EM1U1–01

DISASSEMBLY

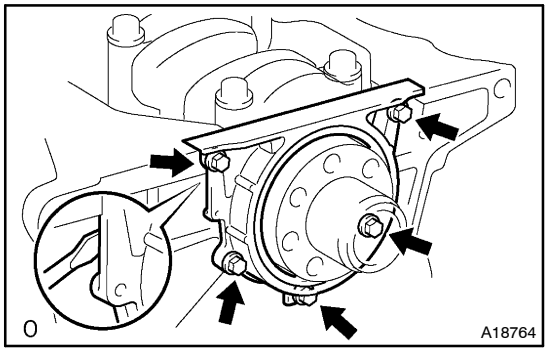
1. **M/T:**
   REMOVE FLYWHEEL
2. **A/T:**
   REMOVE FLYWHEEL
3. **REMOVE REAR END PLATE**

Remove the bolt and end plate.

4. **INSTALL ENGINE TO ENGINE STAND FOR DISASSEMBLY**
5. **REMOVE TIMING BELT AND PULLEYS (See page EM–14)**
6. **REMOVE CYLINDER HEAD (See page EM–40)**
7. **REMOVE TIMING GEARS (See page EM–24)**
8. **REMOVE WATER PUMP (See page CO–4)**
9. **REMOVE OIL PAN (See page LU–10)**
10. **REMOVE TIMING GEAR CASE (See page LU–10)**
11. **REMOVE OIL STRAINER (See page LU–10)**
12. **REMOVE OIL COOLER (See page LU–21)**
13. **REMOVE NO. 2 WATER BYPASS PIPE AND VACUUM TRANSMITTING PIPES**

Remove the 2 bolts, 2 nuts, the water bypass pipe, vacuum transmitting pipe and gasket.

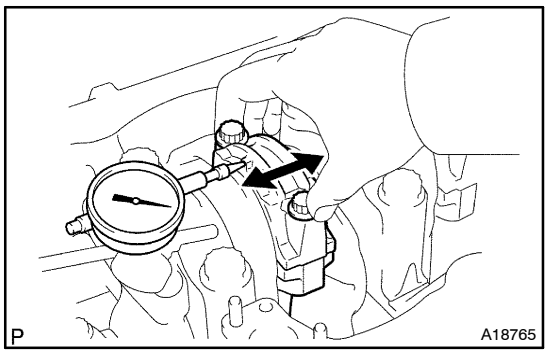
14. **REMOVE WATER INLET AND THERMOSTAT (See page CO–8)**
15. **REMOVE WATER TEMPERATURE SENSOR**
16. **REMOVE ENGINE MOUNTING BRACKETS**
17. **REMOVE CYLINDER BLOCK OIL ORIFICE**



18. **REMOVE REAR OIL SEAL RETAINER**

(a) Remove the 5 bolts.

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

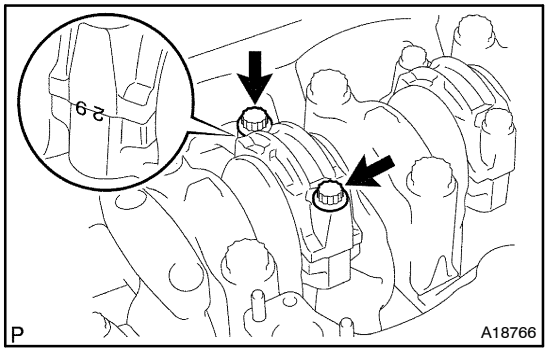


19. **CHECK CONNECTING ROD THRUST CLEARANCE**

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

Standard thrust clearance:
0.10 – 0.30 mm (0.0039 – 0.0118 in.)
Maximum thrust clearance: 0.40 mm (0.0157 in.)

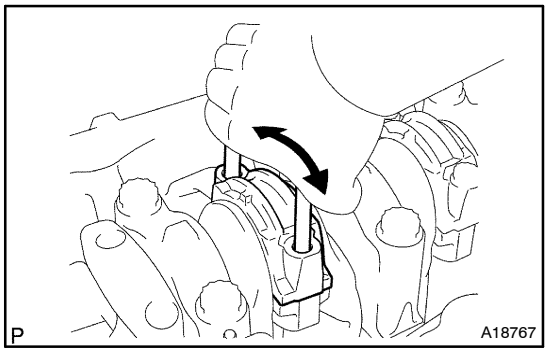
If the thrust clearance is greater than maximum, replace the connecting rod assembly. If necessary, replace the crankshaft.



20. REMOVE CONNECTING ROD CAPS AND CHECK OIL CLEARANCE

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

(b) Remove the connecting rod cap bolts.



(c) Using the 2 removed connecting rod bolts, pry the connecting rod cap back and forth, and remove the connecting cap.

HINT:

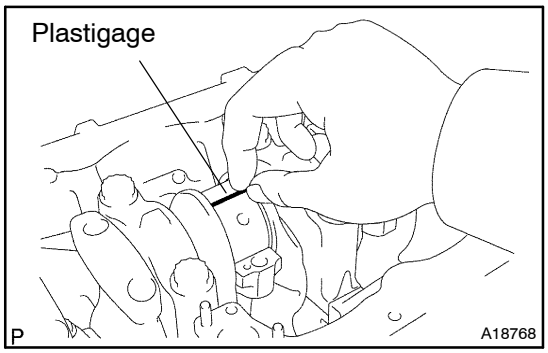
Keep the lower bearing inserted with the connecting rod cap.

(d) Clean the crank pin and bearing.

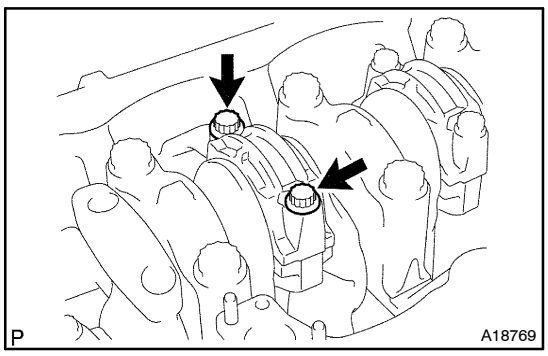
(e) Check the crank pin and bearing for pitting and scratches.

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

If necessary, grind or replace the crankshaft.



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

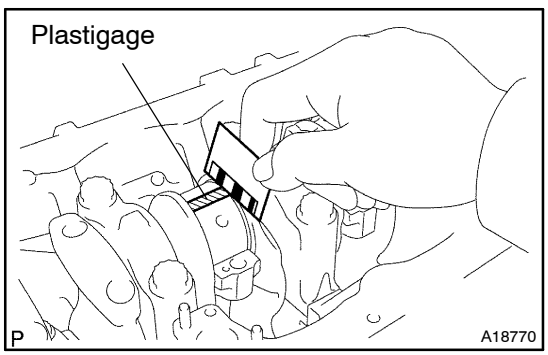


(g) Install the connecting rod cap with the 2 bolts (See page EM–82).

NOTICE:

Do not turn the crankshaft.

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



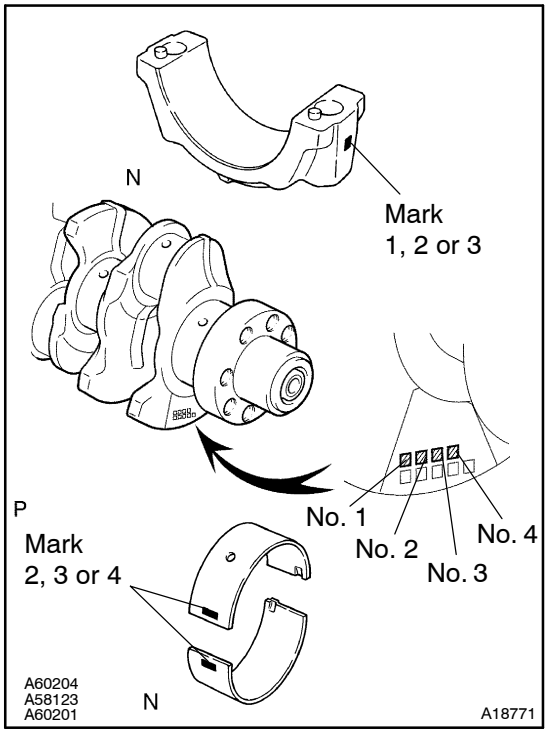
(i) Measure the Plastigage at its widest point.

Standard oil clearance:

STD	0.036 – 0.054 mm (0.0014 – 0.0021 in.)
U/S 0.25, U/S 0.50	0.037 – 0.077 mm (0.0015 – 0.0030 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 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 inprinted on the crankshaft and connecting rod cap, then selecting the bearing with the same number as the total. There are 5 sizes of standard bearings, marked 2, 3, 4, 5 and 6 accordingly.

Item	Number Mark								
Connecting rod cap	1			2			3		
Crankshaft	1	2	3	1	2	3	1	2	3
Use bearing	2	3	4	3	4	5	4	5	6

EXAMPLE:

Connecting rod cap ”3” + Crankshaft ”1” =

Total number 4 (Use bearing ”4”)

Reference

Connecting rod big end inner diameter:

Mark 1	62.014 – 62.020 mm (2.4415 – 2.4417 in.)
Mark 2	62.020 – 62.026 mm (2.4417 – 2.4420 in.)
Mark 3	62.026 – 62.032 mm (2.4420 – 2.4422 in.)

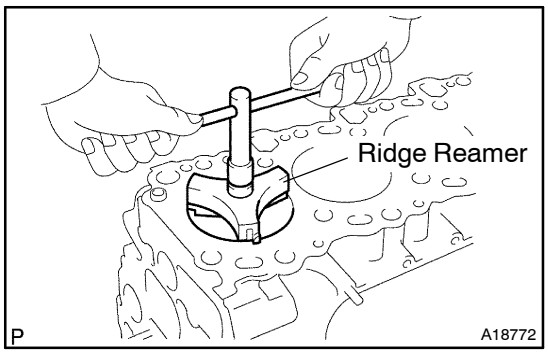
Crankshaft pin diameter:

Mark 1	58.994 – 59.000 mm (2.3226 – 2.3228 in.)
Mark 2	58.988 – 58.994 mm (2.3224 – 2.3226 in.)
Mark 3	58.982 – 58.988 mm (2.3221 – 2.3224 in.)

Standard sized bearing center wall thickness:

Mark 2	1.486 – 1.489 mm (0.0585 – 0.0586 in.)
Mark 3	1.489 – 1.492 mm (0.0586 – 0.0587 in.)
Mark 4	1.492 – 1.495 mm (0.0587 – 0.0589 in.)
Mark 5	1.495 – 1.498 mm (0.0589 – 0.0590 in.)
Mark 6	1.498 – 1.501 mm (0.0590 – 0.0591 in.)

(j) Completely remove the Plastigage.



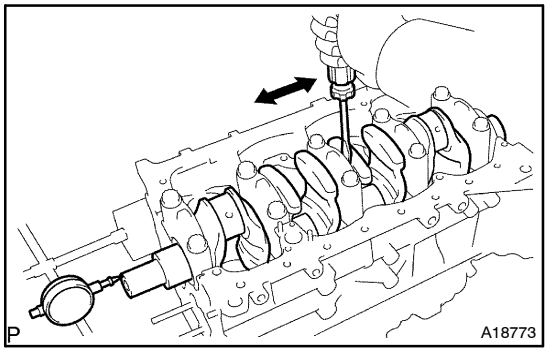
21. REMOVE PISTON AND CONNECTING ROD ASSEMBLIES

(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.



22. CHECK CRANKSHAFT THRUST CLEARANCE

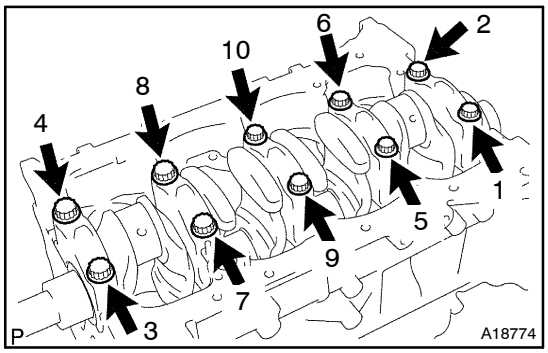
Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

Standard thrust clearance:
0.040 – 0.250 mm (0.0016 – 0.0098 in.)
Maximum thrust clearance: 0.30 mm (0.0118 in.)

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

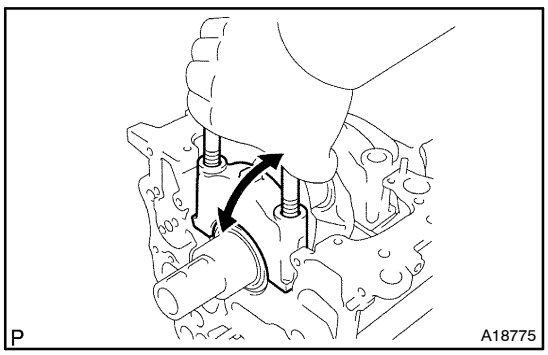
Thrust washer thickness:

STD	2.430 – 2.480 mm (0.0957 – 0.0976 in.)
U/S 0.250	2.555 – 2.605 mm (0.1006 – 0.1026 in.)
U/S 0.125	2.493 – 2.543 mm (0.0981 – 0.1001 in.)



23. 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 the removed main bearing cap bolts, pry the main bearing cap back and forth, and remove the main bearing caps, lower bearings and lower thrust washers (No. 5 main bearing cap only).

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:

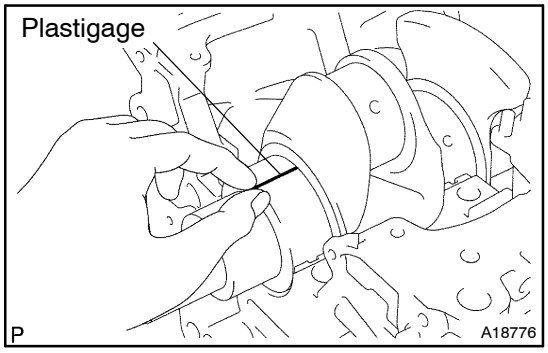
Keep the upper bearings and upper thrust washers together with the cylinder block.

(d) Clean each main journal and bearing.

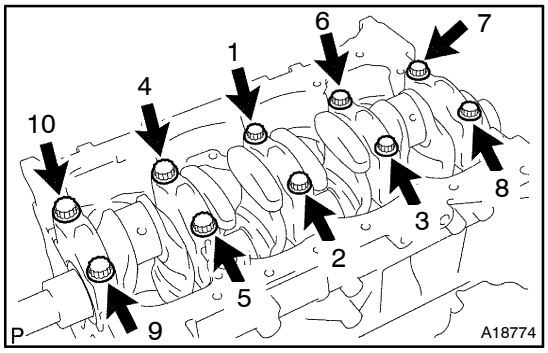
(e) Check each main journal and bearing for pitting and scratches.

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.

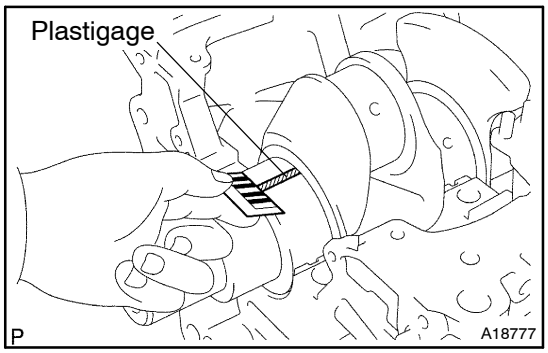


(h) Install the 5 main bearing caps (See page EM–82).

NOTICE:

Do not turn the crankshaft.

(i) Remove the 10 bolts and 5 main bearing caps (See procedure (a) and (b) above).



(j) Measure the Plastigage at its widest point.

Standard clearance:

STD	0.030 – 0.048 mm (0.0012 – 0.0019 in.)
U/S 0.25, U/S 0.50	0.037 – 0.077 mm (0.0015 – 0.0030 in.)

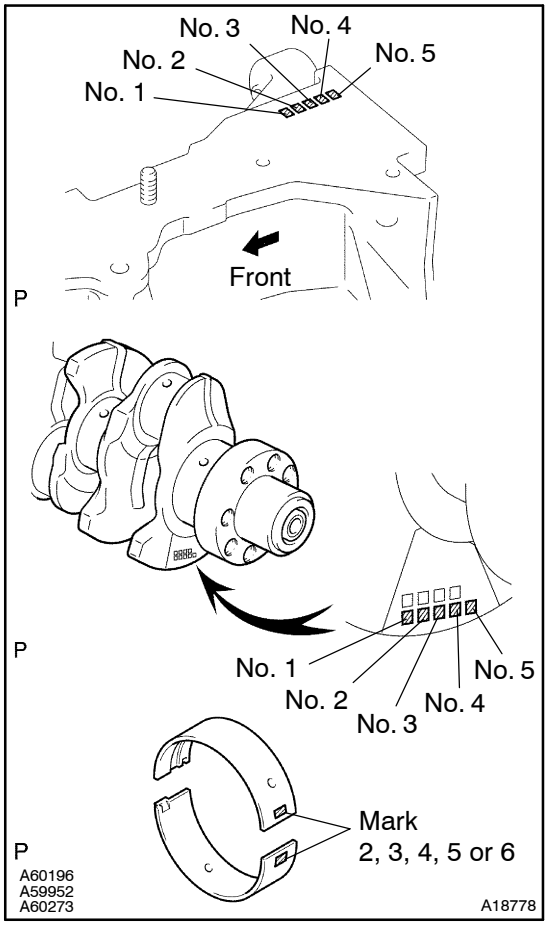
Maximum clearance: 0.10 mm (0.0039 in.)

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

HINT:

If replacing the cylinder block subassembly, the bearing standard clearance will be:

0.036 – 0.054 mm (0.0014 – 0.0021 in.)



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 selecting the bearing with the same number as the total. There are 5 sizes of standard bearings, marked 2, 3, 4, 5 and 6 accordingly.

Item	Number Mark								
Cylinder block	1			2			3		
Crankshaft	1	2	3	1	2	3	1	2	3
Use bearing	2	3	4	3	4	5	4	5	6

EXAMPLE:

Cylinder block ”3” + Crankshaft ”1” =

Total number 4 (Use bearing ”4”)

Reference

Cylinder block main journal bore diameter:

Mark 1	75.000 – 75.006 mm (2.9528 – 2.9530 in.)
Mark 2	75.006 – 75.012 mm (2.9530 – 2.9532 in.)
Mark 3	75.012 – 75. 018 mm (2.9532 – 2.9535 in.)

Crankshaft journal diameter:

Mark 1	69.994 – 70.000 mm (2.7557 – 2.7559 in.)
Mark 2	69.988 – 69.994 mm (2.7554 – 2.7557 in.)
Mark 3	69.982 – 69.988 mm (2.7552 – 2.7554 in.)

Standard sized bearing center wall thickness:

Mark 2	2.482 – 2.485 mm (0.0977 – 0.0978 in.)
Mark 3	2.485 – 2.488 mm (0.0978 – 0.0980 in.)
Mark 4	2.488 – 2.491 mm (0.0980 – 0.0981 in.)
Mark 5	2.491 – 2.494 mm (0.0981 – 0.0982 in.)
Mark 6	2.494 – 2.497 mm (0.0982 – 0.0983 in.)

(k) Completely remove the Plastigage.

24. REMOVE CRANKSHAFT

(a) Lift out the crankshaft.

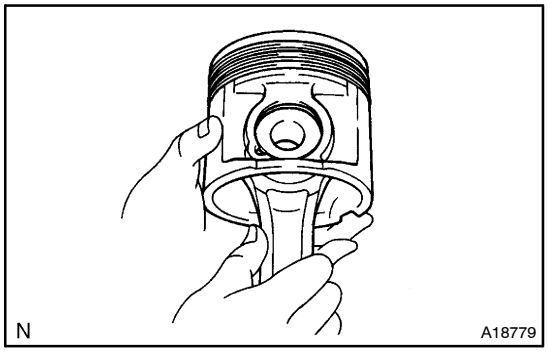
(b) Remove the upper bearings and upper thrust washers from the cylinder block.

HINT:

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

25. REMOVE OIL NOZZLES

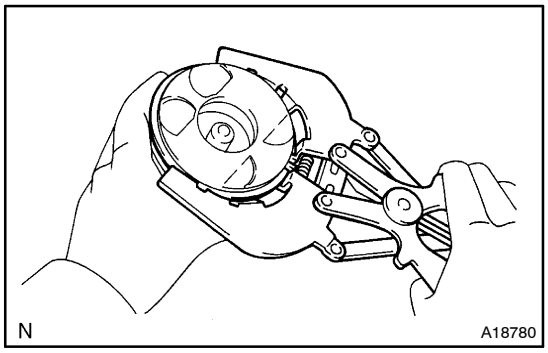
Remove the 4 check valves and oil nozzles.



26. DISCONNECT CONNECTING ROD FROM PISTON

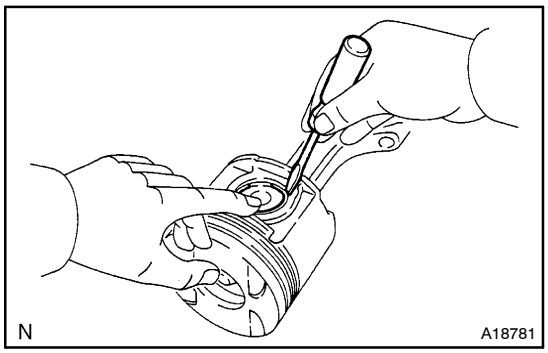
(a) Check the fit between the piston and piston pin.
Try to move the piston back and forth on the piston pin.

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

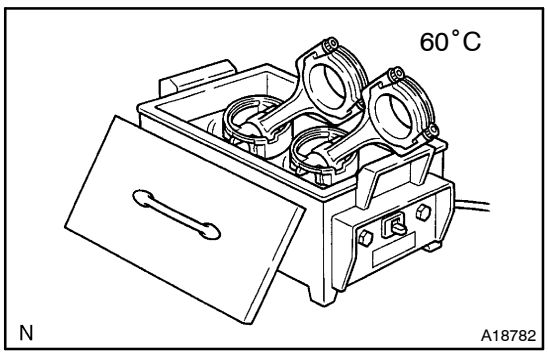


(b) Remove the piston rings.
(1) Using a piston ring expander, remove the 2 compression rings and oil ring.
(2) Remove the coil by hand.

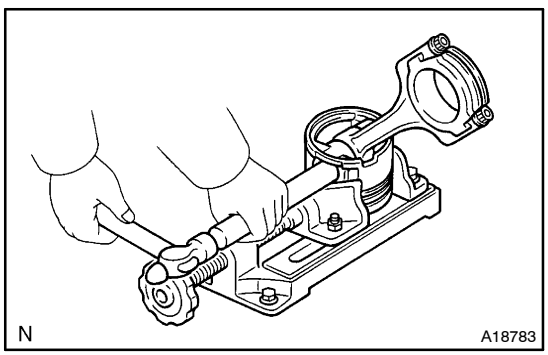
HINT:
Arrange the piston rings in correct order only.



(c) Disconnect the connecting rod from the piston.
(1) Using a small screwdriver, pry off the snap ring from the piston.



(2) Gradually heat the piston to approx. 60˚C (140˚F).



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

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