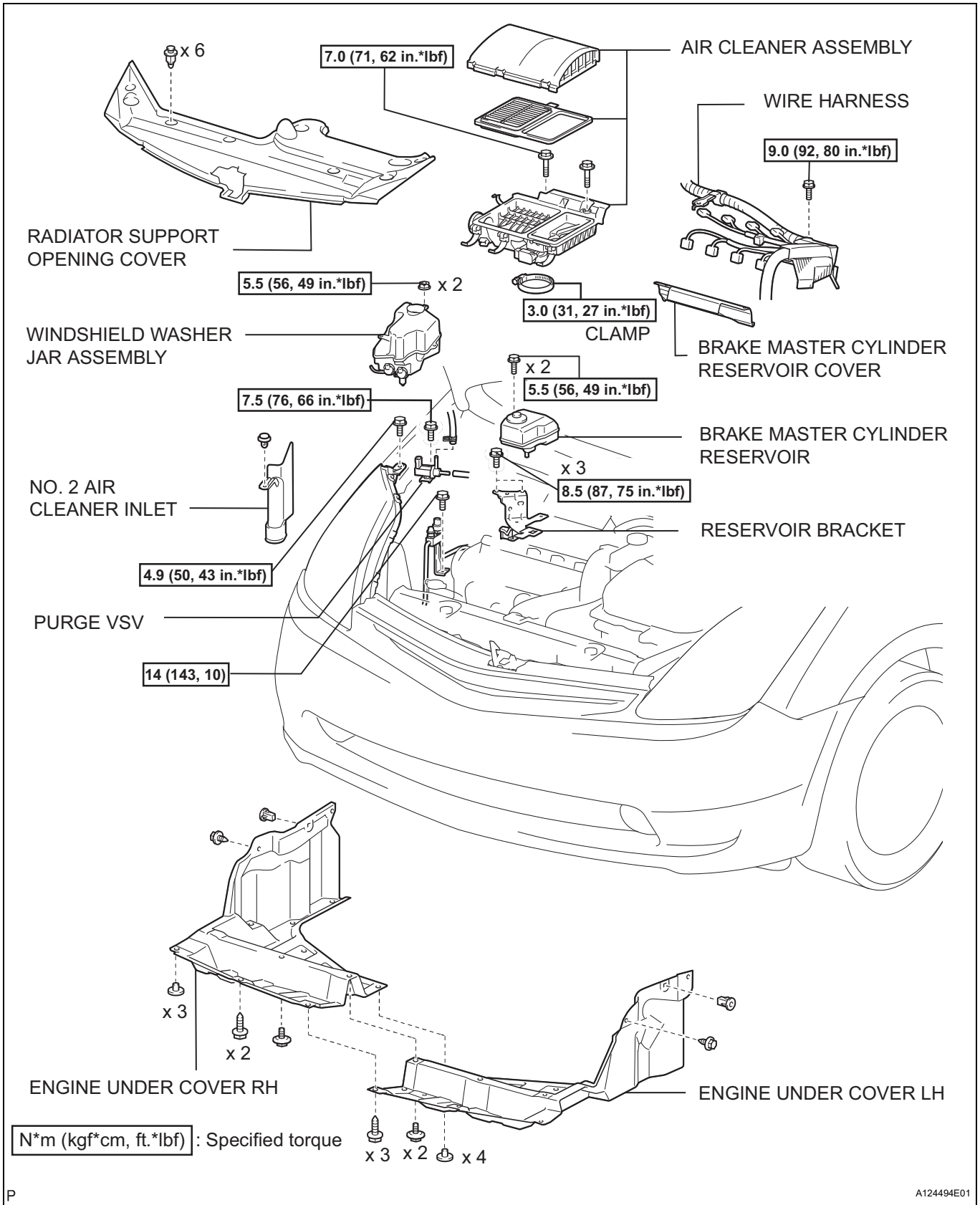
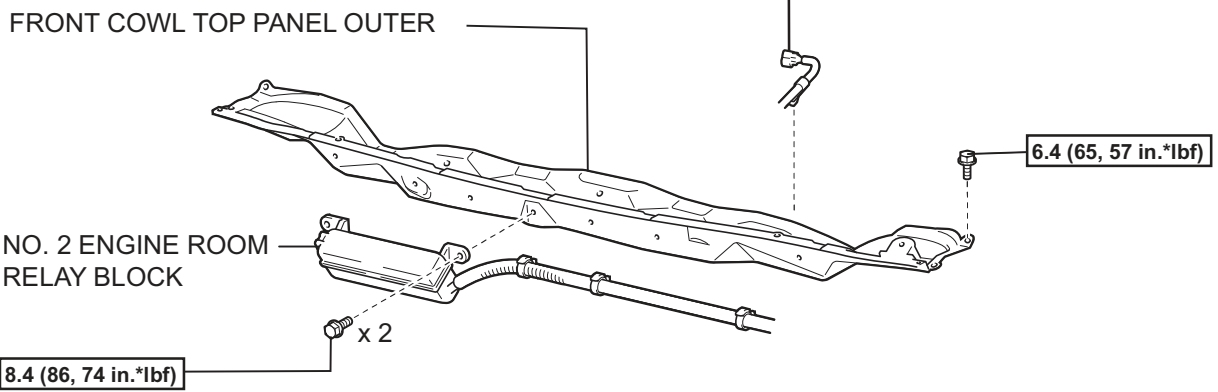
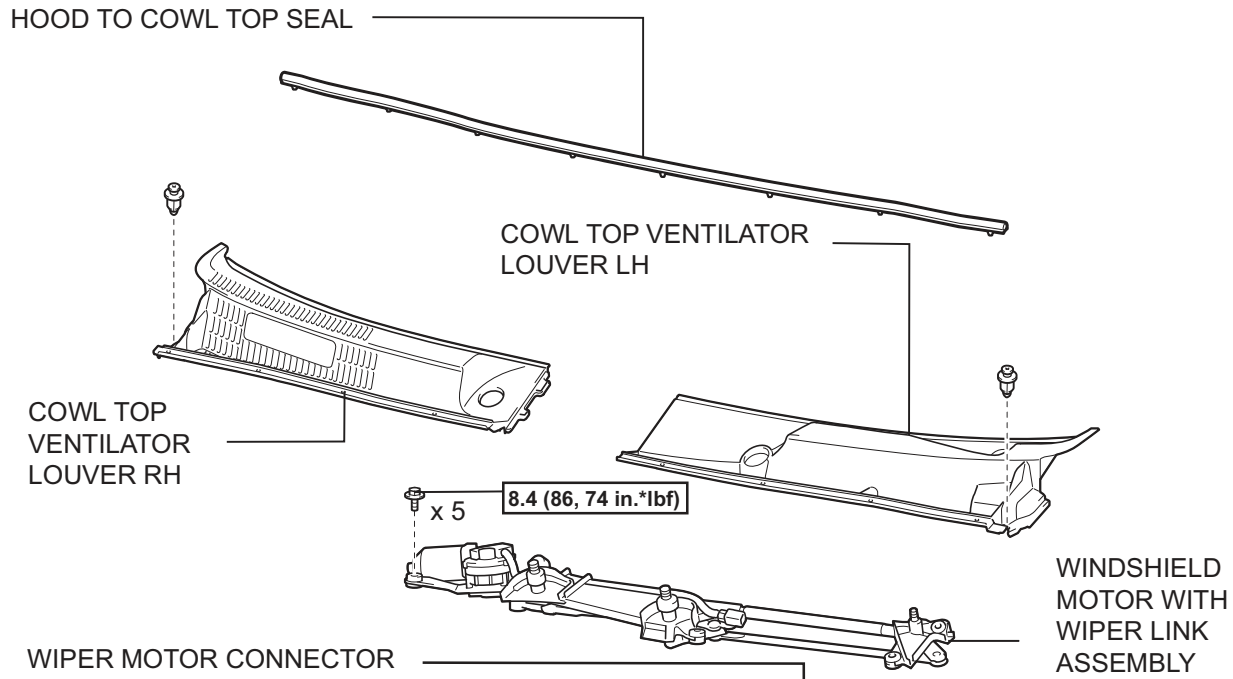
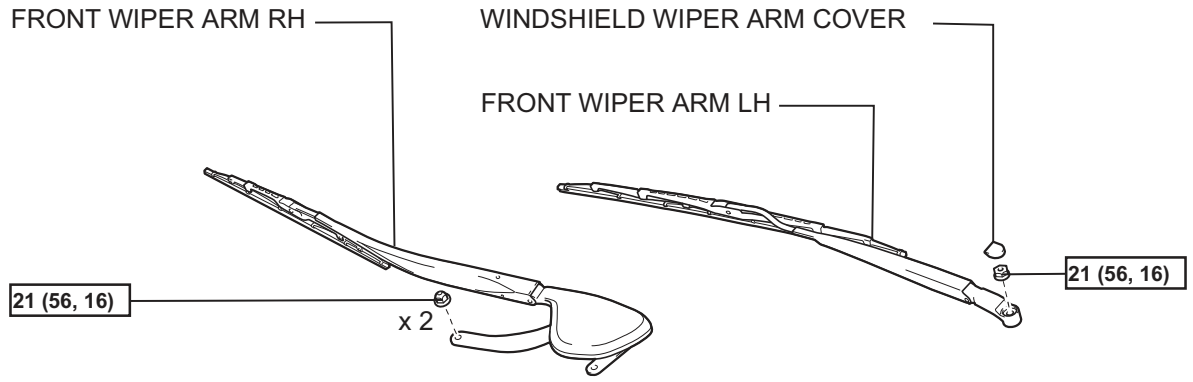


TIMING CHAIN

COMPONENTS

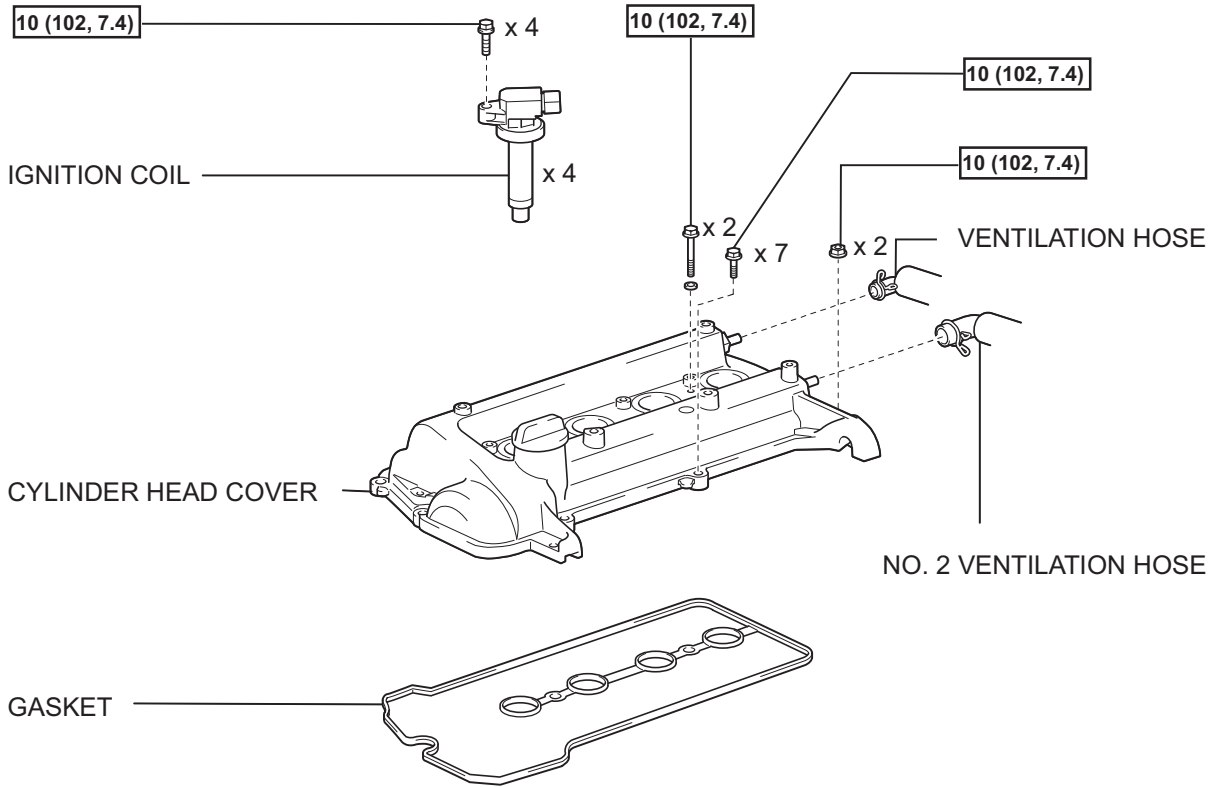


EM

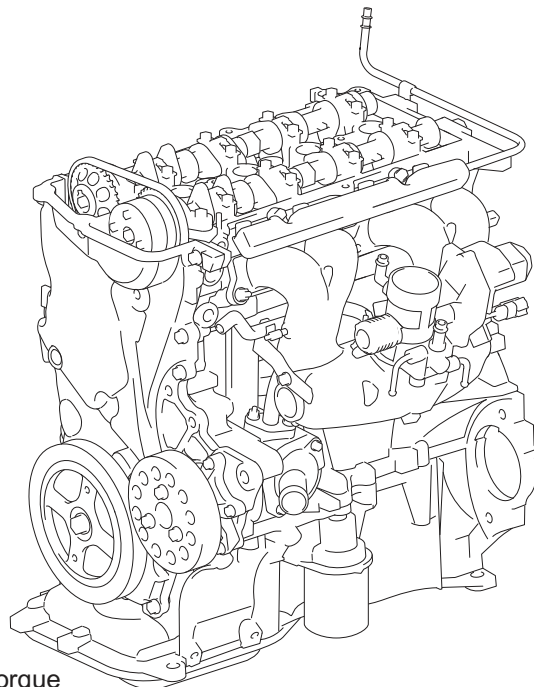


N*m (kgf*cm, ft.*lbf) : Specified torque

EM

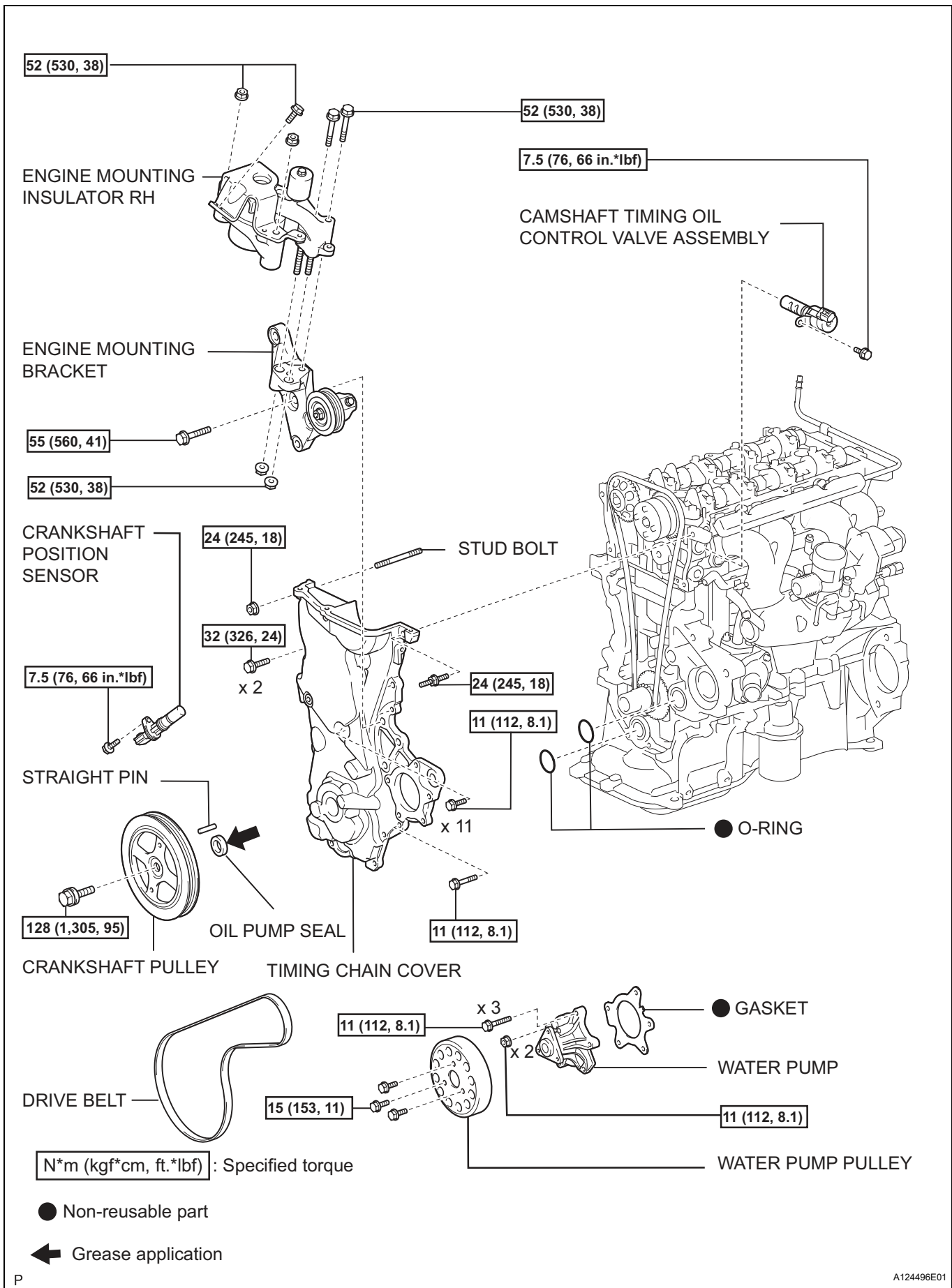


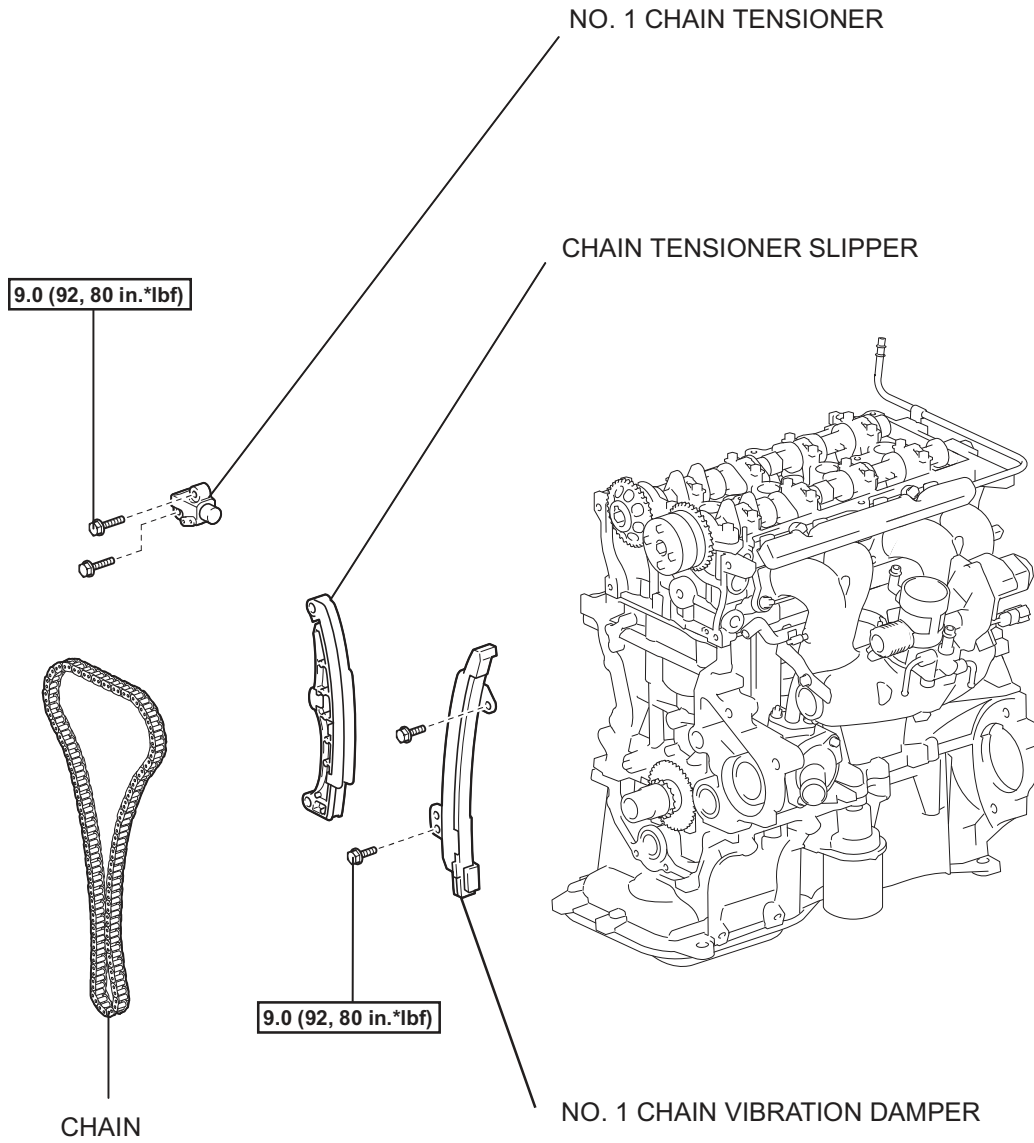
EM



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

EM

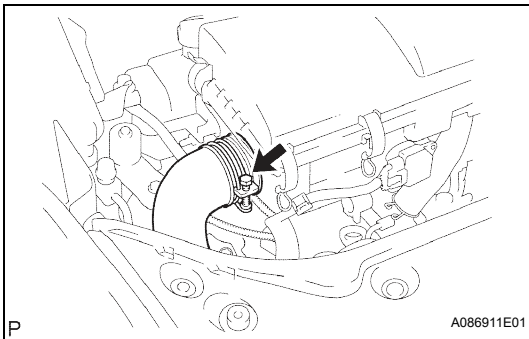




N*m (kgf*cm, ft.*lbf) : Specified torque

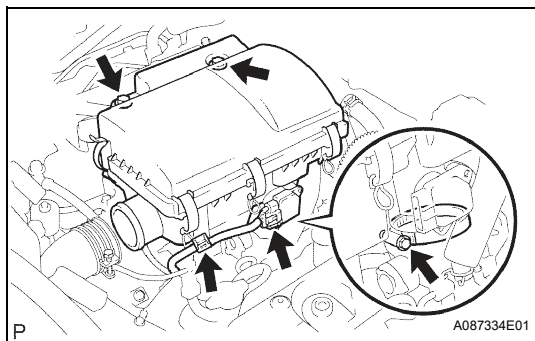
REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (See page [CH-4](#))
2. REMOVE REAR DECK FLOOR BOX (See page [CH-4](#))
3. REMOVE REAR NO. 3 FLOOR BOARD (See page [CH-4](#))
4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
CAUTION:
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
5. REMOVE RADIATOR SUPPORT OPENING COVER
6. REMOVE FRONT WHEELS
7. REMOVE NO. 3 ENGINE UNDER COVER
8. REMOVE NO. 4 CENTER ENGINE UNDER COVER
9. DRAIN ENGINE COOLANT (See page [CO-6](#))
10. DRAIN ENGINE OIL (See page [LU-4](#))
11. REMOVE WIPER ARM HEAD CAP
12. REMOVE FRONT WIPER ARM LH (See page [WW-13](#))
13. REMOVE FRONT WIPER ARM RH (See page [WW-13](#))
14. REMOVE HOOD TO COWL TOP SEAL (See page [WW-13](#))
15. REMOVE COWL TOP VENTILATOR LOUVER LH (See page [WW-13](#))
16. REMOVE COWL TOP VENTILATOR LOUVER RH (See page [WW-13](#))
17. REMOVE WINDSHIELD MOTOR WITH WIPER LINK ASSEMBLY (See page [WW-13](#))
18. REMOVE FRONT COWL TOP PANEL OUTER (See page [FU-12](#))
19. REMOVE AIR CLEANER ASSEMBLY
 - (a) Loosen the clamp, then disconnect the No. 1 air cleaner inlet from the air cleaner case.

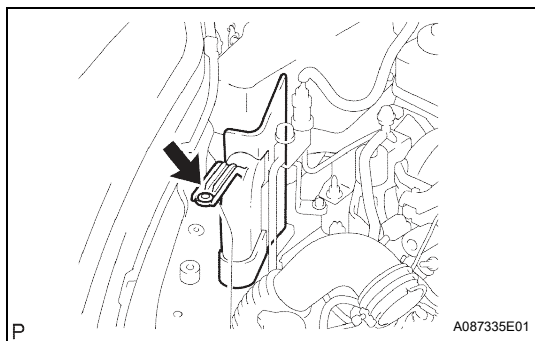


P

A086911E01

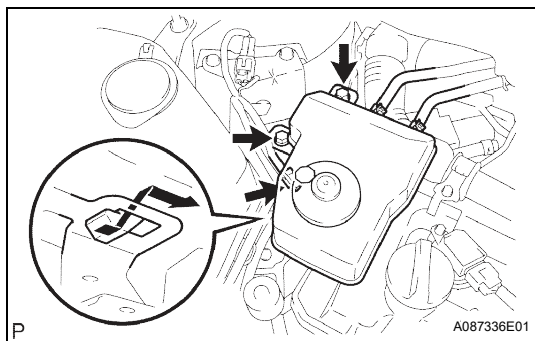


- (b) Disconnect the intake air flow meter connector, then remove the wire harness clamp.
- (c) Loosen the clamp, then remove the 2 bolts and air cleaner assembly.



20. REMOVE NO. 2 AIR CLEANER INLET

- (a) Remove the clip and No. 2 air cleaner inlet.

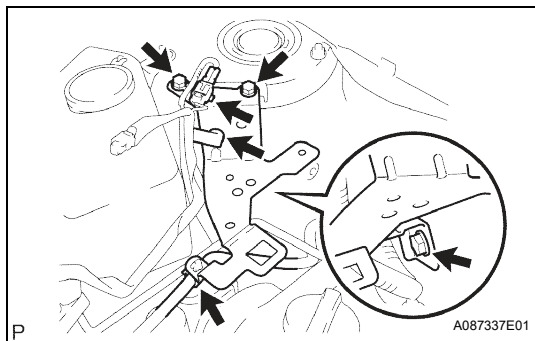


21. DISCONNECT BRAKE MASTER CYLINDER RESERVOIR

- (a) Disconnect the connector.
- (b) Remove the 2 bolts.
- (c) Separate the claw fitting, then suspend the brake master cylinder reservoir with rope.

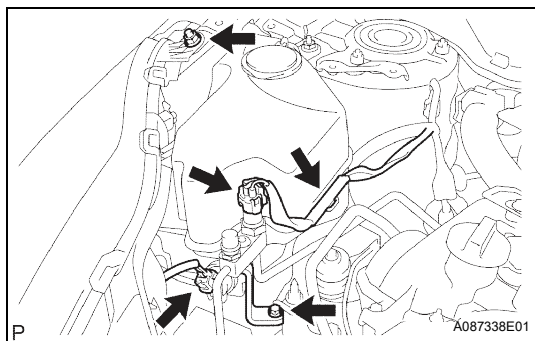
NOTICE:

Be careful of the angle of the brake master cylinder reservoir when suspending to prevent air from coming into the hose.



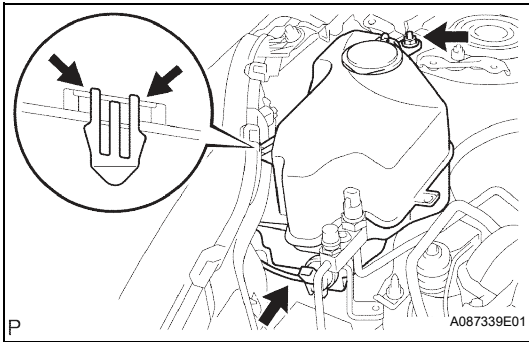
22. REMOVE RESERVOIR BRACKET

- (a) Disconnect the hose from the brake master cylinder reservoir bracket.
- (b) Remove the 3 bolts and wire harness clamp, then remove the brake master cylinder reservoir bracket.

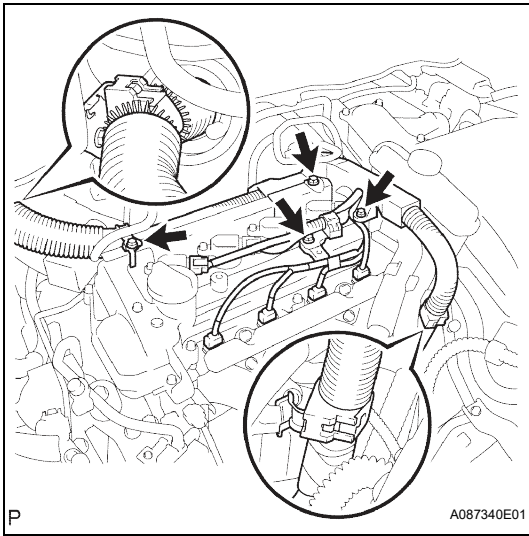


23. REMOVE WINDSHIELD WASHER JAR ASSEMBLY

- (a) Loosen the bolt which holds the headlight RH.
- (b) Disconnect the connector and remove the wire harness clamp.
- (c) Remove the bolt and bracket.

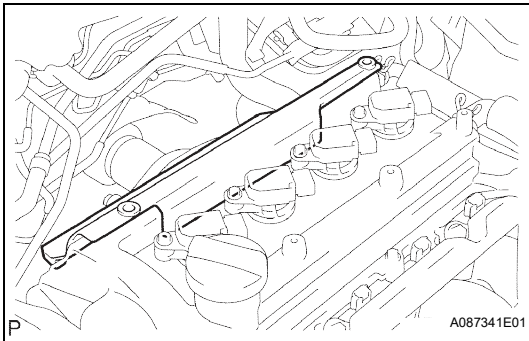


- (d) Remove the nut.
- (e) Slightly lift the headlight RH and separate the claw fitting, then remove the washer jar assembly.
- (f) Disconnect the hose from the washer jar assembly.

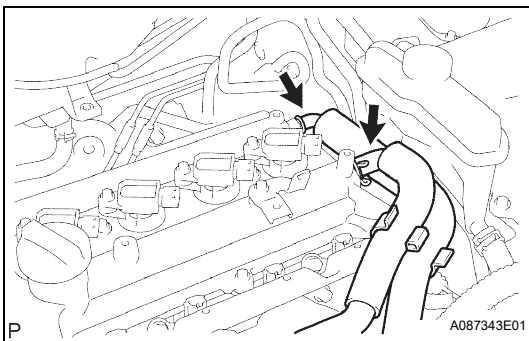


24. REMOVE CYLINDER HEAD COVER

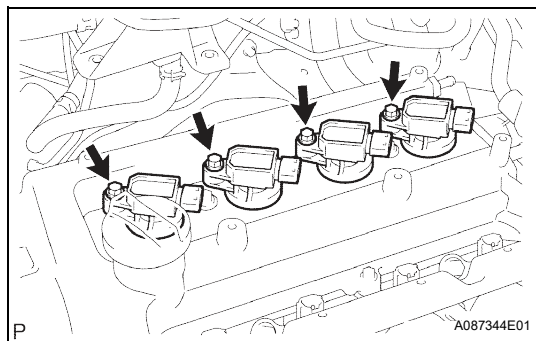
- (a) Disconnect the fuel injector connector and ignition coil connector.
- (b) Remove the 3 bolts and wire harness clamp, then disconnect the wire harness.



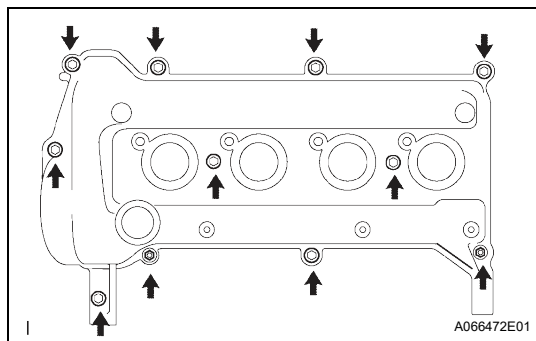
- (c) Remove the brake master cylinder reservoir cover.



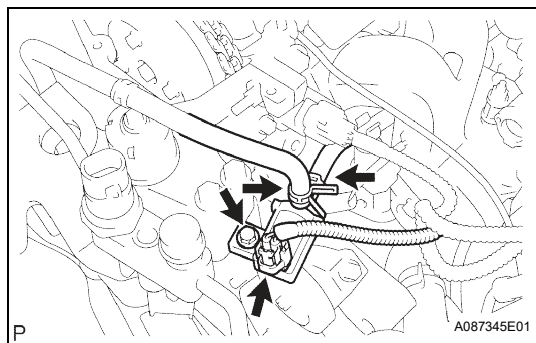
- (d) Disconnect the ventilation hose and ventilation hose No. 2.



(e) Remove the bolt and ignition coil.



(f) Remove the 9 bolts and 2 nuts, then remove the cylinder head cover.

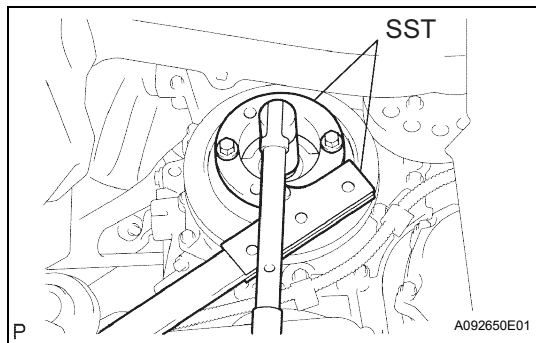


25. REMOVE PURGE VSV

- Disconnect the connector and hose.
- Remove the bolt and purge VSV.

26. REMOVE DRIVE BELT (See page EM-6)

27. REMOVE WATER PUMP (See page CO-11)



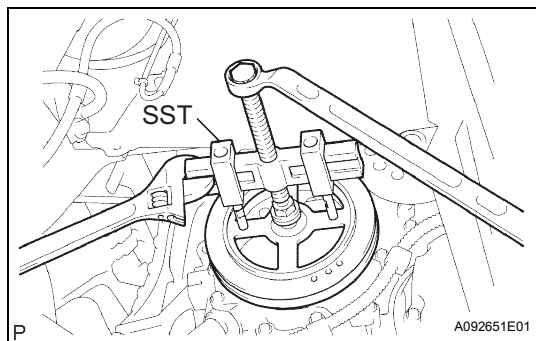
28. REMOVE CRANKSHAFT PULLEY

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

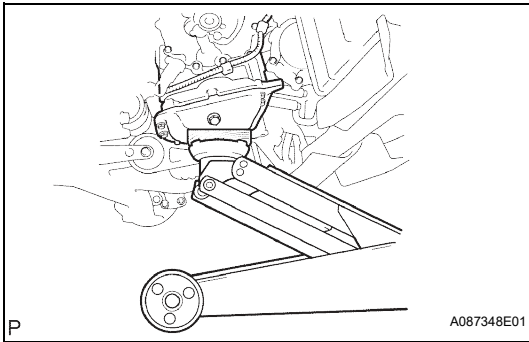
SST 09213-58013 (91111-50845), 09330-00021

NOTICE:

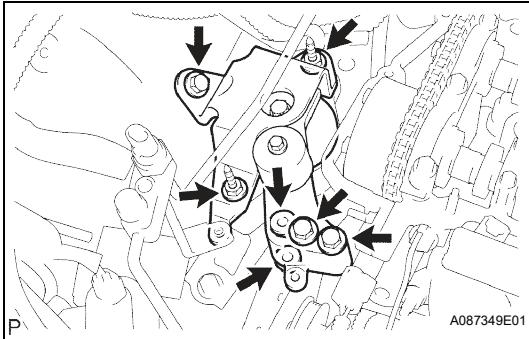
When installing SST, be careful that the bolt which holds SST does not interfere with the chain cover.



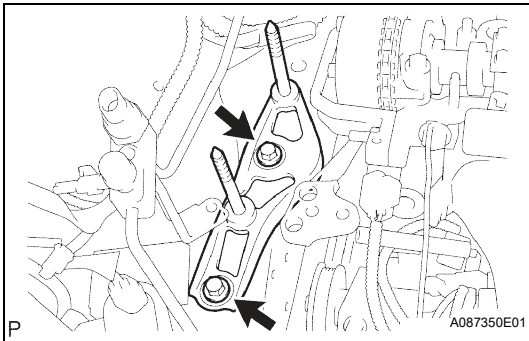
- Loosen the crankshaft bolt until 2 to 3 threads of the bolt are tightened to the crankshaft.
 - Using SST, remove the crankshaft damper.
- SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021)**
- Remove the crankshaft bolt.

**29. REMOVE ENGINE MOUNTING INSULATOR RH**

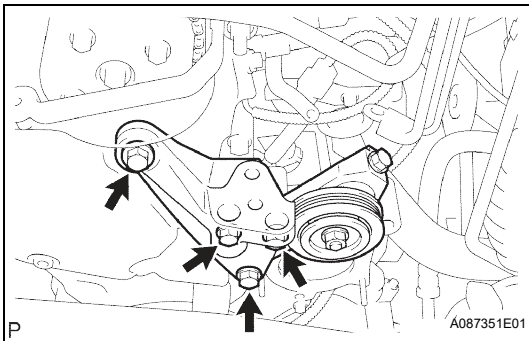
- (a) Put a wooden block on a jack. Support the oil pan with the jack.



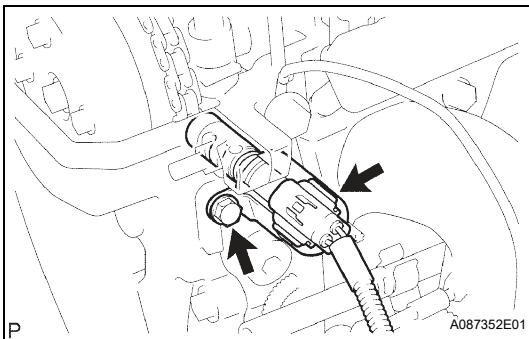
- (b) Remove the 3 bolts and 4 nuts, then remove the engine mounting insulator RH.

**30. REMOVE ENGINE MOUNTING SPACER**

- (a) Remove the 2 bolts and engine mounting spacer.

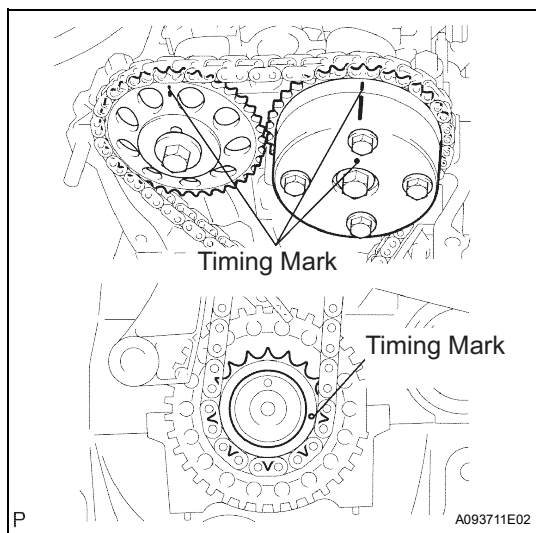
**31. REMOVE ENGINE MOUNTING BRACKET**

- (a) Remove the 4 bolts and engine mounting bracket.

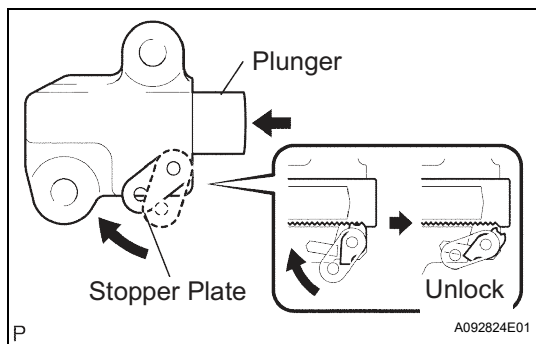
**32. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY**

- (a) Disconnect the connector.
 (b) Remove the bolt and camshaft timing oil control valve assembly.

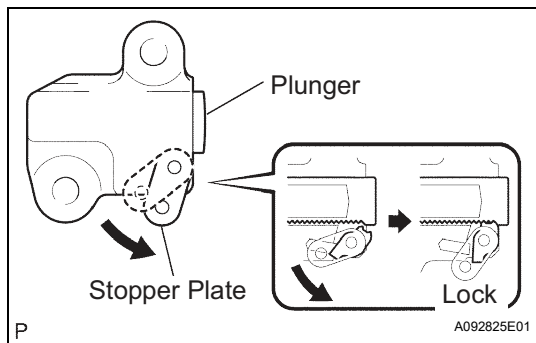
33. REMOVE CRANKSHAFT POSITION SENSOR (See page [ES-443](#))**34. REMOVE TIMING CHAIN COVER (See page [LU-15](#))****35. REMOVE OIL PUMP SEAL (See page [EM-138](#))**

**36. SET NO. 1 CYLINDER TO TDC / COMPRESSION**

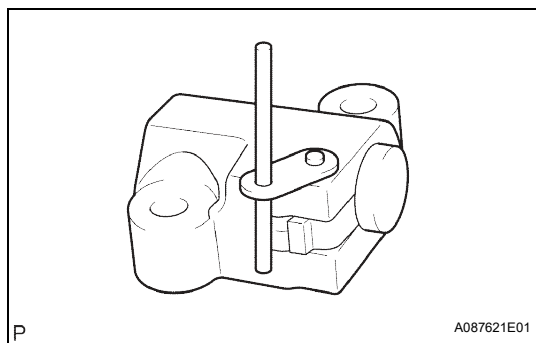
- Install the washer to the crankshaft bolt, then install the bolt to the crankshaft.
- Turn the crankshaft clockwise so it is positioned as illustrated.

**37. REMOVE NO. 1 CHAIN TENSIONER**

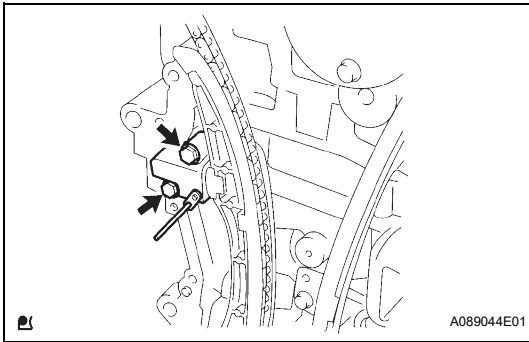
- Lift up the stopper plate, then unlock the plunger.
- Push in the plunger to the end with the plunger unlocked.



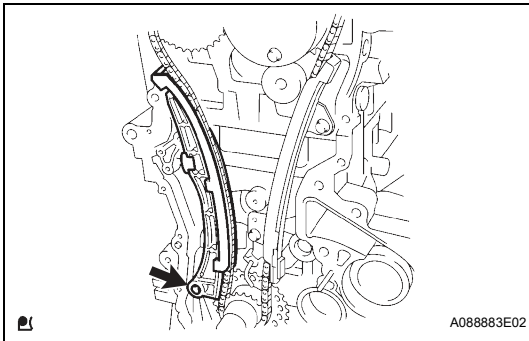
- Lower the stopper plate with the plunger pushed to the end, then lock the plunger.



- Insert a 3.0 mm (0.118 in.) diameter bar into the hole of the stopper plate with the plunger locked.
HINT:
If the stopper plate is not completely lowered and a 3.0 mm (0.118 in.) diameter bar cannot be inserted, unlock and pull out the plunger slightly. Then the stopper plate will be completely lowered and a 3.0 mm (0.118 in.) diameter bar can be inserted easily.

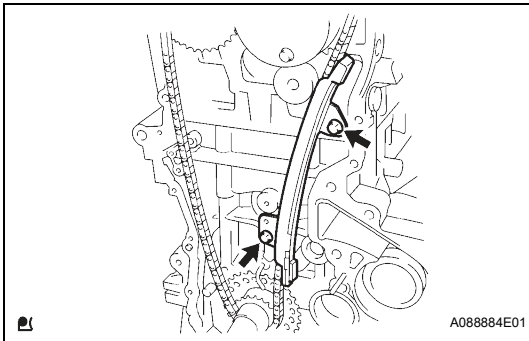


(e) Remove the 2 bolts and chain tensioner.



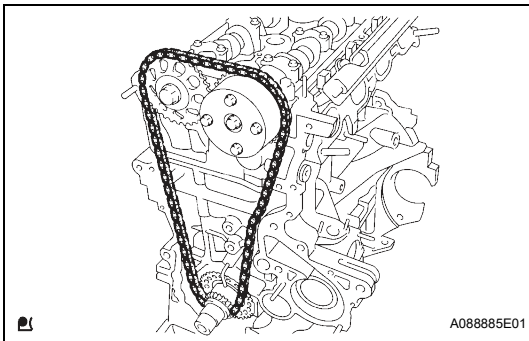
38. REMOVE CHAIN TENSIONER SLIPPER

(a) Remove the bolt and tensioner slipper.



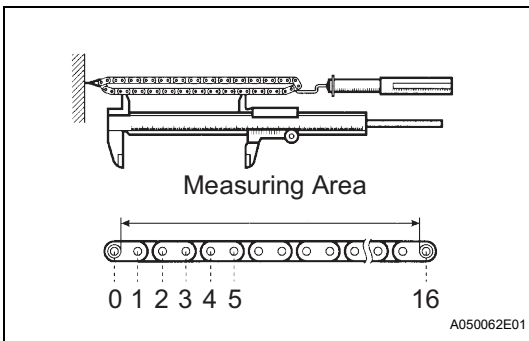
39. REMOVE NO. 1 CHAIN VIBRATION DAMPER

(a) Remove the 2 bolts and chain vibration damper.



40. REMOVE CHAIN

(a) Remove the chain from the engine.



INSPECTION

1. INSPECT CHAIN

(a) Using a spring scale, pull the timing chain with a force of 140 N (14.3 kgf, 31.5 lbf) and measure the length of it.

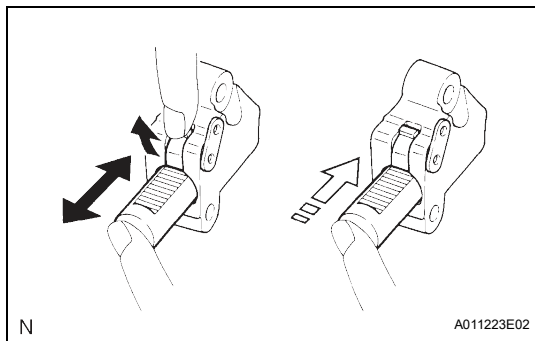
Maximum chain elongation:

124.2 mm (4.890 in.)

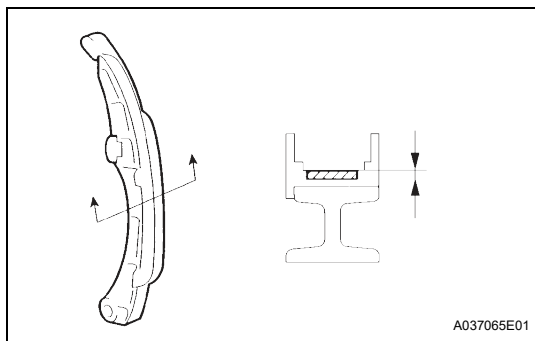
If the elongation is greater than the maximum, replace the chain.

HINT:

Perform the measurements at 3 or more random places to obtain the average length.

**2. INSPECT NO. 1 CHAIN TENSIONER**

- (a) Check that the plunger moves smoothly when the ratchet pawl is raised with your finger.
- (b) Release the ratchet pawl and check that the plunger is locked in place by the ratchet pawl and does not move when pushed with your finger.

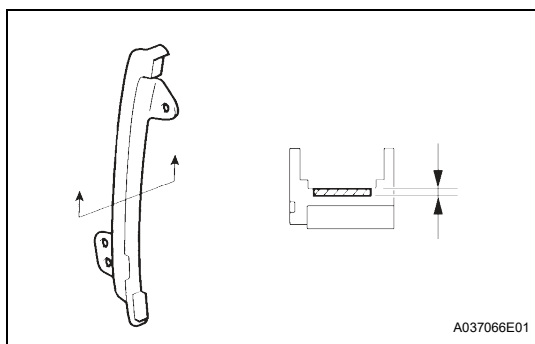
**3. INSPECT CHAIN TENSIONER SLIPPER**

- (a) Measure the chain tensioner slipper wear.

Maximum wear:

1.0 mm (0.039 in.)

If the wear is greater than the maximum, replace the slipper.

EM**4. INSPECT NO. 1 CHAIN VIBRATION DAMPER**

- (a) Measure the vibration damper wear.

Maximum wear:

1.0 mm (0.039 in.)

If the wear is greater than the maximum, replace the damper.

INSTALLATION

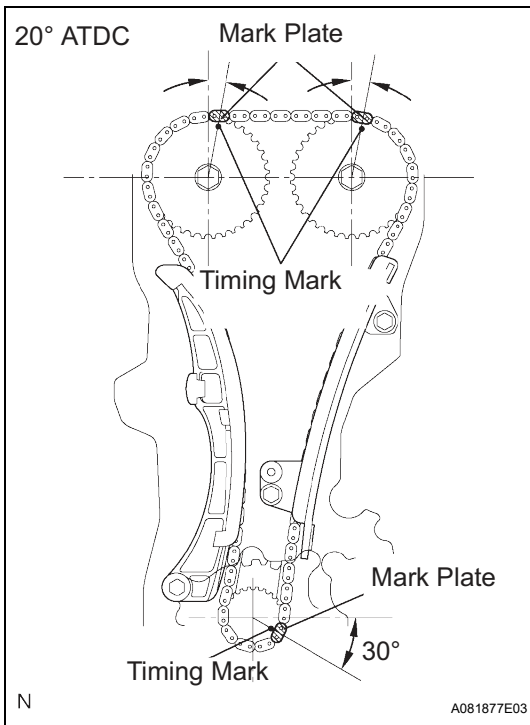
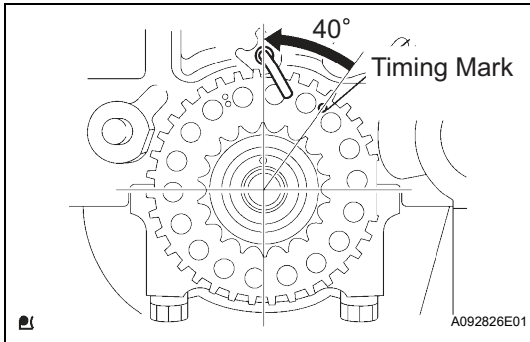
1. INSTALL CHAIN

- (a) Set the position of the No. 1 cylinder to 20° ATDC.

NOTICE:

To prevent the pistons from hitting against valves, the following procedures must be performed in the order below.

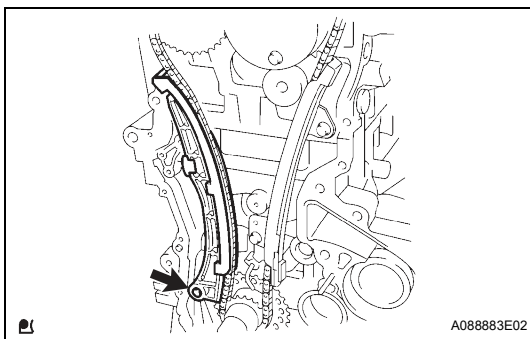
- (1) Set the crankshaft between 40 to 140° ATDC.
 - (2) Set the cams of the intake and exhaust timing sprockets to 20° ATDC.
 - (3) Reset the crankshaft to 20° ATDC.
- (b) Install the chain vibration damper with the 2 bolts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)



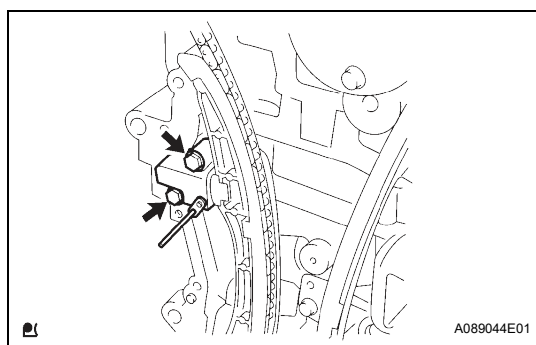
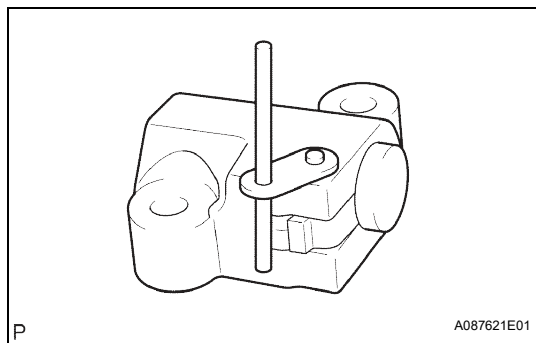
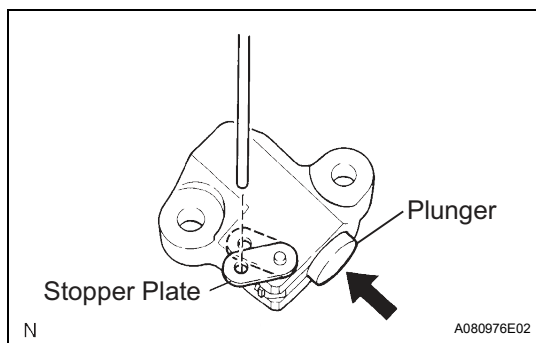
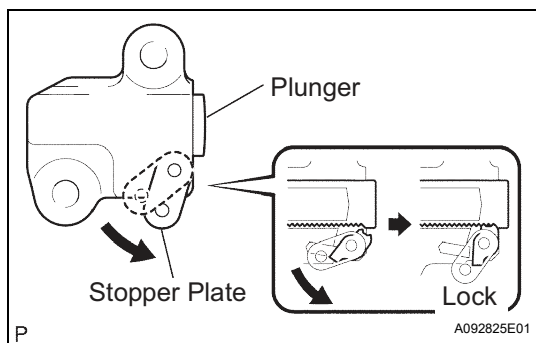
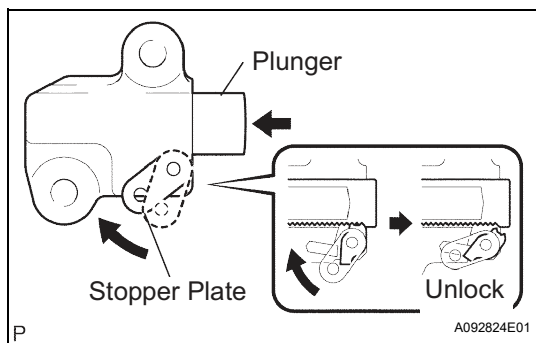
- (c) Align the timing marks of the camshaft timing sprocket, camshaft timing gear and crankshaft timing sprocket with each mark plate (colored in yellow) of the timing chain.

HINT:

To prevent the exhaust camshaft from springing back, turn it using a wrench and set it at the mark on the chain.



- (d) Install the chain tensioner slipper with the bolt.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)



- (e) Install the chain tensioner with the 2 bolts.
- (1) Lift up the stopper plate, then unlock the plunger.
 - (2) Push in the plunger to the end with the plunger unlocked.

- (3) Lower the stopper plate with the plunger pushed to the end, then lock the plunger.

- (4) Insert a 3.0 mm (0.118 in.) diameter bar into the hole of the stopper plate with the plunger locked.

HINT:

If the stopper plate is not completely lowered and a 3.0 mm (0.118 in.) diameter bar cannot be inserted, unlock and pull out the plunger slightly. Then the stopper plate will be completely lowered and a 3.0 mm (0.118 in.) diameter bar can be inserted easily.

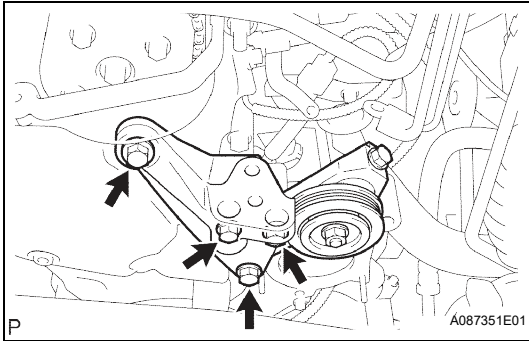
- (5) Install the chain tensioner with the 2 bolts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
 - (6) Remove the bar from the chain tensioner.
- (f) Check the tension between the intake and exhaust camshaft timing sprockets.

2. INSTALL OIL PUMP SEAL (See page [LU-17](#))

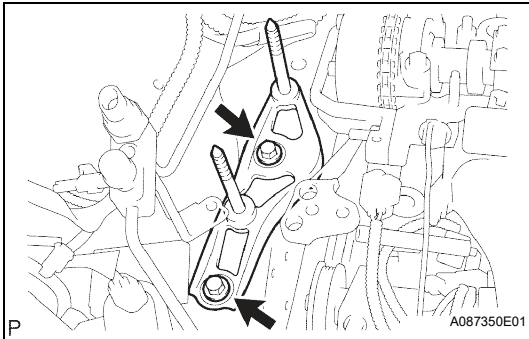
3. INSTALL TIMING CHAIN COVER (See page [LU-19](#))

4. INSTALL CRANKSHAFT POSITION SENSOR (See page [ES-443](#))

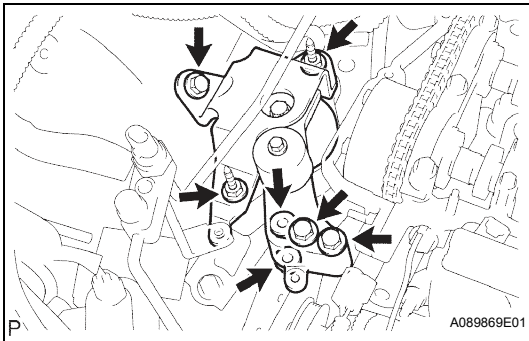
5. **INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY** (See page [ES-438](#))
6. **INSTALL ENGINE MOUNTING BRACKET**
 - (a) Install the engine mounting bracket with the 4 bolts.
Torque: 55 N*m (561 kgf*cm, 41 in.*lbf)



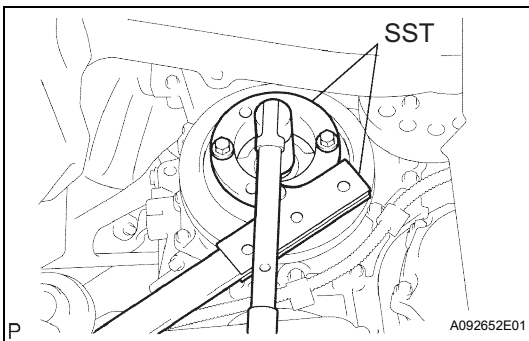
7. **INSTALL ENGINE MOUNTING SPACER**
 - (a) Install the engine mounting spacer with the 2 bolts.
Torque: 55 N*m (561 kgf*cm, 41 in.*lbf)



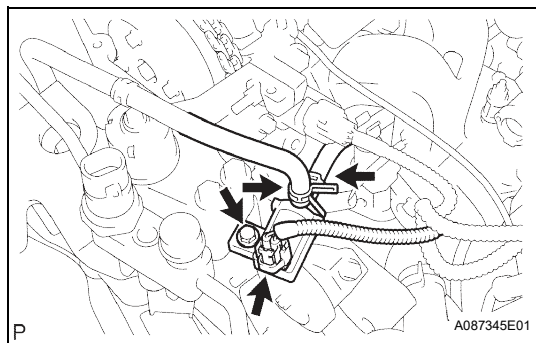
8. **INSTALL ENGINE MOUNTING INSULATOR RH**
 - (a) Install the engine mounting insulator RH with the 3 bolts and 4 nuts.
Torque: 52 N*m (530 kgf*cm, 38 in.*lbf)



9. **INSTALL CRANKSHAFT PULLEY**
 - (a) Align the hole of the crankshaft damper with the straight pin, then install the crankshaft damper.
 - (b) Using SST, hold the crankshaft damper and tighten the crankshaft bolt.
SST 09213-58013 (91111-50845), 09330-00021
Torque: 128 N*m (1,305 kgf*cm, 95 in.*lbf)
NOTICE:
When installing SST, be careful that the bolt which holds SST does not interfere with the chain cover.

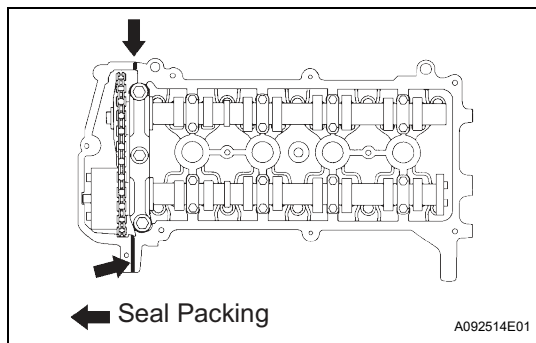


10. **INSTALL WATER PUMP** (See page [CO-11](#))
11. **INSTALL DRIVE BELT** (See page [EM-6](#))
12. **CHECK DRIVE BELT TENSION** (See page [EM-6](#))



13. INSTALL PURGE VSV

- (a) Install the purge VSV with the bolt.
- (b) Connect the hose and connector.



14. INSTALL CYLINDER HEAD COVER

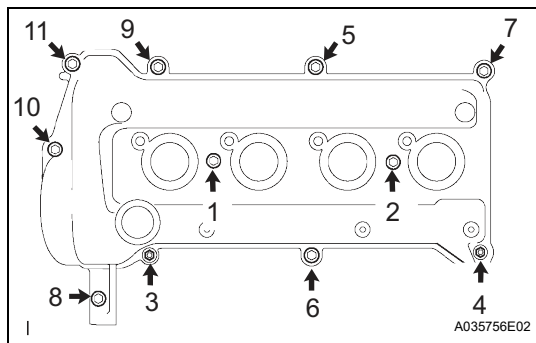
- (a) Apply seal packing to the 2 locations shown in the illustration, then install the cylinder head cover.

Seal packing:

Toyota Genuine Seal Packing Black, Three Bond 1207B or Equivalent

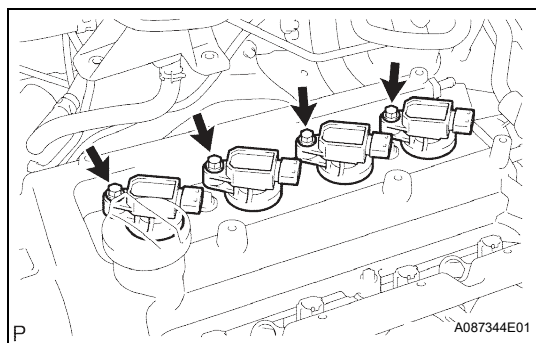
NOTICE:

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



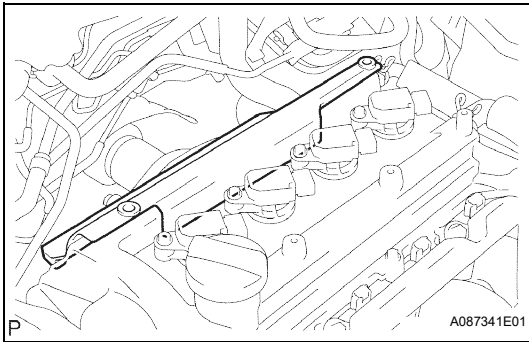
- (b) Install the cylinder head cover with the 9 bolts and 2 nuts.
- (c) Using several steps, tighten the bolts and nuts to the specified torque in the sequence shown in the illustration.

Torque: 10 N*m (102 kgf*cm, 74 in.*lbf)

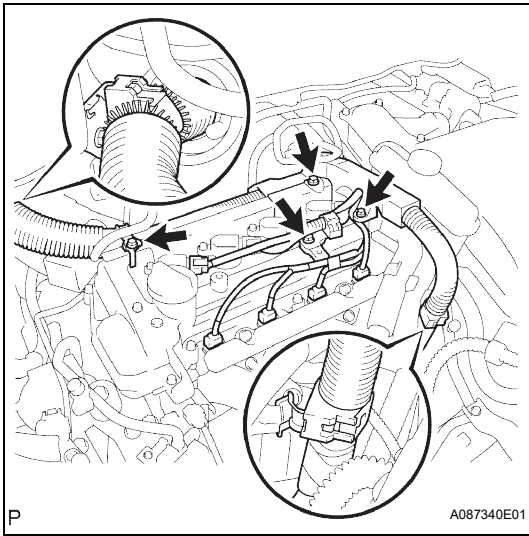


- (d) Install the ignition coil with the bolt.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

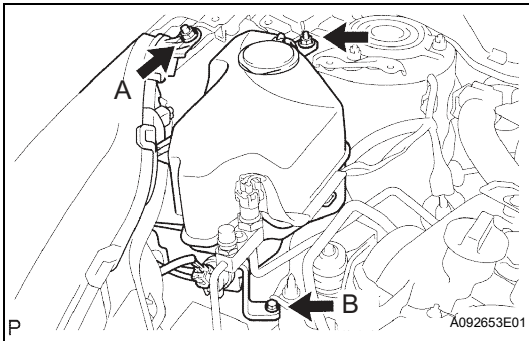




- (e) Install the brake master cylinder reservoir cover to the cylinder head cover.

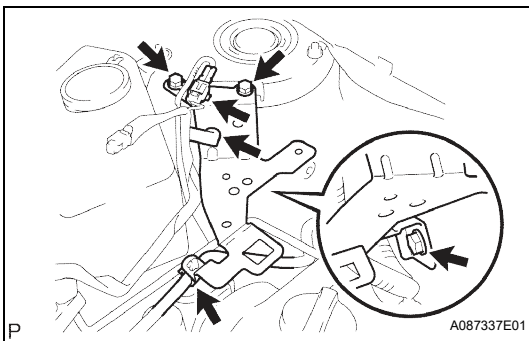


- (f) Install the wire harness and brake master cylinder reservoir cover with the 3 bolts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
 (g) Connect the fuel injector connector and ignition coil connector.



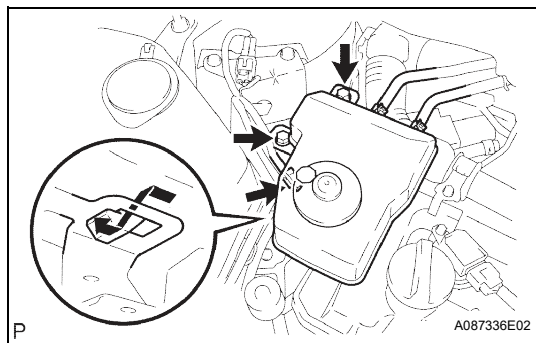
15. INSTALL WINDSHIELD WASHER JAR

- (a) Install the windshield washer with the 2 bolts and nut.
Torque: 4.9 N*m (50 kgf*cm, 43 in.*lbf) for bolt A
14 N*m (143 kgf*cm, 10 in.*lbf) for bolt B
5.5 N*m (56 kgf*cm, 49 in.*lbf) for nut
 (b) Connect the 2 connectors and wire harness.



16. INSTALL RESERVOIR BRACKET

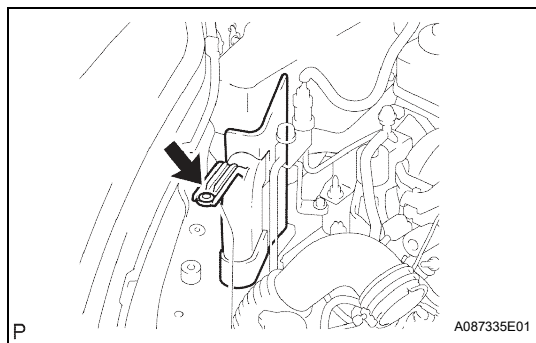
- (a) Install the reservoir bracket with the 3 bolts and connect the wire harness clamp.
Torque: 8.5 N*m (87 kgf*cm, 75 in.*lbf)

**17. INSTALL BRAKE MASTER CYLINDER RESERVOIR**

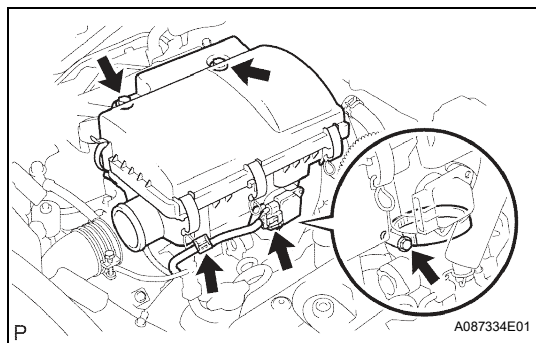
- (a) Attach the claw and install the master cylinder reservoir with the 2 bolts.

Torque: 8.5 N*m (87 kgf*cm, 75 in.*lbf)

- (b) Connect the connector.

**18. INSTALL NO. 2 AIR CLEANER INLET**

- (a) Install the air cleaner inlet with the clip.

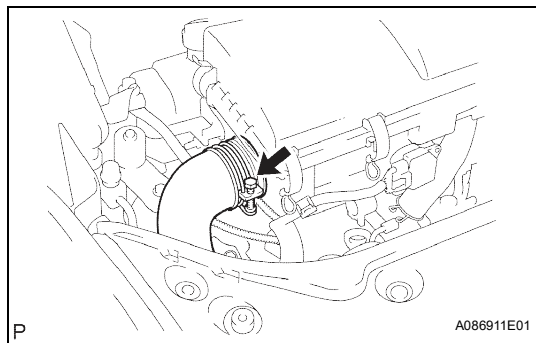
**19. INSTALL AIR CLEANER ASSEMBLY**

- (a) Install the air cleaner with the 2 bolts and tighten the clamp.

Torque: 7.0 N*m (71 kgf*cm, 62 in.*lbf) for bolt
3.0 N*m (31 kgf*cm, 27 in.*lbf) for clamp

- (b) Connect the MAF meter connector and clamp.

- (c) Connect the No. 1 air inlet, and then tighten the clamp.

**20. INSTALL FRONT COWL TOP PANEL OUTER****21. INSTALL WINDSHIELD WIPER MOTOR AND WIPER LINK ASSEMBLY (See page [WW-16](#))****22. INSTALL COWL TOP VENTILATOR LOUVER RH****23. INSTALL COWL TOP VENTILATOR LOUVER LH****24. INSTALL HOOD TO COWL TOP SEAL****25. INSTALL FRONT WIPER ARM LH (See page [WW-16](#))****26. INSTALL FRONT WIPER ARM RH (See page [WW-16](#))****27. INSTALL WIPER ARM HEAD CAP****28. ADD ENGINE OIL (See page [LU-4](#))****29. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page [CH-7](#))****30. INSTALL REAR NO. 3 FLOOR BOARD (See page [CH-8](#))**

31. INSTALL REAR DECK FLOOR BOARD (See page [CH-8](#))
32. INSTALL REAR NO. 2 FLOOR BOARD (See page [CH-8](#))
33. ADD ENGINE COOLANT (See page [CO-7](#))
34. CHECK FOR ENGINE COOLANT LEAKS (See page [CO-2](#))
35. INSTALL RADIATOR SUPPORT OPENING COVER
36. INSTALL NO. 4 CENTER ENGINE UNDER COVER
37. INSTALL NO. 3 ENGINE UNDER COVER
38. INSTALL FRONT WHEELS
39. PERFORM INITIALIZATION
 - (a) Perform initialization (see page [IN-32](#)).

NOTICE:

Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.