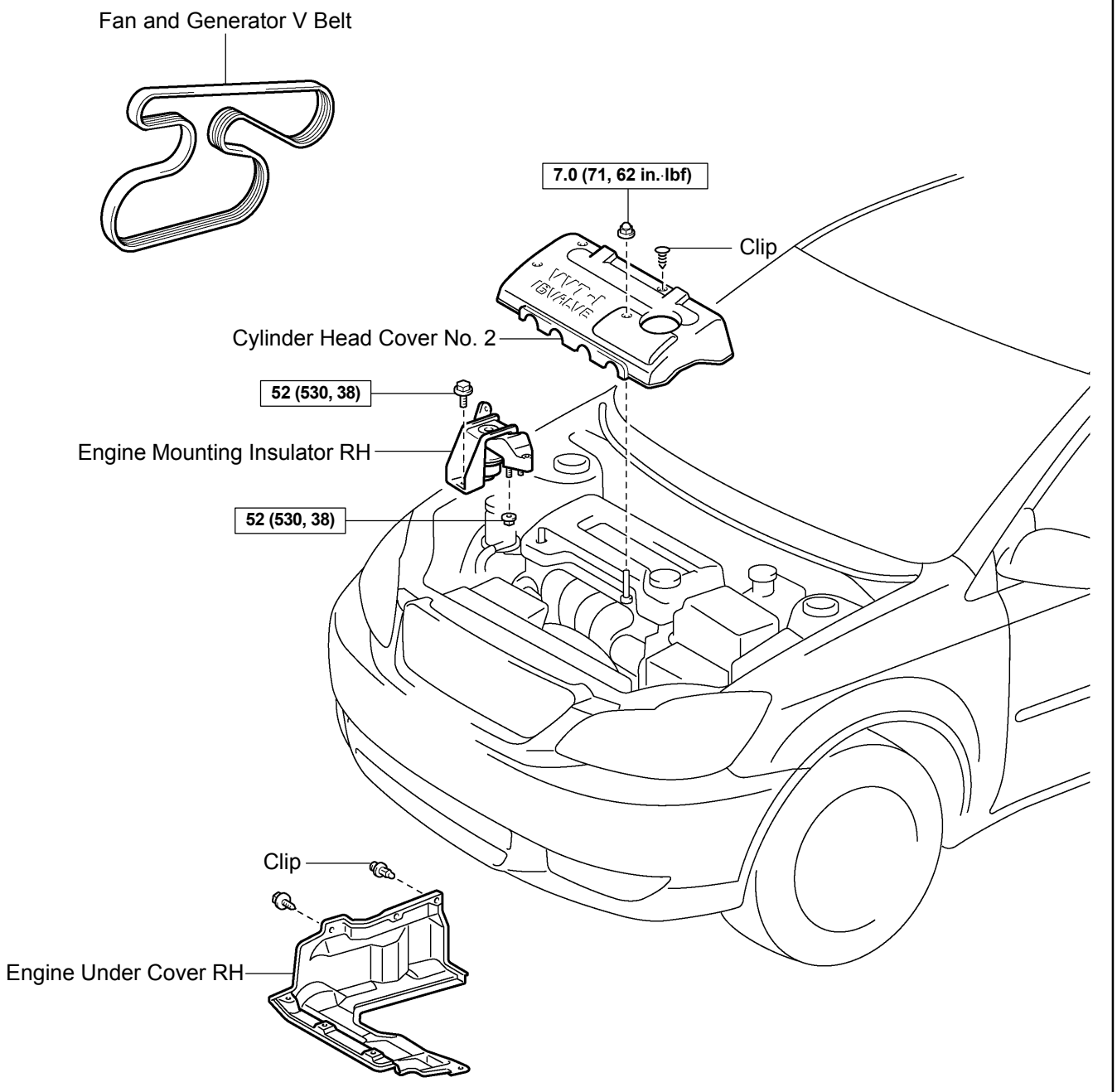
CAMSHAFT

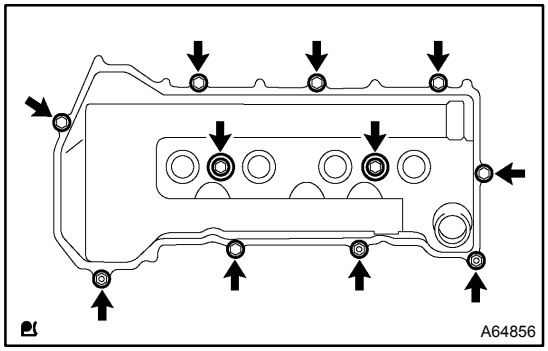
COMPONENTS

140OI–01



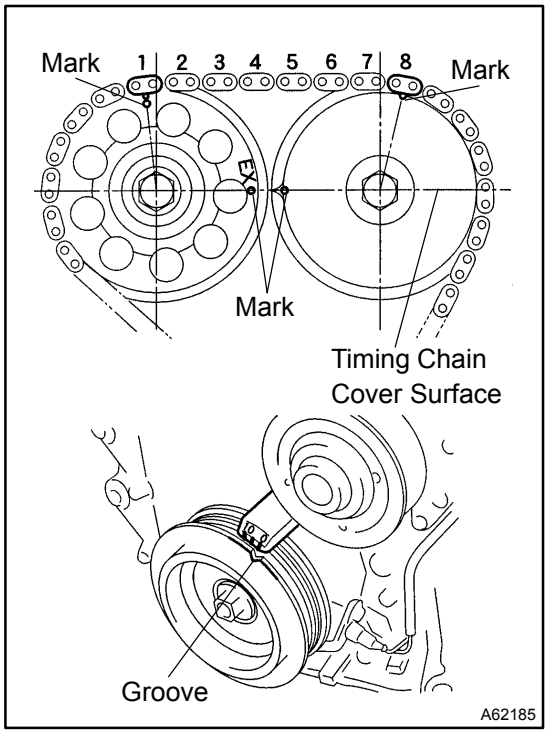
o N·m (kgf·cm, ft·lbf): Specified torque

A64044



9. REMOVE CYLINDER HEAD COVER SUB–ASSY

(a) Remove the 9 bolts, 2 seal washers, 2 nuts, 3 clamp brackets and cylinder head cover.



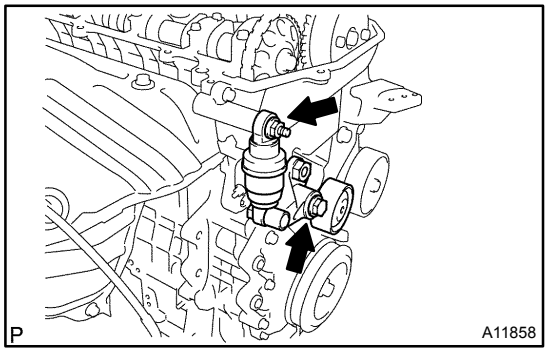
10. SET NO. 1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley, and align its groove with timing mark ”0” of the timing chain cover.

(b) Check that the point marks of the camshaft timing sprocket and VVT timing sprocket are in straight line on the timing chain cover surface as shown in the illustration.

HINT:

If not, turn the crankshaft 1 revolution (360°) and align the marks as above.

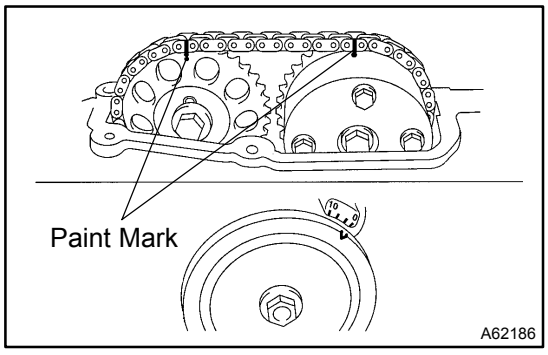


11. REMOVE V–RIBBED BELT TENSIONER ASSY

(a) Remove the bolt, nut and V–ribbed belt tensioner.

HINT:

Handle a jack up and down to remove the bolt.



12. REMOVE CAMSHAFT

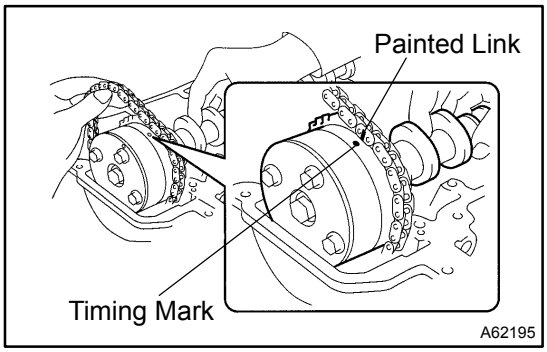
NOTICE:

Be sure not to revolve the crankshaft without the chain tensioner.

(a) Set the No. 1 cylinder to the TDC/compression.

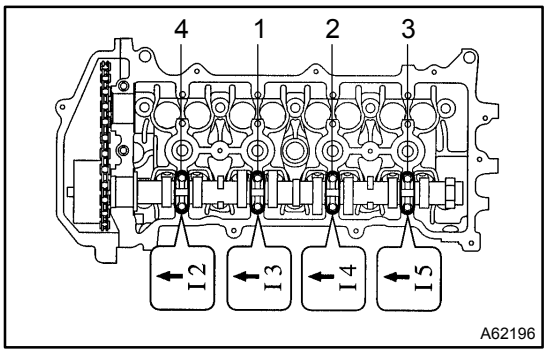
(b) Place match marks on the timing chain and camshaft timing sprockets.

(e) Check that the camshaft timing gear assembly can move to the retard angle side (the right angle), and is locked at the most retarded position.

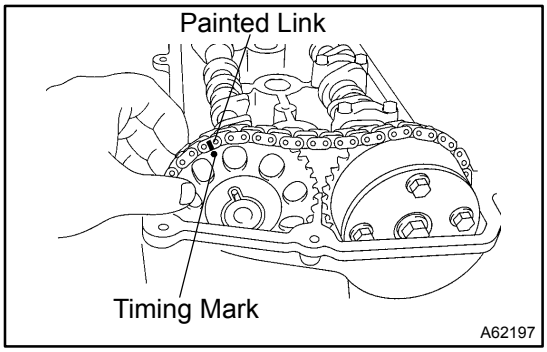


16. INSTALL CAMSHAFT

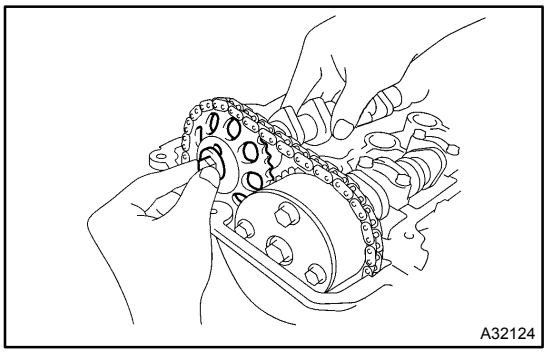
(a) As shown in the illustration, install the timing chain on the camshaft timing gear, with the painted links aligned with the timing marks on the camshaft timing gear.



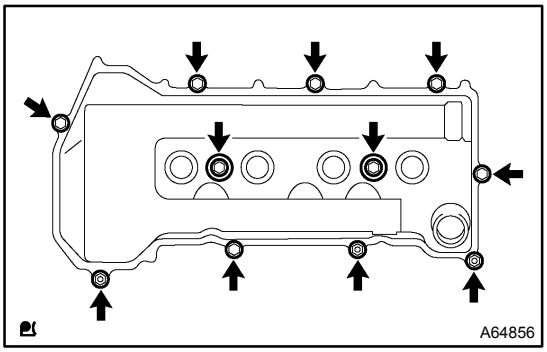
(b) Examine the front marks and numbers and tighten the bolts in the order shown in the illustration.
Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)



(c) Put the camshaft No.2 on the cylinder head with the painted links of the chain aligned with the timing mark on the camshaft timing gear.

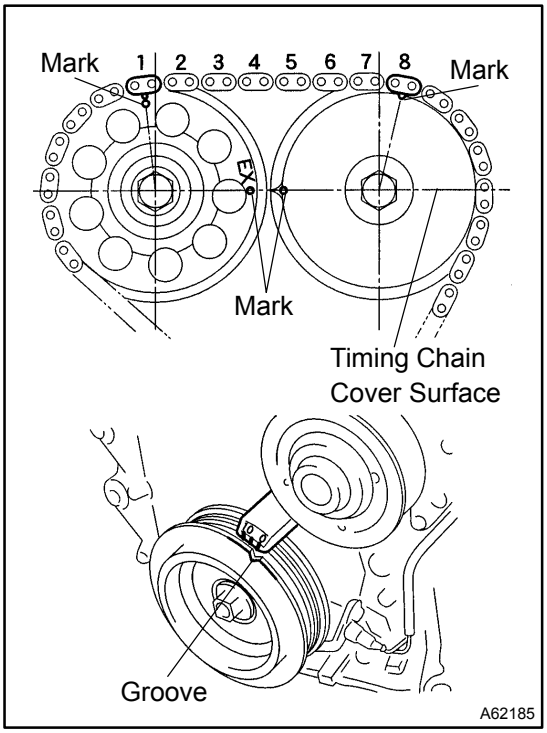


(d) Tighten the camshaft timing gear set bolt temporarily.



13. REMOVE CYLINDER HEAD COVER SUB–ASSY

(a) Remove the 9 bolts, 2 seal washers, 2 nuts, 3 clamp brackets and cylinder head cover.



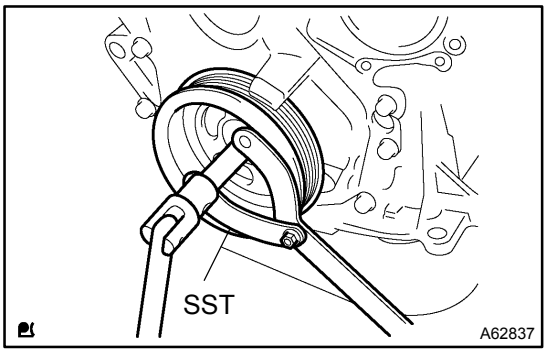
14. SET NO. 1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley, and align its groove with timing mark ”0” of the timing chain cover.

(b) Check that the point marks of the camshaft timing sprocket and VVT timing sprocket are in straight line on the timing chain cover surface as shown in the illustration.

HINT:

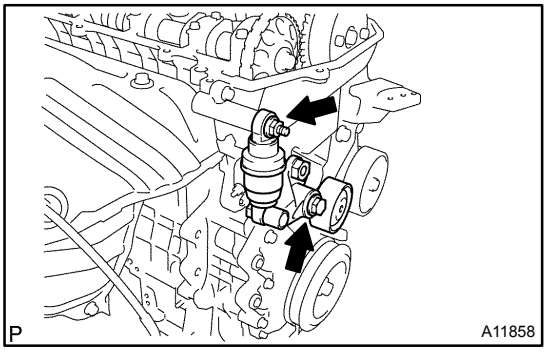
If not, turn the crankshaft 1 revolution (360°) and align the marks as above.



15. REMOVE CRANKSHAFT PULLEY

(a) Using SST, remove the pulley bolt.
SST 09960–10010 (09962–01000, 09963–01000)

(b) Remove the crankshaft pulley from the crankshaft.

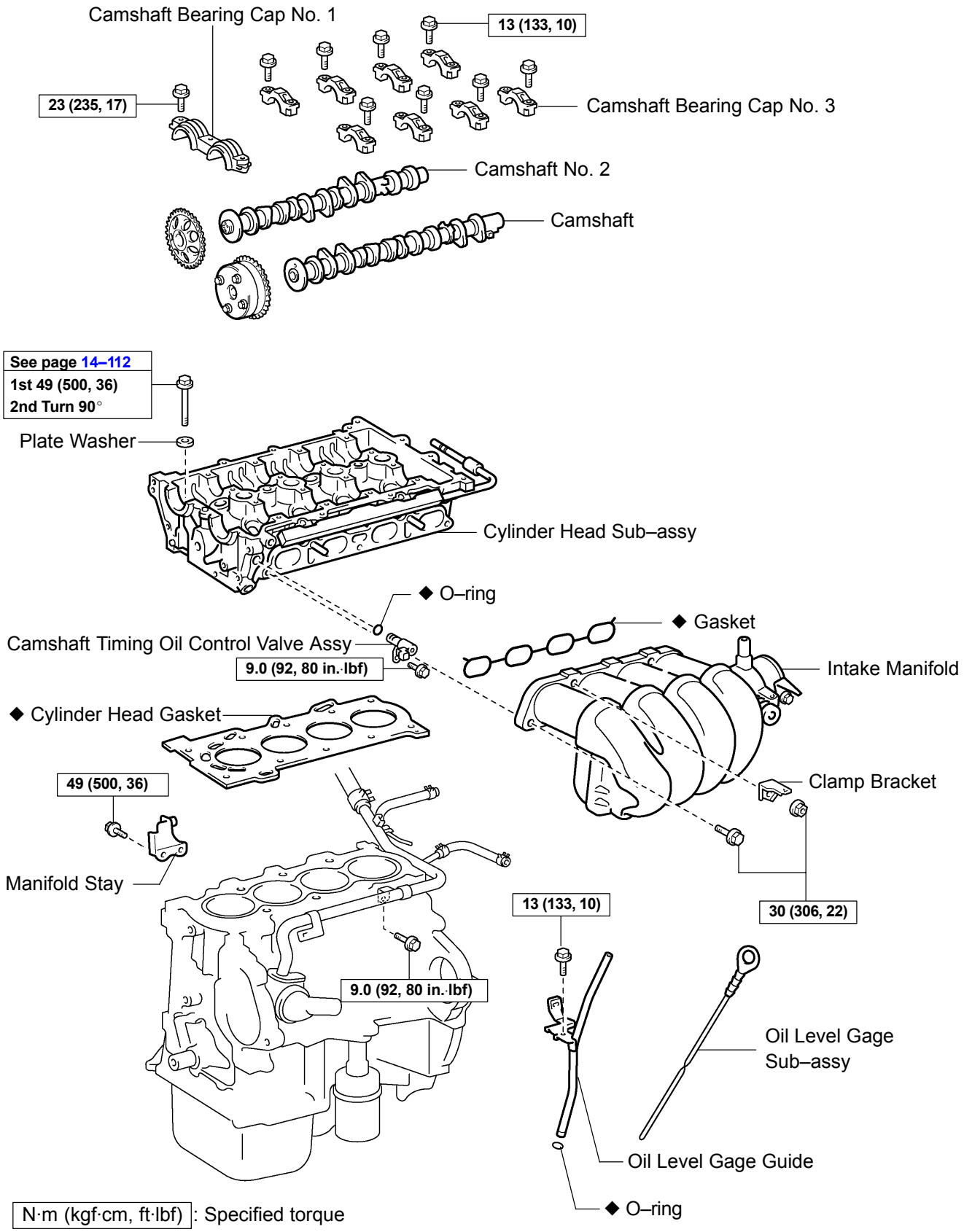


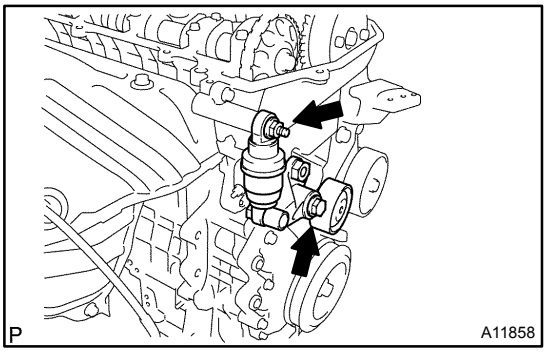
16. REMOVE V–RIBBED BELT TENSIONER ASSY

(a) Remove the bolt, nut and V–ribbed belt tensioner.

HINT:

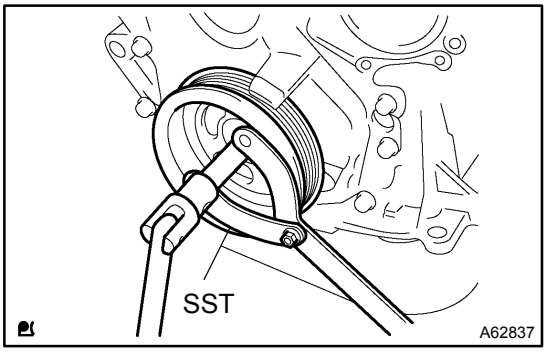
Handle a jack up and down to remove the bolt.





66. INSTALL V–RIBBED BELT TENSIONER ASSY

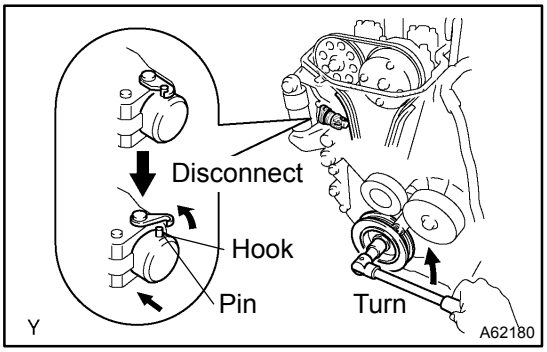
(a) Install the V–ribbed belt tensioner with the nut and bolt.
Torque:
Nut 29 N·m (296 kgf·cm, 21 ft·lbf)
Bolt 69 N·m (704 kgf·cm, 51 ft·lbf)



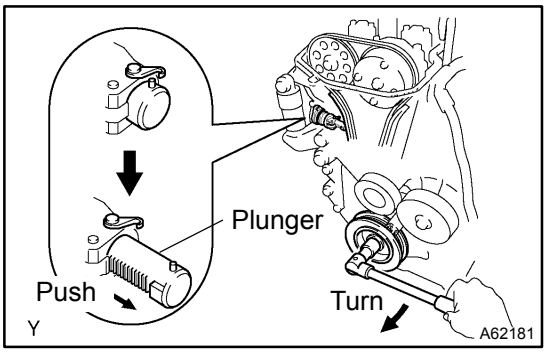
67. INSTALL CRANKSHAFT PULLEY

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

(b) Using SST, install the crankshaft pulley bolt.
SST 09960–10010 (09962–01000, 09963–01000)
Torque: 138 N·m (1,407 kgf·cm, 102 ft·lbf)

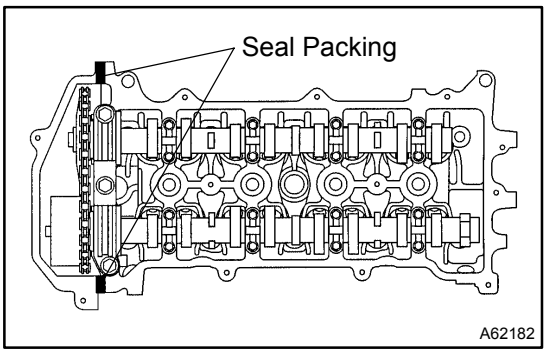


(c) Turn the crankshaft counter clockwise, and disconnect the plunger knock pin form the hook.



(d) Turn the crankshaft clockwise, and check that the slipper is pushed by the plunger.

HINT:
If the plunger does not spring out, press the slipper into the chain tensioner with a screwdriver so that the hook is released from the knock pin and the plunger springs out.



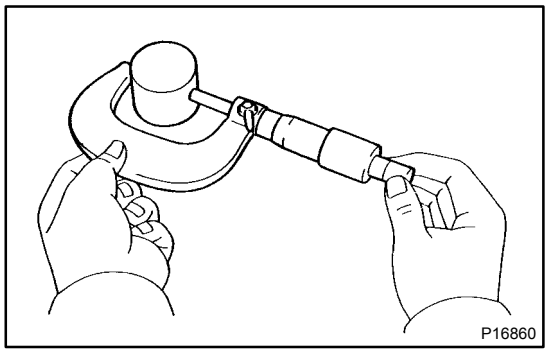
68. INSTALL CYLINDER HEAD COVER SUB–ASSY

(a) Remove any old pacing (FIPG) material.

(b) Apply seal packing to 2 locations as shown in the illustration.
Seal packing: Part No. 08826–00080 or equivalent

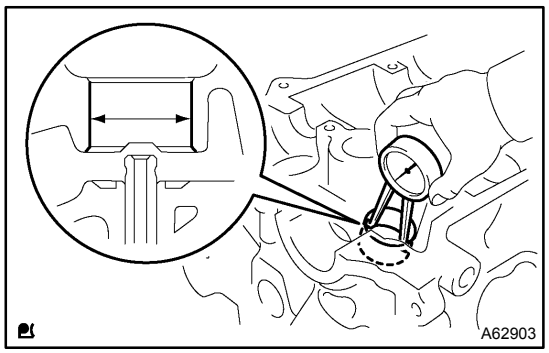
NOTICE:

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



13. INSPECT VALVE LIFTER

(a) Using a micrometer, measure the valve lifter diameter.
Lifter diameter:
30.966 – 30.976 mm (1.2191 – 1.2195 in.)

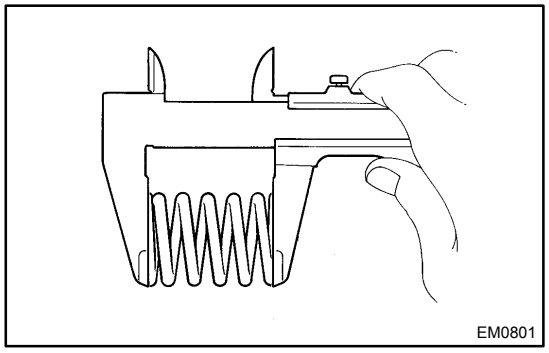


14. INSPECT VALVE LIFTER OIL CLEARANCE

(a) Using a caliper gauge, measure the valve lifter bore diameter of the cylinder head.
Lifter bore diameter:
31.000 – 31.025 mm (1.2205 – 1.2215 in.)

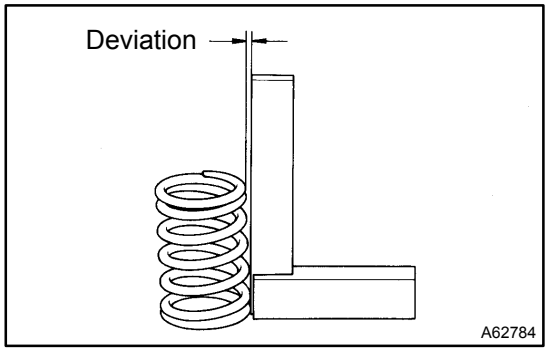
(b) Subtract the valve lifter diameter measurement from the valve lifter bore diameter measurement.
Standard oil clearance:
0.024 – 0.059 mm (0.0009 – 0.0023 in.)
Maximum oil clearance: 0.079 mm (0.0031 in.)

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



15. INSPECT INNER COMPRESSION SPRING

(a) Using a vernier caliper, measure the free length of the inner compression spring.
Free length: 43.40 mm (1.7087 in.)

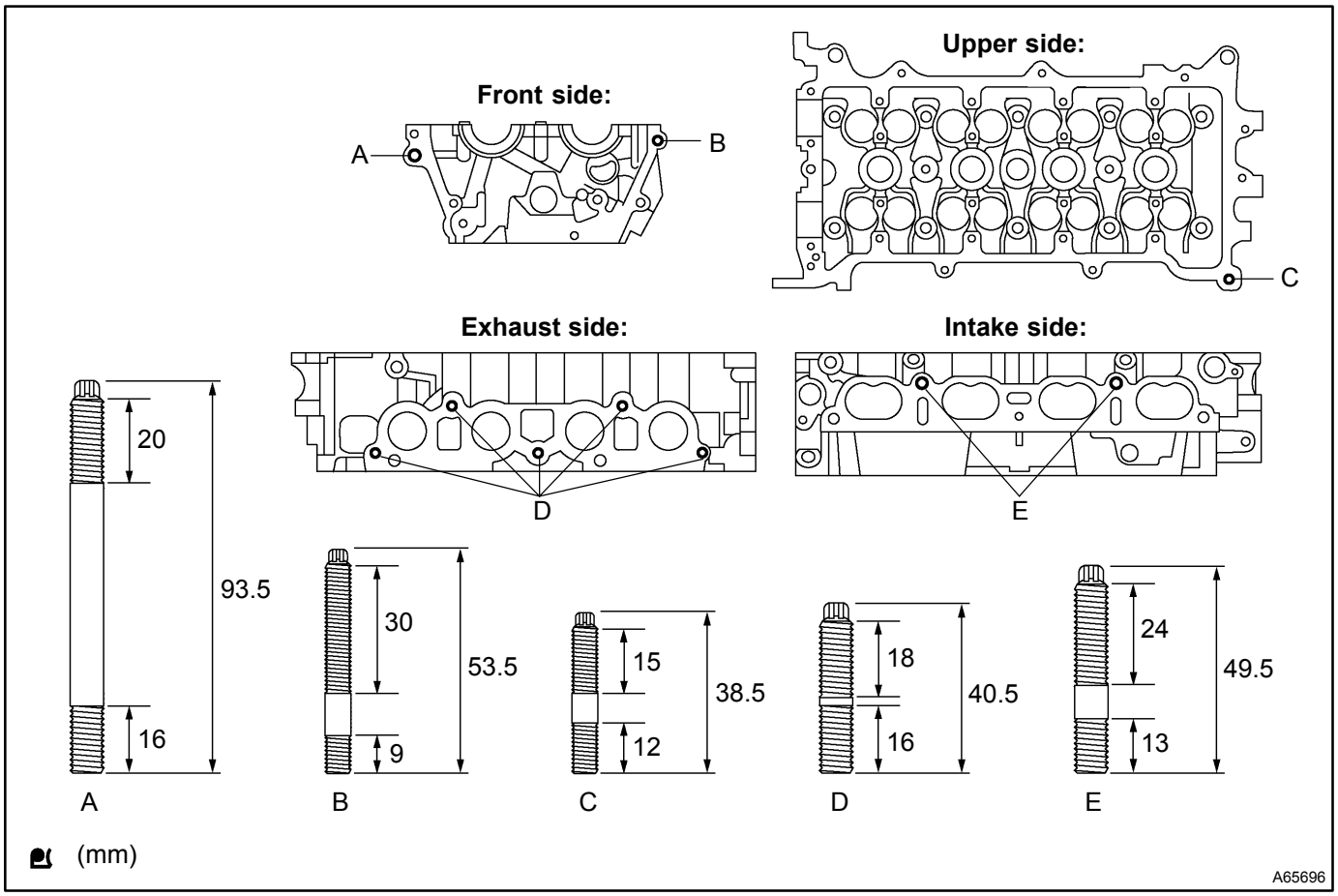


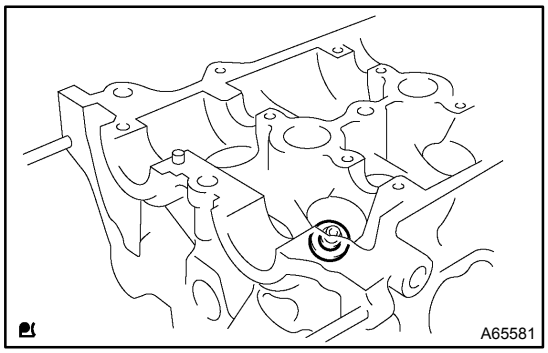
(b) Using a steel square, measure the deviation of the inner compression spring.
Maximum deviation: 1.6 mm (0.063 in.)
Maximum angle (reference): 2°

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

21. INSTALL STUD BOLT

(a) Using torx socket wrench E5 and E7, install the 11 stud bolts,
Torque:
Stud bolt A, D and E 9.5 N·m (97 kgf·cm, 84 in.·lbf)
Stud bolt B and C 5.0 N·m (51 kgf·cm, 44 in.·lbf)





22. INSTALL VALVE SPRING SEAT

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

ENGINE REAR OIL SEAL

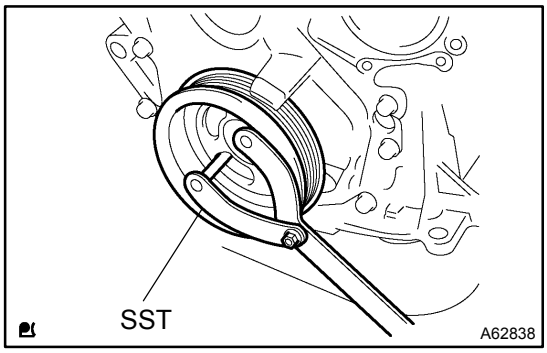
140ON–01

REPLACEMENT

1. **REMOVE MANUAL TRANSAXLE ASSY (M/T TRANSAXLE) (See page 41–17)**
2. **REMOVE AUTOMATIC TRANSAXLE ASSY (A/T TRANSAXLE) (See page 40–9)**
3. **REMOVE CLUTCH COVER ASSY (M/T TRANSAXLE) (See page 42–18)**

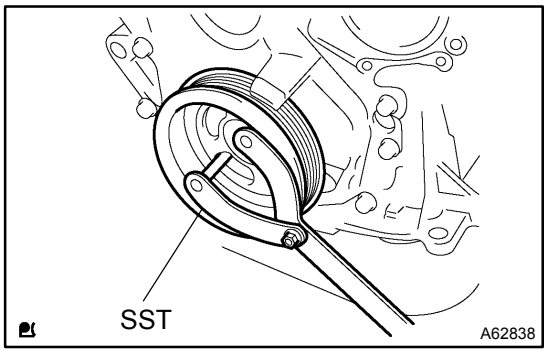
(a) Remove the 6 bolts and clutch cover.

4. **REMOVE CLUTCH DISC ASSY (M/T TRANSAXLE) (See page 42–18)**



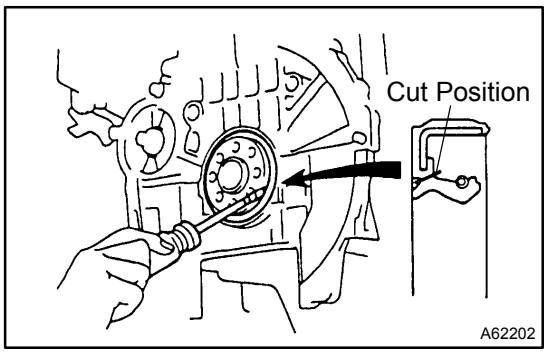
5. **REMOVE FLYWHEEL SUB–ASSY (M/T TRANSAXLE)**

(a) Fix the crankshaft with SST, then remove the 8 bolts and flywheel.
SST 09960–10010 (09962–01000, 09963–01000)



6. **REMOVE DRIVE PLATE & RING GEAR SUB–ASSY (A/T TRANSAXLE)**

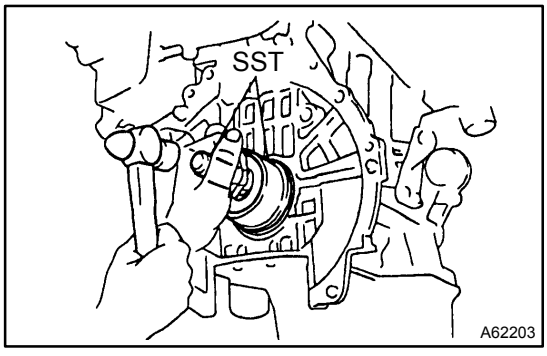
(a) Fix the crankshaft with SST, then remove the 8 bolts and drive plate & ring gear.
SST 09960–10010 (09962–01000, 09963–01000)



7. **REMOVE ENGINE REAR OIL SEAL**

(a) Using a knife, cut off the oil seal lip.
(b) Using a screwdriver with taping its tip, pry out the oil seal.

NOTICE:
After the removal, check if the crankshaft is not damaged. If there is, mend it with a sandpaper (#400).



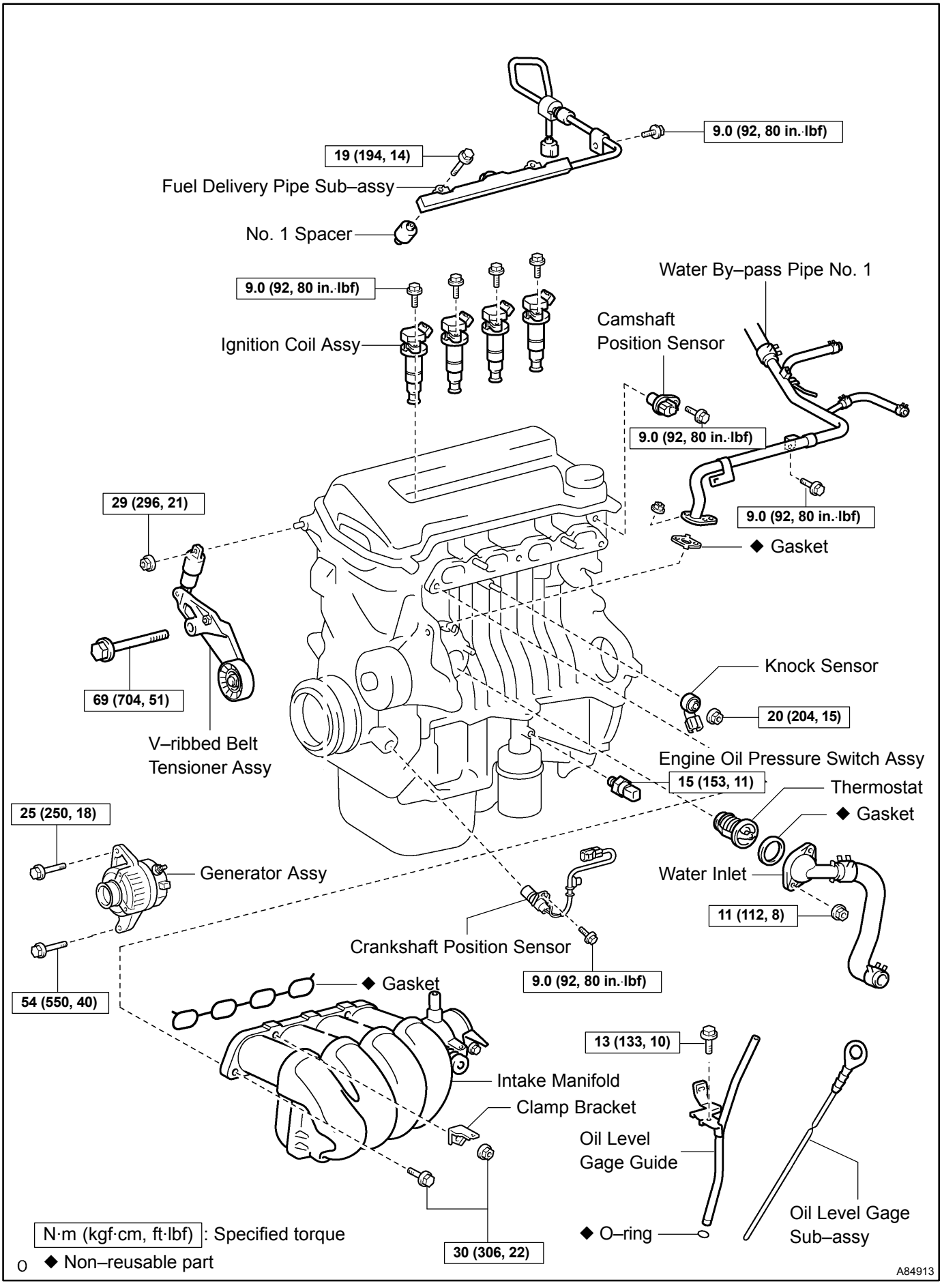
8. **INSTALL ENGINE REAR OIL SEAL**

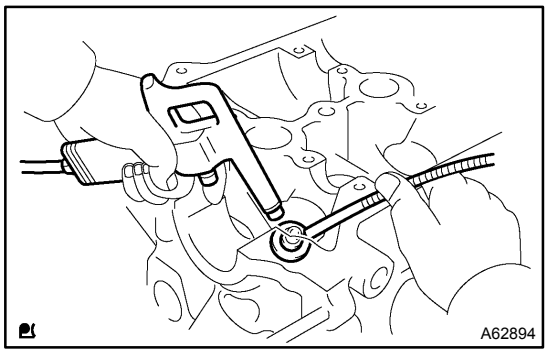
(a) Apply MP grease to a new oil seal lip.

NOTICE:
Keep the lip off foreign materials.

(b) Using SST, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223–15020, 09950–70010 (09951–07100)

NOTICE:
Wipe off extra grease on the crankshaft.



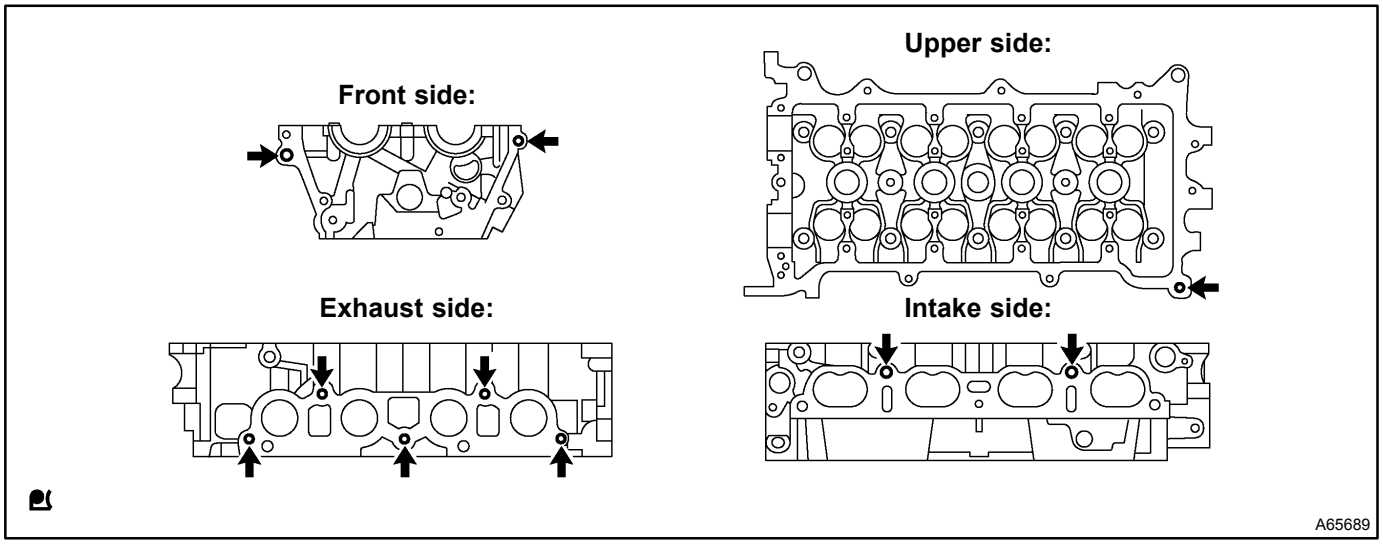


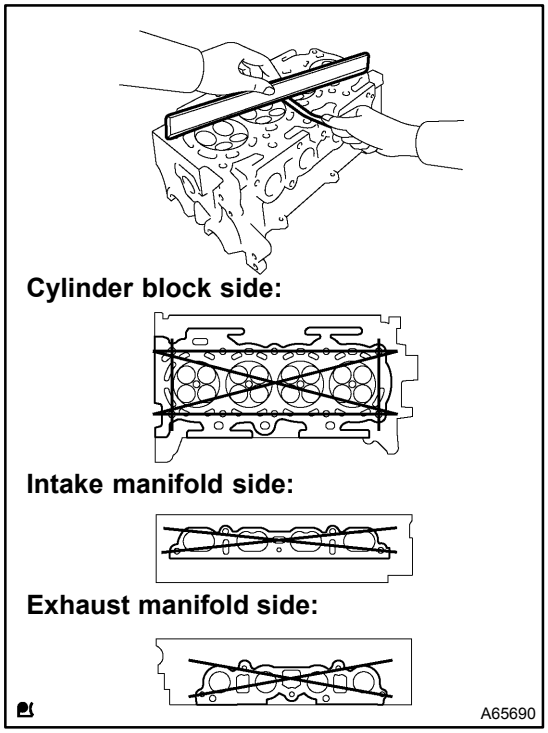
5. REMOVE VALVE SPRING SEAT

(a) Using a compressed air and a magnetic finger, remove the valve spring seats.

6. REMOVE STUD BOLT

(a) Using torx socket wrench E5 and E7, remove the 11 stud bolts.



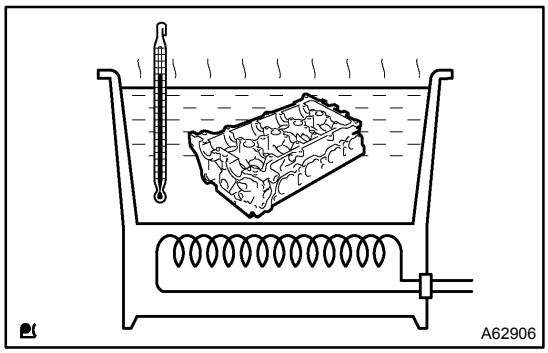


7. INSPECT CYLINDER HEAD FOR FLATNESS

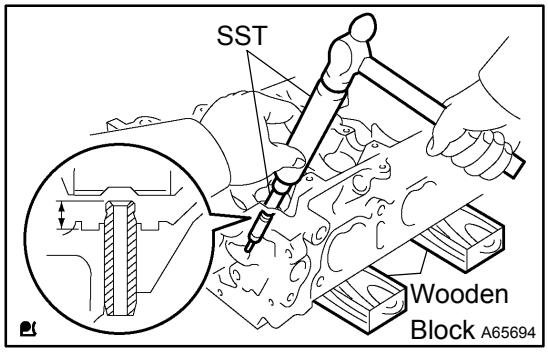
(a) Using a precision straight edge and a feeler gauge, measure the surface contacting the cylinder block and the manifolds for warpage.

Maximum warpage:
Cylinder block side 0.05 mm (0.0020 in.)
Intake manifold side 0.10 mm (0.0039 in.)
Exhaust manifold side 0.10 mm (0.0039 in.)

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



(e) Heat the cylinder head to 80 – 100°C (176 – 212°F).

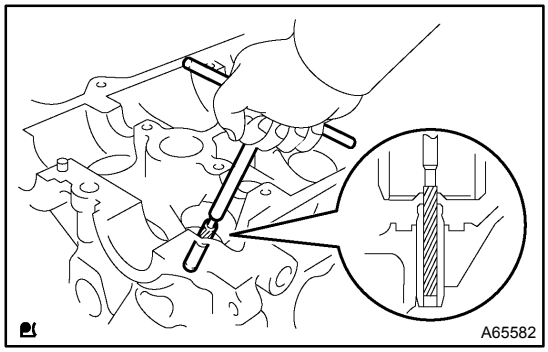


(f) Place the cylinder head on wooden blocks.

(g) Using SST, tap in a new valve guide bushing to the specified protrusion height.

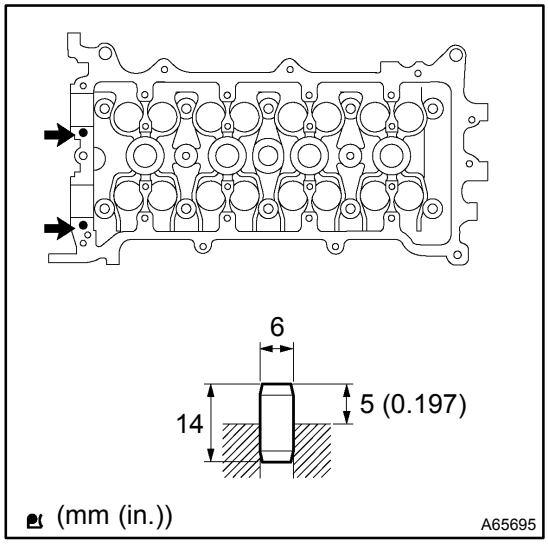
SST 09201–10000, 09201–01055, 09950–70010 (09951–07100)

Protrusion height: 8.7 – 9.1 mm (0.343 – 0.358 in.)



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

Standard oil clearance:
Intake 0.025 – 0.060 mm (0.0010 – 0.0024 in.)
Exhaust 0.030 – 0.065 mm (0.0012 – 0.0026 in.)



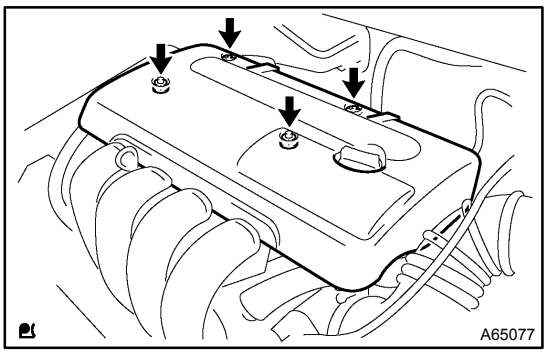
19. INSTALL STRAIGHT PIN

(a) Using a plastic hammer, install the new 2 straight pins.

Standard protrusion: 5 mm (0.197 in.)

REPLACEMENT

1. **WORK FOR PREVENTING GASOLINE FROM SPILLING OUT (See page 11–1)**
2. **REMOVE FRONT WHEELS**
3. **REMOVE ENGINE UNDER COVER RH**
4. **REMOVE ENGINE UNDER COVER LH**
5. **DRAIN COOLANT (See page 16–7)**



6. **REMOVE CYLINDER HEAD COVER NO.2**

(a) Remove the 2 nuts, 2 clips and cylinder head cover.

7. **DISCONNECT RADIATOR HOSE INLET**

(a) Disconnect the radiator hose inlet from the radiator.

8. **DISCONNECT RADIATOR HOSE OUTLET**

(a) Disconnect the radiator hose outlet from the radiator.

9. **DISCONNECT OIL COOLER INLET TUBE NO.1 (A/T TRANSAXLE)**

(a) Disconnect the oil cooler inlet tube from the radiator.

10. **DISCONNECT OIL COOLER OUTLET TUBE NO.1 (A/T TRANSAXLE)**

(a) Disconnect the oil cooler outlet tube from the radiator.

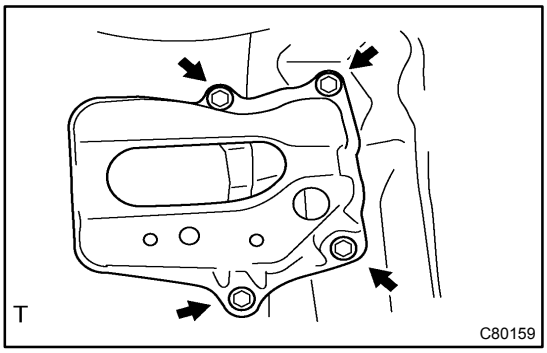
11. **REMOVE RADIATOR SUPPORT UPPER (W/ AIR CONDITIONING)**

(a) Remove the 2 bolts and 2 radiator support upper.

12. **REMOVE RADIATOR ASSY (W/ AIR CONDITIONING)**

(a) Disconnect the connector and harness clamp, and remove the radiator.

13. **REMOVE BATTERY**



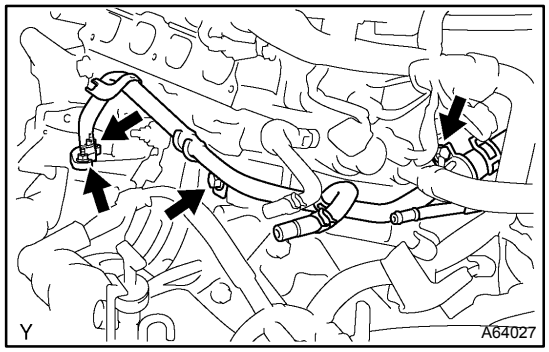
14. **REMOVE BATTERY CARRIER**

(a) Remove the 4 bolts and battery carrier.

15. **REMOVE AIR CLEANER ASSEMBLY WITH HOSE**

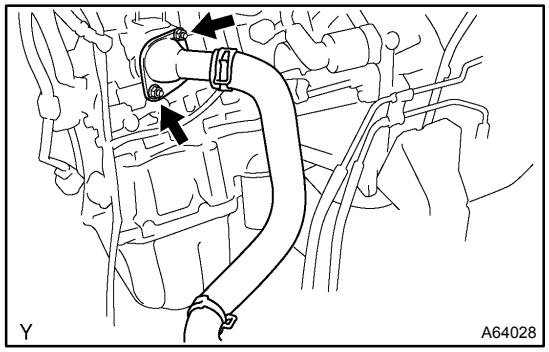
(a) Disconnect the mass air flow sensor connector.

(b) Disconnect the VSV connector.



64. REMOVE WATER BY–PASS PIPE NO.1

(a) Remove the 2 bolts, 2 nuts, water by–pass pipe and gasket.

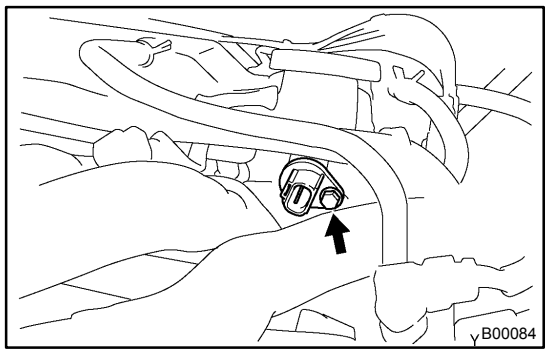


65. REMOVE WATER INLET

(a) Remove the 2 nuts and water inlet.

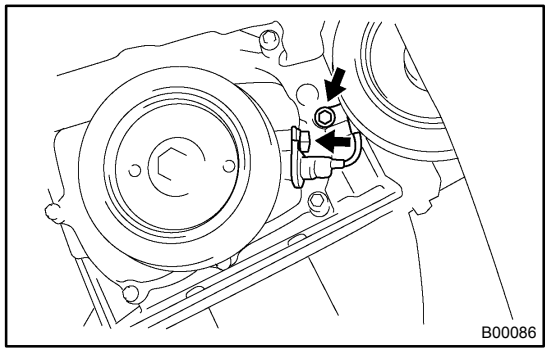
66. REMOVE THERMOSTAT

67. REMOVE ENGINE OIL PRESSURE SWITCH ASSY (See page 17–1)



68. REMOVE CAMSHAFT POSITION SENSOR

(a) Remove the bolt and camshaft position sensor.



69. REMOVE CRANKSHAFT POSITION SENSOR

(a) Remove the 2 bolts and crankshaft position sensor.

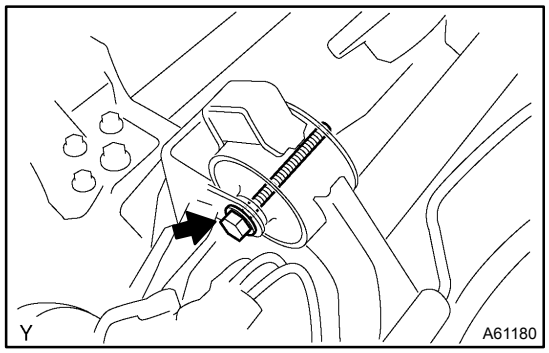
101. INSTALL CLUTCH DISC ASSY (M/T TRANSAXLE) (See page 42–18)
SST 09301–00210

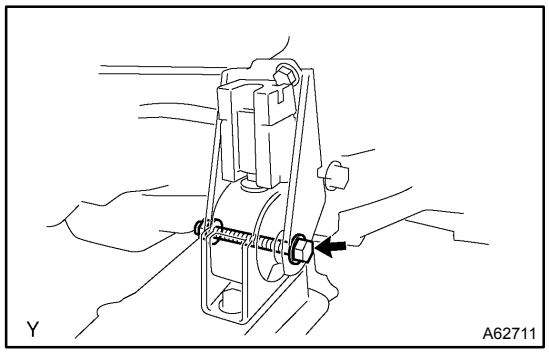
102. INSTALL CLUTCH COVER ASSY (M/T TRANSAXLE) (See page 42–18)
SST 09301–00210

103. INSTALL MANUAL TRANSAXLE ASSY (M/T TRANSAXLE) (See page 41–17)

104. INSTALL AUTOMATIC TRANSAXLE ASSY (A/T TRANSAXLE) (See page 40–9)

105. INSTALL STARTER ASSY (See page 19–4)





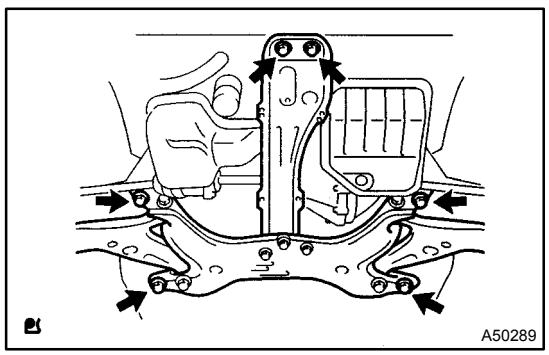
106. INSTALL FRONT SUSPENSION CROSSMEMBER W/CENTER MEMBER

(a) Attach the engine and transaxle assembly to the suspension crossmember and engine mounting member.

(b) Install the bolt holding the rear engine mounting bracket to the mounting insulator.
TMMC, NUMMI made:
Torque: 65 N·m (663 kgf·cm, 48 ft·lbf)
TAKAOKA, TAL made:
Torque: 87 N·m (887 kgf·cm, 64 ft·lbf)

(c) Install the bolt holding the front engine mounting bracket to the mounting insulator.
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

107. INSTALL VANE PUMP ASSY (See page 51–8)



108. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE

(a) Set the engine with transaxle on the engine lifter.

(b) Install the engine with transaxle to the vehicle.

(c) Temporarily, install the suspension crossmember and 6 bolts.

(d) Install the engine mounting insulator LH.
Torque: 80 N·m (816 kgf·cm, 59 ft·lbf)

(e) Install the engine mounting insulator RH.
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)