

ENGINE

CONTENTS

ENGINE COMPONENTS REMOVABLE WITH ENGINE IN PLACE	3- 1
ENGINE REMOVAL AND INSTALLATION	3- 2
ENGINE DISASSEMBLY AND REASSEMBLY	3-16

3

CAMSHAFT/CYLINDER HEAD/CYLINDER HEAD COVER	3A
CYLINDER/PISTONS	3B
CLUTCH	3C
STARTER SYSTEM/GENERATOR/SIGNAL GENERATOR	3D
GEARSHIFT LINKAGE	3E
CRANKCASE/TRANSMISSION/CRANKSHAFT/CONROD	3F
ENGINE LUBRICATION SYSTEM	3G

ENGINE COMPONENTS REMOVABLE WITH ENGINE IN PLACE

The parts listed below can be removed and reinstalled without removing the engine from the frame. Refer to the page listed in this section for removal and reinstallation instructions.

ENGINE LEFT SIDE

PARTS	REMOVAL	INSTALLATION
Secondary case	3-24, 4-5	3-41, 4-10
Secondary driven bevel gear	3-25, 4-5	3-40, 4-10
Neutral indicator light switch	3-25	3-40
Clutch release cylinder	6-59	6-61
Starter torque limiter	3-27, 3D-1	3-36, 3D-6
Starter idle gear	3-17, 3D-1	3-60, 3D-6
Starter clutch	3-27, 3D-1, 3D-5	3-38, 3D-5, 3D-6
Gearshift lever and linkage	3-26, 3E-1	3-38, 3E-5
Generator	3-27, 3D-1	3-38, 3D-6

ENGINE RIGHT SIDE

PARTS	REMOVAL	INSTALLATION
Clutch cover	3-20, 3C-1	3-50, 3C-5
Clutch pressure, drive and driven plates	3-20, 3C-1	3-48, 3C-5
Clutch sleeve hub	3-21, 3C-2	3-46, 3C-5
Clutch housing	3-22, 3C-2	3-46, 3C-4
Oil pump drive gears	3-22, 3C-2	3-46, 3C-4
Oil pump driven gears	3-23	3-45
Oil pressure switch	3-24, 3G-5	3-43, 3G-7
Oil pressure regulator	3-23, 3G-3	3-45, 3G-4
Back torque limiter	3-22, 3C-2	3-46, 3C-5
Rear clutch cover	3-6	3C-6

ENGINE CENTER

PARTS	REMOVAL	INSTALLATION
Carburetor assembly	5-16	5-26
Oil filter	2-6	2-7
Oil cooler	3G-5	3-13
Starter motor	7-14	7-17

ENGINE

CONTENTS

ENGINE COMPONENTS REMOVABLE WITH ENGINE IN PLACE	3- 1
ENGINE REMOVAL AND INSTALLATION	3- 2
ENGINE DISASSEMBLY AND REASSEMBLY	3-16

3

CAMSHAFT/CYLINDER HEAD/CYLINDER HEAD COVER	3A
CYLINDER/PISTONS	3B
CLUTCH	3C
STARTER SYSTEM/GENERATOR/SIGNAL GENERATOR	3D
GEARSHIFT LINKAGE	3E
CRANKCASE/TRANSMISSION/CRANKSHAFT/CONROD	3F
ENGINE LUBRICATION SYSTEM	3G

ENGINE COMPONENTS REMOVABLE WITH ENGINE IN PLACE

The parts listed below can be removed and reinstalled without removing the engine from the frame. Refer to the page listed in this section for removal and reinstallation instructions.

ENGINE LEFT SIDE

PARTS	REMOVAL	INSTALLATION
Secondary case	3-24, 4-5	3-41, 4-10
Secondary driven bevel gear	3-25, 4-5	3-40, 4-10
Neutral indicator light switch	3-25	3-40
Clutch release cylinder	6-59	6-61
Starter torque limiter	3-27, 3D-1	3-36, 3D-6
Starter idle gear	3-17, 3D-1	3-60, 3D-6
Starter clutch	3-27, 3D-1, 3D-5	3-38, 3D-5, 3D-6
Gearshift lever and linkage	3-26, 3E-1	3-38, 3E-5
Generator	3-27, 3D-1	3-38, 3D-6

ENGINE RIGHT SIDE

PARTS	REMOVAL	INSTALLATION
Clutch cover	3-20, 3C-1	3-50, 3C-5
Clutch pressure, drive and driven plates	3-20, 3C-1	3-48, 3C-5
Clutch sleeve hub	3-21, 3C-2	3-46, 3C-5
Clutch housing	3-22, 3C-2	3-46, 3C-4
Oil pump drive gears	3-22, 3C-2	3-46, 3C-4
Oil pump driven gears	3-23	3-45
Oil pressure switch	3-24, 3G-5	3-43, 3G-7
Oil pressure regulator	3-23, 3G-3	3-45, 3G-4
Back torque limiter	3-22, 3C-2	3-46, 3C-5
Rear clutch cover	3-6	3C-6

ENGINE CENTER

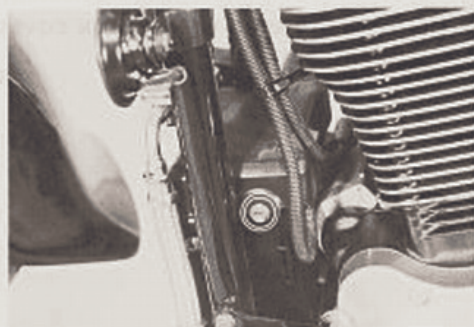
PARTS	REMOVAL	INSTALLATION
Carburetor assembly	5-16	5-26
Oil filter	2-6	2-7
Oil cooler	3G-5	3-13
Starter motor	7-14	7-17

ENGINE REMOVAL AND INSTALLATION

ENGINE REMOVAL

Before taking the engine out of the frame, wash the engine using a steam cleaner. Engine removal is sequentially explained in the following steps. Reinstall the engine by reversing the removal procedure.

- Remove the battery cover.



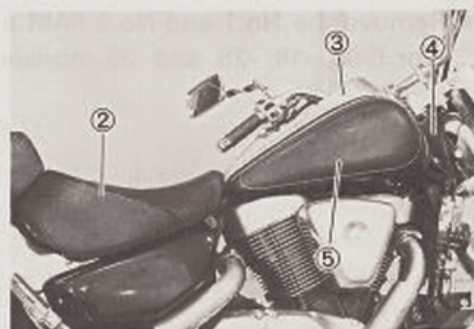
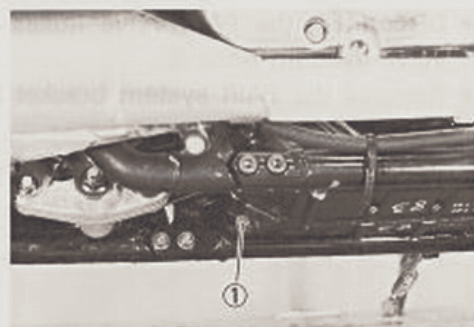
- Disconnect the battery ⊖ lead wire.



- Remove the oil drain plug ① and drain engine oil. (See pp. 2-6 and -7.)



- Remove the seat (See p. 6-2.) ②.
- Remove the meter and fuel inlet cover ③. (See pp. 6-3 and -4.)
- Remove the frame head covers ④ and upper covers ⑤. (See p. 6-3.)



- Remove the engine side box cover ①.



- Remove the engine side box ② and bracket ③.

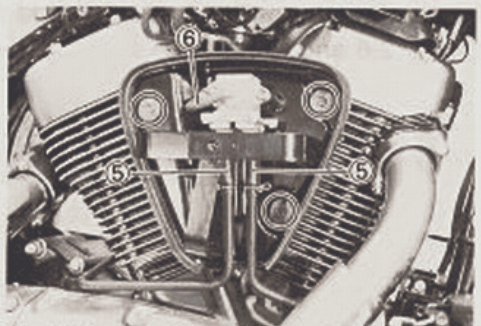


- Remove the PAIR (AIR SUPPLY) cover ④.
(For E-03, -18, -28, and -33 models)



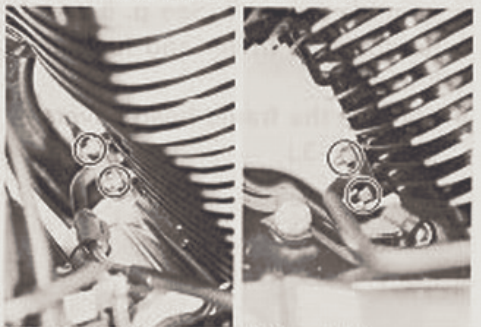
(For E-03, -18, -28, and -33 models)

- Disconnect the PAIR valve hoses ⑤ and PAIR control valve vacuum hose ⑥.
- Remove the PAIR system bracket by disconnecting the PAIR air cleaner hose.
(For E-03, -18, -28, and -33 models)



(For E-03, -18, -28, and -33 models)

- Remove the No.1 and No.2 PAIR air pipe.
(For E-03, -18, -28, and -33 models)

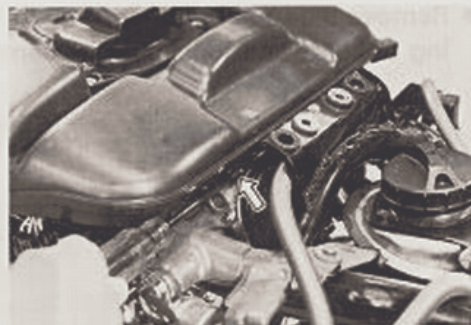


(For E-03, -18, -28, and -33 models)

- Disconnect the horn lead wire and remove the horn with the bracket. (For E-03, -24, -28, and -33 models)



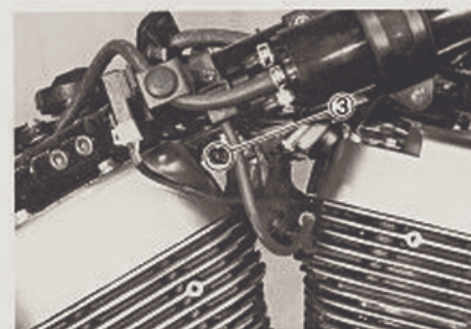
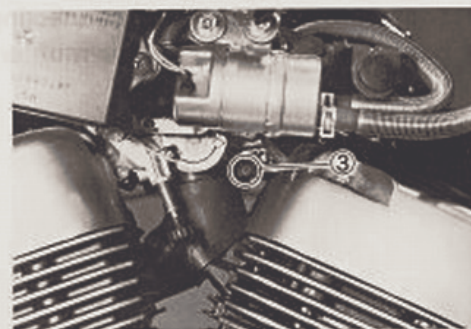
- Loosen the carburetor clamp screw. (Air cleaner side)



- Remove the air cleaner box ① with breather hose ②.

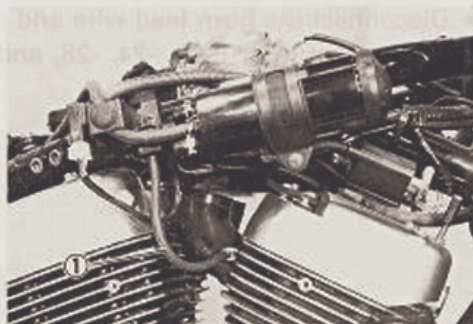


- Loosen the carburetor clamp screws ③. (Engine side)
- Remove the carburetor assembly.

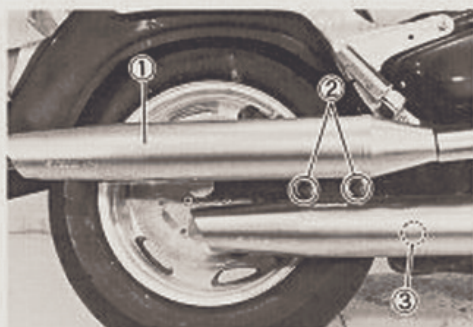


3-5 ENGINE

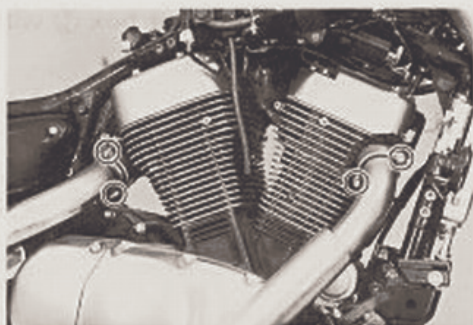
- Disconnect the MAP sensor hose ① from the intake pipe.



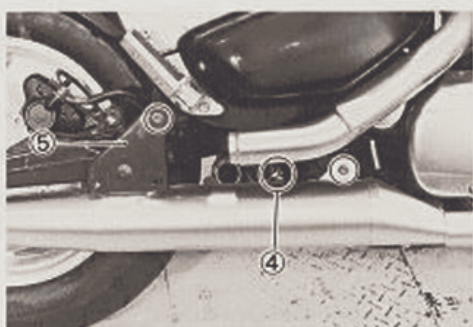
- Remove the upper muffler ① by removing the its mounting bolts ② and loosening its connecting bolt ③.



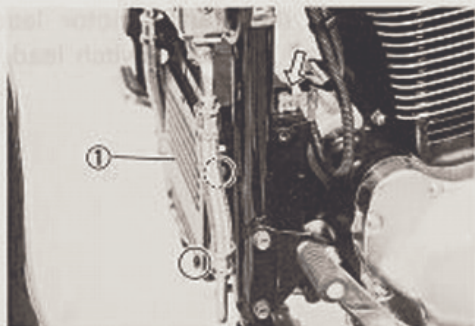
- Remove the exhaust pipe nuts and bolt.



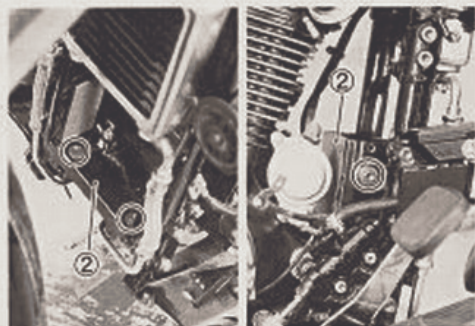
- Loosen the exhaust pipe connecting bolt ④.
- Remove the exhaust pipe/muffler assembly with its bracket ⑤.



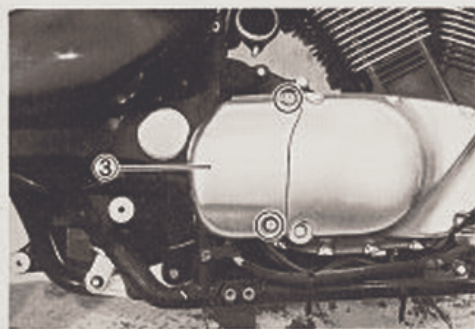
- Disconnect the battery \oplus lead wire.
- Remove the battery cover ① and the battery.



- Remove the battery holder ②.



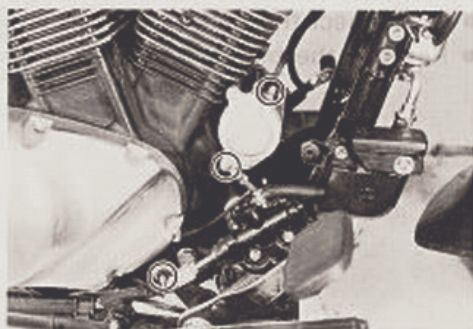
- Remove the rear clutch cover ③.



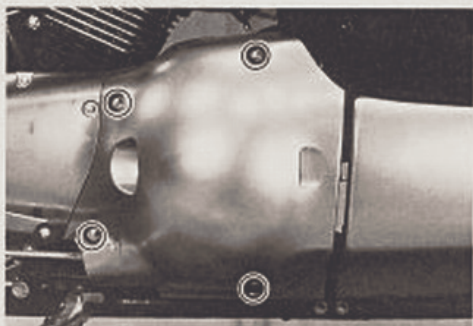
- Remove the fuse box mounting bracket.
- Disconnect the speed sensor lead wire coupler.
- Remove the brake hose clamp bolt.



- Disconnect the starter motor lead wire, ground lead wire, and oil pressure switch lead wire.



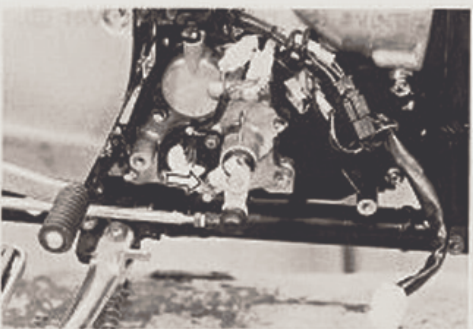
- Remove the secondary gear case cover mounting bolts.



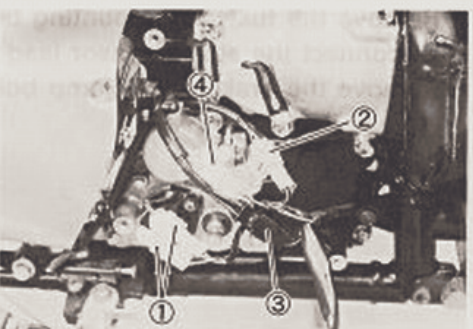
- Remove the secondary gear case cover by disconnecting the regulator/rectifier lead wire coupler.



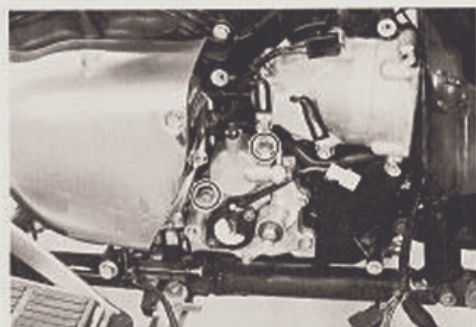
- Remove the gearshift lever by removing the mounting bolt.



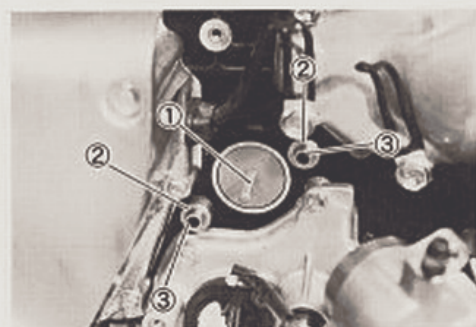
- Disconnect the neutral indicator light switch couplers ①, the side-stand switch coupler ②, the generator coupler ③ and the signal generator coupler ④.



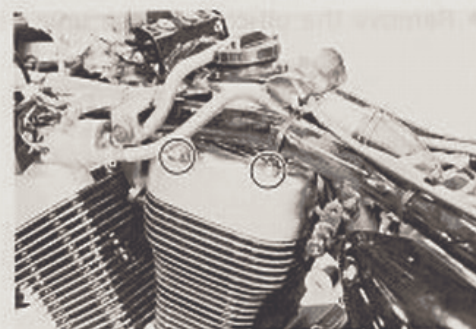
- Remove the clutch release cylinder by removing the bolts.



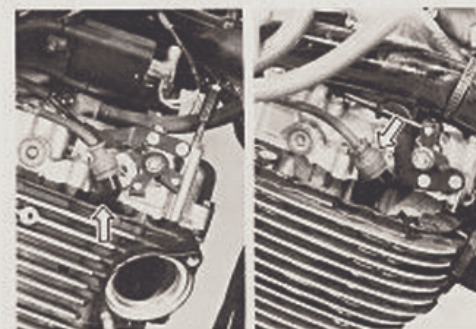
- Remove the push rod ①, spacers ② and dowel pins ③.



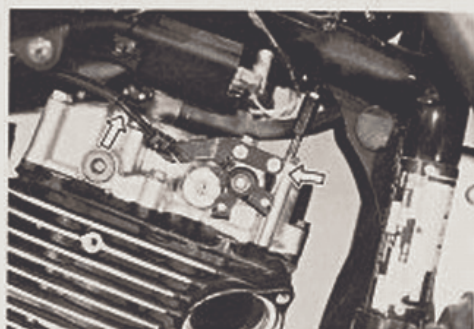
- Remove the cylinder head side caps.



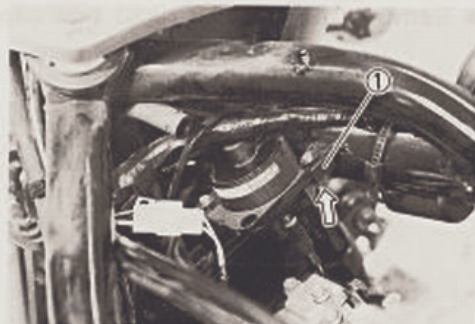
- Remove the spark plug caps.



- Remove the automatic de-compression cables.



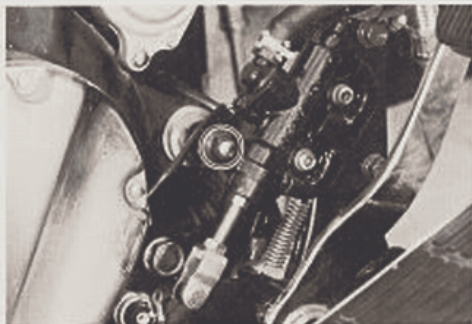
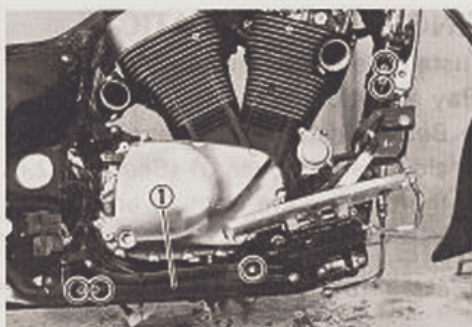
- Remove the automatic de-compression solenoid plunger by removing the bolt and the stopper ①.



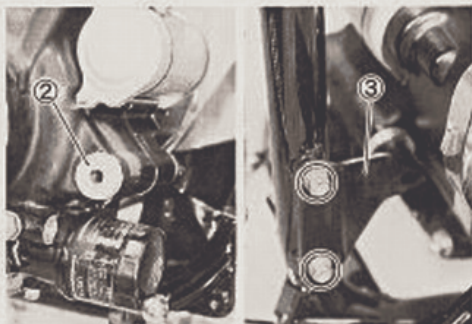
- Remove the oil cooler hose union bolts.



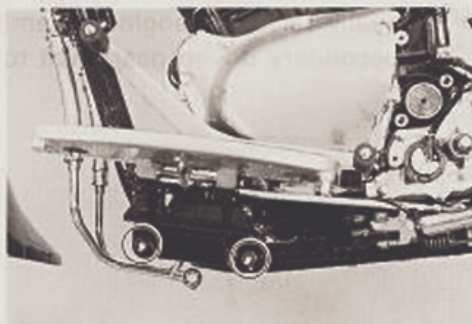
- Remove the engine mounting bolts and nuts.
- Remove the frame down tube mounting bolts and nuts.
- Remove the frame down tube ①.



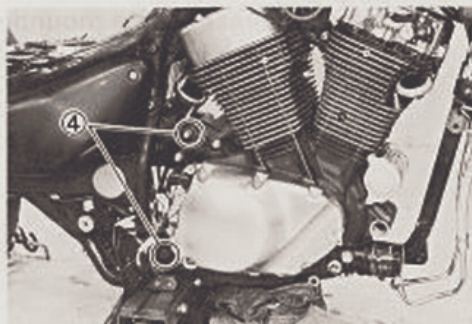
- Remove the right side spacers ②.
- Remove the engine mounting bracket ③.



- Remove the left side footrest bracket.



- Support the engine using an engine jack.
- Remove the engine mounting bolts and nuts ④.
- Gradually lower the engine.



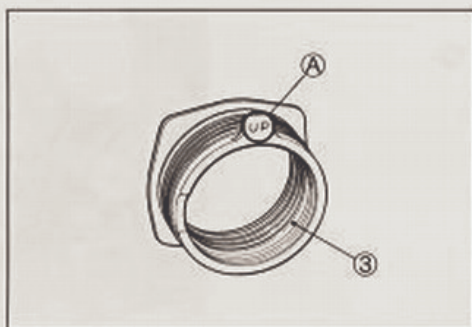
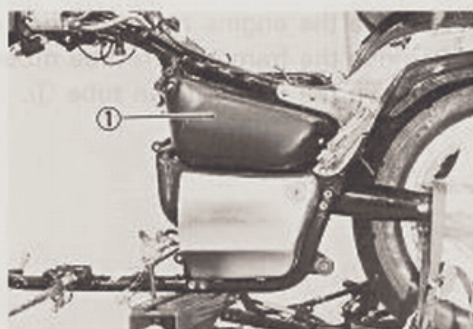
ENGINE INSTALLATION

Install the engine in the reverse order of engine removal. Pay attention to the following points:

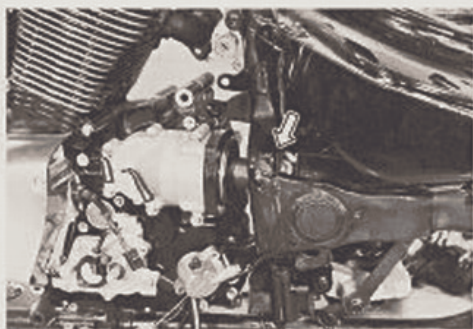
- Before installing the engine assembly, remove the left side frame cover ① (See p. 6-2.) and tool box ②, and then install the boot ③ and universal joint ④.

NOTE:

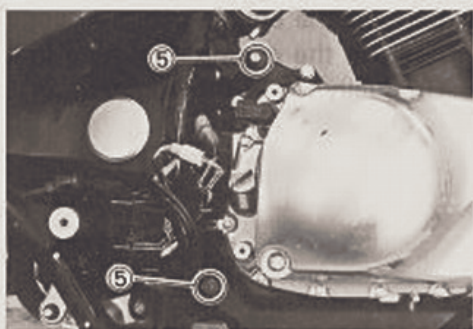
Make sure that the "UP" mark ⑤ on the boot ③ faces up.



- Gradually raise the engine assembly, and then engage the secondary driven gear shaft to the universal joint.



- First install the rear engine mounting bolts (5) after aligning the bolt holes in the frame and the engine.

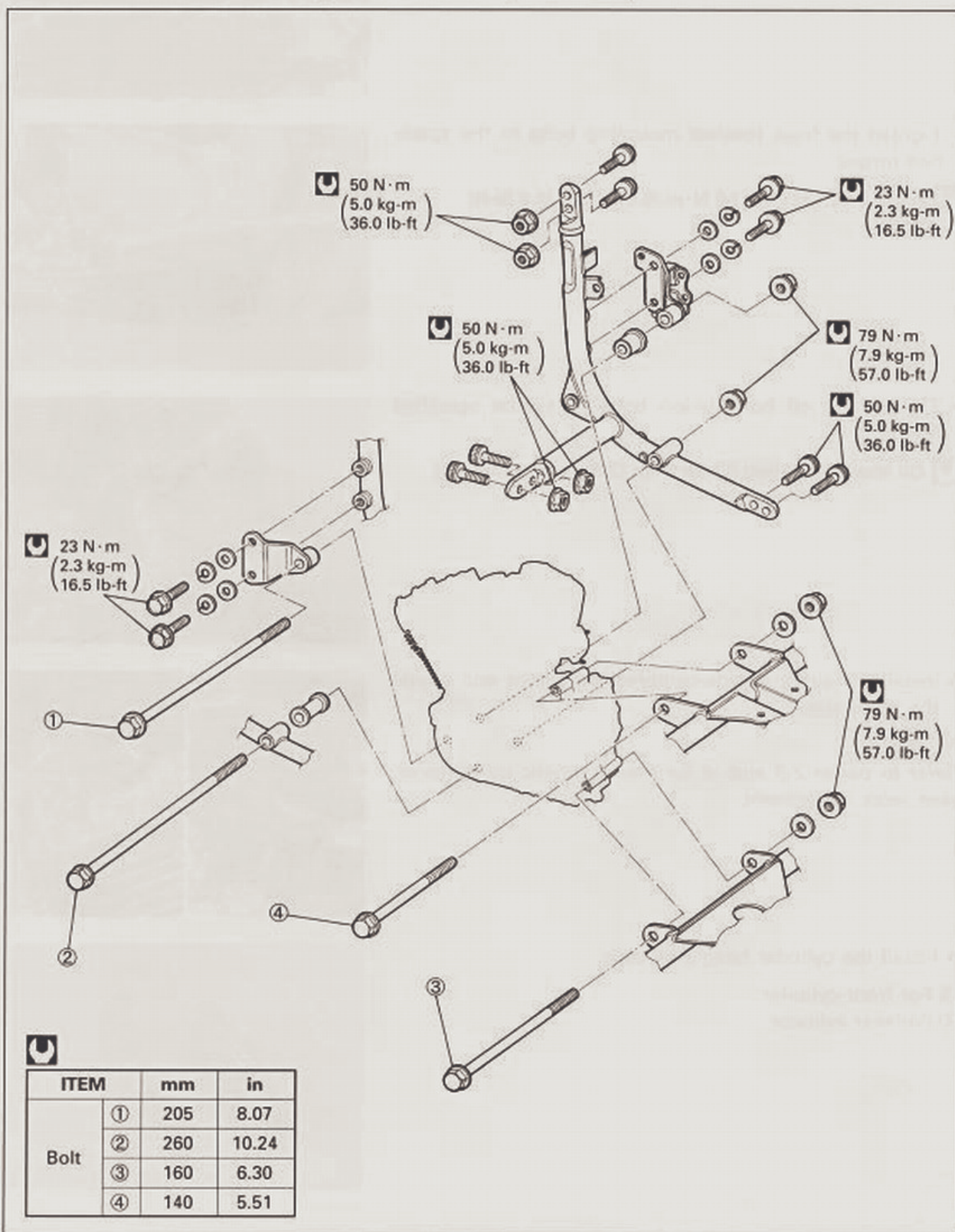


- Install the brackets, spacer, bolts and nuts properly, as shown in the following illustration.

NOTE:

The engine mounting nuts are self-locking. Once the nut has been removed, they are no longer of any use.

Be sure to use new nuts and tighten them to the specified torque.

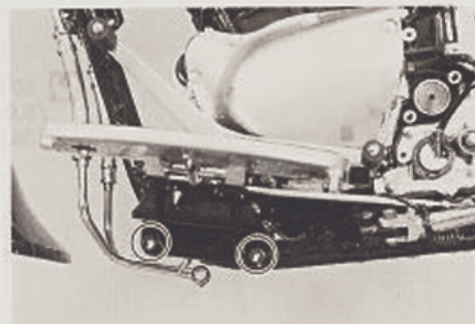


- Properly fit the boot ① onto the engine and the swingarm.




- Tighten the front footrest mounting bolts to the specified torque.

 Front footrest bolt: 50 N·m (5.0 kg-m, 36.0 lb-ft)



- Tighten the oil hose union bolts ② to the specified torque.

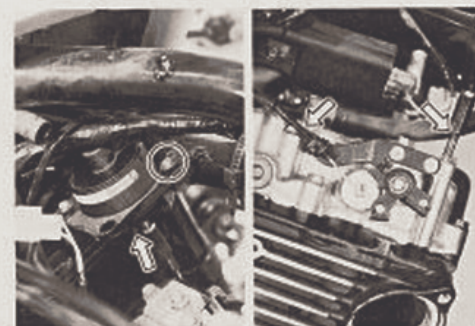
 Oil hose union bolt ②: 26 N·m (2.6 kg-m, 19.0 lb-ft)



- Install the automatic de-compression cables and adjust the cable slack.

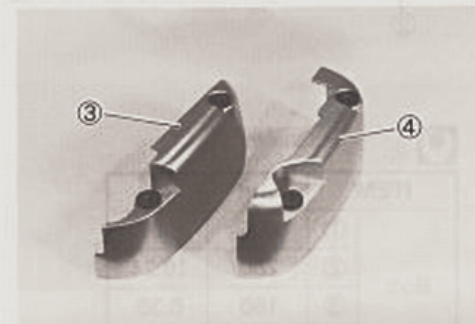
NOTE:

Refer to pages 2-8 and -9 for the automatic de-compression cable adjustment.



- Install the cylinder head side caps.


- ③ For front cylinder
- ④ For rear cylinder

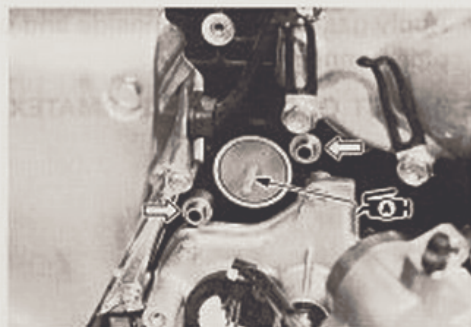


- Install the clutch push rod, spacers and dowel pins.

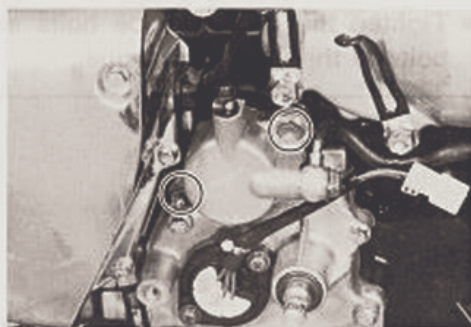
NOTE:

Apply grease to the clutch push rod, when installing it.

 99000-25030: SUZUKI SUPER GREASE "A"



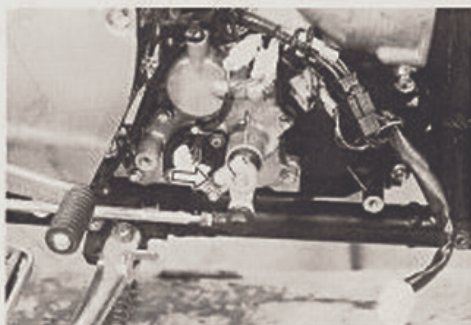
- Install the clutch release cylinder as shown.



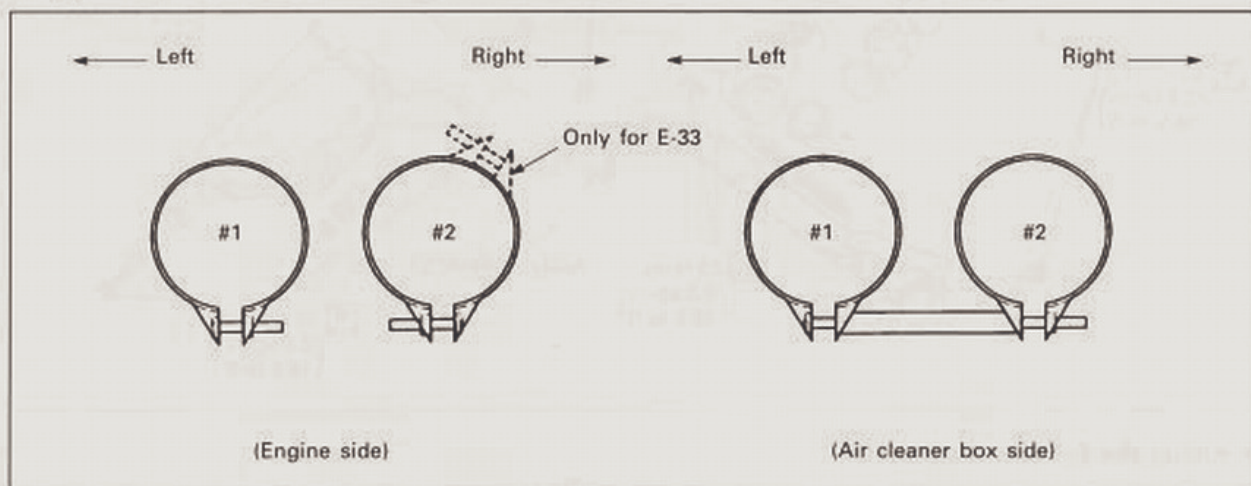
- Properly install the gearshift lever onto the gearshift shaft as shown.

Standard

Gearshift lever height: 82 mm (3.23 in)



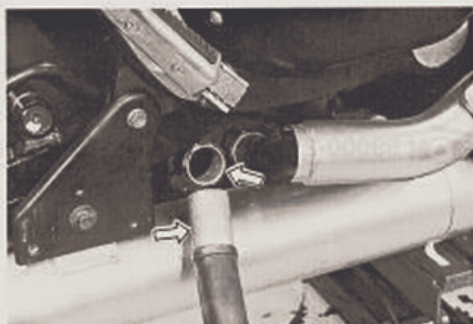
- Install the carburetor and air cleaner box.
- Position the carburetor clamps as shown in the following illustration.



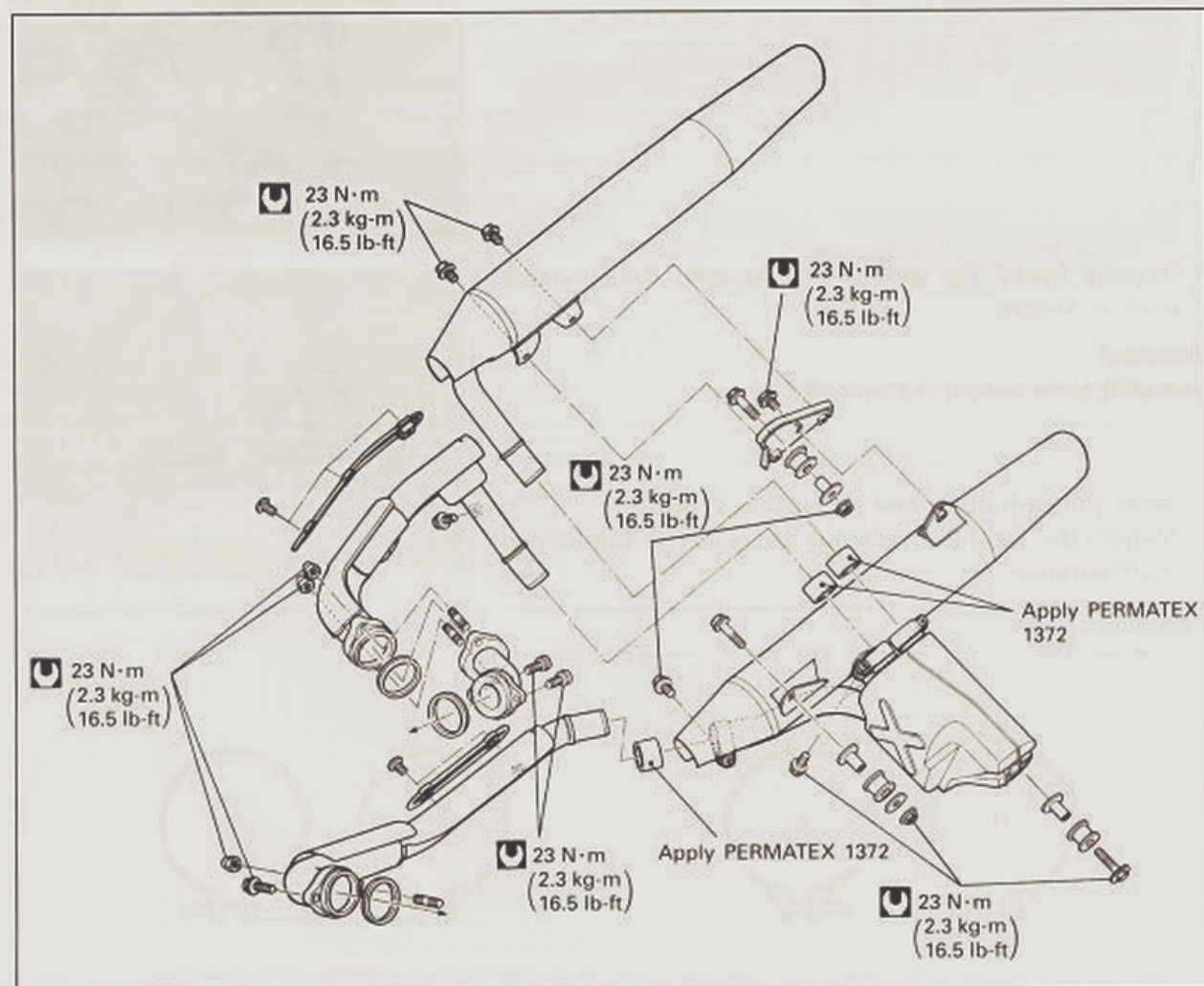
NOTE:

Refer to pages 8-12 to -19 for the cable and hose routing.

- Apply gas sealer to the inside and outside of the exhaust pipe connector.

EXHAUST GAS SEALER: PERMATEX 1372

- Tighten the exhaust pipe bolts and muffler mounting bolts to the specified torque.



- Adjust the following items.

	Page
* Engine oil	2-6 and -7
* Throttle valve synchronization	5-27 to -29
* Idling adjustment	2-8
* Throttle cable play	2-10
* Automatic de-compression cables	2-8 and -9
* Clutch air bleeding	2-11

ENGINE DISASSEMBLY AND REASSEMBLY

ENGINE DISASSEMBLY

▲ CAUTION

Be sure to identify each removed part such as intake pipe, camshaft, cylinder head, piston, conrod etc. as to its location and lay the parts out in groups so that each will be restored to the original location during assembly.

- Remove the spark plugs. (See p. 2-3.)
- Remove the cylinder head side caps.

- Remove the breather cover.
- Remove the cylinder head covers.
- Remove the dowel pins and camshaft end caps.

NOTE:

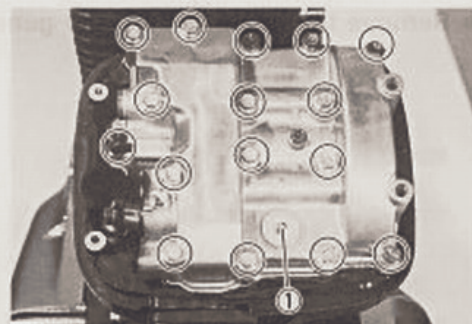
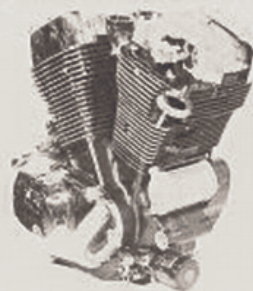
Slightly loosen the plug ① to facilitate later installation. (See p. 3-57.)



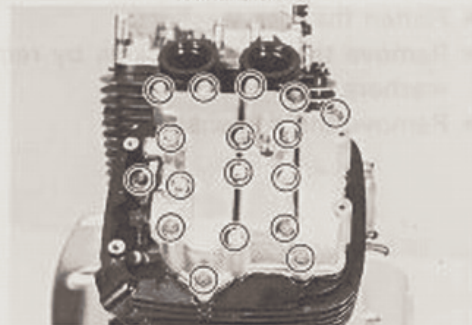
- Remove the generator cover ②.

NOTE:

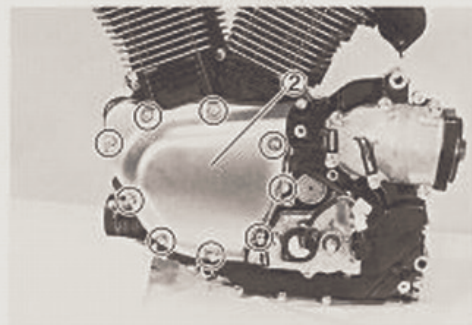
Refer to the section 3D for the generator cover servicing.



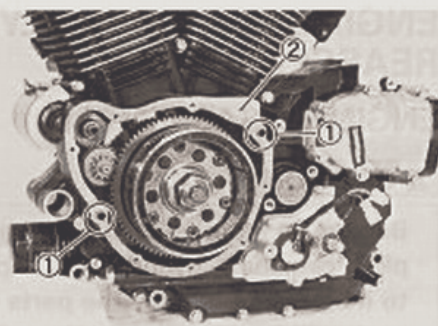
Rear (No.1)



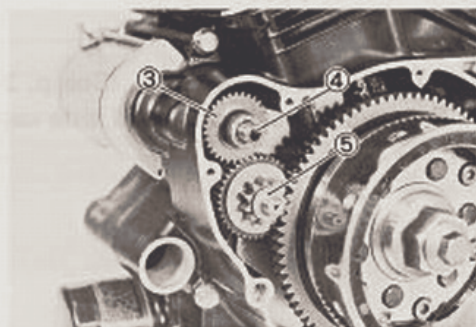
Front (No.2)



- Remove the dowel pins ① and the gasket ②.



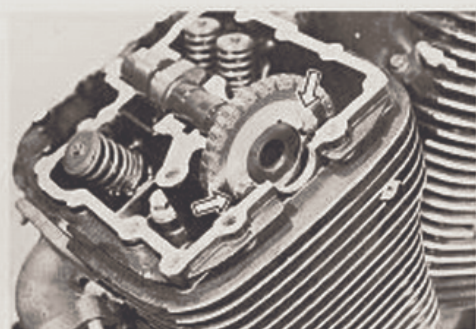
- Remove the starter idle gear ③, its shaft ④ and the washer ⑤.



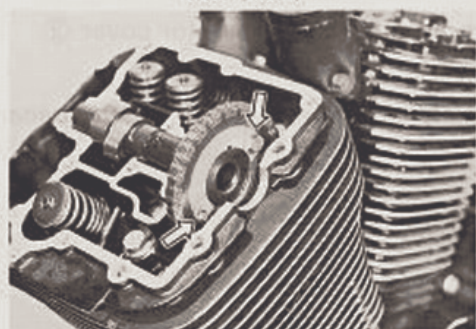
- Remove the bush ⑥ from the generator cover.



- Flatten the lock washers.
- Remove the cam sprockets by removing the bolts and washers.
- Remove the camshafts.



Rear (No.1)



Front (No.2)

NOTE:

Turn the generator rotor with a offset wrench to appear the cam sprocket bolt heads.

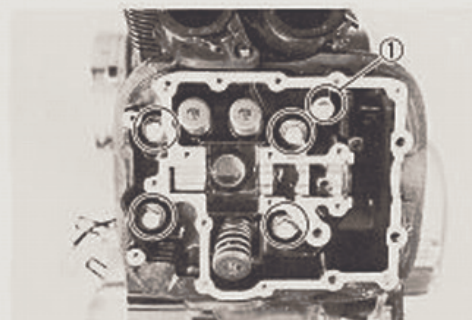
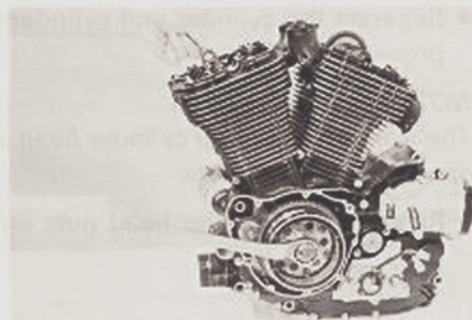
CAUTION

Pull the cam chains up ward, or the chain will be caught between crankcase and the crank shaft when turning crankshaft.

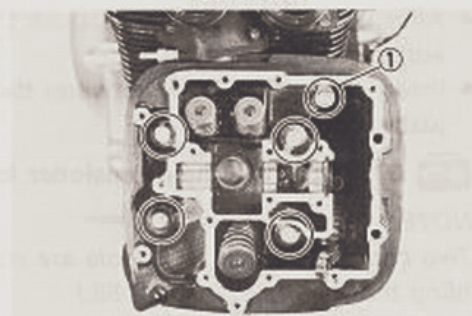
- Remove the cylinder head bolts.

NOTE:

Slightly loosen the cylinder head bolts ① to facilitate later disassembly.



Rear (No.1)

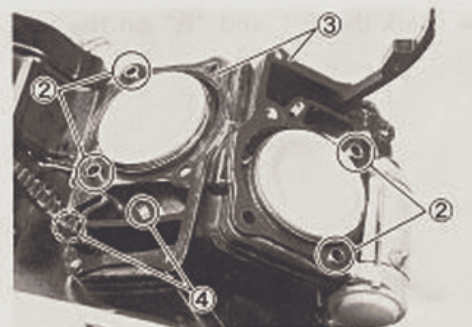


Front (No.2)

- Remove the cylinder heads and cylinders.



- Remove the dowel pins ②, the cylinder base gaskets ③ and the oil jets ④.

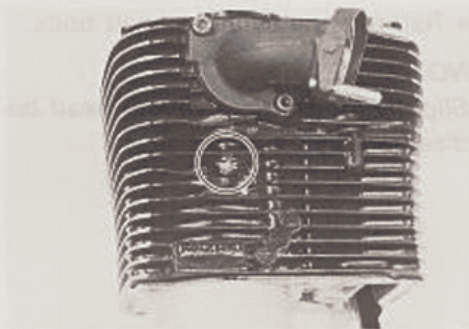
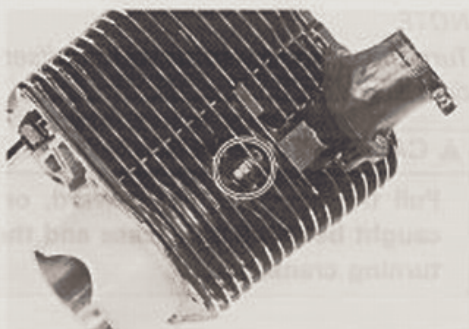


- Separate the cylinder and cylinder head in the following procedure.

NOTE:

The front cylinder and cylinder head separating procedures are same as rear ones.

- Remove the cylinder head nuts and bolt.



- After unlocking the ratchet, push the cam chain tension adjuster rod.
- Insert the special tool between the ratchet and the adjuster body.

TOOL 09918-53810: Chain tensioner lock tool

NOTE:

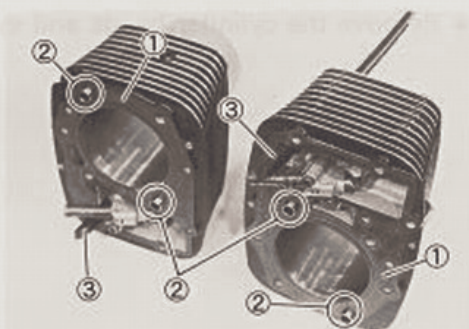
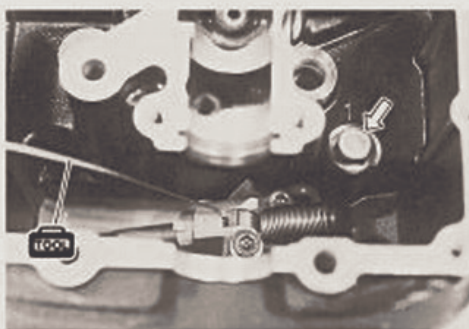
Two chain tensioner lock tools are needed when reassembling the engine. (See p. 3-58.)

- Separate the cylinder and cylinder head.

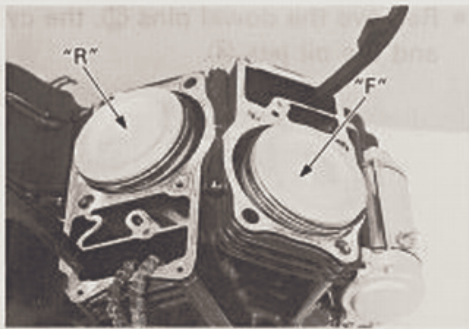
NOTE:

Refer to the section 3B for cam chain tension adjuster servicing.

- Remove the cylinder head gaskets ①, dowel pins ② and cam chain guides ③.



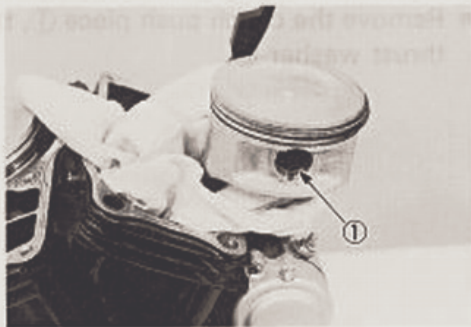
- Mark the "F" and "R" on the each piston head.



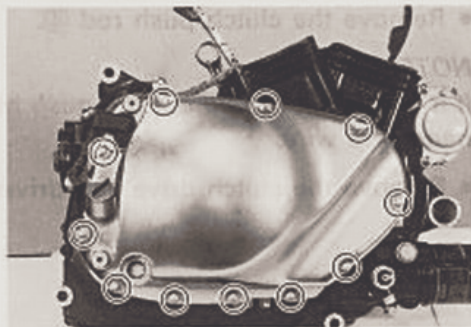
- Place a clean rag over the cylinder to prevent any parts from falling into the crankcase.
- Remove the piston pin circlip ① using long-nose pliers.
- Draw out each piston pin and remove the pistons.

NOTE:

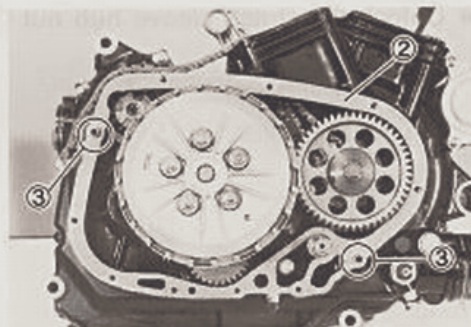
See section 3B for piston and cylinder service.



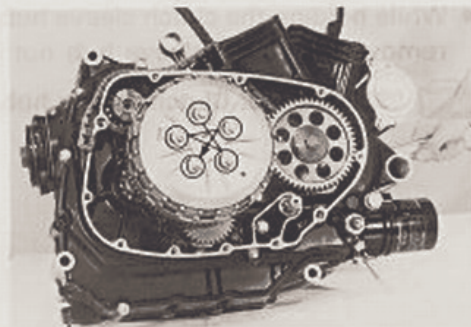
- Remove the clutch cover by removing the bolts.



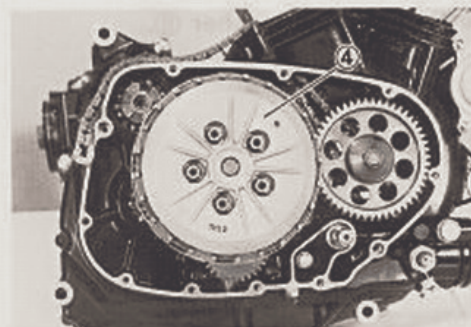
- Remove the gasket ② and dowel pins ③.



- While holding the generator rotor with a offset wrench, remove the clutch spring set bolts and springs diagonally.



- Remove the pressure plate ④.



- Remove the clutch push piece ①, the bearing ② and the thrust washer ③.

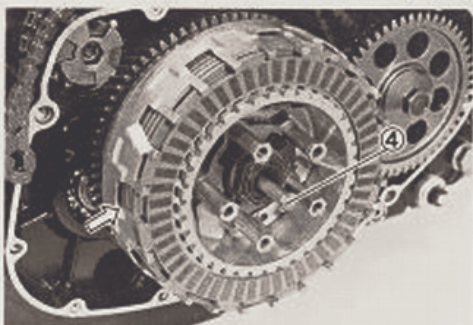


- Remove the clutch push rod ④.

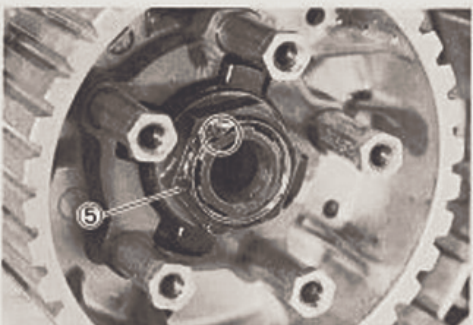
NOTE:

If it is difficult to pull out the push rod ④, use a magnetic hand or a wire.

- Remove the clutch drive and driven plates.

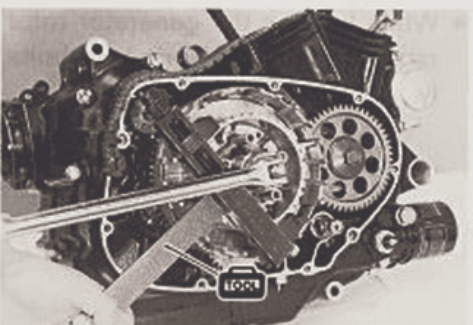


- Unlock the clutch sleeve hub nut ⑤.

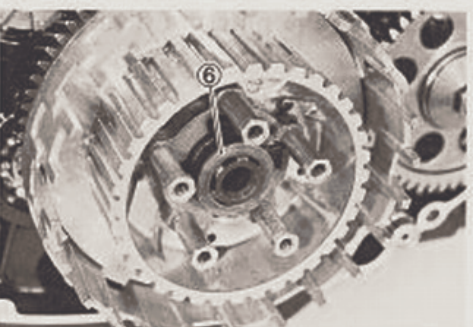


- While holding the clutch sleeve hub with the special tool, remove the clutch sleeve hub nut ⑤.

TOOL 09920-53740: Clutch sleeve hub holder



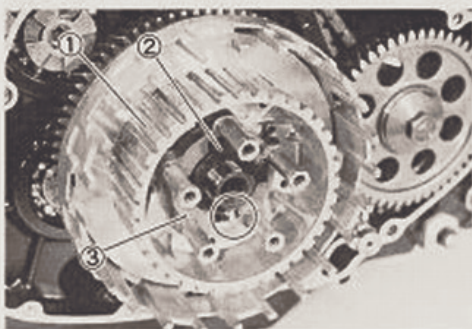
- Remove the washer ⑥.



- Remove the clutch sleeve hub ① along with the clutch drive cam ② and the clutch driven cam ③.

CAUTION

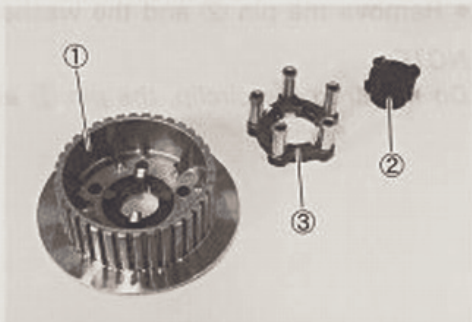
Prior to disassembly, mark the initial position of the clutch drive and driven cam with a paint. Install the clutch drive and driven cam at the initial position when assembling them.



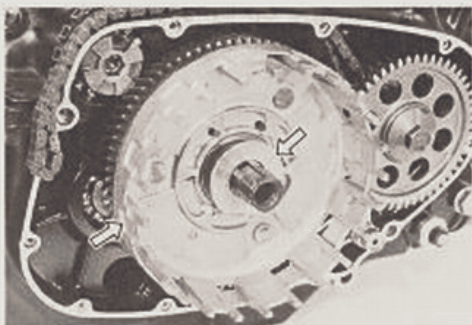
- Remove the clutch drive cam ② and the clutch driven cam ③ from the clutch sleeve hub ①.

NOTE:

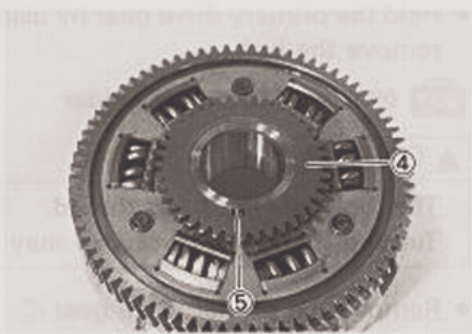
The clutch drive cam ② and the clutch driven cam ③ should be replaced as a set.



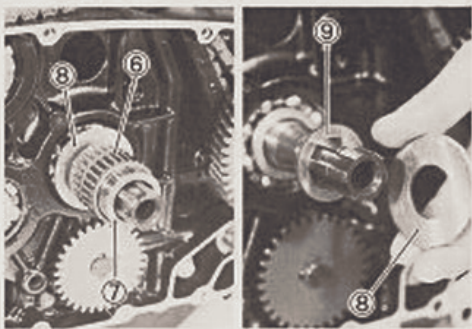
- Remove the thrust washer.
- Remove the primary driven gear assembly.



- Remove the oil pump drive gear ④ and pin ⑤ from the primary driven gear.

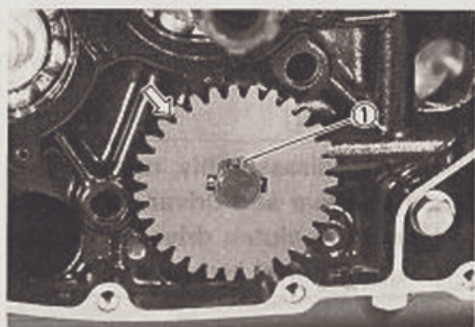


- Remove the needle roller bearing ⑥, the spacer ⑦, thrust washer ⑧ and the spacer ⑨.



- Remove the oil pump driven gear by removing the circlip ①.

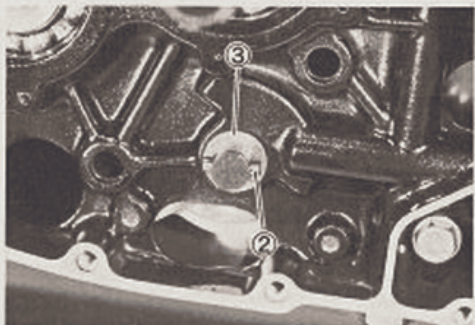
TOOL 09900-06107: Snap ring pliers



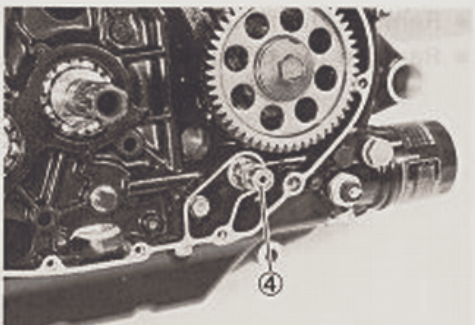
- Remove the pin ② and the washer ③.

NOTE:

Do not drop the circlip, the pin ② and the washer ③.



- Remove the oil pressure regulator ④.



- Hold the primary drive gear by using the special tool and remove the bolt.

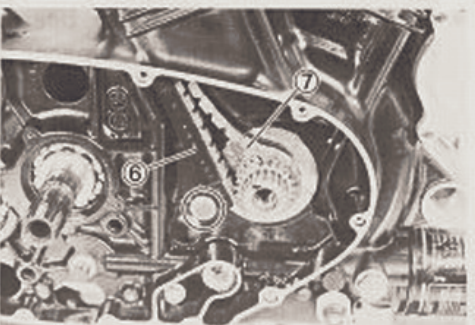
TOOL 09930-40113: Rotor holder

CAUTION

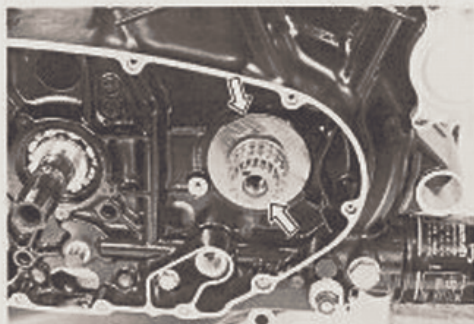
This bolt has left-hand thread.
Turning it counter-clockwise may cause damage.



- Remove the primer drive gear ⑤.
- Remove the cam chain tensioner ⑥ and chain ⑦.



- Remove the cam chain drive sprocket and thrust washer.



- Install the universal joint on the secondary driven gear shaft.
- While holding the universal joint with an adjustable wrench, remove the speed sensor rotor and drive shaft bolt ①.

CAUTION

Drive shaft bolt ① has left-hand thread. Turning it counter-clockwise may cause damage.



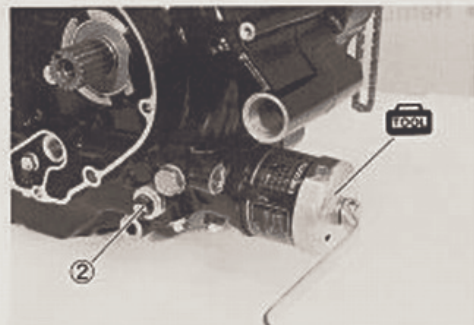
TOOL 09900-18710: Hexagon socket (12 mm)

- Remove the starter motor.

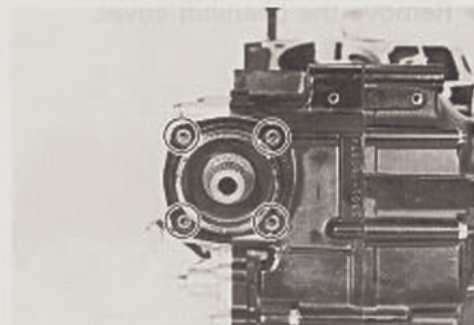


- Remove the oil filter and the oil pressure switch ②.

TOOL 09915-40610: Oil filter wrench



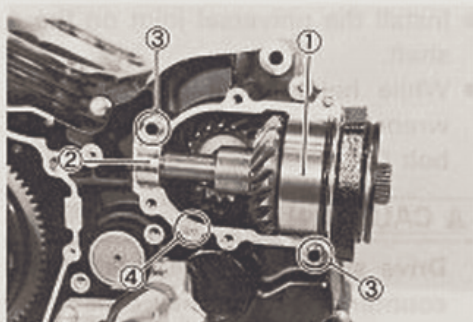
- Remove the secondary driven gear bolts.



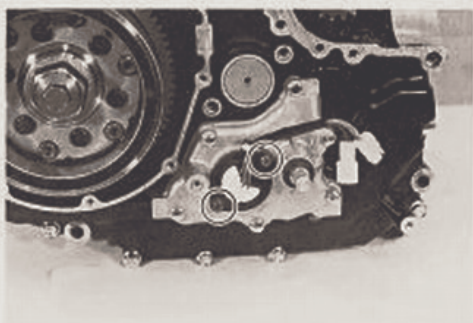
- Remove the secondary gear case by removing bolts.



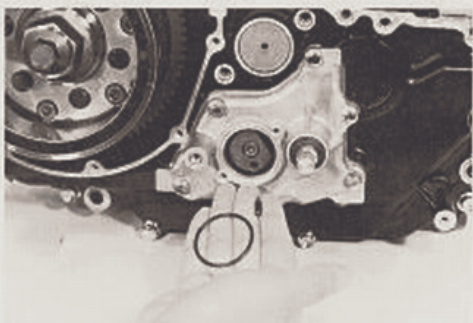
- Remove the secondary driven gear assembly ①, the bearing ②, the dowel pins ③, the oil jet ④, and the pin ⑤.



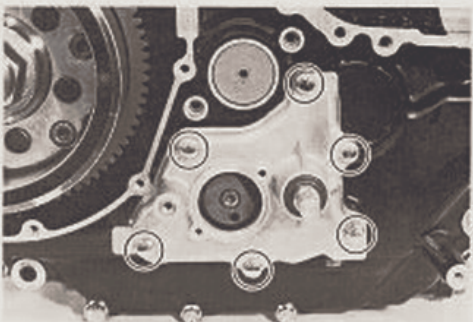
- Remove the neutral indicator light switch.



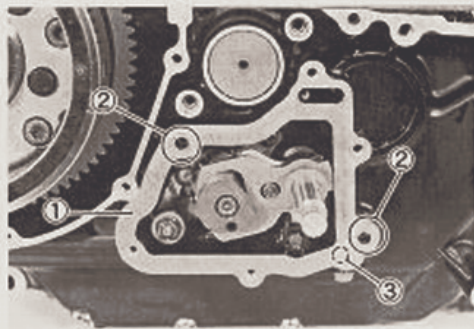
- Remove the switch contact, the spring and the O-ring.



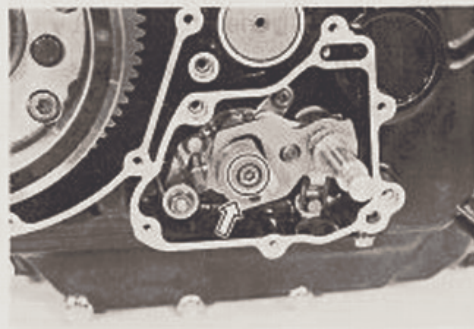
- Remove the gearshift cover.



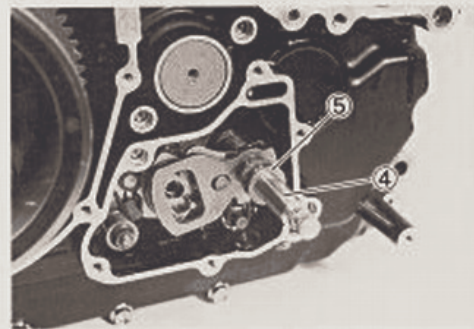
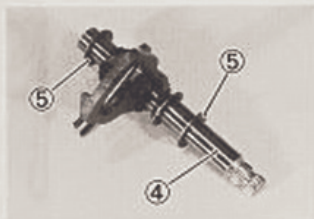
- Remove the gasket ①, the dowel pins ② and the oil jet ③.



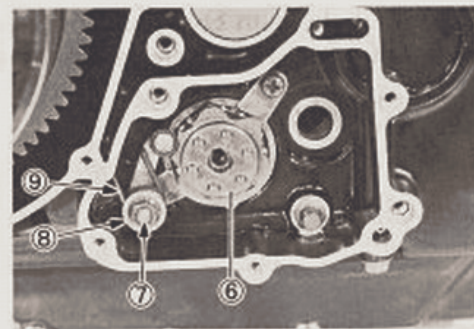
- Remove the gear shift cam retainer.



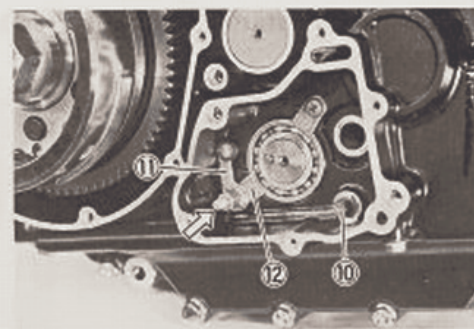
- Remove the gearshift shaft/gearshift arm ④ and the washers ⑤.



- Remove the gearshift cam plate ⑥, the gearshift cam stopper nut ⑦, the washer ⑧ and the spring ⑨.



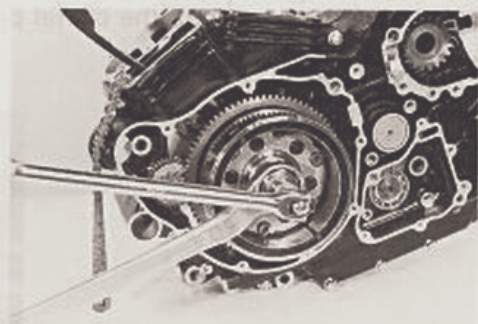
- Remove the gearshift arm stopper bolt ⑩.
- Remove the gearshift cam stopper ⑪ and the bearing retainer ⑫ by removing the gearshift cam stopper bolt.



- Loosen the generator rotor bolt while holding the generator with a offset wrench.

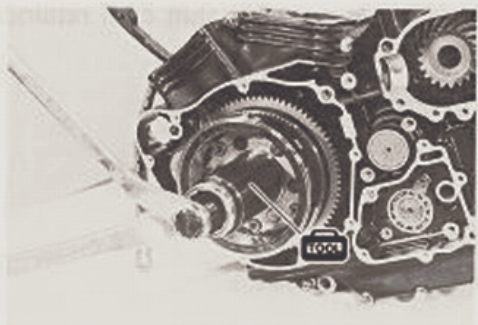
NOTE:

When loosen the rotor bolt, do not remove it. The rotor bolt is used in conjunction with the rotor remover when removing the rotor.



- Remove the generator rotor by using the special tool.

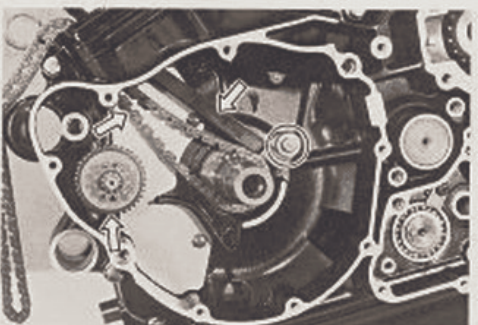
TOOL 09930-30721: Rotor remover



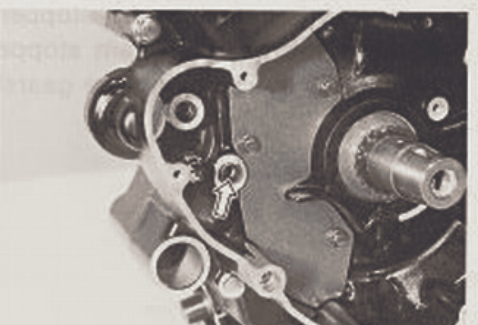
- Remove the key ① and the starter driven gear ②.



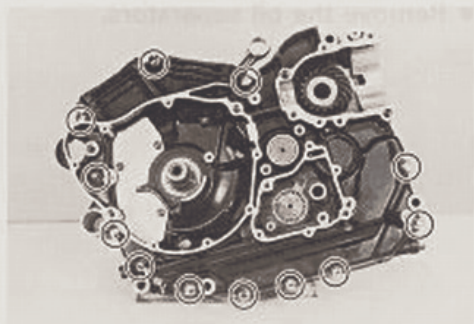
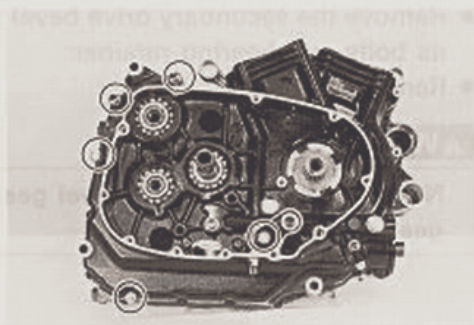
- Remove the cam chain tensioner and the chain.
- Remove the starter torque limiter and the washer.



- Remove the starter torque limiter bush from the crankcase.



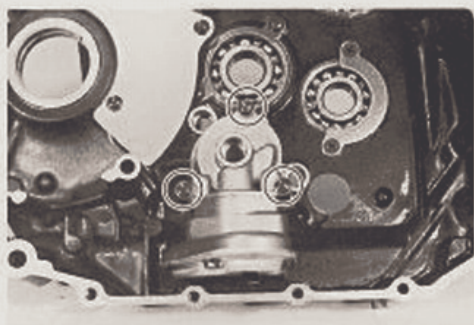
- Remove the crankcase bolts.
- Separate the crankcase into 2 parts.



- Remove the oil pump from the right crankcase halves.

NOTE:

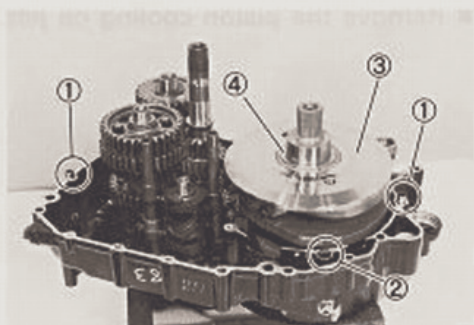
Refer to the page 3G-1 for the oil sump filter removal.



- Remove the dowel pins ① and the O-ring ②.
- Remove the crankshaft ③ with the thrust shim ④.

NOTE:

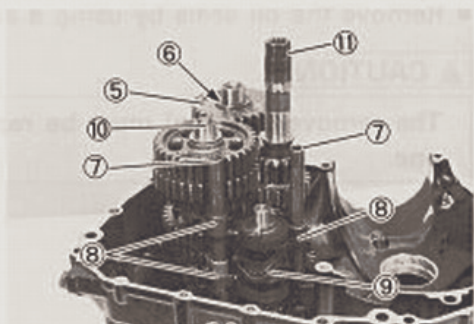
Refer to the section 3F for the crankshaft and the conrods servicing.



- Remove the over driving gear ⑤ with the bush ⑥.
- Remove the gearshift fork shafts ⑦ and the gearshift forks ⑧.
- Remove the gearshift cam ⑨.
- Remove the driveshaft assembly ⑩ and the countershaft assembly ⑪.

NOTE:

Refer to the section 3F for the driveshaft and the countershaft servicing.



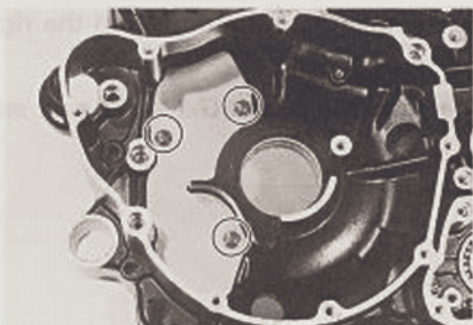
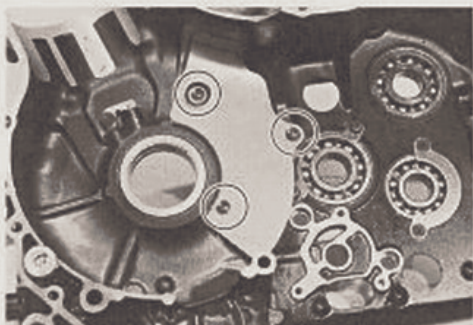
- Remove the secondary drive bevel gear by removing the its bolts and bearing retainer.
- Remove the shim(s).

⚠ WARNING

Never hit the secondary bevel gear. Secondary bevel gear circlip could come off.



- Remove the oil separators.



- Remove the piston cooling oil jets.



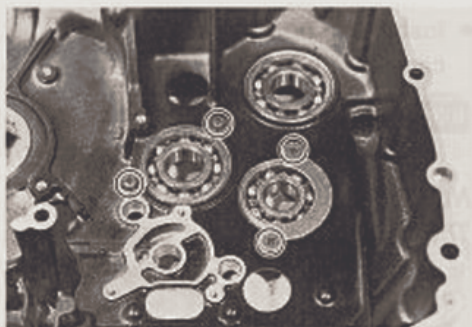
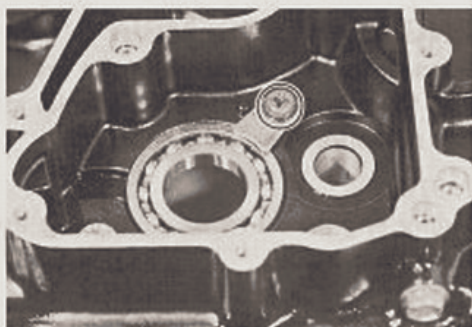
- Remove the oil seals by using a suitable bar.

⚠ CAUTION

The removed oil seal must be replaced with a new one.



- Remove the bearing retainers.



- Remove the bearings (①, ②, ③, ④, ⑤ and ⑥) by using the special tool.



09923-74510: Bearing remover (for ①)

09930-30102: Sliding shaft (for ①)

09913-75821: Bearing remover/installer (for ②, ③, ⑥)

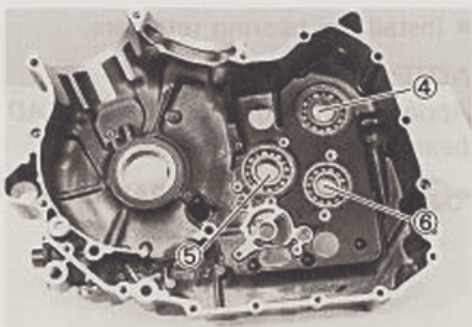
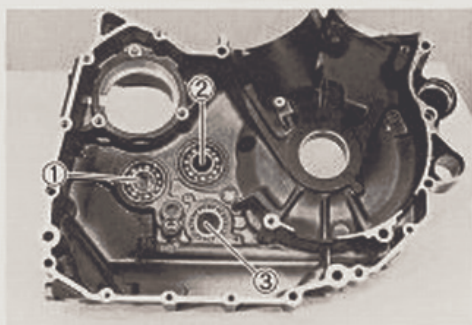
09913-75810: Bearing remover/installer (for ④, ⑤)

⚠ CAUTION

The removed bearings must be replaced with new ones.

NOTE:

Refer to pages 3F-11 and -12 for crankshaft bearing servicing.



ENGINE REASSEMBLY

Reassembled the engine in the reverse order disassembly. The following steps require special attention or precautionary measures should be taken.

NOTE:

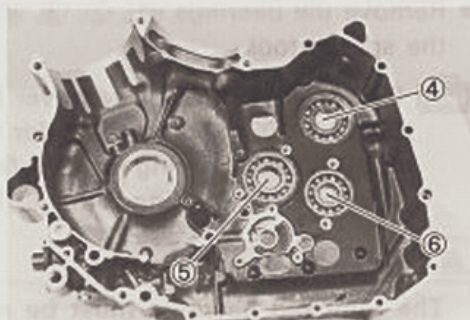
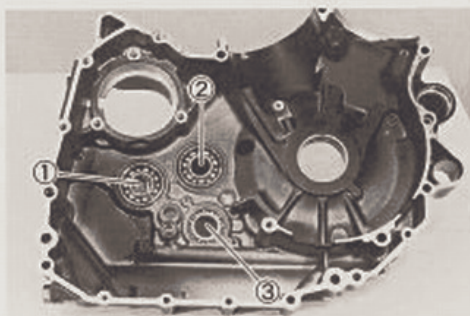
Apply engine oil to each running and sliding part before reassembling.

- Install the bearings (①, ②, ③ ④, ⑤, and ⑥) to the crankcase by using the special tools.

TOOL 09913-75810: Bearing remover/installer (For ①, ②, ③)
09913-75520: Bearing remover/installer (For ④, ⑤, ⑥)

NOTE:

The sealed side of the bearing ① and ② faces outside.

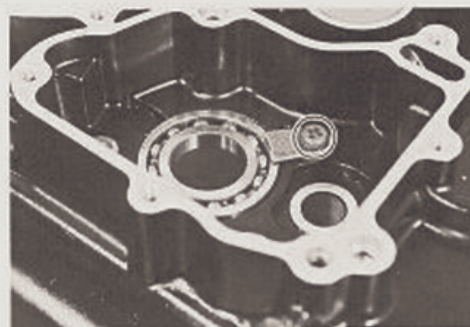


- Install the bearing retainers.


NOTE:

Apply a small quantity of THREAD LOCK "1342" to the bearing retainer screws.

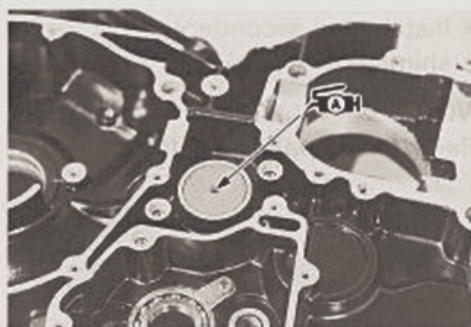
1342 99000-32050: THREAD LOCK "1342"



- Install the oil seal into the crankcase by using the special tools.
- Apply grease to the oil seal lip.

 09913-75810: Bearing remover/installer

 99000-25030: SUZUKI SUPER GREASE "A"



- Fit the new O-rings to each piston cooling oil jet.

CAUTION

Use new O-ring to prevent the oil leakage.

NOTE:

Apply engine oil to the O-ring when installing the oil jet.



- Install the piston cooling oil jet to the left and right crankcase halves.

NOTE:

Apply small quantity of the **THREAD LOCK "1342"** to the bolts and tighten them to the specified torque.

 99000-32050: **THREAD LOCK "1342"**

 Piston cooling oil jet plate bolt: 10 N·m
(1.0 kg-m, 7.0 lb-ft)



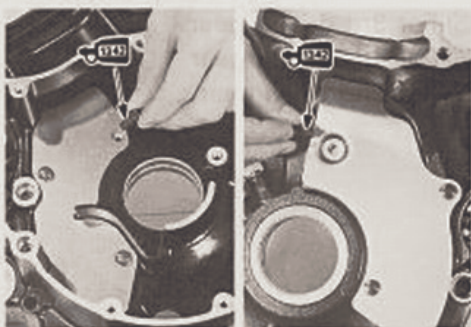
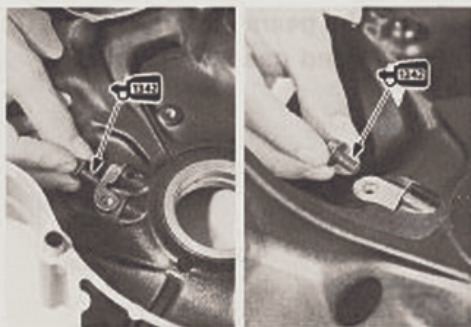
- Install the oil separator, to the left and right crankcase halves.

NOTE:

Apply small quantity of the **THREAD LOCK "1342"** to the bolts and tighten them to the specified torque.

 99000-32050: **THREAD LOCK "1342"**

 Oil separator bolts: 10 N·m (1.0 kg-m, 7.0 lb-ft)



- Install the secondary drive bevel gear assembly and shim(s).

NOTE:

Refer to the pages 4-6 through -9 for the shim selection.



- Tighten the secondary drive bevel gear bearing retainer bolts to the specified torque.

NOTE:

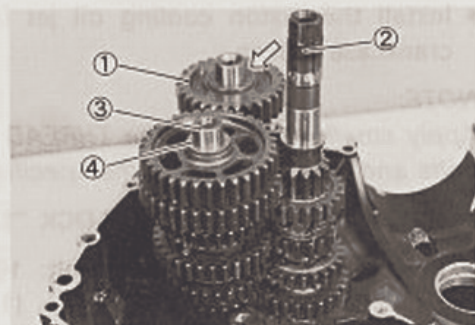
Apply the **THREAD LOCK SUPER "1303"** to the thread of bolts.

1303 99000-32030: THREAD LOCK SUPER "1303"

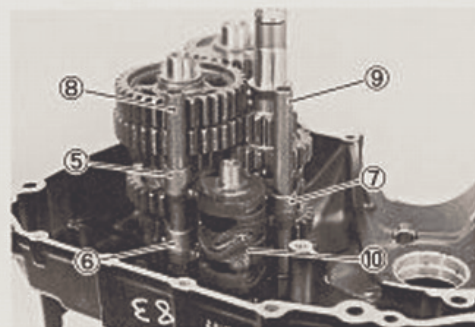
Secondary drive gear bearing retainer bolt: 23 N·m (2.3 kg-m, 16.5 lb-ft)



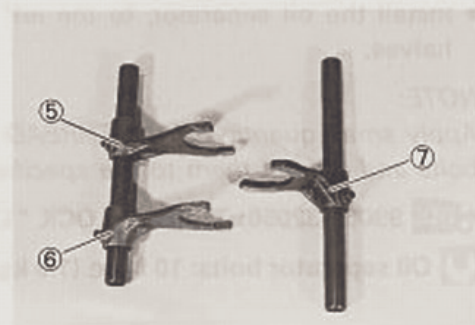
- Install the countershaft assembly ② and driveshaft assembly ③.
- Install the washer ④ to the driveshaft.
- Install the over driving gear ① and bush.



- Install the gearshift forks (⑤, ⑥, ⑦), gearshift fork shafts (⑧, ⑨) and gearshift cam ⑩.



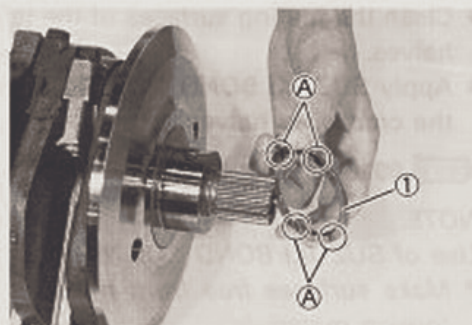
- ⑤ For 3rd driven gear
- ⑥ For 4th driven gear
- ⑦ For 2nd drive gear



- Install the thrust shim ① on the crankshaft.

NOTE:


- * The grooved face **A** of thrust shim ① faces to crankshaft web side.
- * The thrust shim is selected by the crankshaft thrust clearance. (See pp. 3F-12 and -13.)



- Install the crankshaft into the left crankcase half.

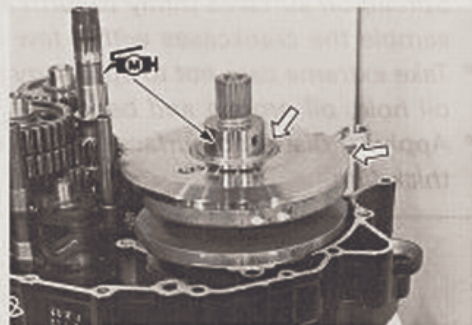
NOTE:

Coat lightly moly paste to the crankshaft journal bearings and the thrust shim.

 99000-25140: SUZUKI MOLY PASTE

CAUTION

Never strike the crankshaft with a plastic hammer when inserting it into the crankcase. It will be easy to install the crankshaft to left crankcase.



- Install the dowel pins and O-ring on the left crankcase half.

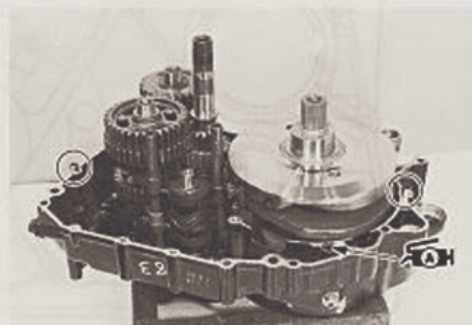
NOTE:

Apply grease to the O-ring.

 99000-25030: SUZUKI SUPER GREASE "A"

CAUTION

Use the new O-ring to prevent oil leakage.



- Install the oil pump ② to the right crankcase half.

NOTE:

Apply a small quantity of THREAD LOCK "1342" to the oil pump mounting bolts and tighten them to the specified torque.

 99000-32050: THREAD LOCK "1342"

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



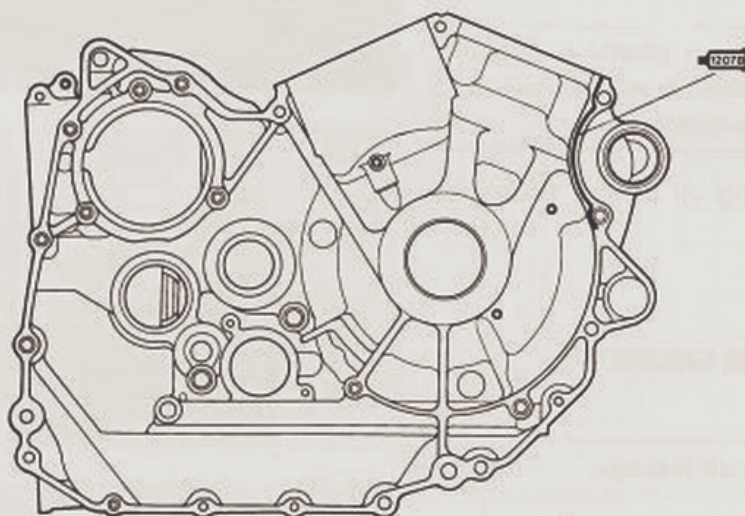
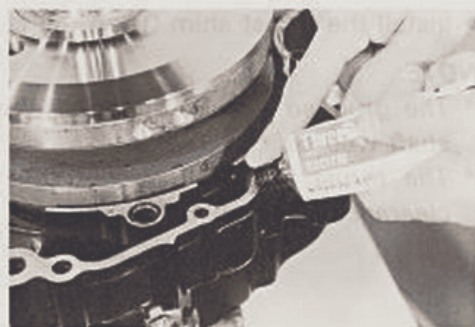
- Clean the mating surfaces of the left and right crankcase halves.
- Apply SUZUKI BOND "1207B" to the mating surface of the crankcase halves.

1207B 99104-31140: SUZUKI BOND "1207B"

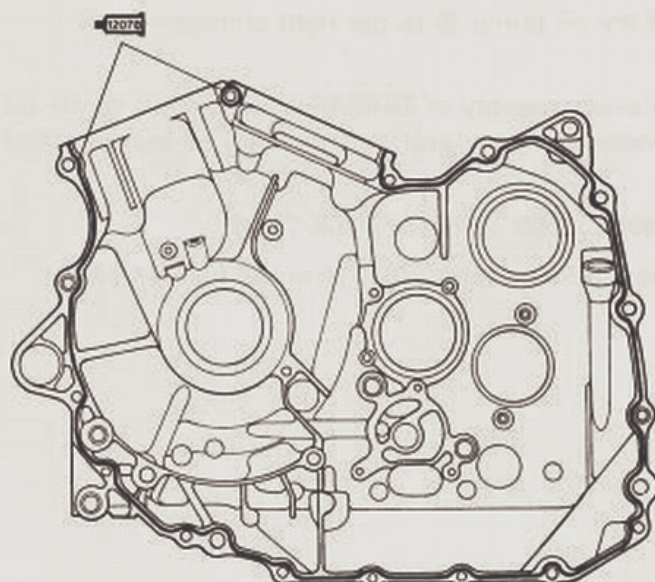
NOTE:

Use of SUZUKI BOND "1207B" is as follows:

- * Make surfaces free from moisture, oil, dust and other foreign materials.
- * Spread on surfaces thinly to form an even layer, and assemble the crankcases within few minutes.
- * Take extreme care not to apply any BOND "1207B" to the oil hole, oil groove and bearing.
- * Apply to distorted surfaces as it forms a comparatively thick film.




Left crankcase



Right crankcase

- When securing the right and left crankcase halves, tighten each bolt a little at a time to equalize the pressure. Tighten all the securing bolts to the specified torque values.

 **Crankcase 8mm bolt:** (Initial) 10 N·m
(1.0 kg-m, 7.0 lb-ft)
(Final) 22 N·m
(2.2 kg-m, 16.0 lb-ft)

Crankcase 6mm bolt: 11 N·m
(1.1 kg-m, 8.0 lb-ft)

CAUTION

Do not drop the O-ring into the crankcase when assembling the right and left crankcase halves.

NOTE:

After the crankcase bolts have been tightened, check if the crankshaft, secondary drive bevel gear shaft, countershaft and the driveshaft rotate smoothly.

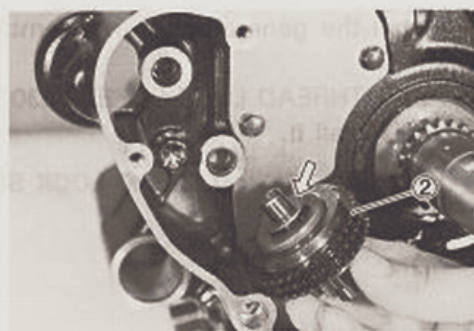
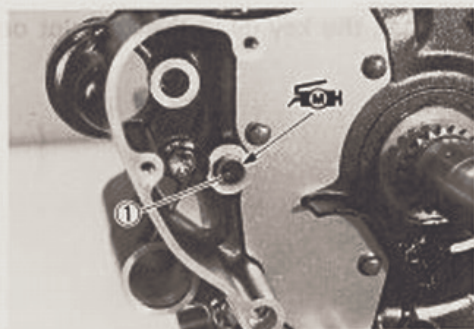
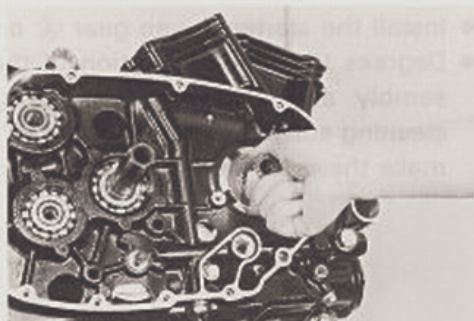
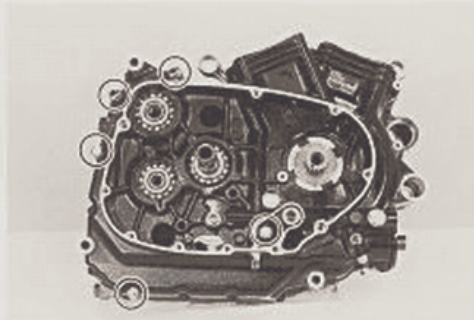
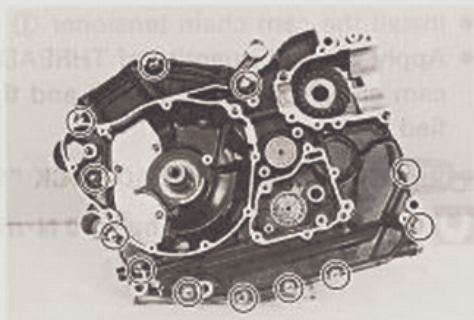
- Install the bush ① into the crankcase.

NOTE:

Apply engine oil and SUZUKI MOLY PASTE to the inside of the bushes.


 99000-25140: SUZUKI MOLY PASTE

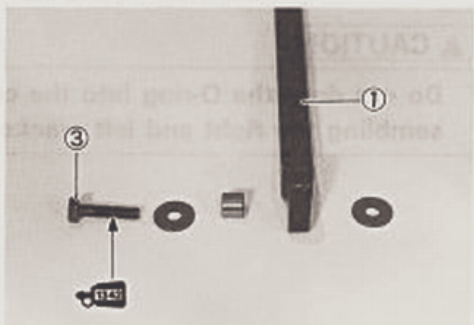
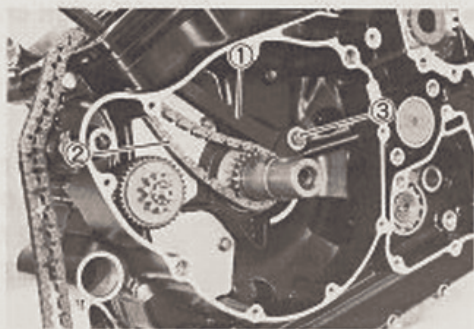
- Install the starter torque limiter ② and the washer.



- Install the cam chain tensioner ① and cam chain ②.
- Apply a small quantity of THREAD LOCK "1342" to the cam chain tensioner bolt ③ and tighten it to the specified torque.

 99000-32050: THREAD LOCK "1342"

 Cam chain tensioner bolt: 10 N·m (1.0 kg-m, 7.0 lb-ft)



- Install the starter driven gear ④ onto the crankshaft.
- Degrees the tapered portion of the generator rotor assembly and also the crankshaft. Use nonflammable cleaning solvent to wipe off the oily or greasy matter to make these surfaces completely dry.

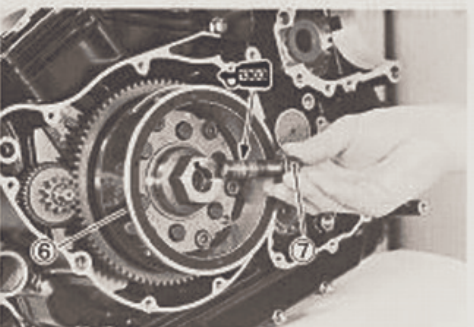


- Install the key ⑤ in the key slot on the crankshaft completely.



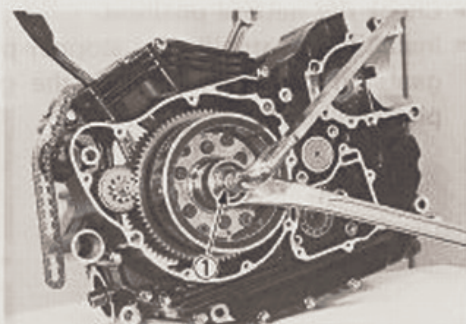
- Install the generator rotor assembly ⑥ onto the crankshaft.
- Apply THREAD LOCK SUPER "1303" to the rotor bolt ⑦ and install it.

 99000-32030: THREAD LOCK SUPER "1303"



- While holding the generator rotor with a offset wrench, tighten its bolt ① to the specified torque.

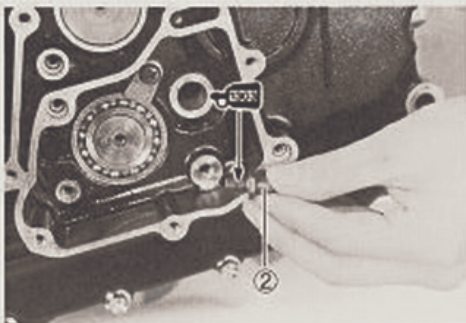
 **Generator rotor bolt: 160 N·m (16.0 kg-m, 115.5 lb-ft)**



- Apply a small quantity of THREAD LOCK SUPER "1303" to the gearshift arm stopper bolt ② and tighten it to the specified torque.

 **99000-32030: THREAD LOCK SUPER "1303"**

 **Gearshift arm stopper bolt: 23 N·m (2.3 kg-m, 16.5 lb-ft)**



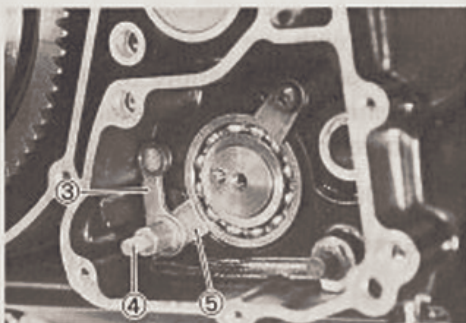
- Install the gearshift cam stopper ③, its bolt ④ and the bearing retainer ⑤.

NOTE:

Apply a small quantity of THREAD LOCK "1342" to the bolt ④ and tighten it to the specified torque.

 **99000-32050: THREAD LOCK "1342"**

 **Gearshift cam stopper bolt: 10 N·m (1.0 kg-m, 7.0 lb-ft)**




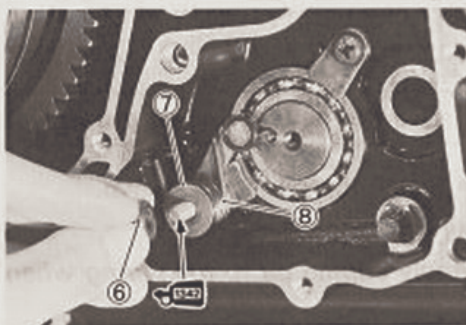
- Install the gearshift cam stopper nut ⑥, the washer ⑦ and the return spring ⑧.

NOTE:

Apply a small quantity of THREAD LOCK "1342" to the nut ⑥ and tighten the nut to the specified torque.

 **99000-32050: THREAD LOCK "1342"**

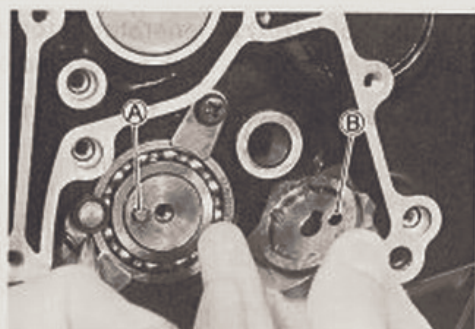
 **Gearshift cam stopper nut: 10 N·m (1.0 kg-m, 7.0 lb-ft)**



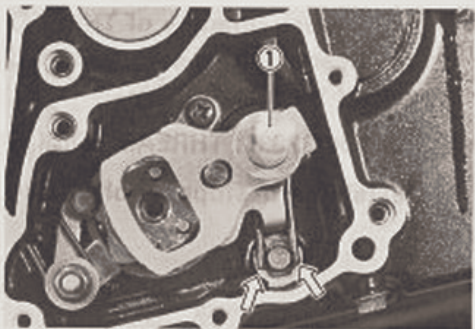
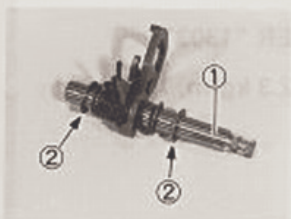
- Confirm the gearshift cam stopper movement.



- Check the neutral position.
- Install the gearshift cam stopper plate after aligning the gearshift cam pins **A** with the gearshift cam stopper plate holes **B**.



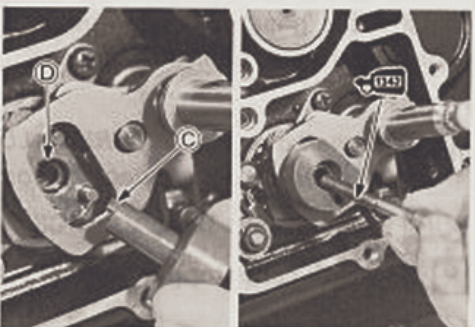
- Install the gearshift shaft/gearshift arm **1** with the washers **2** as shown in the photograph.



- Install the gearshift cam retainer after aligning the portion **C** with the gearshift cam stopper plate groove **D**.
- Apply a small quantity of THREAD LOCK "1342" to the gearshift cam stopper retainer bolt and tighten it to the specified torque.

1342 99000-32050: THREAD LOCK "1342"

U Gearshift cam stopper retainer bolt: 10 N·m
(1.0 kg-m, 7.0 lb-ft)



- Fit the new O-ring to the oil jet (#14).

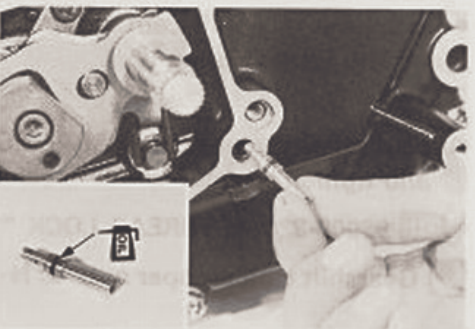
CAUTION

Use the new O-ring to prevent oil leakage.

- Install the oil jet as shown.

NOTE:

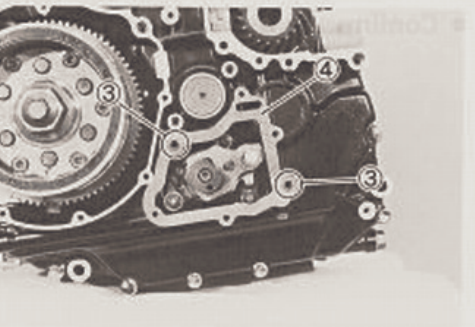
Apply engine oil to the O-ring when installing the oil jet.



- Install the dowel pins **3** and the gasket **4**.

CAUTION

Use new gasket to prevent oil leakage.



- Install the gearshift cover.

NOTE:

Fit the new gasket washer to the bolt ① as shown.

CAUTION

Use the new gasket washer to prevent oil leakage.

NOTE:

Apply grease to the oil seal lip before installing the gear shift cover.

SAH 99000-25030: SUZUKI SUPER GREASE "A"

- Install the spring ② and the switch contact ③.
- Install the O-ring ④.

NOTE:

Apply grease to the O-ring ④.

SAH 99000-25030: SUZUKI SUPER GREASE "A"

- Install the neutral indication light switch ⑤ as shown.

- Install the secondary bevel driven gear bearing and the pin ⑥.

NOTE:

Align the hole (A) of the secondary bevel driven gear bearing with the pin ⑥.

- Install the secondary driven bevel gear assembly ⑦, shim(s) ⑧ and O-ring ⑨.

CAUTION

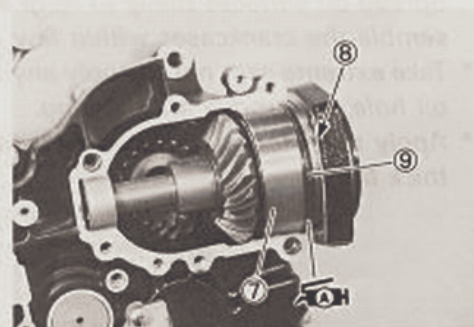
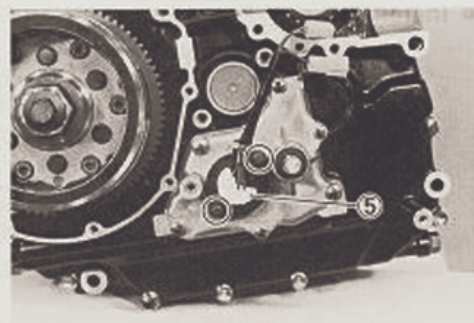
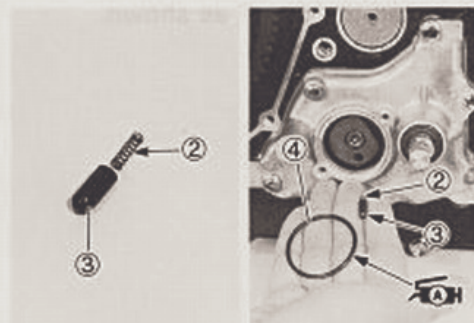
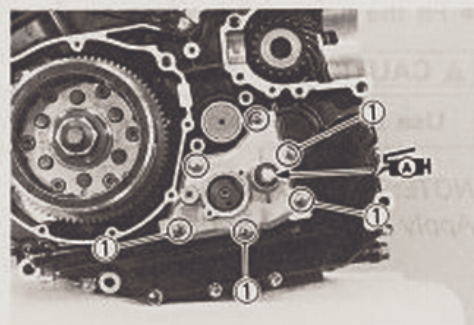
Use the new O-ring to prevent oil leakage.

NOTE:

* Refer to the section 4 for shim selection.

* Apply grease to the O-ring.

SAH 99000-25030: SUZUKI SUPER GREASE "A"



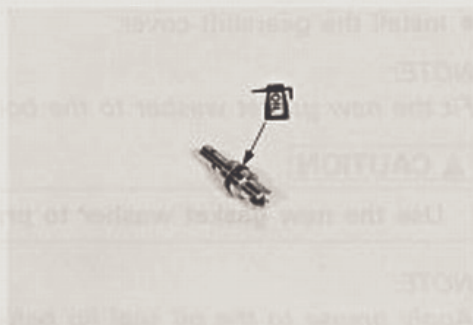
- Fit the new O-ring to the oil jet (#14).

CAUTION

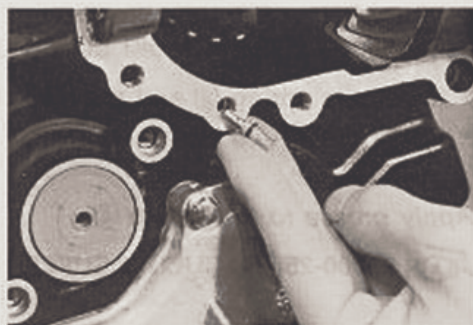
Use the new O-ring to prevent oil leakage.

NOTE:

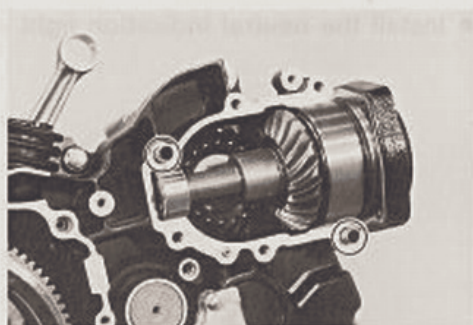
Apply engine oil to the O-ring when installing the oil jet.



- Install the oil jet as shown.



- Install the dowel pins.



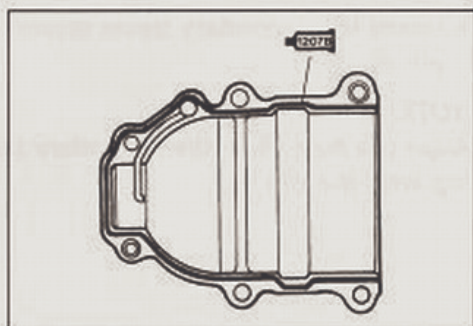
- Clean the mating surfaces of the crankcase and the secondary gear case.
- Apply SUZUKI BOND "1207B" to the mating surface of the secondary gear case.

99104-31140: SUZUKI BOND "1207B"


NOTE:

Use of SUZUKI BOND "1207B" is as follows:

- * Make surfaces free from moisture, oil, dust and other foreign materials.
- * Spread on surfaces thinly to form an even layer, and assemble the crankcases within few minutes.
- * Take extreme care not to apply any BOND "1207B" to the oil hole, oil groove and bearing.
- * Apply to distorted surfaces as it forms a comparatively thick film.



- Tighten the secondary gear case bolts to the specified torque.

 **Secondary gear case bolt (Initial): 10 N·m**
(1.0 kg-m, 7.0 lb-ft)
(Final): 22 N·m
(2.2 kg-m, 16.0 lb-ft)

NOTE:

Fit the clamps ① as shown.




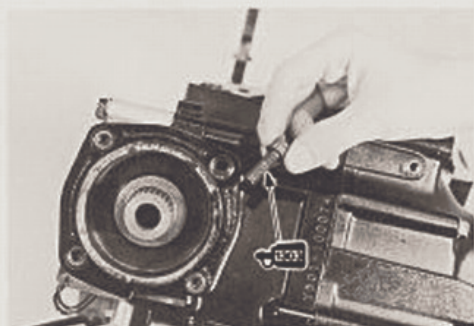
- Tighten the secondary driven bevel gear bolt to the specified torque.

NOTE:


- * Hollow portion ① of the secondary driven gear assembly faces inside.
- * Apply a small quantity of **THREAD LOCK SUPER "1303"** to the bolt.

 **99000-32030: THREAD LOCK SUPER "1303"**

 **Secondary driven bevel gear bolt: 23 N·m**
(2.3 kg-m, 16.5 lb-ft)

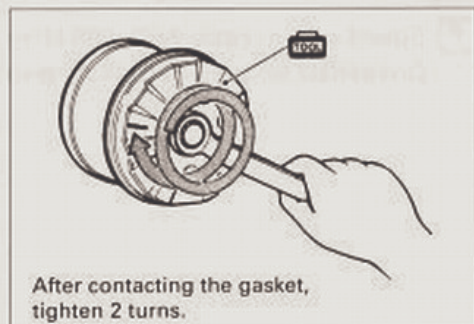
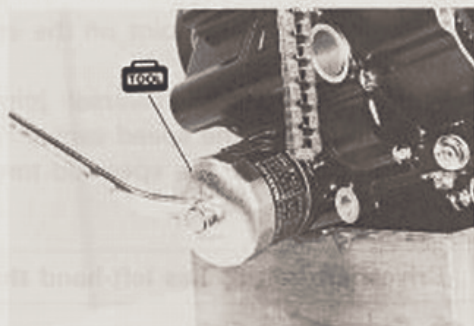


- Apply engine oil lightly to the gasket of the oil filter before installation.
- Install the oil filter turning it by hand until feeling that the filter gasket contacts the mounting surface. Then tighten it 2 turns using the oil filter wrench.

 **09915-40610: Oil filter wrench**

NOTE:

To properly tighten the filter, use the special tool. Never tighten the filter by hand.



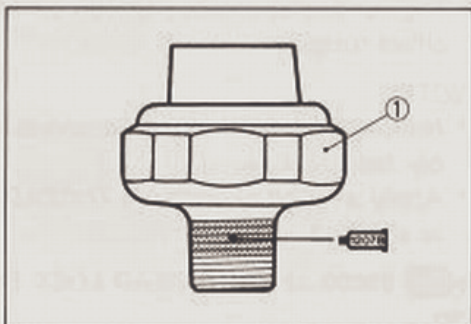
- Apply SUZUKI BOND "1207B" to the thread part of the oil pressure switch ① and tighten it to the specified torque.

1207B 99104-31140: SUZUKI BOND "1207B"

U Oil pressure switch: 14 N·m (1.4 kg-m, 10.0 lb-ft)

NOTE:

Take extreme care not to apply any BOND "1207B" to the oil hole.



- Install the new O-ring to the starter motor.

CAUTION

Use the new O-ring to prevent oil leakage.

- Apply grease to the O-ring.

AH 99000-25030: SUZUKI SUPER GREASE "A"

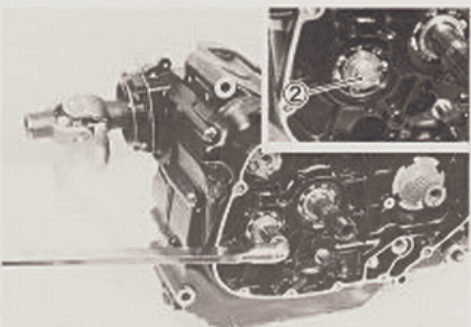
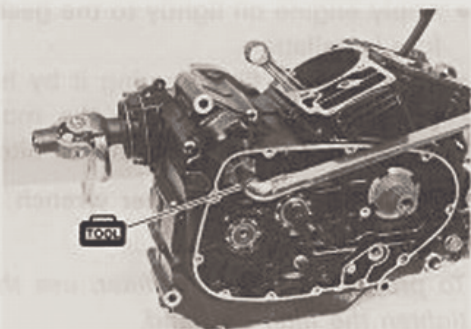
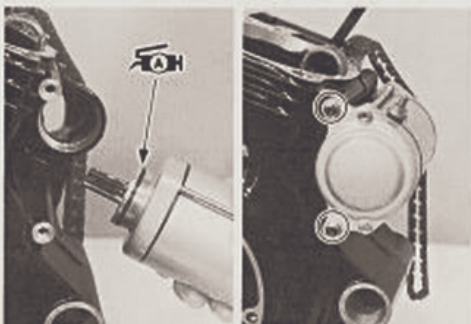
- Install the starter motor.
- Tighten the starter motor mounting bolt securely.
- Install the universal joint on the secondary driven gear shaft.
- While holding the universal joint with an adjustable wrench, tighten the speed sensor rotor bolt and the driveshaft bolt ② to the specified torque.

CAUTION

Driveshaft bolt ② has left-hand thread.

TOOL 09900-18710: Hexagon socket (12 mm)

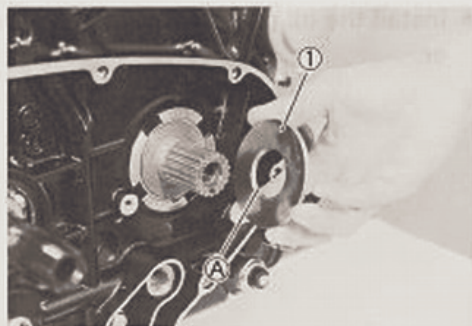
U Speed sensor rotor bolt: 100 N·m (10.0 kg-m, 72.5 lb-ft)
Driveshaft bolt: 60 N·m (6.0 kg-m, 43.5 lb-ft)



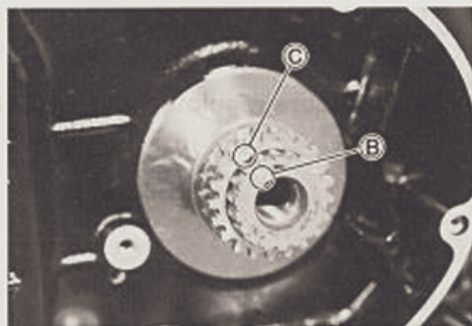
- Install the thrust washer ① onto the crankshaft.

NOTE:

The chamfer A of thrust washer ① faces crankcase.



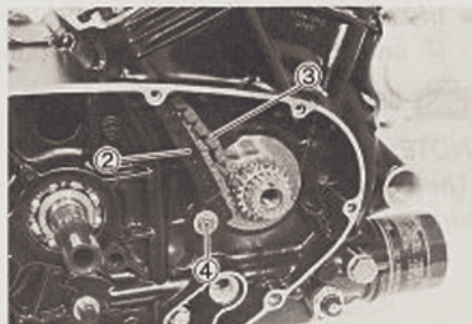
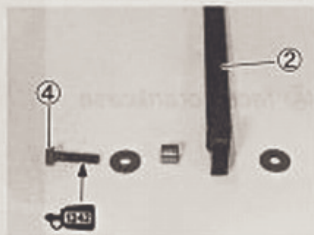
- After aligning the punch mark B of the crankshaft with punch mark C of the cam chain drive sprocket, install the cam chain drive sprocket.



- Install the cam chain tensioner ② and cam chain ③.
- Apply a small quantity of THREAD LOCK "1342" to the cam chain tensioner bolt ④ and tighten it to the specified torque.

1342 99000-32050: THREAD LOCK "1342"

U Cam chain tensioner bolt: 10 N·m (1.0 kg-m, 7.0 lb-ft)



- Install the primary drive gear and its bolt.

NOTE:

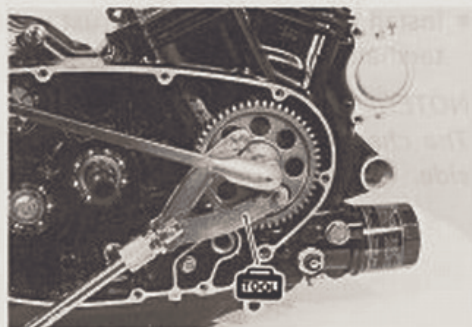
This bolt has left-hand thread.



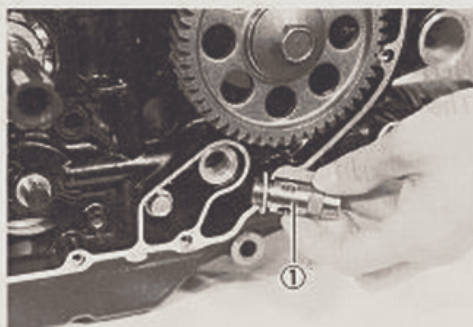
- Hold the primary drive gear by using the special tool and tighten its bolt to the specified torque.

TOOL 09930-40113: Rotor holder

U Primary drive gear bolt: 150 N·m (15.0 kg-m, 108.5 lb-ft)

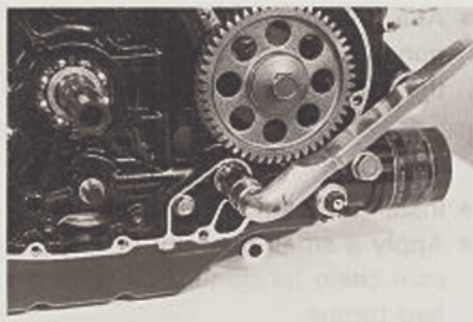


- Install the oil pressure regulator ① and the copper washer.



- Tighten the oil pressure regulator ① to the specified torque.

 Oil pressure regulator: 28 N·m (2.8 kg-m, 20.0 lb-ft)

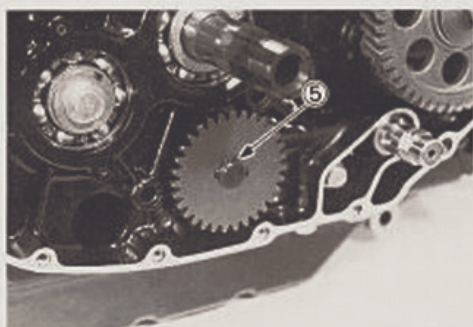
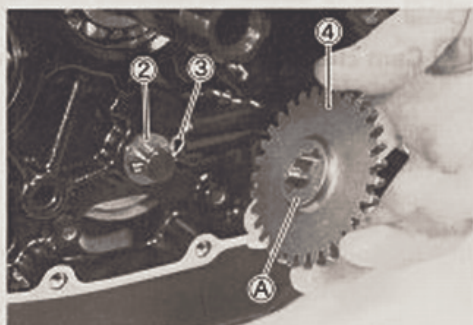


- Install the washer ②, the pin ③, the oil pump driven gear ④ and the circlip ⑤ to the oil pump shaft.

 09900-06107: Snap ring pliers

NOTE:

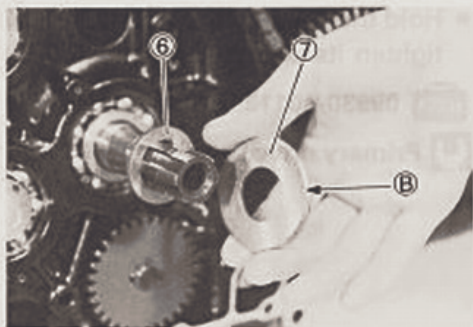
The boss ① of the oil pump driven gear ④ faces crankcase side.



- Install the spacer ⑥ the thrust washer ⑦ onto the countershaft.

NOTE:

The chamfer side ② of thrust washer ⑦ faces crankcase side.



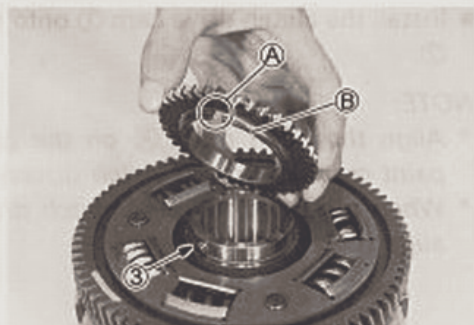
- Install the needle bearing ① and the spacer ② onto the countershaft and apply engine oil to them.



- Install the oil pump drive gear and the pin ③ on the primary driven gear assembly.

NOTE:

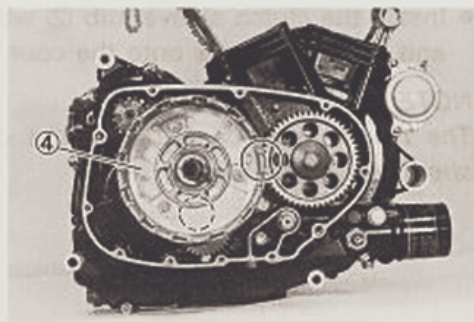
When installing the oil pump drive gear, align the pin ③ with the slot (A) and face the convex side (B) of the oil pump drive gear to the primary drive gear.



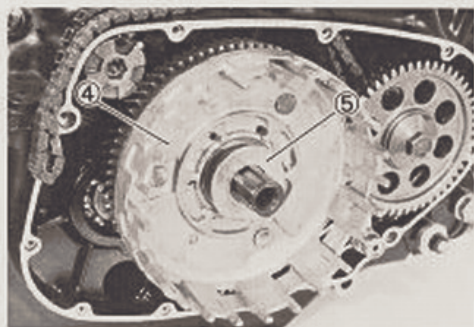
- Install the primary driven gear assembly ④ onto the countershaft.

NOTE:

Be sure to engage the oil pump drive and driven gears, primary drive and driven gears.



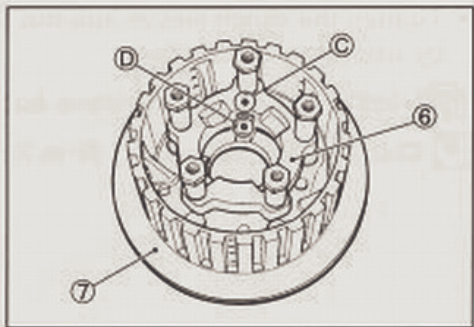
- Install the thrust washer ⑤.



- Install the clutch driven cam ⑥ onto the clutch sleeve hub ⑦.

NOTE:

Align the punched mark (C) on the clutch driven cam with the punched mark (D) on the clutch sleeve hub.

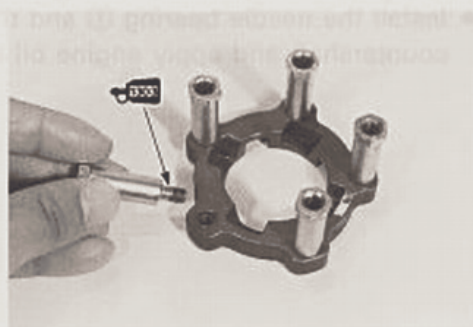


NOTE:

When replacing the clutch spring support bolts, apply **THREAD LOCK SUPER "1303"** and tighten them to the specified torque.

 **99000-32030: THREAD LOCK SUPER "1303"**

 **Clutch spring support bolt: 11 N·m (1.1 kg-m, 8.0 lb-ft)**

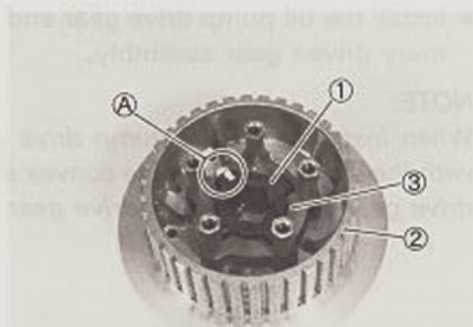


- Install the clutch drive cam ① onto the clutch sleeve hub ②.

NOTE:

* Align the paint mark **A** on the clutch drive cam with paint mark **A** on the clutch driven cam ③.

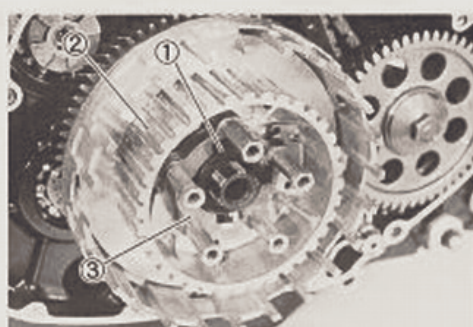
* When installing the new clutch drive and driven cams, align the punched marks.



- Install the clutch sleeve hub ② with the clutch drive ① and driven ③ cams onto the countershaft.

NOTE:

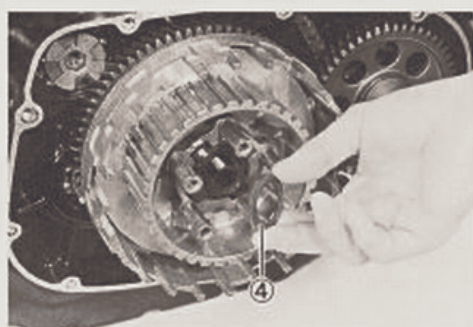
The clutch drive cam ① and the clutch driven cam ③ should be replaced as a set.



- Install the washer ④ onto the countershaft.


NOTE:

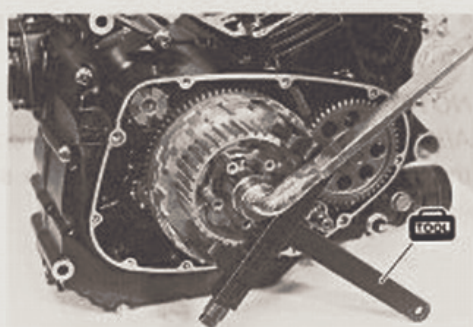
The convex side of the washer faces outside.



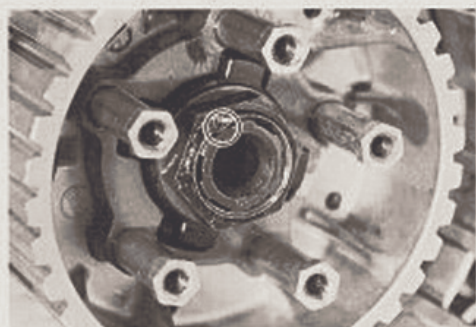
- Tighten the clutch sleeve hub nut to the specified torque by using the special tool.

 **09920-53740: Clutch sleeve hub holder**

 **Clutch sleeve hub nut: 95 N·m (9.5 kg-m, 68.5 lb-ft)**



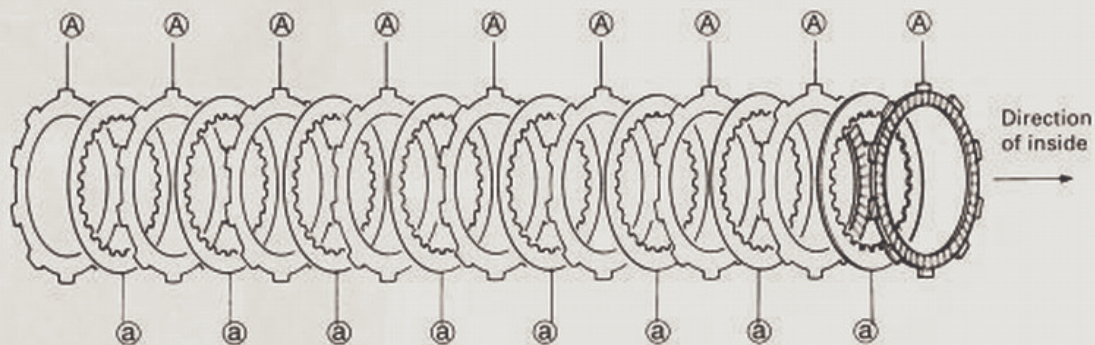
- Lock the clutch sleeve hub nut with a center punch.



- Insert the clutch drive plates and driven plates one by one into the clutch sleeve hub in the prescribed order, drive plate (A) first.

NOTE:

Insert the outermost No.1 drive plate to the other slits of clutch housing as shown.



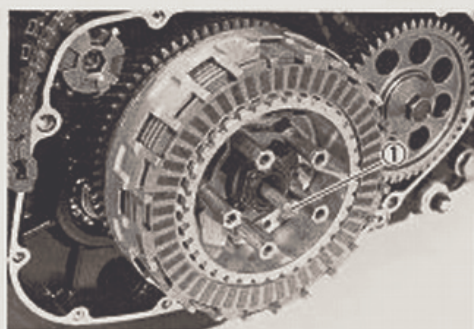
DRIVE PLATE:

(A) Drive Plate (Inside Diameter): 120 mm (4.72 in) ... 9 pcs

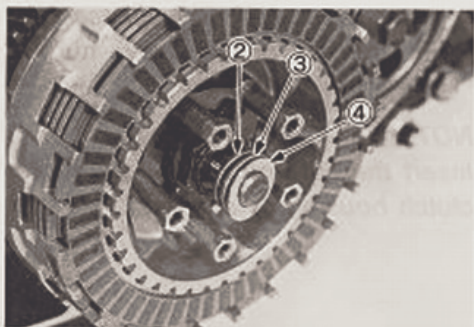
DRIVEN PLATE:

(a) Driven Plate (Thickness): 1.6 mm (0.06 in) ... 8 pcs

- Install the clutch push rod ① into the countershaft.

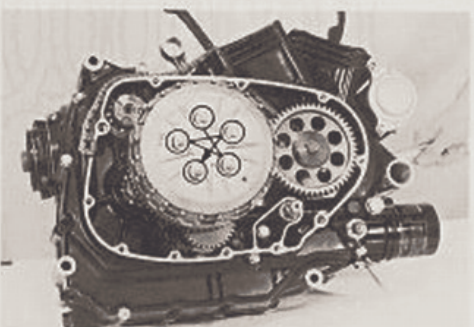
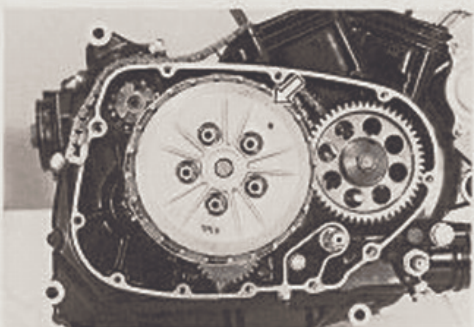


- Install the clutch push piece ②, the bearing ③ and the thrust washer ④ to the countershaft.



- Install the clutch pressure plate securely.
- Hold the generator with a offset wrench, and then tighten the clutch spring set bolts diagonally to the specified torque.

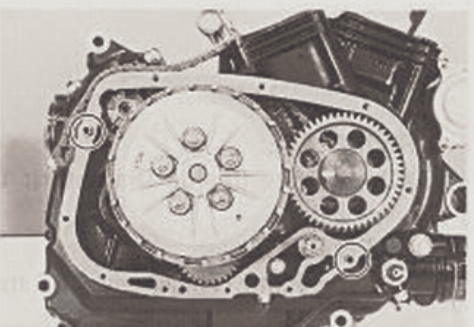
 Clutch spring set bolt: 10 N·m (1.0 kg-m, 7.0 lb-ft)



- Install the gasket and dowel pins.

CAUTION

Use the new gasket to prevent oil leakage.



- Install the O-ring to the speed sensor.

NOTE:

Apply grease to the O-ring when installing the speed sensor.

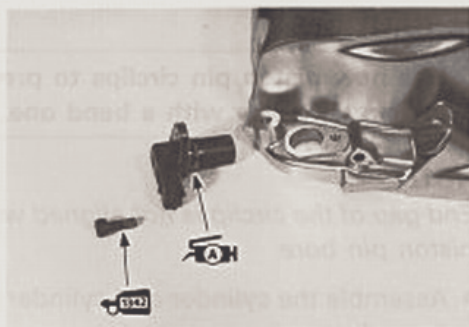
CAUTION

Use the new O-ring to prevent oil leakage.

 99000-25030: SUZUKI SUPER GREASE "A"

- Apply a small quantity of THREAD LOCK "1342" to the bolt.

 99000-32050: THREAD LOCK "1342"



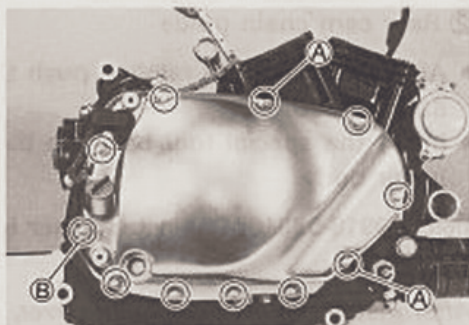
- Tighten the clutch cover bolts securely.

NOTE:

Fit the gasket washers to the bolts (A) and the clamp to the bolt (B) as shown.

CAUTION

Use the new gasket washer to prevent oil leakage.

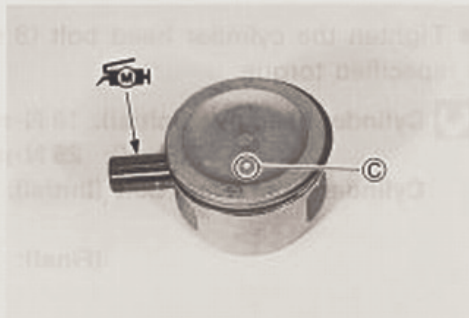


- Apply a light coat of SUZUKI MOLY PASTE to piston pins surfaces.

 99000-25140: SUZUKI MOLY PASTE

NOTE:

Install the pistons with the indent (C) facing towards the exhaust side.



- Install the pistons and piston pins in their original cylinders. Refer to the scribe marks on each piston.
- Place a cloth beneath the piston, and install the circlips (1).

CAUTION

When turning the crankshaft, pull the cam chains upward, or the chains will be caught between the crankcase and the cam drive sprocket.



▲ CAUTION

Use new piston pin circlips to prevent circlip failure which will occur with a bend one.

NOTE:

End gap of the circlip is not aligned with the cutaway in the piston pin bore.

- Assemble the cylinder and cylinder head in the following procedure.
- Install the cam chain guide, the gasket and the dowel pins.

NOTE:

Refer to the section 3B for cam chain tension adjuster installation.

▲ CAUTION

Use the new gasket to prevent gas leakage.

- ① Front cam chain guide
- ② Rear cam chain guide

- After unlocking the ratchet, push the cam chain tension adjuster rod.
- Insert the special tool between the ratchet and the adjuster body.

TOOL 09918-53810: Chain tensioner lock tool.

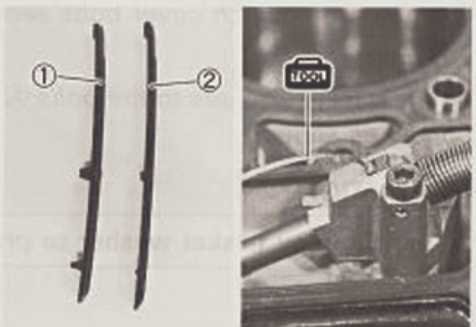
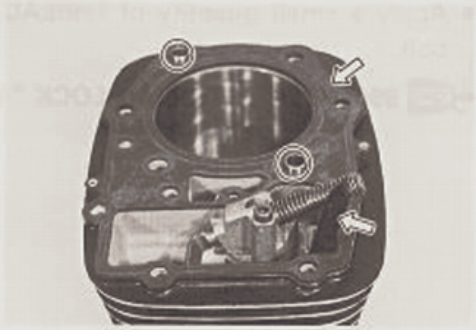
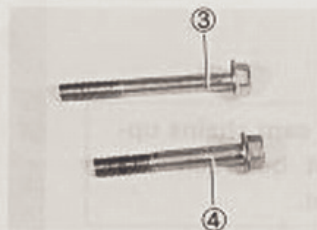
NOTE:

After install the cylinder head cover, remove the tensioner lock tool.

- Tighten the cylinder head bolt (8 mm) and nuts to the specified torque.

- U** **Cylinder head nut (Initial): 10 N·m (1.0 kg-m, 7.0 lb-ft)**
(Final): 25 N·m (2.5 kg-m, 18.0 lb-ft)
Cylinder head 8 mm bolt (Initial): 10 N·m
(1.0 kg-m, 7.0 lb-ft)
(Final): 25 N·m
(2.5 kg-m, 18.0 lb-ft)

- ③ The long cylinder head bolt (8 mm):
For front cylinder head
- ④ The short cylinder head bolt (8 mm):
For rear cylinder head



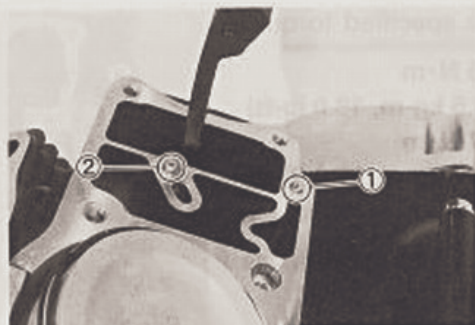
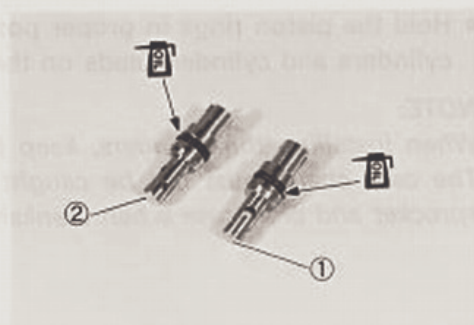
- Apply engine oil to the new O-rings.

CAUTION

Use the new O-rings to prevent oil leakage.

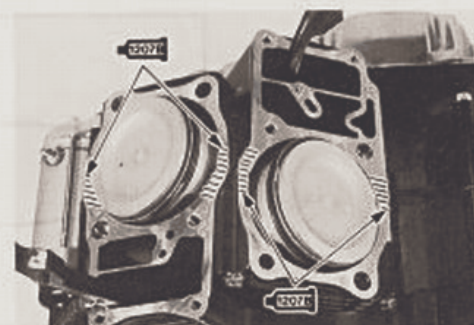
- Install oil jets (① and ②) as shown in the photograph.

- ① Oil jet (#22)
- ② Oil jet (#14)



- Coat SUZUKI BOND "1207B" lightly to the mating surfaces among the right and the left crankcases as shown.

1207B 99104-31140: SUZUKI BOND "1207B"



- Fit the dowel pins ③ and new gaskets ④ to the crankcase.

CAUTION

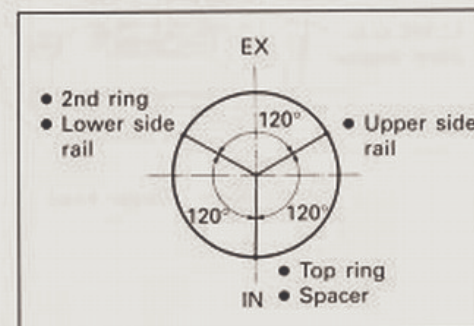
Use the new gaskets to prevent oil leakage.



- Position the piston ring gaps as shown. Before inserting each piston into the cylinder, check that the gaps are located.

NOTE:

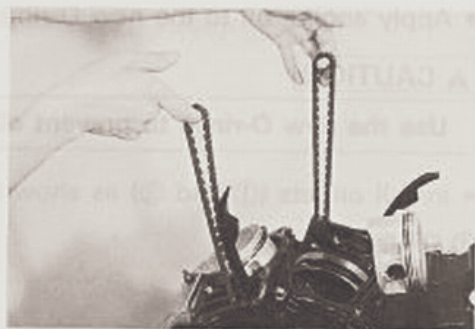
Refer to the section 3B for the piston ring installation.



- Hold the piston rings in proper position, and install the cylinders and cylinder heads on the crankcase.

NOTE:

When installing the cylinders, keep the cam chains taut. The cam chain must not be caught between cam drive sprocket and crankcase when crankshaft is rotated.

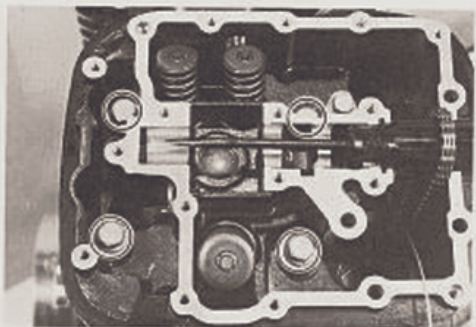


- Tighten the cylinder head bolts to the specified torque.

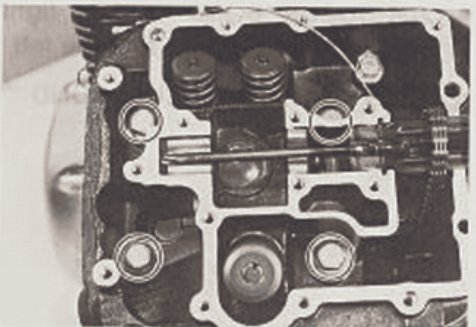
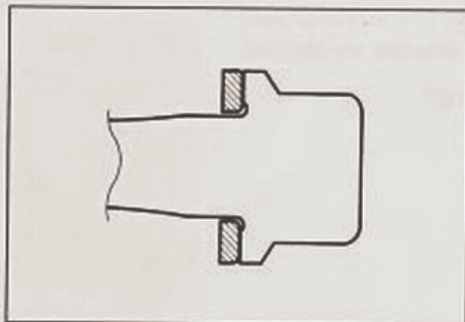
**Cylinder head 10 mm bolt (Initial): 25 N·m
(2.5 kg-m, 18.0 lb-ft)
(Final): 37 N·m
(3.7 kg-m, 27.0 lb-ft)**

NOTE:

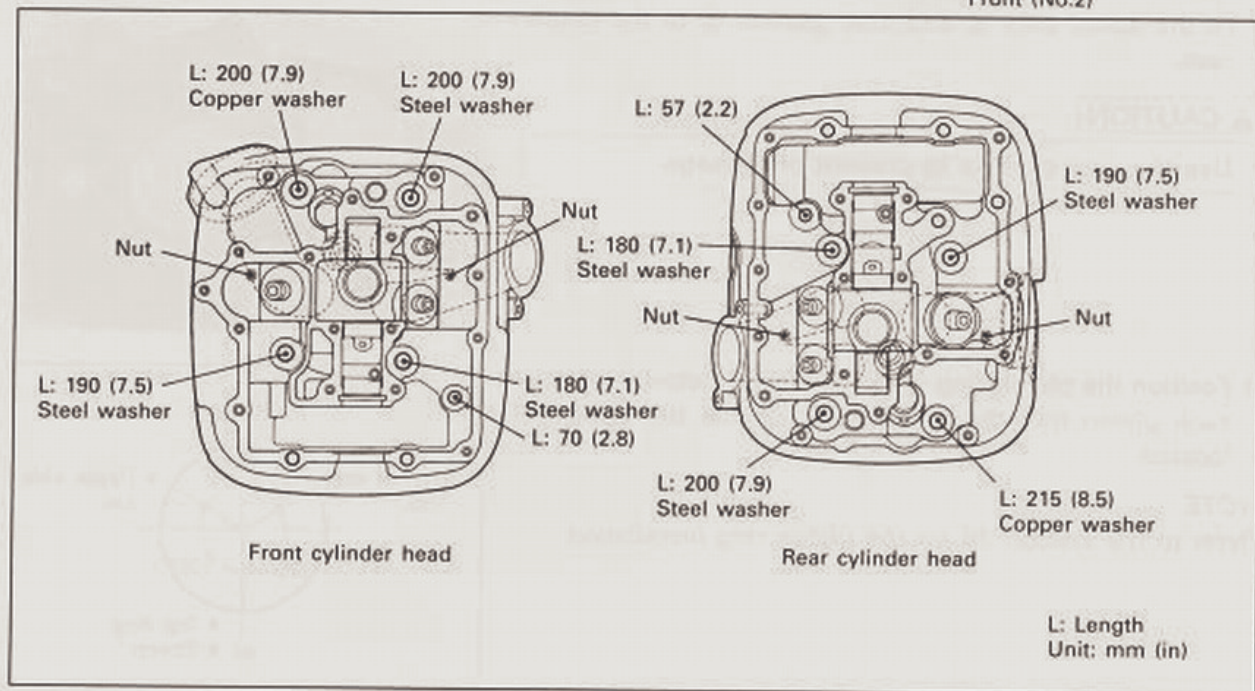
Install the washers to the cylinder head bolts (10 mm) as shown.



Rear (No.1)



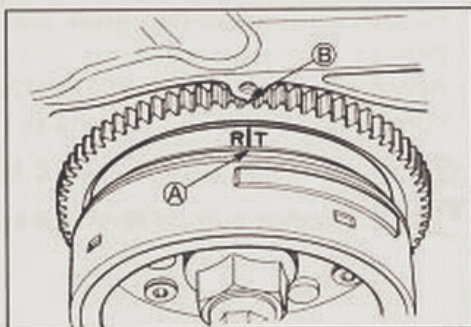
Front (No.2)



- Turn the crankshaft counterclockwise with a offset wrench and align "R | T" line (A) on the generator rotor with the aligning mark (B) of the crankcase while keeping the camshaft drive chain pulled upward.

CAUTION

Pull the cam chains upward, or the chain will be caught between crankcase and cam drive sprocket.



NOTE:

- * Before installing the camshafts onto each cylinder head, apply SUZUKI MOLY PASTE onto the camshaft journals and do not leave any dry spots. Also, apply engine oil onto the camshaft journal holders.

MH 99000-25140: SUZUKI MOLY PASTE

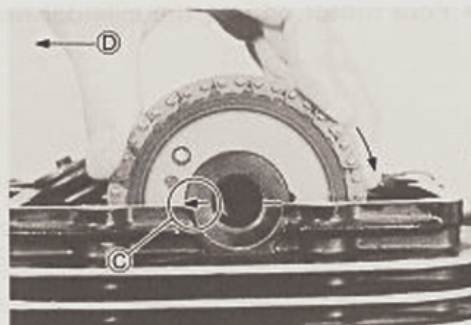
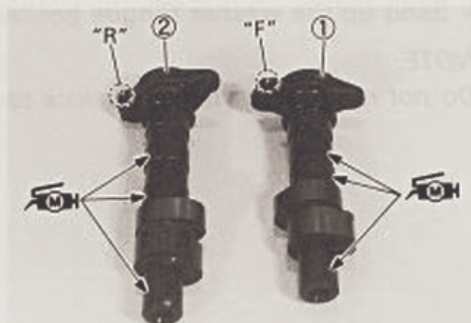
- * The camshaft is identified by the embossed letters "F" and "R".

- ① Front cam shaft
- ② Rear cam shaft

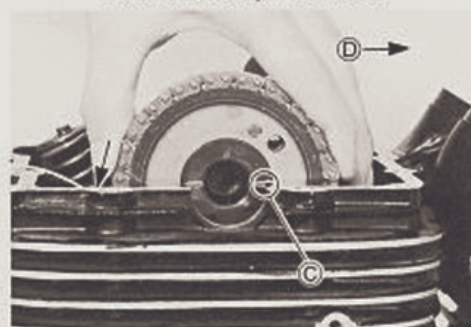
- When the "R/T" line (A) on the generator rotor is aligned with the aligning mark (B) of the crankcase, install the camshafts and cam sprockets and engage the cam chains on each cam sprocket.

NOTE:

- * Each camshaft sprocket has an arrow marked (C). Turn each camshaft so that arrow mark is aligned with the gasket surface of each cylinder head.
- * Both of the arrow marks on the camshafts face front (D).
- * Refer to the page 3-56 for the camshaft positions.



Front (No.2) Cylinder head

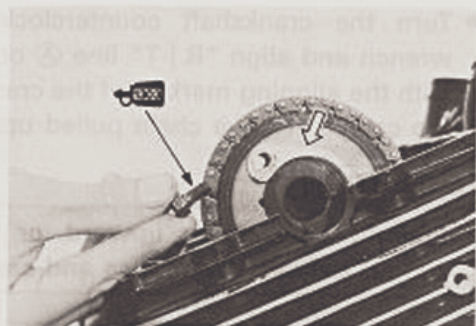


Rear (No.1) Cylinder head

- Fit lock washers so that these are covering the locating pins.
- Apply THREAD LOCK SUPER "1303" to the bolts and tighten the cam sprocket bolts to the specification.

 99000-32030: THREAD LOCK SUPER "1303"

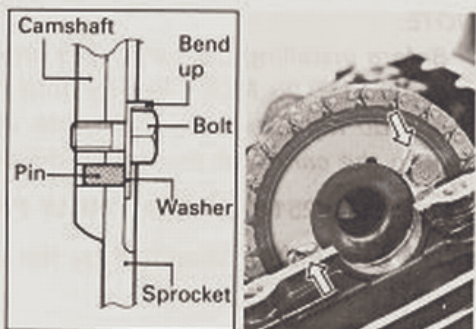
 Cam sprocket bolt: 15 N·m (1.5 kg-m, 11.0 lb-ft)



- Bend up the washer tongue positively to lock the bolts.

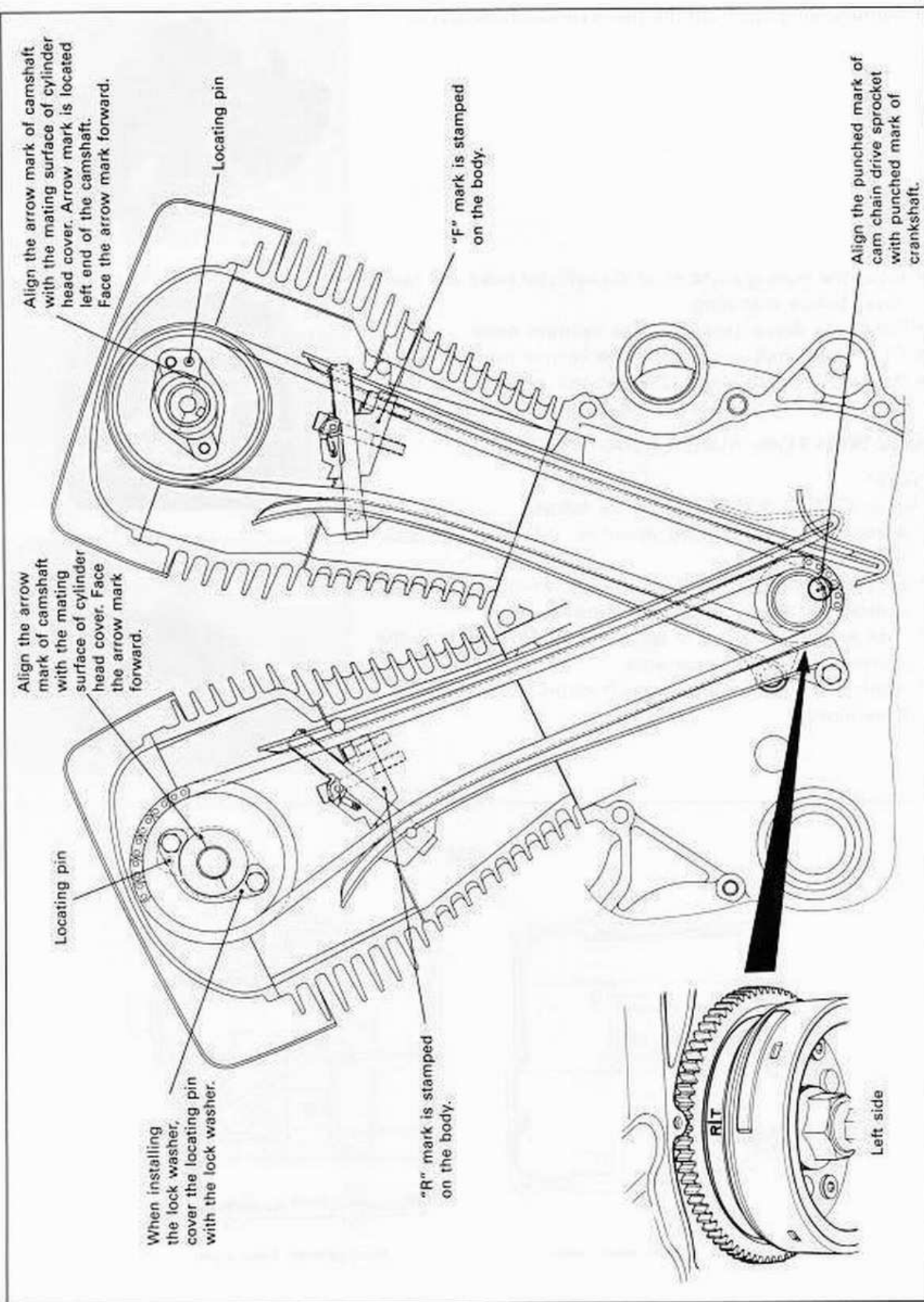
NOTE:

Do not remove the tensioner lock tool at this stage.

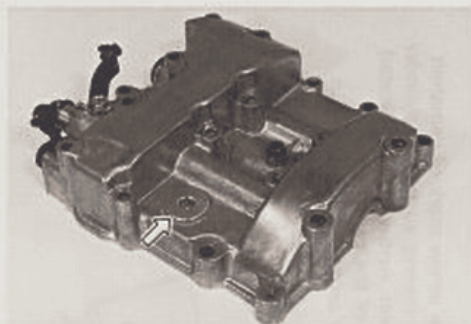


- Pour motor oil into the cylinder head.





- Remove the plug from the rear cylinder head cover.



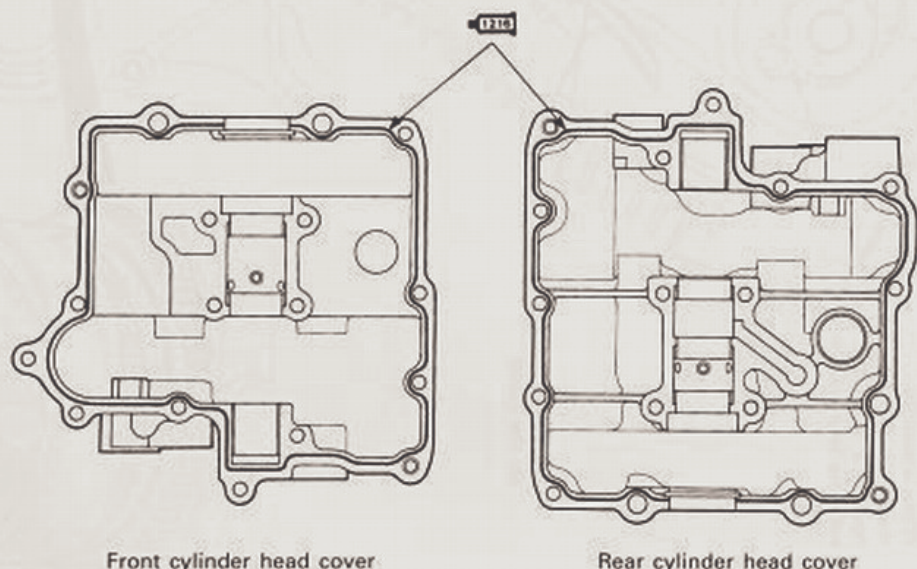
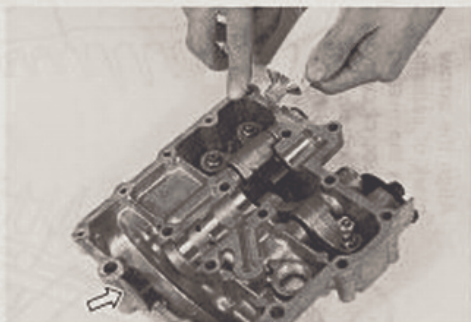
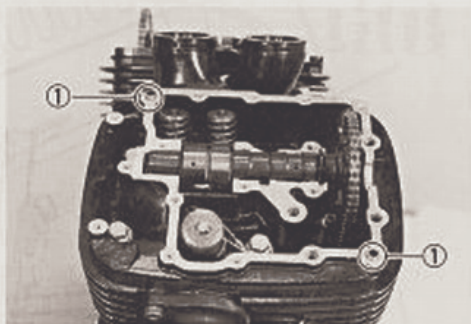
- Clean the mating surfaces of the cylinder head and head cover before matching.
- Install the dowel pins ① to the cylinder head.
- Fit the camshaft end caps to the correct positions.
- Apply SUZUKI BOND "1216" to the mating surface of the cylinder head cover in the following procedure.

1216 99104-31160: SUZUKI BOND "1216"

NOTE:

Use of SUZUKI BOND "1216" is as follows.

- * Make surfaces free from moisture, oil, dust and other foreign materials.
- * Spread on surfaces thinly to form an even layer, and assemble the heads within few minutes.
- * Take extreme care not to apply and BOND "1216" to the journals and oil passage area.
- * Apply to cornered surface as it forms a comparatively thick film.



- Install the cylinder head covers.

NOTE:

- * Before installing the cylinder head covers, bleed the air from the lash adjusters. (See p. 3A-3.)
- * Pass the tensioner lock tool through the hole of the rear cylinder head cover and through the breather hole of the front cylinder head cover.

- Temporarily tighten the front cylinder head covers.
- Tighten the rear cylinder head cover bolts diagonally to the specified torque.

Cylinder head cover bolt (6 mm): 10 N·m
(1.0 kg-m, 7.0 lb-ft)
(8 mm): 25 N·m
(2.5 kg-m, 18.0 lb-ft)

NOTE:

Fit the gasket washer to the bolts **A** as shown.

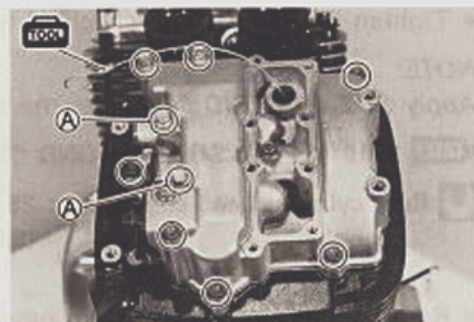
CAUTION

Use the new gasket washer to prevent oil leakage.

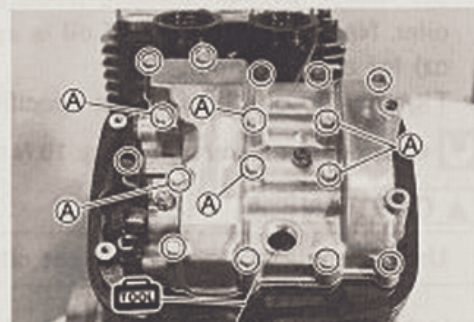
- Remove the tensioner lock tools.

NOTE:

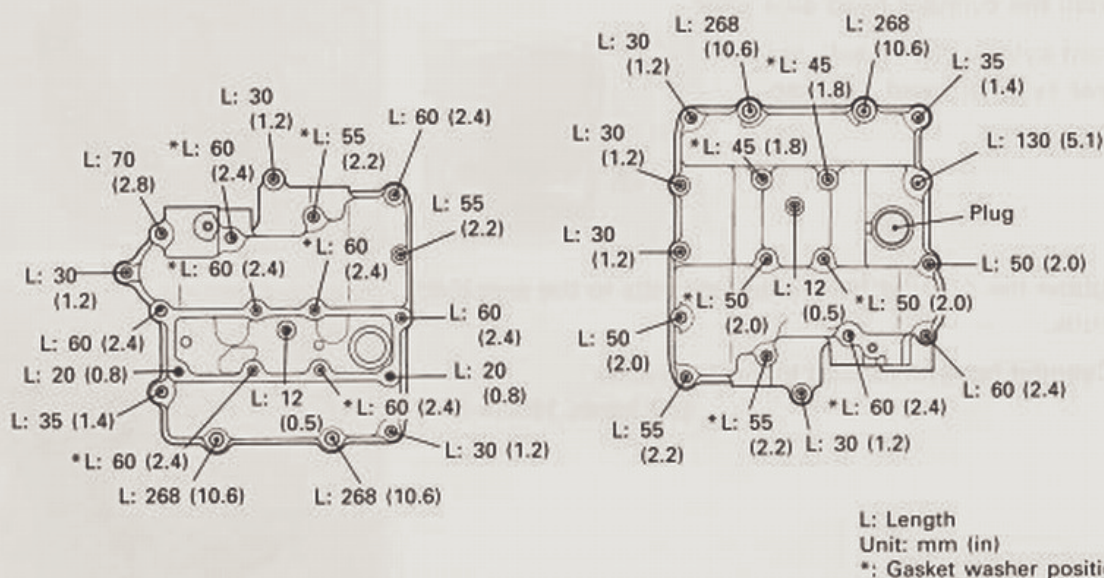
Click sound is heard when the cam drive chain tensioner is released.



Front (No.2)



Rear (No.1)




- Tighten the plug to the specified torque.


NOTE:

Apply SUZUKI BOND "1216" to the thread of the plug.

1216 99104-31160: SUZUKI BOND "1216"

 **Rear cylinder head cover plug: 25 N·m**
(2.5 kg-m, 18.0 lb-ft)


- Remove the oil plug and then pour the engine oil to fill the rocker arm oil passage through the hole (A) with a oiler. Necessary amount of oil is approx. 50 ml (1.7 US oz) for each cylinder.
- Tighten the oil plugs to the specified torque.

 **Cylinder head cover oil plug: 10 N·m (1.0 kg-m, 7.0 lb-ft)**

CAUTION

Use the new gasket to prevent oil leakage.

- Install the breather cover and the gasket.
- Tighten the front cylinder head cover bolts diagonally to the specified torque.

 **Cylinder head cover bolt (6 mm): 10 N·m**
(1.0 kg-m, 7.0 lb-ft)
(8 mm): 25 N·m
(2.5 kg-m, 18.0 lb-ft)

NOTE:

Fit the gasket washer to the bolt (A).

CAUTION

Use the new gasket washer to prevent oil leakage.

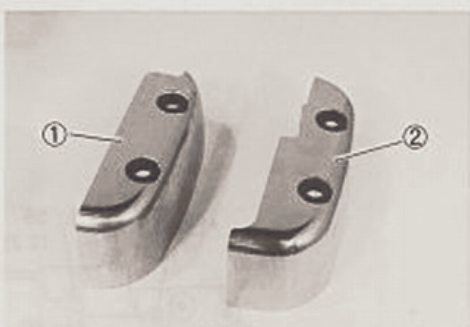
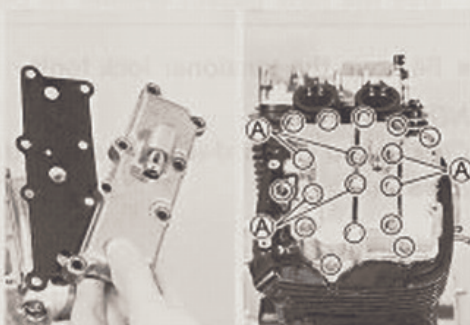
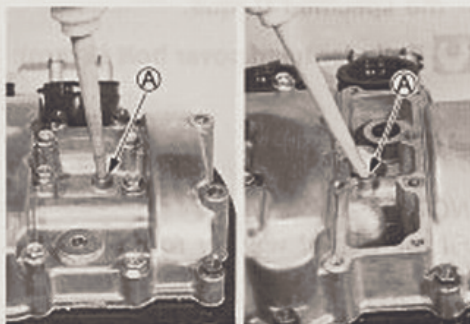
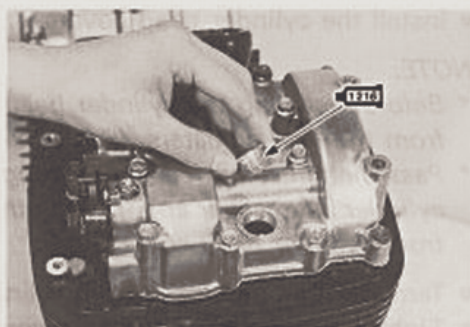
- Install the cylinder head side caps.

- ① Front cylinder head side cap
- ② Rear cylinder head side cap



- Tighten the cylinder head side cap bolts to the specified torque.

 **Cylinder head cover bolt (8 mm): 25 N·m**
(2.5 kg-m, 18.0 lb-ft)




- Install the starter idle gear ①, its shaft ② and the washer ③.

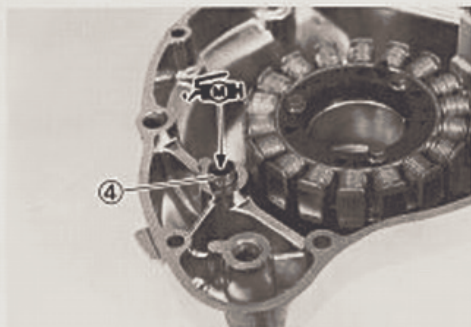


- Install the bush ④ to the generator cover.

NOTE:

Apply engine oil and SUZUKI MOLY PASTE to the inside of the bush ④.

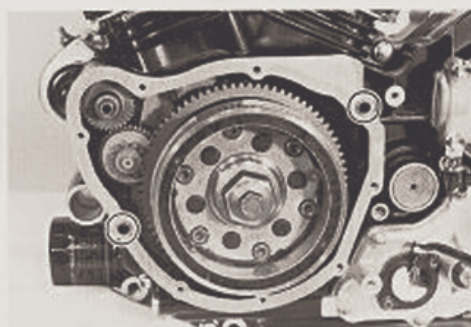
 99000-25140: SUZUKI MOLY PASTE



- Install the dowel pins and gasket.

CAUTION

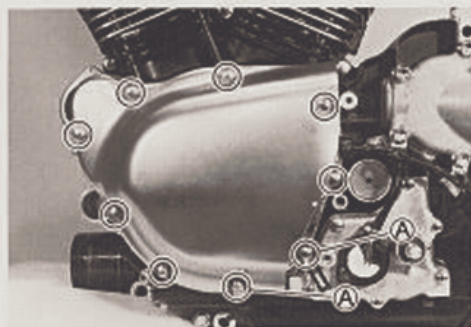
Use the new gasket to prevent oil leakage.



- Tighten the generator cover securely.

NOTE:

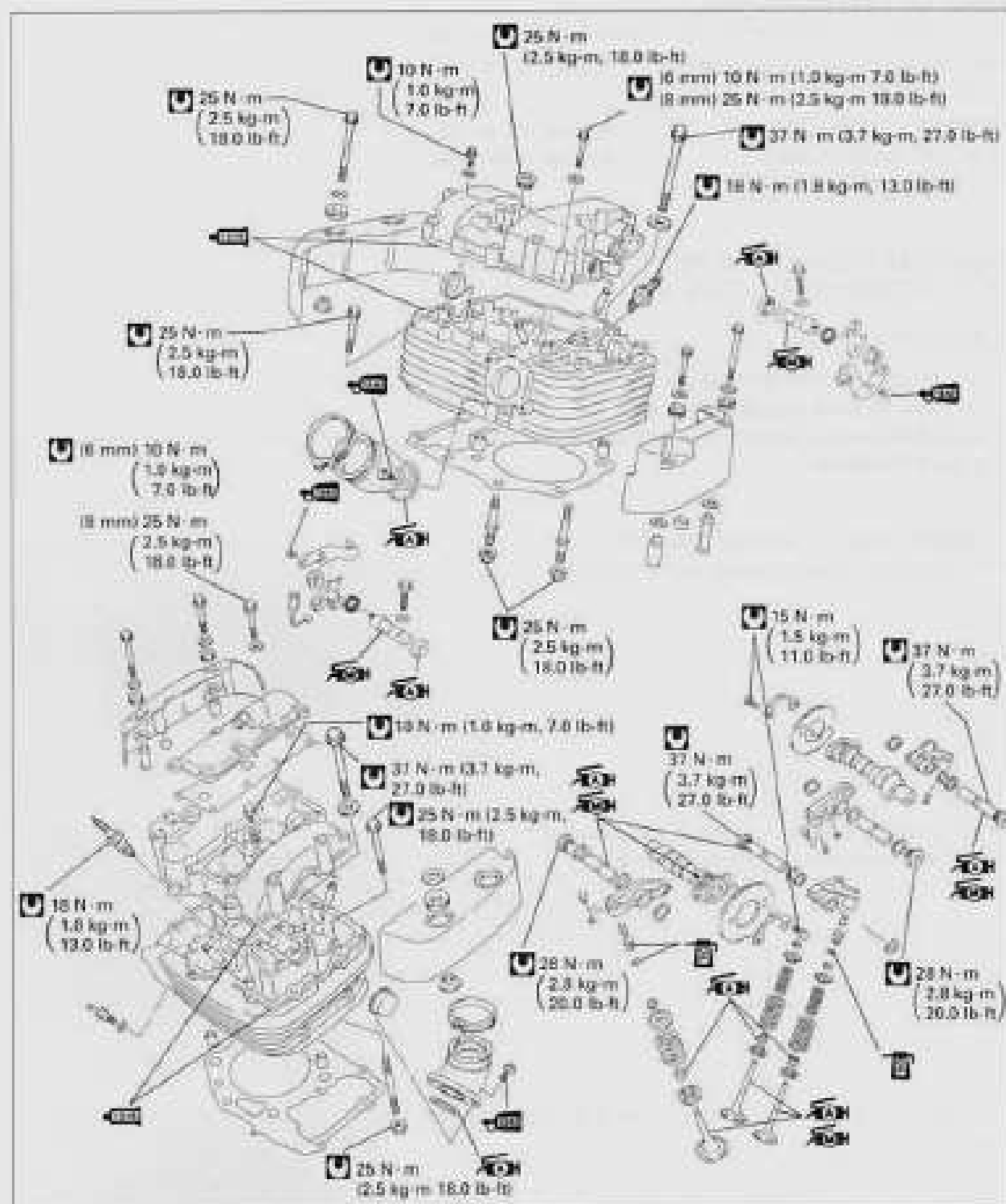
Fit the clamp to the bolt (A) as shown.



- Install the spark plugs. (See p. 2-4.)



CAMSHAFT/CYLINDER HEAD/CYLINDER HEAD COVER



CONTENTS

CAMSHAFT/CYLINDER HEAD/CYLINDER HEAD COVER REMOVAL	3A- 1
CAMSHAFT/CYLINDER HEAD/CYLINDER HEAD COVER SERVICING	3A- 1
CAMSHAFT/CYLINDER HEAD/CYLINDER HEAD COVER INSTALLATION	3A-15

CAMSHAFT/CYLINDER HEAD/CYLINDER HEAD COVER REMOVAL

These engine components require engine removal and disassembly. Refer to the engine removal and the engine disassembly sections.

- * ENGINE REMOVAL See pp. 3-2 to -10.
- * ENGINE DISASSEMBLY See pp. 3-16 to -30.

CAMSHAFT/CYLINDER HEAD/CYLINDER HEAD COVER SERVICING

⚠ CAUTION

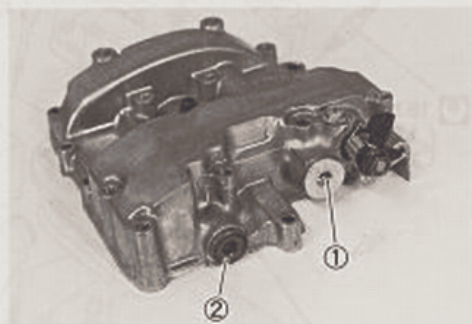
Identify the position of each removed part. Organize the parts in their respective groups (i.e., intake, exhaust, front or rear) so that they can be installed in their original locations.

CYLINDER HEAD COVER DISASSEMBLY

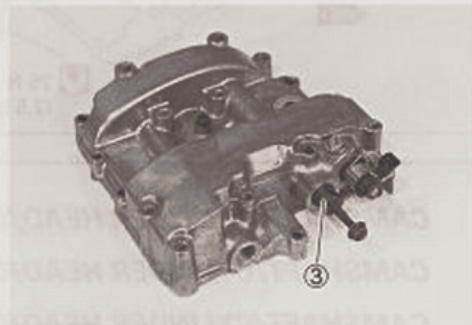
- Remove the de-compression cable holder.



- Remove the exhaust rocker arm shaft plug ①.
- Remove the intake rocker arm shaft ②.

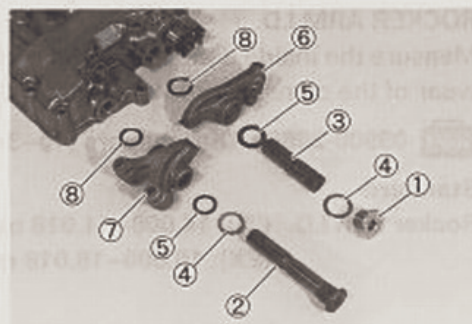


- Remove the exhaust rocker arm shaft ③ by using a 6 mm bolt.



- Remove the following parts.

- | | |
|----------------------------|----------------------|
| ① Plug | ⑤ Thrust washer |
| ② Intake rocker arm shaft | ⑥ Exhaust rocker arm |
| ③ Exhaust rocker arm shaft | ⑦ Intake rocker arm |
| ④ Gasket | ⑧ Wave washer |



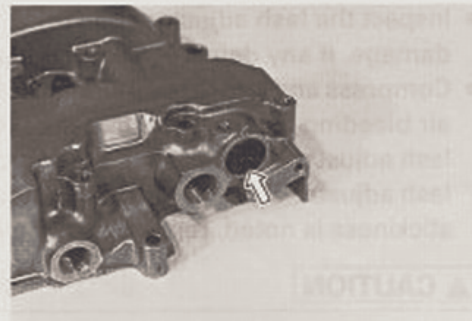
- Remove the de-compression shaft securing bolt and gasket washer.
- Remove the de-compression shaft and spring.



- Remove the oil seal.

NOTE:

If no oil leakage, the oil seal removal is not necessary.



CYLINDER HEAD COVER DISTORTION

After removing sealant (SUZUKI BOND "1216") from the mating surface of the cylinder head cover, place the cylinder head cover on a surface plate and check for distortion with a thickness gauge. Check points are shown in Fig.

Service Limit

Cylinder head cover distortion: 0.05 mm (0.002 in)

If the distortion exceeds the limit, replace the cylinder head set.



ROCKER ARM SHAFT O.D.

Measure the diameter of the rocker arm shafts.



09900-20205: Micrometer (0-25 mm)

Standard

Rocker arm shaft O.D. (IN): 13.966-13.984 mm
 (0.5498-0.5506 in)
(EX): 15.966-15.984 mm
 (0.6286-0.6293 in)



ROCKER ARM I.D.

Measure the inside diameter of the rocker arm and check the wear of the camshaft contacting surfaces.

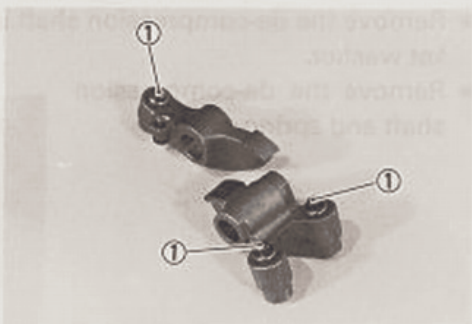
TOOL 09900-20605: Dial calipers (10–34 mm)

Standard

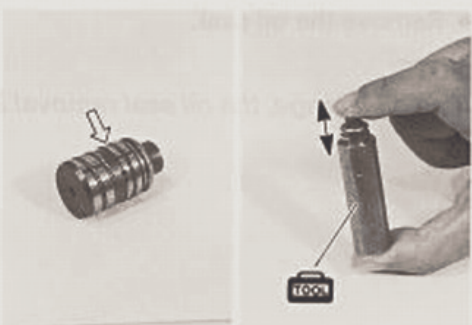
Rocker arm I.D. (IN): 14.000–14.018 mm (0.5511–0.5519 in)
(EX): 16.000–16.018 mm (0.6299–0.6303 in)

**LASH ADJUSTER**

- Remove the lash adjusters ① from the rocker arms.



- Inspect the lash adjuster and O-ring for wear, dent and/or damage. If any defect is found, replace it with a new one.
- Compress and stroke the plunger with your finger by using air bleeding tool and remove the oil completely from the lash adjuster body. Wash it with kerosene and inspect the lash adjuster whether it strokes smoothly. If any hitches or stickiness is noted, replace it with a new one.

**CAUTION**

When removing the cylinder head cover, always use kerosene to bleed the air from the lash adjuster before reinstalling. Never use any solvent, fluid or oil when bleeding the lash adjuster, or it may cause engine damage.

- Using the special tool, bleed the air from the lash adjusters in the kerosene as shown in the figure.

TOOL 09913-10740: Air bleeding tool

- After filling the lash adjuster with fresh kerosene, compress the plunger and body with your finger and inspect that it strokes 0–0.5 mm (A). If it strokes more than specified, bleed the air again and check it. If the stroke is not within the specification, replace the lash adjuster with a new one.

Standard

Lash-adjuster plunger stroke (A): 0–0.5 mm (0–0.02 in)



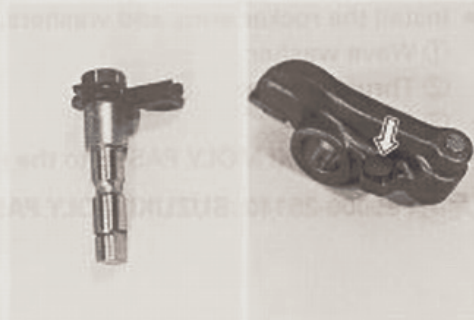
- Install the rash adjusters to the each rocker arm shaft.

NOTE:

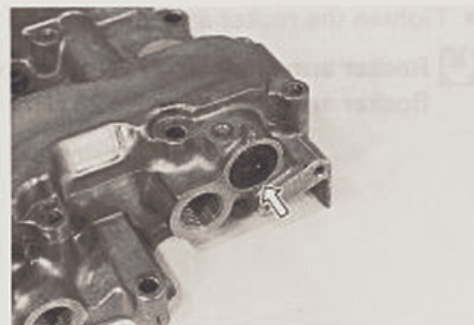
Apply oil to the O-ring when installing the rash adjuster.

**DE-COMPRESSION SHAFT**

- Inspect the de-compression shaft and the seat on the exhaust rocker arm for wear or damage.




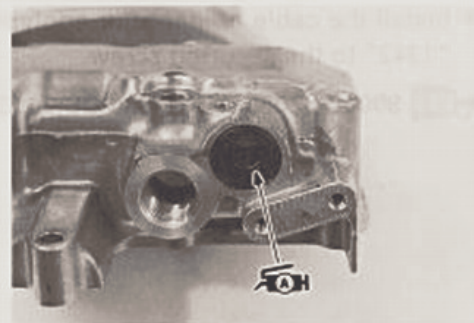
- Inspect the de-compression shaft oil seal for wear or damage.

**CYLINDER HEAD COVER REASSEMBLY**


Reassemble the cylinder head cover in the reverse order of disassembly. Pay attention to the following points:

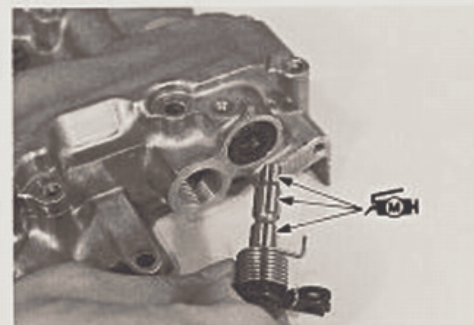
- Install the oil seal and apply grease to its lip.

 99000-25030: SUZUKI SUPER GREASE "A"



- When installing the de-compression shaft, apply SUZUKI MOLY PASTE.

 99000-25140: SUZUKI MOLY PASTE




- Install the spring as shown.
- After installing the de-compression shaft, tighten the set bolt.

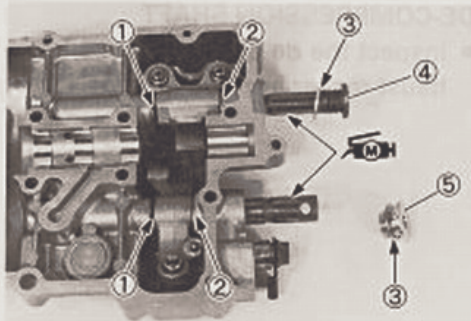
CAUTION

Use a new gasket washer ① on the set bolt to prevent oil leakage.




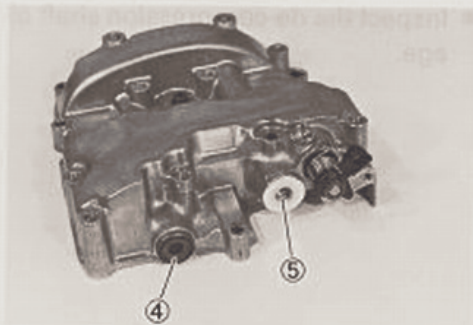
- Install the rocker arms and washers.
 - ① Wave washer
 - ② Thrust washer
 - ③ Gasket
- Apply SUZUKI MOLY PASTE to the rocker arm shaft.

 99000-25140: SUZUKI MOLY PASTE



- Tighten the rocker arm shaft ④ and plug ⑤.

 **Rocker arm shaft ④: 37 N·m (3.7 kg-m, 27.0 lb-ft)**
Rocker arm shaft plug ⑤: 28 N·m (2.8 kg-m, 20.0 lb-ft)



- Install the cable holder after applying the THREAD LOCK "1342" to the securing screw.

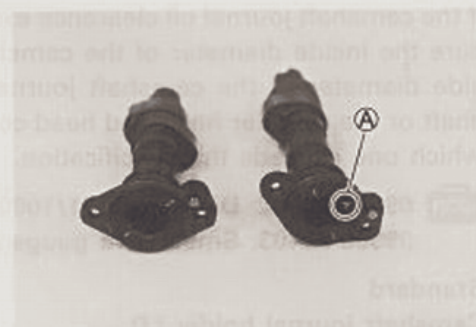
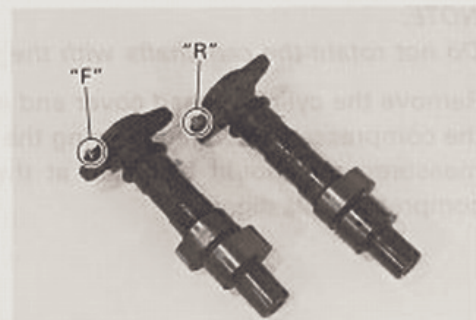
 99000-32050: THREAD LOCK "1342"



CAMSHAFTS

If the engine produces abnormal noises, vibration or lacks power, a camshaft may be distorted or worn to the service limit. The camshaft runout should be checked. Also, check the cams and journals for wear or damage.

The front cylinder camshaft has the embossed letters "F" and the rear cylinder camshaft has the embossed letters "R". Also, the rear cylinder camshaft has the embossed letters "A" as shown.



CAM WEAR

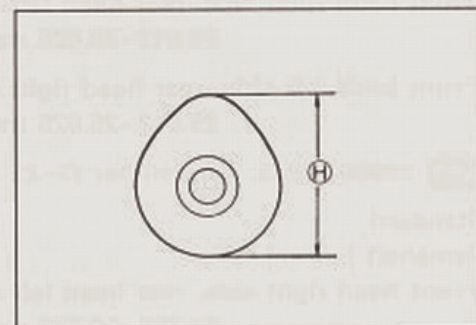
Worn-down cams are often the cause of mistimed valve operation resulting in reduced power output.

Measure the cam height H , using the micrometer. Replace a camshafts if the cams are worn to the service limit.

 **09900-20202: Micrometer (25–50 mm)**


Service Limit

Cam height H (IN): 35.38 mm (1.393 in)
(EX): 36.58 mm (1.440 in)



CAMSHAFT JOURNAL WEAR

Determine whether or not each journal is worn down to the limit by measuring the oil clearance with the camshaft installed in place. Measure the clearance using the plastigauge ①.

 **09900-22301: Plastigauge**
09900-22302: Plastigauge


Service Limit

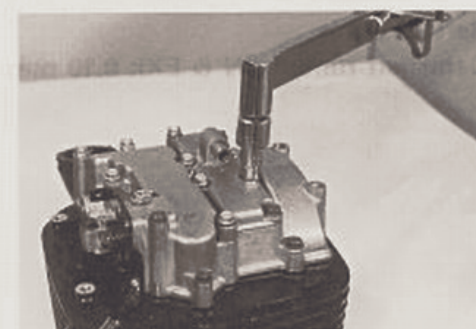
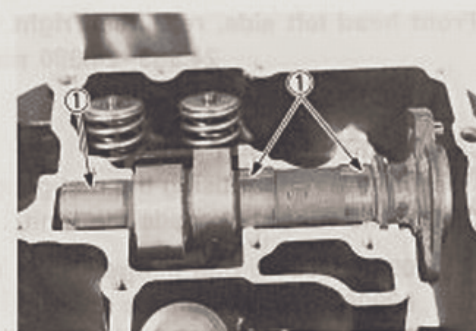
Camshaft journal oil clearance (IN & EX): 0.150 mm
(0.0060 in)

NOTE:

Install each cylinder head cover to its original position.
(See p. 3-58.)

Tighten the cylinder head cover bolts evenly and diagonally to the specified torque.

 **Cylinder head cover bolt (6 mm): 10 N·m**
(1.0 kg-m, 7.0 lb-ft)
(8 mm): 25 N·m
(2.5 kg-m, 18.0 lb-ft)



NOTE:

Do not rotate the camshafts with the plastigauge in place.

Remove the cylinder head cover and measure the width of the compressed plastigauge using the envelope scale. This measurement should be taken at the widest part of the compressed plastigauge.

If the camshaft journal oil clearance exceeds the limit, measure the inside diameter of the camshaft journal and outside diameter of the camshaft journal. Replace the camshaft or the cylinder head and head cover depending upon which one exceeds the specification.

TOOL 09900-20602: Dial gauge (1/1000, 1 mm)
09900-22403: Small bore gauge (18–35 mm)

Standard**Camshaft journal holder I.D.**

(Front head right side, rear head left side):
20.012–20.025 mm (0.7879–0.7884 in)

(Front head left side, rear head right side):
25.012–25.025 mm (0.9847–0.9852 in)

TOOL 09900-20205: Micrometer (0–25 mm)

Standard**Camshaft journal O.D.**

(Front head right side, rear head left side):
19.959–19.980 mm (0.7858–0.7866 in)

(Front head left side, rear head right side):
24.959–24.980 mm (0.9826–0.9835 in)

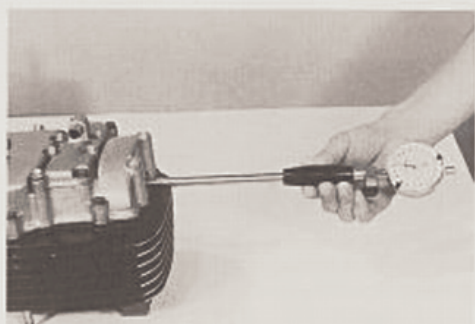
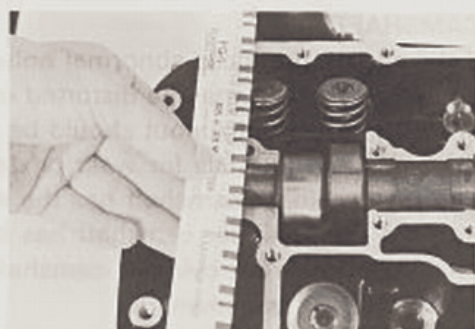
CAMSHAFT RUNOUT

Measure the runout using the dial gauge. Replace the camshaft if the runout exceeds the limit.

TOOL 09900-20606: Dial gauge (1/100 mm, 10 mm)
09900-20701: Magnetic stand
09900-21304: V-block (100 mm)

Service Limit

Camshaft runout (IN & EX): 0.10 mm (0.004 in)

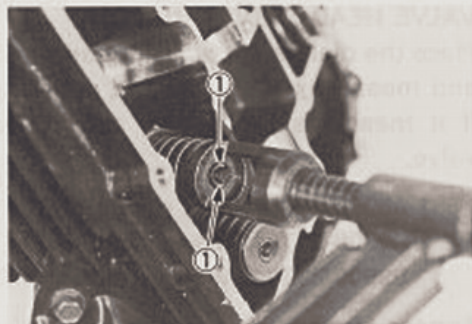
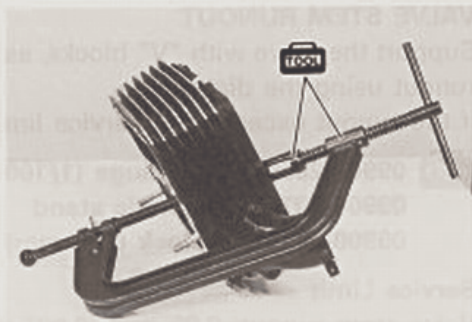
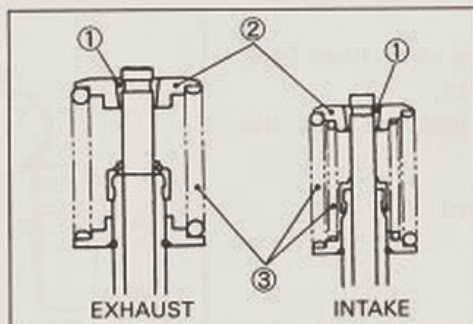


CYLINDER HEAD

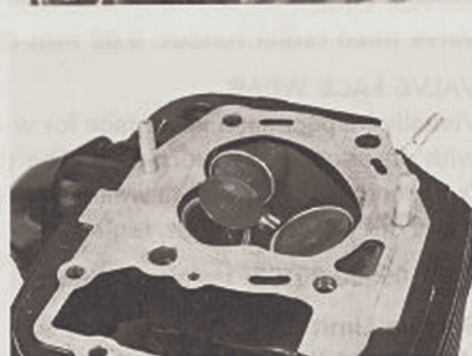
- Using the special tools, compress the valve spring and remove the valve cotteners ① from the valve stem.

TOOL 09916-14510: Valve lifter
 09916-14910: Valve lifter attachment
 09916-84511: Tweezers

- Remove the valve spring retainers ② and the inner and outer valve springs ③.



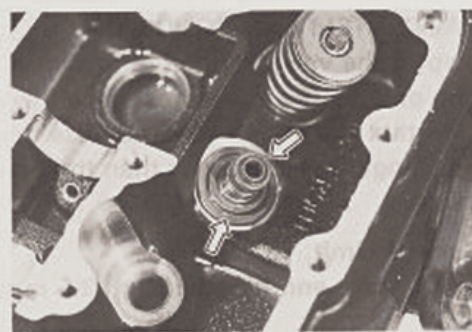
- Remove the valves from the combustion chamber side.



- Remove the valve spring seats.
- Remove the oil seals.

CAUTION

The removed oil seals must be replaced with new ones.

**CYLINDER HEAD DISTORTION**

Decarbonize the combustion chambers.

Check the gasketed surface of the cylinder head for distortion. Use a straightedge and thickness gauge. Take clearance readings at several places. If readings exceed the service limit, replace the cylinder head.

TOOL 09900-20803: Thickness gauge

Service Limit

Cylinder head distortion: 0.05 mm (0.002 in)



VALVE STEM RUNOUT

Support the valve with "V" blocks, as shown, and check its runout using the dial gauge.

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

- TOOL** 09900-20606: Dial gauge (1/100 mm)
 09900-20701: Magnetic stand
 09900-21304: V-block (100 mm)

Service Limit

Valve stem runout: 0.05 mm (0.002 in)

VALVE HEAD RADIAL RUNOUT

Place the dial gauge at a right angle to the valve head face, and measure the valve head radial runout.

If it measures more than the service limit, replace the valve.

- TOOL** 09900-20606: Dial gauge (1/100 mm)
 09900-20701: Magnetic stand
 09900-21304: V-block (100 mm)

Service Limit

Valve head radial runout: 0.03 mm (0.001 in)

VALVE FACE WEAR

Visually inspect each valve face for wear. Replace any valve with an abnormally worn face. The thickness of the valve face decreases as the face wears. Measure the valve face ①.

- TOOL** 09900-20102: Vernier calipers

Service Limit

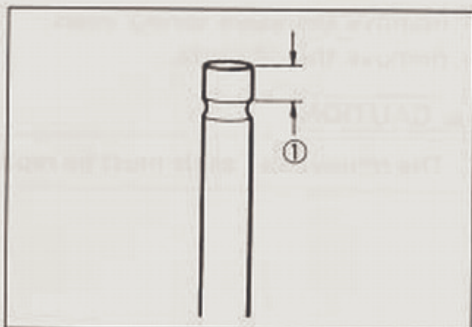
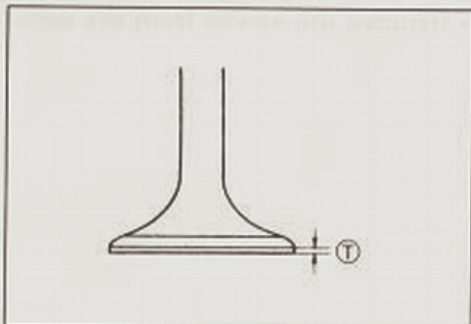
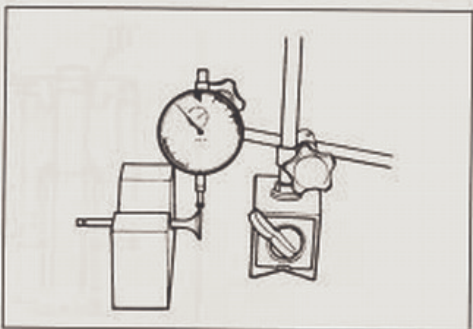
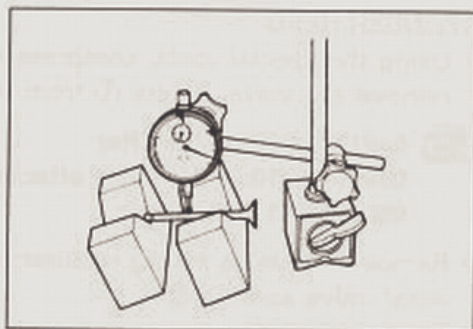
Valve head thickness ①: 0.5 mm (0.02 in)

VALVE STEM END CONDITION

Inspect the valve stem end face for pitting and wear. If pitting or wear is present, resurface the valve stem end. Make sure that the length ① is not less than the service limit. If this length becomes less than the service limit, replace the valve.

Service Limit

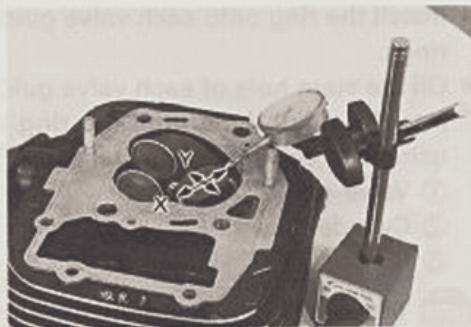
Valve stem end length (IN): 2.5 mm (0.10 in)
 (EX): 2.2 mm (0.09 in)



VALVE STEM DEFLECTION

Lift the valve about 10 mm (0.39 in) from the valve seat. Measure the valve stem deflection in two directions, "X" and "Y", perpendicular to each other. Position the dial gauge as shown. If the deflection exceeds the service limit, then determine whether the valve or the guide should be replaced with a new one.

- TOOL** 09900-20606: Dial gauge (1/100 mm)
09900-20701: Magnetic stand

**Service Limit**

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

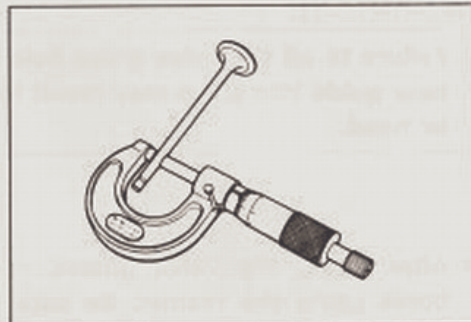
VALVE STEM WEAR

Measure the valve stem O.D. using the micrometer. If it is out of specification, replace the valve with a new one. If the valve stem O.D. is within the specification but the valve stem deflection is not, replace the valve guide. After replacing the valve or valve guide, recheck the deflection.

- TOOL** 09900-20205: Micrometer (0-25 mm)

Standard

Valve stem O.D. (IN) : 5.475-5.490 mm (0.2156-0.2161 in)
(EX) : 6.945-6.960 mm (0.2734 -0.2740 in)

**NOTE:**

If valve guides have to be replaced, refer to the valve guide servicing steps below.

VALVE GUIDE SERVICING

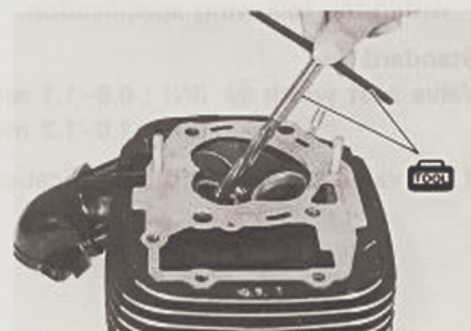
- Using the valve guide remover, drive the valve guide out toward the intake or exhaust camshaft side.

- TOOL** 09916-44910: Valve guide remover/installer
(For intake)
09916-44511: Valve guide remover/installer
(For exhaust)

NOTE:

- * Discard the removed valve guide subassemblies.
- * Only oversized valve guides are available as replacement parts.
- Re-finish the valve guide holes in the cylinder head by using the reamer and handle.

- TOOL** 09916-34580: Valve guide reamer 10.8 mm
(For intake)
09916-34531: Valve guide reamer 12.3 mm
(For exhaust)
09916-34542: Reamer handle



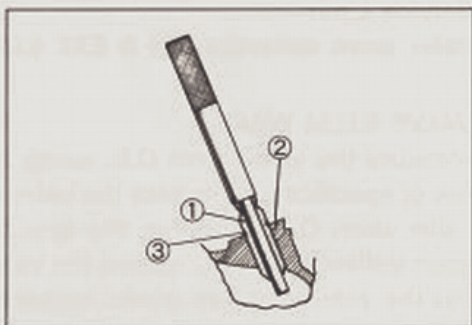
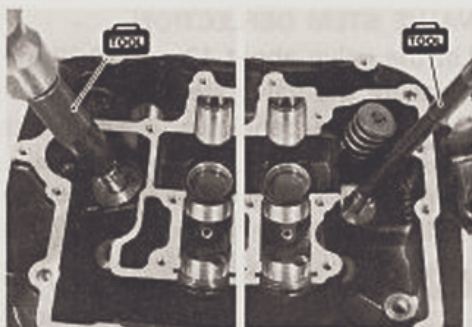
- Install the ring onto each valve guide. Be sure to use new rings.
- Oil the stem hole of each valve guide and drive the guide into the guide hole until the ring completely seated by using the valve guide installer.

- ① Valve guide
- ② Cylinder head
- ③ Ring

- TOOL** 09916-44910: Valve guide remover/installer
(For intake)
- 09916-57321: Valve guide installer handle
(For exhaust)

CAUTION

Failure to oil the valve guide hole before driving the new guide into place may result in a damaged guide or head.



- After fitting the valve guides, re-finish their guiding bores using the reamer. Be sure to clean and oil the guides after reaming.

- TOOL** 09916-34550: Valve guide reamer 5.5 mm (For intake)
- 09916-34520: Valve guide reamer 7.0 mm (For exhaust)
- 09916-34542: Valve guide reamer handle

NOTE:

Insert the reamer from the combustion chamber and always turn the reamer handle clockwise.



VALVE SEAT WIDTH

- Coat the valve seat uniformly with Prussian blue. Install the valve and attach a valve lapper onto it. Tap the coated seat with the valve face in a rotating manner, in order to obtain a clear impression of the seating contact.

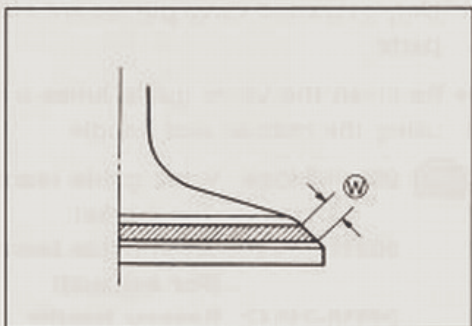
- TOOL** 09916-10911: Valve lapper set

- The ring-like dye impression left on the valve face must be continuous without any breaks. In addition, the width of the dye ring, which is the valve seat width, must be within the following specification.

Standard

Valve seat width W (IN) : 0.9–1.1 mm (0.035–0.043 in)
(EX) : 1.0–1.2 mm (0.039–0.047 in)

If the valve seat is out of specification, re-cut the seat.



VALVE SEAT SERVICING

The valve seats ① for both the intake and exhaust valves are machined to two different angles. The seat contact surface is cut at 45°.



	IN		EX	
	45°	15°	45°	15°
Valve seat cutter	N-229 or -608	N-229 or -212	N-634	N-217
Solid pilot	N-140-5.5	←	N-110-1	←

NOTE:

The valve seat contact area must be inspected after each cut.



09916-24900: Valve seat cutter set

09916-27720: Valve seat cutter (N-229)

09916-24935: Valve seat cutter (N-608)

09916-24480: Solid pilot (N-140-5.5)

09916-29030: Solid pilot (N-110-1)

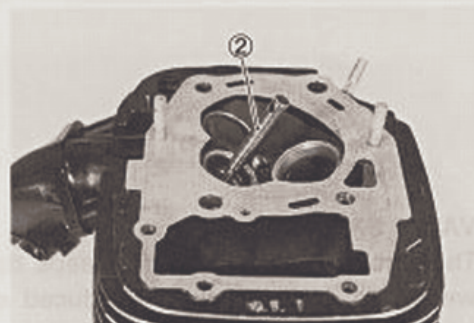
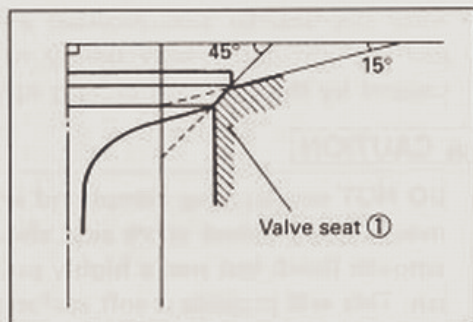
- When installing the solid pilot ②, rotate it slightly. Seat the pilot snugly. Install the 45° cutter, attachment and T-handle.
- Using the 45° cutter, descale and clean up the seat. Rotate the cutter one or two turns.
- Measure the valve seat width after every cut.
- If the valve seat is pitted or burned, use the 45° cutter to condition the seat some more.

NOTE:

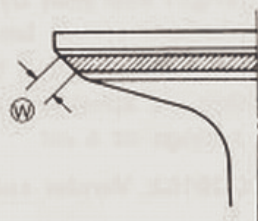
Cut only the minimum amount necessary from the seat to prevent the possibility of the valve stem becoming too close to the rocker arm for correct valve contact angle.

If the contact area is too high on the valve, or if it is too wide, use the 15° cutter to lower and narrow the contact area.

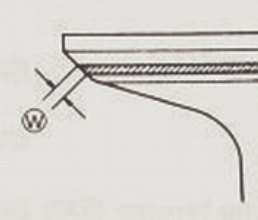
If the contact area is too low or too narrow, use the 45° cutter to raise and widen the contact area.



Contact area too high and too wide on face of valve



Contact area too low and too narrow on face of valve



- After the desired seat position and width is achieved, use the 45° cutter very lightly to clean up any burrs caused by the previous cutting operations.

CAUTION

DO NOT use lapping compound after the final cut is made. The finished valve seat should have a velvety smooth finish but not a highly polished or shiny finish. This will provide a soft surface for the final seating of the valve which will occur during the first few seconds of engine operation.

- Clean and assemble the head and valve components. Fill the intake and exhaust ports with gasoline to check for leaks. If any leaks occur, inspect the valve seat and face for burrs or other things that could prevent the valve from sealing.

WARNING

Always use extreme caution when handling gasoline.

**VALVE SPRING**

The force of the coil spring keeps the valve seat tight. A weakened spring results in reduced engine power output and often accounts for the chattering noise coming from the valve mechanism.

Check the valve springs for proper strength by measuring their free length and also by the force required to compress them. If the spring length is less than the service limit or if the force required to compress the spring does not fall within the specified range, replace both the inner and outer springs as a set.

TOOL 09900-20102: Vernier calipers

Service limit

Valve spring free length (IN) INNER : 35.0 mm (1.38 in)

OUTER: 37.8 mm (1.49 in)

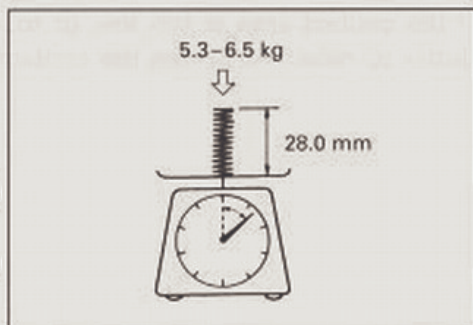
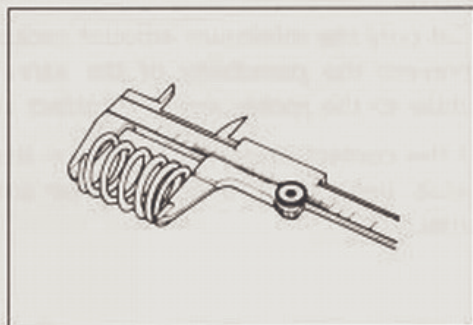
Valve spring free length (EX): 40.6 mm (1.69 in)

Standard

Valve spring tension (IN) INNER : 5.3–6.5 kg/28.0 mm
(11.68–14.33 lbs/1.10 in)

OUTER: 14.0–14.2 kg/31.5 mm
(30.86–31.31 lbs/1.24 in)

Valve spring tension (EX): 20.3–23.3 kg/35.0 mm
(44.75–51.37 lbs/1.38 in)



CYLINDER HEAD REASSEMBLY

- Install each valve spring seat.
- Oil each oil seal ① and press-fit them into position using the valve guide installer.

TOOL 09916-44910: Valve guide remover/installer
(For intake)

09916-44511: Valve guide remover/installer
(For exhaust)

CAUTION

Do not reuse the oil seals.

- Insert the valves with their stems coated with high quality molybdenum disulfide lubricant (SUZUKI MOLY PASTE).
Coat the entire stem making sure that there are no gaps.

CAUTION

When inserting each valve, take care not to damage the lip of the oil seal.

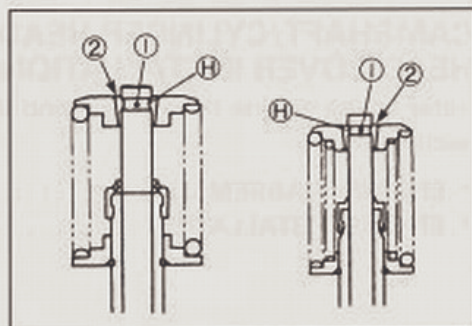
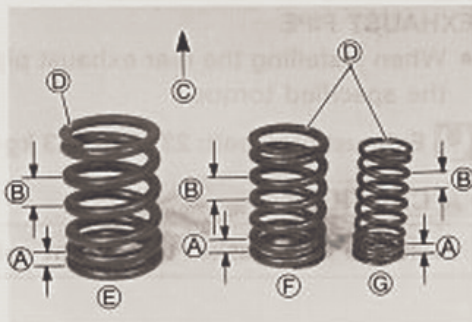
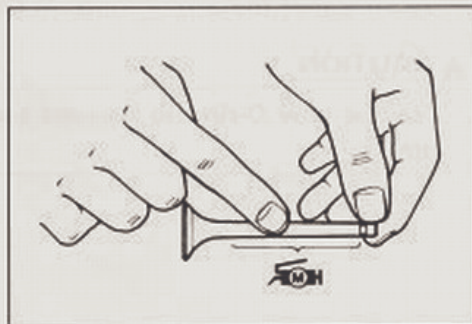
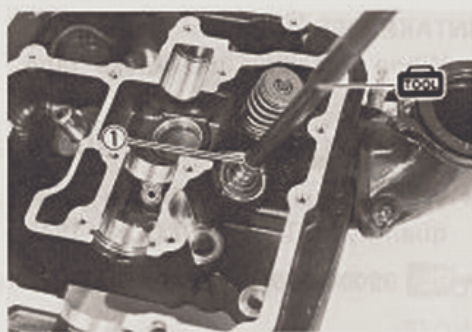
SUZUKI MOLY PASTE

- Install the valve springs with the smaller pitch **A** facing the cylinder head.
 - A** Smaller pitch
 - B** Larger pitch
 - C** Up
 - D** Paint mark
 - E** Exhaust
 - F** Intake (Outer)
 - G** Intake (Inner)
- Install the valve spring retainer, press down the springs using the valve lifter and then install the cotter halves on to the stem end. Then, release the valve lifter to allow the cotter ② to wedge between the retainer and the valve stem. Be sure that the rounded lip **H** of the cotter fits snugly into the groove **I** in the stem end.

TOOL 09916-14510: Valve lifter
09916-14910: Valve lifter attachment
09916-84511: Tweezers


CAUTION

Be sure to install all of the parts in their original positions.



INTAKE PIPE

- When installing the intake pipe, apply grease to the O-ring.

 **99000-25030: SUZUKI SUPER GREASE "A"**

- When installing the intake pipe screws, apply a small quantity of THREAD LOCK "1342" to the screws.

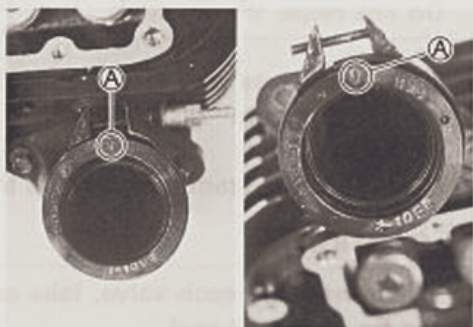
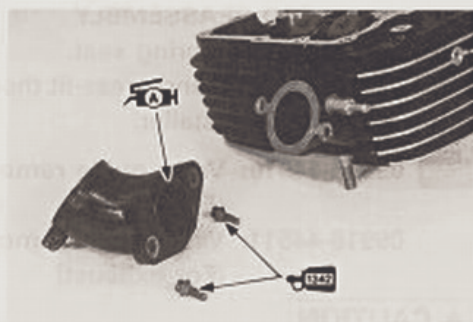
 **99000-32050: THREAD LOCK "1342"**

NOTE:

Make sure that the arrow mark  faces front.

CAUTION

Use the new O-ring to prevent sucking air from the joint.

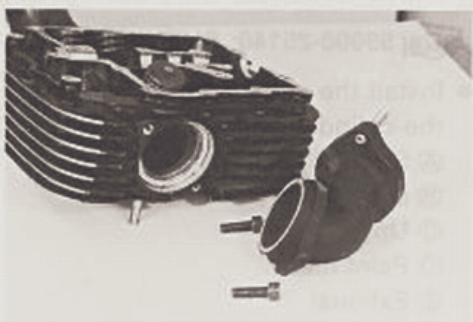
**EXHAUST PIPE**

- When installing the rear exhaust pipe, tighten its bolts to the specified torque.

 Exhaust pipe bolt: 23 N·m (2.3 kg-m, 16.5 lb-ft)

CAUTION

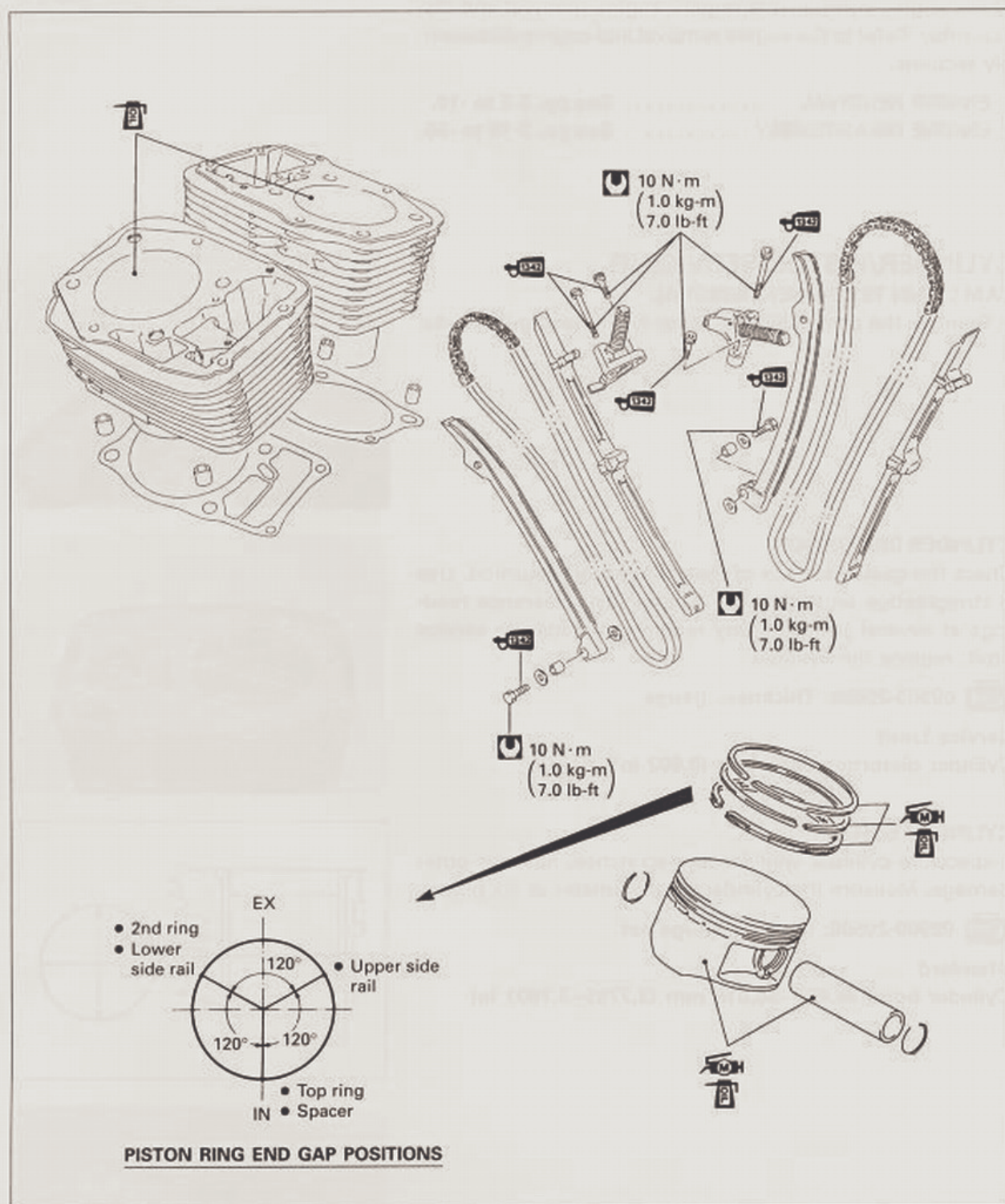
Use the new gasket to prevent exhaust gas leakage.

**CAMSHAFT/CYLINDER HEAD/CYLINDER HEAD COVER INSTALLATION**

Refer to the engine reassembly and the engine installation sections.

- * ENGINE REASSEMBLY See pp. 3-31 to -60.
- * ENGINE INSTALLATION See pp. 3-11 to -15.

CYLINDER/PISTON



3B

CONTENTS

CYLINDER/PISTON REMOVAL	3B- 1
CYLINDER/PISTON SERVICING	3B- 1
CYLINDER/PISTON INSTALLATION	3B- 6

CYLINDER/PISTON REMOVAL

These engine components require engine removal and disassembly. Refer to the engine removal and engine disassembly sections.

- * **ENGINE REMOVAL** See pp. 3-2 to -10.
- * **ENGINE DISASSEMBLY** See pp. 3-16 to -30.

CYLINDER/PISTON SERVICING

CAM CHAIN TENSIONER REMOVAL

- Remove the cam chain tensioner by removing the bolts.



CYLINDER DISTORTION

Check the gasket surface of the cylinder for distortion. Use a straightedge and thickness gauge. Take clearance readings at several places. If any reading exceeds the service limit, replace the cylinder.



09900-20803: Thickness gauge

Service Limit

Cylinder distortion: 0.05 mm (0.002 in)



CYLINDER BORE

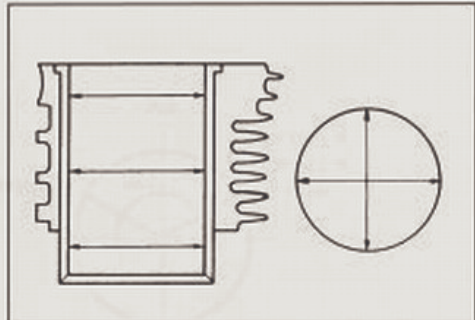
Inspect the cylinder wall for any scratches, nicks or other damage. Measure the cylinder bore diameter at six places.



09900-20508: Cylinder gauge set

Standard

Cylinder bore: 96.000–96.015 mm (3.7795–3.7801 in)



PISTON DIAMETER

Measure the piston diameter using the micrometer at 16 mm (0.6 in) **A** from the skirt end.

If the measurement is less than the service limit, replace the piston.

 **09900-20204: Micrometer (75–100 mm)**

Service Limit

Piston diameter: 95.88 mm (37.7748 in)

**PISTON TO CYLINDER CLEARANCE**

As a result of the previous measurement, if the piston to cylinder clearance exceeds the following limit, replace both cylinder and piston.

Service Limit

Piston to cylinder clearance: 0.12 mm (0.0047 in)

PISTON RING TO GROOVE CLEARANCE

Measure the side clearances of the 1st and 2nd piston rings using the thickness gauge. If any of the clearances exceed the limit, replace both the piston and piston rings.

 **09900-20803: Thickness gauge**
09900-20205: Micrometer (0–25 mm)

Service Limit**Piston ring to groove clearance**

(1st) : 0.180 mm (0.007 in)

(2nd) : 0.150 mm (0.006 in)

Standard**Piston ring groove width**

(1st) : 1.210–1.230 mm (0.0476–0.0484 in)

(2nd) : 1.510–1.530 mm (0.0594–0.0602 in)

(Oil) : 2.810–2.830 mm (0.1106–0.1114 in)

Standard**Piston ring thickness**


(1st) : 1.160–1.175 mm (0.0457–0.0463 in)

(2nd) : 1.470–1.490 mm (0.0579–0.0587 in)




PISTON RING FREE END GAP AND PISTON RING END GAP

Measure the piston ring free end gap by using vernier calipers. Next, fit the piston ring squarely into the cylinder and measure the piston ring end gap by using a thickness gauge. If any of the measurements exceed the service limit, replace the piston ring with a new one.

 **09900-20102: Vernier calipers**

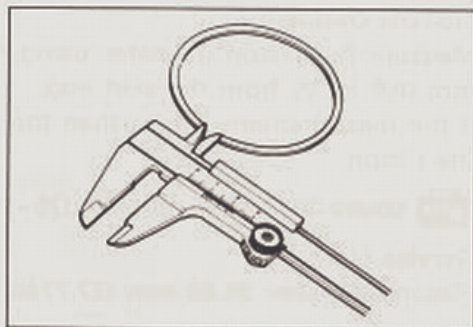
Service Limit

Piston ring free end gap (1st) : 10.8 mm (0.43 in)
(2nd) : 11.2 mm (0.44 in)


 **09900-20803: Thickness gauge**

Service Limit

Piston ring end gap (1st) : 0.70 mm (0.028 in)
(2nd) : 1.00 mm (0.039 in)

**PISTON PIN AND PIN BORE**

Measure the piston pin bore inside diameter using the small bore gauge. If either is out of specification or the difference between these measurement is more than the limits, replace the piston.

 **09900-20602: Dial gauge (1/1000 mm, 1 mm)**
09900-22403: Small bore gauge (18-35 mm)

Service Limit

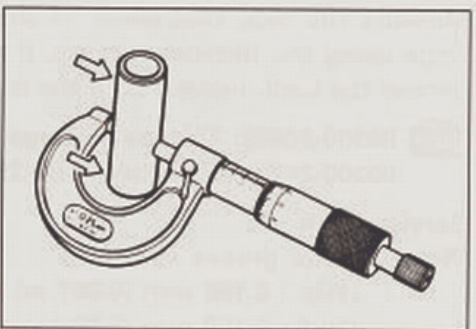
Piston pin bore I.D.: 23.030 mm (0.9067 in)

Measure the piston pin outside diameter at three positions using the micrometer. If any of the measurements are out of specification, replace the piston pin.

 **09900-20205: Micrometer (0-25 mm)**

Service Limit

Piston pin O.D.: 22.980 mm (0.9047 in)

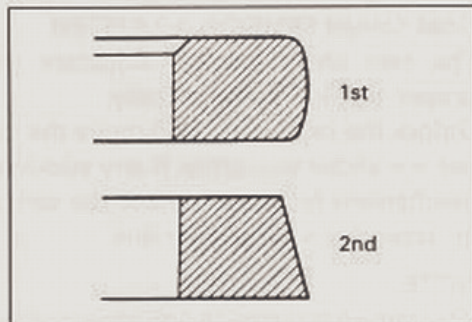


PISTON RING INSTALLATION

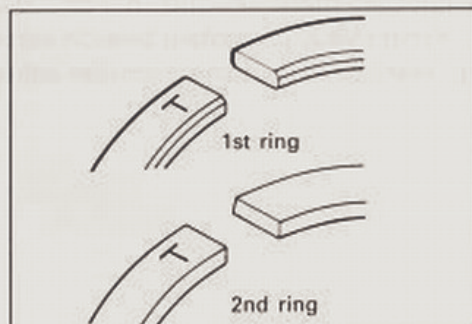
- Install the oil ring first, then the 2nd ring and finally the 1st ring.

NOTE:

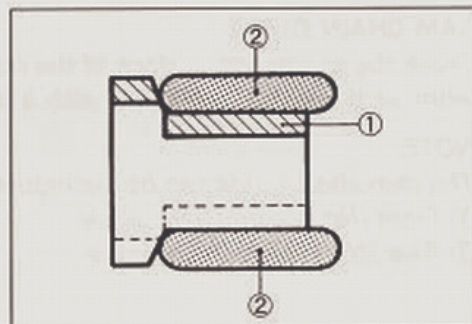
The 1st and 2nd piston rings differ in shape.



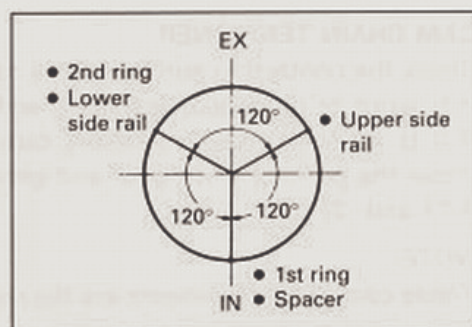
- The 1st and 2nd piston rings should be installed with the "T" mark facing up.



- First, install a spacer ① into the oil ring groove and then install the two side rails ②. The spacer and side rails do not have a designated top and bottom. They can be installed in any position.



- Position the piston ring gaps as shown. Before inserting each piston into its cylinder, check that the gaps are properly positioned.

**NOTE:**

Install the pistons with the indent (A) facing towards the exhaust side.



CAM CHAIN TENSION ADJUSTER

The cam chain tension adjusters are maintained at the proper tension automatically.

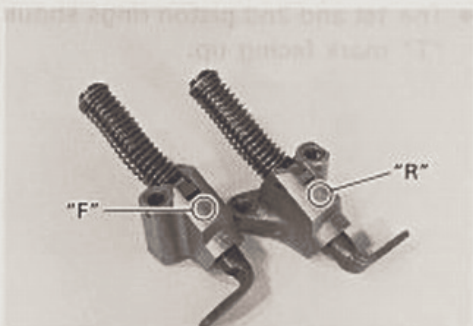
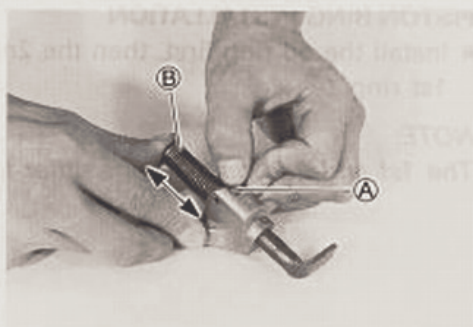
Unlock the ratchet (A), and move the push rod (B) in place to see if it slides smoothly. If any stickiness is noted or ratchet mechanism is faulty, replace the cam chain tension adjuster assembly with a new one.

NOTE:

The cam chain tension adjusters can be distinguished by the embossed mark, "F" and "R", on the body.

F: Front (No.2) cam chain tension adjuster

R: Rear (No.1) cam chain tension adjuster

**CAM CHAIN GUIDE**

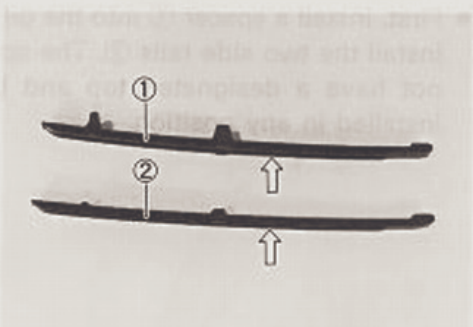
Check the contacting surface of the cam chain guide. If it is worn or damaged, replace it with a new one.

NOTE:

The cam chain guide can be distinguished by its shape.

① Front (No.2) cam chain guide

② Rear (No.1) cam chain guide

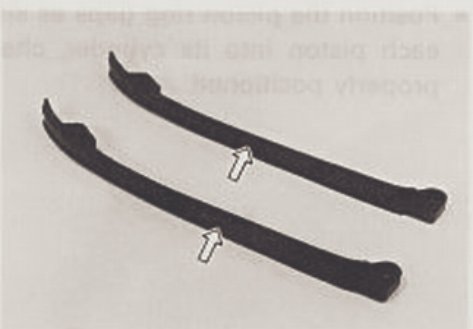
**CAM CHAIN TENSIONER**

Check the contacting surface of the cam chain tensioner. If it is worn or damaged, replace it with a new one.

If it is necessary to replace the cam chain tensioner, remove the primary drive gear and generator rotor. (See pp. 3-23 and -27.)

NOTE:

These cam chain tensioners are the same parts.




CAM CHAIN TENSION ADJUSTER INSTALLATION

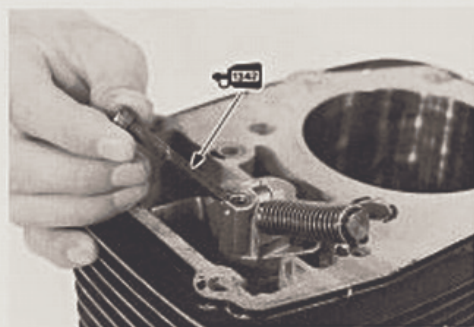
- Install the cam chain tension adjuster.

NOTE:

Apply **THREAD LOCK "1342"** to the threads of the cam chain tension adjuster bolts and then tighten them to the specified torque.

 **99000-32050: THREAD LOCK "1342"**

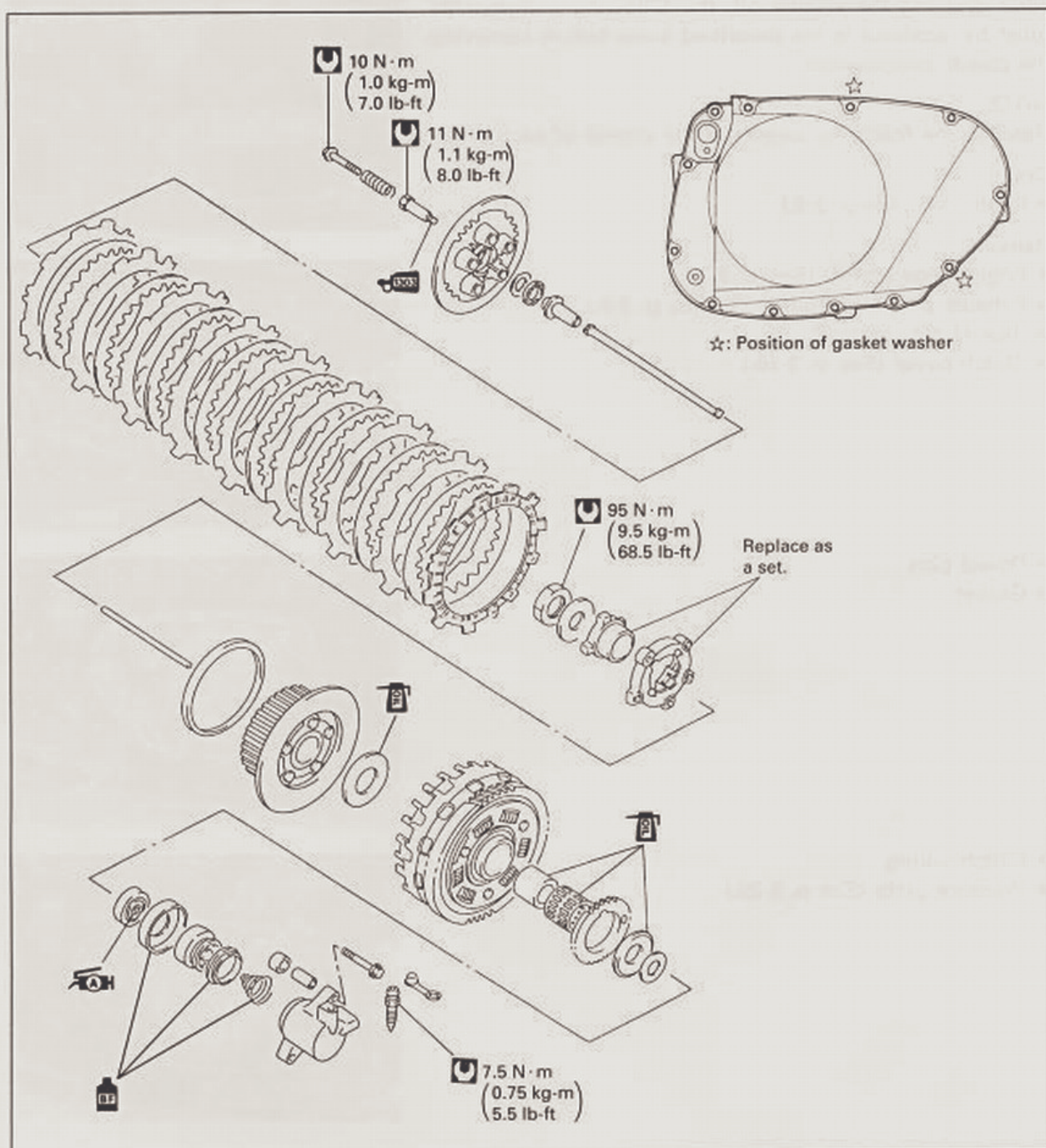
 Cam chain tension adjuster: 10 N·m (1.0 kg-m, 7.0 lb-ft)

**CYLINDER/PISTON INSTALLATION**

Refer to the engine reassembly and the engine installation sections.

- * **ENGINE REASSEMBLY** See pp. 3-31 to -60.
- * **ENGINE INSTALLATION** See pp. 3-11 to -15.

CLUTCH



3C

CONTENTS

CLUTCH REMOVAL	3C- 1
CLUTCH RELEASE CYLINDER REMOVAL	3C- 2
CLUTCH/CLUTCH RELEASE CYLINDER INSPECTION	3C- 3
CLUTCH INSTALLATION	3C- 4
CLUTCH RELEASE CYLINDER INSTALLATION	3C- 6

CLUTCH REMOVAL

After draining the engine oil, the following components must be removed in the described order before removing the clutch components.

NOTE:

Refer to the following pages for the details of each step.

Drain:

- Engine oil (See p. 2-6.)

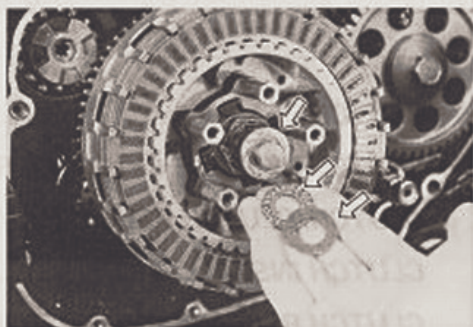
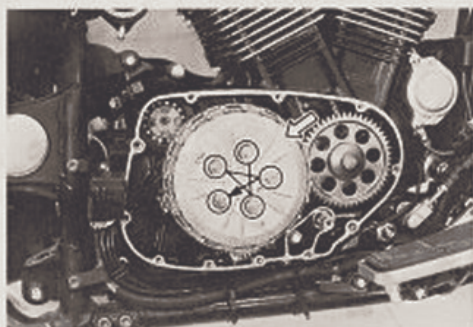
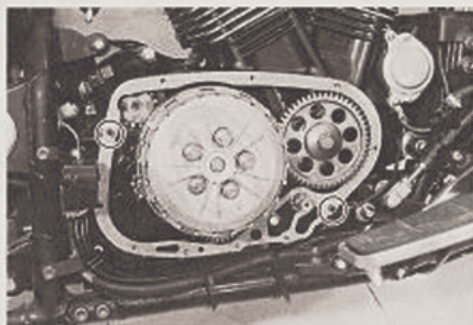
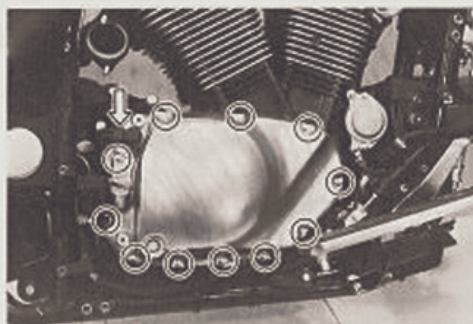
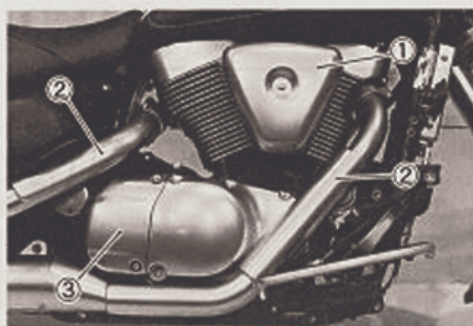
Remove:

- Engine side box ① (See p. 3-3.)
- Exhaust pipe and muffler ② (See p. 3-5.)
- Rear clutch cover ③
- Clutch cover (See p. 3-20.)

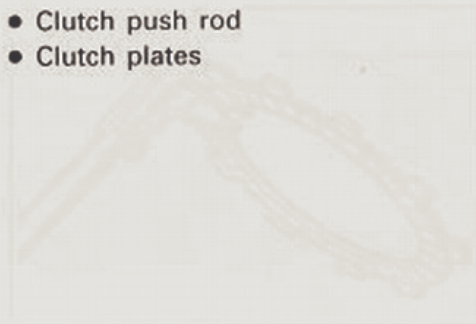
- Dowel pins
- Gasket

- Clutch spring
- Pressure plate (See p. 3-20.)

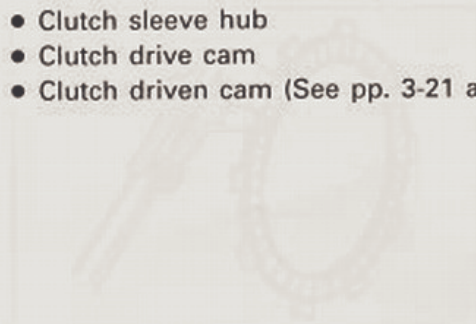
- Clutch push piece
- Bearing
- Washer (See p. 3-21.)



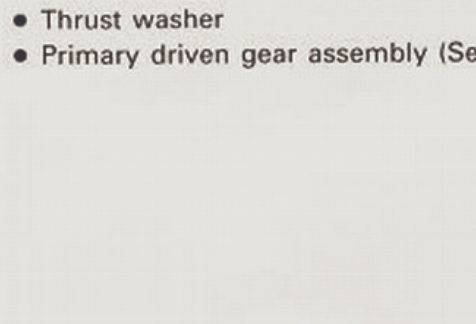
- Clutch push rod
- Clutch plates



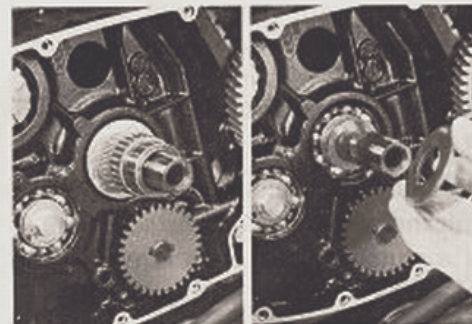
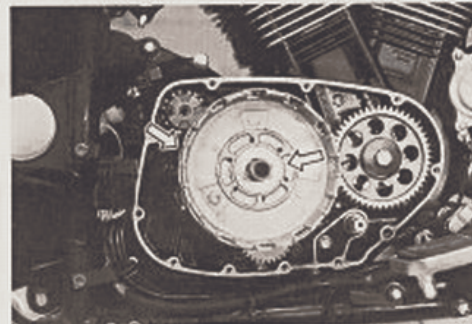
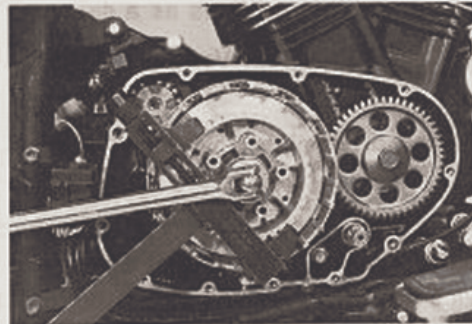
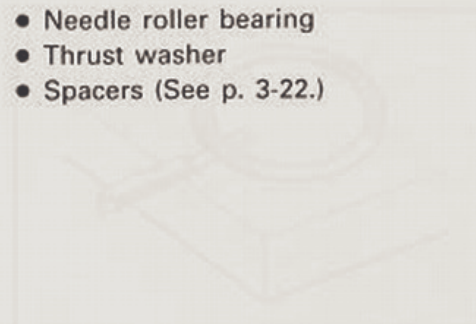
- Clutch sleeve hub
- Clutch drive cam
- Clutch driven cam (See pp. 3-21 and -22.)



- Thrust washer
- Primary driven gear assembly (See p. 3-22.)



- Needle roller bearing
- Thrust washer
- Spacers (See p. 3-22.)



CLUTCH RELEASE CYLINDER REMOVAL AND DISASSEMBLY

See pp. 6-59 and -60.



CLUTCH/CLUTCH RELEASE CYLINDER INSPECTION


CLUTCH DRIVE PLATES

NOTE:

Wipe off any engine oil from the clutch drive plates using a clean rag.

Measure the thickness of the clutch drive plates using vernier calipers.


If a clutch drive plate is not within the standard range, replace the clutch plates as a set.

 09900-20102: Vernier calipers

Standard

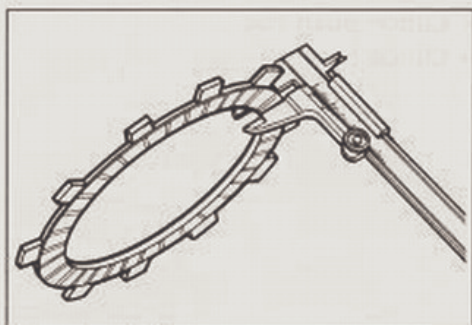
Clutch drive plate thickness: 2.90–3.10 mm
(0.114–0.122 in)

Measure the claw width of the clutch drive plates using vernier calipers. If a clutch drive plate is not within the service limit, replace the clutch plates as a set.

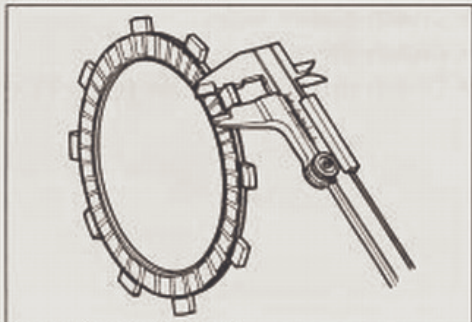
 09900-20102: Vernier calipers

Service Limit

Clutch drive plate claw width: 14.8 mm (0.563 in)



Measuring thickness



Measuring claw width


CLUTCH DRIVEN PLATES

NOTE:

Wipe off any engine oil from the clutch driven plates using a clean rag.

Measure each clutch driven plate for distortion using the thickness gauge and surface plate.

If a clutch driven plate is not within the service limit, replace the clutch plates as a set.


 09900-20803: Thickness gauge

Service Limit

Clutch driven plate distortion: 0.10 mm (0.004 in)

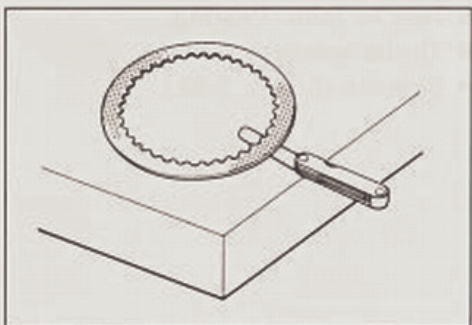
CLUTCH SPRING FREE LENGTH

Measure the free length of each clutch spring using vernier calipers. If any spring is not within the service limit, replace all of the springs.

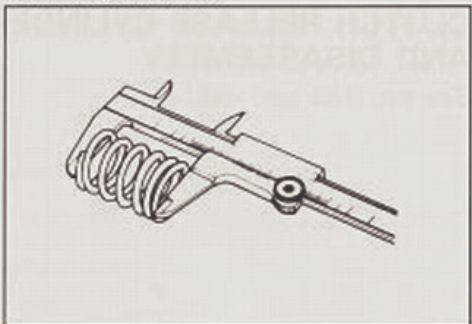
 09900-20102: Vernier calipers

Service Limit

Clutch spring free length: 30.9 mm (1.22 in)



Measuring distortion



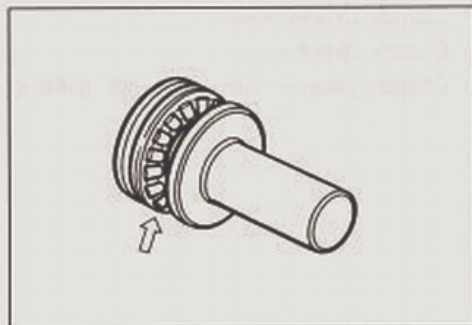
CLUTCH RELEASE BEARING

Inspect the clutch release bearing for any abnormality, especially cracks. When removing the bearing from the clutch, decide whether it can be reused or if it should be replaced.

Smooth engagement and disengagement of the clutch depends on the condition of this bearing.

NOTE:

The thrust washer is located between the clutch pressure plate and the clutch release bearing.

**CLUTCH PUSH ROD**

Visually inspect the clutch push rods for damage and bend.

**CLUTCH RELEASE CYLINDER INSPECTION**

See p. 6-63.

CLUTCH INSTALLATION

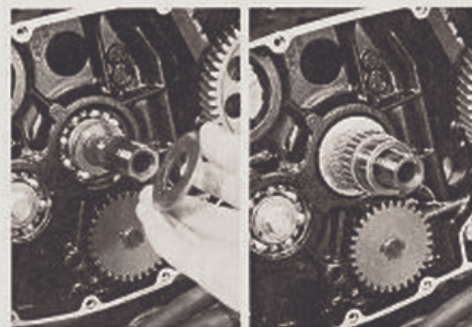
Installation is in the reverse order of removal.

NOTE:

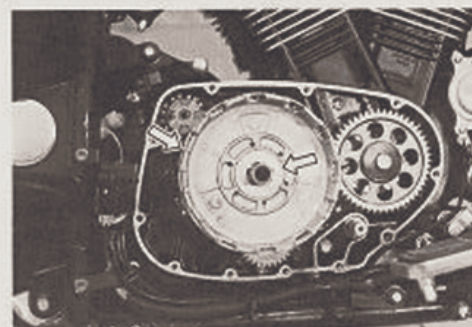
Refer to the following pages for the details of each step.

Install:

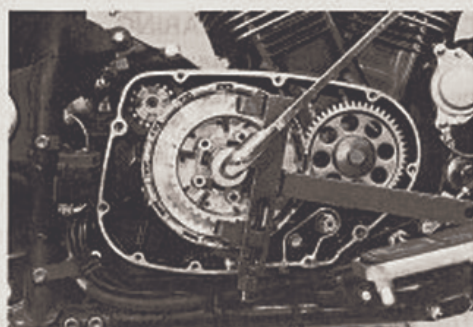
- Spacer
- Thrust washer (See p. 3-45.)
- Spacer
- Needle roller bearing (See p. 3-46.)



- Primary driven gear assembly
- Thrust washer (See p. 3-46.)



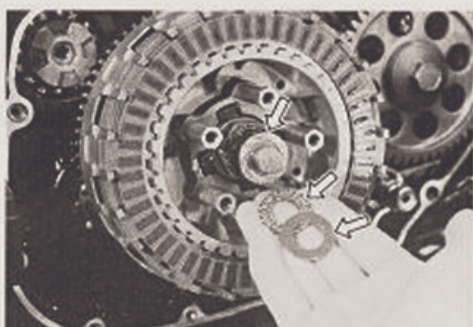
- Clutch driven cam
- Clutch drive cam
- Clutch sleeve hub (See pp. 3-46 and -47.)



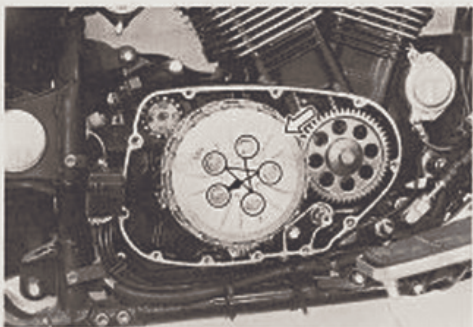
- Clutch plates (See p. 3-48.)
- Clutch push rod (See p. 3-49.)



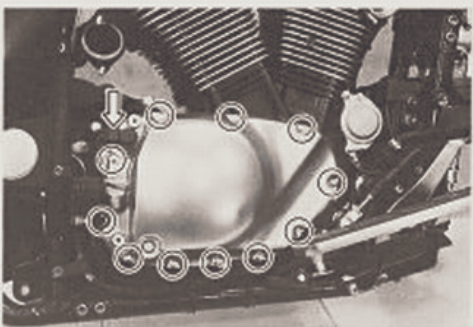
- Clutch push piece
- Bearing
- Washer (See p. 3-49.)



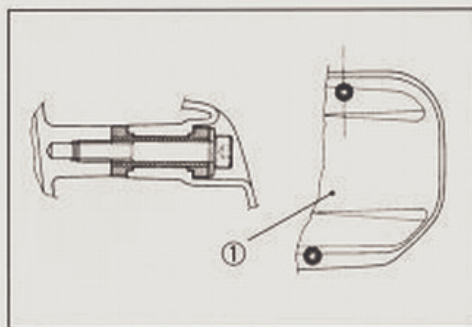
- Pressure plate
- Clutch spring (See p. 3-49.)



- Dowel pins
- Gasket
- Clutch cover (See pp. 3-49 and -50.)



- Rear clutch cover ①.
- Exhaust pipe and muffler. (See p. 3-15.)
- Engine side box.



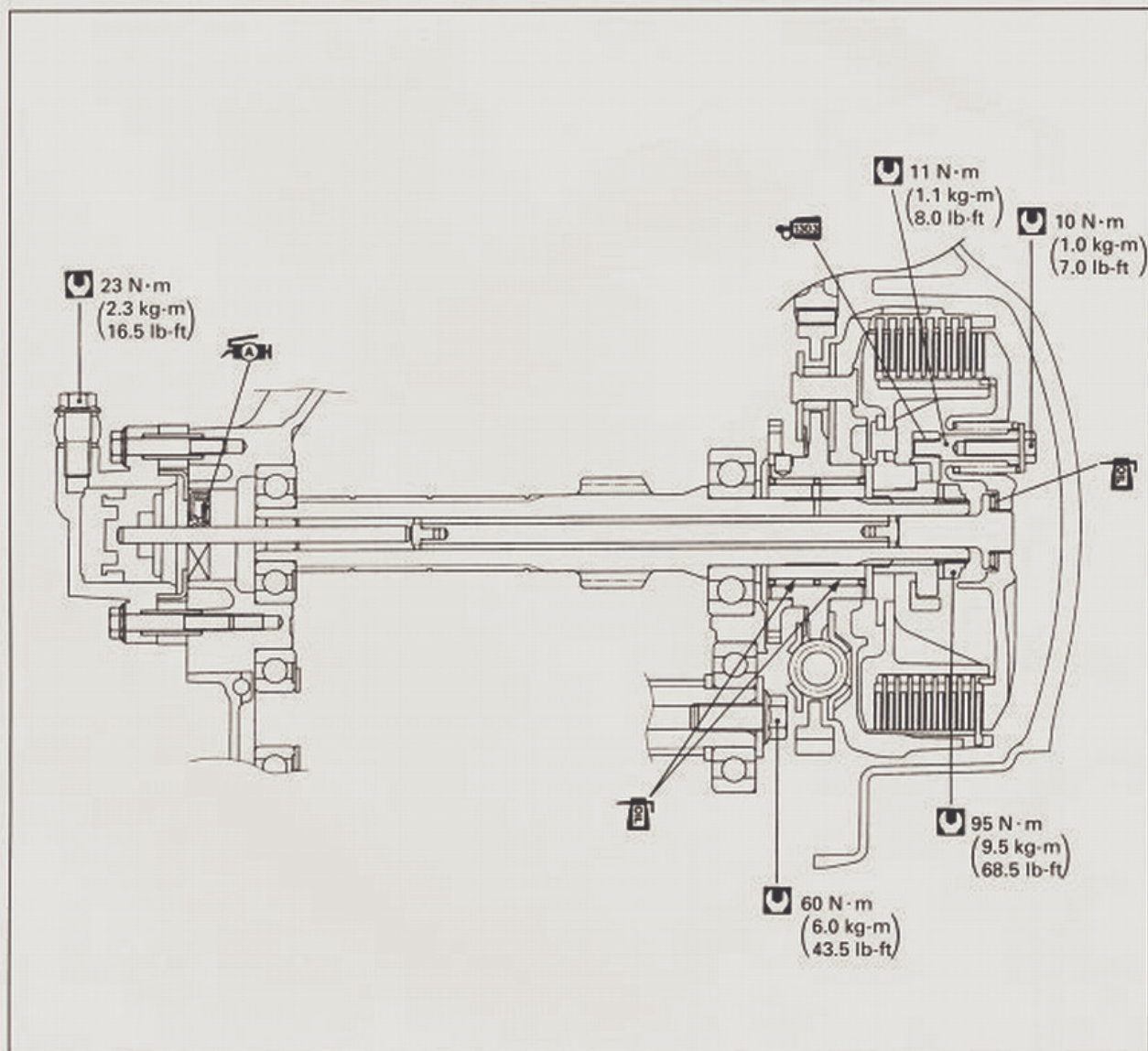
Adjust the following item to the specification.

Page

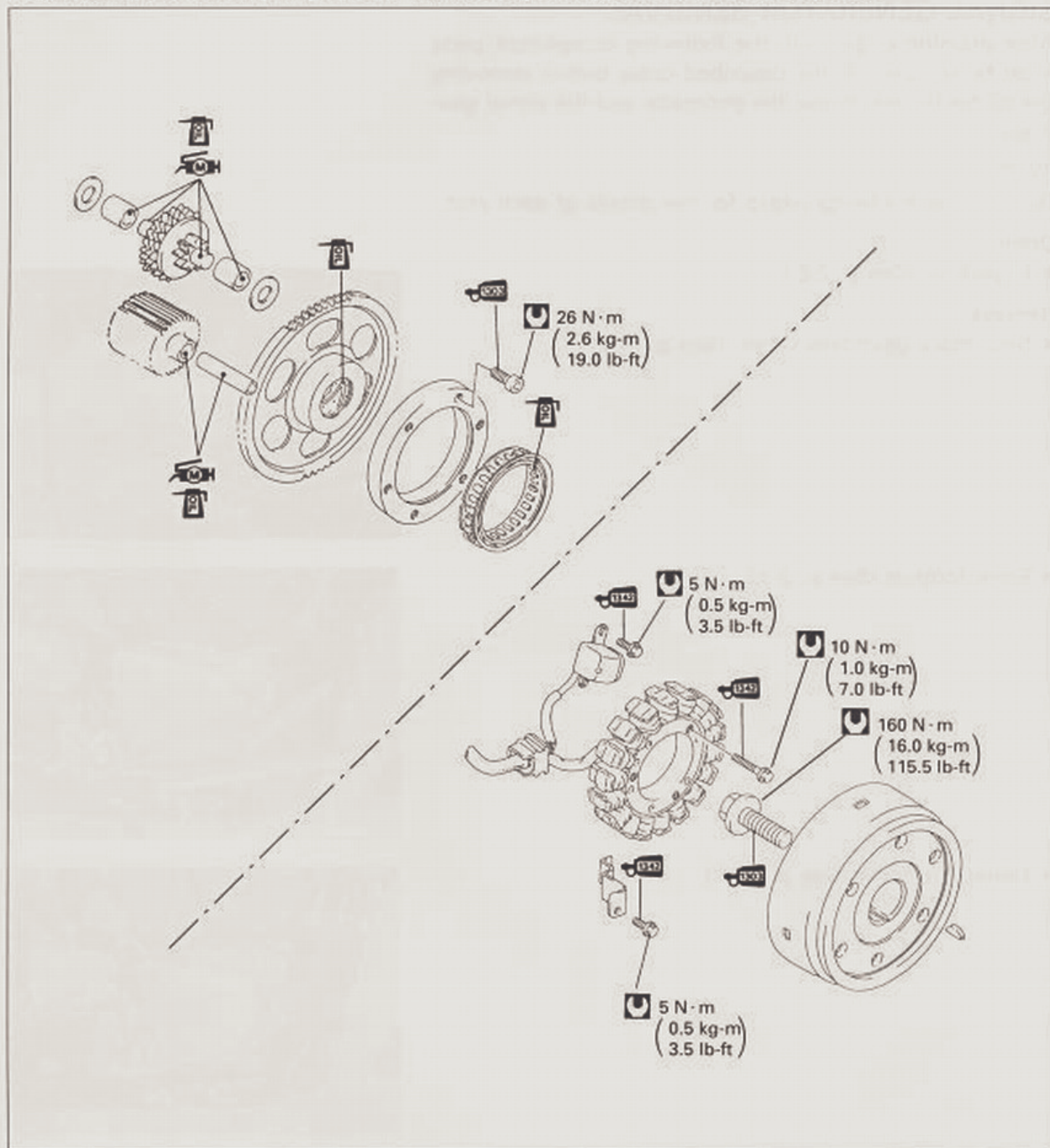
* Engine oil 2-6.

CLUTCH RELEASE CYLINDER REASSEMBLY AND INSTALLATION

See pp. 6-63 and -64.



STARTER SYSTEM/GENERATOR/SIGNAL GENERATOR



3D

CONTENTS

STARTER TORQUE LIMITER/GENERATOR/SIGNAL GENERATOR REMOVAL ..	3D-1
STARTER TORQUE LIMITER/GENERATOR/SIGNAL GENERATOR	
INSPECTION AND SERVICE	3D-3
STARTER TORQUE LIMITER/GENERATOR/SIGNAL GENERATOR	
INSTALLATION	3D-6
STARTER MOTOR REMOVAL	3D-8
STARTER MOTOR INSPECTION AND SERVICING	3D-8
STARTER MOTOR INSTALLATION	3D-8

STARTER TORQUE LIMITER/GENERATOR/ SIGNAL GENERATOR REMOVAL

After draining engine oil, the following component parts must be removed in the described order before removing the starter torque limiter, the generator and the signal generator.

NOTE:

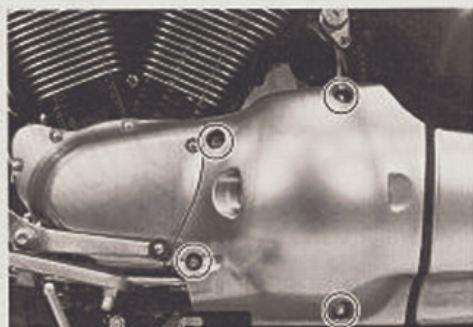
Refer to the following pages for the details of each step.

Drain:

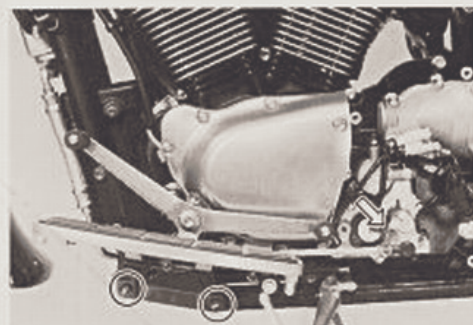
- Engine oil (See p. 2-6.)

Remove:

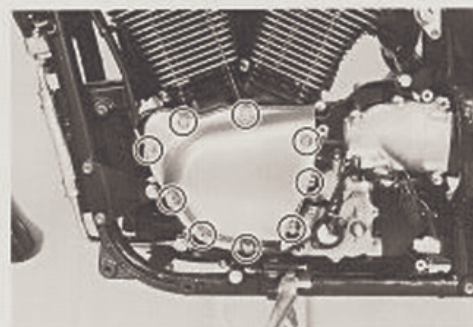
- Secondary gear case cover. (See p. 3-7.)



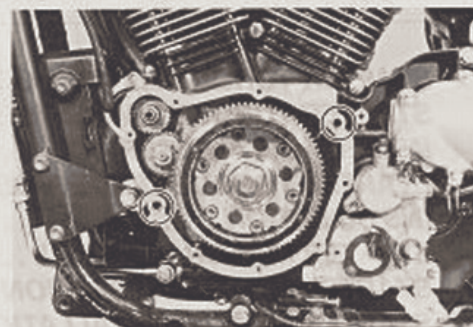
- Front footrest (See p. 3-10.)



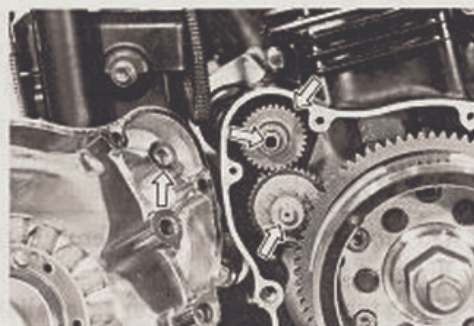
- Generator cover (See p. 3-16.)



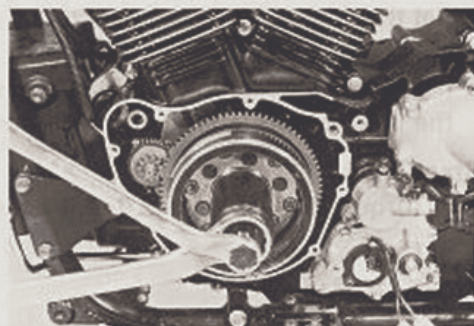
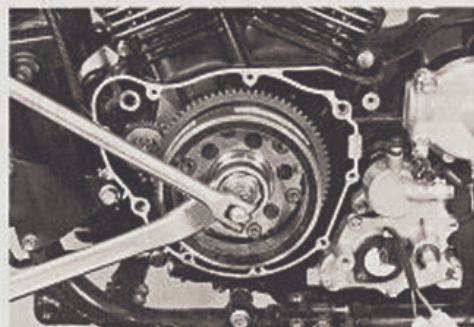
- Dowel pin
- Gasket (See p. 3-16.)



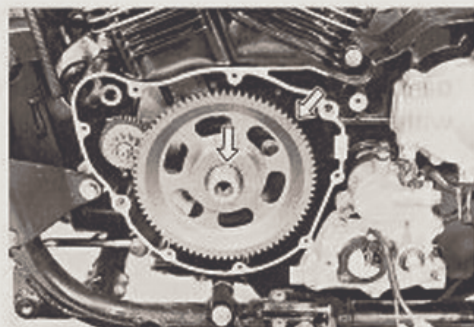
- Starter idle gear
- Shaft
- Washer
- Bush (See p. 3-17.)



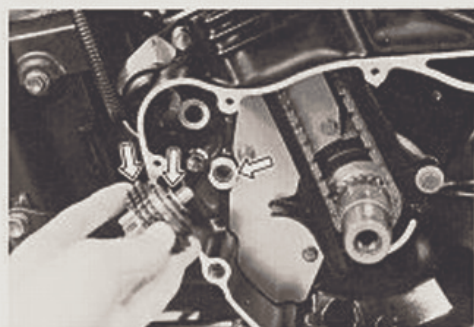
- Generator rotor assembly (See p. 3-27.)



- Key
- Starter driven gear (See p. 3-27.)



- Starter torque limiter
- Washer
- Bush (See p. 3-27.)



STARTER TORQUE LIMITER/GENERATOR/ SIGNAL GENERATOR INSPECTION AND SERVICE

STARTER TORQUE LIMITER INSPECTION

⚠ CAUTION

Do not attempt to disassemble the starter torque limiter.

The starter torque limiter is available only as an assembly.

- Check the slip torque with the special tools.



09930-73130: Starter torque limiter holder ①

09930-73140: Starter torque limiter socket ②

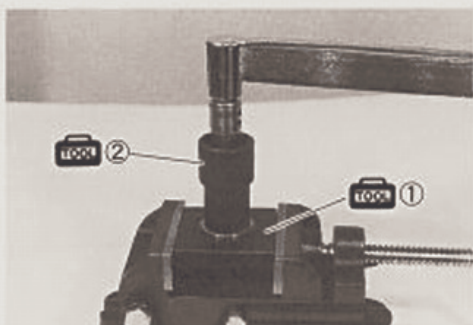
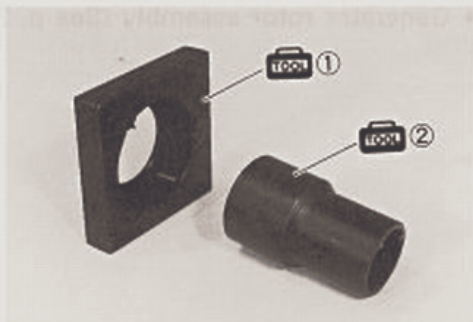
- Set the starter torque limiter to the special tools and vise as shown in the illustration.
- If the slip torque is not within the specification, replace the starter torque limiter with a new one.

Standard

Slip torque: 20–40 N·m (2.0–4.0 kg-m, 14.5–29.0 lb-ft)

STARTER TORQUE LIMITER SHAFT BUSH INSPECTION

- Inspect the inside surfaces of the bushes for wear or damage. If there is anything unusual, replace the bushes with new ones.



GENERATOR INSPECTION

See pp. 7-8 and -9.

SIGNAL GENERATOR INSPECTION

See pp. 7-26 and -27.

GENERATOR STATOR AND SIGNAL GENERATOR SERVICING

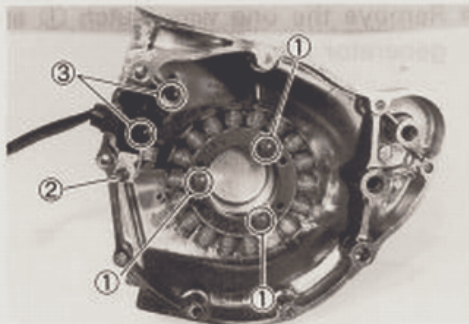
When replacing the generator stator or signal generator, apply THREAD LOCK "1342" to the generator stator set bolts ①, clamp bolt ② and signal generator set bolt ③ and tighten them to the specified torque.

 99000-32050: THREAD LOCK "1342"

 Generator stator set bolt ①: 10 N·m (1.0 kg-m, 7.0 lb-ft)
Generator lead wire clamp bolt ②: 5 N·m

(0.5 kg-m, 3.5 lb-ft)

Signal generator set bolt ③: 5 N·m (0.5 kg-m, 3.5 lb-ft)

**STARTER CLUTCH INSPECTION**

Install the starter driven gear onto the starter clutch and turn the starter driven gear by hand to inspect the starter clutch for a smooth movement. The gear turns one direction only. If a large resistance is felt to rotation, inspect the starter clutch for damage or inspect the starter clutch contacting surface of the starter driven gear for wear or damage. If they are found to be damaged, replace them with new ones.

**STARTER DRIVEN GEAR BEARING INSPECTION**

Inspect the starter driven gear bearing for wear of any damages.

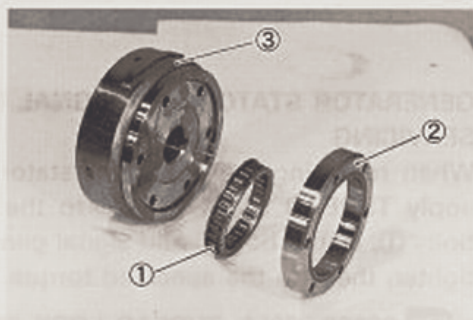


STARTER CLUTCH SERVICING

- Remove the starter clutch securing bolts.



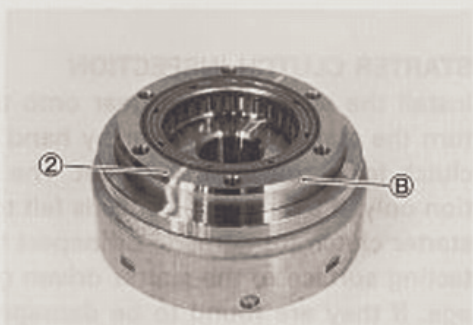
- Remove the one way clutch ① and guide ② from the generator rotor ③.



- When fitting the one way clutch ① to the guide ②, position flange side A of one way clutch to the generator side.




- When installing the starter clutch guide ②, make sure that the chamfer B side faces out.



- Apply THREAD LOCK SUPER "1303" to the starter clutch bolts and tighten them to the specified torque.

 99000-32030: THREAD LOCK SUPER "1303"

 Starter clutch allen bolt: 26 N·m (2.6 kg-m, 19.0 lb-ft)



STARTER TORQUE LIMITER/GENERATOR/ SIGNAL GENERATOR INSTALLATION

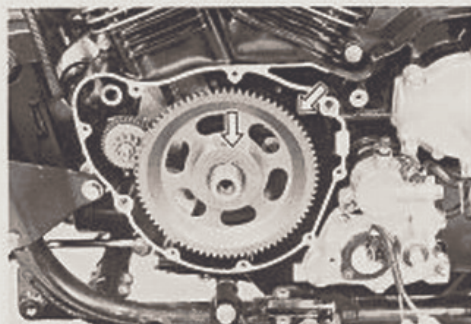
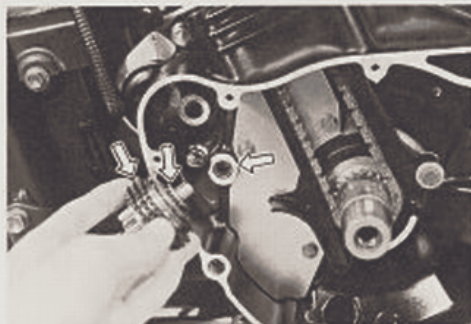
Installation is in the reverse order of removal.

NOTE:

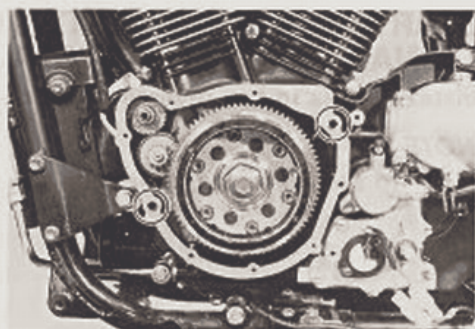
Refer to the following pages for the details of each step.

Install:

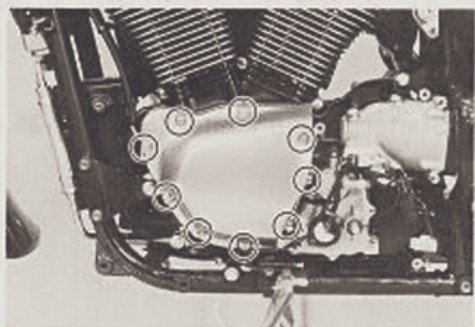
- Bush
 - Washer
 - Starter torque limiter (See p. 3-36.)
-
- Key
 - Starter driven gear (See p. 3-37.)
-
- Generator rotor assembly (See p. 3-37 and -38.)
-
- Starter idle gear
 - Shaft
 - Bush
 - Washer (See p. 3-60.)



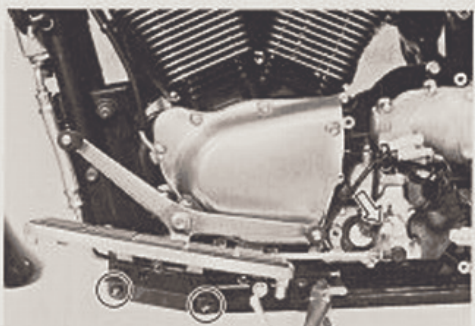
- Gasket
- Dowel pin (See p. 3-60.)



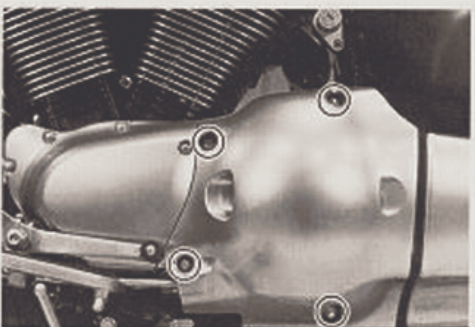
- Generator cover (See p. 3-60.)



- Front footrest (See p. 3-13.)

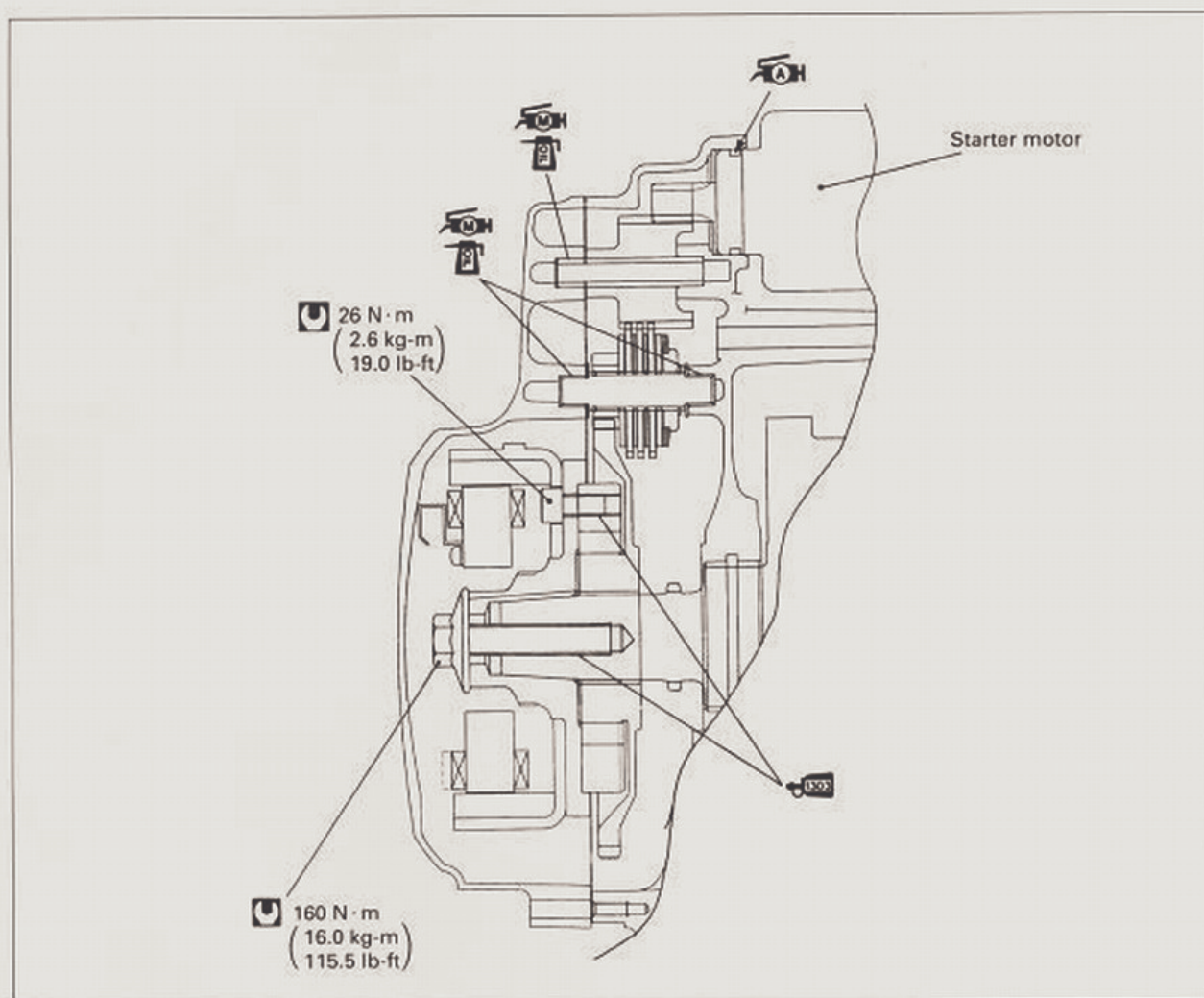


- Secondary gear case cover.



Adjust the following item to the specification.

	Page
* Engine oil	2-6



STARTER MOTOR REMOVAL AND DISASSEMBLY

See p. 7-14.

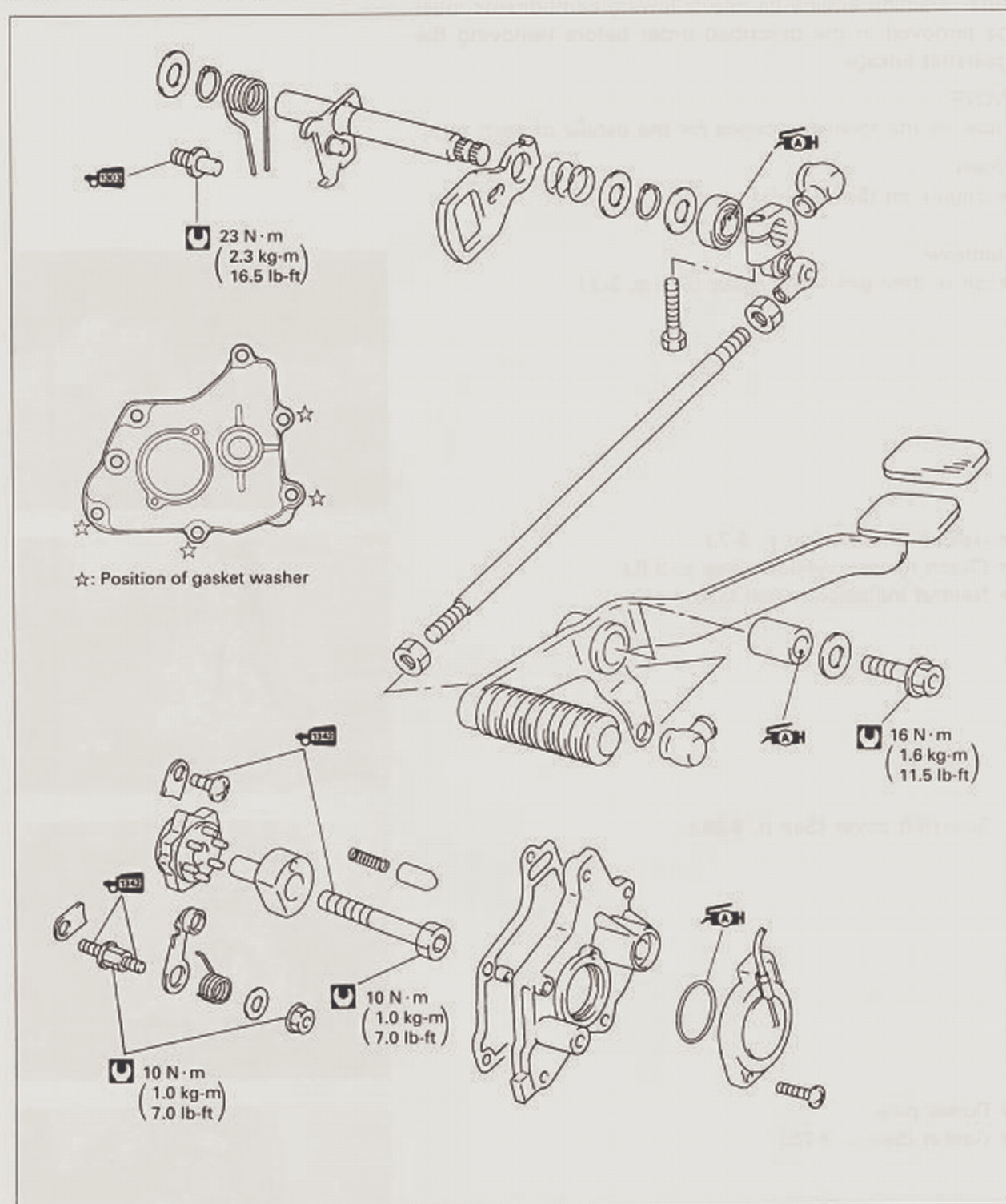
STARTER MOTOR INSPECTION

See p. 7-15.

STARTER MOTOR REASSEMBLY INSTALLATION

See p. 7-16 and 7-17.

GEARSHIFT LINKAGE



3E

CONTENTS

GEARSHIFT LINKAGE REMOVAL	3E-1
GEARSHIFT LINKAGE INSPECTION AND SERVICE	3E-3
GEARSHIFT LINKAGE INSTALLATION	3E-5

GEARSHIFT LINKAGE REMOVAL

After draining engine oil, the following components must be removed in the described order before removing the gearshift linkage.

NOTE:

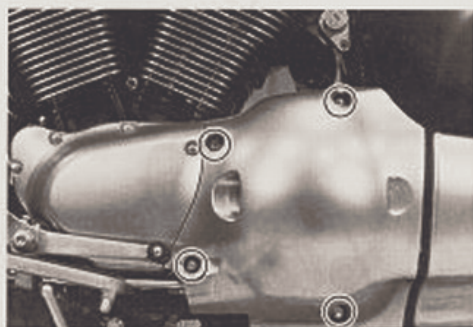
Refer to the following pages for the details of each step.

Drain:

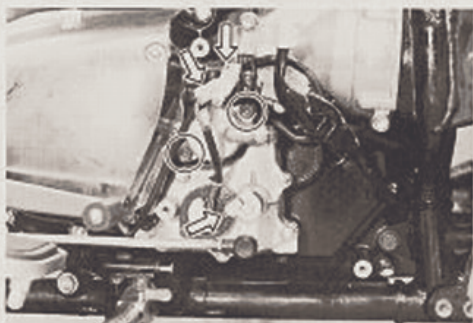
- Engine oil (See p. 2-6.)

Remove:

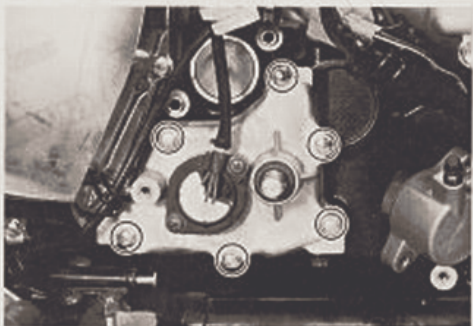
- Secondary gear case cover (See p. 3-7.)



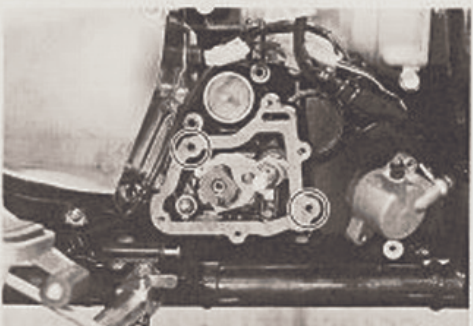
- Gearshift lever (See p. 3-7.)
- Clutch release cylinder (See p. 3-8.)
- Neutral indicator switch lead wire



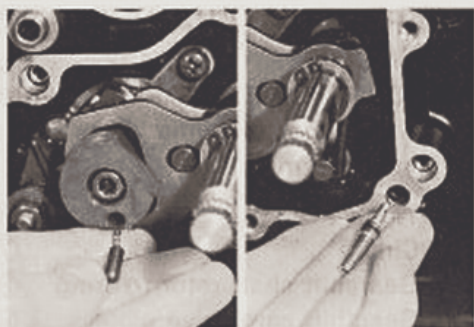
- Gearshift cover (See p. 3-25.)



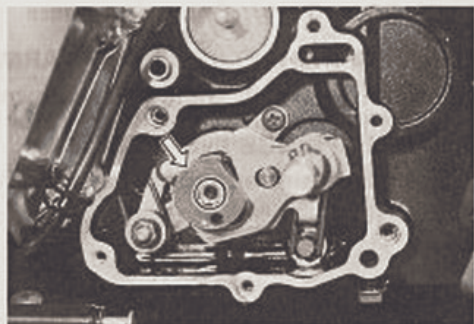
- Dowel pins
- Gasket (See p. 3-26.)



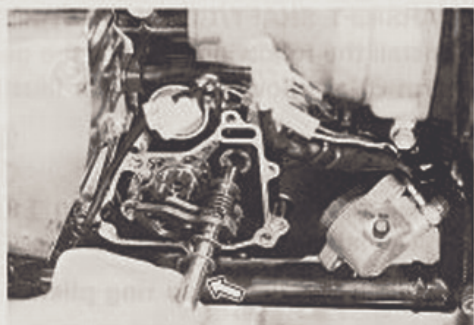
- Switch contact
- Spring (See p. 3-25.)
- Oil jet (See p. 3-26.)



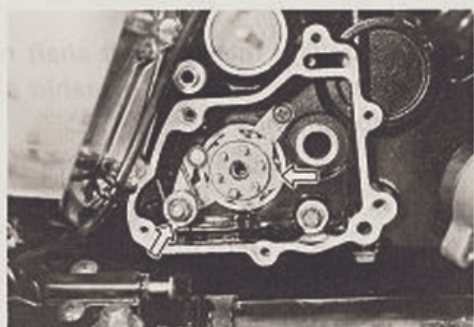
- Gearshift cam retainer (See p. 3-26.)



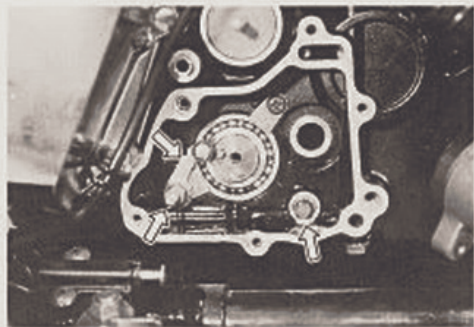
- Gearshift shaft/gearshift arm (See p. 3-26.)



- Gearshift cam plate
- Gearshift cam stopper nut
- Gearshift arm stopper spring (See p. 3-26.)



- Gearshift cam stopper bolt
- Gearshift cam stopper
- Bearing retainer
- Gearshift arm stopper bolt (See p. 3-26.)




GEARSHIFT LINKAGE INSPECTION AND SERVICE

GEARSHIFT SHAFT/GEARSHIFT ARM DISASSEMBLY

- Remove the following parts from the gearshift shaft/gearshift arm ①.

- | | |
|---------------------------------|-----------------------|
| ② Washer | ⑥ Plate return spring |
| ③ Circlip | ⑦ Washer |
| ④ Gearshift shaft return spring | ⑧ Circlip |
| ⑤ Gearshift cam drive plate | ⑨ Washer |

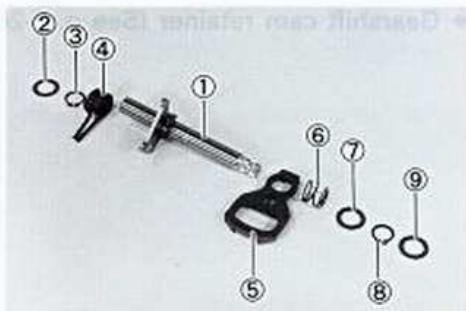
 09900-06107: Snap ring pliers

GEARSHIFT SHAFT/GEARSHIFT ARM INSPECTION

Check the gearshift shaft/gearshift arm ① for wear or bend.

RETURN SPRINGS INSPECTION


Check the return springs, ④ and ⑥, for damage or fatigue.

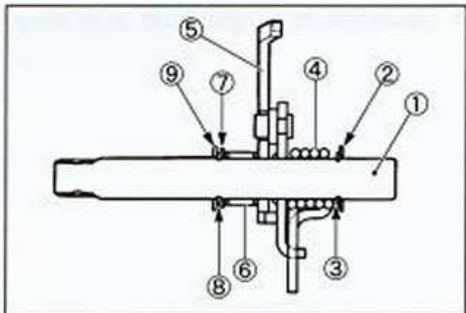


GEARSHIFT SHAFT/GEARSHIFT ARM REASSEMBLY

- Install the following parts to the gearshift shaft/gearshift arm ① as shown in the right illustration.

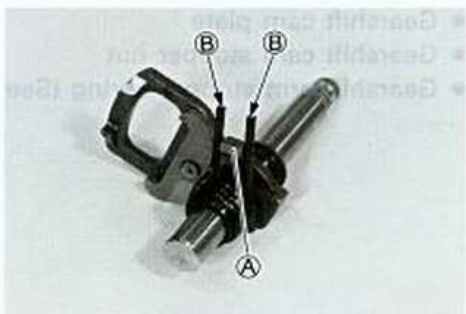
- | | |
|---------------------------------|-----------------------|
| ② Washer | ⑥ Plate return spring |
| ③ Circlip | ⑦ Washer |
| ④ Gearshift shaft return spring | ⑧ Circlip |
| ⑤ Gearshift cam drive plate | ⑨ Washer |

 09900-06107: Snap ring pliers



NOTE:

When installing the gearshift shaft return spring ④, position the stopper A of the gearshift arm between the shaft return spring ends B.



OIL SEAL INSPECTION

Inspect the gearshift shaft oil seal for damage or wear on the lip.

If any defects are found, replace the oil seal with a new one.

**OIL SEAL REPLACEMENT**


- Remove the gearshift shaft oil seal from the gearshift cover.
- Install the new oil seal.

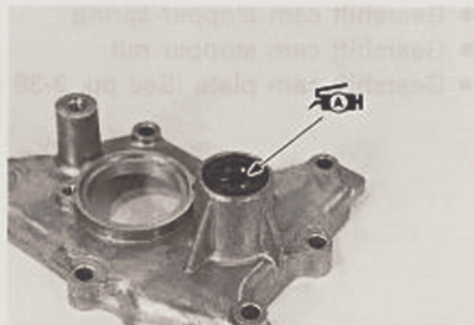
⚠ CAUTION

The removed oil seal must be replaced with a new one.

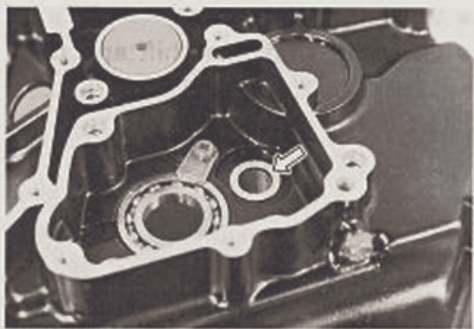
NOTE:

Apply grease to the oil seal lip to prevent oil seal damage when installing the gearshift cover.

 99000-25030: SUZUKI SUPER GREASE "A"

**GEARSHIFT SHAFT HOLE INSPECTION**

Check the gearshift shaft holes for damage or wear.



GEARSHIFT LINKAGE INSTALLATION

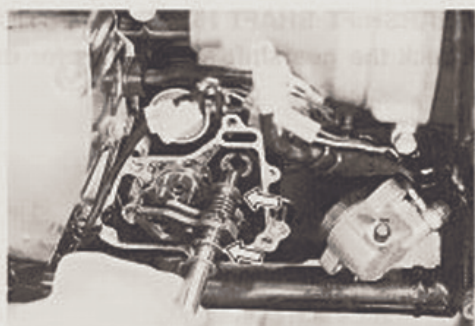
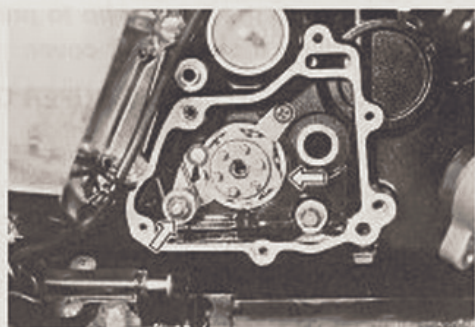
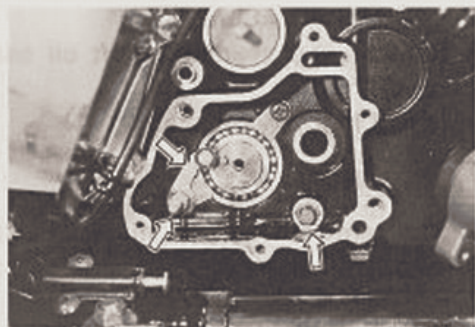
Installation is in the reverse order of removal.

NOTE:

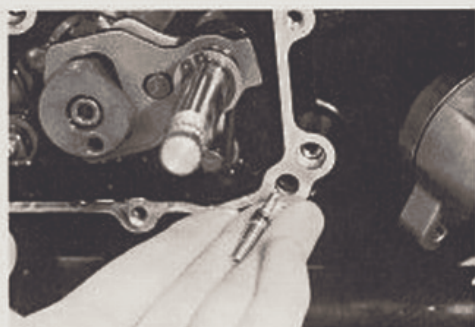
Refer to the following pages for the details of each steps.

Install:

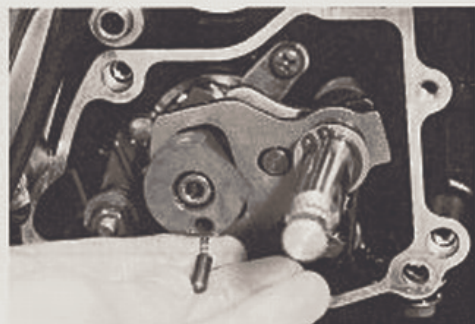
- Gearshift arm stopper bolt
 - Gearshift cam stopper
 - Gearshift arm stopper bolt (See p. 3-38.)
-
- Gearshift cam stopper spring
 - Gearshift cam stopper nut
 - Gearshift cam plate (See pp. 3-38 and 3-39.)
-
- Washer
 - Gearshift shaft/gearshift arm (See p. 3-39.)
-
- Gearshift cam retainer (See p. 3-39.)



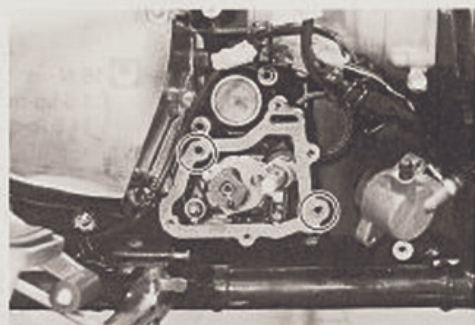
- Oil jet (See p. 3-39.)



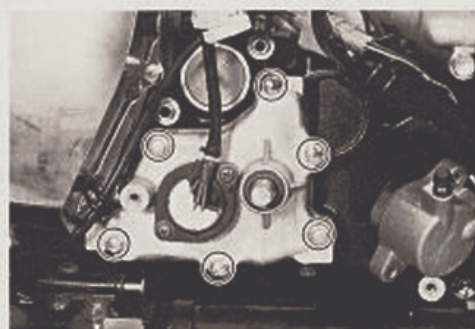
- Switch contact.
- Spring (See p. 3-40.)



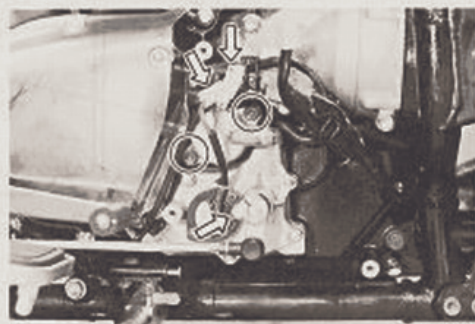
- Dowel pins
- Gasket (See p. 3-39.)



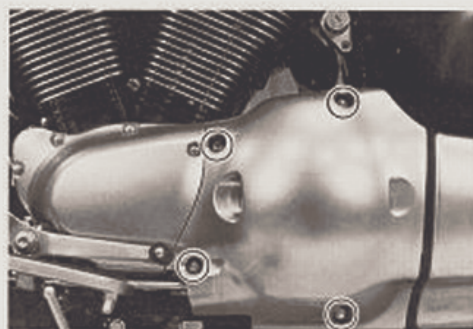
- Gearshift cover (See p. 3-40.)



- Neutral indicator switch lead wire (See p. 3-40.)
- Clutch release cylinder (See p. 3-14.)
- Gearshift lever (See p. 3-14.)

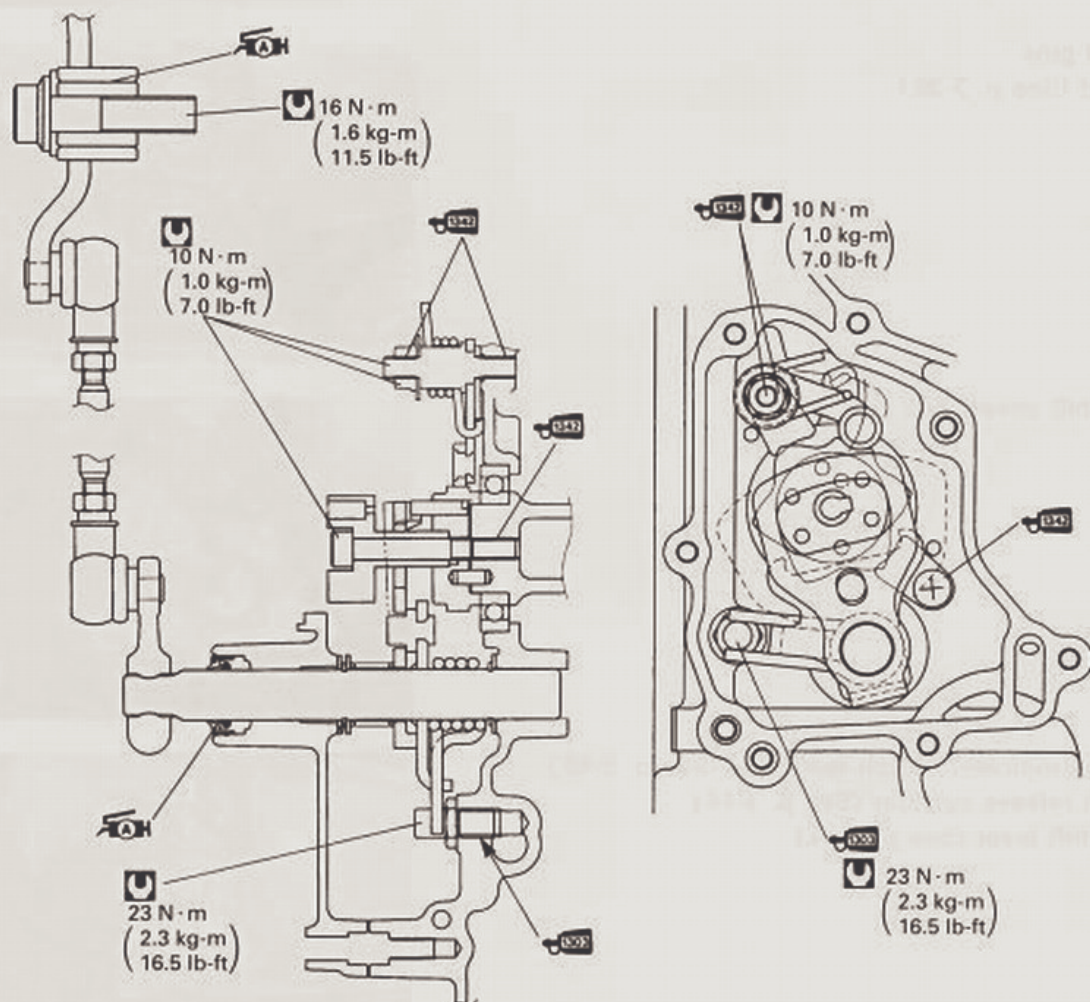


- Secondary gear case cover.

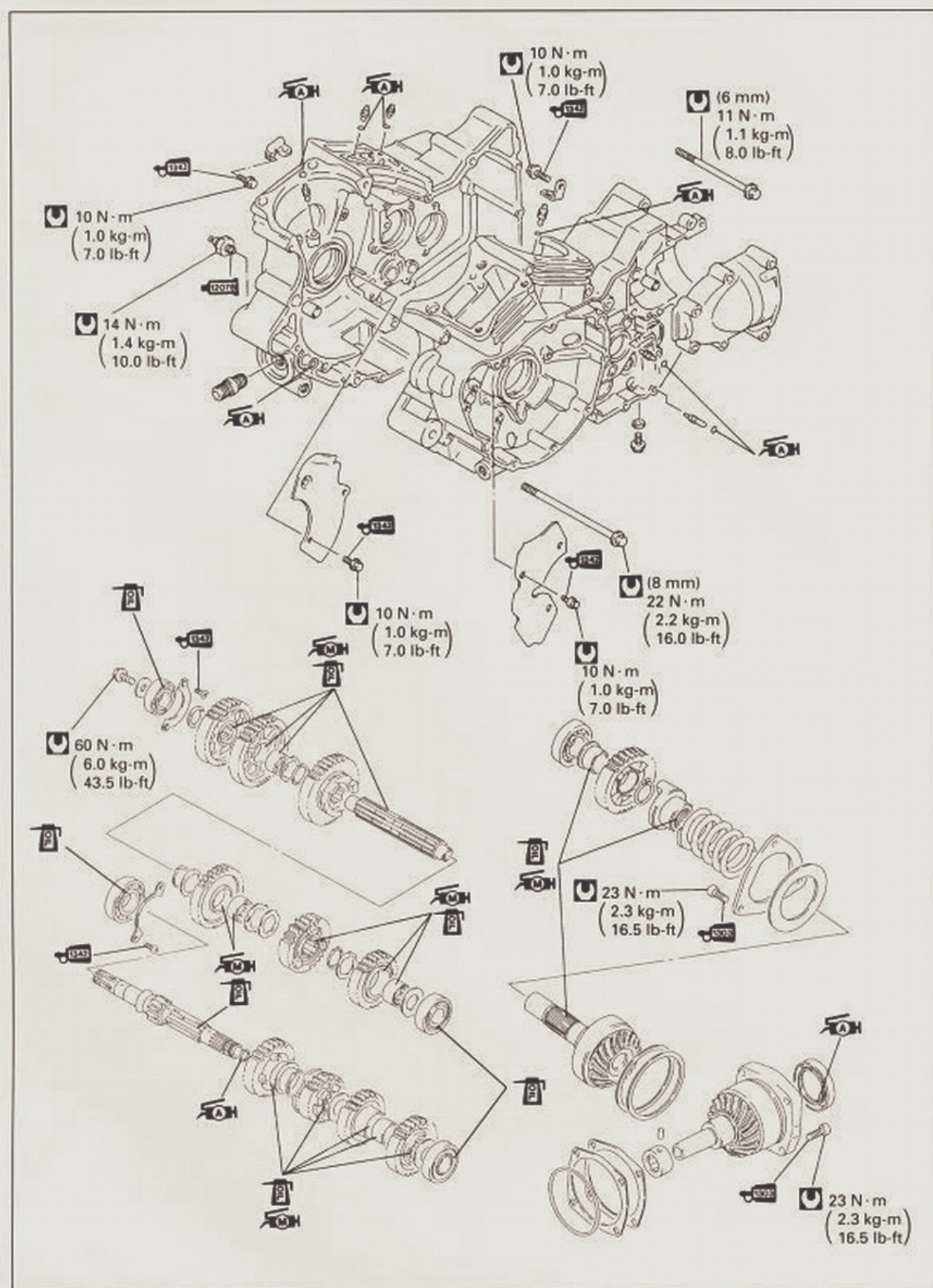


Adjust the following items to the specification.

	Page
* Engine oil	2- 6
* Clutch	2-11



CRANKCASE/TRANSMISSION/CRANKSHAFT/CONROD



TRANSMISSION/CRANKSHAFT/CONROD REMOVAL

The crankcase must be separated to service the transmission, the crankshaft and the conrods. These engine components require engine removal and disassembly. Refer to the engine removal and the engine disassembly sections.

* **ENGINE REMOVAL** See pp. 3-2 to -10.

* **ENGINE DISASSEMBLY** See pp. 3-16 to -30.

TRANSMISSION INSPECTION AND SERVICE

▲ CAUTION

Identify the position of each removed part. Organize the parts in their respective groups (i.e., drive or driven) so that they can be reinstalled in their original positions.

GEARSHIFT FORK TO GROOVE CLEARANCE

Measure the gearshift fork clearance in the groove of its respective gear using the thickness gauge.

If the clearance exceeds the specification, replace the fork, its respective gear or both.

The clearance for each of the three gearshift forks plays an important role in the smoothness and positiveness of the shifting action.



09900-20803: Thickness gauge

09900-20102: Vernier calipers

Standard

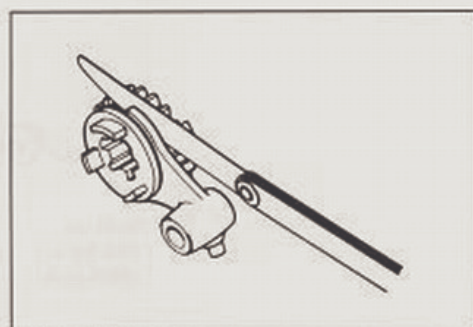
Gearshift fork to groove clearance: 0.10–0.30 mm
(0.004–0.012 in)

Service Limit:

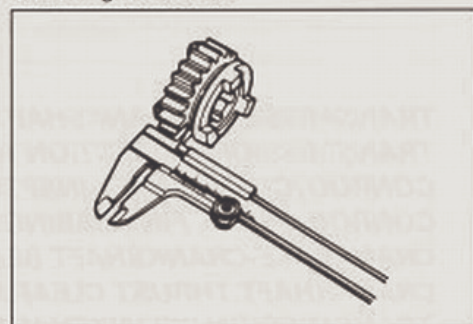
Gearshift fork to groove clearance: 0.5 mm (0.020 in)

Standard

Gearshift fork groove width: 5.50–5.60 mm (0.217–0.220 in)



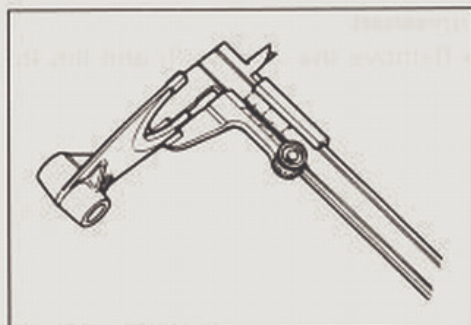
Checking clearance



Checking groove width

Standard

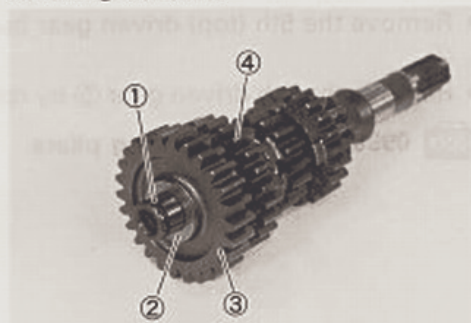
Gearshift fork thickness: 5.30–5.40 mm (0.209–0.213 in)



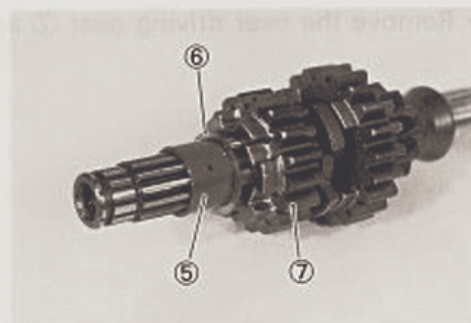
Checking thickness

DISASSEMBLY**Countershaft**

- Remove the O-ring ①, washer ②, 5th (top) drive gear ③ and 4th drive gear ④.



- Remove the 4th drive gear bushing ⑤, washer ⑥ and the 2nd drive gear ⑦.

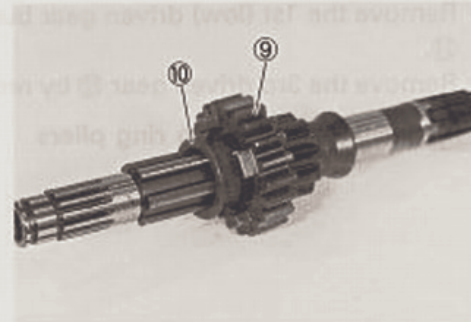


- Remove the 3rd drive gear circlip ⑧.

 **09900-06107: Snap ring pliers**

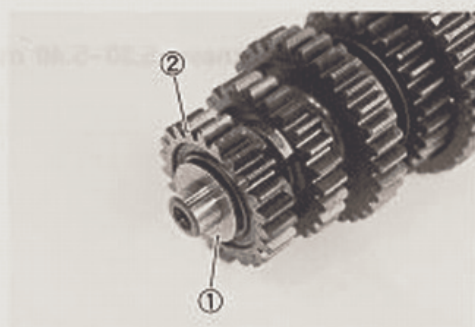


- Remove the 3rd drive gear ⑨ and its bushing ⑩.



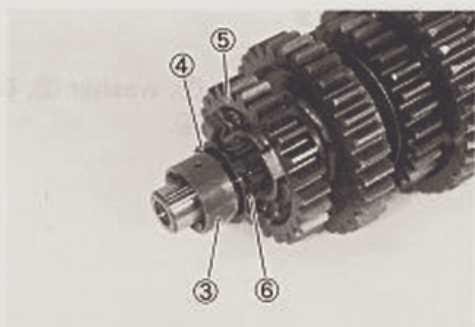
Driveshaft

- Remove the washer ① and 5th (top) driven gear ②.

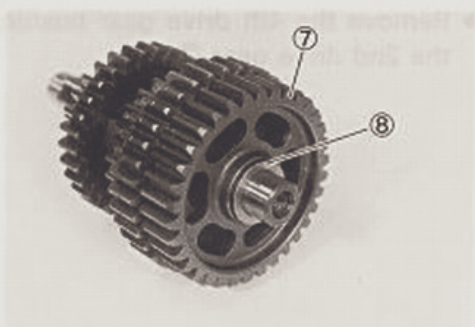


- Remove the 5th (top) driven gear bushing ③ and washer ④.
- Remove the 4th driven gear ⑤ by removing the circlip ⑥.

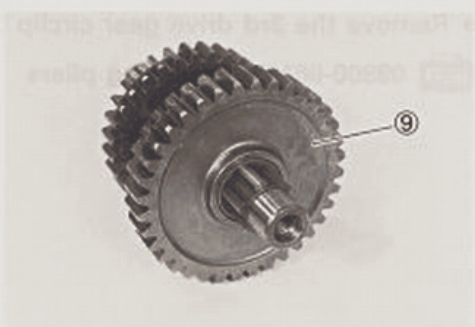
TOOL 09900-06107: Snap ring pliers



- Remove the over driving gear ⑦ and washer ⑧.

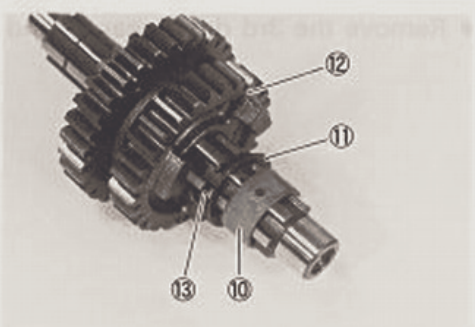


- Remove the 1st (low) driven gear ⑨.



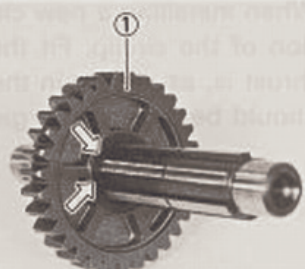
- Remove the 1st (low) driven gear bushing ⑩ and washer ⑪.
- Remove the 3rd driven gear ⑫ by removing the circlip ⑬.

TOOL 09900-06107: Snap ring pliers

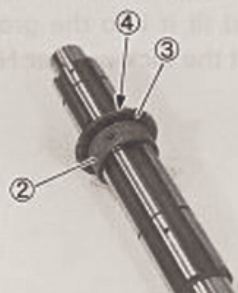


- Remove the 2nd driven gear ① and washer by removing the circlip.

 09900-06107: Snap ring pliers



- Remove the 2nd driven gear bushing ②, lock washer No.1 ③ and No.2 ④.




REASSEMBLY

Assemble the countershaft and driveshaft in the reverse order of disassembly. Pay attention to the following points:

NOTE:

- After installing the gears, rotate the gears by hand to inspect for abnormal noises and smooth rotation. Replace the gear or bushing if there is anything unusual.
- Before installing the gears, lightly coat the driveshaft, countershaft and bushings with SUZUKI MOLY PASTE or engine oil.
- Before installing the O-ring, apply grease to it.

 99000-25140: SUZUKI MOLY PASTE

 99000-25030: SUZUKI SUPER GREASE "A"

CAUTION

- Never reuse a circlip. After a circlip has been removed from a shaft, it should be discarded and a new circlip must be installed.
- When installing a new circlip, do not expand the end gap larger than required to slip the circlip over the shaft.
- After installing a circlip, make sure that it is completely seated in its groove and securely fitted.

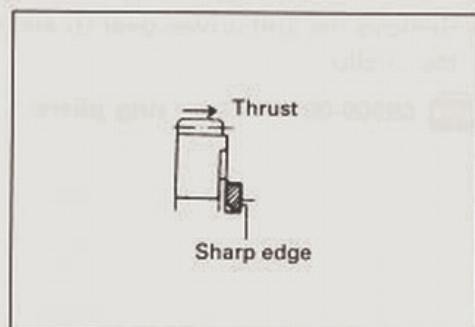
NOTE:

When reassembling the transmission, attention must be given to the locations and positions of washers and circlips. The cross sectional view shows the correct position of the gears, bushings, washers and circlips.

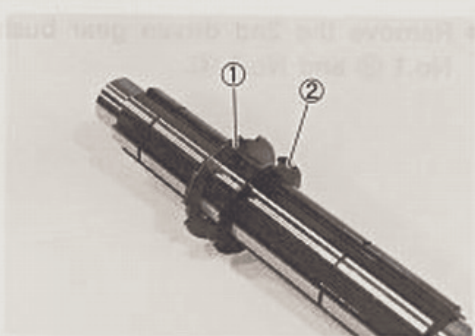
(See pp. 3F-6 and -7.)



- When installing a new circlip, pay attention to the direction of the circlip. Fit the circlip to the side where the thrust is, as shown in the illustration. The rounded side should be against the gear surface.

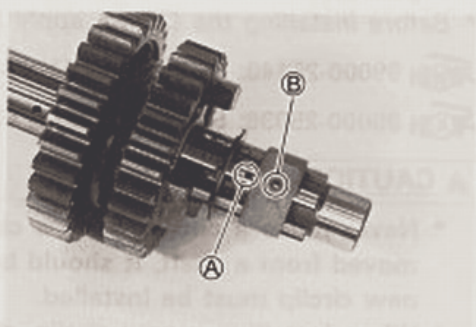
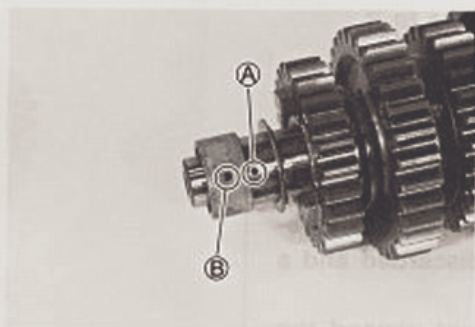
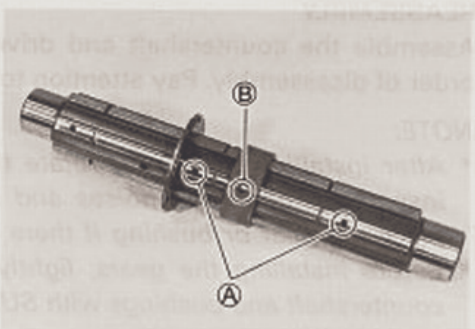


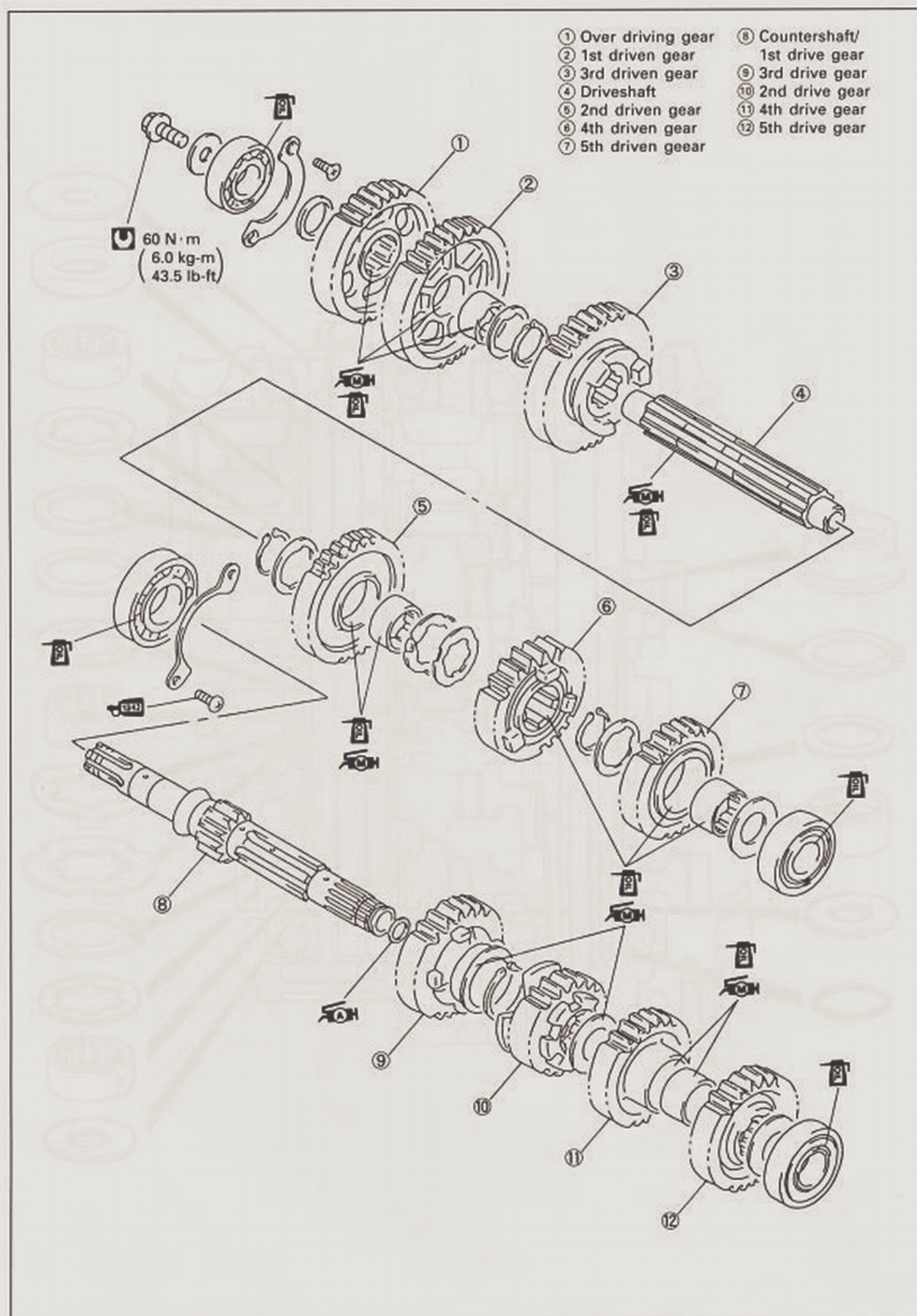
- Install the lock washer No.2 ① onto the driveshaft, and turn and fit it into the groove.
- Then, fit the lock washer No.1 ② in the lock washer No.2 ①.

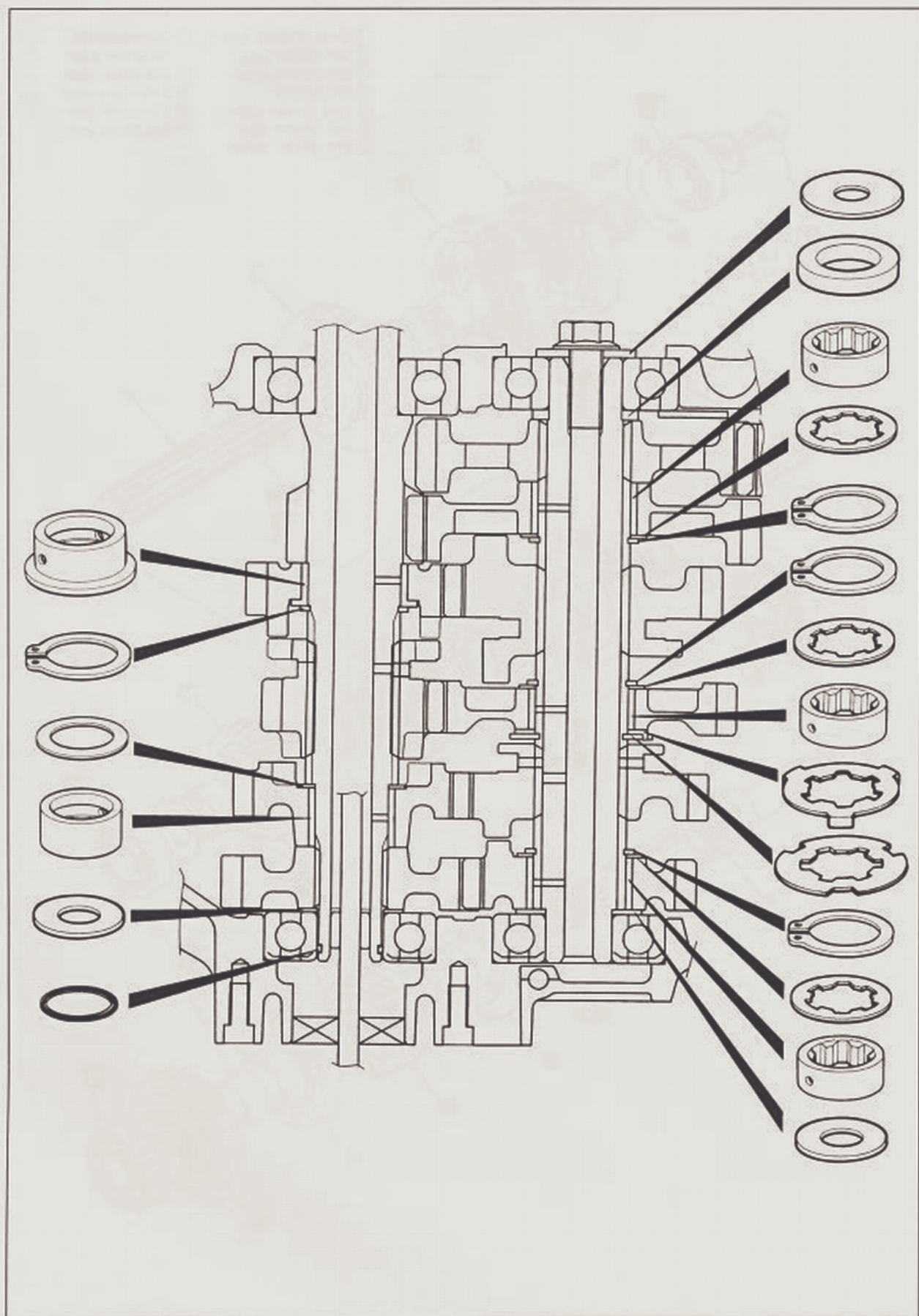


CAUTION

When installing the 2nd, 1st and 5th driven gear bushings onto the driveshaft, align the driveshaft oil hole (A) with the bushing oil hole (B).







CONROD/CRANKSHAFT INSPECTION

CONROD SMALL END I.D.

Measure the conrod small end inside diameter using the small bore gauge.

If the conrod small end inside diameter exceeds the service limit, replace the conrod.

- TOOL** 09900-20602: Dial gauge (1/1000 mm, 1 mm)
09900-22403: Small bore gauge (18–35 mm)

Service Limit

Conrod small end I.D.: 23.040 mm (0.9071 in)

CONROD BIG END SIDE CLEARANCE

Check the conrod big end side clearance using the thickness gauge. If the clearance exceeds the limit, measure the conrod big end width and crank pin width.

If any of the measurements are out of specification, replace the defective part(s).

- TOOL** 09900-20803: Thickness gauge

Service Limit

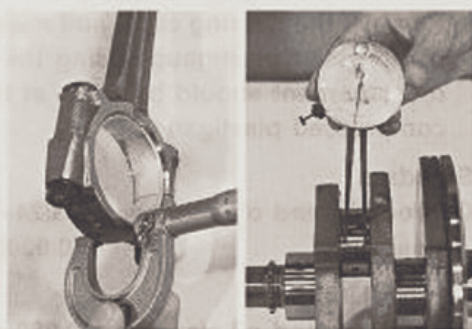
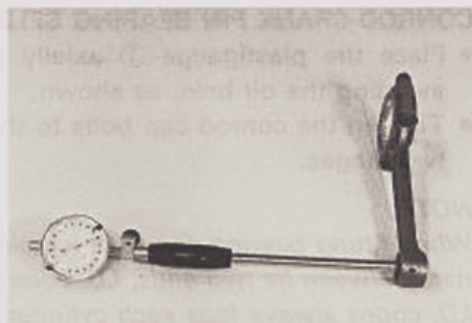
Conrod big end side clearance: 0.3 mm (0.012 in)

- TOOL** 09900-20205: Micrometer (0–25 mm)
09900-20605: Dial calipers (10–34 mm)

Standard

Conrod big end width: 21.95–22.00 mm (0.864–0.866 in)

Crank pin width: 22.10–22.15 mm (0.870–0.872 in)



CONROD-CRANK PIN BEARING INSPECTION AND SERVICE

CONROD-CRANK PIN BEARING INSPECTION

- Loosen the bearing cap nuts and tap the bearing cap nut end lightly using a plastic hammer to remove the bearing cap.

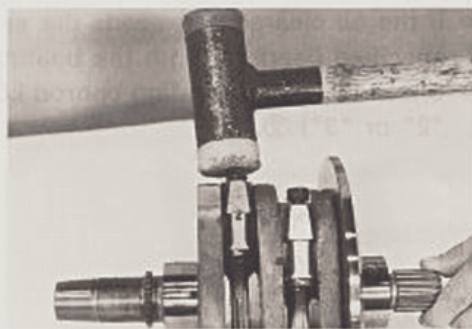
▲ CAUTION

Be sure to install the bearing cap to the original position when reassembling.

- Remove the conrods and mark them to identify their respective cylinders.
- Inspect the bearing surfaces for any signs of fusion, pitting, burns, or flaws. If there is any damage, replace them with the specified set of bearings.

▲ CAUTION

Never try to remove or loosen the conrod big end stud, otherwise, it will displace the stud and will not fit the bearing cap properly.




CONROD-CRANK PIN BEARING SELECTION

- Place the plastigauge ① axially along the crank pin, avoiding the oil hole, as shown.
- Tighten the conrod cap bolts to the specified torque, in two stages.

NOTE:

When fitting bearing cap to crank pin, be sure to discriminate between its two ends, I.D. code A side and the other. I.D. codes always face each cylinder intake valve sides.

 Conrod cap nut (Initial): 25 N·m (2.5 kg-m, 18.0 lb-ft)
(Final) : 51 N·m (5.1 kg-m, 37.0 lb-ft)

 09900-22301: Plastigauge

NOTE:

Never rotate the crankshaft or conrod when a piece of plastigauge is installed.

- Remove the bearing caps, and measure the width of the compressed plastigauge using the envelope scale. This measurement should be taken at the widest part of the compressed plastigauge.

Standard

Conrod big end oil clearance: 0.024–0.042 mm
(0.0009–0.0017 in)

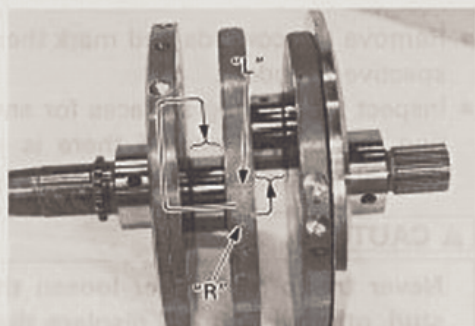
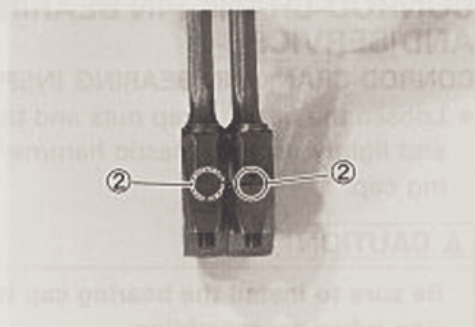
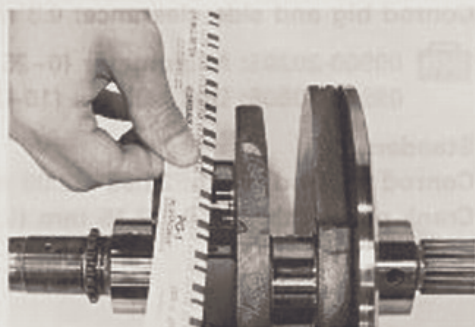
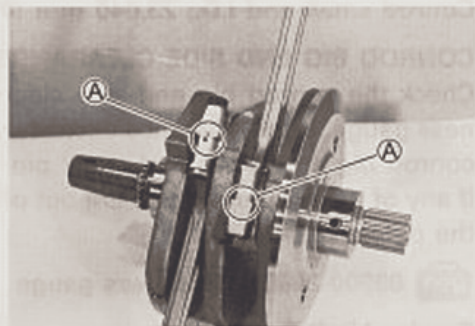
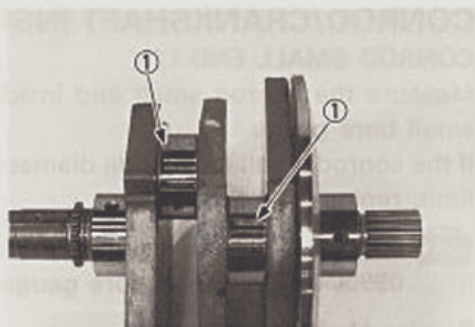
Service Limit

Conrod big end oil clearance: 0.080 mm (0.0031 in)

- If the oil clearance exceeds the service limit, select the specified bearings from the bearing selection table.
- Check the corresponding conrod I.D. code numbers ("1" "2" or "3") ②.

- Check the corresponding crank pin O.D. code numbers ("1", "2" or "3").

		Crank pin O.D.		
	Code	1	2	3
Conrod I.D. ②	1	Green	Black	Brown
	2	Black	Brown	Yellow
	3	Brown	Yellow	Blue



Conrod I.D. specification

Code	I.D. specification
1	53.000–53.006 mm (2.0866–2.0868 in)
2	53.006–53.012 mm (2.0868–2.0871 in)
3	53.012–53.018 mm (2.0871–2.0873 in)

Crank pin O.D. specification

Code	O.D. specification
1	49.994–50.000 mm (1.9683–1.9685 in)
2	49.988–49.994 mm (1.9680–1.9683 in)
3	49.982–49.988 mm (1.9678–1.9680 in)



09900-20202: Micrometer (25–50 mm)

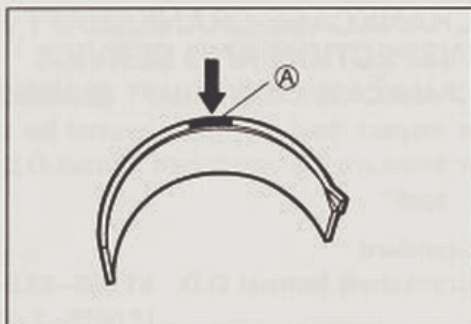
Bearing thickness

Color (Part No.)	Thickness
Green (12164-38B01-0A0)	1.485–1.488 mm (0.0585–0.0586 in)
Black (12164-38B01-0B0)	1.488–1.491 mm (0.0586–0.0587 in)
Brown (12164-38B01-0C0)	1.491–1.494 mm (0.0587–0.0588 in)
Yellow (12164-38B01-0D0)	1.494–1.497 mm (0.0588–0.0589 in)
Blue (12164-38B01-0E0)	1.497–1.500 mm (0.0589–0.0591 in)

Ⓐ Color code

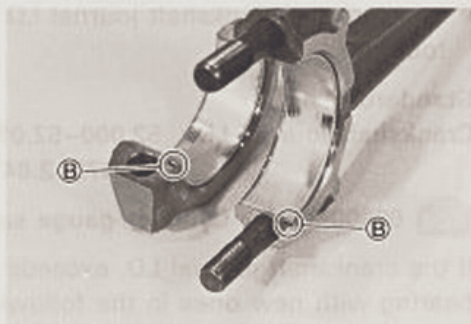
⚠ CAUTION

The bearings should be replaced as a set.




BEARING ASSEMBLY


- When installing the bearings into the bearing cap and conrod, be sure to install the tab Ⓑ first, and then press in the opposite side of the bearing.



- Apply SUZUKI MOLY PASTE and engine oil to the crank pin and bearing surface.

 99000-25140: SUZUKI MOLY PASTE

- When fitting the conrods on the crankshaft, make sure that I.D. codes **A** of the conrods face each cylinder intake valve sides.
- Apply engine oil to the conrod cap bolts.
- Tighten the conrod cap nuts to the specified torque.

 **Conrod cap nut** (Initial) : 25 N·m (2.5 kg-m, 18.0 lb-ft)
(Final) : 51 N·m (5.1 kg-m, 37.0 lb-ft)

- Check that the conrod moves smoothly.

CRANKCASE-CRANKSHAFT BEARING INSPECTION AND SERVICE

CRANKCASE-CRANKSHAFT BEARING INSPECTION

- Inspect the crankshaft journal for any damage.
- Measure the crankshaft journal O.D. by using the special tool.

Standard

Crankshaft journal O.D.: 51.965–51.980 mm
(2.0459–2.0465 in)


 09900-20203: Micrometer (50–75 mm)

- Inspect the crankshaft journal bearings for any damage. If any, replace them with a specified set of bearings.

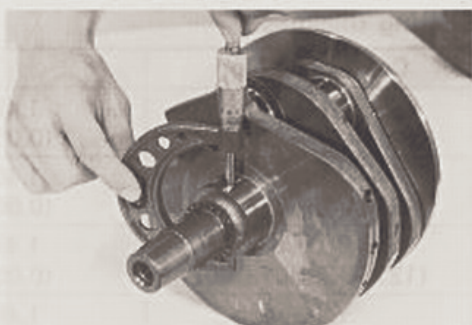
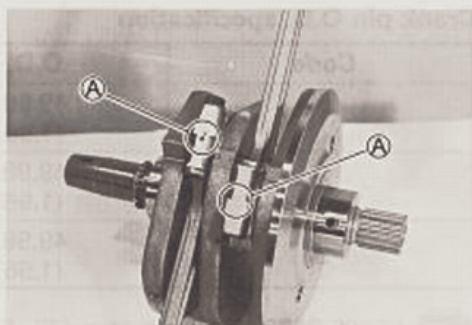
- Measure the crankshaft journal I.D. by using the special tool.

Standard

Crankshaft journal I.D.: 52.000–52.015 mm
(2.0472–2.0478 in)

 09900-20508: Cylinder gauge set

If the crankshaft journal I.D. exceeds the limit, replace the bearing with new ones in the following procedure.



- Remove the crankshaft journal bearing with taking care not to damage the crankcase bearing hole.

NOTE:

Remove the right side crankshaft journal bearing from inside to outside of the right crankcase halves. Remove the left side crankshaft journal bearing from outside to inside of the left crankcase halves.

- Inspect the bearing hole of crankcase for any sign of pitting or flaw.
If any, repair it with emery paper.
- Install the bearings into the crankcases by hydraulic press.

NOTE:

When installing the bearing, be sure to install the stopper part (A) to the groove (B).

- Honing the bearings with specified value.

Standard

Crankshaft journal I.D.: 52.000–52.015 mm
(2.0472–2.0478 in)



CRANKSHAFT THRUST CLEARANCE ADJUSTMENT

- Install the crankshaft in the left crankcase half and install the thrust shim on the crankshaft.
- Install the right crankcase half and tighten the crankcase bolts temporarily.

NOTE:

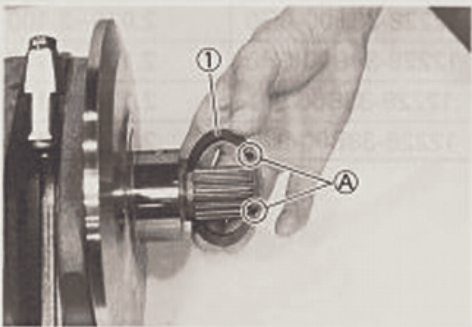
- * It is not necessary to apply SUZUKI BOND "1207B" to the mating surface.
- * The oil grooved face (A) of thrust shim (1) is faced to crankshaft web side.
- Install the thrust washer, cam sprocket drive gear and primary drive gear on the right end of the crankshaft and tighten primary drive gear bolt to the specified torque. (See to p. 3-44.)

 09930-40113 : Rotor holder

 Primary drive gear bolt: 150 N·m (15.0 kg-m, 108.5 lb-ft)

NOTE:

This bolt has left-hand thread.



- Use a thickness gauge to measure the thrust clearance at some places between right crankcase and thrust washer.

Standard

Crankshaft thrust clearance: 0.05–0.10 mm (0.002–0.004 in)



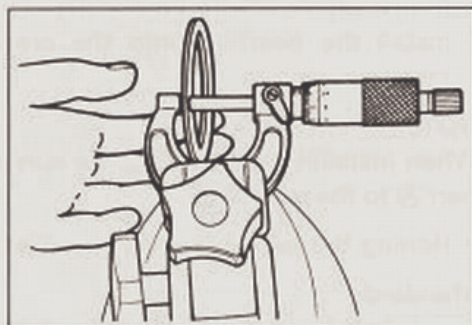
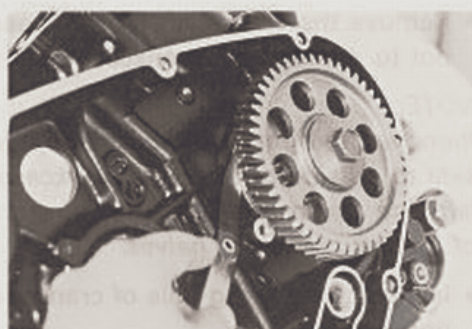
09900-20803: Thickness gauge

If the thrust clearance exceeds the standard range, adjust the thrust clearance by the following procedures:

- Remove the thrust shim, and measure its thickness with a micrometer.
- Change the thrust shim with the other shim if the thrust clearance is incorrect.
- Perform the thrust clearance measurement described above once again.



09900-20205: Micrometer (0–25 mm)

**Checking to make sure it is within standard**

Unit: mm (in)

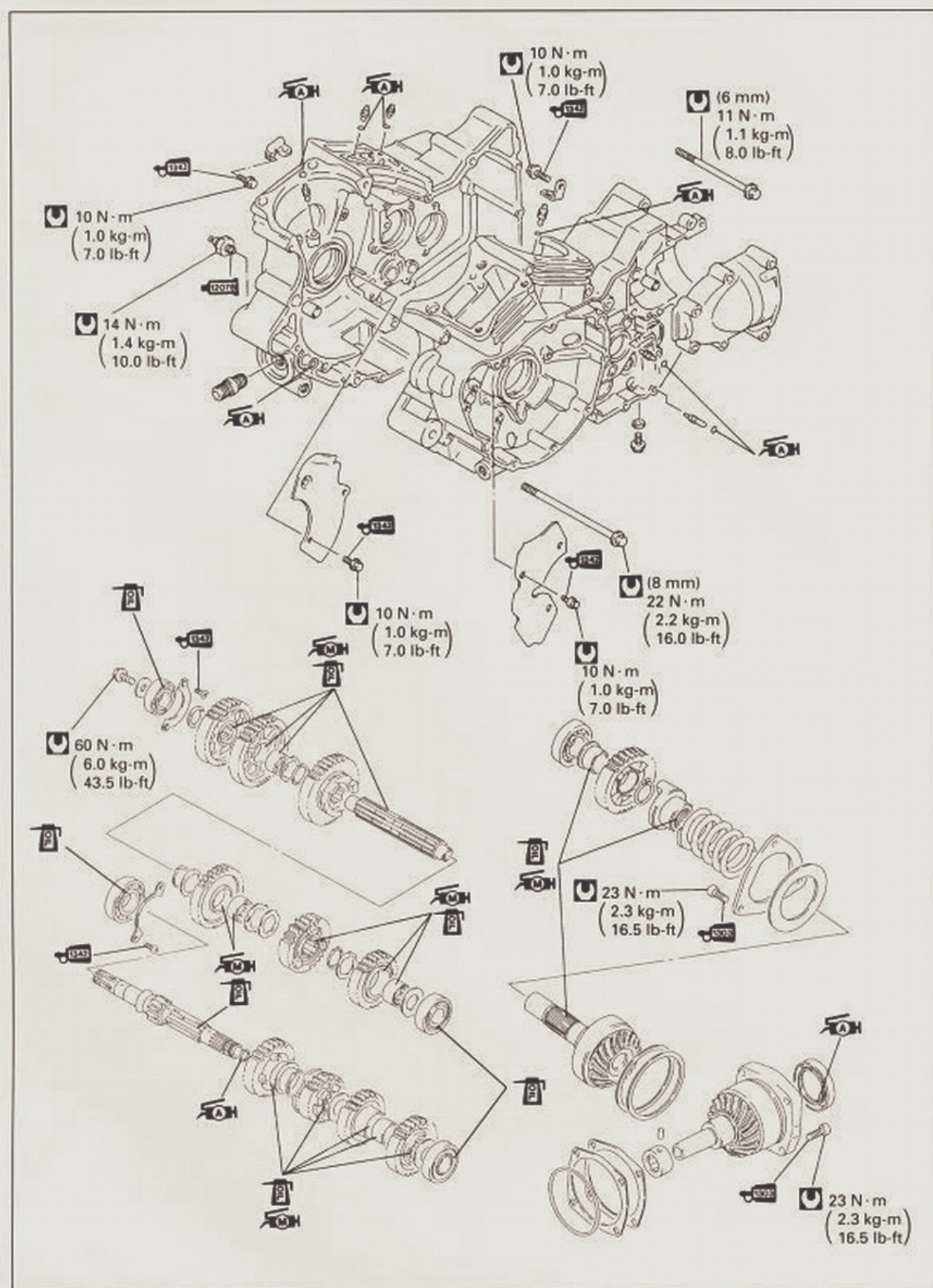
Part number	Thrust shim thickness	ID No.
12228-38B00-0A0	1.925–1.950 (0.0758–0.0768)	1
12228-38B00-0B0	1.950–1.975 (0.0768–0.0778)	2
12228-38B00-0C0	1.975–2.000 (0.0778–0.0787)	3
12228-38B00-0D0	2.000–2.025 (0.0787–0.0797)	4
12228-38B00-0E0	2.025–2.050 (0.0797–0.0807)	5
12228-38B00-0F0	2.050–2.075 (0.0807–0.0817)	6
12228-38B00-0G0	2.075–2.100 (0.0817–0.0827)	7
12228-38B00-0H0	2.100–2.125 (0.0827–0.0837)	8
12228-38B00-0I0	2.125–2.150 (0.0837–0.0846)	9
12228-38B00-0J0	2.150–2.175 (0.0846–0.0856)	10

TRANSMISSION/CRANKSHAFT/CONROD INSTALLATION

Refer to the engine reassembly and the engine installation sections for these engine components installation.

- * **ENGINE REASSEMBLY** See pp. 3-30 to -60.
- * **ENGINE INSTALLATION** See pp. 3-11 to -15.

CRANKCASE/TRANSMISSION/CRANKSHAFT/CONROD



TRANSMISSION/CRANKSHAFT/CONROD REMOVAL

The crankcase must be separated to service the transmission, the crankshaft and the conrods. These engine components require engine removal and disassembly. Refer to the engine removal and the engine disassembly sections.

* **ENGINE REMOVAL** See pp. 3-2 to -10.

* **ENGINE DISASSEMBLY** See pp. 3-16 to -30.

TRANSMISSION INSPECTION AND SERVICE

⚠ CAUTION

Identify the position of each removed part. Organize the parts in their respective groups (i.e., drive or driven) so that they can be reinstalled in their original positions.

GEARSHIFT FORK TO GROOVE CLEARANCE

Measure the gearshift fork clearance in the groove of its respective gear using the thickness gauge.

If the clearance exceeds the specification, replace the fork, its respective gear or both.

The clearance for each of the three gearshift forks plays an important role in the smoothness and positiveness of the shifting action.



09900-20803: Thickness gauge

09900-20102: Vernier calipers

Standard

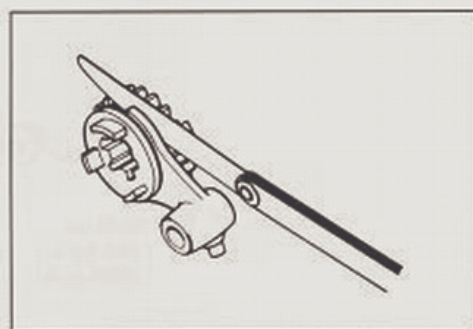
Gearshift fork to groove clearance: 0.10–0.30 mm
(0.004–0.012 in)

Service Limit:

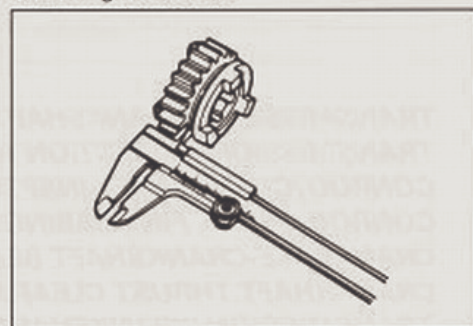
Gearshift fork to groove clearance: 0.5 mm (0.020 in)

Standard

Gearshift fork groove width: 5.50–5.60 mm (0.217–0.220 in)



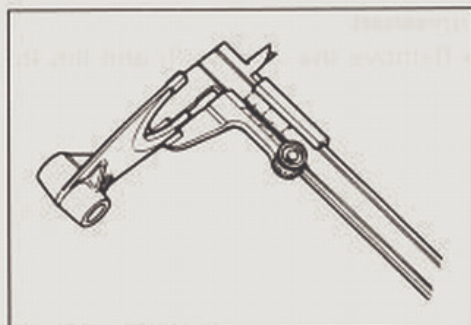
Checking clearance



Checking groove width

Standard

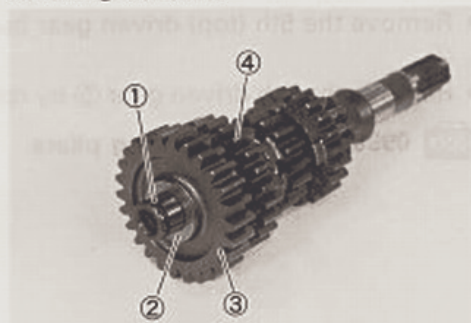
Gearshift fork thickness: 5.30–5.40 mm (0.209–0.213 in)



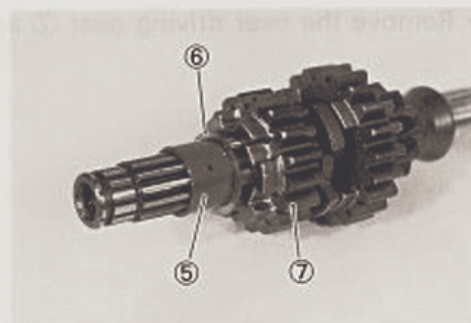
Checking thickness

DISASSEMBLY**Countershaft**


- Remove the O-ring ①, washer ②, 5th (top) drive gear ③ and 4th drive gear ④.



- Remove the 4th drive gear bushing ⑤, washer ⑥ and the 2nd drive gear ⑦.

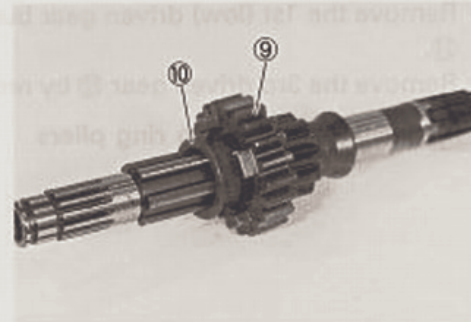


- Remove the 3rd drive gear circlip ⑧.

 **09900-06107: Snap ring pliers**

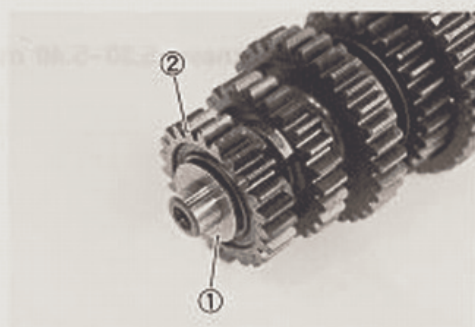


- Remove the 3rd drive gear ⑨ and its bushing ⑩.



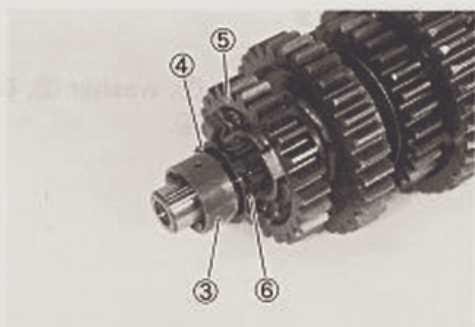
Driveshaft

- Remove the washer ① and 5th (top) driven gear ②.

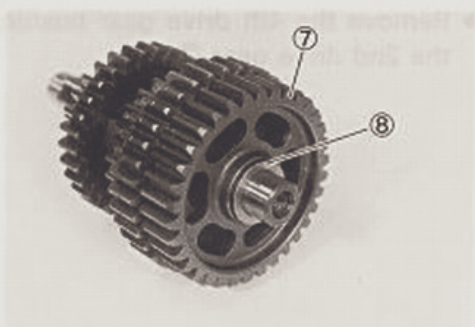


- Remove the 5th (top) driven gear bushing ③ and washer ④.
- Remove the 4th driven gear ⑤ by removing the circlip ⑥.

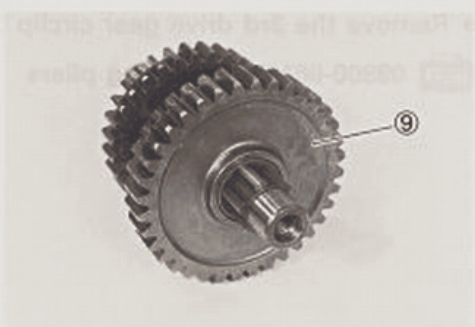
TOOL 09900-06107: Snap ring pliers



- Remove the over driving gear ⑦ and washer ⑧.

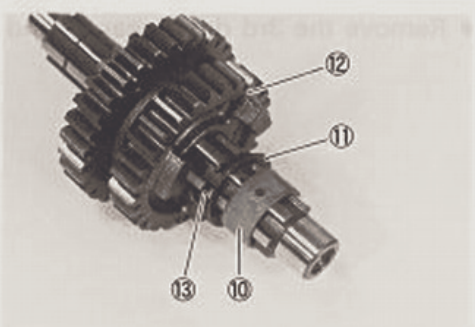


- Remove the 1st (low) driven gear ⑨.



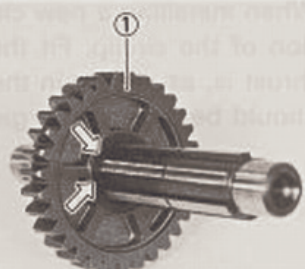
- Remove the 1st (low) driven gear bushing ⑩ and washer ⑪.
- Remove the 3rd driven gear ⑫ by removing the circlip ⑬.

TOOL 09900-06107: Snap ring pliers

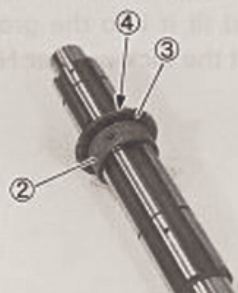


- Remove the 2nd driven gear ① and washer by removing the circlip.

 09900-06107: Snap ring pliers



- Remove the 2nd driven gear bushing ②, lock washer No.1 ③ and No.2 ④.




REASSEMBLY

Assemble the countershaft and driveshaft in the reverse order of disassembly. Pay attention to the following points:

NOTE:

- After installing the gears, rotate the gears by hand to inspect for abnormal noises and smooth rotation. Replace the gear or bushing if there is anything unusual.
- Before installing the gears, lightly coat the driveshaft, countershaft and bushings with SUZUKI MOLY PASTE or engine oil.
- Before installing the O-ring, apply grease to it.

 99000-25140: SUZUKI MOLY PASTE

 99000-25030: SUZUKI SUPER GREASE "A"

CAUTION

- Never reuse a circlip. After a circlip has been removed from a shaft, it should be discarded and a new circlip must be installed.
- When installing a new circlip, do not expand the end gap larger than required to slip the circlip over the shaft.
- After installing a circlip, make sure that it is completely seated in its groove and securely fitted.

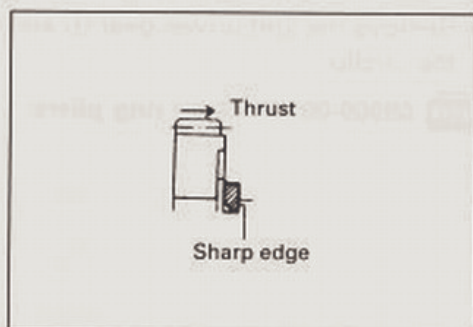
NOTE:

When reassembling the transmission, attention must be given to the locations and positions of washers and circlips. The cross sectional view shows the correct position of the gears, bushings, washers and circlips.

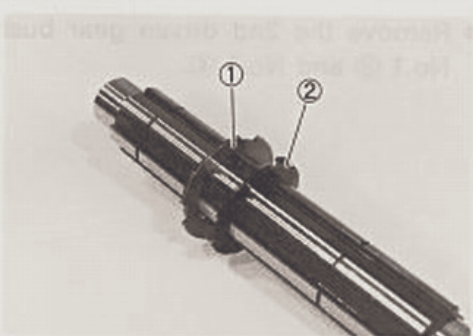
(See pp. 3F-6 and -7.)



- When installing a new circlip, pay attention to the direction of the circlip. Fit the circlip to the side where the thrust is, as shown in the illustration. The rounded side should be against the gear surface.

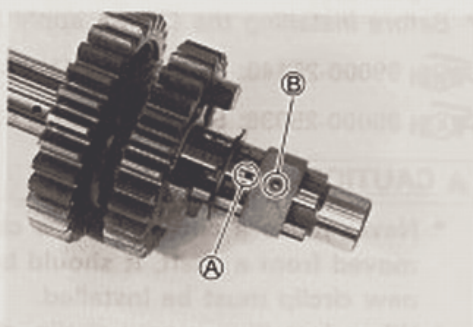
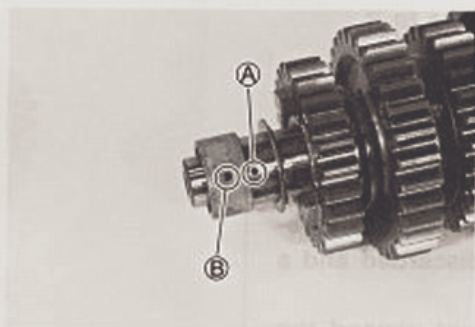
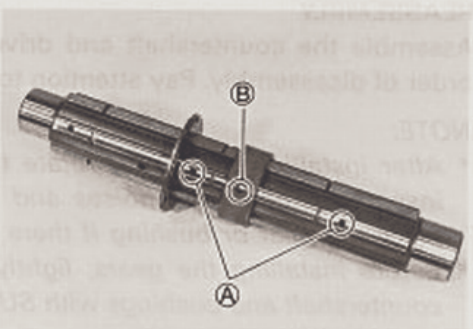


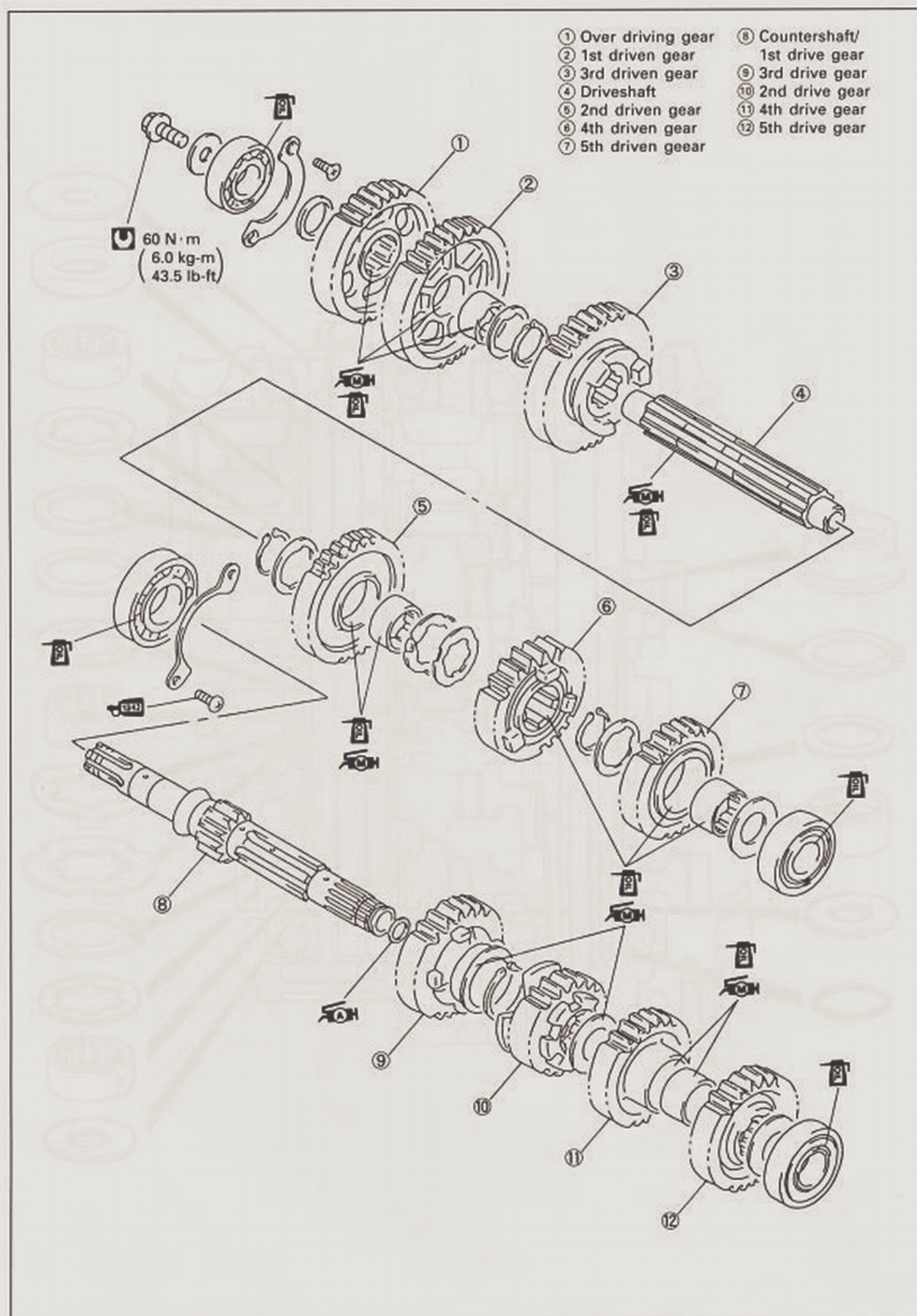
- Install the lock washer No.2 ① onto the driveshaft, and turn and fit it into the groove.
- Then, fit the lock washer No.1 ② in the lock washer No.2 ①.

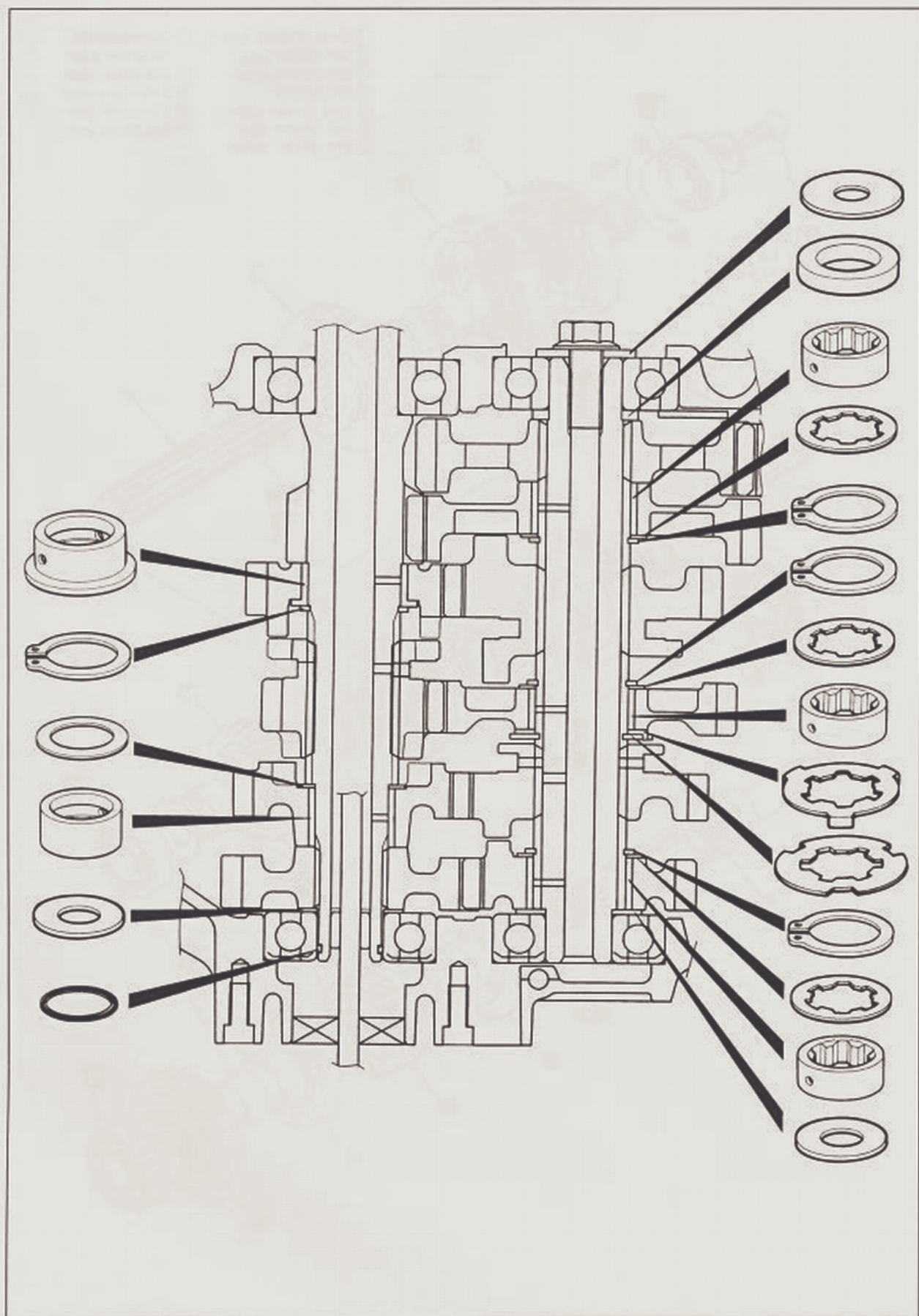


CAUTION

When installing the 2nd, 1st and 5th driven gear bushings onto the driveshaft, align the driveshaft oil hole (A) with the bushing oil hole (B).







CONROD/CRANKSHAFT INSPECTION

CONROD SMALL END I.D.

Measure the conrod small end inside diameter using the small bore gauge.

If the conrod small end inside diameter exceeds the service limit, replace the conrod.

- TOOL** 09900-20602: Dial gauge (1/1000 mm, 1 mm)
09900-22403: Small bore gauge (18–35 mm)

Service Limit

Conrod small end I.D.: 23.040 mm (0.9071 in)

CONROD BIG END SIDE CLEARANCE

Check the conrod big end side clearance using the thickness gauge. If the clearance exceeds the limit, measure the conrod big end width and crank pin width.

If any of the measurements are out of specification, replace the defective part(s).

- TOOL** 09900-20803: Thickness gauge

Service Limit

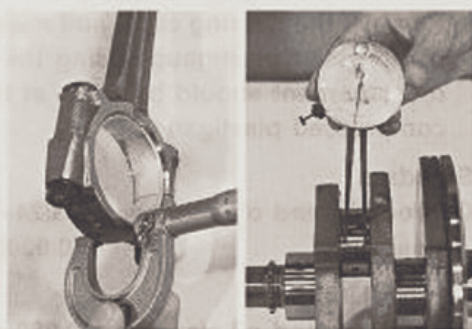
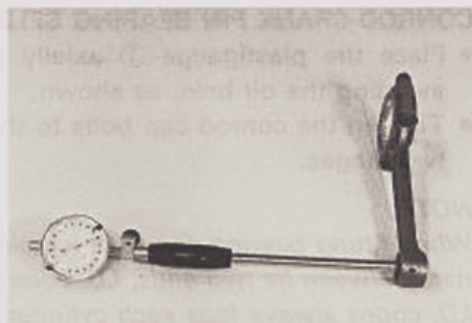
Conrod big end side clearance: 0.3 mm (0.012 in)

- TOOL** 09900-20205: Micrometer (0–25 mm)
09900-20605: Dial calipers (10–34 mm)

Standard

Conrod big end width: 21.95–22.00 mm (0.864–0.866 in)

Crank pin width: 22.10–22.15 mm (0.870–0.872 in)



CONROD-CRANK PIN BEARING INSPECTION AND SERVICE

CONROD-CRANK PIN BEARING INSPECTION

- Loosen the bearing cap nuts and tap the bearing cap nut end lightly using a plastic hammer to remove the bearing cap.

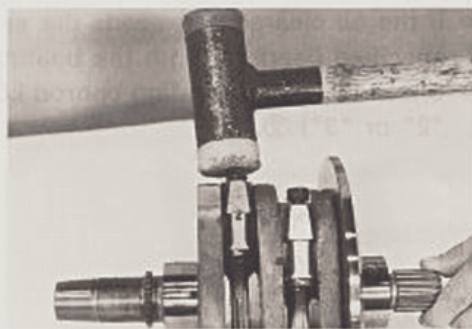
▲ CAUTION

Be sure to install the bearing cap to the original position when reassembling.

- Remove the conrods and mark them to identify their respective cylinders.
- Inspect the bearing surfaces for any signs of fusion, pitting, burns, or flaws. If there is any damage, replace them with the specified set of bearings.

▲ CAUTION

Never try to remove or loosen the conrod big end stud, otherwise, it will displace the stud and will not fit the bearing cap properly.




CONROD-CRANK PIN BEARING SELECTION

- Place the plastigauge ① axially along the crank pin, avoiding the oil hole, as shown.
- Tighten the conrod cap bolts to the specified torque, in two stages.

NOTE:

When fitting bearing cap to crank pin, be sure to discriminate between its two ends, I.D. code A side and the other. I.D. codes always face each cylinder intake valve sides.

 Conrod cap nut (Initial): 25 N·m (2.5 kg-m, 18.0 lb-ft)
(Final) : 51 N·m (5.1 kg-m, 37.0 lb-ft)

 09900-22301: Plastigauge

NOTE:

Never rotate the crankshaft or conrod when a piece of plastigauge is installed.

- Remove the bearing caps, and measure the width of the compressed plastigauge using the envelope scale. This measurement should be taken at the widest part of the compressed plastigauge.

Standard

Conrod big end oil clearance: 0.024–0.042 mm
(0.0009–0.0017 in)

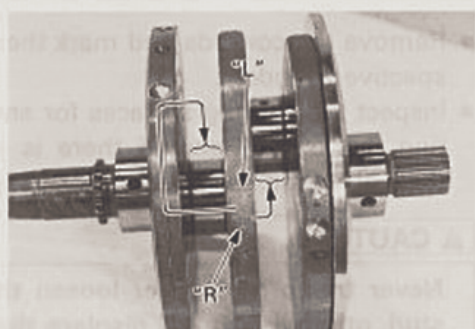
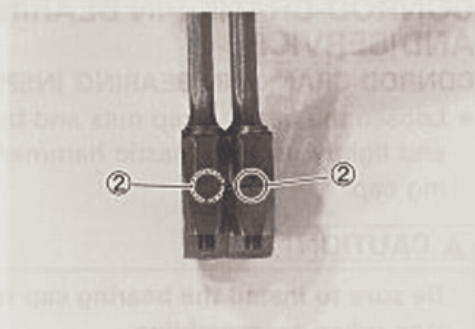
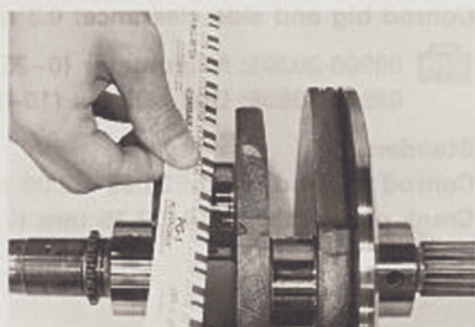
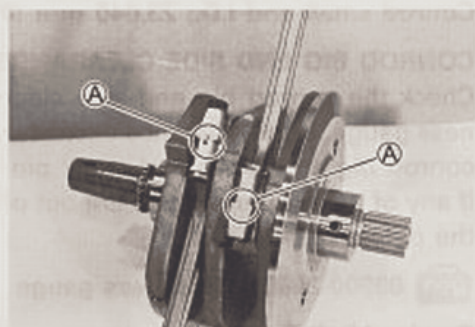
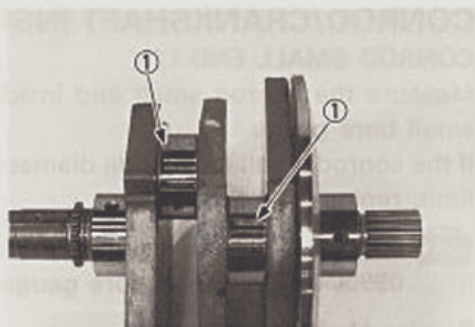
Service Limit

Conrod big end oil clearance: 0.080 mm (0.0031 in)

- If the oil clearance exceeds the service limit, select the specified bearings from the bearing selection table.
- Check the corresponding conrod I.D. code numbers ("1" "2" or "3") ②.

- Check the corresponding crank pin O.D. code numbers ("1", "2" or "3").

		Crank pin O.D.		
	Code	1	2	3
Conrod I.D. ②	1	Green	Black	Brown
	2	Black	Brown	Yellow
	3	Brown	Yellow	Blue



Conrod I.D. specification

Code	I.D. specification
1	53.000–53.006 mm (2.0866–2.0868 in)
2	53.006–53.012 mm (2.0868–2.0871 in)
3	53.012–53.018 mm (2.0871–2.0873 in)

Crank pin O.D. specification

Code	O.D. specification
1	49.994–50.000 mm (1.9683–1.9685 in)
2	49.988–49.994 mm (1.9680–1.9683 in)
3	49.982–49.988 mm (1.9678–1.9680 in)



09900-20202: Micrometer (25–50 mm)

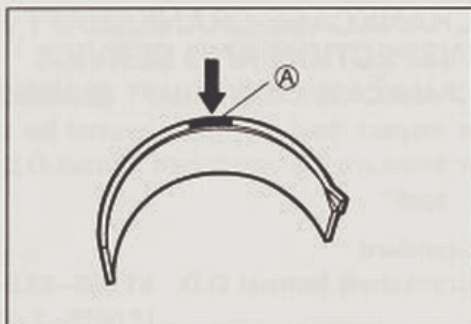
Bearing thickness

Color (Part No.)	Thickness
Green (12164-38B01-0A0)	1.485–1.488 mm (0.0585–0.0586 in)
Black (12164-38B01-0B0)	1.488–1.491 mm (0.0586–0.0587 in)
Brown (12164-38B01-0C0)	1.491–1.494 mm (0.0587–0.0588 in)
Yellow (12164-38B01-0D0)	1.494–1.497 mm (0.0588–0.0589 in)
Blue (12164-38B01-0E0)	1.497–1.500 mm (0.0589–0.0591 in)

Ⓐ Color code

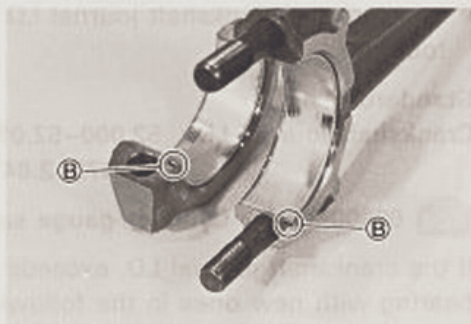
⚠ CAUTION

The bearings should be replaced as a set.




BEARING ASSEMBLY


- When installing the bearings into the bearing cap and conrod, be sure to install the tab Ⓑ first, and then press in the opposite side of the bearing.



- Apply SUZUKI MOLY PASTE and engine oil to the crank pin and bearing surface.

 99000-25140: SUZUKI MOLY PASTE

- When fitting the conrods on the crankshaft, make sure that I.D. codes **A** of the conrods face each cylinder intake valve sides.
- Apply engine oil to the conrod cap bolts.
- Tighten the conrod cap nuts to the specified torque.

 **Conrod cap nut** (Initial) : 25 N·m (2.5 kg-m, 18.0 lb-ft)
(Final) : 51 N·m (5.1 kg-m, 37.0 lb-ft)

- Check that the conrod moves smoothly.

CRANKCASE-CRANKSHAFT BEARING INSPECTION AND SERVICE

CRANKCASE-CRANKSHAFT BEARING INSPECTION

- Inspect the crankshaft journal for any damage.
- Measure the crankshaft journal O.D. by using the special tool.

Standard

Crankshaft journal O.D.: 51.965–51.980 mm
(2.0459–2.0465 in)

 09900-20203: Micrometer (50–75 mm)

- Inspect the crankshaft journal bearings for any damage. If any, replace them with a specified set of bearings.

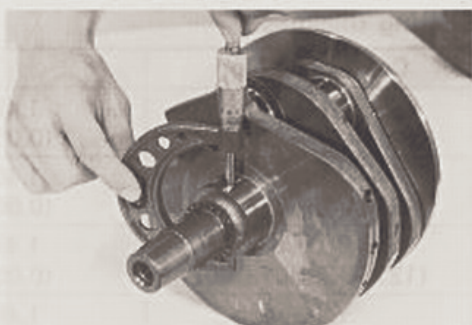
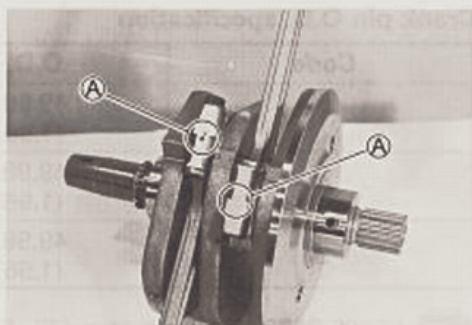
- Measure the crankshaft journal I.D. by using the special tool.

Standard

Crankshaft journal I.D.: 52.000–52.015 mm
(2.0472–2.0478 in)

 09900-20508: Cylinder gauge set

If the crankshaft journal I.D. exceeds the limit, replace the bearing with new ones in the following procedure.



- Remove the crankshaft journal bearing with taking care not to damage the crankcase bearing hole.

NOTE:

Remove the right side crankshaft journal bearing from inside to outside of the right crankcase halves. Remove the left side crankshaft journal bearing from outside to inside of the left crankcase halves.

- Inspect the bearing hole of crankcase for any sign of pitting or flaw.
If any, repair it with emery paper.
- Install the bearings into the crankcases by hydraulic press.

NOTE:

When installing the bearing, be sure to install the stopper part (A) to the groove (B).

- Honing the bearings with specified value.

Standard

Crankshaft journal I.D.: 52.000–52.015 mm
(2.0472–2.0478 in)



CRANKSHAFT THRUST CLEARANCE ADJUSTMENT

- Install the crankshaft in the left crankcase half and install the thrust shim on the crankshaft.
- Install the right crankcase half and tighten the crankcase bolts temporarily.

NOTE:

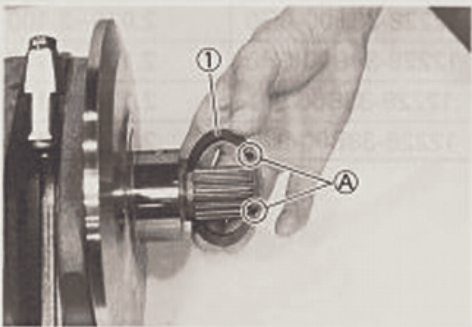
- * It is not necessary to apply SUZUKI BOND "1207B" to the mating surface.
- * The oil grooved face (A) of thrust shim (1) is faced to crankshaft web side.
- Install the thrust washer, cam sprocket drive gear and primary drive gear on the right end of the crankshaft and tighten primary drive gear bolt to the specified torque. (See to p. 3-44.)

 09930-40113 : Rotor holder

 Primary drive gear bolt: 150 N·m (15.0 kg-m, 108.5 lb-ft)

NOTE:

This bolt has left-hand thread.



- Use a thickness gauge to measure the thrust clearance at some places between right crankcase and thrust washer.

Standard

Crankshaft thrust clearance: 0.05–0.10 mm (0.002–0.004 in)



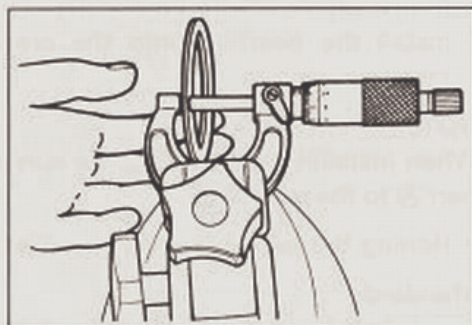
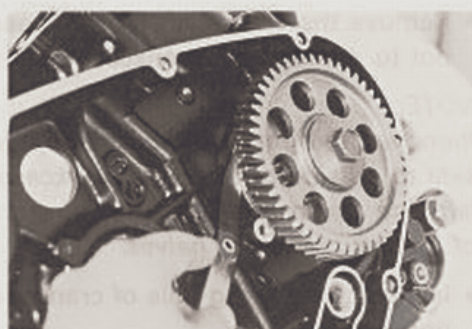
09900-20803: Thickness gauge

If the thrust clearance exceeds the standard range, adjust the thrust clearance by the following procedures:

- Remove the thrust shim, and measure its thickness with a micrometer.
- Change the thrust shim with the other shim if the thrust clearance is incorrect.
- Perform the thrust clearance measurement described above once again.



09900-20205: Micrometer (0–25 mm)

**Checking to make sure it is within standard**

Unit: mm (in)

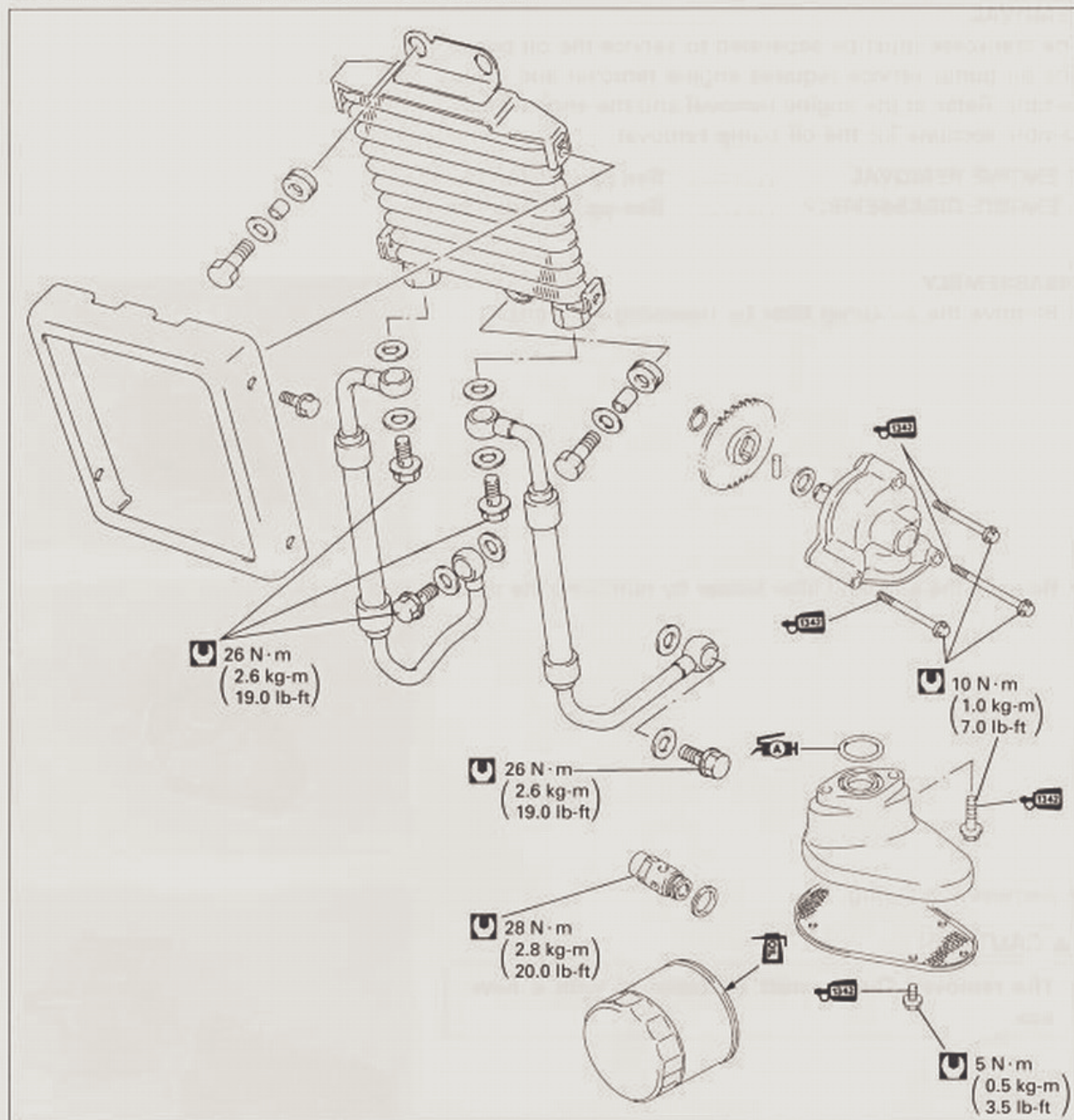
Part number	Thrust shim thickness	ID No.
12228-38B00-0A0	1.925–1.950 (0.0758–0.0768)	1
12228-38B00-0B0	1.950–1.975 (0.0768–0.0778)	2
12228-38B00-0C0	1.975–2.000 (0.0778–0.0787)	3
12228-38B00-0D0	2.000–2.025 (0.0787–0.0797)	4
12228-38B00-0E0	2.025–2.050 (0.0797–0.0807)	5
12228-38B00-0F0	2.050–2.075 (0.0807–0.0817)	6
12228-38B00-0G0	2.075–2.100 (0.0817–0.0827)	7
12228-38B00-0H0	2.100–2.125 (0.0827–0.0837)	8
12228-38B00-0I0	2.125–2.150 (0.0837–0.0846)	9
12228-38B00-0J0	2.150–2.175 (0.0846–0.0856)	10

TRANSMISSION/CRANKSHAFT/CONROD INSTALLATION

Refer to the engine reassembly and the engine installation sections for these engine components installation.

- * **ENGINE REASSEMBLY** See pp. 3-30 to -60.
- * **ENGINE INSTALLATION** See pp. 3-11 to -15.

ENGINE LUBRICATION SYSTEM



3G

CONTENTS

OIL PUMP/SUMP FILTER	3G- 1
OIL PRESSURE REGULATOR	3G- 3
OIL PRESSURE SWITCH/OIL COOLER	3G- 5
OIL FILTER	3G- 7
OIL PRESSURE	3G- 7
OIL JET	3G- 7
ENGINE LUBRICATION SYSTEM CHART	3G-12
ENGINE LUBRICATION SYSTEM	3G-13
CYLINDER HEAD COOLING SYSTEM CHART	3G-15
CYLINDER HEAD COOLING SYSTEM	3G-16

OIL PUMP/OIL SUMP FILTER

REMOVAL

The crankcase must be separated to service the oil pump. The oil pump service requires engine removal and disassembly. Refer to the engine removal and the engine disassembly sections for the oil pump removal.

- * ENGINE REMOVAL See pp. 3-2 to -10.
- * ENGINE DISASSEMBLY See pp. 3-16 to -30.

DISASSEMBLY

- Remove the oil sump filter by removing the bolts.
- Remove the oil sump filter holder by removing the bolts.
- Remove the O-ring.

CAUTION

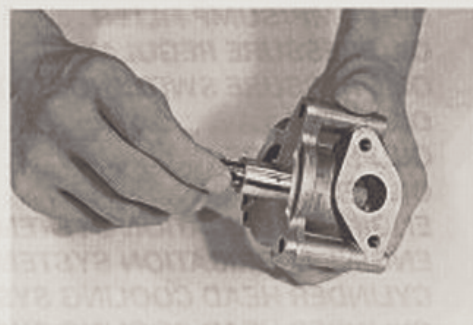
The removed O-ring must be replaced with a new one.

INSPECTION

Rotate the oil pump by hand and check that it moves smoothly. If it does not move smoothly, replace the oil pump assembly.

CAUTION

Do not attempt to disassemble the oil pump assembly.
The oil pump is available only as an assembly.




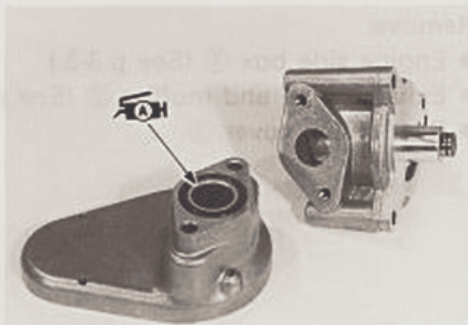
OIL SUMP FILTER CLEANING

Clean the oil sump filter using compressed air.

**REASSEMBLY**

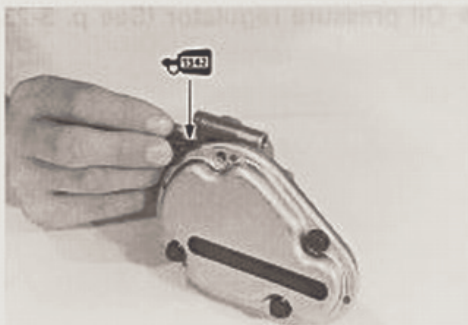
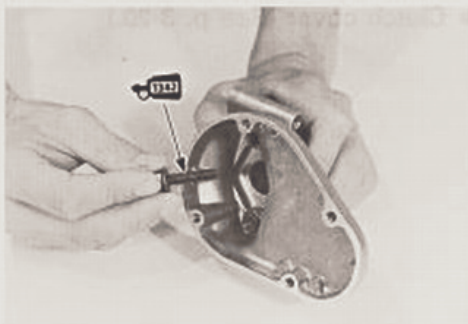
- When installing the O-ring, apply grease to it.

 99000-25030: SUZUKI SUPER GREASE "A"



- Apply a small quantity of the THREAD LOCK "1342" to the oil sump filter and holder bolts and tighten them securely.

 99000-32050: THREAD LOCK "1342"

**INSTALLATION**

Refer to the engine reassembly and the engine installation sections to install the oil pump.

- * ENGINE REASSEMBLY See pp. 3-31 to -60.
- * ENGINE INSTALLATION See pp. 3-11 to -15.

OIL PRESSURE REGULATOR

REMOVAL

After draining the engine oil, the following components must be removed in the described order before removing the oil pressure regulator.

NOTE:

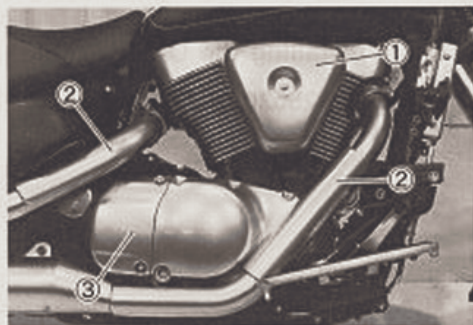
Refer to the following pages for the details of each step.

Drain:

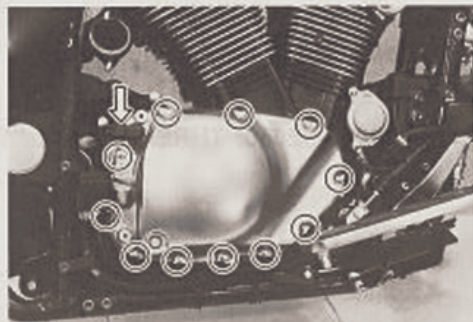
- Engine oil (See p. 2-6.)

Remove:

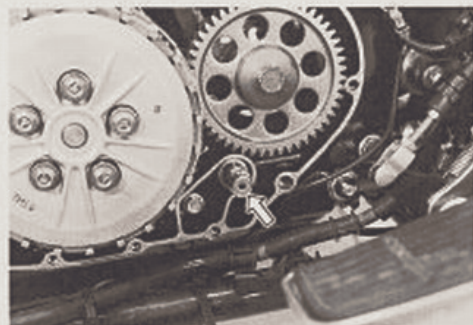
- Engine side box ① (See p.3-3.)
- Exhaust pipe and muffler ② (See p. 3-5.)
- Rear clutch cover ③



- Clutch cover (See p. 3-20.)



- Oil pressure regulator (See p. 3-23.)



OIL PRESSURE REGULATOR INSPECTION

Check the operation of the oil pressure regulator by pushing on the piston with an appropriately shaped tool. If the piston does not operate, replace the oil pressure regulator with a new one.



OIL PRESSURE REGULATOR INSTALLATION

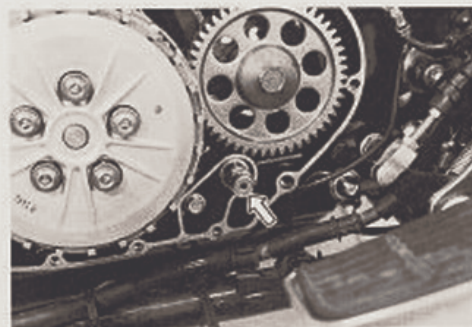
Installation is in the reverse order of removal.

NOTE:

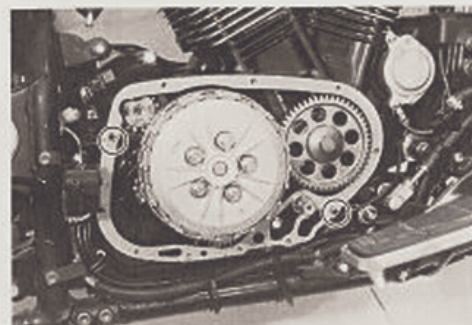
Refer to the following pages for the details of each step.

Install:

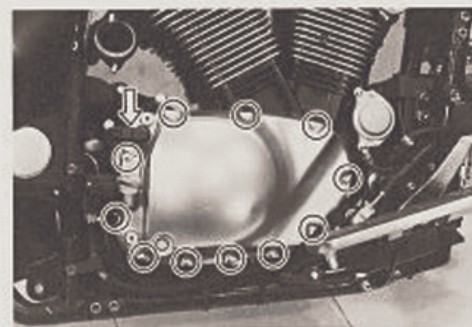
- Copper washer
- Oil pressure regulator (See p. 3-45.)



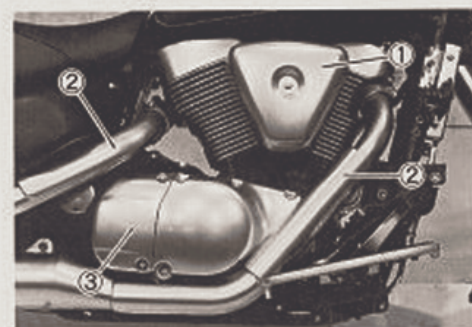
- Dowel pins
- Gasket (See p. 3-49.)



- Clutch cover (See p. 3-50.)



- Rear clutch cover ③
- Exhaust pipe and muffler ② (See p. 3-15.)
- Engine side box ①



Adjust the following item to specification.

- * Engine oil 2-6

Page

OIL PRESSURE SWITCH/OIL COOLER

REMOVAL

After draining the engine oil, remove the oil pressure switch and the oil cooler.

NOTE:

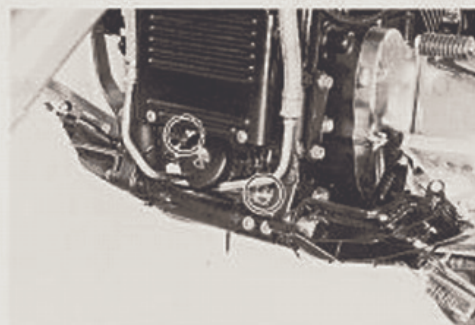
Refer to the following pages for the details of each step.

Drain:

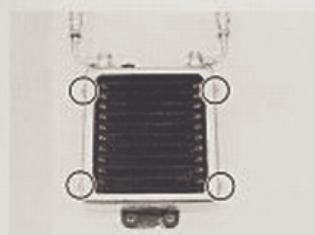
- Engine oil (See p. 2-6.)

Remove:

- Oil cooler union



- Oil cooler
- Oil cooler cover



- Oil pressure switch



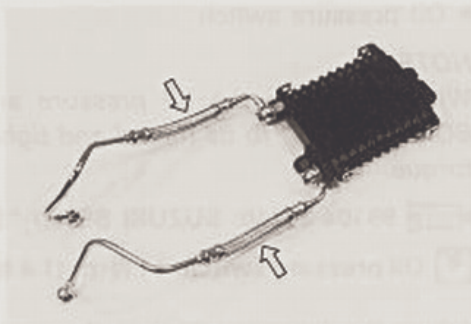
OIL PRESSURE SWITCH INSPECTION

See p. 7-35.



OIL COOLER HOSE INSPECTION

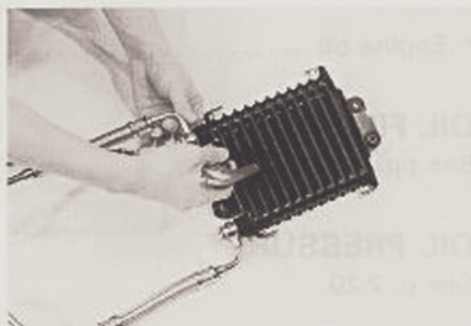
Inspect the oil cooler hoses for damage and oil leaks. If any defects are found, replace the oil cooler hose(s) with a new one.

**OIL COOLER INSPECTION AND CLEANING**

Remove any foreign matter that is stuck in the oil cooler fins using compressed air.

Inspect the oil cooler for oil leaks. If any defects are found, replace the oil cooler with a new one.

If the fins are bent or dented, repair them by carefully straightening them with the blade of a small screwdriver.

**INSTALLATION**

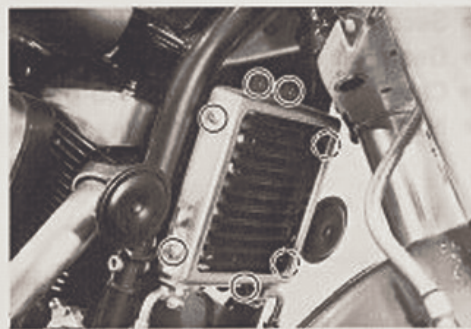
Installation is in the reverse order of removal.

NOTE:

Refer to the following pages for the details of each step.

Install:

- Oil cooler cover
- Oil cooler (See p. 3-13.)



- Oil pressure switch

NOTE:

When installing the oil pressure switch, apply SUZUKI BOND "1207B" to its thread and tighten it to the specified torque.

1207B 99104-31140: SUZUKI BOND "1207B"

 Oil pressure switch: 14 N·m (1.4 kg-m, 10.0 lb-ft)

Adjust the following item to the specification.

Page

* Engine oil 2-6

OIL FILTER

See pp. 2-6 and -7.

OIL PRESSURE

See p. 2-20.

OIL JET**OIL JETS (For transmission) REMOVAL**

After draining the engine oil, remove the oil jets (for transmission).

NOTE:

Refer to the following pages for the details of each step.

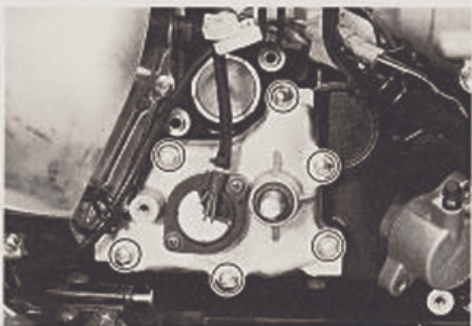
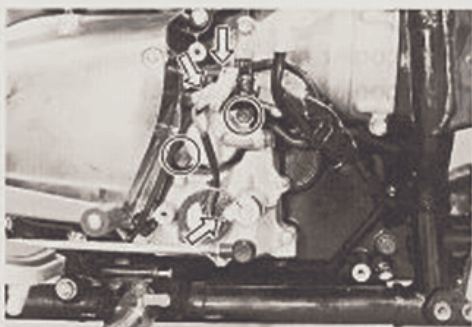
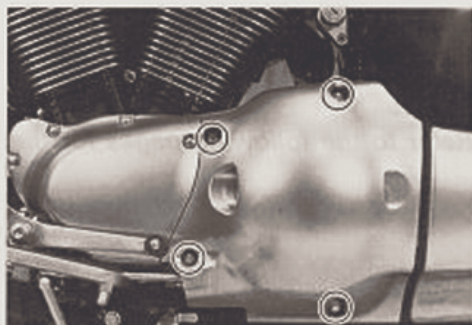
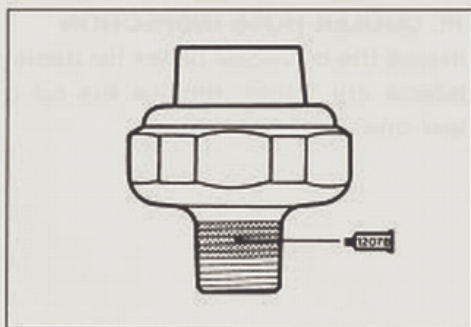
Drain:

- Engine oil (See p. 2-6.)

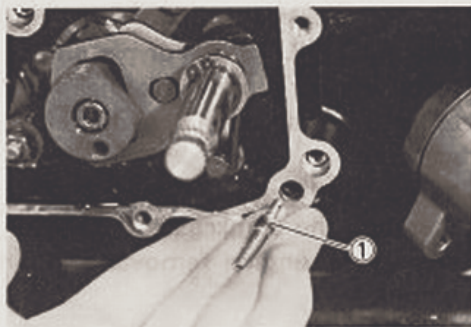
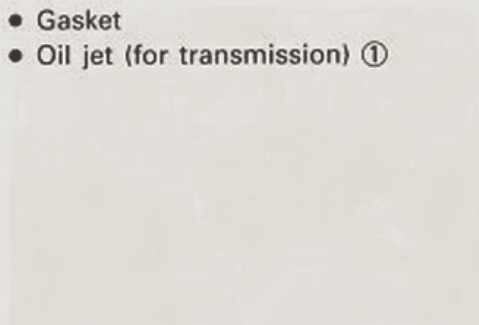
Remove:

- Secondary gear case cover (See p. 3-7.)
- Gearshift lever (See p. 3-7.)
- Clutch release cylinder (See p. 3-8.)
- Neutral indicator switch lead wire

- Gearshift cover (See p. 3-25.)



- Gasket
- Oil jet (for transmission) ①



OIL JET (For secondary bevel gears) REMOVAL

The following component parts must be removed in the described order before removing the oil jet (for secondary bevel gears).

NOTE:

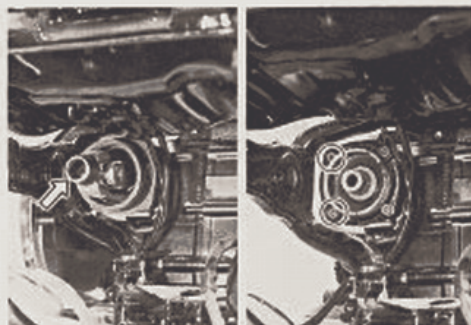
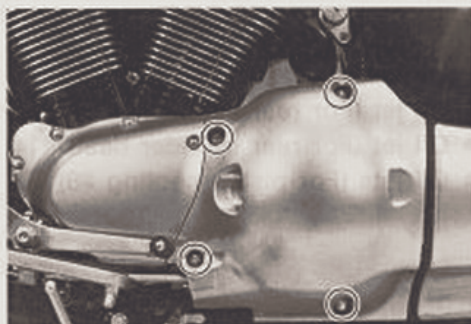
Refer to the following pages for the details of each step.

Drain:

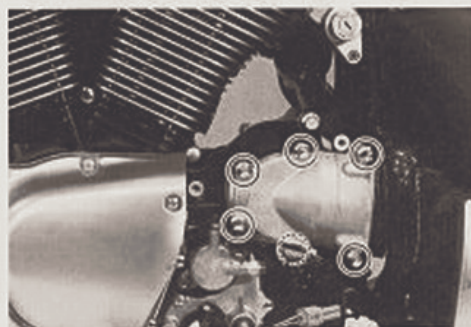
- Engine oil (See p. 2-6.)

Remove:

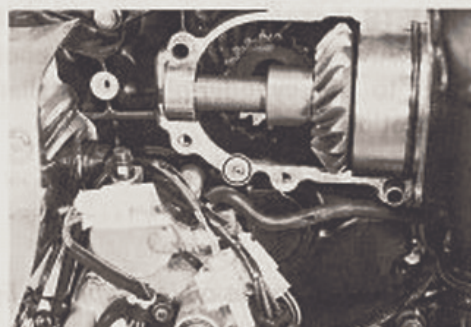
- Secondary gear case cover (See p. 3-7.)
- Swingarm (See pp. 3-35 and -36.)
- Boot
- Universal joint



- Secondary gear case (See pp. 3-24 and -25.)



- Oil jet (for secondary bevel gears)



OIL JETS (For rear cylinder head cooling and rear cylinder head) AND OIL JETS (For piston cooling) REMOVAL

The oil jets (for rear cylinder head cooling ① and rear cylinder head ②) can be removed after removing the rear cylinder.

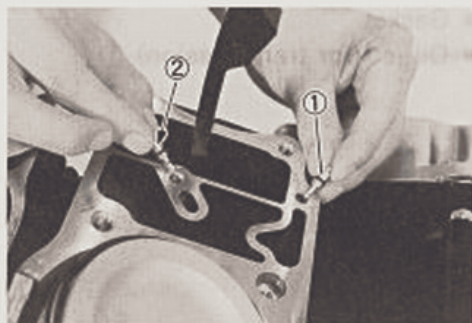
The oil jets (for piston cooling ③) can be removed after separating the crankcase.

Refer to the engine removal and cylinder/piston removal sections.

- * **ENGINE REMOVAL** See pp. 3-2 to -10.
- * **ENGINE DISASSEMBLY** See pp. 3-16 to -30.

Remove:

- Oil jet (For rear cylinder head cooling #22) ①
- Oil jet (For rear cylinder head #14) ②
- Oil jets (For piston cooling #8) ③

**INSPECTION**

Make sure that the piston cooling oil jets and the oil jets are not clogged. If they are clogged, clean their oil passage using a wire of the proper size and compressed air.

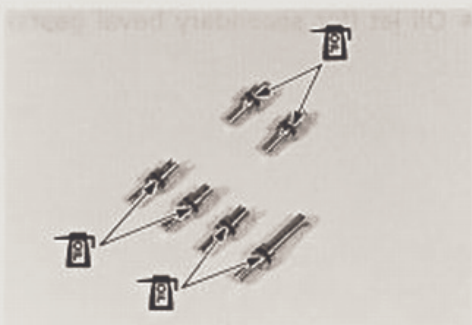
**OIL JETS (For rear cylinder head cooling and rear cylinder head) AND OIL JETS (For piston cooling) INSTALLATION**

Refer to the cylinder/piston installation and the engine installation sections.

- * **ENGINE REASSEMBLY** See pp. 3-31 to -60.
- * **ENGINE INSTALLATION** See pp. 3-11 to -15.

NOTE:

Before installing the oil jets, apply a light coat of engine oil to the O-rings.



OIL JET (For secondary bevel gears)

Installation is in the reverse order of removal.

NOTE:

Refer to the following pages for the details of each step.

Install:

- Oil jet (See p. 3-41.)

NOTE:

Before installing the oil jet, apply a light coat of engine oil to the O-ring.

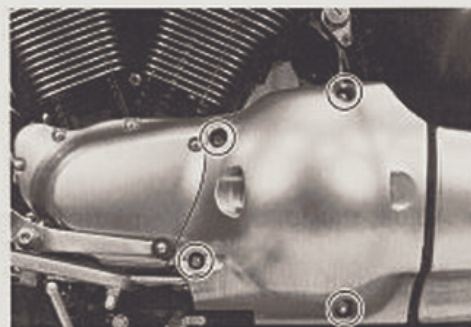
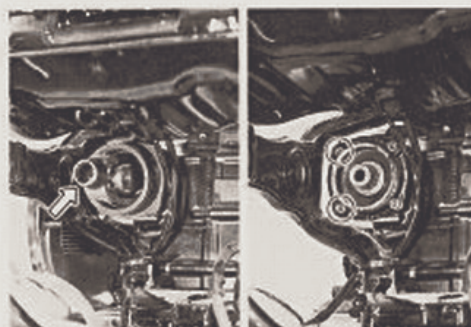
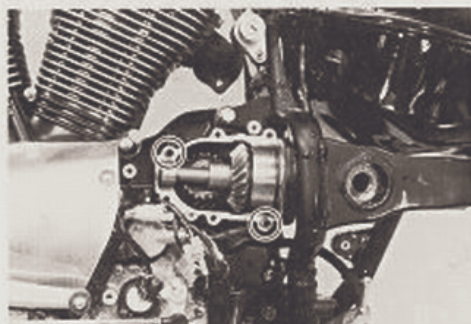
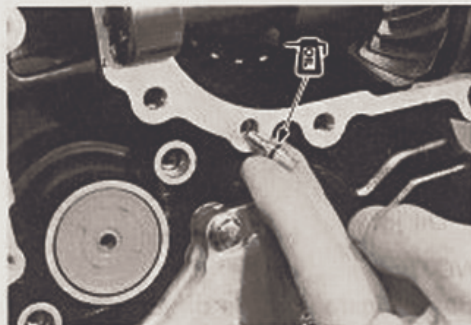
- Dowel pin (See p. 3-41.)

- Secondary gear case (See. p. 3-41.)
- Boot (See p. 3-11.)
- Universal joint

- Swingarm (See pp. 6-40 to -42.)
- Secondary gear case cover

- Adjust the following item to the specification.

- * Engine oil 2-6



Page

OIL JET (For transmission)

Installation is in the reverse order of removal.

NOTE:

Refer to the following pages for the details of each step.

Install:

- Oil jet

NOTE:

Before installing the oil jet, apply a light coat of engine oil to the O-ring.

- Gasket
- Dowel pin (See p. 3-39.)

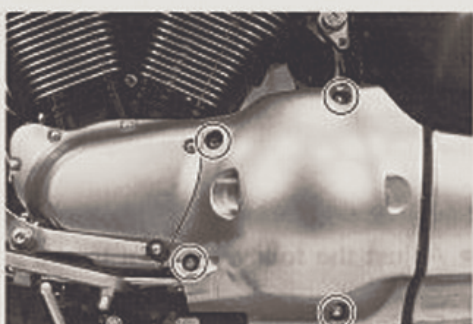
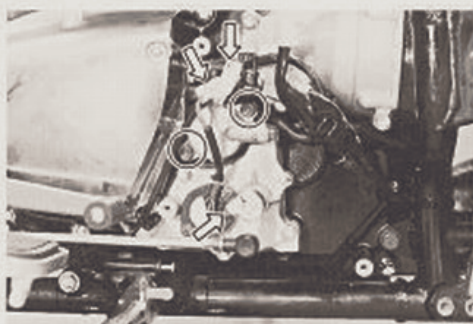
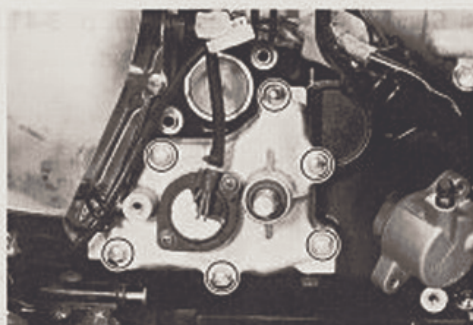
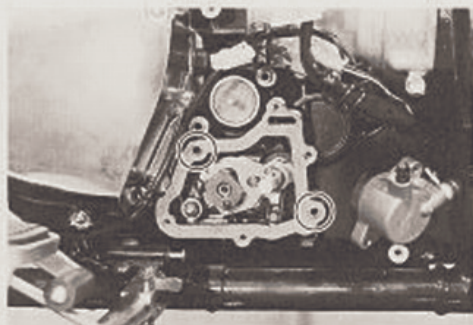
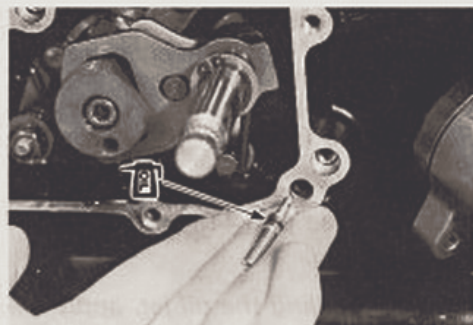
- Gearshift cover (See. p. 3-40.)

- Neutral indicator switch lead wire
- Clutch release cylinder (See p. 3-14.)
- Gearshift lever (See p. 3-14.)

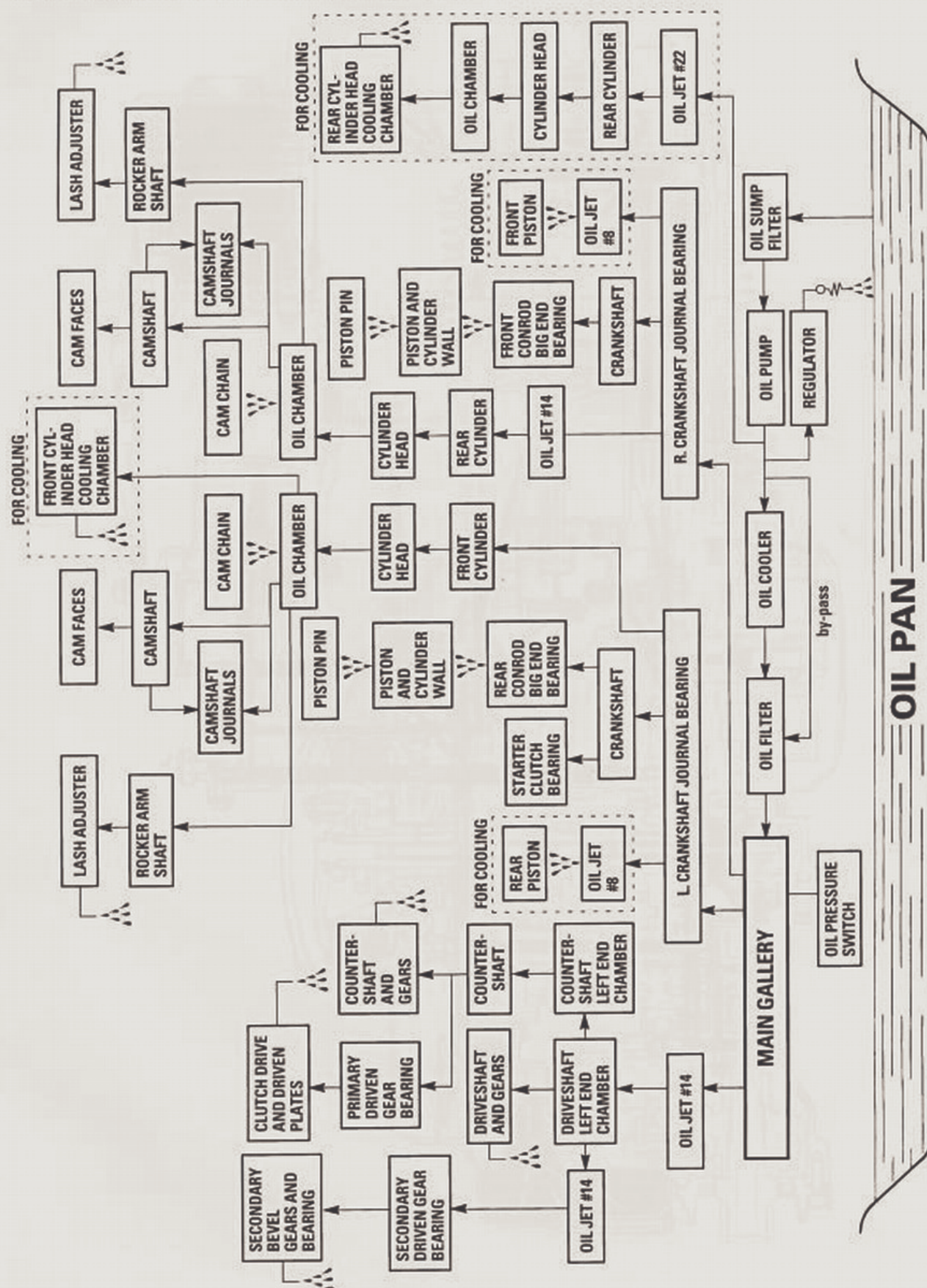
- Secondary gear case cover

- Adjust the following items to the specification.

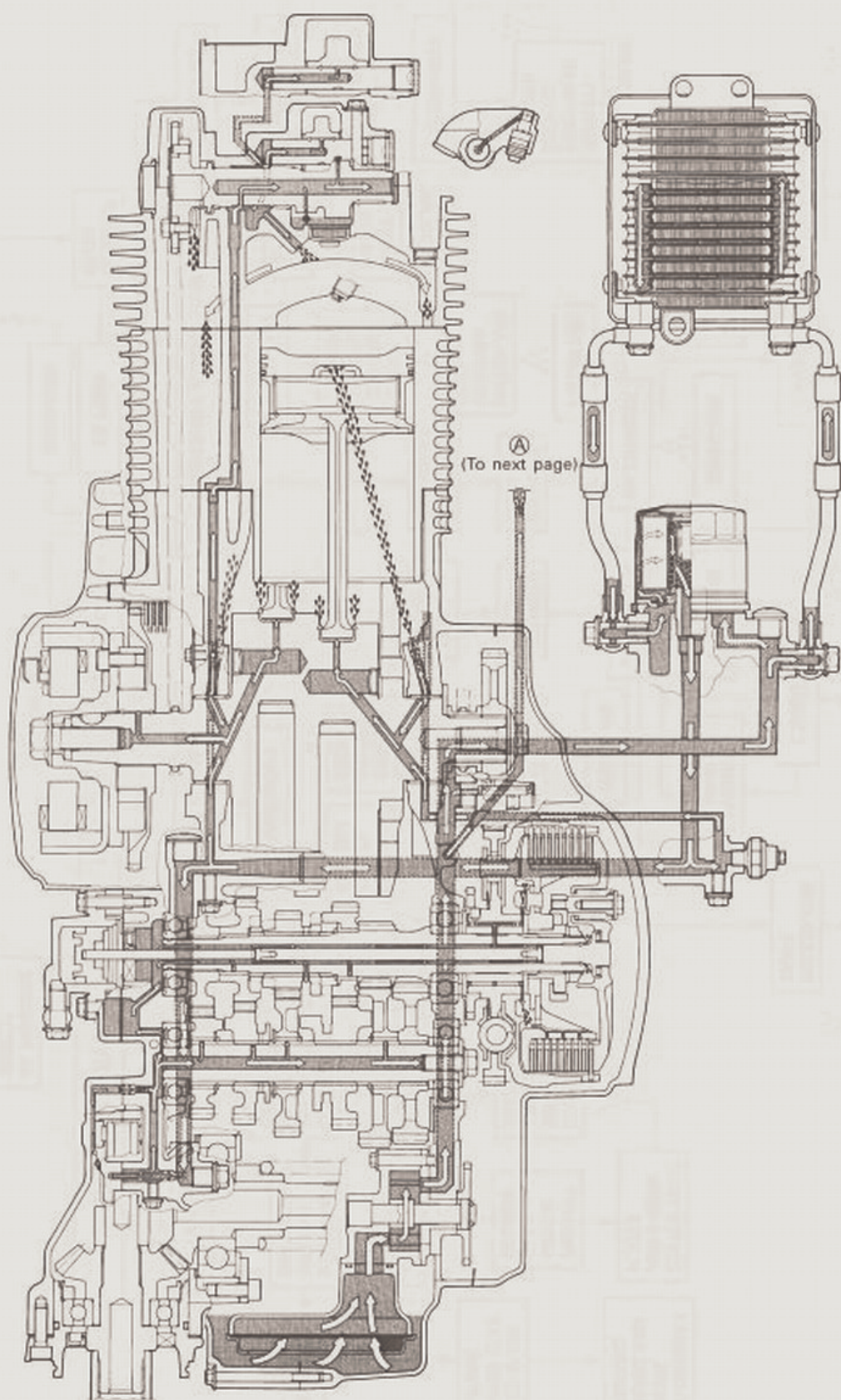
	Page
* Engine oil	2-6
* Clutch	2-11

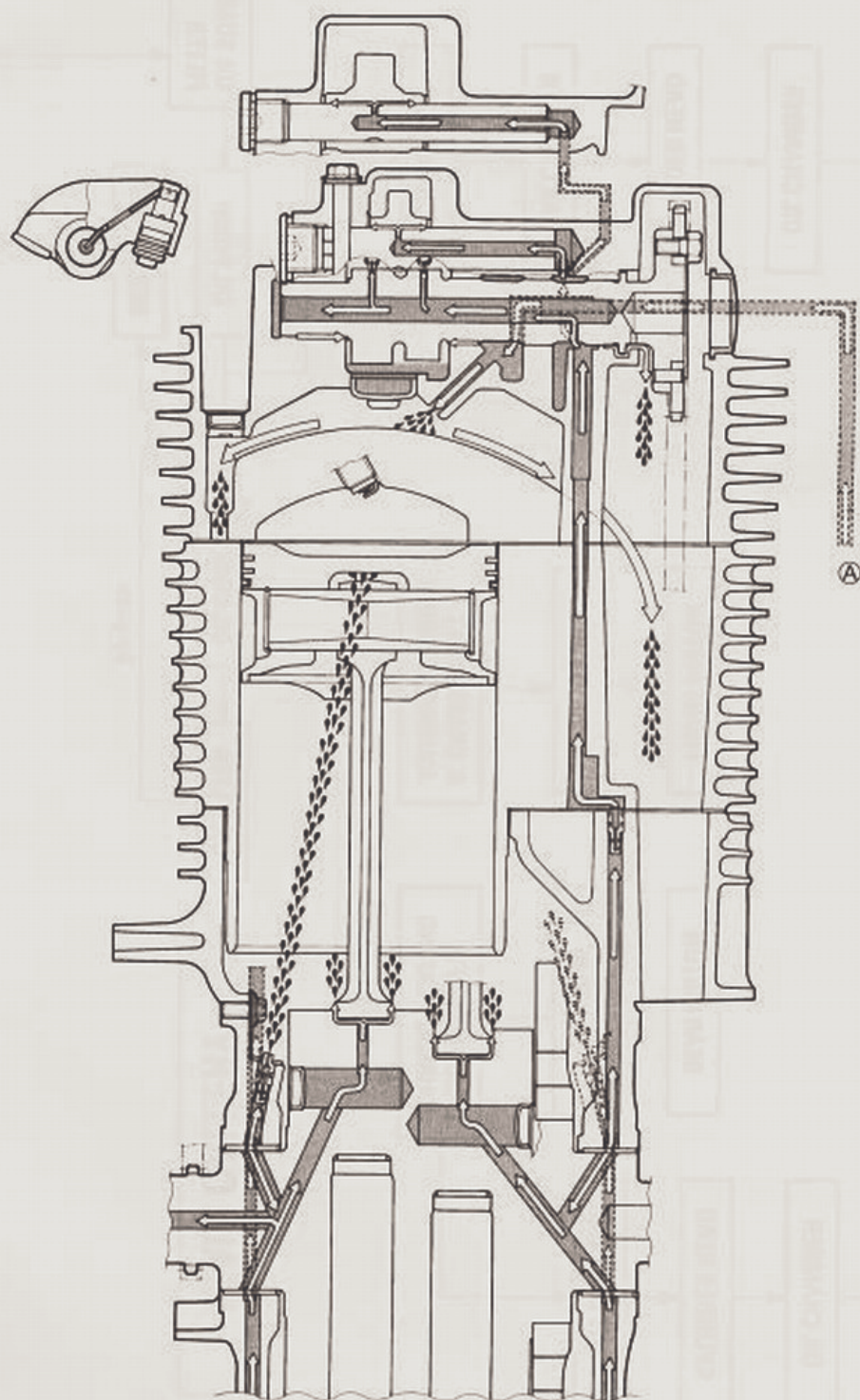


ENGINE LUBRICATION SYSTEM CHART



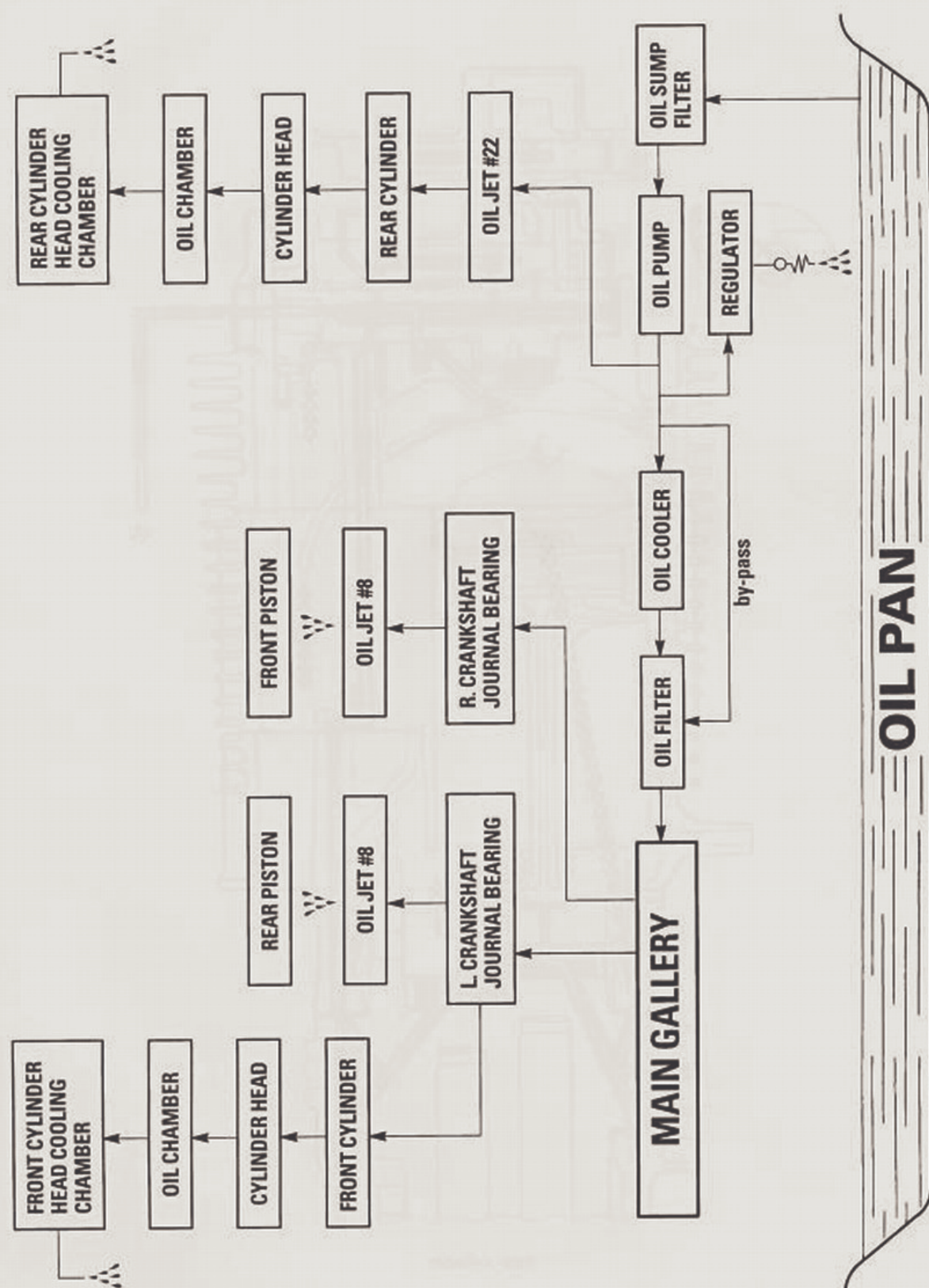
ENGINE LUBRICATION SYSTEM





Rear cylinder

CYLINDER HEAD COOLING SYSTEM CHART



CYLINDER HEAD COOLING SYSTEM

