INSTALLATION

1. INSTALL VALVE TIMING CONTROLLER ASSEMBLY AND CAMSHAFT TIMING SPROCKET

(a) Apply engine oil in the range from the tip of the intake camshaft to 16 mm from that tip.
(b) Align the timing mark on the value timing controller assembly with the knock pin, and install the value timing controller assembly to the cam shaft.

NOTICE:
Do not push valve timing controller assembly to the camshaft forcibly when installing it.
(c) Align the knock pin hole in the cam shaft timing sprocket with the knock pin of the cam shaft, and exhaust the sprocket to the cam shaft.

(d) Temporarily install the timing sprocket bolt.
(e) Hold the hexagon wrench head portion of the camshaft with a wrench, and tighten the timing sprocket bolt.

Torque:
1ZZ–FE 45 N·m (460 kgf·cm, 33 ft·lbf)
2ZZ–GE 54 N·m (551 kgf·cm, 40 ft·lbf)

2. SET NO. 1 CYLINDER TO TDC/COMPRESSION

(a) Turn the hexagonal wrench head portion of the camshafts, and align the point marks of the camshaft timing sprockets.

(b) Using a crankshaft pulley bolt, Turn the crankshaft and set the set key on the crankshaft upward.
3. INSTALL CHAIN VIBRATION DAMPER
Install the damper with the 2 bolts.

Torque:
1ZZ–FE 11 N·m (113 kgf·cm, 8 ft·lb)
2ZZ–GE 20.5 N·m (209 kgf·cm, 15 ft·lb)

4. INSTALL TIMING CHAIN AND CRANKSHAFT TIMING SPROCKET
(a) Install the timing chain on the crankshaft timing sprocket with the yellow color link aligned with the timing mark on the crankshaft timing sprocket.

HINT:
If necessary, install the sprocket with SST.
SST 09223–22010

(b) 1ZZ–FE:
Install the timing chain on the camshaft timing sprockets with the yellow color links aligned with the timing marks on the camshaft timing sprockets.

(c) 2ZZ–GE:
Install the timing chain on the camshaft timing sprockets with the orange color links aligned with the timing marks on the camshaft timing sprockets.
5. **INSTALL CHAIN TENSIONER SLIPPER**

(a) Install the slipper with the bolt.

**Torque:**
- 1ZZ–FE 18.5 N·m (189 kgf·cm, 14 ft·lbf)
- 2ZZ–GE 20.5 N·m (209 kgf·cm, 15 ft·lbf)

(b) Check that the slipper moves is caught on the cylinder head stopper.

**NOTICE:**
DO not turn the crankshaft.

6. **INSTALL CRANK ANGLE SENSOR PLATE**
Install the plate with the "F" mark facing forward.
7. **1ZZ–FE: INSTALL TIMING CHAIN COVER AND WATER PUMP**

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the timing chain cover, cylinder head and cylinder block.
- Using a razor blade and a gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing grooves.
- Thoroughly clean all components to remove all the loose material.
- Using a non-residue solvent, clean both sealing surfaces.

(b) Apply seal packing to the timing chain cover as shown in the illustration.

**Seal packing:**
- **Part No. 08826 – 00100 or equivalent**
  - Install a nozzle that has been cut to a 1.5 mm (0.16 – 0.20 in.) opening.

**HINT:**
Avoid applying an excessive amount to the surface.
- Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

(c) Apply seal packing to 2 locations as shown in the illustration.

**Seal packing:**
- **Part No. 08826 – 00080 or equivalent**
  - Install a nozzle that has been cut to a 1.5 mm (0.16 – 0.20 in.) opening.

**HINT:**
Avoid applying an excessive amount to the surface.
- Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.
(d) Install the timing chain cover, O-ring and water pump with the 17 bolts and nut. Uniformly tighten the bolts and nut in several passes.

**Torque:**
- 10 mm head:
  - 9 N·m (92 kgf·cm, 80 in.-lbf) for C
  - 13 N·m (133 kgf·cm, 10 ft-lbf) for A
  - 11 N·m (113 kgf·cm, 8 ft-lbf) for others
- 12 mm head:
  - 18.5 N·m (189 kgf·cm, 14 ft-lbf)

**NOTICE:**
- Pay attention not to wrap the chain and slipper over the chain cover seal line.
- After installing the chain cover, must install the mounting bracket and water pump within 15 minutes.

**HINT:**
Each bolt length in indicated in the illustration.
- A 45 mm (1.77 in.)
- B 35 mm (1.38 in.)
- C 30 mm (1.18 in.)
- D 25 mm (0.98 in.)

(e) Using a torx wench socket (E8), install the stud bolt.

**Torque: 9.3 N·m (95 kgf·cm, 82 in.-lbf)**
8. **2ZZ-GE: INSTALL TIMINGCHAIN COVER AND WATER PUMP**

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the timing chain cover, cylinder head and cylinder block.
   - Using a razor blade and a gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing grooves.
   - Thoroughly clean all components to remove all the loose material.
   - Using a non-residue solvent, clean both sealing surfaces.

(b) Apply seal packing to the timing chain cover as shown in the illustration.

**Seal packing:**
- Part No. 08826-00100 or equivalent

**HINT:**
Avoid applying an excessive amount to the surface.
- Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

(c) Install the 2 gasket to the timing chain cover as shown in the illustration.

(d) Apply seal packing to 4 locations as shown in the illustration.

**Seal packing:**
- Part No. 08826-00080 or equivalent

**HINT:**
Avoid applying an excessive amount to the surface.
- Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.
(e) Install the timing chain cover, O-ring and water pump with the 19 bolts. Uniformly tighten the bolts in several passes.
   Torque:
   A: 21 N·m (214 kgf·cm, 15 ft·lbf)
   B: 11 N·m (113 kgf·cm, 8 ft·lbf)
   C: 9.0 N·m (92 kgf·cm, 80 in·lbf)
   D: 9.0 N·m (92 kgf·cm, 80 in·lbf)

   NOTICE:
   • Pay attention not to wrap the chain and slipper over the chain cover seal line.
   • After install the chain cover, must install the mounting bracket and water pump within 15 minutes.

(f) Using a torx wrench socket (E8), install the stud bolt.
   Torque: 9.3 N·m (95 kgf·cm, 82 in·lbf)

9. 1ZZ–FE:
   INSTALL RH ENGINE MOUNTING BRACKET
   (a) Apply seal packing to threads of the mounting bolt.
   Seal packing:
   Part No. 08826 – 00080 or equivalent
   HINT:
   Do not apply seal packing to 2 or 3 threads of the bolt end.
   (b) Install the mounting bracket with the 3 bolts.
   Torque: 47 N·m (479 kgf·cm, 35 ft·lbf)

10. 2ZZ–GE:
   INSTALL RH ENGINE MOUNTING BRACKET
   Install the mounting bracket with the 4 bolts.
   Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

11. INSTALL DRIVE BELT TENSIONER
   (a) Check the appearance before installing the drive belt tensioner.
   If in case of having the oil leakage, crack, and etc., replace the drive belt tensioner.
   (b) Install the drive belt tensioner.
   Torque:
   Bolt
   1ZZ–FE 69 N·m (704 kgf·cm, 51 ft·lbf)
   2ZZ–GE 100 N·m (1,020 kgf·cm, 74 ft·lbf)
   Nut 29 N·m (296 kgf·cm, 21 ft·lbf)
   (c) Hook the tool on the hexagonal portion of the drive belt tensioner bracket and operate drive belt tensioner 3 times with full stroke.
   HINT:
   Take 3 seconds or more for 1 full stroke.
12. INSTALL CRANKSHAFT POSITION SENSOR  
Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)

13. INSTALL CRANKSHAFT PULLEY  
(a) Clean the crankshaft pulley inside.  
(b) Align the pulley set key with the key groove of the pulley, and slide on the pulley.  
(c) Using SST and 2 nuts (width: 10 mm (0.25 in.), install the pulley bolt.  
SST 09213–70010, 09330–00021  
Torque:  
1ZZ–FE 138 N·m (1,409 kgf·cm, 102 ft·lbf)  
2ZZ–GE 120 N·m (1,200 kgf·cm, 87 ft·lbf)  

14. INSTALL CHAIN TENSIONER  
(a) Check the chain tensioner.  
(See page EM–16)  
(b) Release the ratchet pawl, fully push in the plunger and apply the hook to the pin so that the plunger cannot spring out.  
(c) Insert the O–ring with your hand until it reaches to the chamfering position and install nut temporarily. Then, by tightening the nut, insert the chain tensioner to the installation position.  
HINT:  
• In the case that the hook is released while pushing in, apply the hook again and push the tensioner in.  
• Pay attention not to catch the O–ring as it is built in the chain tensioner previously.  
(d) Tighten the 2 nuts.  
Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)
15. **SET CHAIN TENSION**
(a) Turn the crankshaft counterclockwise, and disconnect the plunger knock pin from the hook.

(b) 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 or your finger so that the hook is released from the knock pin and the plunger springs out.

16. **CHECK VALVE TIMING**
(a) Turn the crankshaft pulley, and align its groove with timing mark “0” of the timing chain cover.

**NOTICE:**
Always turn the crankshaft clockwise.

(b) Check that the point marks of the camshaft timing sprockets are in straight line on the timing chain cover surface as shown in the illustration.
If not, turn the crankshaft 1 revolution (360°) and align the marks as above.

17. **1ZZ–FE:**
**INSTALL CYLINDER HEAD COVER**
(a) Remove any old packing (FIPG) material.
(b) Apply seal packing to 2 locations as shown in the illustration.

**Seal packing:**
Part No. 08826 – 00080 or equivalent
(c) Install the gasket to the cylinder head cover.
HINT:
Part must be assembled within 3 minutes of application.
Otherwise the material must be remove and reapplied.

(d) Install the cylinder head cover with the 9 bolts, 2 seal washers and 2 nuts.
Uniformly tighten the bolts and nuts, in the several passes, in the sequence shown.
**Torque:**
w/o washer
11 N·m (113 kgf-cm, 8 ft·lbf)
w/ washer
9.0 N·m (92 kgf-cm, 80 in.-lbf)
(e) Connect the 2 PCV hoses to the cylinder head cover.
(f) Install the ignition coil (See page IG–7).

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18. **2ZZ–GE:**
**INSTALL CYLINDER HEAD COVER**
(a) Remove any old packing (FIPG) material.
HINT:
When FIPG on the head cover gasket side cannot be eliminated completely, replace the gasket.
(b) Apply seal packing to 2 locations as shown in the illustration.
**Seal packing:**
Part No. 08826–00080 or equivalent
(c) Install the gasket to the cylinder head cover.
HINT:
Part must be assembled within 3 minutes of application. Otherwise the material must be remove and reapplied.
(d) Install a new O–ring to the cylinder head cover.
(e) Install the cylinder head cover and wire harness protector with the 9 bolts. Uniformly tighten the bolts, in the several passes, in the sequence shown.

**Torque:** 10 N·m (100 kgf·cm, 7 ft·lbf)

(f) Connect the 2 PCV hoses to the cylinder head cover.

(g) Install a new gasket and No. 1 ventilation pipe with 2 nuts and bolt.

**Torque:**
- Nut 10 N·m (100 kgf·cm, 7 ft·lbf)
- Bolt 25 N·m (255 kgf·cm, 18 ft·lbf)

(h) Connect the No. 3 ventilation hose to the No. 1 ventilation pipe.

(i) Install the ignition coil (See page IG–7).

19. **INSTALL RH ENGINE MOUNTING INSULATOR**

(a) **1ZZ–FE:**
Install the RH engine mounting insulator with the 4 bolts and 2 nuts.

**Torque:** 52 N·m (530 kgf·cm, 38 ft·lbf)

(b) **2ZZ–GE:**
Install the RH engine mounting insulator with the 5 bolts and 2 nuts.

**Torque:** 52 N·m (530 kgf·cm, 38 ft·lbf)

20. **INSTALL PS PUMP**

(a) Install the PS pump with the 2 through bolts and nuts.

**Torque:** 36 N·m (370 kgf·cm, 27 ft·lbf)

(b) Install the PS pump pulley with the pulley nut.

(c) Connect the PS oil pressure switch connector.

21. **INSTALL GENERATOR AND DRIVE BELT**

(See page CH–17)

22. **INSTALL RH ENGINE UNDER COVER**

23. **INSTALL RH FRONT WHEEL**

24. **FILL WITH ENGINE COOLANT** (See page CO–2)

25. **INSTALL FRONT FENDER APRON SEAL AND UPPER RADIATOR SUPPORT SEAL**

26. **START ENGINE AND CHECK FOR COOLANT LEAKS**