

ENGINE

ON-VEHICLE INSPECTION

1. INSPECT VALVE LASH ADJUSTER NOISE

- (a) Rev up the engine several times. Check that the engine does not emit unusual noises.
If unusual noises occur, warm up the engine and idle it for over 30 minutes. Then repeat this procedure.

HINT:

If any defects or problems are found during the inspection above, perform lash adjuster inspection (See page [EM-76](#)).

2. INSPECT IGNITION TIMING

- (a) Warm up the engine.
(b) When using the intelligent tester:

Check the ignition timing.

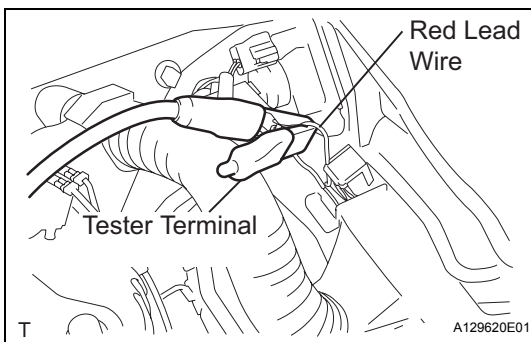
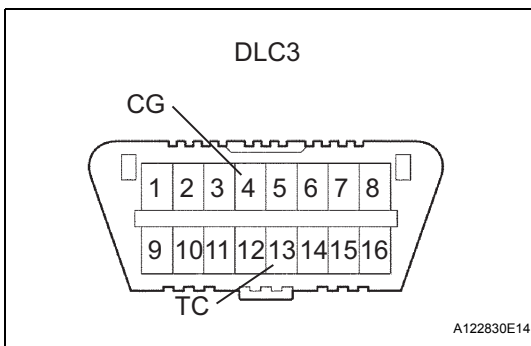
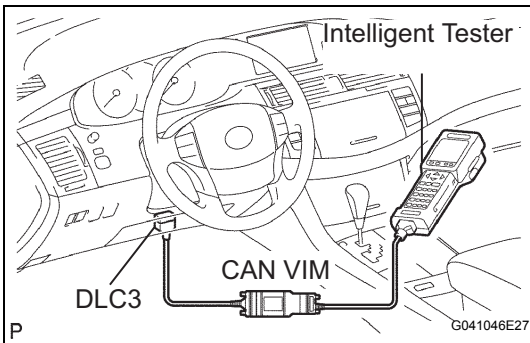
- (1) Connect the intelligent tester to the DLC3.
- (2) Enter DATA LIST MODE with the intelligent tester.

Ignition timing:

8 to 12° BTDC at idle

HINT:

Refer to the intelligent tester operator's manual for help on selecting the DATA LIST.



- (c) When not using the intelligent tester:
Check the ignition timing.
- (1) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.

SST 09843-18040

NOTICE:

- **Confirm the terminal numbers before connecting them. Connection with a wrong terminal can damage the engine.**
- **Turn off all electrical systems before connecting the terminals.**
- **Perform this inspection after the cooling fan motor is turned off.**

- (2) Remove the V-bank cover.
- (3) Pull out the red lead wire harness.
- (4) Connect the tester terminal of the timing light to the red lead wire as shown in the illustration.

NOTICE:

Use a timing light which detects the first signal.

- (5) Check the ignition timing at idle.

Ignition timing:

8 to 12° BTDC at idle

NOTICE:

When checking the ignition timing, the transmission should be in the neutral position.

HINT:

Run the engine at 1,000 to 1,300 rpm for 5 seconds, and then check that the engine rpm returns to idle speed.

- (6) Disconnect terminals 13 (TC) and 4 (CG) of the DLC3.
- (7) Check the ignition timing at idle.

Ignition timing:

5 to 15° BTDC at idle

- (8) Confirm that the ignition timing moves to the advanced angle side when the engine rpm is increased.
- (9) Remove the timing light.

3. INSPECT ENGINE IDLE SPEED

- (a) Warm up the engine.

- (b) When using the intelligent tester:
 - Check the idle speed.

- (1) Connect the intelligent tester to the DLC3.
- (2) Enter DATA LIST MODE with the intelligent tester.

Idle speed:

600 to 700 rpm

NOTICE:

- **When checking the idle speed, the transmission should be in the neutral position.**
- **Check the idle speed with the cooling fan off.**
- **Switch off all accessories and air conditioning before connecting the intelligent tester.**

HINT:

Refer to the intelligent tester operator's manual for further details.

- (c) When not using the intelligent tester:
 - Check the idle speed.

- (1) Using SST, connect tachometer test probe to terminal 9 (TAC) of the DLC3.

SST 09843-18030

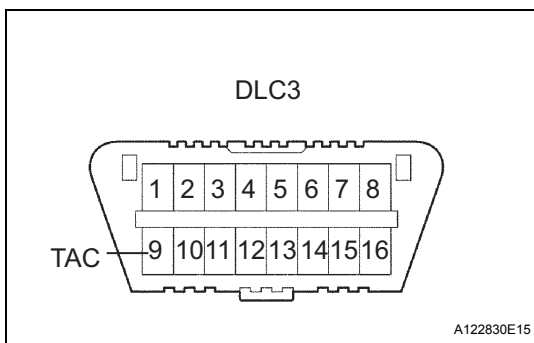
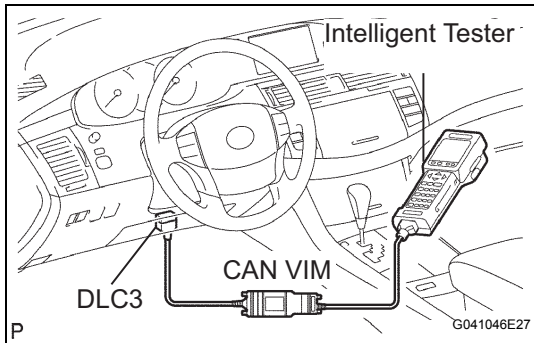
- (2) Check the idle speed.

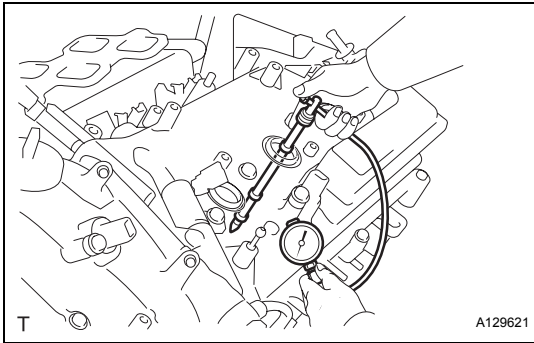
Idle speed:

600 to 700 rpm

4. INSPECT COMPRESSION

- (a) Warm up and stop the engine.
- (b) Disconnect the injector connectors.
- (c) Remove the intake air surge tank (See page [FU-12](#)).
- (d) Remove the 6 ignition coils.
- (e) Remove the 6 spark plugs.





- (f) Check the cylinder compression pressure.
- (1) Insert a compression gauge into the spark plug hole.
 - (2) While cranking the engine, measure the compression pressure.

Compression pressure:

1.4 MPa (14 kgf/cm², 199 psi)

Minimum pressure:

0.98 MPa (10 kgf/cm², 142 psi)

Difference between each cylinder:

0.1 MPa (1.0 kgf/cm², 15 psi)

NOTICE:

- **Always use a fully charged battery to obtain an engine speed of 250 rpm or more.**
 - **Check the other cylinders' compression pressure in the same way.**
 - **This measurement must be done as quickly as possible.**
- (3) If the cylinder compression is low, pour a small amount of engine oil into the cylinder through the spark plug hole and inspect again.
- HINT:**
- If adding oil increases the compression, the piston rings and / or cylinder bore may be worn or damaged.
 - If pressure stays low, a valve may be stuck or seated improperly, or there may be leakage in the gasket.

5. INSPECT CO/HC

- (a) Start the engine.
- (b) Rev the engine at 2,500 rpm for approximately 180 seconds.
- (c) Insert CO/HC meter testing probe at least 40 cm (1.3 ft) into the tailpipe during idling.
- (d) Check CO/HC concentration at idle and / or 2,500 rpm.

HINT:

Check regulations and restrictions in your area when performing 2 mode CO/CH concentration testing (engine check at both idle speed and at 2,500 rpm).

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

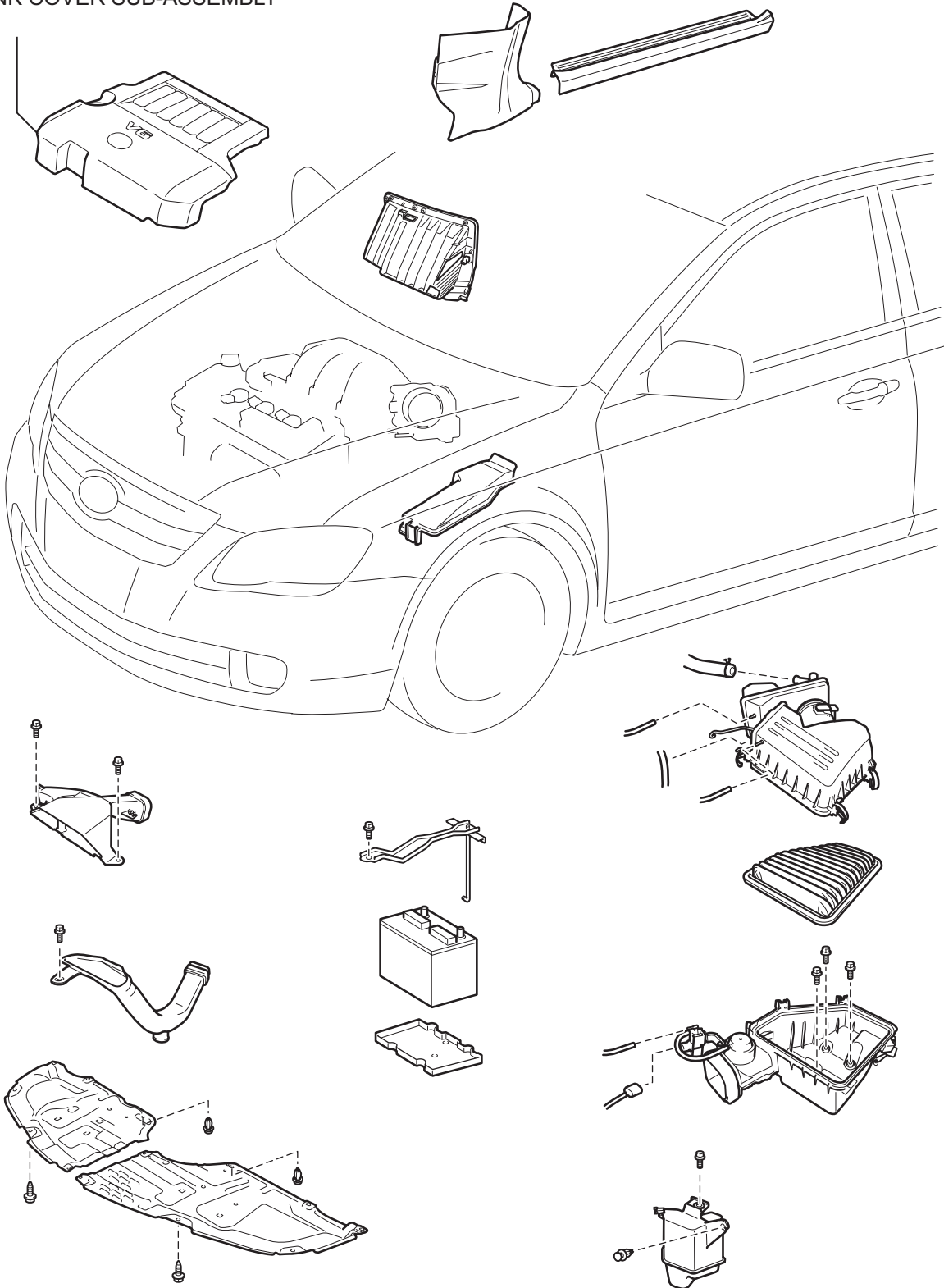
- (1) Check A/F sensor and heated oxygen sensor operation.

(2) See the table below for possible causes, and then inspect and repair.

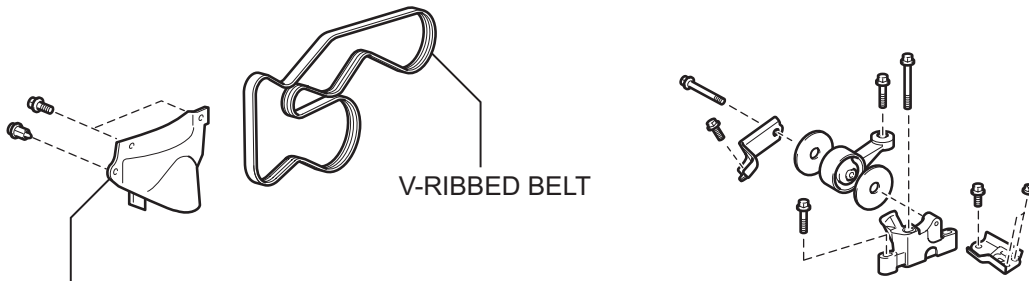
CO	HC	Problems	Causes
Normal	High	Rough idle	<ol style="list-style-type: none"> 1. Faulty ignitions: <ul style="list-style-type: none"> – Incorrect timing – Fouled, shorted or improperly gapped plugs 2. Incorrect valve clearance 3. Leaks in intake and exhaust valves 4. Leaks in cylinders
Low	High	Rough idle (fluctuating HC reading)	<ol style="list-style-type: none"> 1. Vacuum leaks: <ul style="list-style-type: none"> – PCV hoses – Intake manifold – Throttle body – Brake booster line 2. Lean mixture causing misfire
High	High	Rough idle (black smoke from exhaust)	<ol style="list-style-type: none"> 1. Restricted air filter 2. Plugged PCV valve 3. Faulty SFI system: <ul style="list-style-type: none"> – Faulty fuel pressure regulator – Defective ECT sensor – Defective MAF meter – Faulty ECM – Faulty injectors – Faulty throttle position sensor

DRIVE BELT COMPONENTS

V-BANK COVER SUB-ASSEMBLY

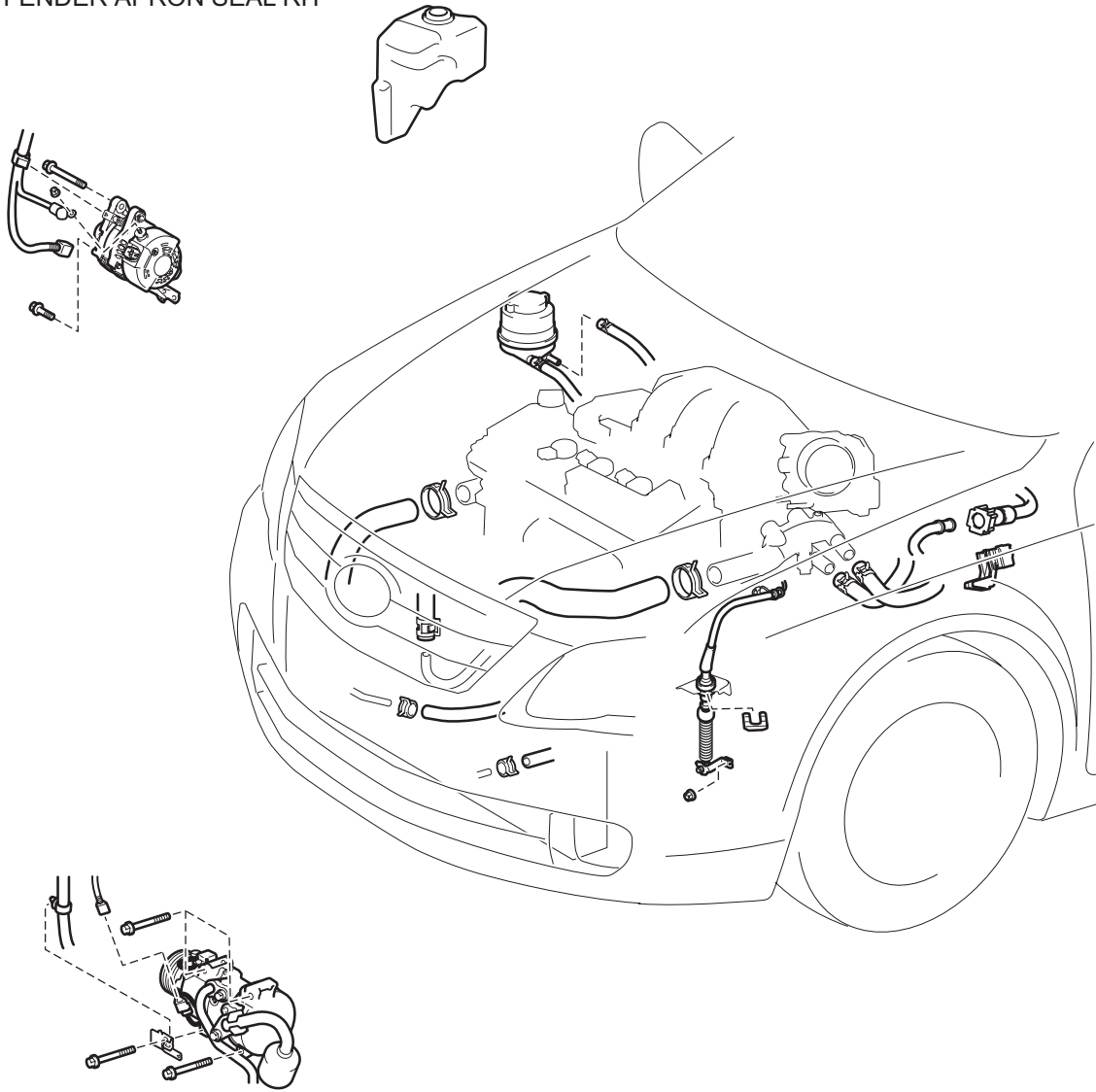


EM



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FRONT FENDER APRON SEAL RH

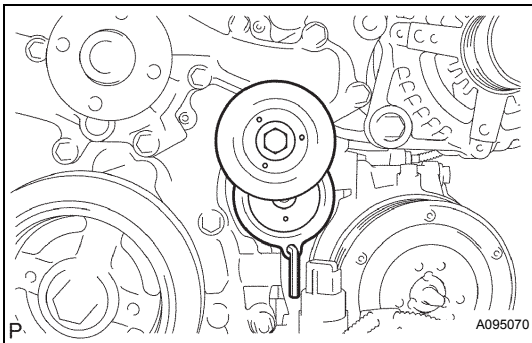
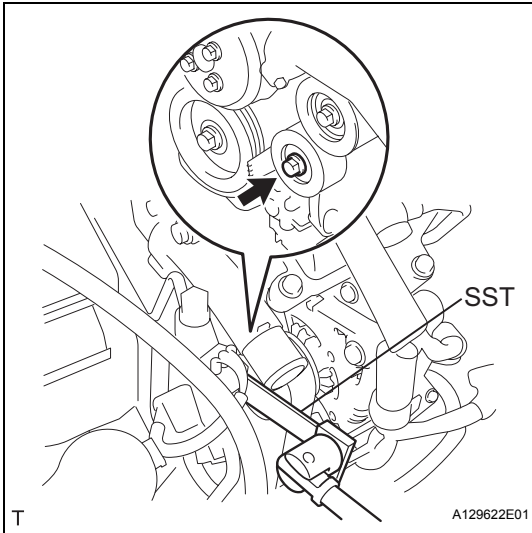


REMOVAL

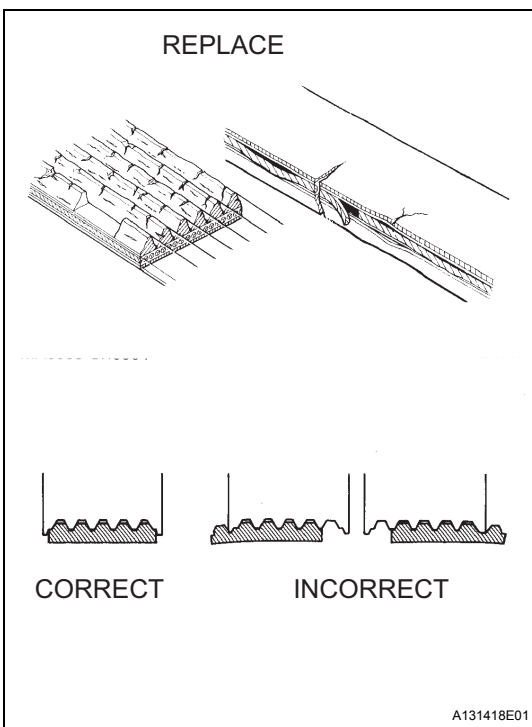
1. REMOVE FRONT WHEEL RH
2. REMOVE FRONT FENDER APRON SEAL RH
3. REMOVE V-BANK COVER SUB-ASSEMBLY
4. REMOVE V-RIBBED BELT

- (a) Using SST, release the belt tension by turning the belt tensioner counterclockwise, and remove the V-ribbed belt from the belt tensioner.

SST 09249-63010



- (b) While turning the belt tensioner counterclockwise, align with its holes, and then insert the 5 mm bi-hexagon wrench into the holes to fix the V-ribbed belt tensioner.



INSPECTION

1. INSPECT V-RIBBED BELT

- (a) Visually check the V-ribbed belt for excessive wear, frayed cords, etc.

If any defect has been found, replace the V-ribbed belt.

HINT:

Cracks on the rib side of a V-ribbed belt are considered acceptable.

If the drive belt has chunks missing from its ribs, it should be replaced.

HINT:

- After installing the V-ribbed belt, check that it fits properly in the ribbed grooves. Check to confirm that the belt has not slipped out of the grooves on the bottom of the crank pulley by hand.
- A "new belt" is a belt which has been used for less than 5 minutes with the engine running.
- A "used belt" is a belt which has been used for 5 minutes with the engine running.

- After installing a new belt, run the engine for approximately 5 minutes and then recheck the tension.

2. INSPECT V-REBBED BELT TENSIONER ASSEMBLY

- Check that nothing gets caught in the tensioner by turning it clockwise and counterclockwise.

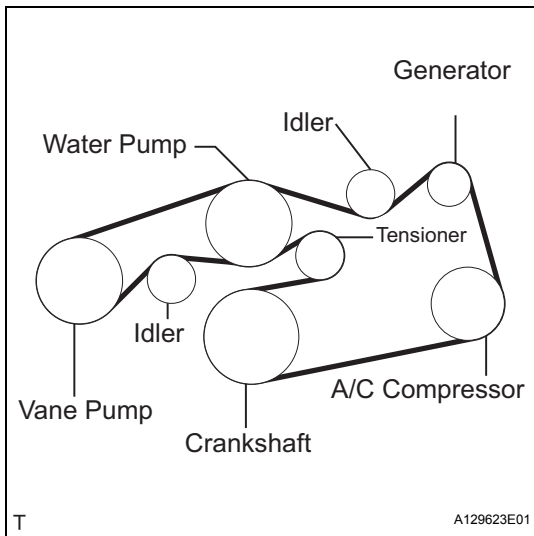
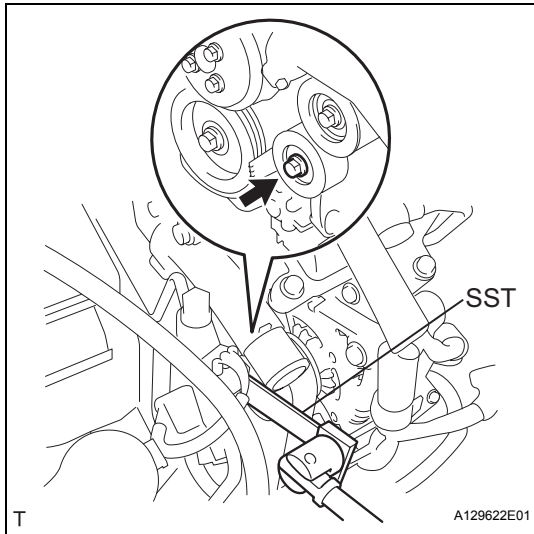
If a malfunction exists, replace the tensioner.

INSTALLATION

1. INSTALL V-RIBBED BELT

- Install the V-ribbed belt.
- Using SST, turn the belt tensioner counterclockwise, remove the bar.

SST 09249-63010



- If it is difficult to install the V-ribbed belt, perform the following procedure.

- Put the V-ribbed belt on everything except the tensioner pulley as shown in the illustration.
- While releasing the belt tension by turning the belt tensioner counterclockwise, put the V-ribbed belt on the tensioner pulley.

NOTICE:

- Put the backside of the V-ribbed belt on the tensioner pulley and idler pulley.
- Check that the V-ribbed belt is properly set to each pulley.

2. INSTALL V-BANK COVER SUB-ASSEMBLY

3. INSTALL FRONT FENDER APRON SEAL RH

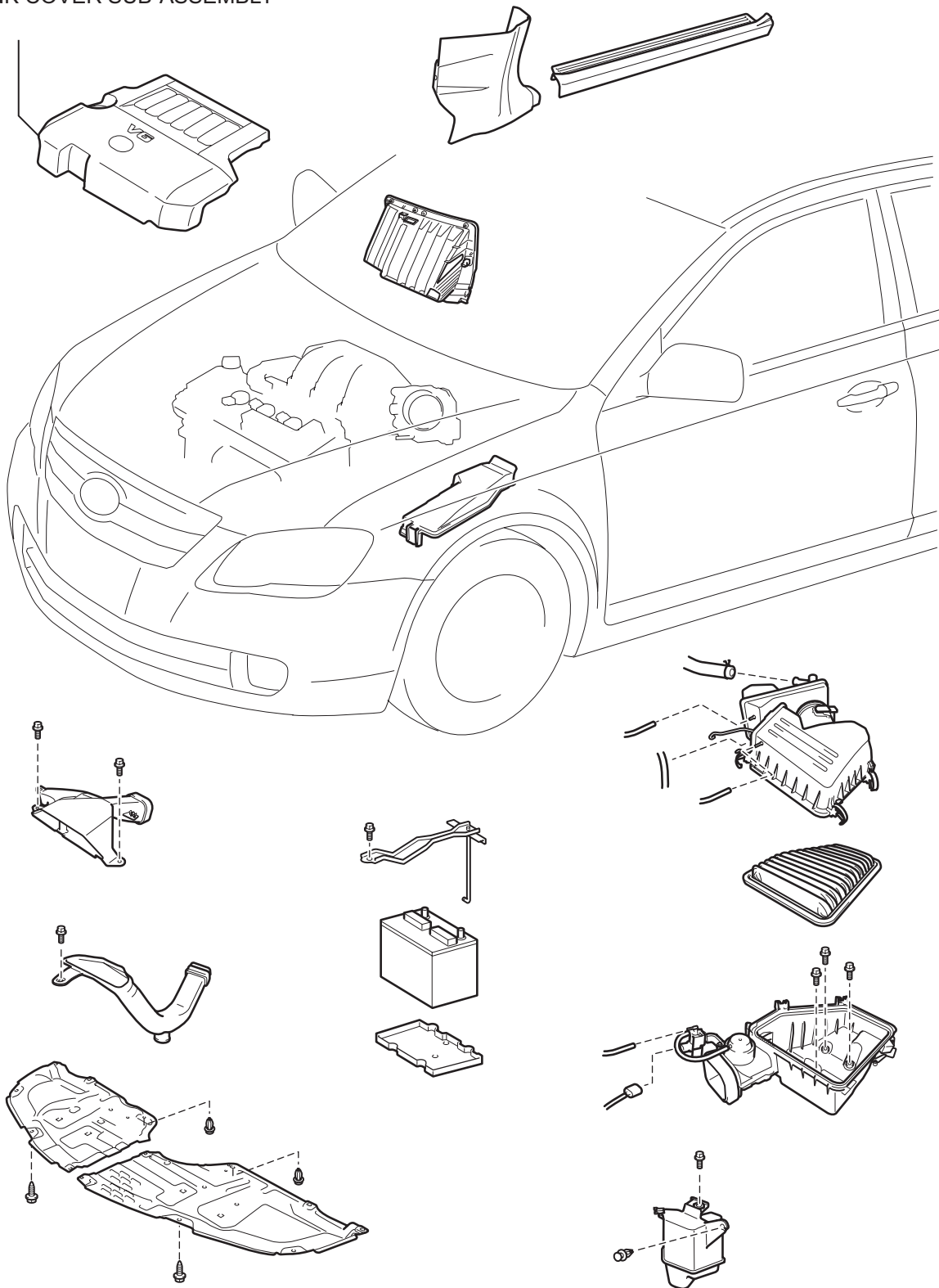
4. INSTALL FRONT WHEEL RH

Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

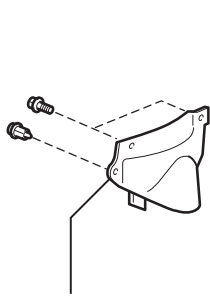
ENGINE FRONT OIL SEAL

COMPONENTS

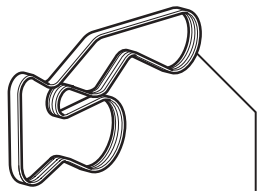
V-BANK COVER SUB-ASSEMBLY



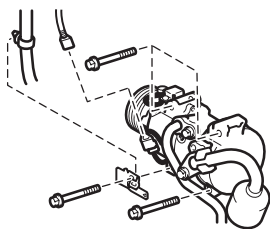
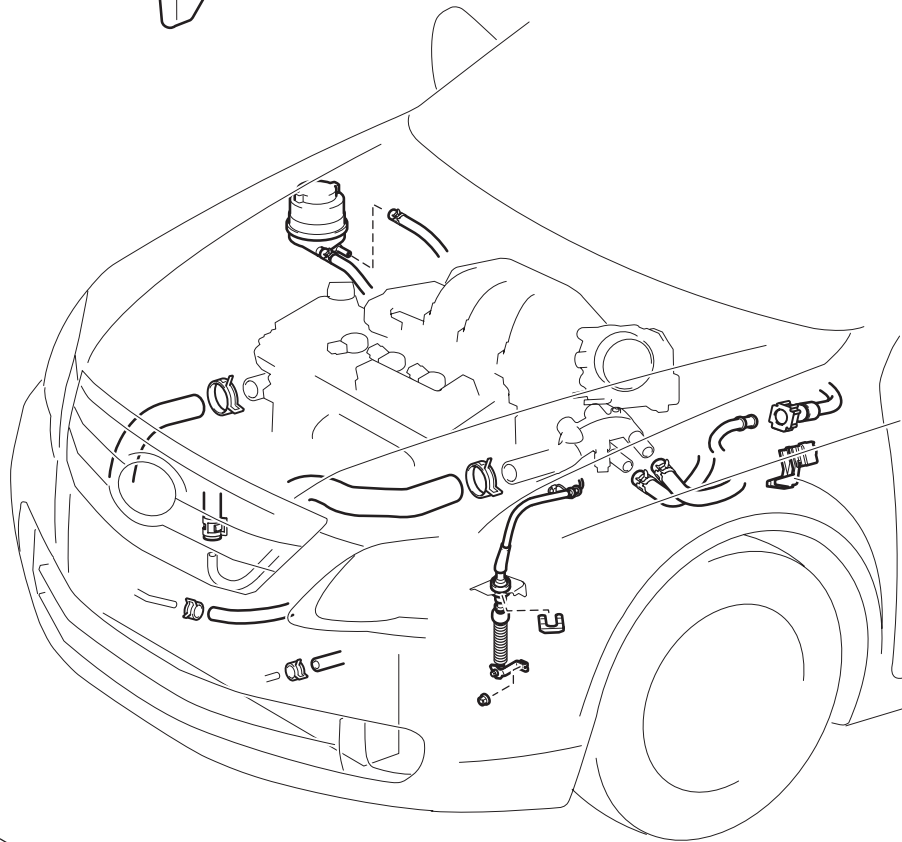
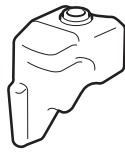
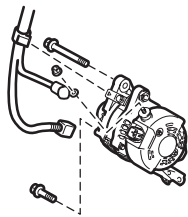
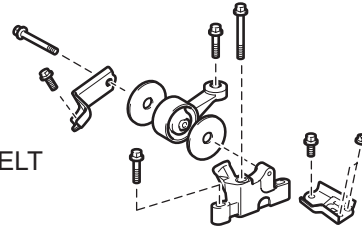
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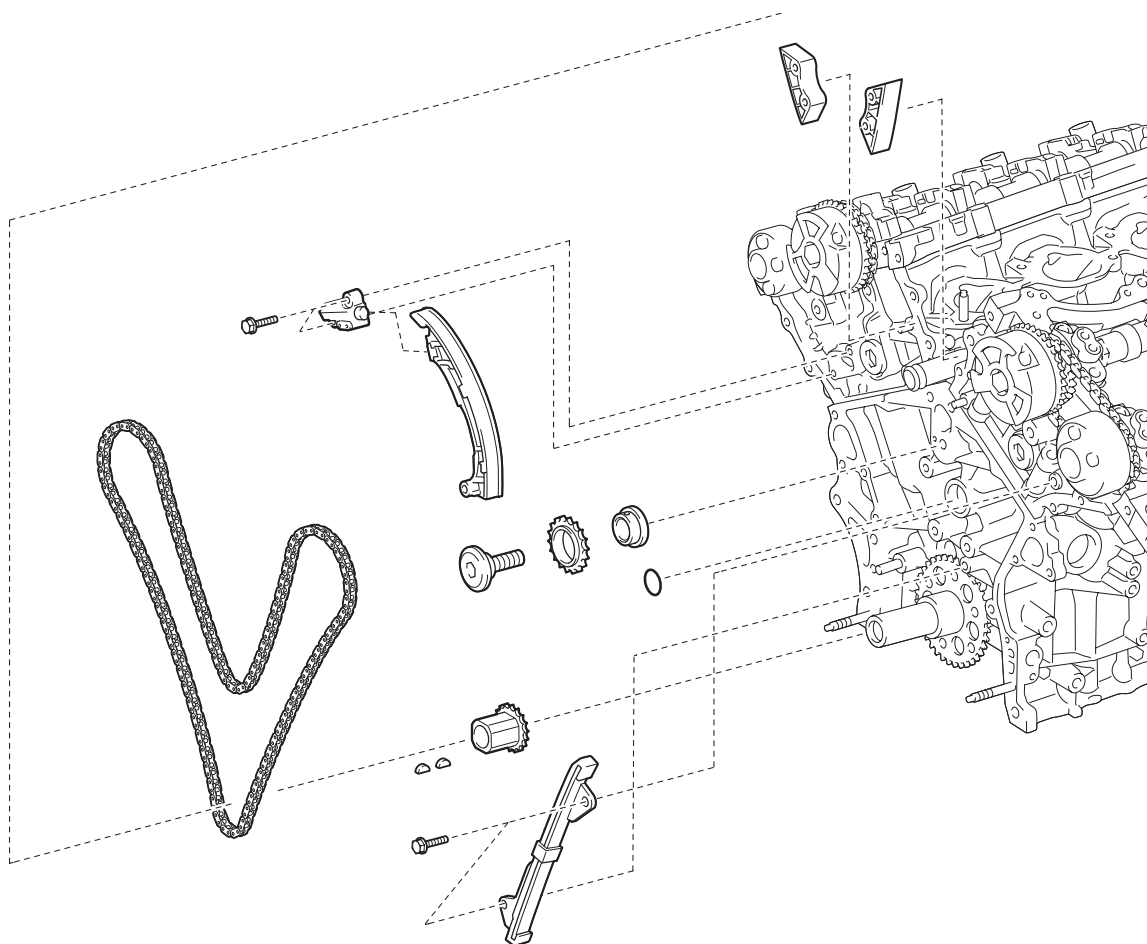
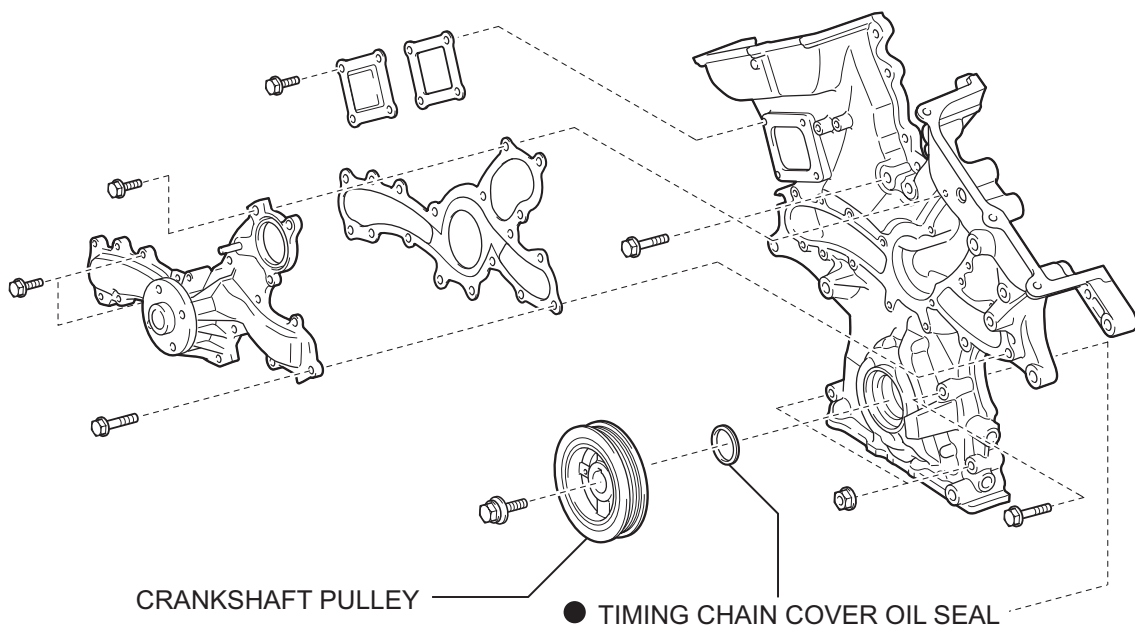
FRONT FENDER APRON SEAL RH



FAN AND GENERATOR V BELT



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● Non-reusable part

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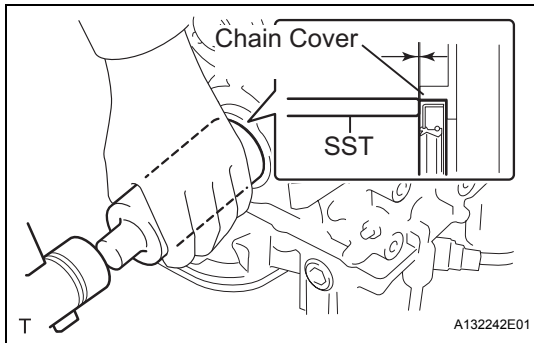
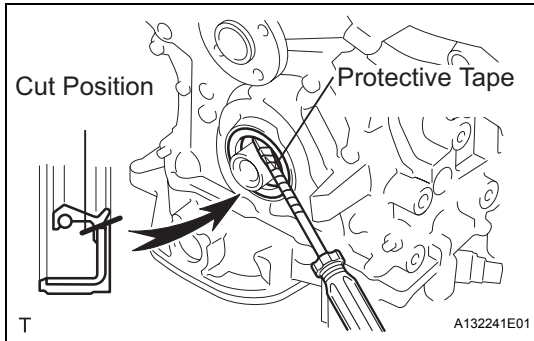
REMOVAL

1. REMOVE FRONT WHEEL RH
2. REMOVE FRONT FENDER APRON SEAL RH
3. REMOVE V-BANK COVER SUB-ASSEMBLY
4. REMOVE FAN AND GENERATOR V BELT
HINT:
Remove V-ribbed belt (See page [EM-7](#)).
SST 09249-63010
5. REMOVE CRANKSHAFT PULLEY (See page [EM-59](#))
6. REMOVE TIMING CHAIN COVER OIL SEAL

(a) Using a screwdriver, pry out the oil seal.

NOTICE:

Be careful not to damage the crankshaft. Tape the screwdriver tip before use.

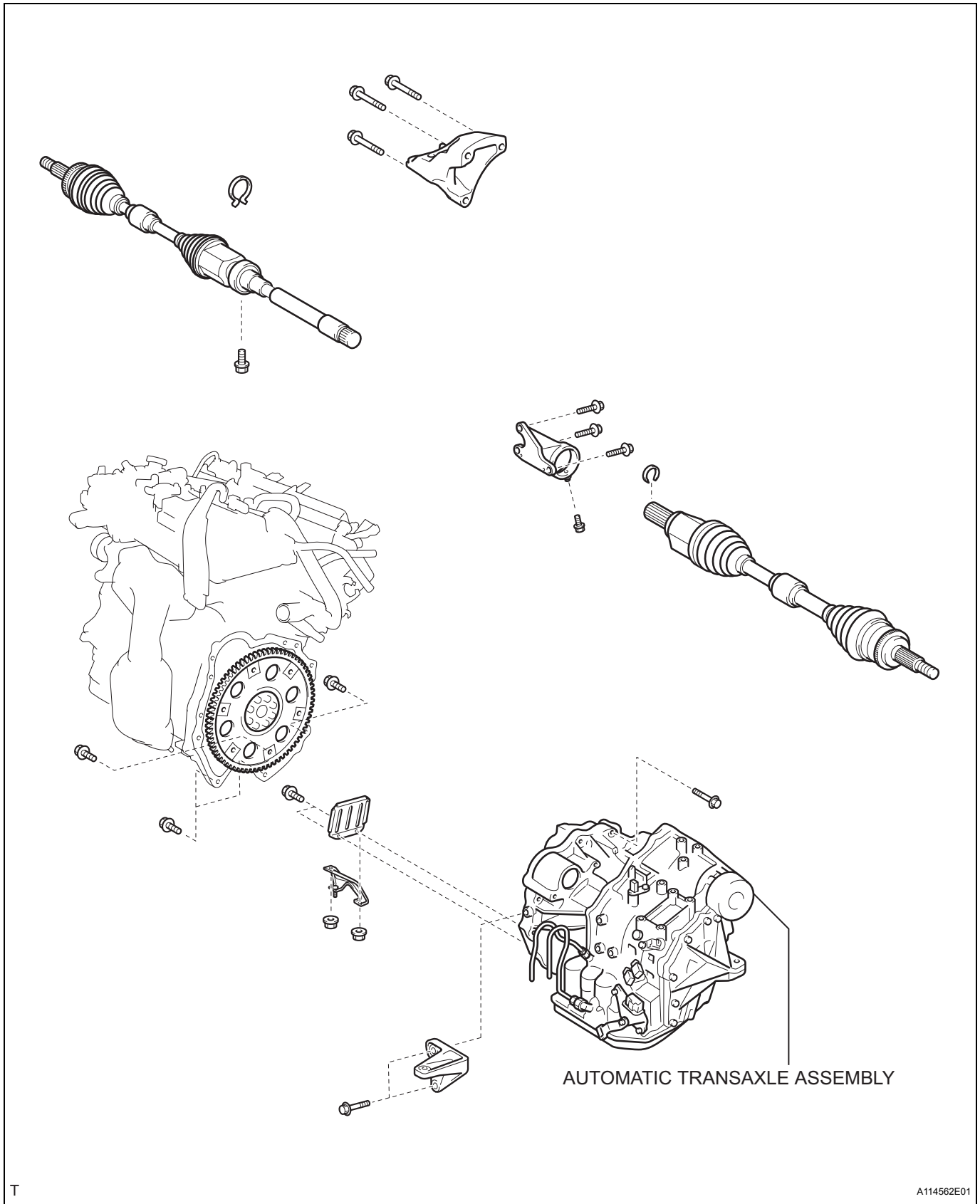


INSTALLATION

1. INSTALL TIMING CHAIN COVER OIL SEAL
 - (a) Apply MP grease to a new oil seal lip.
 - (b) Using SST and a hammer, tap in the oil seal until its surface is flush with the timing chain cover edge.
SST 09316-60011 (09316-00011)
2. INSTALL CRANKSHAFT PULLEY (See page [EM-145](#))
3. INSTALL FAN AND GENERATOR V BELT
HINT:
Install the V-ribbed belt (See page [EM-8](#)).
SST 09249-63010
4. INSTALL V-BANK COVER SUB-ASSEMBLY
5. INSTALL FRONT WHEEL RH

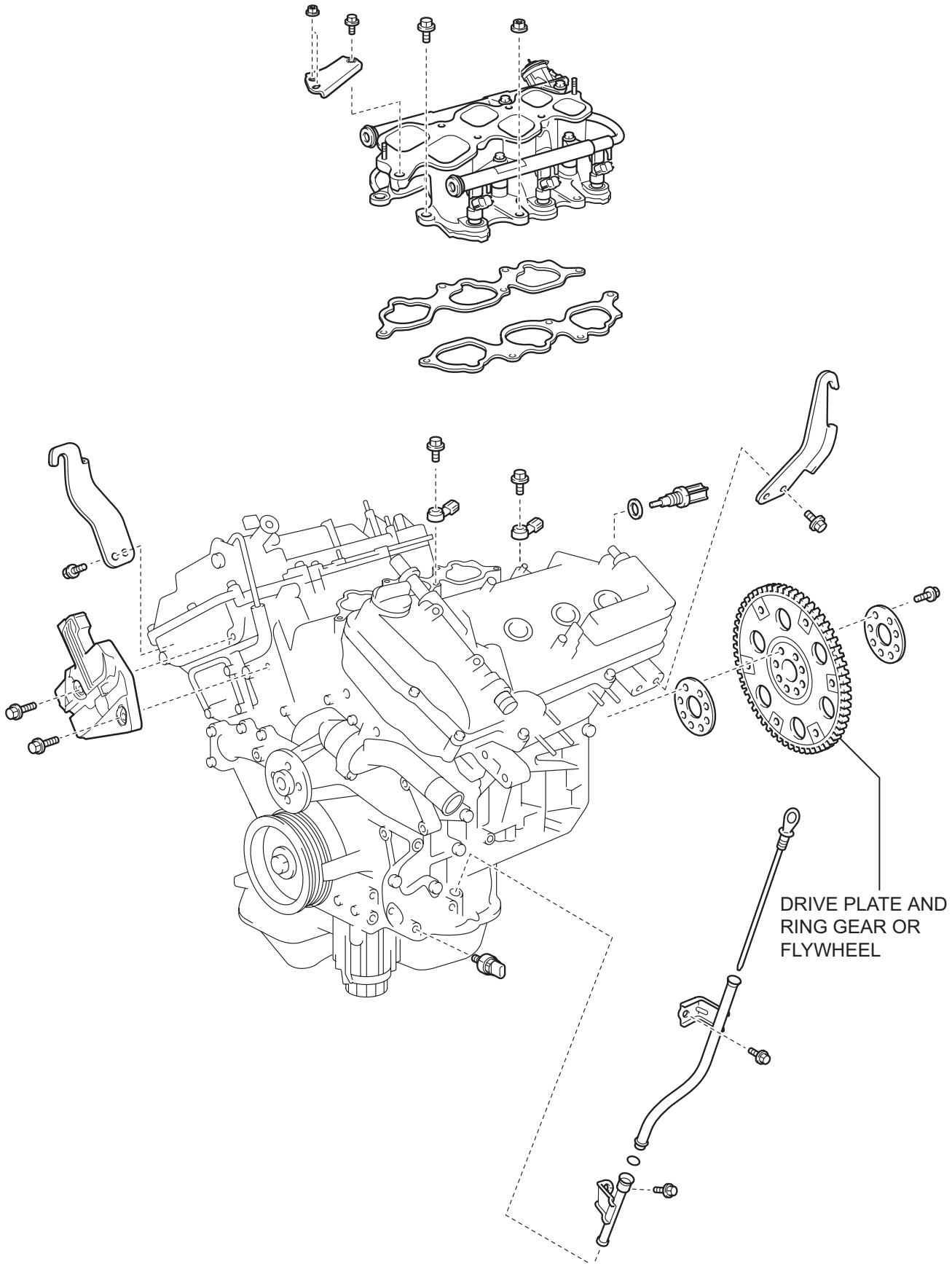
ENGINE REAR OIL SEAL

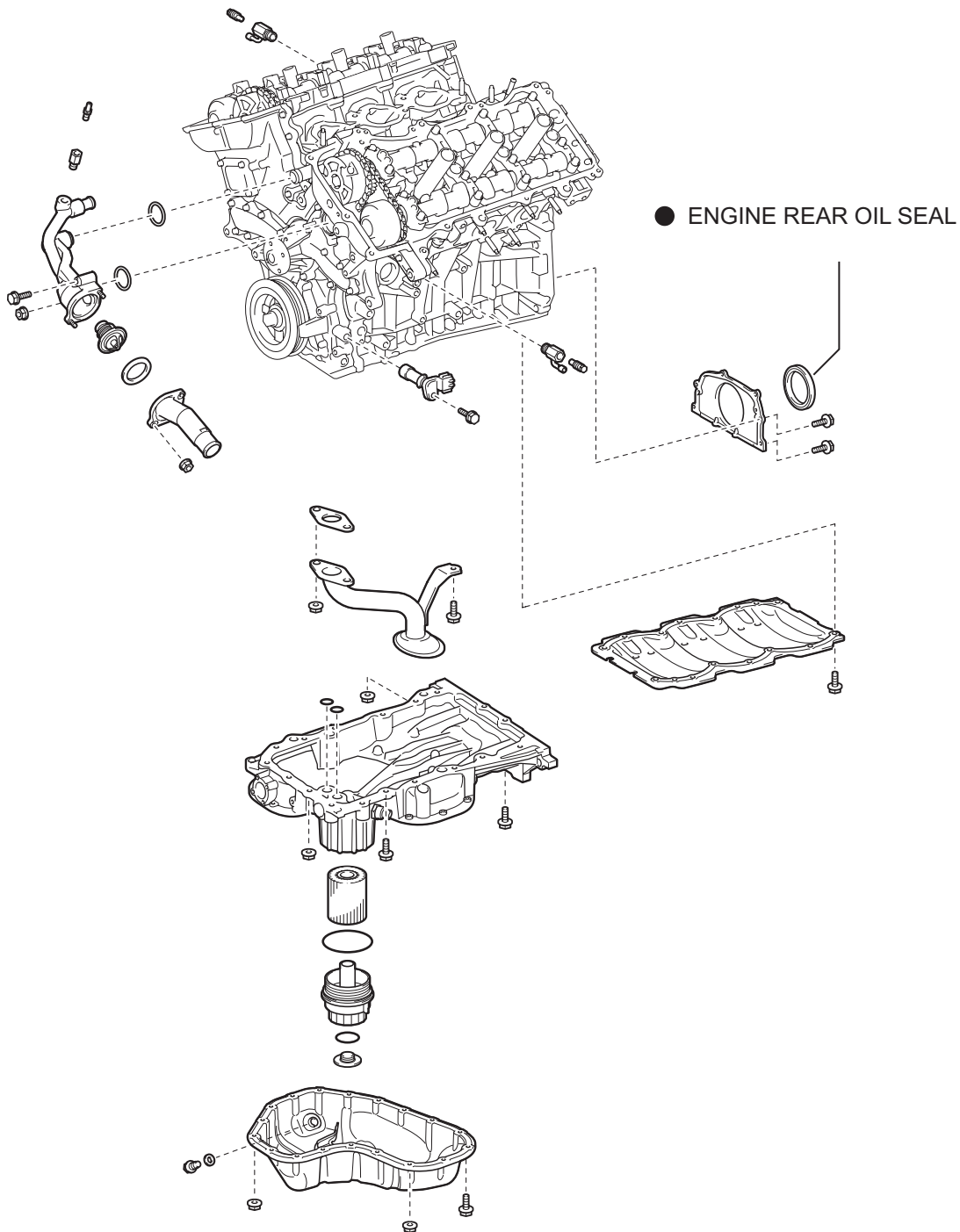
COMPONENTS



EM

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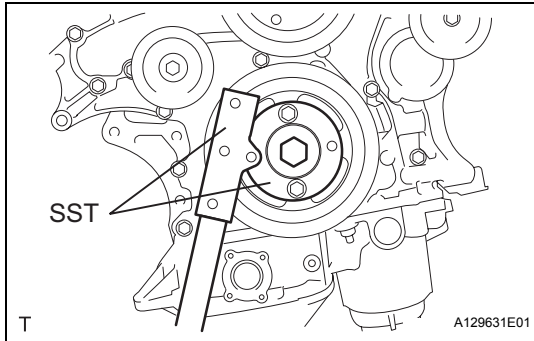
EM

REMOVAL

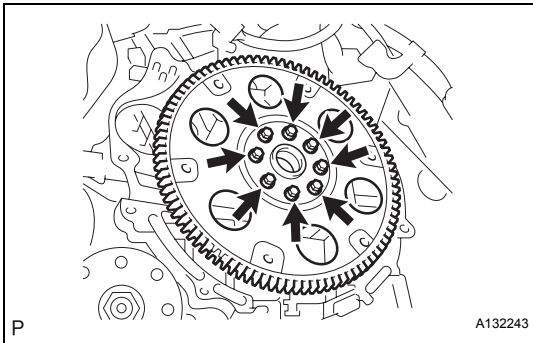
1. REMOVE AUTOMATIC TRANSAXLE ASSEMBLY (See page [AX-158](#))
2. REMOVE DRIVE PLATE AND RING GEAR OR FLYWHEEL

(a) Using SST, hold the crankshaft.

SST 09213-70011 (09213-70020), 09330-00021



(b) Remove the 8 bolts, front spacer, drive plate and rear spacer.



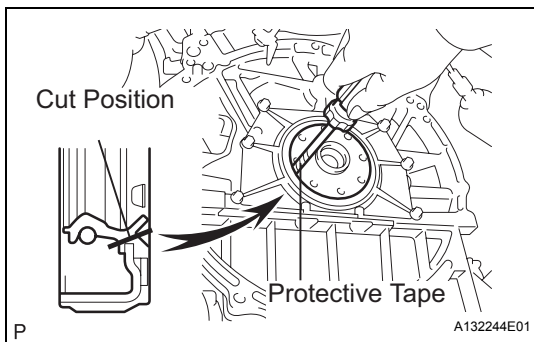
3. REMOVE ENGINE REAR OIL SEAL

(a) Using a knife, cut off the oil seal lip.

(b) Using a screwdriver, pry out the oil seal.

NOTICE:

Be careful not to damage the crankshaft. Tape the screwdriver tip before use.



INSTALLATION

1. INSTALL ENGINE REAR OIL SEAL

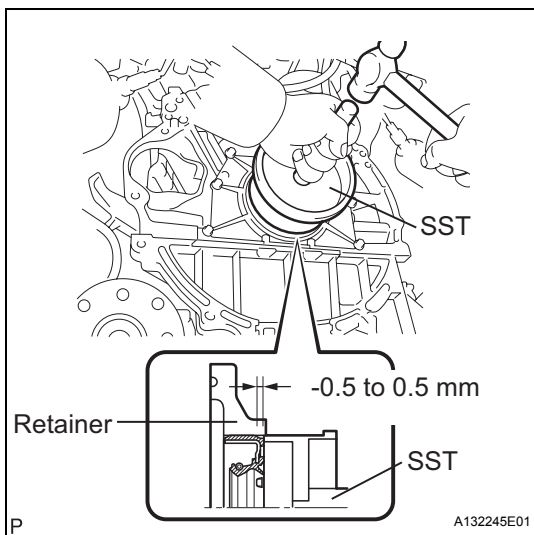
(a) Apply MP grease to a new oil seal lip.

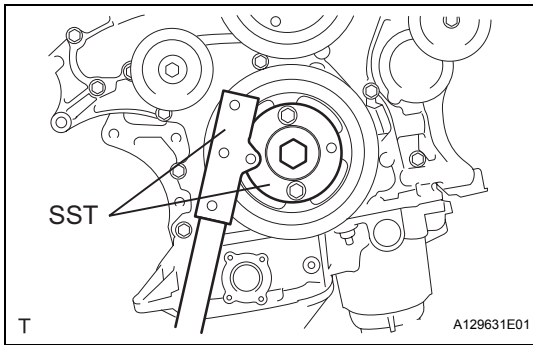
(b) Using SST and a hammer, tap in the oil seal.

SST 09223-15030, 09950-70010 (09951-07150)

Oil seal tap in depth:

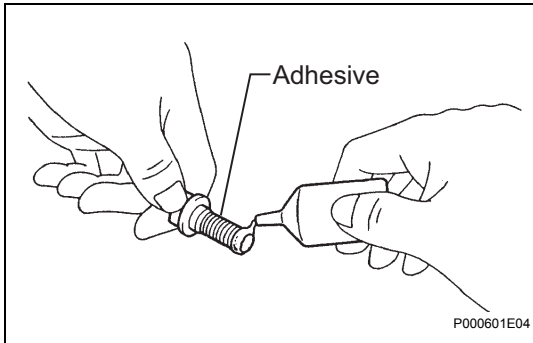
-0.5 to 0.5 mm (-0.020 to 0.020 in.)





2. INSTALL DRIVE PLATE AND RING GEAR OR FLYWHEEL

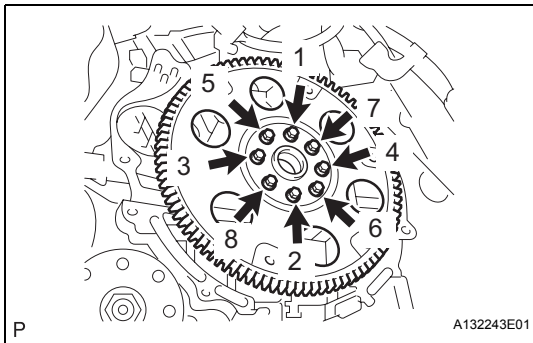
- (a) Using SST, hold the crankshaft.
SST 09213-70011 (09213-70020), 09330-00021



- (b) Apply adhesive to 2 or 3 threads of the mounting bolt end.

Adhesive:

Part No. 08833-00070, THREE BOND 1324 or equivalent



- (1) Install the front spacer, drive plate and rear spacer on the crankshaft.

- (2) Install and tighten the 8 mounting bolts uniformly in several steps.

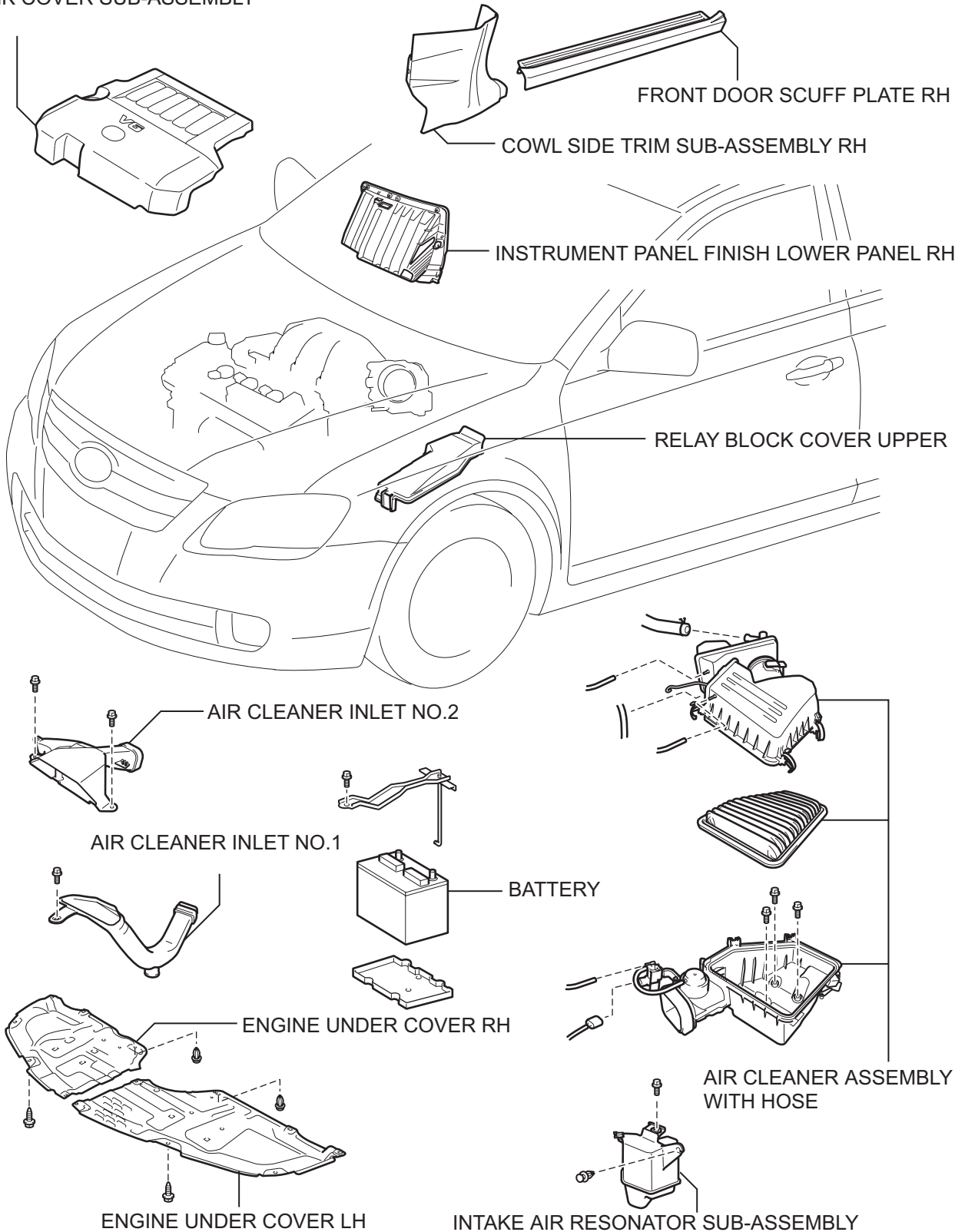
Torque: 83 N*m (850 kgf*cm, 61 ft.*lbf)

3. INSTALL AUTOMATIC TRANSAXLE ASSEMBLY (See page [AX-160](#))

ENGINE ASSEMBLY

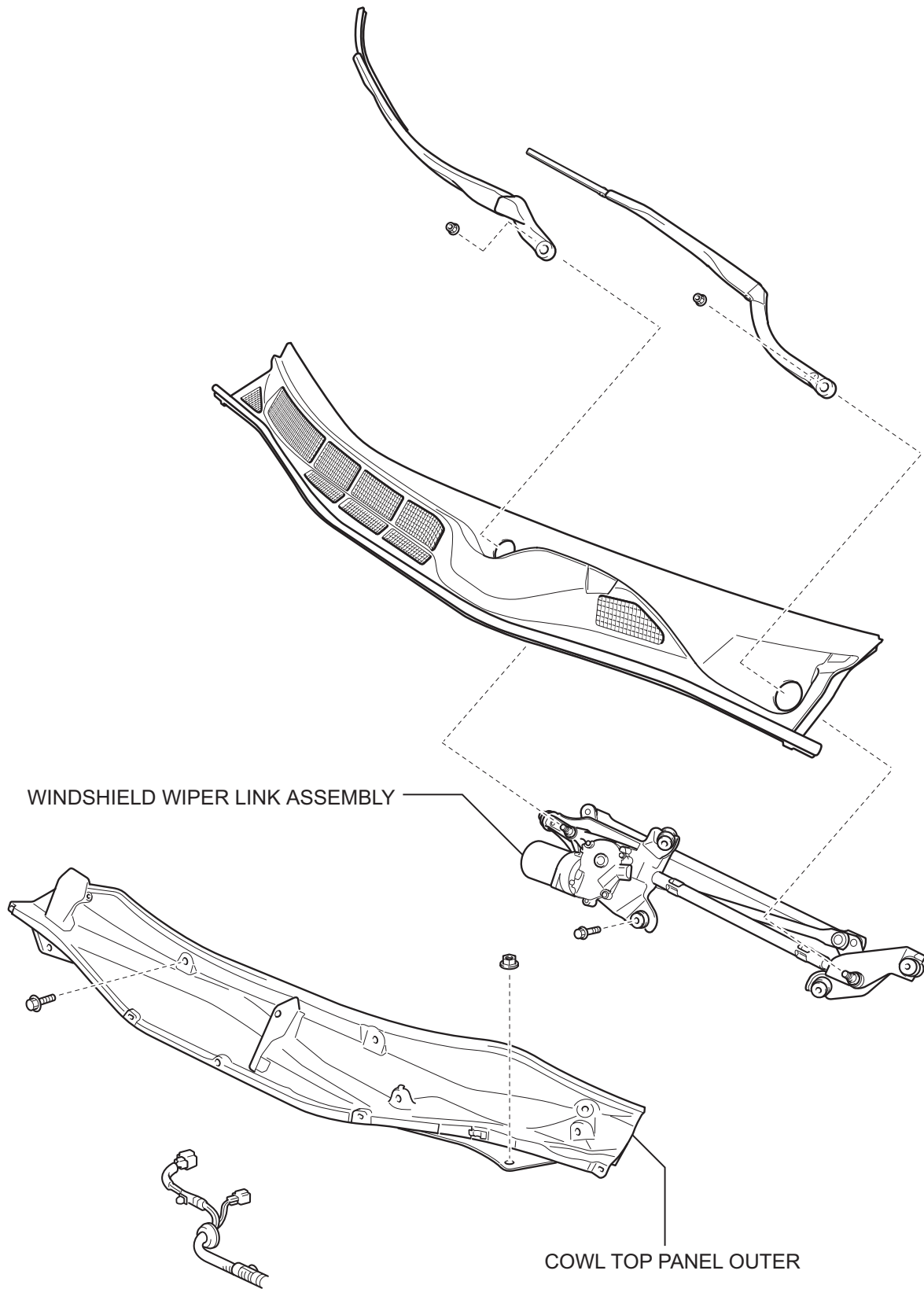
COMPONENTS

V-BANK COVER SUB-ASSEMBLY



EM

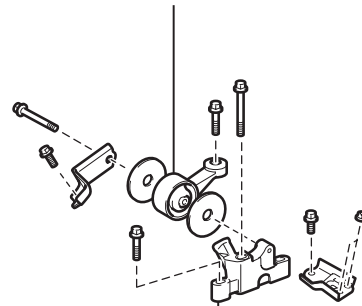
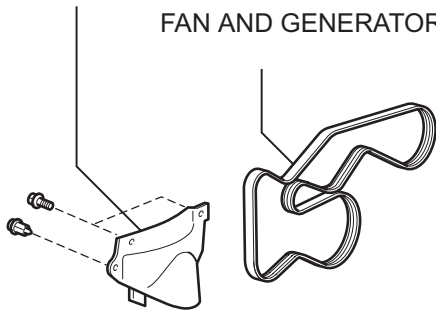
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FRONT FENDER APRON SEAL RH

FAN AND GENERATOR V BELT

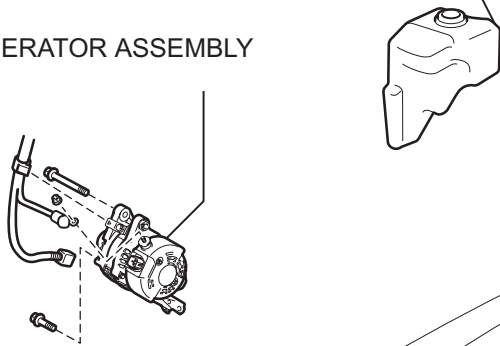
ENGINE MOVING CONTROL ROD



RADIATOR RESERVE TANK ASSEMBLY

GENERATOR ASSEMBLY

ENGINE MOUNTING CONTROL BRACKET



OIL RESERVOIR TO PUMP HOSE NO.1

FUEL TUBE SUB-ASSEMBLY

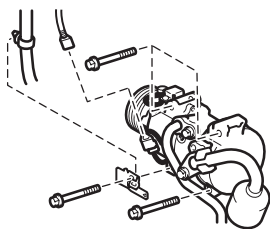
HEATER WATER INLET HOSE A

RADIATOR HOSE INLET

RADIATOR HOSE
OUTLET

STEERING GEAR OUTLET
RETURN TUBE

OIL COOLER OUTLET HOSE



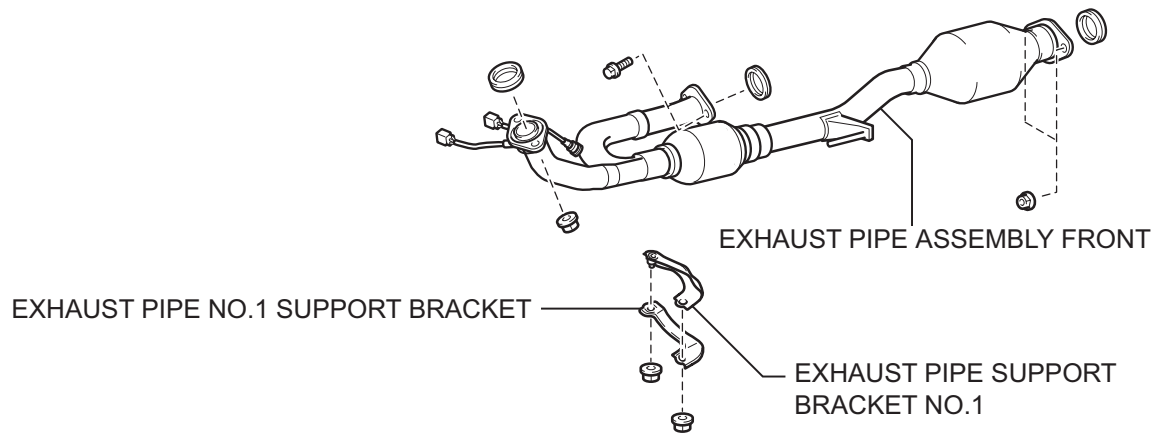
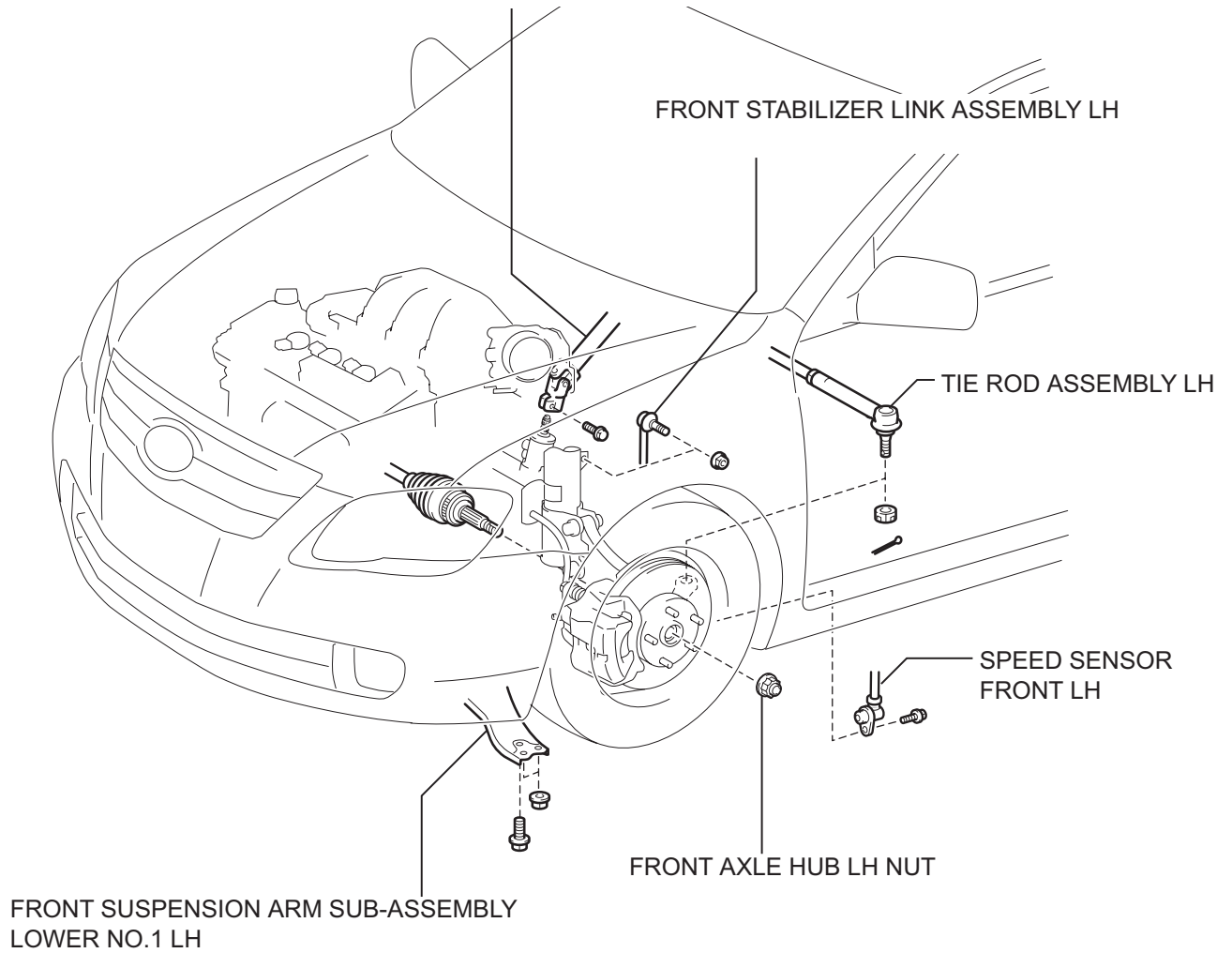
OIL COOLER INLET HOSE

HEATER WATER OUTLET HOSE A

TRANSMISSION CONTROL CABLE ASSEMBLY

EM

STEERING INTERMEDIATE SHAFT ASSEMBLY



EM

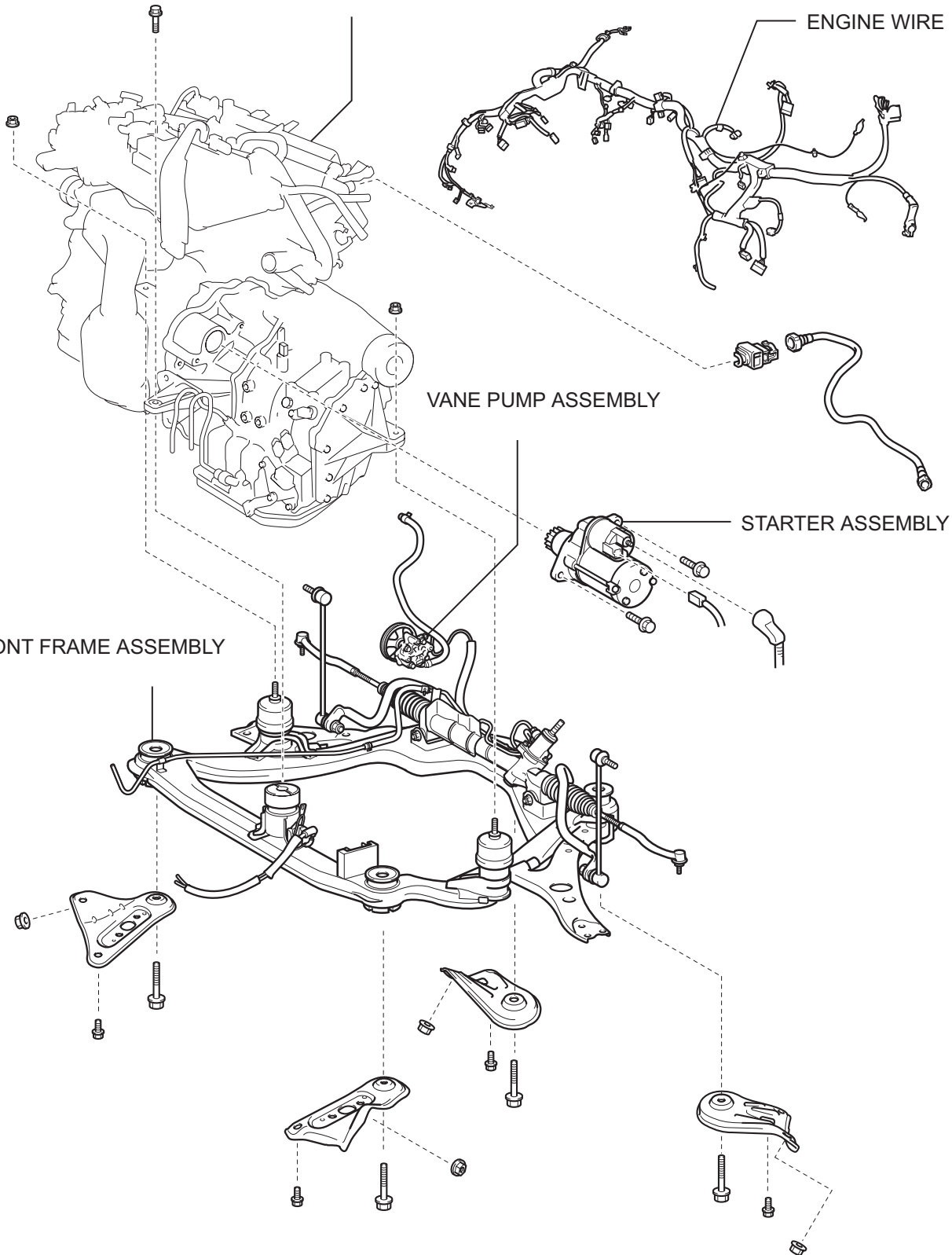
ENGINE ASSEMBLY WITH TRANSAXLE

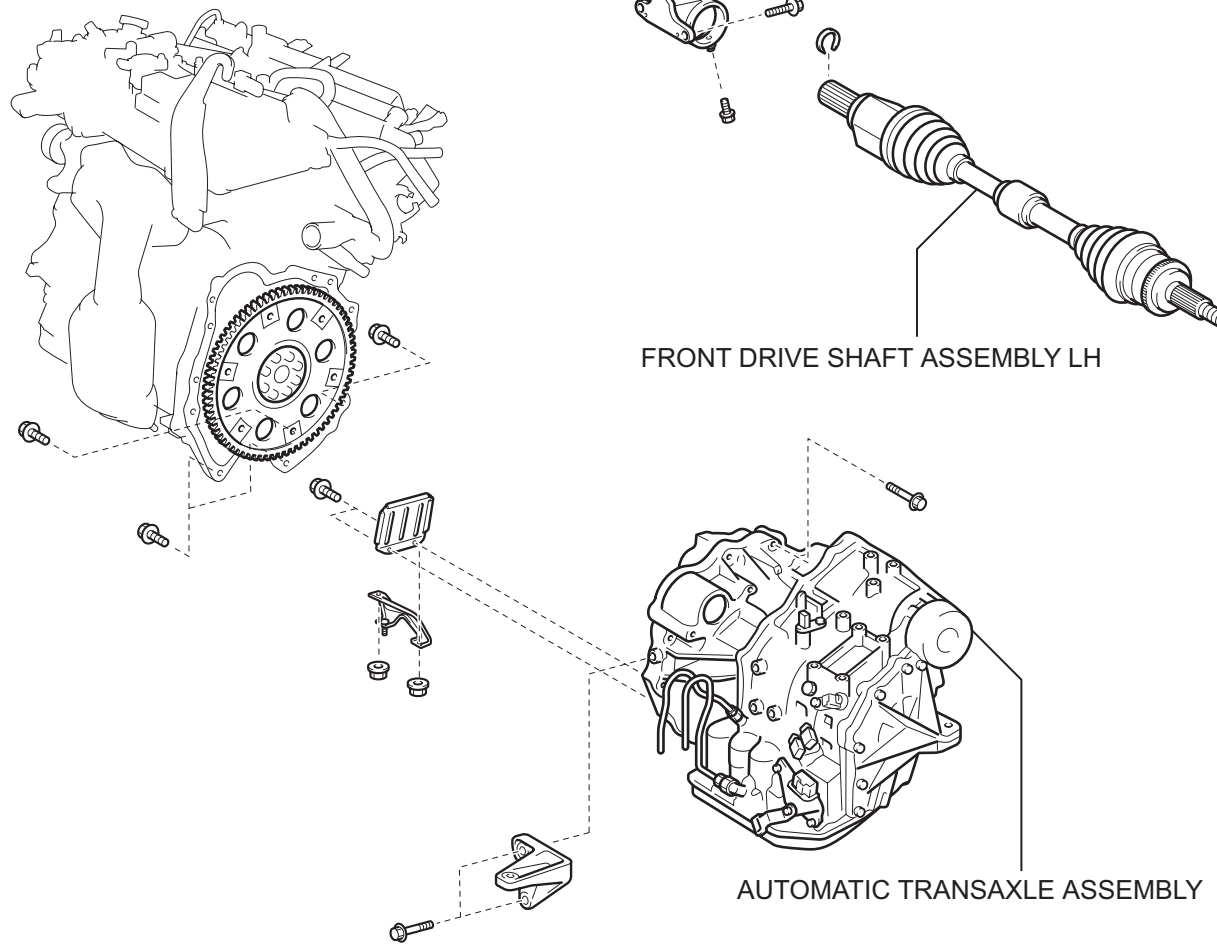
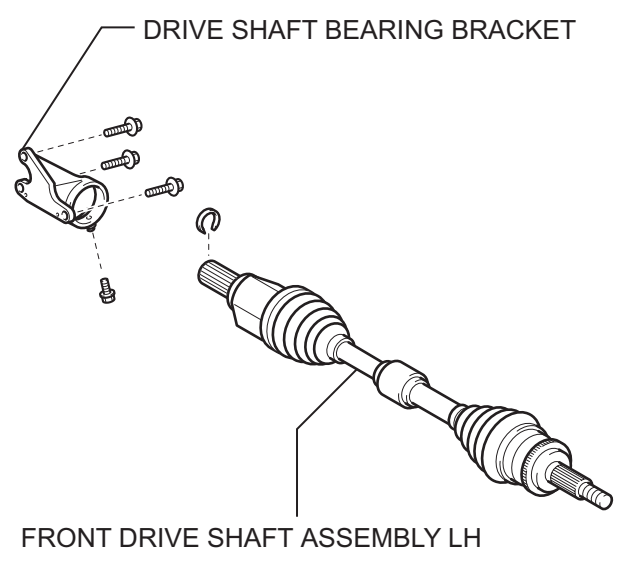
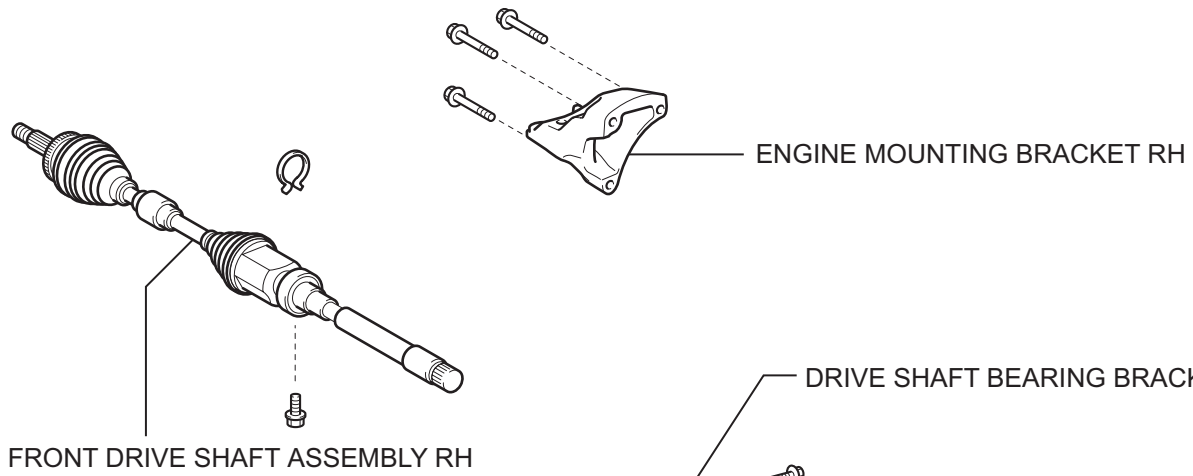
ENGINE WIRE

VANE PUMP ASSEMBLY

STARTER ASSEMBLY

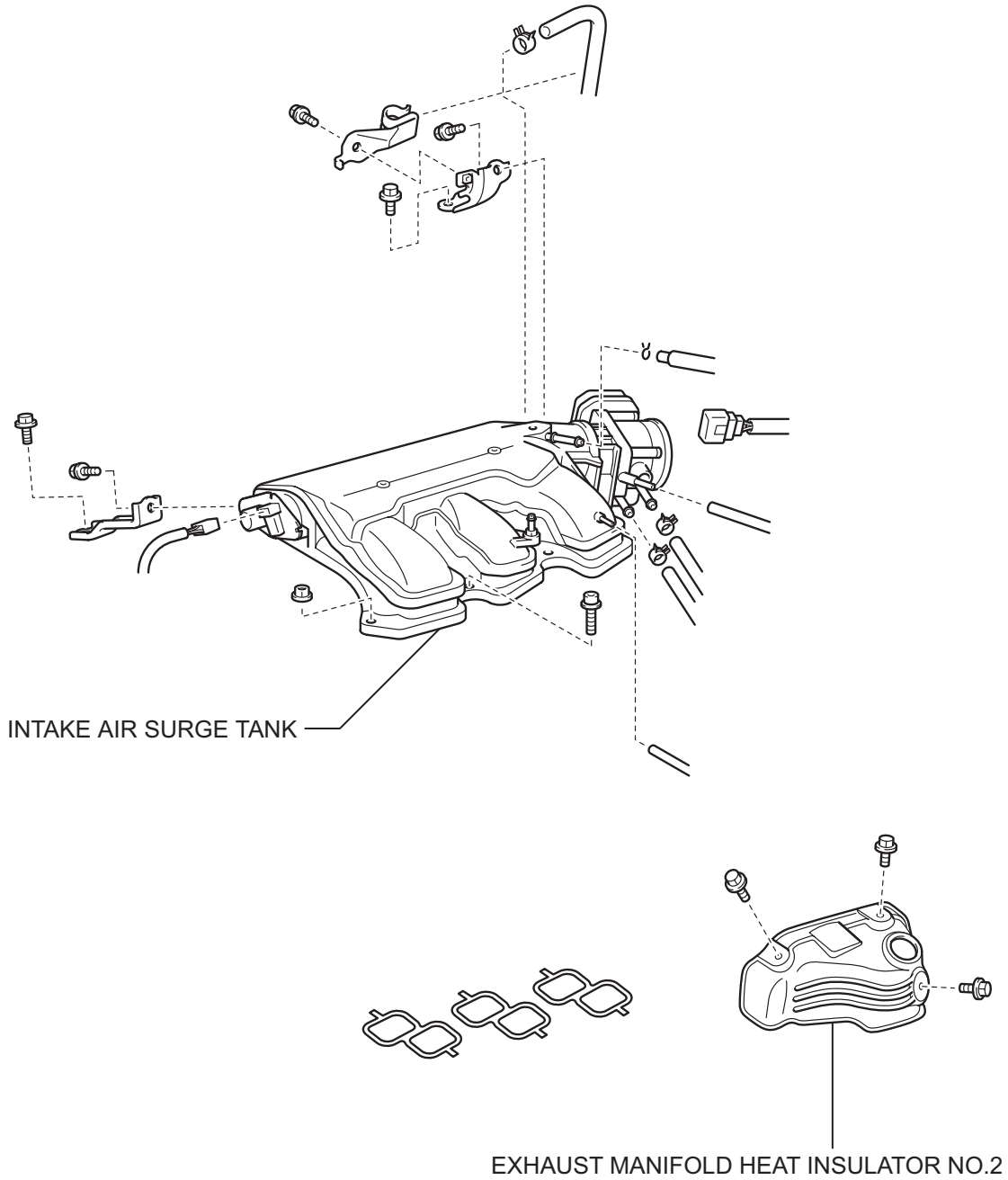
FRONT FRAME ASSEMBLY





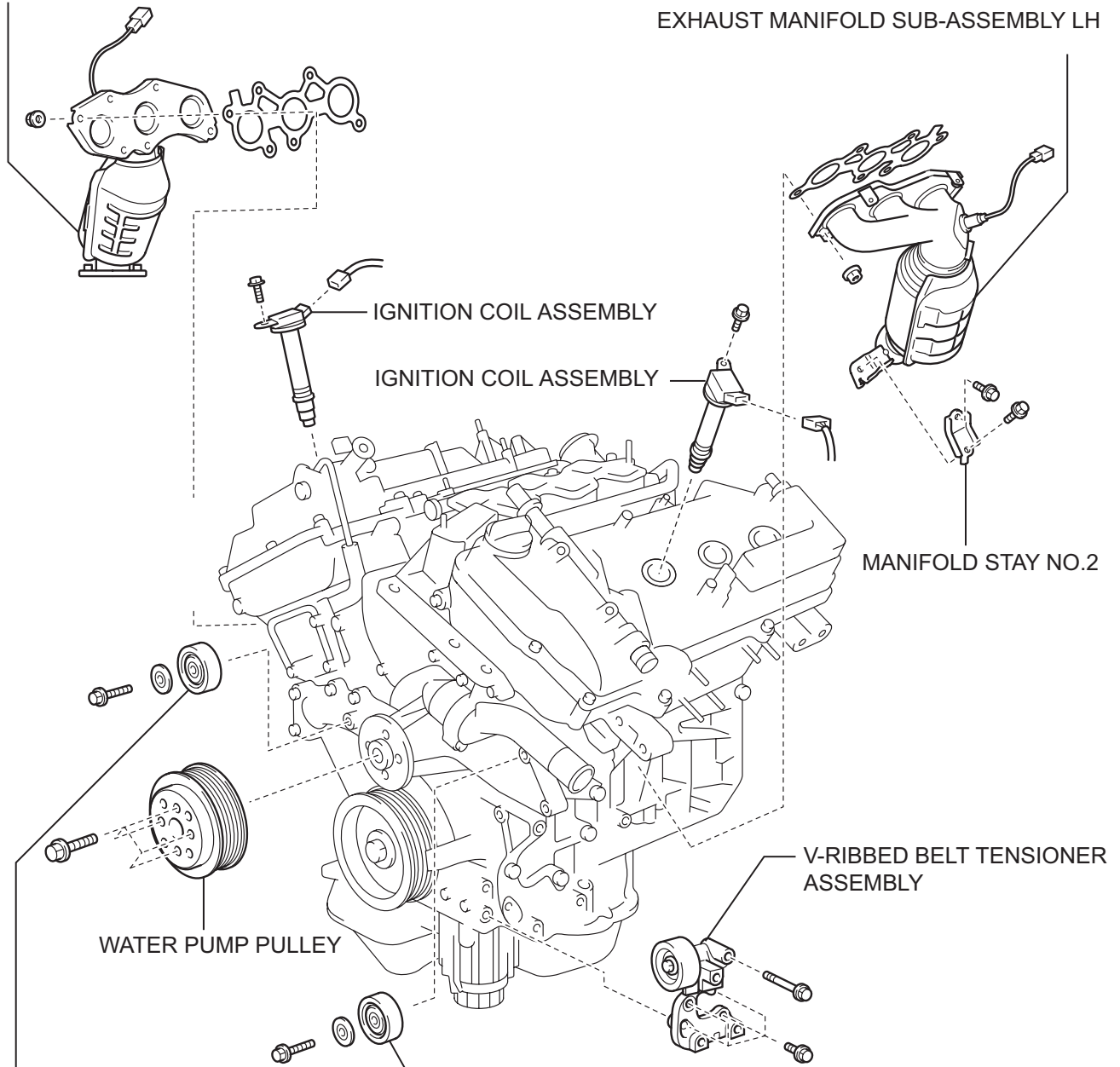
T

EM



EXHAUST MANIFOLD SUB-ASSEMBLY RH

EXHAUST MANIFOLD SUB-ASSEMBLY LH

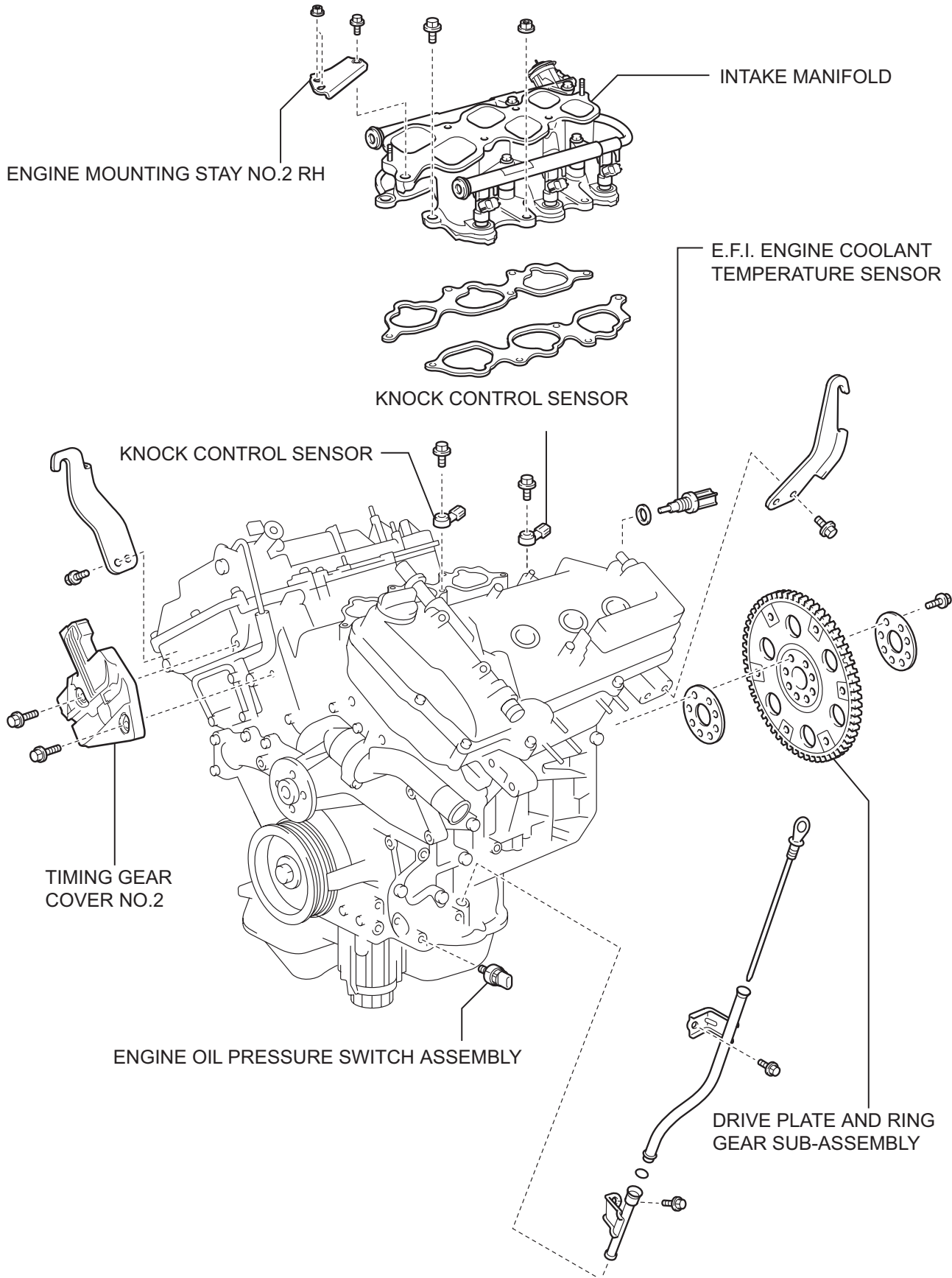


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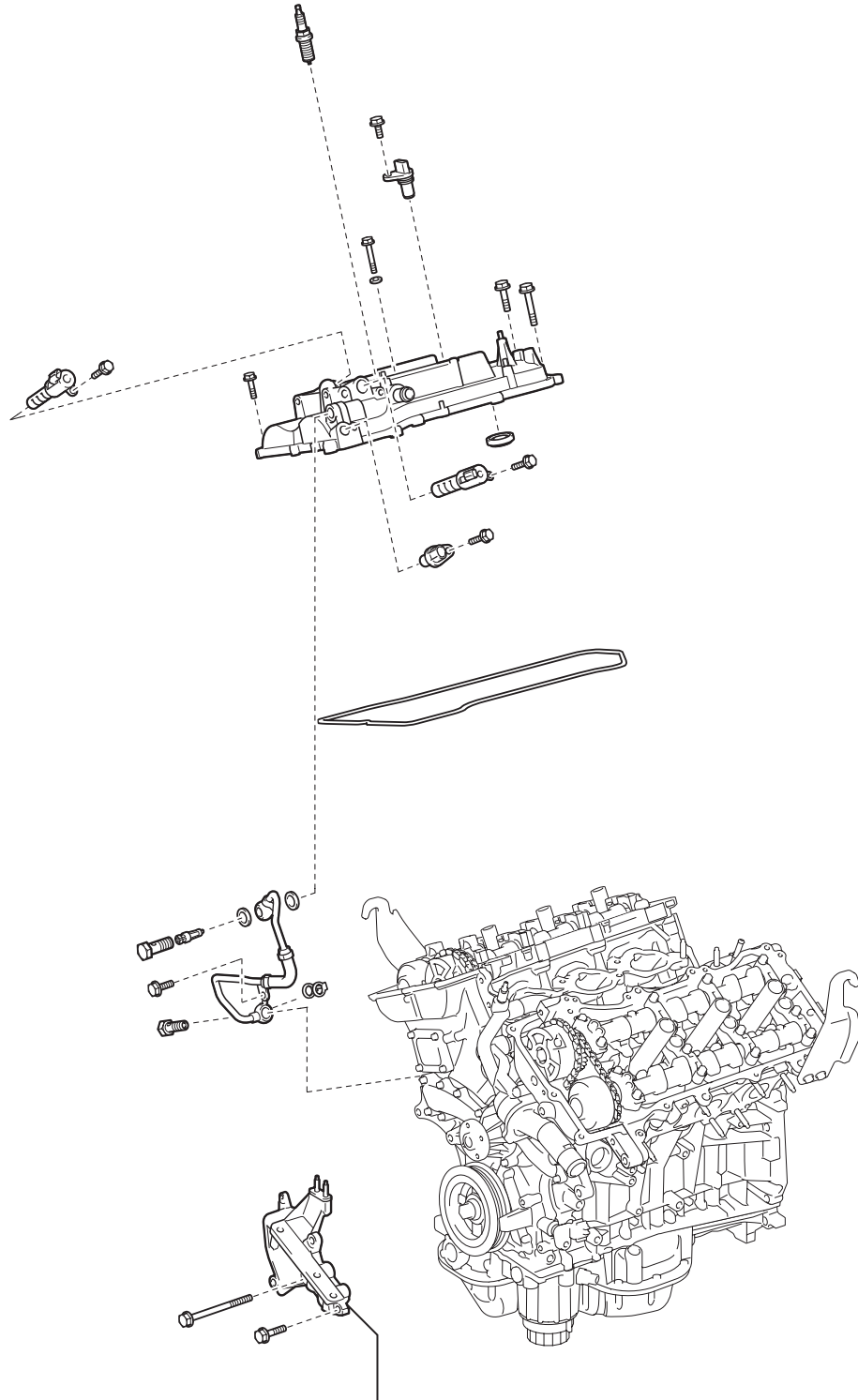
IDLER PULLEY SUB-ASSEMBLY NO.2
(RR SIDE)

IDLER PULLEY SUB-ASSEMBLY NO.2 (FR SIDE)

EM



EM

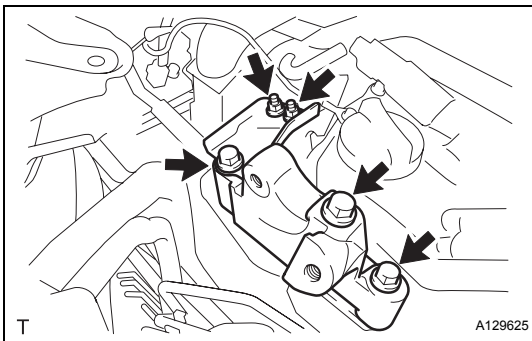
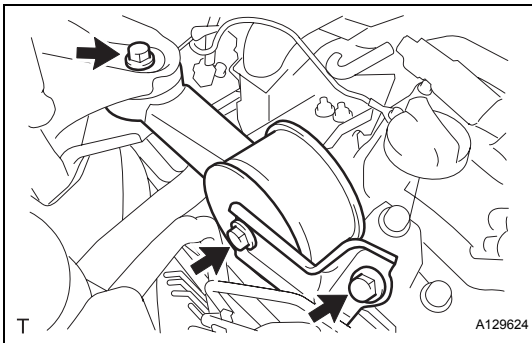


ENGINE MOUNTING BRACKET FRONT NO.1 LH

REMOVAL

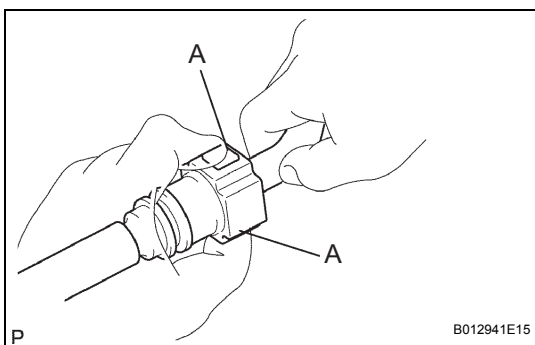
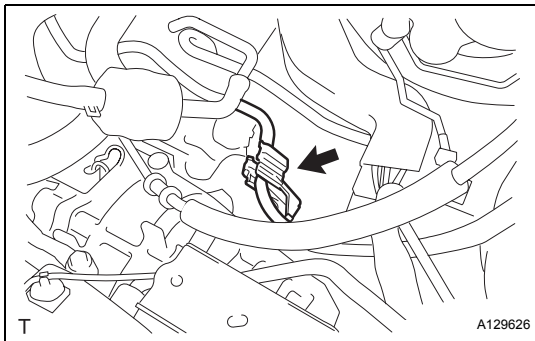
1. PREVENT GASOLINE FROM SPILLING OUT
2. REMOVE FRONT WHEELS
3. REMOVE ENGINE UNDER COVER RH
4. REMOVE ENGINE UNDER COVER LH
5. REMOVE FRONT FENDER APRON SEAL RH
6. DRAIN ENGINE OIL
7. DRAIN ENGINE COOLANT (See page [CO-7](#))
8. DRAIN AUTOMATIC TRANSAXLE FLUID
9. REMOVE WINDSHIELD WIPER LINK ASSEMBLY (See page [WW-38](#))
10. REMOVE COWL TOP PANEL OUTER (See page [BR-20](#))
11. REMOVE BATTERY
12. REMOVE V-BANK COVER SUB-ASSEMBLY
 - (a) Disconnect the 3 clips, and remove the cover.
13. REMOVE FAN AND GENERATOR V BELT

HINT:
Remove V-ribbed belt (See page [EM-7](#)).
SST 09249-63010
14. REMOVE RADIATOR RESERVE TANK ASSEMBLY
15. REMOVE ENGINE MOVING CONTROL ROD
 - (a) Remove the 3 bolts, mounting stay No. 3 RH and moving control rod.



16. REMOVE ENGINE MOUNTING CONTROL BRACKET
 - (a) Remove the 3 bolts and 2 nuts, mounting stay No. 2 RH and mounting control bracket.
17. REMOVE AIR CLEANER INLET NO.2
 - (a) Remove the 2 bolts and air cleaner inlet No. 2.
18. REMOVE AIR CLEANER ASSEMBLY WITH HOSE
 - (a) Disconnect the 3 vacuum hoses and ventilation hose No. 2.
 - (b) Disconnect the MAF meter connector and clamp.
 - (c) Remove the hose clamp, 3 clips and air cleaner cap.
 - (d) Remove the 3 bolts and air cleaner case.
19. REMOVE AIR CLEANER INLET NO.1
 - (a) Remove the bolt and air cleaner inlet No. 1.

20. REMOVE INTAKE AIR RESONATOR SUB-ASSEMBLY
 - (a) Remove the clip, bolt and intake air resonator.
21. REMOVE INTAKE AIR SURGE TANK (See page [FU-12](#))
22. SEPARATE FUEL TUBE SUB-ASSEMBLY
 - (a) Remove the fuel pipe clamp No. 1.

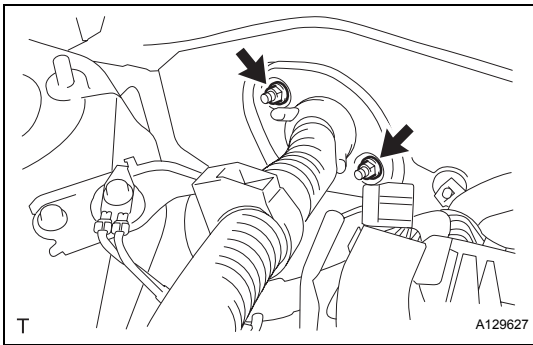


- (b) Disconnect the connector from the tube while pinching part A with your fingers as shown in the illustration.

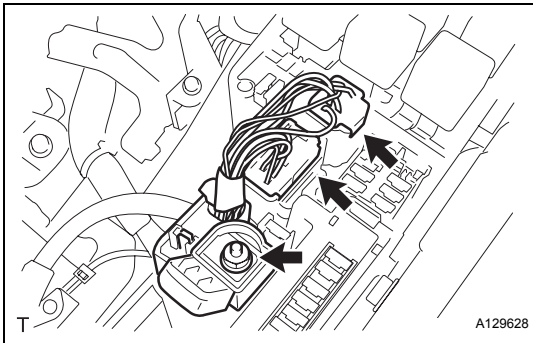
NOTICE:

- Check for contamination in the pipe and around the connector. Clean if necessary and then disconnect the connector.
- Disconnect the connector by hand.
- Do not bend, fold or rotate the nylon tube.
- If the pipe and connector are stuck together, push and pull the connector until it comes free.
- Put the pipe and connector ends in vinyl bags to prevent damage and contamination.

23. REMOVE RADIATOR HOSE INLET
24. REMOVE RADIATOR HOSE OUTLET
25. DISCONNECT OIL COOLER INLET HOSE
26. DISCONNECT OIL COOLER OUTLET HOSE
27. DISCONNECT HEATER WATER INLET HOSE A
28. DISCONNECT HEATER WATER OUTLET HOSE A
29. REMOVE RELAY BLOCK COVER UPPER
30. REMOVE FRONT DOOR SCUFF PLATE RH (See page [IR-12](#))
31. REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page [IR-12](#))
32. REMOVE INSTRUMENT PANEL FINISH LOWER PANEL RH (See page [IP-11](#))

**33. DISCONNECT ENGINE WIRE**

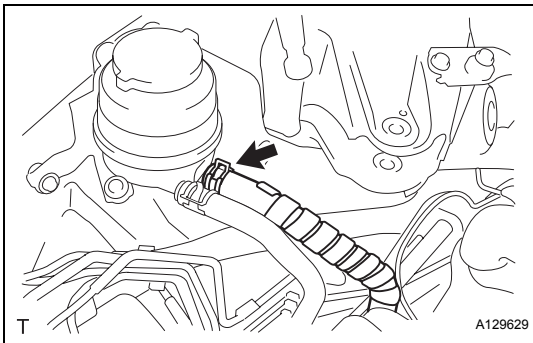
- (a) Remove the 2 nuts and engine wire from the body.
- (b) Disconnect the engine wire from the ECM and passenger side J/B.



- (c) Disconnect the engine wire from the engine room J/B.
 - (1) Remove the nut and separate the wire harness.
 - (2) Using a screwdriver, unlock the engine room J/B. Pull the engine room J/B upward.
 - (3) Disconnect the engine wire connectors.
- (d) Pull out the engine wire.
- (e) Remove the body ground.

34. DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY (See page AX-146)**35. DISCONNECT OIL RESERVOIR TO PUMP HOSE NO.1**

- (a) Disconnect the oil reservoir to pump hose No. 1.

**36. DISCONNECT STEERING GEAR OUTLET RETURN TUBE**

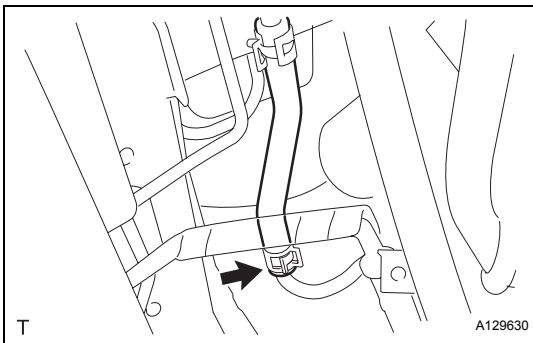
- (a) Disconnect the steering gear outlet return tube.

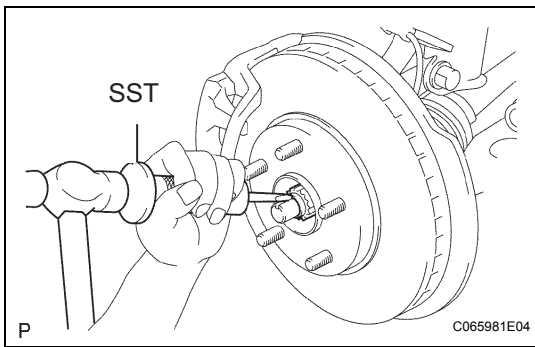
37. REMOVE EXHAUST PIPE NO.1 SUPPORT BRACKET (See page EX-2)**38. REMOVE EXHAUST PIPE ASSEMBLY FRONT (See page EX-2)****39. DISCONNECT FRONT STABILIZER LINK ASSEMBLY LH**

- (a) Using a 6 mm socket hexagon wrench, hold the ball stud.
- (b) Remove the nut and disconnect the stabilizer link.

40. DISCONNECT FRONT STABILIZER LINK ASSEMBLY RH**HINT:**

Use the same procedures described for the LH side.



**41. REMOVE FRONT AXLE HUB LH NUT**

- (a) Using SST and a hammer, strike the lock nut covering to remove it.

SST 09930-00010

NOTICE:

- Set the drive shaft's groove so that it faces up. Then use the SST and a hammer.
- Remove the covering from the lock nut completely. Otherwise the screw of the drive shaft may be damaged.
- Do not sharpen the tip of the SST.

- (b) Using a 30 mm socket wrench, remove the lock nut.

42. REMOVE FRONT AXLE HUB RH NUT**HINT:**

Use the same procedures described for the LH side.

43. DISCONNECT SPEED SENSOR FRONT LH

- (a) Remove the bolt and disconnect the speed sensor from the steering knuckle.

NOTICE:

Keep the speed sensor tip and connection free of foreign matter.

44. DISCONNECT SPEED SENSOR FRONT RH**HINT:**

Use the same procedures described for the LH side.

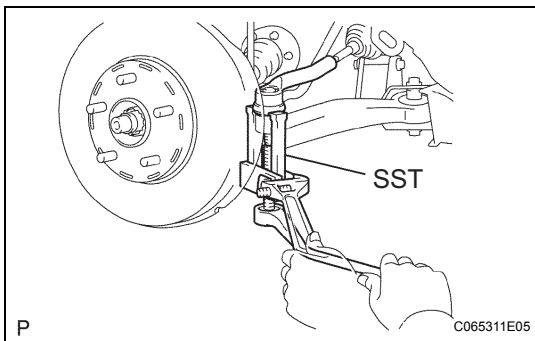
45. DISCONNECT TIE ROD ASSEMBLY LH

- (a) Remove the cotter pin and nut.
 (b) Using SST, disconnect the tie rod end from the steering knuckle.

SST 09628-62011

NOTICE:

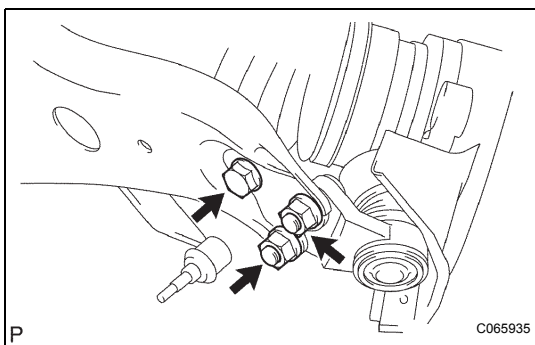
Do not damage the dust cover of the ball joint.

**46. DISCONNECT TIE ROD ASSEMBLY RH****HINT:**

Use the same procedures described for the LH side.

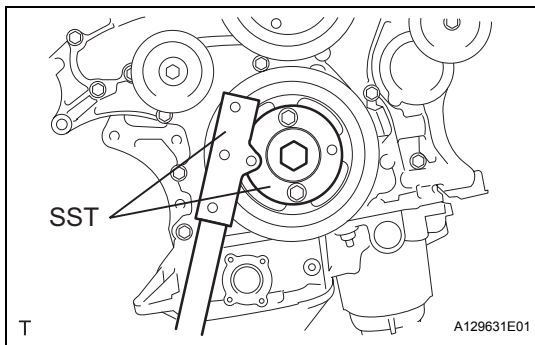
47. DISCONNECT FRONT SUSPENSION ARM SUB-ASSEMBLY LOWER NO.1 LH

- (a) Remove the bolt and 2 nuts, and separate the front suspension arm from the lower ball joint.
 (b) Using a plastic hammer, disconnect the drive shaft from the axle hub.

**48. DISCONNECT FRONT SUSPENSION ARM SUB-ASSEMBLY LOWER NO.1 RH****HINT:**

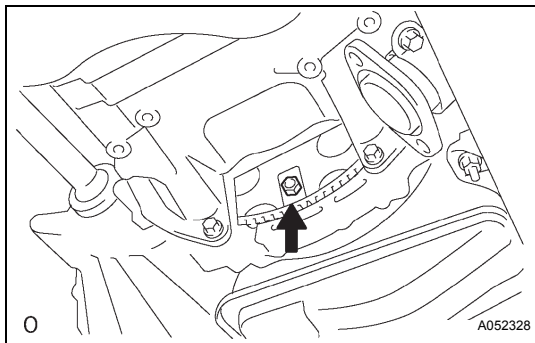
Use the same procedures described for the LH side.

49. REMOVE EXHAUST PIPE SUPPORT BRACKET NO.1
(See page [EX-2](#))

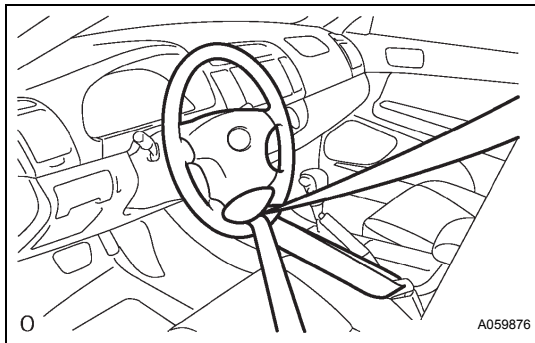


50. REMOVE DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT

- (a) Using SST, hold the crankshaft.
SST 09213-70011 (09213-70020), 09330-00021
- (b) Remove the 2 bolts and flywheel housing under cover.

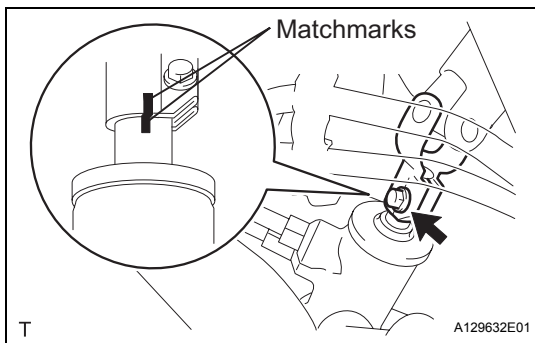


- (c) Remove the 6 torque converter setting bolts.



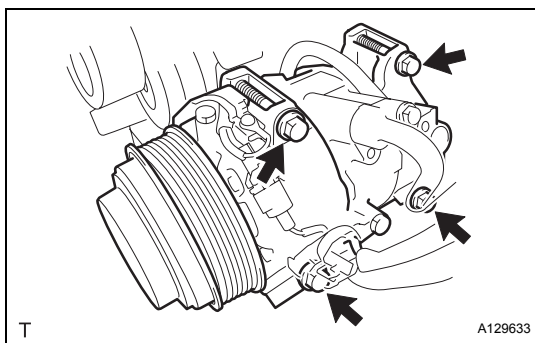
51. DISCONNECT STEERING INTERMEDIATE SHAFT ASSEMBLY

- (a) To prevent the steering wheel from rotating, fix the wheel with the seat belt.
NOTICE:
If the steering wheel is not fixed, the spiral cable will be damaged.



- (b) Put matchmarks on the steering intermediate shaft and control valve shaft.
- (c) Remove the bolt and disconnect the steering intermediate shaft.

52. REMOVE GENERATOR ASSEMBLY (See page [CH-9](#))

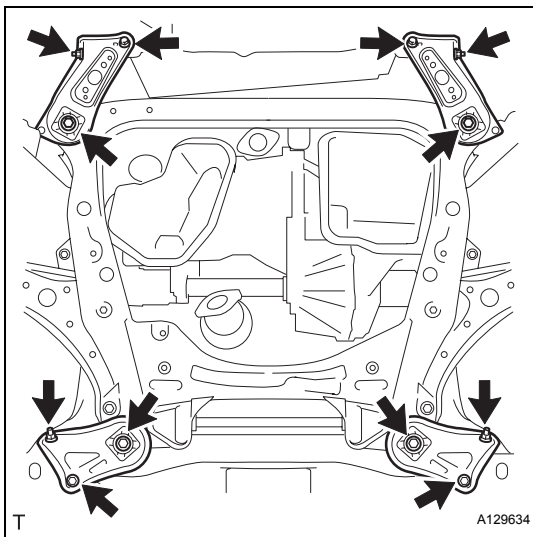


53. SEPARATE COOLER COMPRESSOR ASSEMBLY

- (a) Remove the 2 connector clamps.
- (b) Remove the 4 bolts and separate the compressor.
HINT:
Hang up the hoses instead of detaching them.

54. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE

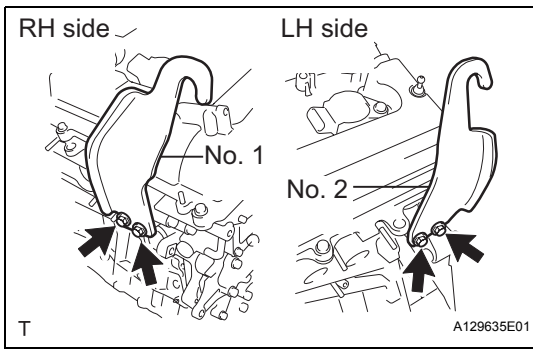
- (a) Set the engine lifter.



- (b) Remove the 4 bolts, 2 nuts, frame side rail plate RH and LH.
- (c) Remove the 4 bolts, 2 nuts, front suspension member brace rear RH and LH.
- (d) Operate the engine lifter, then remove the engine assembly from the vehicle.

NOTICE:

Make sure the engine is clear of all wiring and hoses.



- (e) Install the 2 engine hangers with the 4 bolts as shown in the illustration.

Part NO.:

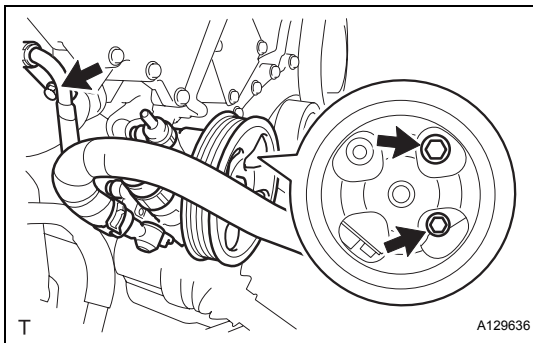
Engine hanger No. 1 12281-31070

Engine hanger No. 2 12282-31050

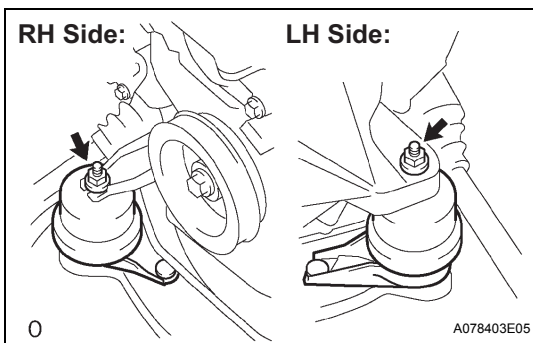
Bolts 91671-10825

Torque: 33 N*m (337 kgf*cm, 24 ft.*lbf)

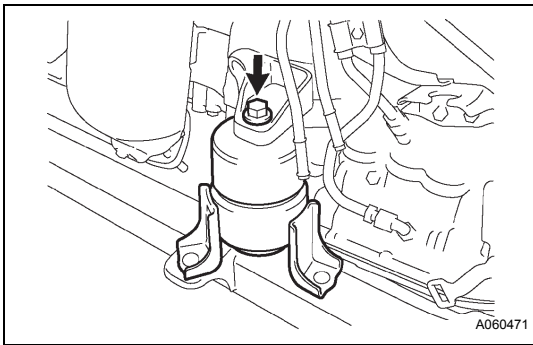
- (f) Attach the engine sling device and hang the engine with the chain block.

**55. REMOVE VANE PUMP ASSEMBLY**

- (a) Remove the pressure feed tube clamp bolt.
- (b) Remove the 2 bolts, nut and vane pump.

**56. REMOVE FRONT FRAME ASSEMBLY**

- (a) Remove the 2 nuts and disconnect the engine mounting insulators RH and LH.



- (b) Remove the bolt and disconnect the engine mounting insulator FR.

57. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-6)

58. REMOVE FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-7)

59. REMOVE ENGINE WIRE

60. REMOVE STARTER ASSEMBLY (See page ST-72)

61. REMOVE AUTOMATIC TRANSAXLE ASSEMBLY (See page AX-158)

62. REMOVE DRIVE PLATE AND RING GEAR SUB-ASSEMBLY

SST 09213-70011 (09213-70020), 09330-00021

63. INSTALL ENGINE STAND

64. REMOVE IGNITION COIL ASSEMBLY

- (a) Remove the 6 bolts and 6 ignition coils.

65. REMOVE ENGINE MOUNTING STAY NO.2 RH

- (a) Remove the bolt and mounting stay No. 2 RH.

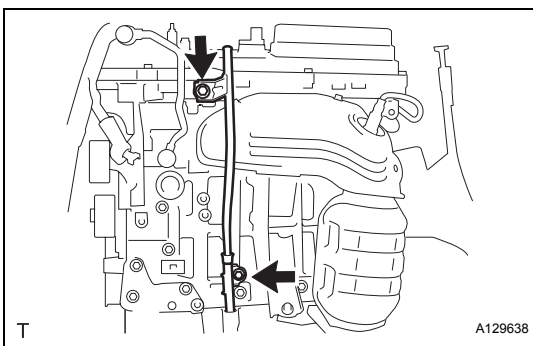
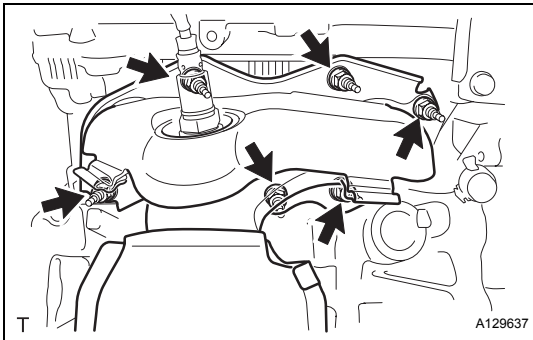
66. REMOVE INTAKE MANIFOLD

67. REMOVE EXHAUST MANIFOLD SUB-ASSEMBLY RH

- (a) Disconnect the A/F sensor connector clamp.

- (b) Uniformly loosen and remove the 6 nuts.

- (c) Remove the manifold and gasket.

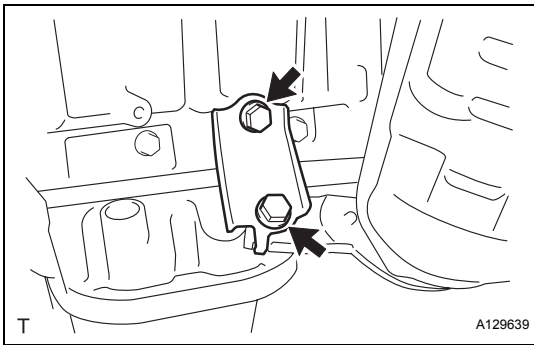


68. REMOVE OIL LEVEL GAUGE GUIDE SUB-ASSEMBLY

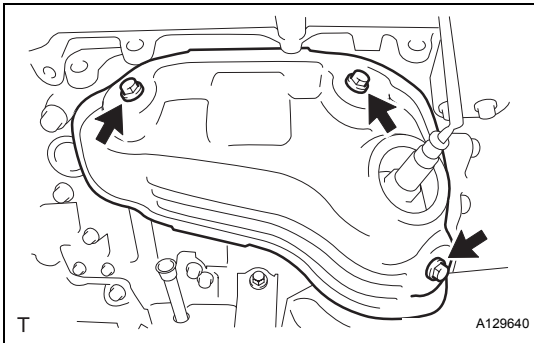
- (a) Remove the oil level gauge.

- (b) Remove the 2 bolts, oil level gauge guides No. 1 and No. 2.

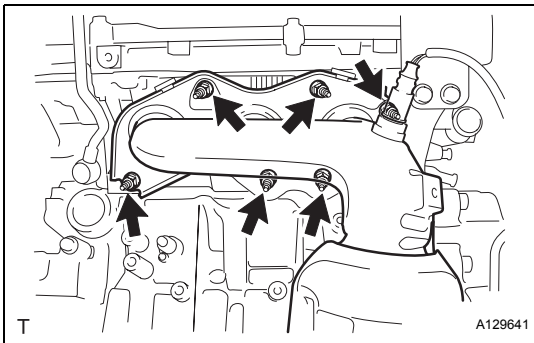
- (c) Remove the O-rings from the oil level gauge guide.

**69. REMOVE MANIFOLD STAY NO.2**

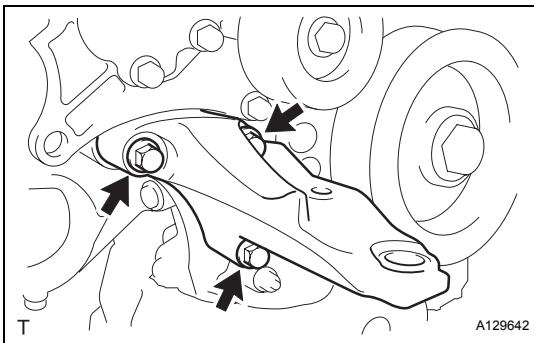
- (a) Remove the 2 bolts and manifold stay No. 2.

**70. REMOVE EXHAUST MANIFOLD HEAT INSULATOR NO.2**

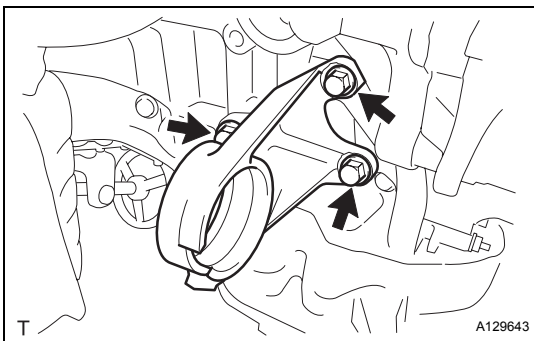
- (a) Remove the 3 bolts and insulator No. 2.

**71. REMOVE EXHAUST MANIFOLD SUB-ASSEMBLY LH**

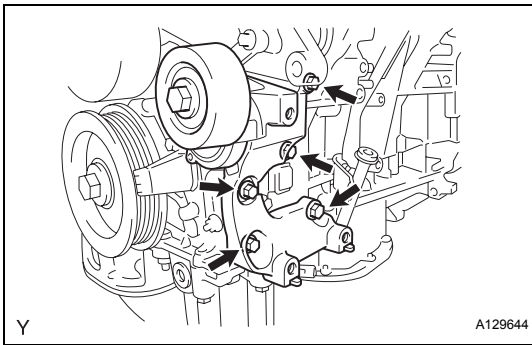
- (a) Uniformly loosen and remove the 6 nuts.
 (b) Remove the manifold and gasket.

**72. REMOVE ENGINE MOUNTING BRACKET RH**

- (a) Remove the 3 bolts and engine mounting bracket RH.

**73. REMOVE DRIVE SHAFT BEARING BRACKET**

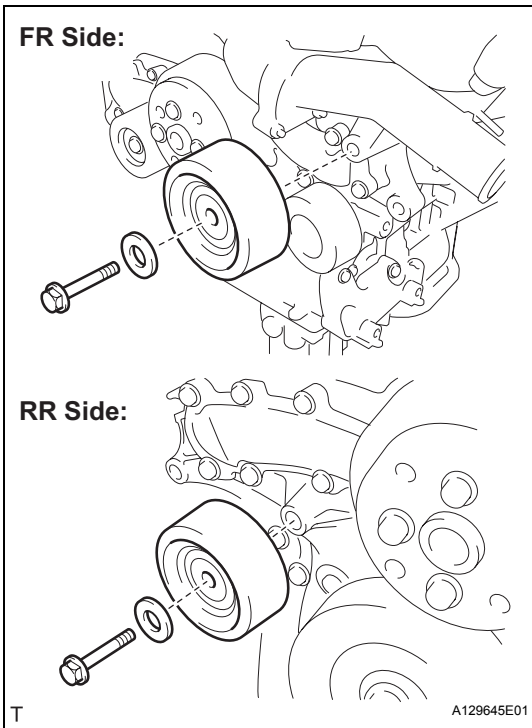
- (a) Remove the 3 bolts and drive shaft bearing bracket.

**74. REMOVE V-RIBBED BELT TENSIONER ASSEMBLY**

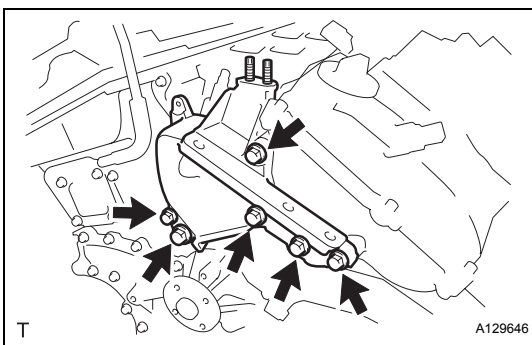
- (a) Remove the 5 bolts and V-ribbed belt tensioner assembly.

75. REMOVE TIMING GEAR COVER NO.2

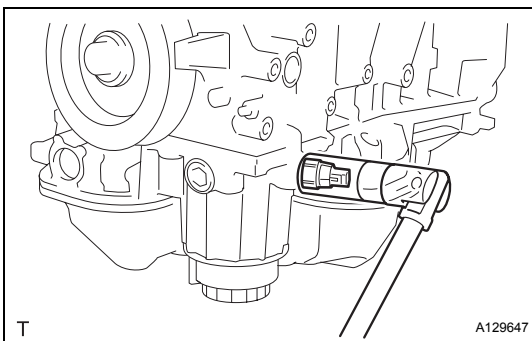
- (a) Remove the 2 bolts and timing gear cover No. 2.

**76. REMOVE IDLER PULLEY SUB-ASSEMBLY NO.2**

- (a) Remove the bolt, plate and idler pulley sub-assembly No. 2.

77. REMOVE WATER PUMP PULLEY (See page CO-17)**78. REMOVE ENGINE MOUNTING BRACKET FRONT NO.1 LH**

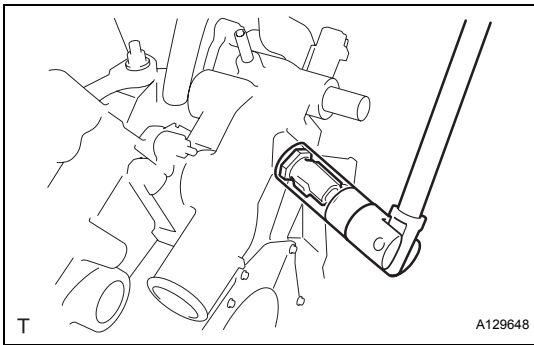
- (a) Remove the 6 bolts and engine mounting bracket front No. 1 LH.

**79. REMOVE ENGINE OIL PRESSURE SWITCH ASSEMBLY**

- (a) Using a 24 mm deep socket wrench, remove the engine oil pressure switch assembly.

80. REMOVE KNOCK CONTROL SENSOR

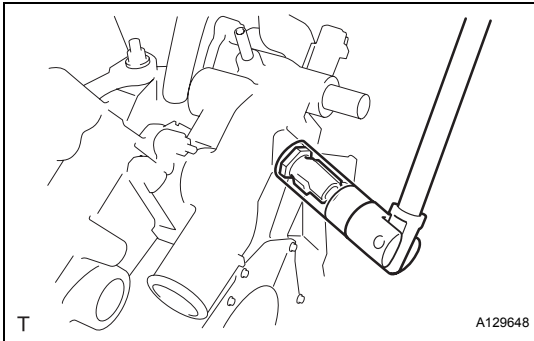
- (a) Remove 2 bolts and 2 sensors.



81. REMOVE E.F.I. ENGINE COOLANT TEMPERATURE SENSOR

- (a) Using a 19 mm deep socket wrench, remove the EFI engine coolant temperature sensor and gasket.

82. REPLACE PARTIAL ENGINE ASSEMBLY



INSTALLATION

1. INSTALL E.F.I. ENGINE COOLANT TEMPERATURE SENSOR

- (a) Using a 19 mm deep socket wrench, install the EFI engine coolant temperature sensor and a new gasket.

Torque: 20 N*m (200 kgf*cm, 14 ft.*lbf)

2. INSTALL KNOCK CONTROL SENSOR (See page [ES-438](#))

3. INSTALL ENGINE OIL PRESSURE SWITCH ASSEMBLY

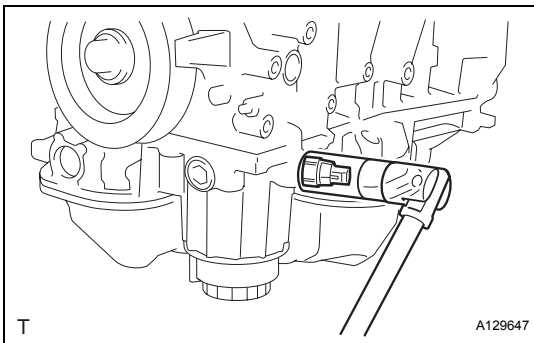
- (a) Clean the threads of the oil pressure switch. Apply adhesive to 2 or 3 threads of the oil pressure switch.

Adhesive:

Part No. 08833-00080 THREE BOND 1344, LOCTITE 242 or equivalent

- (b) Using a 24 mm deep socket wrench install the oil pressure switch.

Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

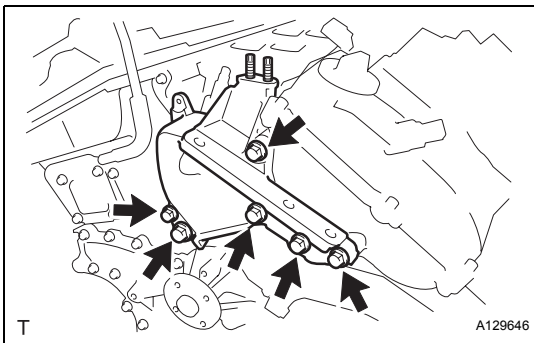


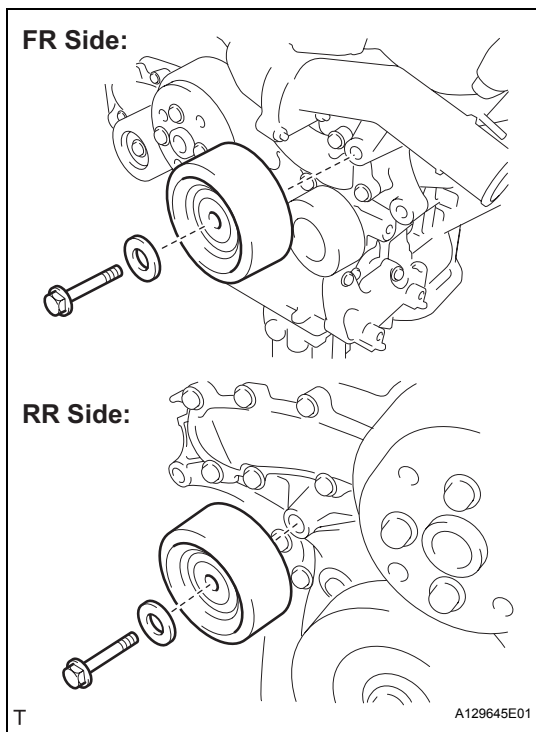
4. INSTALL ENGINE MOUNTING BRACKET FRONT NO.1 LH

- (a) Install the engine mounting bracket front No. 1 LH with the 6 bolts.

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

5. INSTALL WATER PUMP PULLEY (See page [CO-18](#))



**6. INSTALL IDLER PULLEY SUB-ASSEMBLY NO.2**

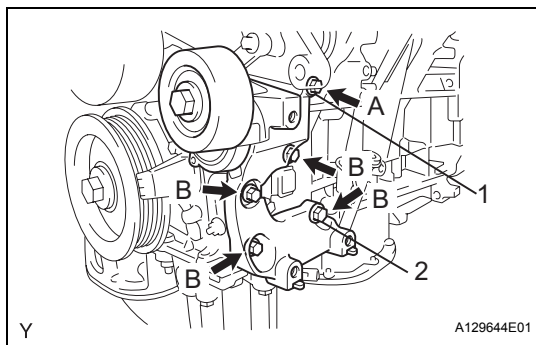
- (a) Install the idler pulley sub-assembly No. 2 and cover plate with the bolt.

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

7. INSTALL TIMING GEAR COVER NO.2

- (a) Install the timing gear cover No. 2 with the 2 bolts.

Torque: 6.0 N*m (61 kgf*cm, 53 in.*lbf)

**8. INSTALL V-RIBBED BELT TENSIONER ASSEMBLY**

- (a) Temporarily install the V-ribbed belt tensioner with the 5 bolts.

- (b) Install the V-ribbed belt tensioner by tightening the bolt 1 and bolt 2 in the order shown in the illustration.

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

- (c) Tighten the other bolts.

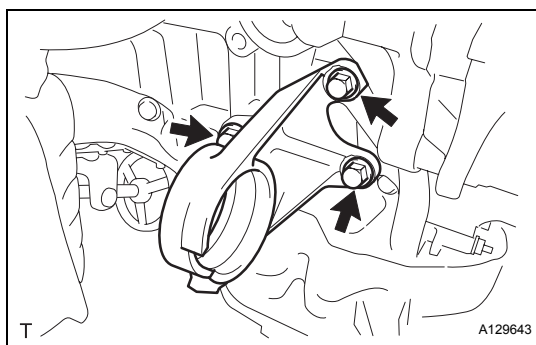
Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)

HINT:

Each bolt length is as follows:

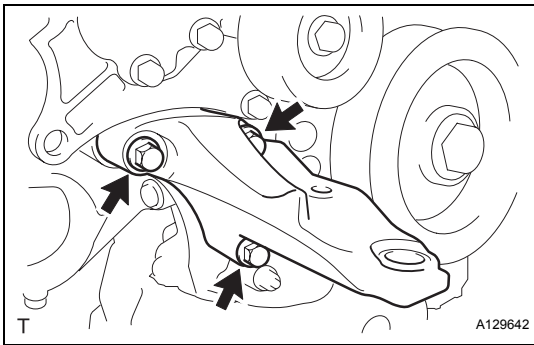
A: 70 mm (2.76 in.)

B: 33 mm (1.30 in.)

**9. INSTALL DRIVE SHAFT BEARING BRACKET**

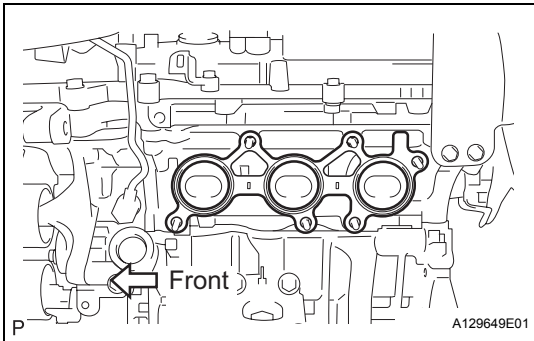
- (a) Install the drive shaft bearing bracket with the 3 bolts.

Torque: 64 N*m (650 kgf*cm, 47 ft.*lbf)

**10. INSTALL ENGINE MOUNTING BRACKET RH**

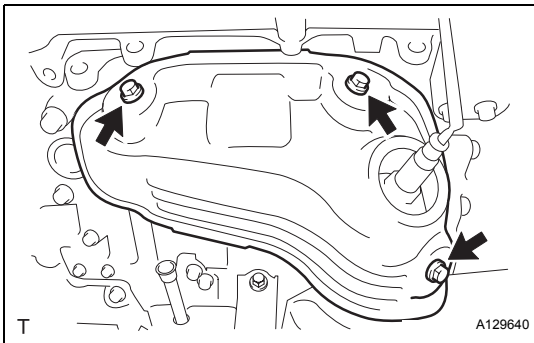
- (a) Install the engine mounting bracket RH with the 3 bolts.

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

**11. INSTALL EXHAUST MANIFOLD SUB-ASSEMBLY LH**

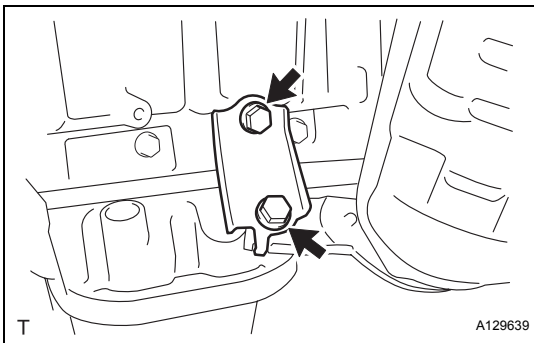
- (a) Install a new gasket as shown in the illustration.
 (b) Install the exhaust manifold sub-assembly RH with the 6 nuts.

Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

**12. INSTALL EXHAUST MANIFOLD HEAT INSULATOR NO.2**

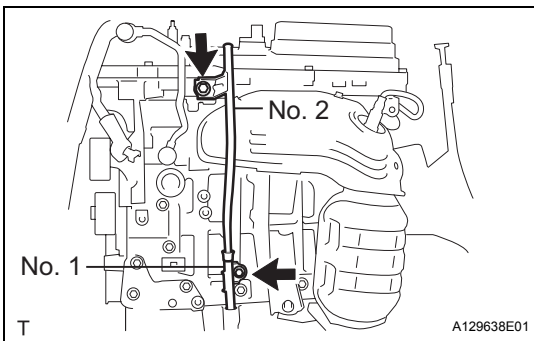
- (a) Install the insulator No. 2 with the 3 bolts.

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

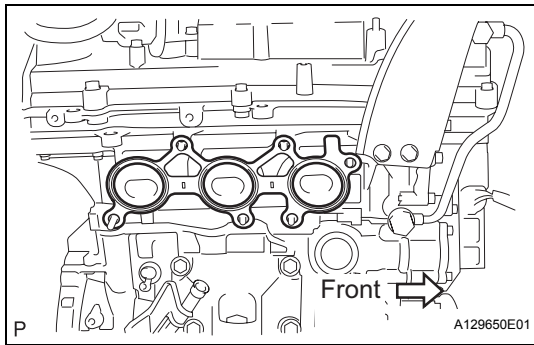
**13. INSTALL MANIFOLD STAY NO.2**

- (a) Install the manifold stay No. 2 with the 2 bolts.

Torque: 34 N*m (347 kgf*cm, 25 ft.*lbf)

**14. INSTALL OIL LEVEL GAUGE GUIDE SUB-ASSEMBLY**

- (a) Install 2 new O-rings to the oil level gauge guide.
 (b) Apply a coat of engine oil lightly to the O-rings.
 (c) Push in the oil level gauge guide end into the guide hole.
 (d) Install the oil level gauge guide No. 1 with the bolt.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)
 (e) Install the oil level gauge guide No. 2 with the bolt.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)
 (f) Install the oil level gauge.



- 15. INSTALL EXHAUST MANIFOLD SUB-ASSEMBLY RH**
 (a) Install a new gasket as shown in the illustration.
 (b) Install the exhaust manifold sub-assembly RH with the 6 nuts.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

16. INSTALL INTAKE MANIFOLD

17. INSTALL ENGINE MOUNTING STAY NO.2 RH

- (a) Install the mounting stay No. 2 RH with the bolt.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

18. INSTALL IGNITION COIL ASSEMBLY

- (a) Install the 6 ignition coil assembly with the 6 bolts.
Torque: 10 N*m (102 kgf*cm, 7 in.*lbf)

19. INSTALL DRIVE PLATE AND RING GEAR SUB-ASSEMBLY

SST 09213-70011, 09330-00021

20. INSTALL AUTOMATIC TRANSAXLE ASSEMBLY (See page AX-160)

21. INSTALL STARTER ASSEMBLY (See page ST-79)

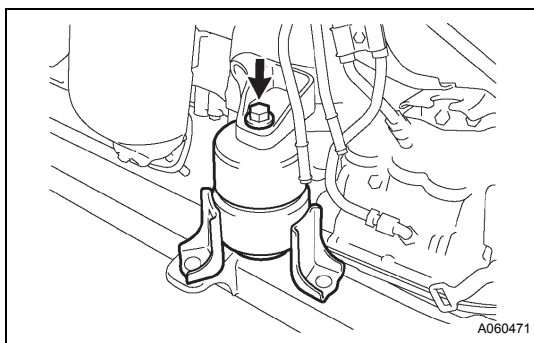
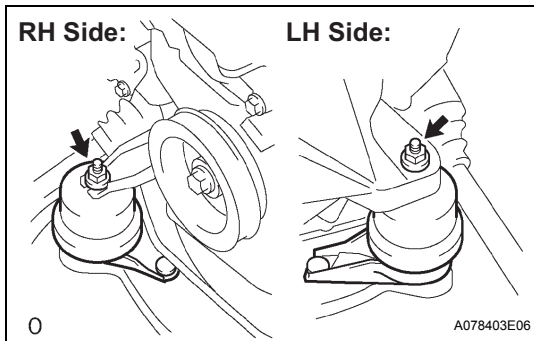
22. INSTALL ENGINE WIRE

23. INSTALL FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-13)

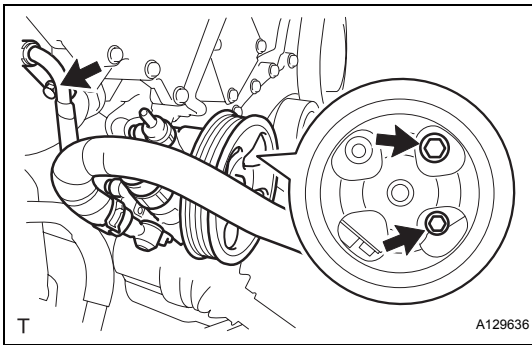
24. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-13)

25. INSTALL FRONT FRAME ASSEMBLY

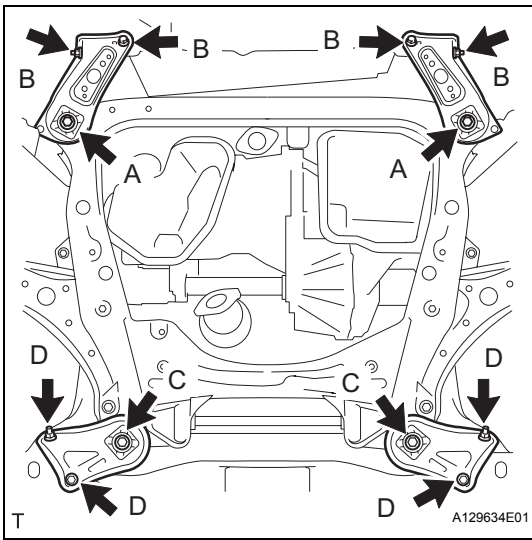
- (a) Install the engine mounting insulators RH and LH with the 2 nuts.
Torque: 95 N*m (969 kgf*cm, 70 ft.*lbf)



- (b) Install the engine mounting insulator FR with the bolt.
Torque: 87 N*m (887 kgf*cm, 64 ft.*lbf)

**26. INSTALL VANE PUMP ASSEMBLY**

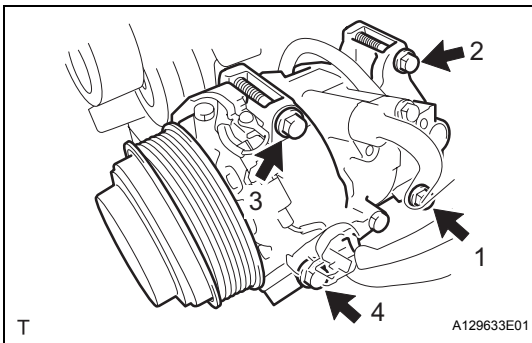
- (a) Install the vane pump with the 2 bolts and nut.
Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)
- (b) Install the pressure feed tube clamp bolt.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)

**27. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE**

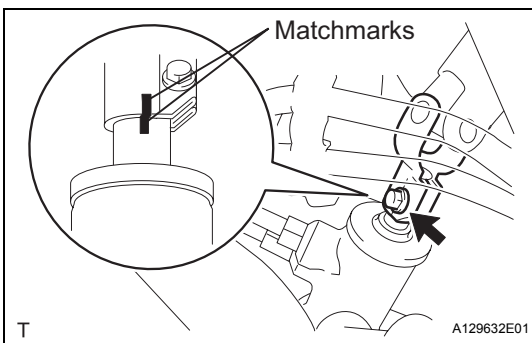
- (a) Set the engine assembly with transaxle on the engine lifter.
- (b) Install the engine assembly to the vehicle.
- (c) Install the frame side rail plates RH and LH with the 4 bolts and 2 nuts.

Torque: A**85 N*m (867 kgf*cm, 63 ft.*lbf)****B****32 N*m (329 kgf*cm, 24 ft.*lbf)**

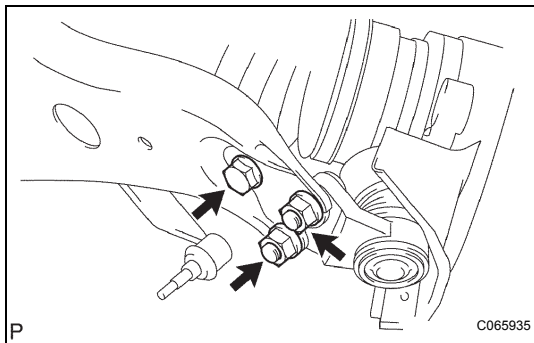
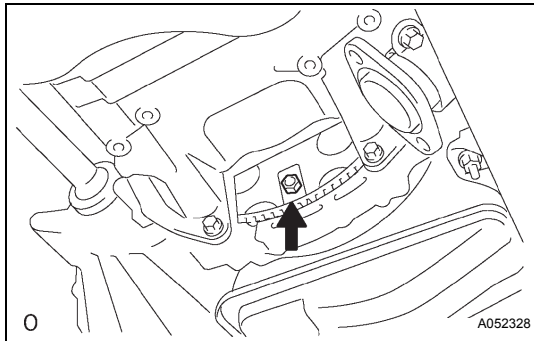
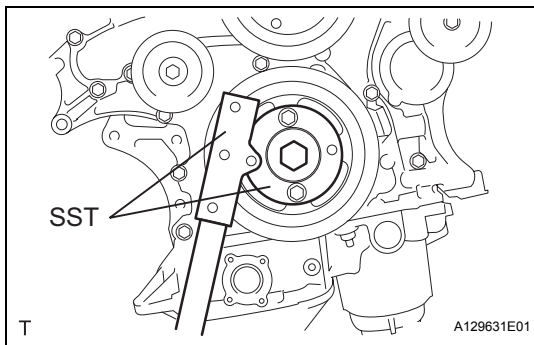
- (d) Install the front suspension member brace rears RH and LH with the 4 bolts and 2 nuts.

Torque: C**85 N*m (867 kgf*cm, 63 ft.*lbf)****D****32 N*m (329 kgf*cm, 24 ft.*lbf)****28. INSTALL COOLER COMPRESSOR ASSEMBLY**

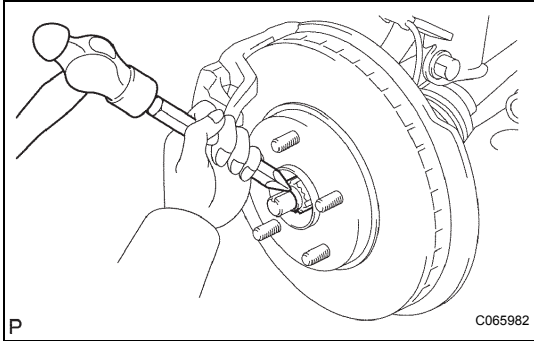
- (a) Temporarily install the cooler compressor with the 4 bolts.
- (b) Install the compressor with the 4 bolts by tightening the bolt in the order shown in the illustration.
Torque: 25 N*m (250 kgf*cm, 18 ft.*lbf)
- (c) Install the 2 connector clamps.

29. INSTALL GENERATOR ASSEMBLY (See page CH-15)**30. INSTALL STEERING INTERMEDIATE SHAFT ASSEMBLY**

- (a) Align the matchmarks on the intermediate shaft and control valve shaft, and install the bolt.
Torque: 35 N*m (360 kgf*cm, 26 ft.*lbf)



- 31. INSTALL DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT**
- Using SST, hold the crankshaft.
SST 09213-70011 (09213-70020), 09330-00021
 - Using kerosene or gasoline, clean the bolts thoroughly.
 - Apply adhesive to 2 or 3 threads of the bolt end.
Adhesive:
Part No. 08833-00070, THREE BOND 1324 or equivalent
 - Install the 6 torque converter set bolts.
Torque: 41 N*m (413 kgf*cm, 30 ft.*lbf)
NOTICE:
First tighten the green colored bolt, then the other 5 bolts.
 - Install the flywheel housing under cover with the 2 bolts.
Torque: 7.8 N*m (80 kgf*cm, 69 in.*lbf)
- 32. INSTALL EXHAUST PIPE SUPPORT BRACKET NO.1**
- Install the exhaust pipe support bracket No. 1 with the 2 bolts.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)
- 33. INSTALL FRONT SUSPENSION ARM SUB-ASSEMBLY LOWER NO.1 LH**
- Install the drive shaft to the steering knuckle.
 - Install the suspension lower arm with the bolt and 2 nuts.
Torque: 75 N*m (764 kgf*cm, 55 ft.*lbf)
- 34. INSTALL FRONT SUSPENSION ARM SUB-ASSEMBLY LOWER NO.1 RH**
- HINT:**
Use the same procedures described for the LH side.
- 35. INSTALL TIE ROD ASSEMBLY LH**
- Connect the tie rod end to the steering knuckle with the castle nut.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)
NOTICE:
 - Prevent lubricants from contacting the thread and taper portions.
 - After tightening the castle nut, tighten additional 60° so that a cotter pin can be inserted.
 - Insert a new cotter pin.
- 36. INSTALL TIE ROD ASSEMBLY RH**
- HINT:**
Use the same procedures described for the LH side.
- 37. INSTALL SPEED SENSOR FRONT LH (See page DS-14)**

**38. INSTALL SPEED SENSOR FRONT RH**

HINT:

Use the same procedures described for the LH side.

39. INSTALL FRONT AXLE HUB LH NUT

- (a) Using a 30 mm socket wrench, install a new hub nut.

Torque: 294 N*m (2,998 kgf*cm, 217 ft.*lbf)

- (b) Using a chisel and hammer, tap the hub nut.

40. INSTALL FRONT AXLE HUB RH NUT

HINT:

Use the same procedures described for the LH side.

41. INSTALL FRONT STABILIZER LINK ASSEMBLY LH

- (a) Using a 6 mm socket hexagon wrench, hold the ball stud and install the nut.

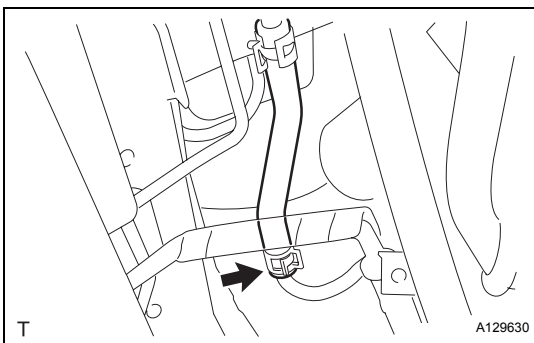
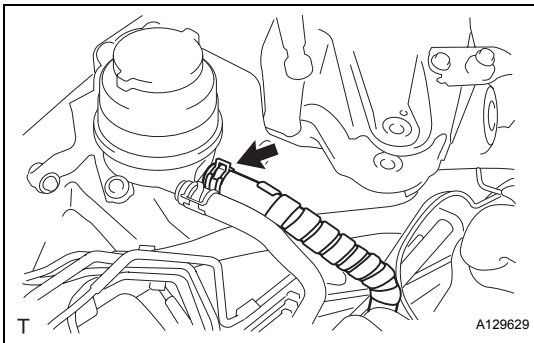
Torque: 74 N*m (755 kgf*cm, 55 ft.*lbf)**42. INSTALL FRONT STABILIZER LINK ASSEMBLY RH**

HINT:

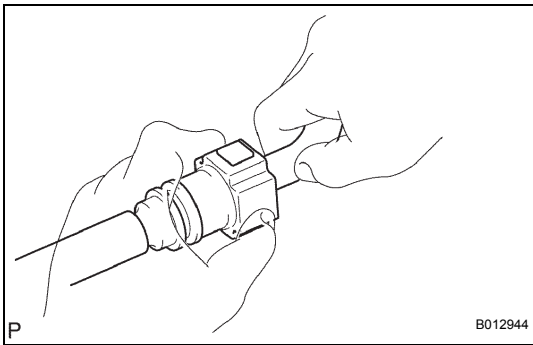
Use the same procedures described for the LH side.

43. INSTALL EXHAUST PIPE ASSEMBLY FRONT (See page EX-3)**44. INSTALL EXHAUST PIPE NO.1 SUPPORT BRACKET (See page EX-4)****45. CONNECT OIL RESERVOIR TO PUMP HOSE NO.1**

- (a) Connect the oil reservoir to pump hose No. 1.

**46. CONNECT STEERING GEAR OUTLET RETURN TUBE**

- (a) Connect the steering gear outlet return tube.

**47. CONNECT FUEL TUBE SUB-ASSEMBLY**

- (a) Push in the fuel tube connector to the fuel pipe until connector makes a "click" sound.

NOTICE:

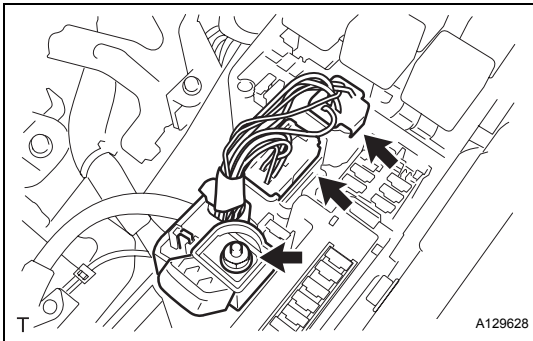
- Check for damage or contamination on the connected part of the pipe.
- Check if the pipe and the connector are securely connected by trying to pull them apart.

- (b) Install the fuel pipe clamp No. 1.

48. CONNECT TRANSMISSION CONTROL CABLE ASSEMBLY (See page AX-148)**49. CONNECT ENGINE WIRE**

- (a) Install the nut and connect the wire harness to the engine room J/B.

Torque: 8.4 N*m (85 kgf*cm, 74 in.*lbf)



- (b) Install the engine wire to the body with the 2 nuts.

Torque: 6.0 N*m (61 kgf*cm, 53 in.*lbf)

50. CONNECT HEATER WATER OUTLET HOSE A**51. CONNECT HEATER WATER INLET HOSE A****52. CONNECT OIL COOLER OUTLET HOSE****53. CONNECT OIL COOLER INLET HOSE****54. INSTALL RADIATOR HOSE OUTLET****55. INSTALL RADIATOR HOSE INLET****56. INSTALL INTAKE AIR SURGE TANK (See page FU-17)****57. INSTALL INTAKE AIR RESONATOR SUB-ASSEMBLY**

- (a) Install the intake air resonator with the bolt and clip.

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

58. INSTALL AIR CLEANER INLET NO.1

- (a) Install the air cleaner inlet No. 1 with the bolt.

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

59. INSTALL AIR CLEANER ASSEMBLY WITH HOSE

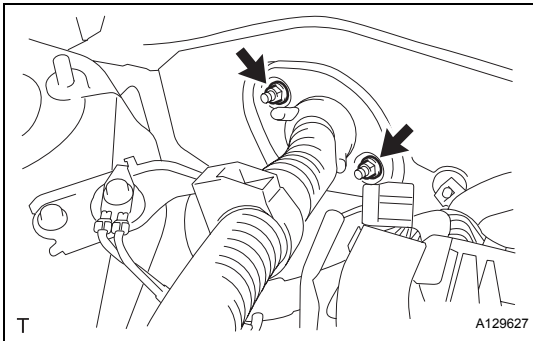
- (a) Install the air cleaner case with the 3 bolts.

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

- (b) Install the air cleaner cap with the hose clamp and 3 clips.

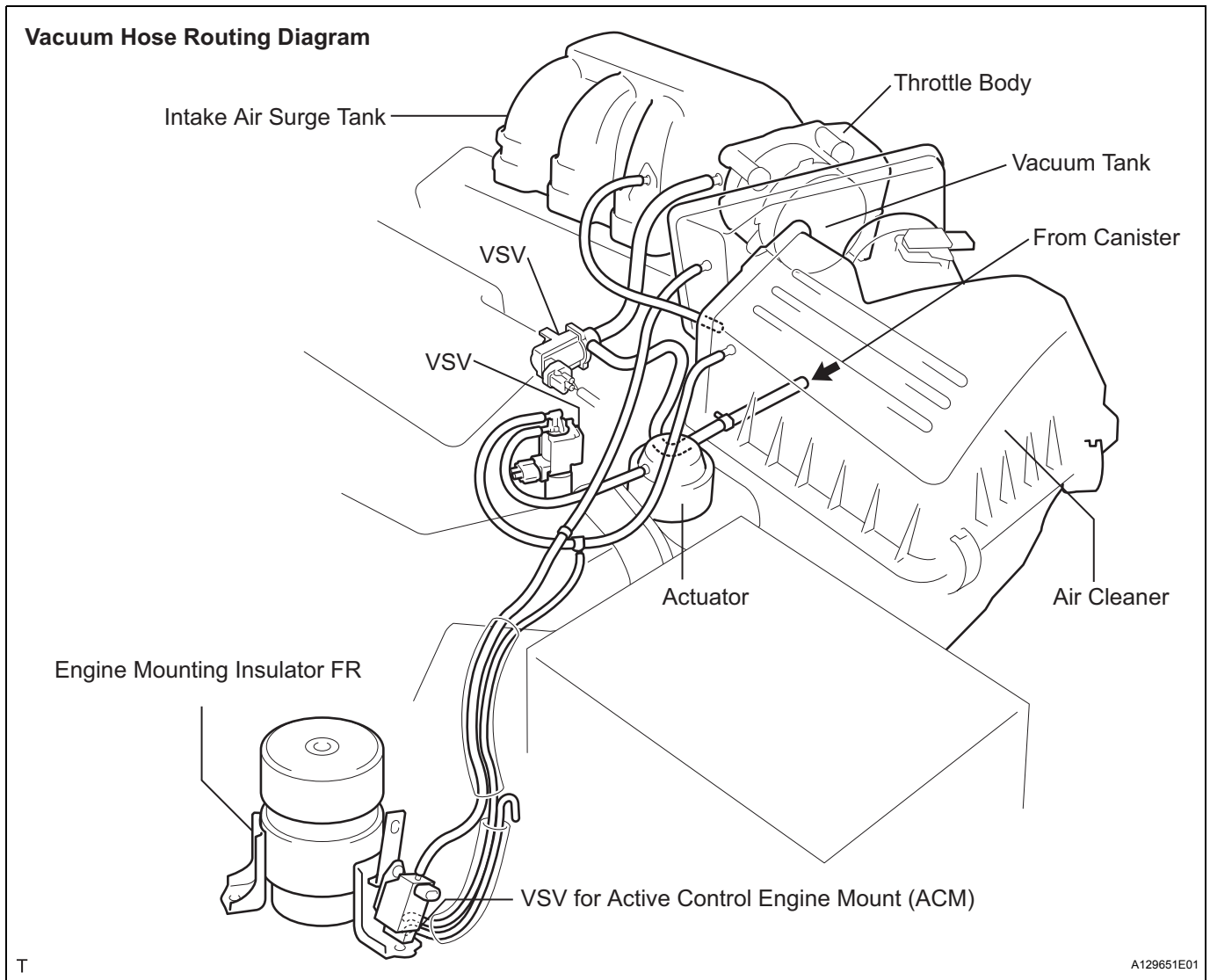
- (c) Connect the MAF meter connector and clamp.

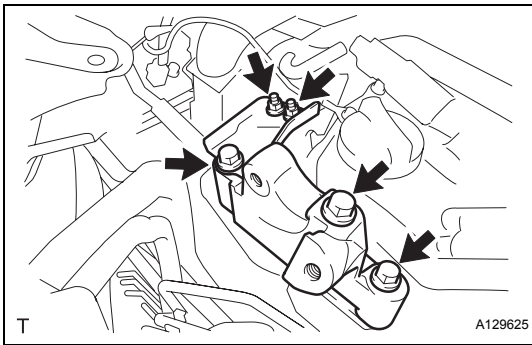
- (d) Connect the 3 vacuum hoses and ventilation hose No. 2.



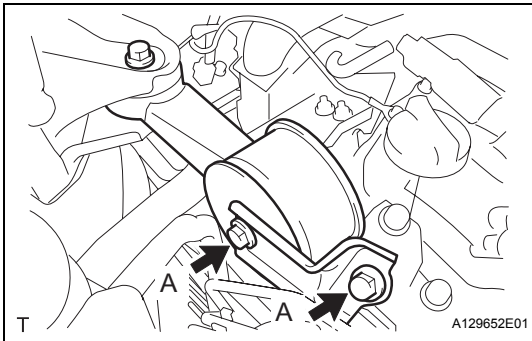
60. INSTALL AIR CLEANER INLET NO.2

- (a) Install air cleaner inlet No. 2 with the 2 bolts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

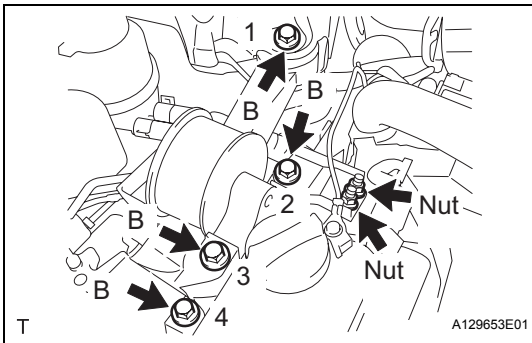
61. CONNECT VACUUM HOSES**62. INSTALL INSTRUMENT PANEL FINISH LOWER PANEL RH****63. INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH****64. INSTALL FRONT DOOR SCUFF PLATE RH****65. INSTALL RELAY BLOCK COVER UPPER**

**66. INSTALL ENGINE MOUNTING CONTROL BRACKET**

- (a) Temporarily install the mounting stay No. 2 RH and mounting bracket with the 3 bolts and 2 nuts.

**67. INSTALL ENGINE MOVING CONTROL ROD**

- (a) Temporarily install the moving control rod and mounting stay No. 3 RH with the 3 bolts.
 (b) Tighten the bolt A.
Torque: 44 N*m (450 kgf*cm, 32 ft.*lbf)



- (c) Tightening the bolt B in the order shown in the illustration.
Torque: 38 N*m (387 kgf*cm, 28 ft.*lbf)
 (d) Tighten the 2 nuts.
Torque: 23 N*m (235 kgf*cm, 17 ft.*lbf)

68. INSTALL RADIATOR RESERVE TANK ASSEMBLY**69. INSTALL FAN AND GENERATOR V BELT**

HINT:

Install the V-ribbed belt (See page [EM-8](#)).

SST 09249-63010

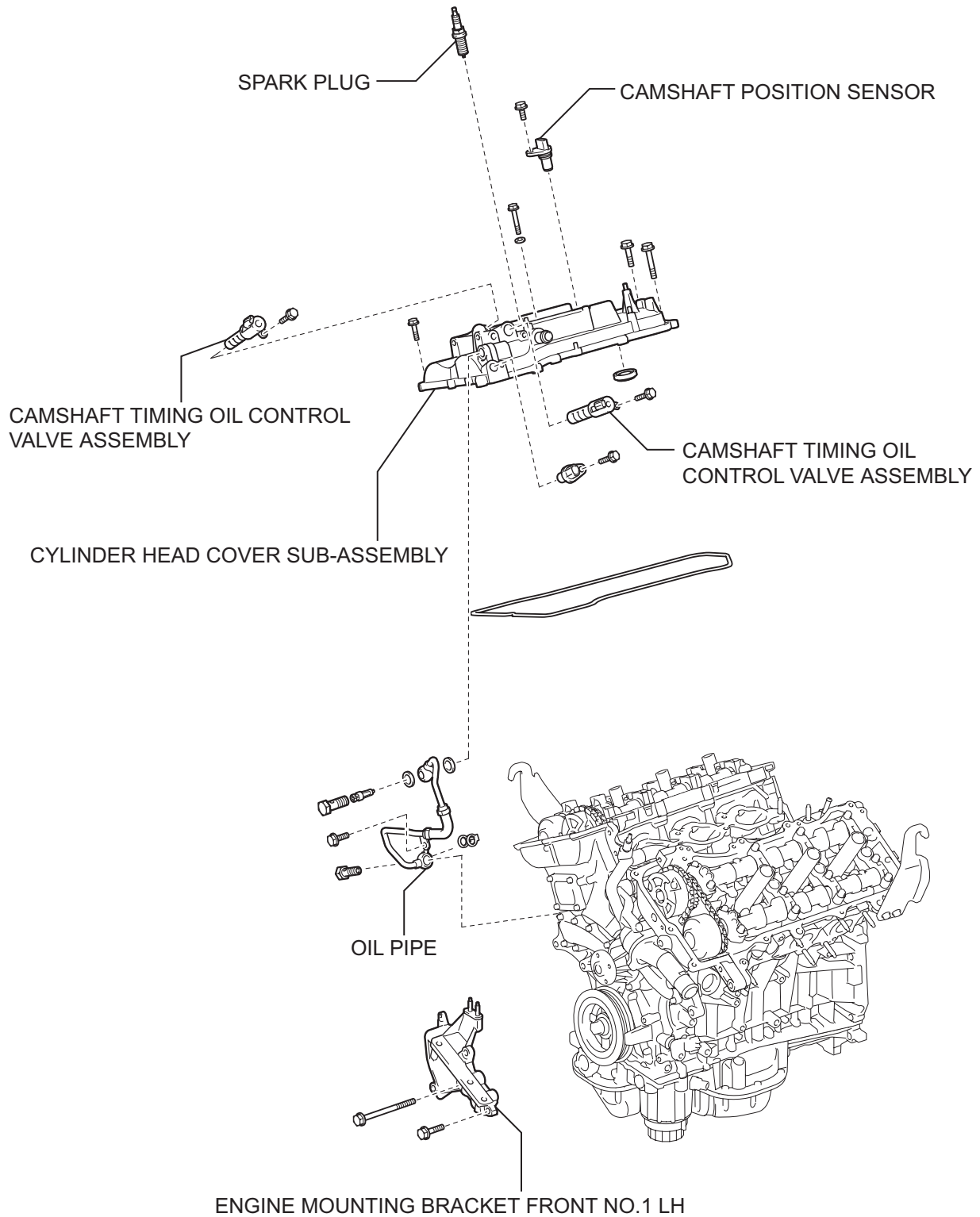
70. INSTALL COWL TOP PANEL OUTER (See page [BR-23](#))**71. INSTALL WINDSHIELD WIPER LINK ASSEMBLY (See page [WW-40](#))****72. INSTALL FRONT WHEELS**

Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

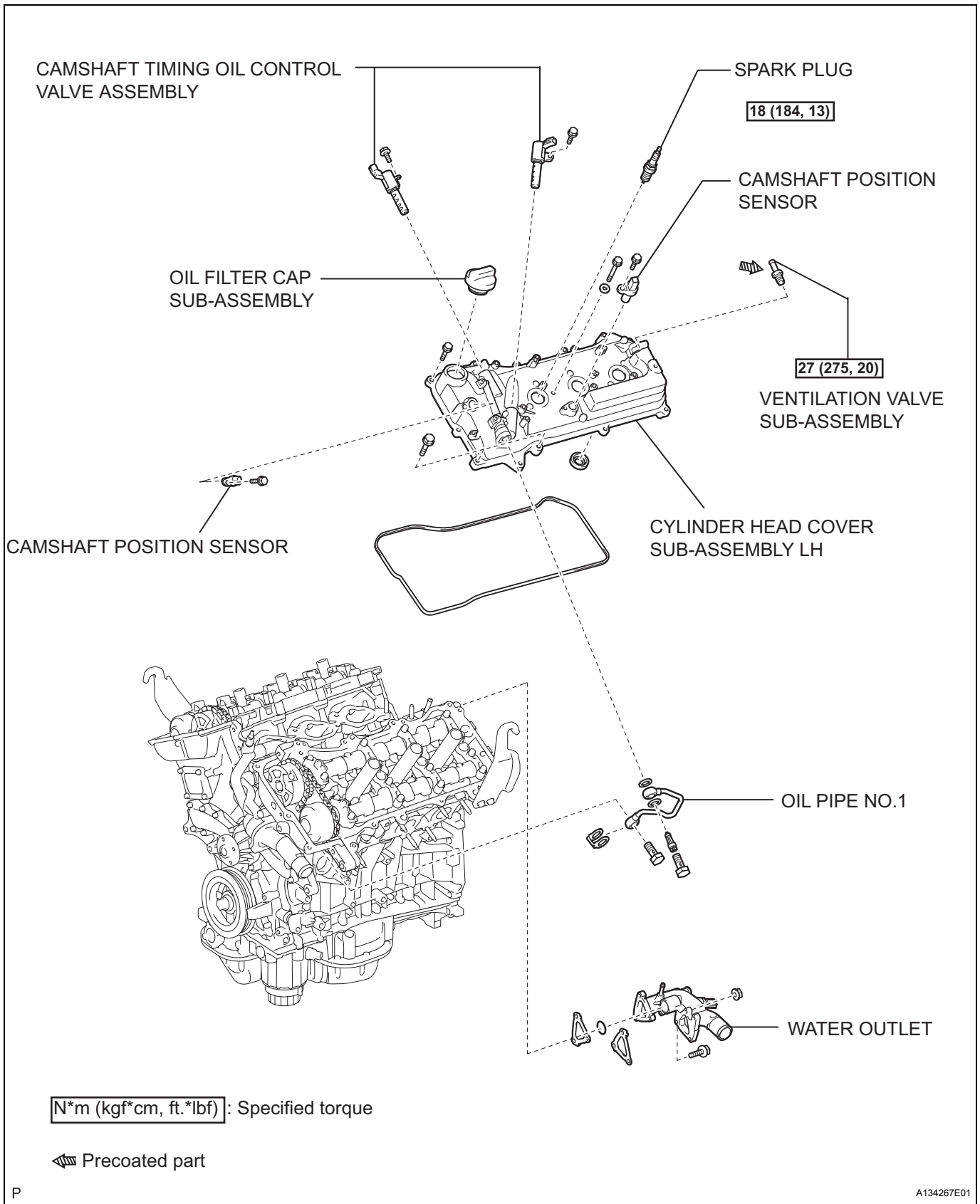
73. ADD AUTOMATIC TRANSAXLE FLUID**74. ADD ENGINE OIL****75. ADD ENGINE COOLANT (See page [CO-7](#))****76. ADD POWER STEERING FLUID****77. BLEED POWER STEERING FLUID****78. CHECK FOR OIL LEAKS****79. CHECK FOR ENGINE COOLANT LEAKS (See page [CO-8](#))****80. INSPECT FOR FUEL LEAKS (See page [FU-7](#))****81. CHECK FOR EXHAUST GAS LEAKS**

-
- 82. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT**
HINT:
Adjust the front wheel alignment (See page [SP-4](#)).
 - 83. INSPECT IGNITION TIMING (See page [EM-1](#))**
 - 84. INSPECT ENGINE IDLE SPEED (See page [EM-2](#))**
 - 85. CHECK FUNCTION OF THROTTLE BODY (See page [ES-433](#))**
 - 86. INSTALL V-BANK COVER SUB-ASSEMBLY**
 - (a) Fit the 3 retainers and install the V-bank cover.
 - 87. INSPECT CO/HC (See page [EM-3](#))**
 - 88. CHECK ABS SPEED SENSOR SIGNAL**
 - (a) ABS WITH EBD SYSTEM (See page [BC-11](#))
 - (b) ABS WITH EBD & BA & TRAC & VSC SYSTEM
(See page [BC-107](#))
 - 89. PERFORM INITIALIZATION**
 - (a) Some systems need initialization when disconnecting the cable from the negative battery terminal.

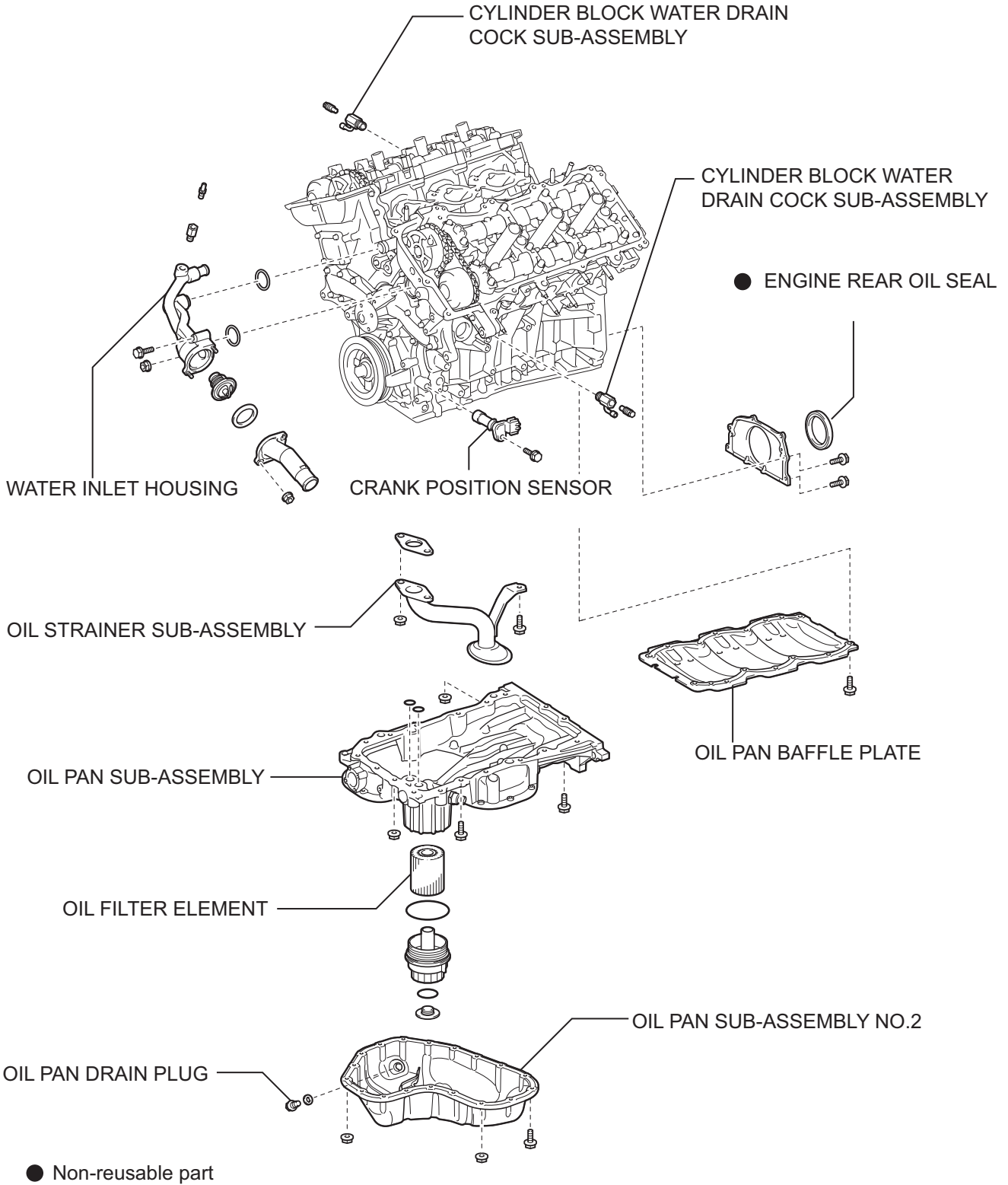
ENGINE UNIT COMPONENTS



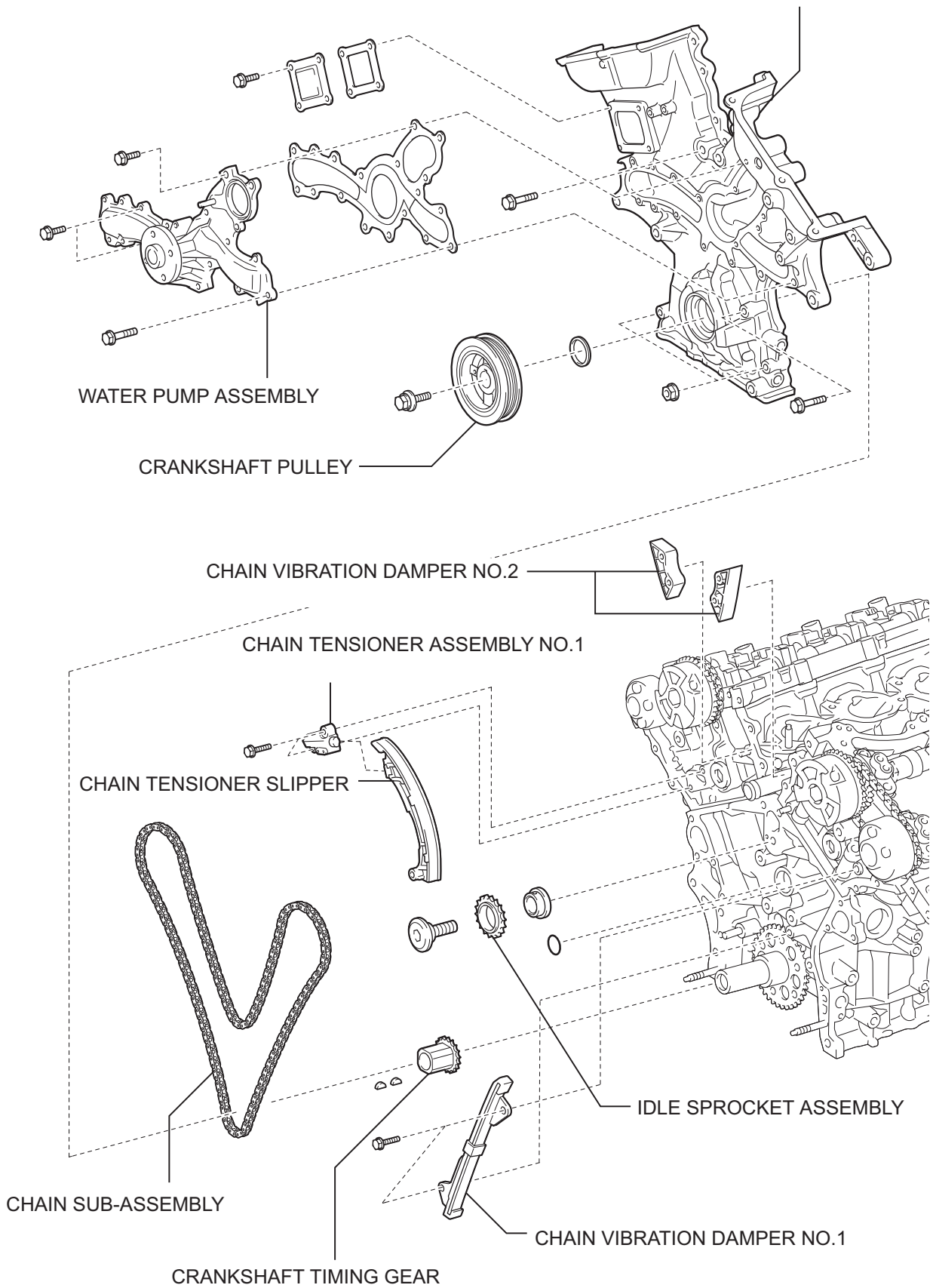
EM



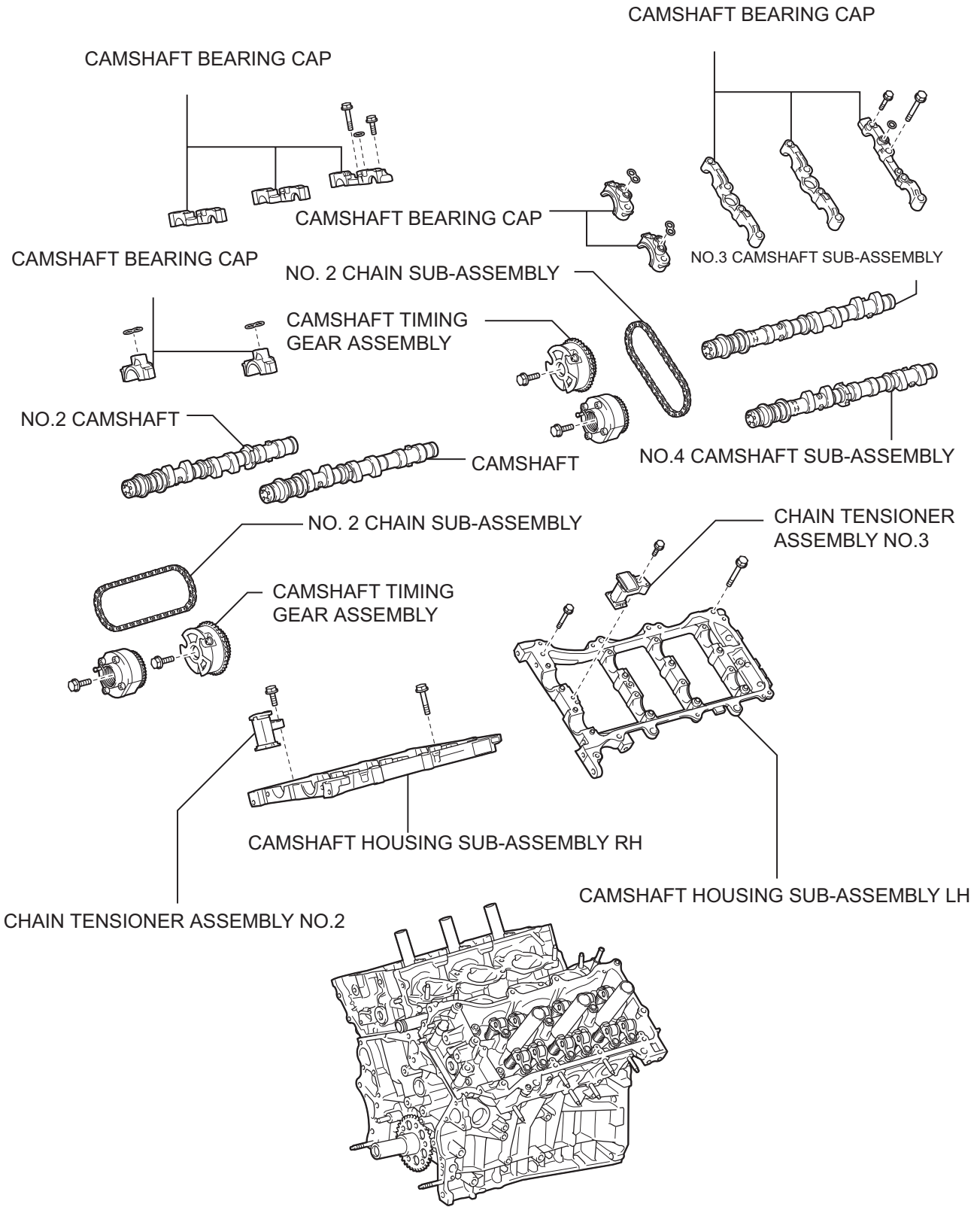
EM



TIMING CHAIN COVER SUB-ASSEMBLY

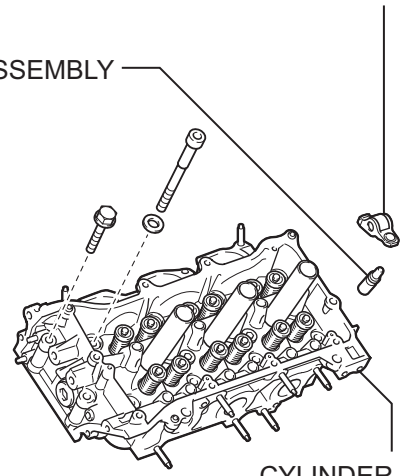
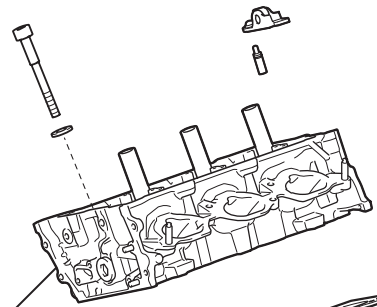


EM

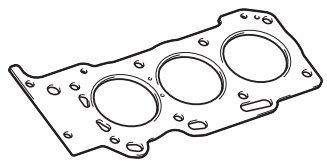
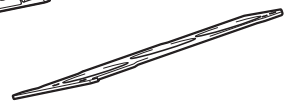


VALVE ROCKER ARM SUB-ASSEMBLY NO.1

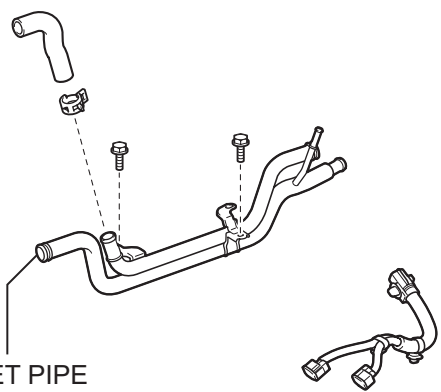
VALVE LASH ADJUSTER ASSEMBLY



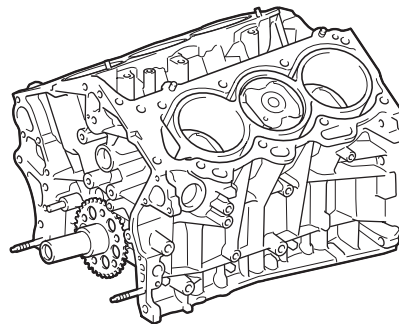
CYLINDER HEAD LH



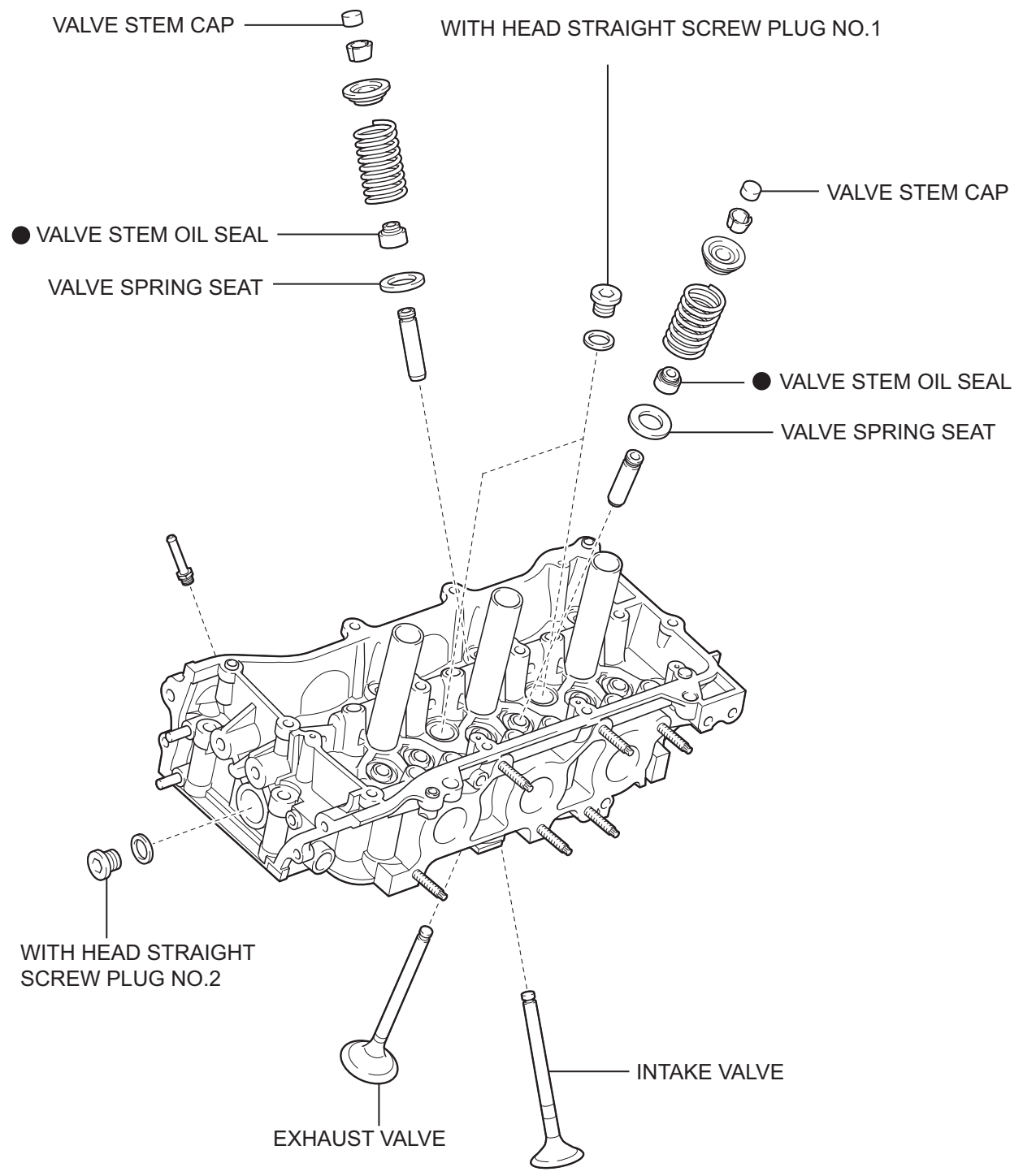
CYLINDER HEAD SUB-ASSEMBLY



WATER INLET PIPE

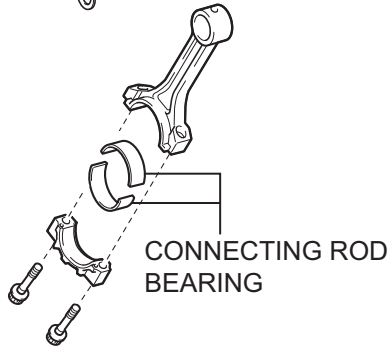
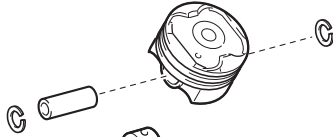
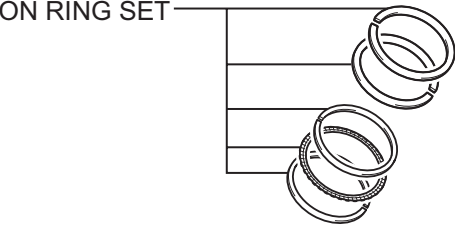


EM

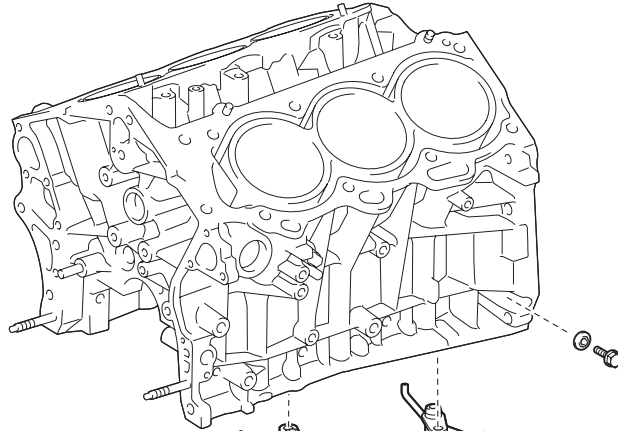


● Non-reusable part

PISTON RING SET



CONNECTING ROD BEARING



SUB-ASSEMBLY OIL NOZZLE NO.1

CRANKSHAFT BEARING

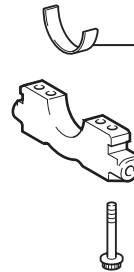
CRANKSHAFT THRUST WASHER SET

CRANKSHAFT THRUST WASHER SET



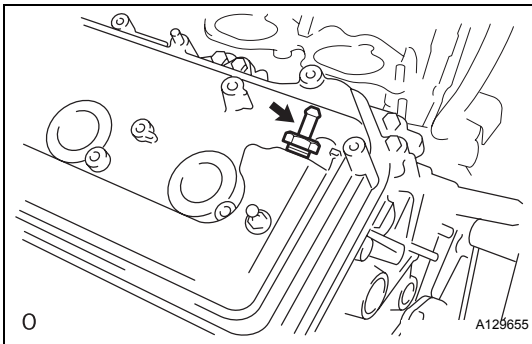
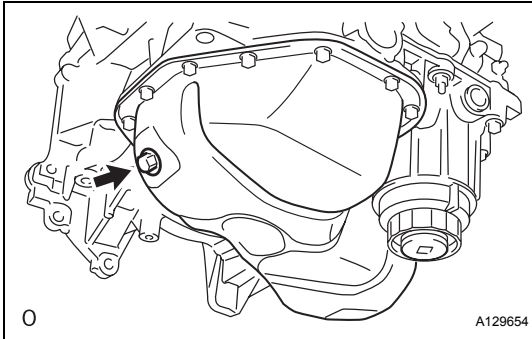
CRANKSHAFT

CRANKSHAFT BEARING

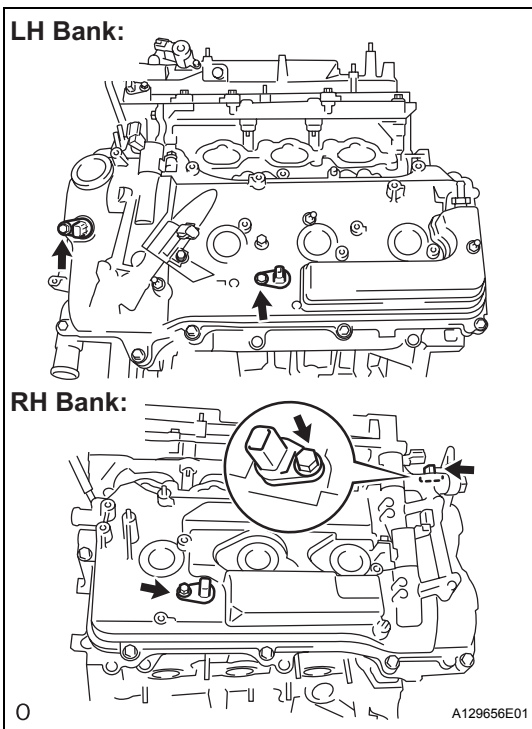


DISASSEMBLY

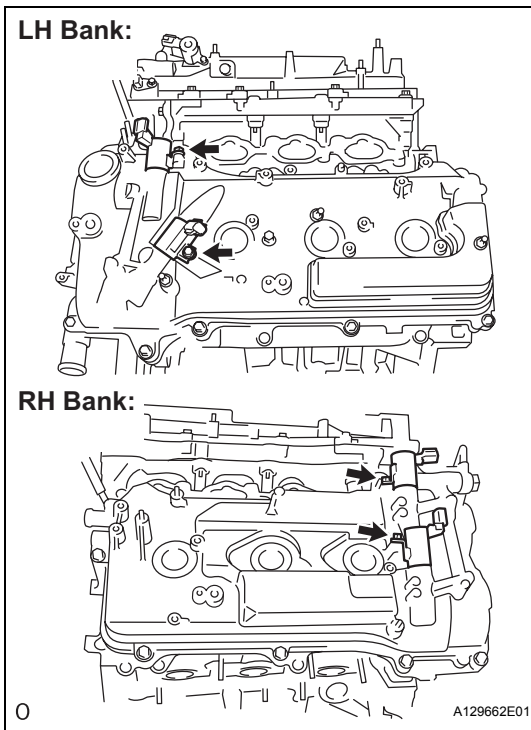
1. **REMOVE OIL FILTER CAP SUB-ASSEMBLY**
(a) Remove the oil filler cap sub-assembly.
2. **REMOVE SPARK PLUG**
3. **REMOVE OIL PAN DRAIN PLUG**
(a) Remove the drain plug and gasket.



4. **REMOVE VENTILATION VALVE SUB-ASSEMBLY**
(a) Remove the ventilation valve sub-assembly.

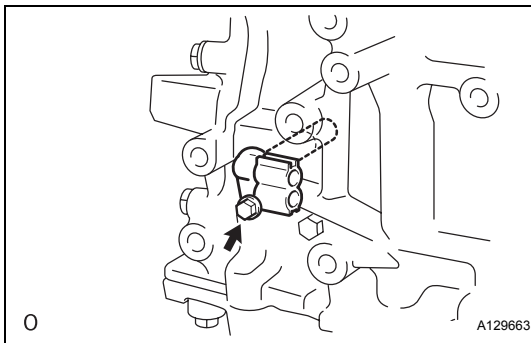


5. **REMOVE CAMSHAFT POSITION SENSOR**
(a) Remove the 4 bolts and 4 camshaft position sensors.



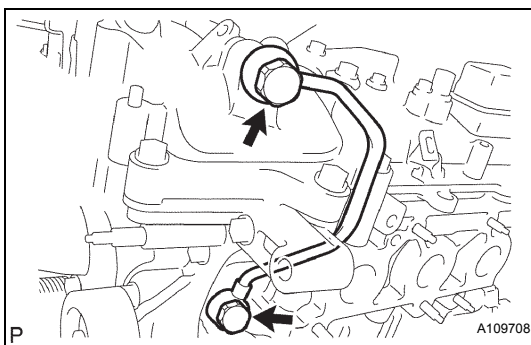
6. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

- (a) Remove the 4 bolts and 4 camshaft timing oil control valves.



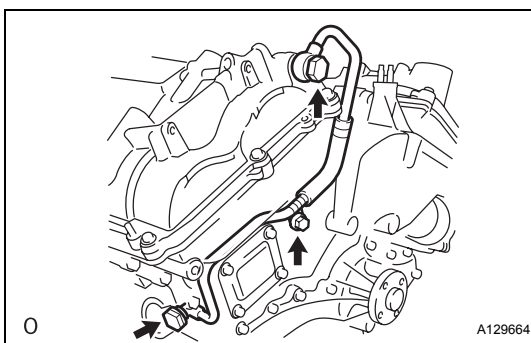
7. REMOVE CRANK POSITION SENSOR

- (a) Remove the bolt and crankshaft position sensor.



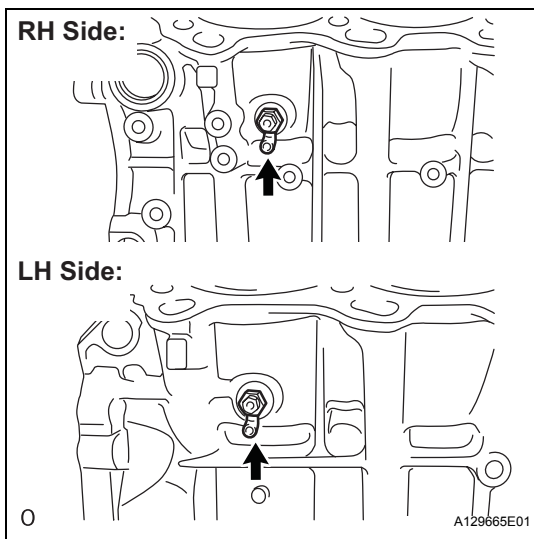
8. REMOVE OIL PIPE NO.1

- (a) Remove the 2 oil pipe unions and oil pipe No. 1.
 (b) Remove the oil control valve filter LH and gaskets.



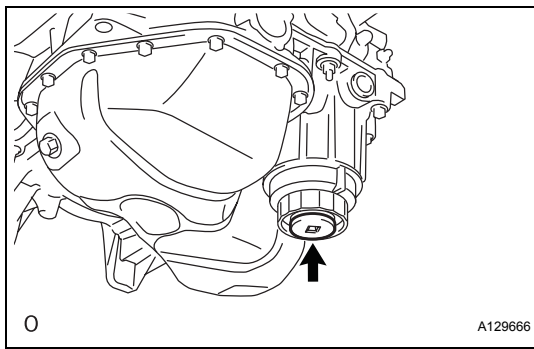
9. REMOVE OIL PIPE

- (a) Remove the bolt.
 (b) Remove the 2 oil pipe unions and oil pipe.
 (c) Remove the oil control valve filter RH and gaskets.



10. REMOVE CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY

- (a) Remove the water drain cocks from the cylinder block.
- (b) Remove the water drain cock plugs from the water drain cocks.

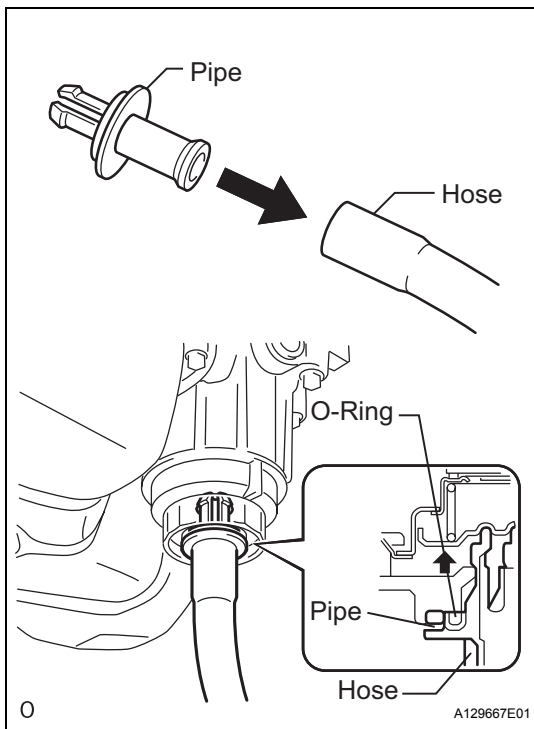


11. REMOVE OIL FILTER ELEMENT

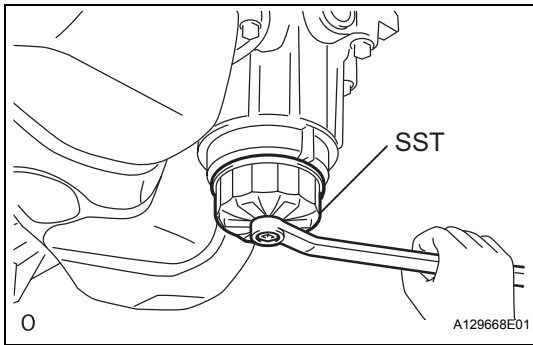
- (a) Remove the drain plug.

NOTICE:

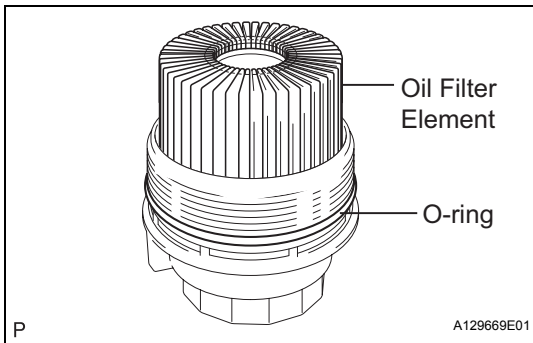
Do not remove the O-ring.



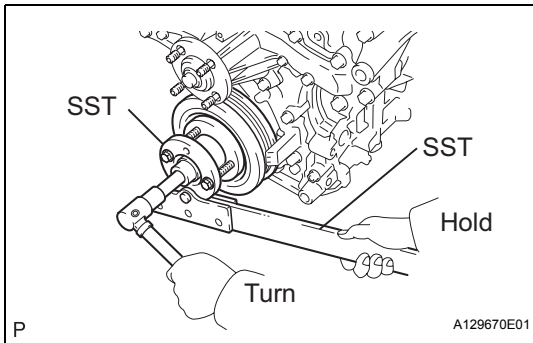
- (b) Connect the hose to the pipe.
- (c) Insert the pipe with the hose into the oil filter cap.
- (d) Make sure that the oil is completely drained and remove the pipe and O-ring.



- (e) Using SST, remove the oil filter cap.
SST 09228-06501

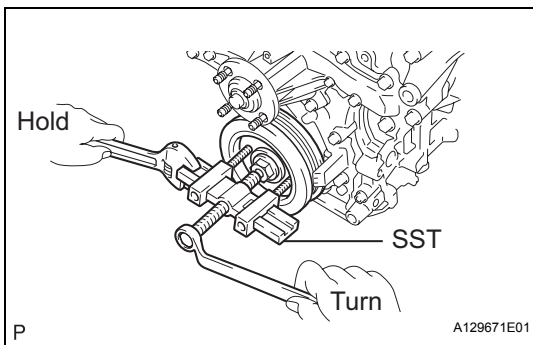


- (f) Remove the oil filter element and O-ring from the oil filter cap.
NOTICE:
Do not use any tools when removing the O-ring to prevent the O-ring groove from being damaged.

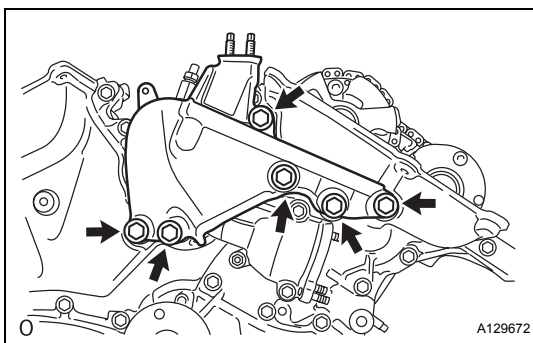


12. REMOVE CRANKSHAFT PULLEY

- (a) Using SST, loosen the crankshaft pulley bolt.
SST 09213-70011 (09213-70020), 09330-00021

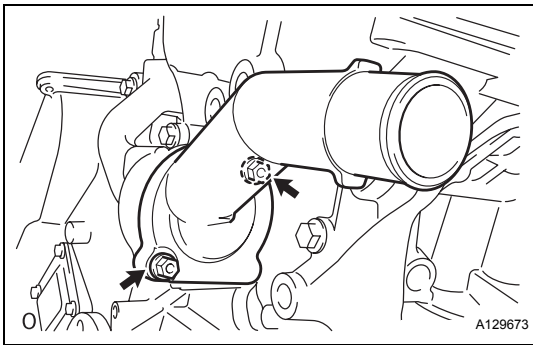


- (b) Using SST, remove the crankshaft pulley bolt and crankshaft pulley.
SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021)

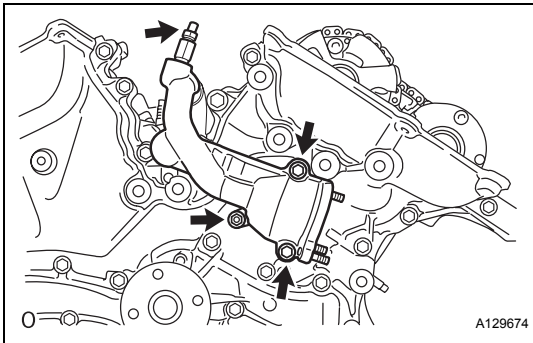


13. REMOVE ENGINE MOUNTING BRACKET FRONT NO.1 LH

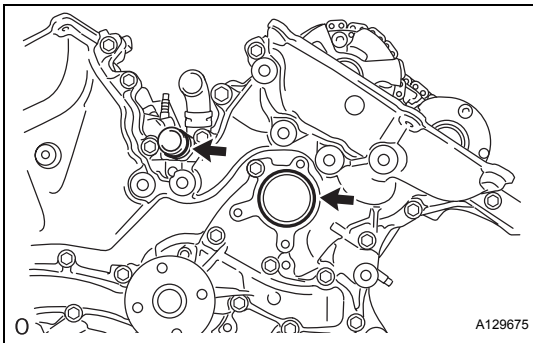
- (a) Remove the 6 bolts, and engine mounting bracket front No. 1 LH.

**14. REMOVE WATER INLET HOUSING**

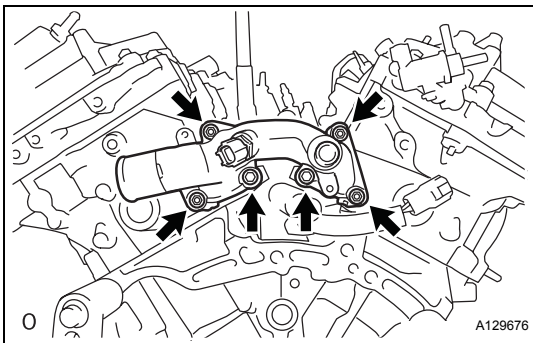
- (a) Remove the 2 nuts, water inlet and thermostat.
- (b) Remove the gasket.
- (c) Remove the drain cock plug.
- (d) Remove the drain cock.



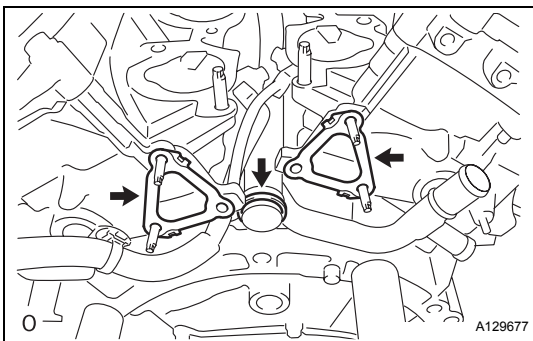
- (e) Remove the 2 bolts, nut, and water inlet housing.



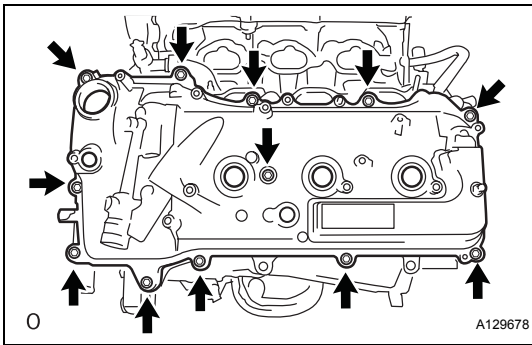
- (f) Remove the 2 O-rings.

**15. REMOVE WATER OUTLET**

- (a) Remove the 2 bolts, 4 nuts, and water outlet.

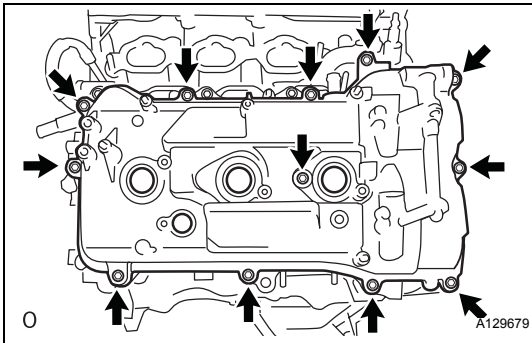


- (b) Remove the 2 gaskets and O-ring.



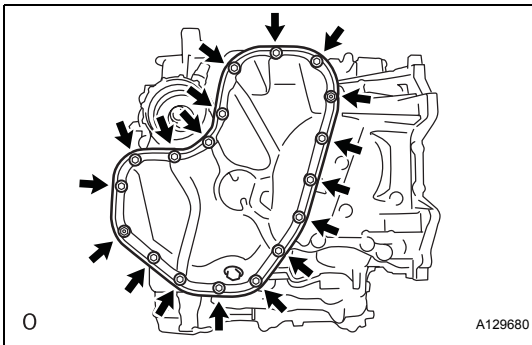
16. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY LH

- (a) Remove the 12 bolts, head cover and gasket.



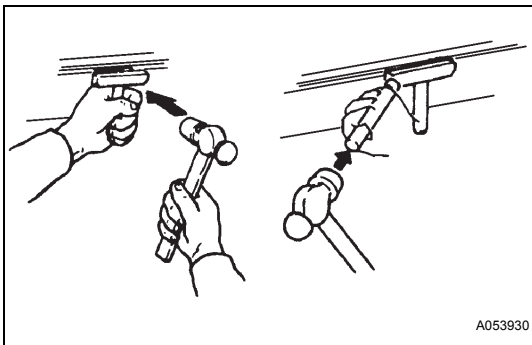
17. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY LH

- (a) Remove the 12 bolts, head cover and gasket.



18. REMOVE OIL PAN SUB-ASSEMBLY NO.2

- (a) Remove the 16 bolts and 2 nuts.

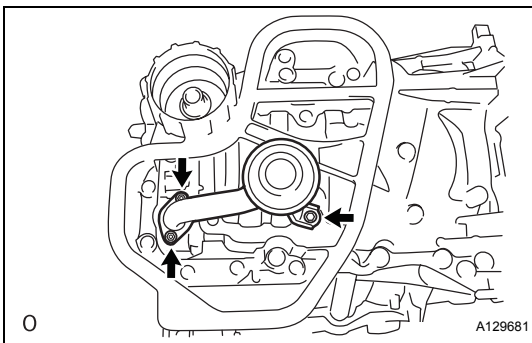


- (b) Insert the blade of SST between the oil pans. Cut through the applied sealer and remove the oil pan sub-assembly No. 2.

SST 09032-00100

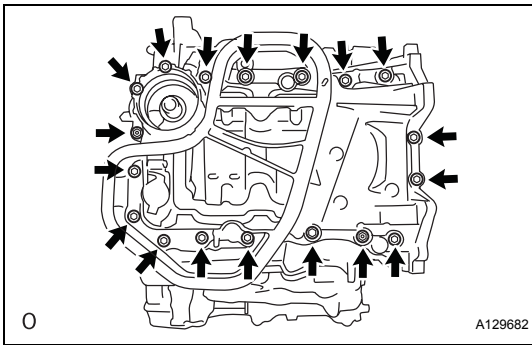
NOTICE:

Be careful not to damage the contact surfaces of the oil pans.



19. REMOVE OIL STRAINER SUB-ASSEMBLY

- (a) Remove the bolt, 2 nuts, oil strainer and gasket.

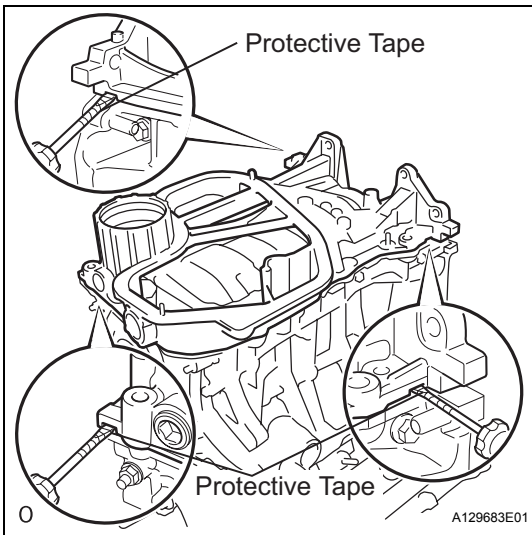


20. REMOVE OIL PAN SUB-ASSEMBLY

- (a) Remove the 16 bolts and 2 nuts.

HINT:

Be sure to clean the bolts and stud bolts and check the threads for cracks or other damage.



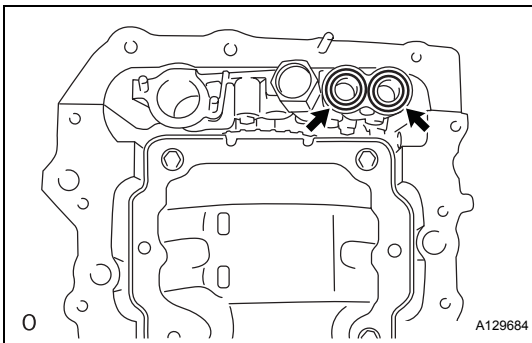
- (b) Remove the oil pan by prying between the oil pan and cylinder block with a screwdriver.

NOTICE:

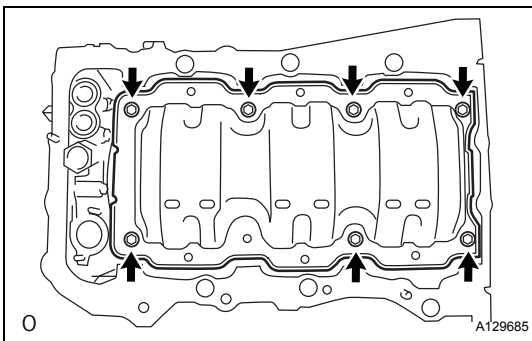
Be careful not to damage the contact surfaces of the cylinder block and oil pan.

HINT:

Tape the screwdriver tip before use.

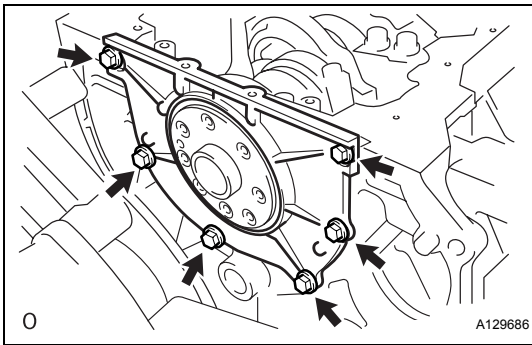


- (c) Remove the 2 O-rings.

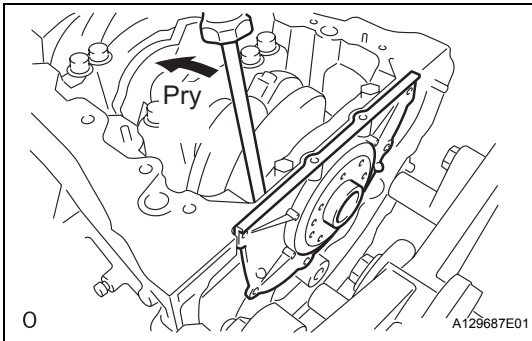


21. REMOVE OIL PAN BAFFLE PLATE

- (a) Remove the 7 bolts and oil pan baffle plate.

**22. REMOVE ENGINE REAR OIL SEAL**

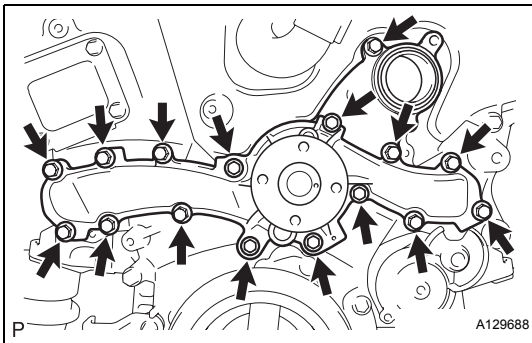
(a) Remove the 6 bolts.



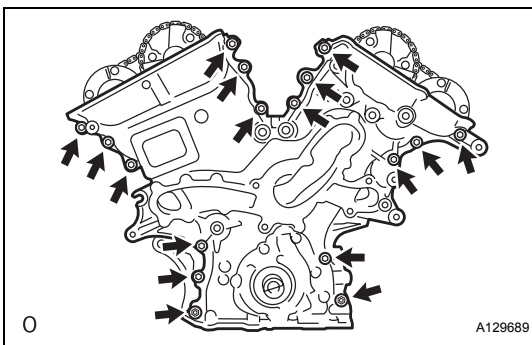
(b) Using a screwdriver, pry out the oil seal retainer.

HINT:

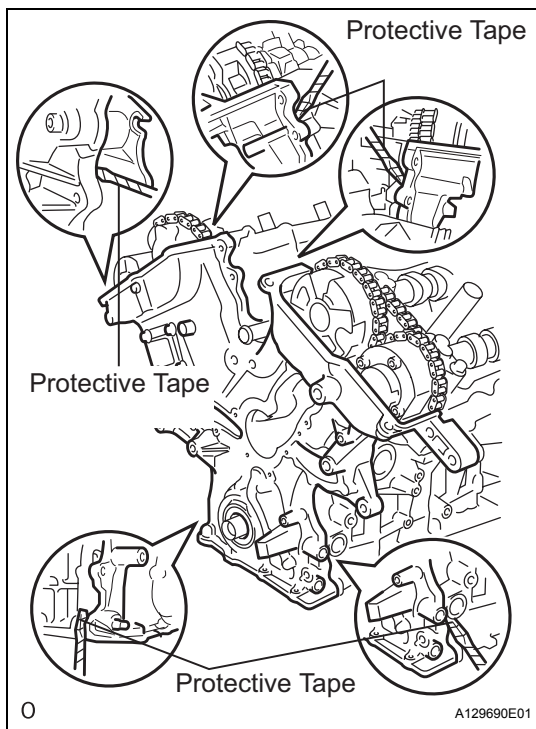
Tape the screwdriver tip before use.

**23. REMOVE WATER PUMP ASSEMBLY**

(a) Remove the 16 bolts, water pump and gasket.

**24. REMOVE TIMING CHAIN COVER SUB-ASSEMBLY**

(a) Remove the 15 bolts and 2 nuts as shown in the illustration.



- (b) Remove the timing chain cover by prying between the timing chain cover and cylinder head or cylinder block with a screwdriver.

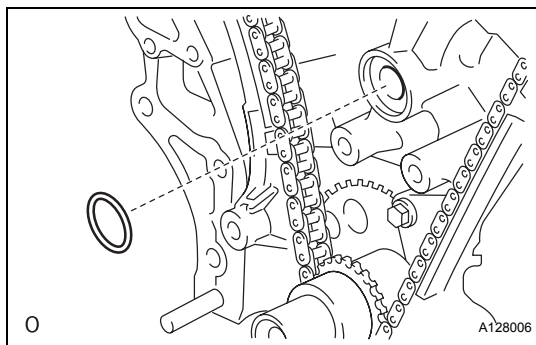
NOTICE:

Be careful not to damage the contact surfaces of the cylinder head, cylinder block and chain cover.

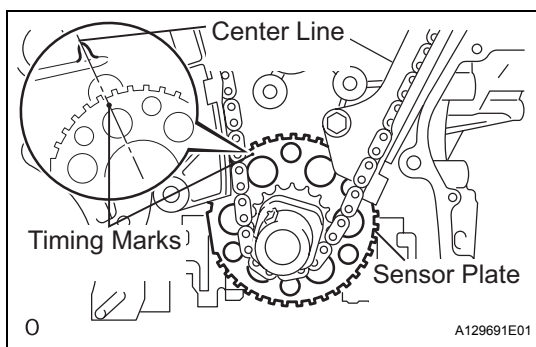
HINT:

Tap the screwdriver tip before use.

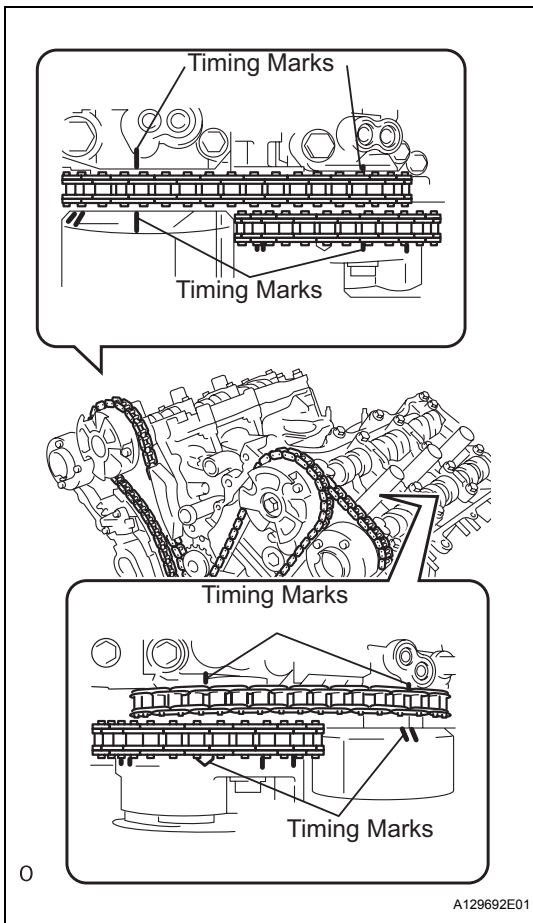
- (c) Remove the 4 bolts, chain cover plate and gasket.



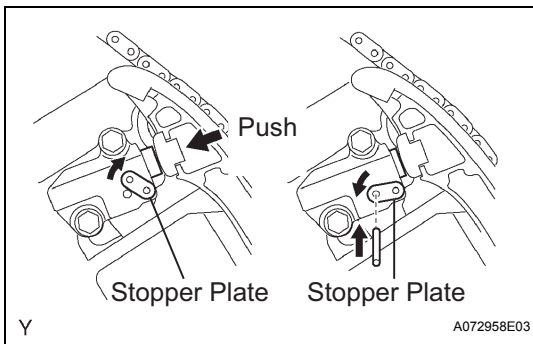
- (d) Remove the gasket.

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

- (a) Temporarily tighten the pulley set bolt.
- (b) Set the timing mark on the crank angle sensor plate to the RH block bore center line (TDC / compression).



- (c) Check that the timing marks of the camshaft timing gears are aligned with the timing marks of the bearing cap as shown in the illustration. If not, turn the crankshaft 1 revolution (360°) and align the timing marks as above.

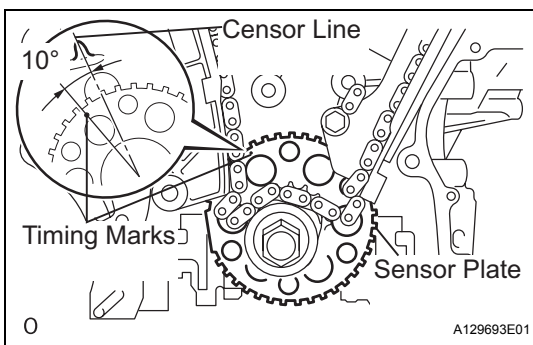


26. REMOVE CHAIN TENSIONER ASSEMBLY NO.1

- Move the stopper plate upward to release the lock, and push the plunger deep into the tensioner.
- Move the stopper plate downward to set the lock, and insert a hexagon wrench into the stopper plate's hole.
- Remove the 2 bolts and chain tensioner.

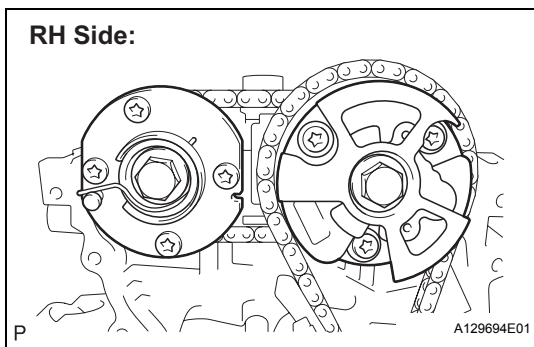
27. REMOVE CHAIN TENSIONER SLIPPER

- Remove the chain tensioner slipper.

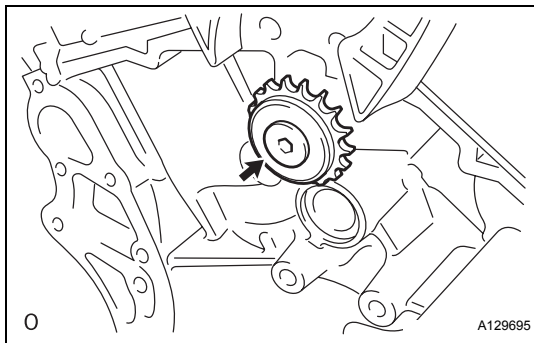


28. REMOVE CHAIN SUB-ASSEMBLY

- Turn the crankshaft counterclockwise 10° to loosen the chain of the crankshaft timing gear.
- Remove the chain from the crank timing gear and place it on the crankshaft.

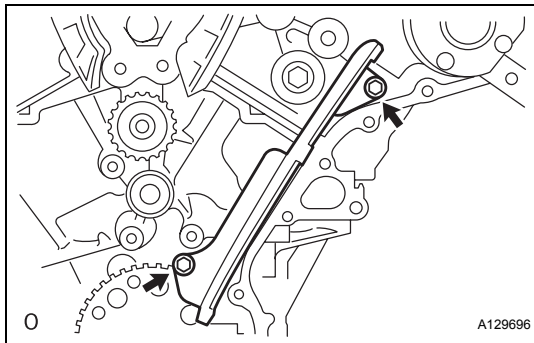


- (c) Turn the camshaft timing gear assembly on the RH bank clockwise (approximately 60°) and set it as shown in the illustration. Be sure to loosen the chain between the center banks.
- (d) Remove the chain.



29. REMOVE IDLE SPROCKET ASSEMBLY

- (a) Using a 10 mm hexagon wrench, remove the idle gear shaft No. 2, idle sprocket and idle gear shaft No. 1.

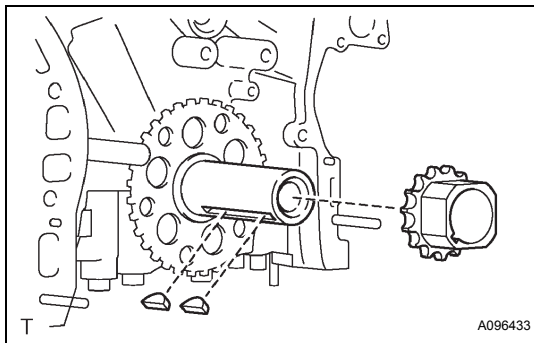


30. REMOVE CHAIN VIBRATION DAMPER NO.1

- (a) Remove the 2 bolts and chain vibration damper No. 1.

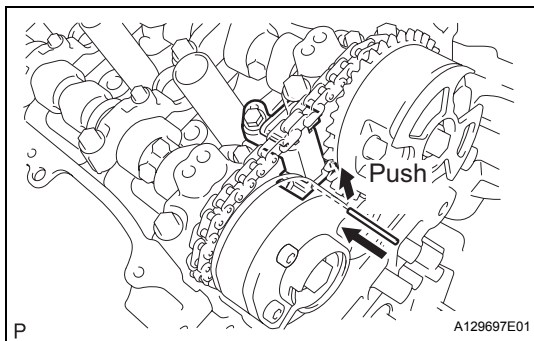
31. REMOVE CHAIN VIBRATION DAMPER NO.2

- (a) Remove the 2 chain vibration dampers.



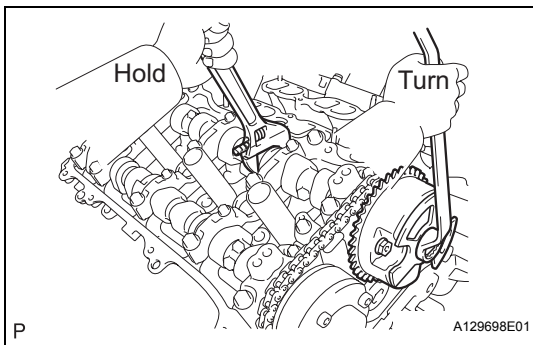
32. REMOVE CRANKSHAFT TIMING GEAR

- (a) Remove the pulley set bolt.
- (b) Remove the crankshaft timing gear from the crankshaft.
- (c) Remove the 2 pulley set keys from the crankshaft.



33. REMOVE CAMSHAFT TIMING GEARS AND NO. 2 CHAIN (for RH BANK)

- (a) While raising up the chain tensioner No. 2, insert a pin of $\phi 1.0$ mm (0.039 in.) into the hole to fix it.



- (b) Hold the hexagonal portion of the camshaft with a wrench, and remove the 2 bolts and 2 camshaft timing gears.

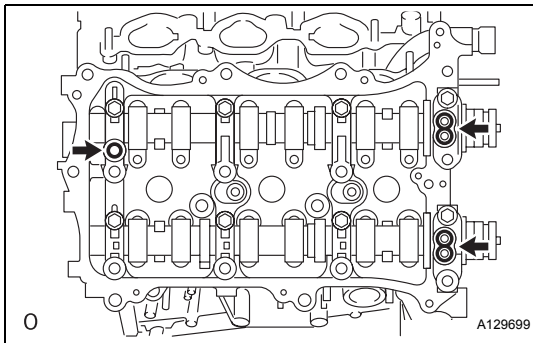
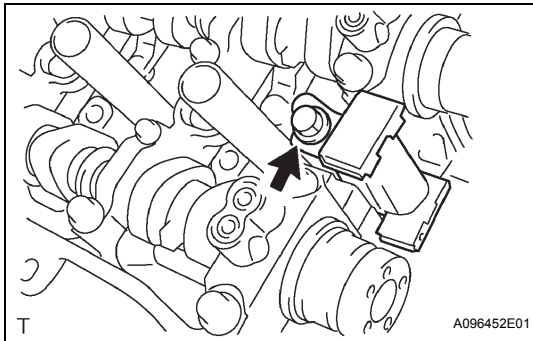
NOTICE:

- Be careful not to damage the cylinder head with the wrench.
- Do not disassemble the camshaft timing gear assembly.

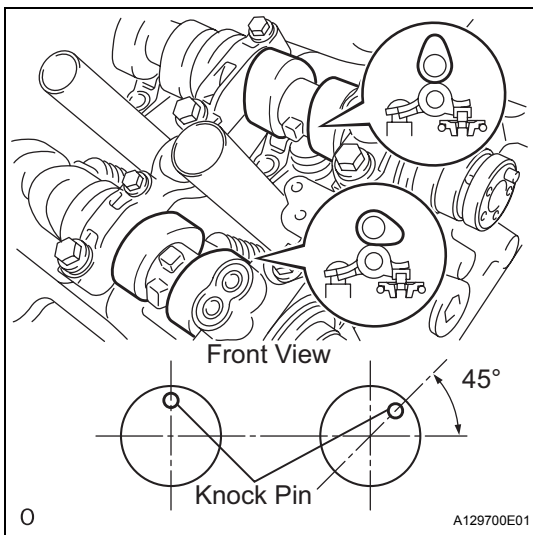
- (c) Remove the No. 2 chain.

34. REMOVE CHAIN TENSIONER ASSEMBLY NO.2

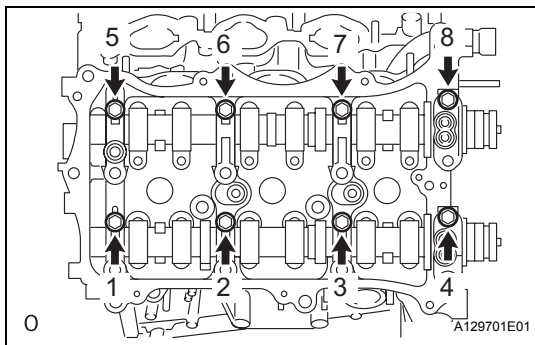
- (a) Remove the bolt and chain tensioner No. 2.

**35. REMOVE CAMSHAFT BEARING CAP**

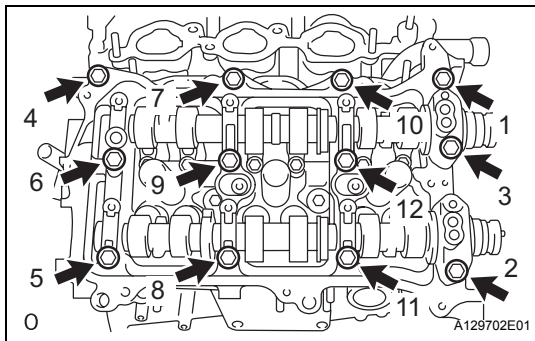
- (a) Remove the 3 gaskets.



- (b) Make sure that the knock pin of the camshaft is positioned as shown in the illustration.



- (c) Uniformly loosen and remove the 8 bearing cap bolts in the sequence shown in the illustration.



- (d) Uniformly loosen and remove the 12 bearing cap bolts in the sequence shown in the illustration.

NOTICE:

Uniformly loosen the bolts while keeping the camshaft level.

- (e) Remove the 5 bearing caps.

36. REMOVE CAMSHAFT

- (a) Remove the camshaft.

37. REMOVE NO.2 CAMSHAFT

- (a) Remove the No. 2 camshaft.

38. REMOVE CAMSHAFT HOUSING SUB-ASSEMBLY RH

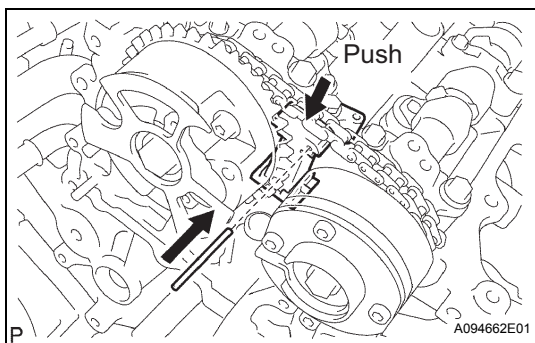
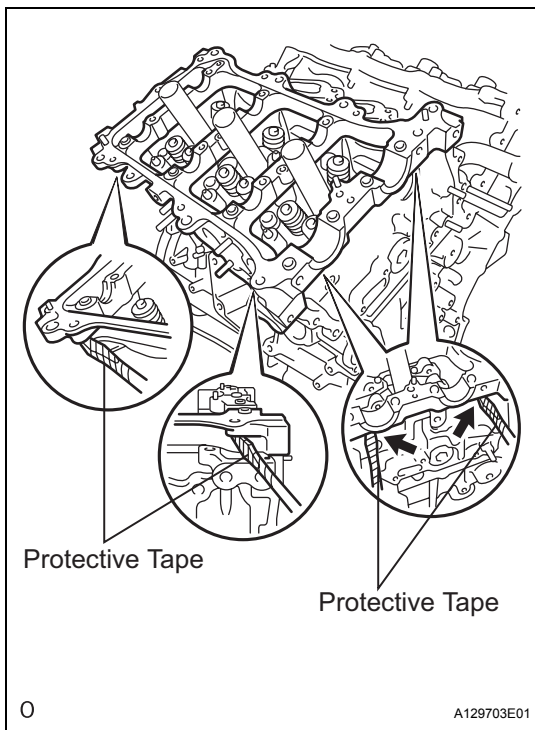
- (a) Remove the camshaft housing sub-assembly RH by prying between the cylinder head and camshaft housing sub-assembly RH with a screwdriver.

NOTICE:

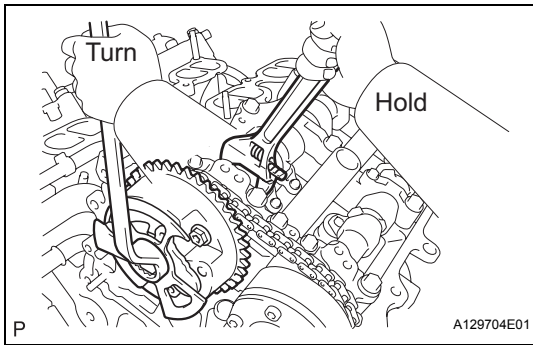
Be careful not to damage the contact surfaces of the cylinder head and camshaft housing.

HINT:

Tape the screwdriver tip before use.

**39. REMOVE CAMSHAFT TIMING GEARS AND NO. 2 CHAIN (for LH BANK)**

- (a) While pushing down the chain tensioner No. 3, insert a pin of $\phi 1.0$ mm (0.039 in.) into the hole to fix it.



- (b) Hold the hexagonal portion of the camshaft with a wrench, and remove the 2 bolts and 2 camshaft timing gears.

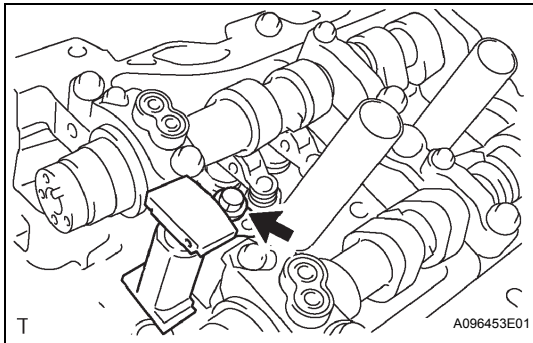
NOTICE:

- Be careful not to damage the cylinder head with the wrench.
- Do not disassemble the camshaft timing gear assembly.

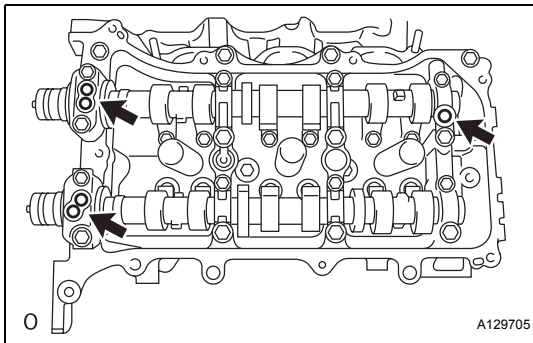
- (c) Remove the No. 2 chain.

40. REMOVE CHAIN TENSIONER ASSEMBLY NO.3

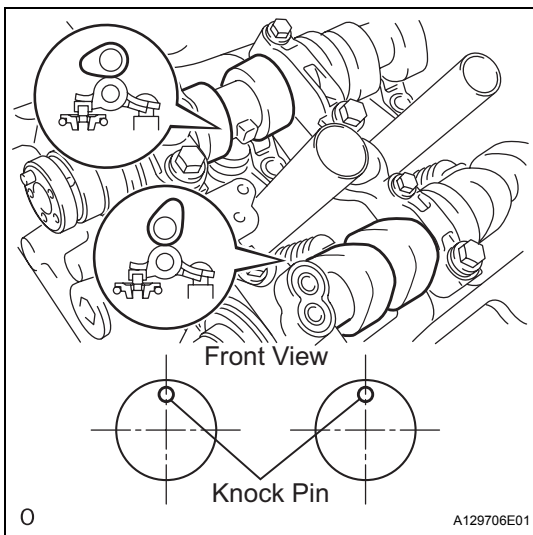
- (a) Remove the bolt and chain tensioner No. 3.

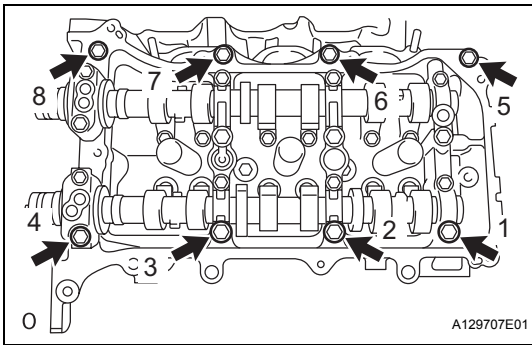
**41. REMOVE CAMSHAFT BEARING CAP**

- (a) Remove the 3 gaskets.

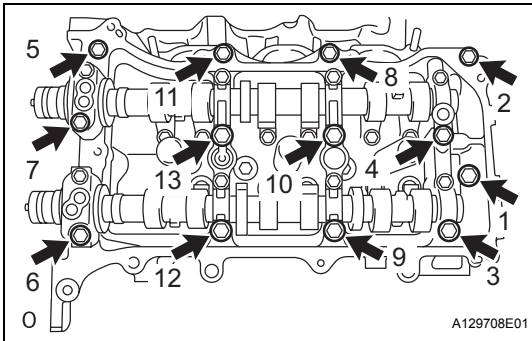


- (b) Make sure that the knock pin of the camshaft is positioned as shown in the illustration.





- (c) Uniformly loosen and remove the 8 bearing cap bolts in the sequence shown in the illustration.



- (d) Uniformly loosen and remove the 13 bearing cap bolts in the sequence shown in the illustration.

NOTICE:

Uniformly loosen the bolts while keeping the camshaft level.

- (e) Remove the 5 bearing caps.

42. REMOVE NO.4 CAMSHAFT SUB-ASSEMBLY

- (a) Remove the No. 4 camshaft sub-assembly.

43. REMOVE NO.3 CAMSHAFT SUB-ASSEMBLY

- (a) Remove the No. 3 camshaft sub-assembly.

44. REMOVE CAMSHAFT HOUSING SUB-ASSEMBLY LH

- (a) Remove the camshaft housing sub-assembly LH by prying between the cylinder head and camshaft housing sub-assembly LH with a screwdriver.

NOTICE:

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

HINT:

Tape the screwdriver tip before use.

45. REMOVE VALVE ROCKER ARM SUB-ASSEMBLY NO.1

- (a) Remove the 24 valve rocker arms.

HINT:

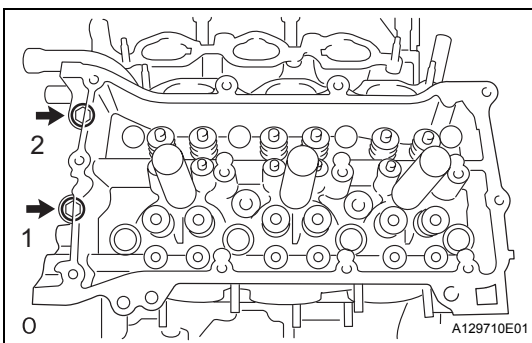
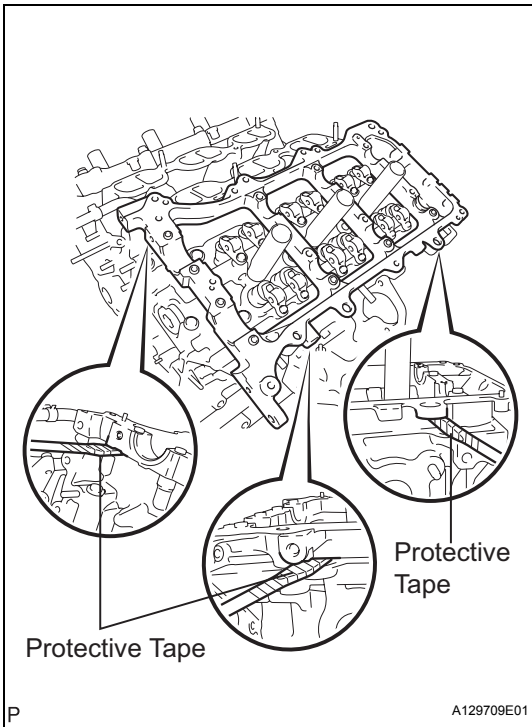
Arrange the removed parts in the correct order.

46. REMOVE VALVE LASH ADJUSTER ASSEMBLY

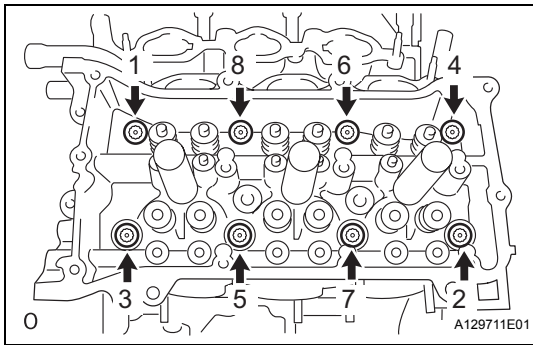
- (a) Remove the 24 valve lash adjusters from the cylinder head.

HINT:

Arrange the removed parts in the correct order.

**47. REMOVE CYLINDER HEAD LH**

- (a) Uniformly loosen and remove the 2 bolts in the sequence shown in the illustration.



- (b) Using a 10 mm bi-hexagon wrench, uniformly loosen the 8 bolts in the sequence shown in the illustration. Remove the 8 cylinder head bolts and plate washers.

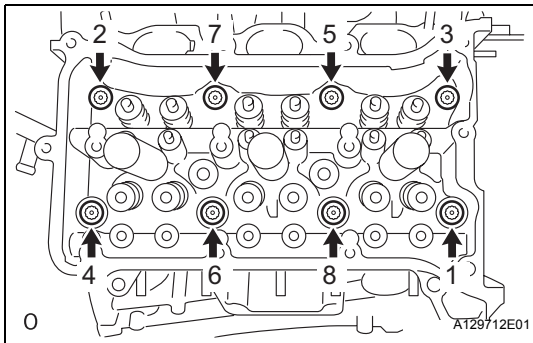
NOTICE:

- Be careful not to drop washers into the cylinder head.
- Head warpage or cracking could result from not removing bolts in an incorrect order.

HINT:

Be sure to keep the removed parts separate for each installation position.

- (c) Remove the cylinder head and gasket.

48. REMOVE CYLINDER HEAD SUB-ASSEMBLY

- (a) Using a 10 mm bi-hexagon wrench, uniformly loosen the 8 bolts in the sequence shown in the illustration. Remove the 8 cylinder head bolts and plate washers.

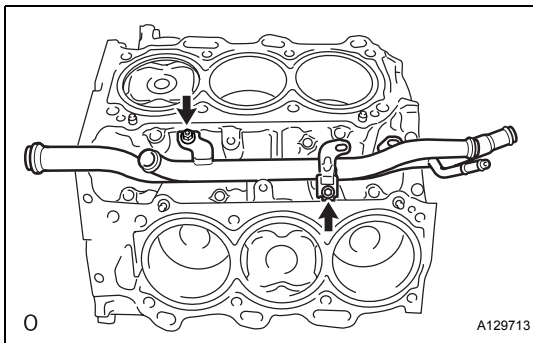
NOTICE:

- Be careful not to drop washers into the cylinder head.
- Head warpage or cracking could result from not removing bolts in an incorrect order.

HINT:

Be sure to keep the removed parts separate for each installation position.

- (b) Remove the cylinder head and gasket.

49. REMOVE WATER INLET PIPE

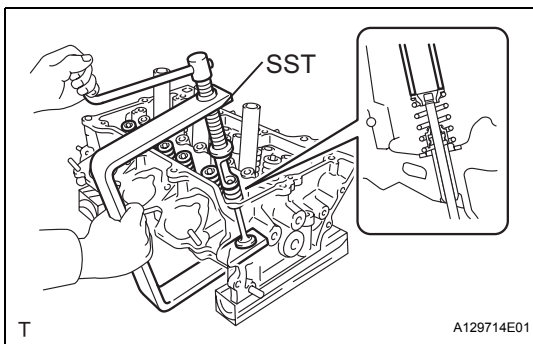
- (a) Separate the knock sensor wire.
 (b) Remove the 2 bolts and water outlet pipe.
 (c) Separate the water by-pass hose No. 1.

50. REMOVE VALVE STEM CAP

- (a) Remove the valve stem caps from the cylinder head.

HINT:

Arrange the removed parts in the correct order.

51. REMOVE INTAKE VALVE

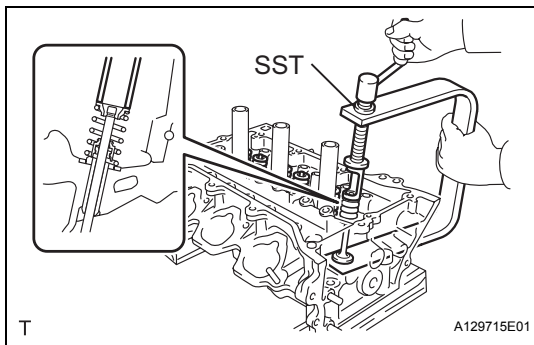
- (a) Using SST and wooden blocks, compress the compression spring and remove the valve retainer locks.

SST 09202-70020 (09202-00010)

- (b) Remove the retainer, compression spring and valve.

HINT:

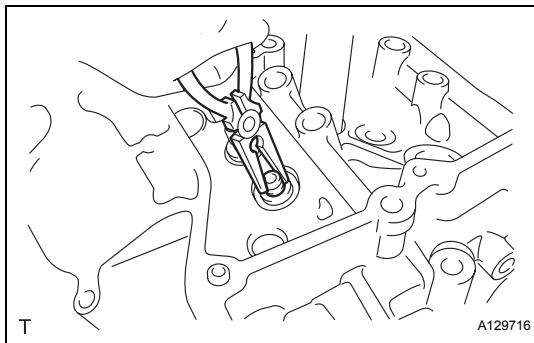
Arrange the removed parts in the correct order.

**52. REMOVE EXHAUST VALVE**

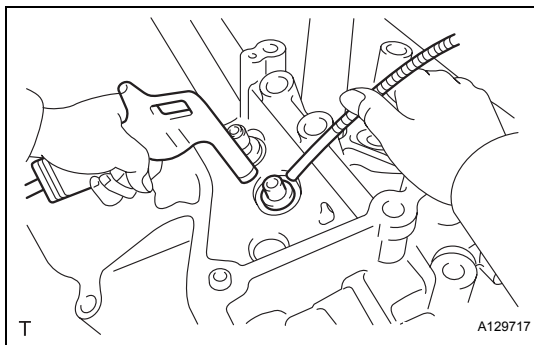
- (a) Using SST and wooden blocks, compress the compression spring and remove the valve retainer locks.

SST 09202-70020 (09202-00010)

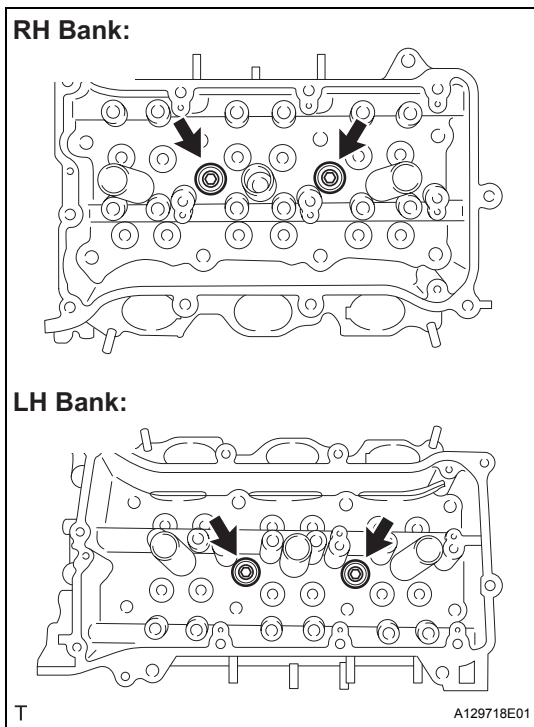
- (b) Remove the retainer, compression spring and valve.
HINT:
 Arrange the removed parts in the correct order.

**53. REMOVE VALVE STEM OIL SEAL**

- (a) Using needle-nose pliers, remove the oil seals.

**54. REMOVE VALVE SPRING SEAT**

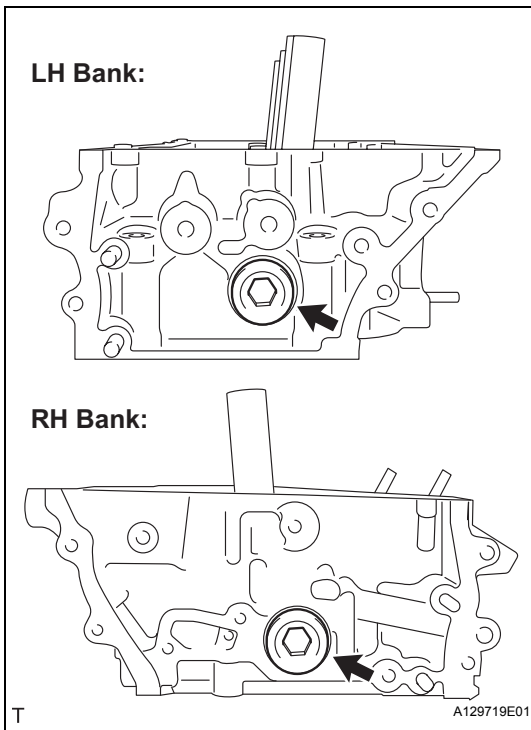
- (a) Using compressed air and a magnetic finger, remove the valve spring seat by blowing air onto it.

**55. REMOVE WITH HEAD STRAIGHT SCREW PLUG NO.1**

- (a) Using a 10 mm hexagon wrench, remove the 4 screw plugs and 4 gaskets.

NOTICE:

If water leaks from the w/ head straight screw plug No. 1 or the plug is corroded, replace it.



56. REMOVE WITH HEAD STRAIGHT SCREW PLUG NO.2

- (a) Using a 14 mm hexagon wrench, remove the 2 screw plugs and 2 gaskets.

NOTICE:

If water leaks from the w/ head straight screw plug No. 2 or the plug is corroded, replace it.

57. REMOVE RING PIN

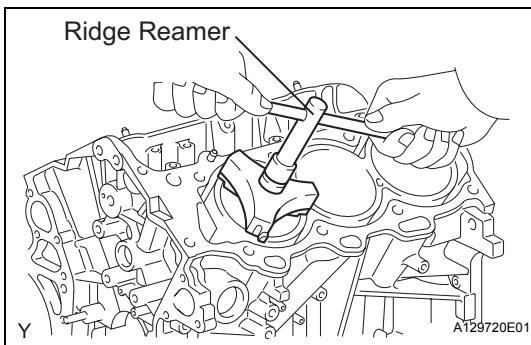
NOTICE:

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

58. REMOVE STUD BOLT

NOTICE:

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



59. REMOVE PISTON SUB-ASSEMBLY WITH CONNECTING ROD

- (a) Using a ridge reamer, remove all the carbon from the top of the cylinder.
- (b) 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.

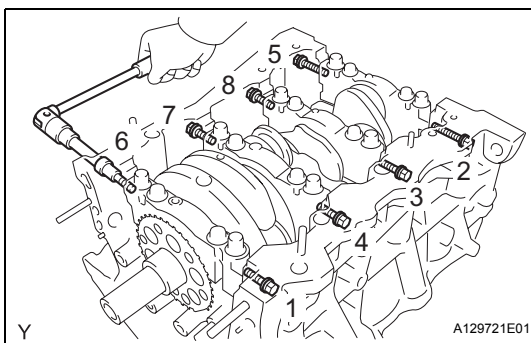
60. REMOVE CONNECTING ROD BEARING

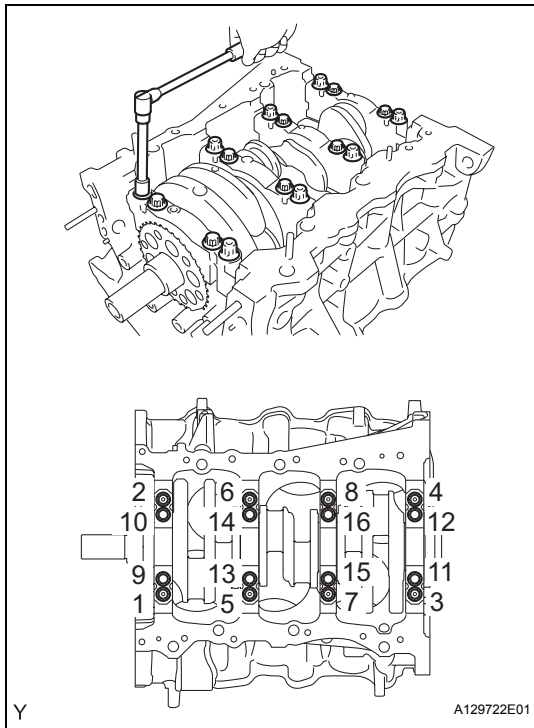
HINT:

Arrange the removed parts in the correct order.

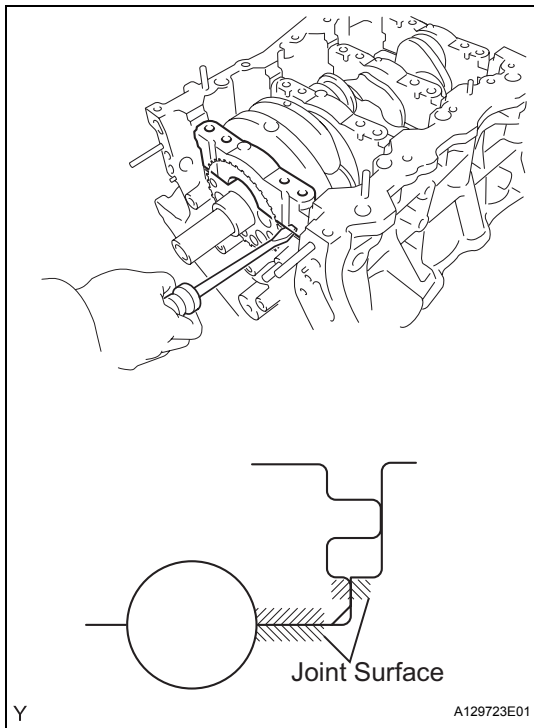
61. REMOVE CRANKSHAFT

- (a) Uniformly loosen and remove the 8 main bearing cap bolts and seal washers in the several steps and in the sequence shown in the illustration.





- (b) Uniformly loosen the 16 bearing cap bolts in several steps in the sequence shown in the illustration.



- (c) Using a screwdriver, pry out main bearing caps. Remove the 4 main bearing caps and lower bearings.

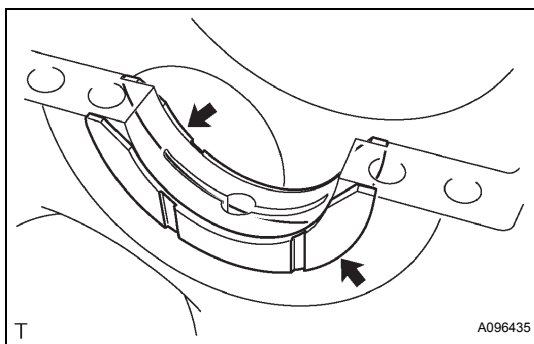
NOTICE:

- Pull up the main cap little by little to the right and the left in turns.
- Be careful not to damage the joint surface of the cylinder block and the main bearing caps.

62. REMOVE CRANKSHAFT BEARING

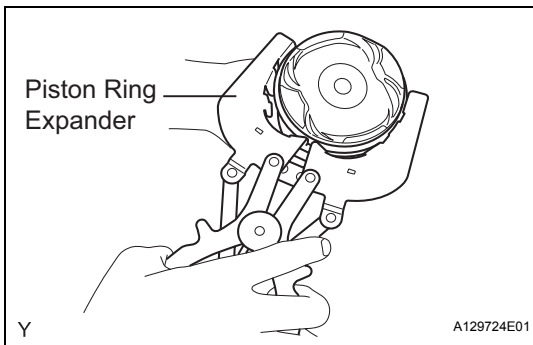
HINT:

Arrange the removed parts in the correct order.

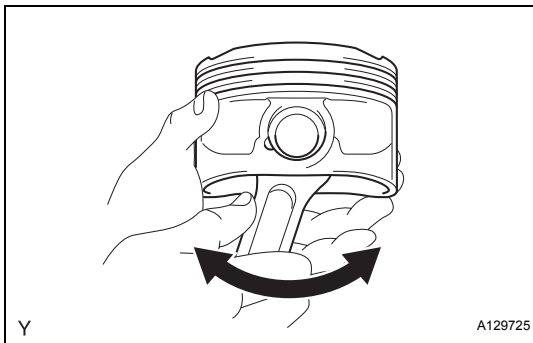


63. REMOVE CRANKSHAFT THRUST WASHER SET

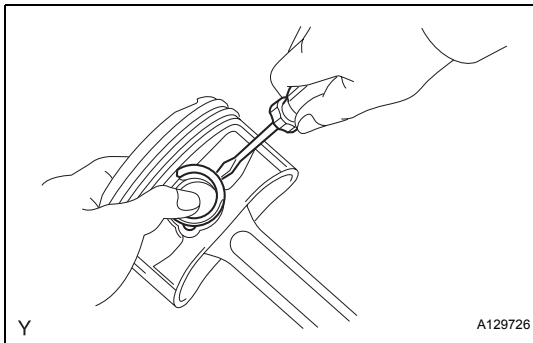
- (a) Remove the upper bearings and upper thrust washers from the cylinder block.

**64. REMOVE PISTON RING SET**

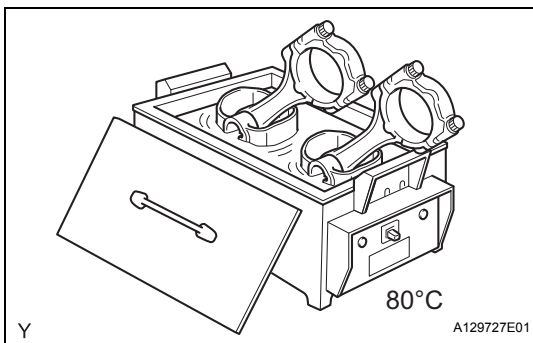
- (a) Using a piston ring expander, remove the 2 compression rings.
 - (b) Using a piston ring expander, remove the 2 side rails.
 - (c) Remove the oil ring expander by hand.
- HINT:
Arrange the piston rings in the correct order.

**65. REMOVE PISTON SUB-ASSEMBLY WITH PIN**

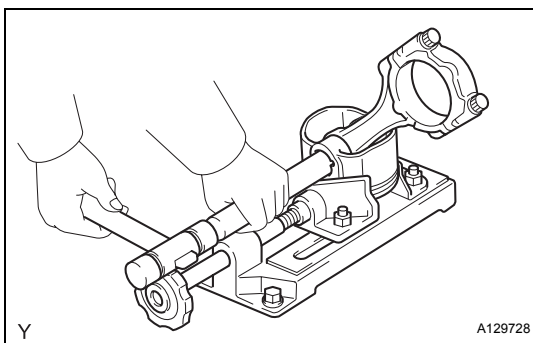
- (a) Check the fitting condition between the piston and piston pin.
 - (1) Try to move the piston back and forth on the piston pin.
If any movement is felt, replace the piston and pin as a set.



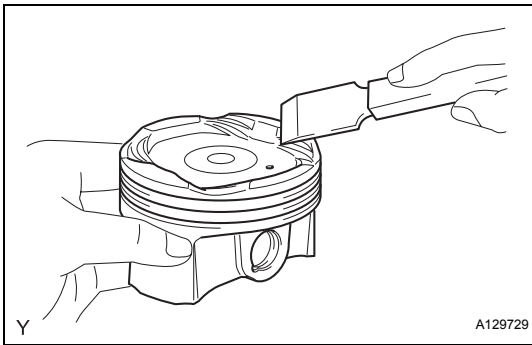
- (b) Disconnect the connecting rod from the piston.
 - (1) Using a screwdriver, pry off the snap rings from the piston.



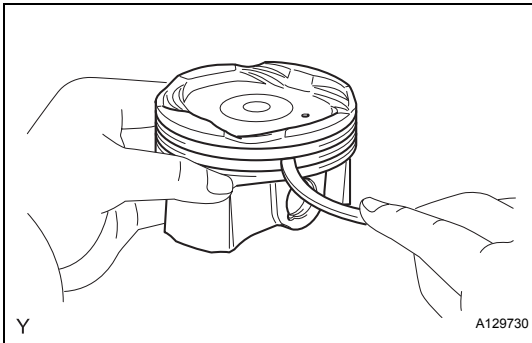
- (2) Gradually heat the piston to approximately 80°C (176°F).



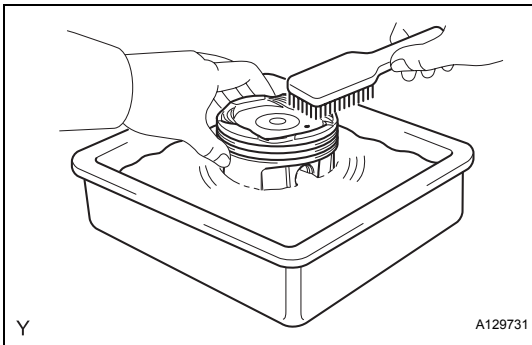
- (3) Using a brass bar and plastic hammer, lightly tap out the piston pin and remove the connecting rod.
- HINT:
- The piston and pin are a matched set.
 - Arrange the pistons, pins, rings, connecting rods and bearings in the correct order.



- (c) Using a gasket scraper, remove the carbon from the piston top.



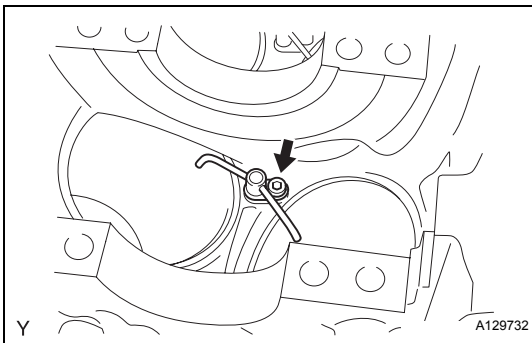
- (d) Using a groove cleaning tool or broken ring, clean the piston ring grooves.



- (e) Using solvent and a brush, thoroughly clean the piston.

NOTICE:

Do not use a wire brush.



66. REMOVE SUB-ASSEMBLY OIL NOZZLE NO.1

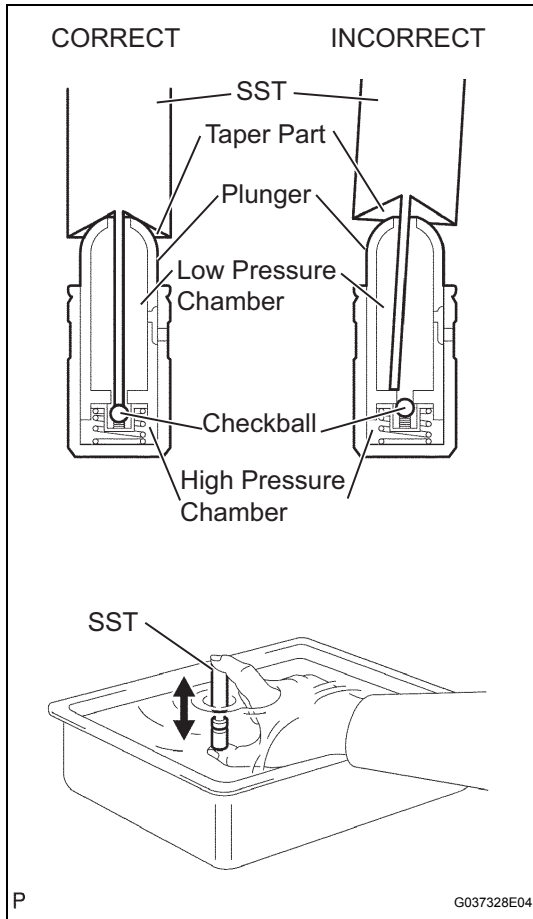
- (a) Using a 5 mm hexagon wrench, remove the 3 oil nozzles.
 (b) Check the oil nozzles for damage or clogging. If necessary, replace the oil nozzle.

INSPECTION

1. INSPECT VALVE LASH ADJUSTER ASSEMBLY

NOTICE:

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



- Place the lash adjuster into a container full of engine oil.
- Insert 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

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

OK:

Plunger moves up and down.

NOTICE:

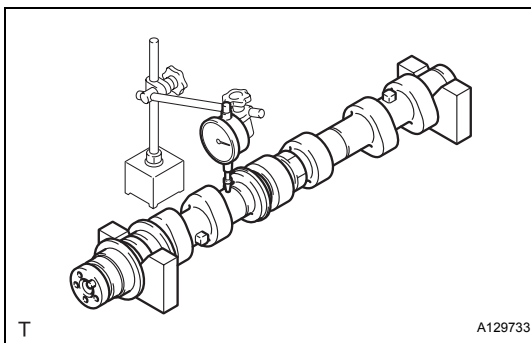
When bleeding high-pressure air from the compression chamber, make sure that the tip of the SST is actually pressing the checkball as shown in the illustration. If the checkball is not pressed, air will not bleed.

- After bleeding the air, remove SST. Then 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.



2. INSPECT CAMSHAFTS

- Inspect camshaft for runout.
 - Place the camshaft on V-blocks.
 - Using a dial indicator, measure the circle runout at the center journal.

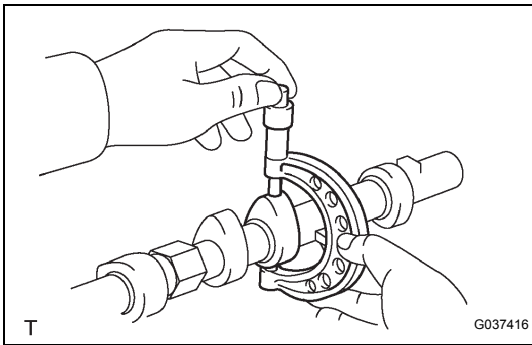
Maximum circle runout:

0.04 mm (0.0016 in.)

If the circle runout is greater than the maximum, replace the camshaft.

HINT:

Check the oil clearance after replacing the camshaft.



- (b) Using a micrometer, measure the cam lobe height.

Standard cam lobe height

Item	Specification
Intake	44.316 to 44.416 mm (1.7447 to 1.7487 in.)
Exhaust	44.262 to 44.362 mm (1.7426 to 1.7465 in.)

Maximum cam lobe height

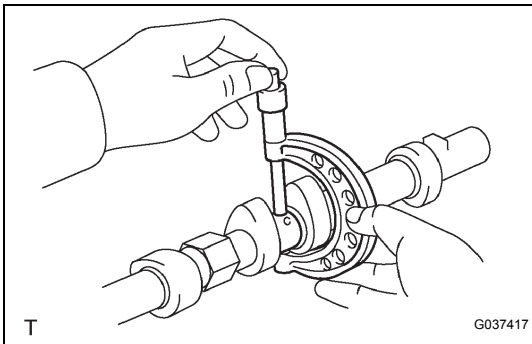
Item	Specification
Intake	44.166 mm (1.7388 in.)
Exhaust	44.112 mm (1.7367 in.)

- (c) Using a micrometer, measure the journal diameter.

Standard journal diameter

Item	Specification
No. 1 journal	35.946 to 35.960 mm (1.4152 to 1.4157 in.)
Other journal	25.959 to 25.975 mm (1.0220 to 1.0226 in.)

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



3. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY

- (a) Clamp the camshaft in a vise.

NOTICE:

Be careful not to damage the camshaft in the vise.

- (b) Put the camshaft timing gear and camshaft together by aligning the key groove and straight pin.
 (c) Lightly press the gear against the camshaft, and turn the gear. Push further at the position where the pin enters the groove.

CAUTION:

Be sure not to turn the camshaft timing gear in the retard direction (the right angle).

- (d) Check that there is no clearance between the gear's fringe and the camshaft.

- (e) Tighten the fringe bolt with the camshaft timing gear fixed.

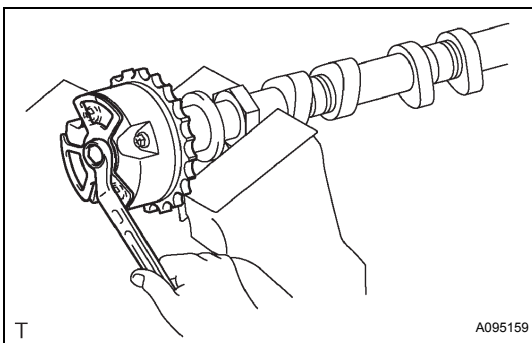
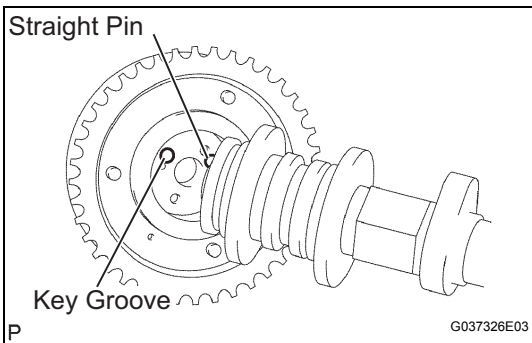
Torque: 100 N*m (1,020 kgf*cm, 74 ft.*lbf)

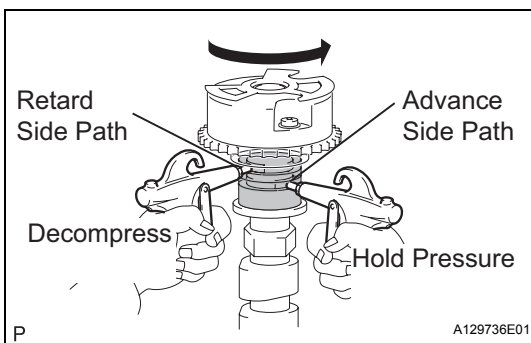
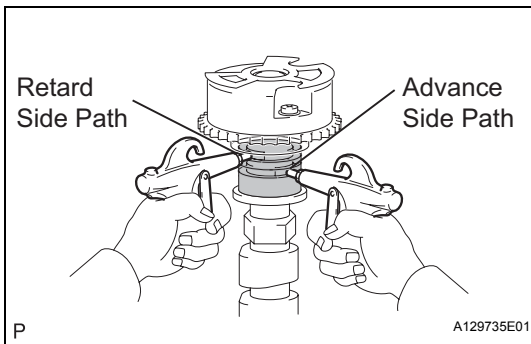
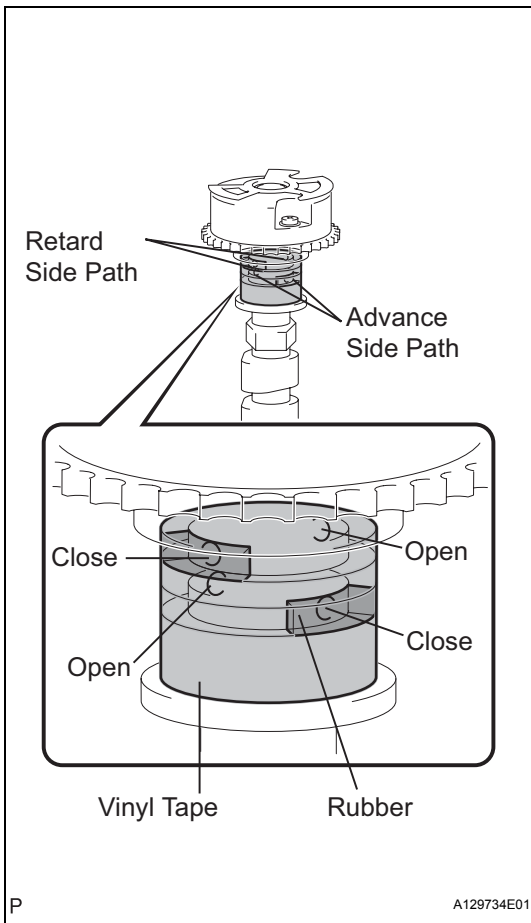
- (f) Check the lock of the camshaft timing gear.

- (1) Clamp the camshaft in a vise, and confirm that the camshaft timing gear is locked.

NOTICE:

Be careful not to damage the camshaft.





- (g) Release the lock pin.
- (1) Cover the 4 oil paths of the cam journal with vinyl tape as shown in the illustration.
HINT:
2 advance side paths are provided in the groove of the camshaft. Plug one of the paths with a rubber piece.
 - (2) Break through the tape of the advance side path and the retard side path on the opposite side to the hole of the advance side path, as shown in the illustration.

- (3) Apply approximately 200 kPa (2.0 kgf/cm², 28 psi) of air pressure to the two broken paths.

CAUTION:

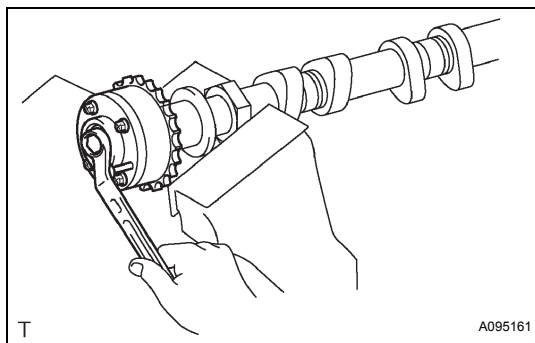
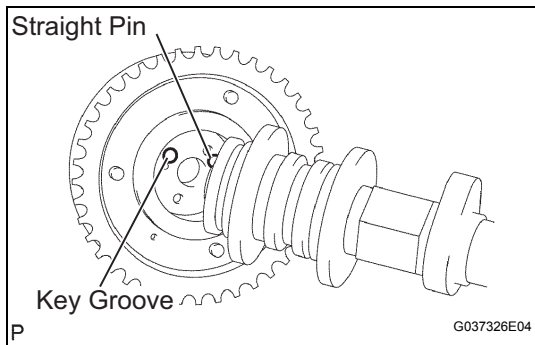
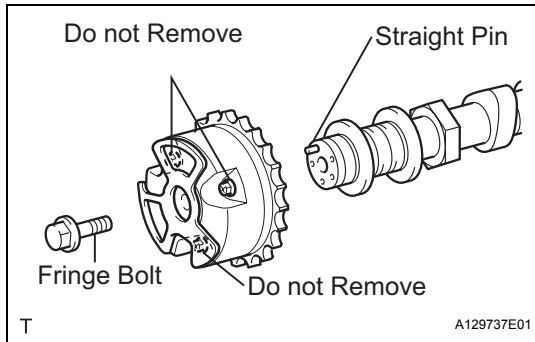
Cover the paths with a shop rag or piece of cloth when applying pressure to keep oil from splashing.

- (4) Check that the camshaft timing gear revolves in the advance direction when reducing the air pressure applied to the retard side path.
HINT:
This operation releases the lock pin for the most retarded position.
- (5) When the camshaft timing gear reaches the most advanced position, release the air pressure from the retard side path and advance side path, in that order.

NOTICE:

Do not release the air pressure from the advance side path first. The gear may abruptly shift in the retard direction and break the lock pin.

EM



- (h) Check for smooth rotation.
 (1) Turn the camshaft timing gear within its movable range (21°) 2 or 3 times, but do not turn it to the most retarded position. Make sure that the gear turns smoothly.

CAUTION:

Do not use air pressure to perform the smooth operation check.

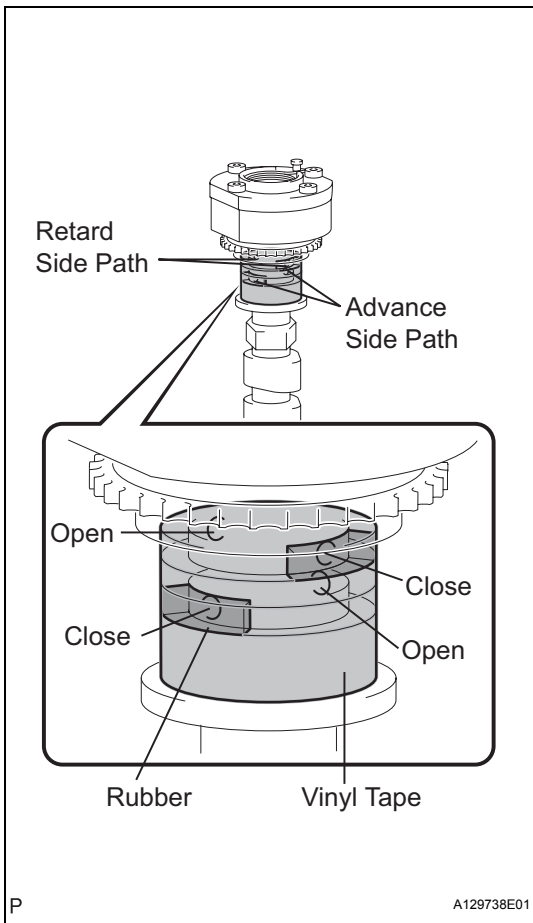
- (i) Check the lock in the most retarded position.
 (1) Confirm that the camshaft timing gear is locked at the most retarded position.
- (j) Remove the fringe bolt and camshaft timing gear.

NOTICE:

- Be sure not to remove the other 3 bolts.
- If planning to reuse the gear, be sure to release the straight pin lock before installing the gear.

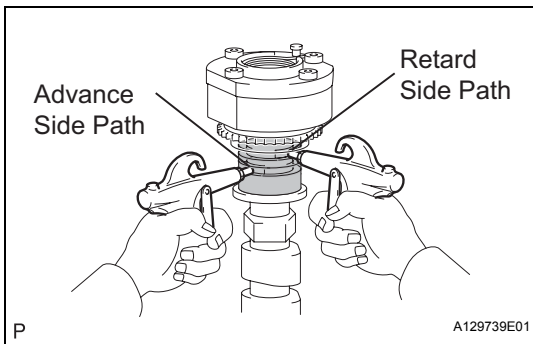
4. INSPECT CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY

- (a) Clamp the camshaft in a vise.
NOTICE:
Be careful not to damage the camshaft in the vise.
- (b) Put the camshaft timing exhaust gear and camshaft together by aligning the key groove and straight pin.
- (c) Lightly press the gear against the camshaft, and turn the gear. Push further at the position where the pin enters the groove.
CAUTION:
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 fringe and the camshaft.
- (e) Tighten the fringe bolt with the camshaft timing exhaust gear fixed.
Torque: 100 N*m (1,020 kgf*cm, 74 ft.*lbf)
- (f) Check the camshaft timing exhaust gear lock.
 (1) Make sure that the camshaft timing exhaust gear is locked.



(g) Release the lock pin.

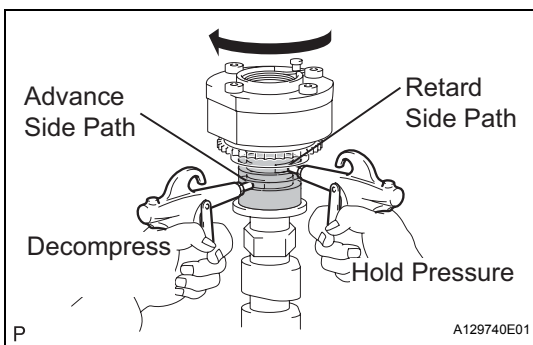
- (1) Cover the 4 oil paths of the cam journal with vinyl tape as shown in the illustration.
HINT:
4 oil paths are provided in the groove. Plug 2 paths with rubber pieces.
- (2) Prick a hole in the tape placed on the advance side path. Prick a hole in the tape placed on the retard side path, on the opposite side to that of the advance side path, as shown in the illustration.



- (3) Apply approximately 200 kPa (2.0 kgf/cm², 28 psi) of air pressure to the two broken paths (the advance side path and the retard side path).

NOTICE:

Cover the paths with a shop rag or piece of cloth when applying pressure to keep oil from splashing.



- (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 comes 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.

NOTICE:

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.

- (h) Check for smooth rotation.
 (1) Turn the camshaft timing exhaust gear within its movable range (18.5°) 2 or 3 times, but do not turn it to the most advanced position. Make sure that the gear turns smoothly.

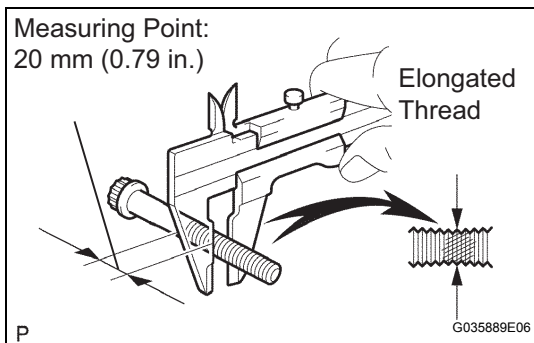
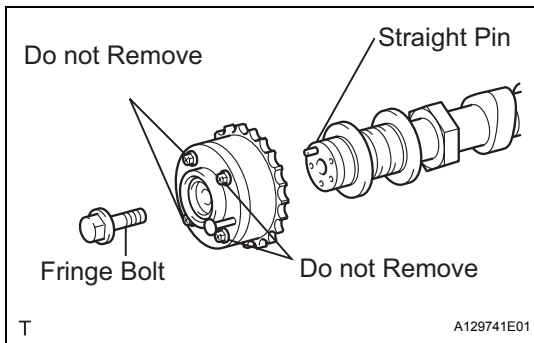
NOTICE:

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.

- (i) Check the lock at the most advanced position.
 (1) Make sure that the camshaft timing exhaust gear is locked at the most advanced position.
- (j) Remove the fringe bolt and camshaft timing exhaust gear.

NOTICE:

- **Be sure not to remove the other 3 bolts.**
- **If planning to reuse the gear, be sure to release the straight pin lock before installing the gear.**

**5. INSPECT CYLINDER HEAD SET BOLT**

- (a) Using vernier calipers, measure the minimum diameter of the elongated thread at the measuring point.

Standard outside diameter:

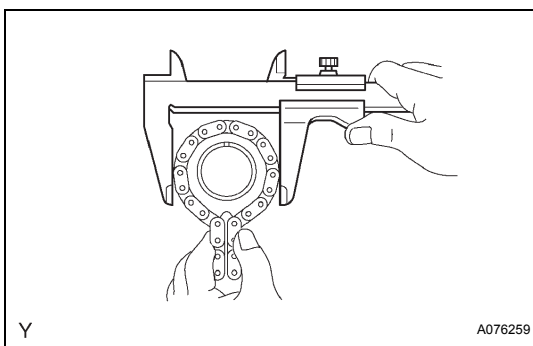
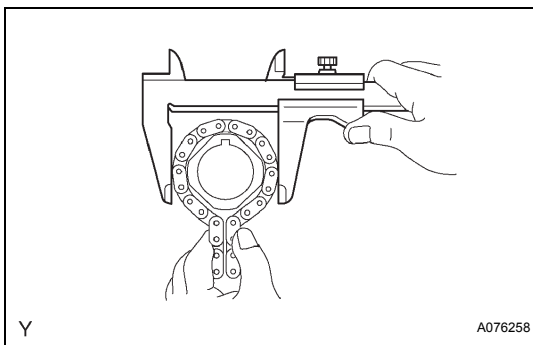
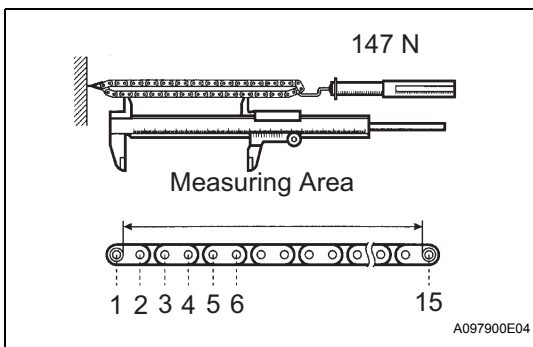
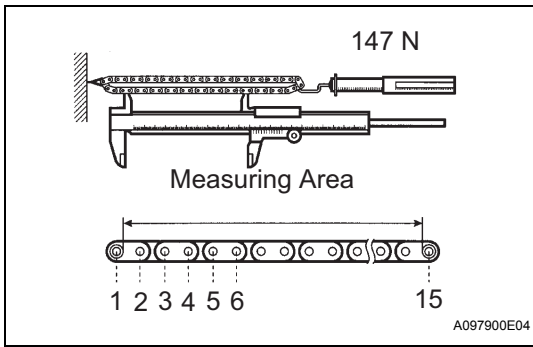
10.85 to 11.00 mm (0.4272 to 0.4331 in.)

Minimum outside diameter:

10.70 mm (0.4213 in.)

HINT:

- If a visual check reveals no excessively thin areas, check the center of the bolt (see illustration) and find the area that has the lowest diameter.



- If the diameter is less than the minimum, replace the cylinder head bolt.

6. INSPECT CHAIN SUB-ASSEMBLY

- Pull the chain with a force of 147 N (15 kgf, 33 lbf) as shown in the illustration.
- Using vernier calipers, measure the length of 15 links.

Maximum chain elongation:

136.9 mm (5.390 in.)

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

NOTICE:

Perform the same measurement by pulling at random in 3 or more places to obtain an average.

7. INSPECT NO.2 CHAIN SUB-ASSEMBLY

- Pull the chain with a force of 147 N (15 kgf, 33 lbf) as shown in the illustration.
- Using vernier calipers, measure the length of 15 links.

Maximum chain elongation:

137.6 mm (5.417 in.)

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

NOTICE:

Perform the same measurement by pulling at random in 3 or more places to obtain an average.

8. INSPECT CRANKSHAFT TIMING GEAR

- Wrap the chain around the sprocket.
- Using vernier calipers, measure the sprocket diameter with the chain.

Minimum sprocket diameter (w/ chain):

61.4 mm (2.417 in.)

HINT:

- The vernier calipers must contact the chain rollers for the measurement.
- If the diameter is less than the minimum, replace the chain and sprocket.

9. INSPECT IDLE SPROCKET ASSEMBLY

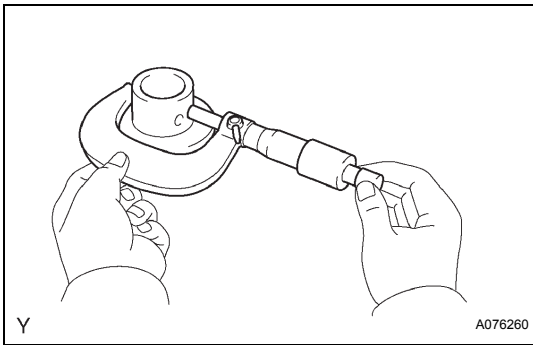
- Wrap the chain around the sprocket.
- Using vernier calipers, measure the sprocket diameter with the chain.

Minimum sprocket diameter (w/ chain):

61.4 mm (2.417 in.)

HINT:

- The vernier calipers must contact the chain rollers for the measurement.
- If the diameter is less than the minimum, replace the chain and sprocket.

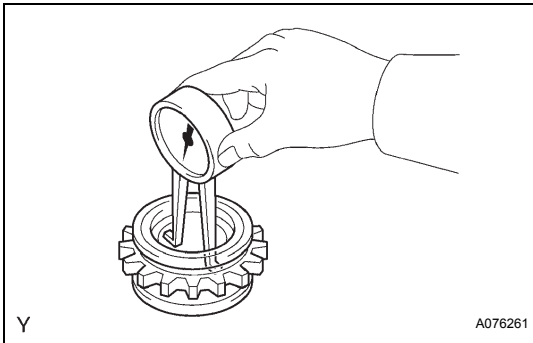


10. INSPECT IDLE GEAR SHAFT OIL CLEARANCE

- (a) Using a micrometer, measure the idle gear shaft diameter.

Idle gear shaft diameter:

30.000 to 30.013 mm (1.1811 to 1.1816 in.)



- (b) Using a caliper gauge, measure the inside diameter of the idle gear.

Idle gear inside diameter:

30.020 to 30.033 mm (1.1819 to 1.1824 in.)

- (c) Subtract the idle gear shaft diameter measurement from the idle gear inside diameter measurement.

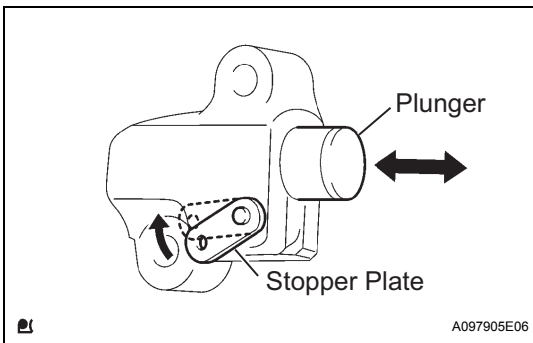
Standard oil clearance:

0.007 to 0.033 mm (0.0003 to 0.0013 in.)

Maximum oil clearance:

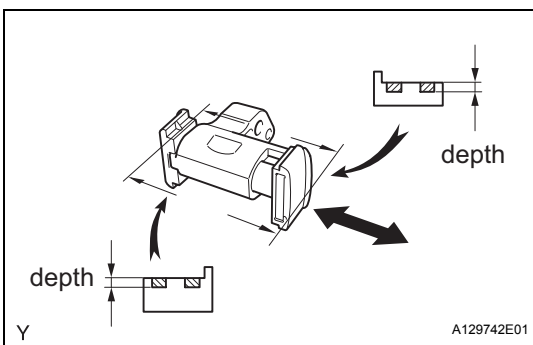
0.083 mm (0.0033 in.)

If the thrust oil clearance is greater than the maximum, replace the idle gear shaft and idle gear.



11. INSPECT CHAIN TENSIONER ASSEMBLY NO.1

- (a) Move the stopper plate upward to release the lock. Push the plunger and check that it moves smoothly. If necessary, replace the chain tensioner assembly No. 1.



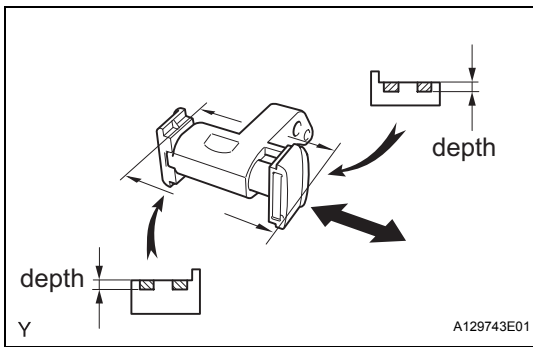
12. INSPECT CHAIN TENSIONER ASSEMBLY NO.2

- (a) Check that the plunger moves smoothly.
(b) Measure the worn depth of the chain tensioner slipper.

Maximum depth:

0.9 mm (0.035 in.)

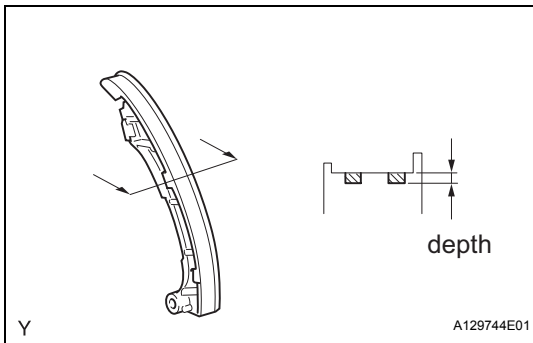
If the depth is greater than the maximum, replace the chain tensioner No. 2.

**13. INSPECT CHAIN TENSIONER ASSEMBLY NO.3**

- (a) Check that the plunger moves smoothly.
- (b) Measure the worn depth of the chain tensioner slipper.

Maximum depth:**0.9 mm (0.035 in.)**

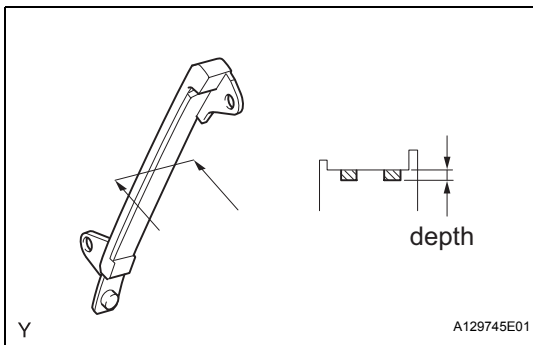
If the depth is greater than the maximum, replace the chain tensioner No . 3.

**14. INSPECT CHAIN TENSIONER SLIPPER**

- (a) Measure the worn depth of the chain tensioner slipper.

Maximum depth:**1.0 mm (0.039 in.)**

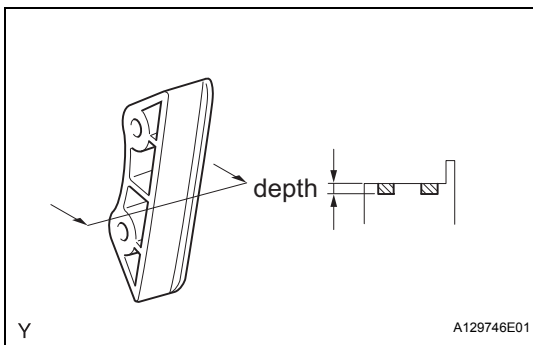
If the depth is greater than the maximum, replace the chain tensioner slipper.

**15. INSPECT CHAIN VIBRATION DAMPER NO.1**

- (a) Measure the worn depth of the chain vibration damper No. 1.

Maximum depth:**1.0 mm (0.039 in.)**

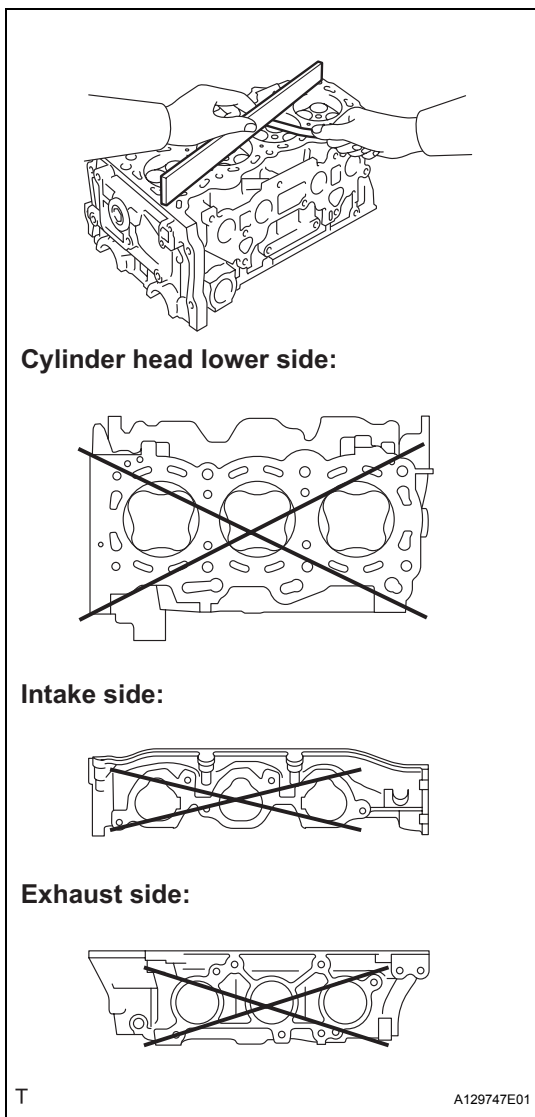
If the depth is greater than the maximum, replace the chain vibration damper No .1.

**16. INSPECT CHAIN VIBRATION DAMPER NO.2**

- (a) Measure the worn depth of the chain vibration damper No. 2.

Maximum depth:**1.0 mm (0.039 .)**

If the depth is greater than the maximum, replace the chain vibration damper No . 2.



17. INSPECT CYLINDER HEAD SUB-ASSEMBLY

- (a) Using a precision straight edge and feeler gauge, measure the warpage of the contact surface of the cylinder block and manifolds.

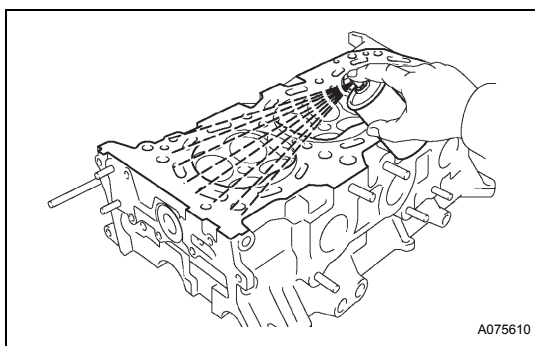
Standard warpage

Item	Warpage
Cylinder head lower	0.05 mm (0.0020 in.)
Intake	0.08 mm (0.0031 in.)
Exhaust	0.08 mm (0.0031 in.)

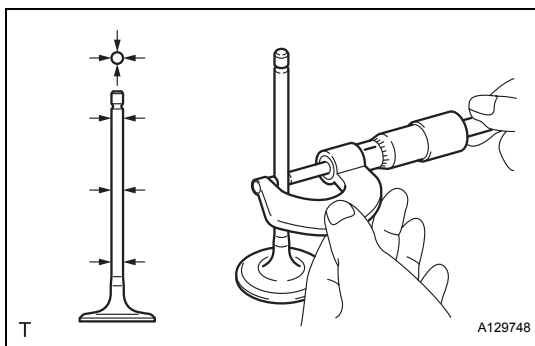
Maximum warpage:

0.10 mm (0.0039 in.)

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



- (b) Using a dye penetrant, check the intake ports, exhaust ports and cylinder surface for cracks. If cracked, replace the cylinder head.

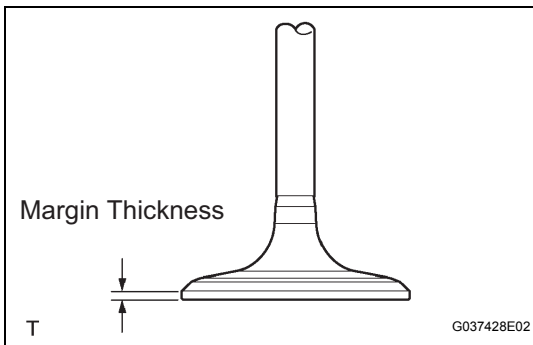


18. INSPECT INTAKE VALVE

- (a) 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.)



- (b) Using vernier calipers, measure the valve head margin thickness.

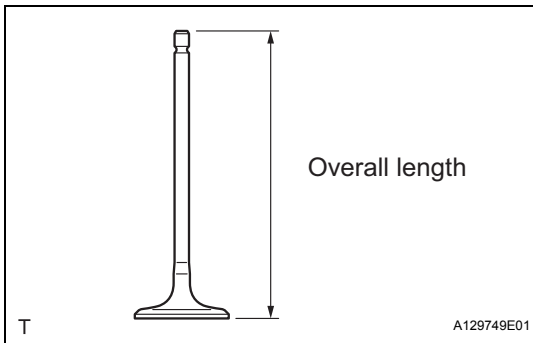
Standard margin thickness:

1.0 mm (0.0394 in.)

Minimum margin thickness:

0.5 mm (0.0197 in.)

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



- (c) Using vernier calipers, measure the valve's overall length.

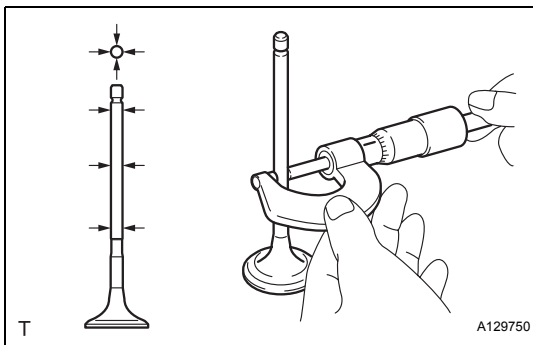
Standard overall length:

105.85 mm (4.1673 in.)

Minimum overall length:

105.35 mm (4.1476 in.)

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

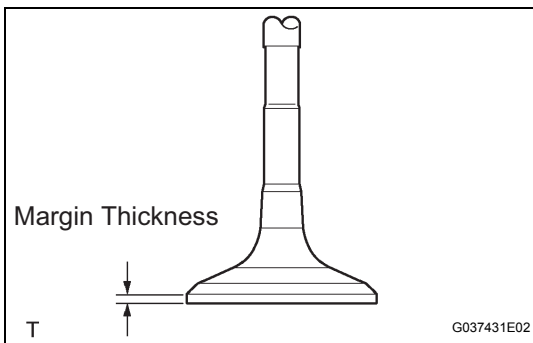


19. INSPECT EXHAUST VALVE

- (a) Using a micrometer, measure the diameter of the valve stem.

Valve stem diameter:

5.465 to 5.480 mm (0.2151 to 0.2157 in.)



- (b) Using vernier calipers, measure the valve head margin thickness.

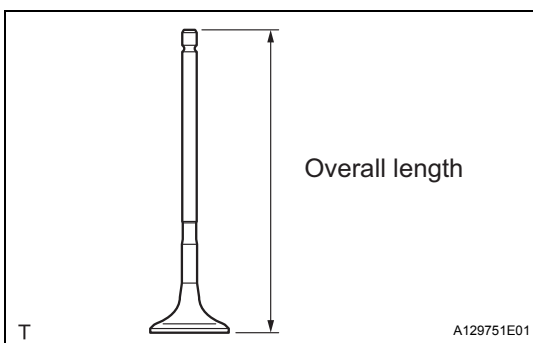
Standard margin thickness:

1.0 mm (0.0394 in.)

Minimum margin thickness:

0.5 mm (0.0197 in.)

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



- (c) Using vernier calipers, measure the valve's overall length.

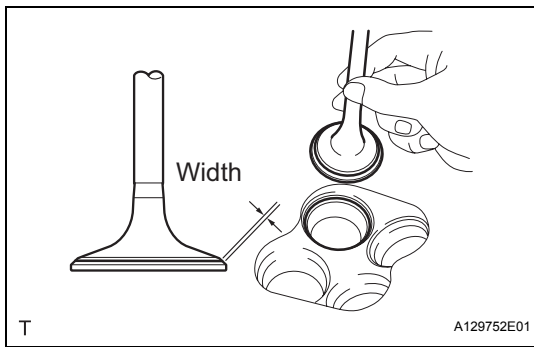
Standard overall length:

111.40 mm (4.3464 in.)

Minimum overall length:

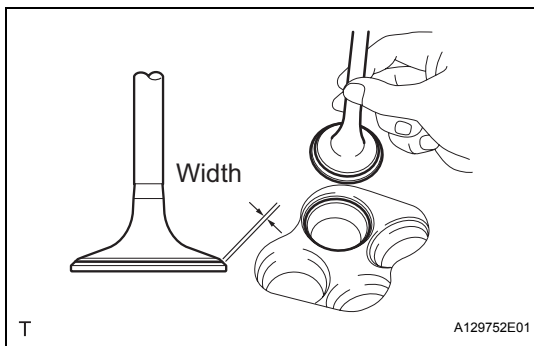
109.90 mm (4.3268 in.)

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



20. INSPECT INTAKE VALVE SEATS

- (a) Apply a light coat of prussian blue (or white lead) to the valve face.
- (b) Lightly press the valve face against the valve seat.
- (c) Check the valve face and valve seat by using the following procedure.
 - (1) If prussian blue appears around the entire valve face, the valve face is concentric. If not, replace the valve.
 - (2) If prussian blue appears around the entire valve seat, the guide and valve face are concentric. If not, resurface the valve seat.
 - (3) Check that the valve seat contacts in the middle of the valve face with the width between 1.1 and 1.5 mm (0.043 and 0.059 in.).



21. INSPECT EXHAUST VALVE SEATS

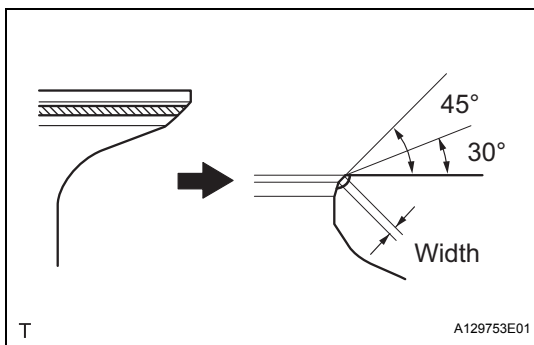
- (a) Apply a light coat of prussian blue (or white lead) to the valve face.
- (b) Lightly press the valve face against the valve seat.
- (c) Check the valve face and valve seat by using to the following procedure.
 - (1) If prussian blue appears around the entire valve face, the valve face is concentric. If not, replace the valve.
 - (2) If prussian blue appears around the entire valve seat, the guide and valve face are concentric. If not, resurface the valve seat.
 - (3) Check that the valve seat contacts in the middle of the valve face with the width between 1.2 and 1.6 mm (0.047 and 0.063 in.).

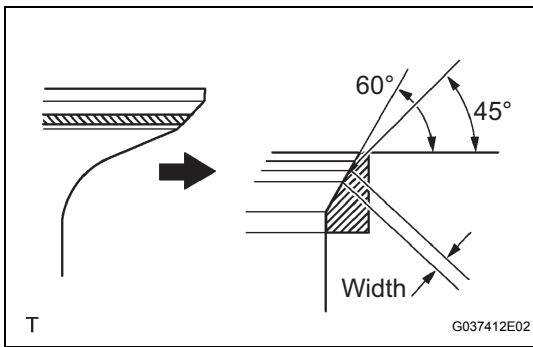
22. REPAIR INTAKE VALVE SEATS

NOTICE:

Keep the lip free from foreign matter.

- (a) If the seating is too high on the valve face, use 30° and 45° cutters to correct the seat.



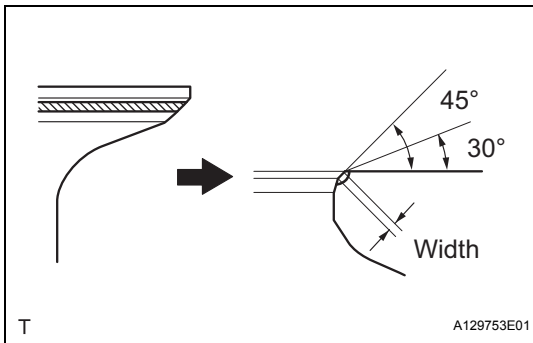


- (b) If the seating is too low on the valve face, use 60° and 45° cutters to correct the seat.
- (c) Handrub the valve and valve seat with an abrasive compound.
- (d) Check the valve seating position.

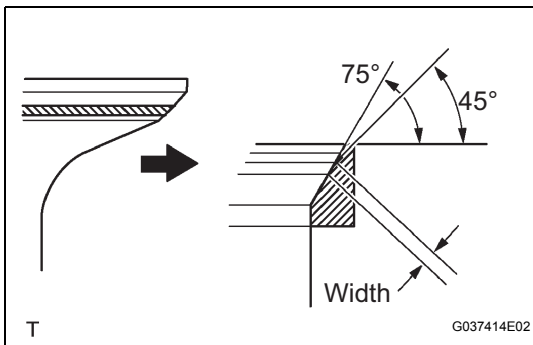
23. REPAIR EXHAUST VALVE SEATS

NOTICE:

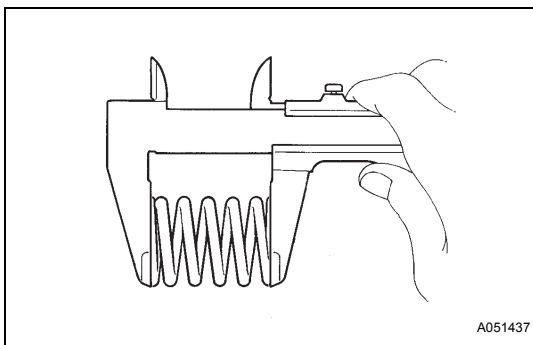
Keep the lip free from foreign matter.



- (a) If the seating is too high on the valve face, use 30° and 45° cutters to correct the seat.



- (b) If the seating is too low on the valve face, use 45° and 75° cutters to correct the seat.
- (c) Handrub the valve and valve seat with an abrasive compound.
- (d) Check the valve seating position.



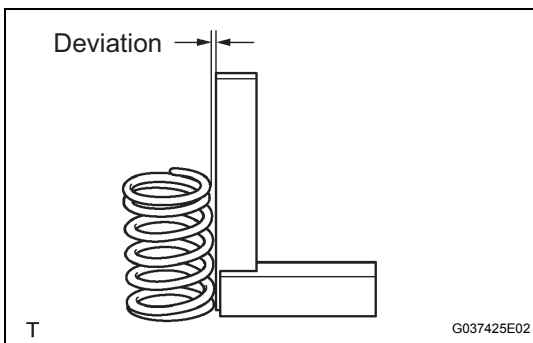
24. INSPECT INNER COMPRESSION SPRING

- (a) Using vernier calipers, measure the free length of the inner compression spring.

Free length:

45.46 mm (1.7898 in.)

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



- (b) Using a steel square, measure the deviation of the inner compression spring.

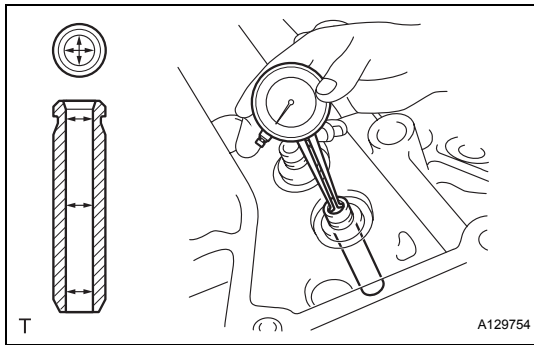
Maximum deviation:

1.0 mm (0.039 in.)

Maximum angle (reference):

2°

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



25. INSPECT VALVE GUIDE BUSH OIL CLEARANCE

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

Bush inside diameter:

5.510 to 5.530 mm (0.2169 to 0.2177 in.)

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

Standard clearance

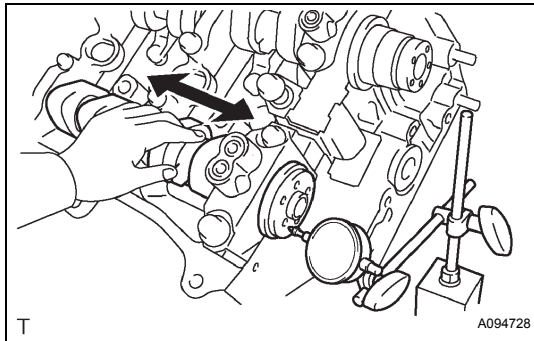
Item	Clearance
Intake	0.025 to 0.060 mm (0.0010 to 0.0024 in.)
Exhaust	0.030 to 0.065 mm (0.0012 to 0.0026 in.)

Maximum oil clearance

Item	Clearance
Intake	0.08 mm (0.0032 in.)
Exhaust	0.10 mm (0.0039 in.)

HINT:

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



26. INSPECT CAMSHAFT THRUST CLEARANCE

- (a) Install the RH bank camshafts (See page [EM-129](#)).
- (b) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.

Standard thrust clearance:

0.08 to 0.13 mm (0.0031 to 0.0051 in.)

Maximum thrust clearance:

0.15 mm (0.006 in.)

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

- (c) Install the LH bank camshafts (See page [EM-130](#)).
- (d) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.

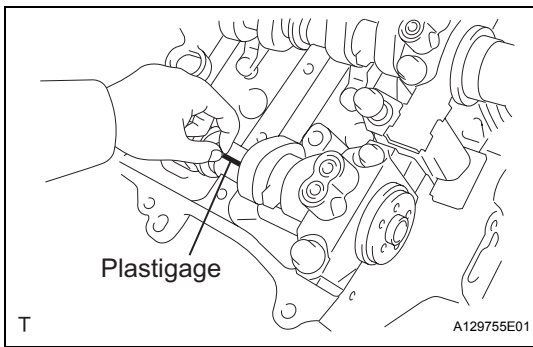
Standard thrust clearance:

0.08 to 0.13 mm (0.0031 to 0.0051 in.)

Maximum thrust clearance:

0.15 mm (0.006 in.)

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

**27. INSPECT CAMSHAFT OIL CLEARANCE**

- (a) Clean the bearing caps, camshaft housing and camshaft journals.
- (b) Place the camshafts on the camshaft housing.
- (c) Lay a strip of Plastigage across each of the camshaft journals.
- (d) Install the bearing caps (See page [EM-130](#)).

NOTICE:**Do not turn the camshaft.**

- (e) Remove the bearing caps (See page [EM-69](#)).

- (f) Measure the Plastigage at its widest point.

Standard oil clearance

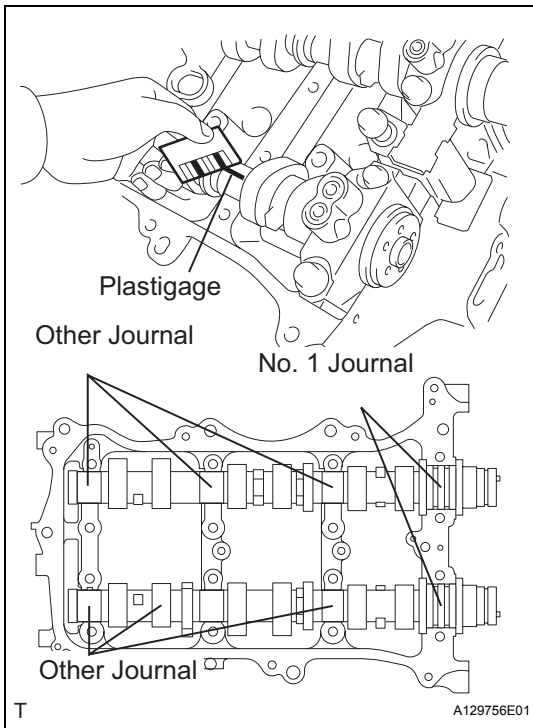
Item	Oil Clearance
No. 1 journal	0.040 to 0.079 mm (0.0016 to 0.0031 in.)
Other journal	0.025 to 0.062 mm (0.00098 to 0.0024 in.)

Maximum oil clearance

Item	Oil Clearance
No. 1 journal	0.10 mm (0.0039 in.)
Other journal	0.09 mm (0.0035 in.)

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

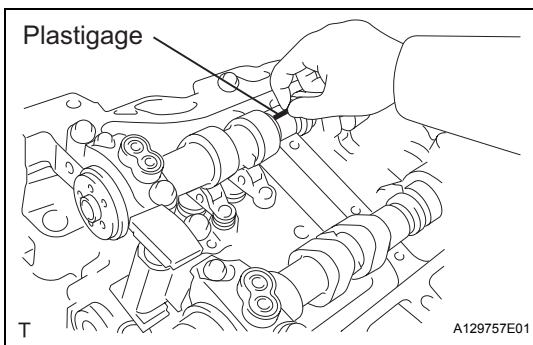
- (g) Clean the bearing caps, camshaft housing and camshaft journals.
- (h) Place the camshafts on the camshaft housing.

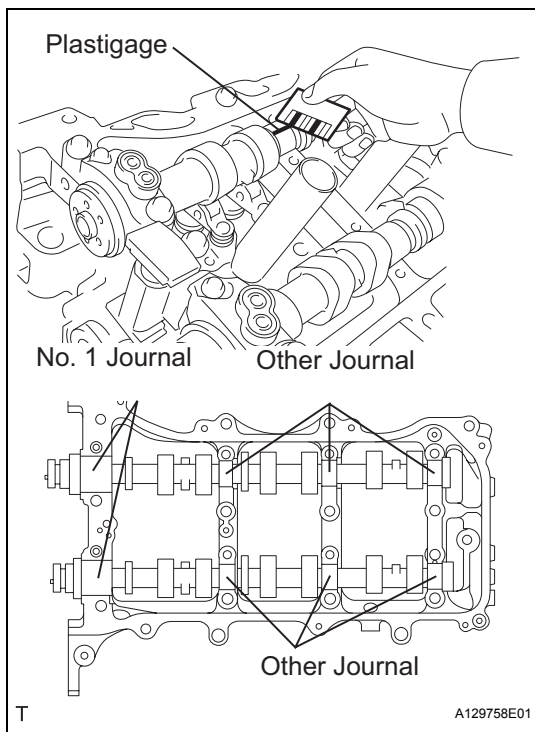


- (i) Lay a strip of Plastigage across each of the camshaft journals.
- (j) Install the bearing caps (See page [EM-130](#)).

NOTICE:**Do not turn the camshaft.**

- (k) Remove the bearing caps (See page [EM-69](#)).





- (l) Measure the Plastigage at its widest point.

Standard oil clearance

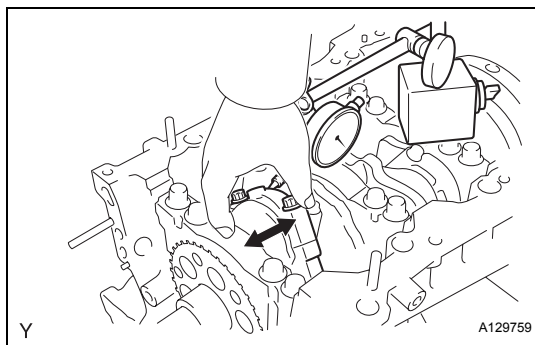
Item	Oil Clearance
No. 1 journal	0.040 to 0.079 mm (0.0016 to 0.0031 in.)
Other journal	0.025 to 0.062 mm (0.00098 to 0.0024 in.)

Maximum oil clearance

Item	Oil Clearance
No. 1 journal	0.10 mm (0.0039 in.)
Other journal	0.09 mm (0.0035 in.)

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

EM



28. INSPECT CONNECTING ROD THRUST CLEARANCE

- (a) Using a dial indicator, measure the thrust clearance while moving the connecting rod back and forth.

Standard thrust clearance:

0.15 to 0.40 mm (0.0059 to 0.0157 in.)

Maximum thrust clearance:

0.50 mm (0.020 in.)

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

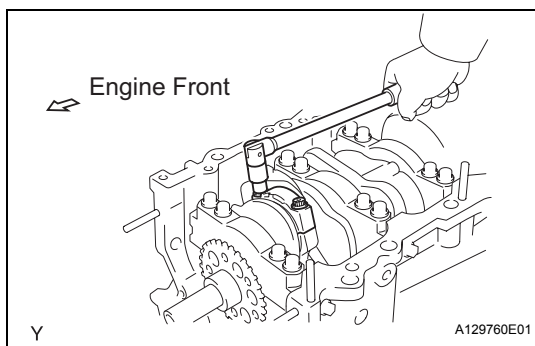
29. INSPECT CONNECTING ROD OIL CLEARANCE

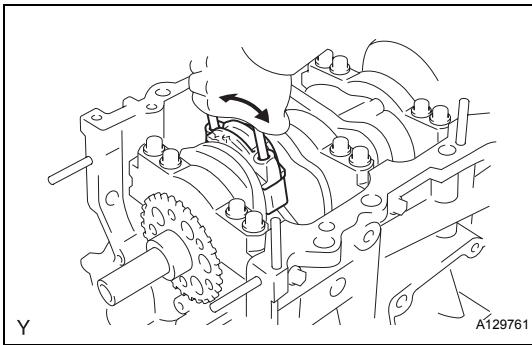
- (a) Check that the matchmarks on the connecting rod and cap are aligned to ensure the correct reassembly (Procedure "A").

HINT:

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

- (b) Using SST, remove the 2 connecting rod cap bolts (Procedure "B").



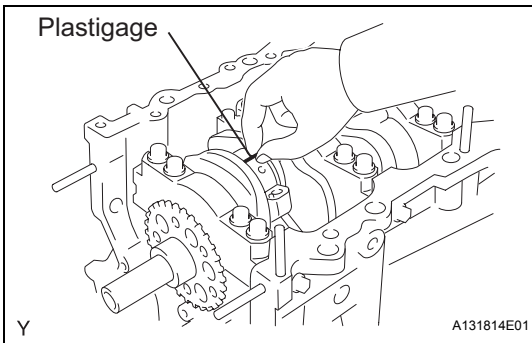


- (c) Using the 2 removed connecting rod caps bolts, remove the connecting rod cap and lower bearing by wiggling the connecting rod cap right and left (Procedure "C").

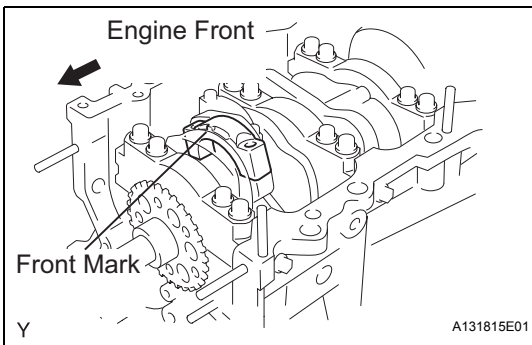
HINT:

Keep the lower bearing inserted to the connecting rod cap.

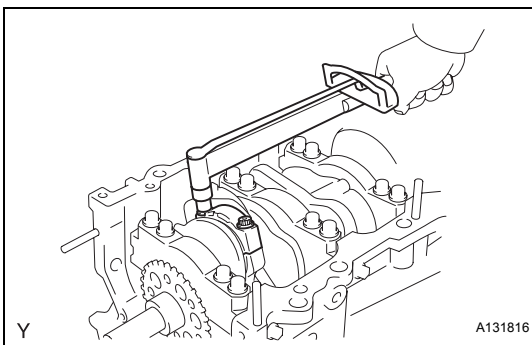
- (d) Clean the crank pin and bearing (Procedure "D").
 (e) Check the crank pin and bearing for pitting and scratches (Procedure "E").



- (f) Lay a strip of Plastigage on the crank pin (Procedure "F").



- (g) Check that the front mark of the connecting rod cap is facing forward (Procedure "G").

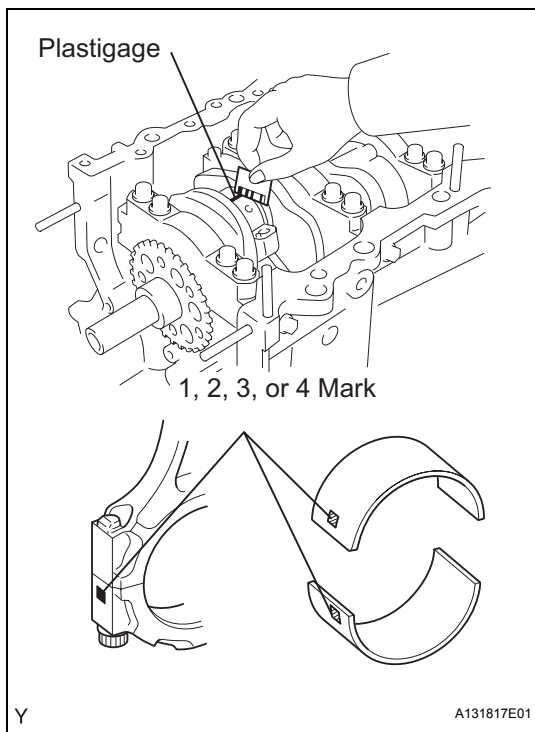


- (h) Using SST, install the connecting rod cap (Procedure "H").

NOTICE:

Do not turn the crankshaft.

- (i) Remove the 2 bolts and connecting rod cap (see procedure "B" and "C" above).



- (j) Measure the Plastigage at its widest point.
Standard oil clearance:
0.045 to 0.067 mm (0.0018 to 0.0026 in.)
Maximum oil clearance:
0.070 mm (0.0028 in.)

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

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, 3 and 4 mark on its surface.

Reference:

Connecting rod diameter

Mark	Diameter
1	56.000 to 56.006 mm (2.2047 to 2.2050 in.)
2	56.007 to 56.012 mm (2.2050 to 2.2052 in.)
3	56.013 to 56.018 mm (2.2052 to 2.2054 in.)
4	56.019 to 56.024 mm (2.2055 to 2.2057 in.)

Standard bearing center wall thickness

Mark	Diameter
1	1.481 to 1.484 mm (0.0583 to 0.0584 in.)
2	1.484 to 1.487 mm (0.0584 to 0.0585 in.)
3	1.487 to 1.490 mm (0.0585 to 0.0587 in.)
4	1.490 to 1.493 mm (0.0587 to 0.0588 in.)

Crankshaft pin diameter:

52.992 to 53.000 mm (2.0863 to 2.0866 in.)

- (k) Completely remove the Plastigage.

30. INSPECT CRANKSHAFT THRUST CLEARANCE

- (a) Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

Standard thrust clearance:

0.04 to 0.24 mm (0.0016 to 0.0094 in.)

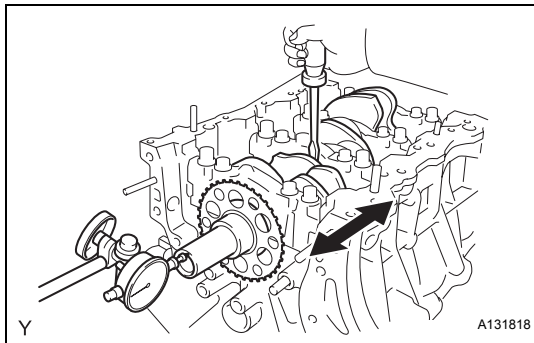
Maximum thrust clearance:

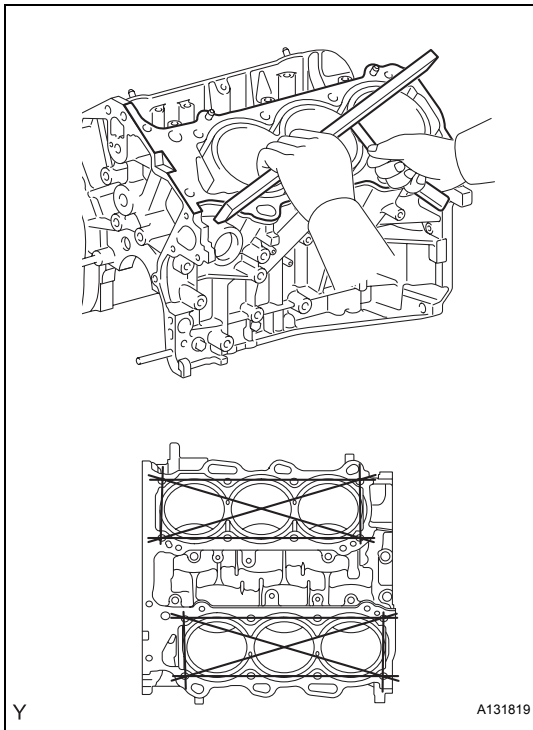
0.30 mm (0.0118 in.)

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

Thrust washer thickness:

2.43 to 2.48 mm (0.0957 to 0.0976 in.)





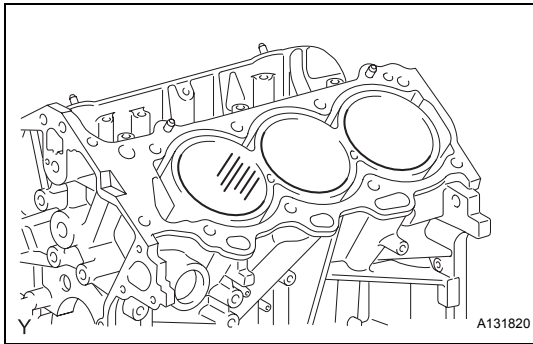
31. INSPECT CYLINDER BLOCK FOR WARPAGE

- (a) Using a precision straight edge and feeler gauge, measure the warpage of the contact surface of the cylinder head gasket.

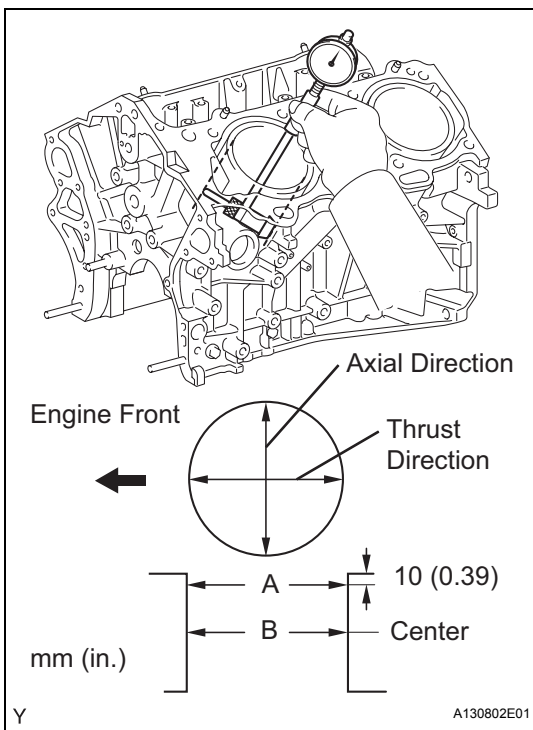
Maximum warpage:

0.07 mm (0.0028 in.)

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



- (b) Visually check the cylinder for vertical scratches. If deep scratches are present, rebore all the 6 cylinders. If necessary, replace the cylinder block.



32. INSPECT CYLINDER BORE

- (a) Using a cylinder gauge, measure the cylinder bore diameter at positions A and B in the thrust and axial directions.

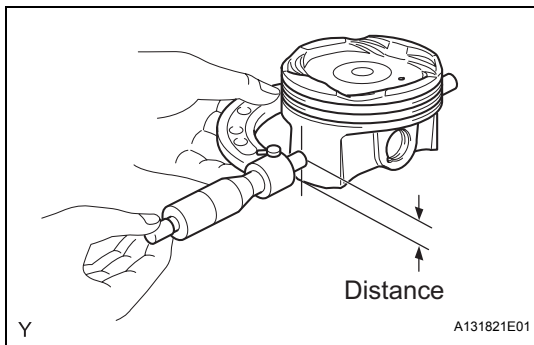
Standard diameter:

94.000 to 94.012 mm (3.7008 to 3.7013 in.)

Maximum diameter:

94.200 mm (3.7087 in.)

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

**33. INSPECT PISTON SUB-ASSEMBLY WITH PIN**

- (a) Using a micrometer, measure the piston diameter at right angles to the piston center line where the distance from the piston end is as specified.

Distance:

9.8 mm (0.3858 in.)

Standard diameter:

93.960 to 93.980 mm (3.6992 to 3.7000 in.)

Maximum diameter:

93.830 mm (3.6941 in.)

34. INSPECT PISTON OIL CLEARANCE

- (a) Measure the cylinder bore diameter in the thrust direction.
- (b) Subtract the piston diameter measurement from the cylinder bore diameter measurement.

Standard oil clearance:

0.02 to 0.052 mm (0.0008 to 0.0020 in.)

Maximum oil clearance:

0.06 mm (0.0024 in.)

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

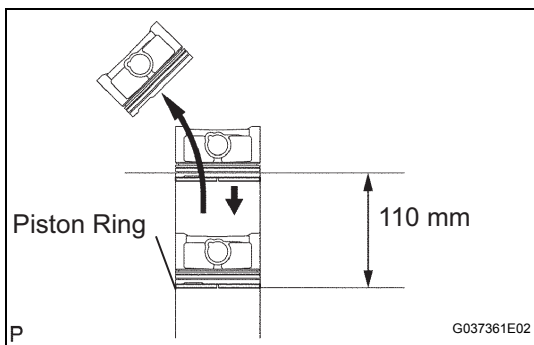
**35. INSPECT RING GROOVE CLEARANCE**

- (a) Using a feeler gauge, measure the clearance between a new piston ring and the wall of the ring groove.

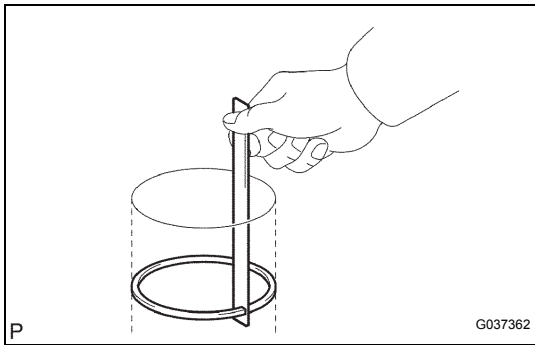
Ring groove clearance

Item	Clearance
No. 1	0.020 to 0.070 mm (0.0008 to 0.0028 in.)
No. 2	0.020 to 0.060 mm (0.0008 to 0.0024 in.)
Oil	0.070 to 0.150 mm (0.0028 to 0.0059 in.)

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

**36. INSPECT PISTON RING END GAP**

- (a) Insert the piston ring into the cylinder bore.
- (b) Using a piston, push the piston ring a little beyond the bottom of the ring travel, 110 mm (4.33 in.) from the top of the cylinder block.



- (c) Using a feeler gauge, measure the end gap.
Standard end gap

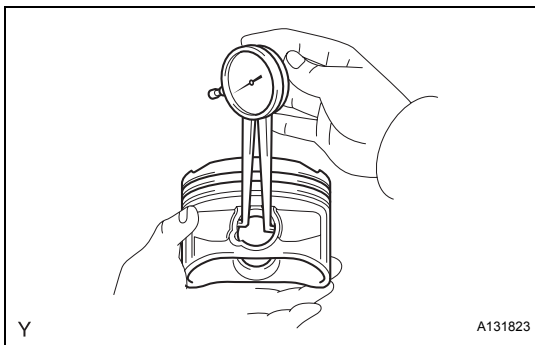
Item	End Gap
No. 1	0.25 to 0.35 mm (0.0098 to 0.0138 in.)
No. 2	0.50 to 0.60 mm (0.0197 to 0.0236 in.)
Oil	0.10 to 0.40 mm (0.0039 to 0.0157 in.)

Maximum end gap

Item	End Gap
No. 1	0.50 mm (0.0197 in.)
No. 2	0.85 mm (0.0335 in.)
Oil	0.60 mm (0.0236 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.

EM

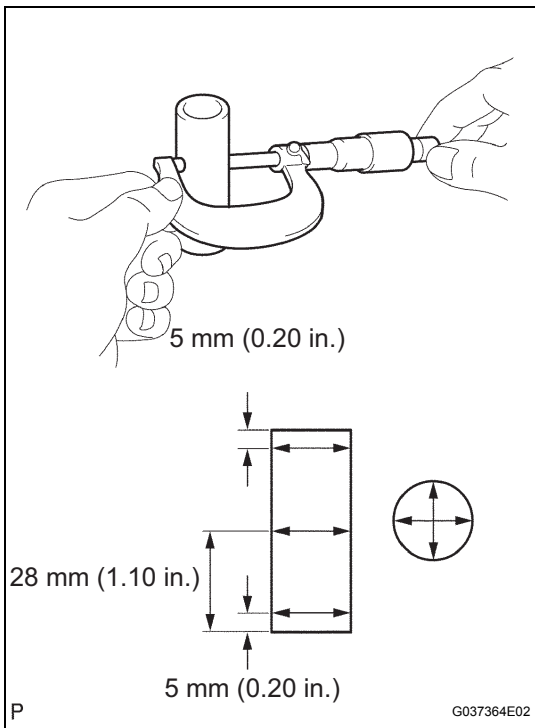


37. INSPECT PISTON PIN OIL CLEARANCE

- (a) Using a caliper gauge, measure the inside diameter of the piston pin hole.

Piston pin hole inside diameter

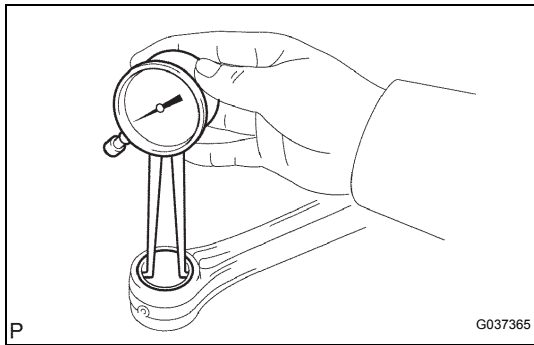
Mark	Diameter
A	22.001 to 22.004 mm (0.8662 to 0.8663 in.)
B	22.004 to 22.007 mm (0.8663 to 0.8664 in.)
C	22.007 to 22.010 mm (0.8664 to 0.8665 in.)



- (b) Using a micrometer, measure the piston pin diameter.

Piston pin diameter

Mark	Diameter
A	21.997 to 22.000 mm (0.8660 to 0.8661 in.)
B	22.000 to 22.003 mm (0.8661 to 0.8663 in.)
C	22.003 to 22.006 mm (0.8663 to 0.8664 in.)



- (c) Subtract the piston pin diameter measurement from the piston pin hole diameter measurement.

Standard oil clearance:

0.001 to 0.007 mm (0.00002 to 0.0003 in.)

Maximum oil clearance:

0.015 mm (0.0006 in.)

HINT:

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

- (d) Using a caliper gauge, measure the inside diameter of the connecting rod bushing.

Bushing inside diameter

Mark	Diameter
A	22.005 to 22.008 mm (0.8663 to 0.8665 in.)
B	22.009 to 22.011 mm (0.8665 to 0.8666 in.)
C	22.012 to 22.014 mm (0.8666 to 0.8667 in.)

- (e) Subtract the piston pin diameter measurement from the bushing inside diameter measurement.

Standard oil clearance:

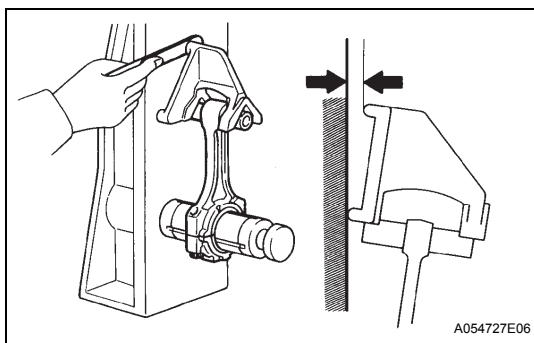
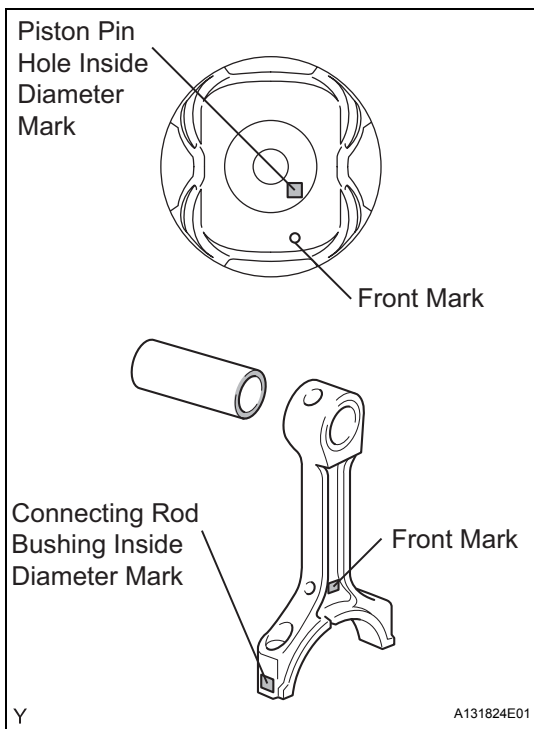
0.005 to 0.011 mm (0.0002 to 0.0004 in.)

Maximum oil clearance:

0.03 mm (0.0012 in.)

HINT:

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



38. INSPECT CONNECTING ROD

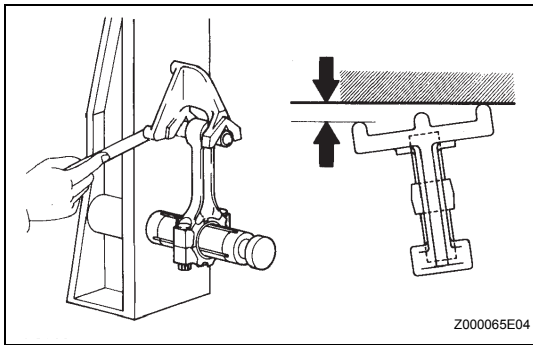
- (a) Using a rod aligner and feeler gauge, check the connecting rod alignment.

- (1) Check for out-of-alignment.

Maximum out-of-alignment:

0.05 mm (0.0020 in.) per 100mm (3.94 in.)

If the out-of- alignment is greater than the maximum, replace the connecting rod assembly.

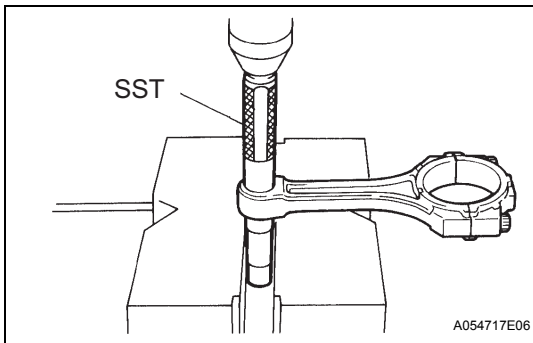


- (2) Check for twist.

Maximum twist :

0.15 mm (0.0059 in.) per 100 mm (3.94 in.)

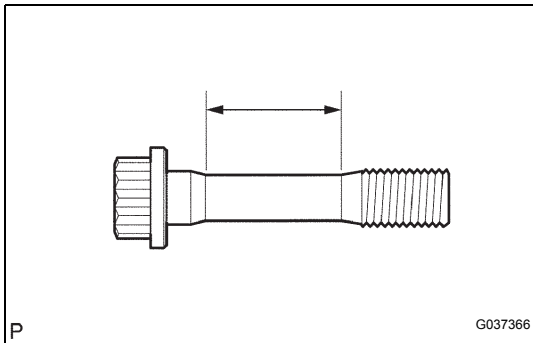
If the twist is greater than the maximum, replace the connecting rod assembly.



39. REMOVE CONNECTING ROD SMALL END BUSH

- (a) Using SST and a press, press out the bush.

SST 09222-30010



40. INSPECT CONNECTING ROD BOLT

- (a) Using vernier calipers, measure the tension portion diameter of the bolt.

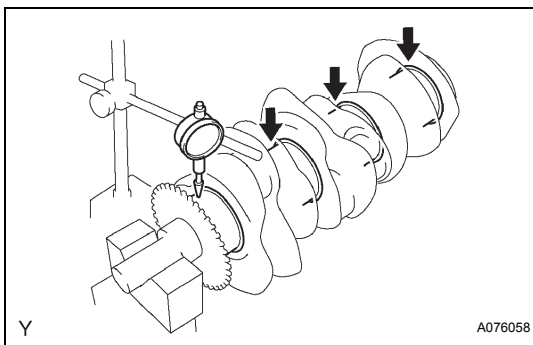
Standard diameter:

7.2 to 7.3 mm (0.283 to 0.287 in.)

Minimum diameter:

7.0 mm (0.276 in.)

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



41. INSPECT CRANKSHAFT

- (a) Inspect for circle runout.

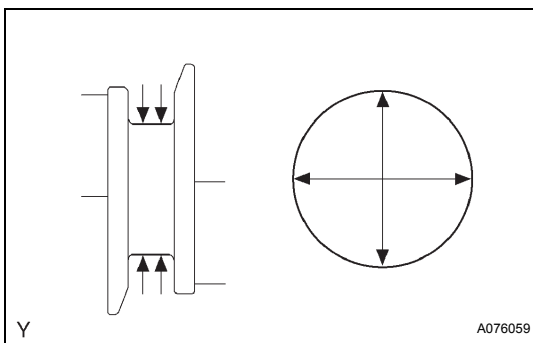
- (1) Place the crankshaft on the V-blocks.

- (2) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout:

0.06 mm (0.0024 in.)

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



- (b) Inspect the main journals.

- (1) Using a micrometer, measure the diameter of each main journal.

Standard journal diameter:

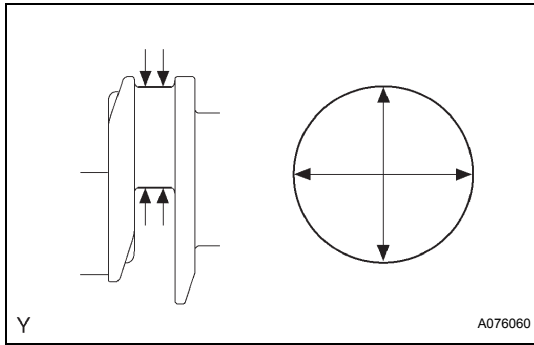
60.988 to 61.00 mm (2.4011 to 2.4016 in.)

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

- (2) Check each main journal for taper and out-of-round as shown in the illustration.

Maximum taper and out-of-round:

0.02 mm (0.0008 in.)



If the taper and out-of-round is greater than the maximum, replace the crankshaft.

(c) Inspect the crank pin.

- (1) Using a micrometer, measure the diameter of each crank pin.

Diameter:

52.992 to 53.000 mm (2.0863 to 2.0866 in.)

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

- (2) Check each crank pin for taper and out-of-round as shown in the illustration.

Maximum taper and out-of-round:

0.02 mm (0.0008 in.)

If the taper and out-of-round is greater than the maximum, replace the crankshaft.

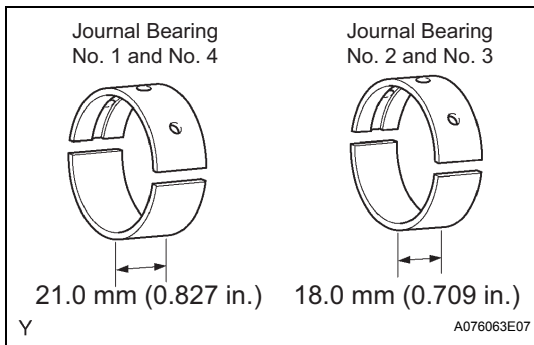
42. INSPECT CRANKSHAFT OIL CLEARANCE

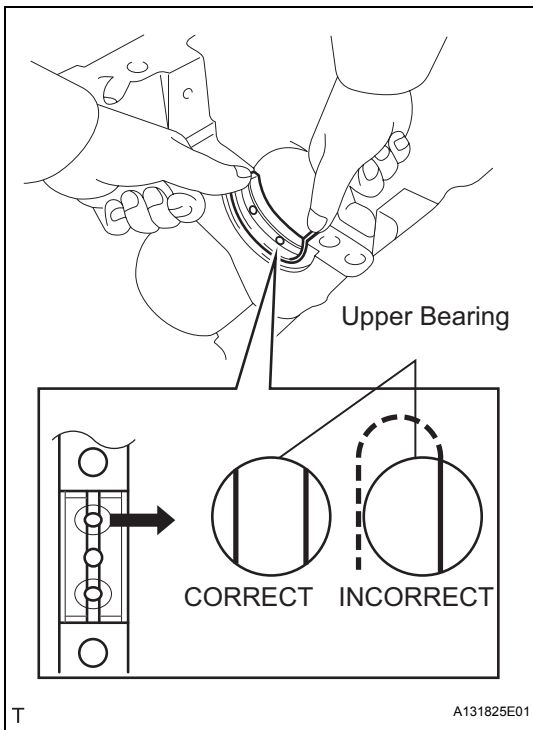
NOTICE:

Main bearings come in widths of 18.0 mm (0.709 in.) and 21.0 mm (0.827 in.). Install the 21.0 mm (0.827 in.) bearings in the No. 1 and No. 4 cylinder block journal positions with the main bearing cap. Install the 18.0 mm (0.709 in.) bearings in the No. 2 and No. 3 positions.

- (a) Clean the main journal and the both surfaces of the bearing.

EM

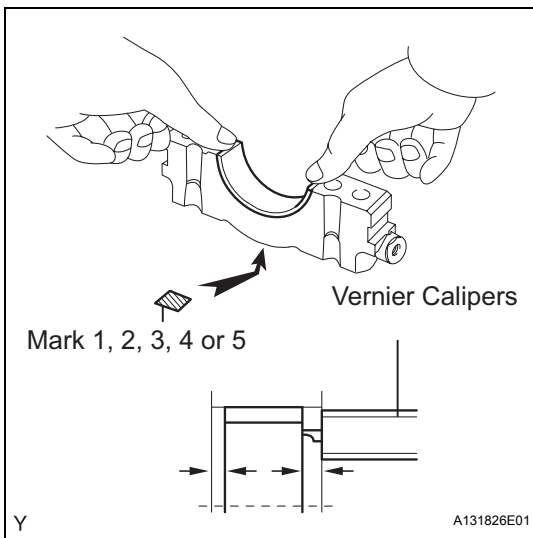




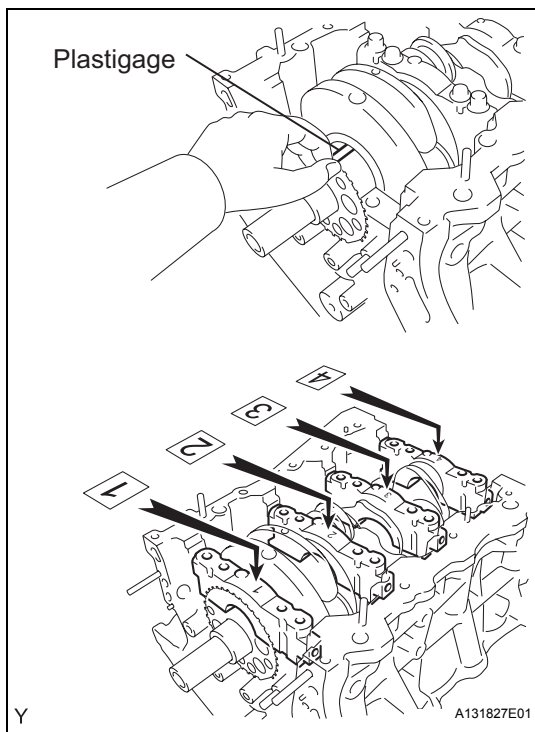
- (b) Install the upper bearing.
- (1) Install the upper bearing to the cylinder block as shown in the illustration.

NOTICE:

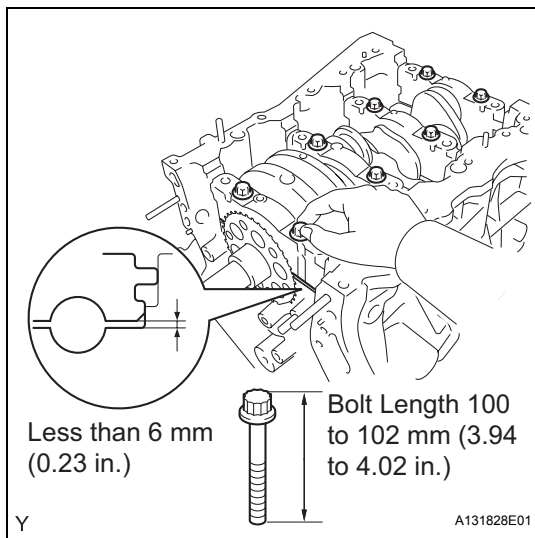
Do not apply engine oil to the bearing and its contact surface.



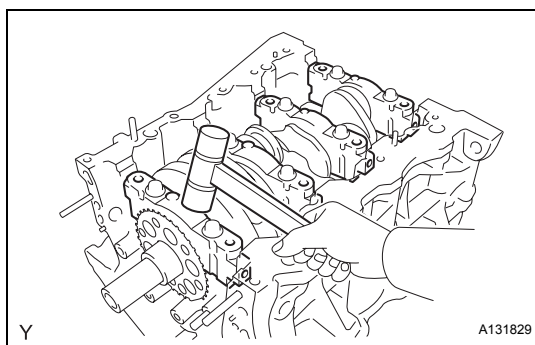
- (c) Install the lower bearing.
- (1) Install the lower bearing to the bearing cap.
- (2) Using vernier calipers, measure the distance between the bearing cap's edge and the lower bearing's edge.
- Dimension (A - B):**
0.7 mm (0.0276 in.) or less
- NOTICE:**
Do not apply engine oil to the bearing's contact area and underside.
- (d) Place the crankshaft on the cylinder block.



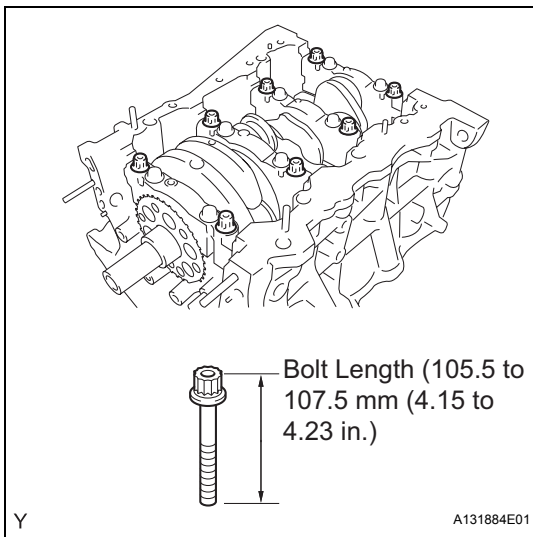
- (e) Lay a strip of Plastigage across each journal.
- (f) Examine the front marks and numbers and install the bearing caps on the cylinder block.
HINT:
A number is marked on each main bearing cap to indicate the installation position.
- (g) Apply a light coat of engine oil on the threads and under the head of bearing cap bolts.
- (h) Temporarily install the 8 main bearing cap bolts to the inside positions.



- (i) Insert the main bearing cap with your hand until the clearance between the main bearing cap and the cylinder block is less than 6 mm (0.23 in.) by marking the 2 internal bearing cap bolts as a guide.
Bolt length:
100 to 102 mm (3.94 to 4.02 in.)



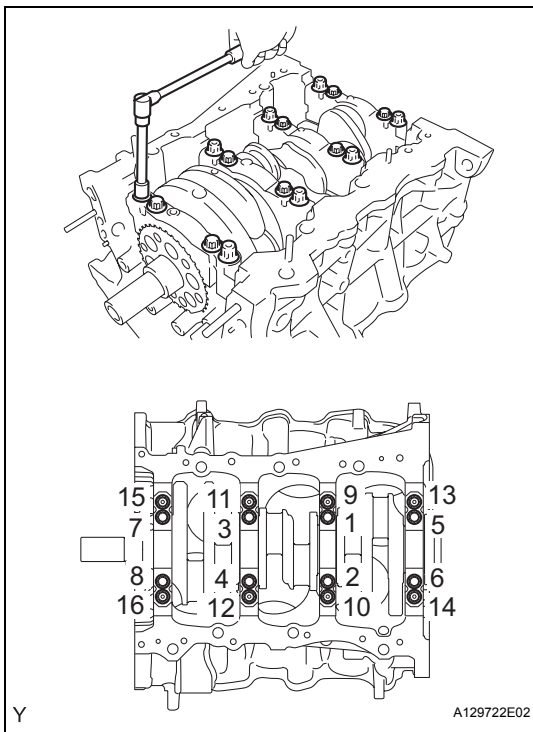
- (j) Using a plastic hammer, lightly tap the bearing cap to ensure a proper fit.
- (k) Apply a light coat of engine oil on the threads and under the head of the 8 main bearing cap bolts.



- (l) Install the 8 main bearing cap bolts to the outside positions.

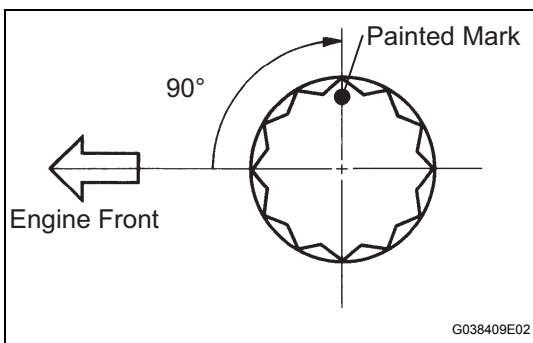
Bolt length:

105.5 to 107.5 mm (4.15 to 4.23 in.)



- (m) Install and uniformly tighten the 16 main bearing cap bolts in several steps and in the sequence shown in the illustration.

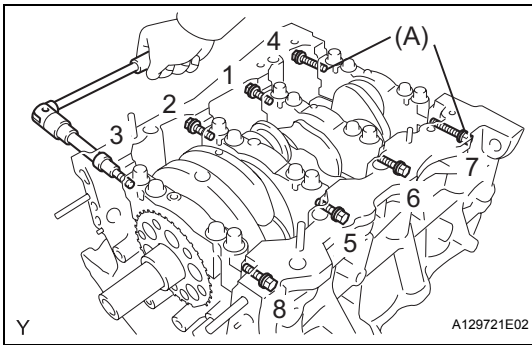
Torque: 61 N*m (622 kgf*cm, 45 ft.*lbf)



- (n) Mark the front side of the bearing cap bolts with paint.
- (o) Tighten the bearing cap bolts another 90° in the sequence shown.
- (p) Check that the painted mark is now at a 90° angle to the front.

NOTICE:

Do not turn the crankshaft.



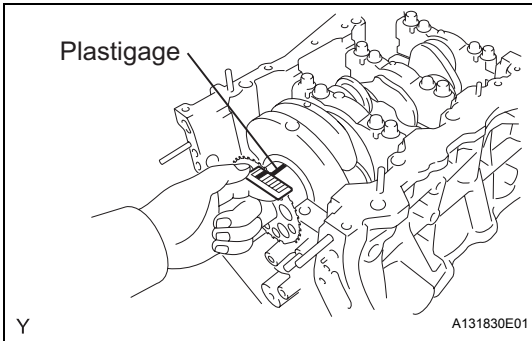
- (q) Install and uniformly tighten the 8 main bearing cap bolts in several steps and in the sequence shown in the illustration.

Torque: 52 N*m (525 kgf*cm, 38 ft.*lbf)

HINT:

- Bolt (A) length: 45 mm (1.77 in.)
- Except bolt (A) length: 30 mm (1.18 in.)

- (r) Remove the main bearing caps.



- (s) Measure the Plastigage at its widest point.

Standard oil clearance:

0.026 to 0.047 mm (0.0010 to 0.0019 in.)

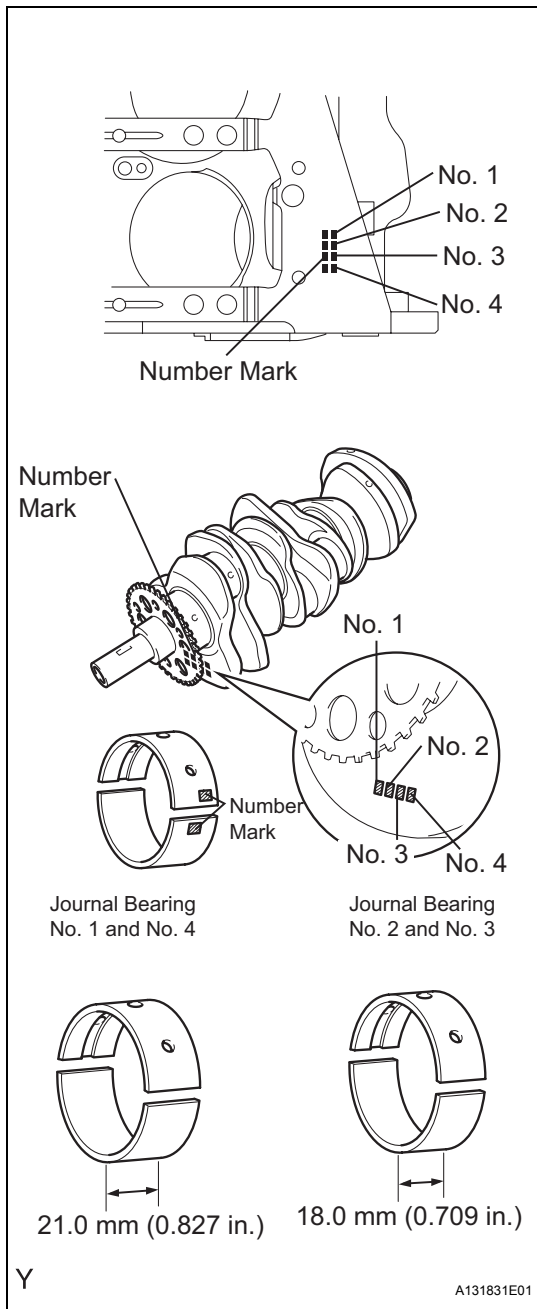
Maximum clearance:

0.050 mm (0.0020 in.)

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

NOTICE:

Completely remove the Plastigage.



- (t) If replacing a bearing, replace it with one having the same number. If the number of the bearing cannot be determined, select the correct bearing by adding together the numbers imprinted on the cylinder block and crankshaft, then refer to the table below for the appropriate bearing number. There are 5 sizes of standard bearings, marked "1", "2", "3", "4" and "5" accordingly.

Journal bearings:

Cylinder block (A) + Crankshaft	0 - 5	6 - 11	12 - 17	18 - 23	24 - 28
Use Bearing	"1"	"2"	"3"	"4"	"5"

HINT:

EXAMPLE: Cylinder block "11" + Crankshaft "06" = Total number 17 (Use bearing "3")



Crankshaft main journal diameter

Mark	Diameter
"00"	60.999 to 61.000 mm (2.4015 to 2.4016 in.)
"01"	60.998 to 60.999 mm (2.4015 to 2.4015 in.)
"02"	60.997 to 60.998 mm (2.4015 to 2.4015 in.)
"03"	60.996 to 60.997 mm (2.4014 to 2.4015 in.)
"04"	60.995 to 60.996 mm (2.4014 to 2.4014 in.)
"05"	60.994 to 60.995 mm (2.4013 to 2.4014 in.)
"06"	60.93 to 60.994 mm (2.4013 to 2.4013 in.)
"07"	60.992 to 60.993 mm (2.4013 to 2.4013 in.)
"08"	60.991 to 60.992 mm (2.4012 to 2.4013 in.)
"09"	60.990 to 60.991 mm (2.4012 to 2.4012 in.)
"10"	60.989 to 60.990 mm (2.4011 to 2.4012 in.)
"11"	60.988 to 60.989 mm (2.4.11 to 2.4011 in.)

Standard upper bearing center wall thickness (No. 1 and No. 4 journal)

Mark	Diameter
"1"	2.500 to 2.503 mm (0.0984 to 0.0985 in.)
"2"	2.503 to 2.506 mm (0.0985 to 0.0987 in.)
"3"	2.506 to 2.509 mm (0.0987 to 0.0988 in.)
"4"	2.509 to 2.512 mm (0.0988 to 0.0989 in.)
"5"	2.512 to 2.515 mm (0.0989 to 0.0990 in.)

Standard lower bearing center wall thickness (No. 1 and No. 4 journal)

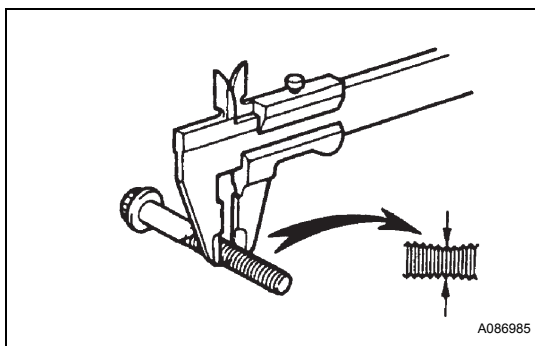
Mark	Diameter
"1"	2.478 to 2.481 mm (0.0976 to 0.0977 in.)
"2"	2.481 to 2.484 mm (0.0977 to 0.0978 in.)
"3"	2.484 to 2.487 mm (0.0978 to 0.0979 in.)
"4"	2.487 to 2.490 mm (0.0979 to 0.0980 in.)
"5"	2.490 to 2.493 mm (0.0980 to 0.0981 in.)

Standard upper bearing center thickness (No. 2 and No. 3 journal)

Mark	Diameter
"1"	2.478 to 2.481 mm (0.0976 to 0.0977 in.)
"2"	2.481 to 2.484 mm (0.0977 to 0.0978 in.)
"3"	2.484 to 2.487 mm (0.0978 to 0.0979 in.)
"4"	2.487 to 2.490 mm (0.0979 to 0.0980 in.)
"5"	2.490 to 2.493 mm (0.0980 to 0.0981 in.)

Standard lower bearing center thickness (No. 2 and No. 3 journal)

Mark	Diameter
"1"	2.500 to 2.503 mm (0.0984 to 0.0985 in.)
"2"	2.503 to 2.506 mm (0.0985 to 0.0987 in.)
"3"	2.506 to 2.509 mm (0.0987 to 0.0988 in.)
"4"	2.509 to 2.512 mm (0.0988 to 0.0989 in.)
"5"	2.512 to 2.515 mm (0.0989 to 0.0990 in.)

**43. INSPECT CRANKSHAFT BEARING CAP SET BOLT**

- (a) Using vernier calipers, measure the minimum diameter of the compressed thread at the measuring point.

Standard diameter:

10.8 to 11.0 mm (0.4252 to 0.4331 in.)

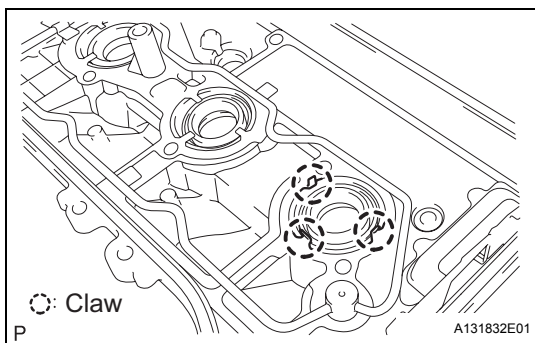
Minimum diameter:

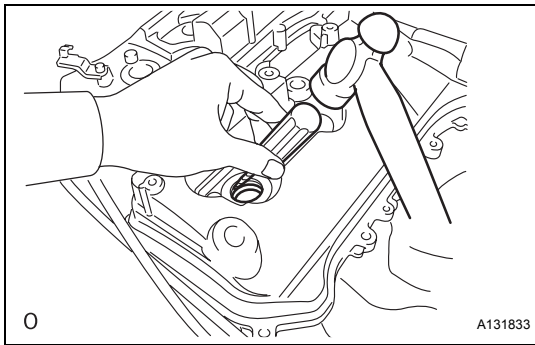
10.7 mm (0.4213 in.)

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

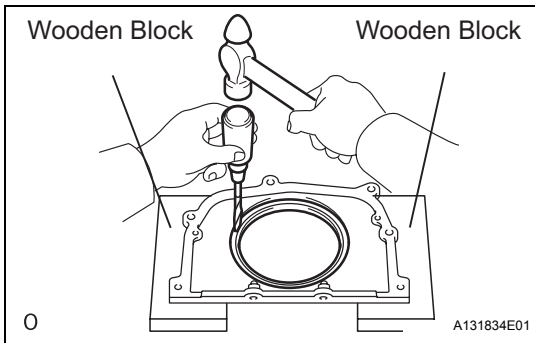
REPLACEMENT**1. REMOVE SPARK PLUG TUBE GASKET**

- (a) Pry up the claws of the ventilation baffle plate.





- (b) Using a screwdriver with its tip taped and a hammer, tap out the 3 spark plug tube gaskets.

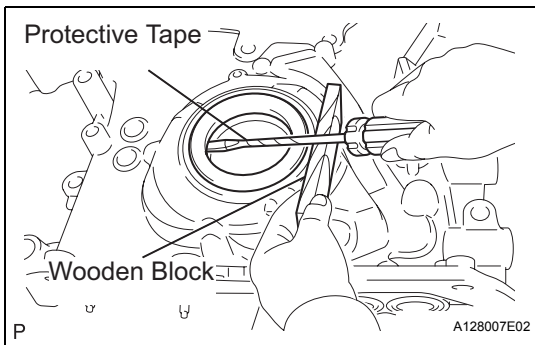


2. REMOVE ENGINE REAR OIL SEAL

- (a) Place the oil seal retainer on wooden blocks.
 (b) Using a screwdriver and a hammer, tap out the oil seal.

HINT:

Tap the screwdriver tip before use.

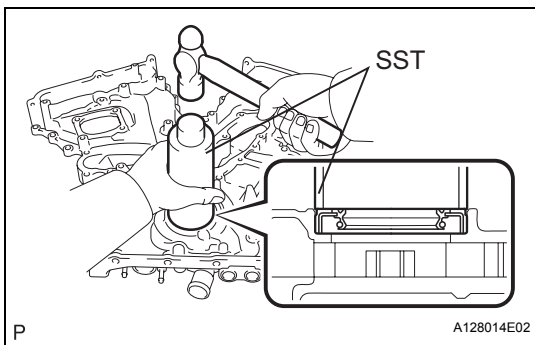


3. REMOVE TIMING CHAIN COVER OIL SEAL

- (a) Using a screwdriver, pry out the oil seal.

HINT:

Tap the screwdriver tip before use.



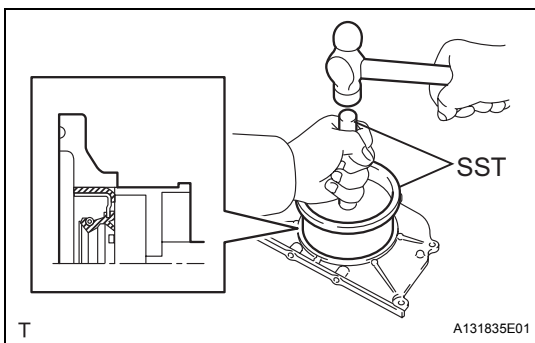
4. INSTALL TIMING CHAIN COVER OIL SEAL

- (a) Using SST, tap in a new oil seal until its surface is flush with the timing gear case edge.

SST 09316-60011 (09316-00011)

NOTICE:

- Keep the lip free from 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 case.



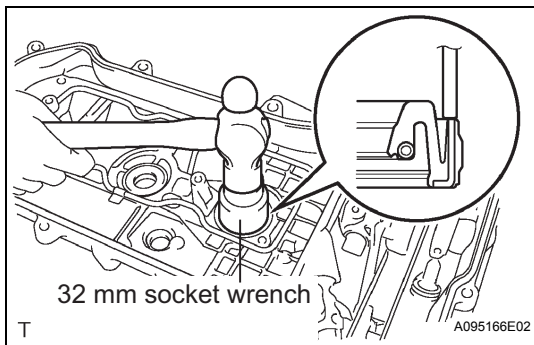
5. INSTALL ENGINE REAR OIL SEAL

- (a) Place the oil seal retainer on wooden blocks.
 (b) Using SST, tap in a new oil seal until its surface is flush with the oil seal retainer edge.

SST 09223-15030

NOTICE:

- Keep the lip free from foreign matter.
- Do not tap on the oil seal at an angle.

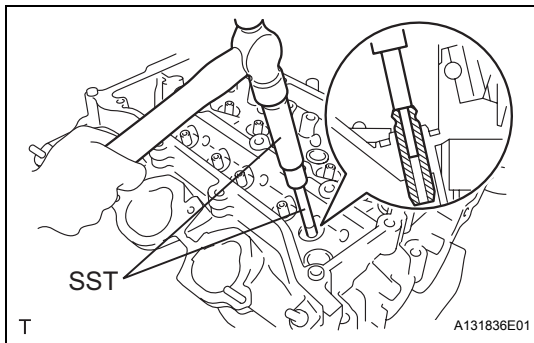


6. INSTALL SPARK PLUG TUBE GASKET

- (a) Using a 32 mm socket wrench, tap in 6 new spark plug tube gaskets to the head covers.

NOTICE:

- Keep the lip free from foreign matter.
 - Do not tap on the oil seal at an angle.
- (b) Return the claw of the ventilation baffle plate to its original position.



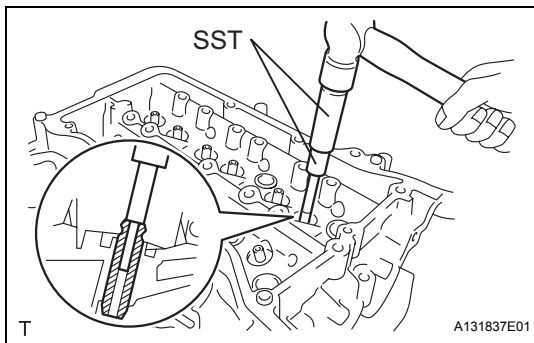
7. REMOVE INTAKE VALVE GUIDE BUSH

- (a) Heat the cylinder head to 80 to 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)



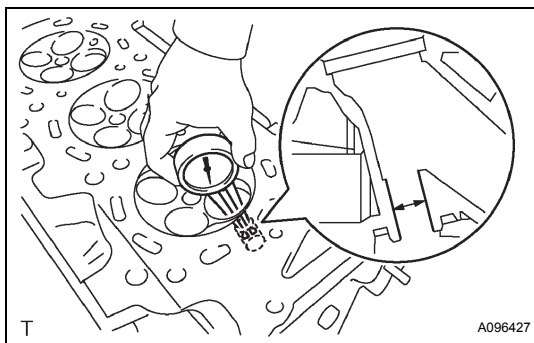
8. REMOVE EXHAUST VALVE GUIDE BUSH

- (a) Heat the cylinder head to 80 to 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)



9. INSTALL INTAKE VALVE GUIDE BUSH

- (a) 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.)

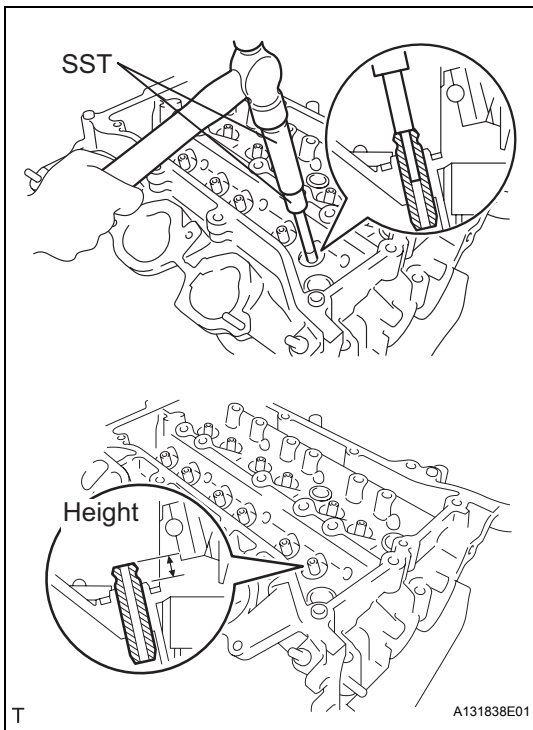
- (b) Select a new guide bush (STD or O/S 0.05).

Bush size	Bush bore diameter
Use STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
Use O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)

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 a O/S 0.05 valve guide bush.

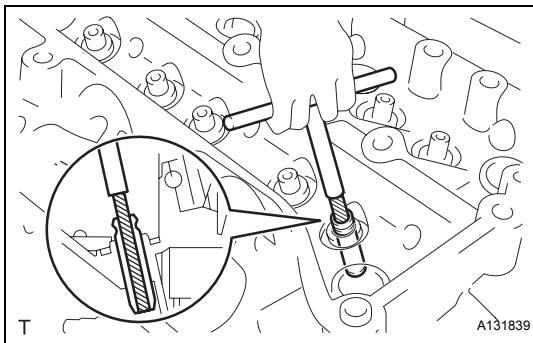
If the bush bore diameter of the cylinder head is greater than 10.356 mm (0.4077 in.), replace the cylinder head.

- (c) Heat the cylinder head to 80 to 100°C (176 to 212°F)

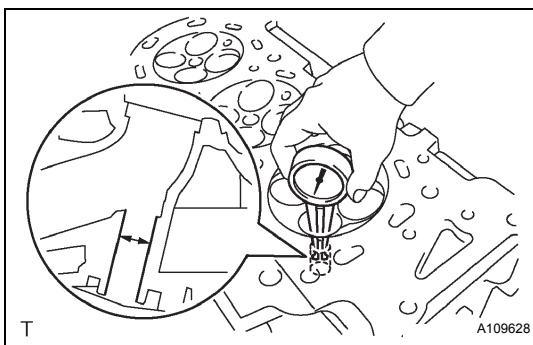


- (d) Place the cylinder head on wooden blocks.
 (e) Using SST, tap in a new valve guide bush to the specified protrusion height.
SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)

Protrusion height:
9.30 to 9.70 mm (0.3661 to 0.3819 in.)



- (f) Using a sharp 5.5 mm reamer, ream the valve guide bush to obtain the standard specified clearance.
Standard oil clearance:
0.025 to 0.060 mm (0.0010 to 0.0023 in.)



10. INSTALL EXHAUST VALVE GUIDE BUSH

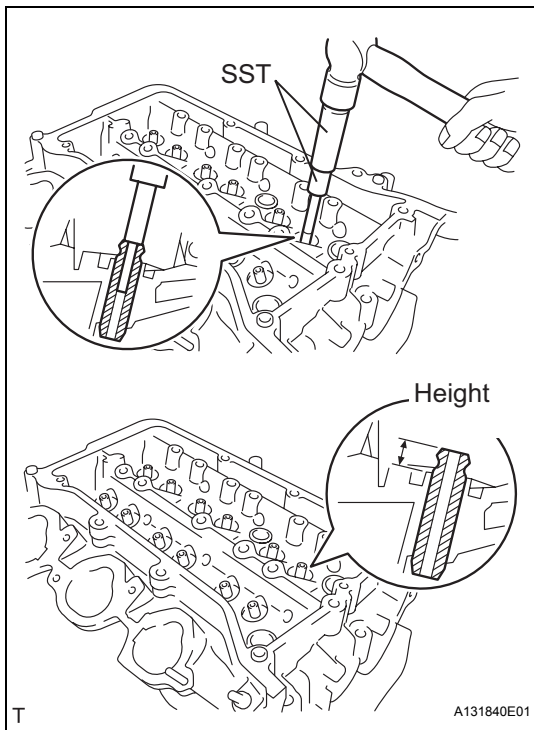
- (a) Using a caliper gauge, measure the bush bore diameter of the cylinder head.
Cylinder bore diameter:
10.285 to 10.306 mm (0.4049 to 0.4057 in.)
 (b) Select a new guide bush (STD or O/S 0.05).

Bush size	Bush bore diameter
Use STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
Use O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)

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 a 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.

- (c) Heat the cylinder head to 80 to 100°C (176 to 212°F).

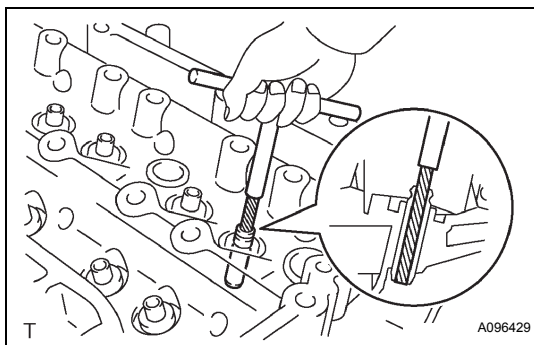


- (d) Place the cylinder head on wooden blocks.
 (e) Using SST, tap in a new valve guide bush to the specified protrusion height.

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

Protrusion height:

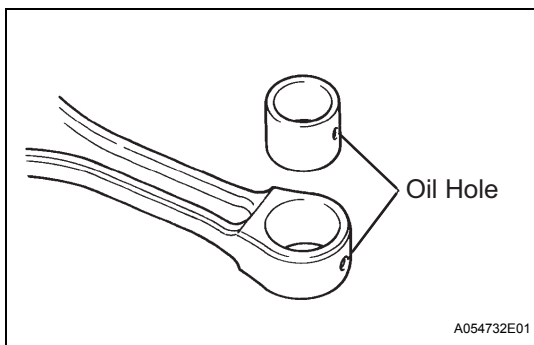
9.30 to 9.70 mm (0.3661 to 0.3819 in.)



- (f) Using a sharp 5.5 mm reamer, ream the valve guide bushing to obtain the standard specified clearance.

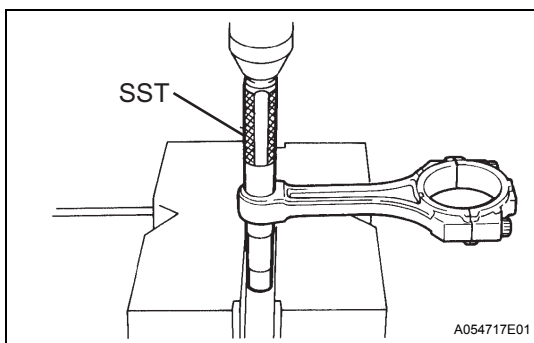
Standard oil clearance:

0.030 to 0.065 mm (0.0012 to 0.0026 in.)

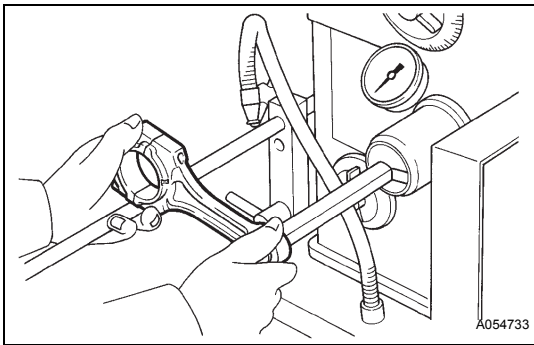


11. INSTALL CONNECTING ROD SMALL END BUSH

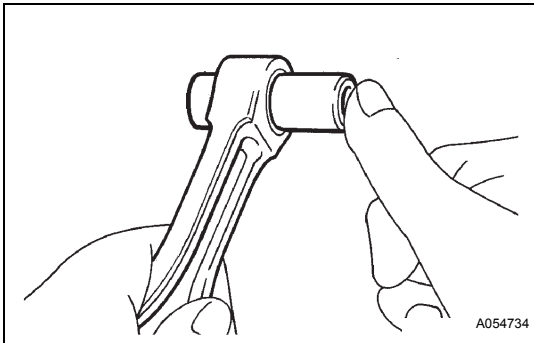
- (a) Align the oil holes of a new bush and the connecting rod.



- (b) Using SST and a press, press in the bush.
SST 09222-30010



- (c) Using a pin hole grinder, hone the bush to obtain the standard specified clearance between the bush and piston pin.



- (d) Check that the piston pin fits at normal room temperature.
- (1) Coat the piston pin with engine oil, and push it into the connecting rod with your thumb.

REASSEMBLY

1. INSTALL TIGHT PLUG

NOTICE:

If water leaks from the tight plug or the plug corrodes, replace it.

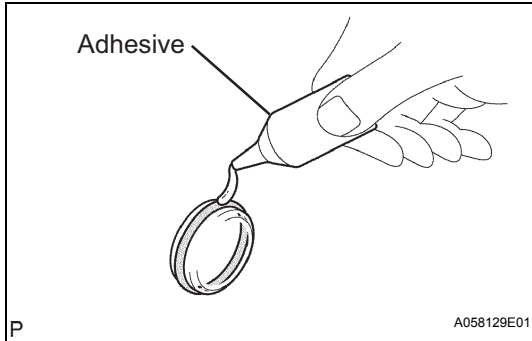
- (a) Apply adhesive around the tight plugs.

Adhesive::

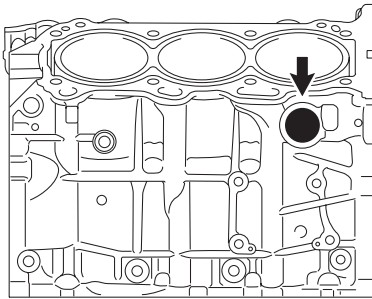
Part No. 08833-00070, THREE BOND 1324 or equivalent.

- (b) Using SST, tap in the tight plugs.

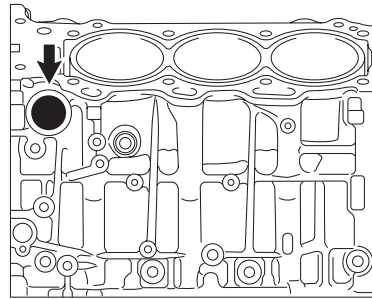
SST 09950-60010 (09951-00340), 09950-70010 (09951-07100)



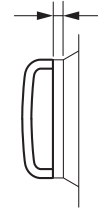
RH Side:



LH Side:



0.2 to 1.2 mm
(0.007 to 0.047 in.)



Y

A131841E01

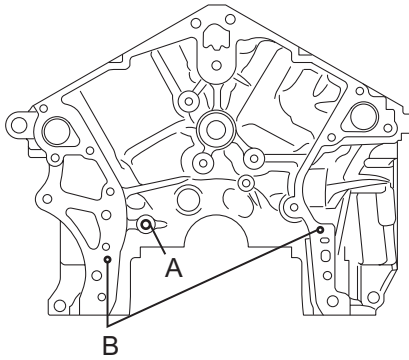
2. INSTALL STRAIGHT PIN

- (a) Using a plastic hammer, tap in new straight pins to the cylinder block.

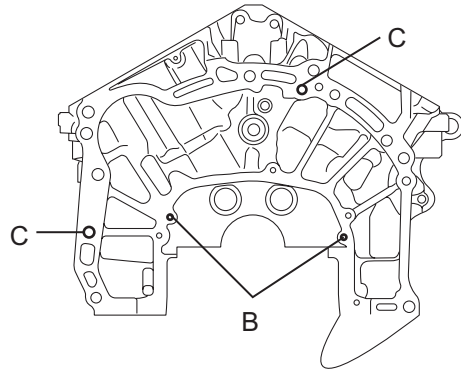
Standard protrusion

Item	protrusion
Pin A	23 mm (0.906 in.)
Pin B	6 mm (0.236 in.)
Pin C	11 mm (0.433 in.)
Pin D	9 mm (0.354 in.)

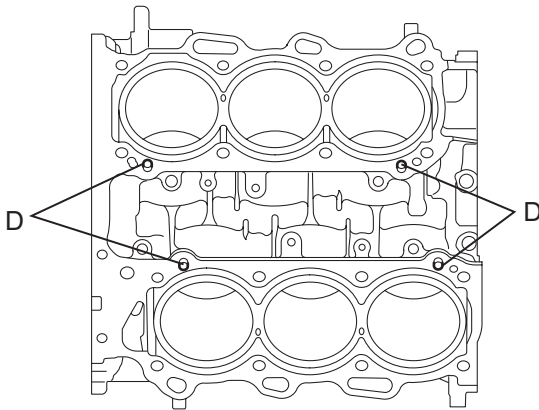
Cylinder Block Front:



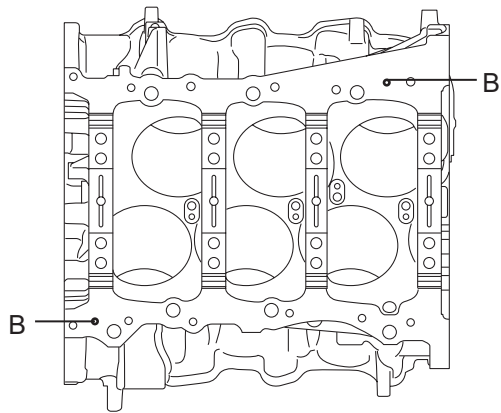
Cylinder Block Rear:



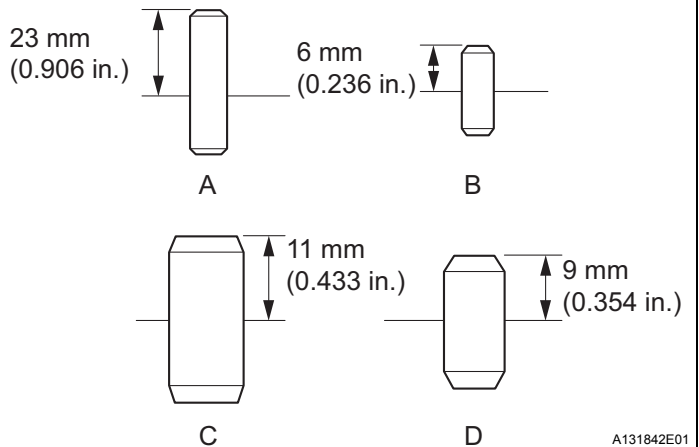
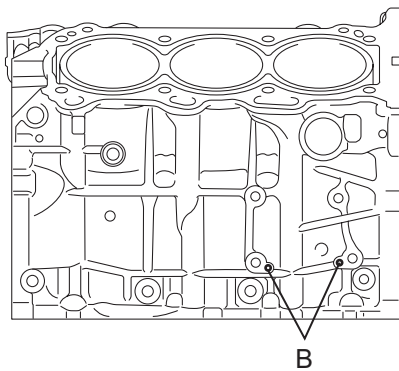
Cylinder Block Upper:



Cylinder Block Lower:



Cylinder Block RH Side:



EM

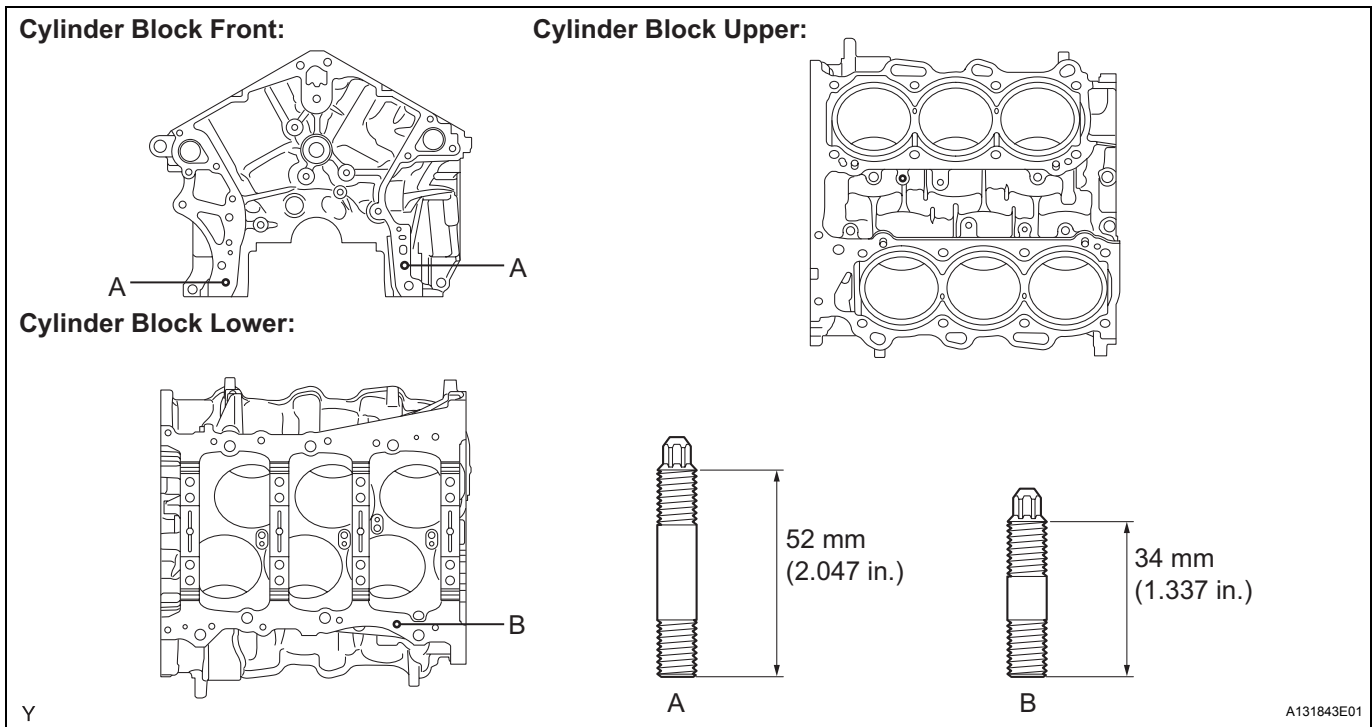
Y

A131842E01

3. INSTALL STUD BOLT

- (a) Using an E8 "torx" socket wrench, install the stud bolt.

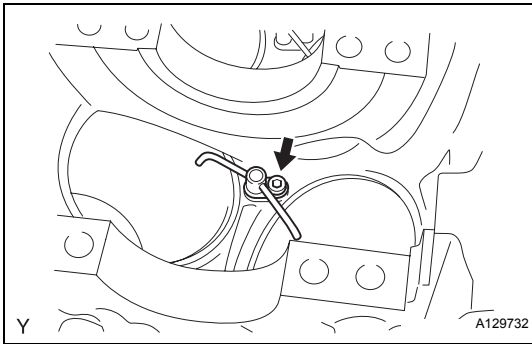
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)



4. INSTALL SUB-ASSEMBLY OIL NOZZLE NO.1

- (a) Using a 5 mm hexagon wrench, install the 3 oil nozzles with the bolts.

Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

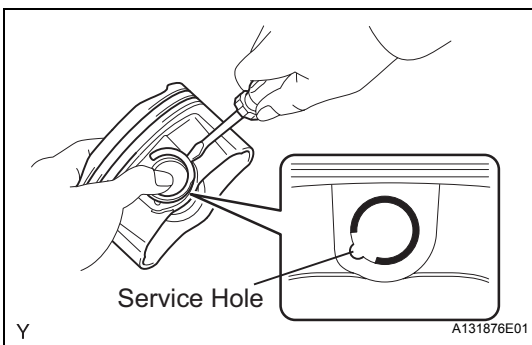


5. INSTALL PISTON SUB-ASSEMBLY WITH PIN

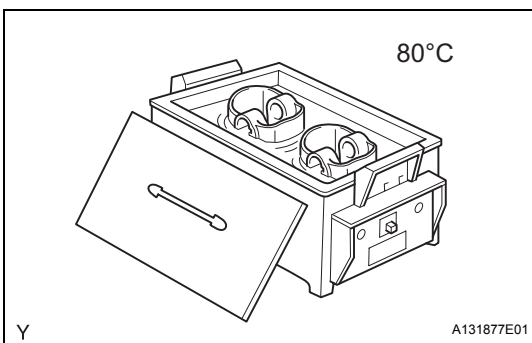
- (a) Using a screwdriver, install a new snap ring at one end of the piston pin hole.

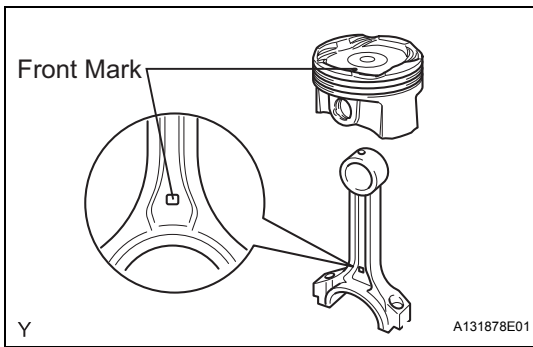
HINT:

Be sure that end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.

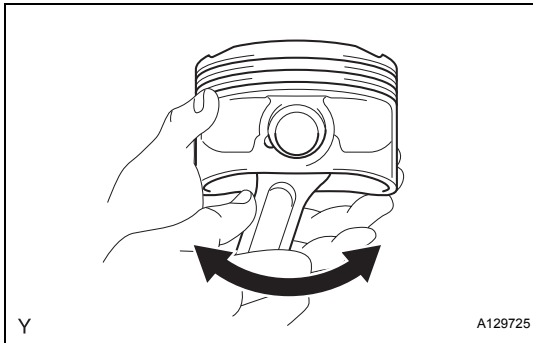


- (b) Gradually heat the piston to approximately 80°C (176°F).

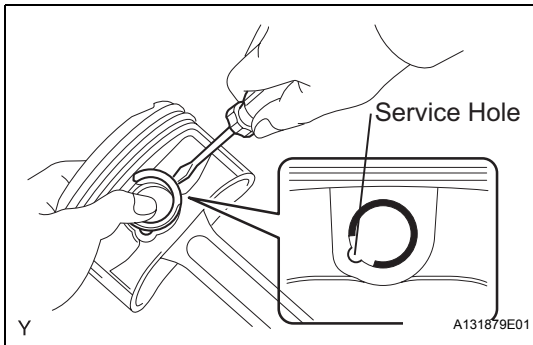




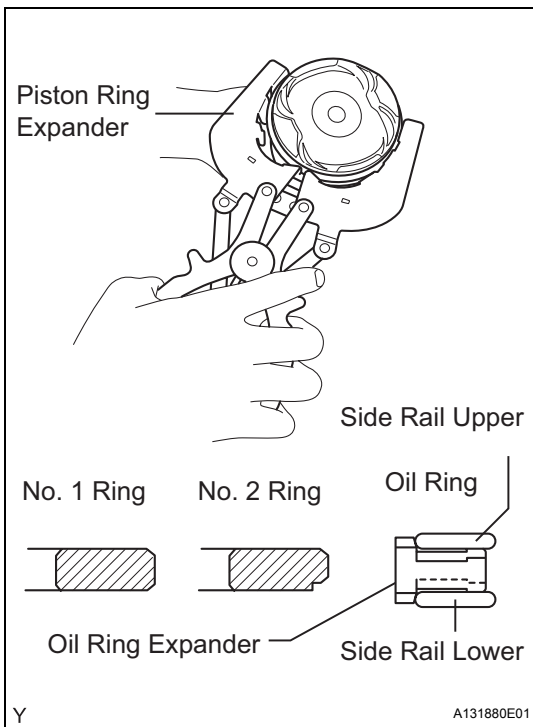
- (c) Coat the piston pin with engine oil.
- (d) Align the front marks of the piston and connecting rod, and push in the piston pin with your thumb.
HINT:
The piston and pin are a matched set.



- (e) Check the fitting condition between the piston and piston pin by trying to move the piston back and forth on the piston pin.

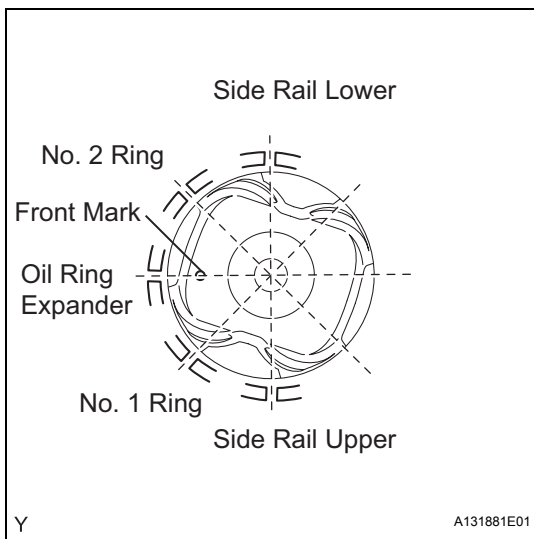


- (f) Using a screwdriver, install a new snap ring at the other end of the piston pin hole.
HINT:
Be sure that the end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.



6. INSTALL PISTON RING SET

- (a) Install the oil ring expander and 2 side rails by hand.
- (b) Using a piston ring expander, install the 2 compression rings so that the painted marks are positioned as shown in the illustration.



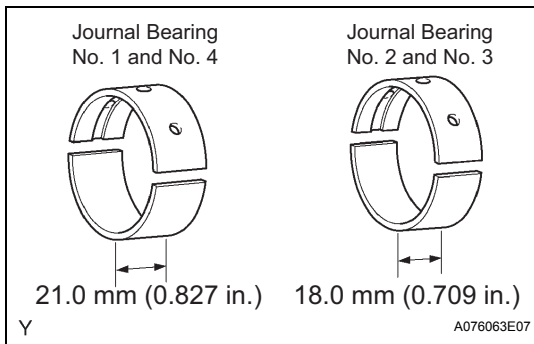
- (c) Position the piston rings so that the ring ends are as shown in the illustration.

NOTICE:

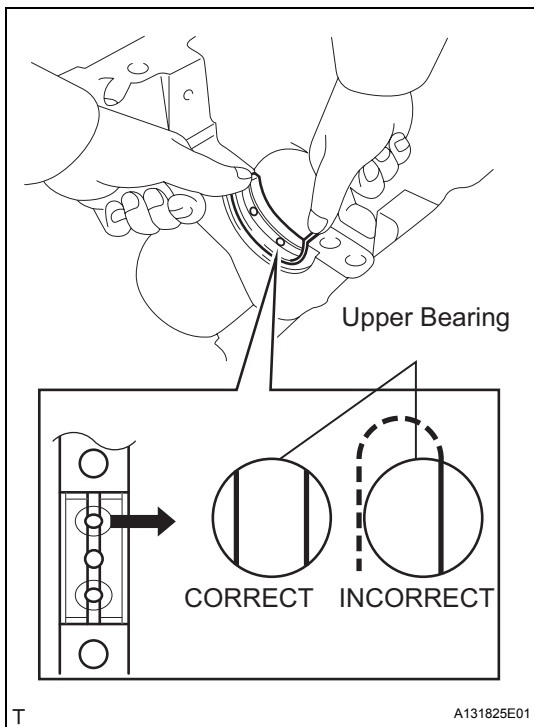
Do not align the ring ends.

7. INSTALL CRANKSHAFT BEARING**NOTICE:**

Main bearings come in widths between 18.0 mm (0.709 in.) and 21.0 mm (0.827 in.). Install the 21.0 mm (0.827 in.) bearings in the No. 1 and No. 4 cylinder block journal positions with the main bearing cap. Install the 18.0 mm (0.709 in.) bearings in the No. 2 and No. 3 positions.



- (a) Clean the main journal and the both surfaces of the bearing.

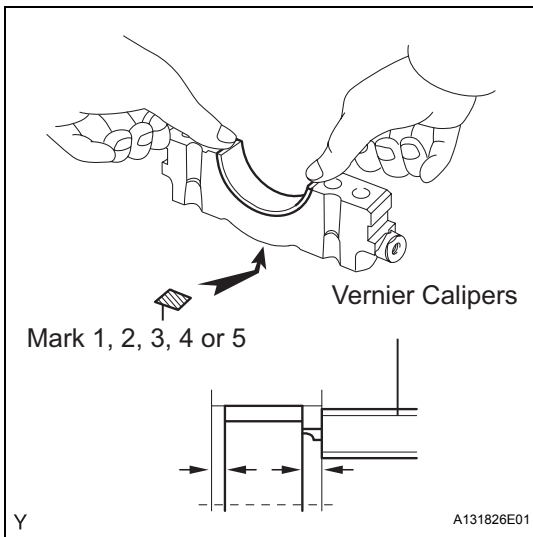


- (b) Install the upper bearing.

- (1) Install the upper bearing to the cylinder block as shown in the illustration.

NOTICE:

Do not apply engine oil to the bearing and its contact surface.



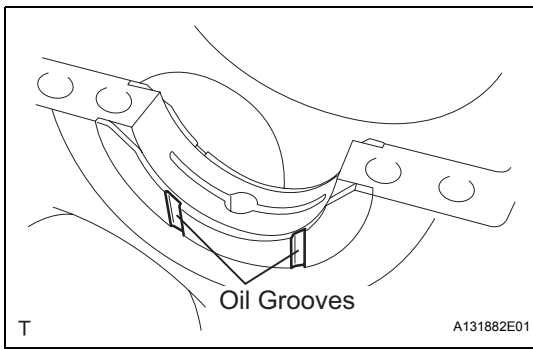
- (c) Install the lower bearing.
- (1) Install the lower bearing to the bearing cap.
 - (2) Using vernier calipers, measure the distance between the bearing cap's edge and the lower bearing's edge.

Dimension (A - B):

0.7 mm (0.0276 in.) or less.

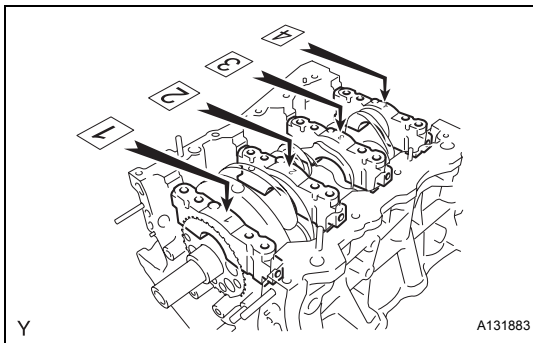
NOTICE:

Do not apply engine oil to the bearing's contact area and underside.



8. INSTALL CRANKSHAFT

- (a) Install the crankshaft thrust washer to the cylinder block.
 - (1) Install the 2 thrust washers under the No. 2 journal position of the cylinder block with the oil grooves facing outward.
- (b) Apply engine oil to the upper bearing, then place the crankshaft on the cylinder block.

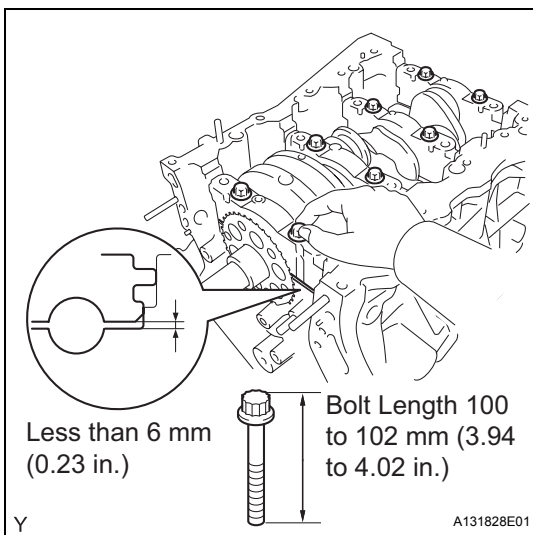


- (c) Confirm the front marks and numbers of the main bearing caps and install the bearing caps on the cylinder block.

HINT:

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

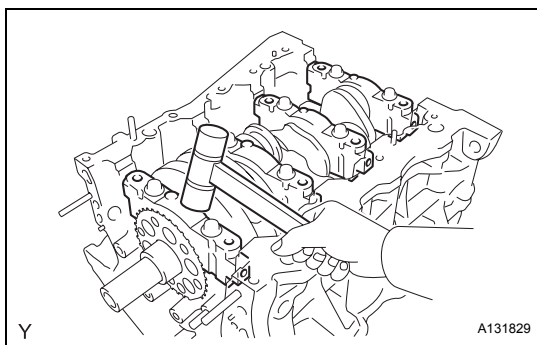
- (d) Apply a light coat of engine oil on the threads and under the head of bearing cap bolts.
- (e) Temporarily install the 8 main bearing cap bolts to the inside positions.



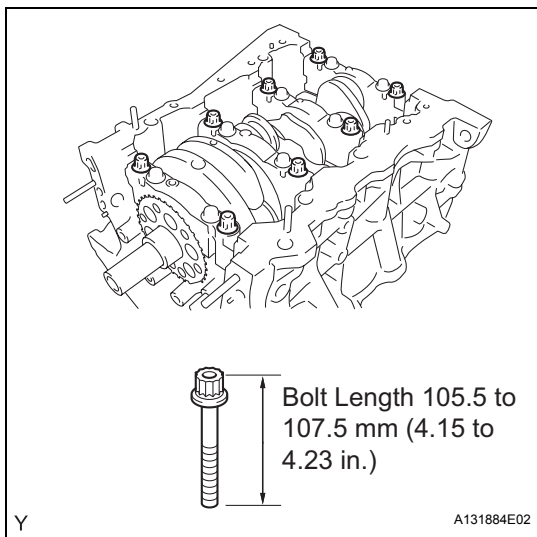
- (f) Insert the main bearing cap by hand until the clearance between the main bearing cap and the cylinder block is less than 6 mm (0.23 in.) by marking the 2 internal bearing cap bolts as a guide.

Bolt length:

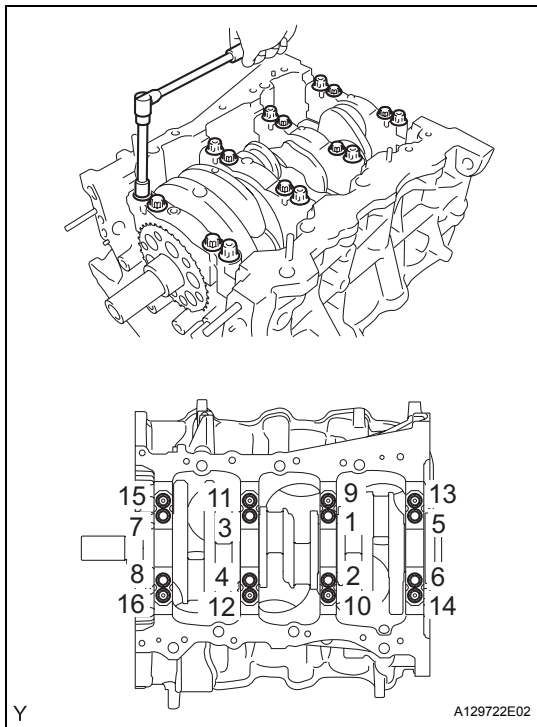
100 to 102 mm (3.94 to 4.02 in.)



- (g) Using a plastic hammer, lightly tap the bearing cap to ensure a proper fit.
- (h) Apply a light coat of engine oil to the threads and under the heads of 8 main bearing cap bolts.



- (i) Install the 8 main bearing cap bolts to the outside positions.

Bolt length:**105.5 to 107.5 mm (4.15 to 4.23 in.)**

- (j) Install the crankshaft bearing cap bolts.

HINT:

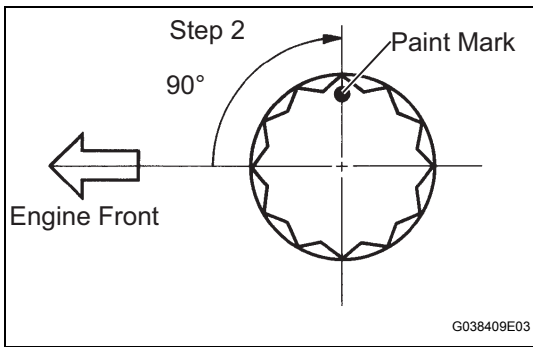
The main bearing cap bolts are tightened in 2 progressive steps.

- (k) Step 1

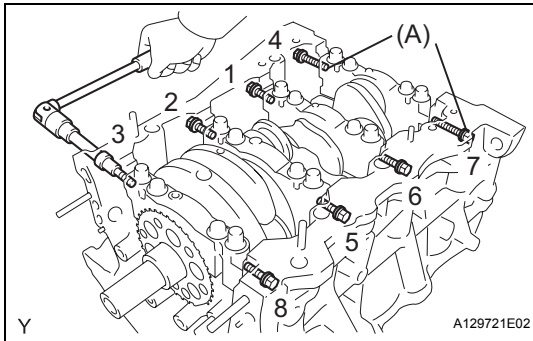
- (1) Install and uniformly tighten the 16 main bearing cap bolts in the sequence shown in the illustration.

Torque: 61 N*m (622 kgf*cm, 45 ft.*lbf)

If any of the main bearing cap bolts does not meet the torque specified, replace it.



- (l) Step 2
- (1) Mark the front of the bearing cap bolts with paint.
 - (2) Tighten the bearing cap bolts another 90° in the order above.
 - (3) Check that the painted mark is now at a 90° angle to the front.
- (m) Check that the crankshaft turns smoothly.
 (n) Check the crankshaft thrust clearance.

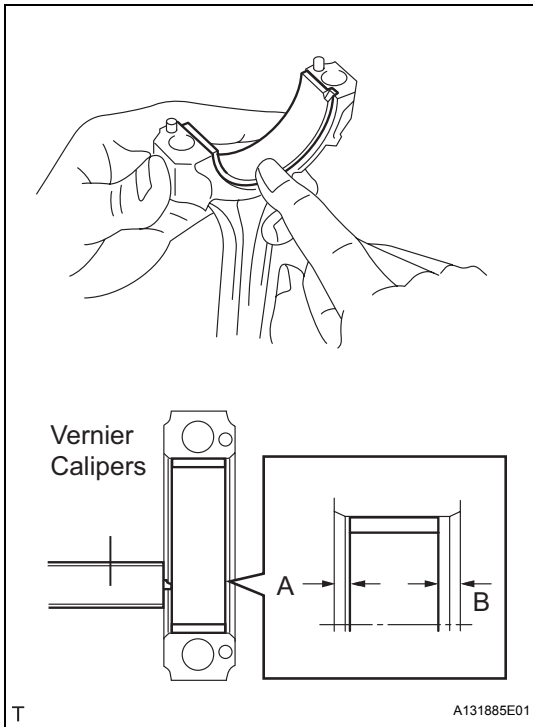


- (o) Install and uniformly tighten the 8 main bearing cap bolts in several steps and in the sequence shown in the illustration.

Torque: 52 N*m (525 kgf*cm, 38 ft.*lbf)

HINT:

- Bolt (A) length: 45 mm (1.77 in.)
 - Except bolt (A) length: 30 mm (1.18 in.)
- (p) Check that the crankshaft turns smoothly.
 (q) Check the crankshaft thrust clearance.



9. INSTALL CONNECTING ROD BEARING

- (a) Install the connecting rod bearing to the connecting rod and bearing cap.
- (b) Using vernier calipers, measure the distance between the connecting rod's and bearing cap's edges, and each connecting rod bearing's edge.

Dimension (A - B):

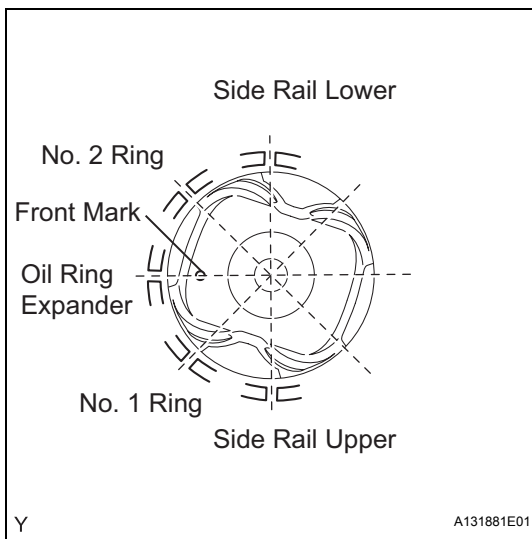
0.7 mm (0.0276 in.) or less

NOTICE:

Do not apply engine oil to the bearing's contact area and underside.

10. INSTALL PISTON SUB-ASSEMBLY WITH CONNECTING ROD

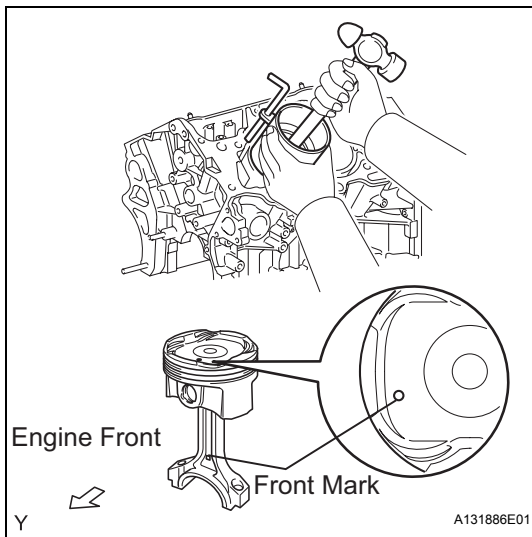
- (a) Apply engine oil to the cylinder walls, the pistons, and the surfaces of the connecting rod bearings.



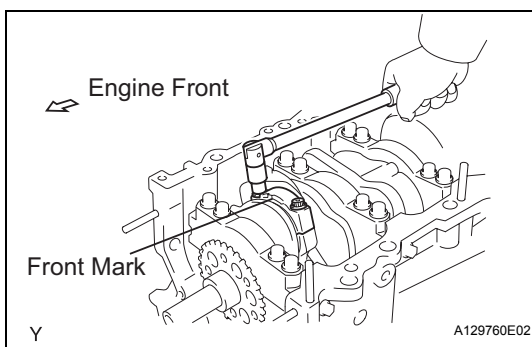
- (b) Position the piston rings so that the ring ends are as shown in the illustration.

NOTICE:

Do not align the ring ends.



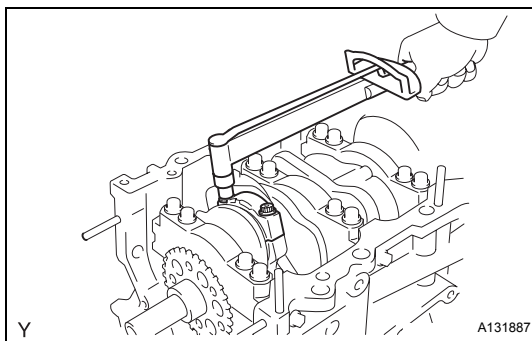
- (c) Using a piston ring compressor, push the correctly numbered piston and connecting rod assembly into the cylinder with the front mark of the piston facing forward.
- (d) Match the numbered connecting rod cap with the connecting rod.



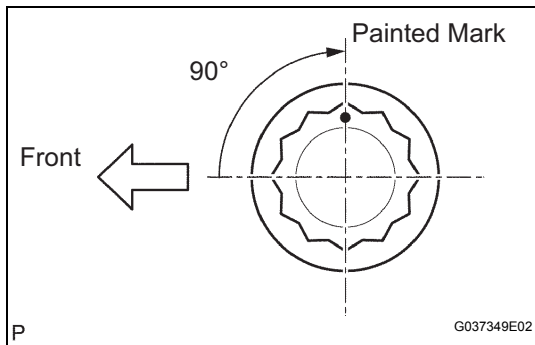
- (e) Check that the front mark of the connecting rod cap is facing forward.
- (f) Apply a light coat of engine oil to the threads and under the heads of the connecting rod cap bolts.
- (g) Install the connecting cap bolts.

HINT:

The connecting cap bolts are tightened in 2 progressive steps.



- (h) Step 1
 (1) Install and alternately tighten the bolts of the connecting rod cap in several steps.
Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)



- (i) Step 2
 - (1) Mark the front side of each connecting cap bolt with paint.
 - (2) Tighten the cap bolts another 90° as shown in the illustration.
 - (3) Check the painted mark is now at a 90° angle to the front.
- (j) Check that the crankshaft turns smoothly.
- (k) Check the connecting rod thrust clearance.

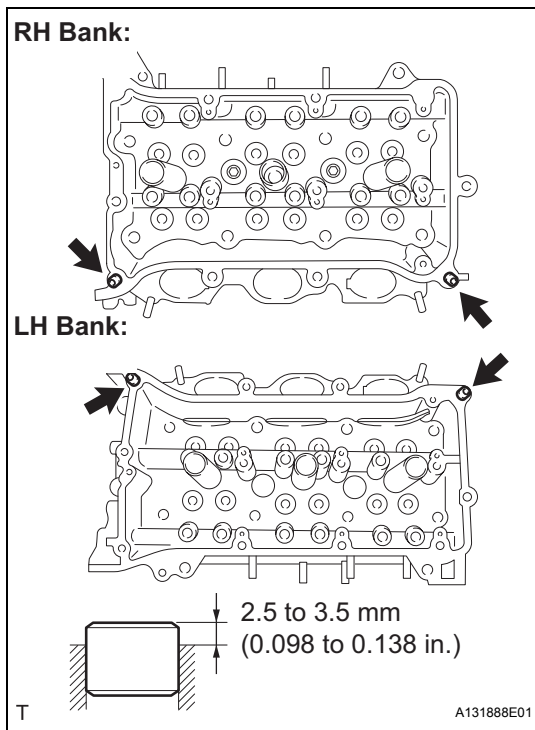
11. INSTALL RING PIN

- (a) Using a plastic hammer, tap in 4 new ring pins to the specified protrusion height.

Specified protrusion height:

2.5 to 3.5 mm (0.098 to 0.138 in.)

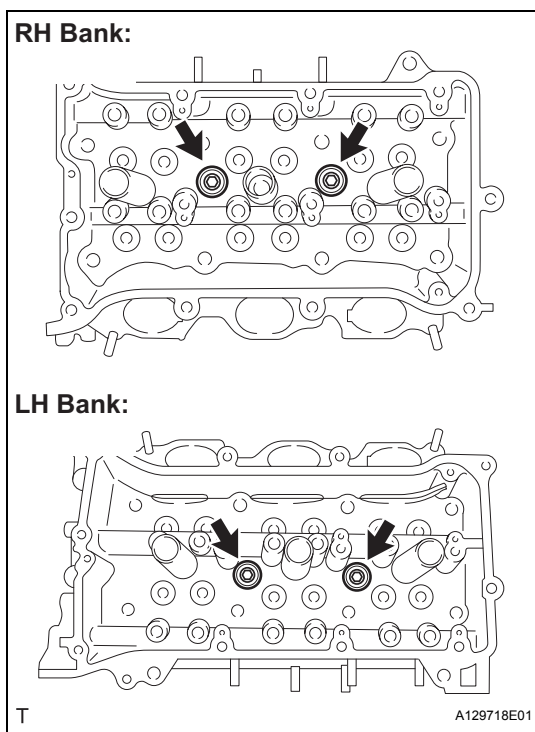
EM

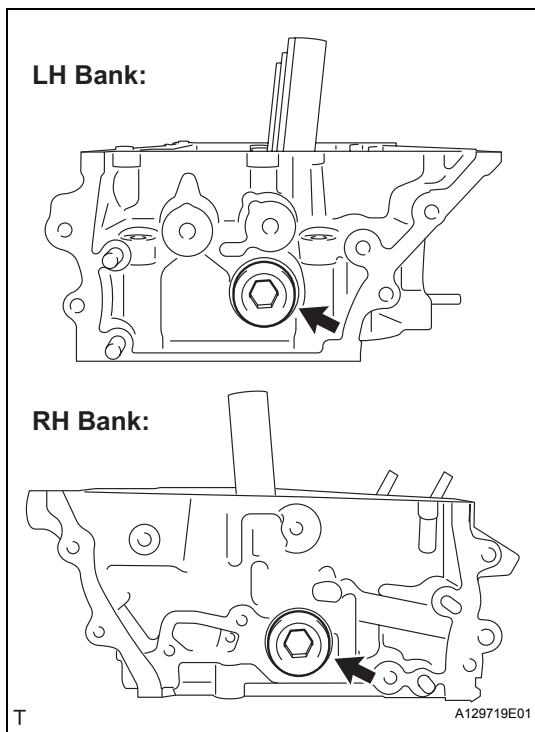


12. INSTALL WITH HEAD STRAIGHT SCREW PLUG NO.1

- (a) Using a 10 mm hexagon wrench, install 4 new gaskets and the straight screw plugs.

Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf)



**13. INSTALL WITH HEAD STRAIGHT SCREW PLUG NO.2**

- (a) Using a 14 mm hexagon wrench, install 2 new gaskets and the 2 straight screw plugs.
Torque: 80 N*m (816 kgf*cm, 59 ft.*lbf)

14. INSTALL STUD BOLT**NOTICE:**

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

- (a) Using E6 and E8 "torx" socket wrenches, install the stud bolts.

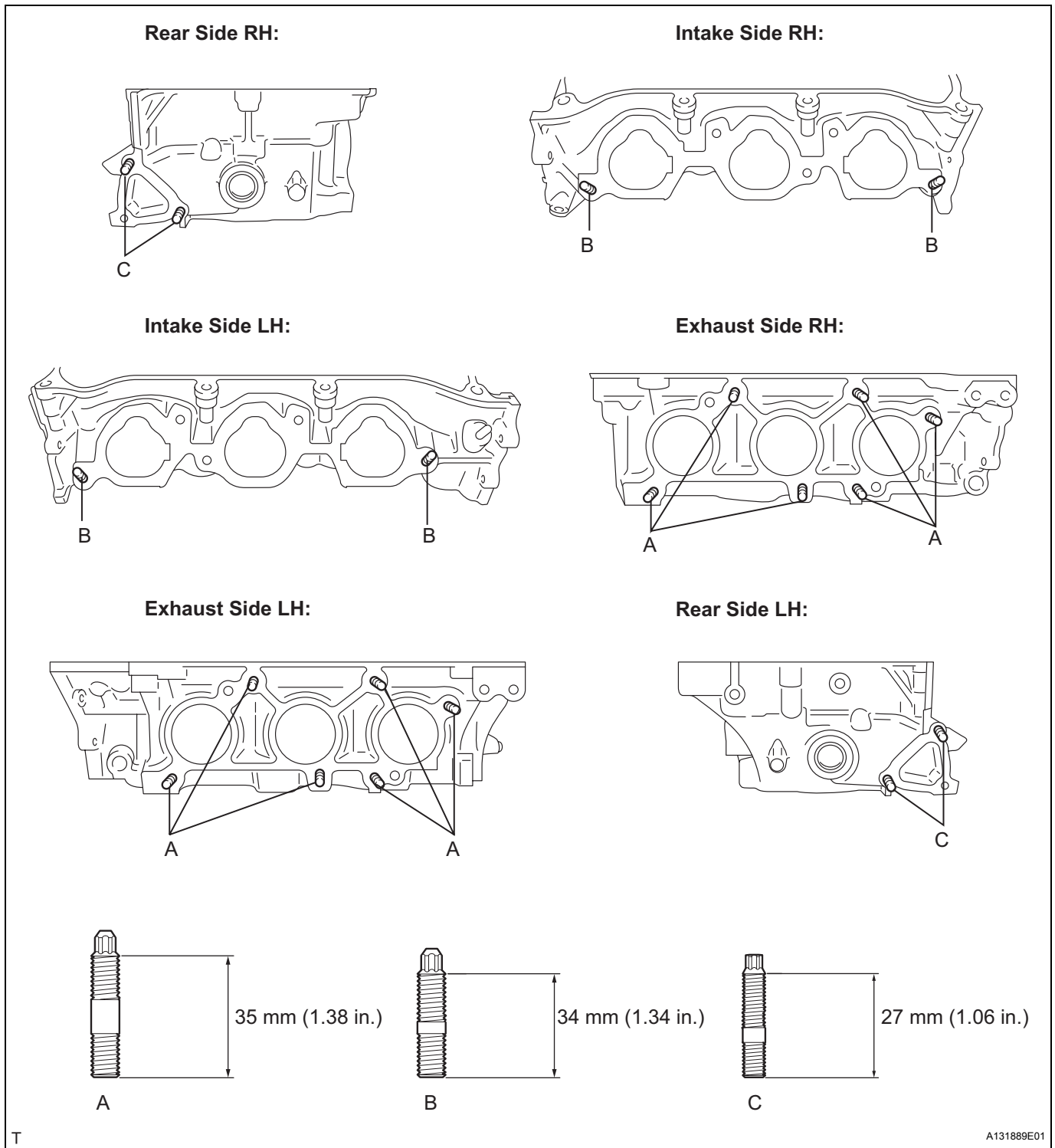
Torque: A and B bolts

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

C bolt

4.0 N*m (41 kgf*cm, 35 in.*lbf)

EM

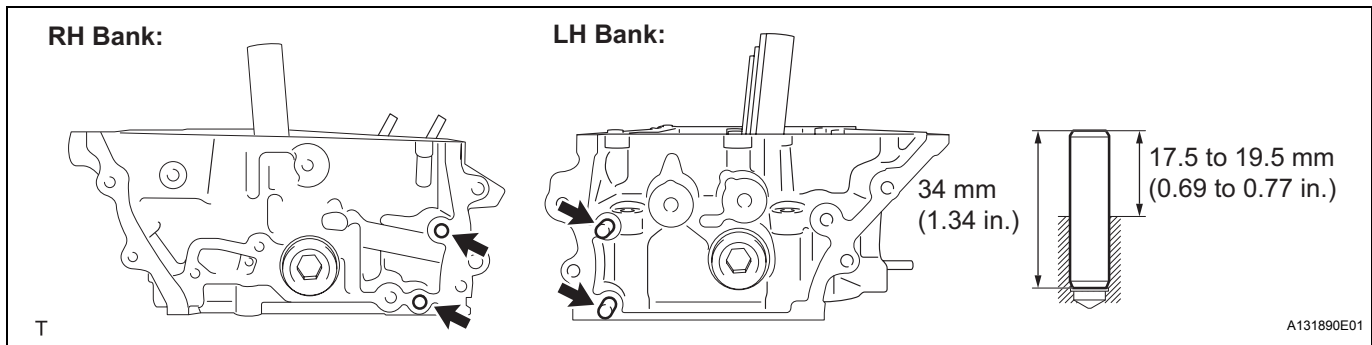


15. INSTALL STRAIGHT PIN

- (a) Using a plastic hammer, tap in 4 new straight pins as shown in the illustration.

Specified protrusion height:

17.5 to 19.5 mm (0.689 to 0.768 in.)



16. INSTALL VALVE SPRING SEAT

- (a) Install the valve spring seats to the cylinder head.

17. INSTALL VALVE STEM OIL SEAL

- (a) Apply a light coat of engine oil to new oil seals.

NOTICE:

Pay attention when installing the intake and exhaust oil seals. For example, installing the intake oil seal into the exhaust side or installing the exhaust oil seal to the intake side can cause installation problems later.

HINT:

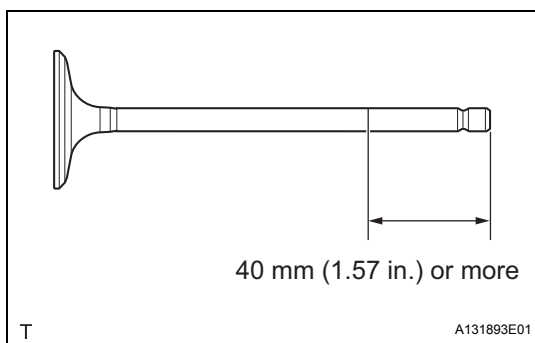
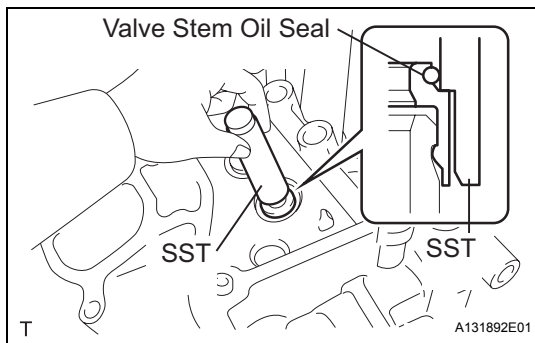
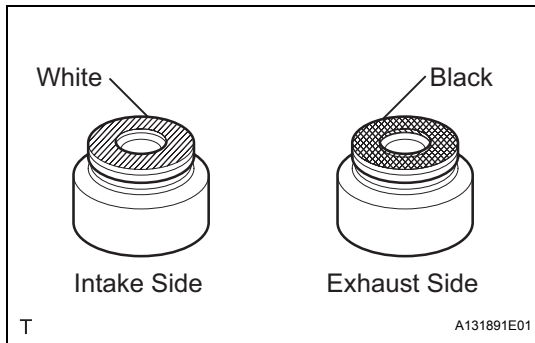
The intake valve oil seals are white and the exhaust valve oil seals are black.

- (b) Using SST, push in the oil seals.

SST 09201-41020

NOTICE:

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

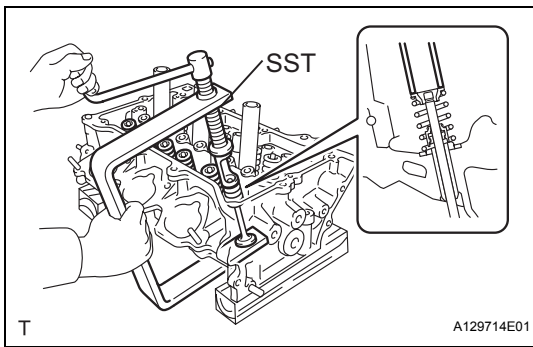


18. INSTALL INTAKE VALVE

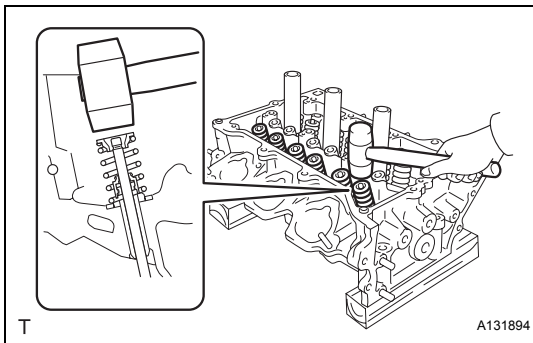
- (a) Apply a plenty of engine oil to the tip area of the intake valve shown in the illustration.
- (b) Install the valve, compression spring and spring retainer to the cylinder head.

NOTICE:

Install the same parts in the same combination to the original locations.



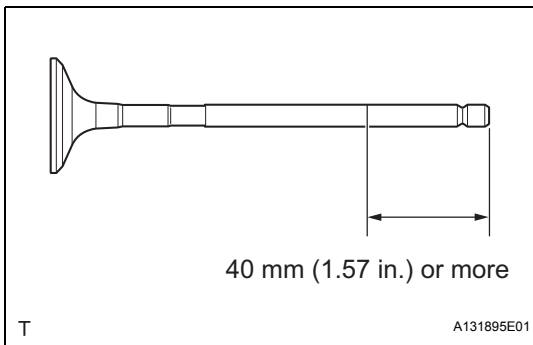
- (c) Using SST and wooden blocks, compress the spring and install the 2 retainer locks.
SST 09202-70020 (09202-00010)



- (d) Using a plastic hammer, lightly tap the valve stem tip to ensure a proper fit.

NOTICE:

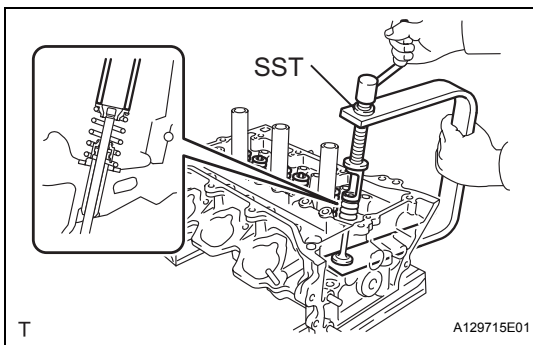
Be careful not to damage the retainer.

**19. INSTALL EXHAUST VALVE**

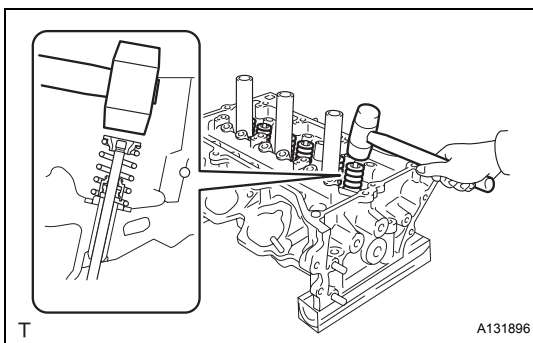
- (a) Apply a plenty of engine oil to the tip area of the intake valve shown in the illustration.
 (b) Install the valve, compression spring and spring retainer to the cylinder head.

NOTICE:

Install the same parts in the same combination to the original locations.



- (c) Using SST and wooden blocks, compress the spring and install the 2 retainer locks.
SST 09202-70020 (09202-00010)



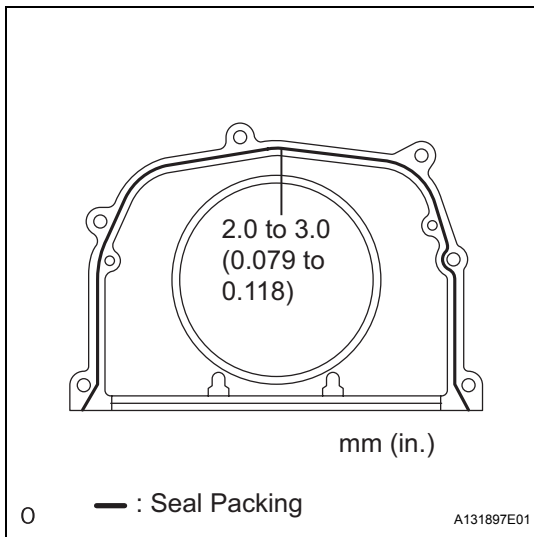
- (d) Using a plastic hammer, lightly tap the valve stem tip to ensure a proper fit.

NOTICE:

Be careful not to damage the retainer.

20. INSTALL VALVE STEM CAP

- (a) Apply a light coat of engine oil to the valve stem caps.
 (b) Install the valve stem caps to the cylinder head.



21. INSTALL ENGINE REAR OIL SEAL RETAINER

- (a) Apply seal packing in a continuous bead as shown in the illustration.

Seal packing:

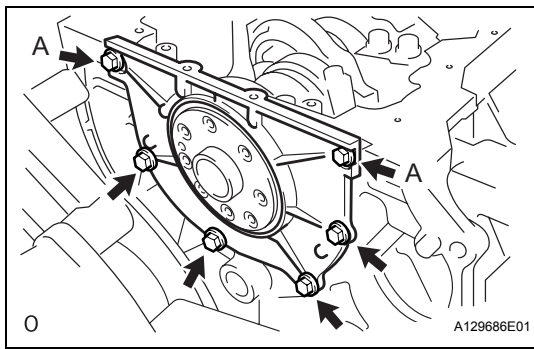
Part No. 08826-00080 or equivalent

Seal diameter:

2.0 to 3.0 mm (0.079 to 0.118 in.)

NOTICE:

- Remove any oil from the contact surface.
- Install the crankcase within 3 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after installation.



- (b) Install the oil seal retainer with the 6 bolts.

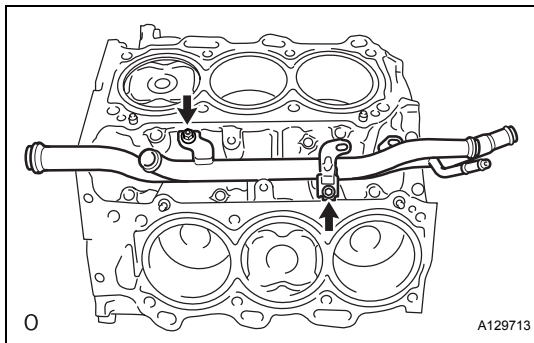
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

NOTICE:

Be sure to apply adhesive 1324 to the bolts in the places indicated by A before installing them.

Adhesive:

Part No. 08833-00070, THREE BOND 1324 or equivalent

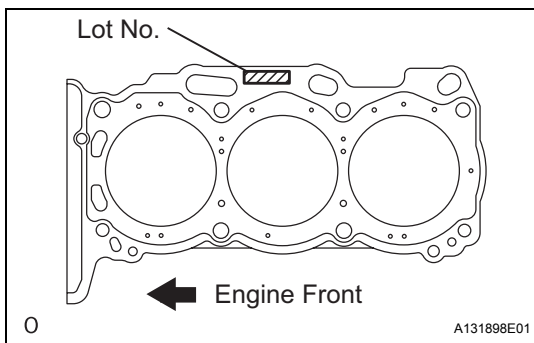


22. INSTALL WATER INLET PIPE

- (a) Install the water inlet pipe with the 2 bolts.

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

- (b) Install the water by-pass hose No. 1.



23. INSTALL CYLINDER HEAD SUB-ASSEMBLY

- (a) Place the cylinder head gasket on the cylinder block surface with the front face of the Lot No. stamp upward.

NOTICE:

- Be careful of the installation direction.
- Gently place the cylinder head in order not to damage the gasket with the bottom part of the head.

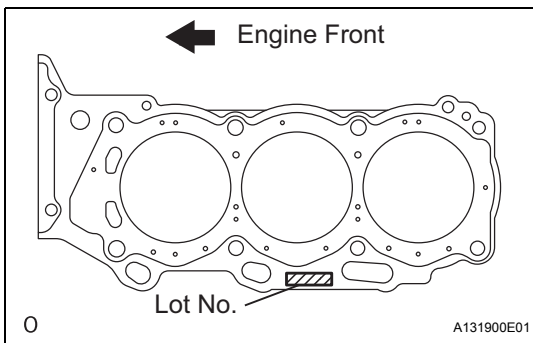
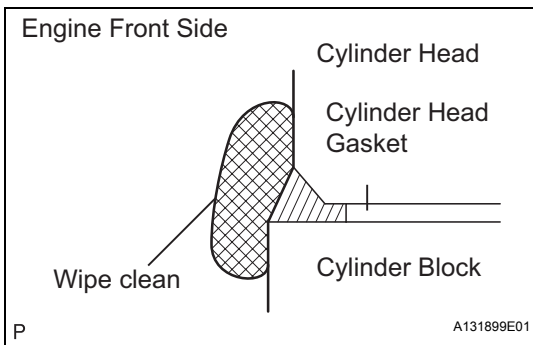
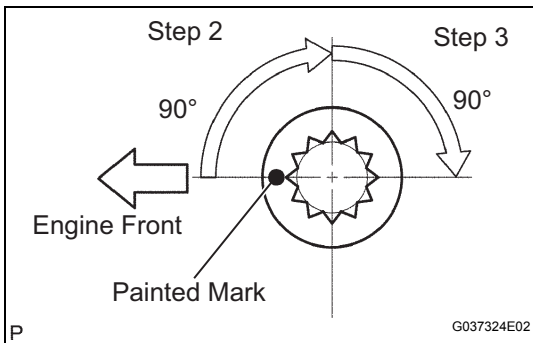
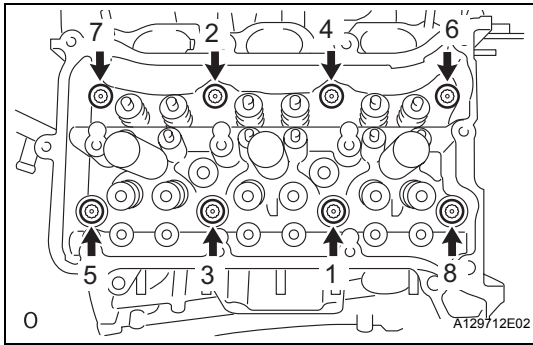
- (b) Place the cylinder head on the cylinder block.

NOTICE:

Ensure that no oil is on the mounting surface of the cylinder head.

HINT:

The cylinder head bolts are tightened in 3 progressive steps.



- (c) Apply a light coat of engine oil to the threads and under the heads of the cylinder head bolts.
- (d) Step 1
 (1) Using a 10 mm bi-hexagon wrench, install and uniformly tighten the 8 cylinder head bolts with the plate washers in several steps and in the sequence shown in the illustration.
Torque: 36 N*m (367 kgf*cm, 27 ft.*lbf)

- (e) Step 2
 (1) Mark the cylinder head bolt head with paint as shown in the illustration.
 (2) Tighten the cylinder head bolts another 90°.
- (f) Step 3
 (1) Tighten the cylinder head bolts by an additional 90°.
 (2) Check that the painted mark is now facing rearward.

- (g) Seal packing will seep out on the engine's front side. Thoroughly wipe clean any seal packing.

24. INSTALL CYLINDER HEAD LH

- (a) Place the cylinder head gasket on the cylinder block surface with the front face of the Lot No. stamp upward.

NOTICE:

- Be careful of the installation direction.
- Gently place the cylinder head in order not to damage the gasket with the bottom part of the head.

- (b) Place the cylinder head on the cylinder block.

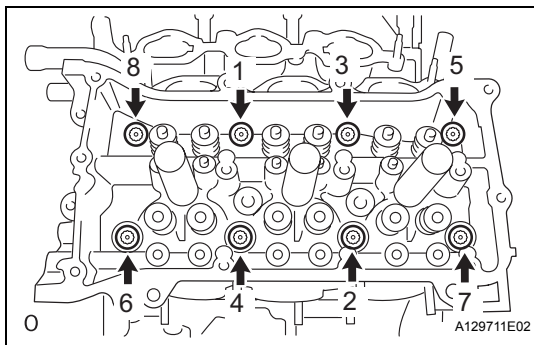
NOTICE:

Ensure that no oil is on the mounting surface of the cylinder head.

HINT:

The cylinder head bolts are tightened in 3 progressive steps.

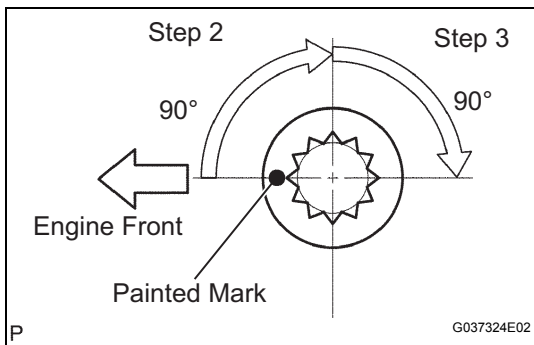
- (c) Apply a light coat of engine oil to the threads and under the heads of the cylinder head bolts.



(d) Step 1

- (1) Using a 10 mm bi-hexagon wrench, install and uniformly tighten the 8 cylinder head bolts with the plate washers in several steps and in the sequence shown in the illustration.

Torque: 36 N*m (367 kgf*cm, 27 ft.*lbf)

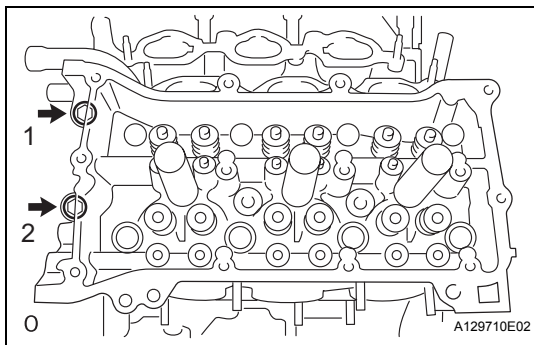


(e) Step 2

- (1) Mark the cylinder head bolt head with paint as shown in the illustration.
- (2) Tighten the cylinder head bolts another 90°.

(f) Step 3

- (1) Tighten the cylinder head bolts by an additional 90°.
- (2) Check that the painted mark is now facing rearward.

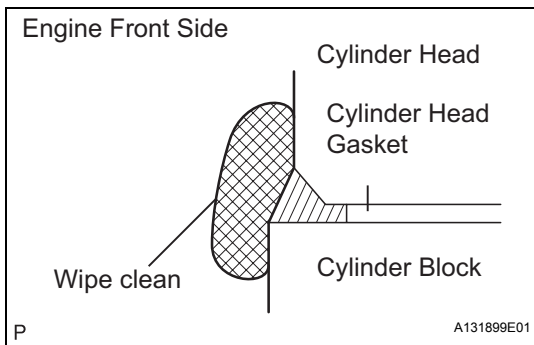


- (g) Tighten the 2 bolts in the order shown in the illustration.

Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)

NOTICE:

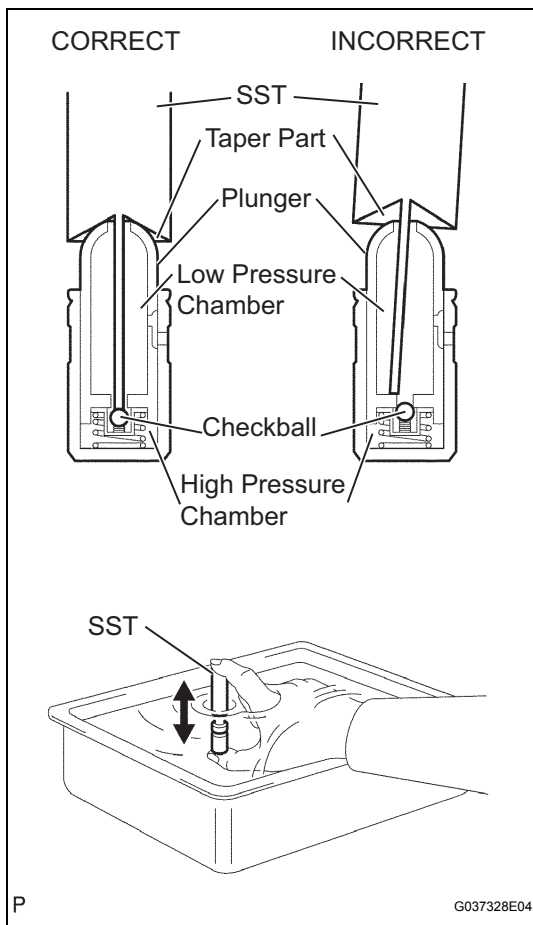
Only use the specifications stated above when tightening the bolts 1 and 2 shown in the illustration.



- (h) Seal packing will seep out on the engine's front side. Thoroughly wipe clean any seal packing.

25. INSTALL VALVE LASH ADJUSTER ASSEMBLY**NOTICE:**

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



- (a) Place the lash adjuster into a container full of engine oil.
- (b) Insert SST's tip into the lash adjuster's plunger and use the tip to press down on the checkball inside the plunger.

SST 09276-75010

- (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 the air.

OK:

Plunger moves up and down.

NOTICE:

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

- (e) After bleeding the air, remove the SST. Then quickly and firmly press the plunger with a finger.

OK:

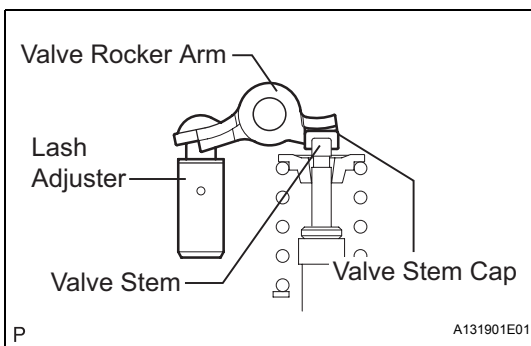
Plunger is very difficult to move.

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

- (f) Install the lash adjusters.

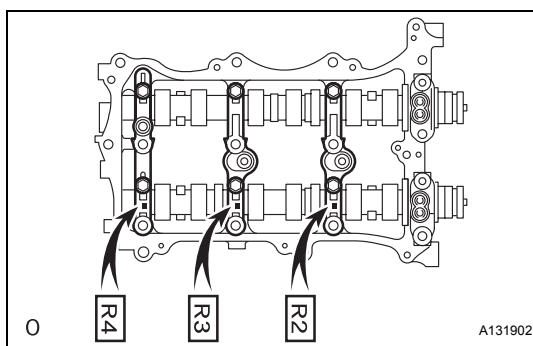
NOTICE:

Install the lash adjuster at the same place it was removed from.



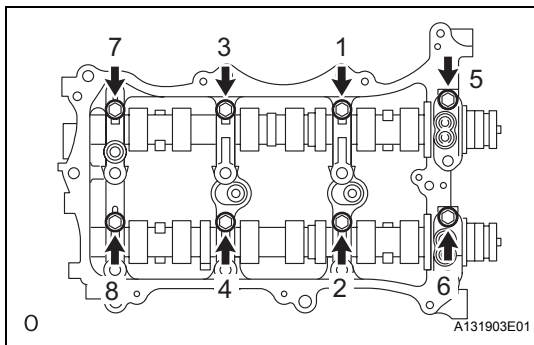
26. INSTALL VALVE ROCKER ARM SUB-ASSEMBLY NO.1

- (a) Apply engine oil to the lash adjuster tips and valve stem cap ends.
- (b) Make sure that the valve rocker arms are installed as shown in the illustration.



27. INSTALL CAMSHAFT BEARING CAP RH

- (a) Apply engine oil to the camshaft journals, camshaft housings and bearing caps.
- (b) Install the camshaft and camshaft No. 2 to the camshaft housing RH.
- (c) Make sure of the marks and numbers on the camshaft bearing caps and place them in each proper position and direction.



- (d) Temporarily tighten the 8 bolts in the order shown in the illustration.

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

28. INSTALL CAMSHAFT HOUSING SUB-ASSEMBLY RH

- (a) Apply seal packing in a continuous bead as shown in the illustration.

Seal packing:

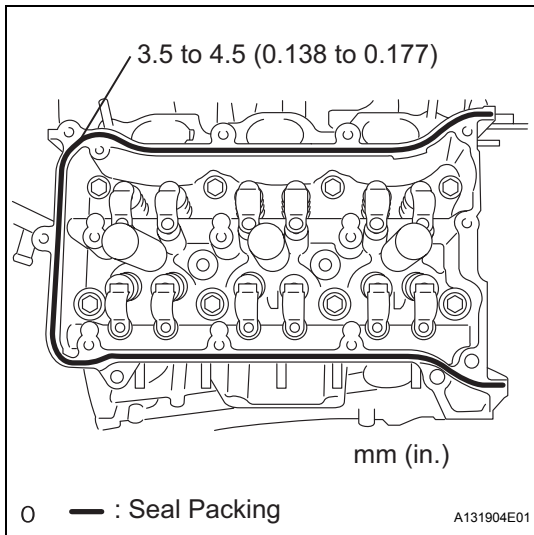
Part No. 08826-00080 or equivalent

Seal diameter:

3.5 to 4.5 mm (0.138 to 0.177 in.)

NOTICE:

- Remove any oil from the contact surface.
- Install the camshaft housing sub-assembly RH within 3 minutes and tighten the bolts within 15 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after installing.

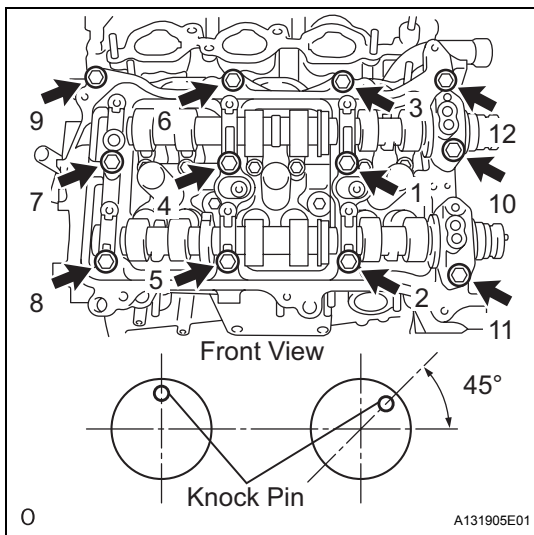


- (b) Install the camshaft housing RH, and tighten the 12 bolts in the order shown in the illustration.

Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)

NOTICE:

Make sure that the knock pin of the camshaft is positioned as shown in the illustration before installing the camshaft housing RH.

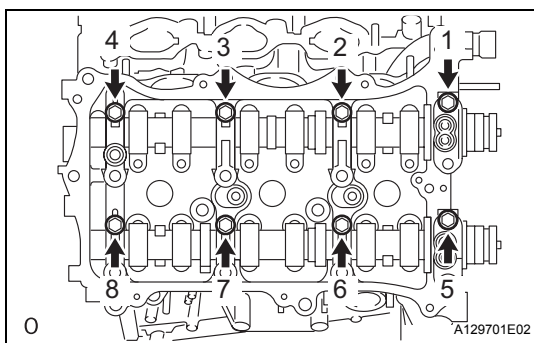


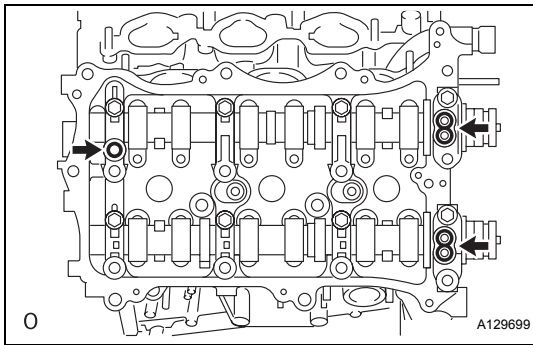
- (c) Tighten the 8 bolts in the order shown in the illustration.

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

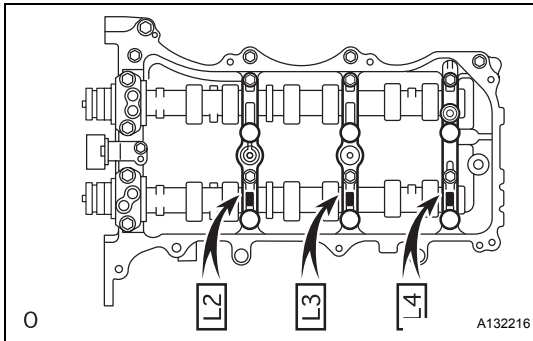
NOTICE:

Thoroughly wipe clean any seal packing.



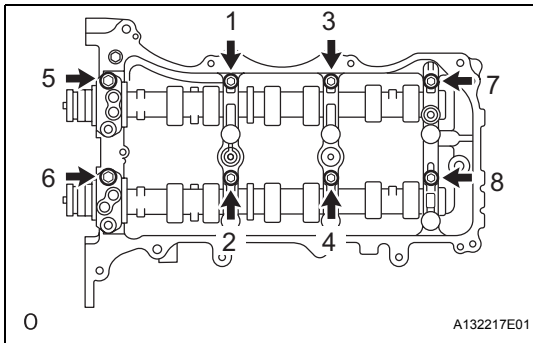


(d) Install 3 new gaskets.



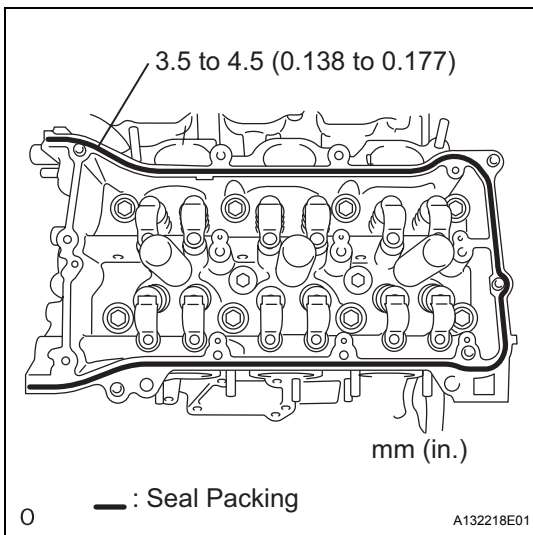
29. INSTALL CAMSHAFT BEARING CAP

- Apply engine oil to the camshaft journals, camshaft housings and bearing caps.
- Install the camshaft No. 3 and camshaft No. 4 to the camshaft housing LH.
- Make sure of the marks and numbers on the camshaft bearing caps and place them in each proper position and direction.



- Temporarily tighten the 8 bolts in the order shown in the illustration.

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



30. INSTALL CAMSHAFT HOUSING SUB-ASSEMBLY LH

- Apply seal packing in a continuous bead as shown in the illustration.

Seal packing:

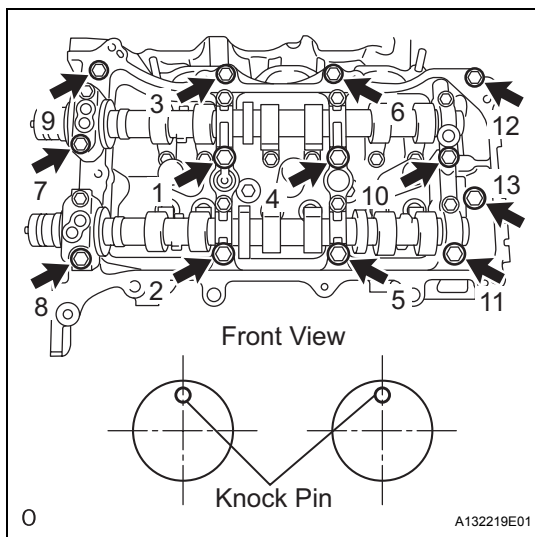
Part No. 08826-00080 or equivalent

Seal diameter:

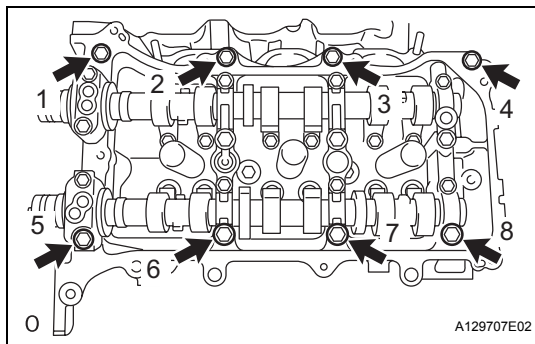
3.5 to 4.5 mm (0.138 to 0.177 in.)

NOTICE:

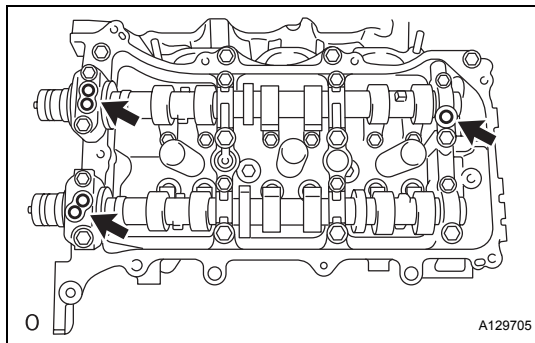
- Remove any oil from the contact surface.
- Install the camshaft housing sub-assembly LH within 3 minutes and tighten the bolts within 15 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after installing.



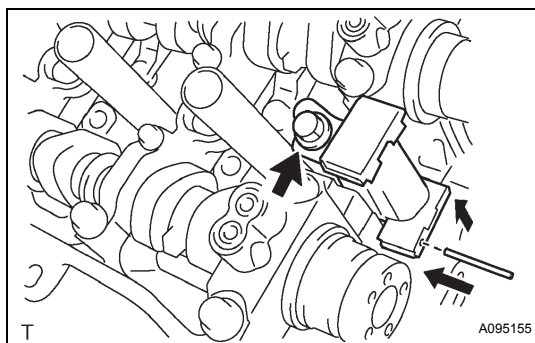
- (b) Install the camshaft housing LH, and tighten the 13 bolts in the order shown in the illustration.
Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)
NOTICE:
 Make sure that the knock pin of the camshaft is positioned as shown in the illustration before installing the camshaft housing LH.



- (c) Tighten the 8 bolts in the order shown in the illustration.
Torque: 16 N*m (163 kgf*cm, 12 ft.*lbf)
NOTICE:
 Thoroughly wipe clean any seal packing.

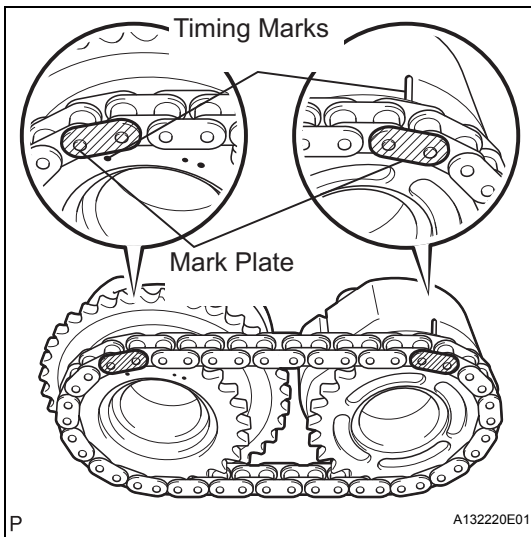


- (d) Install 3 new gaskets.



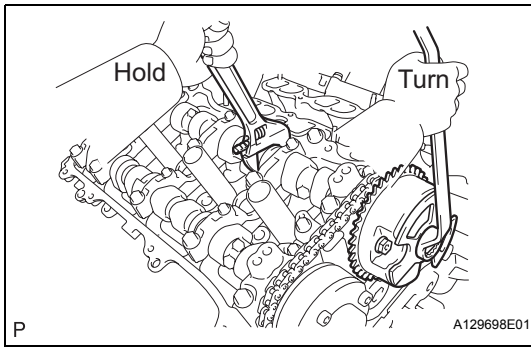
31. INSTALL CHAIN TENSIONER ASSEMBLY NO.2

- (a) Install the chain tensioner No. 2 with the bolt.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)
- (b) While pushing in the tensioner, insert a pin of $\phi 1.0$ mm (0.039 in.) into the hole to fix it.



32. INSTALL CAMSHAFT TIMING GEARS AND NO. 2 CHAIN (for RH BANK)

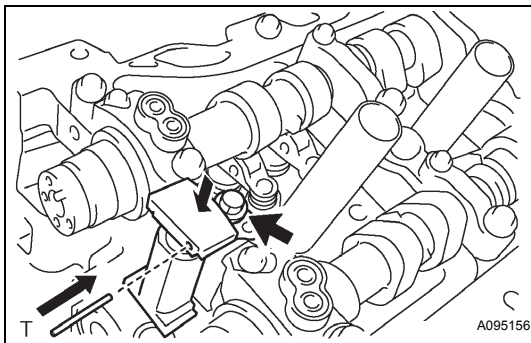
- Align the mark plate (yellow) with the timing marks (1 dot mark) of the camshaft timing gears as shown in the illustration.
- Apply a small amount of engine oil to the bolt threads and bolt-seating surface.
- Align the knock pin of the camshaft with the pin hole of the camshaft timing gear. Install the camshaft timing gear and camshaft timing exhaust gear RH with No. 2 chain installed.



- Hold the hexagonal portion of the camshaft with a wrench, and tighten the 2 bolts.

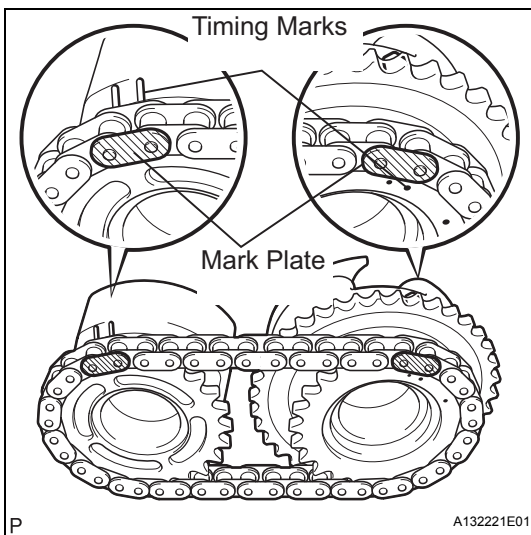
Torque: 100 N*m (1,020 kgf*cm, 74 ft.*lbf)

- Remove the pin from the chain tensioner No. 2.



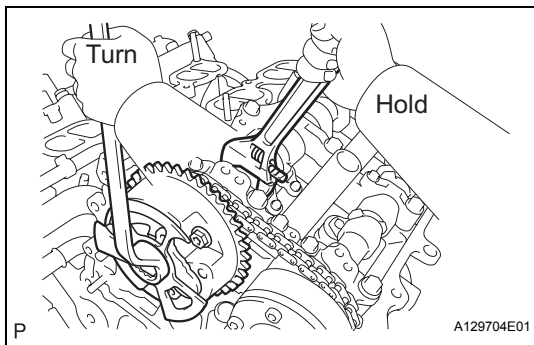
33. INSTALL CHAIN TENSIONER ASSEMBLY NO.3

- Install the chain tensioner No. 3 with the bolt.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)
- While pushing in the tensioner, insert a pin of $\phi 1.0$ mm (0.039 in.) into the hole to fix it.

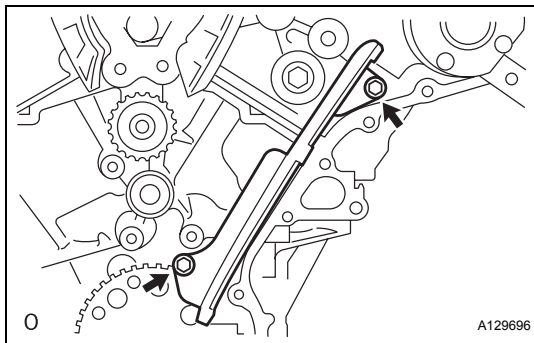


34. INSTALL CAMSHAFT TIMING GEARS AND NO. 2 CHAIN (for LH BANK)

- Align the mark plate (yellow) with the timing marks (2 dot mark) of the camshaft timing gears as shown in the illustration.
- Apply a small amount of engine oil to the bolt threads and bolt-seating surface.
- Align the knock pin of the camshaft with the pin hole of the camshaft timing gear. Install the camshaft timing gear and camshaft timing exhaust gear LH with No. 2 chain installed.



- (d) Hold the hexagonal portion of the camshaft with a wrench, and tighten the 2 bolts.
Torque: 100 N*m (1,020 kgf*cm, 74 ft.*lbf)
 (e) Remove the pin from the chain tensioner No. 2.

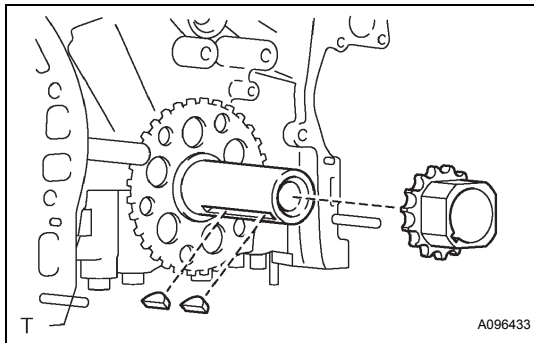


35. INSTALL CHAIN VIBRATION DAMPER NO.1

- (a) Install the chain vibration damper No. 1 with the 2 bolts.
Torque: 23 N*m (230 kgf*cm, 17 ft.*lbf)

36. INSTALL CHAIN VIBRATION DAMPER NO.2

- (a) Install the 2 chain vibration damper.

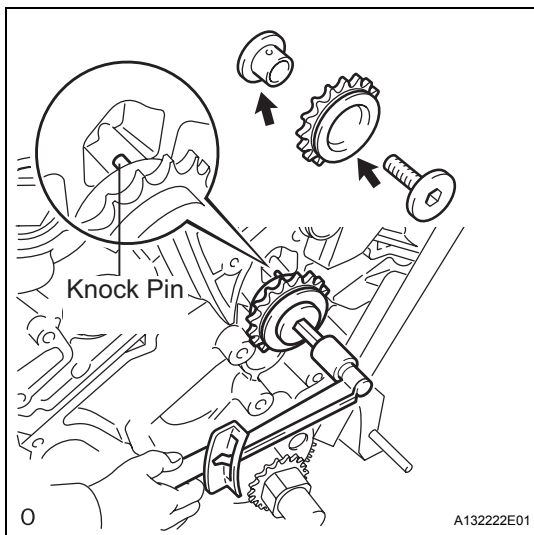


37. INSTALL CRANKSHAFT TIMING GEAR

- (a) Install the timing gear set keys and timing gear as shown in the illustration.

38. INSTALL IDLE SPROCKET ASSEMBLY

- (a) Apply a light coat of engine oil to rotating surface of the idle gear shaft No. 1.



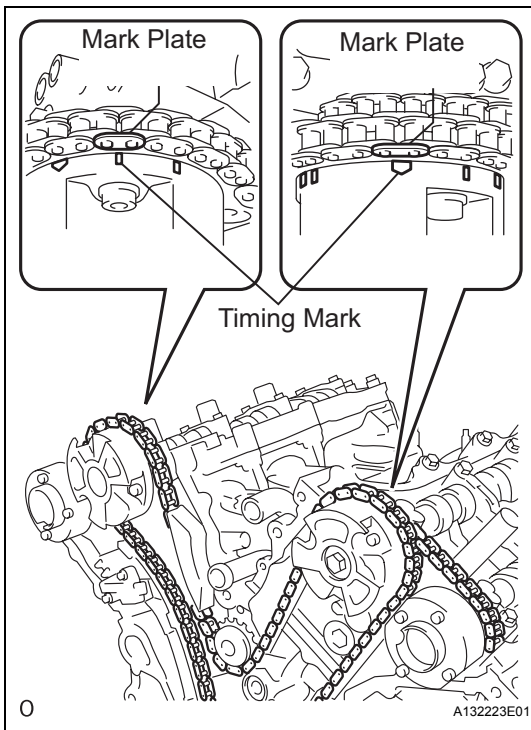
- (b) Temporarily install the idle gear shaft No. 1 and idle sprocket with the idle gear shaft No. 2 while aligning the knock pin of the idle gear shaft No. 1 with the knock pin groove of the cylinder block.

NOTICE:

Be careful of the idle gear direction.

- (c) Using a 10 mm hexagon wrench, tighten the idle gear shaft No. 2.

Torque: 60 N*m (612 kgf*cm, 44 ft.*lbf)

**39. INSTALL CHAIN SUB-ASSEMBLY**

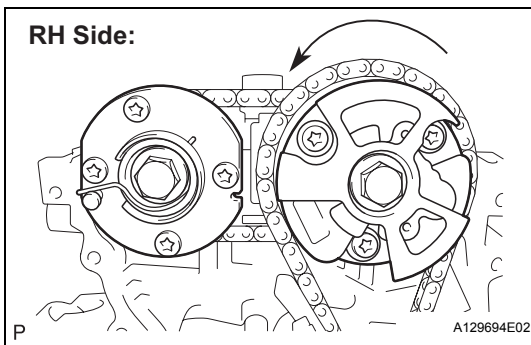
- (a) Align the mark plate and timing mark as shown in the illustration and temporarily install the chain.

NOTICE:

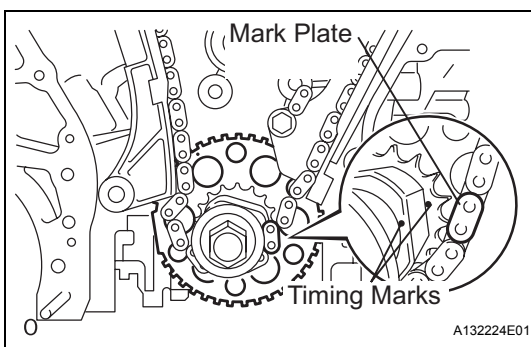
Do not pass the chain over the crankshaft yet.

HINT:

The chain mark plate is orange.



- (b) Turn the camshaft timing gear assembly on the RH bank counterclockwise to tighten the chain between banks.

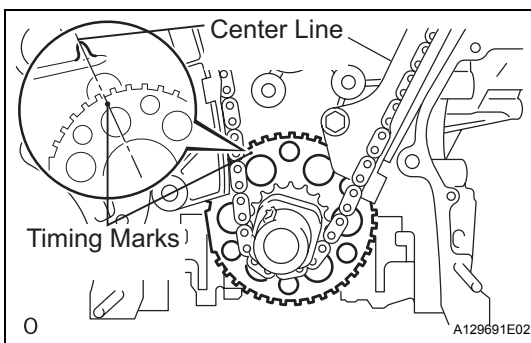


- (c) Align the mark plate and timing mark as shown in the illustration and install the chain onto the crankshaft timing gear.

HINT:

The chain mark plate is yellow.

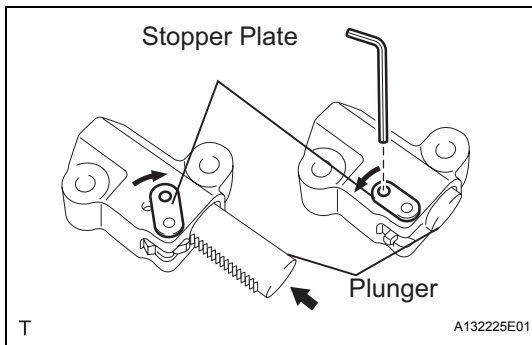
- (d) Temporarily tighten the pulley set bolt.



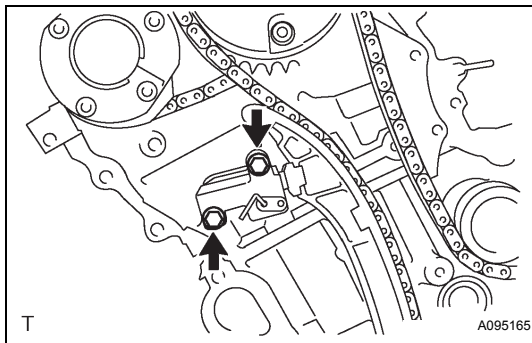
- (e) Turn the crankshaft clockwise to set it to the RH block bore center line (TDC / compression).

40. INSTALL CHAIN TENSIONER SLIPPER

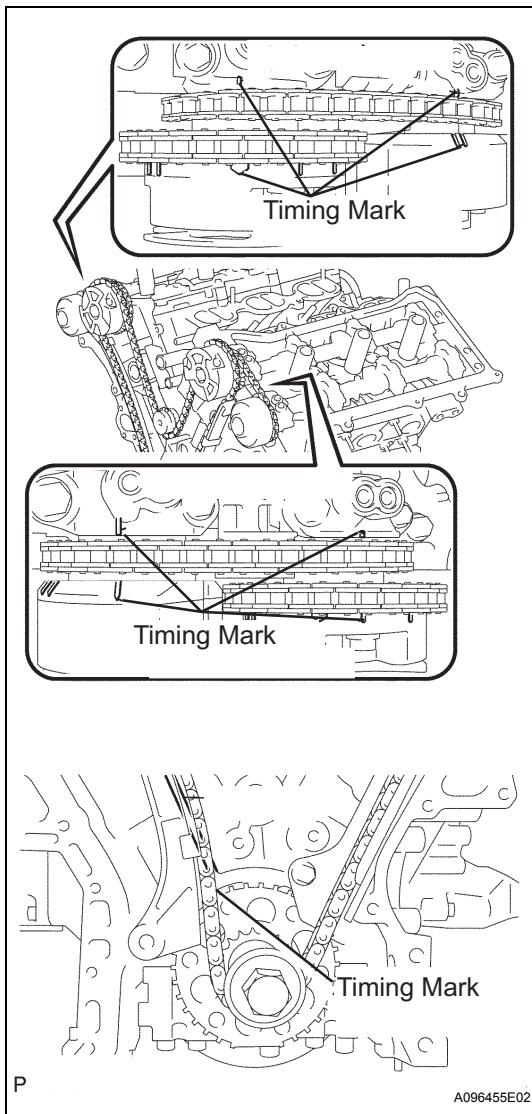
- (a) Install the chain tensioner slipper.

**41. INSTALL CHAIN TENSIONER ASSEMBLY NO.1**

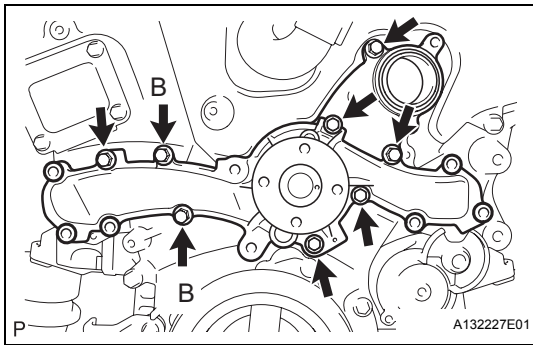
- (a) Move the stopper plate upward to release the lock, and push the plunger deep into the tensioner.
- (b) Move the stopper plate downward to set the lock, and insert a hexagon wrench into the hole of the stopper plate.



- (c) Install the chain tensioner No. 1 with the 2 bolts.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)



- (d) Remove the lock pin of the chain tensioner assembly No. 1. Check that each timing mark is aligned with the crankshaft at the TDC / compression.
- (e) Remove the pulley set bolt.

**42. INSTALL WATER PUMP ASSEMBLY**

- (a) Install a new gasket and the water pump with the 8 bolts.

Torque: 9.1 N*m (93 kgf*cm, 81 in.*lbf)

NOTICE:

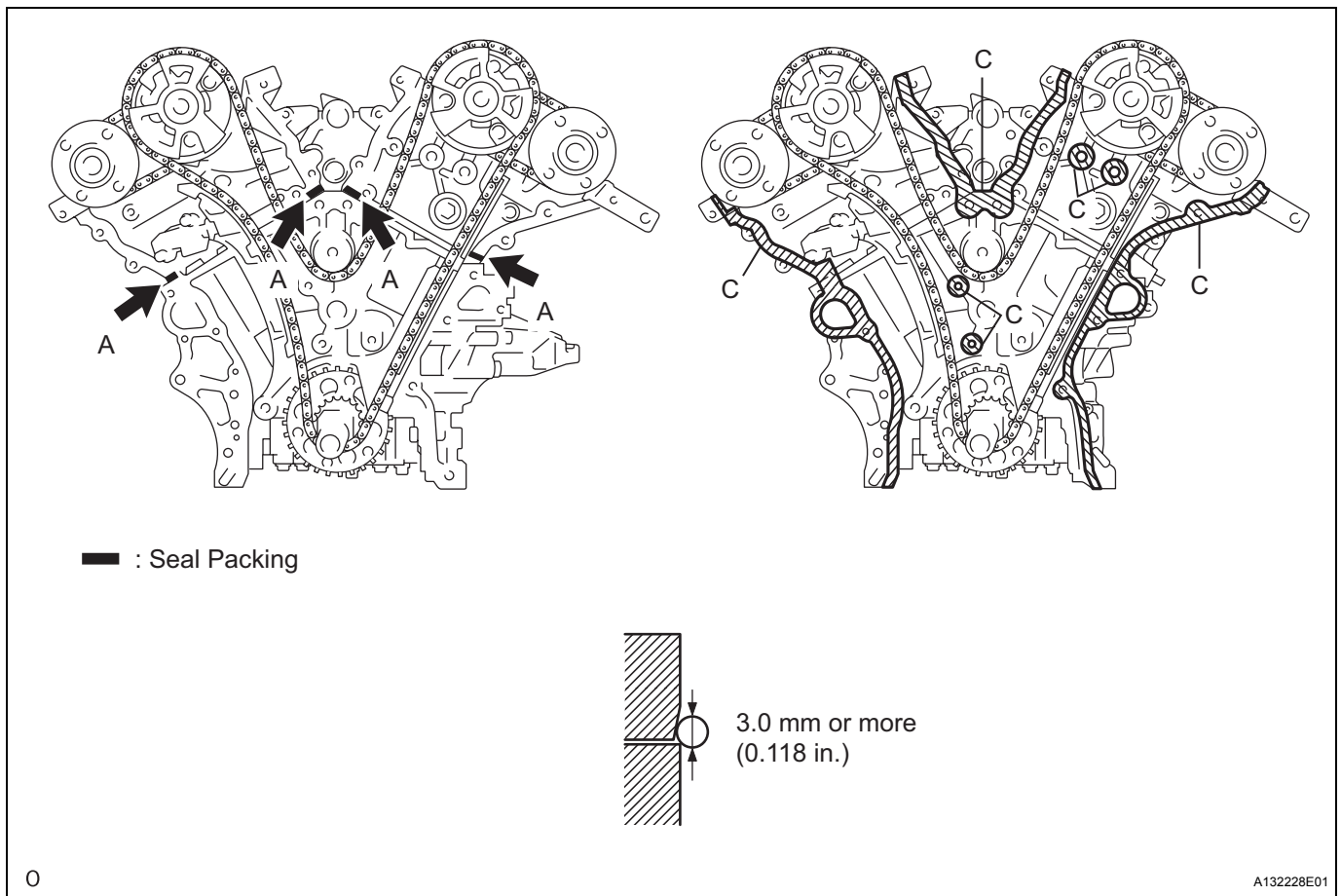
Be sure to replace the bolts indicated by B with new ones or reuse them after applying adhesive 1344.

43. INSTALL TIMING CHAIN COVER SUB-ASSEMBLY

- (a) Install a new gasket and the chain cover plate with the 4 bolts.

Torque: 9.1 N*m (93 kgf*cm, 81 in.*lbf)

- (b) Apply seal packing in a continuous bead to the engine unit as shown in the following illustration.

**Seal packing:**

Part No. 08826-00080 or equivalent

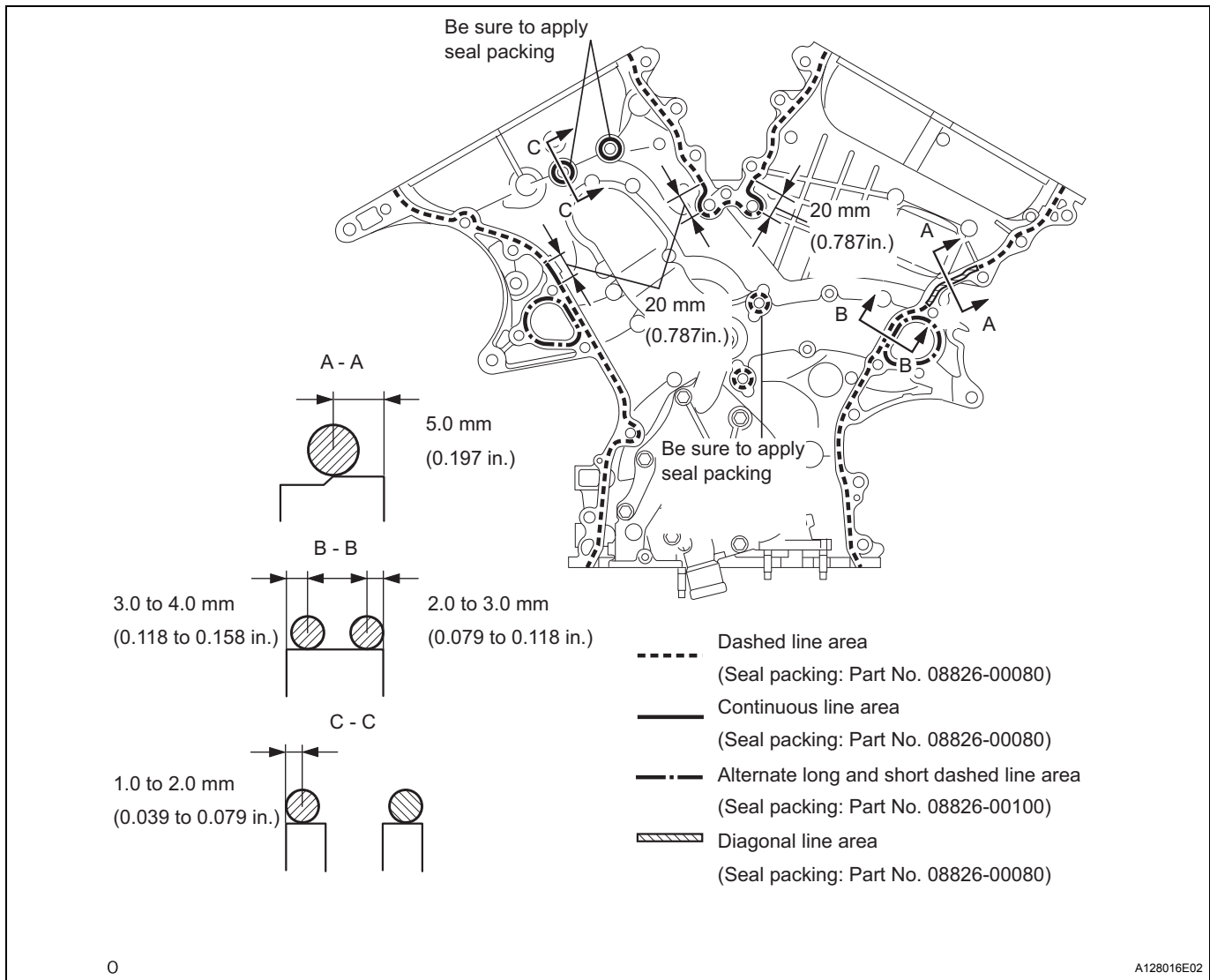
Seal width:

3.0 mm or more (0.118 in.)

NOTICE:

- **Be sure to clean and degrease the contact surfaces, especially the areas indicated by C in the illustration.**
- **When the contact surfaces are wet, degrease with cleaning agent and wipe off with an oil-free cloth before applying seal packing.**

- Install the crankcase within 3 minutes and tighten the bolts within 15 minutes after applying seal packing.
 - Do not start the engine for at least 2 hours after installation.
- (c) Apply seal packing in a continuous bead to the timing chain cover as shown in the following illustration.



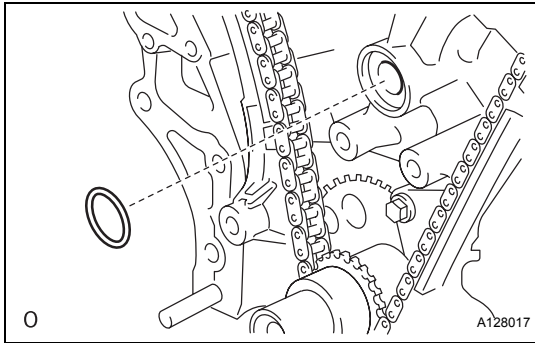
Seal packing:
08826-00080 or equivalent
08826-00100 or equivalent

NOTICE:

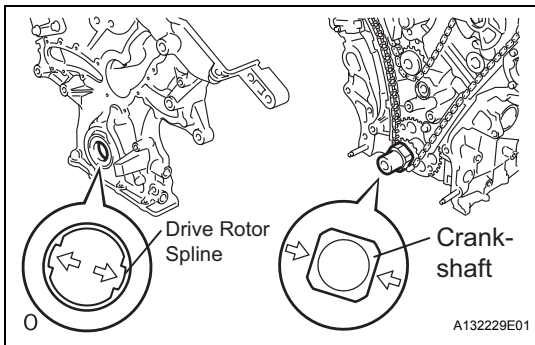
- When the contact surfaces are wet, degrease with cleaning agent and wipe off with an oil-free cloth before applying seal packing.
- Install the crankcase within 3 minutes and tighten the bolts within 15 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after installation.

HINT:
Apply seal packing referring to the table and illustration below.

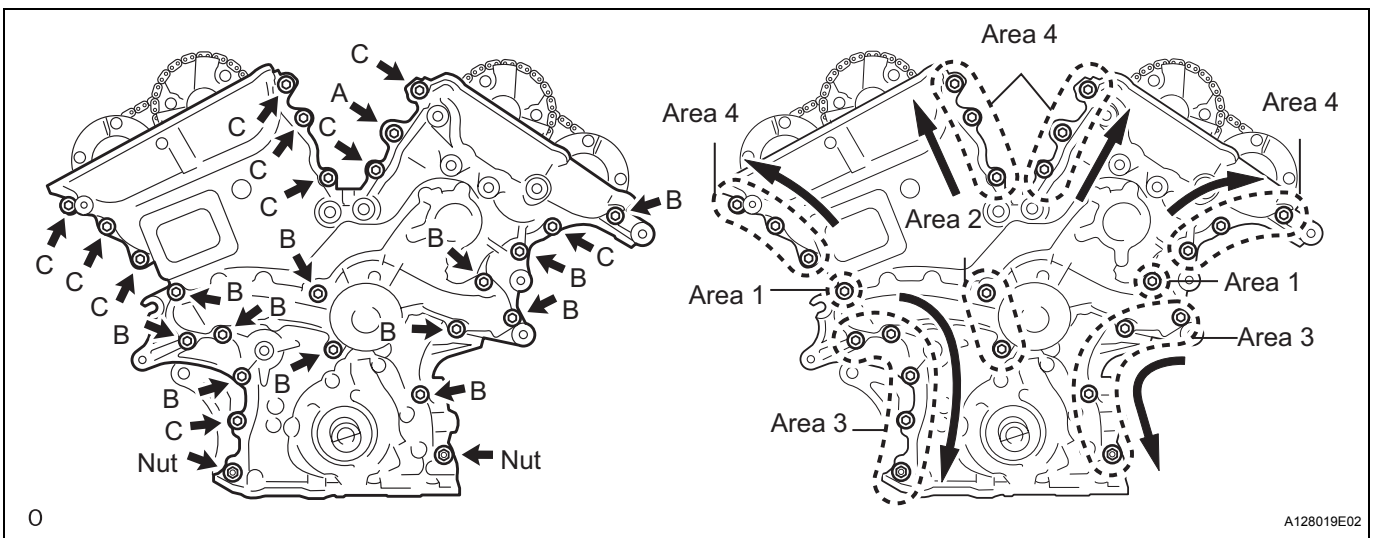
Area	Seal Packing Diameter	Application Position from Inside Seal Line
Dashed line area	3.5 mm or more (0.138 in.)	3.0 to 4.0 mm (0.118 to 0.158 in.)
Continuous line area	4.5 mm or more (0.177 in.)	3.0 to 4.0 mm (0.118 to 0.158 in.)
Alternate long and short dashed line area	3.5 mm or more (0.138 in.)	2.0 to 3.0 mm (0.079 to 0.118 in.)
Diagonal line area	6.0 mm or more (0.236 in.)	5.0 mm (0.197 in.)



(d) Install a new gasket.



- (e) Align the oil pump's drive rotor spline and the crankshaft as shown in the illustration. Install the spline and chain cover to the crankshaft.
- (f) Loosely install the timing chain cover with the 23 bolts and 2 nuts, but do not tighten the bolts and 2 nuts yet.



NOTICE:
Make sure that there is no oil on the bolt threads.

HINT:
Bolt length

Item	Length
Bolt A	40 mm (1.57 in.)

Item	Length
Bolt B	55 mm (2.17 in.)
Bolt C	25 mm (0.98 in.)

- (g) Fully tighten the bolts in this order: Area 1 and Area 2.

Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

- (h) Fully tighten the bolts and nuts in this order: Area 3.

Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

- (i) Fully tighten the bolts in this order: Area 4.

Torque: Bolt A

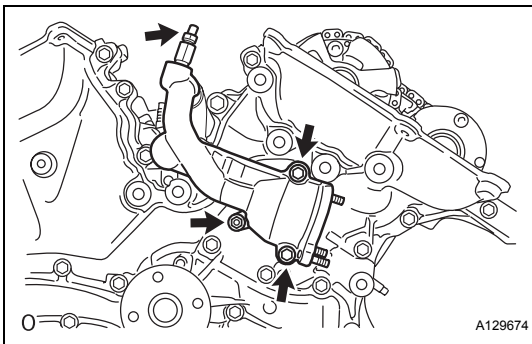
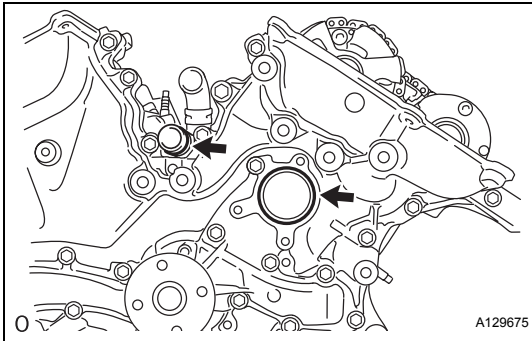
43 N*m (438 kgf*cm, 32 ft.*lbf)

Bolts except A

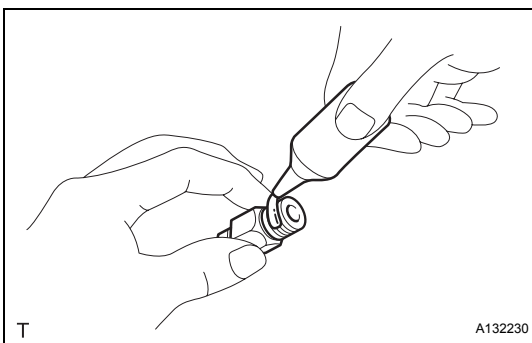
21 N*m (214 kgf*cm, 15 ft.*lbf)

44. INSTALL WATER INLET HOUSING

- (a) Install 2 new O-rings.
 (b) Apply soapy water to the O-ring.



- (c) Install the water inlet with the 2 bolts and nut.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

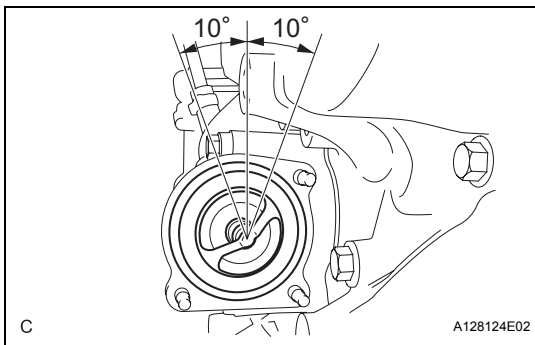


- (d) Apply adhesive around the drain cock.

Adhesive:

Part No. 08833-00070, THREE BOND 1324 or equivalent.

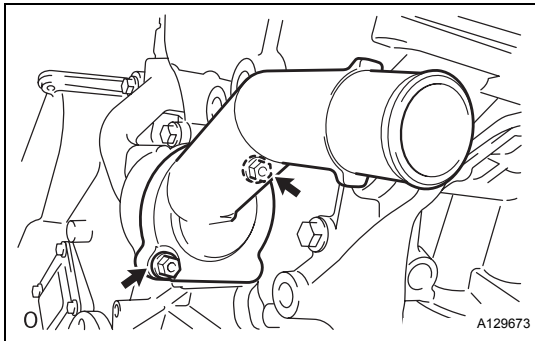
- (e) Install the water drain cock to the water inlet housing.
Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)
- (f) Install the water drain cock plug to the water drain cock.
Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)
- (g) Install a new gasket to the thermostat.



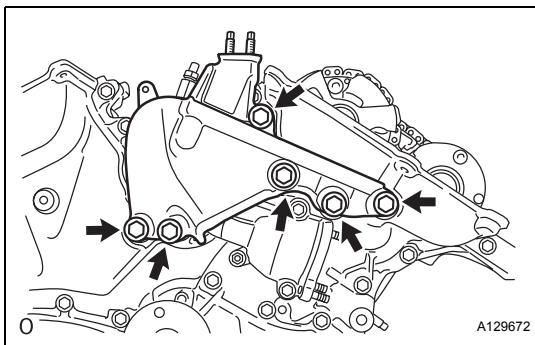
- (h) Align the thermostat jiggle valve with the upper stud bolt, and insert the thermostat in the water inlet housing.

HINT:

The jiggle valve may be set within 10° of either side of the prescribed position.



- (i) Install the water inlet with the 2 nuts.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)



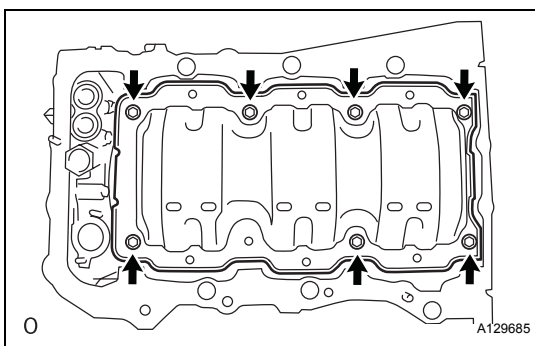
45. INSTALL ENGINE MOUNTING BRACKET FRONT NO.1 LH

- (a) Install the engine mounting bracket front No. 1 LH with the 6 bolts.

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

NOTICE:

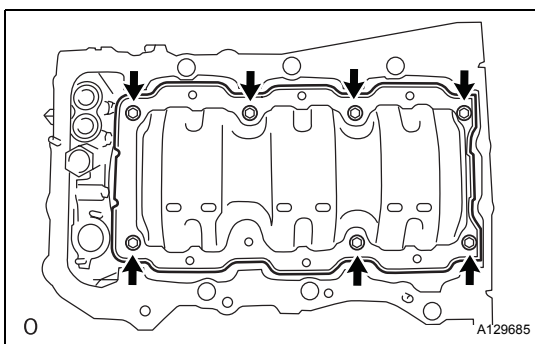
- Install the water inlet and mounting bracket within 15 minutes after installing the chain cover.
- Do not start the engine for at least 2 hours after installation.



46. INSTALL OIL PAN BAFFLE PLATE

- (a) Install the oil pan baffle plate with the 7 bolts.

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

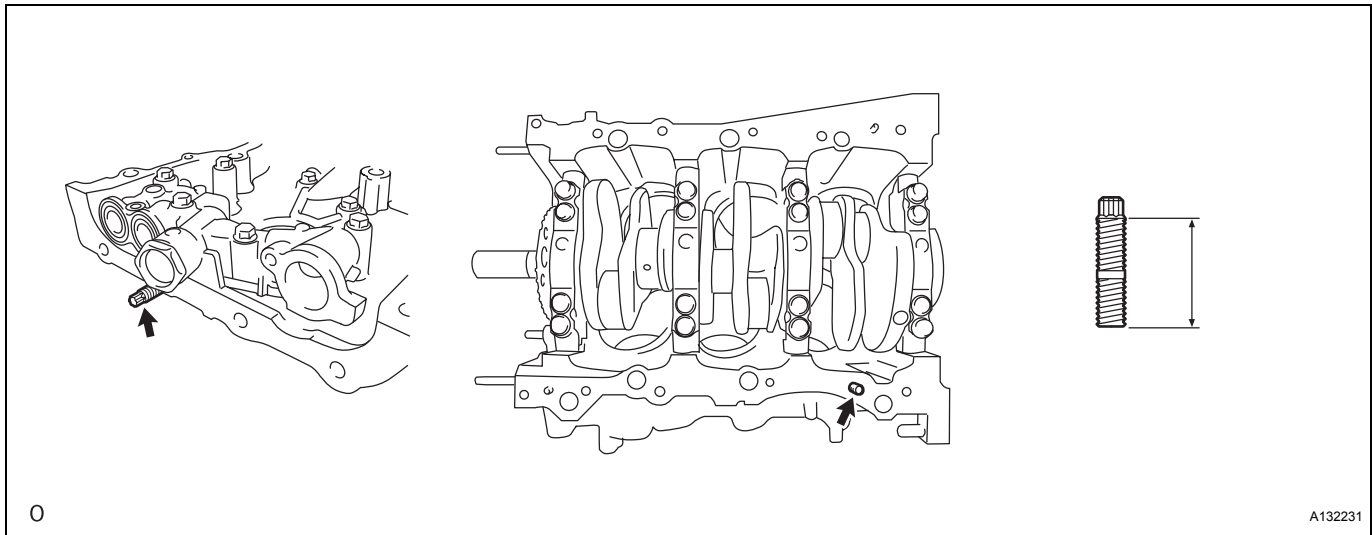


47. INSTALL OIL PAN SUB-ASSEMBLY

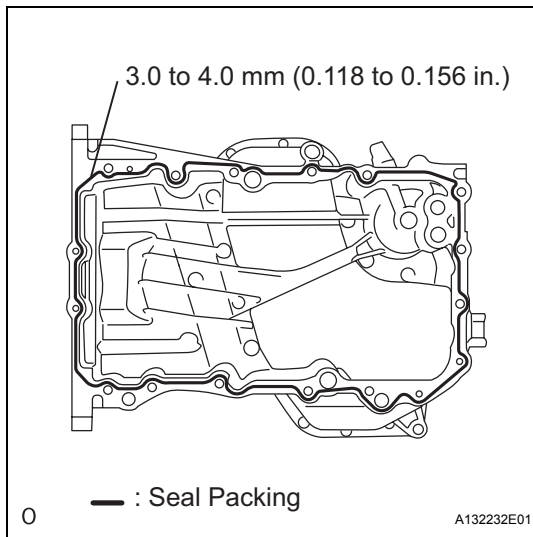
- (a) Install the stud bolt.

- (1) Using an E8 "torx" socket wrench, install the stud bolts as shown in the illustration.

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



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- (b) Apply seal packing in a continuous bead as shown in the illustration.

Seal packing:

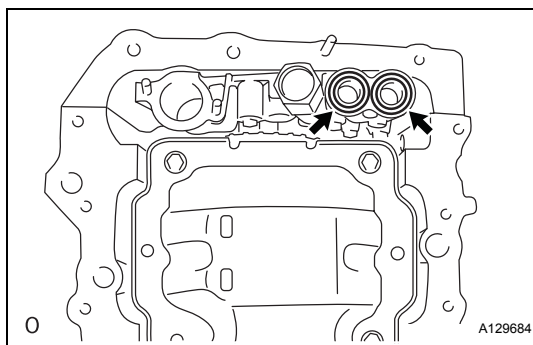
Part No. 08826-00080 or equivalent

Seal diameter:

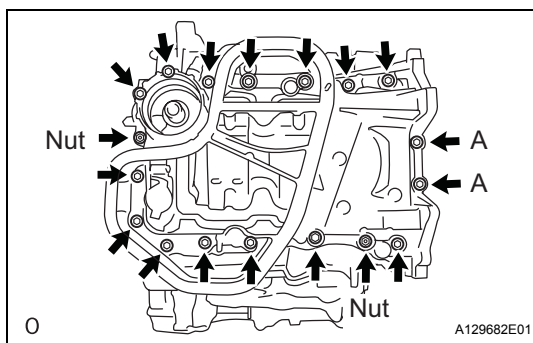
3.0 to 4.0 mm (0.118 to 0.156 in.)

NOTICE:

- Remove any oil from the contact surface.
- Install the crankcase within 3 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after installation.



- (c) Install 2 new O-rings.



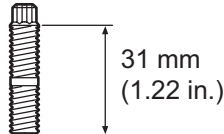
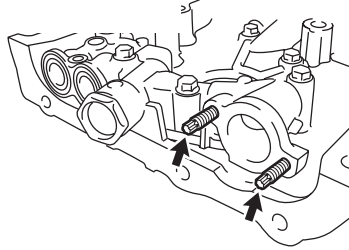
- (d) Install the oil pan with the 16 bolts and 2 nuts.

Torque: Bolt A

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

Bolts except A

21 N*m (214 kgf*cm, 15 ft.*lbf)

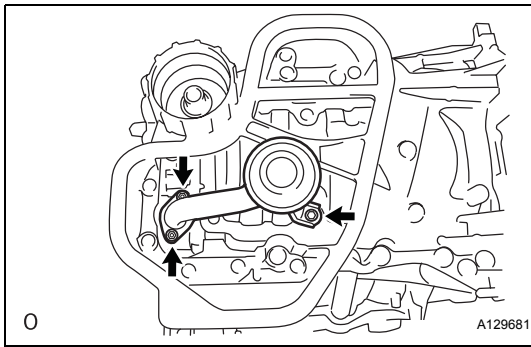
Timing Chain Cover:

0

A132233E01

48. INSTALL OIL STRAINER SUB-ASSEMBLY

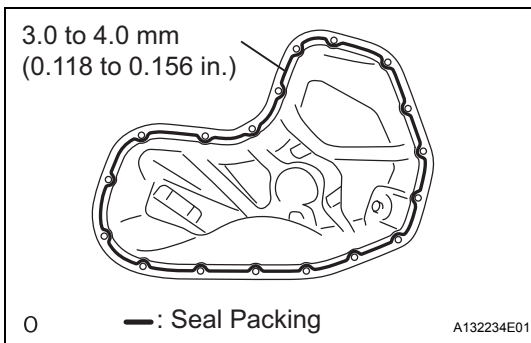
- (a) Install the stud bolt.
 (1) Using an E6 "torx" socket wrench, install the stud bolts as shown in the illustration.
Torque: 4.0 N*m (41 kgf*cm, 35 in.*lbf)



0

A129681

- (b) Install a new gasket and the oil strainer with the bolt and 2 nuts.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)



0

—: Seal Packing

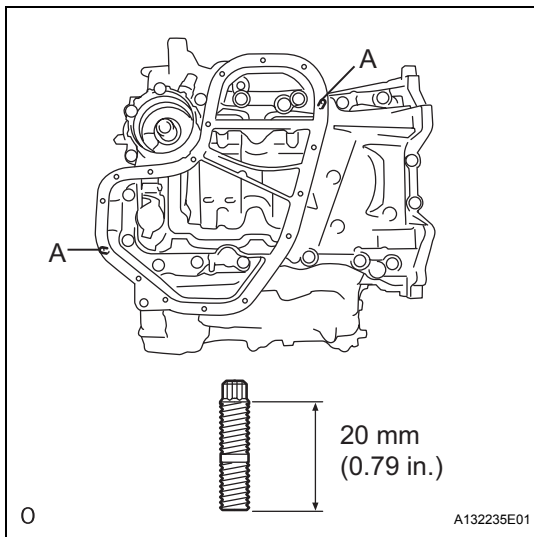
A132234E01

49. INSTALL OIL PAN SUB-ASSEMBLY NO.2

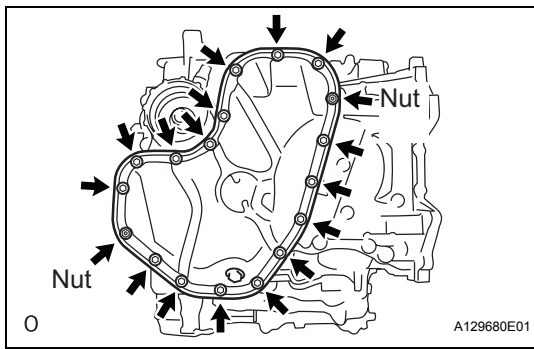
- (a) Apply seal packing in a continuous bead as shown in the illustration.

Seal packing:**Part No. 08826-00080 or equivalent****Seal diameter:****3.0 to 4.0 mm (0.118 to 0.156 in.)****NOTICE:**

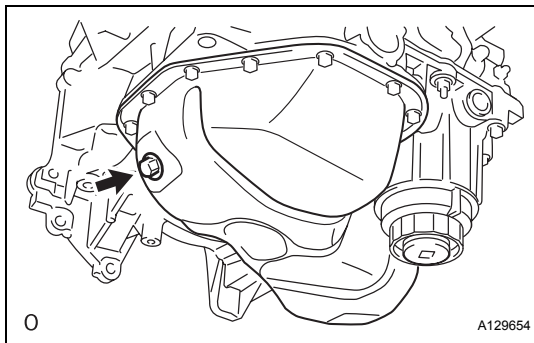
- Remove any oil from the contact surface.
- Install the crankcase within 3 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after installation.



- (b) Install the stud bolt.
 (1) Using an E6 "torx" socket wrench, install the stud bolts as shown in the illustration.
Torque: 4.0 N*m (41 kgf*cm, 35 in.*lbf)

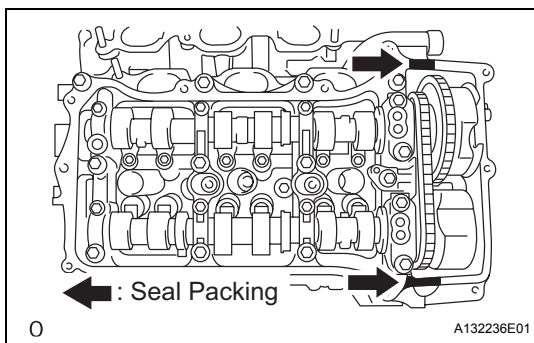


- (c) Install the oil pan No. 2 with the 16 bolts and 2 nuts.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)



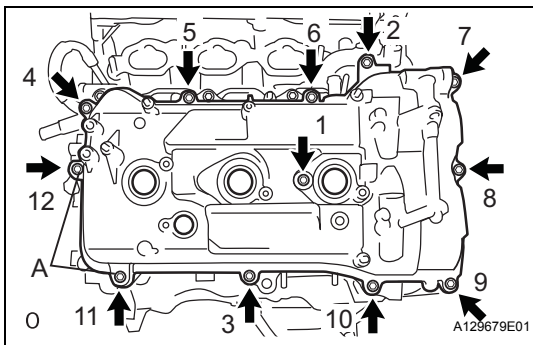
50. INSTALL OIL PAN DRAIN PLUG

- (a) Install a new gasket and the drain plug.
Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)



51. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY

- (a) Apply seal packing as shown in the illustration.
Seal packing:
 08826-00080 or equivalent
NOTICE:
- Remove any oil from the contact surface.
 - Install the crankcase within 3 minutes after applying seal packing.
 - Do not start the engine for at least 2 hours after installation.
- (b) Install the gasket to the head cover.



- (c) Install the head cover with the 12 bolts.

Torque: Bolt A

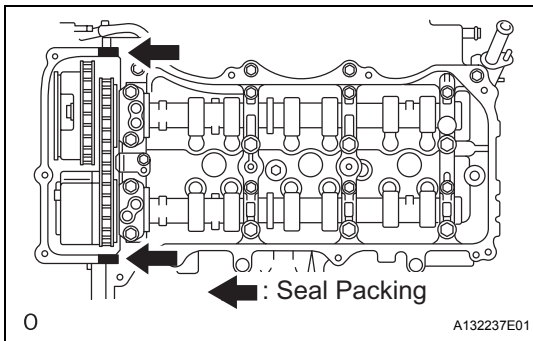
21 N*m (214 kgf*cm, 15 ft.*lbf)

Bolts except A

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

HINT:

Make sure the tightening torque of bolts 1.



52. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY LH

- (a) Apply seal packing as shown in the illustration.

Seal packing:

08826-00080 or equivalent

NOTICE:

- Remove any oil from the contact surface.
- Install the crankcase within 3 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after installation.

- (b) Install the gasket to the head cover.

- (c) Install the head cover with the 14 bolts.

Torque: Bolt A

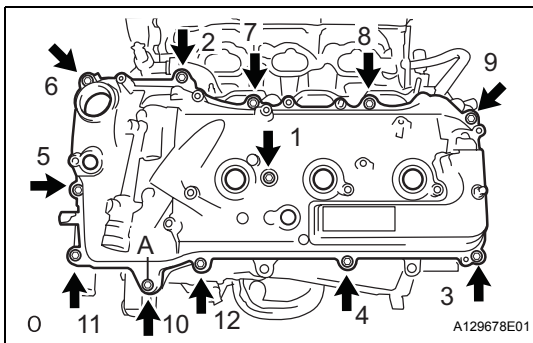
21 N*m (214 kgf*cm, 15 ft.*lbf)

Bolts except A

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

HINT:

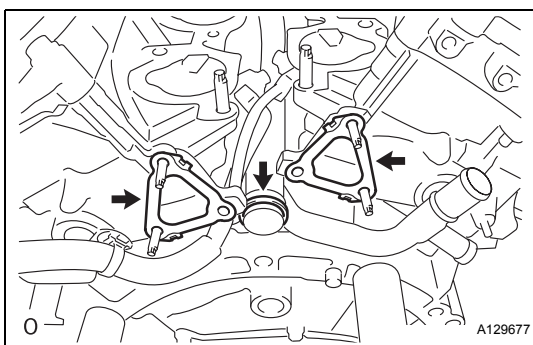
Make sure the tightening torque of bolts 1 and 10.

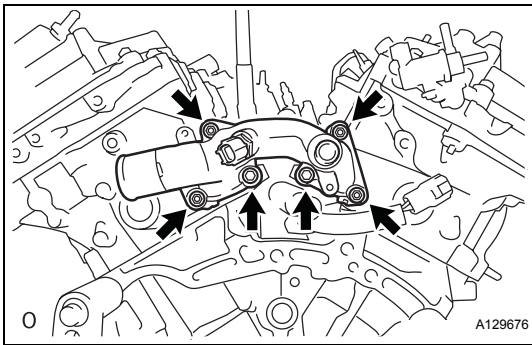


53. INSTALL WATER OUTLET

- (a) Install 2 new gaskets and a new O-ring.

- (b) Apply soapy water to the O-ring.





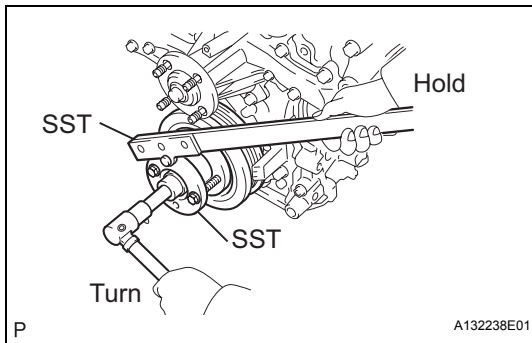
- (c) Install the water outlet with the 2 bolts and 4 nuts.

Torque: Bolts

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

Nuts

10 N*m (102 kgf*cm, 8 ft.*lbf)



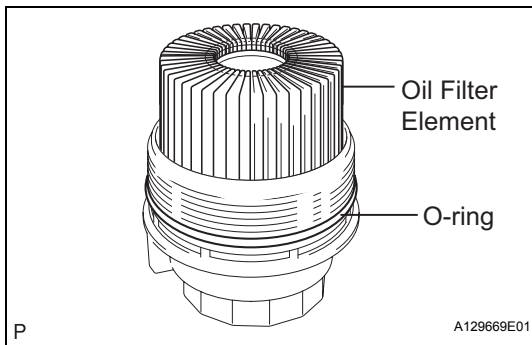
54. INSTALL CRANKSHAFT PULLEY

- (a) Align the pulley set key with the key groove of the pulley, and slide on the pulley.

- (b) Using SST, install the pulley bolt.

SST 09213-70011 (09213-70020), 09330-00021

Torque: 250 N*m (2,550 kgf*cm, 184 ft.*lbf)



55. INSTALL OIL FILTER ELEMENT

- (a) Clean the inside of the oil filter cap, the threads and O-ring groove.

- (b) Apply a small amount of engine oil to a new O-ring and install it to the oil filter cap.

- (c) Set a new oil filter element to the oil filter cap.

- (d) Remove dirt or foreign matter from the installation surface and inside of the engine.

- (e) Apply a small amount of engine oil to the O-ring again and install the oil filter cap.

NOTICE:

- Be careful that the O-ring does not get caught between the parts.
- The O-ring must not be twisted on the groove.

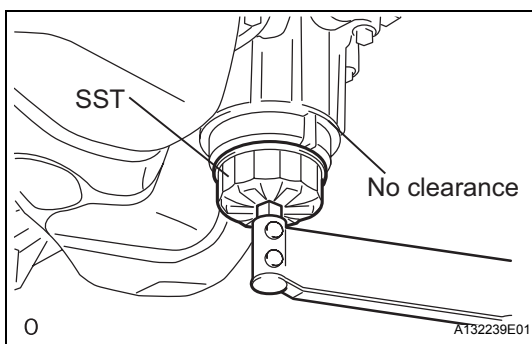
- (f) Using SST, install the oil filter cap.

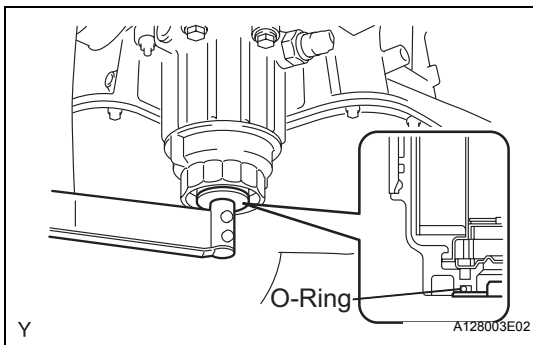
SST 09228-06501

Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)

NOTICE:

Make sure that the oil filter is installed securely as shown in the illustration.





- (g) Apply a light coat of engine oil to a new O-ring and install it to the oil filter cap.

NOTICE:

Remove all dirt and foreign matter from the installation surface.

- (h) Install the oil filter drain plug to the oil filter cap.

Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)

NOTICE:

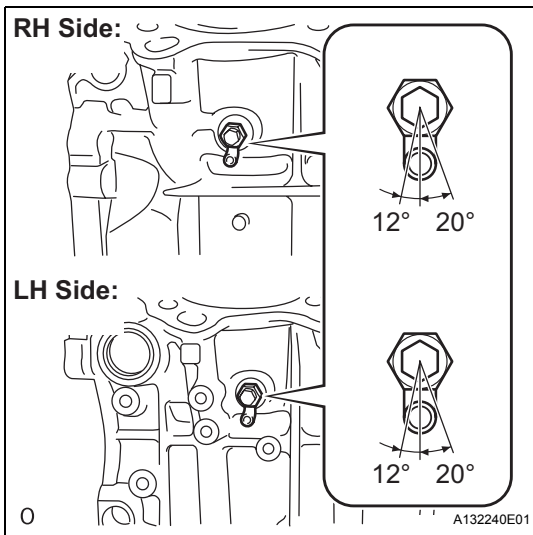
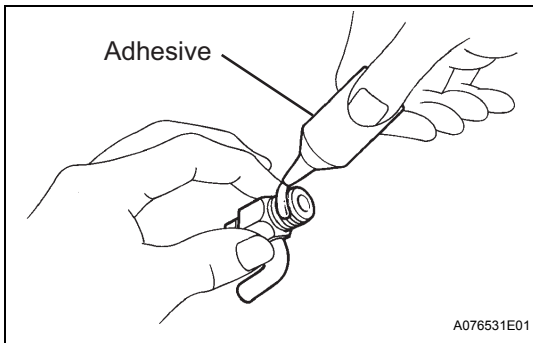
Make sure that the O-ring does not get caught between the parts.

56. INSTALL CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY

- (a) Apply adhesive around the drain cocks.

Adhesive:

Part No. 08833-00070, THREE BOND 1324 or equivalent



- (b) Install the cylinder block water drain cocks as shown in the illustration.

Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)

NOTICE:

- **Do not rotate the drain cocks more than 1 revolution (360°) after tightening the drain cocks with the specified torque.**
- **Do not loosen the drain cocks after setting correctly.**

- (c) Install the water drain cock plug to the water drain cocks.

Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)

57. INSTALL OIL PIPE NO.1

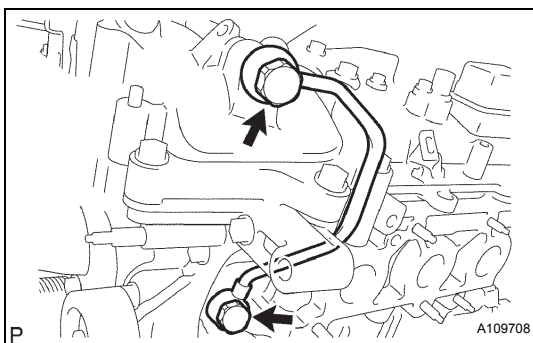
- (a) Make sure that there is no foreign matter on the mesh of the oil control valve filter LH.
- (b) Install the oil control valve filter LH to the oil pipe union. Install 2 new gaskets and temporarily install oil pipe No. 1 (on the head cover side) with the oil pipe union.
- (c) Install a new gasket and temporarily install oil pipe No. 1 (on the cylinder head side) with the oil pipe union.

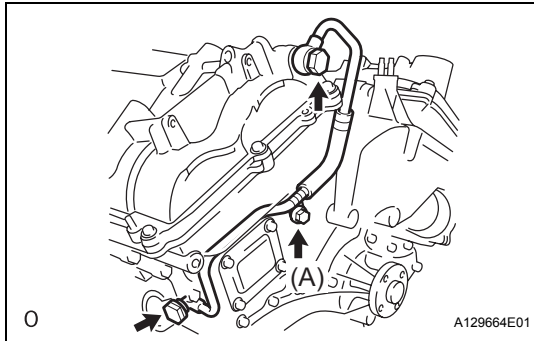
NOTICE:

Remove any oil from the contact surface.

- (d) Tighten the oil pipe union (on the head cover side).

Torque: 57 N*m (581 kgf*cm, 42 ft.*lbf)





- (e) Tighten the oil check valve bolt (on the cylinder head side).

Torque: 57 N*m (581 kgf*cm, 42 ft.*lbf)

58. INSTALL OIL PIPE

- (a) Make sure that there is no foreign matter on the mesh of the oil control valve filter RH.
 (b) Install the oil control valve filter RH to the oil pipe union. Install 2 new gaskets and temporarily install oil pipe (on the head cover side) with the oil pipe union.

NOTICE:

Remove any oil from the contact surface.

- (c) Install a new gasket and temporarily install oil pipe (on the cylinder head side) with the oil pipe union.

NOTICE:

Remove any oil from the contact surface.

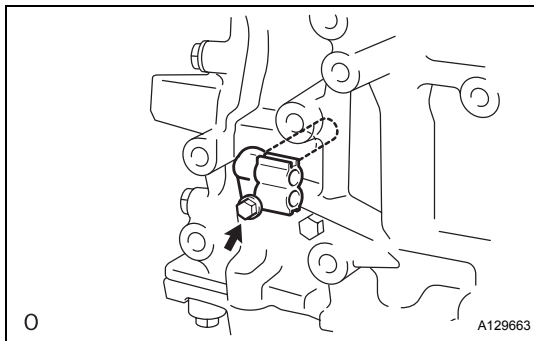
- (d) Install the bolt (A) to the cylinder head.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)
 (e) Tighten the oil pipe union (on the head cover side).
Torque: 57 N*m (581 kgf*cm, 42 ft.*lbf)
 (f) Tighten the oil pipe union (on the cylinder head side).

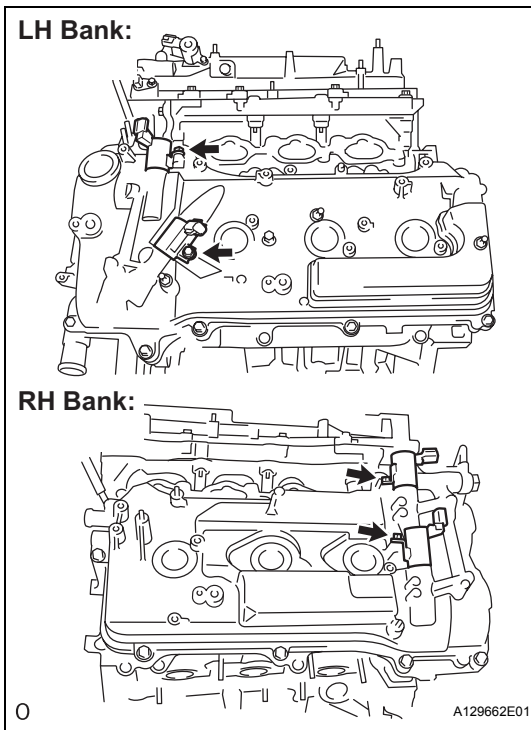
Torque: 57 N*m (581 kgf*cm, 42 ft.*lbf)

59. INSTALL CRANK POSITION SENSOR

- (a) Install the crankshaft position sensor with the bolt.

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

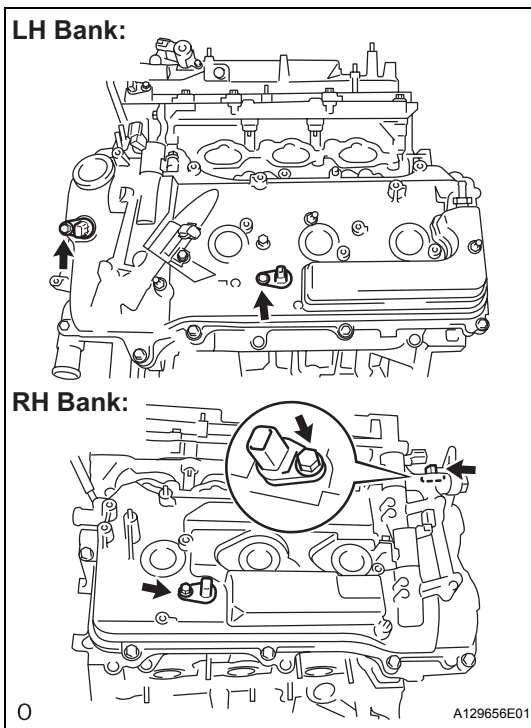




60. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

- (a) Install the 4 camshaft timing oil control valves with the 4 bolts.

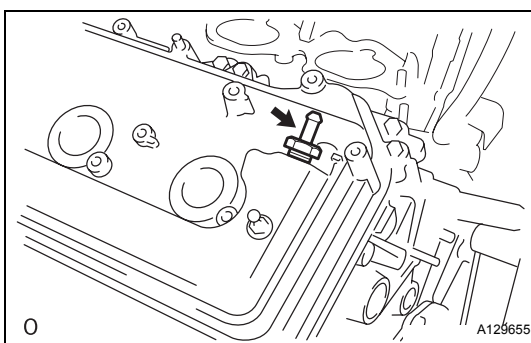
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)



61. INSTALL CAMSHAFT POSITION SENSOR

- (a) Install the 4 camshaft position sensors with the 4 bolts.

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



62. INSTALL VENTILATION VALVE SUB-ASSEMBLY

- (a) Apply adhesive around the ventilation valve.

Adhesive:

Part No. 08833-00070, THREE BOND 1324 or equivalent

- (b) Install the ventilation valve sub-assembly.

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

63. INSTALL SPARK PLUG

- (a) Install the 6 spark plugs.

Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)

64. INSTALL OIL FILTER CAP SUB-ASSEMBLY

- (a) Install the oil filter cap sub-assembly.