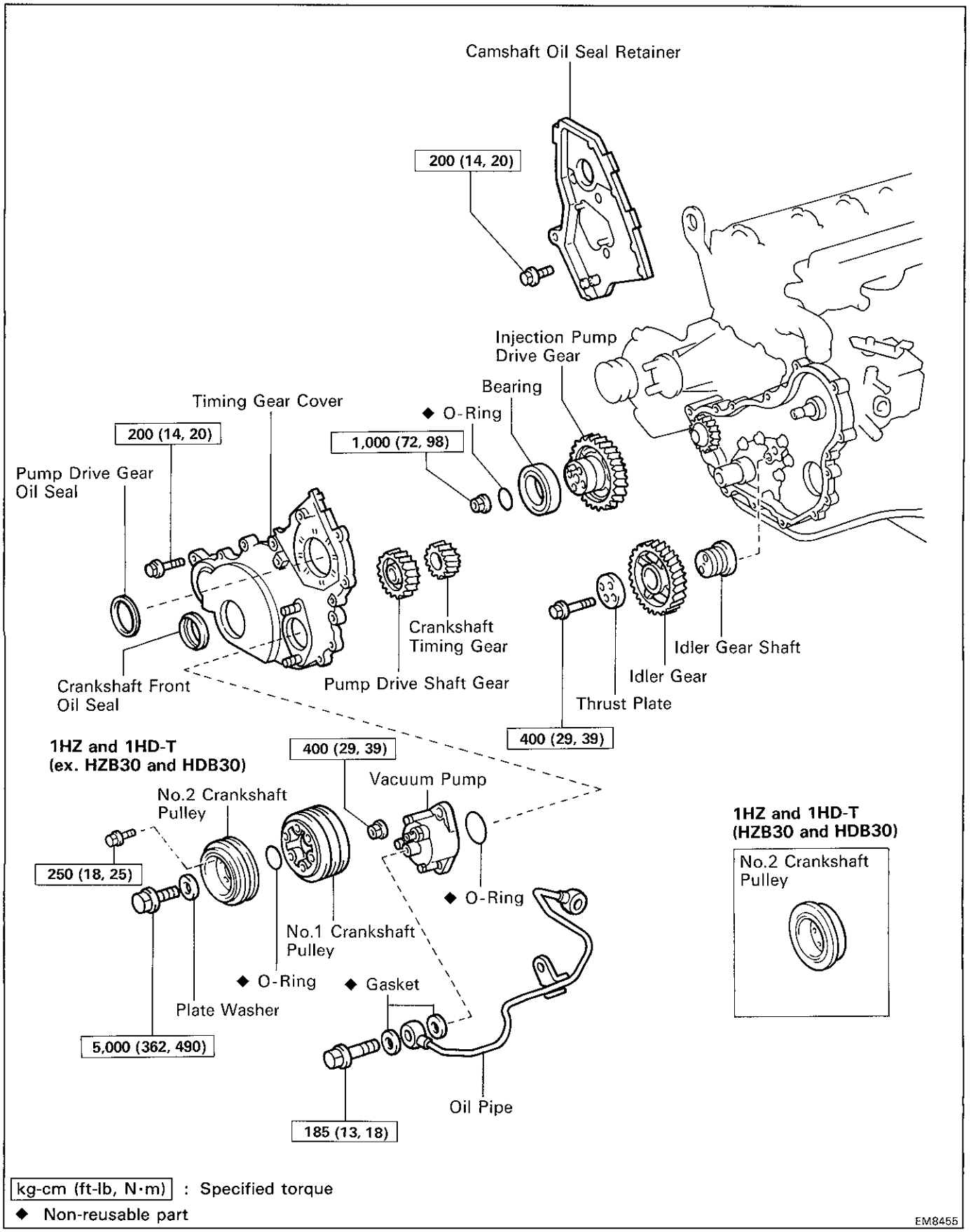
TIMING GEARS

COMPONENTS



kg-cm (ft-lb, N·m) : Specified torque

◆ Non-reusable part

EM8455

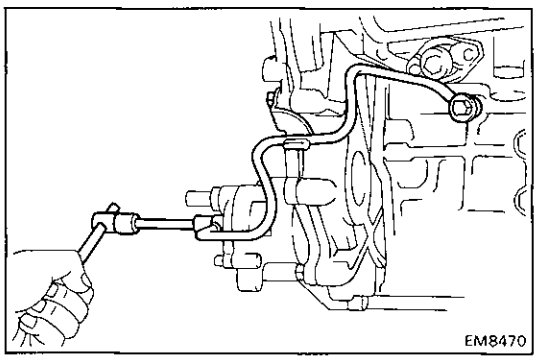
REMOVAL OF TIMING GEARS

(See page EM-42)

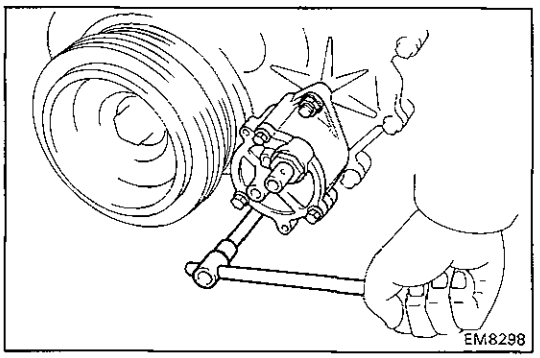
1. **REMOVE DRIVE BELT, FAN AND WATER PUMP PULLEY**
(See step 2 on page CO-7)

2. **REMOVE TIMING BELT AND PULLEYS**
(See page EM-32)

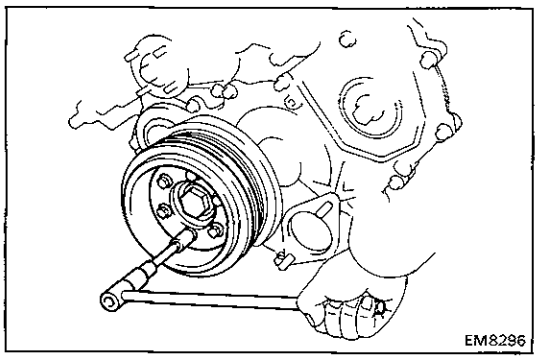
3. **REMOVE CAMSHAFT OIL SEAL RETAINER**
(See step 14 on page EM-59)



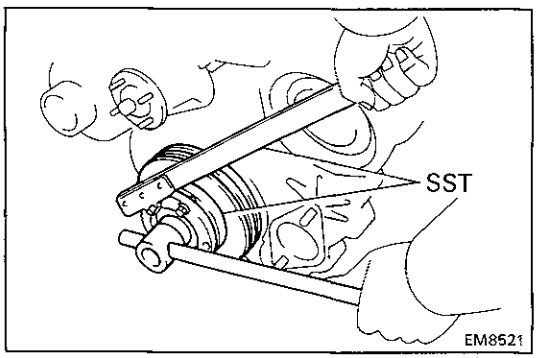
4. **REMOVE OIL PIPE**
   (a) Remove the two union bolts and four gaskets.
   (b) Remove the bolt and oil pipe.



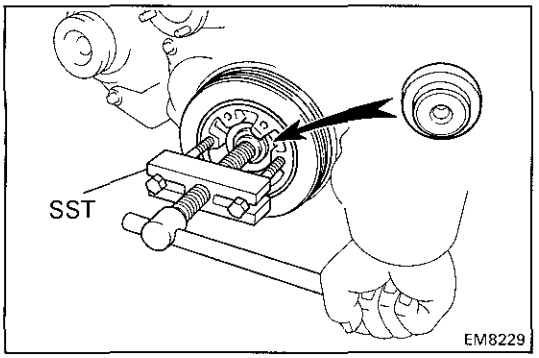
5. **REMOVE VACUUM PUMP**
   (a) Remove the two nuts and vacuum pump.
   (b) Remove the O-ring.



6. **(1HZ and 1HD-T)**
REMOVE NO.2 CRANKSHAFT PULLEY
Remove the six bolts and No.2 crankshaft pulley.



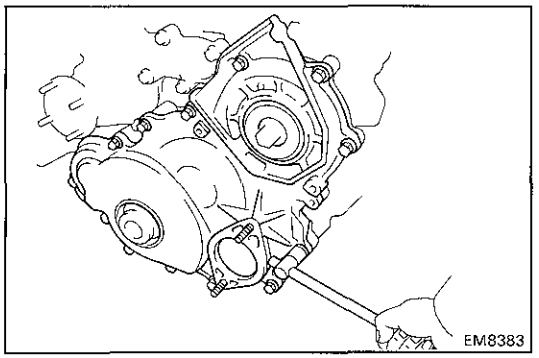
7. **REMOVE NO.1 CRANKSHAFT PULLEY**
   (a) Using SST, remove the pulley bolt and plate.
   SST 09213-58011 and 09330-00021



(b) Using SST, remove the No.1 crankshaft pulley.

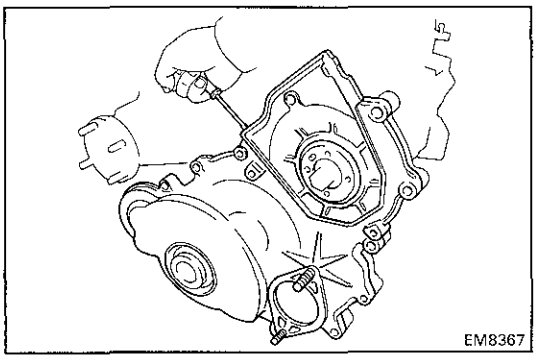
SST 09213-60017 (09213-00020, 09213-00030, 09213-00060) and 09950-20017

(c) Remove the O-ring from the No.1 crankshaft pulley.

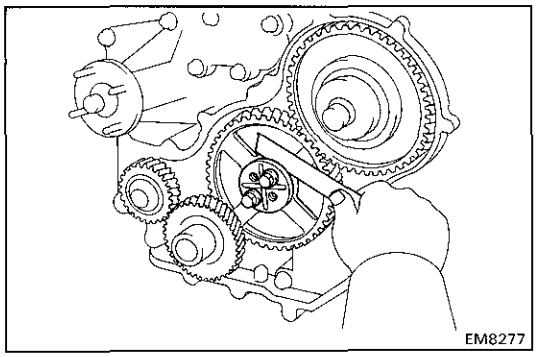


8. REMOVE TIMING GEAR COVER

(a) Remove the fourteen bolts.



(b) Pry out the timing gear cover.



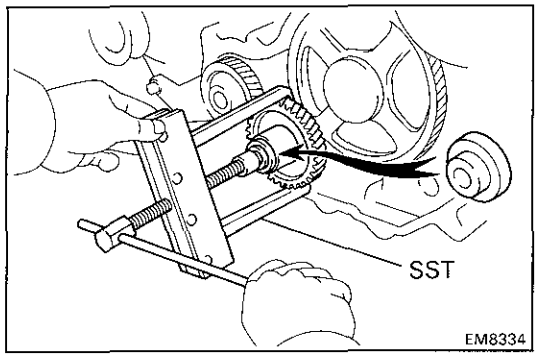
9. CHECK THRUST CLEARANCE OF IDLER GEAR

Using a thickness gauge, measure the thrust clearance.

Standard thrust clearance: 0.05 – 0.15 mm (0.0020 – 0.059 in.)

Maximum thrust clearance: 0.30 mm (0.0118 in.)

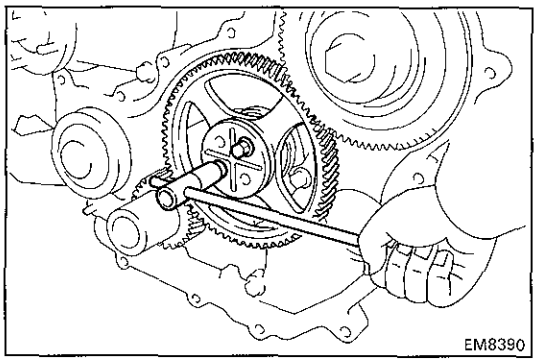
If the thrust clearance is greater than maximum, replace the thrust plate. If necessary, replace the idler gear and/or idler gear shaft.



10. REMOVE PUMP DRIVE SHAFT GEAR

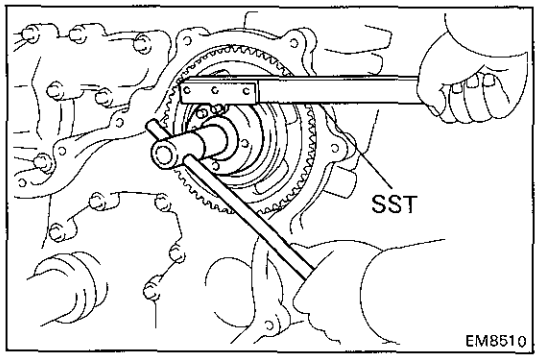
Using SST, remove the pump drive shaft gear.

SST 09213-36020 and 09950-20017



11. REMOVE IDLER GEAR

Remove the two bolts, thrust plate, idler gear and idler gear shaft.

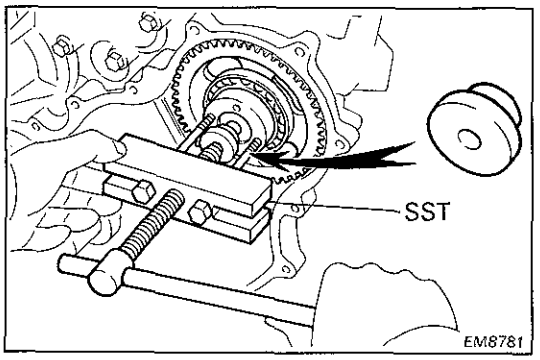


12. REMOVE INJECTION PUMP DRIVE GEAR

(a) Using SST, remove the injection pump drive gear set nut.

SST 09330-00021

(b) Remove the O-ring.

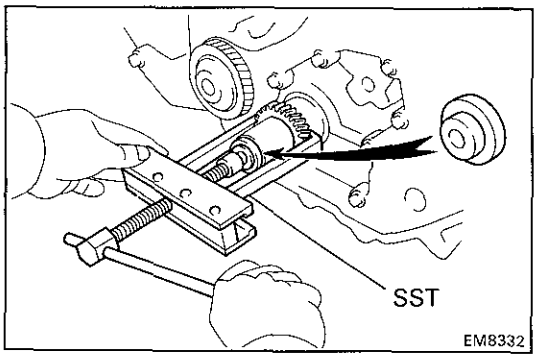


(c) Using SST, remove the injection pump drive gear.

SST 09213-60017 (09213-00020, 09213-00030, 09213-00060) and 09950-20017

NOTICE:

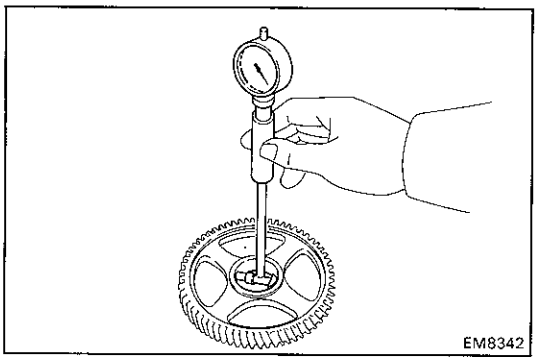
- **Tighten the two bolts of SST more than 8 mm (0.31 in.)**
- **Set the SST so that it is balanced.**



13. REMOVE CRANKSHAFT TIMING GEAR

Using SST, remove the crankshaft timing gear.

SST 09213-36020 and 09950-20017

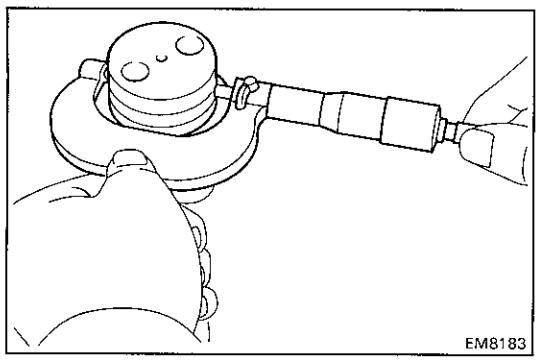


INSPECTION OF TIMING GEARS

1. INSPECT IDLER GEAR

(a) Using a cylinder gauge, measure the inside diameter of the idler gear.

Idler gear inside diameter: 45.000 – 45.025 mm (1.7717 – 1.7726 in.)



(b) Using a micrometer, measure the diameter of the idler gear shaft.

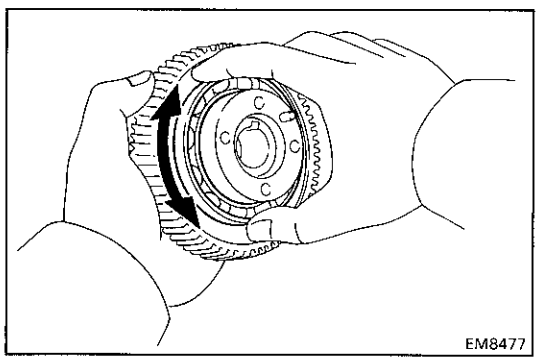
Idler gear shaft diameter: 44.950 – 44.975 mm (1.7697 – 1.7707 in.)

(c) Subtract the idler gear shaft diameter measurement from the idler gear inside diameter measurement.

Standard oil clearance: 0.025 – 0.075 mm (0.0010 – 0.0030 in.)

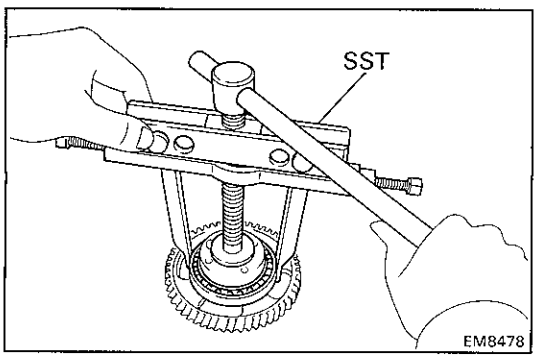
Maximum oil clearance: 0.20 mm (0.0079 in.)

If the clearance is greater than maximum, replace the gear and shaft.



2. INSPECT INJECTION PUMP DRIVE GEAR BEARING

Check that bearing is not rough or worn.

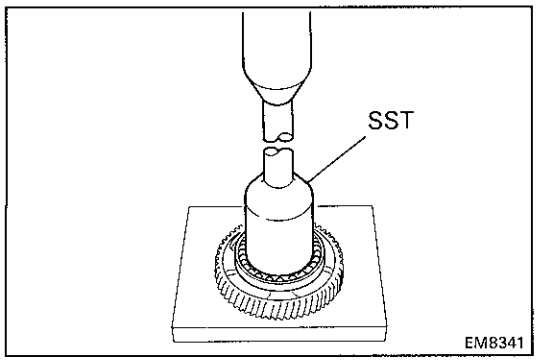


3. IF NECESSARY, REPLACE INJECTION PUMP DRIVE GEAR BEARING

A. Remove bearing

Using SST, remove the bearing.

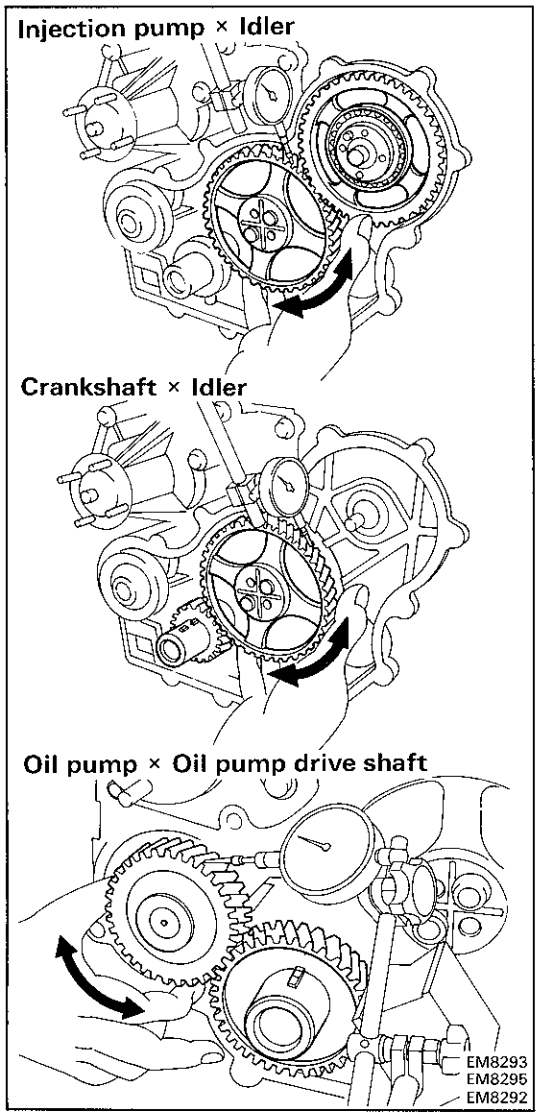
SST 09950-20017



B. Install bearing

Using SST and a press, press in a new bearing.

SST 09214-76011



4. CHECK BACKLASH OF TIMING GEARS

Using a dial indicator, measure the backlash.

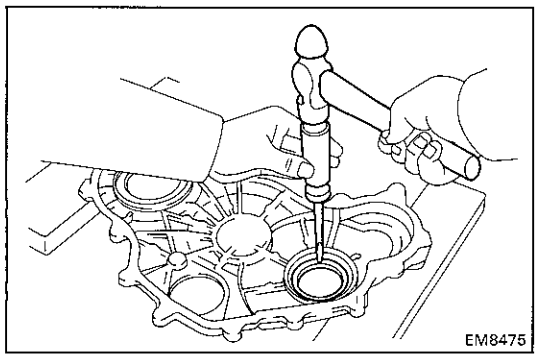
Standard gear backlash: 0.05 – 0.15 mm (0.0020 – 0.0060 in.)

Maximum gear backlash: 0.30 mm (0.0118 in.)

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

REPLACEMENT OF CRANKSHAFT FRONT OIL SEAL

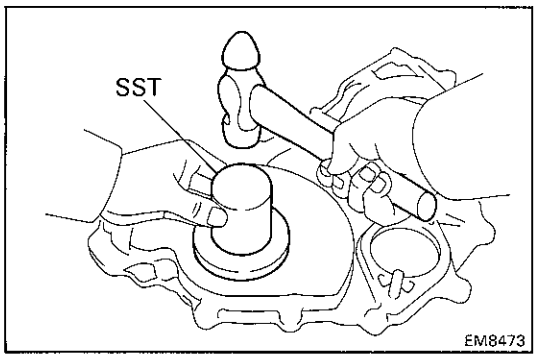
HINT: There are two methods (A and B) to replace the oil seal as follows:



REPLACE CRANKSHAFT FRONT OIL SEAL

A. If timing gear cover is removed from cylinder block:

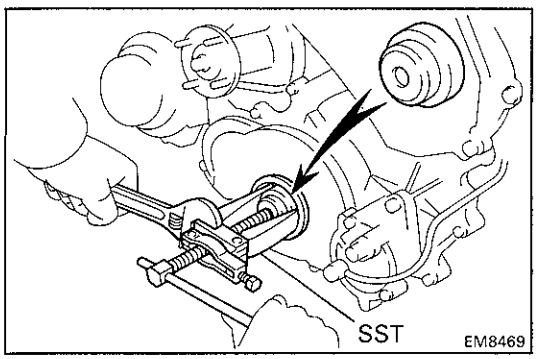
(a) Using a screwdriver and hammer, tap out the oil seal.



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

SST 09223-78010

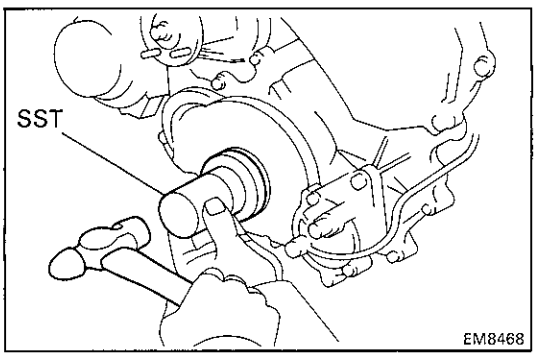
(c) Apply MP grease to the oil seal lip.



B. If timing gear cover is installed to the cylinder block:

(a) Using SST, remove the oil seal.

SST 09308-10010 and 09950-20017



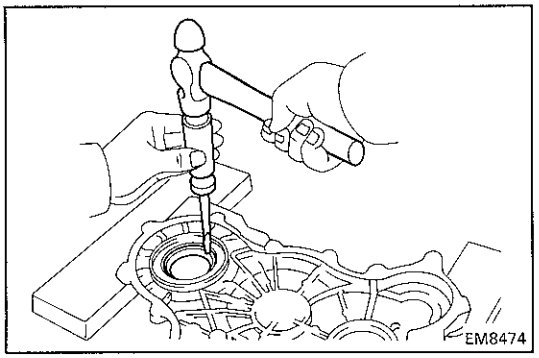
(b) Apply MP grease to a new oil seal lip.

(c) Using SST and a hammer, tap in the oil seal until its surface is flush with the timing gear cover edge.

SST 09223-78010

REPLACEMENT OF INJECTION PUMP DRIVE GEAR OIL SEAL

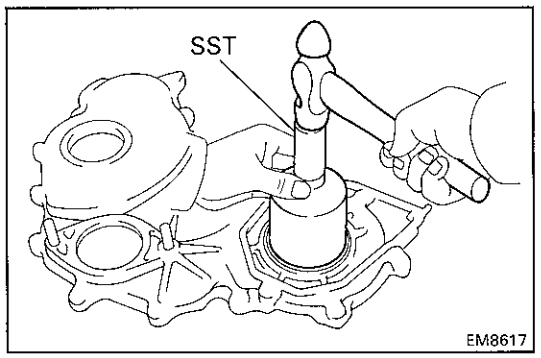
HINT: There are two methods (A and B) to replace the oil seal as follows:



REPLACE INJECTION PUMP DRIVE GEAR OIL SEAL

A. If timing gear cover is removed from cylinder block:

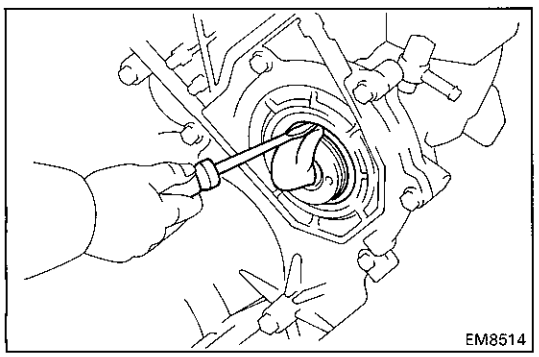
(a) Using a screwdriver and hammer, tap out the oil seal.



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

SST 09214-76011

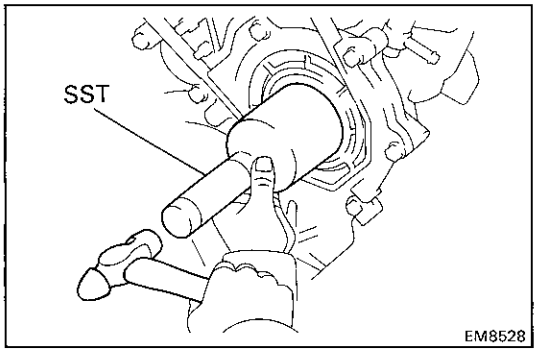
(c) Apply MP grease to the oil seal lip.



B. If timing gear cover is installed to the cylinder block:

(a) Using a screwdriver, pry out the oil seal.

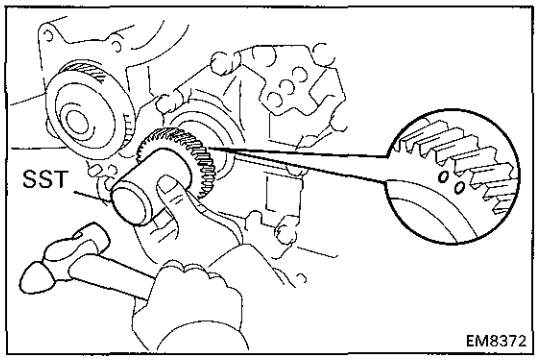
NOTICE: Be careful not to damage the injection pump drive gear. Tape the screwdriver tip.



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

(c) Using SST and a hammer, tap in a new oil seal until its surface is flush with the timing gear cover edge.

SST 09214-76011



INSTALLATION OF TIMING GEARS

(See page EM-42)

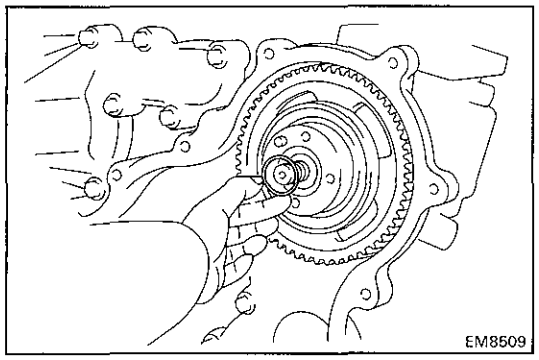
1. INSTALL CRANKSHAFT TIMING GEAR

(a) Put the timing crankshaft timing gear with the timing mark facing frontward.

(b) Align the timing gear set key with the key groove of the timing gear.

(c) Using SST and a hammer, tap in the timing gear.

SST 09223-00010

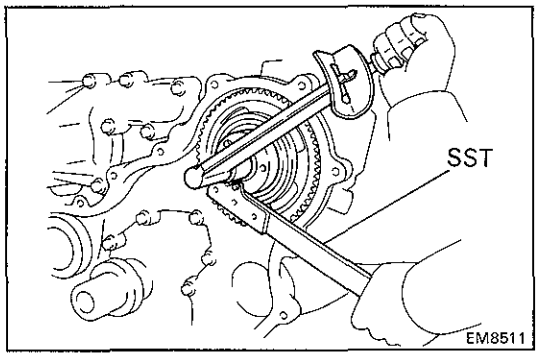


2. INSTALL INJECTION PUMP DRIVE GEAR

(a) Install the set key to the groove of the injection pump drive shaft.

(b) Align the set key with the key groove of the injection pump drive gear and install the drive gear.

(c) Install a new O-ring to the drive gear.

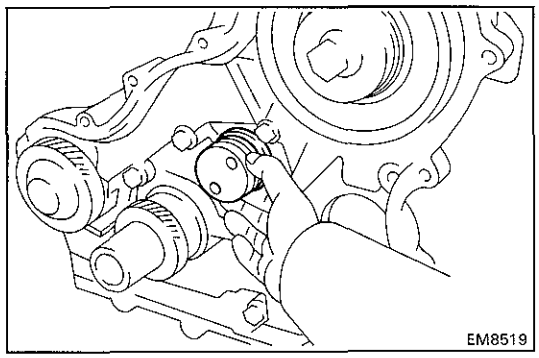


(d) Install the injection pump drive gear set nut.

(e) Using SST, torque the nut.

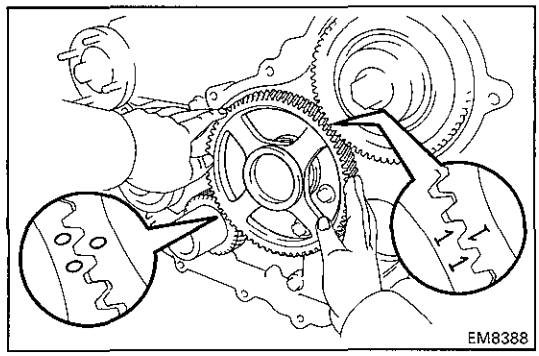
SST 09330-00021

Torque: 1,000 kg-cm (72 ft-lb, 98 N·m)

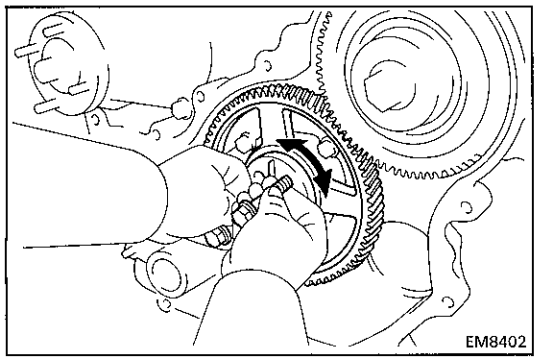


3. INSTALL IDLER GEAR

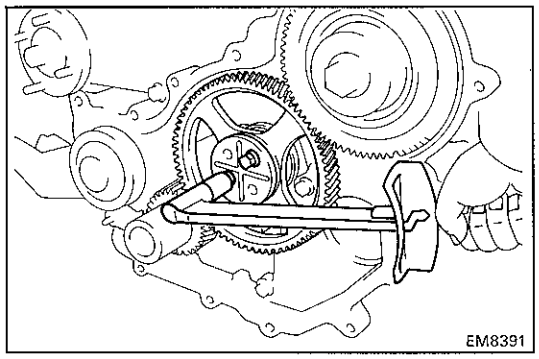
(a) Install the idler gear shaft.



(b) Align the idler gear timing marks "0" and "1" with the crankshaft timing gear mark "0" and injection pump drive gear timing mark "1" respectively, and mesh the gears.

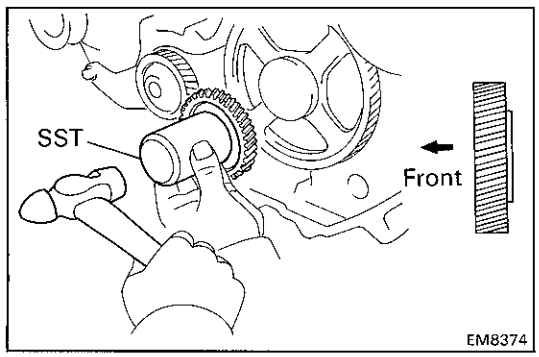


(c) Align the thrust plate set bolt holes.



(d) Install the thrust plate with the two bolts. Torque the bolts.

Torque: 400 kg-cm (29 ft-lb, 39 N·m)



4. INSTALL PUMP DRIVE SHAFT GEAR

(a) Align the pump drive shaft gear set key with the key groove of the drive shaft gear.

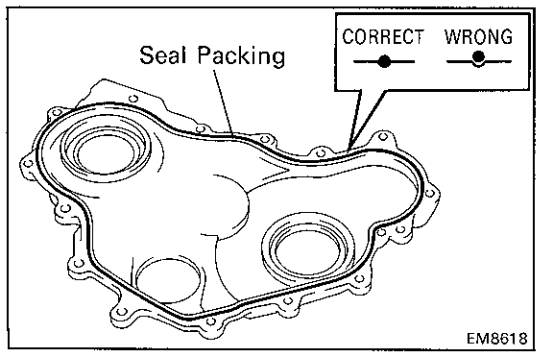
(b) Using SST and a hammer, tap in the pump drive shaft gear.

SST 09223-00010

5. INSTALL TIMING GEAR COVER

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the timing gear cover and cylinder block.

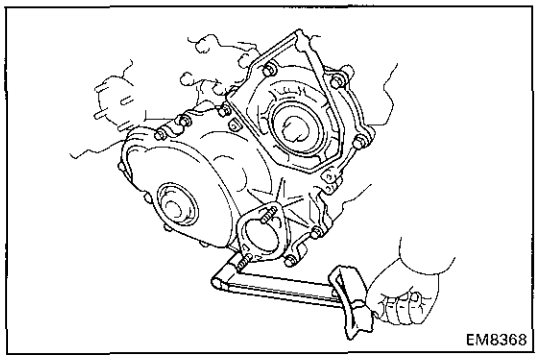
- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
- Thoroughly clean all components to remove all the loose material.
- Using a non-residue solvent, clean both sealing surfaces.



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

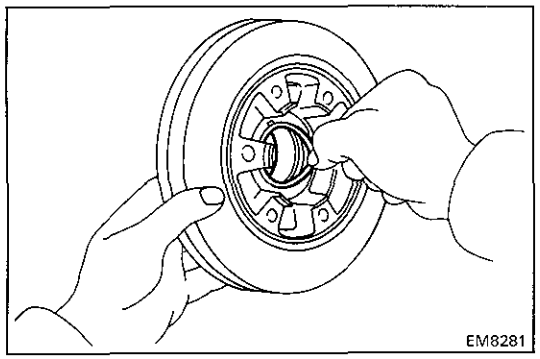
Seal packing: Part No.08826-00080 or equivalent

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



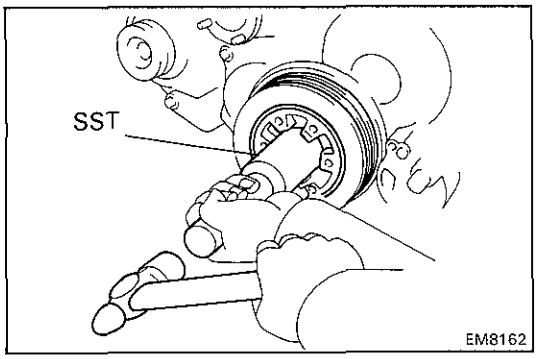
(c) Install the timing gear cover with the fourteen bolts.

Torque: 200 kg-cm (14 ft-lb, 20 N·m)



6. INSTALL NO.1 CRANKSHAFT PULLEY

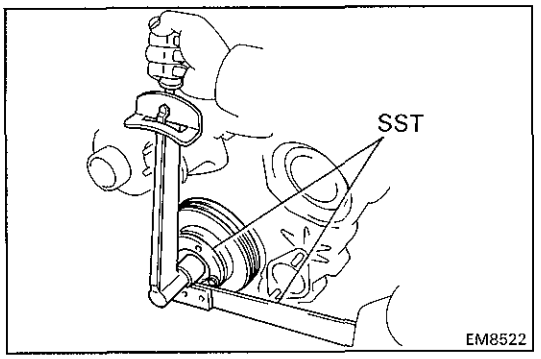
(a) Install a new O-ring in the No.1 crankshaft pulley groove.



(b) Align the pulley set key with the key groove of the pulley.

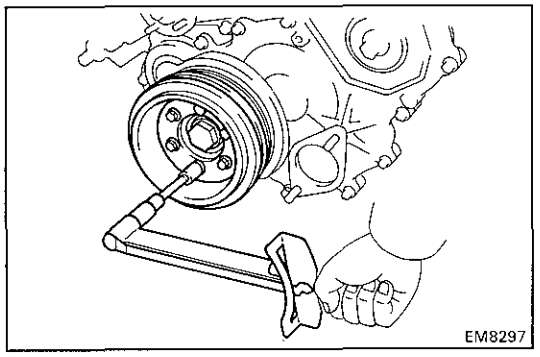
(c) Using SST and a hammer, tap in the pulley.

SST 09214-60010



(d) Using SST, install and torque the plate and bolt.

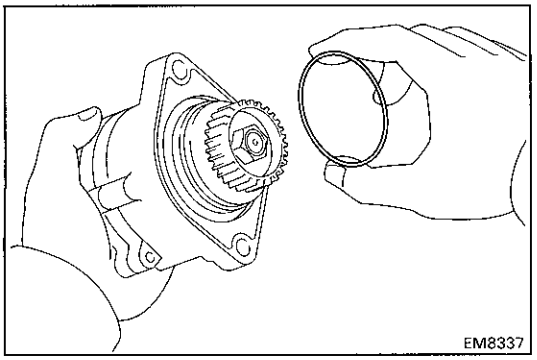
Torque: 5,000 kg-cm (362 ft-lb, 490 N·m)



7. (1HZ and 1HD-T)
INSTALL NO.2 CRANKSHAFT PULLEY

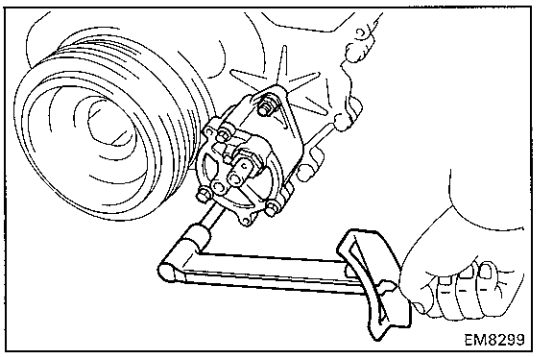
Install the No.2 crankshaft pulley with the six bolts.

Torque: 250 kg-cm (18 ft-lb, 25 N·m)



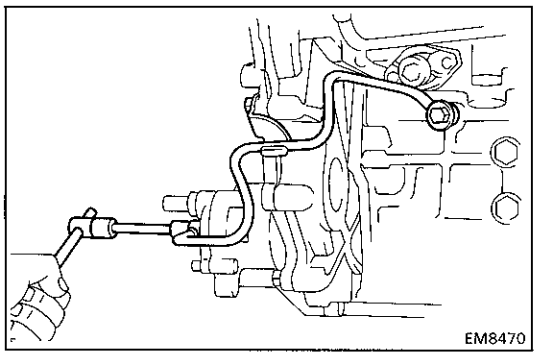
8. INSTALL VACUUM PUMP

(a) Install a new O-ring to the vacuum pump.



(b) Install the vacuum pump with the two nuts.

Torque: 400 kg-cm (29 ft-lb, 39 N·m)



9. INSTALL OIL PIPE

Install the oil pipe with the bolt, two union bolts and four new gaskets.

Torque:	**Bolt**	**200 kg-cm (14 ft-lb, 20 N·m)**
	Union bolt	**185 kg-cm (13 ft-lb, 18 N·m)**

10. INSTALL CAMSHAFT OIL SEAL RETAINER
(See step 6 on page EM-79)

11. INSTALL PULLEYS AND TIMING BELT
(See page EM-38)

12. INSTALL WATER PUMP PULLEY, FAN AND DRIVE BELT
(See step 5 on page CO-9)