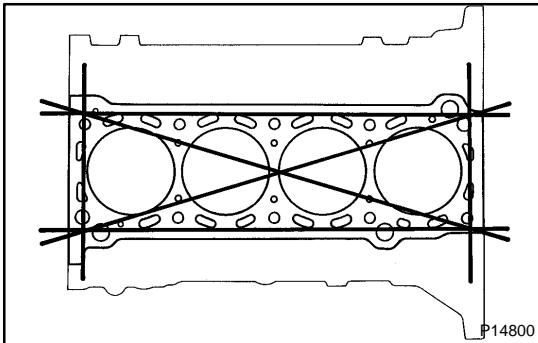


## INSPECTION

### 1. REMOVE GASKET MATERIAL

- (a) Remove the gasket material.  
Using a gasket scraper, remove all the gasket material from the top surface of the cylinder block.
- (b) Clean the cylinder block.  
Using a soft brush and solvent, thoroughly clean the cylinder block.

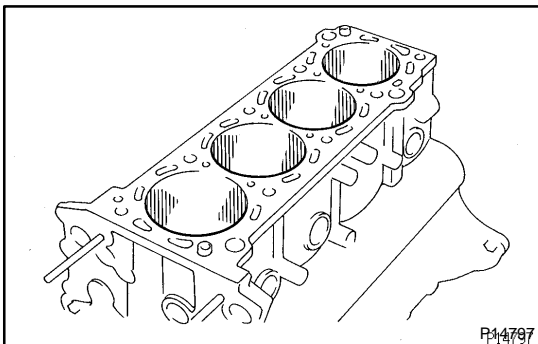


### 2. INSPECT CYLINDER BLOCK

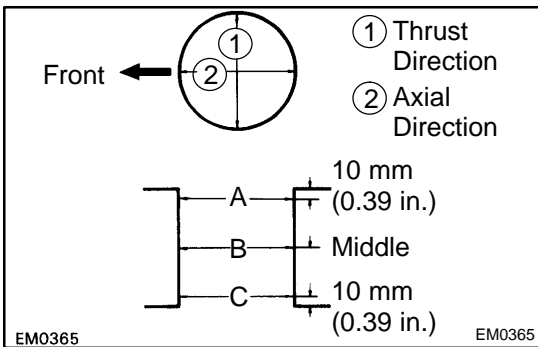
- (a) Inspect for flatness.  
Using a precision straight edge and thickness gauge, measure the surfaces contacting the cylinder head gasket for warpage.

**Maximum warpage: 0.05 mm (0.0020 in.)**

If warpage is greater than maximum, replace the cylinder block.



- (b) Visually check the cylinder for vertical scratches.  
If deep scratches are present, rebore all the 4 cylinders. If necessary, replace the cylinder block.



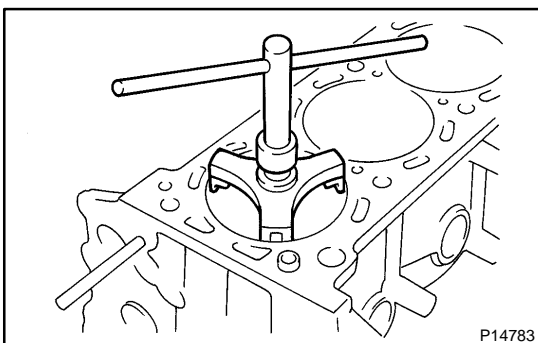
- (c) Inspect the cylinder bore diameter.  
Using a cylinder gauge, measure the cylinder bore diameter at positions A, B and C in the thrust and axial directions.

**Standard diameter:**

**94.990 – 95.003 mm (3.7400 – 3.7403 in.)**

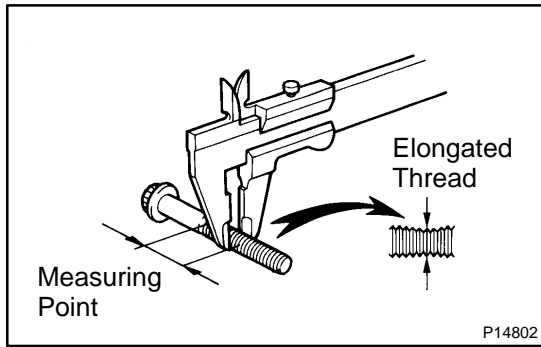
**Maximum diameter: 95.06 mm (3.7425 in.)**

If the diameter is greater than maximum, rebore all the 4 cylinders. If necessary, replace the cylinder block.



### 3. REMOVE CYLINDER RIDGE

If the wear is less than 0.2 mm (0.008 in.), using a ridge reamer, grind the top of the cylinder.



#### 4. INSPECT MAIN BEARING CAP BOLTS

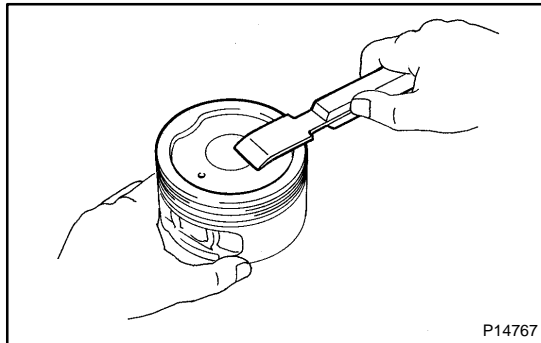
Using vernier calipers, measure the minimum diameter of the elongated thread at the measuring point.

**Standard outside diameter:**

**10.76 – 10.97 mm (0.4236 – 0.4319 in.)**

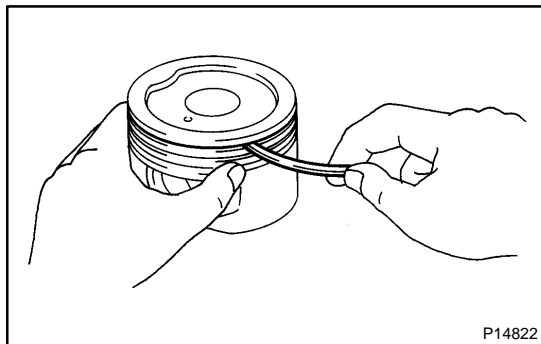
**Minimum outside diameter: 10.40 mm (0.4094 in.)**

If the diameter is less than minimum, replace the bolt.



#### 5. CLEAN PISTON

(a) Using a gasket scraper, remove the carbon from the piston top.

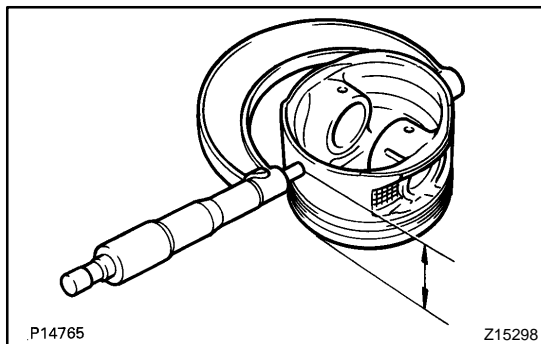


(b) Using a groove cleaning tool or broken ring, clean the piston ring grooves.

(c) Using solvent and a brush, thoroughly clean the piston.

**NOTICE:**

**Do not use a wire brush.**



#### 6. INSPECT PISTON AND CONNECTING ROD

(a) Inspect the piston oil clearance.

(1) Using a micrometer, measure the piston diameter at right angles to the piston pin center line, 35.5 mm (1.40 in.) for 2RZ-FE or 37.5 mm (1.47 in.) for 3RZ-FE from the piston head.

**Piston diameter:**

STD	2RZ-FE	94.923 – 94.933 mm (3.7371 – 3.7375 in.)
	3RZ-FE	94.933 – 94.943 mm (3.7375 – 3.7379 in.)
O/S 0.50	2RZ-FE	95.423 – 95.433 mm (3.7568 – 3.7572 in.)
	3RZ-FE	95.433 – 95.443 mm (3.7572 – 3.7576 in.)

(2) Measure the cylinder bore diameter in the thrust directions.

(3) Subtract the piston diameter measurement from the cylinder bore diameter measurement.

**Standard oil clearance:**

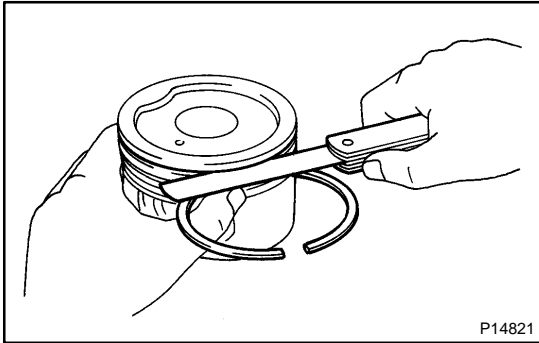
2RZ-FE	0.057 – 0.080 mm (0.0022 – 0.0031 in.)
3RZ-FE	0.047 – 0.070 mm (0.0019 – 0.0028 in.)

If the oil clearance is greater than maximum, replace all the 4 pistons and rebore all the 4 cylinders. If necessary, replace the cylinder block.

HINT:

Use new cylinder block:

Use a piston with the same number mark as the cylinder bore diameter marked on the cylinder block.

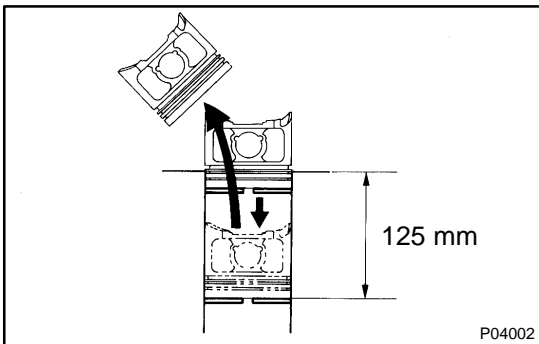


- (b) Inspect the piston ring groove clearance. Using a feeler gauge, measure the clearance between new piston ring and the wall of the piston ring groove.

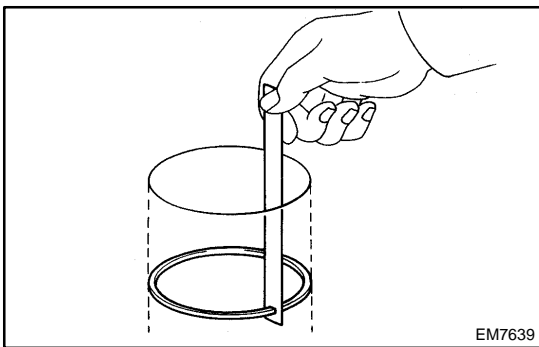
**Ring groove clearance:**

No.1	0.020 – 0.070 mm (0.0008 – 0.0028 in.)
No.2	0.030 – 0.070 mm (0.0012 – 0.0028 in.)

If the clearance is not as specified, replace the piston.



- (c) Inspect the piston ring end gap.
  - (1) Insert the piston ring into the cylinder bore.
  - (2) Using a piston, push the piston ring a little beyond the bottom of the ring travel, 125 mm (4.92 in.) from the top of the cylinder block.



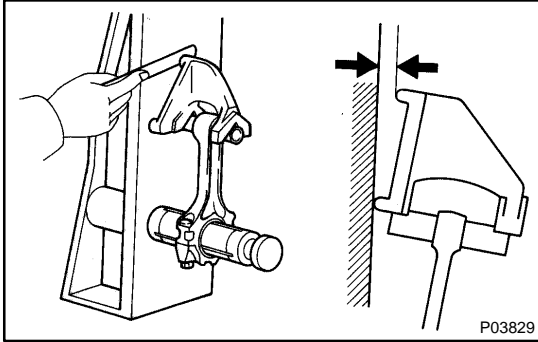
- (3) Using a feeler gauge, measure the end gap.

**Ring end gap:**

No.1	0.300 – 0.400 mm (0.0118 – 0.0157 in.)
No.2	0.400 – 0.500 mm (0.0157 – 0.0197 in.)

If the end gap is not as specified, replace the piston ring. If the end gap is not as specified, even with a new piston ring, rebore all the 4 cylinders or replace the cylinder block.

- (d) Inspect the piston pin fit. At 80 – 90°C (176 – 194°F), you should be able to push the piston pin into the piston pin hole with your thumb.



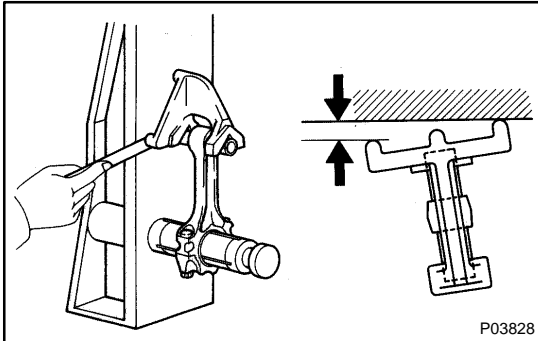
(e) Using a rod aligner and feeler gauge, check the connecting rod alignment.

(1) Check for bend.

**Maximum bend:**

**0.05 mm (0.0020 in.) per 100 mm (3.94 in.)**

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

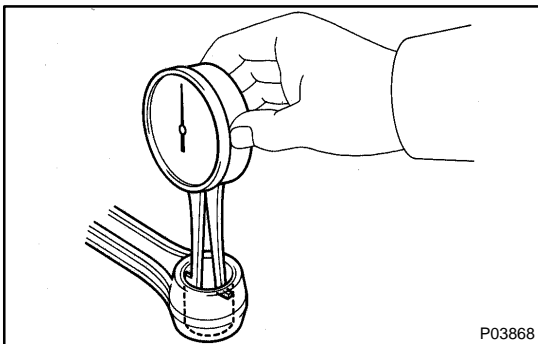


(2) Check for twist

**Maximum twist:**

**0.15 mm (0.0059 in.) per 100 mm (3.94 in.)**

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

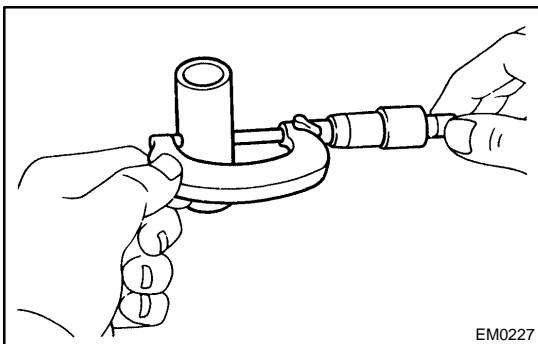


(f) Inspect the piston pin oil clearance.

(1) Using a caliper gauge, measure the inside diameter of the connecting rod bushing.

**Bushing inside diameter:**

**24.008 – 24.017 mm (0.9452 – 0.9455 in.)**



(2) Using a micrometer, measure the pin diameter.

**Piston pin diameter:**

**24.000 – 24.009 mm (0.9449 – 0.9452 in.)**

(3) Subtract the piston pin diameter measurement from the bushing inside diameter measurement.

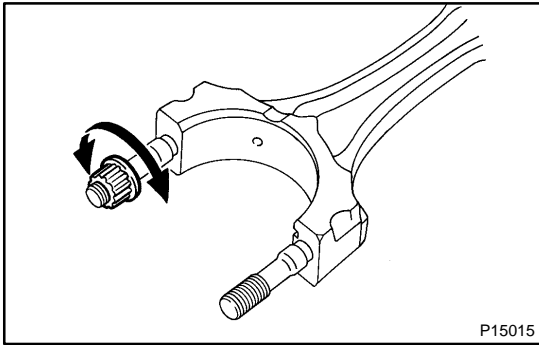
**Standard oil clearance:**

**0.005 – 0.011 mm (0.0002 – 0.0004 in.)**

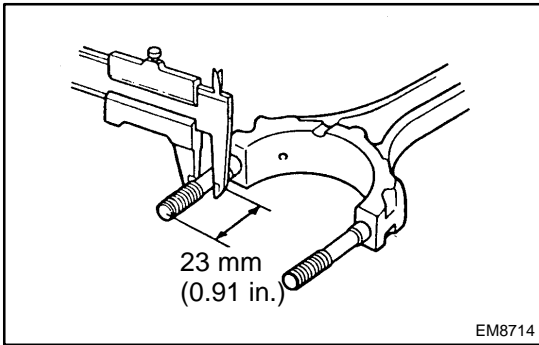
**Maximum oil clearance: 0.015 mm (0.0006 in.)**

If the oil clearance is greater than maximum, replace the bushing (See page [EM-97](#)).

If necessary, replace the piston and piston pin as a set.



- (g) Inspect the connecting rod bolts.
  - (1) Install the cap nut to the connecting rod bolt. Check that the cap nut can be turned easily by hand to the end of the thread.



- (2) If the cap nut cannot be turned easily, measure the minimum outside diameter of the connecting rod bolt with vernier calipers.

**Standard outside diameter:**

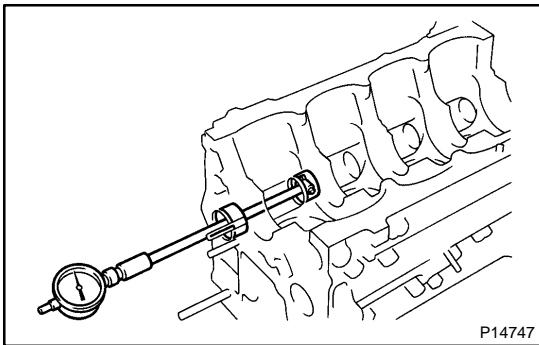
**7.80 – 7.90 mm (0.3071 – 0.3110 in.)**

**Minimum outside diameter: 7.60 mm (0.2992 in.)**

**HINT:**

If the location of minimum diameter cannot be judged by visual inspection, measure the outer diameter at the location shown in the illustration.

If the outside diameter is less than limit, replace the connecting rod bolt and nut as a set.

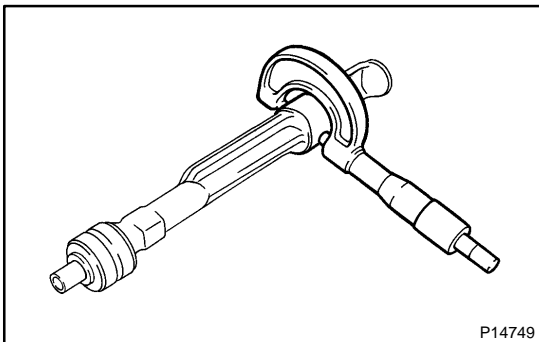


**7. 3RZ-FE: INSPECT NO.1 (RH) AND NO.2 (LH) BALANCE SHAFTS**

- (a) Using a cylinder gauge, measure the inside diameter of the balance shaft bearing.

**Bearing inside diameter (from front side):**

No.1 (RH)	38.025 – 38.045 mm (1.4970 – 1.4978 in.)
No.2 (LH)	37.525 – 37.545 mm (1.4774 – 1.4781 in.)



- (b) Using a micrometer, measure the diameter of the balance shaft main journals.

**Main journal diameter (from front side):**

No.1 (RH)	37.969 – 38.985 mm (1.4948 – 1.4955 in.)
No.2 (LH)	37.449 – 37.465 mm (1.4744 – 1.4750 in.)

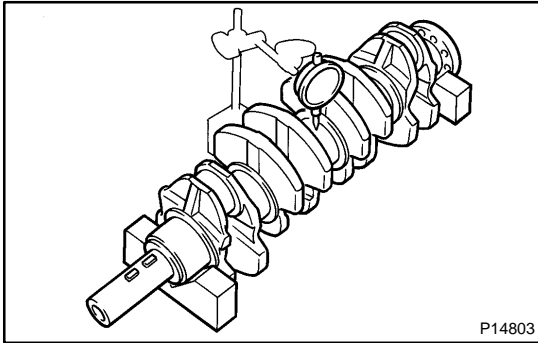
- (c) Subtract the balance shaft main journal diameter measurement from the balance shaft bearing inside diameter measurement.

**Standard oil clearance:**

No.1 (RH)	0.040 – 0.076 mm (0.0016 – 0.0031 in.)
No.2 (LH)	0.060 – 0.096 mm (0.0024 – 0.0038 in.)

**Maximum oil clearance: 0.15 mm (0.0059 in.)**

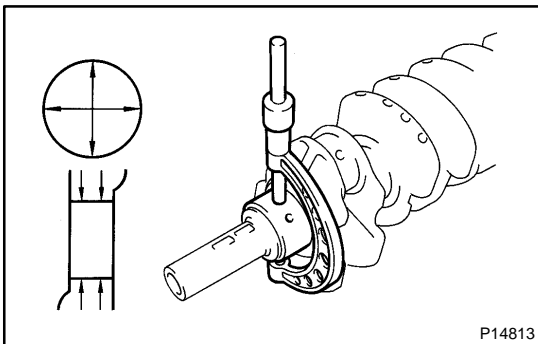
If the clearance is greater than maximum, replace the cylinder block and balance shaft.

**8. INSPECT CRANKSHAFT****(a) Inspect for circle runout.**

- (1) Place the crankshaft on V-blocks.
- (2) Using a dial indicator, measure the circle runout at the center journal.

**Maximum circle runout: 0.03 mm (0.0012 in.)**

If the circle runout is greater than maximum, replace the crankshaft.

**(b) Inspect the main journals and crank pins.**

- (1) Using a micrometer, measure the diameter of each main journal and crank pin.

**Main journal diameter:**

STD	No.3	59.981 – 59.994 mm (2.2615 – 2.3620 in.)
	Others	59.987 – 60.000 mm (2.3617 – 2.3622 in.)
U/S 0.25	No.3	59.740 – 59.750 mm (2.3520 – 2.3524 in.)
	Others	59.745 – 59.755 mm (2.3522 – 2.3526 in.)

**Crank pin diameter:**

STD	52.987 – 53.000 mm (2.0861 – 2.0866 in.)
U/S 0.25	52.745 – 52.755 mm (2.0766 – 2.0770 in.)

If the diameter is not as specified, check the oil clearance (See page [EM-84](#)).

If necessary, grind or replace the crankshaft.

- (2) Check each main journal and crank pin for taper and out-of-round as shown.

**Maximum taper and out-of-round:****0.005 mm (0.0002 in.)**

If the taper and out-of-round is greater than maximum, replace the crankshaft.

**9. IF NECESSARY, GRIND AND HONE MAIN JOURNALS AND/OR CRANK PINS**

Grind and hone the main journals and/or crank pins to the finished undersized diameter (See procedure in step 6). Install new main journal and/or crank pin undersized bearings.