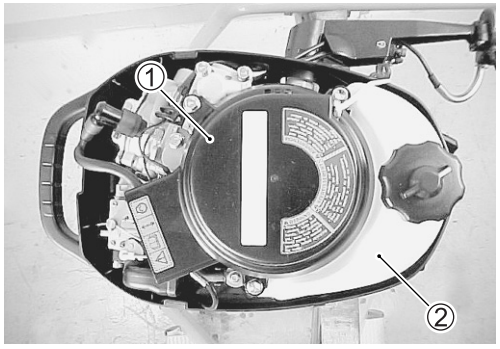
POWER UNIT

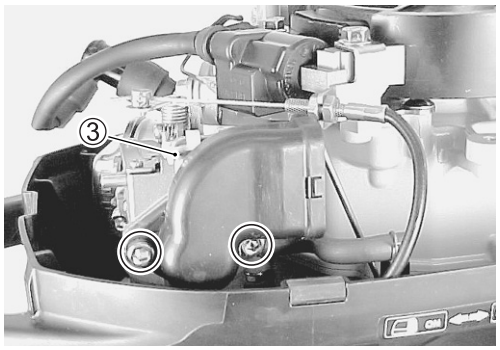
CONTENTS

POWER UNIT
REMOVAL

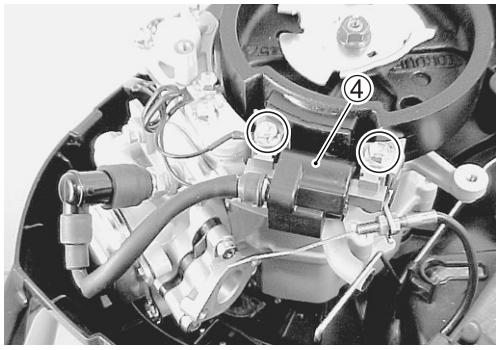
Before removing the power unit:
- **Drain the engine oil. (See page 2-4.)**
- **Shift into "NEUTRAL" position.**



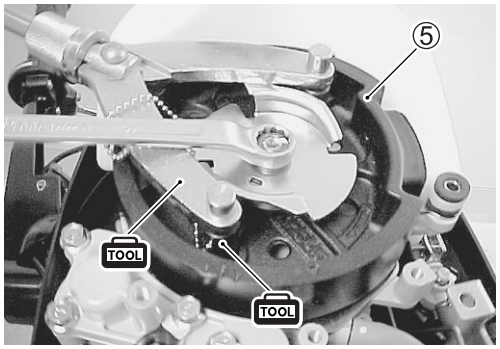
1. Remove the recoil starter assy ①. (See page 5-2.)
2. Remove the fuel tank ②. (See page 4-13.)



3. Remove the carburetor assy ③. (See page 4-5.)

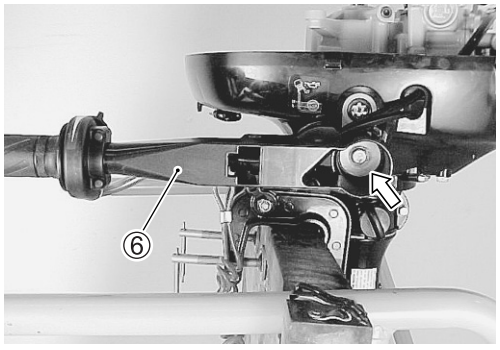


4. Remove the igniter unit ④.



5. Remove the flywheel magneto ⑤. (See page 3-7 and 3-8.)

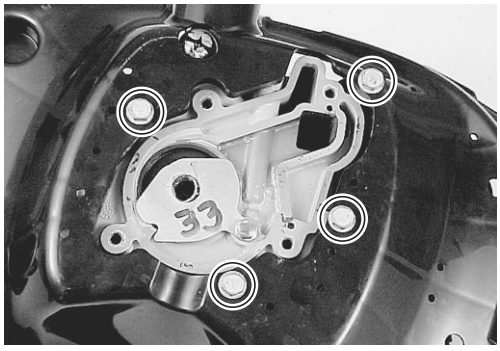
TOOL **09930-40113: Flywheel holder**
09930-40120: Rotor holder attachment



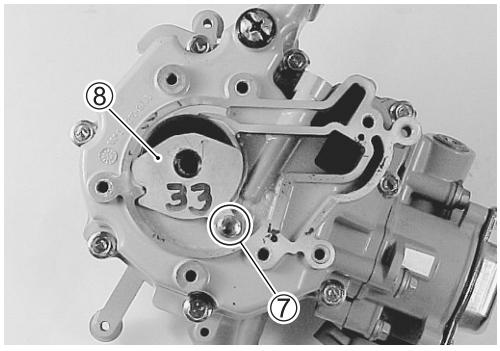
6. Remove the tiller handle assy ⑥. (See page 7-11.)

7. Remove the four engine mounting bolts.
8. Detach the power unit with the lower cover.

9. Remove the four bolts, then detach the power unit from the lower cover.



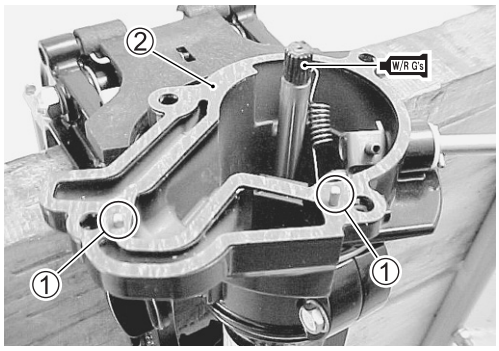
10. Remove a bolt ⑦ and oil seal protector ⑧.



INSTALLATION

Installation is reverse order of removal with the special attention to the following steps.

1. Install the two dowel pins ① and gasket ② onto the driveshaft housing.



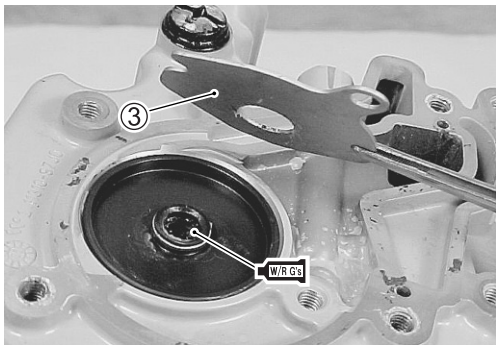
CAUTION

Do not re-use the gasket once removed.
Always use new parts.

2. Apply the Water Resistant Grease to the driveshaft splines.

W/R G's 99000-25161: SUZUKI WATER RESISTANT GREASE

3. Apply the Water Resistant Grease to the seal lips of the driveshaft oil seal.

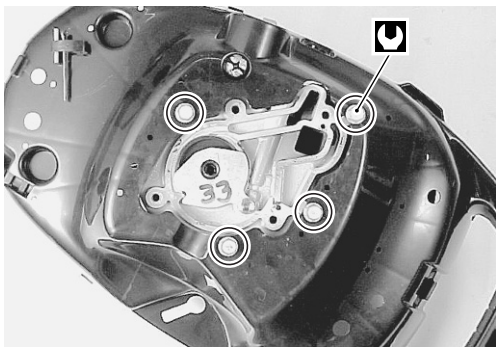


W/R G's 99000-25161: SUZUKI WATER RESISTANT GREASE

4. Install the oil seal protector ③ and tighten the bolt after applying the Thread Lock to the bolt.

1342 99000-32050: THREAD LOCK "1342"

5. Install the power unit to the lower cover, then tighten the four bolts to the specified torque.



Lower cover bolt: 8 N·m (0.8 kg-m, 6.0 lb-ft)

6. Install the power unit/lower cover assembly onto the drive-shaft housing.
7. Apply the Silicone Seal to the four power unit mounting bolts and tighten the bolts to the specified torque.

Si SEAL 99000-31120: SUZUKI SILICONE SEAL

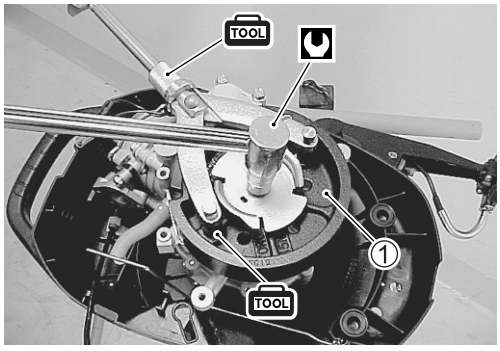
Power unit mounting bolt: 10 N·m (1.0 kg-m, 7.0 lb-ft)

FLYWHEEL MAGNETO

- Install the flywheel magneto and tighten the flywheel nut to the specified torque. (See page 3-8.)

TOOL 09930-40113: Flywheel holder
09930-40120: Rotor holder attachment

Flywheel nut: 45 N·m (4.5 kg-m, 32.5 lb-ft)

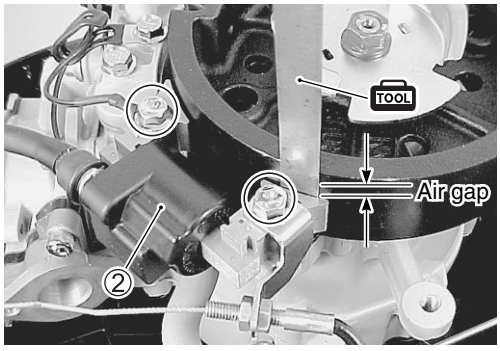


IGNITER UNIT

- Install the igniter unit with an air gap of 0.5 mm between the both core ends and the flywheel. (See page 3-8.)

TOOL 09900-20803: Thickness gauge

Air gap: 0.5 mm (0.02 in)



FINAL ASSEMBLY CHECK

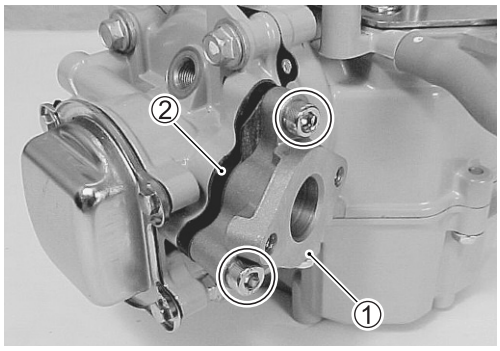
Perform the following checks in order to ensure proper and safe operation of the repaired unit.

- All parts removed have been returned to the original positions.
- Lower unit gear engagement is properly adjusted.
  (See page 8-19.)
- Fuel hose routing matchs service manual illustration.
  (See page 9-2.)
- Wire routing matchs service manual illustration.
  (See page 9-3.)
- No fuel leakage is evident.
- No water leakage is evident during final test running.

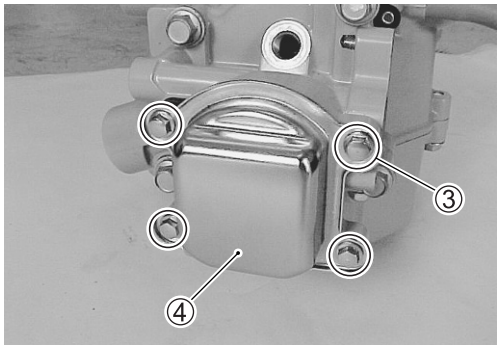
CYLINDER HEAD / VALVE / ROCKER ARM

REMOVAL

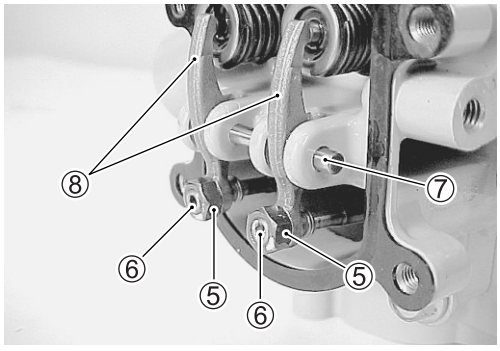
1. Remove the two bolts, the intake manifold ① and the insulator ②.



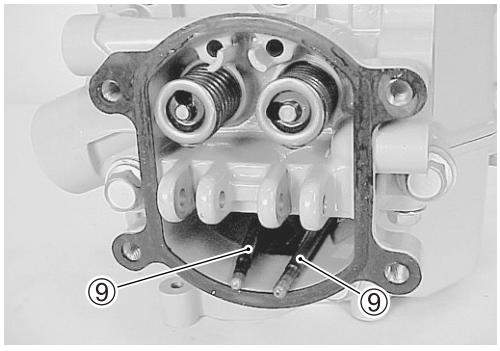
2. Remove the four bolts ③ and the cylinder head cover ④.



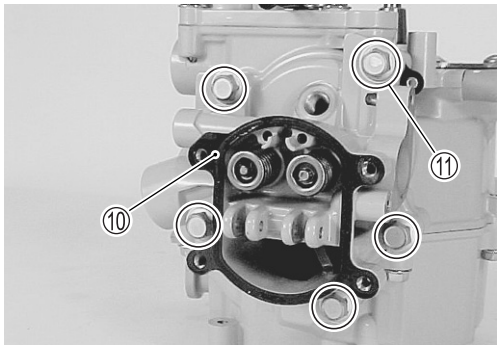
3. Remove the valve adjusting lock nuts ⑤, then remove the valve adjusting screw ⑥.
4. Remove the rocker arm shaft ⑦ and the rocker arms ⑧.



5. Remove the push rods ⑨.



6. Remove the gasket ⑩.
7. Remove the five bolts ⑪ and the cylinder head assembly from the cylinder block.



INSTALLATION

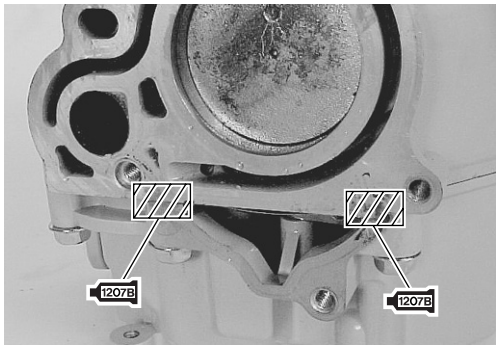
Installation in reverse order of removal paying special attention to the following steps.

CAUTION

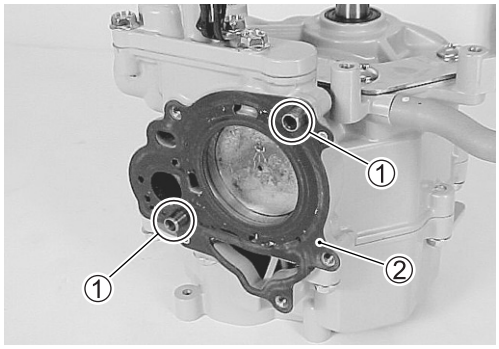
Do not re-use gasket. Always use a new gasket.

1. Before installing cylinder head gasket, apply bond to both surfaces of the hatched areas shown in illustration.

1207B 99000-31140: SUZUKI BOND "1207B"



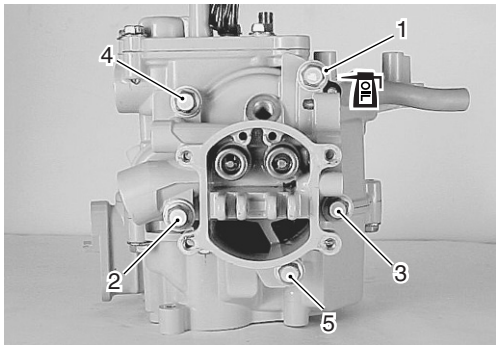
2. Insert the dowel pins ① and place a new cylinder head gasket ② into position on cylinder.

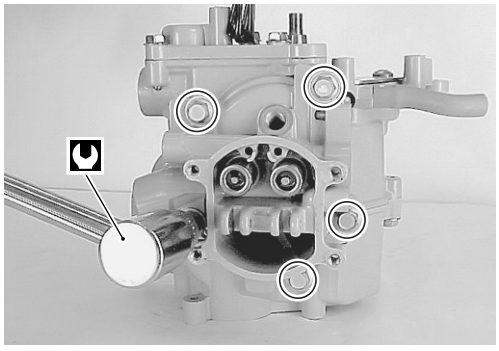


3. Position cylinder head assembly on cylinder.
4. Apply engine oil to cylinder head bolts.
5. Lightly seat all cylinder head bolts at first.
   According to tightening order in figure, tighten bolts in two steps.

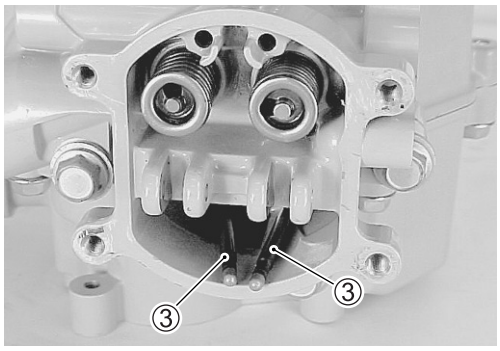
Cylinder head bolt:

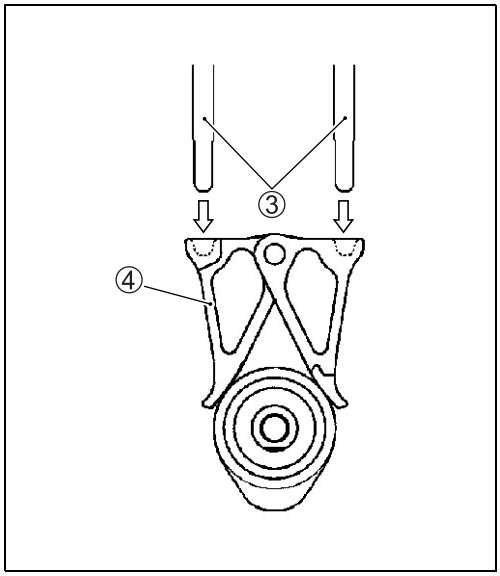
1st step	**7 N·m (0.7 kg-m, 5.0 lb-ft)**
Final step	**13 N·m (1.3 kg-m, 9.5 lb-ft)**



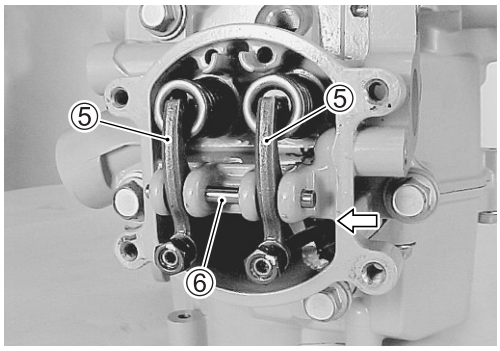


6. Install the two push rods ③ onto the cam rocker arms ④.



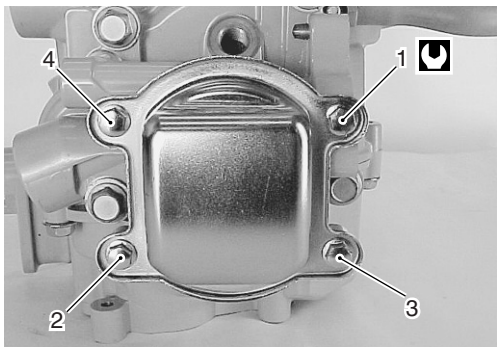


7. Install the rocker arms ⑤ and the rocker arm shaft ⑥.
8. Adjust the valve clearance. (See page 2-8 and 2-9.)



9. Install the cylinder head cover and the gasket, then tighten the four cylinder head cover bolts diagonally to the specified torque.

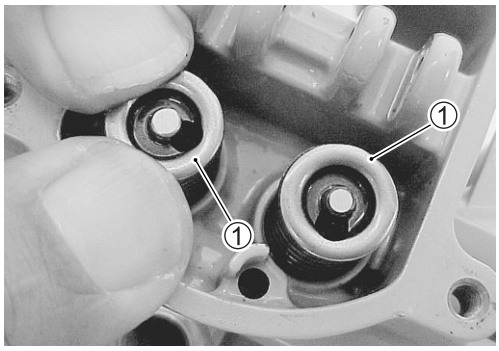
Cylinder head cover bolt: 7 N·m (0.7 kg-m, 5.0 lb-ft)

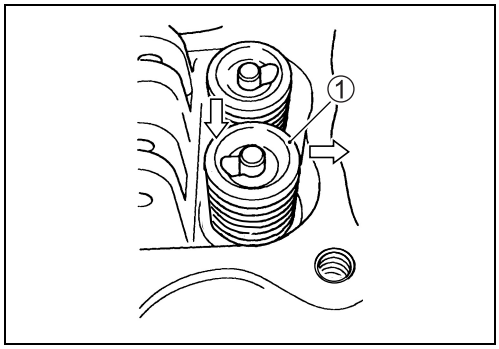


DISASSEMBLY

1. Remove the retainer ①.

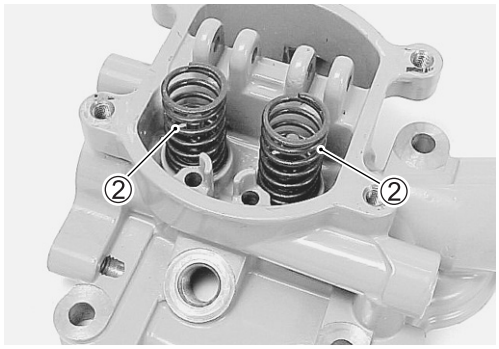
NOTE:
To remove the retainer, push it with the thumbs of both hands: move it in the arrow direction and force it off the valve shaft.



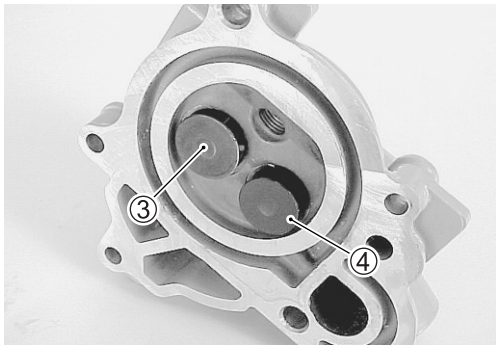


2. Remove the valve springs ②.

NOTE:
Reassemble each valve spring to their original position.



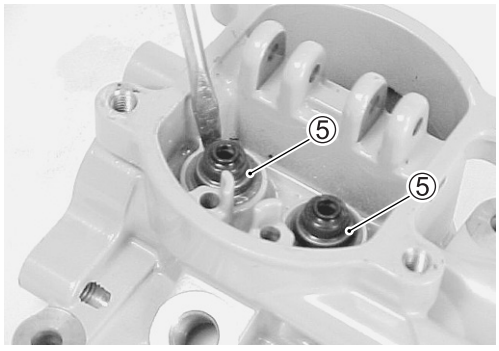
3. Remove the intake valve ③ and exhaust valve ④.



4. Remove the valve stem seals ⑤.

CAUTION

Do not re-use the removed valve stem seal.



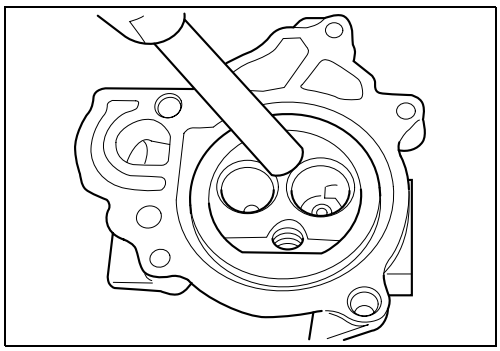
INSPECTION AND SERVICING

NOTE:
If excessive wear, crack, defective or other damage is found on any component, replace.

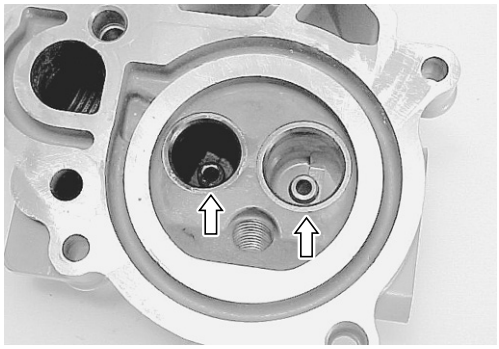
CYLINDER HEAD

1. Remove all carbon from the combustion chamber.

NOTE:
- *Do not use any sharp edged tool in order to scrape carbon off the cylinder head or the head components.*
- *Be careful not to scuff or nick the metal surfaces when decarboning.*



2. Inspect the cylinder head for crack in the intake and the exhaust ports, the combustion chamber and the head surface.

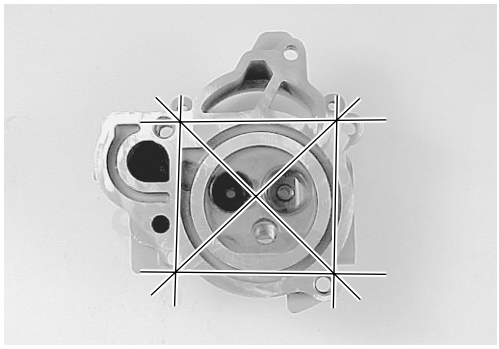


Valve seat

Inspect the valve seats for crack or other damage.

Cylinder head distortion

Using a straightedge and the thickness gauge, measure the gasket surface of the cylinder head at a total of six locations as shown in the figure.

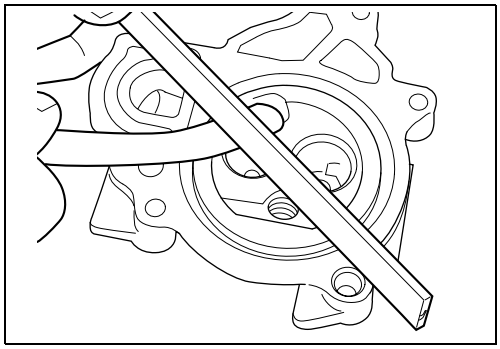


TOOL 09900-20803: Thickness gauge

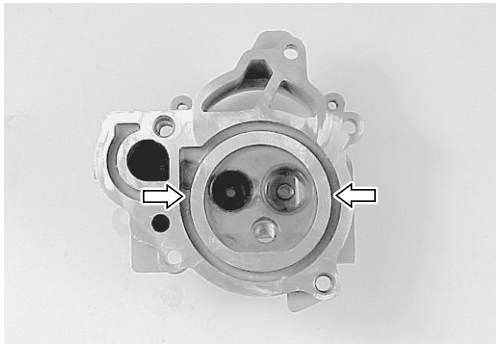
Cylinder head distortion:
Service limit: 0.05 mm (0.002 in)

If the measurement exceeds the service limit, resurface or replace the cylinder head.

NOTE:
The cylinder head can be resurfaced, using a surface plate and a #400 grit wet sandpaper.
Move the cylinder head in a figure eight pattern when sanding.



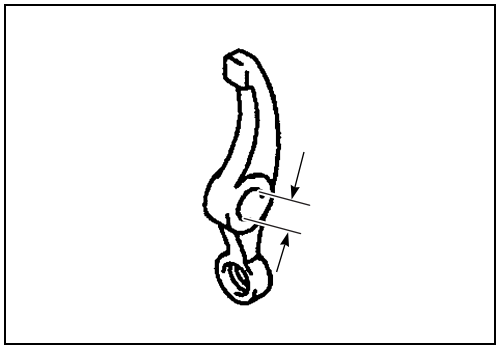
Water jacket
Inspect the water jackets for clog or obstruction. Clean the water jackets if necessary.



ROCKER ARM AND ROCKER ARM SHAFT
Inspect the rocker arm for wear, crack or other damage.
Replace it necessary.
Inspect the rocker arm shaft for wear, bend or other damage.
Replace it necessary.

Rocker arm shaft hole diameter
Measure the rocker arm shaft hole diameter using a small bore gauge.

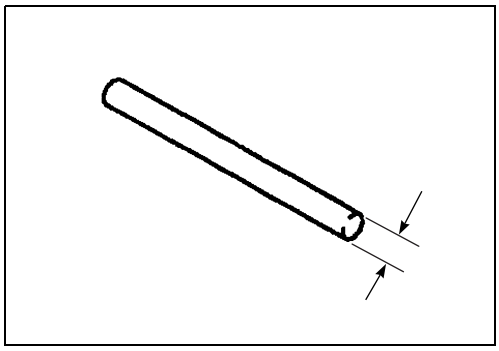
Rocker arm shaft hole diameter:
Standard: 4.015 – 4.027 mm (0.1581 – 0.1585 in)



Rocker arm shaft outside diameter
Measure the rocker arm shaft diameter using the micrometer.

09900-20205: Micrometer

Rocker arm shaft outside diameter:
Standard: 3.990 – 4.005 mm (0.1571 – 0.1577 in)



PUSH ROD
Inspect the push rod for bend or other damage.
Replace it necessary.

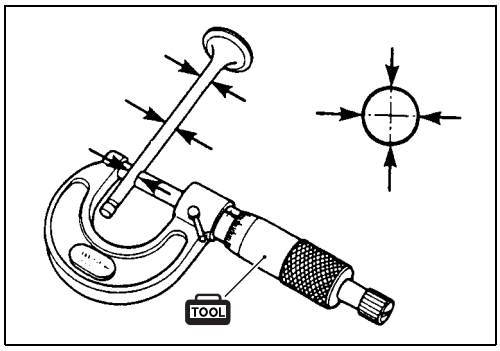
VALVE/VALVE GUIDE

Using the micrometer and a small bore gauge, take the diameter readings on the valve stems and the guides in order to check the guide to stem clearance. Be sure to take readings at more than one place along length of each stem and guide.

TOOL 09900-20205: Micrometer

Valve stem outside diameter

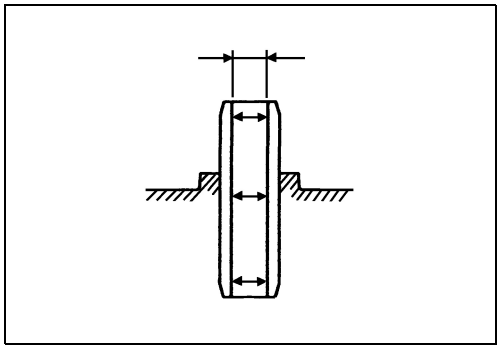
Measure the valve stem outside diameter using the micrometer.



Valve stem outside diameter:
Standard:
IN. 3.975 – 3.990 mm (0.1565 – 0.1571 in)
EX. 3.960 – 3.975 mm (0.1559 – 0.1565 in)

Valve guide inside diameter

Measure the valve guide inside diameter using a small bore gauge.



Valve guide inside diameter:
Standard:
IN. & EX. 4.000 – 4.012 mm (0.1575 – 0.1580 in)

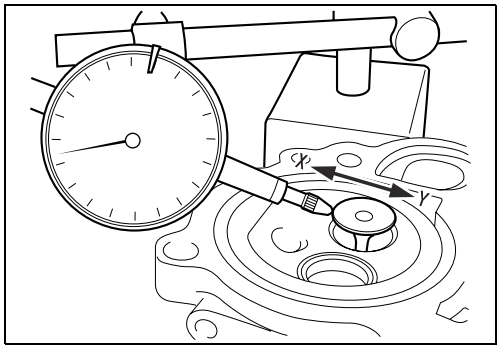
Valve guide to valve stem clearance:
Standard:
IN. 0.010 – 0.037 mm (0.0004 – 0.0015 in)
EX. 0.025 – 0.052 mm (0.0010 – 0.0020 in)

Service limit: IN. 0.075 mm (0.0030 in)
EX. 0.090 mm (0.0035 in)

If the measurement exceeds the service limit, replace the valve and/or the cylinder head.

Valve stem deflection

If unable to measure the valve guide inside diameter, measure the “Valve stem deflection”.



TOOL 09900-20602: Dial gauge
09900-20701: Magnetic stand

1. Install the valves into the valve guide.
2. Lift the valves 8 – 10 mm off seat.
3. Move the valve head in the direction “X – Y” and measure the deflection.

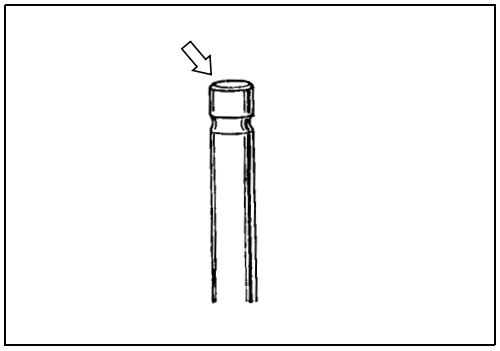
Valve stem deflection:
Service limit: IN. & EX. 0.35 mm (0.014 in)

If the measurement exceeds the service limit, replace the valve and/or the cylinder head.

Valve stem end

Inspect the valve stem end face for pitting and wear. If pitting or wear is found, the valve stem end may be resurfaced.

If the chamfer of stem end has been worn away, replace the valve.



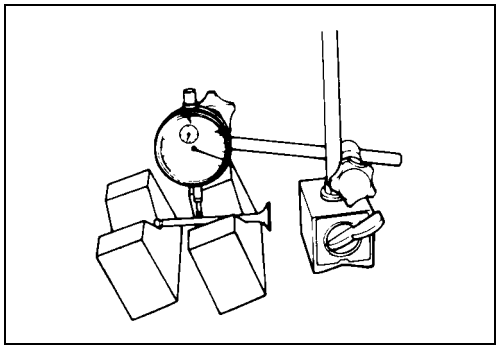
Valve stem runout

Measure the valve stem runout.

TOOL **09900-20602: Dial gauge**
09900-20701: Magnetic stand
09900-21304: "V" block set

Valve stem runout:
Service limit: 0.05 mm (0.002 in)

If the measurement exceeds the service limit, replace the valve.



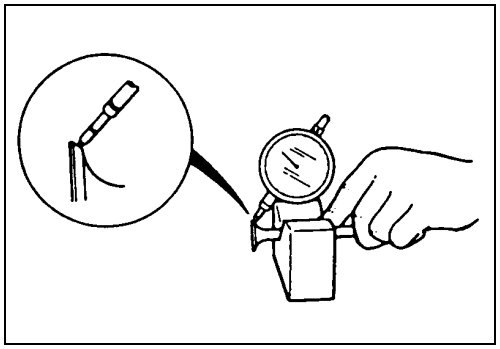
Valve head radial runout

Measure the valve head radial runout.

TOOL **09900-20602: Dial gauge**
09900-20701: Magnetic stand
09900-21304: "V" block set

Valve head radial runout:
Service limit: 0.08 mm (0.003 in)

If the measurement exceeds the service limit, replace the valve.



Valve head thickness

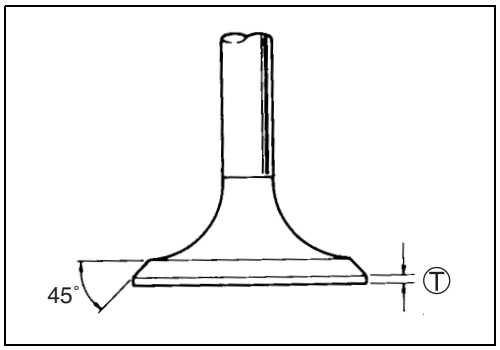
Measure the thickness Ⓣ of the valve head.

TOOL **09900-20101: Vernier calipers**

Valve head thickness:

Service limit: IN. & EX. 0.5 mm (0.02 in)

If the measurement exceeds the service limit, replace the valve.

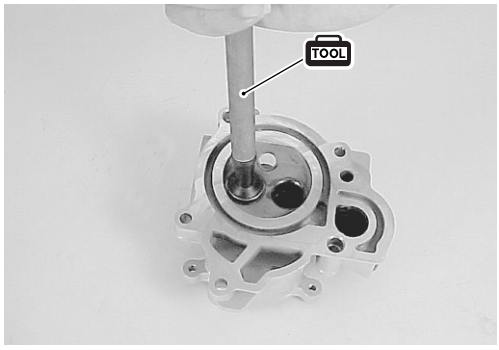


Valve seat contact width

Measure the valve seat contact width as follows.

1. Remove all carbon from the valve and seat.
2. Coat the valve seat evenly with Prussian Blue (or equivalent).
3. Install the valve into the valve guide.
4. Put the valve lapper on the valve head.

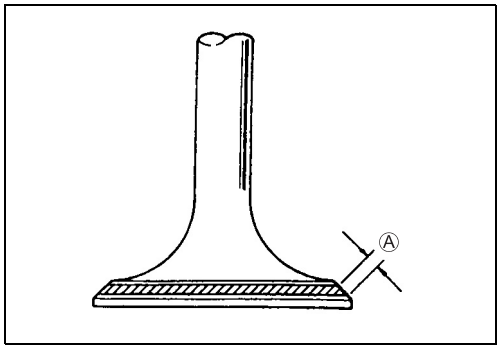
TOOL 09916-10911: Valve lapper



5. Rotate the valve while gently tapping the valve contact area against the seat.
6. Continuously pattern on the valve seating face with Prussian blue.
7. Measure the valve seat contact width Ⓐ.

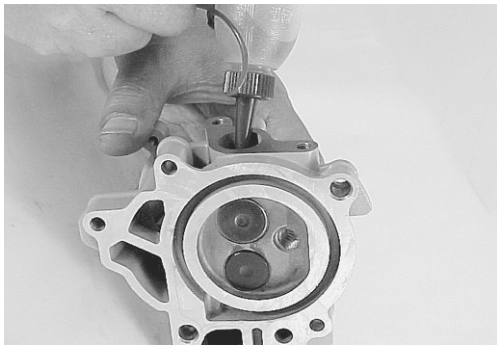
TOOL 09900-20101: Vernier calipers

Valve seat contact width Ⓐ:
Standard: IN. & EX. 0.8 – 1.0 mm (0.03 – 0.04 in)



If measurement exceeds specification, repair valve seat.

NOTE:
Clean and assemble the cylinder head and the valve components.
Fill the intake and the exhaust ports with solvent in order to check for leaks between the valve seat and the valve.
If any leaks occur, inspect the valve seat and the face for burrs or other things that could prevent the valve from sealing.



VALVE SPRING

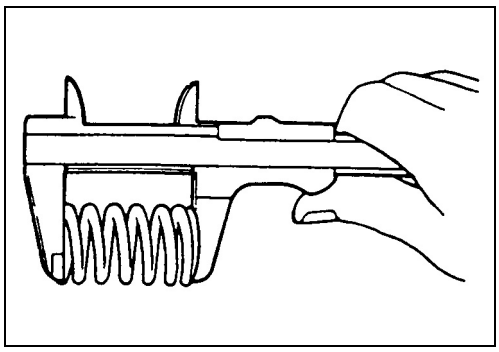
Valve spring free length

Measure the valve spring free length.

TOOL 09900-20101: Vernier calipers

Valve spring free length:
Standard: IN. & EX. 22.42 mm (0.883 in)
Service limit: IN. & EX. 21.52 mm (0.847 in)

If the measurement exceeds the service limit, replace the valve spring.



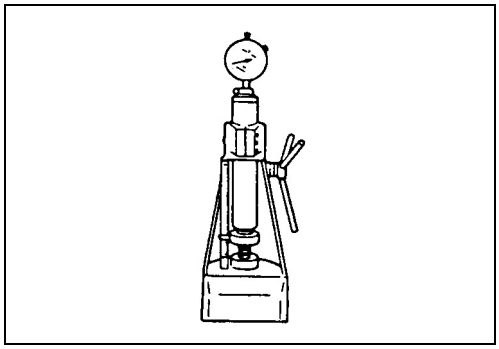
Valve spring preload

Measure the valve spring preload.

TOOL 09900-20101: Vernier calipers

Valve spring preload:
Standard:
IN. & EX. 36.5 – 41.9 N (3.65 – 4.19 kg, 8.05 – 9.24 lbs) for 15 mm (0.6 in)
Service limit:
IN. & EX. 33 N (3.3 kg, 7.34 lbs) for 15 mm (0.6 in)

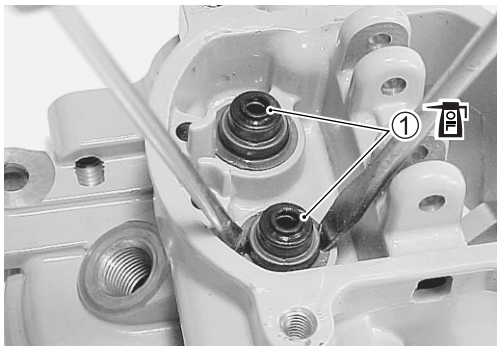
If the measurement exceeds the service limit, replace the valve spring.



REASSEMBLY

Reassembly is reverse order of disassembly with the special attention to the following steps.

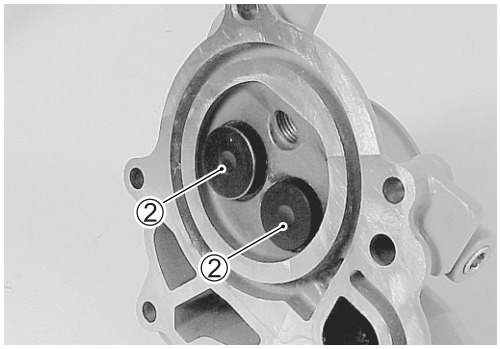
1. Apply engine oil to the valve stem seals ①.
2. Install the valve stem seals to the valve guide.



CAUTION

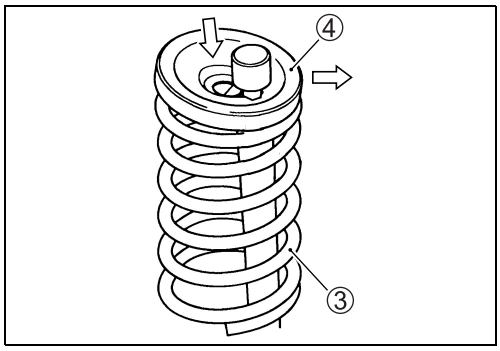
Do not re-use the removed valve stem seal.
Always use a new stem seal.

3. Apply engine oil to the valve guide bore and valve stem.
4. Install the valve ② to the valve guide.

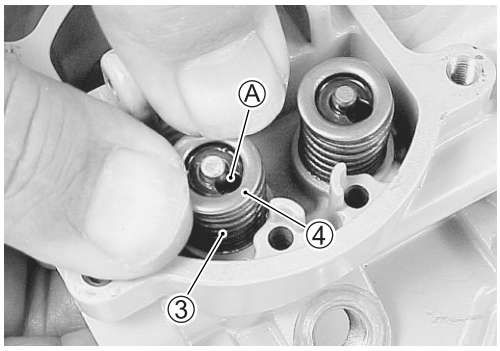


5. Install the valve spring ③ and the retainer ④.

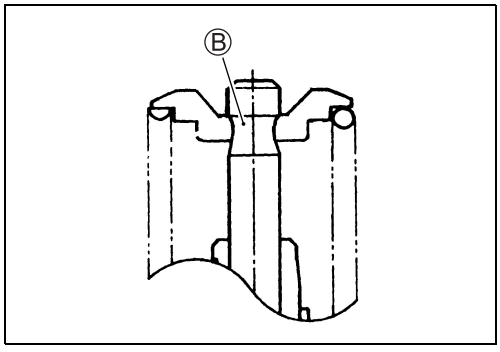
NOTE:
Reassemble each valve spring to their original position.



6. Push down the retainer with both thumbs to admit the valve stem into the side hole Ⓐ of the retainer, and let it slide sidewise into the center hole.



7. Make sure the retainers are properly seated in groove Ⓑ.

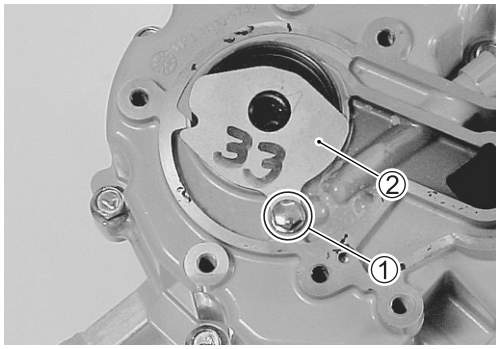


CYLINDER / PISTON / CRANKSHAFT / CONROD / CAMSHAFT

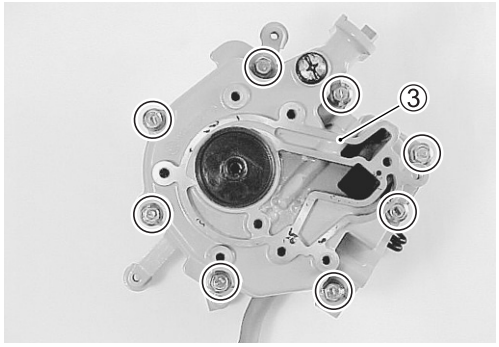
DISASSEMBLY

1. Remove the power unit. (See page 6-2.)
2. Remove the cylinder head. (See page 6-7.)

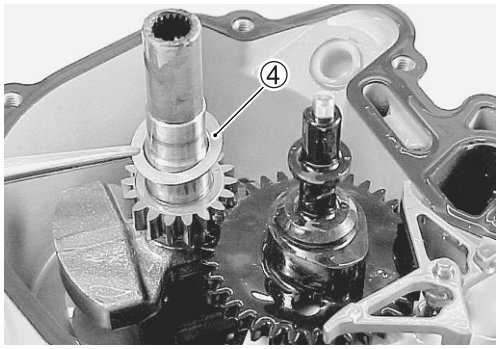
3. Remove the bolt ① and the under oil seal plate ②.



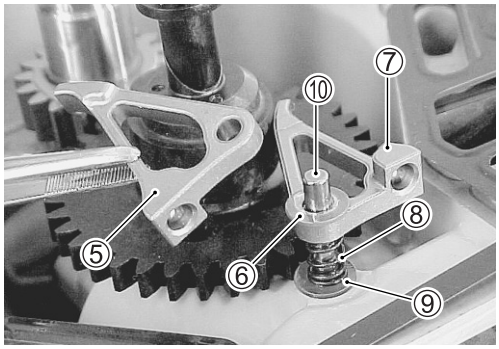
4. Remove the eight bolts and the crankcase ③.



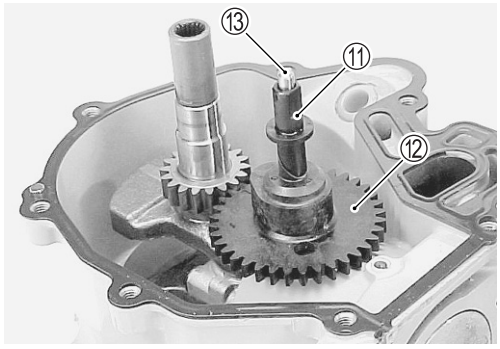
5. Remove the thrust washer ④.



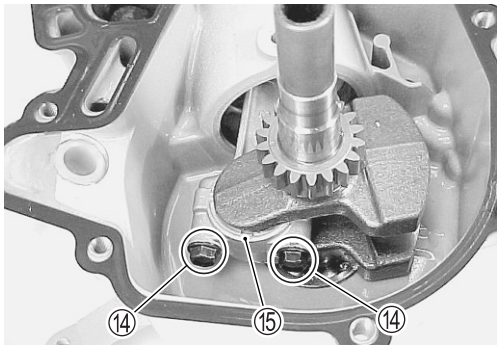
6. Remove the cam rocker arm ⑤, washer ⑥, cam rocker arm ⑦, spring ⑧, washer ⑨ and shaft ⑩.



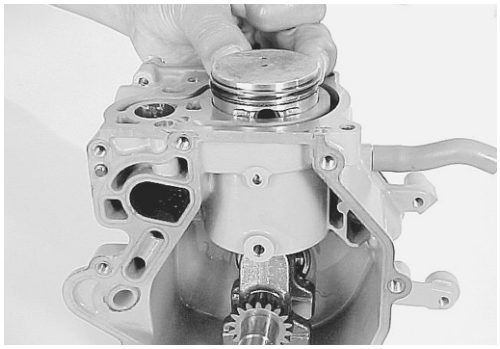
7. Remove the oil pump shaft ⑪, camshaft ⑫ and shaft ⑬.



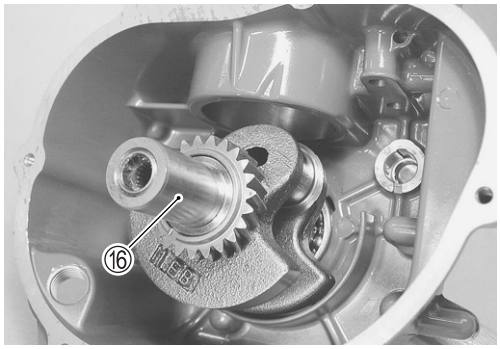
8. Remove the two conrod bolts ⑭ and the conrod cap ⑮.



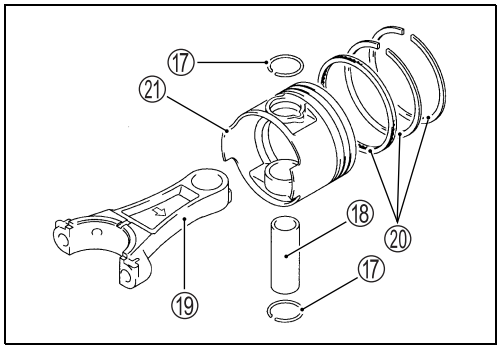
9. Remove the piston with the conrod through the top of the cylinder bore.



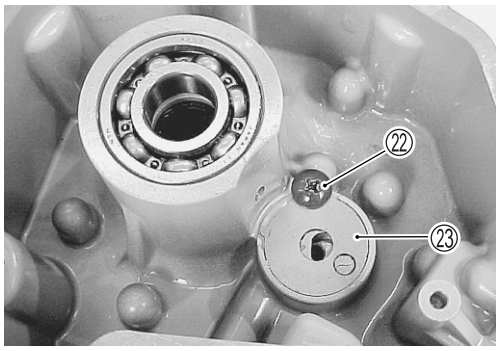
10. Remove the crankshaft ⑯ from the cylinder block.



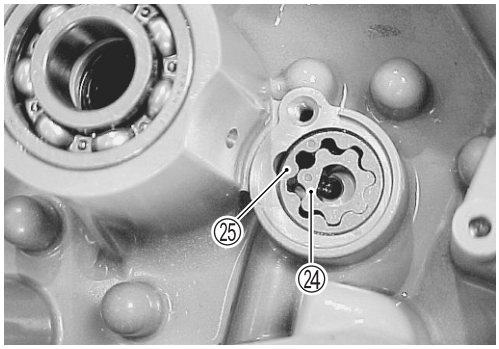
11. Remove the circlips ⑰, the piston pin ⑱, the conrod ⑲ and the piston rings ⑳ from the piston ㉑.



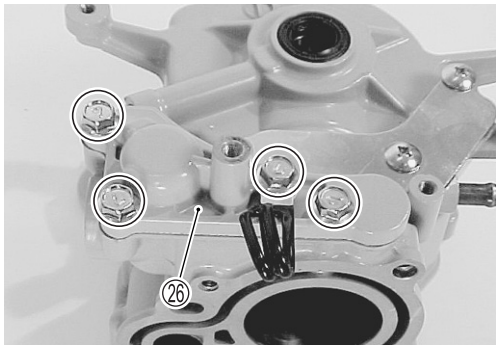
12. Remove the screw ㉒ and the oil pump outer plate ㉓.



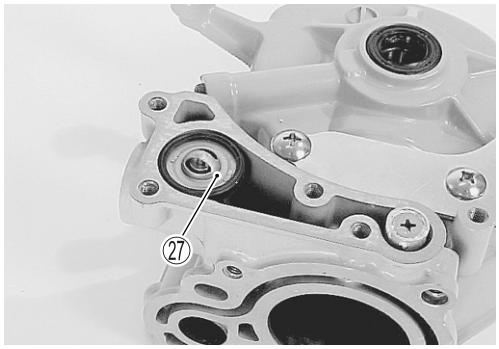
13. Remove the inner rotor ㉔ and the outer rotor ㉕.



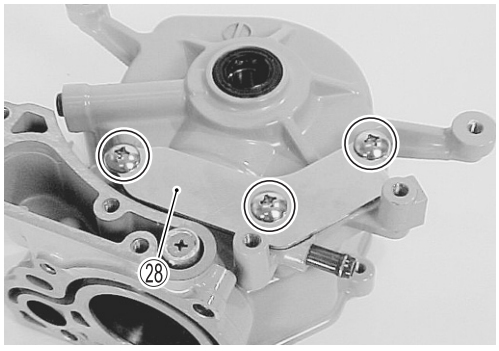
14. Remove the four bolts and the thermostat cover ㉖.



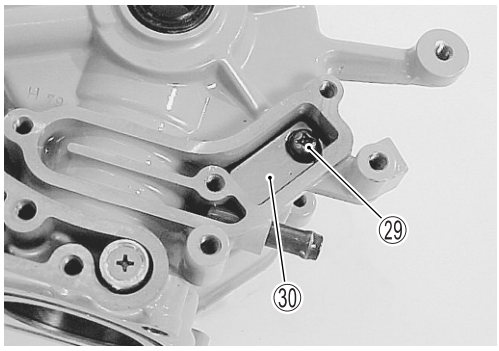
15. Remove the thermostat ㉗.



16. Remove the three screws and the breather plate ㉘.



17. Remove a screw ㉙ and the reed valve ㉚.



INSPECTION AND SERVICING

NOTE:
If excessive wear, crack, defective or other damage is found on any component, replace.

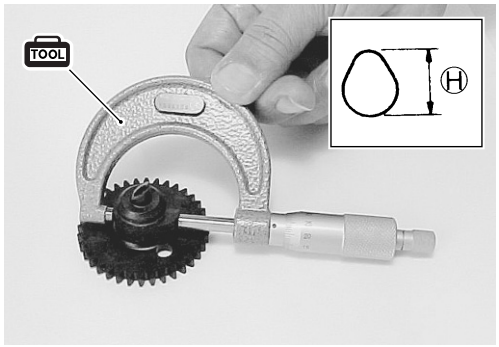
CAMSHAFT
Cam face
Inspect the cam face for scratches and wear.

Cam wear
Measure the cam height Ⓗ.

TOOL 09900-20202: Micrometer

Cam height:
Standard:
IN. & EX. 28.480 – 28.680 mm (1.1213 – 1.1291 in)
Service limit: IN. & EX. 28.180 mm (1.1094 in)

If the measurement exceeds the service limit, replace the camshaft.



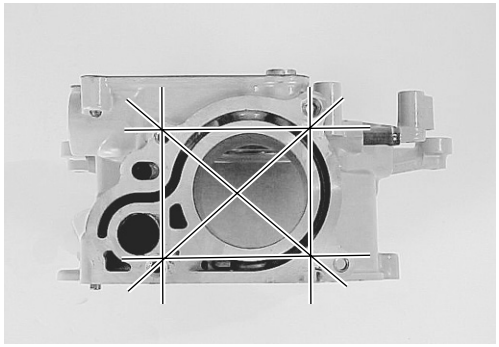
Camshaft gear
Inspect the camshaft gear for wear or other damage.
Replace it necessary.

CAM ROCKER ARM
Inspect the cam rocker arm for wear or other damage.
Replace it necessary.

CYLINDER / PISTON / PISTON RING

Cylinder distortion

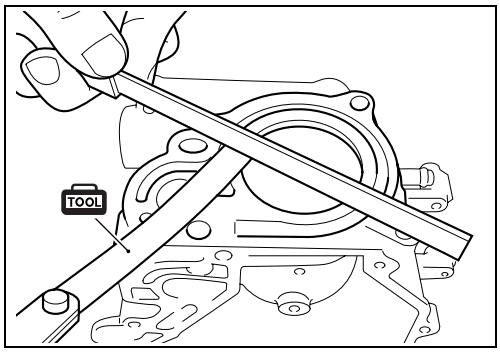
Using a straightedge and the thickness gauge, measure the gasket surface of the cylinder at a total of six locations as shown in the figure.



TOOL 09900-20803: Thickness gauge

Cylinder distortion:
Service limit: 0.05 mm (0.002 in)

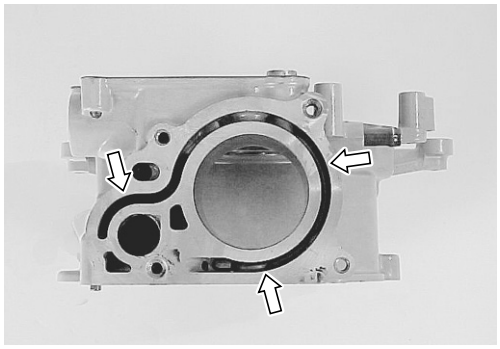
If the measurement exceeds the service limit, resurface or replace the cylinder.



NOTE:
The cylinder can be resurfaced, using a surface plate and a #400 grit wet sandpaper.
Move the cylinder in a figure eight pattern when sanding.

Water jacket

Inspect the water jackets for clog or obstruction.
Clean the water jackets if necessary.

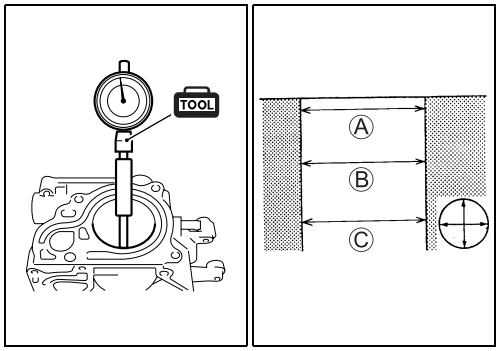


Cylinder bore

Inspect the cylinder wall for scratches, roughness or ridges which indicate excessive wear.
If the cylinder bore is very rough or deeply scratched or ridged, rebore the cylinder and use a oversize piston.

Cylinder bore wear (difference)

Using the cylinder bore gauge, measure the cylinder bore in the thrust and axial directions at the three positions Ⓐ, Ⓑ and Ⓒ.



TOOL 09900-20530: Cylinder gauge set

Check for the followings.

- Difference between the measurements at the three positions (taper).
- Difference between the thrust and axial measurements (out-of-round).

Cylinder bore wear (difference):
Service limit: 0.100 mm (0.0039 in)

If the wear (difference) exceeds the service limit, rebore or replace the cylinder.

Piston to cylinder clearance

To check the clearance, measure the following items.

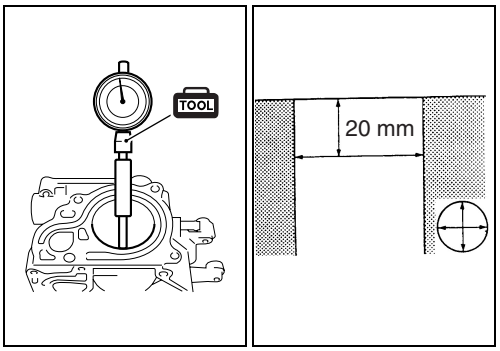
- Cylinder bore at 20 mm elevation from the gasket surface at a right angle to the crankshaft pin.
- Piston skirt diameter at 5 mm elevation from the skirt end.

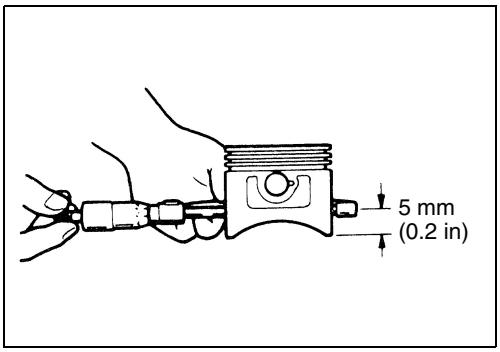
TOOL 09900-20530: Cylinder gauge set
09900-20202: Micrometer

Piston to cylinder clearance:
Standard: 0.018 – 0.033 mm (0.0007 – 0.0013 in)
Service limit: 0.100 mm (0.0039 in)

If the clearance exceeds the service limit, replace the piston and/or the cylinder, or rebore the cylinder.

Cylinder bore:
Standard: 48.000 – 48.015 mm (1.8898 – 1.8904 in)
Piston skirt diameter:
Standard: 47.975 – 47.990 mm (1.8888 – 1.8894 in)



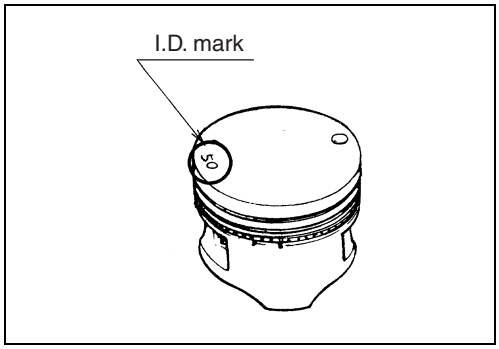


Identification of oversize piston and piston ring

Oversize piston and piston ring are marked as show in the figures.

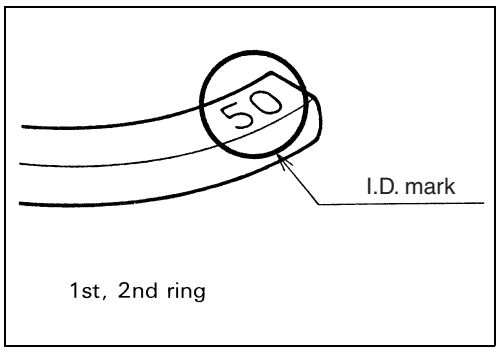
Piston

Oversize	I.D. mark
0.50 mm	50



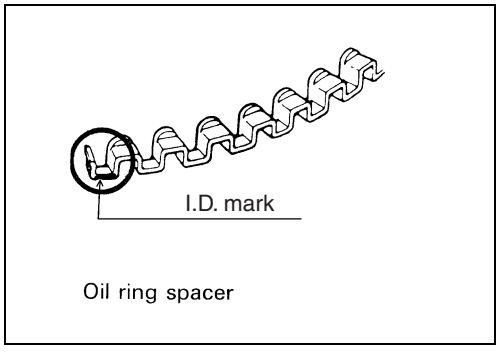
1st ring & 2nd ring

Oversize	I.D. mark
0.50 mm	50



Oil ring

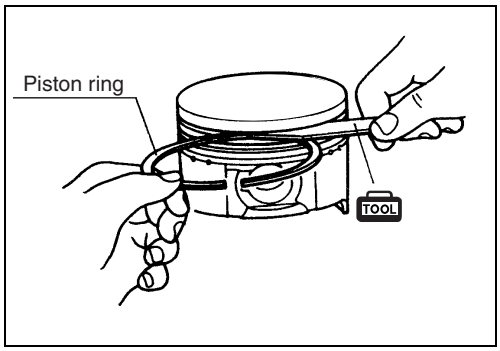
Oversize	I.D. mark
0.50 mm	Blue paint



Piston ring to groove clearance

Before checking, the piston grooves must be clean, dry and free of carbon.

Fit the piston ring into the piston groove, and measure the clearance between the ring and the ring groove using the thickness gauge.

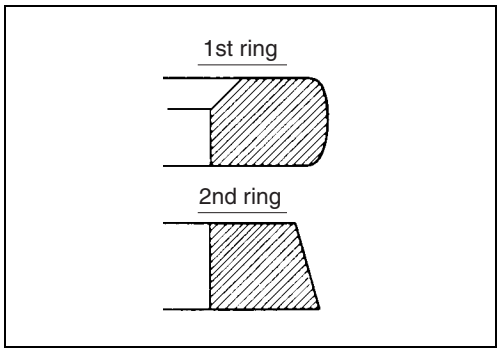


TOOL 09900-20803: Thickness gauge

Piston ring to groove clearance:
Standard:
1st & 2nd 0.020 – 0.060 mm (0.0008 – 0.0024 in)

Service limit:
1st & 2nd 0.120 mm (0.0047 in)

If the measurement exceeds the service limits, replace the piston and/or the piston ring.

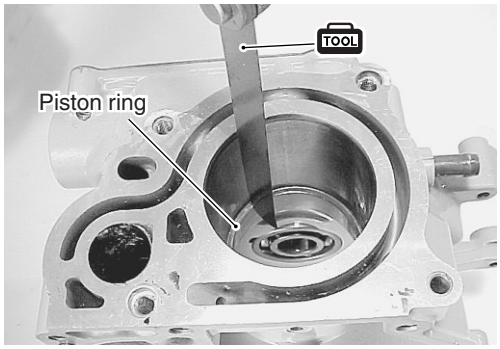


Piston ring groove width:
Standard:
1st & 2nd 1.21 – 1.23 mm (0.048 – 0.049 in)
Oil 1.51 – 1.53 mm (0.059 – 0.060 in)

Piston ring thickness:
Standard:
1st & 2nd 1.17 – 1.19 mm (0.046 – 0.047 in)

Piston ring end gap

Measure the piston ring end gap with the piston ring in the lowest position of the cylinder bore.



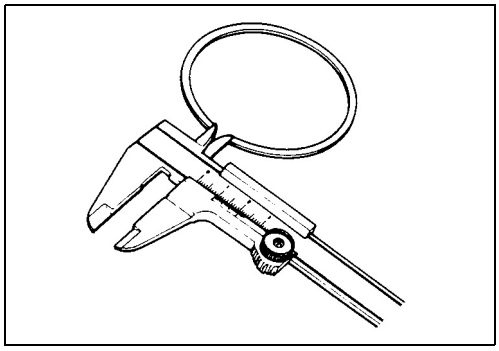
TOOL 09900-20803: Thickness gauge

Piston ring end gap:
Standard:
1st & 2nd 0.15 – 0.35 mm (0.006 – 0.014 in)

Service limit:
1st & 2nd 0.50 mm (0.020 in)

If the measurement exceeds the service limit, replace the position ring.

Piston ring free end gap
Measure the piston ring free end gap.



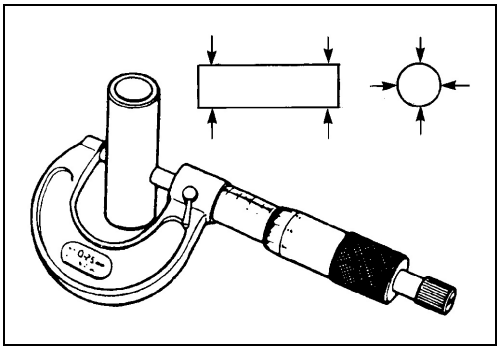
09900-20101: Vernier calipers

Piston ring free end gap:
Standard:
1st Approx. 6.1 mm (0.24 in)
2nd Approx. 5.7 mm (0.22 in)

Service limit:
1st 4.9 mm (0.19 in)
2nd 4.6 mm (0.18 in)

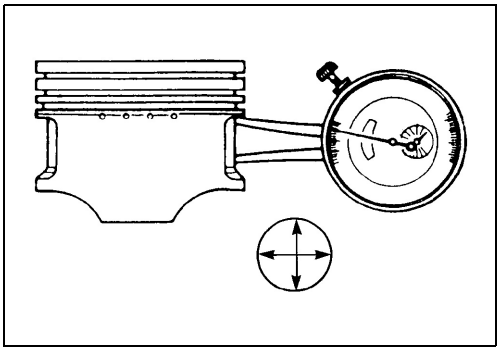
If the measurement exceeds the service limits, replace the piston ring.

PISTON PIN / CONROD / CRANKSHAFT
Piston pin clearance
To check the clearance, measure the following items.
- Piston pin outside diameter in the thrust and axial directions.
- Piston pin hole diameter in the thrust and axial directions.



09900-20205: Micrometer
09900-20605: Dial calipers

Pin clearance in piston pin hole:
Standard: 0.002 – 0.013 mm (0.0001 – 0.0005 in)
Service limit: 0.040 mm (0.0016 in)

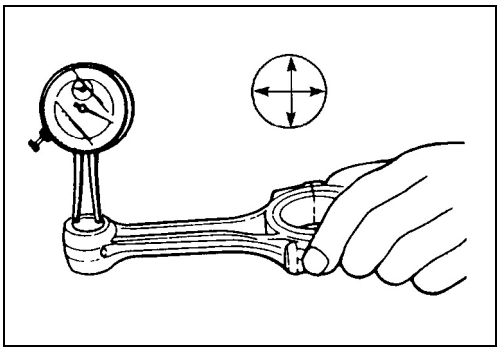


Pin clearance in conrod small end:
Standard: 0.006 – 0.019 mm (0.0002 – 0.0007 in)
Service limit: 0.050 mm (0.0020 in)

If the clearance exceeds the service limit, replace the piston, the piston pin and/or the conrod assembly.

Piston pin outside diameter:
Standard: 11.995 – 12.000 mm (0.4722 – 0.4724 in)
Service limit: 11.980 mm (0.4717 in)

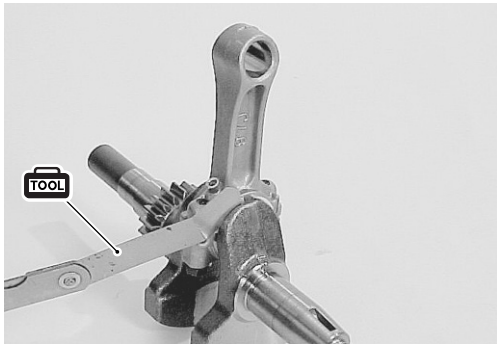
Piston pin hole diameter:
Standard: 12.002 – 12.008 mm (0.4725 – 0.4728 in)
Service limit: 12.030 mm (0.4736 in)



Conrod small end inside diameter:
Standard: 12.006 – 12.014 mm (0.4727 – 0.4730 in)
Service limit: 12.040 mm (0.4740 in)

Conrod big end side clearance

Measure the clearance with the conrod installed on the crank pin as shown in the figure.



TOOL 09900-20803: Thickness gauge

Conrod big end side clearance:
Standard: 0.20 – 0.70 mm (0.008 – 0.028 in)
Service limit: 1.00 mm (0.039 in)

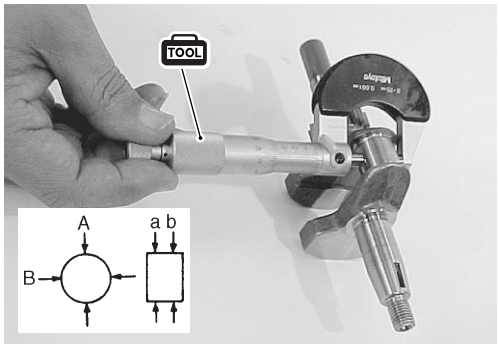
If the measurement exceeds the service limit, replace the conrod assembly and/or crankshaft.

Conrod big end width:
Standard: 17.50 – 17.80 mm (0.689 – 0.701 in)

Crank pin width:
Standard: 18.00 – 18.20 mm (0.709 – 0.717 in)

Crank pin

Inspect the crank pin for uneven wear or damage. Measure the crank pin outside diameter for out-of-round or taper using the micrometer.



Out-of-round: A – B
Taper: a – b

TOOL 09900-20205: Micrometer

Crank pin outside diameter difference
(Out-of-round and Taper):
Service limit: 0.010 mm (0.0004 in)

If the out-of-round or the taper is exceeds the service limit, replace the crankshaft.

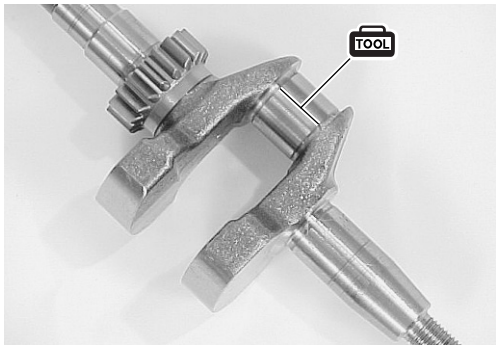
Crank pin outside diameter:
Standard: 18.990 – 19.000 mm (0.7476 – 0.7480 in)

Conrod big end oil clearance

Check the clearance as follows.

1. Clean the surface of the conrod, the conrod cap and the crank pin.
2. Place a piece of the plastigauge on the crank pin parallel to the crankshaft, avoiding the oil hole.

09900-22301: Plastigauge



3. Install the conrod and the conrod cap to the crank pin.
4. Install the two conrod bolts and tighten the bolts to the specified torque in two steps.

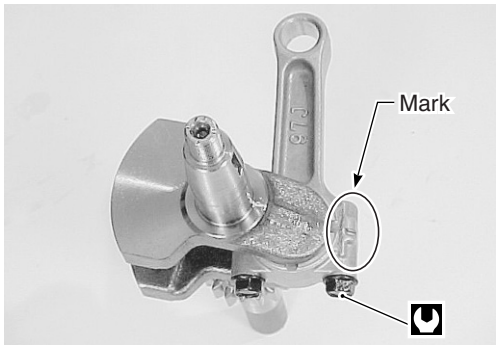
NOTE:

Do not rotate the conrod with the plastigauge in place.

Conrod bolt:

1st step 3.5 N·m (0.35 kg-m, 2.5 lb-ft)

2nd step 7 N·m (0.7 kg-m, 5.0 lb-ft)



5. Remove the conrod and the conrod cap from the crank pin.
6. Using the scale on the plastigauge envelop, measure the plastigauge with the widest point.

Conrod big end oil clearance:

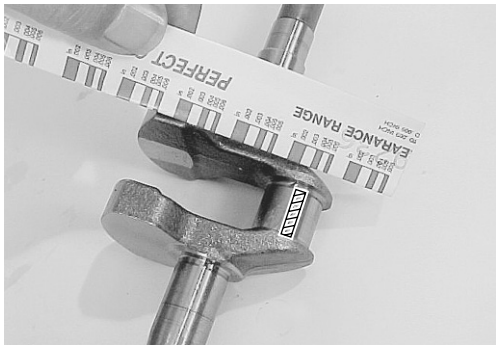
Standard: 0.15 – 0.035 mm (0.0006 – 0.0014 in)

Service limit: 0.080 mm (0.0031 in)

If the measurement exceeds the service limit replace the conrod assembly and/or crankshaft.

Conrod big end inside diameter:

Standard: 19.015 – 19.025 mm (0.7486 – 0.7490 in)



Crankshaft runout

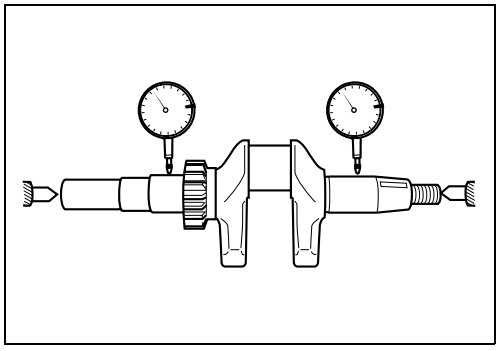
Measure the crankshaft runout as shown in the figure.

09900-20602: Dial gauge

Crankshaft runout:

Service limit: 0.05 mm (0.002 in)

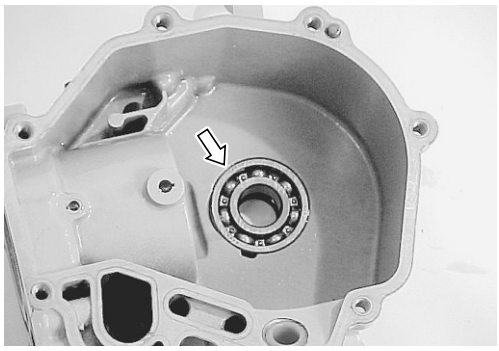
If the measurement exceeds the service limit, replace the crankshaft.



OIL SEAL AND BEARING

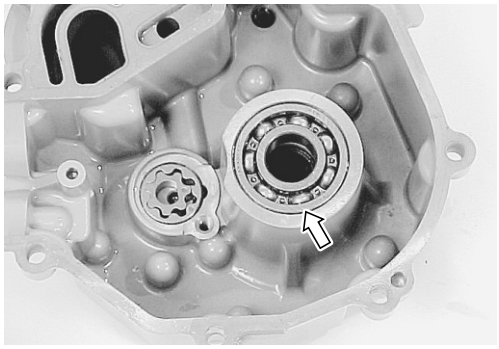
Visually check the oil seals installed in the cylinder block and crankcase for cut, nick, excessive wear or other damage.
Visually check the crankshaft upper bearing for pitting, noisy, rough or other damage.

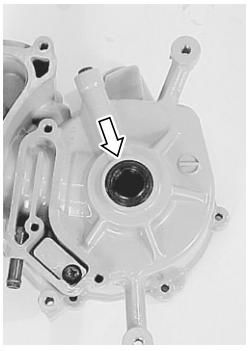
NOTE:
If neither defective nor any damage is found on the oil seals and the bearing, do not remove the oil seals and the bearing.

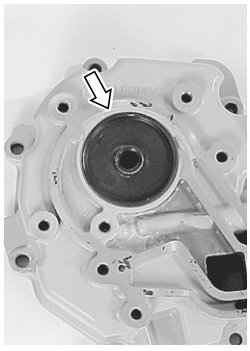


CAUTION

Do not re-use the oil seal once removed. Always use a new oil seal.

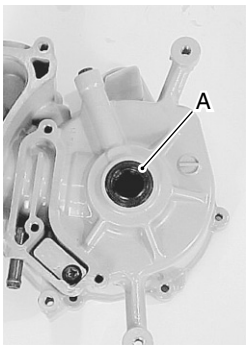


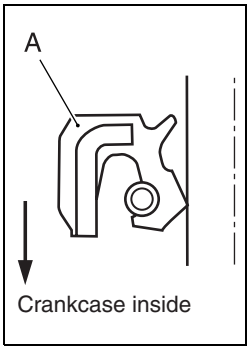


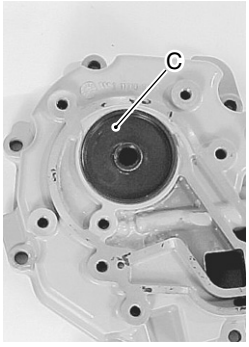


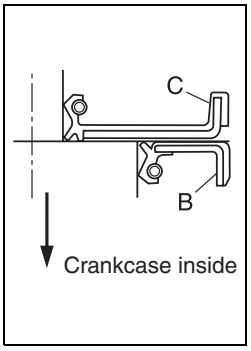
Drive the oil seal down into the position as shown in the figure.

A: Crankshaft upper oil seal
B: Crankshaft lower oil seal
C: Driveshaft oil seal



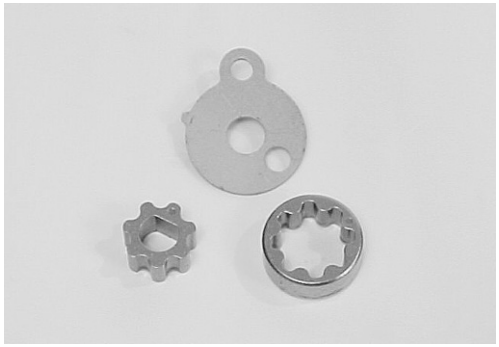






OIL PUMP

Inspect the outer rotor, the inner rotor and the rotor plate for excessive wear or other damage.
Replace it necessary.



REASSEMBLY

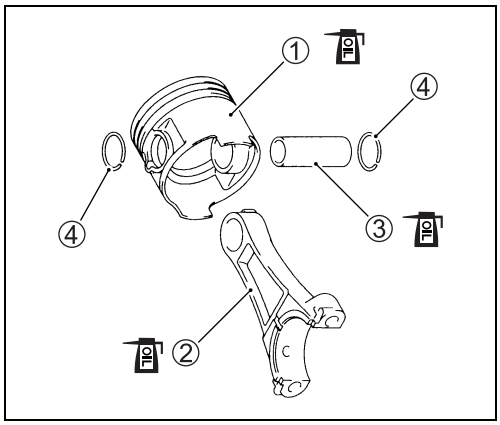
Reassembly is reverse order of disassembly with the special attention to the following steps.

CAUTION

- **If the original components are not replaced, each piston, piston pin and conrod is to be assembled and installed in the original order and position.**
- **Do not re-use the gasket, the oil seal, the O-ring and the circlip once removed. Always use new parts.**

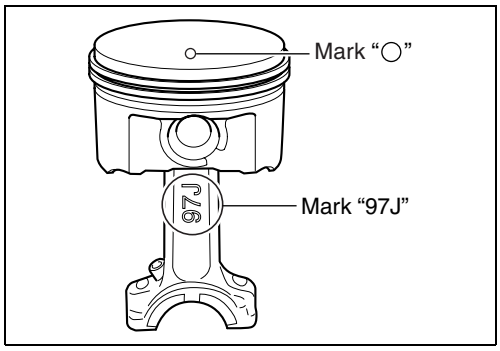
PISTON TO CONROD

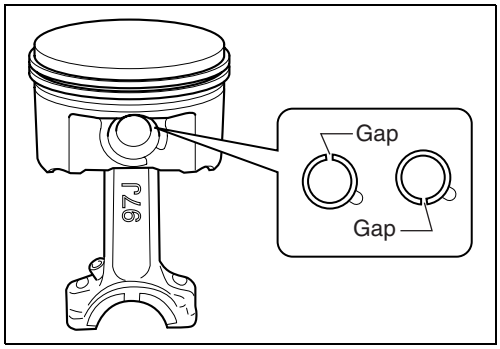
1. Apply engine oil to the piston pin ③, the piston pin bore and the conrod ②.
2. Fit the conrod to the piston ① as shown in the figure and insert the piston pin through the piston and the conrod.
3. Install the piston pin circlips ④.



NOTE:

- *Make sure that the conrod is installed in the direction shown in the figure.*
- *Install the circlips with a gap facing either up or down as shown in the figure.*

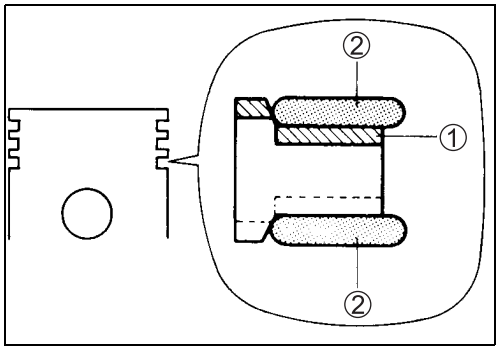




PISTON RING TO PISTON

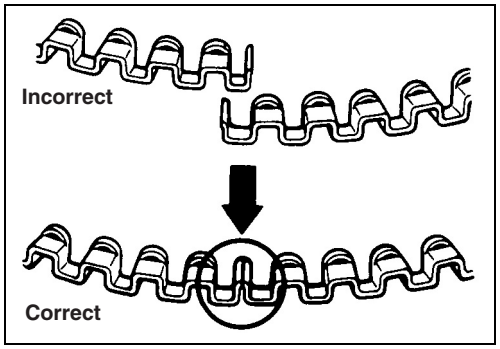
Oil ring

1. Apply engine oil to the piston rings.
2. Install the spacer ① first, then the side rails ② to the piston.



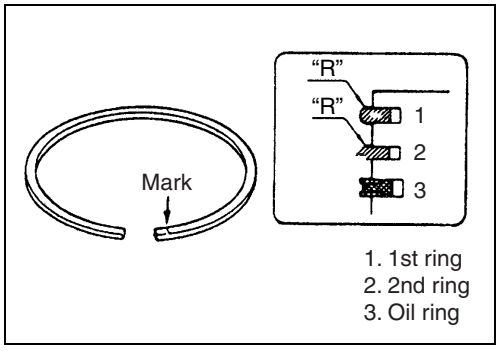
CAUTION

When installing the spacer, do not allow the ends to overlap in the groove.



1st ring and 2nd ring

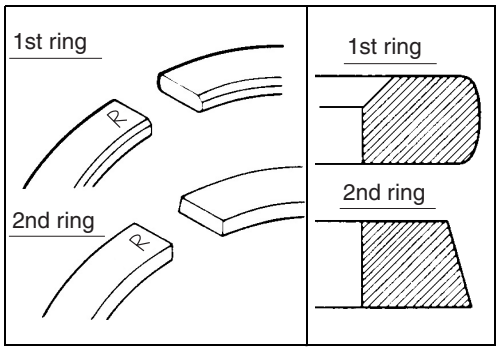
1. Apply engine oil to the piston rings.
2. Install the 2nd ring and the 1st ring to the piston with the "R" mark toward the piston head side.



NOTE:

The 1st ring differs from the 2nd ring in shape.

Distinguish the 1st ring from the 2nd ring by referring to the figure.

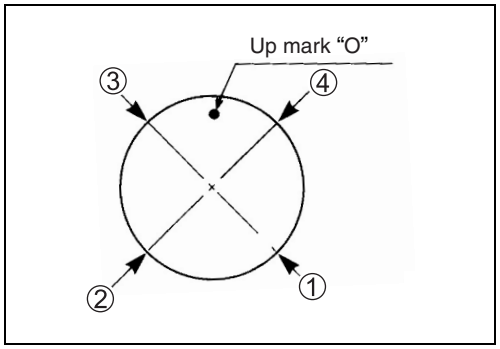


Ring gap direction

Position the piston rings so that the ring gaps are staggered at approximately 90 degree angles as shown in the figure.

① 1st ring ③ 2nd ring

② Oil ring lower side rail ④ Oil ring upper side rail



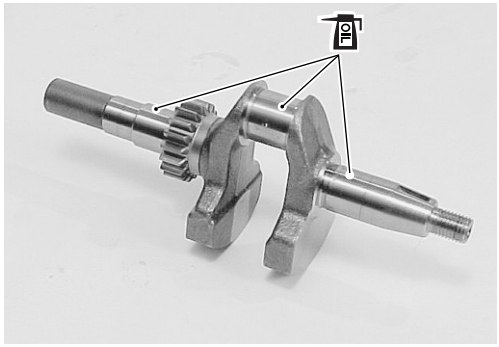
CAUTION

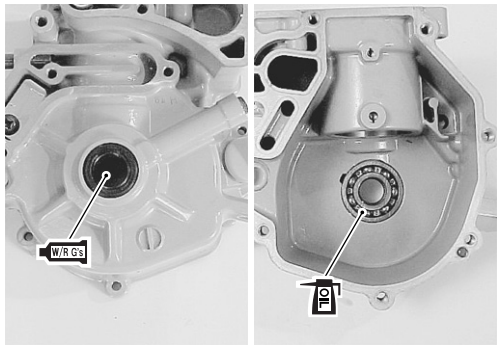
Failure to a stagger the piston ring gaps may result in the crankcase oil dilution.

CRANKSHAFT AND PISTON TO CYLINDER

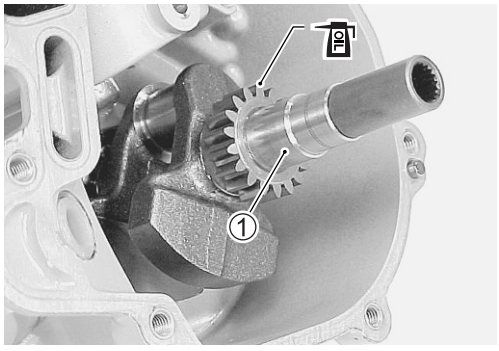
1. Apply engine oil to the crankshaft journals, the crank pin and the bearing.
2. Apply the Water Resistant Grease to the lip of the upper oil seal.

W/R G's 09900-25161: SUZUKI WATER RESISTANT GREASE



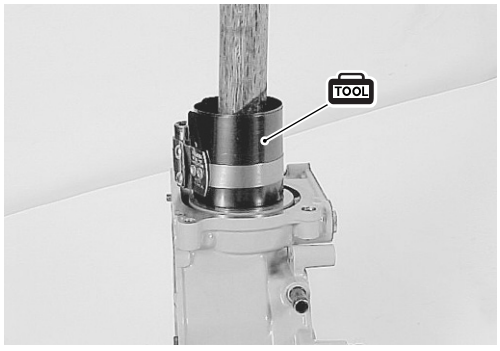


3. Install the crankshaft ① to the cylinder block.



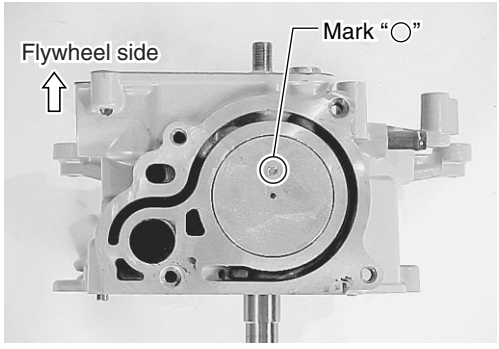
4. Apply engine oil to the piston and the cylinder wall.
5. Insert the piston/conrod assembly into the cylinder bore from the cylinder head side using the piston ring compressor.

TOOL Piston ring compressor



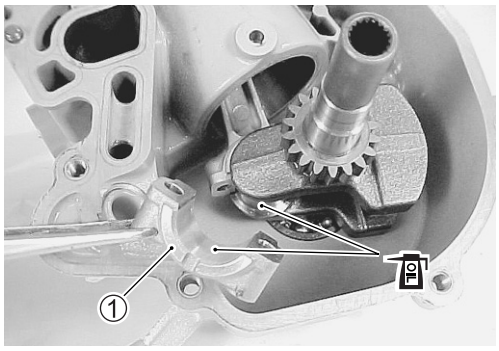
NOTE:

Position the "○" mark on the piston head to the flywheel side.

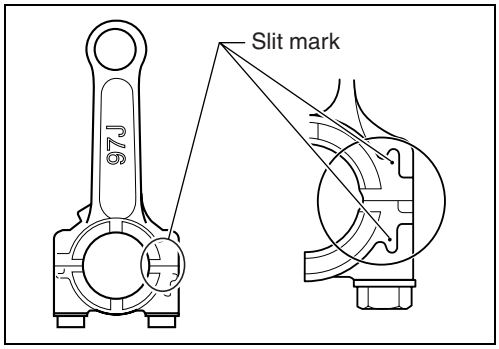


CONROD CAP

1. Apply engine oil to the crank pin, the connecting rod and the connecting rod cap ①.



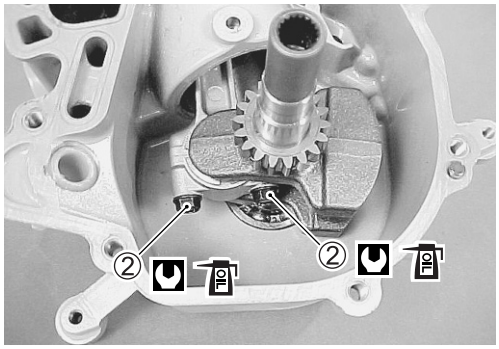
2. Install the conrod cap in the direction as shown in the figure.



3. Apply engine oil lightly to the conrod bolts.
4. Tighten the two conrod bolts to the specified torque in two steps.

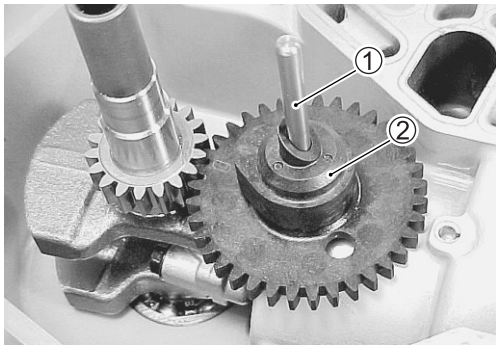
Conrod bolt:

1st step	**3.5 N·m (0.35 kg-m, 2.5 lb-ft)**
2nd step	**7 N·m (0.7 kg-m, 5.0 lb-ft)**

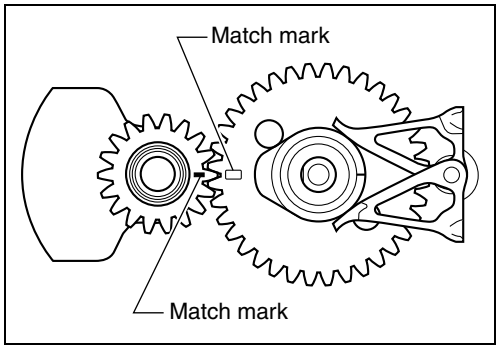


CAMSHAFT

1. Apply engine oil to the shaft ①.
2. Install the shaft ① to the cylinder block.
3. Apply engine oil to the cam faces, the cam journals and the timing gear.

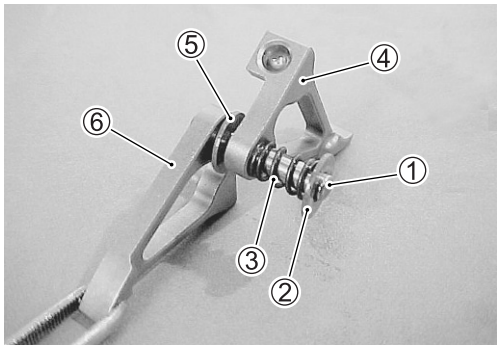


4. While aligning each mark on the camshaft gear and the crankshaft gear, install the camshaft ②.

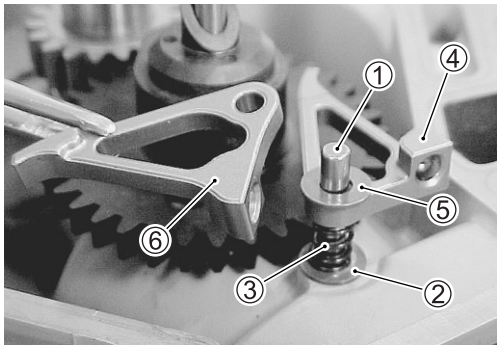


CAM ROCKER ARM

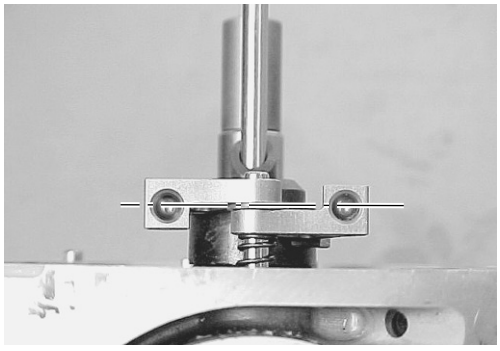
1. Apply engine oil to the cam rocker arm shaft ①.
2. Install the washer ② and the spring ③ to the shaft ① as shown in the figure.



3. Install the cam rocker arm ④, the washer ⑤ and the cam rocker arm ⑥.

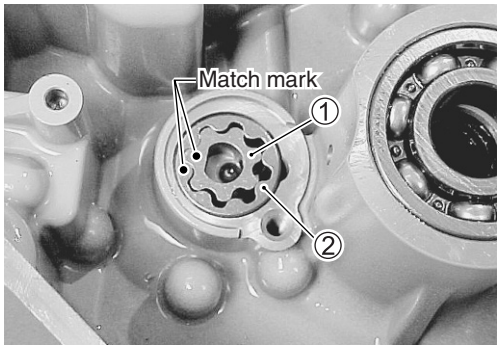


NOTE:
Be sure the cam rocker arms are positioned as shown in the figure.



OIL PUMP

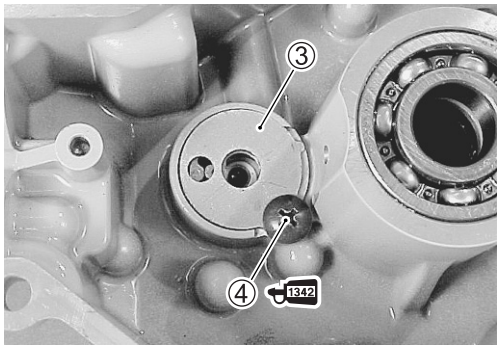
1. Apply engine oil to the inner rotor and the outer rotor.
2. Install the inner rotor ① and the outer rotor ② to the crankcase as shown in the figure.



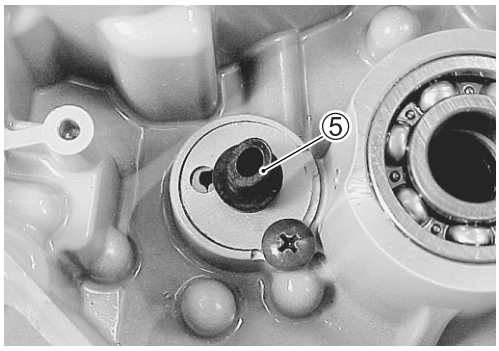
3. Install the outer plate ③.
4. Apply the THREAD LOCK to the screw ④.

1342 99000-32050: THREAD LOCK "1342"

5. Secure the outer plate ③ with the screw ④.

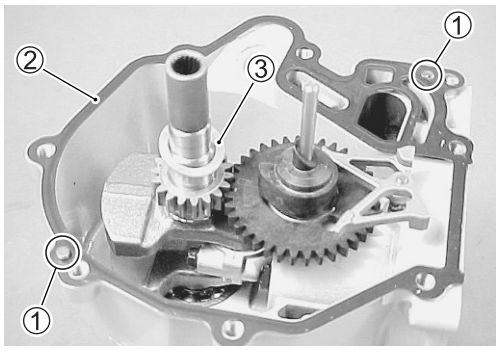


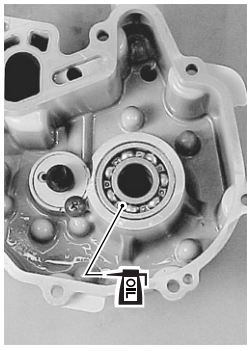
6. Install the oil pump shaft ⑤.

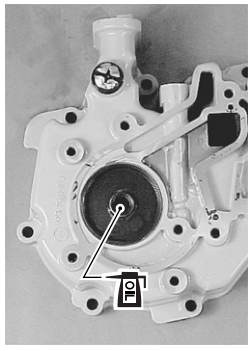


CRANKCASE TO CYLINDER

1. Clean the mating surfaces of the cylinder block and the crankcase.
2. Install the two dowel pins ① and the gasket ② to the cylinder block.
3. Install the thrust washer ③ into the crankshaft.
4. Apply engine oil to the crank journals.
5. Apply engine oil to the crankcase bearing, the crankshaft lower oil seal and the driveshaft oil seal.

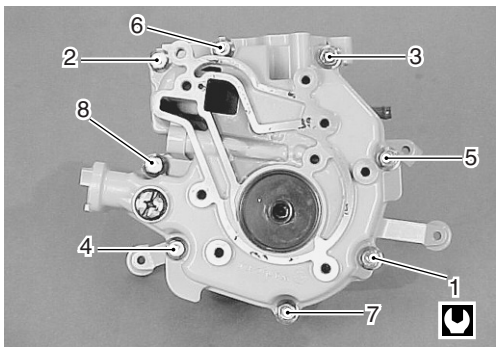






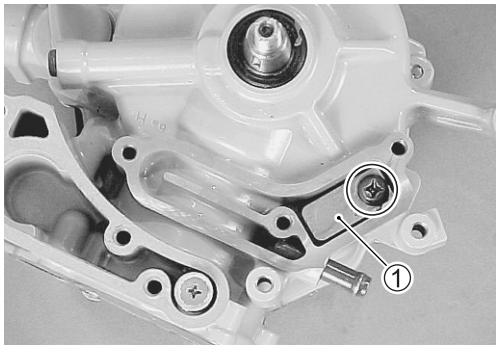
6. Install the crankcase to the cylinder block.
7. Tighten the eight crankcase bolts to the specified torque in the order indicated.

Crankcase bolt: 11 N·m (1.1 kg-m, 8.0 lb-ft)

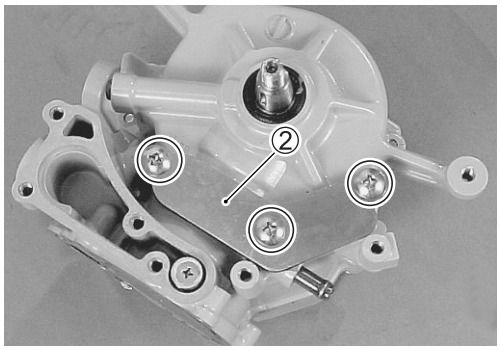


BREATHER PLATE AND THERMOSTAT

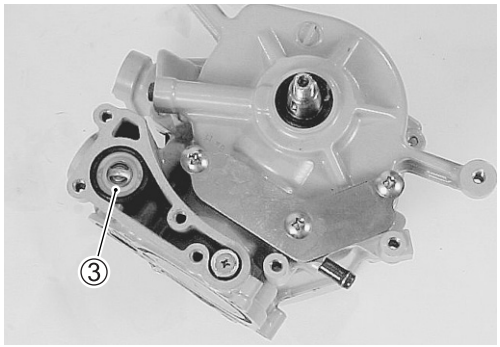
1. Install the reed valve ① to the cylinder block and secure with a screw.



2. Install the gasket and breather plate ② to the cylinder block and secure with the three screws.

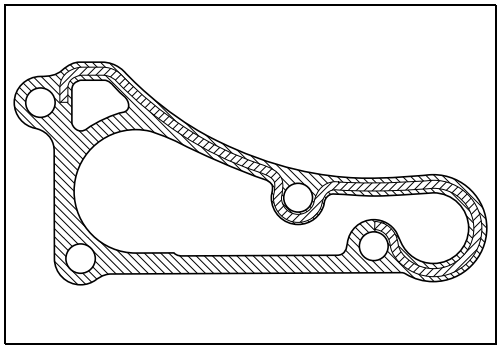


3. Install the thermostat ③.

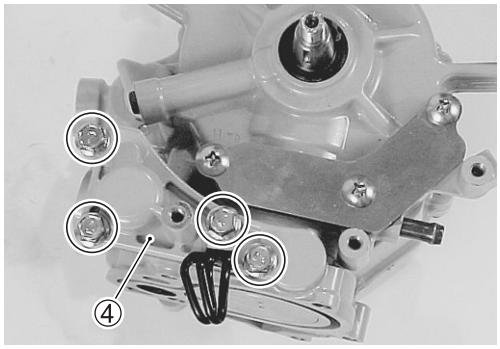


4. Apply sealant to both surfaces of thermostat cover gasket (as shown with hatched lines).

Si SEAL **99000-31120: SUZUKI SILICONE SEAL**



5. Install the gasket and the thermostat cover ④ to the cylinder block and secure with the four bolts.



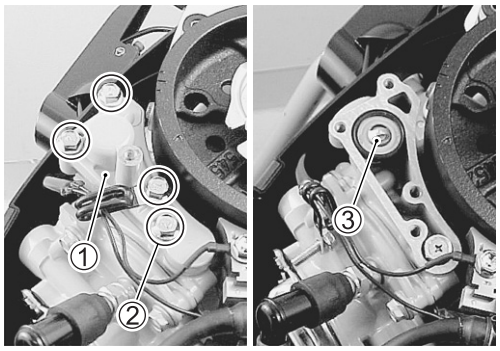
CYLINDER HEAD
Install the cylinder head. (See page 6-8 and 6-9.)

POWER UNIT
Install the power unit. (See page 6-4 to 6-6.)

THERMOSTAT

REMOVAL

1. Remove the recoil starter assy. (See page 5-2.)
2. Remove the four bolts ② and the thermostat cover ①.
3. Remove the thermostat ③.



INSPECTION

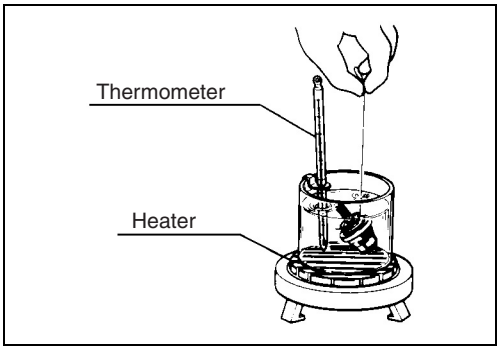
If salt deposits, corrosion, wear or other damage is found, clean or replace the thermostat.

Thermostat operation

Check the thermostat operating temperature as follows.

1. Insert a length of thread between the thermostat valve/body and suspend the thermostat in a container filled with water.
2. Place the thermometer in the container and heat water. Observe water temperature when the thermostat valve opens and releases the thread.

   Thermostat operating temperature:
   Standard: 48 – 52 °C (118 – 126 °F)



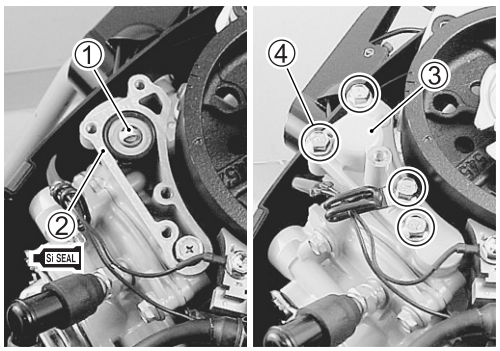
INSTALLATION

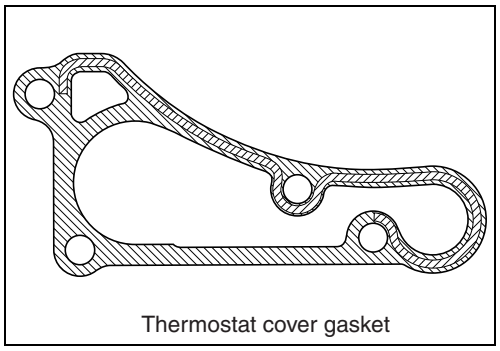
Installation is reverse order of removal with special attention to the following steps.

1. Install the thermostat ①.
2. Apply sealant to both surfaces of thermostat cover gasket (as shown with hatched lines).

Si SEAL 99000-31120: SUZUKI SILICONE SEAL

3. Install the gasket ② and the thermostat cover ③ to the cylinder block and secure with the four bolts ④.



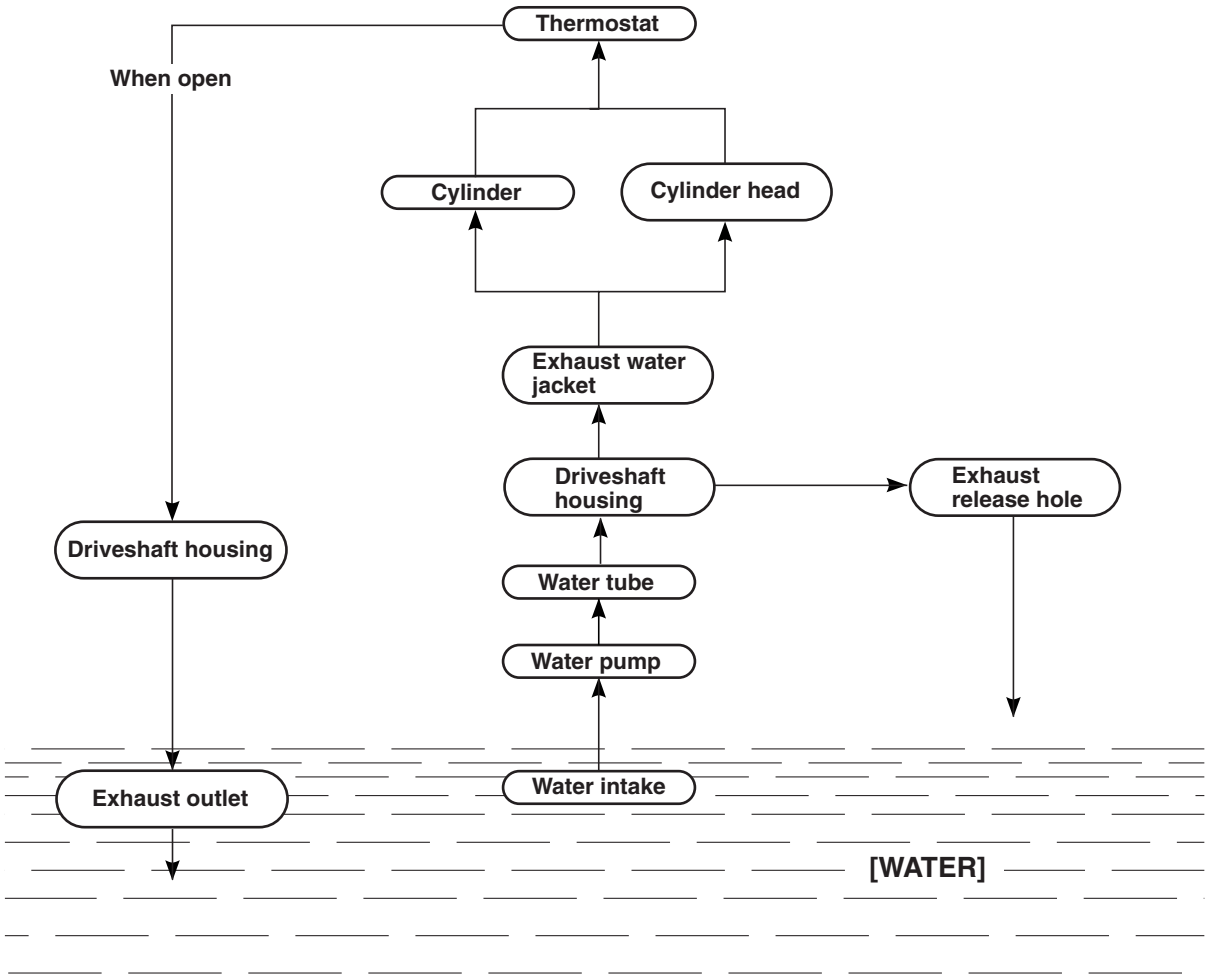


Thermostat cover gasket

OPERATION
WATER COOLING SYSTEM
The water cooling system consists of the water pump (in the lower unit), the water tube (between the lower unit and the power unit) and the thermostat (in the cylinder). This system cools both the power unit and the exhaust and is shown in schematic form below.
If overheating occurs, the components of the cooling system must be inspected for blockage, corrosion build-up or damage.

Component inspection	Refer to page
Water pump/Impeller	8-8
Water tube	7-6
Thermostat	6-38
Cylinder head	6-11
Cylinder block	6-23

COOLING SYSTEM SCHEMATIC



ENGINE LUBRICATION SYSTEM

A camshaft driven trochoid type pump provides engine oil to all power unit components requiring lubrication.

ENGINE OIL LUBRICATION CHART