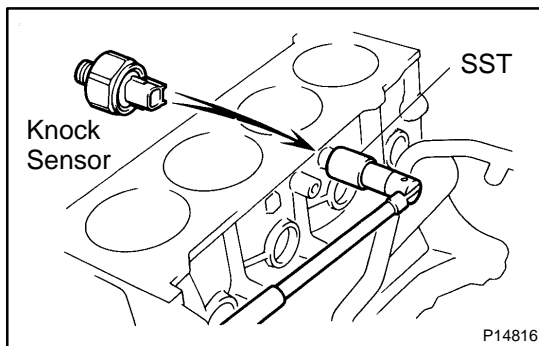
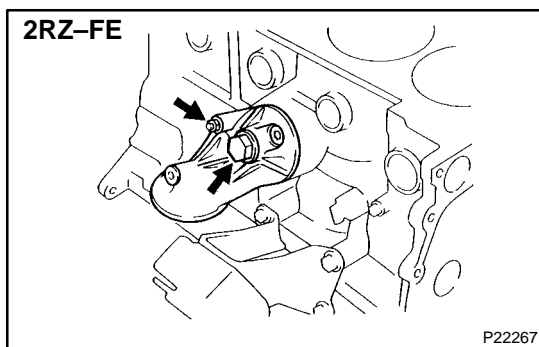


DISASSEMBLY

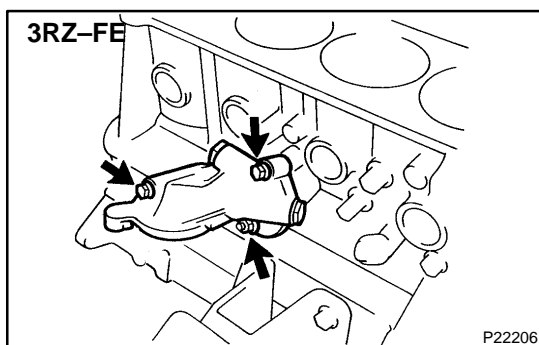
1. **M/T:**
REMOVE FLYWHEEL
Remove the 10 bolts and flywheel.
2. **A/T:**
REMOVE DRIVE PLATE
Remove the 10 bolts, front spacer, drive plate and rear plate.
3. **REMOVE REAR END PLATE**
Remove the 3 bolts and rear end plate.
4. **INSTALL ENGINE TO ENGINE STAND FOR DISASSEMBLY**
5. **REMOVE CYLINDER HEAD** (See page [EM-34](#))
6. **REMOVE TIMING CHAINS, GEARS AND SPROCKET** (See page [EM-17](#))
7. **REMOVE FUEL FILTER**



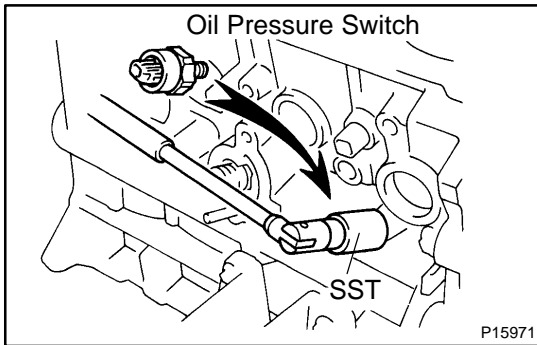
8. **REMOVE KNOCK SENSOR**
Using SST, remove the knock sensor.
SST 09816-30010
9. **REMOVE WATER BYPASS PIPE**
Remove the bolt and water bypass pipe.
10. **REMOVE OIL FILTER** (See page [LU-2](#))



11. **2RZ-FE:**
REMOVE OIL FILTER BRACKET
 - (a) Remove the nut, union bolt, gasket and oil filter bracket.
 - (b) Remove the O-ring from the union bolt.



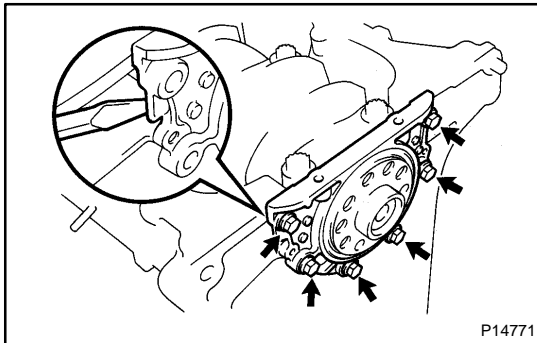
12. **3RZ-FE:**
REMOVE OIL FILTER BRACKET
 - (a) Remove the 2 bolts, nut, oil filter bracket and O-ring.
 - (b) Using a 14 mm hexagon wrench, remove the union and O-ring.
13. **REMOVE ENGINE COOLANT DRAIN PLUG**

**14. REMOVE OIL PRESSURE SWITCH**

Using SST, remove the oil pressure switch.
SST 09816-30010

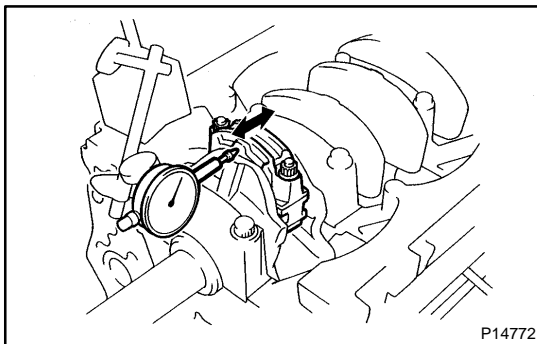
15. REMOVE RH AND LH ENGINE MOUNTING ASSEMBLIES

Remove the 4 bolts and mounting assembly.

16. REMOVE ENGINE WIRE BRACKET**17. REMOVE CRANKSHAFT POSITION SENSOR CONNECTOR BRACKET****18. REMOVE REAR OIL SEAL RETAINER**

(a) Remove the 6 bolts.

(b) Using a screwdriver, remove the oil seal retainer by prying the portions between the oil seal retainer and cylinder block.

**19. CHECK CONNECTING ROD THRUST CLEARANCE**

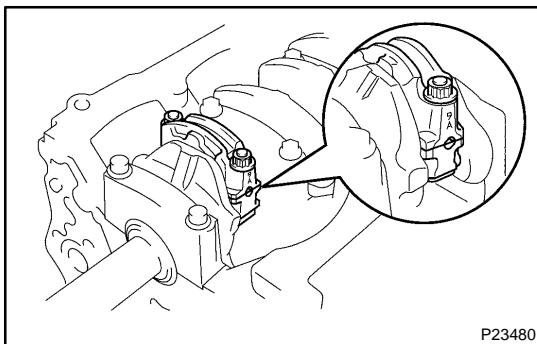
Using a dial indicator, measure the thrust clearance while moving the connecting rod back and forth.

Standard thrust clearance:

0.160 – 0.312 mm (0.0063 – 0.0123 in.)

Maximum thrust clearance: 0.35 mm (0.0138 in.)

If the thrust clearance is greater than maximum, replace the connecting rod assembly. If necessary, replace the crankshaft.

**20. REMOVE CONNECTING ROD CAPS AND CHECK OIL CLEARANCE**

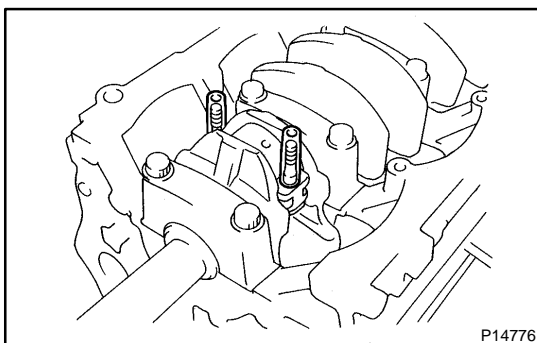
(a) Check the match marks on the connecting rod and cap are aligned to ensure correct reassembly.

(b) Remove the connecting rod cap nuts.

(c) Using a plastic-faced hammer, lightly tap the connecting rod bolts and lift off the connecting rod cap.

HINT:

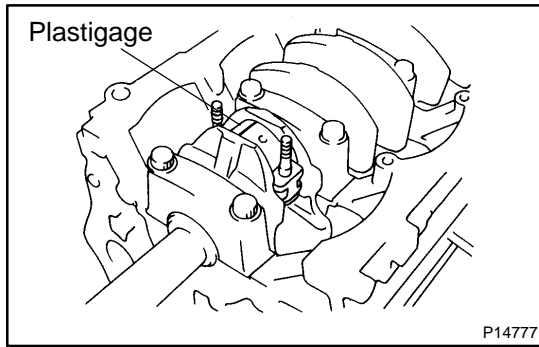
Keep the lower bearing inserted with the connecting rod cap.



(d) Cover the connecting rod bolts with a short piece of hose to protect the crankshaft from damage.

(e) Clean the crank pin and bearing.

(f) Check the crank pin and bearing for pitting and scratches. If the crank pin or bearing is damaged, replace the bearings. If necessary, grind or replace the crankshaft.

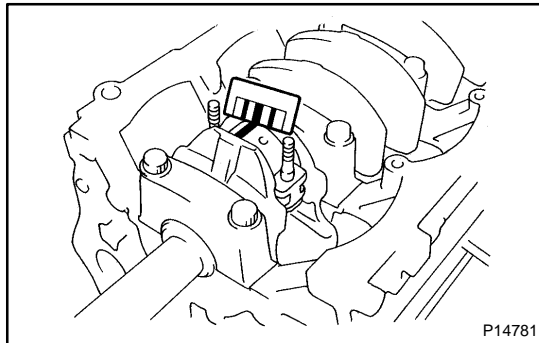


- (g) Lay a strip of Plastigage across the crank pin.
 (h) Install the connecting rod cap with the 2 nuts (See page EM-100).

NOTICE:

Do not turn the crankshaft.

- (i) Remove the 2 nuts and connecting rod cap.
 (See procedure (b) and (c) above)

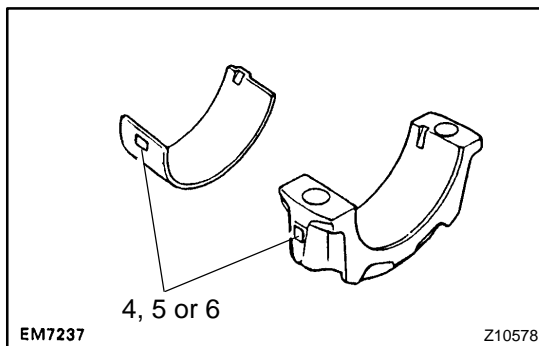


- (j) Measure the Plastigage at its widest point.
Standard oil clearance:

STD	0.030 – 0.055 mm (0.0012 – 0.0022 in.)
U/S 0.25	0.030 – 0.071 mm (0.0012 – 0.0026 in.)

Maximum oil clearance: 0.10 mm (0.0039 in.)

If the oil clearance is greater than maximum, replace the bearings. If necessary, grind or replace the crankshaft.

**HINT:**

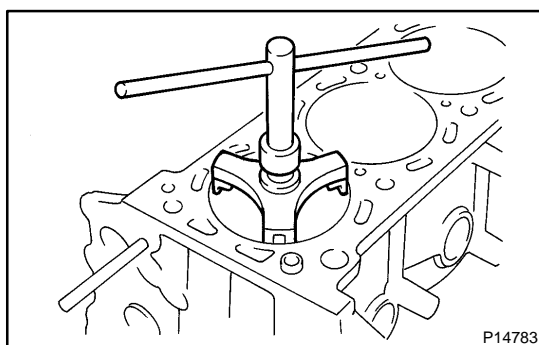
If using a standard bearing, replace with one having the same number as marked on the bearing cap. There are 3 sizes of standard bearings, marked "4", "5" and "6" accordingly.

Reference

Standard sized bearing center wall thickness:

Mark "4"	1.482 – 1.485 mm (0.0583 – 0.0585 in.)
Mark "5"	1.485 – 1.488 mm (0.0585 – 0.0586 in.)
Mark "6"	1.488 – 1.491 mm (0.0586 – 0.0587 in.)

- (k) Completely remove the Plastigage.

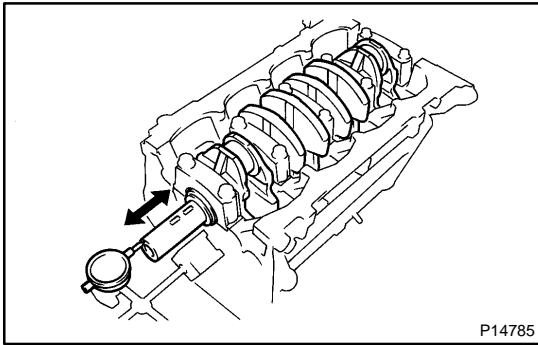


21. REMOVE PISTON AND CONNECTING ROD ASSEMBLIES

- (a) Using a ridge reamer, remove the all carbon from the top of the cylinder.
 (b) Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.

HINT:

- Keep the bearings, connecting rod and cap together.
- Arrange the piston and connecting rod assemblies in correct order.



22. CHECK CRANKSHAFT THRUST CLEARANCE

Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

Standard thrust clearance:

0.020 – 0.220 mm (0.0008 – 0.0087 in.)

Maximum thrust clearance: 0.30 mm (0.0118 in.)

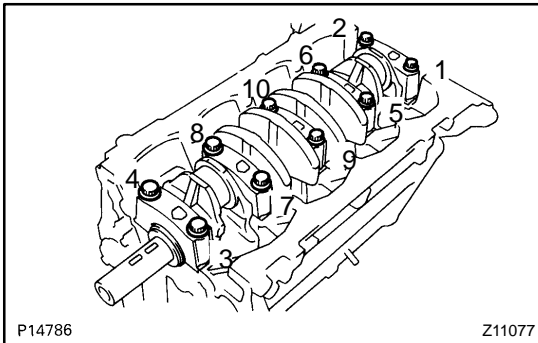
If the thrust clearance is greater than maximum, replace the thrust washers as a set.

Thrust washer thickness:

2.440 – 2.490 mm (0.0961 – 0.0980 in.)

23. REMOVE MAIN BEARING CAPS AND CHECK OIL CLEARANCE

(a) Uniformly loosen and remove the main bearing cap bolts in several passes, in the sequence shown.



(b) Using the removed main bearing cap bolts, pry the main bearing cap back and forth, and remove the main bearing caps, lower bearings and (No.3 main bearing cap only) lower thrust washers.

HINT:

- Keep the lower bearing and main bearing cap together.
- Arrange the main bearing caps and lower thrust washers in correct order.

(c) Lift out the crankshaft.

HINT:

Keep the upper bearings and upper thrust washers together with the cylinder block.

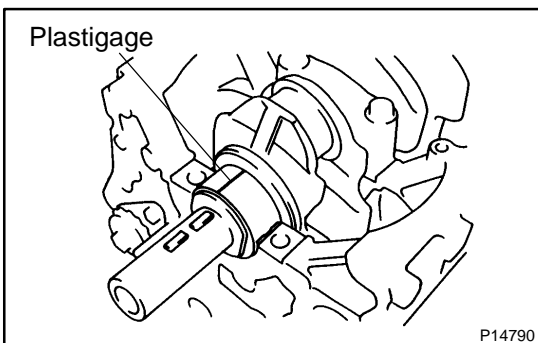
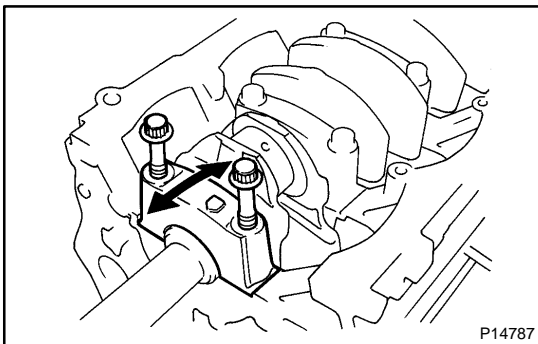
(d) Clean each main journal and bearing.

(e) Check each main journal and bearing for pitting and scratches.

If the journal or bearing is damaged, replace the bearings.

If necessary, grind or replace the crankshaft.

(f) Place the crankshaft on the cylinder block.



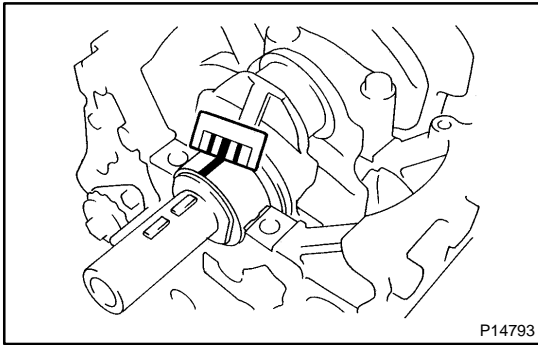
(g) Lay a strip of Plastigage across each journal.

(h) Install the main bearing caps. (See page [EM-100](#))

NOTICE:

Do not turn the crankshaft.

(i) Remove the main bearing caps. (See procedure (a) and (b) above)



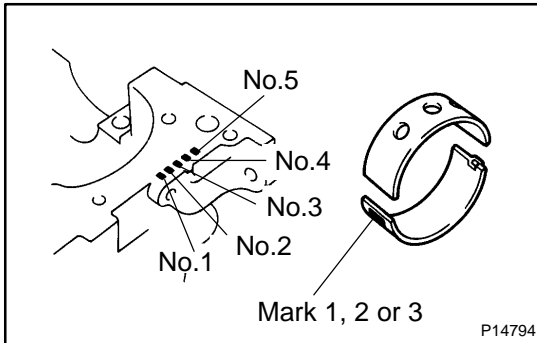
(j) Measure the Plastigage at its widest point.

Oil clearance:

STD	No.3	0.030 – 0.055 mm (0.0012 – 0.0022 in.)
	Others	0.024 – 0.049 mm (0.0009 – 0.0019 in.)
U/S 0.25	No.3	0.030 – 0.070 mm (0.0012 – 0.0028 in.)
	Others	0.025 – 0.065 mm (0.0010 – 0.0026 in.)

Maximum clearance: 0.10 mm (0.0039 in.)

If the oil clearance is greater than maximum, replace the bearings. If necessary, grind or replace the crankshaft.



HINT:

If using a standard bearing, replace with one having the same number as marked on the block. There are 3 sizes of standard bearings, marked "1", "2" and "3" accordingly.

Reference:

Standard bearing center wall thickness:

Mark "1"	1.987 – 1.990 mm (0.0782 – 0.0783 in.)
Mark "2"	1.991 – 1.993 mm (0.0784 – 0.0785 in.)
Mark "3"	1.994 – 1.996 mm (0.0785 – 0.0786 in.)

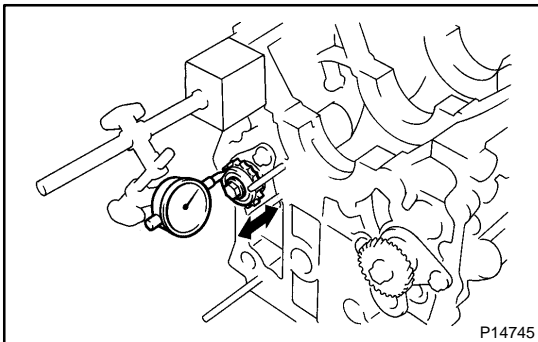
(k) Completely remove the Plastigage.

24. REMOVE CRANKSHAFT

- (a) Lift out the crankshaft.
- (b) Remove the upper main bearings and upper thrust washers from the cylinder block.

HINT:

Arrange the main bearings and thrust washers in correct order.



25. CHECK THRUST CLEARANCES OF NO.1 (RH) AND NO.2 (LH) BALANCE SHAFTS

Using a dial indicator, measure the thrust clearance while moving the balance shaft back and forth.

Standard thrust clearance:

0.07 – 0.13 mm (0.0027 – 0.0051 in.)

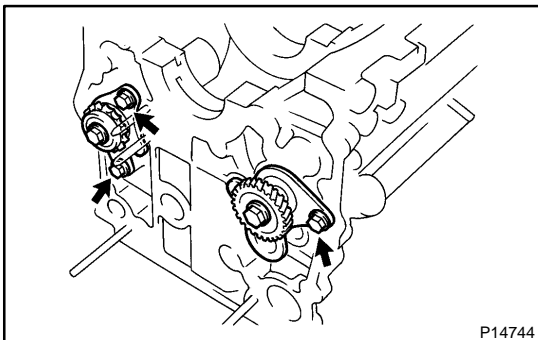
Maximum thrust clearance: 0.20 mm (0.0079 in.)

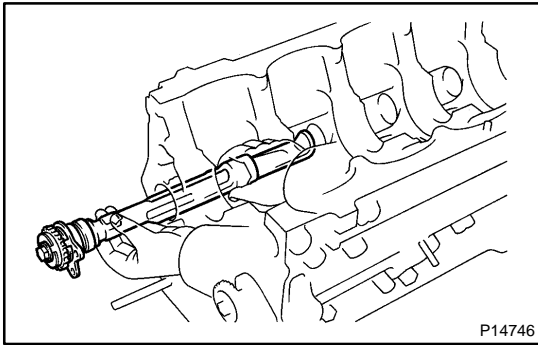
If the thrust clearance is greater than maximum, replace the balance shaft thrust washer.

If necessary, replace the balance shaft.

26. REMOVE NO.1 (RH) AND NO.2 (LH) BALANCE SHAFTS

- (a) Remove the 1 bolt from the No.1 balance shaft.
- (b) Remove the 2 bolts from the No.2 balance shaft.

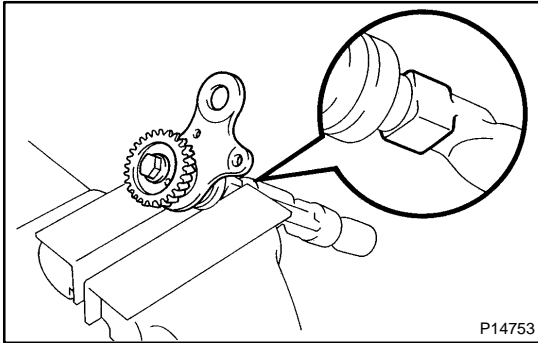




(c) Remove the balance shafts.

NOTICE:

When removing the balance shaft make sure you support the balance shaft with both hands and avoid scratching the balance shaft bearing on the cylinder block side.



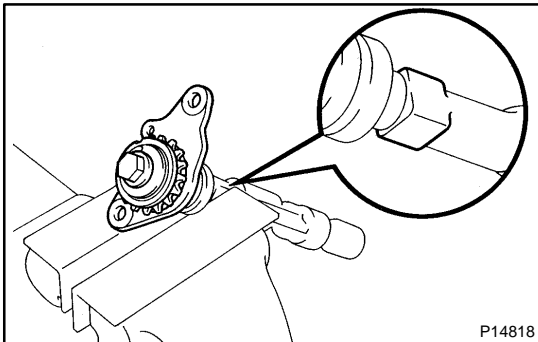
27. DISASSEMBLE NO.1 (RH) BALANCE SHAFT

(a) Mount the hexagon wrench head portion of the balance shaft in a vise.

NOTICE:

Be careful not to damage the balance shaft.

- (b) Remove the balance shaft timing gear with the bolt.
 (c) Remove the No.1 balance shaft thrust plate and the balance shaft thrust spacer.
 (d) Remove the key.



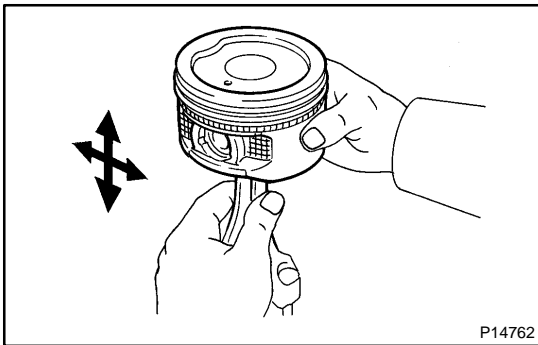
28. DISASSEMBLE NO.2 (LH) BALANCE SHAFT

(a) Mount the hexagon wrench head portion of the balance shaft in a vise.

NOTICE:

Be careful not to damage the balance shaft.

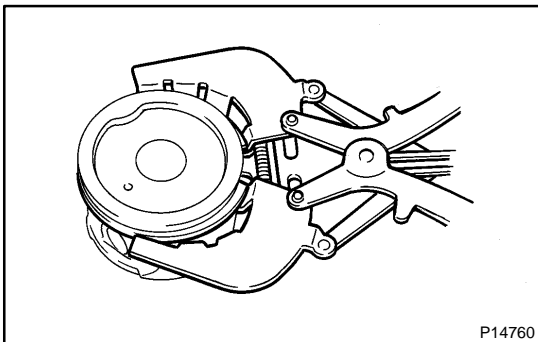
- (b) Remove the balance shaft timing sprocket with the bolt.
 (c) Remove the No.2 balance shaft thrust plate.



29. CHECK FIT BETWEEN PISTON AND PISTON PIN

Try to move the piston back and forth on the piston pin.

If any movement is felt, replace the piston and pin as a set.

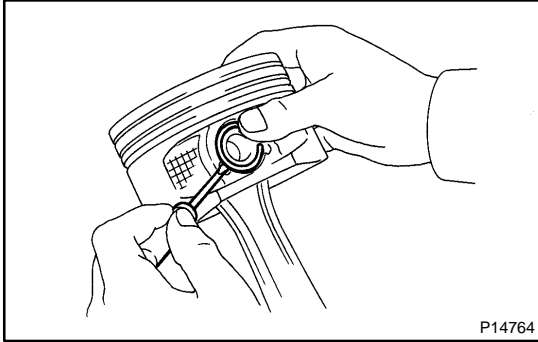


30. REMOVE PISTON RINGS

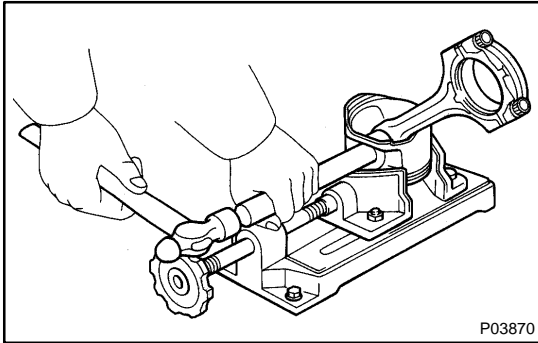
- (a) Using a piston ring expander, remove the 2 compression rings.
 (b) Remove the 2 side rails and oil ring by hand.

HINT:

Arrange the rings in correct order only.

**31. DISCONNECT CONNECTING ROD FROM PISTON**

- (a) Using a small screwdriver, pry out the 2 snap rings.
- (b) Gradually heat the piston to 80 – 90°C (176 – 194°F).



- (c) Using plastic-faced hammer and brass bar, lightly tap out the piston pin and remove the connecting rod.

HINT:

- The piston and pin are a matched set.
- Arrange the pistons, pins, rings, connecting rods and bearings correct order.