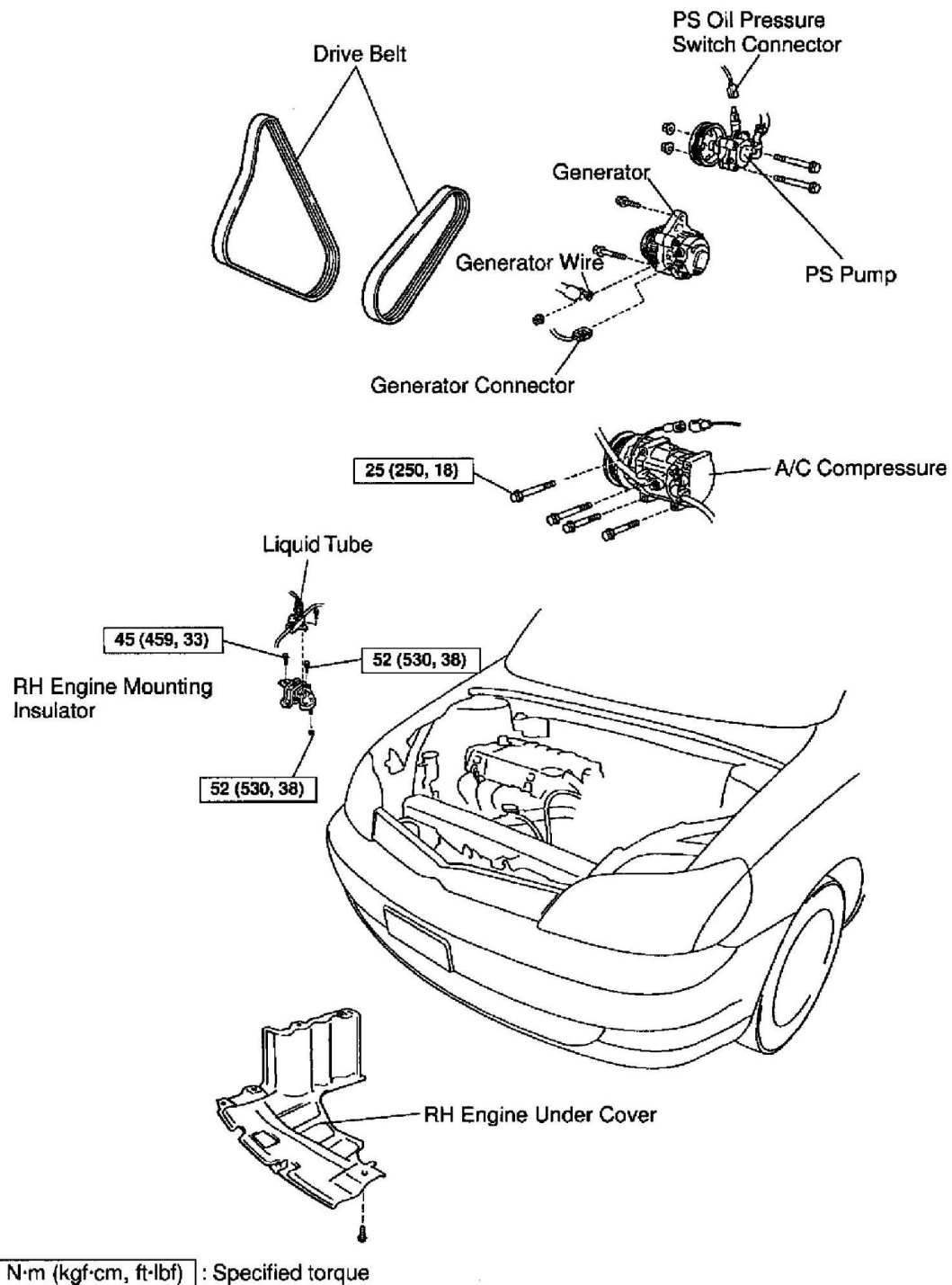
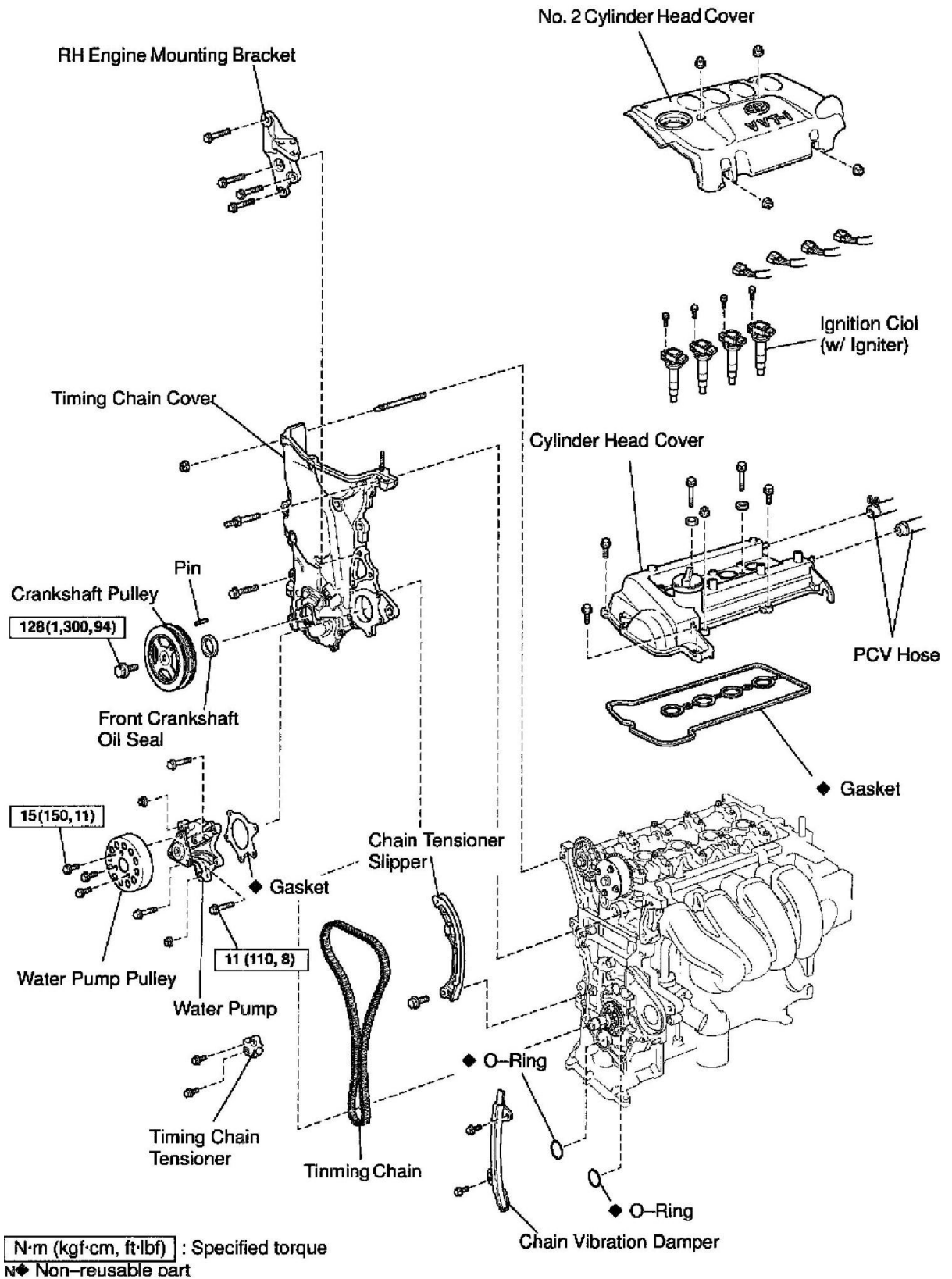




# Toyota Echo L4-1.5L (1NZ-FE) 2001

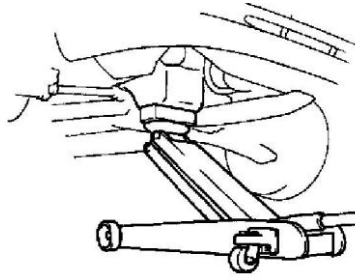
## Timing Chain: Service and Repair





## REMOVAL

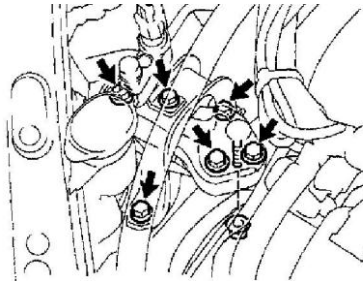
1. DRAIN ENGINE COOLANT
2. REMOVE RH FRONT WHEEL
3. REMOVE RH ENGINE UNDER COVER
4. REMOVE DRIVE BELT AND GENERATOR
5. DISCONNECT PS PUMP FROM ENGINE
6. REMOVE RH ENGINE MOUNTING INSULATOR



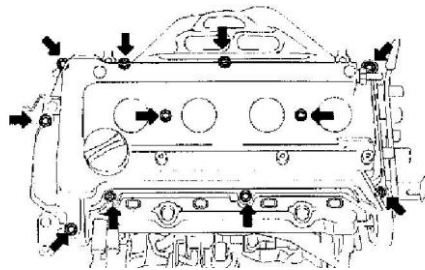
- a. Set the jack to the engine.

HINT: Place a wooden block between the jack and engine.

- b. w/ A/C: Remove the bolt holding the liquid tube to the RH engine mounting insulator.



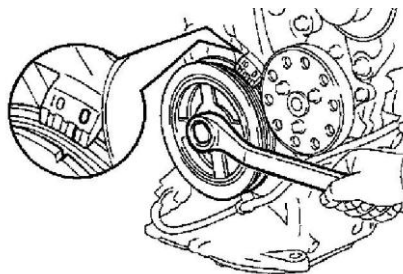
- c. Remove the 5 bolts, nut and RH engine mounting insulator.



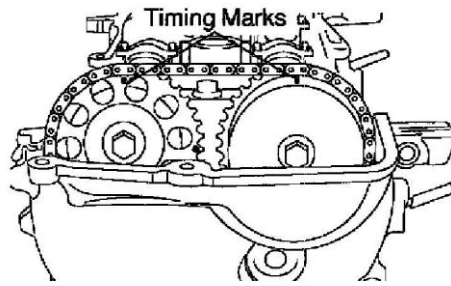
## 7. REMOVE CYLINDER HEAD COVER

- a. Remove the 4 nuts and No.2 cylinder head cover.
- b. Remove the ignition coils.
- c. Remove the 2 PCV hoses from the cylinder head cover.
- d. Remove the 7 bolts, 2 seal washers, 2 nuts, cylinder head cover and gasket.

## 8. SET NO.1 CYLINDER TO TDC/COMPRESSION

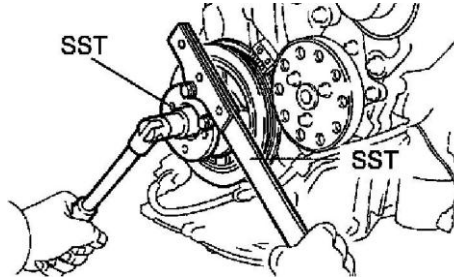


- a. Turn the crankshaft pulley, and align its groove with timing mark "0" of the timing chain cover.

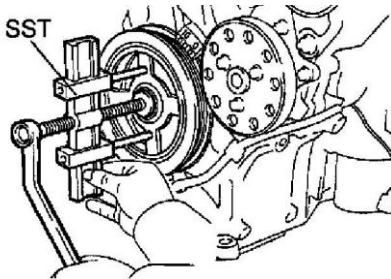


- b. Check that both timing marks on the camshaft timing sprocket and valve timing controller assembly are facing right up. If not, turn the crankshaft 1 revolution (360°) and align the marks.

#### 9. REMOVE CRANKSHAFT PULLEY



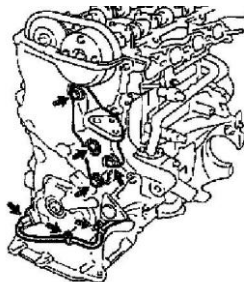
- a. Using SST, remove the pulley bolt. SST 09213-70010, 09330-00021



- b. Remove the crankshaft pulley and pin.

HINT: If necessary, remove the pulley with SST.

SST 09950-50012 (09951-05010, 09952-05010, 09953-05020, 09950-05020) 10. REMOVE CRANKSHAFT POSITION SENSOR

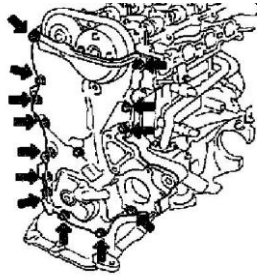


#### 11. REMOVE RH ENGINE MOUNTING BRACKET

Remove the 4 bolts and mounting bracket.

#### 12. REMOVE WATER PUMP

#### 13. REMOVE OIL CONTROL VALVE



#### 14. REMOVE TIMING CHAIN COVER

- Remove the 13 bolts and nut.
- Using a torx wrench socket (E8), remove the stud bolt.
- Remove the timing chain cover by prying the portions between the cylinder head and cylinder block with a screwdriver.

NOTICE: Be careful not to damage the contact surfaces of the timing chain cover, cylinder head and cylinder block. d. Remove the 2 O-rings from the cylinder block and oil pan No. 1.

#### 15. REMOVE CHAIN TENSIONER

Remove the 2 bolts and chain tensioner.

#### 16. REMOVE CHAIN TENSIONER SLIPPER

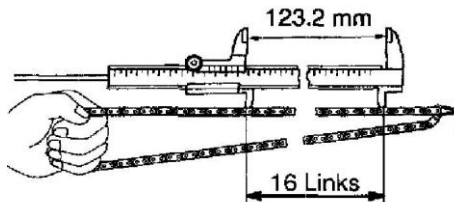
#### 17. REMOVE CHAIN VIBRATION DAMPER

Remove the 2 bolts and damper.

#### 18. REMOVE TIMING CHAIN

### INSPECTION

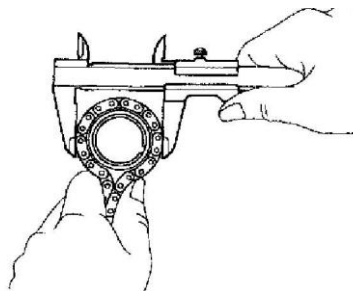
#### 1. INSPECT TIMING CHAIN AND TIMING SPROCKETS



- Using a vernier calipers, measure the length of 16 links with the chain fully stretched. Maximum chain elongation: 123.2 mm (4.850 inch). If the elongation is greater than maximum, replace the chain.

HINT: Make the same measurements pulling at 3 or more places selected at random.

- Wrap the chain around the timing sprocket.



- Using a vernier calipers, measure the timing sprocket diameter with the chain.

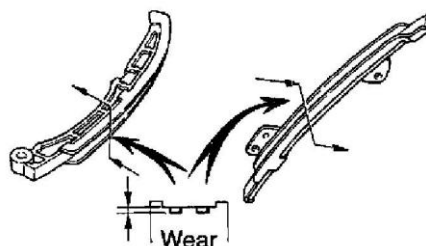
NOTICE: Vernier calipers must contact the chain rollers for measuring.

Minimum sprocket diameter (w/ Chain):

Camshaft 96.2 mm (3.787 inch)

Crankshaft 50.5 mm (1.988 inch)

If the diameter is less than minimum, replace the chain and sprockets.

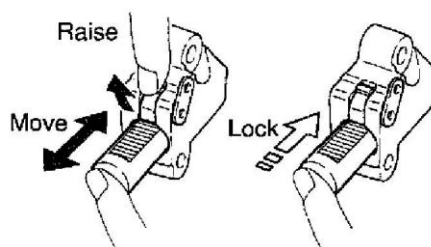


## 2. INSPECT CHAIN TENSIONER SLIPPER AND VIBRATION DAMPER

Measure the chain tensioner slipper and vibration damper wears.

Maximum wear: 1.0 mm (0.039 inch)

If the wear is greater than maximum, replace the slipper and/or damper.



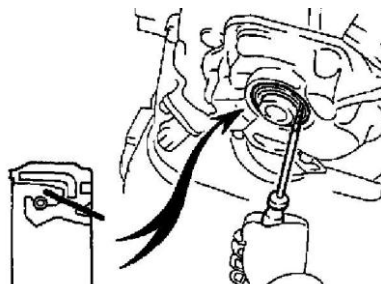
## 3. INSPECT CHAIN TENSIONER

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

## REPLACEMENT

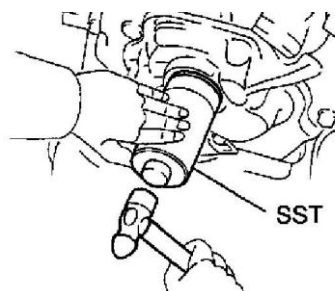
### REPLACE CRANKSHAFT FRONT OIL SEAL

- Using a knife, cut off the oil seal lip.



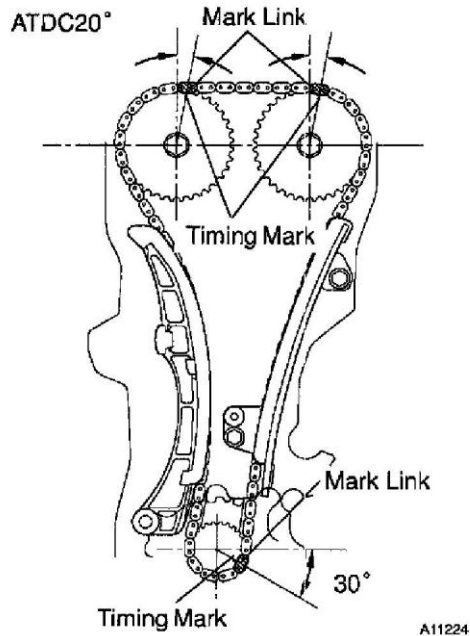
- Using a screwdriver, pry out the oil seal.

**NOTICE:** Be careful not to damage the crankshaft. Tape the screw driver tip.



- c. Using SST and a hammer, tap in the oil seal until its surface is flush with the timing chain cover edge. SST 09612-22011

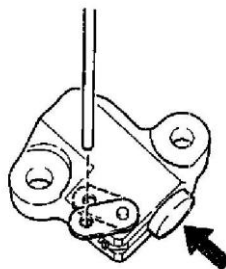
## INSTALLATION



### 1. INSTALL TIMING CHAIN

- After setting the crankshaft at ATDC 40 - 140°, set cams of intake and exhaust timing sprockets at ATDC 20° and then the reset the crankshaft at ATDC 20°.
- Install the chain vibration damper with the 2 bolts.  
Torque: 9.0 Nm (92 kgf-cm, 80 inch lbs.)
- Align the match marks of timing chain mark plate (Yellow), camshaft timing sprocket, camshaft timing gear and crankshaft timing sprocket to install the timing chain.

HINT: To prevent the exhaust camshaft from spring back turn it using a wrench and set it at the mark on a chain. d. Install the chain tensioner slipper.



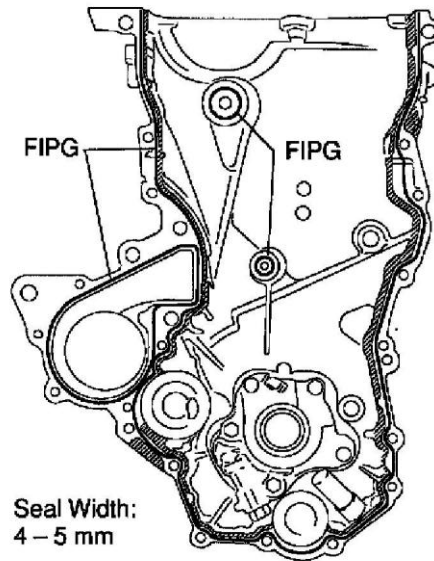
### 2. INSTALL CHAIN TENSIONER

- While rotating the lock plate of the tensioner upward, push in the plunger of the tensioner.
- While rotating the lock plate of the tensioner downward, insert a bar of 2.5 mm (0.098 inch) into the holes in the lock plate.
- Install the chain tensioner with the 2 bolts.  
Torque: 9.0 Nm (92 kgf-cm, 80 inch lbs.)
- Remove the bar from the chain tensioner.
- Check that the tension between the intake and exhaust camshaft timing sprocket.

### 3. INSTALL TIMING CHAIN COVER AND WATER PUMP

- 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.



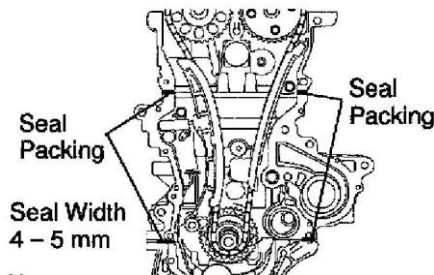
- b. Apply seal packing to the timing chain cover.

Seal packing: Part No. 08826-00100 or equivalent

- Install a nozzle that has been cut to a 4 - 5 mm (0.16 - 0.20 inch) opening.
- FIPG shall be accumulated in the groove for FIPG to a depth of 2.5 mm (0.10 inch) or more.

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 4 locations.

Seal packing: Part No. 08826-00080 or equivalent

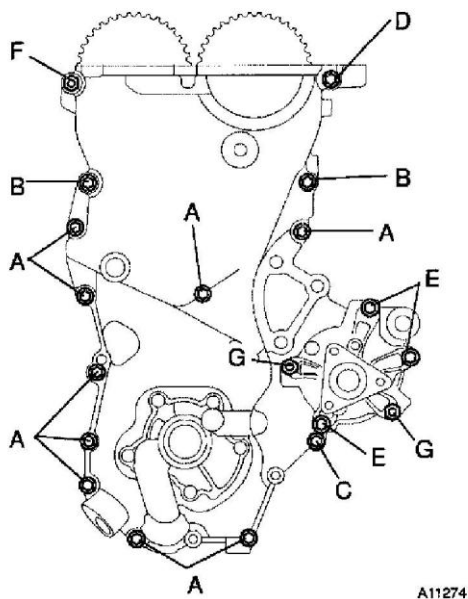
- Install a nozzle that has been cut to a 4 - 5 mm (0.16 - 0.20 inch) opening.

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 2 new O-rings to the cylinder block and oil pan No. 1.





- e. Install the timing chain cover, new O-ring and water pump with the 16 bolts and 3 nuts. Uniformly tighten the bolts and nut in several passes.

Torque:

Bolt A 11 Nm (113 kgf-cm, 8 ft. lbs.)  
 Bolt B 24 Nm (245 kgf-cm, 18 ft. lbs.)  
 Bolt C 11 Nm (113 kgf-cm, 8 ft. lbs.)  
 Bolt D 24 Nm (245 kgf-cm, 18 ft. lbs.)  
 Bolt E 11 Nm (113 kgf-cm, 8 ft. lbs.)  
 Nut F 24 Nm (245 kgf-cm, 18 ft. lbs.) Nut G 11 Nm (113 kgf-cm, 8 ft. lbs.)

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 is indicated in the illustration.

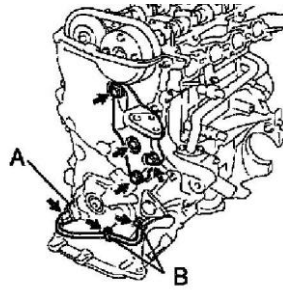
A: 20 mm (0.787 inch)  
 B: 30 mm (1.181 inch)  
 C: 35 mm (1.378 inch)  
 D: 20 - 14 mm (0.787 - 0.551 inch)  
 E: 35 mm (1.378 inch)

#### 4. 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 4 bolts. Torque: 55 Nm (561 kgf-cm, 41 ft. lbs.)



5. INSTALL CRANKSHAFT POSITION SENSOR

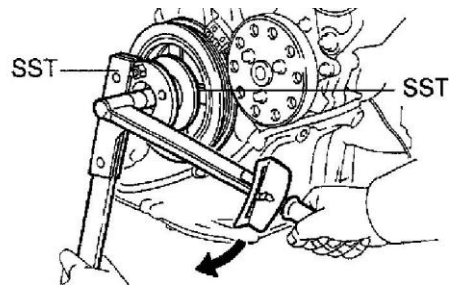
Torque:

Bolt A 7.5 Nm (76 kgf-cm, 66 inch lbs.)

Bolt B 11 Nm (113 kgf-cm, 8 ft. lbs.)

6. INSTALL OIL CONTROL VALVE

Torque: 8.0 Nm (82 kgf-cm, 71 inch lbs.)



7. INSTALL CRANKSHAFT PULLEY

a. Clean the crankshaft pulley inside.

b. Install the pin to the crankshaft.

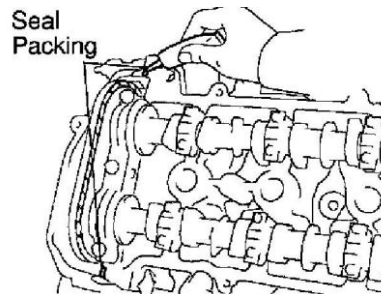
c. Align the hole in the crank pulley with the pin position and install the crank pulley. d. Using SST, install the pulley bolt.

SST 09213-70010, 09330-00021

Torque: 128 Nm (1,300 kgf-cm, 94 ft. lbs.)

8. INSTALL CYLINDER HEAD COVER

a. Remove any old packing (FIPG) material.

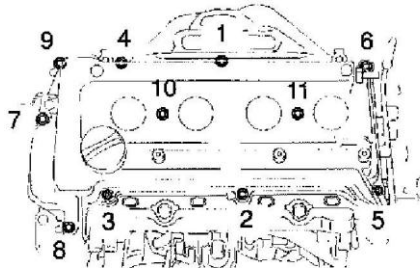


b. Apply seal packing to 2 locations.

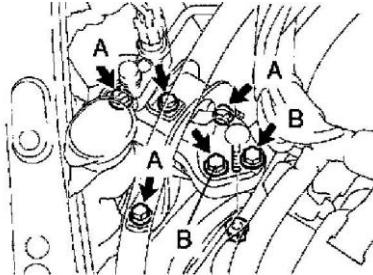
Seal packing: Part No. 08826-00080 or equivalent

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 and cable bracket with the 7 bolts, 2 seal washers and 2 nuts. Uniformly tighten the bolts and nuts, in the several passes.  
Torque: 10 Nm (100 kgf-cm, 7 ft. lbs.)
- e. Connect the 2 PCV hoses to the cylinder head cover.
- f. Install the ignition coil.



#### 9. INSTALL RH ENGINE MOUNTING INSULATOR

- a. Install the RH engine mounting insulator with the 5 bolts and nut.

Torque:

Bolt A 45 Nm (459 kgf-cm, 33 ft. lbs.)

Bolt B and nut 52 Nm (530 kgf-cm, 38 ft. lbs.)

- b. w/ A/C: Install the liquid tube with the bolt.

#### 10. INSTALL PS PUMP

#### 11. INSTALL GENERATOR AND DRIVE BELT

#### 12. INSTALL RH ENGINE UNDER COVER

#### 13. INSTALL RH FRONT WHEEL

#### 14. FILL WITH ENGINE COOLANT

#### 15. START ENGINE AND CHECK FOR COOLANT LEAKS