP ASSEMBLY**

a. Install the oil pump assembly with the 3 bolts.

Torque: 21 N*m (214 kgf*cm, 16 ft.*lbf)

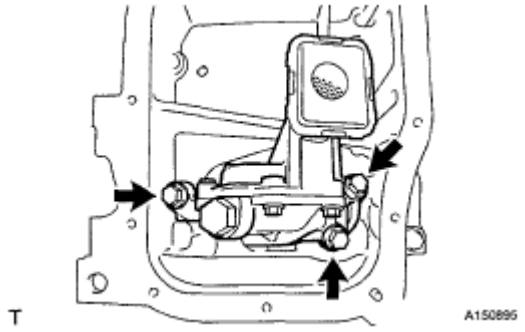

Fig. 473: Locating Bolts And Oil Pump Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **INSTALL NO. 2 OIL PAN SUB-ASSEMBLY**
   a. Remove any old packing material from the contact surface.
   b. Apply seal packing in a continuous bead (diameter: 4 mm (0.157 in.)) to the places shown in the illustration.

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

      NOTE:
      - **Remove any oil from the contact surface.**
      - **Install the No. 2 oil pan sub-assembly within 3 minutes and tighten the bolts within 15 minutes of applying the seal packing.**
      - **Do not expose the seal to engine oil for 2 hours after installation.**

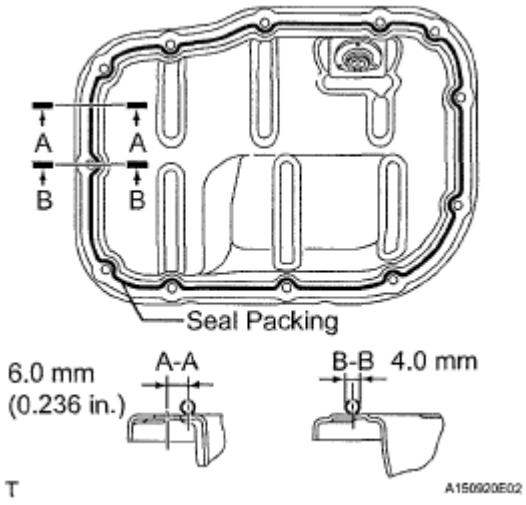

Fig. 474: Applying Seal Packing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   c. Install the No. 2 oil pan sub-assembly with the 10 bolts and 2 nuts.

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

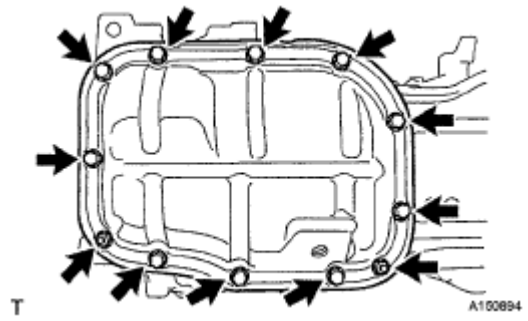

Fig. 475: Locating Bolts And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. **INSTALL OIL PAN DRAIN PLUG**
   a. Install a new gasket and the oil pan drain plug.

   Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)

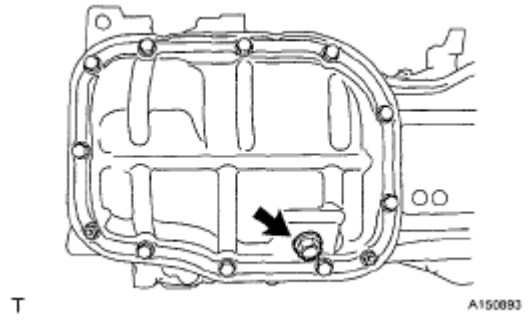

Fig. 476: Locating Oil Pan Drain Plug
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. **INSTALL CYLINDER BLOCK WATER DRAIN COCK ASSEMBLY**
   a. Apply adhesive to the threads of the drain cock.

   Adhesive: Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

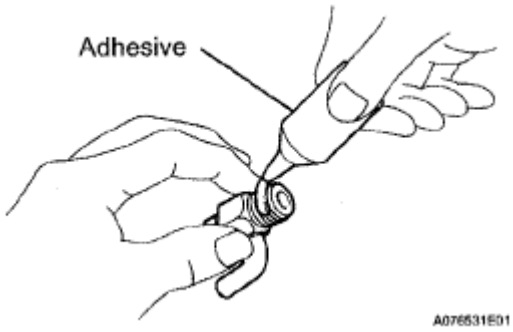

Fig. 477: Applying Adhesive To Threads Of Drain Cock
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Install the water drain cock as shown in the illustration.

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

NOTE:

- **Do not rotate the drain cock more than 1 revolution (360°) after tightening it to the specified torque.**
- **Install the water drain cock within 3 minutes after applying the adhesive.**
- **Do not start the engine for at least 2 hours after installing the water drain cock.**

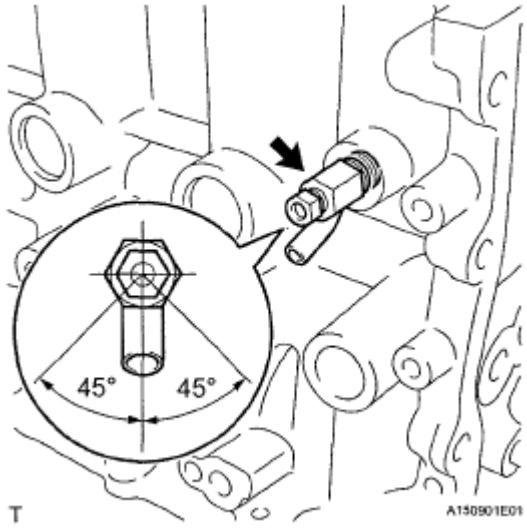

Fig. 478: Locating Water Drain Cock Plug
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Install the water drain cock plug to the water drain cock.

Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)

6. **INSTALL VENTILATION VALVE SUB-ASSEMBLY**
   a. Apply adhesive to the threads of the ventilation valve.

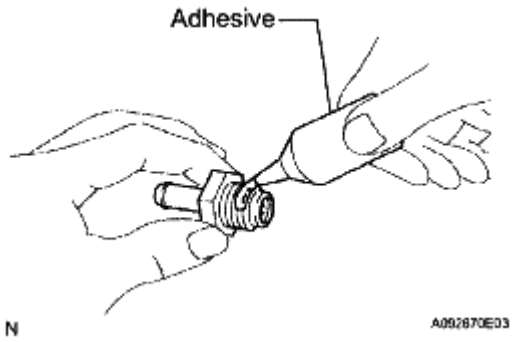

Fig. 479: Applying Adhesive To Threads Of Ventilation Valve
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Install the ventilation valve.

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

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

NOTE:

- **Install the crankcase within 3 minutes after applying the adhesive.**
- **Do not start the engine for at least 2 hours after installing the ventilation valve.**

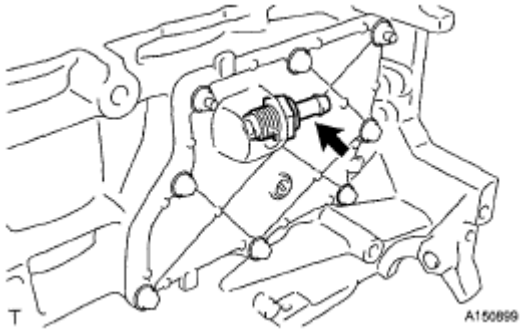

Fig. 480: Locating Ventilation Valve
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. **INSTALL CYLINDER HEAD GASKET**
   a. Place a new cylinder head gasket on the cylinder block with the Lot No. stamp facing upward.

NOTE:

- **Remove any oil from the contact surface.**

- **Pay attention to the mounting orientation of the cylinder head gasket.**
- **Do not damage the cylinder gasket when installing the cylinder head onto the cylinder block.**

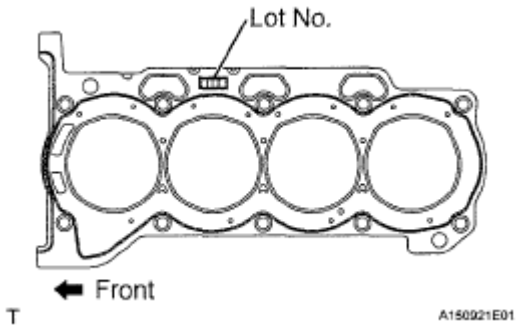

Fig. 481: Identifying Cylinder Head Gasket Lot No. Stamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. **INSTALL CYLINDER HEAD SUB-ASSEMBLY**

HINT:

The cylinder head bolts are tightened in 2 successive steps.

a. Apply a light coat of engine oil to the threads of the cylinder head bolts.
b. Using several steps, install and tighten the 10 cylinder head bolts and plate washers uniformly with as a 10 mm bi-hexagon wrench in the sequence shown in the illustration.

Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

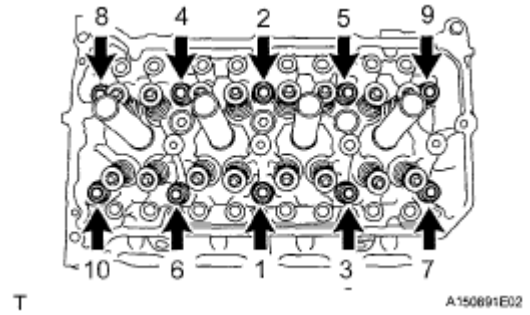

Fig. 482: Locating Cylinder Head Bolts And Tightening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Mark the front of the cylinder head bolt with paint.
d. Retighten the cylinder head bolts by additional 90° and one more additional 45° as shown in the illustration.

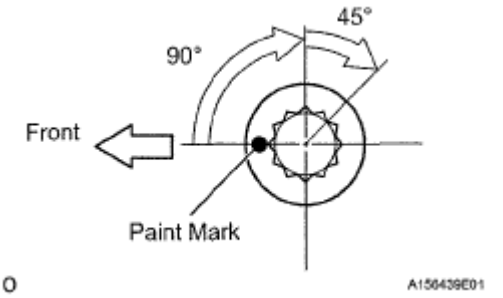

Fig. 483: Identifying Cylinder Head Bolt Tightening Direction
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

e. Check that the paint mark is now at a 135° angle from the front.

9. **INSTALL VALVE LASH ADJUSTER ASSEMBLY**

NOTE:

- **Keep the lash adjuster free of dirt and foreign objects.**
- **Only use clean engine oil.**

a. Place the lash adjuster into a container filled with engine oil.
b. Insert the SST's tip into the lash adjuster's plunger and use the tip to press down on the check ball inside the plunger.

SST 09276-75010

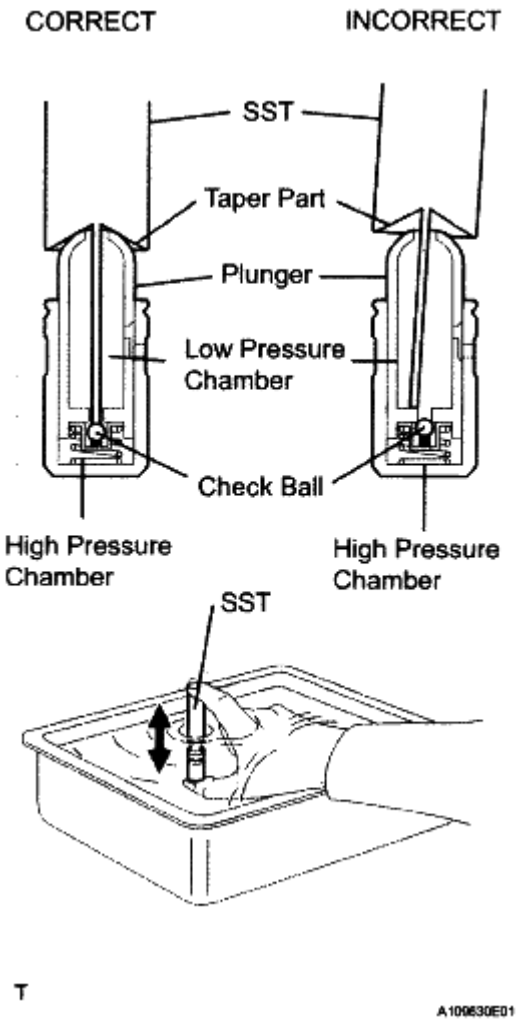

Fig. 484: Checking Lash Adjuster
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Squeeze the SST and lash adjuster together to move the plunger up and down 5 or 6 times.
d. Check the movement of the plunger and bleed the air.

OK: Plunger moves up and down.

NOTE: When bleeding air from the high-pressure chamber, make sure that the tip of the SST is actually pressing the check ball as shown in the illustration. If the check ball is not pressed, air will not bleed.

e. After bleeding the air, remove the SST. Then, try to press the plunger quickly and firmly with a finger.

OK: Plunger is very difficult to move.

If the result is not as specified, replace the lash adjuster.

f. Install the lash adjusters.

NOTE: Install the lash adjuster into its original position.

10. **INSTALL NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY**
    a. Apply engine oil to the lash adjuster tip and valve stem cap end.
    b. Install the valve rocker arms as shown in the illustration.

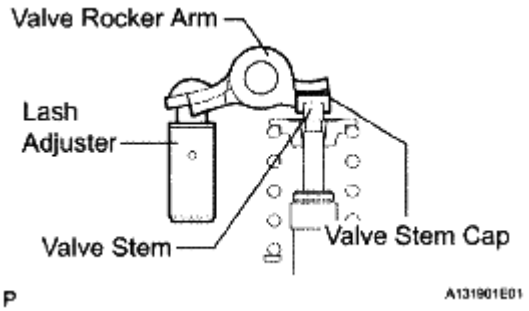

Fig. 485: Identifying Valve Rocker Arm
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. **INSTALL NO. 1 CAMSHAFT BEARING**
    a. Clean the both surfaces of the bearing.
    b. Install the 2 No. 1 camshaft bearings.
    c. Using vernier calipers, measure the distance between the bearing cap's edge and the camshaft bearing's edge.

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.

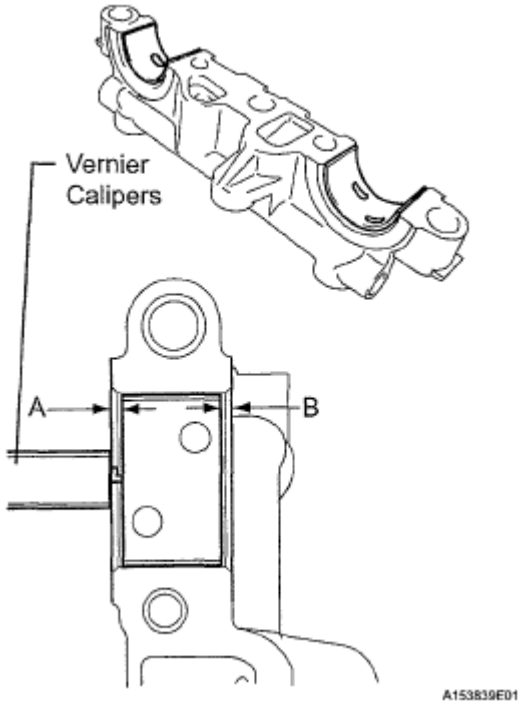

Fig. 486: Identifying Bearing Cap's Edge Dimension
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

12. **INSTALL OIL CONTROL VALVE FILTER**
    a. Check that there is no foreign matter on the mesh part of the filter.
    b. Install the oil control valve filter.

NOTE: Do not touch the mesh when installing the oil control valve filter.

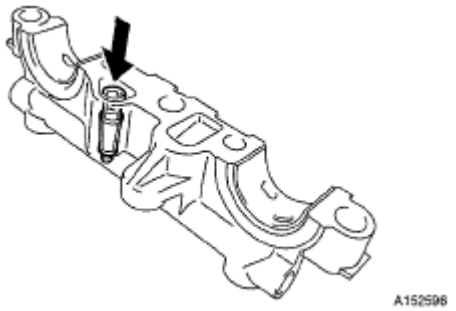

Fig. 487: Installing Oil Control Valve Filter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

13. **INSTALL NO. 2 CAMSHAFT BEARING**
    a. Clean both surfaces of the bearing.
    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.

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.

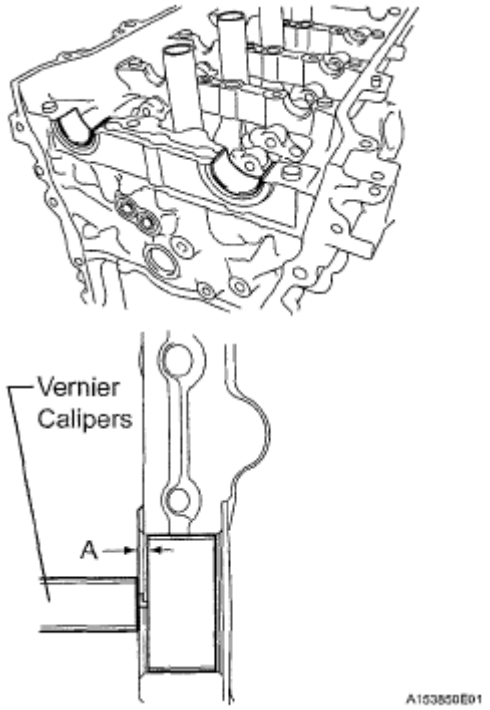

Fig. 488: Identifying Bearing Cap's Edge Dimension
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

14. **INSTALL NO. 2 CAMSHAFT**
    a. Clean the camshaft journals.
    b. Apply a light coat of engine oil to the camshaft journals, camshaft housings and bearing caps.
    c. Install the No. 2 camshaft to the camshaft housing.

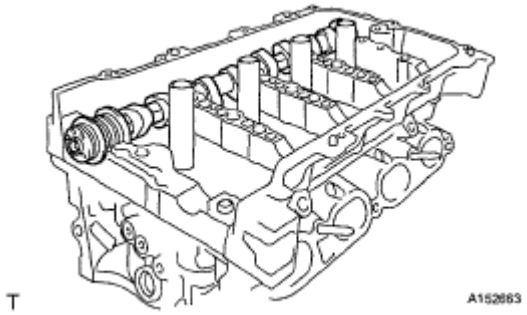

Fig. 489: Identifying No. 2 Camshaft

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

15. **INSTALL CAMSHAFT**
    a. Clean the camshaft journals.
    b. Apply a light coat of engine oil to the camshaft journals, camshaft housings and bearing caps.
    c. Install the camshaft to the camshaft housing.

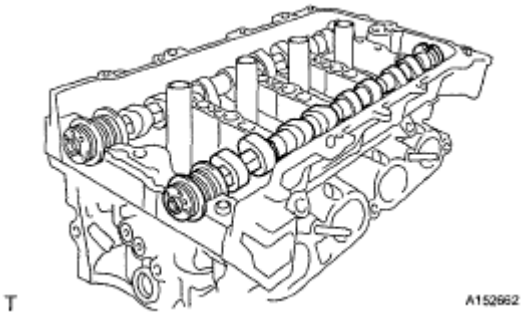

Fig. 490: Identifying Camshaft
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

16. **INSTALL CAMSHAFT BEARING CAP**
    a. Apply engine oil to the camshaft journals, camshaft housing and bearing caps.
    b. Check the marks and numbers on the camshaft bearing caps and place them in the proper position and direction.

    HINT:

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

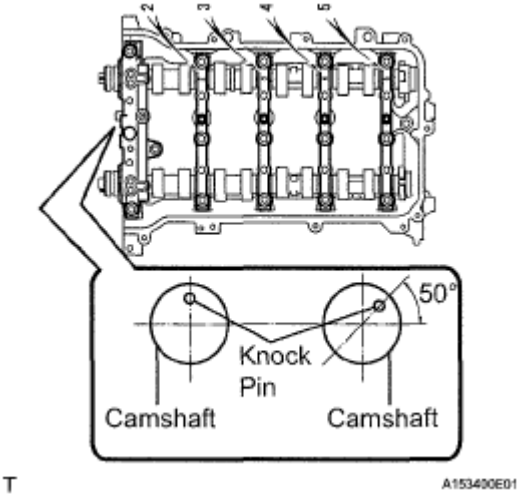

Fig. 491: Identifying Knock Pin Of Camshaft
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Tighten the 10 bolts in the order shown in the illustration.

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

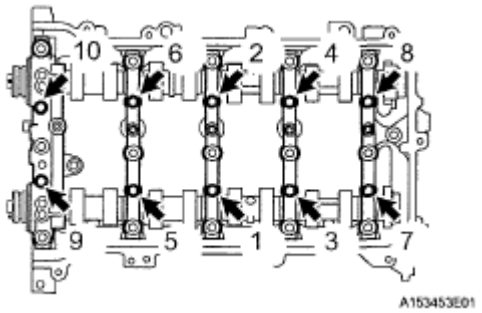

Fig. 492: Locating Bolts And Tightening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

17. **INSTALL CAMSHAFT HOUSING SUB-ASSEMBLY**

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

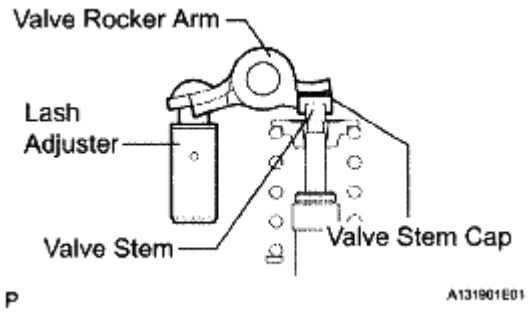

Fig. 493: Identifying Valve Rocker Arm
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

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

Seal diameter: 3.5 to 4.0 mm (0.138 to 0.158 in.)

NOTE:

- **Remove any oil from the contact surface.**
- **Install the camshaft housing sub-assembly RH within 3 minutes of applying the seal packing.**
- **Do not start the engine for at least 2 hours after installing.**

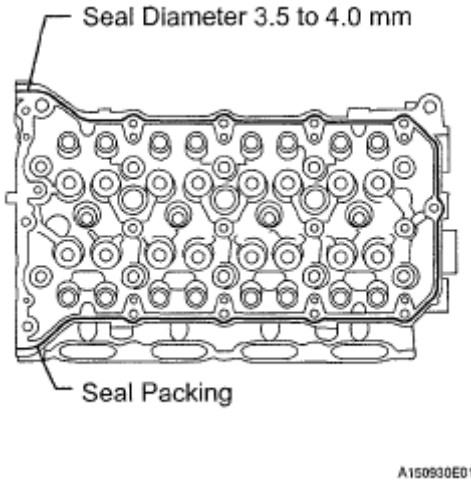

Fig. 494: Applying Seal Packing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Set the camshaft and No. 2 camshaft as shown in the illustration.
d. Install the camshaft housing and tighten the 17 bolts in the order shown in the illustration.

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

NOTE:

- **After installing the camshaft housing, make sure that the cam lobes are positioned as shown in the illustration.**
- **If any of the bolts are loosened during installation, remove the camshaft housing, clean the installation surfaces, and reapply seal packing.**
- **If the camshaft housing is removed because any of the bolts are loosened during installation, make sure that the previously applied seal packing does not enter any oil passages.**
- **After installing the camshaft housing, wipe off any seal packing that seeped out from between the housing and the cylinder head.**

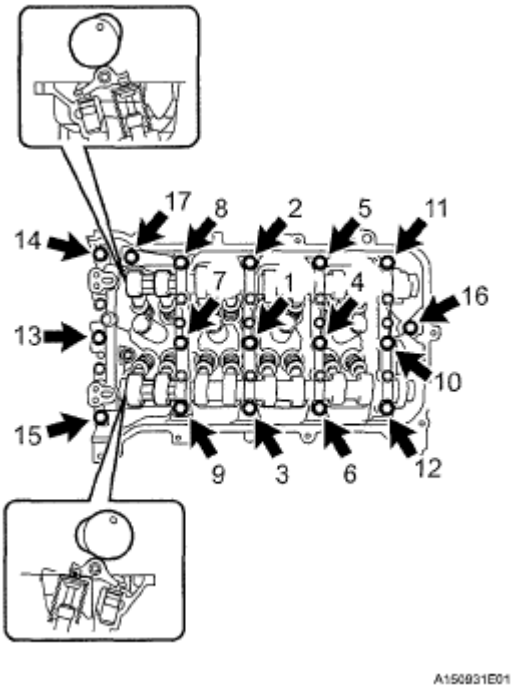

Fig. 495: Locating Camshaft Housing Bolts And Tightening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

18. **INSTALL CAMSHAFT TIMING GEAR ASSEMBLY**
    a. Check that the knock pin is installed on the camshaft.
    b. Put the camshaft timing gear and camshaft together with the straight pin and key groove misaligned, as shown in the illustration.

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.

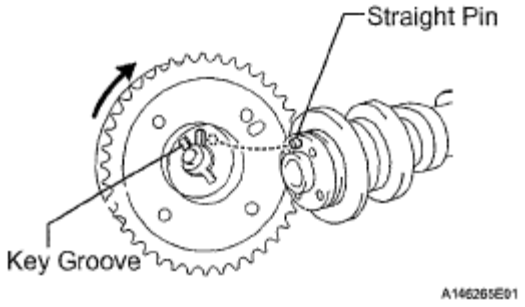

Fig. 496: Identifying Straight Pin And Key Groove
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    c. 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.

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

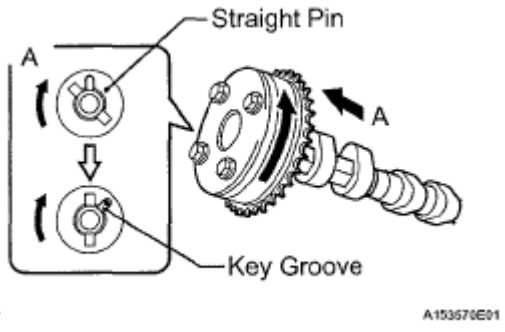

Fig. 497: Identifying Straight Pin And Key Groove
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Measure the clearance between the gear and the camshaft.

Clearance: 0.1 to 0.4 mm (0.004 to 0.016 in.)

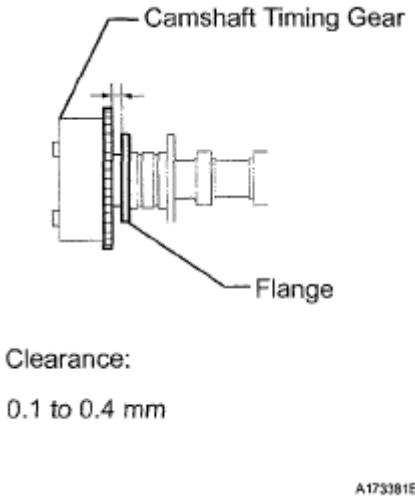

Fig. 498: Identifying Clearance Between Gear And Camshaft
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

e. Tighten the flange bolt with the camshaft timing gear fixed in place.

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

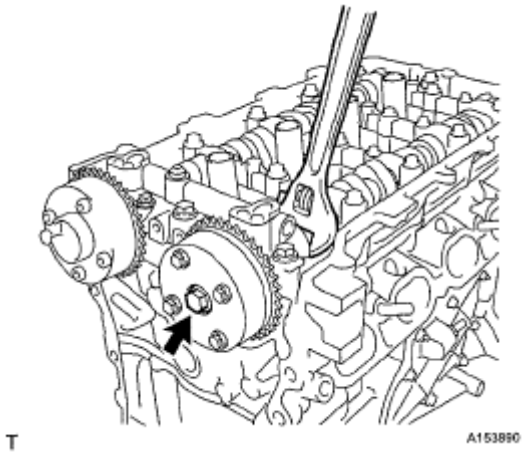

Fig. 499: Locating Flange Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

f. Check that the camshaft timing gear can move to the retard angle side (the right direction) and is locked in the most retarded position.

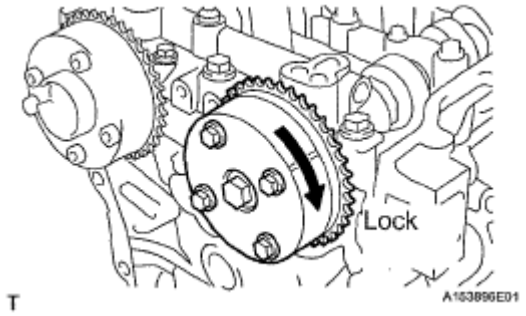

Fig. 500: Identifying Camshaft Timing Gear Direction
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

19. **INSTALL CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY**
    a. Check that the knock pin is installed on the camshaft.
    b. Put the camshaft timing exhaust gear and camshaft together by aligning the key groove and straight pin.

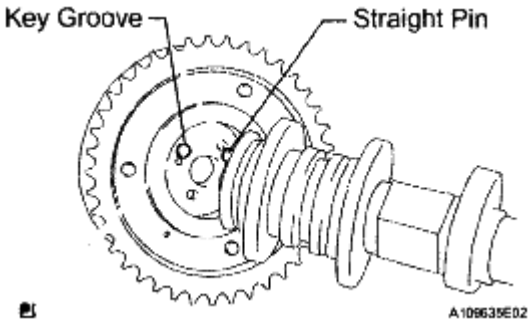

Fig. 501: Identifying Key Groove And Straight Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Lightly press the gear against the camshaft, and turn the gear. Push further at the position where the pin enters the groove.

NOTE: Be sure not to turn the camshaft timing exhaust gear in the retard direction (the right angle).

d. Check that there is no clearance between the gear's flange and the camshaft.
e. Tighten the flange bolt with the camshaft timing exhaust gear fixed.

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

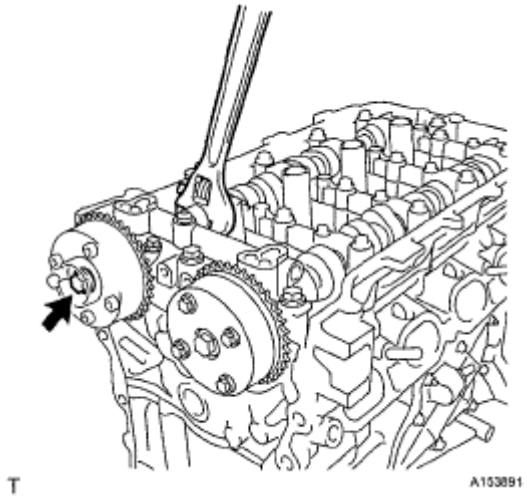

Fig. 502: Locating Flange Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

f. Check the camshaft timing exhaust gear lock.
    1. Make sure that the camshaft timing exhaust gear is locked.

20. **INSTALL NO. 1 CRANKSHAFT POSITION SENSOR PLATE**
    a. Install the sensor plate with the "F" mark facing forward.

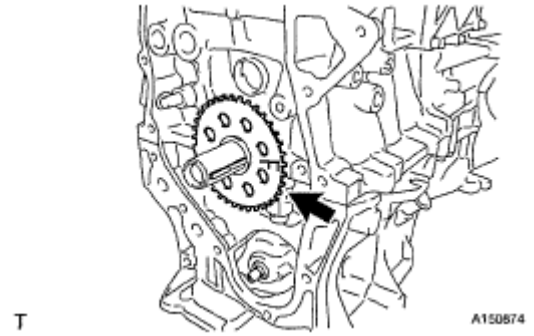

Fig. 503: Identifying No. 1 Crankshaft Position Sensor Plate
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

21. **INSTALL CRANKSHAFT TIMING GEAR KEY**
    a. Using a plastic-faced hammer, tap in the 2 crankshaft timing gear keys.

       HINT:

       Tap in the crankshaft timing gear keys until they come in contact with the crankshaft.

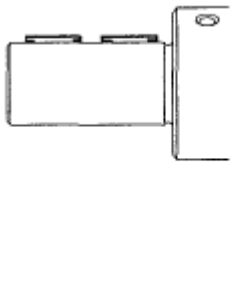

Fig. 504: Identifying Crankshaft Timing Gear Keys
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

22. **INSTALL NO. 2 CHAIN SUB-ASSEMBLY**
    a. Set the crankshaft key as shown in the illustration.

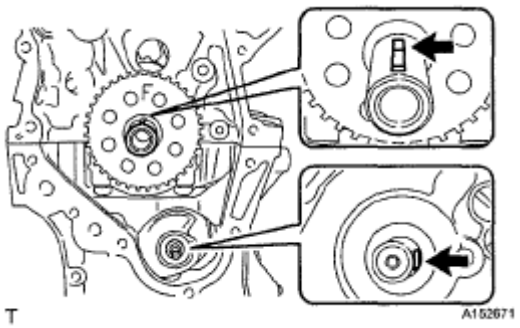

Fig. 505: Locating Crankshaft Key
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Turn the drive shaft so that the cutout faces right.
c. Align the yellow mark links with the timing marks of each gear as shown in the illustration.

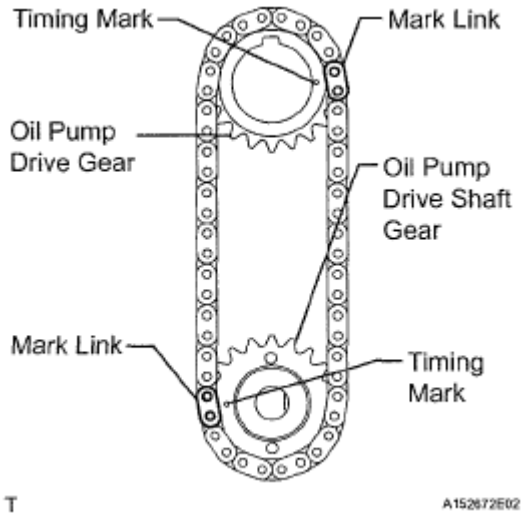

Fig. 506: Identifying Yellow Mark Links And Timing Marks
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Install the gears onto the crankshaft and oil pump shaft with the chain on the gears.
e. Temporarily tighten the oil pump drive shaft gear with the nut.
f. Insert the damper spring into the adjusting hole, and then install the chain tensioner plate with the bolt.

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

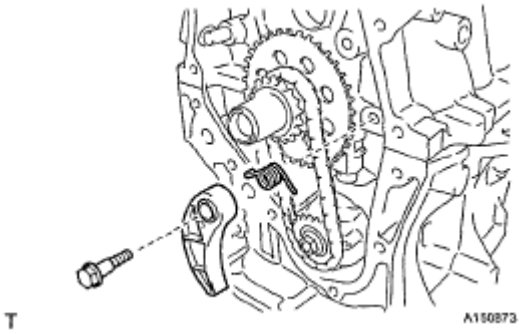

Fig. 507: Identifying Bolt, Chain Tensioner Plate And Spring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

g. Align the adjusting hole of the oil pump drive shaft gear with the groove of the oil pump.

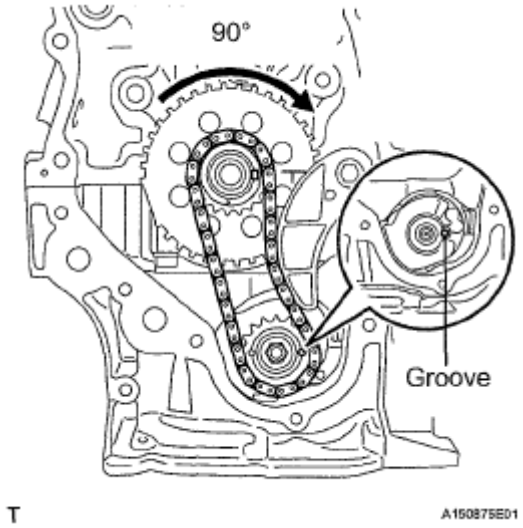

Fig. 508: Turning Crankshaft 90° Clockwise
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

h. Insert a 4 mm diameter bar into the adjusting hole of the oil pump drive shaft gear to lock the gear in position, and then tighten the nut.

Torque: 28 N*m (286 kgf*cm, 21 ft.*lbf)

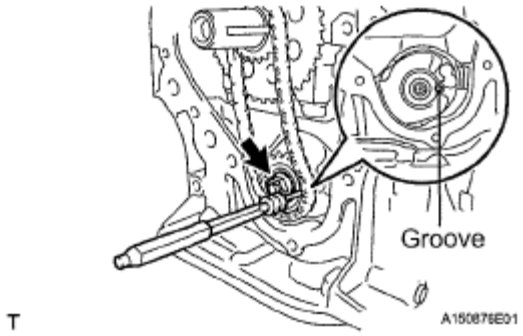

Fig. 509: Inserting Bar Into Adjusting Hole Of Oil Pump Drive Shaft Gear
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

23. **INSTALL CRANKSHAFT TIMING GEAR OR SPROCKET**
    a. Install the crankshaft timing gear or sprocket.

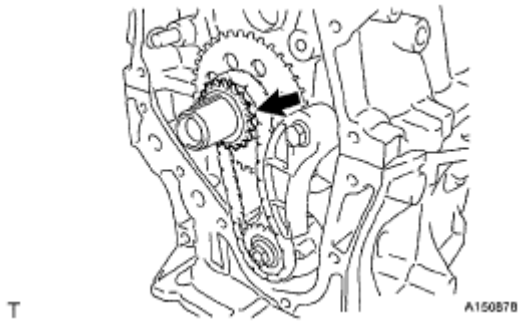

Fig. 510: Locating Crankshaft Timing Gear Or Sprocket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

24. **INSTALL NO. 1 CHAIN VIBRATION DAMPER**
    a. Install the No. 1 chain vibration damper with the 2 bolts.

    Torque: 21 N*m (214 kgf*cm, 16 ft.*lbf)

Fig. 511: Locating No. 1 Chain Vibration Damper And Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

25. **INSTALL CHAIN SUB-ASSEMBLY**
    a. Check the No. 1 cylinder TDC/compression.
        1. Temporarily tighten the crankshaft pulley bolt.
        2. Turn the crankshaft counterclockwise until the timing gear key is facing up.

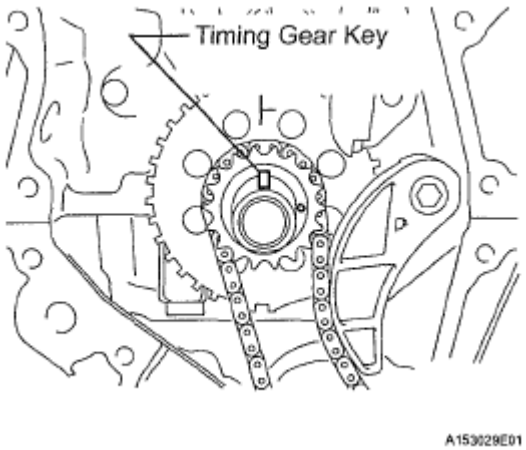

Fig. 512: Identifying Timing Gear Key
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. Remove the crankshaft pulley bolt.
4. Check the timing mark on each camshaft timing gear.

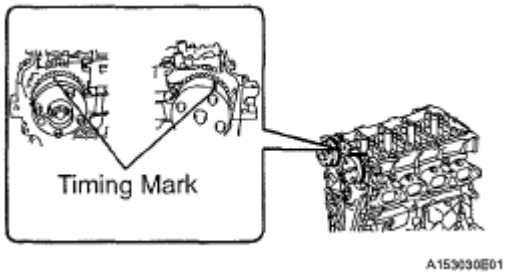

Fig. 513: Identifying Timing Mark On Camshaft Timing Gear
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Align the mark plate (orange) with the timing mark as shown in the illustration and install the chain.

HINT:

- Be sure to position the mark plate at the front of the engine.
- The mark plate on the camshaft side is colored orange.
- Do not pass the chain around the sprocket of the camshaft timing gear assembly. Only place it on the sprocket.
- Pass the chain through the No. 1 vibration damper.

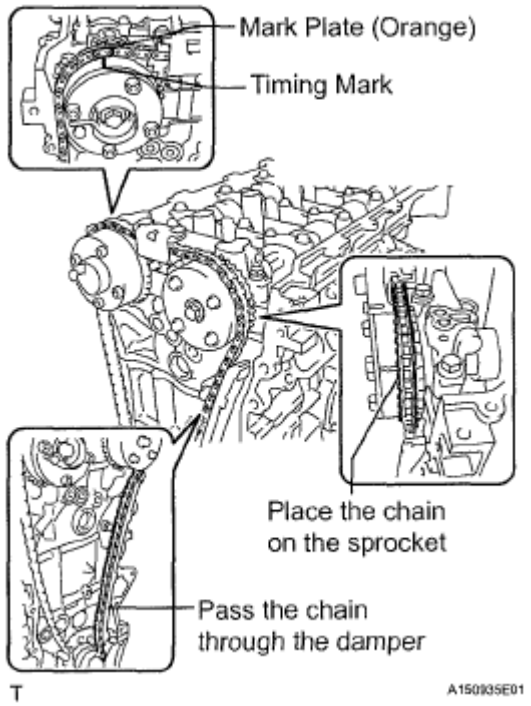

Fig. 514: Identifying Mark Plate And Timing Mark
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Place the chain on the crankshaft without passing it around the shaft.

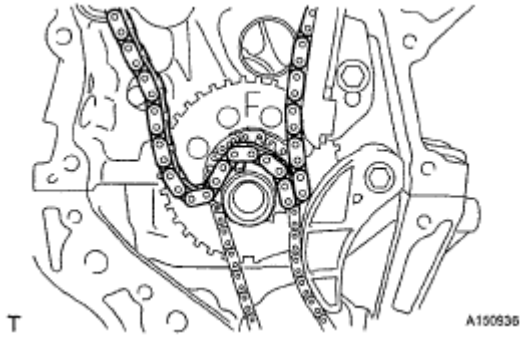

Fig. 515: Identifying Chain On Crankshaft
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Hold the hexagonal portion of the camshaft with a wrench and turn the camshaft timing gear assembly counterclockwise to align the mark plate (orange) and timing mark.

HINT:

- Be sure to position the mark plate at the front of the engine.
- The mark plate on the camshaft side is colored orange.

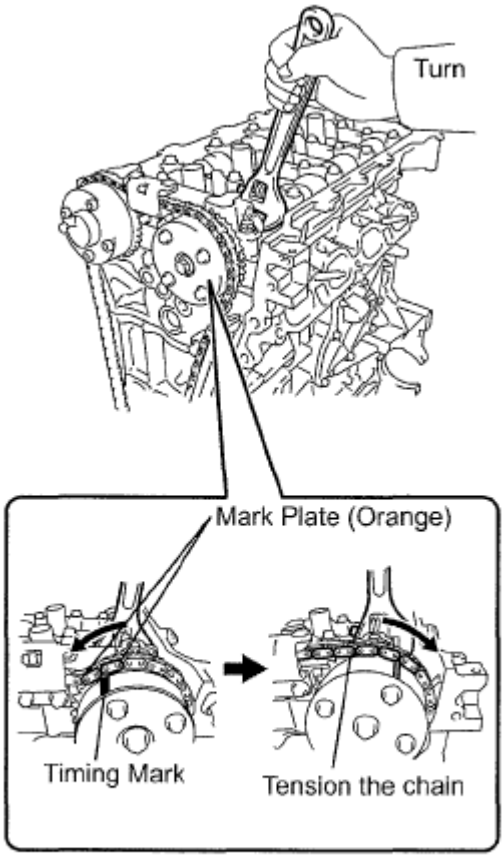

Fig. 516: Holding Hexagonal Portion Of Camshaft With Wrench
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

e. Hold the hexagonal portion of the camshaft with a wrench and turn the camshaft timing gear assembly clockwise.

   HINT:

   When tensioning the chain, turn the camshaft timing gear assembly clockwise slowly to prevent the chain from being misaligned.

f. Align the mark plate (yellow) and timing mark and install the chain to the crankshaft timing gear.

   HINT:

   The mark plate on the crankshaft side is colored yellow.

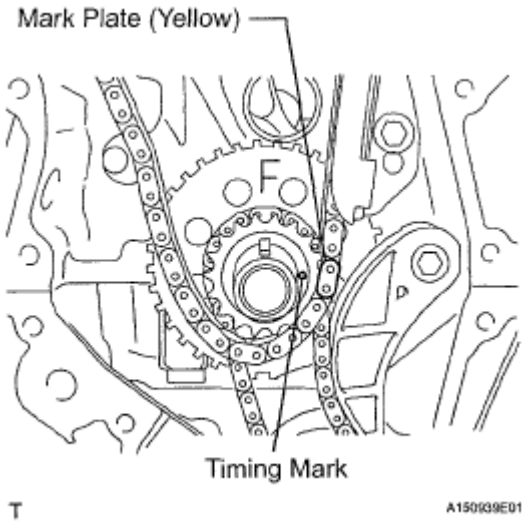

Fig. 517: Identifying Mark Plate (Yellow) And Timing Mark (1 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

g. Recheck each timing mark at TDC/compression.

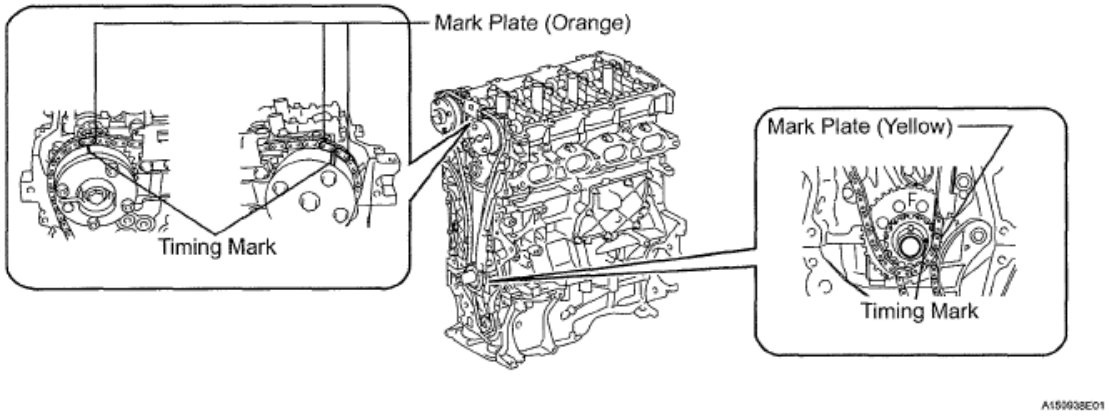

Fig. 518: Identifying Mark Plate (Yellow) And Timing Mark (2 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

26. **INSTALL CHAIN TENSIONER SLIPPER**
    a. Install the chain tensioner slipper.

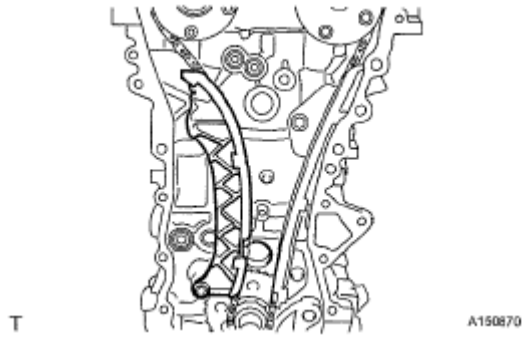

Fig. 519: Identifying Chain Tensioner Slipper
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

27. **INSTALL NO. 2 CHAIN VIBRATION DAMPER**
    a. Install the No. 2 chain vibration damper with the 2 bolts.

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

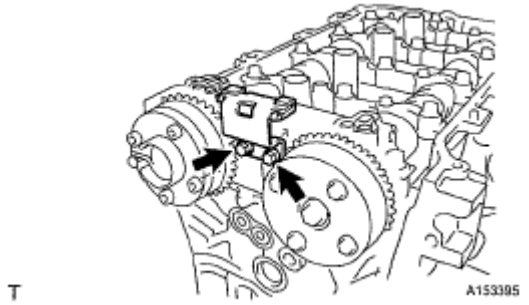

Fig. 520: Locating Bolts And No. 2 Chain Vibration Damper
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

28. **INSTALL NO. 1 GENERATOR BRACKET**
    a. Install the No. 1 generator bracket with the 4 bolts.

    Torque: 21 N*m (214 kgf*cm, 16 ft.*lbf)

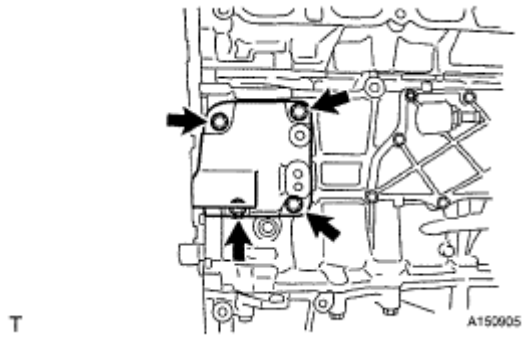

Fig. 521: Locating Bolts And Generator Bracket

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

29. **INSTALL WATER INLET HOUSING**
    a. Install a new gasket and the water inlet housing with the 3 bolts.

    Torque: 21 N*m (214 kgf*cm, 16 ft.*lbf)

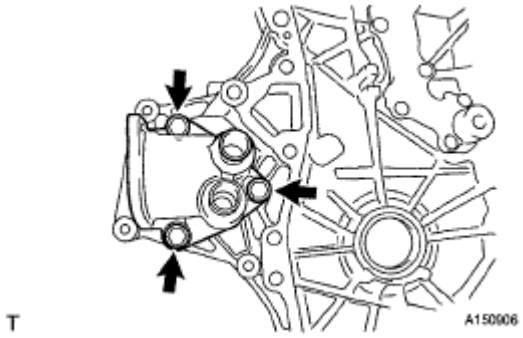

Fig. 522: Locating Bolts, Gasket And Water Inlet Housing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

30. **INSTALL TIMING CHAIN OR BELT COVER SUB-ASSEMBLY**
    a. Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the timing chain cover, cylinder head and cylinder block.

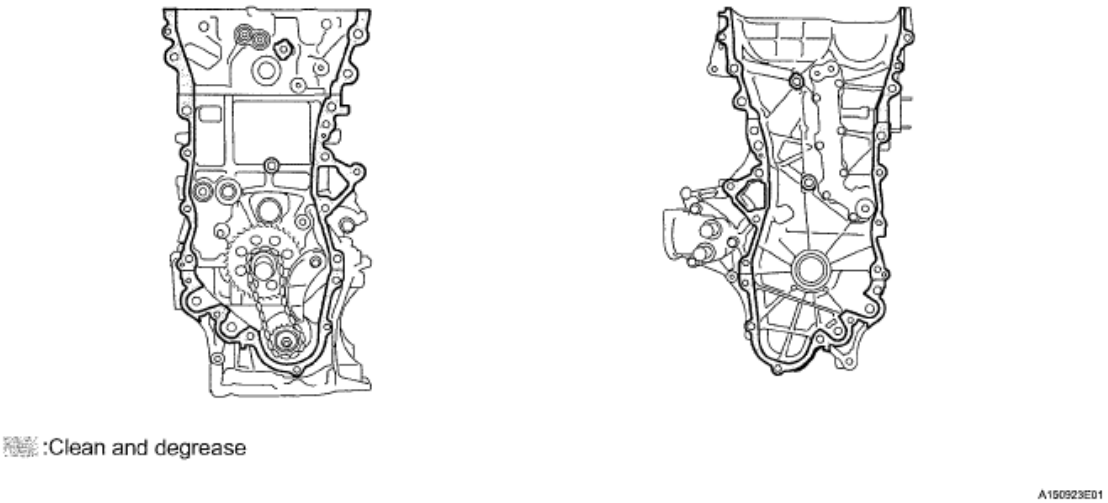

Fig. 523: Identifying Old Packing (FIPG) Material
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    b. Install 3 new O-rings.

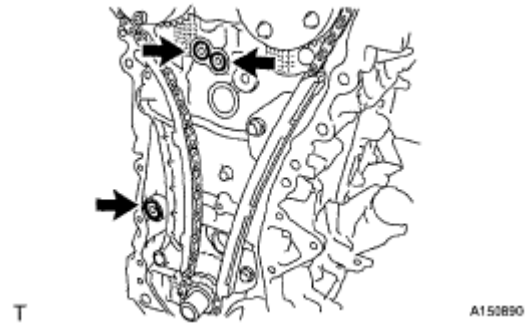

Fig. 524: Locating O-Rings
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Apply seal packing as shown in the illustration.

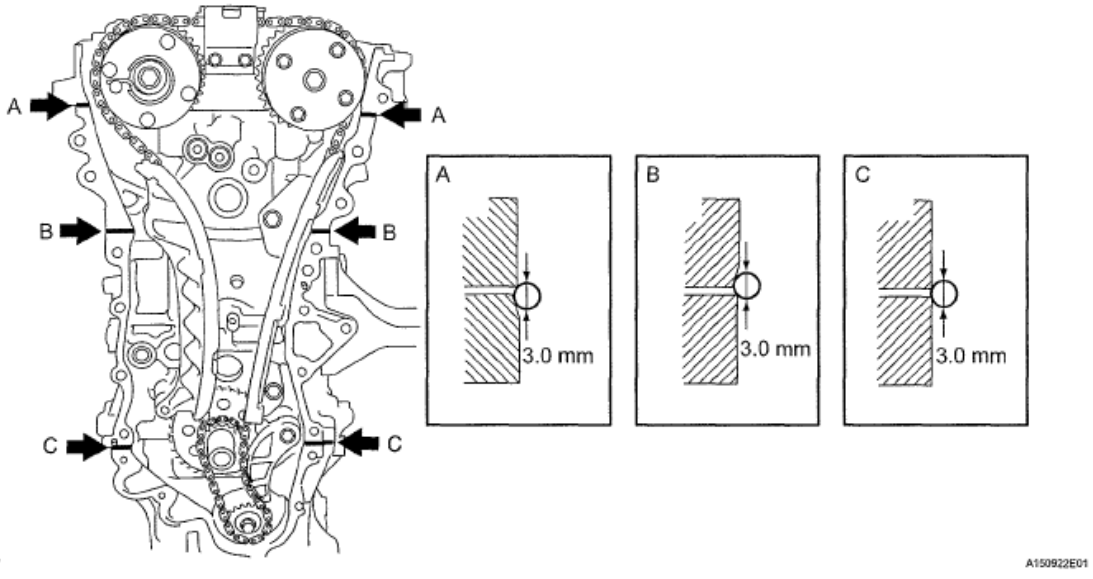

Fig. 525: Applying Seal Packing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

Seal diameter: 3.0 mm (0.118 in.)

NOTE:

- **Remove any oil from the contact surface.**
- **Install the chain cover within 3 minutes of applying the seal packing.**
- **Do not start the engine for at least 2 hours after installing.**

d. Apply seal packing in a continuous line to the timing chain cover, as shown in the following illustration.

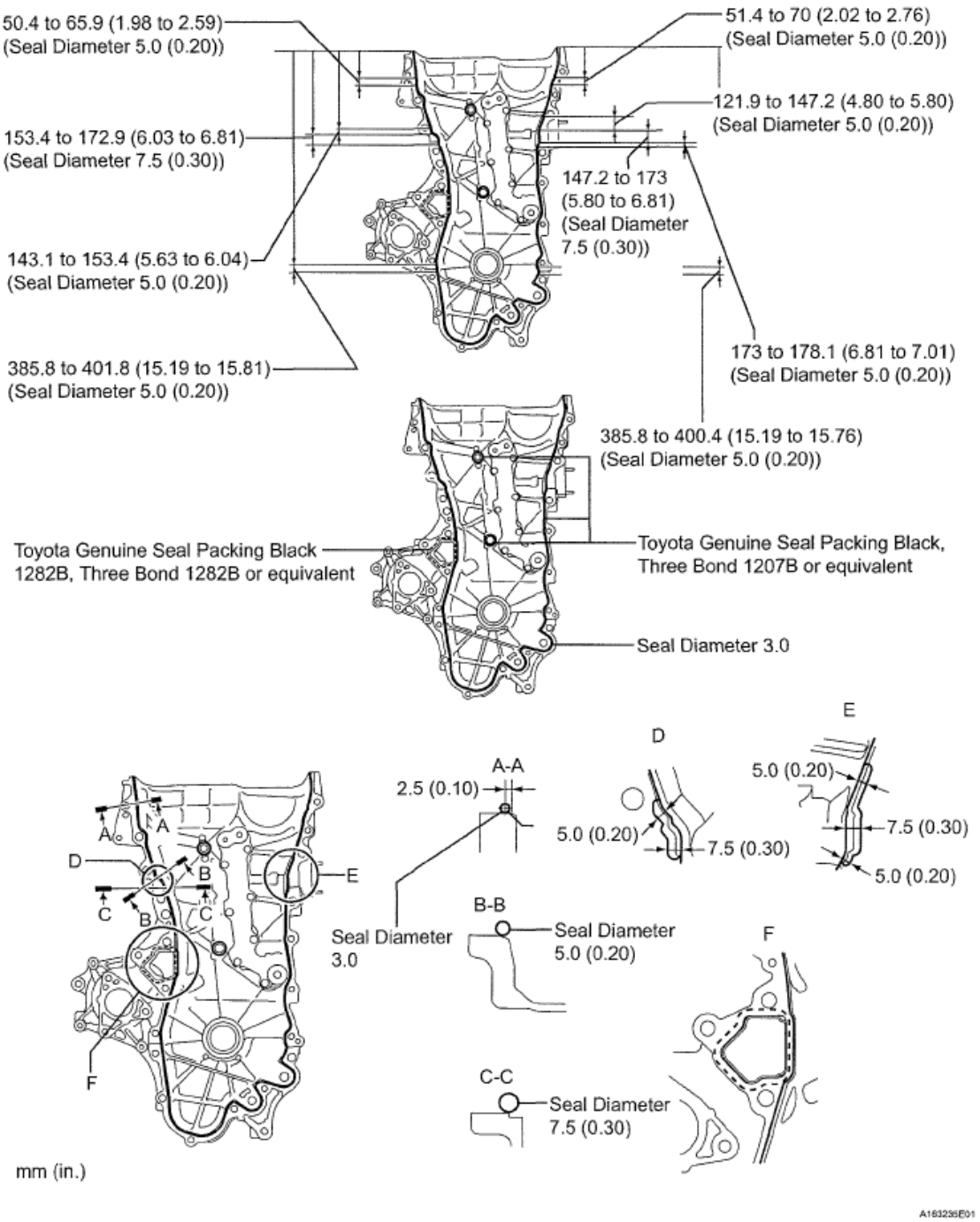

Fig. 526: Applying Seal Packing To Timing Chain Cover
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- **When the contact surfaces are wet, wipe them with oil-free cloth before applying seal packing.**
- **Install the chain cover within 3 minutes and tighten the bolts within 15 minutes of applying the seal packing.**

- **Do not start the engine for at least 2 hours after installation.**

Apply seal packing as follows

SEAL PACKING DIAMETER CHART

Area	Seal Packing Diameter	Application Position from Inside Seal Line	Seal packing
Continuous Line Area	3.0 mm (0.118 in.)	2.5 mm (0.098 in.)	Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent
Dashed Line Area	4.0 mm (0.156 in.)	3.0 mm (0.118 in.)	Toyota Genuine Seal Packing Black 1282B, Three Bond 1282B or equivalent

e. Install a new gasket.

NOTE: Remove any oil from the contact surface.

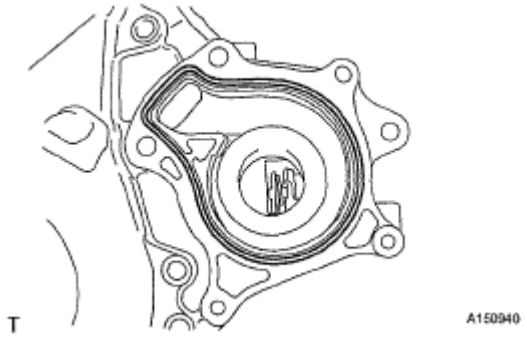

Fig. 527: Identifying Gasket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

f. Install 2 new O-rings.

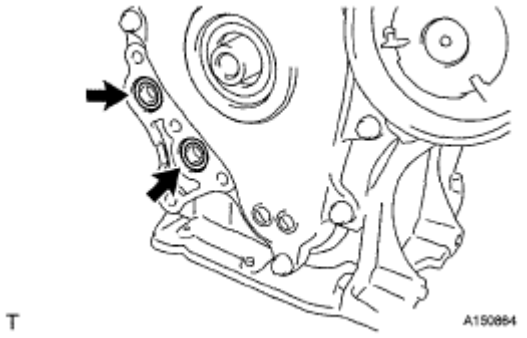

Fig. 528: Locating O-Rings
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

g. Install the timing chain cover with the 19 bolts as shown in the illustration.

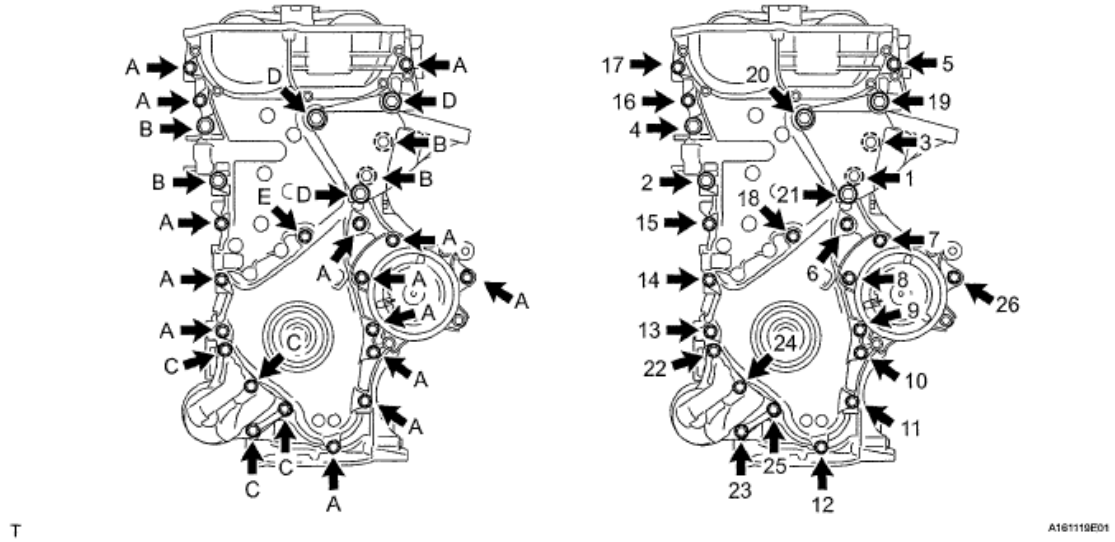

Fig. 529: Locating Timing Chain Cover Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Torque: Bolt A and C

26 N*m (260 kgf*cm, 19* ft.*lbf)

Bolt B and D

51 N*m (520 kgf*cm, 38 ft.*lbf)

Bolt E

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

NOTE:

- **When the contact surfaces are wet, wipe them with oil-free cloth before applying seal packing.**
- **Install the chain cover within 3 minutes and tighten the bolts within 15 minutes of applying seal packing.**
- **Do not start the engine for at least 2 hours after installation.**
- **Tighten bolt D through the engine mounting bracket, pressing it against the timing chain or belt cover sub-assembly.**
- **Tighten bolt C through the oil filter bracket, pressing it against the timing chain or belt cover sub-assembly.**

Bolt length

BOLT LENGTH CHART

Item	Length
Bolt A and C	35 mm (1.38 in.)
Bolt B	55 mm (2.16 in.)
Bolt D	80 mm (3.15 in.)
Bolt E	40 mm (1.57 in.)

h. Install the water pump with the 3 bolts.

Torque: 24 N*m (245 kgf*cm, 18 ft.*lbf)

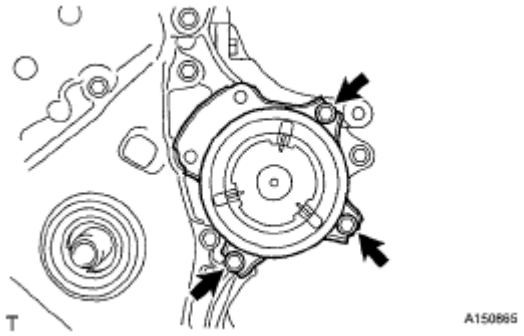

Fig. 530: Locating Bolts And Water Pump Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

31. **INSTALL THERMOSTAT**
    a. Install a new gasket onto the thermostat.
    b. Install the thermostat with the jiggle valve facing upward.

HINT:

The jiggle valve may be set within 10° on either side, as shown in the illustration.

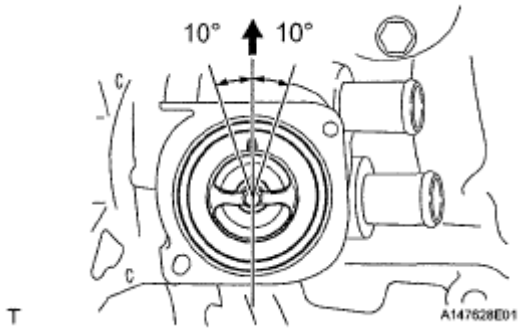

Fig. 531: Identifying Jiggle Valve Facing Upward
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

32. **INSTALL WATER INLET**

a. Install the water inlet with the 2 nuts.

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

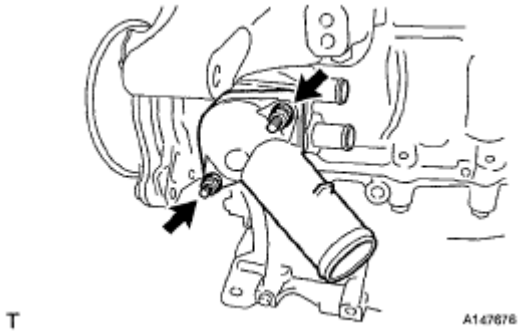

Fig. 532: Locating Water Inlet And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

33. **INSTALL CRANKSHAFT PULLEY**
   a. Align the pin hole in the crankshaft pulley with the pin position and install the crankshaft pulley.
   b. Provisionally install the bolt.
   c. Using SST, tighten the bolt while holding the crankshaft pulley.

SST 09213-58013 (91651 -60855), 09330-00021

Torque: 190 N*m (1940 kgf*cm, 140 ft.*lbf)

NOTE: Check the SST installation positions when installing them, to avoid the SST fixing bolts from coming into contact with the timing chain or belt cover sub-assembly.

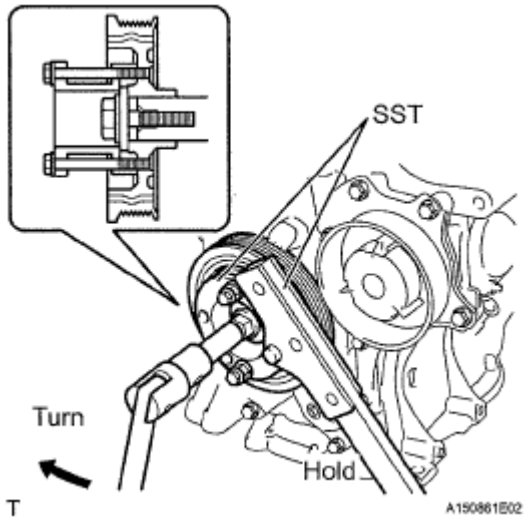

Fig. 533: Tightening Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

34. **INSTALL ENGINE OIL PRESSURE SWITCH ASSEMBLY**
    a. Apply adhesive to 2 or 3 threads of the oil pressure switch.

    Adhesive: Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

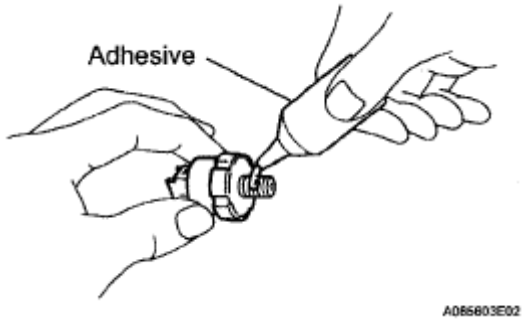

Fig. 534: Applying Adhesive To 2 Or 3 Threads Of Oil Pressure Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    b. Using a 24 mm deep socket wrench, install the oil pressure switch.

    Torque: 15 N*m (153 kgf*cm, 11 ft.*lbf)

NOTE:

- **Install the oil pressure switch within 3 minutes of applying the adhesive.**
- **Do not start the engine within 1 hour of installation.**

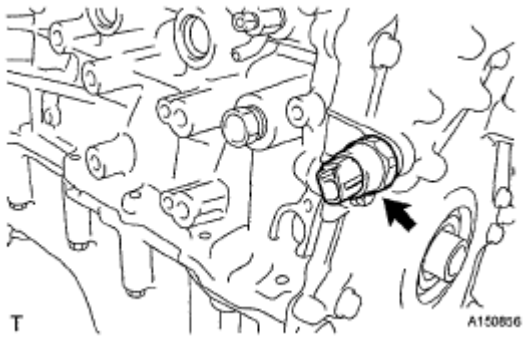

Fig. 535: Locating Engine Oil Pressure Switch Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

35. **INSTALL ENGINE WATER TEMPERATURE SENSOR**
    a. Install a new gasket to the engine water temperature sensor.

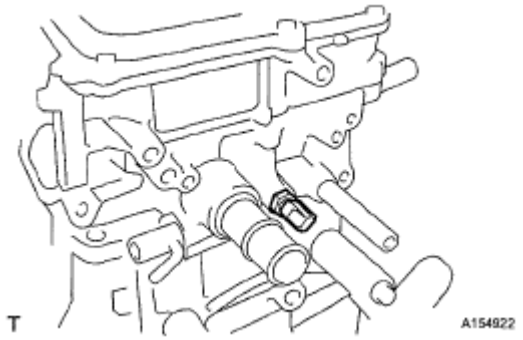

Fig. 536: Identifying Engine Water Temperature Sensor
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Install the engine water temperature sensor.

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

36. **INSTALL KNOCK SENSOR**

a. Install the knock sensor with the bolt.

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

NOTE: Make sure that the knock sensor is in the correct position.

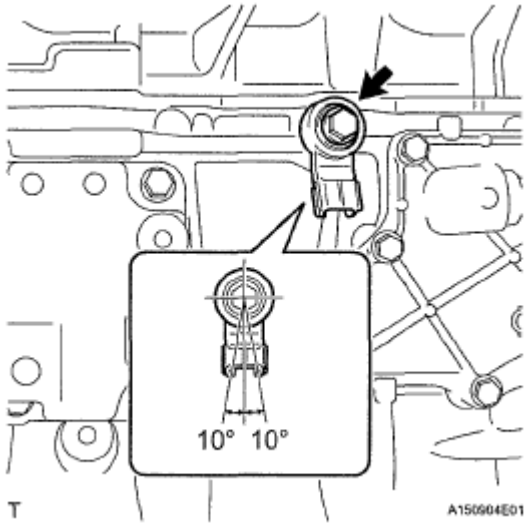

Fig. 537: Locating Knock Sensor And Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

37. **INSTALL NO. 1 TAPER SCREW PLUG**

a. Apply adhesive to 2 or 3 threads of the plug, and install the plug.

Torque: 43 N*m (439 kgf*cm, 32 ft.*lbf)

NOTE:

- **Install the plug within 3 minutes of applying the adhesive.**
- **Do not start the engine within 1 hour of installation.**

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

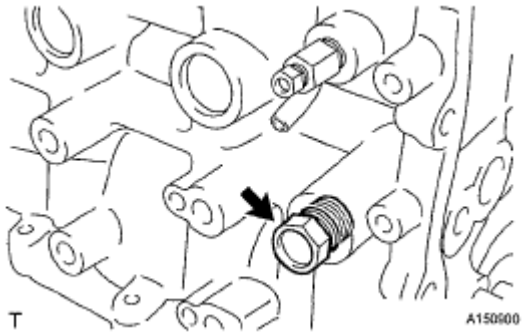

Fig. 538: Locating No. 1 Taper Screw Plug
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

38. **INSTALL CRANKSHAFT POSITION SENSOR**
    a. Apply a light coat of engine oil to the O-ring of the sensor.

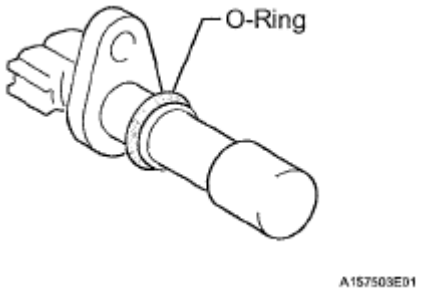

Fig. 539: Identifying O-Ring Of Sensor
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    b. Install the crankshaft position sensor with the bolt.

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

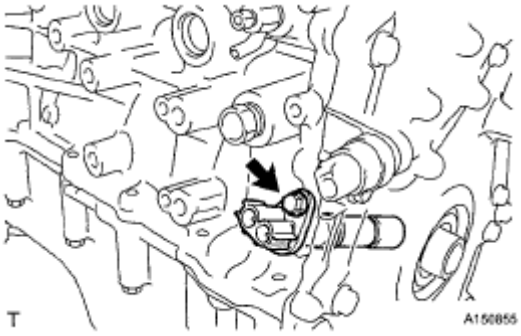

Fig. 540: Locating Bolt And Crankshaft Position Sensor
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

39. **INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY**
    a. Release the ratchet pawl, then fully push in the plunger and hook the hook on the pin so that the plunger is in the position shown in the illustration.

NOTE: Make sure that the cam engages the first tooth of the plunger to allow the hook to pass over the pin.

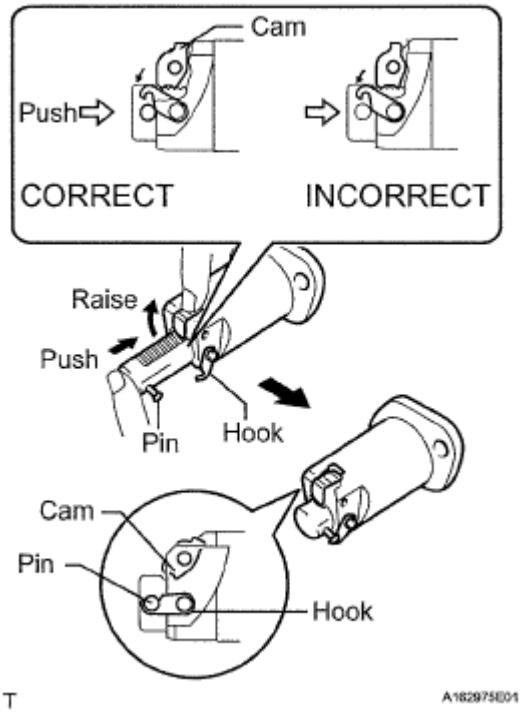

Fig. 541: Checking No. 1 Chain Tensioner Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    b. Install a new gasket, bracket and the No. 1 chain tensioner with the 2 nuts.

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

NOTE: **If the hook releases the plunger while the chain tensioner is being installed, set the hook again.**

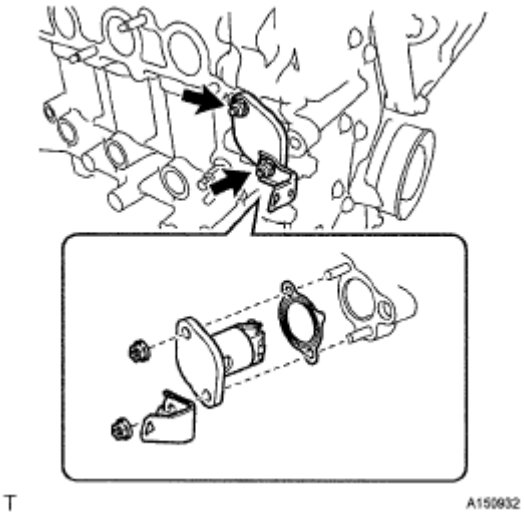

Fig. 542: Locating Gasket, Bracket And No. 1 Chain Tensioner
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Turn the crankshaft counterclockwise, then disconnect the plunger knock pin from the hook.

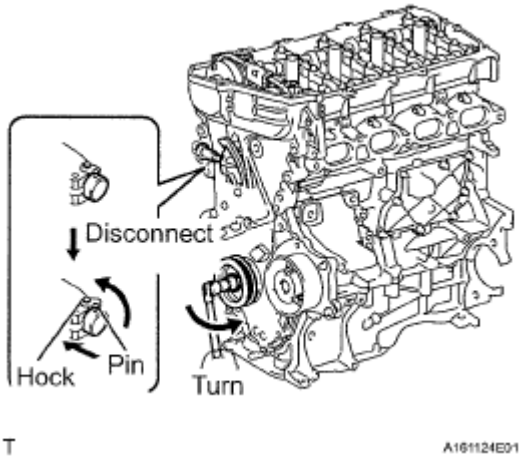

Fig. 543: Turning Crankshaft Counterclockwise
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Turn the crankshaft clockwise, then check that the plunger is extended.

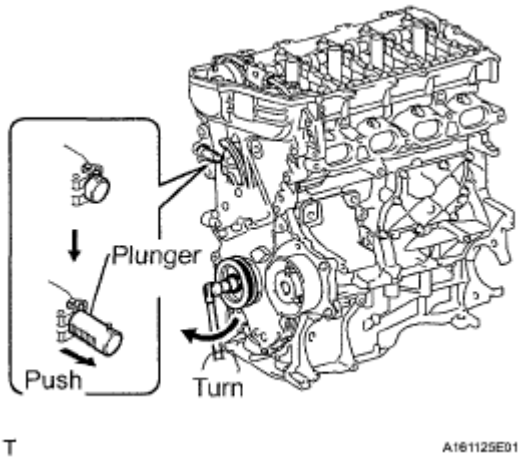

Fig. 544: Turning Crankshaft Clockwise
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

40. **INSTALL OIL FILTER SUB-ASSEMBLY**
    a. Clean the inside of the oil filter cap, threads and Coring groove.
    b. Apply a small amount of engine oil to a new O-ring and install it onto the oil filter cap.

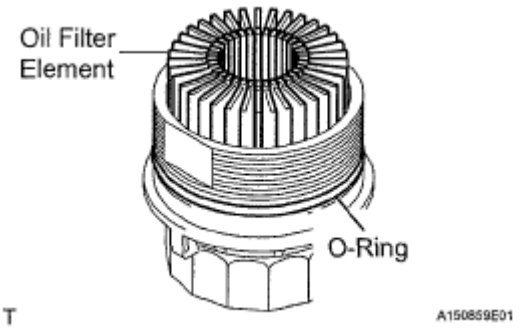

Fig. 545: Identifying Oil Filter Element And O-Ring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    c. Set a new oil filter element into the oil filter cap.
    d. Remove any dirt or foreign matter from the installation surface of the engine.
    e. Apply a small amount of engine oil to the O-ring again and install the oil filter cap.
    f. Using SST, tighten the oil filter cap.

SST 09228-06501

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

NOTE:

- **Make sure that the oil filter is installed securely as shown in the illustration.**

- **Be careful that the O-ring does not get caught between the parts.**

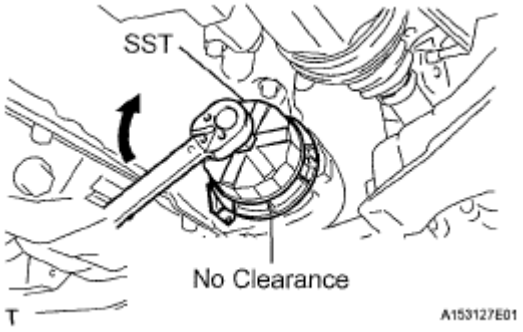

Fig. 546: Tightening Oil Filter Cap
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

41. **INSTALL CYLINDER HEAD COVER GASKET**
    a. Install the gasket to the cylinder head cover.

NOTE: Remove any oil from the contact surface.

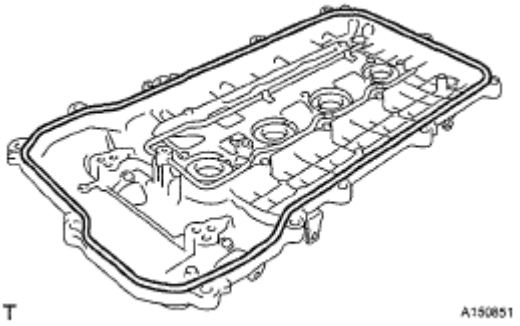

Fig. 547: Installing Gasket To Cylinder Head Cover
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

42. **INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY**
    a. Install 3 new gaskets onto the No. 1 camshaft bearing cap.

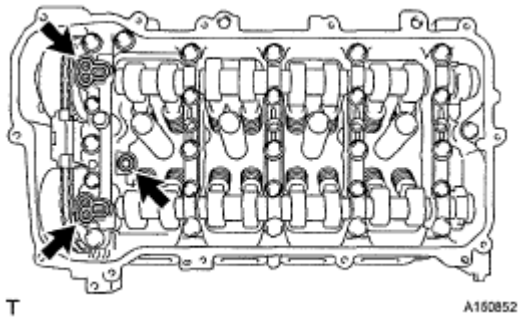

Fig. 548: Locating Gaskets
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Apply seal packing as shown the illustration.

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

NOTE:

- **Remove any oil from the contact surface.**
- **Install the cylinder head cover within 3 minutes and tighten the bolts within 15 minutes of applying seal packing.**
- **Do not start the engine for at least 2 hours after the installation.**

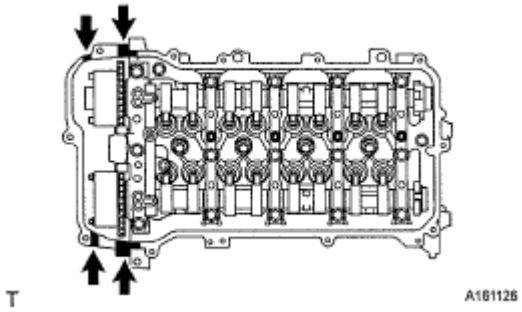

Fig. 549: Locating Seal Packing Area
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Install the cylinder head cover with a new seal washer and the 13 bolts.

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

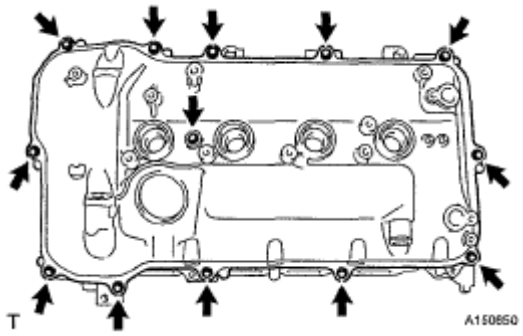

Fig. 550: Locating Bolts, Seal Washer And Cylinder Head Cover
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

43. **INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY**
    a. Apply a light coat of engine oil to 2 new O-rings, then install each of them onto the camshaft timing oil control valve.

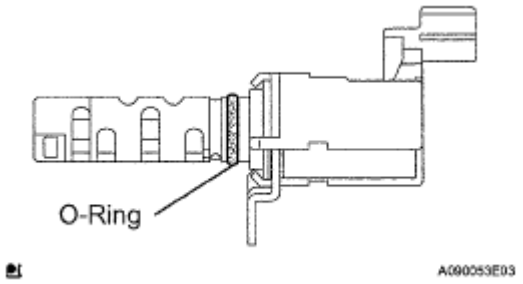

Fig. 551: Identifying O-Rings
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    b. Install the 2 camshaft timing oil control valves and bracket with the 2 bolts.

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

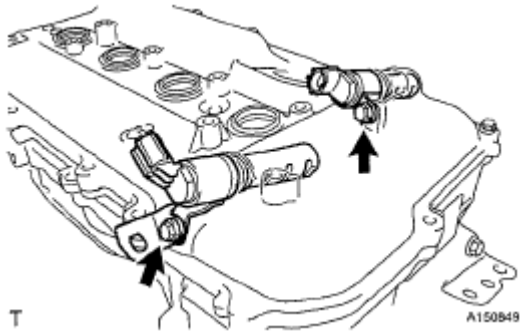

Fig. 552: Locating Bolts, O-Rings, Bracket And Oil Control Valves
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

44. **INSTALL CAMSHAFT POSITION SENSOR**

a. Apply a light coat of engine oil to the O-ring of the sensor.

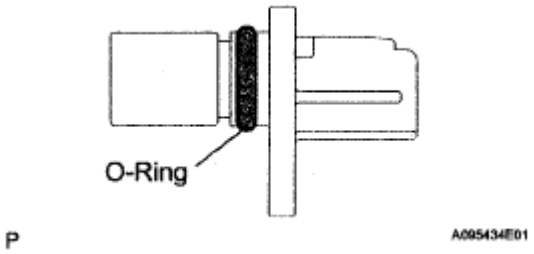

Fig. 553: Identifying O-Ring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Install the 2 sensors with the 2 bolts.

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

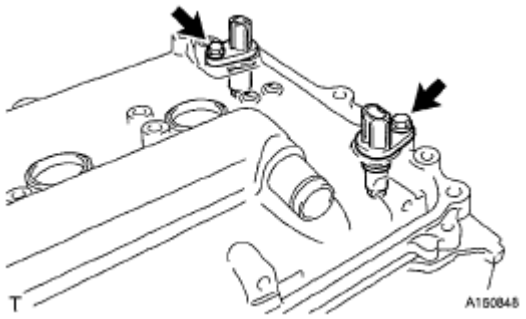

Fig. 554: Locating Bolts And Sensors
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

45. **INSTALL SPARK PLUG**

a. Using a socket wrench 14 mm, install the 4 spark plugs.

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

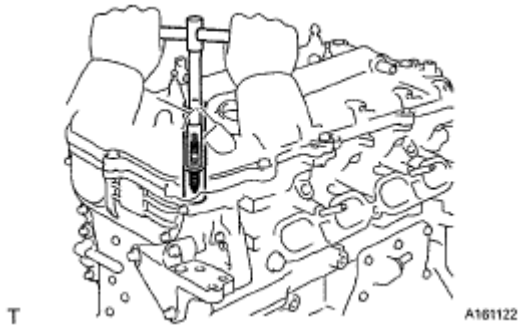

Fig. 555: Installing Spark Plugs
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

46. **INSTALL OIL FILLER CAP GASKET**
    a. Install the gasket to the cap.

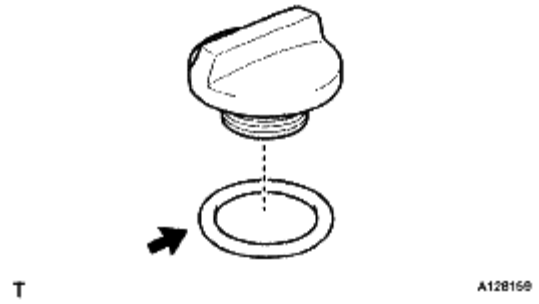

Fig. 556: Locating Gasket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

47. **INSTALL OIL FILLER CAP SUB-ASSEMBLY**
    a. Install the oil filler cap.

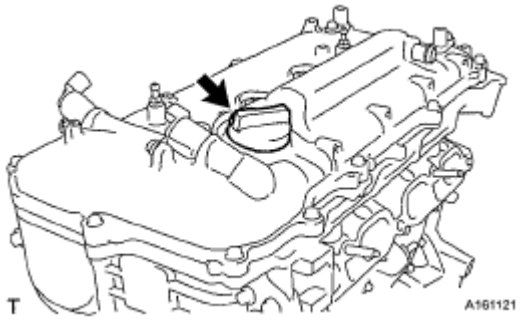

Fig. 557: Locating Oil Filler Cap
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

48. **INSTALL ENGINE HANGER**
    a. Install the 2 engine hangers with the 2 bolts.

Torque: 43 N*m (439 kgf*cm, 32 ft.*lbf)

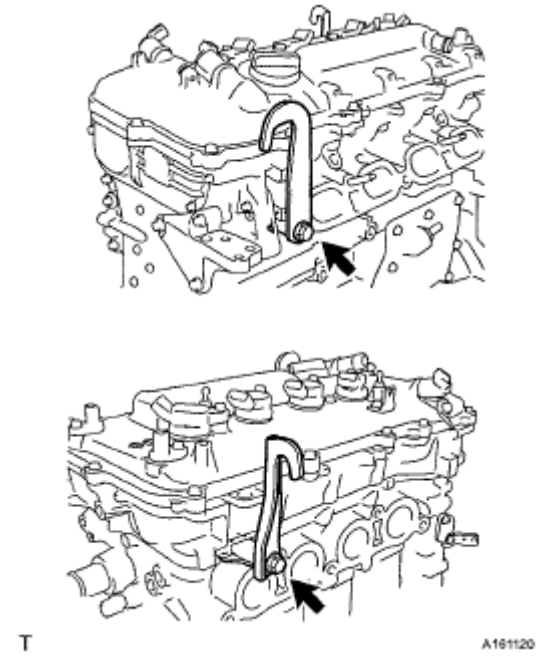

Fig. 558: Locating Bolts And Engine Hangers
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. **INSTALL WIRE HARNESS CLAMP BRACKET**
   a. Install the 4 wire harness clamp brackets with the 4 bolts.

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

      13 N*m (130 kgf*cm, 9 ft.*lbf) for bolt B

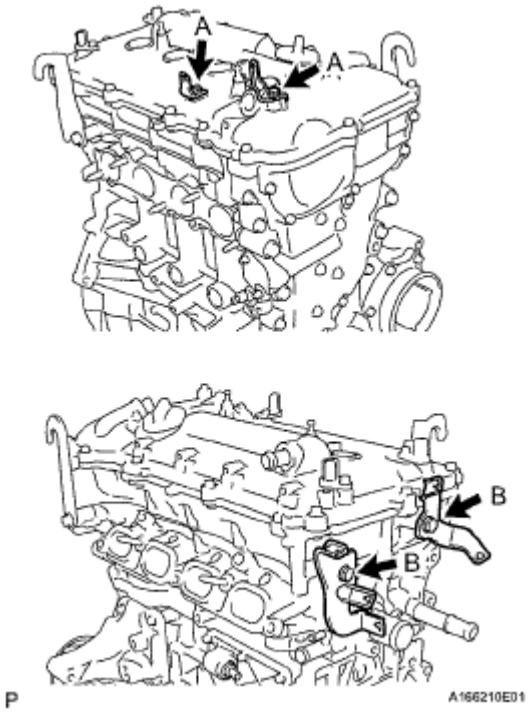

Fig. 559: Locating Wire Harness Clamp Brackets And Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **INSTALL EXHAUST MANIFOLD**
   a. Install a new exhaust manifold gasket and exhaust manifold with the 5 nuts in the sequence shown in the illustration.

   Torque: 21 N*m (214 kgf*cm, 16 ft.*lbf)

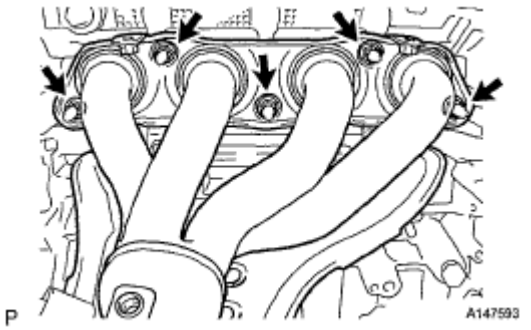

Fig. 560: Locating Nuts And Exhaust Manifold
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **INSTALL MANIFOLD STAY**
   a. Install the manifold stay with the 3 bolts.

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

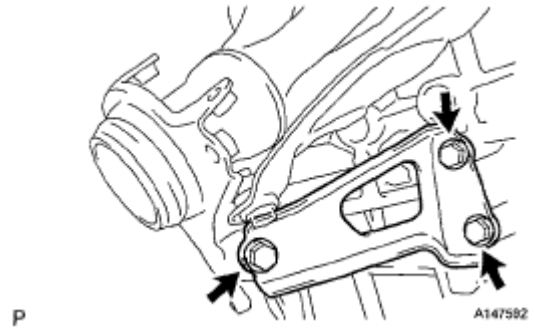

Fig. 561: Locating Bolts And Manifold Stay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. **INSTALL NO. 1 EXHAUST MANIFOLD HEAT INSULATOR**
   a. Install the No. 1 exhaust manifold heat insulator with the 4 bolts.

   Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

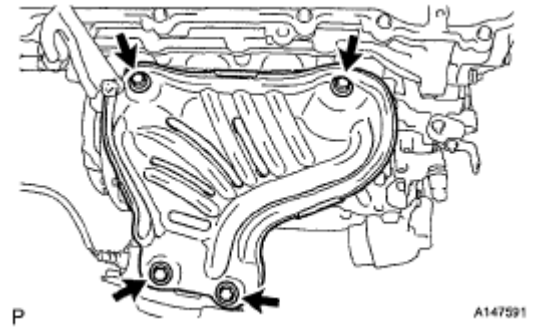

Fig. 562: Locating Bolts And No. 1 Exhaust Manifold Heat Insulator
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. **INSTALL AIR TUBE ASSEMBLY**
   a. Install the air tube assembly with the 2 bolts.

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

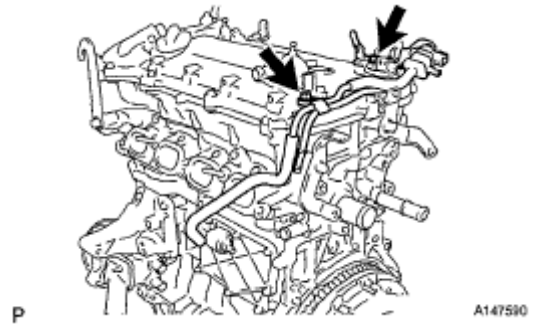

Fig. 563: Locating Bolts And Air Tube Assembly

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

6. **INSTALL NO. 1 WATER BY-PASS PIPE**
   a. Install the water by-pass pipe with the 2 bolts.

   Torque: 21 N*m (214 kgf*cm, 16 ft.*lbf)

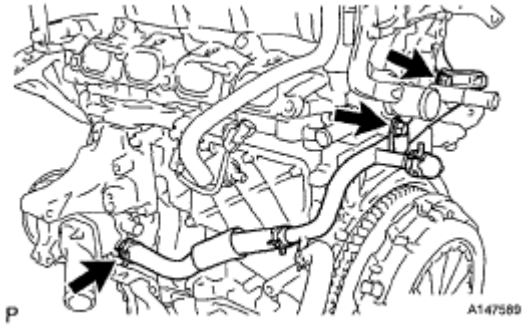

Fig. 564: Locating Bolts And Water By-Pass Pipe
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Connect the No. 3 water by-pass hose with the clip.
7. **INSTALL WATER INLET HOSE**
   a. Install the water inlet hose with the 2 clips.

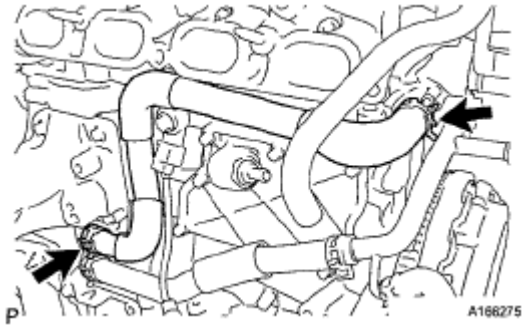

Fig. 565: Locating Clips And Water Inlet Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. **INSTALL WATER BY-PASS HOSE**
   a. Install the water by-pass hose with the clip.

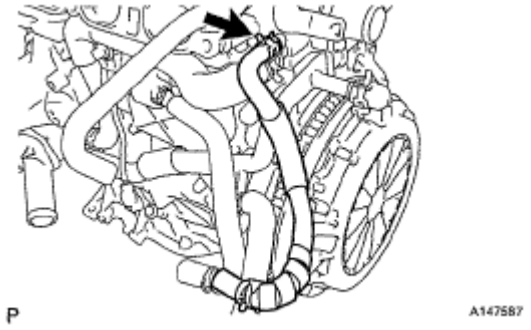

Fig. 566: Locating Clip And Water By-Pass Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. **INSTALL OIL LEVEL GAGE GUIDE**
   a. Install a new O-ring.
   b. Install the oil level gage guide with the bolt.

   Torque: 21 N*m (214 kgf*cm, 16 ft.*lbf)

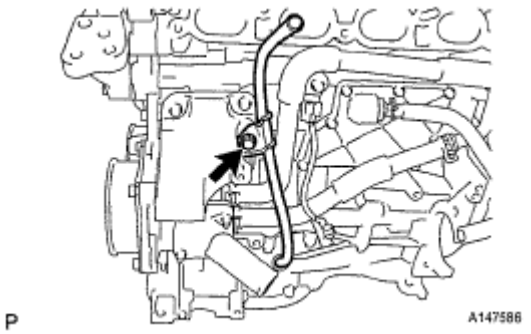

Fig. 567: Locating Bolt And Oil Level Gage Guide
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. **INSTALL OIL LEVEL DIPSTICK**
11. **INSTALL VENTILATION HOSE**
    a. Install the ventilation hose.

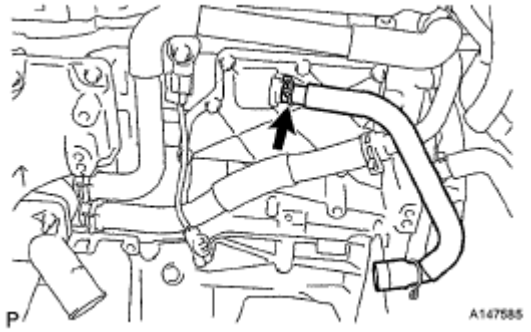

Fig. 568: Locating Ventilation Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

12. **INSTALL FAN BELT ADJUSTING BAR**
    a. Install the fan belt adjusting bar with the bolt.

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

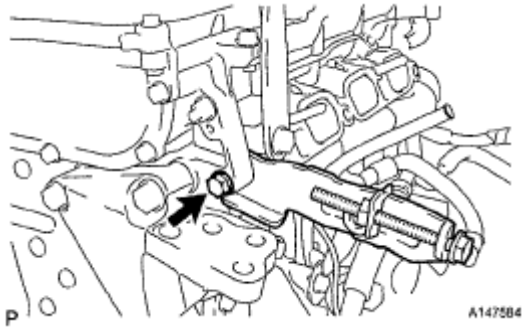

Fig. 569: Locating Bolt And Fan Belt Adjusting Bar
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

13. **INSTALL GENERATOR ASSEMBLY** (See **INSTALLATION**)
14. **INSTALL FUEL INJECTOR** (See **INSTALLATION**)
15. **INSTALL INJECTOR VIBRATION INSULATOR** (See **INSTALLATION**)
16. **INSTALL NO. 1 DELIVERY PIPE SPACER** (See **INSTALLATION**)
17. **INSTALL FUEL DELIVERY PIPE SUB-ASSEMBLY**
    a. Install the fuel delivery pipe with the 4 fuel injectors, then provisionally install the 3 bolts.

NOTE:

- **Do not drop the fuel injectors when installing the fuel delivery pipe.**
- **Check that the fuel injectors rotate smoothly after installing the fuel delivery pipe.**

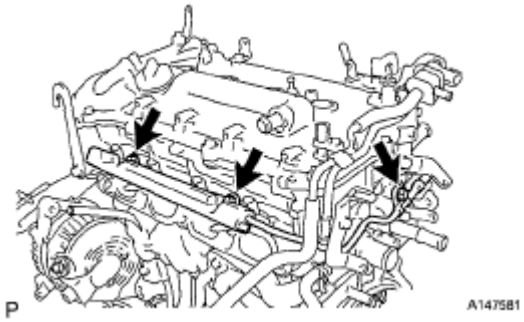

Fig. 570: Locating Bolts And Fuel Delivery Pipe
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Tighten the 3 bolts to the specified torque.

Torque: 21 N*m (214 kgf*cm, 16 ft.*lbf)

18. **INSTALL INTAKE MANIFOLD**
    a. Install a new gasket onto the intake manifold.
    b. Provisionally tighten the intake manifold and manifold stay with the 4 bolts and 2 nuts in the order shown in the illustration, and then tighten them to the specified torque.

Torque: 28 N*m (286 kgf*cm, 21 ft.*lbf)

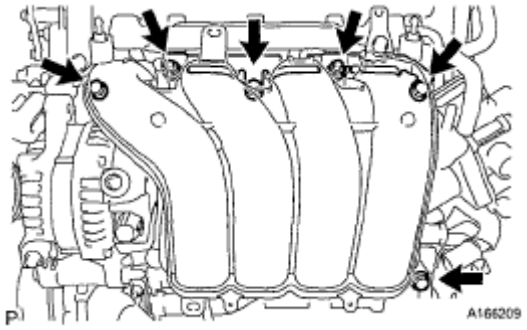

Fig. 571: Locating Bolt And Nuts And Intake Manifold And Manifold Stay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Install the wire harness clamp onto the intake manifold.

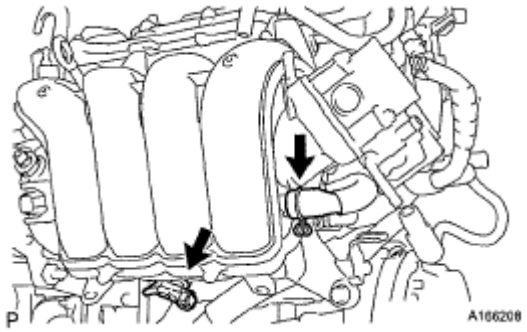

Fig. 572: Locating Wire Harness Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Install the ventilation hose into the intake manifold.
e. Install the No. 1 vacuum transmitting hose with the clip.
f. Install the No. 1 fuel vapor feed hose into the throttle body manifold.
g. Install the 2 water by-pass hoses with the 2 clips.

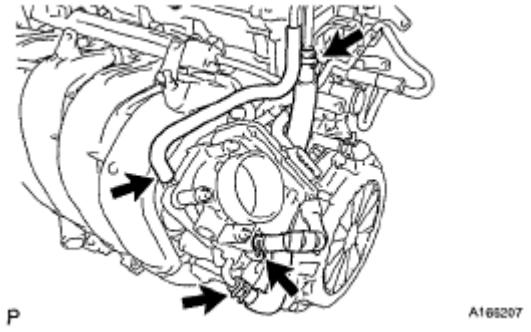

Fig. 573: Locating Clips And Water By-Pass Hoses
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

19. **INSTALL NO. 1 RADIATOR HOSE**
    a. Install the No. 1 radiator hose with the clip.

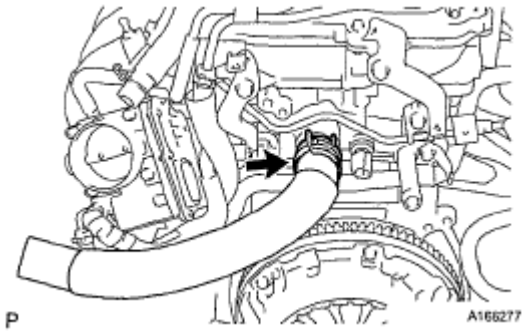

Fig. 574: Locating Clip And No. 1 Radiator Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

20. **INSTALL HEATER WATER INLET HOSE A**
    a. Install heater water inlet hose A with the clip.

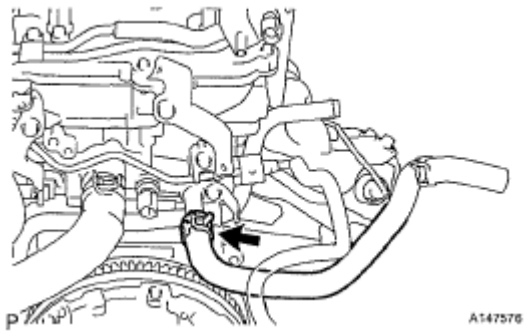

Fig. 575: Locating Clip And Heater Water Inlet Hose A
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

21. **INSTALL HEATER WATER OUTLET HOSE A (FROM HEATER UNIT)**

a. Install heater water outlet hose A with the clip.

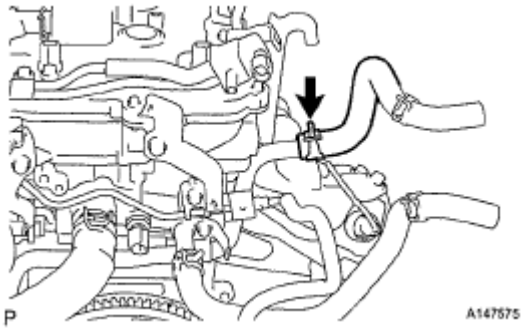

Fig. 576: Locating Clip And Heater Water Outlet Hose A
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

22. **INSTALL NO. 2 VENTILATION HOSE**
    a. Install the No. 2 ventilation hose.

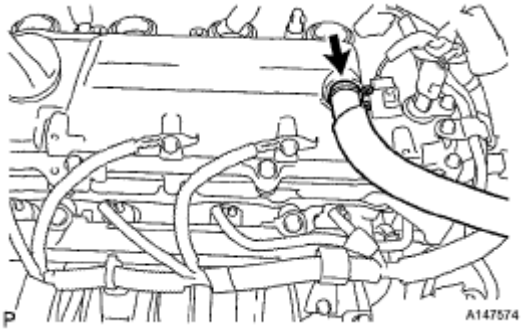

Fig. 577: Locating No. 2 Ventilation Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

23. **INSTALL ENGINE WIRE**
24. **INSTALL RADIO SETTING CONDENSER**
    a. Install the radio setting condenser with the bolt.

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

    b. Connect the radio setting condenser connector.

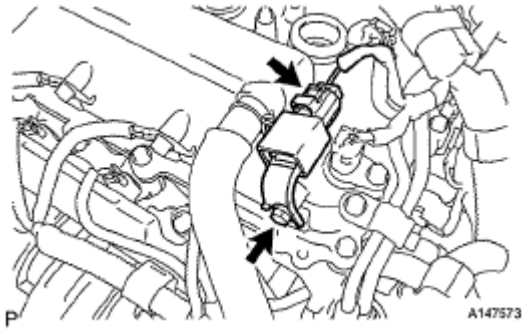

Fig. 578: Locating Radio Setting Condenser Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

25. **INSTALL IGNITION COIL ASSEMBLY**
    a. Install the 4 ignition coil assemblies with the 4 bolts.

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

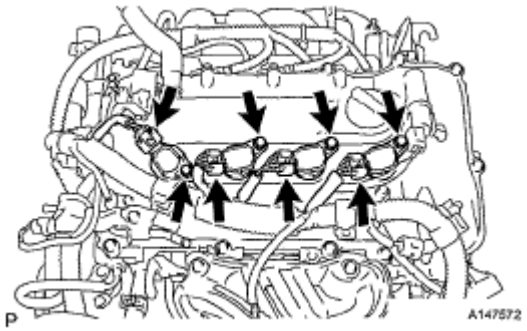

Fig. 579: Locating Bolts And Ignition Coil Assemblies
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    b. Connect the 4 ignition coil assembly connectors.

