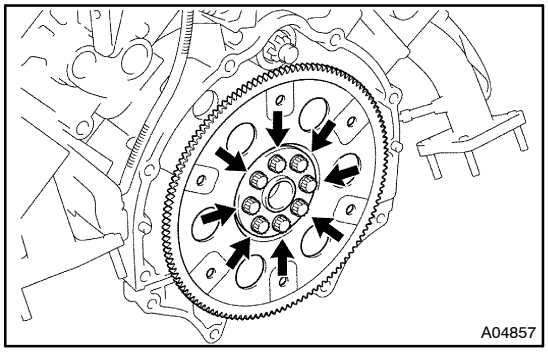
EM0SY–01

DISASSEMBLY



1. A/T:
REMOVE DRIVE PLATE

Remove the 8 bolts, front spacer, drive plate and rear spacer.

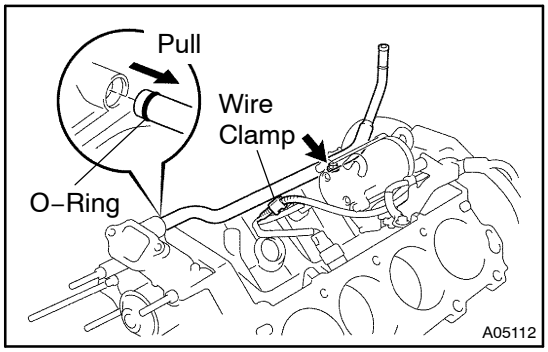
2. M/T:
REMOVE FLYWHEEL

Remove the 8 bolts and flywheel.

3. INSTALL ENGINE TO ENGINE STAND

4. REMOVE TIMING BELT AND PULLEYS
(See page EM–16)

5. REMOVE CYLINDER HEAD (See page EM–33)

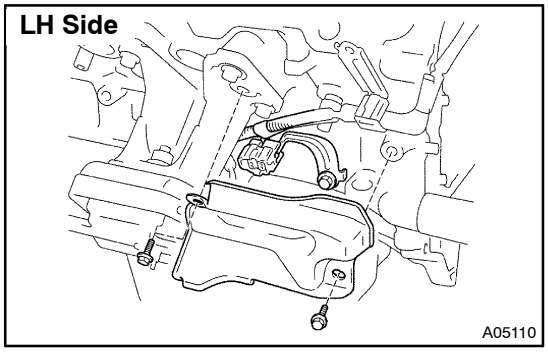


6. REMOVE WATER BYPASS PIPE

(a) Disconnect the wire clamp (for knock sensor 1, 2) from bracket of the water bypass pipe.
(b) Remove the bolt.
(c) Pull out the water bypass pipe from the water pump.
(d) Remove the O –ring from the water bypass pipe.

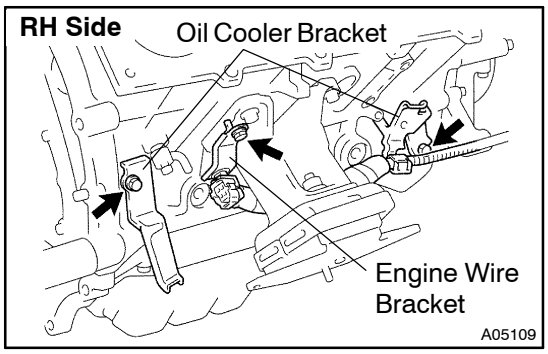
7. REMOVE STARTER

8. REMOVE KNOCK SENSORS (See page FI–69)



9. Europe:
DISCONNECT ENGINE WIRE FROM LH SIDE OF CYLINDER BLOCK

(a) Remove the 2 bolts and engine wire cover from the LH side of the cylinder block.
(b) Disconnect the oil level sensor connector.
(c) Remove the bolt, disconnect the bracket on the engine wire from the cylinder block.



10. Europe:
DISCONNECT ENGINE WIRE FROM RH SIDE OF CYLINDER BLOCK

Remove the 2 bolts, and disconnect the engine wire bracket and oil cooler bracket on the engine wire from the cylinder block.

11. A/T:
REMOVE OIL COOLER PIPE BRACKET

(a) Europe:
Remove the bolt and bracket.

(b) Except Europe:
Remove the bolt and bracket. Remove the 2 brackets.

12. REMOVE ENGINE MOUNTING BRACKETS

Remove the 4 bolts and mounting bracket. Remove the 2 mounting brackets

13. REMOVE WATER PUMP (See page CO–5)

14. REMOVE NO.2 OIL PAN (See page LU–8)

15. REMOVE OIL PAN BAFFLE PLATE

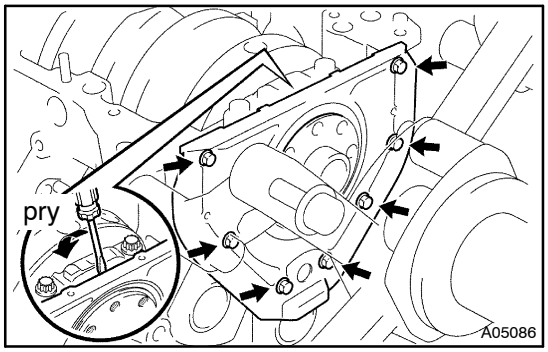
16. REMOVE NO.1 OIL PAN (See page LU–8)

17. REMOVE OIL STRAINER

18. REMOVE OIL PUMP (See page LU–8)

19. REMOVE ENGINE COOLANT DRAIN UNIONS

Remove the 2 drain unions.

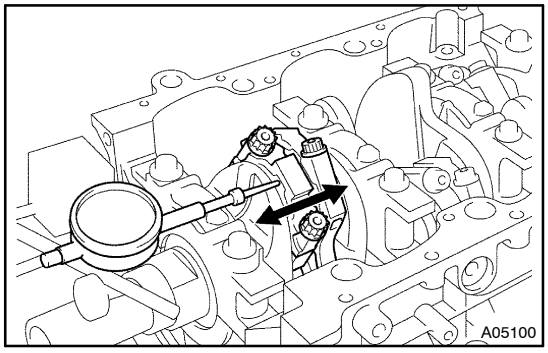


20. REMOVE REAR OIL SEAL RETAINER

(a) Remove the 7 bolts.

(b) Using a screwdriver, remove the oil seal retainer by prying the portions between the oil seal retainer and main bearing cap.

(c) Remove the O –ring.



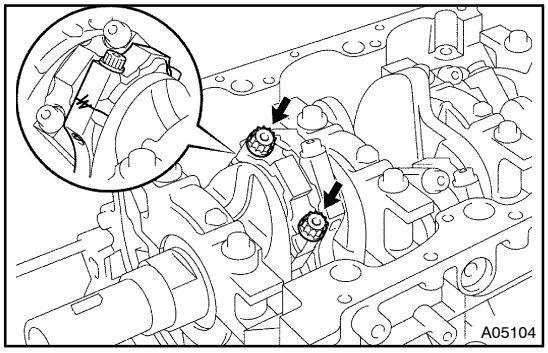
21. CHECK CONNECTING ROD THRUST CLEARANCE

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

Standard thrust clearance:
0.160 – 0.290 mm (0.0063 – 0.0138 in.)
Maximum thrust clearance: 0.35 mm (0.0 138 in.)

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

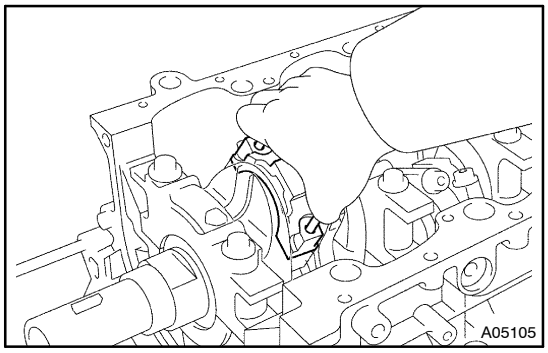
Connecting rod thickness:
22.880 – 22.920 mm (0.9008 – 0.9024 in.)



22. REMOVE CONNECTING ROD CAPS AND CHECK OIL CLEARANCE

(a) Check the matchmarks on the connecting rod and cap to ensure correct reassembly.

(b) Remove the 2 connecting rod cap bolts.



(c) Using the 2 removed connecting rod cap bolts, remove the connecting rod cap and lower bearing by wiggling the connecting rod cap right and left.

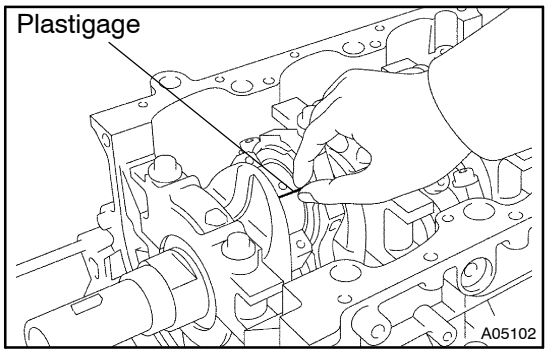
HINT:

Keep the lower bearing inserted with the connecting rod cap.

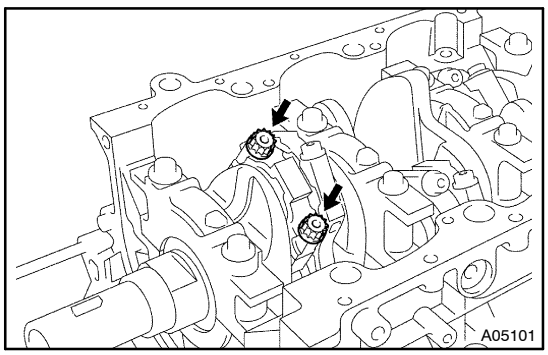
(d) Clean the crank pin and bearing.

(e) Check the crank pin and bearing for pitting and scratches.

If the crank pin or bearing is damaged, replace the bearings. If necessary, replace the crankshaft.



(f) Lay a strip of Plastigage across the crank pin.

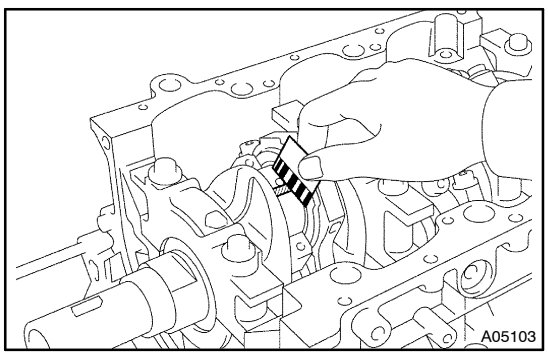


(g) Install the connecting rod cap with the 2 bolts.
(See page EM–89)

NOTICE:

Do not turn the crankshaft.

(h) Remove the 2 bolts, connecting rod cap and lower bearing. (See procedure (b) and (c) above)



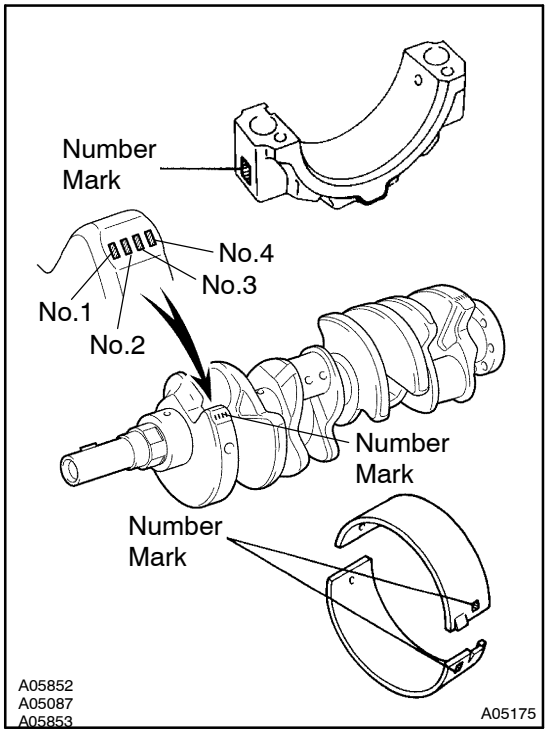
(i) Measure the Plastigage at its widest point.

Standard oil clearance:

0.027 – 0.053 mm (0.00 11 – 0.0021 in.)

Maximum oil clearance: 0.065 mm (0.0026 in.)

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



HINT:

If using a standard bearing, replace it with one having the same number. If the number of the bearing cannot be determined, select the correct bearing by adding together the numbers imprinted on the connecting rod cap and crankshaft, then selecting the bearing with the same number as the total. There are 6 sizes of standard bearings, marked "2", "3", "4", "5", "6" and "7".

	Number mark											
Connecting rod cap	1	1	2	1	2	3	2	3	4	3	4	4
Crankshaft	1	2	1	3	2	1	3	2	1	3	2	3
Use bearing	2	3		4			5			6		7

EXAMPLE:

Connecting rod cap "3" + Crankshaft " 1"
= Total number 4 (Use bearing "4")

Reference

Connecting rod big end inside diameter:

Mark " 1"	55.000 – 55.006 mm (2. 1654 – 2.1656 in.)
Mark "2"	55.006 – 55.012 mm (2. 1656 – 2.1658 in.)
Mark "3"	55.012 – 55.018 mm (2. 1658 – 2.1661 in.)
Mark "4"	55.018 – 55.024 mm (2. 1661 – 2.1663 in.)

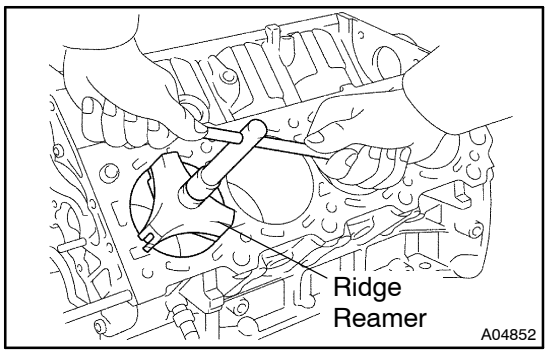
Crankshaft crank pin diameter:

Mark " 1"	51.994 – 52.000 mm (2.0470 – 2.0472 in.)
Mark "2"	51.988 – 51.994 mm (2.0468 – 2.0470 in.)
Mark "3"	51.982 – 51.988 mm (2.0465 – 2.0468 in.)

Standard sized bearing center wall thickness:

Mark "2"	1.484 – 1.487 mm (0.0584 – 0.0585 in.)
Mark "3"	1.487 – 1.490 mm (0.0585 – 0.0587 in.)
Mark "4"	1.490 – 1.493 mm (0.0587 – 0.0588 in.)
Mark "5"	1.493 – 1.496 mm (0.0588 – 0.0589 in.)
Mark "6"	1.496 – 1.499 mm (0.0589 – 0.0590 in.)
Mark "7"	1.499 – 1.502 mm (0.0590 – 0.0591 in.)

(j) Completely remove the Plastigage.



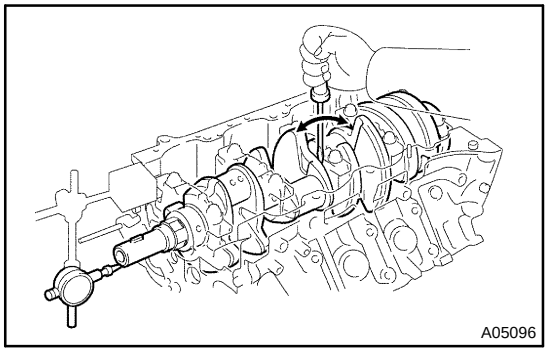
23. REMOVE PISTON AND CONNECTING ROD ASSEMBLIES

(a) Using a ridge reamer, remove all the 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.



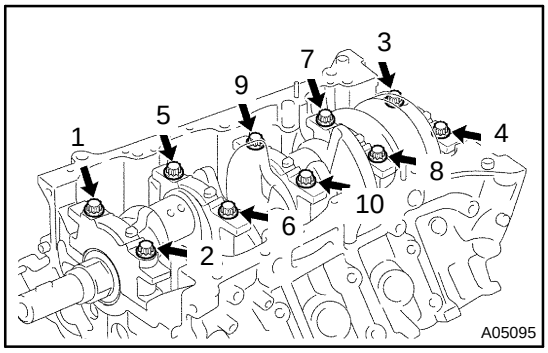
24. CHECK CRANKSHAFT THRUST CLEARANCE

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.)

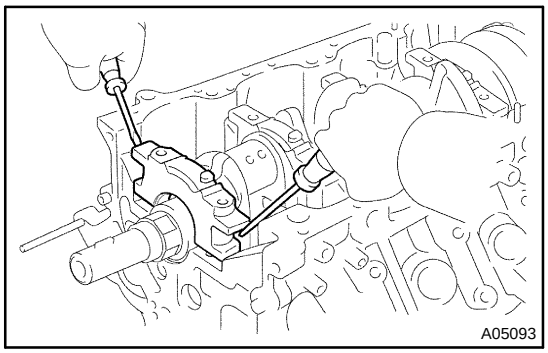
If the thrust clearance is greater than maximum, replace the thrust washers as a set.

Thrust washer thickness:
2.440 − 2.490 mm (0.0961 − 0.0980 in.)



25. REMOVE MAIN BEARING CAPS AND CHECK OIL CLEARANCE

(a) Uniformly loosen and remove the 10 main bearing cap bolts in several passes, in the sequence shown.



(b) Using 2 screwdrivers, pry out the main bearing cap, and remove the 5 main bearing caps, 5 lower bearings and 2 lower thrust washers (No.3 main bearing cap only).

NOTICE:
Be careful not to damage the cylinder block.

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.

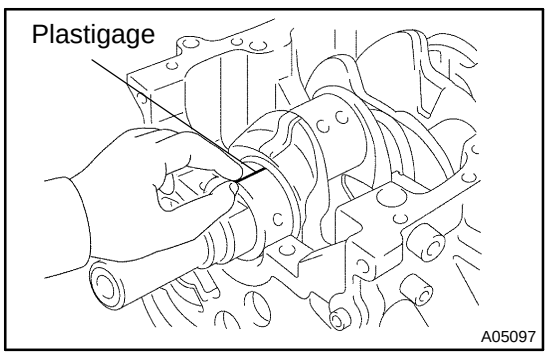
HINT:

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

(d) Clean each main journal and bearing.

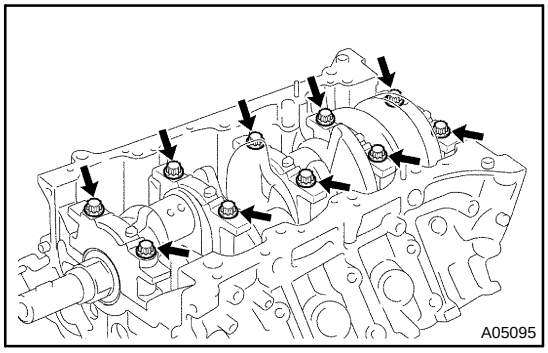
(e) Check each main journal and bearing for pitting and scratches.

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



(f) Place the crankshaft on the cylinder block.

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

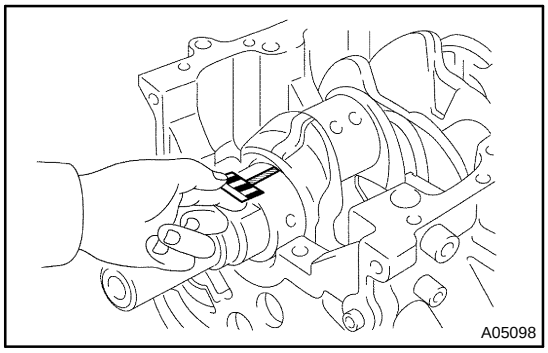


(h) Install the main bearing caps.
(See page EM−89)

NOTICE:

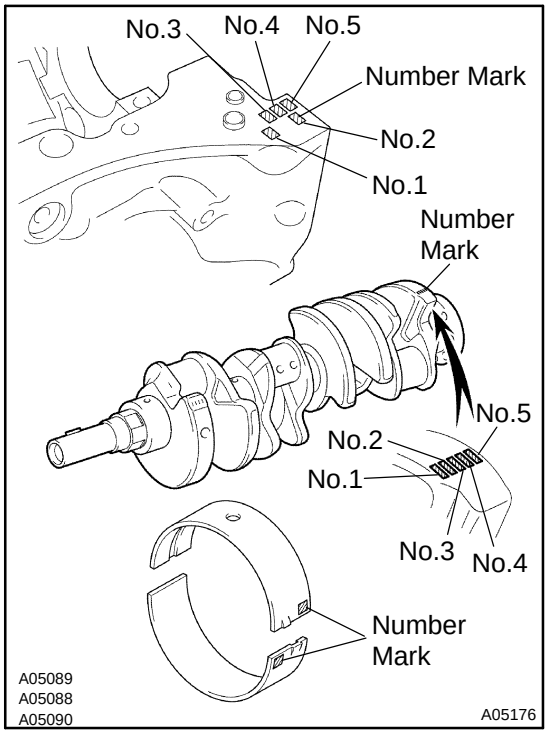
Do not turn the crankshaft.

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



(j) Measure the Plastigage at its widest point.
Standard clearance:
0.040 − 0.058 mm (0.0016 − 0.0023 in.)
Maximum clearance: 0.070 mm (0.0028 in.)

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



HINT:

If using a standard bearing, replace it with one having the same number. If the number of the bearing cannot be determined, select the correct bearing by adding together the numbers imprinted on the cylinder block and crankshaft, then refer to the table below for the appropriate bearing number. There are 5 sizes of the standard bearings. For No.1 and No.5 position bearings, use bearings marked ”3”, ”4”, ”5”, ”6” and ”7”. For others position bearings, use bearings marked ”1”, ”2”, ”3”, ”4” and ”5”.

No.1, No.5:

		Use bearing
Cylinder block (A) + Crankshaft (B)	0 − 5	3
	6 − 11	4
	12 − 17	5
	18 − 23	6
	24 − 28	7

EXAMPLE:
Cylinder block ”08” + Crankshaft ”06”
= Total number 14 (Use bearing ”5”)

Others:

		Use bearing
Cylinder block (A) + Crankshaft (B)	0 − 5	1
	6 − 11	2
	12 − 17	3
	18 − 23	4
	24 − 28	5

EXAMPLE:
Cylinder block ”08” + Crankshaft ”06”
= Total number 14 (Use bearing ”3”)

Reference

Cylinder block main journal bore diameter (A):

Mark ”00”	72.000 mm (2.8346 in.)
Mark ”01”	72.001 mm (2.8347 in.)
Mark ”02”	72.002 mm (2.8347 in.)
Mark ”03”	72.003 mm (2.8348 in.)
Mark ”04”	72.004 mm (2.8348 in.)
Mark ”05”	72.005 mm (2.8348 in.)
Mark ”06”	72.006 mm (2.8349 in.)
Mark ”07”	72.007 mm (2.8349 in.)
Mark ”08”	72.008 mm (2.8350 in.)
Mark ”09”	72.009 mm (2.8350 in.)
Mark ”10”	72.010 mm (2.8350 in.)
Mark ”11”	72.011 mm (2.8351 in.)
Mark ”12”	72.012 mm (2.8351 in.)
Mark ”13”	72.013 mm (2.8352 in.)
Mark ”14”	72.014 mm (2.8352 in.)
Mark ”15”	72.015 mm (2.8352 in.)
Mark ”16”	72.016 mm (2.8353 in.)

Crankshaft main journal diameter (B):

Mark ”00”	67.000 mm (2.6378 in.)
Mark ”01”	66.999 mm (2.6378 in.)
Mark ”02”	66.998 mm (2.6377 in.)
Mark ”03”	66.997 mm (2.6377 in.)
Mark ”04”	66.996 mm (2.6376 in.)
Mark ”05”	66.995 mm (2.6376 in.)
Mark ”06”	66.994 mm (2.6376 in.)
Mark ”07”	66.993 mm (2.6375 in.)
Mark ”08”	66.992 mm (2.6375 in.)
Mark ”09”	66.991 mm (2.6374 in.)
Mark ”10”	66.990 mm (2.6374 in.)
Mark ”11”	66.989 mm (2.6374 in.)
Mark ”12”	66.988 mm (2.6373 in.)

Standard bearing center wall thickness:

No.1 and No.5

Mark ”3”	2.481 − 2.484 mm (0.0977 − 0.0978 in.)
Mark ”4”	2.484 − 2.487 mm (0.0978 − 0.0979 in.)
Mark ”5”	2.487 − 2.490 mm (0.0979 − 0.0980 in.)
Mark ”6”	2.490 − 2.493 mm (0.0980 − 0.0981 in.)
Mark ”7”	2.493 − 2.496 mm (0.0981 − 0.0983 in.)

Others:

Mark ”1”	2.481 − 2.484 mm (0.0977 − 0.0978 in.)
Mark ”2”	2.484 − 2.487 mm (0.0978 − 0.0979 in.)
Mark ”3”	2.487 − 2.490 mm (0.0979 − 0.0980 in.)

Mark ”4”	2.490 − 2.493 mm (0.0980 − 0.0981 in.)
Mark ”5”	2.493 − 2.496 mm (0.0981 − 0.0983 in.)

(k) Completely remove the Plastigage.

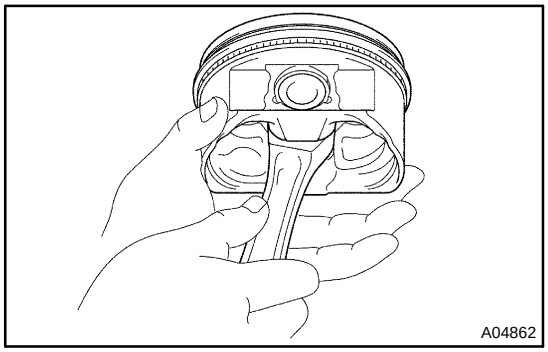
26. REMOVE CRANKSHAFT

(a) Lift up the crankshaft.

(b) Remove the 5 upper main bearings and 2 upper thrust washers from the cylinder block.

HINT:

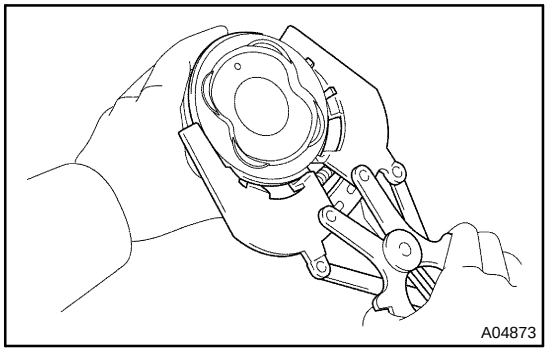
Arrange the main bearing caps, bearings and thrust washers in correct order.



27. 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.



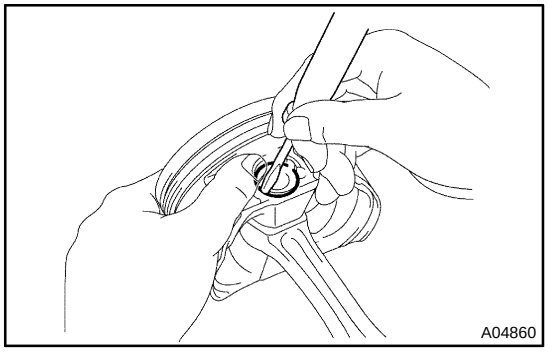
28. REMOVE PISTON RINGS

(a) Using a piston ring expander, remove the 2 compression rings.

(b) Remove the 2 side rails and oil ring by hand.

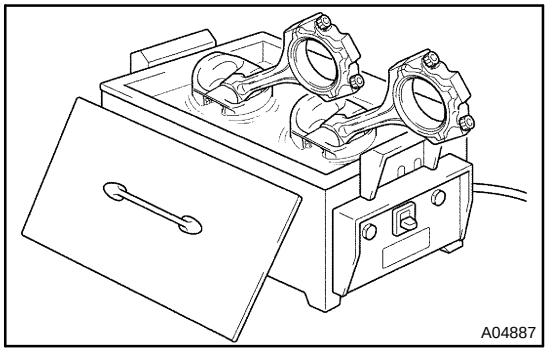
HINT:

Arrange the piston rings in correct order only.

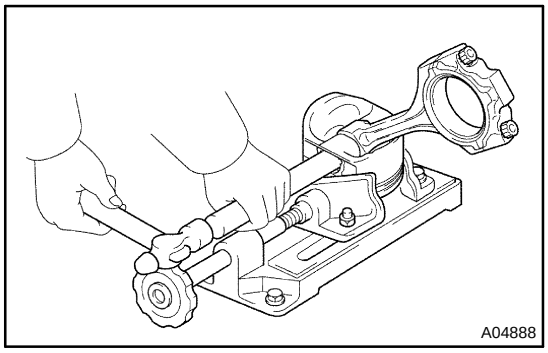


29. DISCONNECT CONNECTING ROD FROM PISTON

(a) Using a small screwdriver, pry out the 2 snap rings.



(b) Gradually heat the piston to approx. 60°C (140°F).



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

HINT:

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