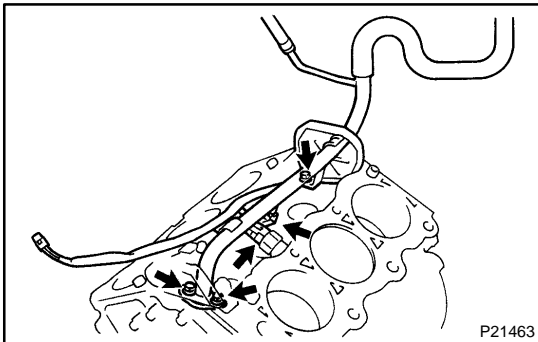
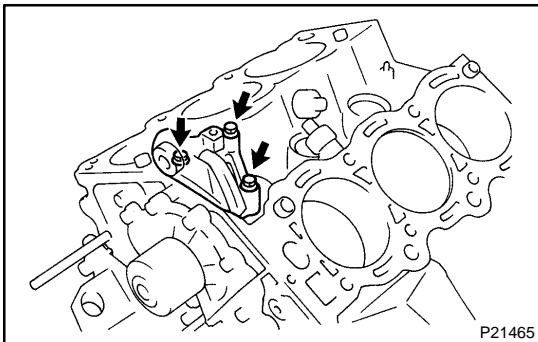


## DISASSEMBLY

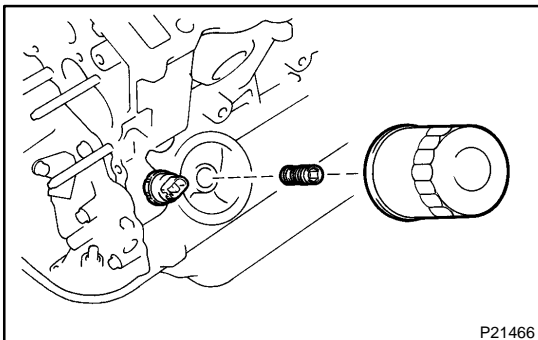
1. M/T:  
REMOVE FLYWHEEL
2. A/T:  
REMOVE DRIVE PLATE
3. REMOVE REAR END PLATE
4. INSTALL ENGINE TO ENGINE STAND FOR DISASSEMBLY
5. REMOVE TIMING BELT AND PULLEYS  
(See page [EM-13](#))
6. REMOVE CYLINDER HEADS (See page [EM-29](#))



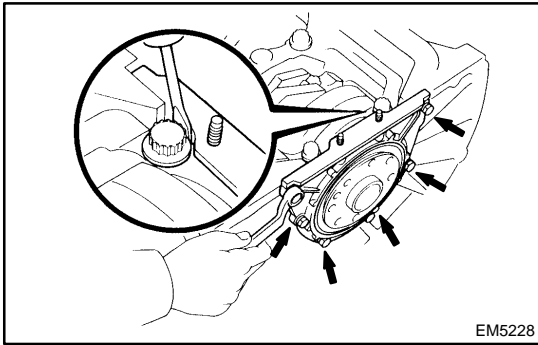
7. REMOVE WATER BYPASS PIPE WITH KNOCK SENSOR WIRE
  - (a) Disconnect the 2 knock sensor connectors.
  - (b) Remove the 2 bolts, nut and water bypass pipe with the knock sensor wire.



8. REMOVE NO.2 IDLER PULLEY BRACKET  
Remove the 3 bolts and idler pulley bracket.
9. REMOVE KNOCK SENSORS (See page [SF-58](#))
10. REMOVE WATER PUMP (See page [CO-6](#))
11. REMOVE GENERATOR ADJUSTING BAR
12. REMOVE OIL PRESSURE SWITCH  
Using SST, remove the oil pressure switch.  
SST 09816-30010



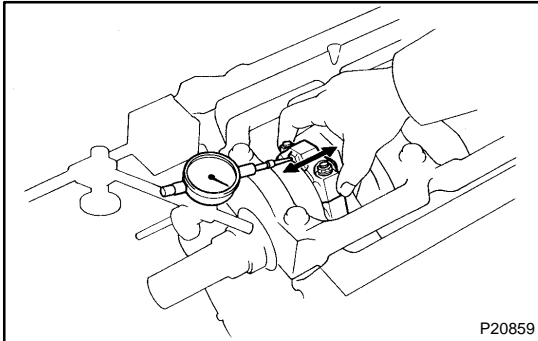
13. REMOVE OIL FILTER (See page [LU-2](#))
14. REMOVE OIL FILTER UNION  
Using a 12 mm hexagon wrench, remove the union.
15. REMOVE RH AND LH ENGINE MOUNTING BRACKETS
16. REMOVE COOLANT DRAIN COCK
17. w/ Oil Cooler:  
REMOVE OIL COOLER (See page [LU-18](#))
18. REMOVE OIL PUMP (See page [LU-8](#))



EM5228

**19. REMOVE REAR OIL SEAL RETAINER**

- (a) Remove the 6 bolts and retainer.
- (b) Using a screwdriver, remove the oil seal retainer by prying the portions between the oil seal retainer and main bearing cap.



P20859

**20. CHECK CONNECTING ROD THRUST CLEARANCE**

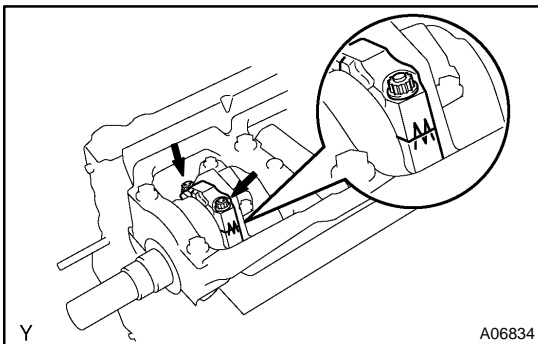
Using a dial indicator, measure the thrust clearance while moving the connecting rod back and forth.

**Standard thrust clearance:**

**0.150 – 0.330 mm (0.0059 – 0.0130 in.)**

**Maximum thrust clearance: 0.380 mm (0.0150 in.)**

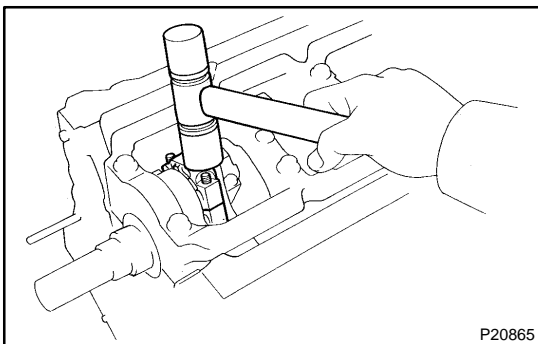
If the thrust clearance is greater than maximum, replace the connecting rod assembly.



A06834

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

- (a) Check the matchmarks on the connecting rod and cap are aligned to ensure correct order.
- (b) Remove the 2 connecting rod cap nuts.



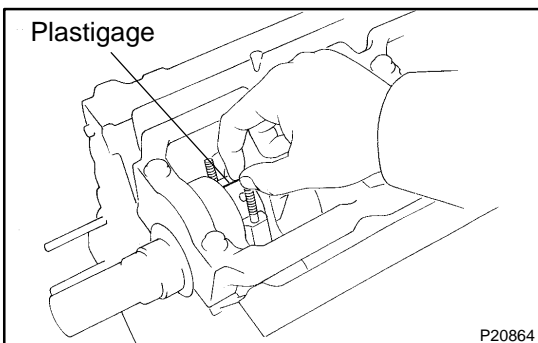
P20865

- (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.



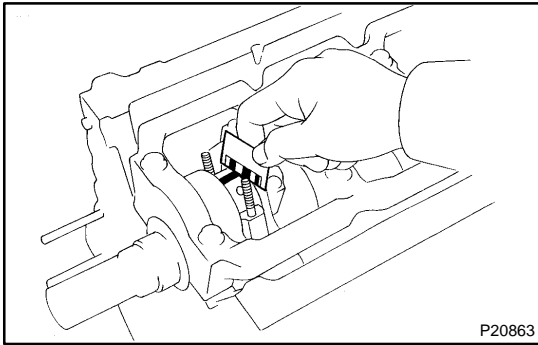
P20864

- (g) Lay a strip of Plastigage across the crank pin.
- (h) Install the connecting rod cap with the 2 nuts (See page [EM-98](#)).

**NOTICE:**

**Do not turn the crankshaft.**

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



(j) Measure the Plastigauge at its widest point.

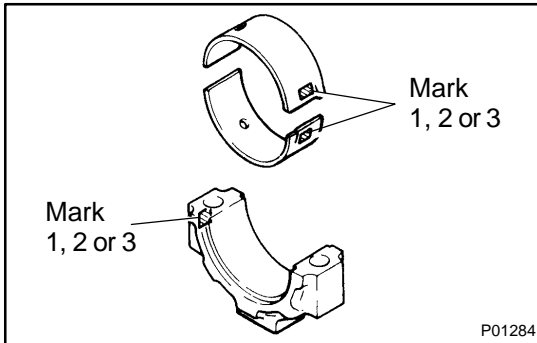
**Standard oil clearance:**

STD	0.024 – 0.053 mm (0.0009 – 0.0021 in.)
U/S 0.25	0.023 – 0.069 mm (0.0009 – 0.0027 in.)

**Maximum oil clearance: 0.08 mm (0.0031 in.)**

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

If necessary, grind or replace the crankshaft.



HINT:

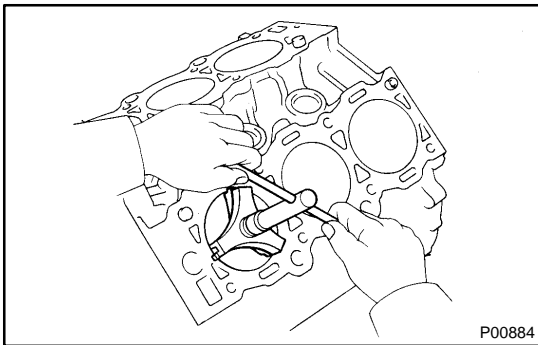
If using a standard bearing, replace with one having the same number marked on the connecting rod cap. There are 3 sizes of standard bearings, marked "1", "2" and "3" accordingly.

**Reference**

**Standard bearing center wall thickness:**

Mark "1"	1.484 – 1.488 mm (0.0584 – 0.0586 in.)
Mark "2"	1.488 – 1.492 mm (0.0586 – 0.0587 in.)
Mark "3"	1.492 – 1.496 mm (0.0587 – 0.0589 in.)

(k) Completely remove the Plastigauge.

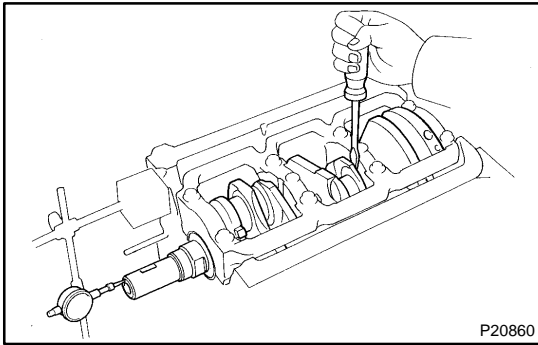


**22. REMOVE PISTON AND CONNECTING ROD ASSEMBLIES**

- Using a ridge reamer, remove the all carbon from the top of the cylinder.
- Cover the connecting rod bolts with a short piece of hose to protect the crankshaft from damage.
- 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.



### 23. 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: 0.300 mm (0.0118 in.)**

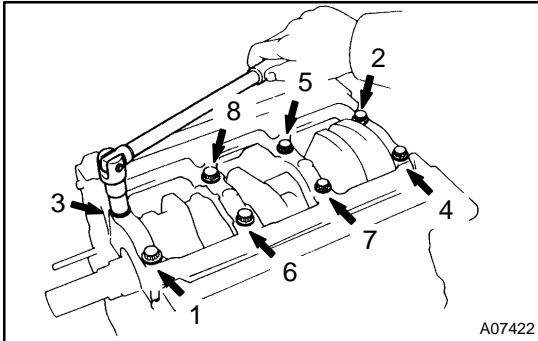
If the thrust clearance is greater than maximum, replace the thrust washers as a set.

**Thrust washer thickness:**

**2.440 – 2.490 mm (0.0961 – 0.0980 in.)**

### 24. REMOVE MAIN BEARING CAP AND CHECK OIL CLEARANCE

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



(b) Using a screwdriver, pry out the main bearing cap and remove the main bearing cap, lower main bearings and lower thrust washers (No.2 journal position of main bearing cap only).

**HINT:**

Keep the lower main bearings and lower thrust washers together with the main bearing cap.

(c) Lift out the crankshaft.

**HINT:**

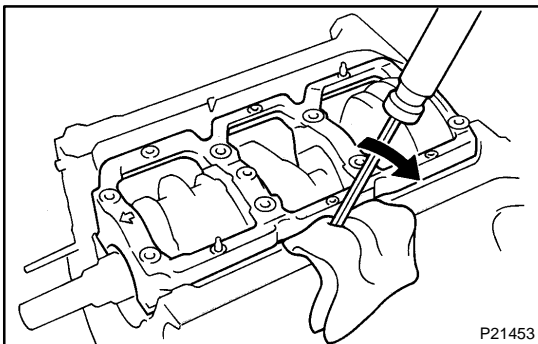
Keep the upper main bearings and upper thrust washers together with the cylinder block.

(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.



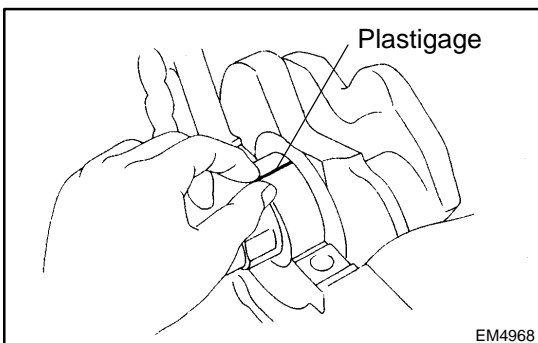
(g) Lay a strip of Plastigage across each journal.

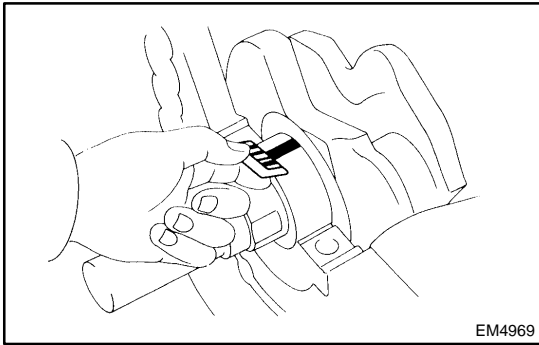
(h) Install the main bearing cap with the 8 bolts (See page [EM-98](#)).

**NOTICE:**

**Do not turn the crankshaft.**

(i) Remove the 8 bolts and main bearing cap (See step (a) and (b) above).





(j) Measure the Plastigauge at its widest point.

**Standard clearance:**

No.1	STD	0.020 – 0.038 mm (0.0008 – 0.0015 in.)
	U/S 0.25	0.019 – 0.059 mm (0.0007 – 0.0023 in.)
Others	STD	0.024 – 0.042 mm (0.0009 – 0.0017 in.)
	U/S 0.25	0.023 – 0.063 mm (0.0009 – 0.0025 in.)

**Maximum clearance: 0.08 mm (0.0031 in.)**

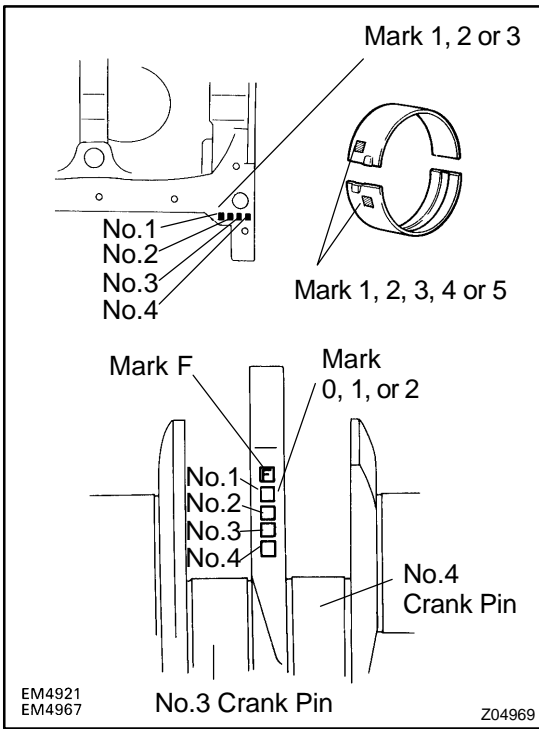
**HINT:**

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

No.1	0.010 – 0.049 mm (0.0004 – 0.0020 in.)
Others	0.014 – 0.053 mm (0.0006 – 0.0021 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. 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 "1", "2", "3", "4" and "5" accordingly.

	Number marked								
	1			2			3		
Cylinder block									
Crankshaft	0	1	2	0	1	2	0	1	2
Use bearing	1	2	3	2	3	4	3	4	5

EXAMPLE: Cylinder block "2" + Crankshaft "1"  
= Total number 3 (Use bearing "3")

**Reference****Standard sized bearing center wall thickness:**

No.1	Mark "1"	1.991 – 1.994 mm (0.0784 – 0.0785 in.)
	Mark "2"	1.994 – 1.997 mm (0.0785 – 0.0786 in.)
	Mark "3"	1.997 – 2.000 mm (0.0786 – 0.0787 in.)
	Mark "4"	2.000 – 2.003 mm (0.0787 – 0.0789 in.)
	Mark "5"	2.003 – 2.006 mm (0.0789 – 0.0790 in.)
Others	Mark "1"	1.989 – 1.992 mm (0.0783 – 0.0784 in.)
	Mark "2"	1.992 – 1.995 mm (0.0784 – 0.0785 in.)
	Mark "3"	1.995 – 1.998 mm (0.0785 – 0.0787 in.)
	Mark "4"	1.998 – 2.001 mm (0.0787 – 0.0788 in.)
	Mark "5"	2.001 – 2.004 mm (0.0788 – 0.0789 in.)

**Cylinder block main journal bore diameter:**

Mark "1"	68.010 – 68.016 mm (2.6776 – 2.6778 in.)
Mark "2"	68.016 – 68.022 mm (2.6778 – 2.6780 in.)
Mark "3"	68.022 – 68.028 mm (2.6780 – 2.6783 in.)

**Crankshaft main journal diameter:**

Mark "0"	63.996 – 64.000 mm (2.5195 – 2.5197 in.)
Mark "1"	63.990 – 63.996 mm (2.5193 – 2.5195 in.)
Mark "2"	63.985 – 63.990 mm (2.5191 – 2.5193 in.)

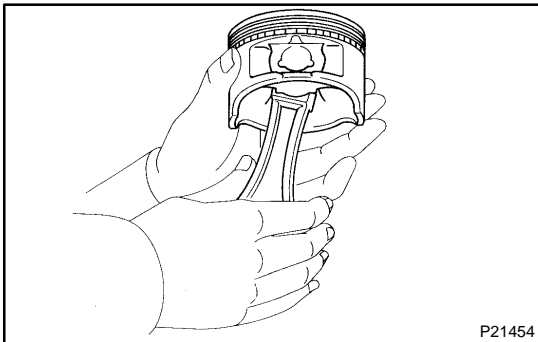
(k) Completely remove the Plastigauge.

**25. REMOVE CRANKSHAFT**

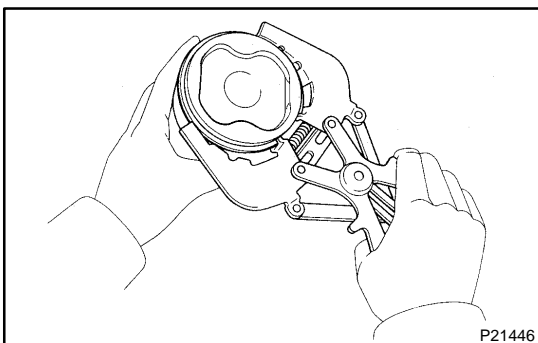
- (a) Lift out the crankshaft.
- (b) Remove the upper main bearings and upper thrust washers from the cylinder block.

**HINT:**

Arrange the main bearings and thrust washers in correct order.

**26. CHECK FIT BETWEEN PISTON AND PISTON PIN**

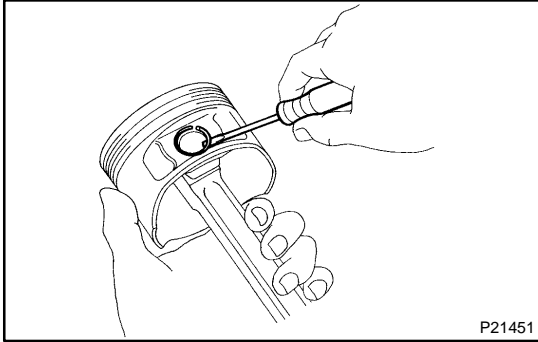
Try to move the piston back and forth on the piston pin. If any movement is felt, replace the piston and pin as a set.

**27. REMOVE PISTON RINGS**

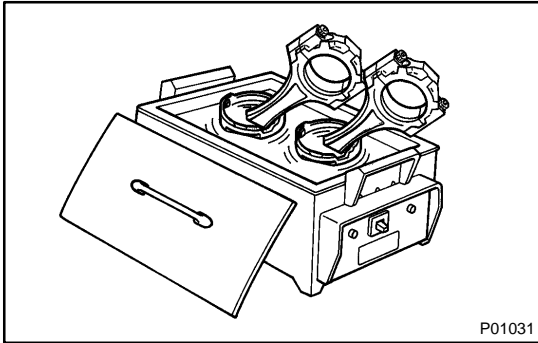
- (a) Using a piston ring expander, remove the 2 compression rings.
- (b) Remove the 2 side rails and oil ring by hand.

**HINT:**

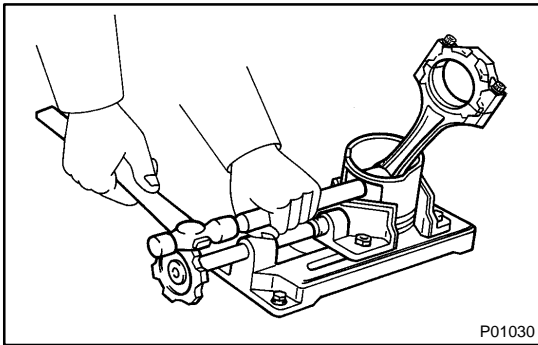
Arrange the piston rings in the correct order only.

**28. DISCONNECT CONNECTING ROD FROM PISTON**

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



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



(c) Using a 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 in the correct order.