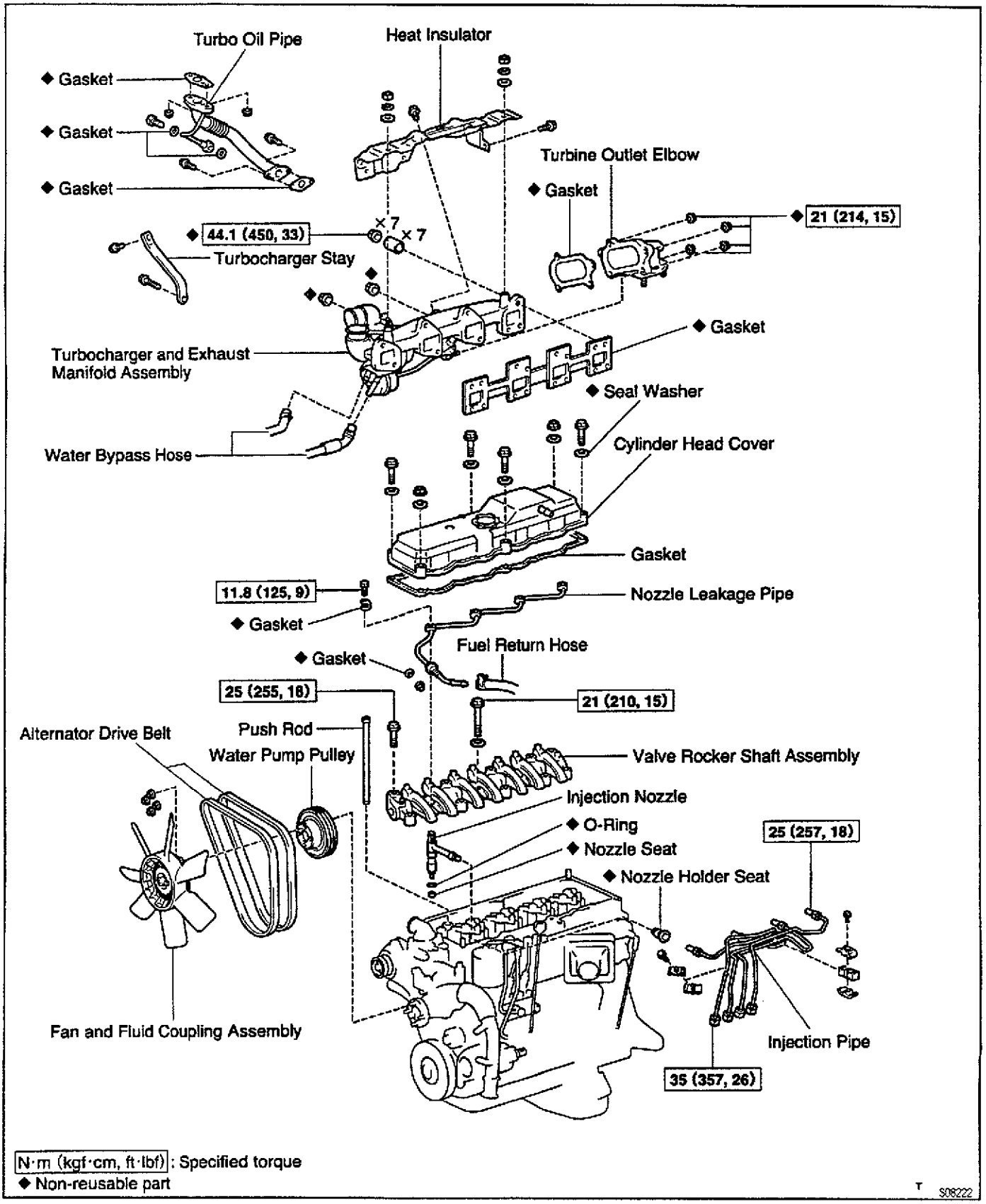
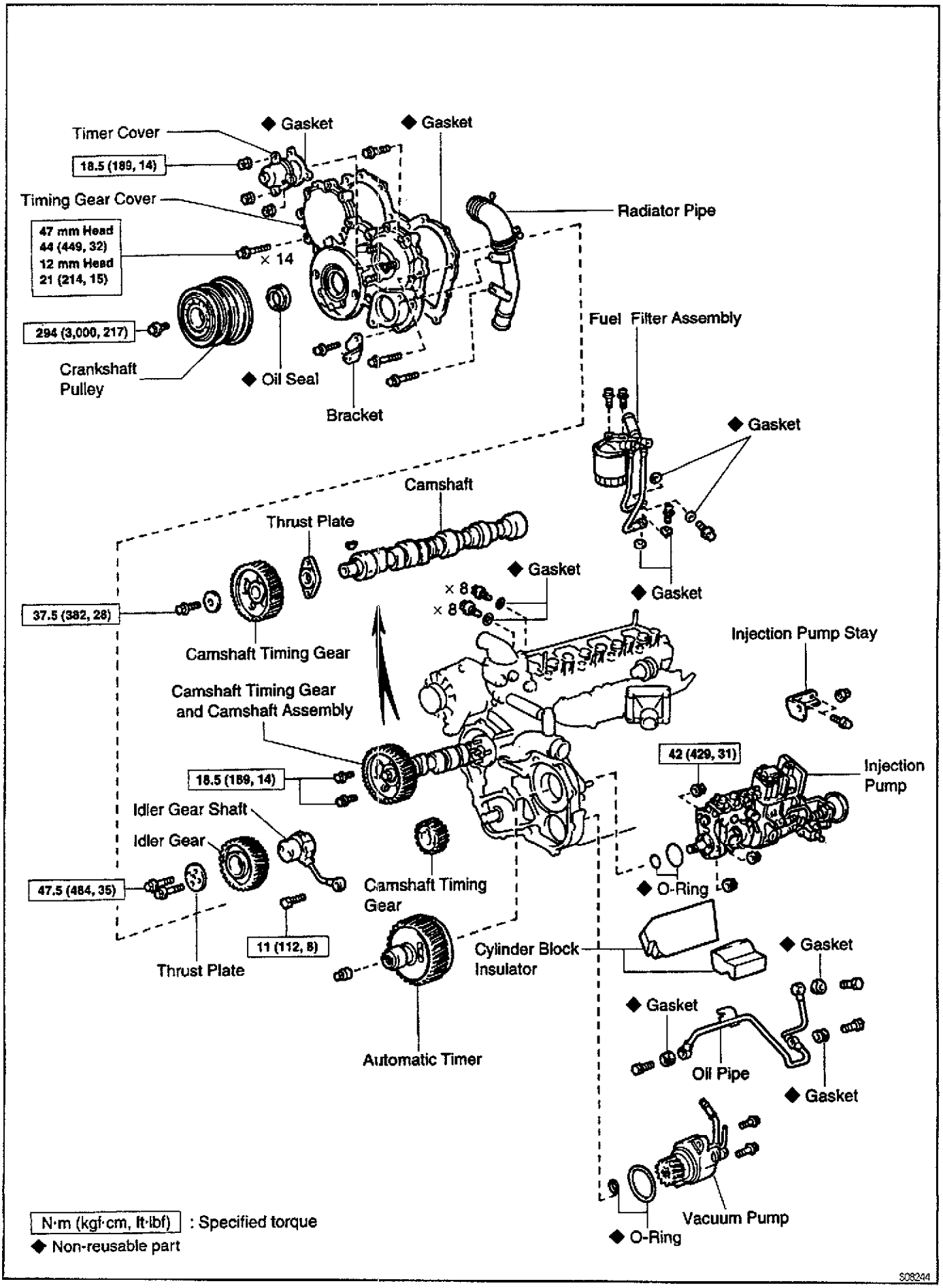
TIMING GEAR

COMPONENTS FOR REMOVAL AND INSTALLATION



N·m (kgf·cm, ft·lbf): Specified torque
◆ Non-reusable part

T S06222


Timer Cover
◆ Gasket
◆ Gasket
18.5 (189, 14)
Timing Gear Cover
Radiator Pipe
47 mm Head
44 (449, 32)
12 mm Head
21 (214, 15)
× 14
294 (3,000, 217)
Crankshaft Pulley
◆ Oil Seal
Bracket
Fuel Filter Assembly
◆ Gasket
Camshaft
Thrust Plate
◆ Gasket
◆ Gasket
× 8
× 8
37.5 (382, 28)
Camshaft Timing Gear
Injection Pump Stay
Camshaft Timing Gear and Camshaft Assembly
42 (429, 31)
Injection Pump
18.5 (189, 14)
Idler Gear Shaft
Idler Gear
47.5 (484, 35)
Camshaft Timing Gear
◆ O-Ring
11 (112, 8)
Thrust Plate
Cylinder Block Insulator
◆ Gasket
◆ Gasket
Oil Pipe
◆ Gasket
Automatic Timer
Vacuum Pump
◆ O-Ring
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
S08244

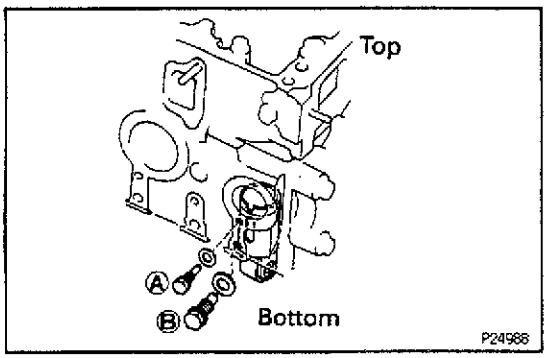
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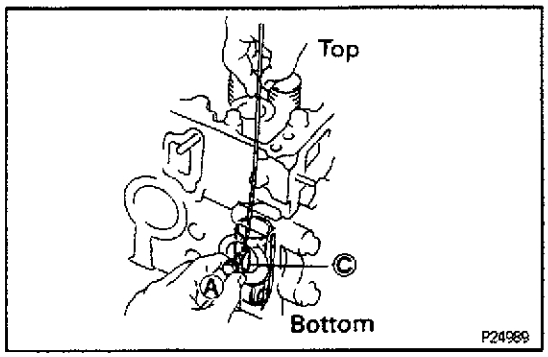
TIMING GEARS AND CAMSHAFT

REMOVAL

1. **REMOVE DRIVE BELT(S), FAN, FLUID COUPLING ASSEMBLY AND WATER PUMP PULLEY**
   (See water pump removal in Cooling System)
2. **REMOVE INJECTION NOZZLES**
   (See injection nozzles removal in Fuel System)
3. **REMOVE TURBOCHARGER AND EXHAUST MANIFOLD ASSEMBLY**
   (See turbocharger removal in Turbocharger System)
4. **REMOVE VALVE ROCKER SHAFT ASSEMBLY**
   (See cylinder head removal)
5. **DISPLACE VALVE LIFTERS**

(a) Remove bolts Ⓐ, Ⓑ and gaskets.





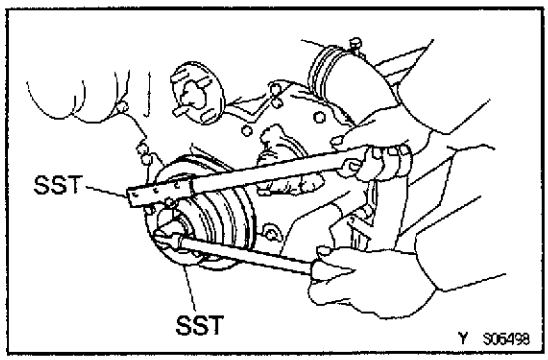
(b) Using a wire, lift up the valve lifter until long hole Ⓒ of the valve lifter moves up to the position of the installation hole for bolt Ⓐ.
HINT: If the lifter is lifted up too high it may get out of position.

(c) Install bolt Ⓐ.

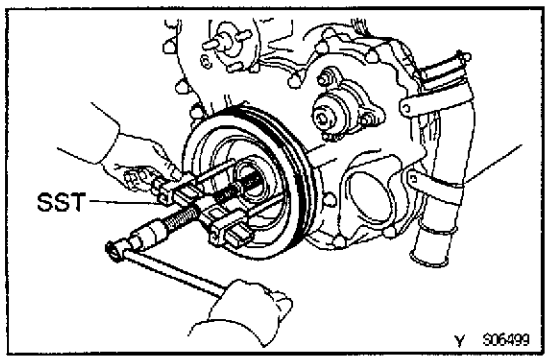
(d) Check that bolt Ⓐ prevents the valve lifter from falling.
NOTICE: Be careful not to scratch the valve lifter.

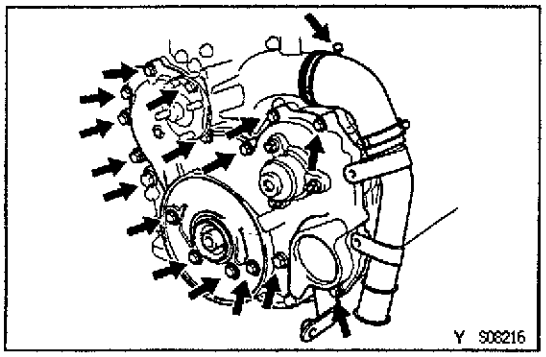
6. **REMOVE OIL DIPSTICK AND GUIDE**
   (See oil pump removal in Lubrication System)
7. **REMOVE OIL PIPE**
   (See steps 3 (d) and (e) in injection pump removal in Fuel System)
8. **REMOVE CRANKSHAFT PULLEY**

(a) Using SST, remove the mount bolt.
SST 09213–58012 (90105–08076),
09330–00021



(b) Using SST, remove the pulley.
SST 09950–50010 (09951–05010, 09952–05010, 09953–05010, 09953–05020, 09954–05030)



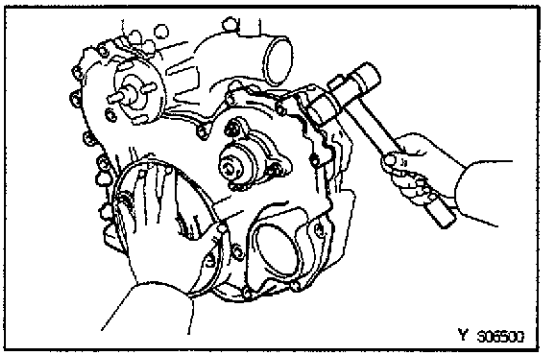


9. REMOVE RADIATOR PIPE

Disconnect the radiator hose from the water pump, and remove the radiator pipe.

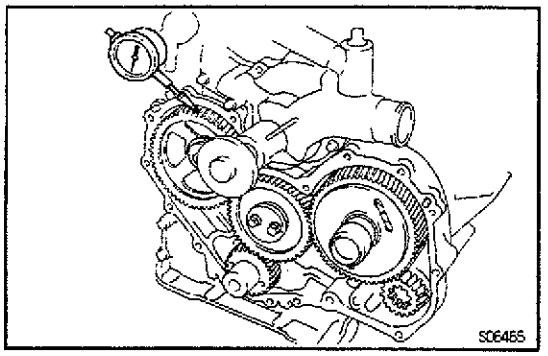
10. REMOVE TIMING GEAR COVER

(a) Remove the 16 mount bolts and bracket.



(b) Using a plastic–faced hammer, lightly tap out the gear cover.

(c) Remove the cover gasket.



11. CHECK TIMING GEAR BACKLASH

Using a dial indicator, measure the backlash between each gear.

Standard backlash:

0.045 – 0.161 mm (0.0018 – 0.0063 in.)

Maximum backlash:

0.30 mm (0.0118 in.)

If the backlash is greater than maximum, replace the gears as a set.

12. REMOVE INJECTION PUMP

(See injection pump removal in Fuel System)

HINT: Install the crankshaft pulley bolt to the crankshaft.

13. REMOVE AUTOMATIC TIMER

14. REMOVE VACUUM PUMP

(a) Remove the 2 bolts and vacuum pump.

(b) Remove the 2 O–rings from the vacuum pump.

TIMING GEARS AND CAMSHAFT INSTALLATION

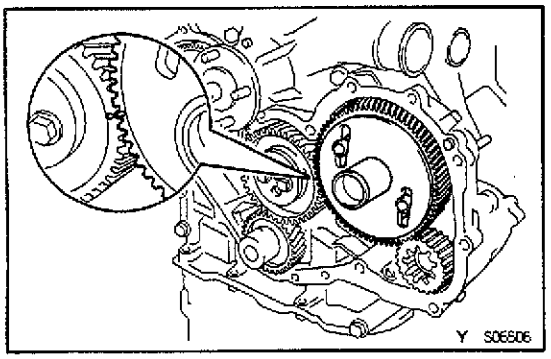
E07FN–02

1. INSTALL VACUUM PUMP

(a) Install 2 new O–rings to the vacuum pump.

(b) Install the vacuum pump with the 2 bolts.

Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)



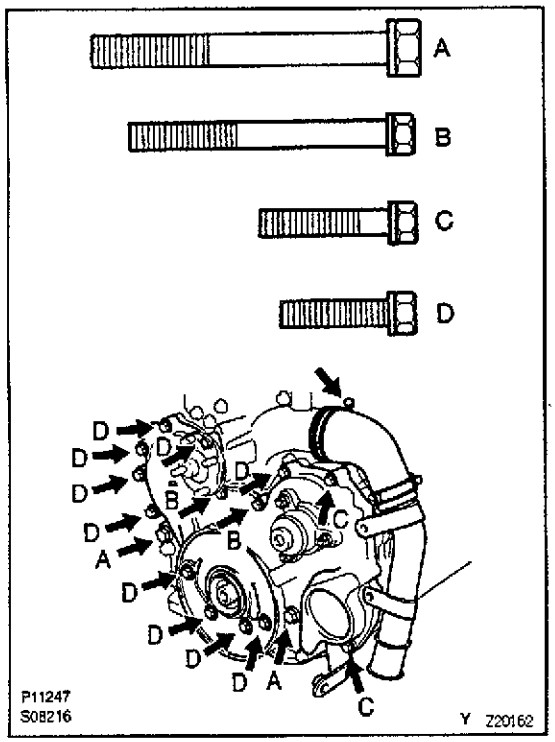
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2. **INSTALL AUTOMATIC TIMER**
Align the idle gear timing mark "0" with the injection pump drive gear timing mark "0", and mesh the gears.

3. **INSTALL INJECTION PUMP**
(See injection pump installation in Fuel System)

4. **CHECK TIMING GEAR BACKLASH**
(See step 11 in timing gears and camshaft removal)
Standard backlash:
0.045 — 0.161 mm (0.0018 — 0.0063 in.)
Maximum backlash:
0.30 mm (0.0118 in.)

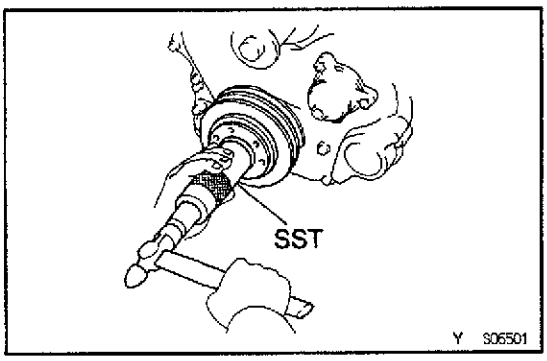
5. **CHECK IDLE GEAR THRUST CLEARANCE**
(See timing gears and camshaft removal)
Standard thrust clearance:
0.060 — 0.170 mm (0.0024 — 0.0067 in.)
Maximum thrust clearance:
0.30 mm (0.0118 in.)

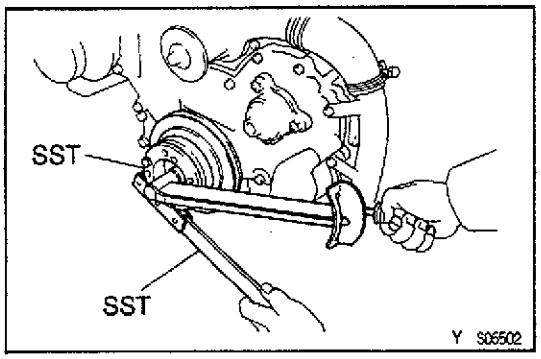


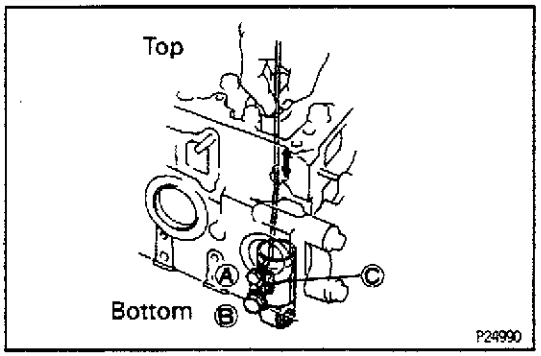
6. **INSTALL TIMING GEAR COVER**
(a) Install a new gasket and the timing gear cover.
(b) Align the 2 knock pins of the oil pump and lightly tap in the timing gear cover, using a plastic — faced hammer.
(c) Install the bracket and 16 mount bolts.
Torque:
14 mm head
44 N·m (449 kgf·cm, 32 ft·lbf)
12 mm head
21 N·m (214 kgf·cm, 15 ft·lbf)
HINT: Each bolt length is indicated in the illustration.
Bolt length
A 80 mm (3.15 in.) for 14 mm head
B 77 mm (3.03 in.) for 12 mm head
C 40 mm (1.57 in.) for 12 mm head
D 35 mm (1.38 in.) for 12 mm head

7. **INSTALL RADIATOR PIPE**
(a) Connect the radiator hose to the water pump.
(b) Install the radiator pipe with the 2 bolts.
Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)

8. **INSTALL CRANKSHAFT PULLEY**
(a) Align the pulley set key with the key groove of the pulley.
(b) Using SST and a hammer, tap in the pulley.
SST 09608—06041







(c) Apply a light coat of engine oil on the threads and under the bolt head.

(d) Using SST, install and torque the pulley mount bolt.
SST 09213–58012 (90201–08131, 91111–50845), 09330–00021
Torque: 294 N·m (3,000 kgf·cm, 217 ft·lbf)

9. INSTALL OIL PIPE
(See injection pump installation in Fuel System)

10. INSTALL OIL DIPSTICK AND GUIDE
(See injection pump installation in Fuel System)

11. DISPLACE VALVE LIFTERS

(a) Remove bolt Ⓐ and let the lifter slide down.

(b) Install bolts Ⓐ and Ⓑ with new gaskets.
Torque:
Bolt Ⓐ 7.5 N·m (76 kgf·cm, 4.7 in.·lbf)
Bolt Ⓑ 37.5 N·m (382 kgf·cm, 28 ft·lbf)
HINT: When installing bolt Ⓑ, check that the hole for bolt Ⓑ is aligned with long hole Ⓒ of valve lifter.

(c) Check that the valve lifter can move up and down within the limits of long hole Ⓒ.
NOTICE: Be careful not to scratch the valve lifter.

12. INSTALL VALVE ROCKER SHAFT ASSEMBLY
(See cylinder head installation)

13. INSTALL TURBOCHARGER AND EXHAUST MANIFOLD ASSEMBLY
(See turbocharger installation in Turbocharger System)

14. INSTALL INJECTION NOZZLES
(See injection nozzles installation in Fuel System)

15. INSTALL WATER PUMP PULLEY, FAN, FLUID COUPLING ASSEMBLY (FAN SPACER AND FAN) AND DRIVE BELT(S)
(See water pump installation in Cooling System)

16. START ENGINE AND CHECK FOR LEAKS

17. CHECK ENGINE OIL LEVEL

18. READJUST VALVE CLEARANCE
(See valve clearance inspection and adjustment)

19. READJUST DRIVE BELT(S)
(See on–vehicle inspection in Charging System)