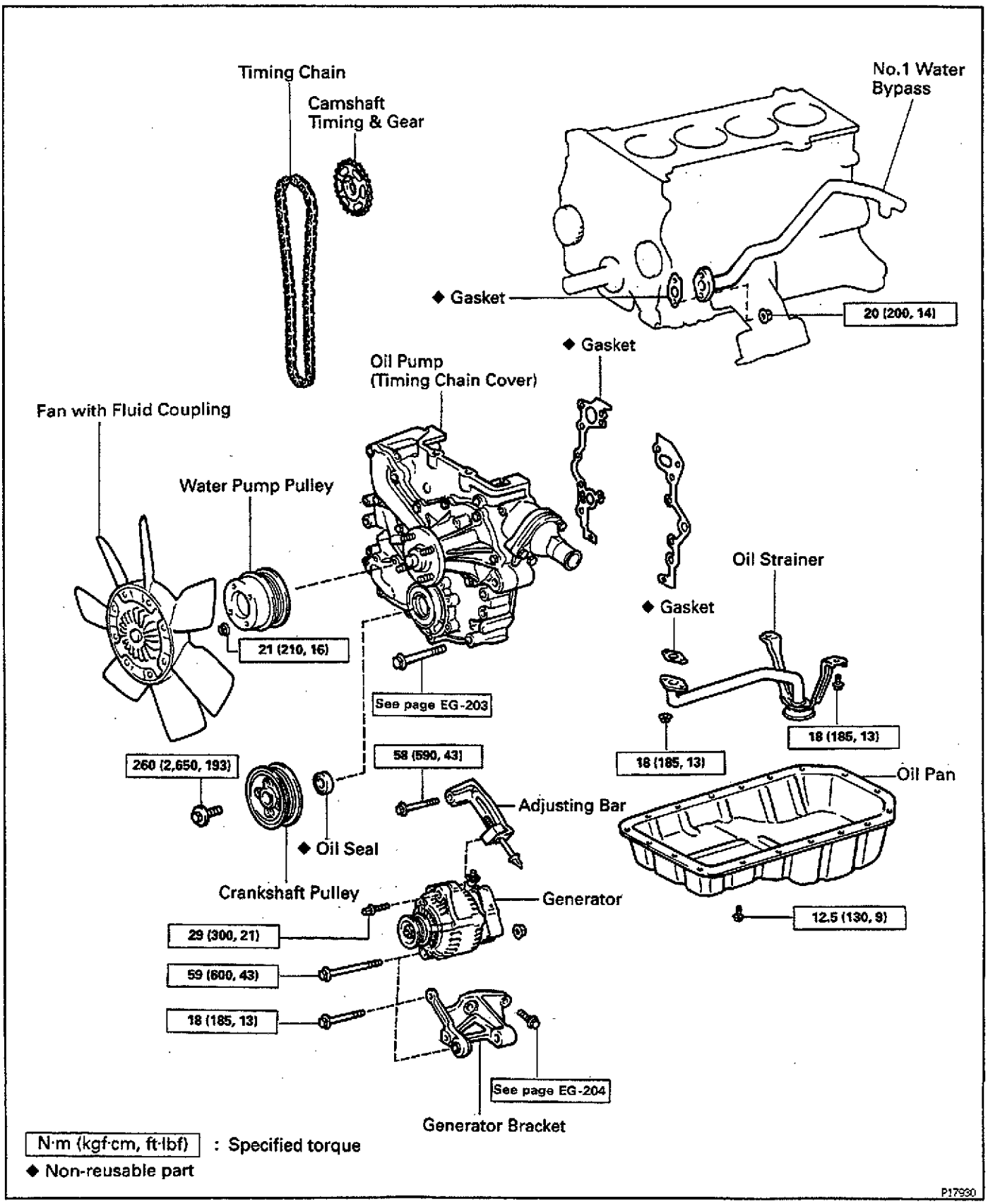
OIL PUMP

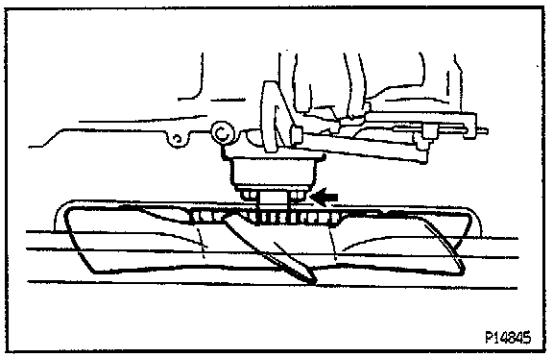
COMPONENTS FOR REMOVAL AND INSTALLATION

EG



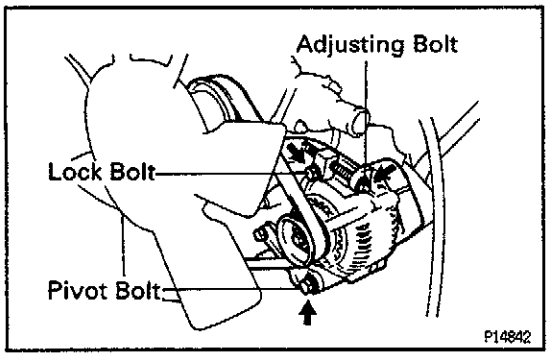
OIL PUMP REMOVAL

1. **DRAIN ENGINE OIL**
2. **DRAIN ENGINE COOLANT**
3. **REMOVE CYLINDER HEAD**
   (See page EG–35)

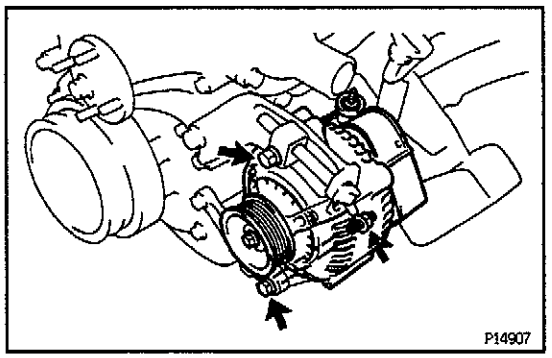


4. **REMOVE DRIVE BELT, FAN WITH FLUID COUPLING AND WATER PUMP PULLEY**

(a) Stretch the belt and loosen the water pump pulley mounting nuts.

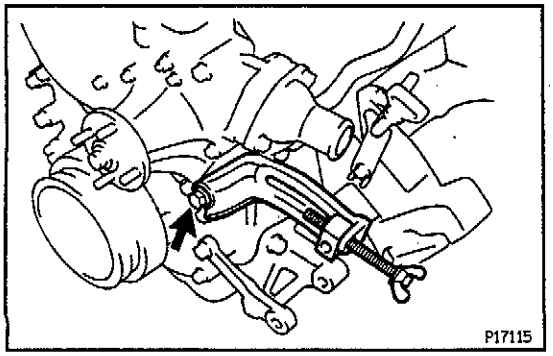


(b) Loosen the lock, pivot and adjusting bolts of the alternator, and remove the drive belt.
(c) Remove the 4 water pump pulley mounting nuts.
(d) Pull out the fan with fluid coupling and water pump pulley.



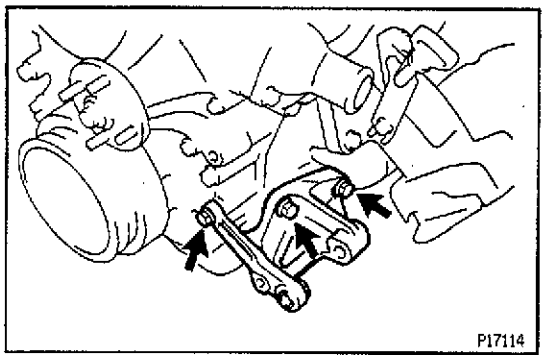
5. **REMOVE ALTERNATOR, ADJUSTING BAR AND BRACKET**

(a) Remove the lock, pivot bolts and the alternator.

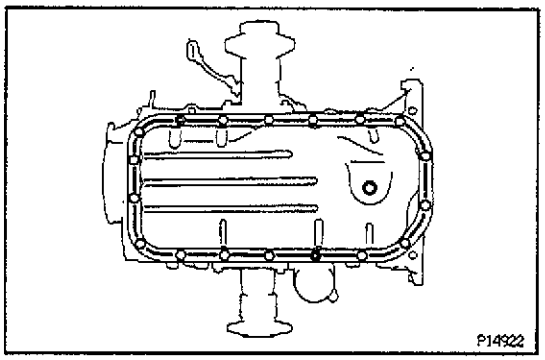


(b) Remove the bolt and adjusting bar.

EG

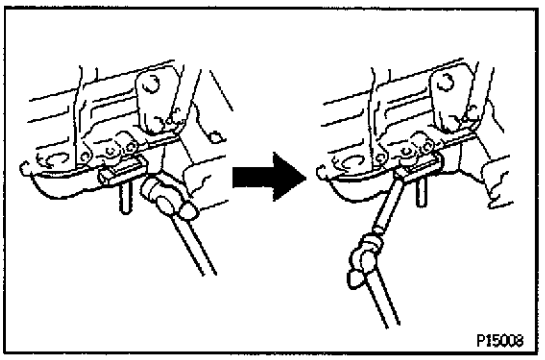


(c) Remove the 3 bolts and bracket.

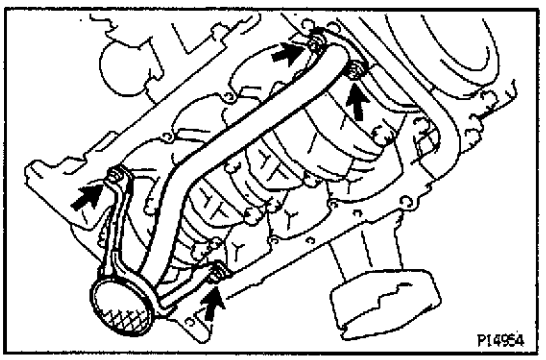


6. REMOVE OIL PAN

(a) Remove the 16 mounting bolts and 2 nuts.

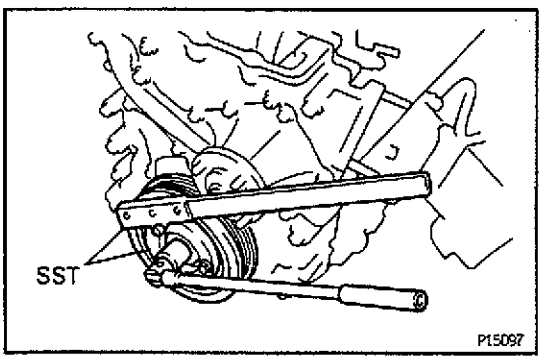


(b) Insert the blade of SST between the cylinder block and oil pan, cut off applied sealer and remove the oil pan.
SST 09032–00100
NOTICE: Be careful not to damage the oil pan flanges of the oil pan and cylinder block.



7. REMOVE OIL STRAINER

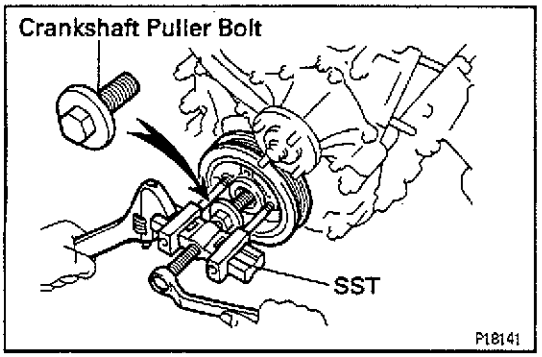
Remove the 2 bolts, 2 nuts, oil strainer and gasket.



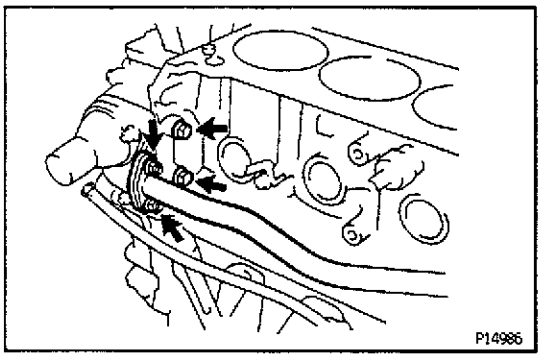
8. REMOVE CRANKSHAFT PULLEY

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

(b) Remove the crankshaft pulley.

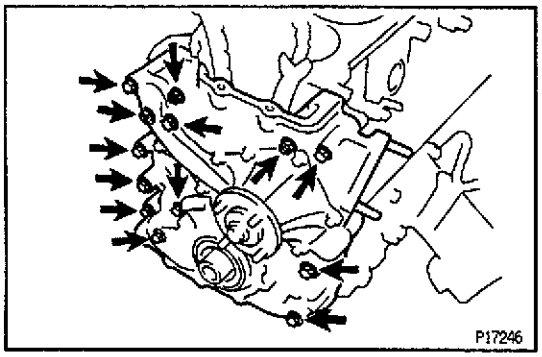


HINT: If necessary, remove the pulley with SST and crankshaft pulley bolt.
SST 09950—50010 (09951—05010, 09952—05010, 09953—05010, 09954—05020)

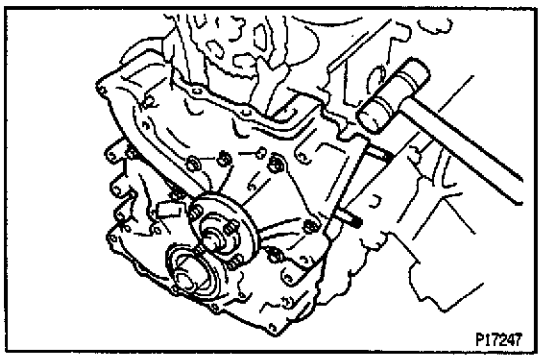


9. REMOVE TIMING CHAIN COVER

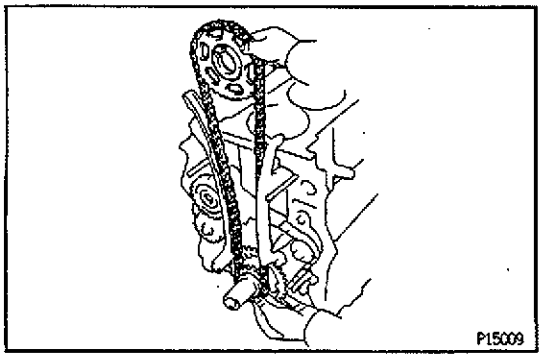
(a) Remove the 2 water bypass pipe mounting nuts.
(b) Remove the 2 timing chain cover mounting bolts.



(c) Remove the 11 mounting bolts and 2 mounting nuts.



(d) Using a plastic — faced hammer, loosen the chain cover and remove the timing chain cover and 3 gaskets.

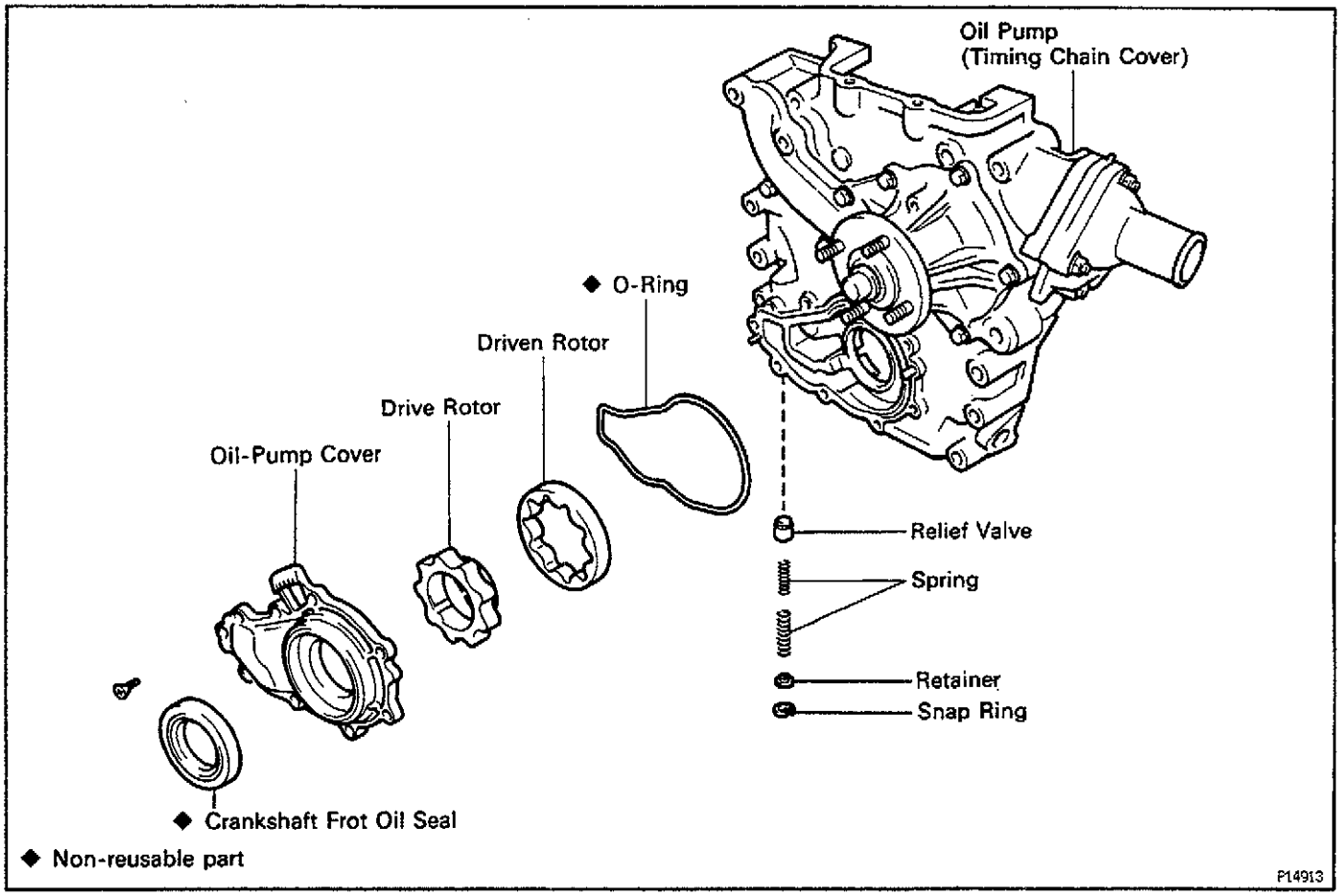


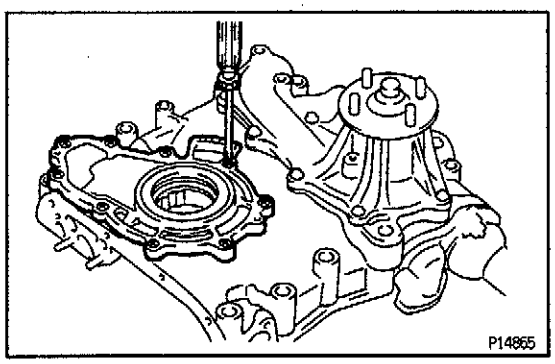
10. REMOVE NO.1 TIMING CHAIN AND CAMSHAFT TIMING GEAR

EG

COMPONENTS FOR DISASSEMBLY AND ASSEMBLY

EG1JG-02



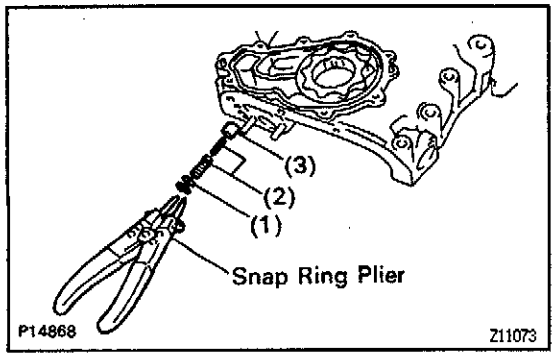


EG0NP-04

OIL PUMP DISASSEMBLY

1. REMOVE DRIVE AND DRIVEN ROTORS

Remove the 9 screws, pump cover, drive rotor, driven rotor and O−ring.

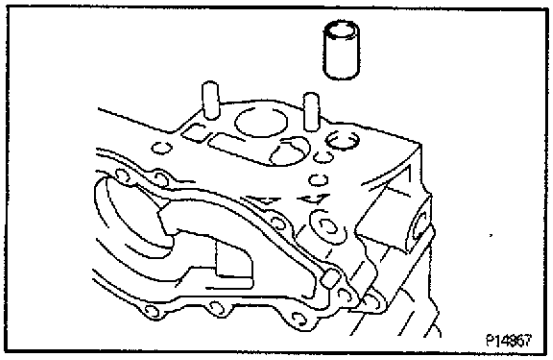


2. REMOVE RELIEF VALVE

(a) Using snap ring pliers, remove the snap ring.

(b) Remove the following parts:

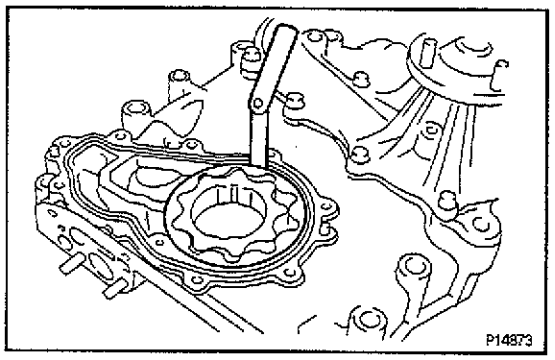
(1) Retainer
(2) Spring
(3) Relief valve



OIL PUMP INSPECTION

1. **INSPECT RELIEF VALVE**

Coat the valve with engine oil and check that it falls smoothly into the valve hole by its own weight.
If it does not, replace the relief valve. If necessary, replace the oil pump assembly.



2. **INSPECT DRIVE AND DRIVEN ROTORS**

A. Inspect rotor body clearance

Using a thickness gauge, measure the clearance between the driven rotor and body.

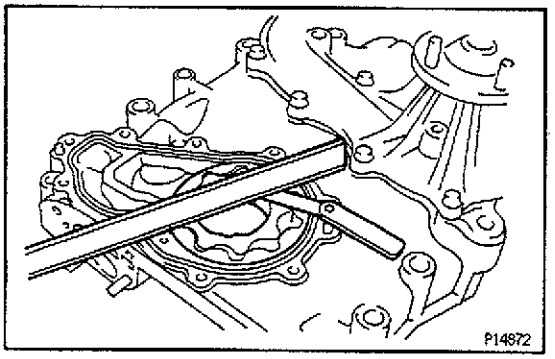
Standard body clearance:

0.100 – 0.175 mm (0.0039 – 0.0069 in.)

Maximum body clearance:

0.30 mm (0.0118 in.)

If the body clearance is greater than maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.



B. Inspect rotor side clearance

Using a thickness gauge and precision straight edge, measure the clearance between the rotors and precision straight edge.

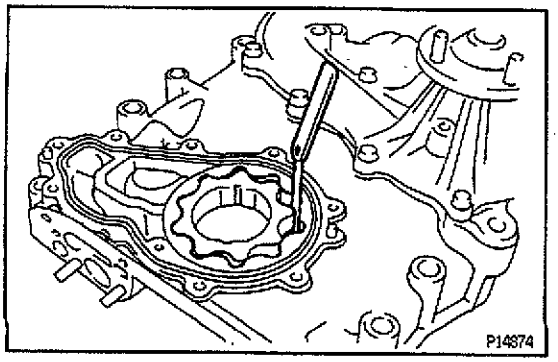
Standard side clearance:

0.030 – 0.090 mm (0.0012 – 0.0035 in.)

Maximum side clearance:

0.15 mm (0.0059 in.)

If the side clearance is greater than maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.



C. Inspect rotor tip clearance

Using a thickness gauge, measure the clearance between the drive and driven rotor tips.

Standard tip clearance:

0.110 – 0.240 mm (0.0043 – 0.0094 in.)

Maximum tip clearance:

0.25 mm (0.0098 in.)

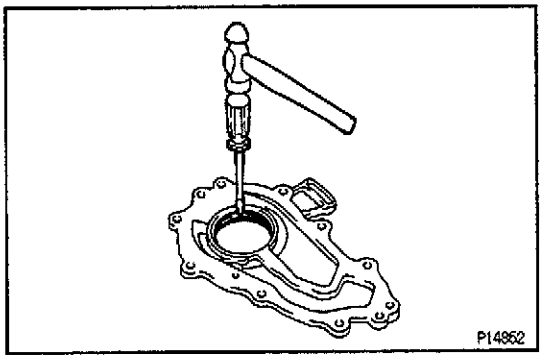
If the tip clearance is greater than maximum, replace the rotors as a set.

EG0681-0A

CRANKSHAFT FRONT OIL SEAL REPLACEMENT

HINT: There are 2 methods (A and B) to replace the oil seal which are as follows:

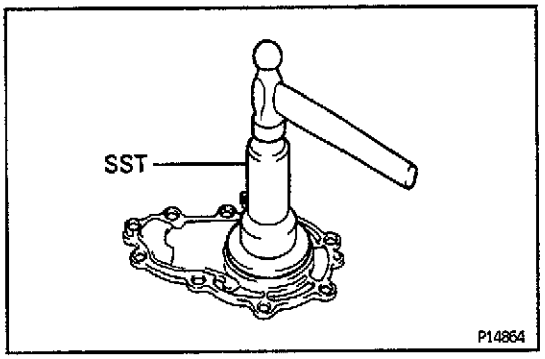
EG



REPLACE CRANKSHAFT FRONT OIL SEAL

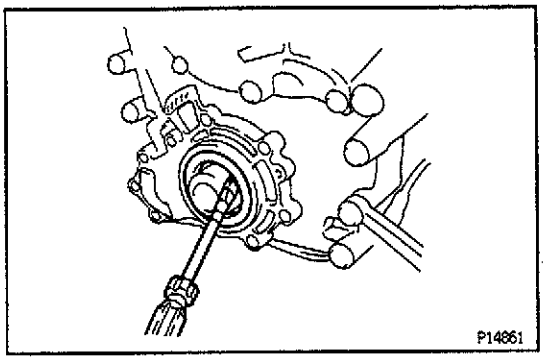
A. If oil pump is removed from the cylinder block:

(a) Using a screwdriver and a hammer, tap out the oil seal.



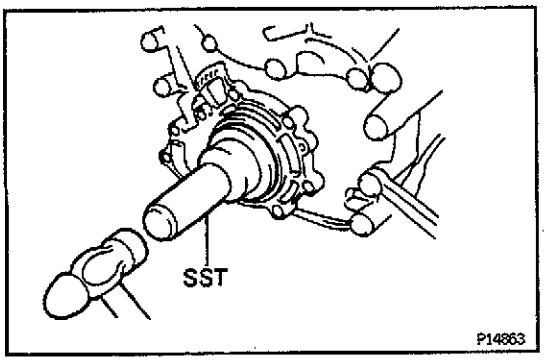
(b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump cover edge.
SST 09223—50010

(c) Apply MP grease to the oil seal lip.



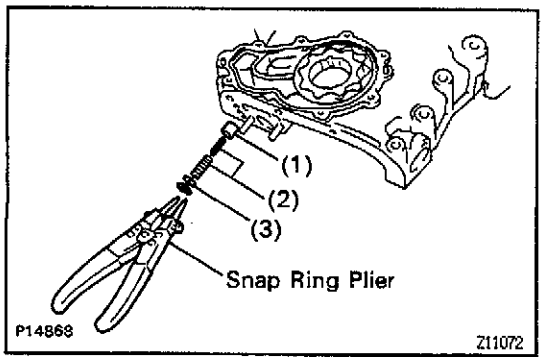
B. If oil pump is installed to the cylinder block:

(a) Using a screwdriver, pry out the oil seal.
NOTICE: Be careful not to damage the crankshaft. Tape the screwdriver tip.



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

(c) Using SST and a hammer, tap in the oil seal until its surface is flush with the oil pump cover edge.
SST 09223—50010



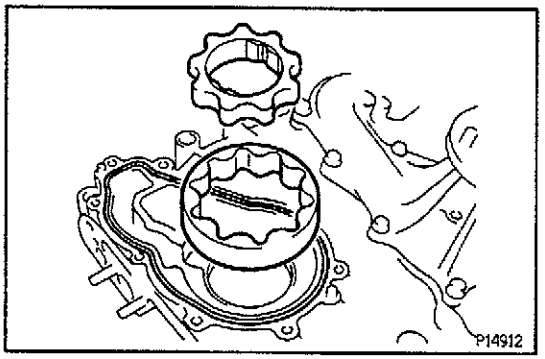
OIL PUMP ASSEMBLY

(See Components for Disassembly and Assembly)

1. INSTALL RELIEF VALVE

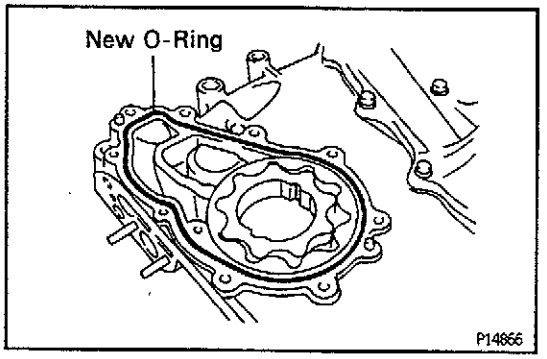
(a) Install the following parts:
- (1) Relief valve
- (2) Spring
- (3) Retainer

(b) Using snap ring pliers, install the ring.

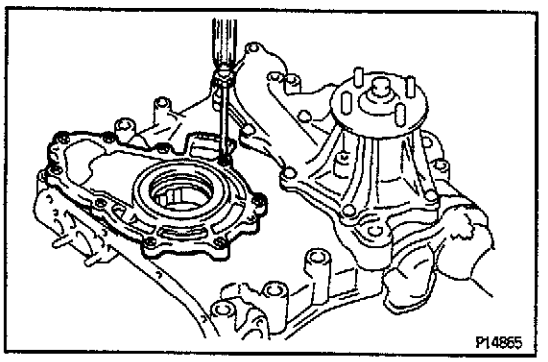


2. INSTALL DRIVE AND DRIVEN ROTORS

(a) Place the drive and driven rotors into the pump body.



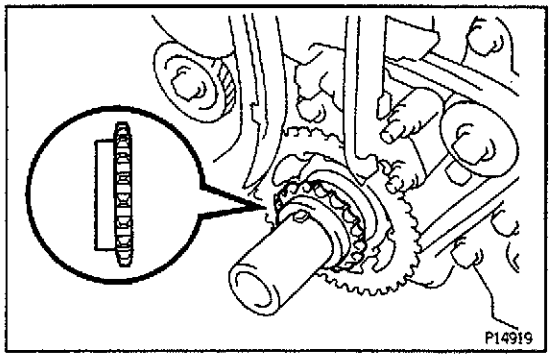
(b) Place a new O–ring on to the pump body.



(c) Install the pump cover with the 9 screws.

EG

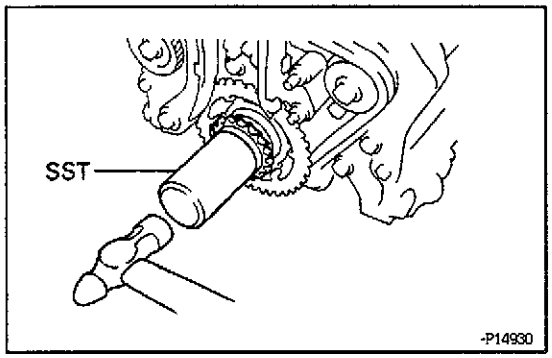
EG



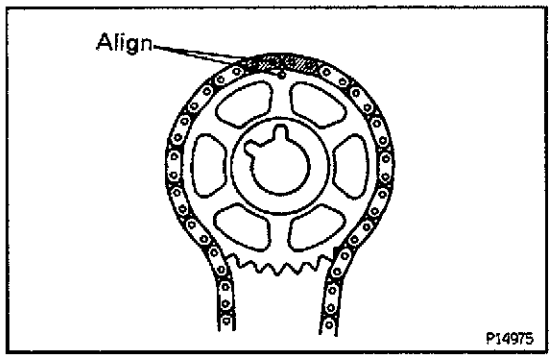
OIL PUMP INSTALLATION

(See Components for Removal and Installation)

1. INSTALL CRANKSHAFT TIMING GEAR

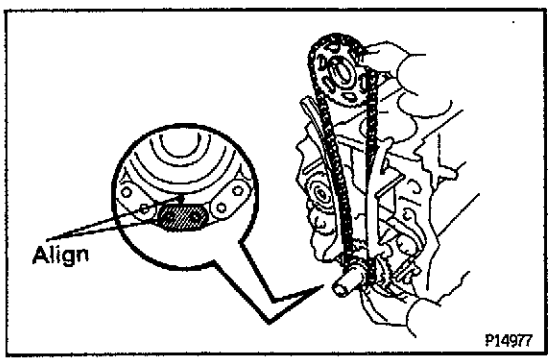


HINT: If necessary, install the gear with SST.
SST 09636—20010

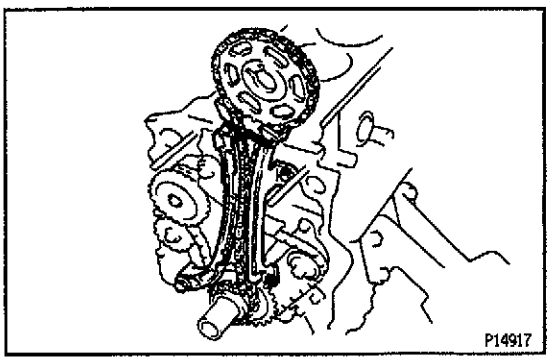


2. INSTALL NO.1 TIMING CHAIN AND CAMSHAFT TIMING GEAR

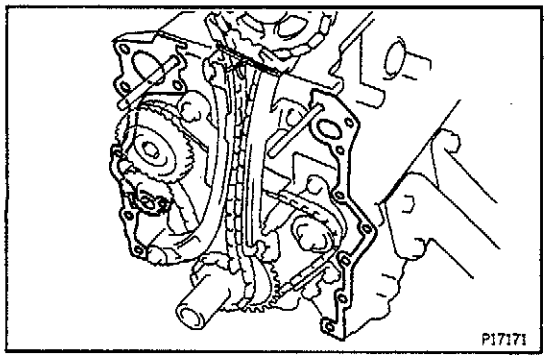
(a) Align the timing mark between the mark link of the No.1 timing chain, and install the No.1 timing chain to the timing gear.



(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.

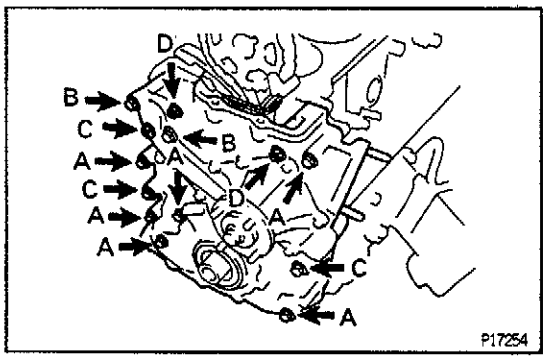


(c) Tie the No.1 timing chain with a cord as shown in the illustration and make sure it doesn't come loose.



3. INSTALL TIMING CHAIN COVER

(a) Install 3 new gaskets to the cylinder block and No.1 water bypass pipe.

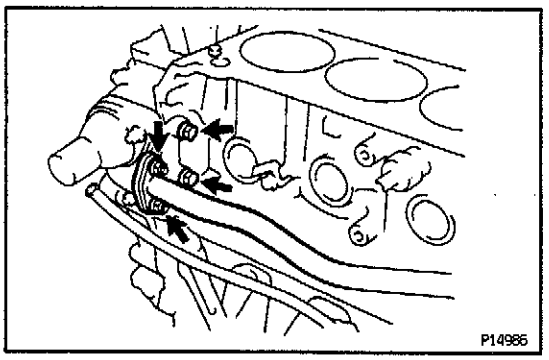


(b) Install the timing chain cover with the 11 bolts and 2 nuts.

Torque:

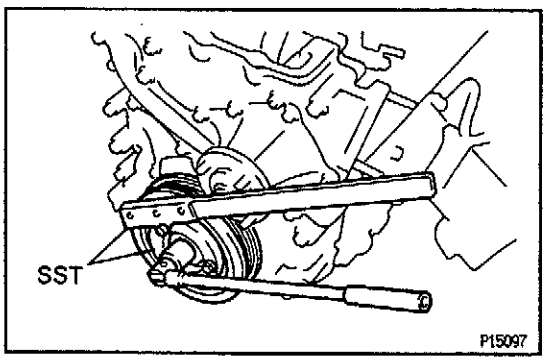
Bolt A 20 N·m (200 kgf·cm, 14 ft·lbf)
Bolt B 24.5 N·m (250 kgf·cm, 18 ft·lbf)
Bolt C 44 N·m (440 kgf·cm, 32 ft·lbf)
Nut D 20 N·m (200 kgf·cm, 14 ft·lbf)

(c) Remove the cord from the chain.



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

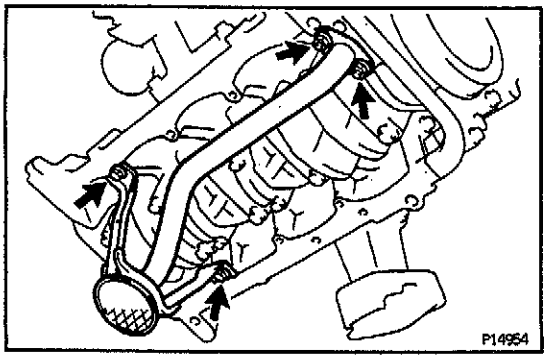
(e) Install the 2 No.1 water bypass pipe mounting nuts.
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)



4. INSTALL CRANKSHAFT PULLEY

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

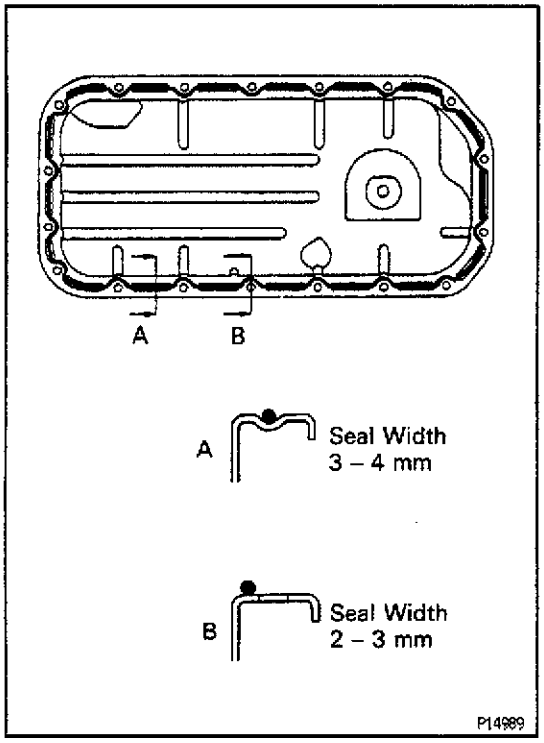
(b) Using SST, install and torque the pulley bolt.
SST 09213—54015, 09330—00021
Torque: 260 N·m (2,650 kgf·cm, 193 ft·lbf)



5. INSTALL OIL STRAINER

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

EG



6. 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.

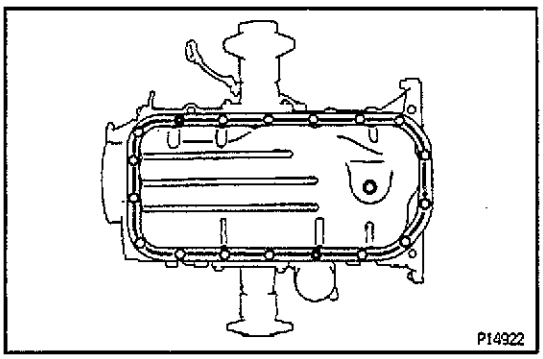
Seal packing:

Part No. 08826–00080 or equivalent

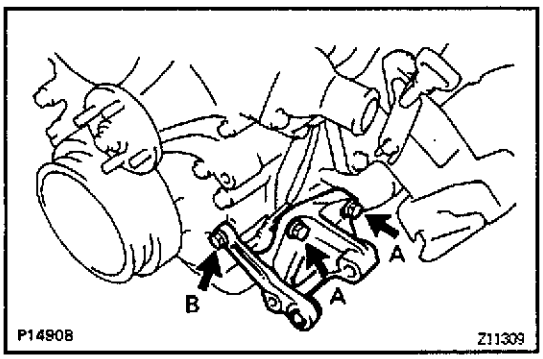
- Install a nozzle that has been cut to a 2 – 3 mm (0.08 – 0.12 in.) opening or 3 – 4 mm (0.012 – 0.016 in.) opening.

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.



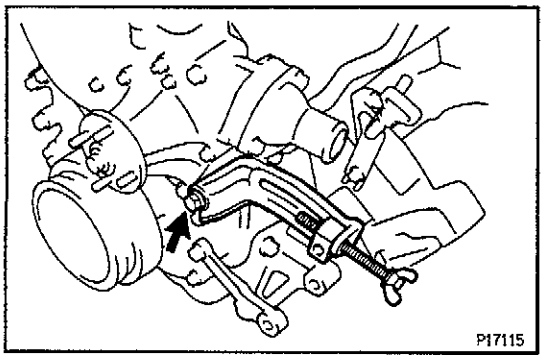
(c) Install the oil pan with the 16 bolts and 2 nuts.
Torque: 12.5 N·m (130 kgf·cm, 9 ft·lbf)



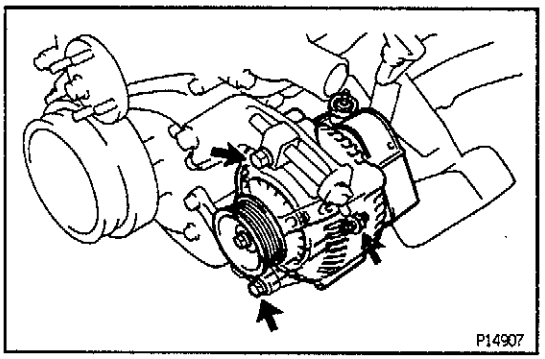
7. INSTALL ALTERNATOR, ADJUSTING BAR AND BRACKET

(a) Install the bracket with the 3 bolts.
Torque:

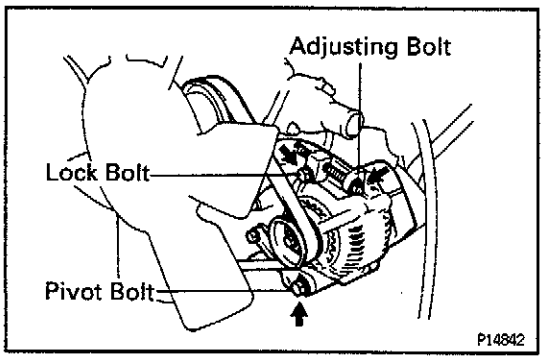
Bolt A 74.5 N·m (760 kgf·cm, 54 ft·lbf)
Bolt B 18 N·m (185 kgf·cm, 13 ft·lbf)



(b) Install the adjusting bar with the bolt.
Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)



(c) Install the alternator with the pivot bolt and lock bolt.

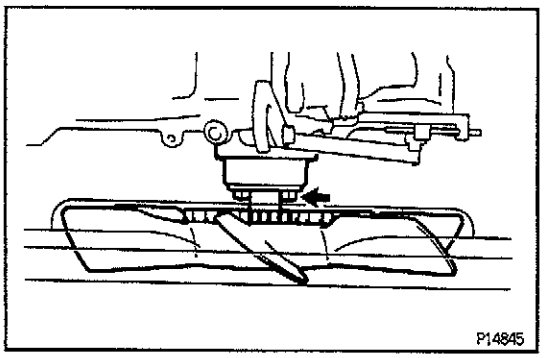


8. INSTALL WATER PUMP PULLEY, FAN WITH FLUID COUPLING AND DRIVE BELT

(a) Place the fan with fluid coupling and water pump pulley in position.

(b) Temporarily install the water pump pulley mounting nuts.

(c) Install the drive belt, and temporarily tighten the adjusting bolt and pivot bolt.



(d) Stretch the belt tight and tighten the 4 water pump pulley mounting nuts.
Torque: 21 N·m (210 kgf·cm, 16 ft·lbf)

(e) Adjust the drive belt.
(See CH section)

9. INSTALL CYLINDER HEAD
(See page EG–59)

10. START ENGINE AND CHECK FOR LEAKS