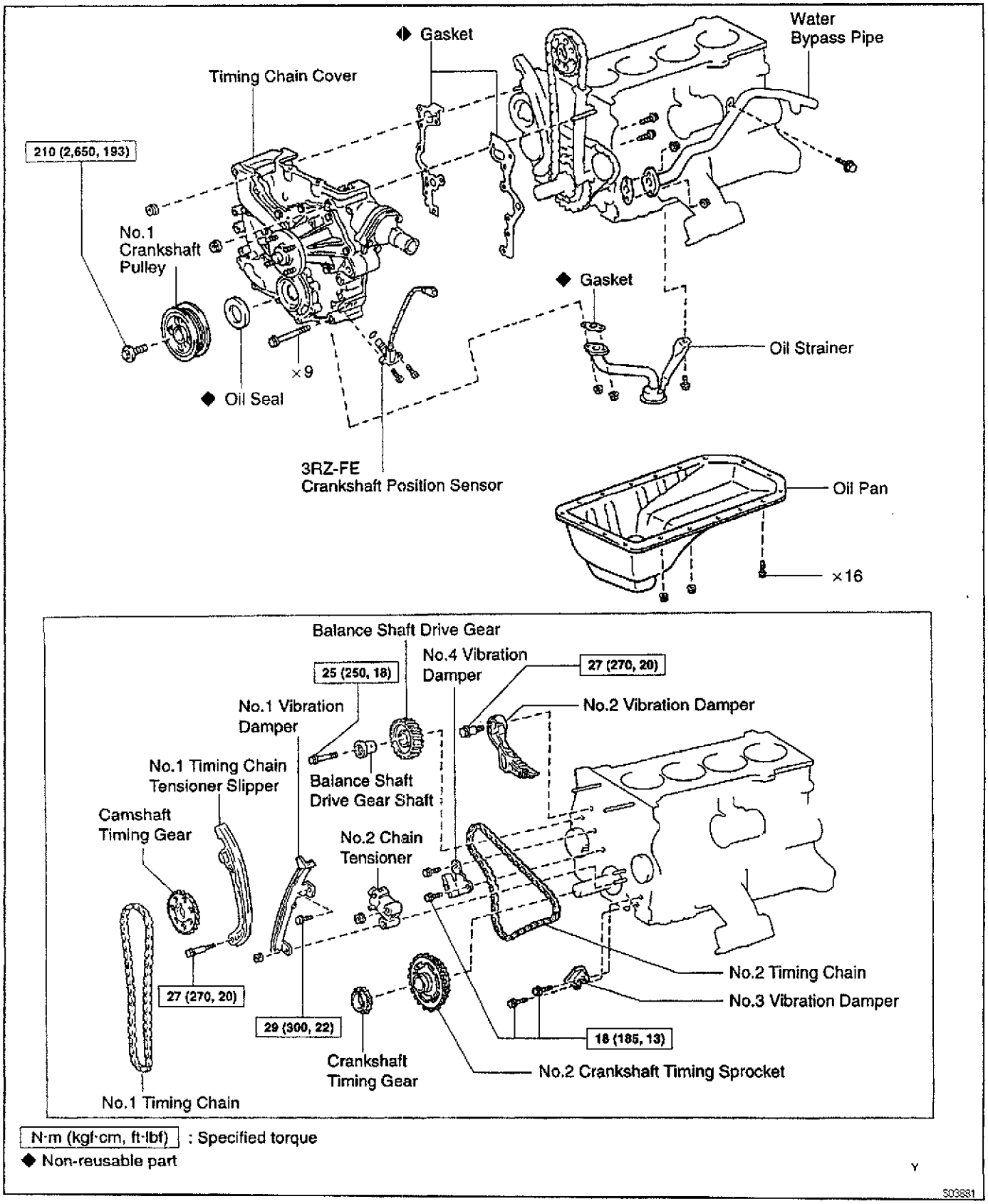
TIMING CHAIN

COMPONENTS FOR REMOVAL AND INSTALLATION

EQ76V–01



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

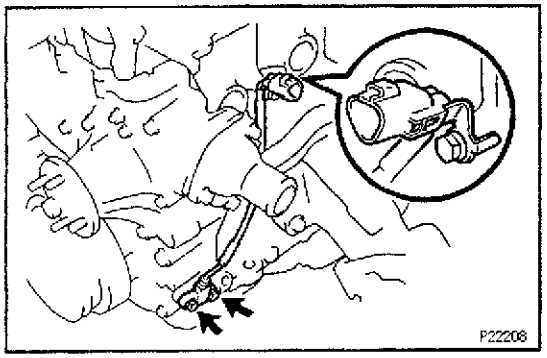
◆ Non-reusable part

503881

EG76W-01

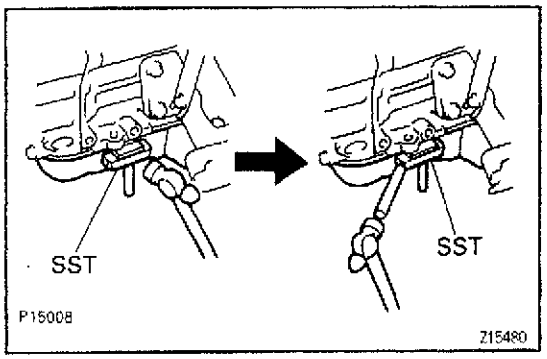
TIMING CHAIN REMOVAL

1. **DRAIN ENGINE OIL**
2. **DRAIN ENGINE COOLANT**
3. **REMOVE CYLINDER HEAD ASSEMBLY**
   (See cylinder head removal)



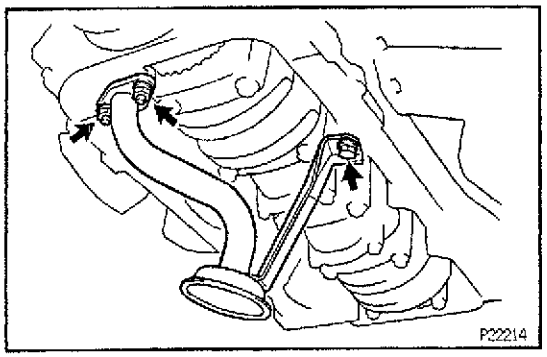
4. **3RZ–FE:**
   REMOVE CRANKSHAFT POSITION SENSOR

(a) Remove the 2 bolts and crankshaft position sensor.
(b) Remove the O – ring from the crankshaft position sensor.

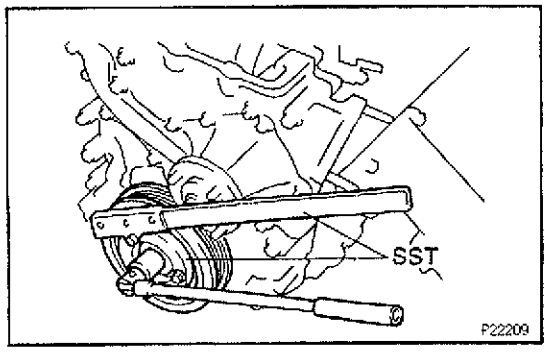


5. **REMOVE OIL PAN**

(a) Remove the 16 bolts and 2 nuts.
(b) Insert the blade of SST between the cylinder block and oil pan, cut off applied sealer and remove the oil pan.
SST 09032–00100
NOTICE: Be careful not to damage the oil pan flanges of the oil pan and cylinder block.

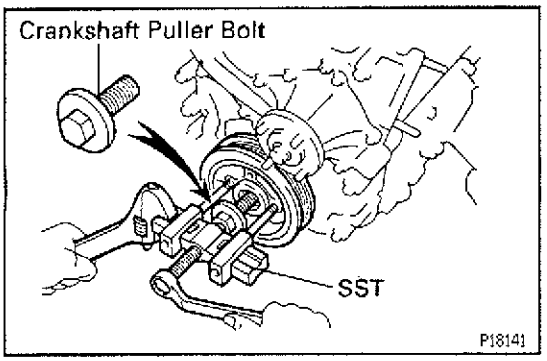


6. **REMOVE OIL STRAINER**
   Remove the bolt, 2 nuts, oil strainer and gasket.

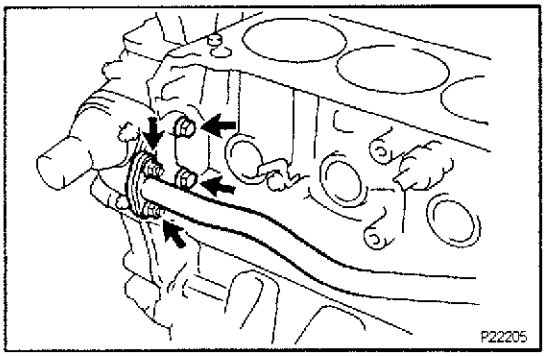


7. **REMOVE CRANKSHAFT PULLEY**

(a) Using SST, remove the pulley bolt.
SST 09213–54015, 09330–00021
(b) Remove the crankshaft pulley.

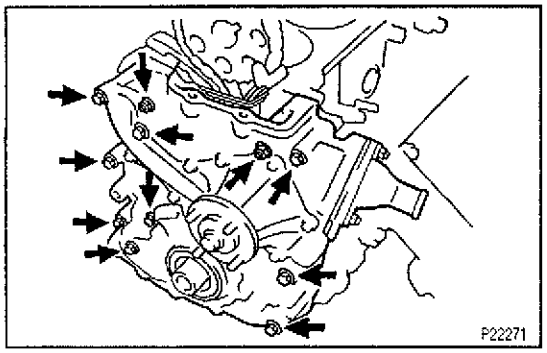


HINT: If necessary, remove the pulley with SST and crankshaft pulley bolt.
SST 09950—50010 (09951—05010, 09952—05010, 09953—05010, 09954—05020)



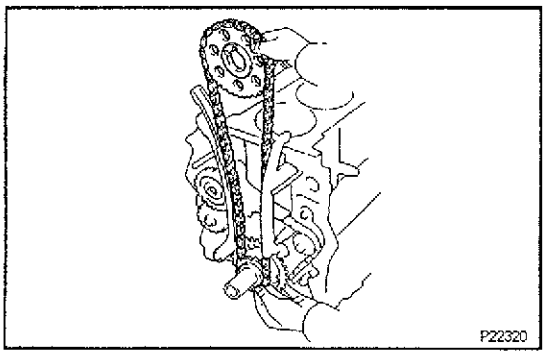
8. REMOVE TIMING CHAIN COVER

(a) Remove the 2 water bypass pipe nuts.
(b) Remove the 2 timing chain cover bolts.

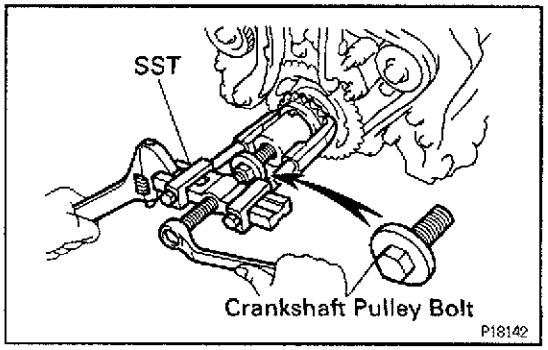


(c) Remove the 9 bolts and 2 nuts.
(d) Using a plastic faced hammer, loosen the chain cover and remove the timing chain cover and 3 gasket.

No.1 Timing Chain

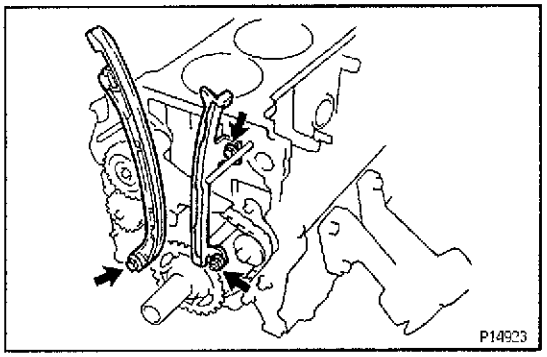


9. REMOVE NO.1 TIMING CHAIN AND CAMSHAFT TIMING GEAR



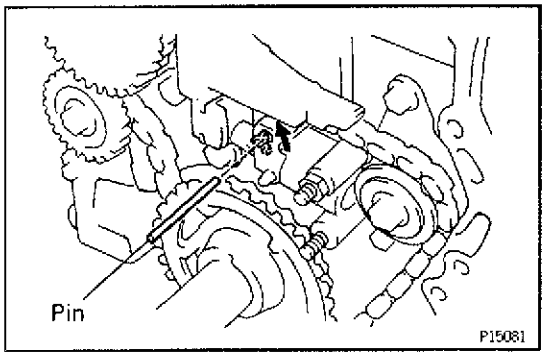
10. REMOVE CRANKSHAFT TIMING GEAR

HINT: If necessary, remove the gear with SST and crankshaft pulley bolt.
SST 09950—40010 (09951—04010, 09952—04010, 09953—04010, 09954—04010, 09955—04060)



11. REMOVE NO.1 TIMING CHAIN TENSIONER SLIPPER AND NO.1 VIBRATION DAMPER

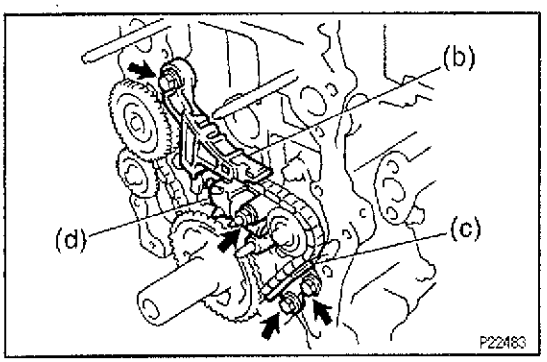
(a) Remove the bolt and slipper.
(b) Remove the bolt, nut and No.1 damper.



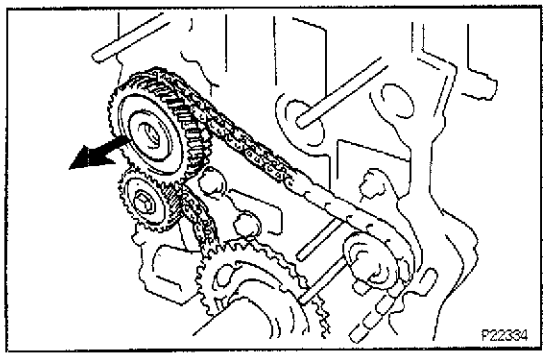
No.2 Timing Chain

12. REMOVE NO.2, NO.3 VIBRATION DAMPERS AND NO.2 CHAIN TENSIONER

(a) Install a pin to the No.2 chain tensioner and lock the plunger.

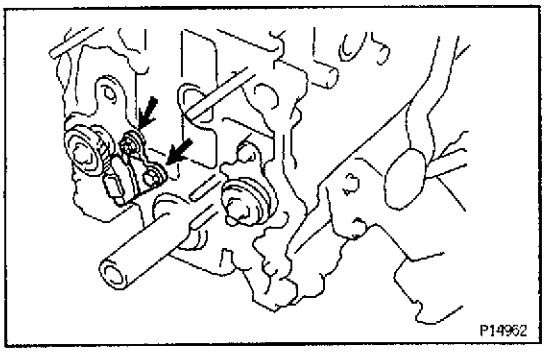


(b) Remove the bolt and No.2 damper.
(c) Remove the 2 bolts and No.3 damper.
(d) Remove the nut and No.2 chain tensioner.



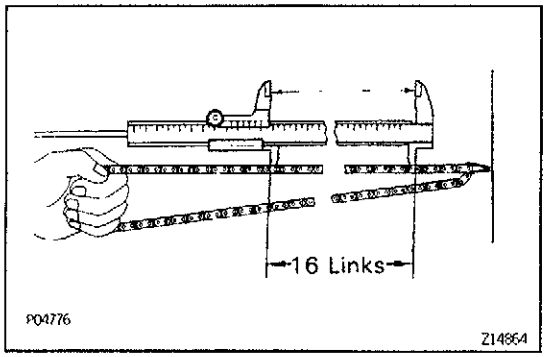
13. REMOVE BALANCE SHAFT DRIVE GEAR, SHAFT, NO. 2 TIMING CHAIN AND NO. 2 CRANKSHAFT TIMING SPROCKET

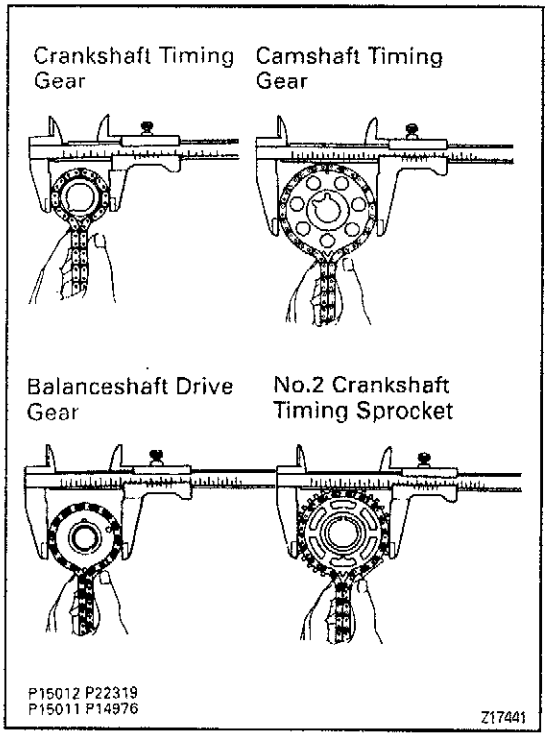
(a) Remove the bolt from the balance shaft drive gear.
(b) Remove the balance shaft drive gear with the shaft.
(c) Remove the No.2 timing chain with the No.2 crankshaft timing sprocket.

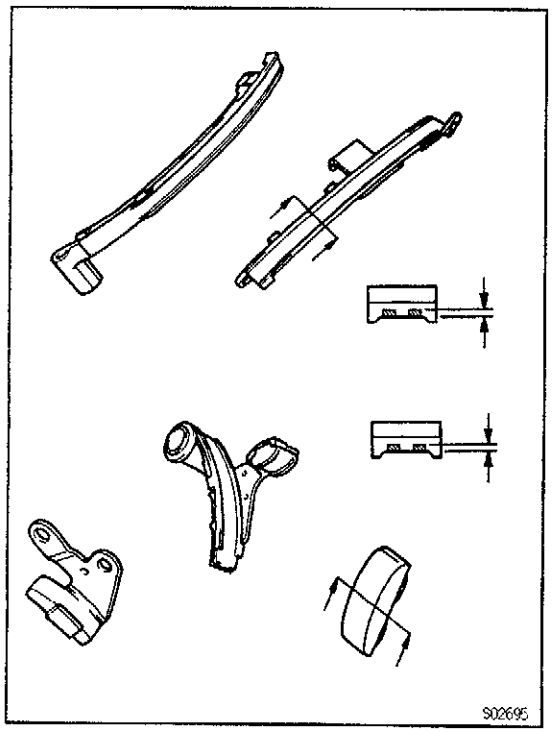


14. REMOVE NO.4 VIBRATION DAMPER

Remove the 2 bolts and No.4 damper.







EG78X-01

TIMING CHAIN COMPONENTS INSPECTION

1. INSPECT TIMING CHAINS, TIMING GEARS AND TIMING SPROCKETS

(a) Measure the length of 16 links with the chain fully stretched.

Maximum chain elongation:

No.1 Timing chain

147.5 mm (5.807 in.)

No.2 Timing chain

123.6 mm (4.866 in.)

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

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

(b) Wrap the chain around the timing gear and timing sprocket.

(c) Using vernier calipers, measure the timing gear and timing sprocket diameter with the chain.

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

Minimum gear diameter (w/ chain):

Camshaft

113.8 mm (4.480 in.)

Crankshaft

59.4 mm (2.339 in.)

Balance shaft

75.9 mm (2.988 in.)

Minimum sprocket diameter (w/ chain):

No.2 crankshaft

96.7 mm (3.807 in.)

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

2. INSPECT CHAIN TENSIONER SLIPPER AND VIBRATION DAMPERS

Measure the chain tensioner slipper and vibration damper wears.

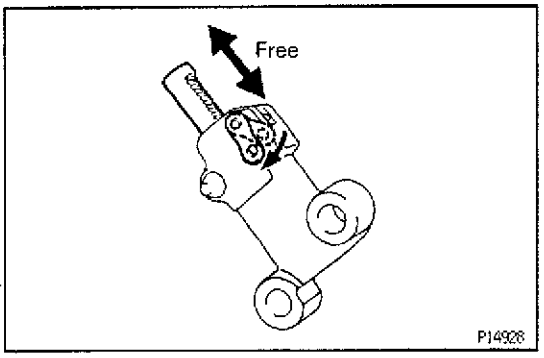
Maximum wear:

1.0 mm (0.039 in.)

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

3. INSPECT NO.1 CHAIN TENSIONER

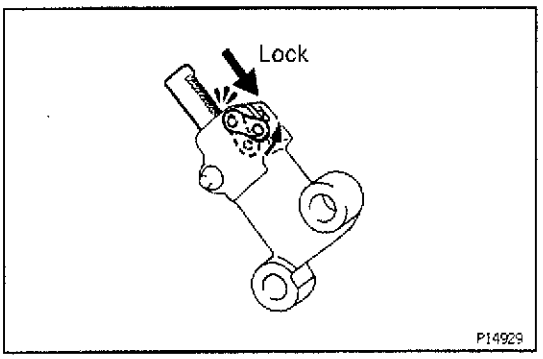
(See step 14 in cylinder head components, inspection, cleaning and repair in cylinder head)



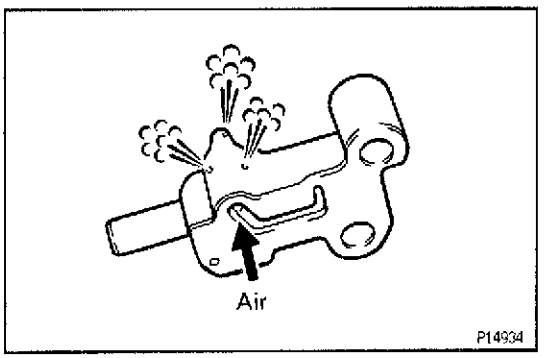
4. INSPECT NO.2 CHAIN TENSIONER

A. Inspect chain tensioner

(a) Check that the plunger moves smoothly when the ratchet pawl is raised with your finger.



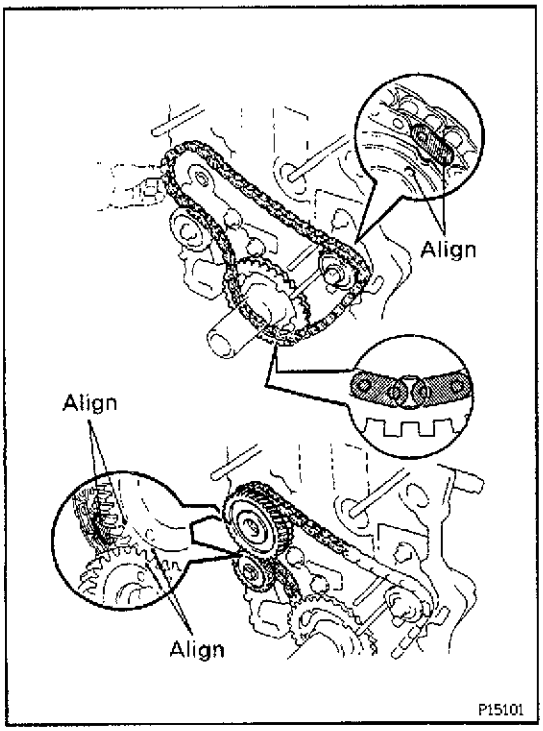
(b) Release the ratchet pawl and check that the plunger is locked in place by the ratchet pawl and does not move when pushed with your finger.



B. Inspect oil jet (No.2 chain tensioner).

Check the oil jet for damage or clogging.

If necessary, replace the oil jet (No.2 chain tensioner).



EG78Y-01

TIMING CHAIN INSTALLATION

No.2 Timing Chain

NOTICE: Check that No.1 cylinder is at TDC and that the weights of the No.1 and No.2 balance shafts are at the bottom side.

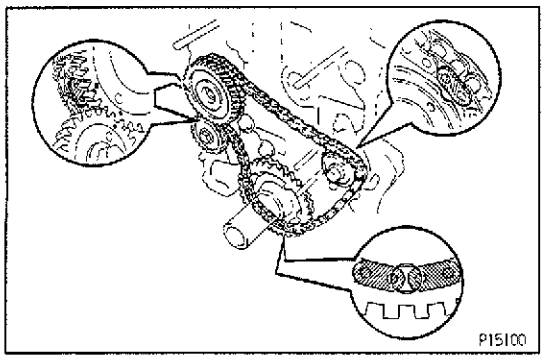
1. INSTALL NO.4 VIBRATION DAMPER

Install the No.4 damper with the 2 bolts.

2. INSTALL NO.2 TIMING CHAIN, NO.2 CRANKSHAFT TIMING SPROCKET, BALANCE SHAFT DRIVE GEAR AND SHAFT

(a) Install the No.2 timing chain by matching its mark links with the timing marks on the No.2 crankshaft timing sprocket and balance shaft timing sprocket.

(b) Fit the other mark link of No.2 timing chain onto the sprocket behind the large timing mark of the balance shaft drive gear.



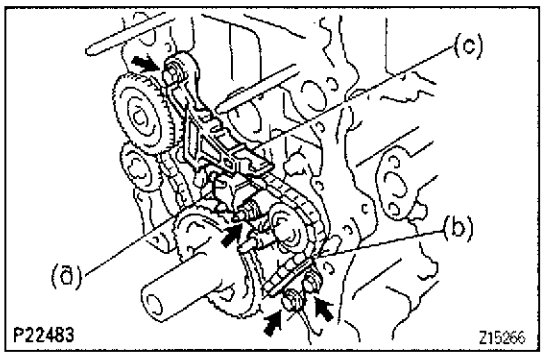
(c) Insert the balance shaft drive gear shaft through the balance shaft drive gear so that it fits into the thrust plate hole.
Then align the small timing mark of the balance shaft drive gear with the timing mark of the balance shaft timing gear.

(d) Install the bolt to the balance shaft drive gear and tighten it.
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

(e) Check that each timing mark is matched with the corresponding mark link.

3. INSTALL NO.2, NO.3 VIBRATION DAMPERS AND NO.2 CHAIN TENSIONER

NOTICE: Assemble the chain tensioner with the pin installed, then remove the pin after assembly. When doing this, avoid pushing the No.2 vibration damper against the chain.

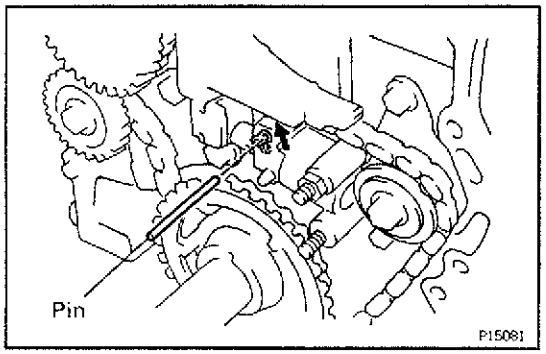


(a) Install the No.2 chain tensioner with the nut.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

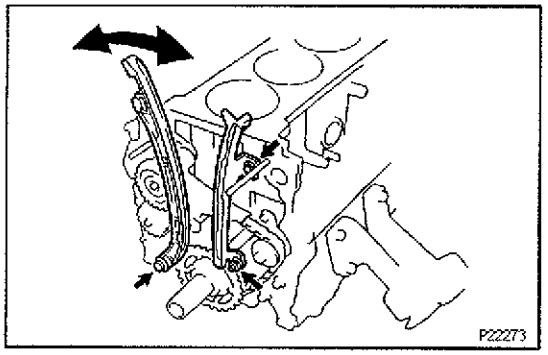
(b) Install No.3 damper with the 2 bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

(c) Install No.2 damper with the bolt.
Torque: 27 N·m (270 kgf·cm, 20 ft·lbf)

(d) Remove a pin from the No.2 chain tensioner and free the plunger.



No.1 Timing Chain

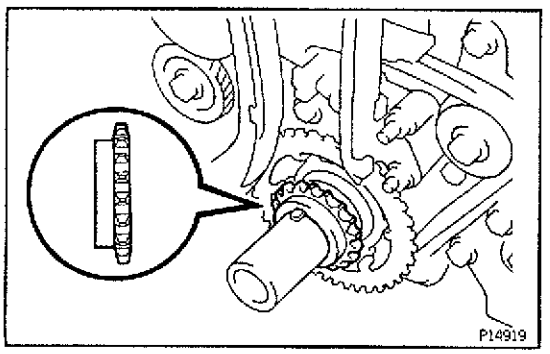


4. INSTALL NO.1 TIMING CHAIN TENSIONER SLIPPER AND NO.1 VIBRATION DAMPER

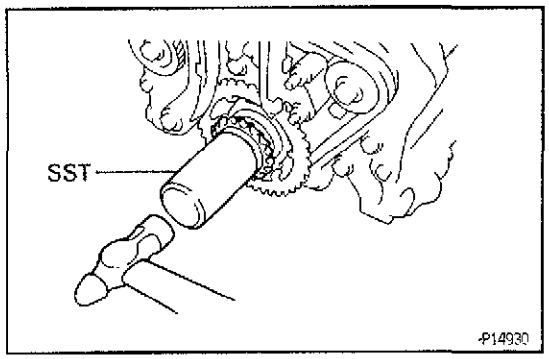
(a) Install the No.1 damper with the bolt and nut.
Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

(b) Install the slipper with the bolt.
Torque: 27 N·m (270 kgf·cm, 20 ft·lbf)

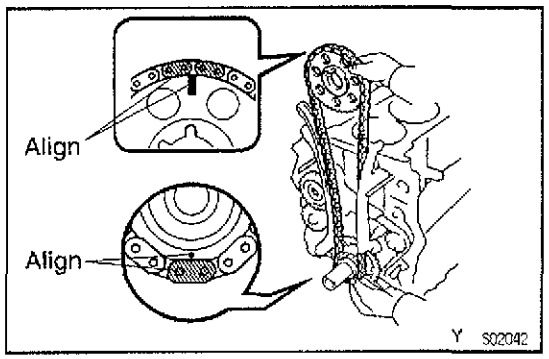
(c) Check that the slipper moves smoothly.



5. INSTALL CRANKSHAFT TIMING GEAR



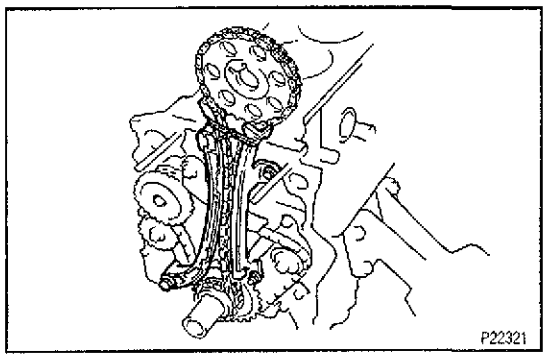
HINT: If necessary, install the gear with SST.
SST 09636–20010



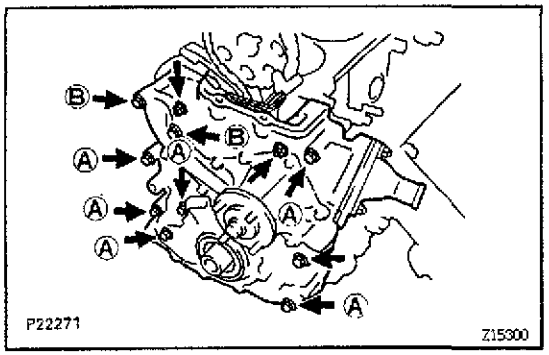
6. INSTALL NO.1 TIMING CHAIN AND CAMSHAFT TIMING GEAR

(a) Align the timing mark between the mark link of the No.1 timing chain, and install the No.1 timing chain to the timing gear.

(b) Align the timing mark of the crankshaft timing gear with the mark link of the No.1 timing chain and install the No.1 timing chain.



(c) Tie the No.1 timing chain with a cord as shown in the illustration, and make sure it doesn't come loose.



7. INSTALL TIMING CHAIN COVER

(a) Install 3 new gaskets to the cylinder block and water bypass pipe.

(b) Install the timing chain cover with the 9 bolts and 2 nuts.

Torque:

Bolt:

12 mm head Ⓐ: 20 N·m (200 kgf·cm, 14 ft·lbf)

12 mm head Ⓑ: 24.5 N·m (250 kgf·cm, 18 ft·lbf)

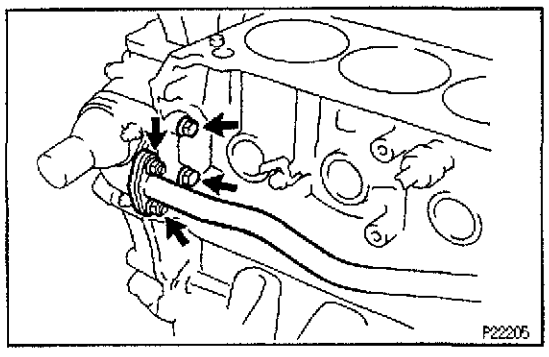
14 mm head: 44 N·m (440 kgf·cm, 32 ft·lbf)

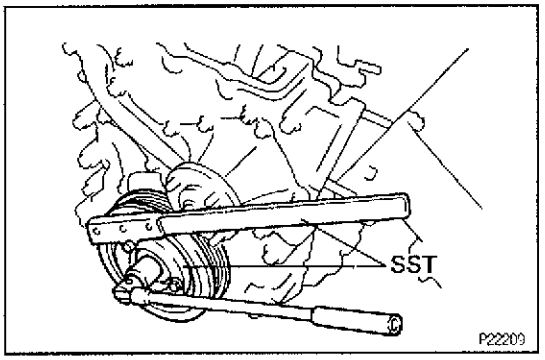
Nut : 20 N·m (200 kgf·cm, 14 ft·lbf)

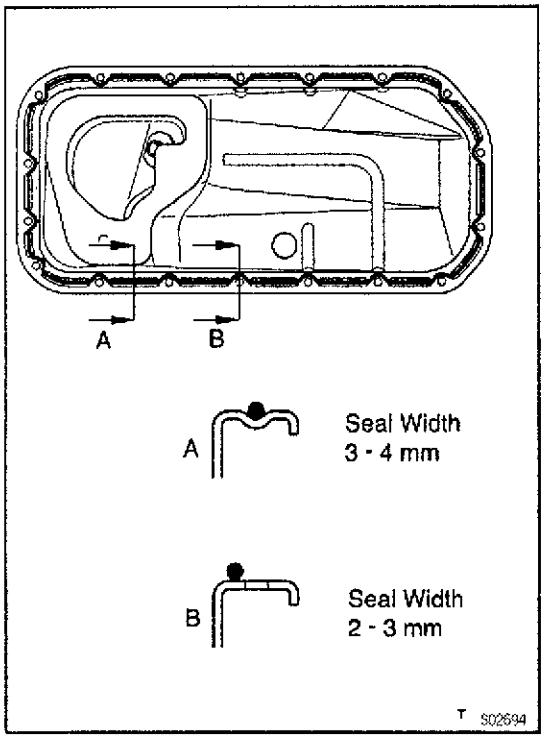
(c) Install the 2 timing chain cover bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

(d) Install the 2 water bypass pipe nuts.
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

(e) Remove the cord from the chain.







8. 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 and torque the pulley bolt.
SST 09213—54015, 09330—00021
Torque: 260 N·m (2,650 kgf·cm, 193 ft·lbf)

9. INSTALL OIL STRAINER

Install a new gasket and the oil strainer with the bolt and 2 nuts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

10. INSTALL OIL PAN

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surface of the oil pan.

- Using a razor blade and 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.

NOTICE: Do not use a solvent which will affect the painted surfaces.

(b) Apply seal packing to the oil pan as shown in the illustration.
Seal packing:
Part No. 08826—00080 or equivalent

- Install a nozzle that has been cut to a 2 — 3 mm (0.08 — 0.12 in.)opening or 3 — 4 mm (0.012 — 0.016 in.) opening.

HINT: Avoid applying an excessive amount to the surface.

- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

(c) Install the oil pan with the 16 bolts and 2 nuts.
Torque: 12.5 N·m (130 kgf·cm, 9 ft·lbf)

11. 3RZ—FE:
INSTALL CRANKSHAFT POSITION SENSOR
Install a new O—ring.
Torque: 8.5 N·m (85 kgf·cm, 74 in.·lbf)

12. INSTALL CYLINDER HEAD ASSEMBLY

13. FILL WITH ENGINE OIL AND ENGINE COOLANT

14. START ENGINE AND CHECK FOR LEAKS

15. RECHECK ENGINE COOLANT AND ENGINE

16. OIL LEVEL

EG