


PRIMARY DRIVE GEAR

PRIMARY DRIVE GEAR INSPECTION

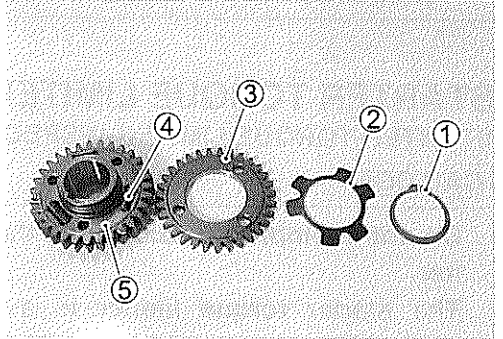
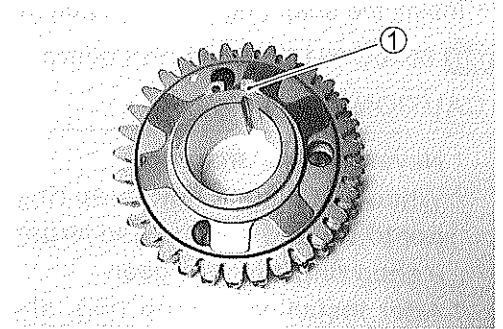
Visually inspect the gear teeth for wear and damage. If they are worn, replace the gear with a new one.

PRIMARY DRIVE GEAR DISASSEMBLY

- Disassemble the primary drive gear by removing the snap ring ①.

 09900-06107: Snap ring pliers

- ①: Snap ring
- ②: Spring washer
- ③: Scissors gear
- ④: Spring
- ⑤: Primary drive gear

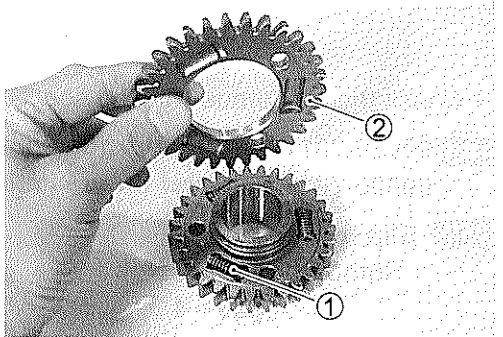


PRIMARY DRIVE GEAR REASSEMBLY

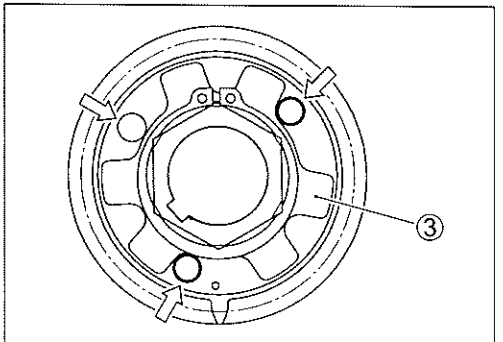
- Set the springs ① into the grooves.
- Install the scissors gear ②.

NOTE:

Align the holes of the primary drive gear and the scissors gear.

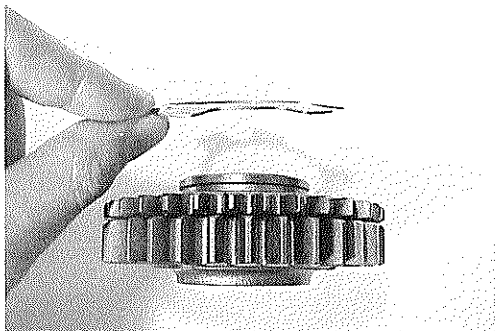


- Install the spring washer ③ not to cover the holes of the gears.



NOTE:

The convex side of the washer faces upward.

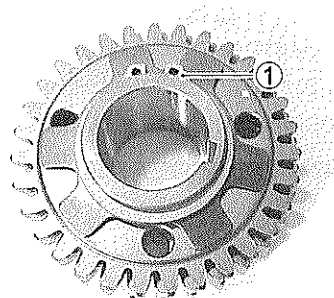


- Install the snap ring ① completely with the special tool.

TOOL 09900-06107: Snap ring pliers

CAUTION

- * Never reuse a snap ring.
- * When installing a new snap ring, care must be taken not to expand the end gap larger than required to slip a snap ring over the gear.
- * After installing a snap ring, always insure that it is completely seated in its groove and securely fitted.

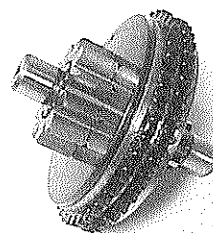


STARTER TORQUE LIMITER

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.

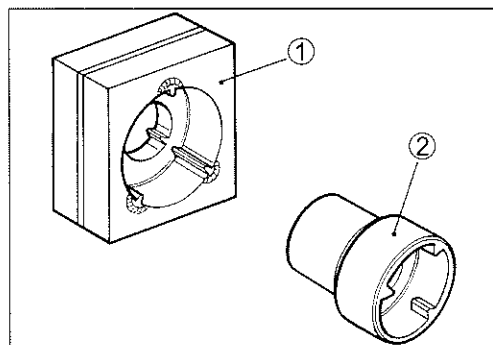
TOOL 09930-73110: Starter torque limiter holder ①

09930-73120: Starter torque limiter socket ②

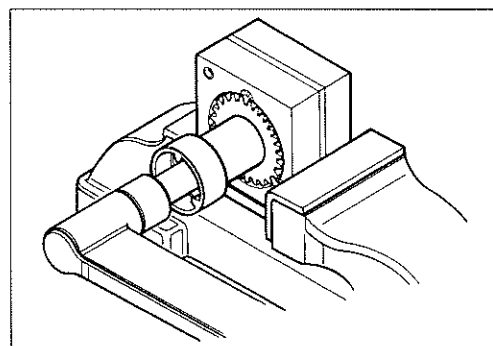
DATA Slip torque

Standard: 20 – 45 N·m

(2.0 – 4.5 kgf-m, 14.5 – 32.5 lb-ft)




- 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.

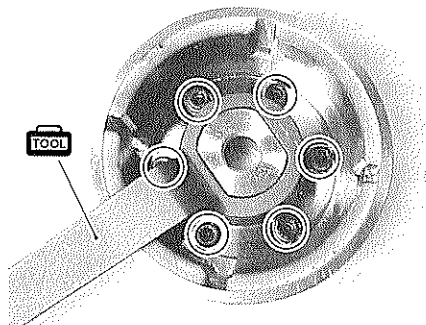


STARTER CLUTCH

DISASSEMBLY

- Remove the starter clutch securing bolts by holding the rotor with the special tool.

 **09930-44541: Rotor holder**

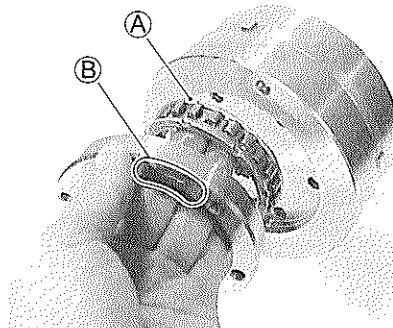


REASSEMBLY


- Install the starter clutch in the proper direction.

NOTE:

- * When installing the starter clutch onto the rotor, face the flange side **(A)** of the one way clutch to the rotor.
- * The arrow mark **(B)** must face to the engine side.
- Apply engine oil to the starter clutch.

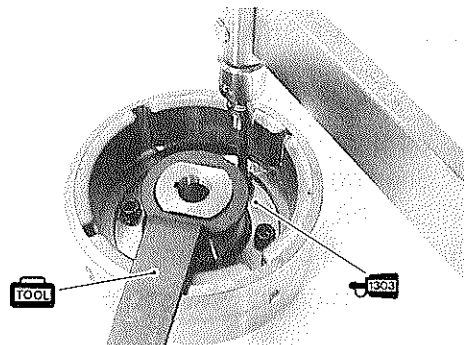


- Apply THREAD LOCK SUPER "1303" to the bolts, and then tighten them to the specified torque with the special tool.

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

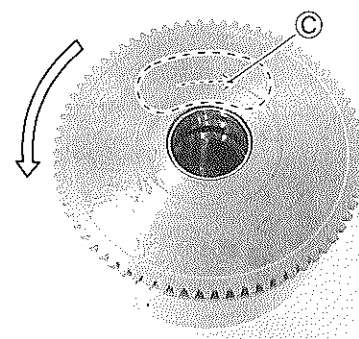
 **99000-32030: THREAD LOCK SUPER "1303"**

 **09930-44541: Rotor holder**

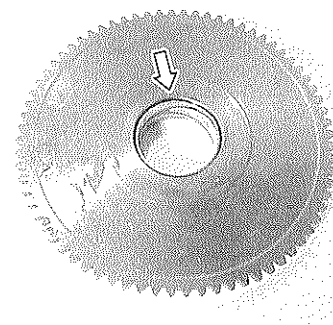


INSPECTION

- Install the starter driven gear to the starter clutch.
- Check that the starter driven gear turns in the opposite direction of the arrow mark **(C)** on the rotor while holding the generator rotor. The gear never turns in the direction of the arrow.
- If there is anything unusual, replace the one way clutch.



Inspect the starter driven gear bushing for any damage.




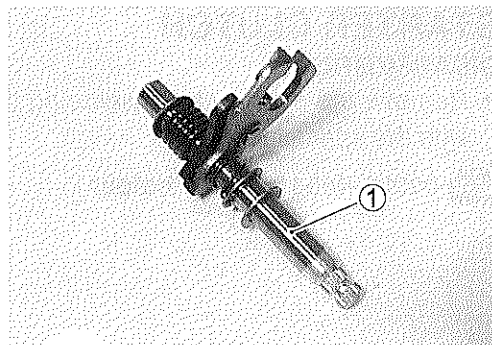
GEARSHIFT

GEARSHIFT SHAFT/GEARSHIFT ARM DISASSEMBLY

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

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

 **09900-06107: Snap ring pliers**

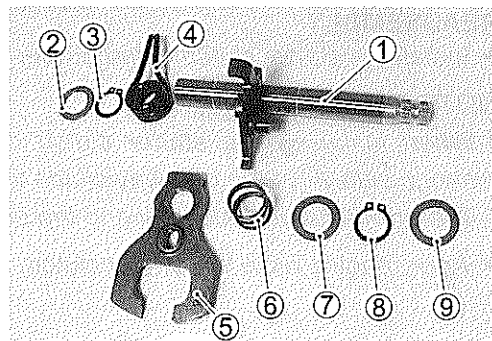


GEARSHIFT SHAFT/GEARSHIFT ARM INSPECTION

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.

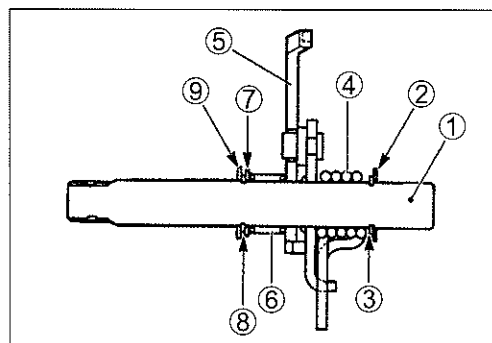


GEARSHIFT SHAFT/GEARSHIFT ARM REASSEMBLY

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

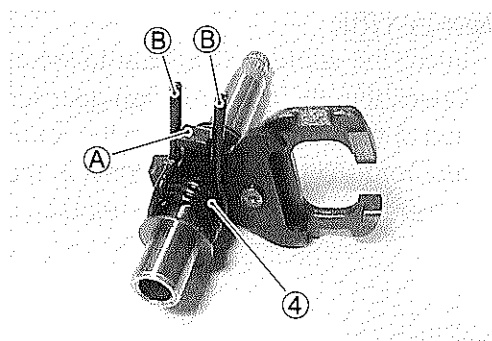
- | | |
|---------------------------------|-----------------------|
| ② Washer | ⑥ Plate return spring |
| ③ Snap ring | ⑦ Washer |
| ④ Gearshift shaft return spring | ⑧ Snap ring |
| ⑤ Gearshift cam drive plate | ⑨ Washer |

 **09900-06107: Snap ring pliers**



NOTE:

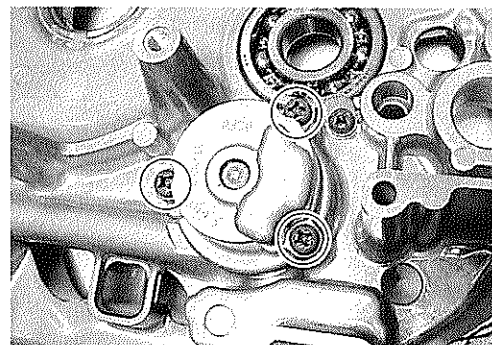
When installing the gearshift shaft return spring ④, position the stopper A of the gearshift arm between the shaft return spring ends B.



CRANKCASE

OIL PUMP

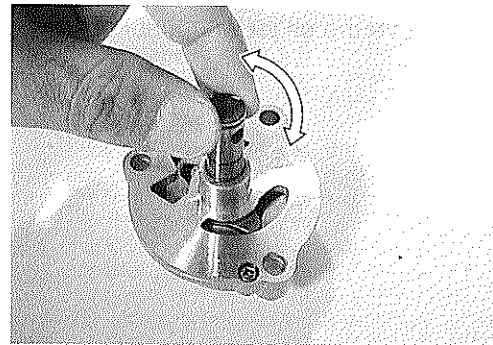
- Remove the oil pump.



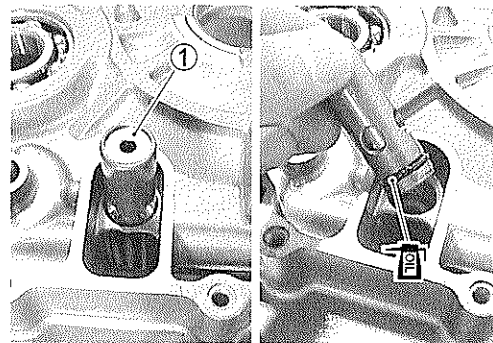
- Rotate the oil pump by hand and check that it moves smoothly.
- If it does not move smoothly, replace the oil pump assembly.

CAUTION

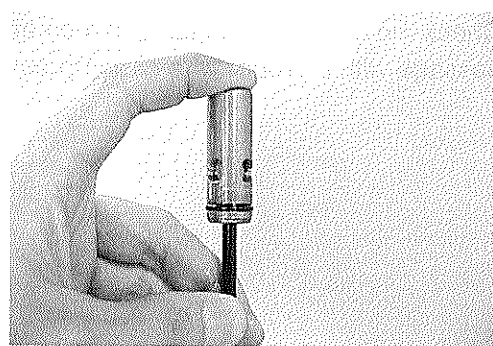
**Do not attempt to disassemble the oil pump assembly.
The oil pump is available only as an assembly.**

**OIL PRESSURE REGULATOR**

- Remove the oil pressure regulator ①.
- When installing the oil pressure regulator, apply engine oil to the new O-ring.



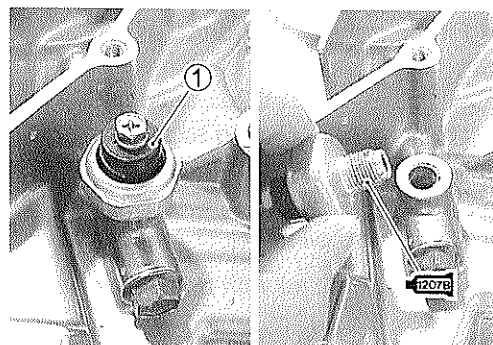
Check the operation of the oil pressure regulator by pushing on the piston with a proper bar. If the piston does not operate, replace the oil pressure regulator with a new one.

**OIL PRESSURE SWITCH**

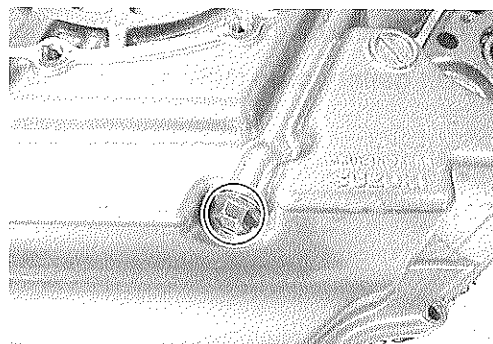
- Remove the oil pressure switch ①.
- When installing the oil pressure switch, apply SUZUKI BOND "1215" to the thread.

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

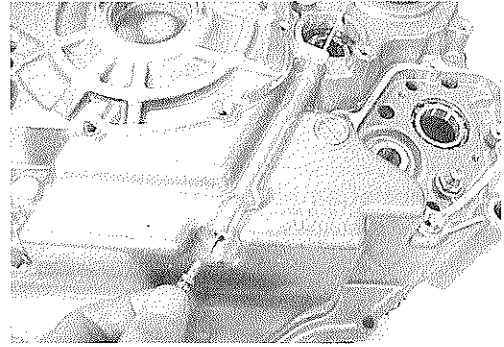
 99104-31140: SUZUKI BOND "1207B"

**OIL JET**

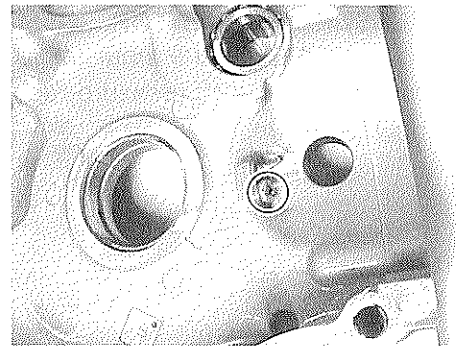
- Remove the oil gallery plug.



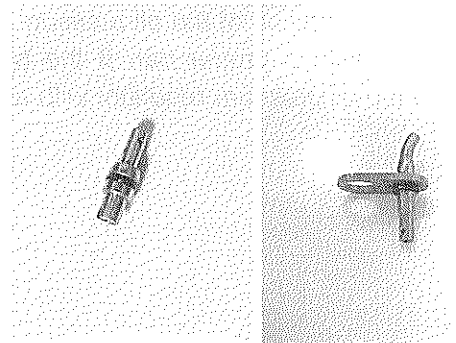
- Remove the oil jet with a suitable bar.



- Remove the oil jet.



Check the oil jets for clogging. If they are clogged, clean their oil passage with a proper wire or compressed air.



- Fit the new O-ring to the oil jet.

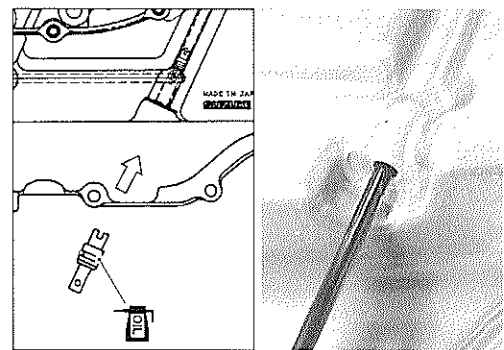
CAUTION

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 with a suitable bar.

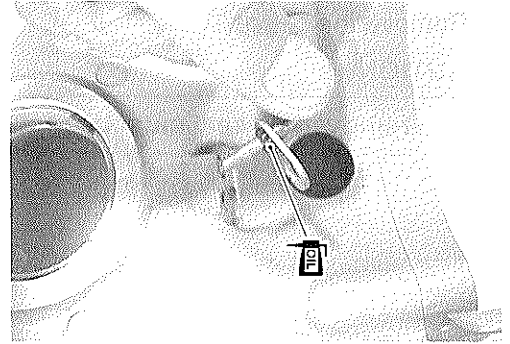


- Tighten the oil gallery plug to the specified torque.

Oil gallery plug (M8): 18 N·m (1.8 kgf-m, 13.0 lb-ft)



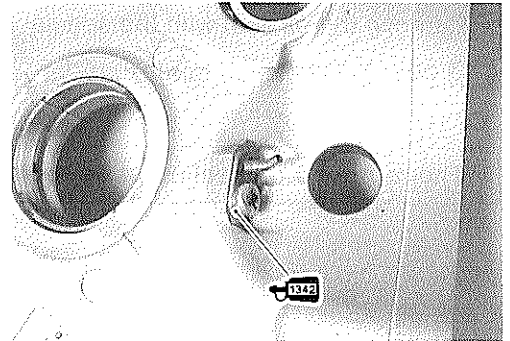
- Apply engine oil to the new O-ring and install it.



- Apply THREAD LOCK "1342" to the screw and tighten it to the specified torque.

 Piston cooling oil nozzle screw: 8 N·m (0.8 kgf-m, 6.0 lb-ft)

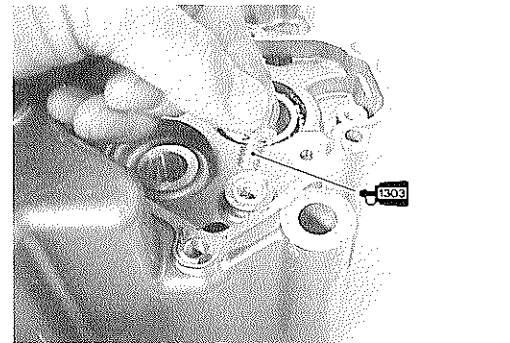
 99000-32050: THREAD LOCK "1342"



- When replacing the gearshift arm stopper bolt, apply THREAD LOCK SUPER "1303" to it.

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

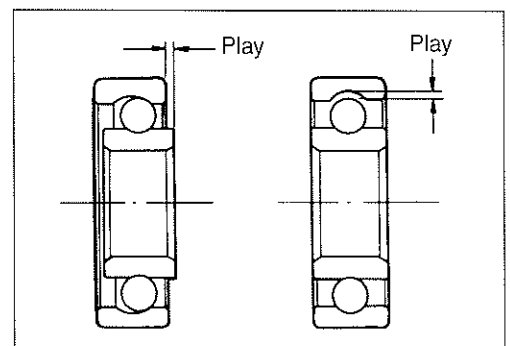
 99000-32030: THREAD LOCK SUPER "1303"



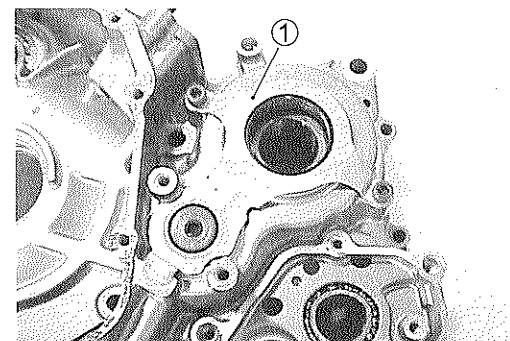
BEARING/OIL SEAL

Rotate the bearing inner race by finger to inspect for abnormal play, noise and smooth rotation while the bearings are in the crankcase.

Replace the bearing in the following procedure if there is anything unusual.



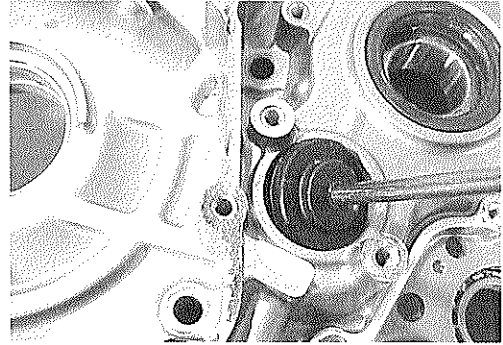
- Remove the oil seal retainer ①.



- Remove the oil seal.

CAUTION

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

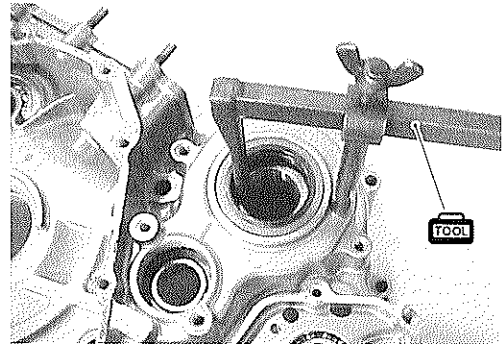


- Remove the oil seal with the special tool.

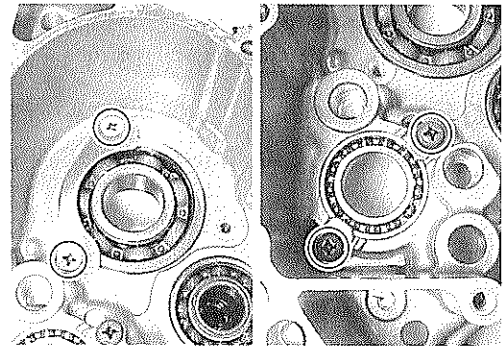
TOOL 09913-50121: Oil seal remover

CAUTION

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



- Remove the bearing retainers.

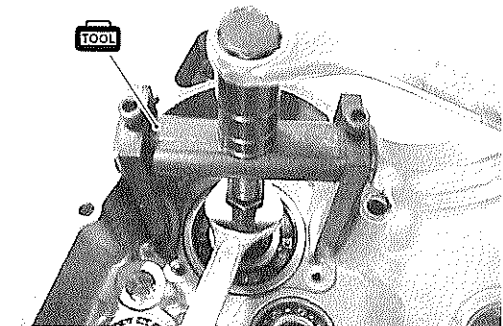


- Remove the bearings with the special tool.

TOOL 09921-20240: Bearing remover set

NOTE:

If there is no abnormal noise, the bearing removal is not necessary.

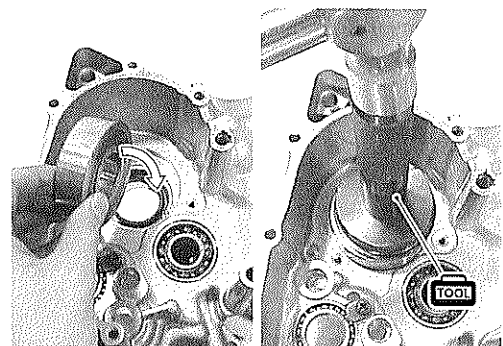


- Install the bearings with the special tool.

TOOL 09913-70210: Bearing installer set

NOTE:

The sealed side of the driveshaft bearing must face outside.

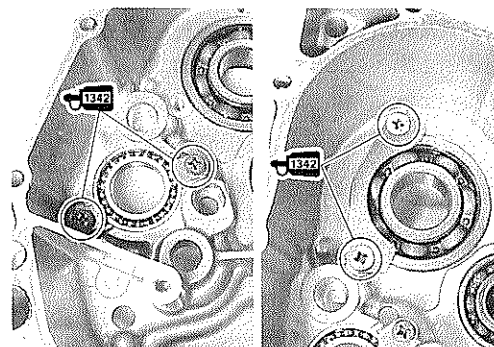


- Install the bearing retainers.

NOTE:

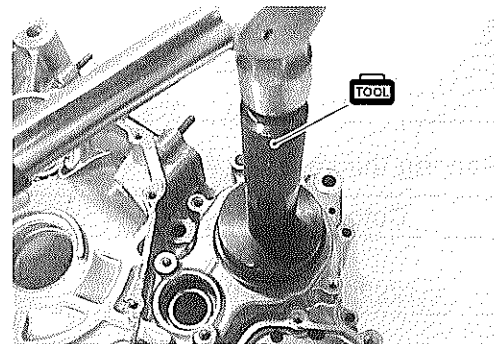
When installing the bearing retainers, apply **THREAD LOCK** to the screws.

 **09900-32050: THREAD LOCK "1342"**

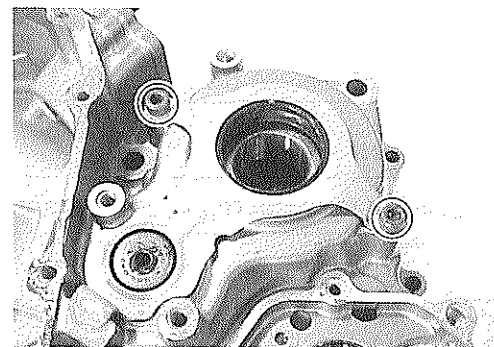


- Install the oil seals with the special tool.

 **09913-70210: Bearing installer set**

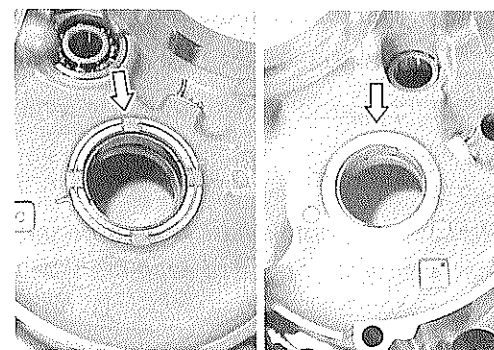


- Install the oil seal retainer.




CRANKCASE-CRANKSHAFT BEARING CRANKCASE-CRANKSHAFT BEARING INSPECTION

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

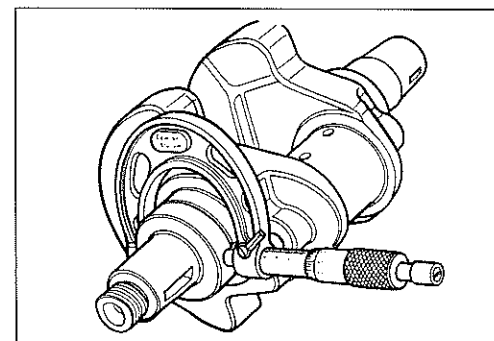


- Inspect the crankshaft journal for any damage.
- Measure the crankshaft journal O.D. with the special tool.

 **Crankshaft journal O.D.**

Standard: 47.985 – 48.000 mm (1.8892 – 1.8898 in)

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

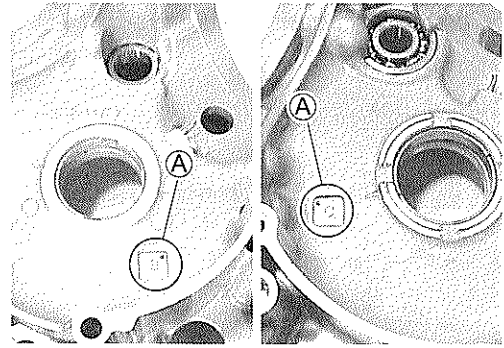


CRANKCASE-CRANKSHAFT BEARING SELECTION

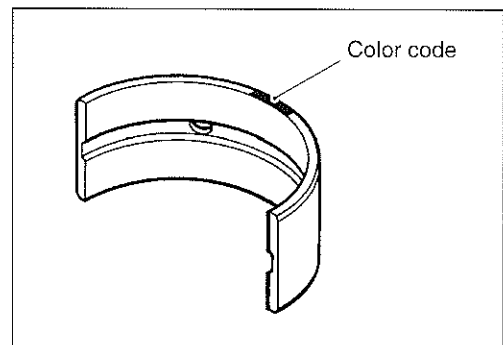
Select the specified bearings from the crankcase bore I.D. code. The crankcase bore I.D. code (A) "A", "B" or "C", is stamped on the inside of each crankcase half.

Bearing selection table

I.D. code (A)	I.D. specification	Bearing
A	52.000 – 52.006 mm (2.0472 – 2.0475 in)	Green
B	52.006 – 52.012 mm (2.0475 – 2.0477 in)	Black
C	52.012 – 52.018 mm (2.0477 – 2.0479 in)	Brown

**Bearing thickness**

Color (Part No.)	Thickness
Green (12229-06G00-0A0)	1.996 – 1.999 mm (0.0786 – 0.0787 in)
Black (12229-06G00-0B0)	1.999 – 2.002 mm (0.0787 – 0.0788 in)
Brown (12229-06G00-0C0)	2.002 – 2.005 mm (0.0788 – 0.0789 in)

**CAUTION**

Bearing must be replaced as a set.

CRANKSHAFT JOURNAL BEARING REPLACEMENT

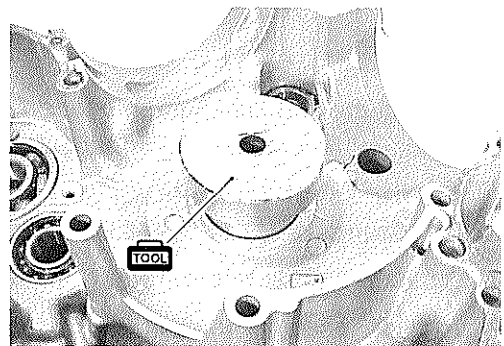
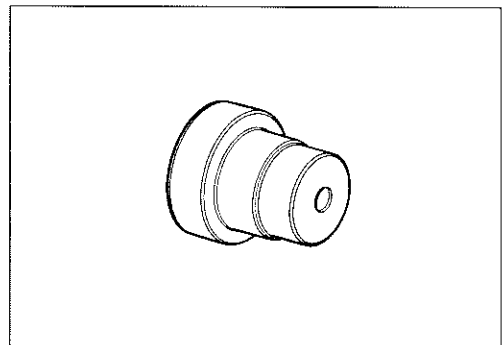
- Use the special tool to replace the crankshaft journal bearings. The replacement procedure is as follows.

 09913-60230: Journal bearing remover/installer

- Set the special tool as shown to remove the crankshaft journal bearings.

NOTE:

Remove the crankshaft journal bearings in only one direction, from inside to outside of each crankcase half.



- Gradually press out the bearing with the special tool by using the hand-press.

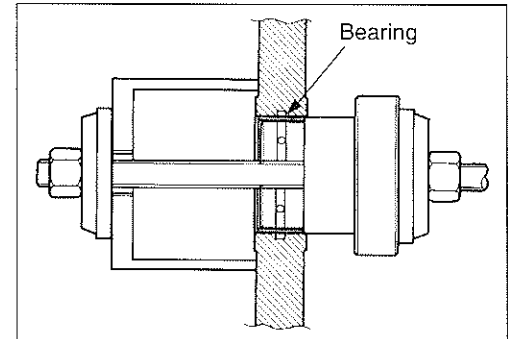
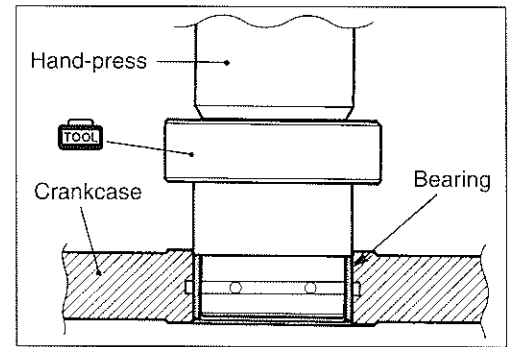
CAUTION

The removed bearings must be replaced with new ones.

NOTE:

Using the hand-press is recommended to remove the crankshaft journal bearings. However, the crankshaft journal bearings can be removed by using with the following special tools.

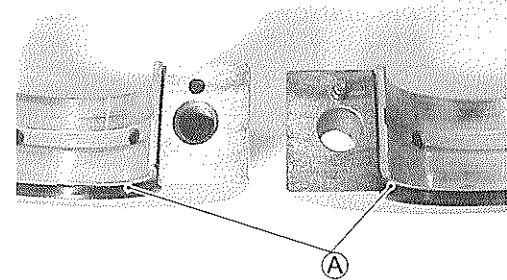
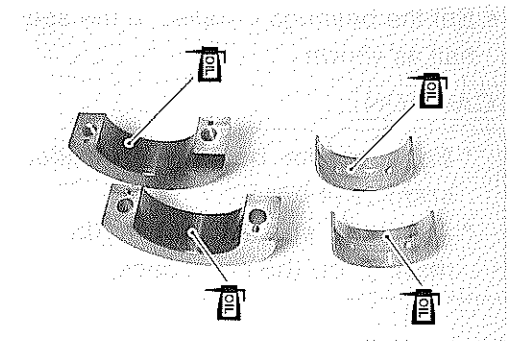
- TOOL** 09924-84510: Bearing installer set
- 09924-74570: Final drive gear bearing remover/installer



- Set the specified crankshaft journal bearings to the special tool.

CAUTION

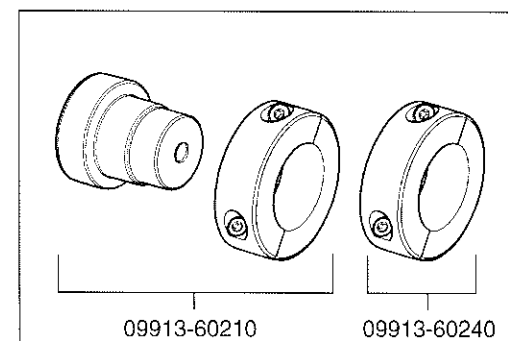
- * Before setting the bearing, apply enough engine oil to the special tool and bearings.
- * When setting the bearing, align the bearing side with the engraved line (A) and also the bearing edge with the mating surface of the special tool.




- TOOL** 09913-60210: Journal bearing remover/installer set or
- 09913-60240: Journal bearing remover/installer

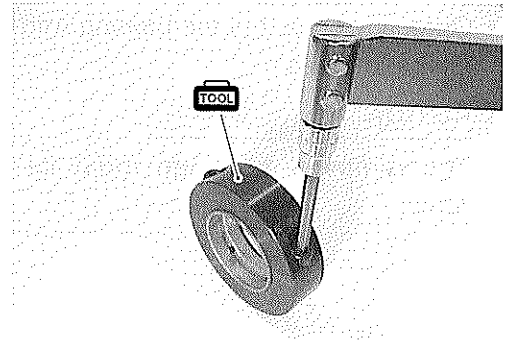
NOTE:

Journal bearing remover/installer (09913-60240) is included in Journal bearing remover/installer set (09913-60210).



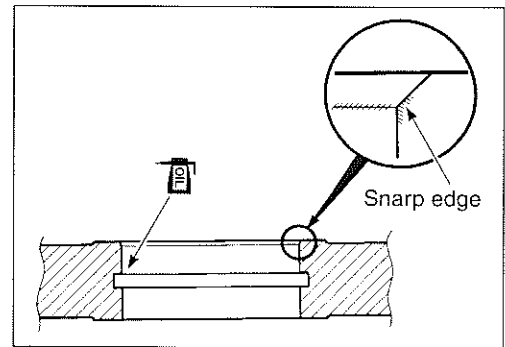
- Tighten the special tool bolt to the specified torque.

 **Special tool bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)**



CAUTION

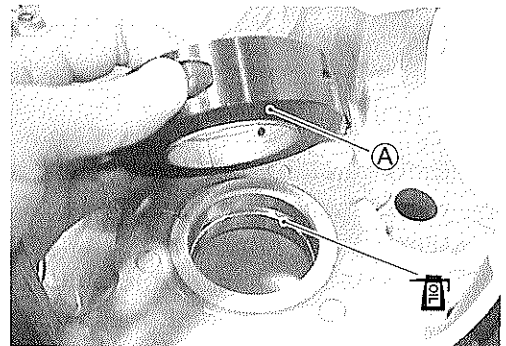
Before installing the bearings, lightly shave off the sharp edge part of the crankcase chamfer by using an oilstone and wash the crankcase bore with enough engine oil.



- Set the bearings installed in the special tool to the crankcase half as shown.

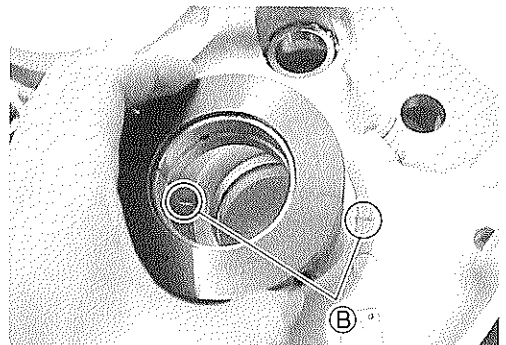
CAUTION

- * Be sure the bearing protruded side **(A)** faces the crankcase bore.
- * Align the special tool mating surface with the line mark **(B)** on the crankcase.

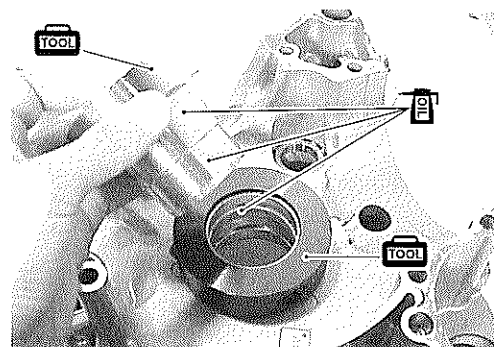


NOTE:

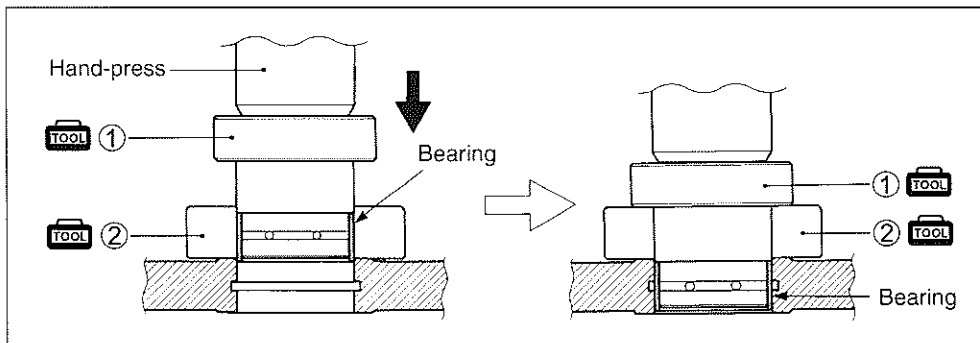
The upper and lower bearings are same.



- Apply enough engine oil to the special tool and the bearings and then set the special tool carefully.
- Gradually press in the bearing into the main journal bore by using the hand-press until the special tool ① stops the special tool ②.

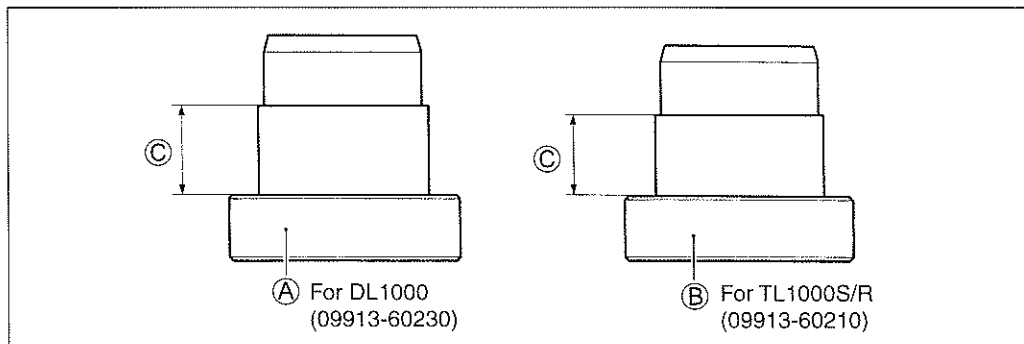


TOOL 09913-60230: Journal bearing remover/installer



CAUTION

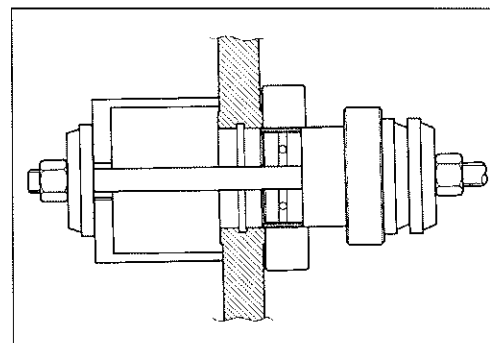
Use the new special tool **A** (09913-60230) for DL1000. The tool **A** and **B** differ in length **C**.



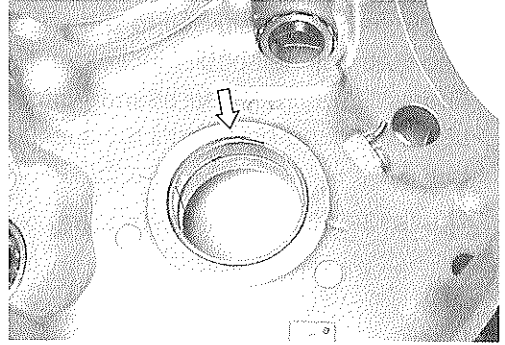
NOTE:

Using the hand-press is recommended to install the crankshaft journal bearings. However, the crankshaft journal bearings can be installed by using the following special tools.

- TOOL 09924-84510: Bearing installer set**
- 09924-74570: Final drive gear bearing remover/installer**



- After installing the bearings, check the bearing surface for any scratch or damage.

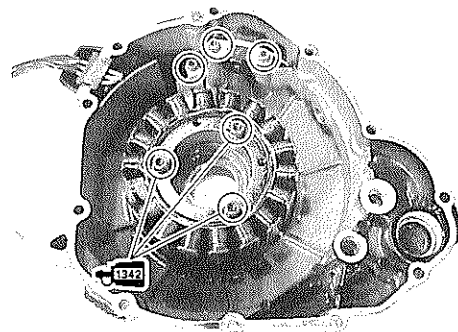


GENERATOR COVER

REPLACEMENT

When replacing the generator stator or crankshaft position sensor, apply THREAD LOCK "1342" to the generator stator set bolts.

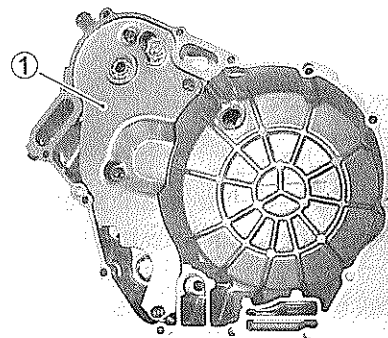
 1342 99000-32050: THREAD LOCK "1342"



CLUTCH COVER

OIL SEPARATER

- Remove the oil separator ①.



GEARSHIFT COVER

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.

CAUTION


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

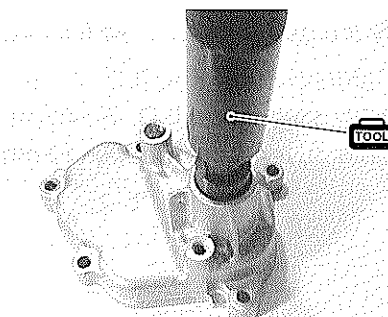
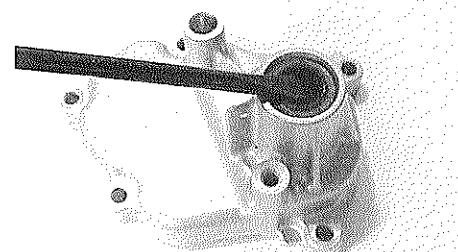
- Install the new oil seal with the special tool.

 09913-70210: Bearing installer set

NOTE:

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

 99000-25030: SUZUKI SUPER GREASE "A" (USA)
99000-25010: SUZUKI SUPER GREASE "A" (Others)



ENGINE REASSEMBLY

Reassemble the engine in the reverse order of disassembly.

NOTE:

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

ENGINE BOTTOM SIDE

CRANKSHAFT

- Install the crankshaft into the left crankcase half.

NOTE:

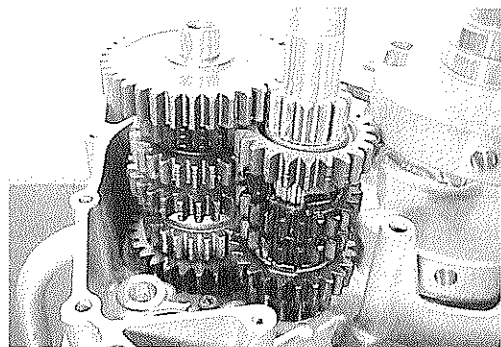
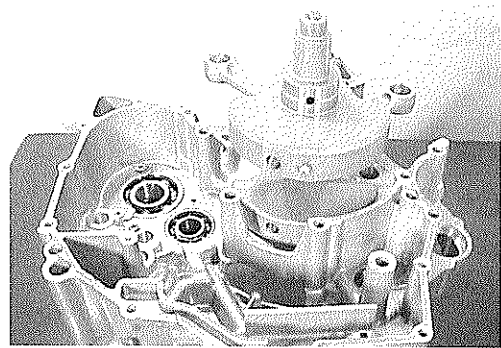
Coat lightly molybdenum oil solution to the crankshaft journal bearings.

 MOLYBDENUM OIL

CAUTION

Never strike the crankshaft with a plastic hammer when inserting it into the crankcase.

- Install the countershaft assembly and driveshaft assembly.

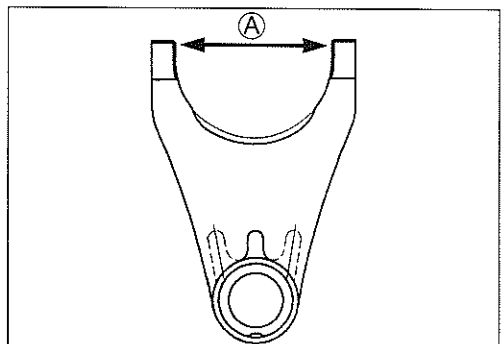
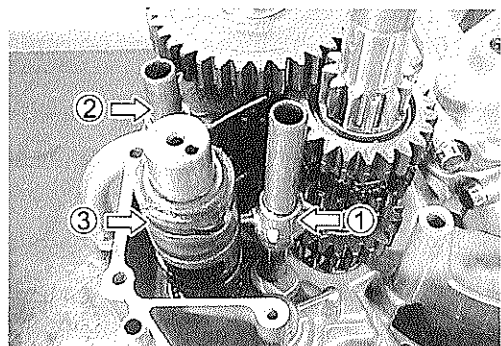


- Install the gearshift forks and gearshift cam.

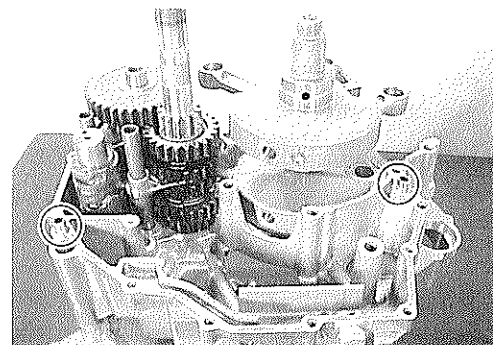
NOTE:

Identify the gearshift forks as follows.

- ① For 3rd/4th drive gear [I.D. Ⓐ: 36 mm (1.4 in), Gold]
- ② For 5th driven gear [I.D. Ⓐ: 40 mm (1.6 in)]
- ③ For 6th driven gear [I.D. Ⓐ: 40 mm (1.6 in), Gold]



- Fit the dowel pins.



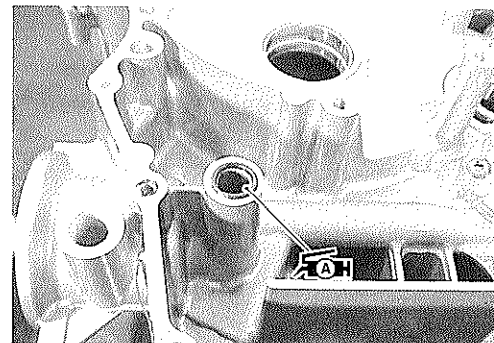
- Apply grease to the O-ring and install it.

CAUTION 99000-25030: SUZUKI SUPER GREASE "A" (USA)
99000-25010: SUZUKI SUPER GREASE "A" (Others)

CAUTION

Use the new O-ring to prevent oil leakage.

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

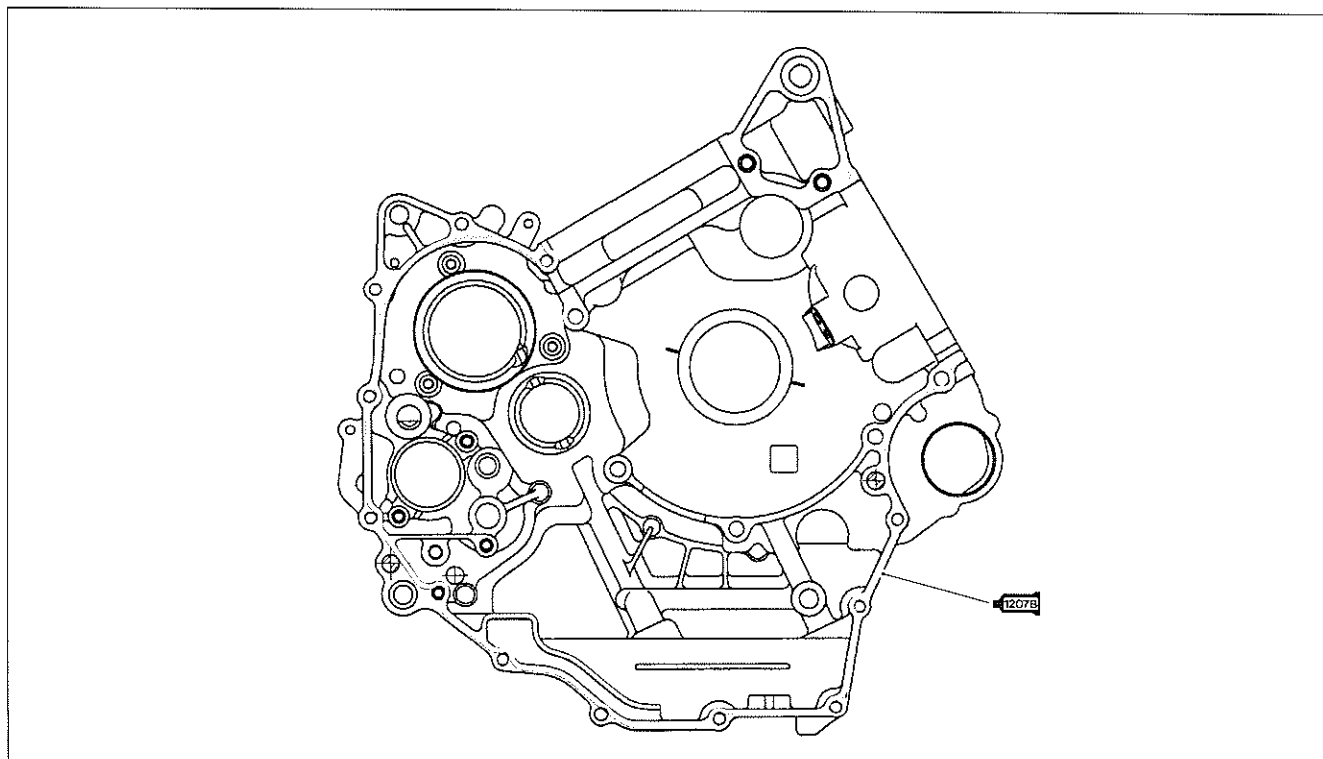


1207B 99104-31140: SUZUKI BOND "1207B"

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.



- 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.

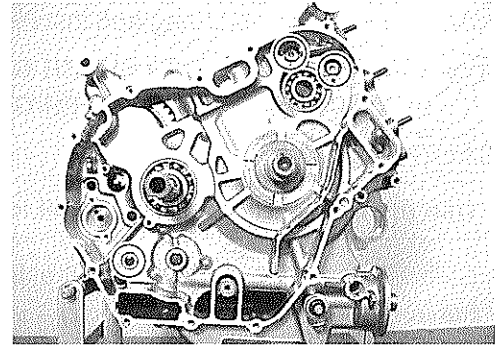
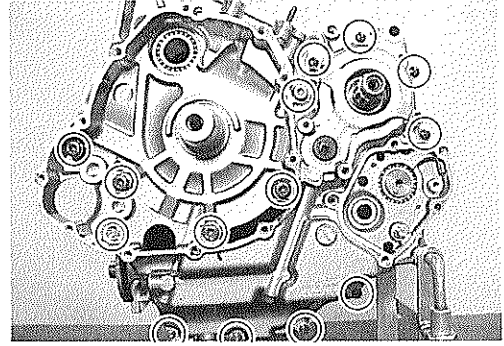
**🔧 Crankcase bolt: (M8) 26 N-m (2.6 kgf-m, 19.0 lb-ft)
(M6) 11 N-m (1.1 kgf-m, 8.0 lb-ft)**

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, the driveshaft and the countershaft rotate smoothly.



- Install the engine sprocket spacer ① onto the driveshaft.

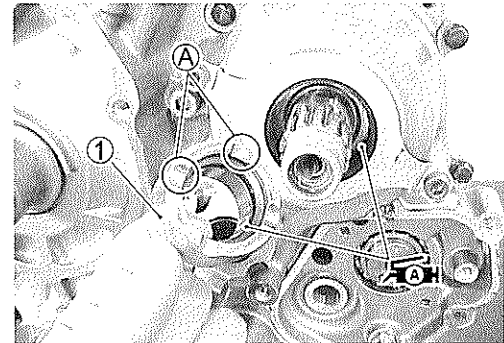
CAUTION

Use the new O-ring to prevent oil leakage.

NOTE:

- * The grooved (A) side of the engine sprocket spacer faces crankcase side.
- * Apply grease to the oil seal lip and O-ring.

**🔧 99000-25030: SUZUKI SUPER GREASE "A" (USA)
99000-25010: SUZUKI SUPER GREASE "A" (Others)**



GEARSHIFT

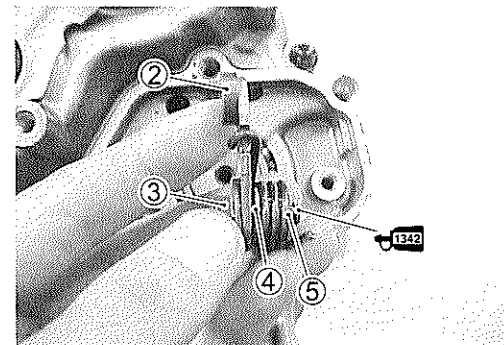
- Install the gearshift cam stopper ②, its bolt ③, washer ④ and return spring ⑤.

NOTE:

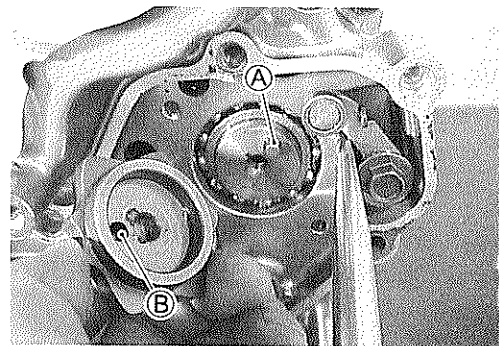
Apply a small quantity of THREAD LOCK "1342" to the gearshift cam stopper bolt ③ and tighten it to the specified torque.

🔧 1342 99000-32050: THREAD LOCK "1342"

🔧 Gearshift cam stopper bolt: 10 N-m (1.0 kgf-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 pin **A** with the gearshift cam stopper plate hole **B**.

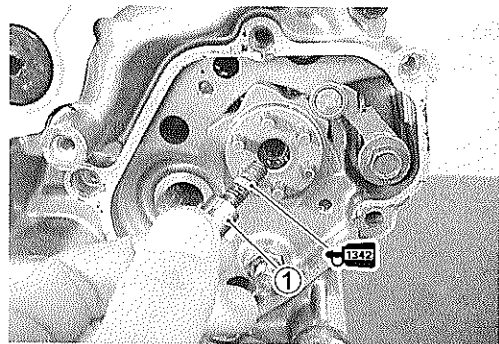


- Apply a small quantity of THREAD LOCK "1342" to the gearshift cam stopper plate bolt **1** and tighten it to the specified torque.

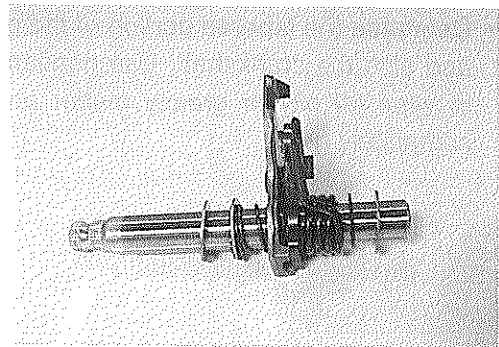
1342 99000-32050: THREAD LOCK "1342"

1 Gearshift cam stopper plate bolt:

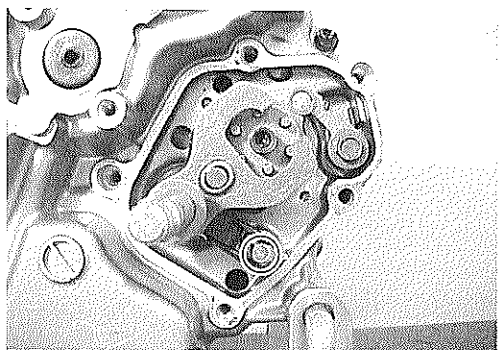
10 N·m (1.0 kgf-m, 7.0 lb-ft)



- Assembly the gearshift shaft/gearshift arm.



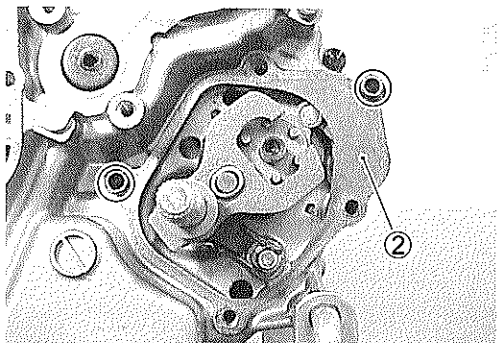
- Install the gearshift shaft as shown.



- Install the dowel pins and gasket **2**.

CAUTION

Use new gasket to prevent oil leakage.

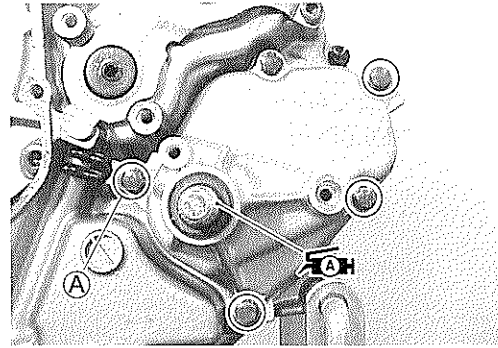


- Install the gearshift cover.

NOTE:

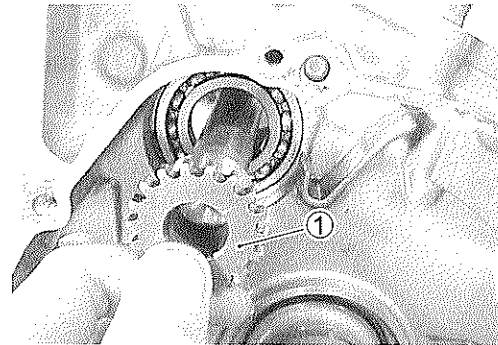
- * Fit the clamp to the bolt (A).
- * Apply grease to the oil seal lip before installing the gearshift cover.

 99000-25030: SUZUKI SUPER GREASE "A" (USA)
99000-25010: SUZUKI SUPER GREASE "A" (Others)

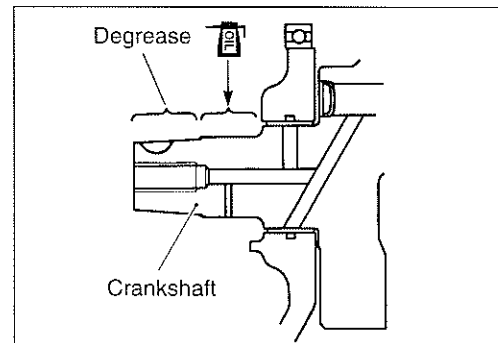


GENERATOR ROTOR

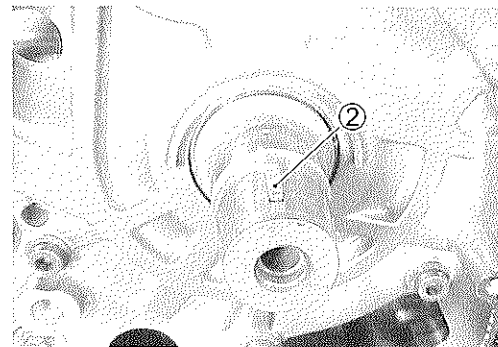
- Install the cam drive idle gear shaft (1).



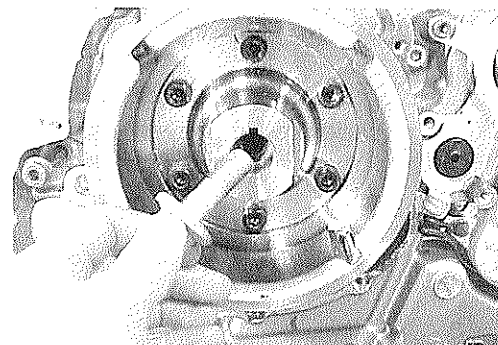
- Degrease the tapered portion of the generator rotor assembly and also the crankshaft. Use nonflammable cleaning solvent to wipe off oily or greasy matter and make these surfaces completely dry.



- Install the key (2).




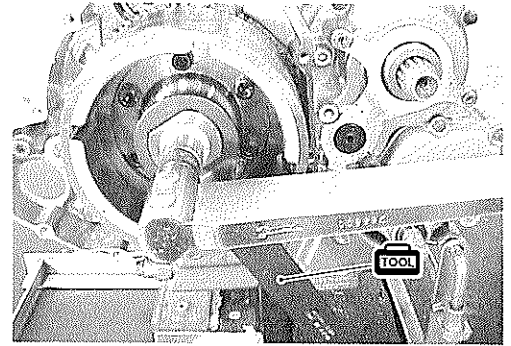
- Install the generator rotor together with the starter drive gear.
- Install the generator rotor bolt.



- While holding the generator rotor with the special tool, tighten the bolt to the specified torque.

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


 **09930-44541: Rotor holder**

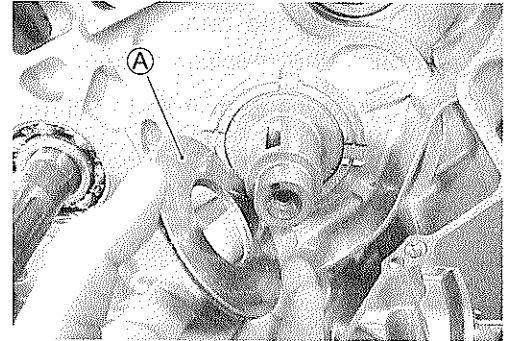



PRIMARY DRIVE GEAR

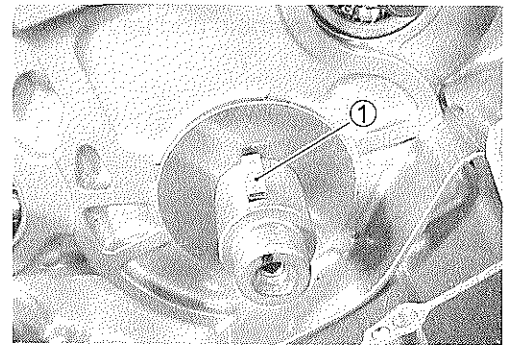
- Install the thrust washer onto the crankshaft.



NOTE:

The grooved side  of the thrust washer faces the crankcase side.




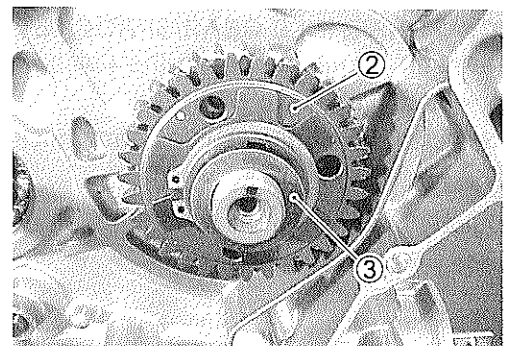
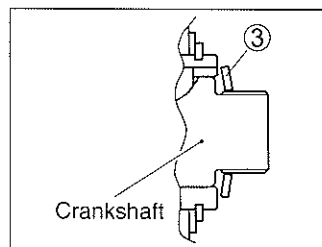
- Install the key .



- Install the primary drive gear assembly  and the washer .

NOTE:

The convex side of the washer  faces outside.

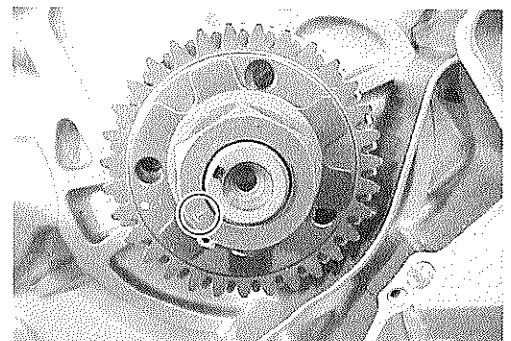


- Install the primary drive gear nut.

NOTE:

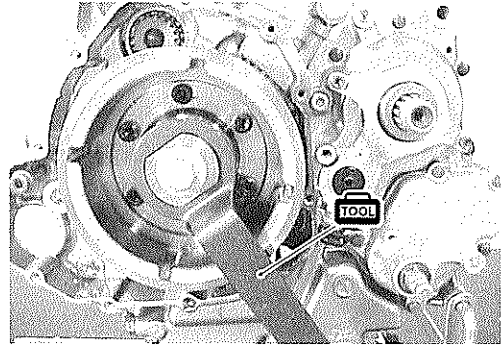
* This nut has left-hand thread.

* The "L" mark on the nut faces outside.



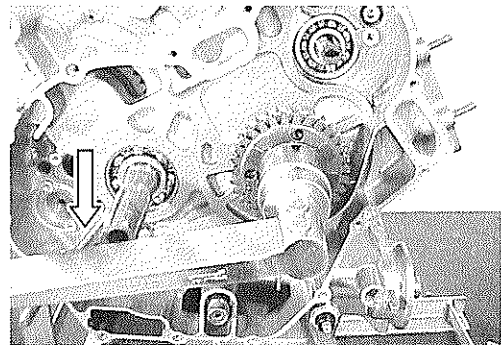
- Hold the generator rotor with the special tool.

TOOL 09930-44541: Rotor holder

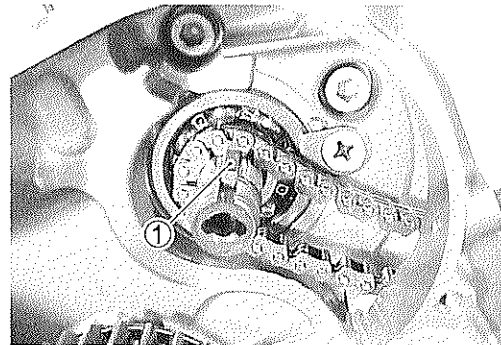


- While holding the generator rotor, tighten the primary drive gear nut to the specified torque.

U Primary drive gear nut: 115 N·m (11.5 kgf·m, 83.0 lb-ft)



- Install the cam chain and key ①.

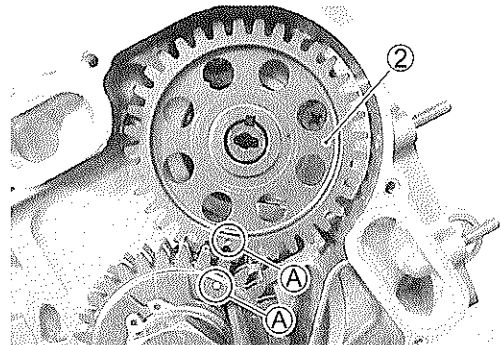


CAM DRIVE IDLE GEAR/SPROCKET

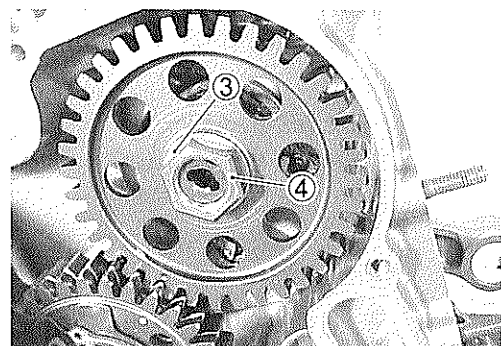
- Insert a suitable bar to the holes of the primary drive gears and align the two gears.
- Install the cam drive idle gear/sprocket ②.

NOTE:


Align the punched marks **A** on the cam drive idle gear/sprocket and primary drive gear.

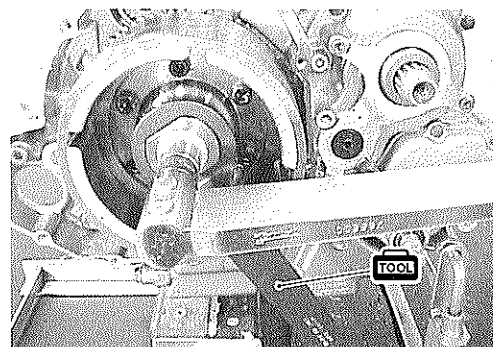


- Install the washer ③ and nut ④.



- Hold the generator rotor with the special tool.

 **09930-44541: Rotor holder**

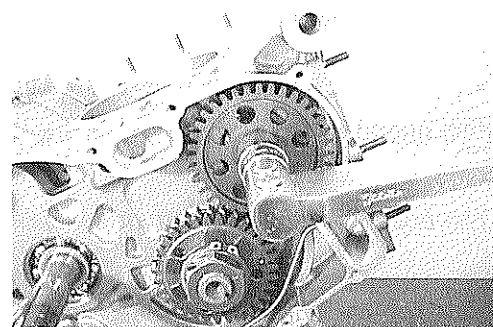


- While holding the generator rotor, tighten the cam drive idle gear/sprocket nut to the specified torque.

 **Cam drive idle gear/sprocket nut:**
70 N·m (7.0 kgf-m, 50.5 lb-ft)

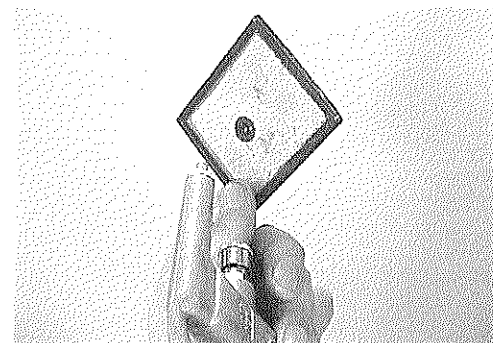
CAUTION

Before tightening the cam drive idle gear/sprocket nut, be sure to engage the front and rear cam chains to each sprocket.



OIL SUMP FILTER

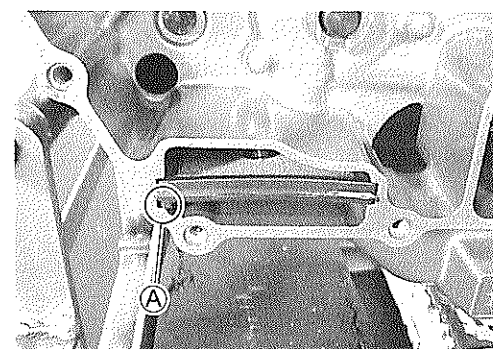
- Clean the oil sump filter using compressed air.



- Install the oil sump filter.

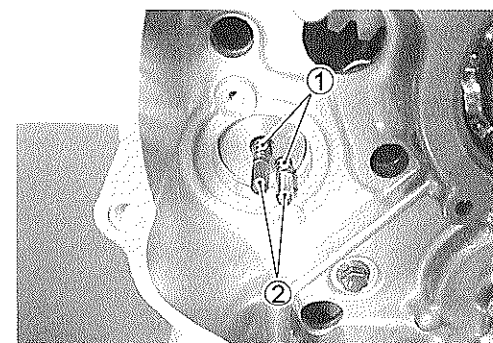
NOTE:

The projection **A** of the oil sump filter faces to the bottom.

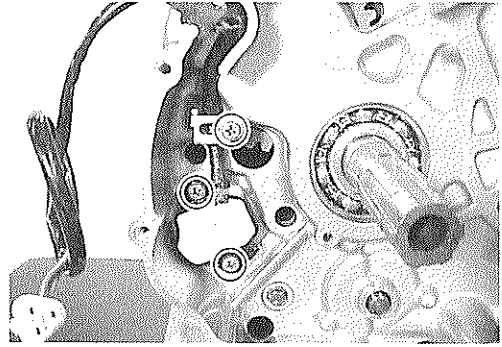


GEAR POSITION SWITCH

- Install the springs **1** and gear position switch contacts **2**.



- Install the gear position switch and cable guide.



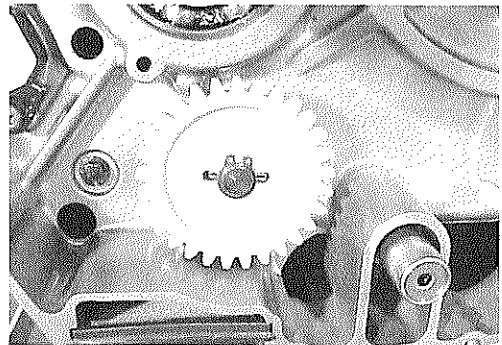
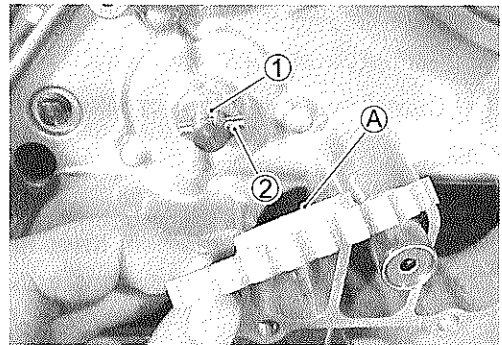
OIL PUMP DRIVEN GEAR

- Install the washer ① and pin ②.
- Install the oil pump driven gear by installing the snap ring.

TOOLS 09900-06107: Snap ring pliers

NOTE:

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

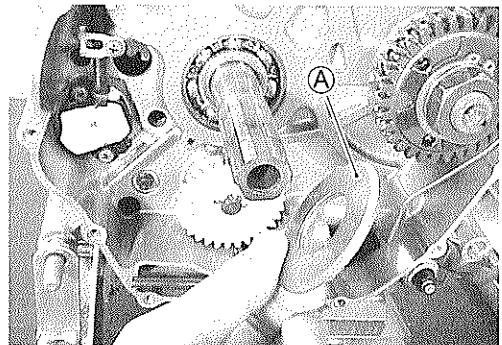


CLUTCH

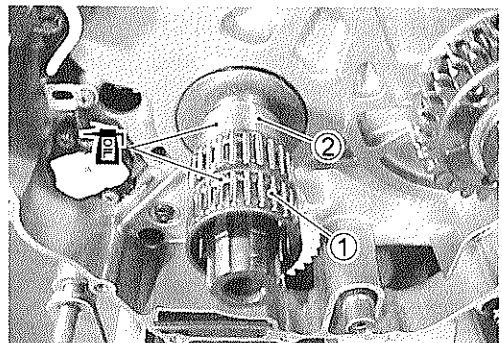
- Install the thrust washer onto the countershaft.

NOTE:

The chamfer side ① of thrust washer faces crankcase side.



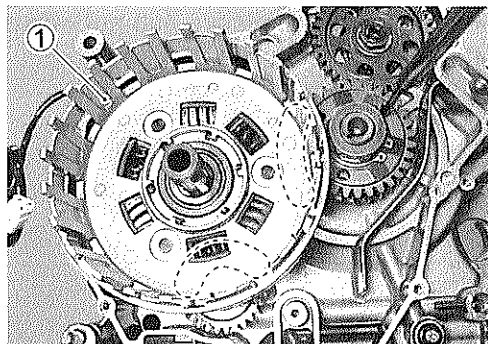
- Install the needle bearing ① and spacer ② onto the counter- shaft.
- Apply engine oil to them.



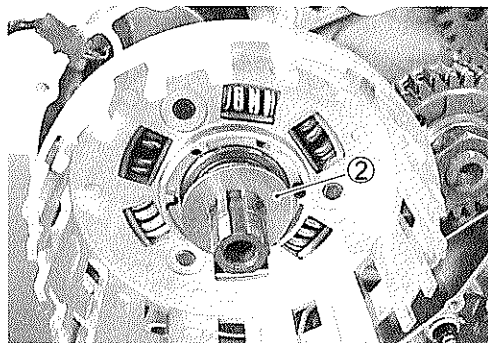
- Install the primary driven gear assembly ① onto the counter-shaft.

NOTE:

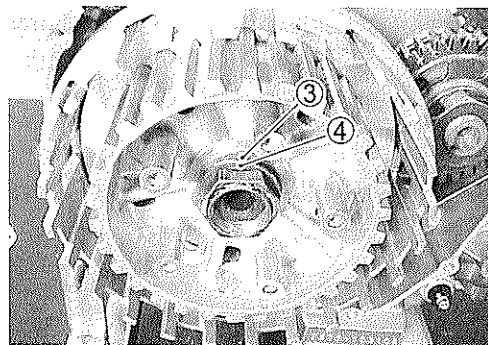
- * When installing the primary driven gear assembly, align the teeth of the primary drive gears by inserting a suitable bar to the holes of them.
- * Be sure to engage the oil pump drive and driven gears, primary drive and driven gears.



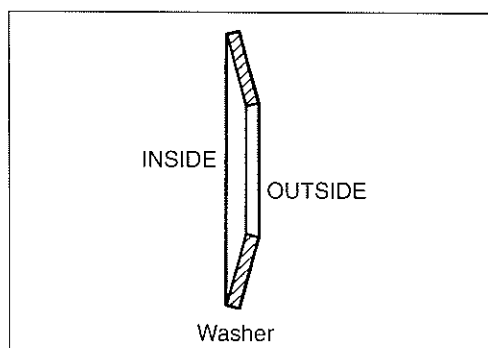
- Install the thrust washer (2).




- Install the clutch sleeve hub.
- Install the washer (3), (4) and clutch sleeve hub nut.

**NOTE:**

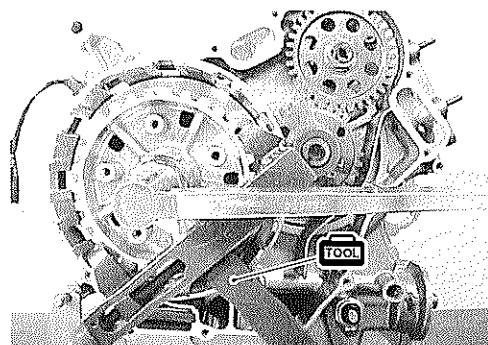
The convex side of the washer faces outside.



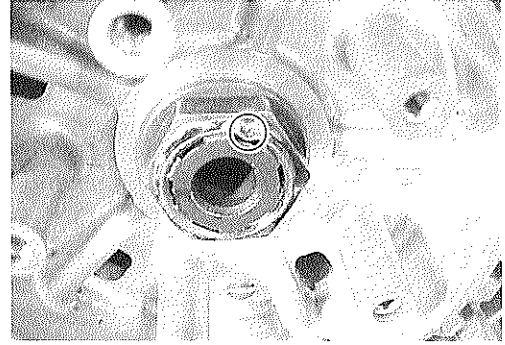
- Tighten the clutch sleeve hub nut to the specified torque with the special tool.

 Clutch sleeve hub nut: 150 N·m (15.0 kgf-m, 108.5 lb-ft)

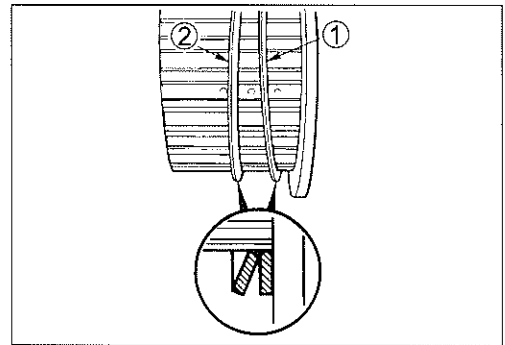
 09920-53740: Clutch sleeve hub holder



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



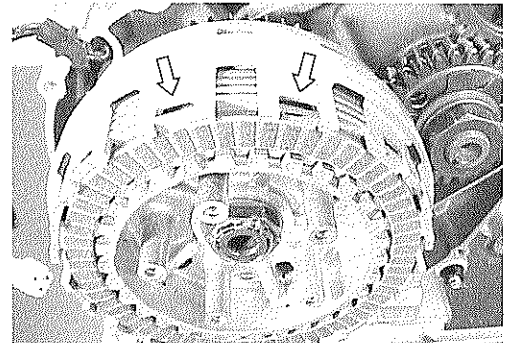
- Install the spring washer seat ① and spring washer ② onto the clutch sleeve hub correctly.



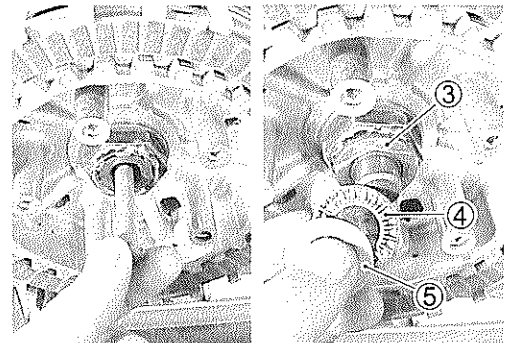
- Insert the clutch drive plates and driven plates one by one into the clutch sleeve hub in the prescribed order, No.3 drive plate being inserted first.

NOTE:


Insert the outermost No.2 drive plate claws to the other slits of clutch housing as shown.




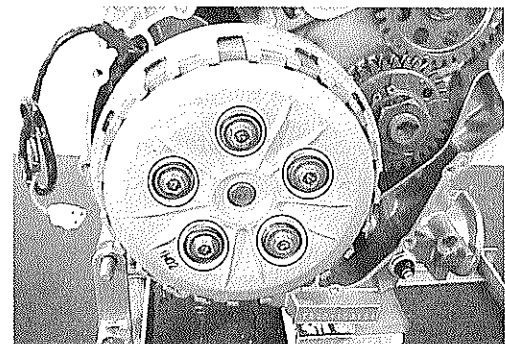
- Install the clutch push rod into the countershaft.
- Install the clutch push piece ③, bearing ④ and thrust washer ⑤.

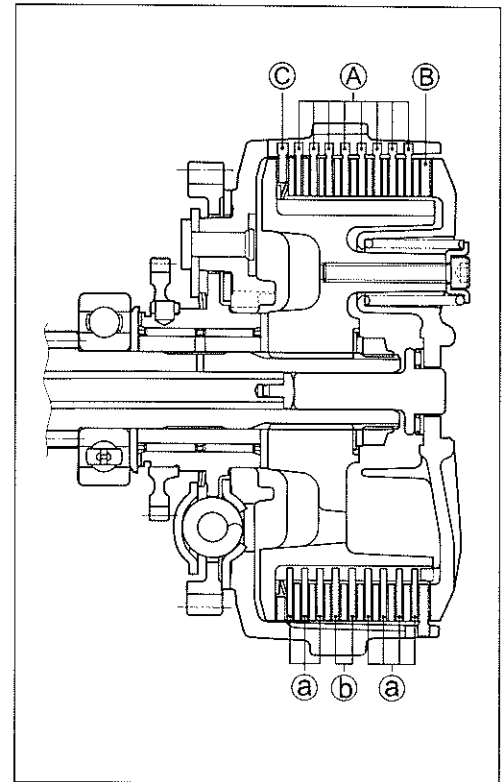
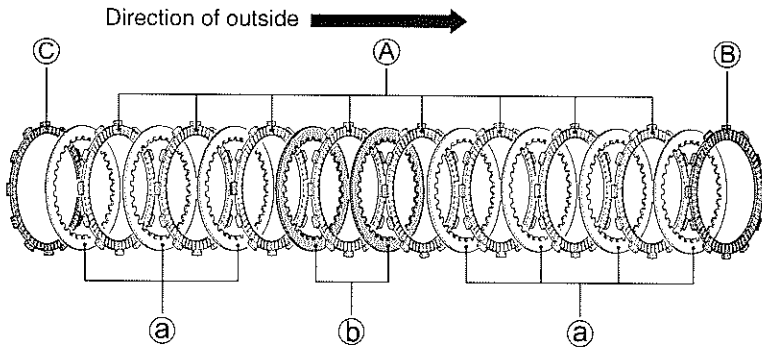


- Tighten the clutch spring set bolts diagonally to the specified torque while holding the generator rotor with the special tool.

 **Clutch spring set bolts: 10 N·m (1.0 kgf·m, 7.0 lb·ft)**

 **09930-44541: Rotor holder**





NOTE:

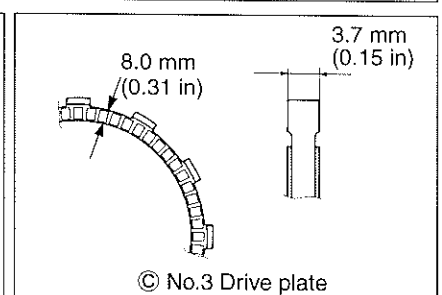
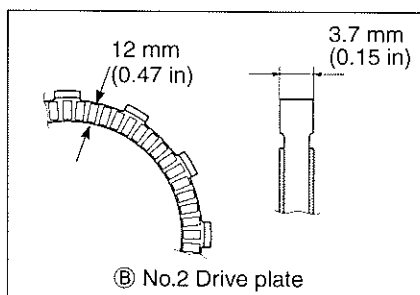
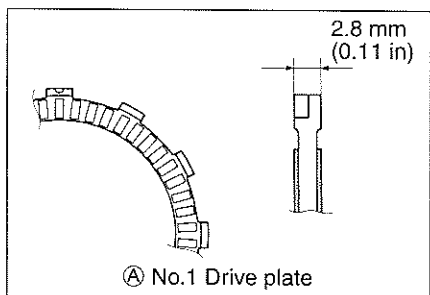
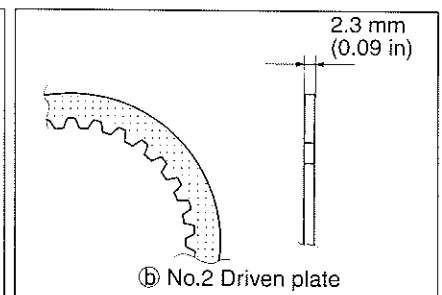
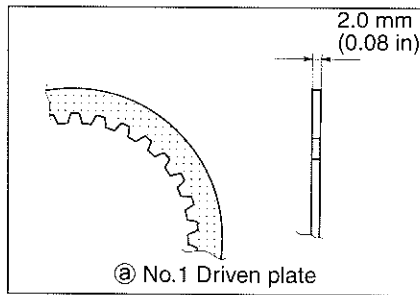
- *The No.2 Driven plate should be installed between 4th to 7th position from the clutch sleeve hub.
- *Set the numbers of driven plate to the standard specifications when replacing the driven plates with the new ones.

DRIVEN PLATE:

- Ⓐ No.1 Driven plate.....5 – 8 pcs. (Standard: 7pcs.)
- Ⓑ No.2 Driven plate.....1 – 4 pcs. (Standard: 2pcs.)

DRIVE PLATE:

- Ⓐ No.1 Drive plate.....8 pcs.
- Ⓑ No.2 Drive plate.....1 pc.
- Ⓒ No.3 Drive plate.....1 pc.

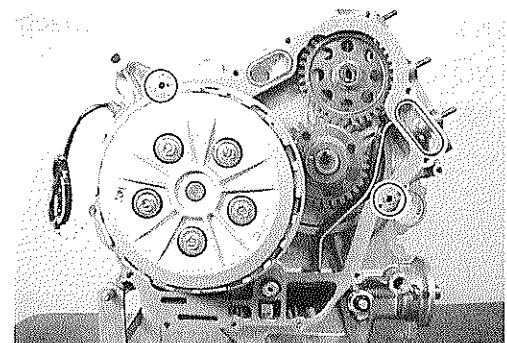


CLUTCH COVER

- Install the gasket and dowel pins.

CAUTION

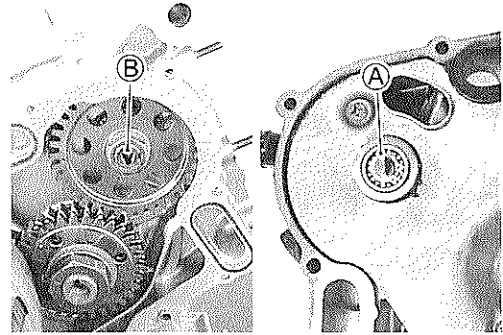
Use the new gasket to prevent oil leakage.



- Install the clutch cover.

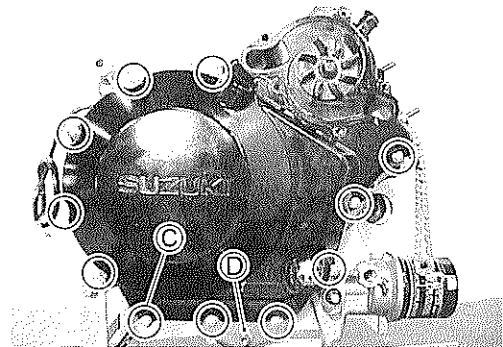
NOTE:

Set the impeller shaft end (A) to the cam drive idle shaft (B).




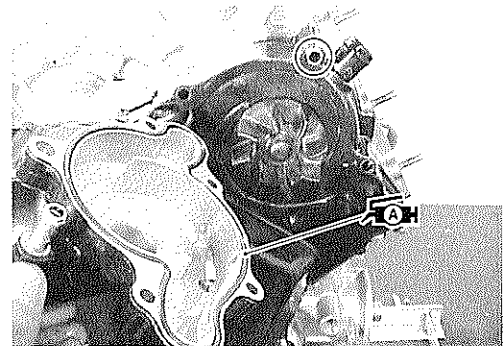
NOTE:

- * Fit the clamp to the bolt (C).
- * Install the bracket (D).

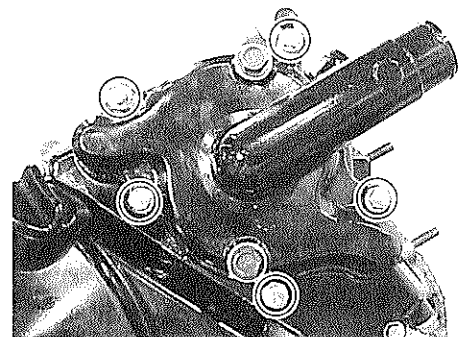


- Fit the dowel pin.
- Apply the grease to the O-ring.

 **99000-25030: SUZUKI SUPER GREASE "A" (USA)**
99000-25010: SUZUKI SUPER GREASE "A" (Others)



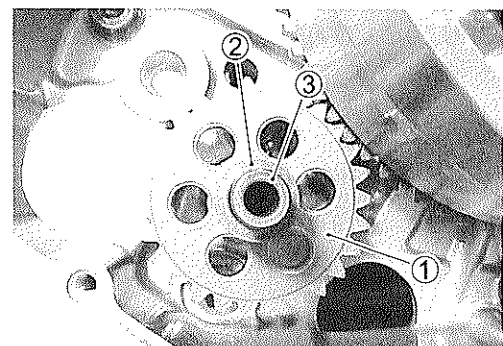
- Install the water pump case.



- Install the starter idle gear (1), spacer (2) and shaft (3).

NOTE:

Apply engine oil to the shaft (3).

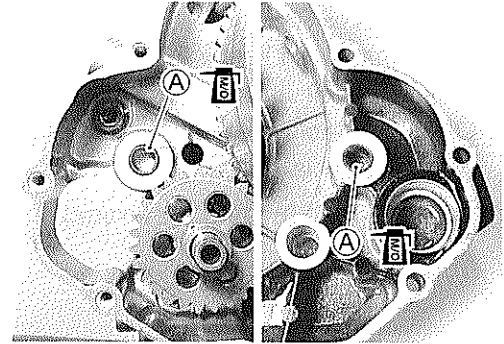


- Install the bushings ① into the crankcase and generator cover.

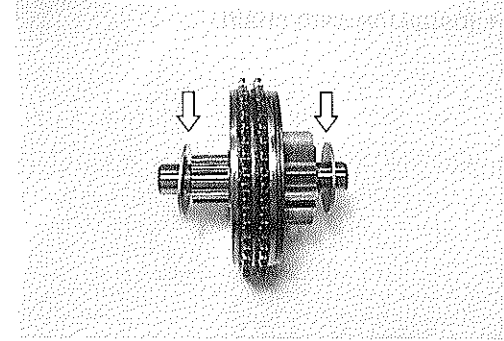
NOTE:

Apply molybdenum oil solution to the inside of the bushings.

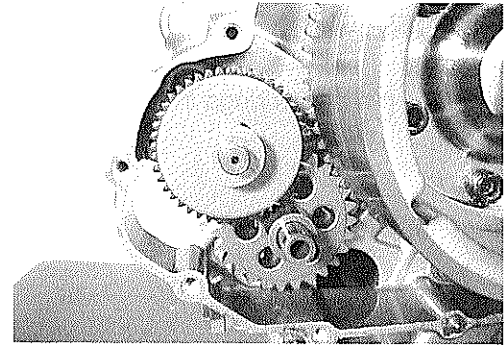
MOLYBDENUM OIL



- Fit the washers onto the starter torque limiter.



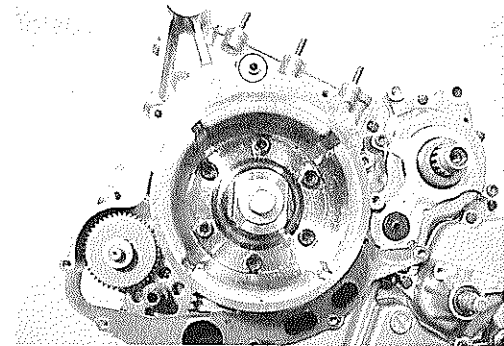
- Install the starter torque limiter.



- Install the dowel pin and gasket.

CAUTION

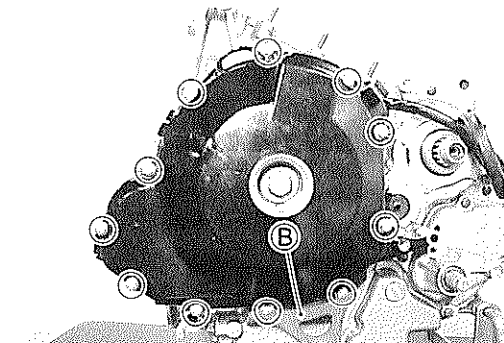
Use the new gasket to prevent oil leakage.



- Install the generator cover.


NOTE:

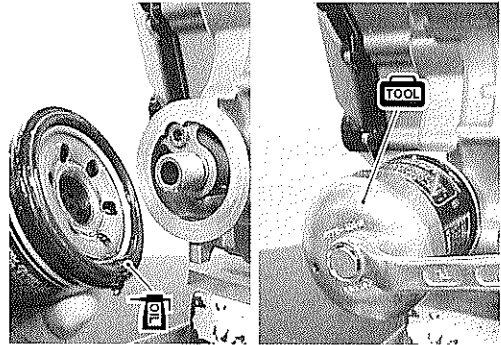
Install the bracket ②.



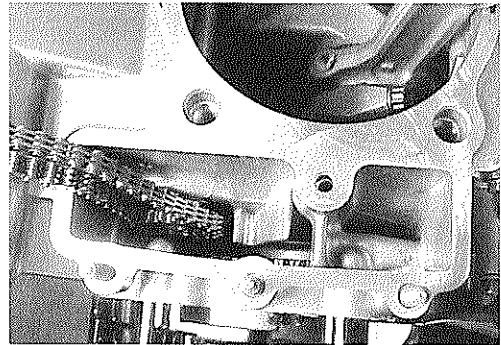
OIL FILTER

- Apply engine oil lightly to the O-ring.
- Install the oil filter turning it by hand until feeling that the O-ring contacts the mounting surface. Then tighten it 2 turns with the special tool.

 **09915-40610: Oil filter wrench**



- Install the cam chain.



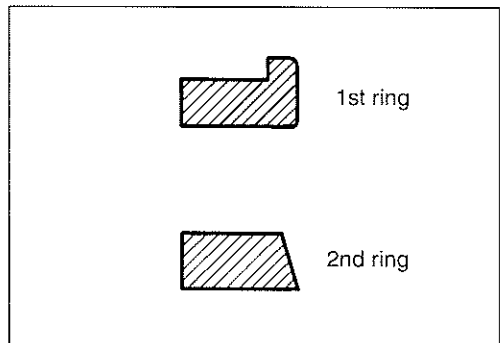
ENGINE TOP SIDE

PISTON

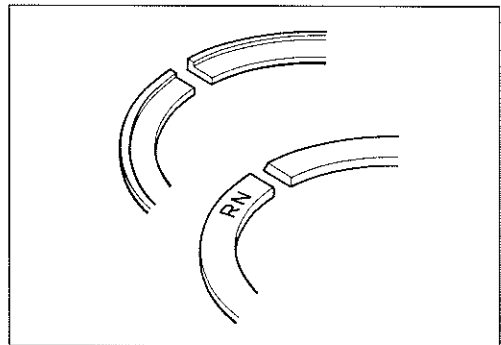
- Install the piston rings in the order of oil ring, 2nd ring and 1st ring.

NOTE:

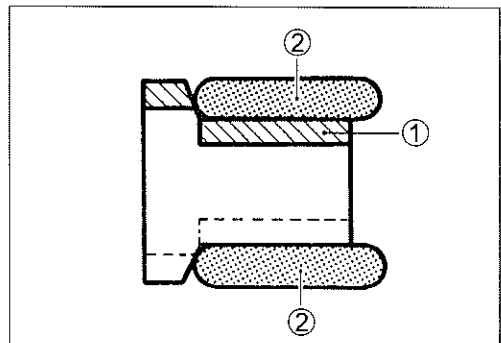
1st ring and 2nd ring differ in the shape.



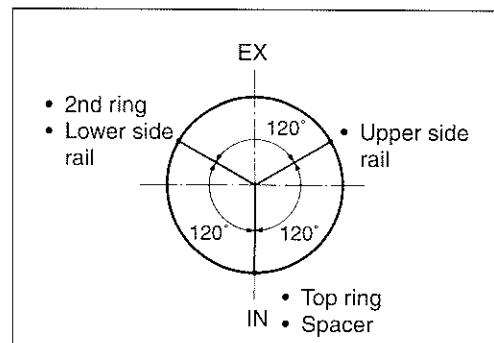
- Be sure to bring the concave side of 1st ring to top when fitting it to the piston.
- 2nd (middle) ring has letters “RN” marked on the side. Be sure to bring the marked side of the 2nd ring to top when fitting it to the piston.



- The first member to go into the ring groove is spacer ①. After placing the spacer, fit the two side rails ②. Side designations, top and bottom, are not applied to the spacer and side rails: you can position each either way.



- Position the gaps of the three rings as shown. Before inserting each piston into the cylinder, check that the gaps are so located.

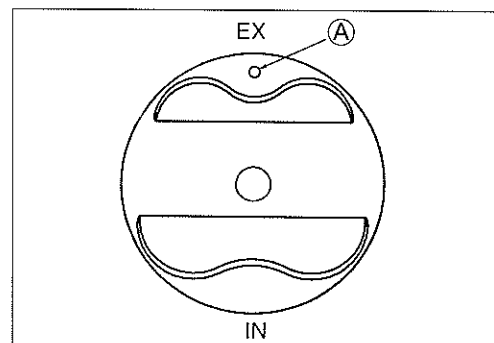


- Apply a light coat of molybdenum oil solution to the piston pin.

MOLYBDENUM OIL

NOTE:

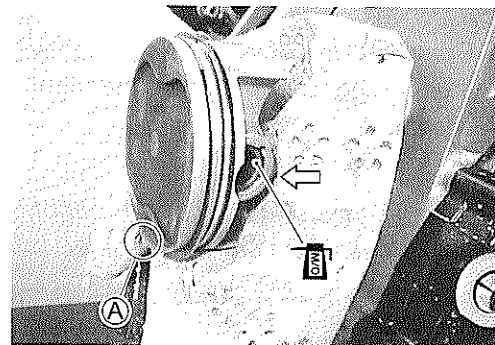
When installing the pistons, front and rear, the indents (A) on the piston heads must be located to each exhaust side.



- Place a clean rag over the cylinder base so as not to drop the piston pin circlips into the crankcase.
- Install the pistons, front and rear.
- Install the piston pin circlips.

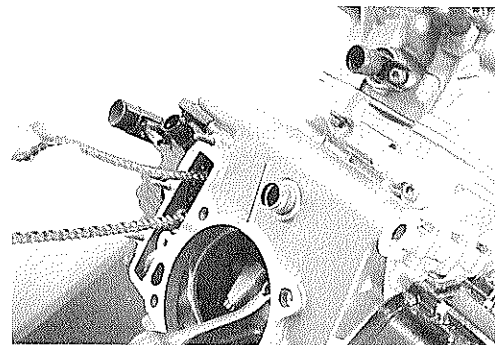
CAUTION

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



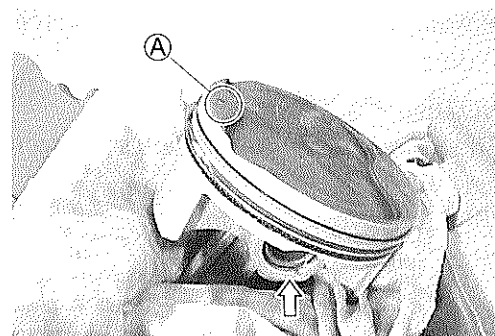
CAUTION

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



NOTE:

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

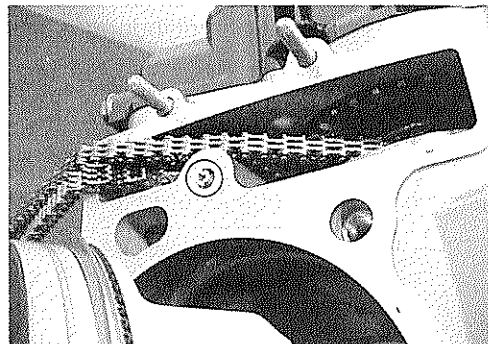
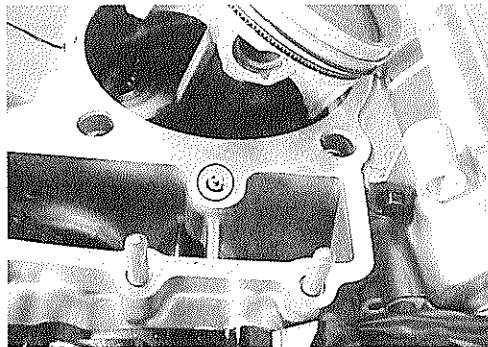


OIL JET

- Apply engine oil to the new O-rings.
- Install each of the oil jets.

CAUTION

Use the new O-rings to prevent oil leakage.



CYLINDER

- Coat SUZUKI BOND “1207B” lightly to the mating surfaces at the parting line between the right and left crankcases as shown.

NOTE:

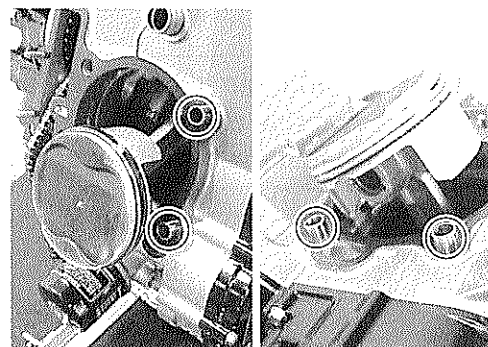
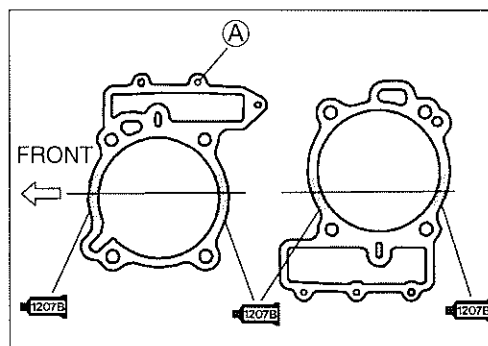
When replacing the stud bolt (A), apply SUZUKI BOND “1207B” to the thread of the crankcase side.

1207B 99104-31140: SUZUKI BOND “1207B”

- Fit the dowel pins and new gaskets ① to the crankcase.

CAUTION

Use the new gaskets to prevent oil leakage.



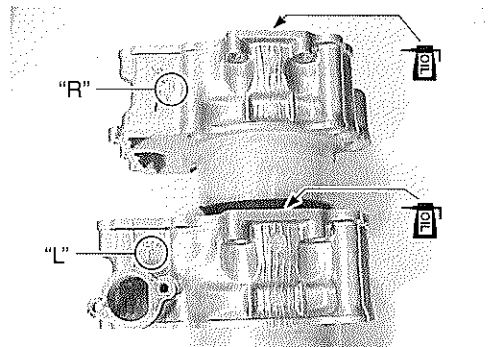
- Apply engine oil to the sliding surface of the pistons and cylinders.

NOTE:

The cylinders can be distinguished by the embossed-letters, “F” and “R”.

“F”: Front (No.1) cylinder

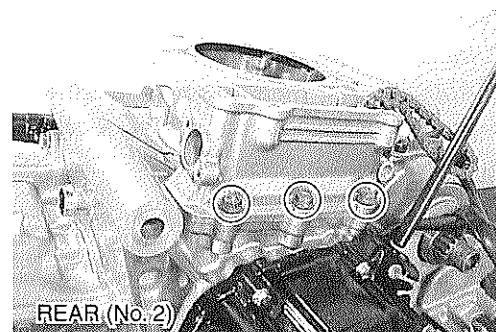
“R”: Rear (No.2) cylinder



- Hold the piston rings in proper position, and insert each of the pistons into the respective cylinders.

NOTE:

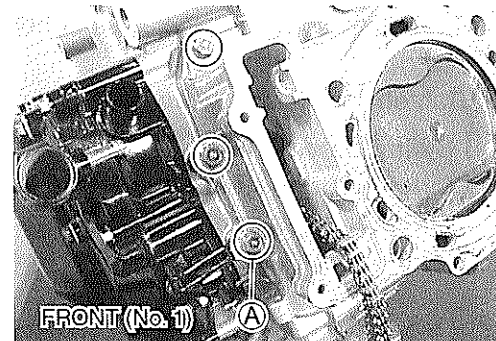
When installing the cylinders, keep the cam chains taut. The cam chain must not be caught between cam drive sprocket and crankcase when turning the crankshaft.



- Tighten the cylinder nuts (M6) temporarily.

NOTE:

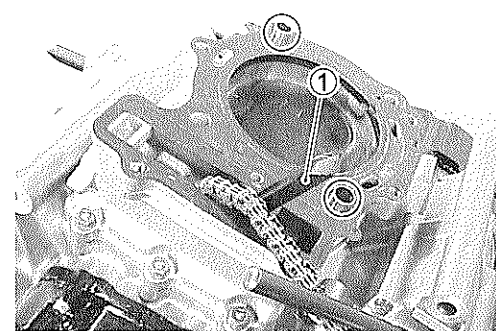
Fit the clamp to the front cylinder nut (A).

**CYLINDER HEAD**

- Pull the cam chains out of the cylinders and install the cam chain guides (1).

NOTE:

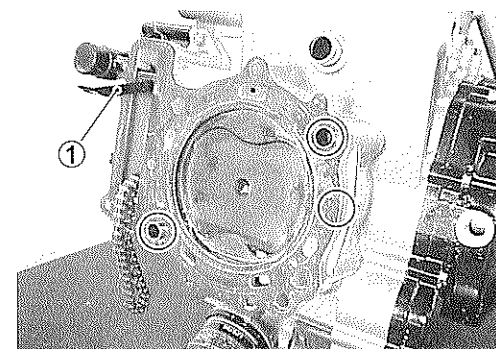
There are the guide holders for the bottom ends of each cam chain guide cast in the crankcase. Be sure that the cam chain guides are inserted properly.



- Fit the dowel pins and new cylinder head gaskets to the cylinders, front and rear.

CAUTION

Use the new gaskets to prevent gas leakage.



- Place the rear cylinder head on the cylinder.

NOTE:

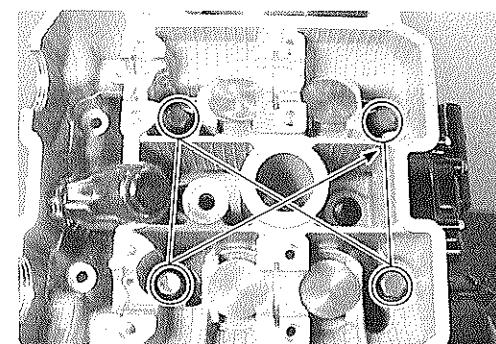
When installing the cylinder head, keep the cam chain taut.

- Tighten the cylinder head bolts (M10) to the specified two step torque with a torque wrench sequentially and diagonally.

U Cylinder head bolt (M10):

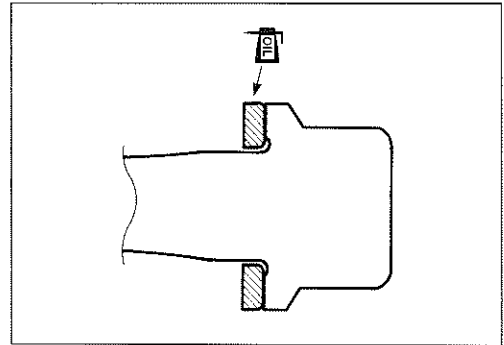
Initial 25 N·m (2.5 kgf-m, 18.0 lb-ft)

Final 47 N·m (4.7 kgf-m, 34.0 lb-ft)



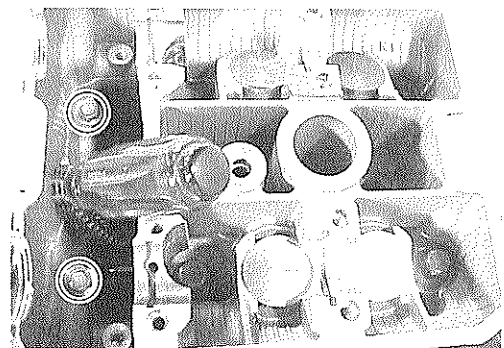
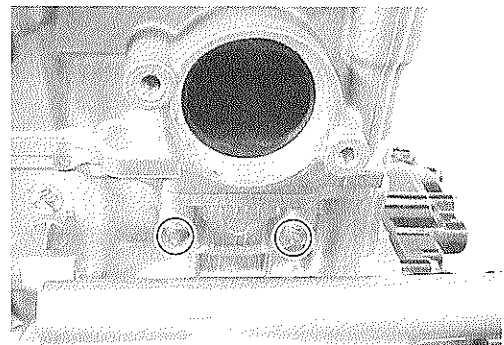
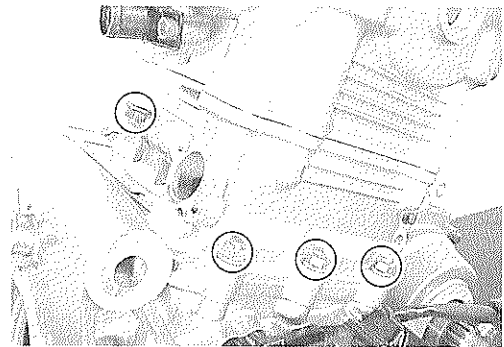
NOTE:

- * Install the washers to the cylinder head bolts (M10) as shown.
- * Apply engine oil to the washers and thread portion of the bolts before installing the cylinder head bolts.



- After firmly tightening the cylinder head bolts (M10), install the cylinder head nuts and bolts.
- Tighten the cylinder head nuts, bolts and the cylinder nuts.

- 🔧 **Cylinder head nut (M8): 25 N·m (2.5 kgf-m, 18.0 lb-ft)**
- Cylinder head nut (M6): 10 N·m (1.0 kgf-m, 7.0 lb-ft)**
- Cylinder head bolt (M6): 10 N·m (1.0 kgf-m, 7.0 lb-ft)**
- Cylinder nut (M6): 10 N·m (1.0 kgf-m, 7.0 lb-ft)**



- Place the front cylinder head on the cylinder.

NOTE:

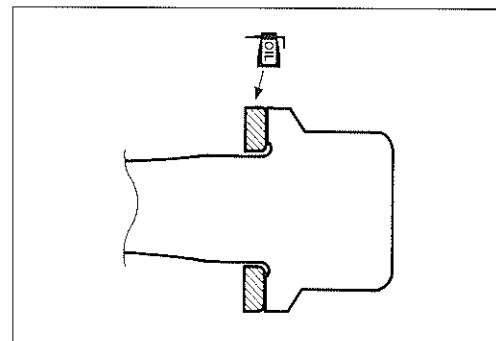
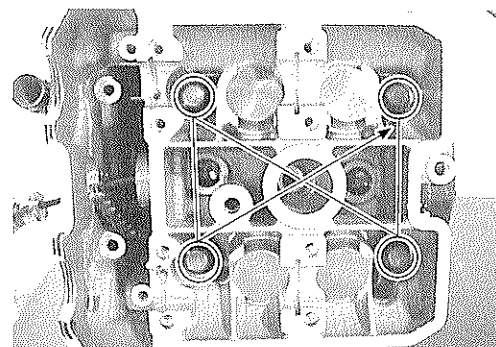
When installing the cylinder head, keep the cam chain taut.

- Tighten the cylinder head bolts (M10) to the specified two-step torque with a torque wrench sequentially and diagonally.

**🔩 Cylinder head bolt (M10): Initial 25 N·m
(2.5 kgf-m, 18.0 lb-ft)
Final 47 N·m
(4.7 kgf-m, 34.0 lb-ft)**

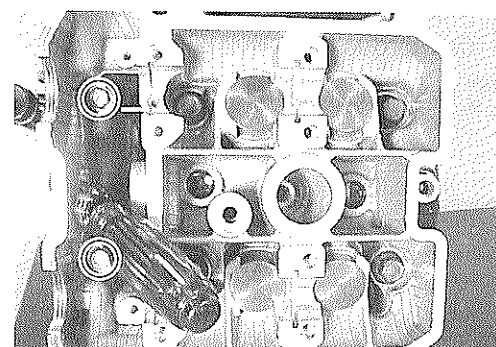
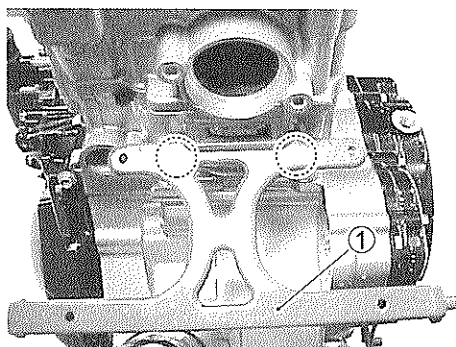
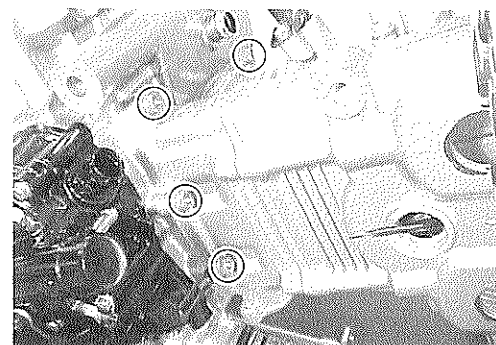
NOTE:

- * *Install the washers to the cylinder head bolts (M10) as shown.*
- * *Apply engine oil to the washers and thread portion of the bolts before installing the cylinder head bolts.*



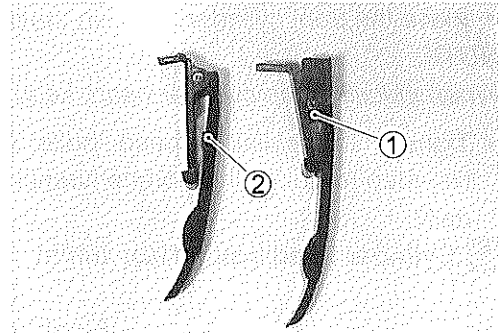
- After firmly tightening the cylinder head bolts (M10), install the cylinder head nuts, bolts and oil cooler mounting bracket ①.
- Tighten the cylinder head nuts, bolts and the cylinder nuts.

**🔩 Cylinder head nut (M8): 25 N·m (2.5 kgf-m, 18.0 lb-ft)
Cylinder head nut (M6): 10 N·m (1.0 kgf-m, 7.0 lb-ft)
Cylinder head bolt (M6): 10 N·m (1.0 kgf-m, 7.0 lb-ft)
Cylinder nut (M6): 10 N·m (1.0 kgf-m, 7.0 lb-ft)**



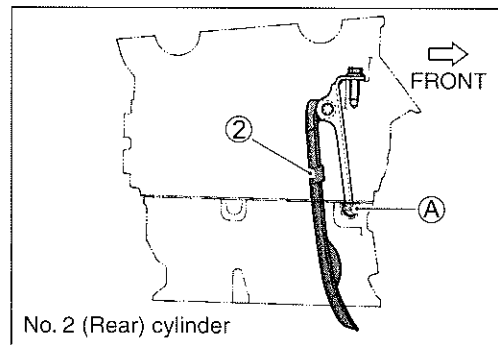
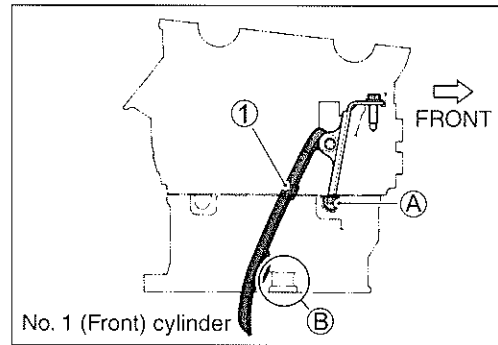
- Pull the cam chains upward and install the cam chain tensioners into each cylinder head.

- ① For No.1 (Front) cylinder head
- ② For No.2 (Rear) cylinder head



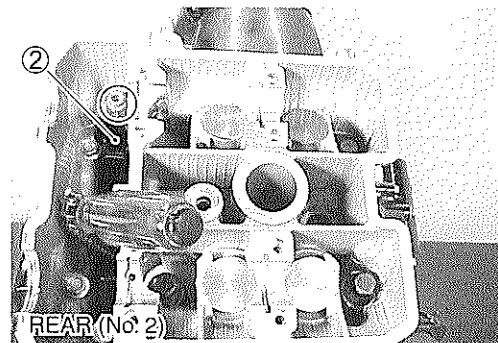
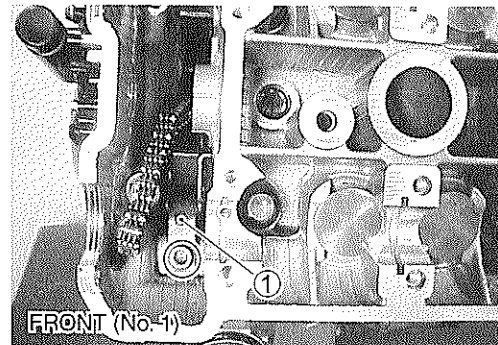
NOTE:

- * When installing the cam chain tensioners, insert the their holder ends (A) into each guide cast on the cylinder.
- * When installing the No.1 (Front) cam chain tensioner, through it rear side of the rib (B).



- Tighten the cam chain tensioner mounting bolts to the specified torque.

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



FRONT CAM DRIVE IDLE GEAR/SPROCKET

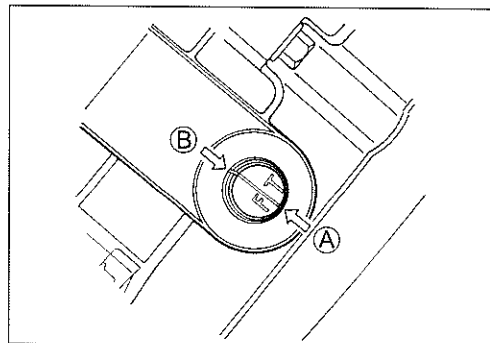
- Turn the crankshaft counterclockwise with the box wrench and align "F I T" line (A) on the generator rotor with the index mark (B) of the valve timing inspection hole while keeping the camshaft drive chain pulled upward.

CAUTION

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

CAUTION

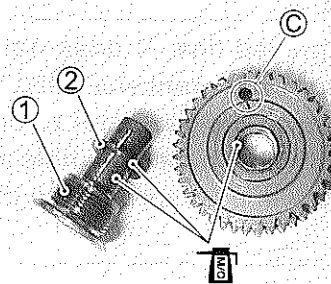
To adjust the camshaft timing correctly, be sure to align "F I T" line (A) with the index mark (B) and hold this position when installing the cam drive idle gears/sprockets, front and rear.



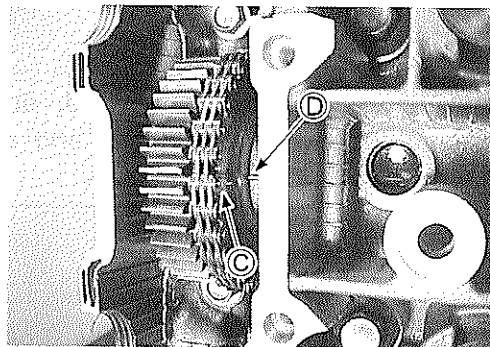
- Apply molybdenum oil solution to the cam drive idle gear/sprocket bearing, its shaft (1), and thrust washer (2).

MOLYBDENUM OIL**NOTE:**

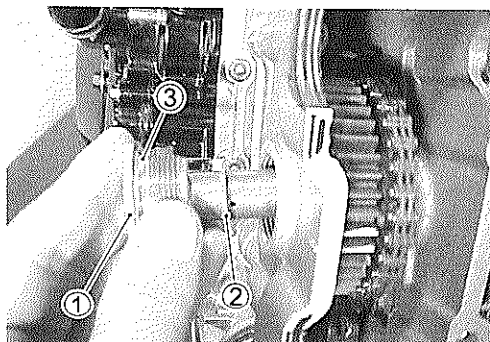
- * The thickness of thrust washer (2) must be selected for each cylinder head. **THRUST WASHER SELECTION** 3-44
- * Paint the engraved line (C) on the cam drive idle gear/sprocket.



- Install the cam drive idle gear/sprocket onto the front cylinder head and engage the cam chain on it.
- Align the engraved line (C) on the cam drive idle gear/sprocket with the embossed line (D) on the cylinder head.



- Install the cam drive idle gear/sprocket shaft (1), the copper washer (3) and the thrust washer (2).



- Check and correct the positions of the “F I T” line on the generator rotor and cam drive idle gear/sprocket ①.

CAUTION

When checking the positions, remove the cam chain slack at the cam chain guide ② side by holding the cam drive idle gear/sprocket by hand.

NOTE:

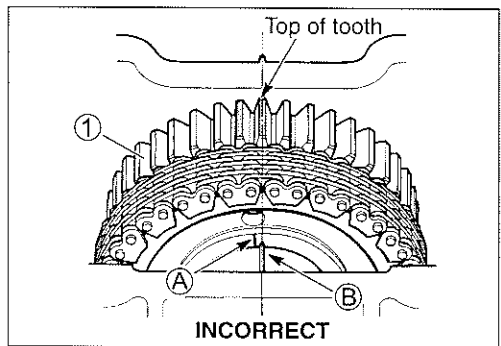
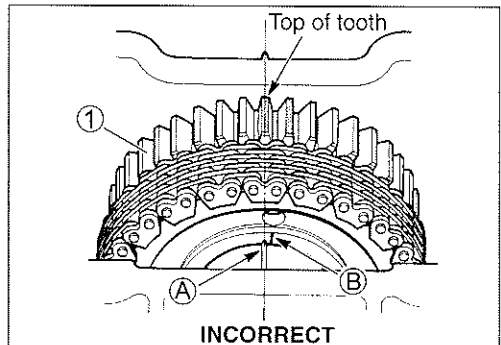
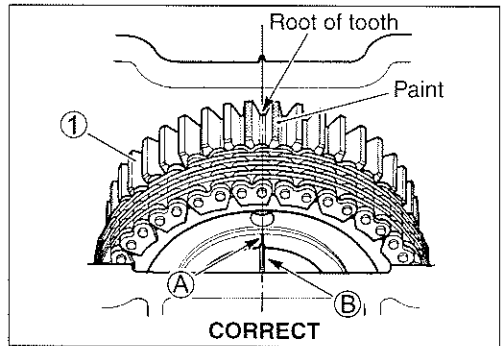
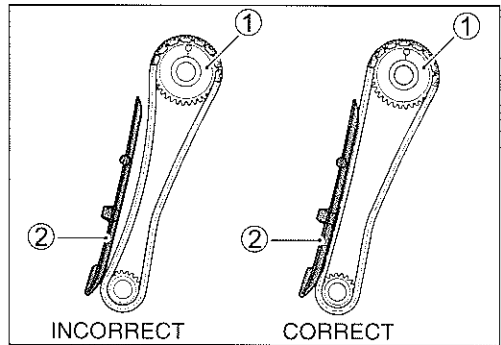
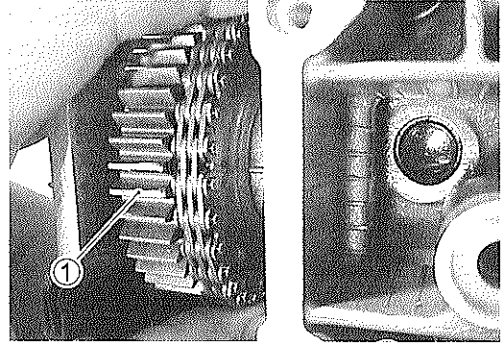
Due to special valve train mechanism, aligning of the three elements; the engraved line ①, embossed line ② and the gear tooth root on the cam drive idle gear/sprocket; can occur once every other rotation of crankshaft.

CAUTION

If the engraved line ① does not align the embossed line ②, turn the crankshaft 360° (1 turn) to bring the “F I T” line on the generator rotor to the index mark of the valve timing inspection hole again and reinstall the cam drive idle gear/sprocket to the correct position as shown.

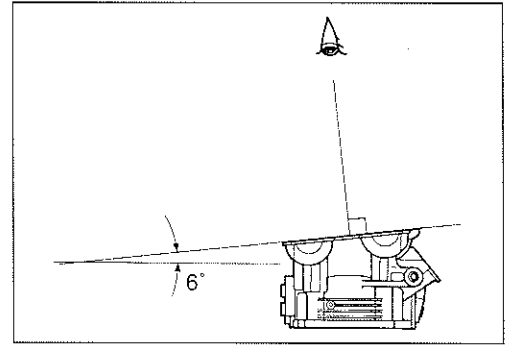
CAUTION

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



NOTE:

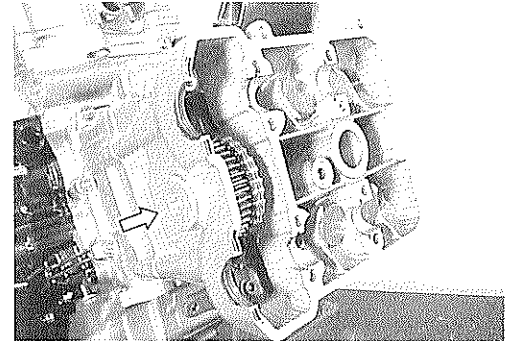
When checking the cam drive idle gear/sprocket ① position at its gear tooth, top or root, bring the eye level as shown in right illustration.



- Tighten the cam drive idle gear/sprocket shaft to the specified torque.

🔧 Cam drive idle gear/sprocket shaft:

40 N·m (4.0 kgf-m, 29.0 lb-ft)

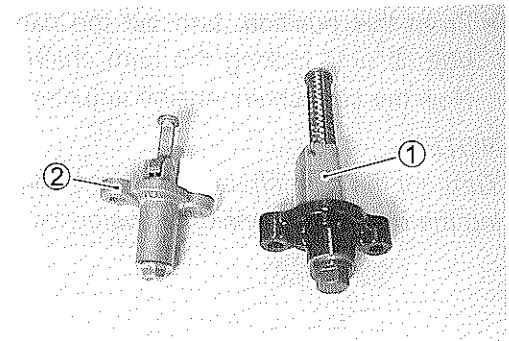
**CAM CHAIN TENSION ADJUSTER**

- Install the front cam chain tension adjuster to the following procedure.

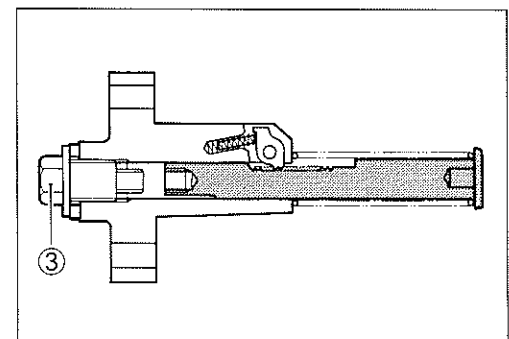
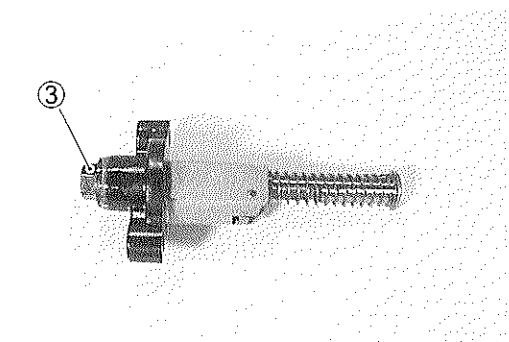
NOTE:

The cam chain tension adjusters are distinguished by the shapes.

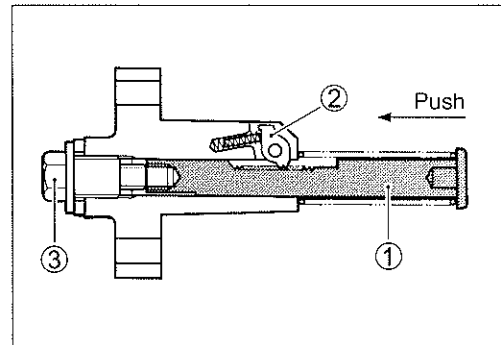
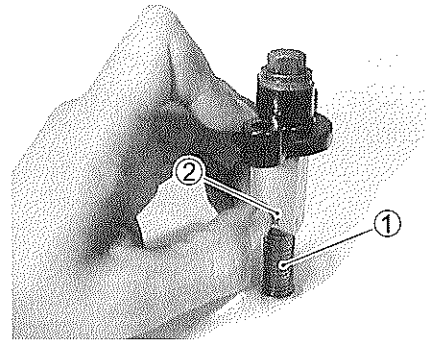
- ① For No.1 (Front) cylinder
- ② For No.2 (Rear) cylinder



- Turn in the cam chain tension adjuster bolt ③ fully.



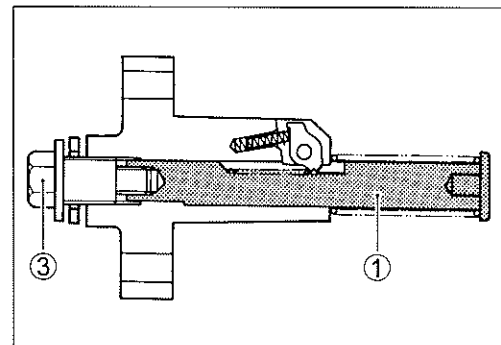
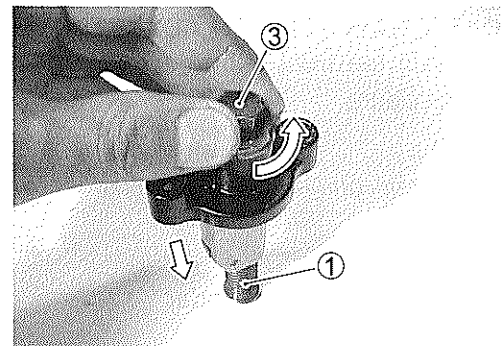
- Compress the cam chain tension adjuster rod ① fully by releasing the ratchet ②.



- From this position, turn out the cam chain tension adjuster bolt ③ until locking the cam chain tension adjuster rod ①. Now the cam chain tension adjuster is ready to install.

NOTE:

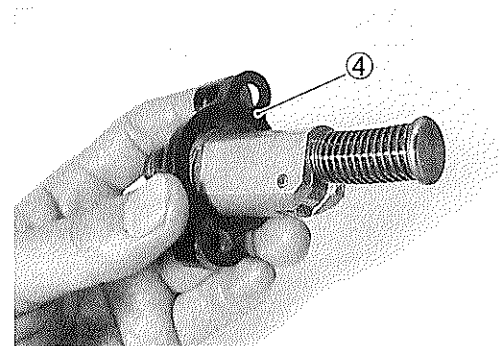
Turn out the cam chain tension adjuster bolt ③ while compressing the cam chain tension adjuster rod.



- Install the new gasket ④.

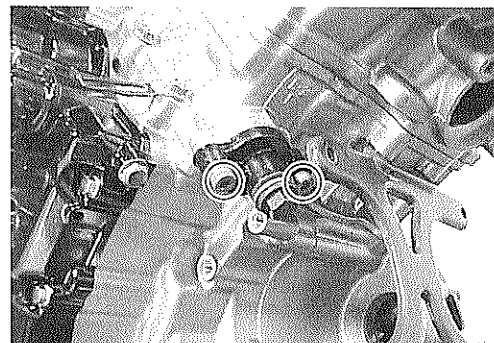
CAUTION

Use the new gasket to prevent oil leakage.



- Install the cam chain tension adjuster as shown and tighten its mounting bolts to the specified torque.

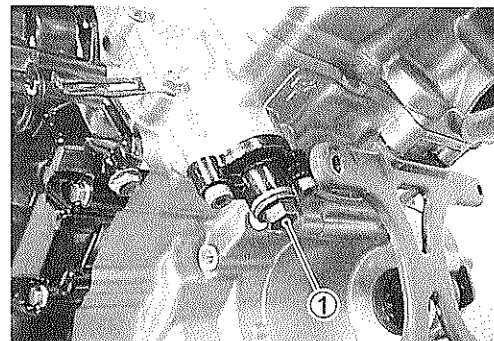
U Cam chain tension adjuster mounting bolt:
10 N·m (1.0 kgf-m, 7.0 lb-ft)



- Release the cam chain tension adjuster by turning in its bolt ①.

NOTE:

Click sound is heard when the cam chain tension adjuster rod is released.

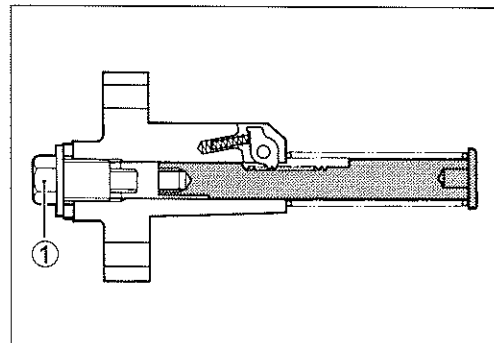


- Tighten the cam chain tension adjuster bolt ① to the specified torque.

U Cam chain tension adjuster bolt (Front):
23 N·m (2.3 kgf-m, 16.5 lb-ft)

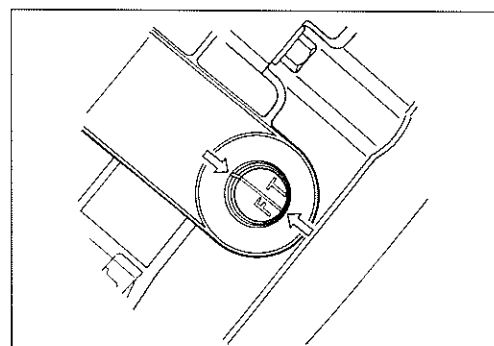
CAUTION

After installing the cam chain tension adjuster, check to be sure that the adjuster work properly by checking the slack of cam chain.



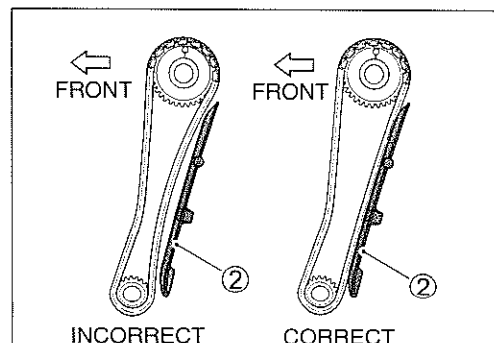
REAR CAM DRIVE IDLE GEAR/SPROCKET

- For the rear cam drive idle gear/sprocket installation, the crankshaft setting position must be set at the same position (TDC of compression stroke) as the front one.
- The procedures are also the same as the front cam drive idle gear/sprocket installation.



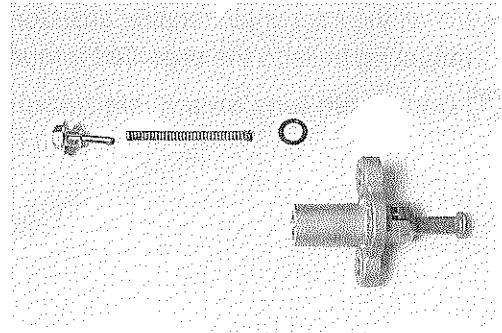
CAUTION

When checking the cam drive idle gear/sprocket position, remove the cam chain slack at the cam chain guide ② side by holding it by hand.

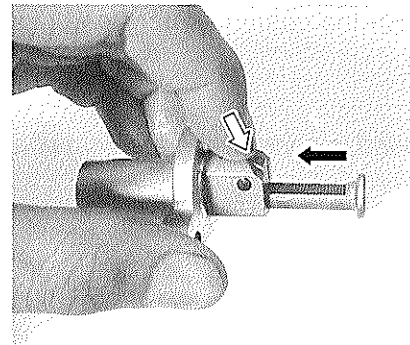


REAR CAM CHAIN TENSION ADJUSTER

- Install the rear cam chain tension adjuster to the following procedure.
- Disassemble the rear cam chain tension adjuster.



- Compress the cam chain tension adjuster rod by releasing the ratchet.



- Install the new gasket ①.

CAUTION

Use the new gasket to prevent oil leakage.

- Install the cam chain tension adjuster as shown and tighten its mounting bolts to the specified torque.

🔧 Cam chain tension adjuster mounting bolt:
10 N·m (1.0 kgf-m, 7.0 lb-ft)

- Install a new O-ring, spring and cam chain tension adjuster bolts and tighten them to the specified torque.

NOTE:

Apply grease to the O-ring before installing.

- 🔧 99000-25030: SUZUKI SUPER GREASE "A" (USA)
- 99000-25010: SUZUKI SUPER GREASE "A" (Others)

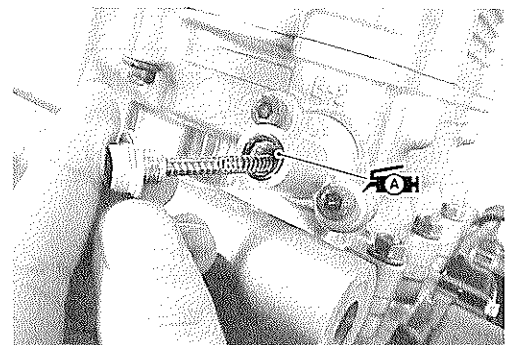
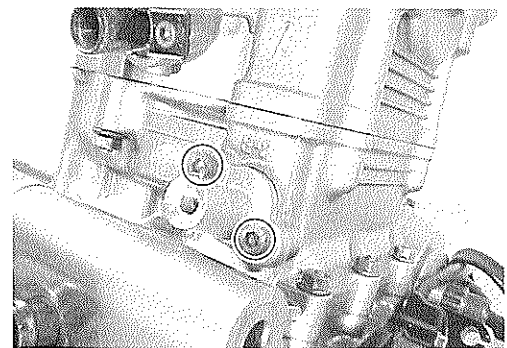
🔧 Cam chain tension adjuster bolt (Rear):
7 N·m (0.7 kgf-m, 5.0 lb-ft)

NOTE:

Click sound is heard when extending the cam chain tension adjuster rod.

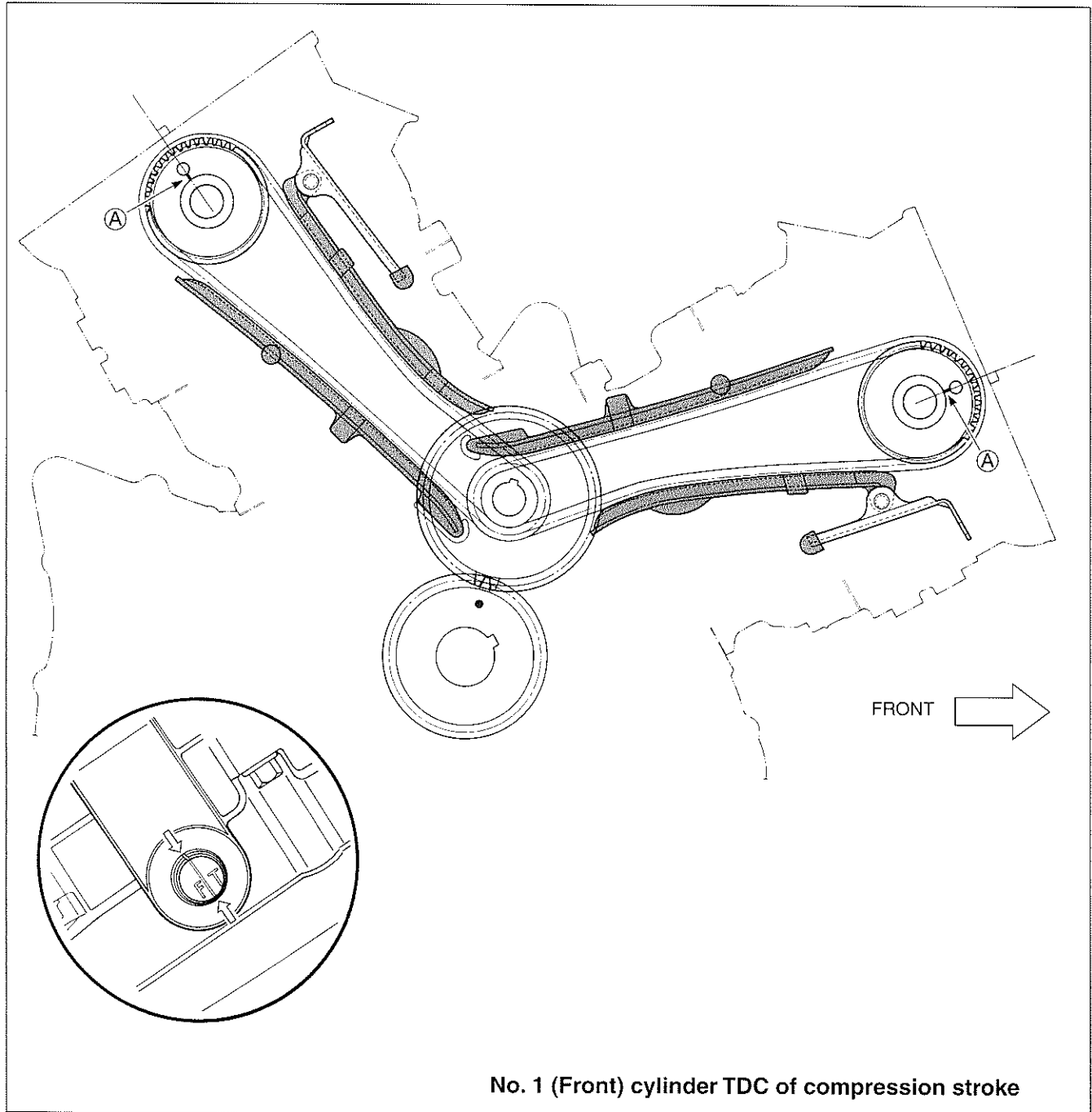
CAUTION

After installing the cam chain tension adjuster, check to be sure that the adjuster work properly by checking the slack of cam chain.



CAMSHAFT

- Rotate the generator rotor 720 degrees (2 turns) and align the "F I T" line on the generator rotor with the index mark of the valve timing inspection hole.
- Recheck the position of the engraved lines (A) on the front and rear cam drive idle gears/sprockets.

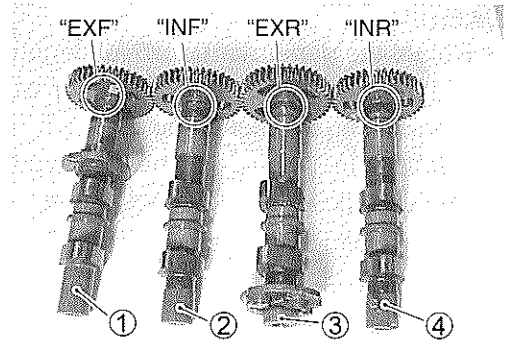
**NO.1 (FRONT) CAMSHAFTS**

- At the above condition, install the No.1 (Front) camshafts, intake and exhaust, in the following procedure.

NOTE:

The cam shafts are identified by the engraved letters.

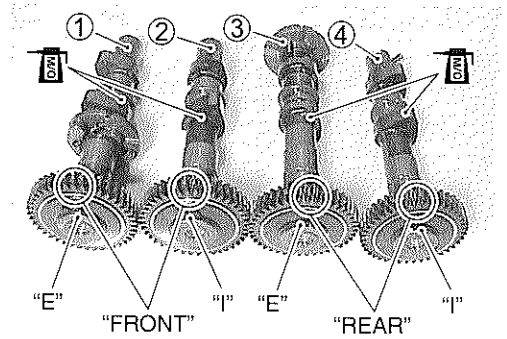
- ① No.1 (Front) exhaust camshaft
- ② No.1 (Front) intake camshaft
- ③ No.2 (Rear) exhaust camshaft
- ④ No.2 (Rear) intake camshaft



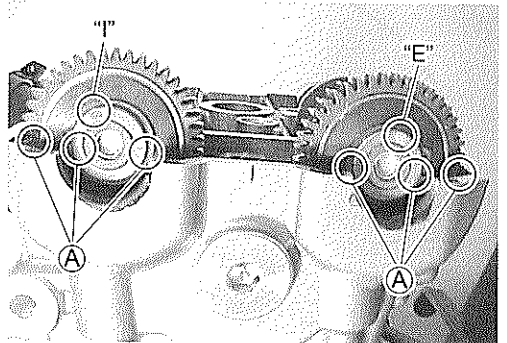
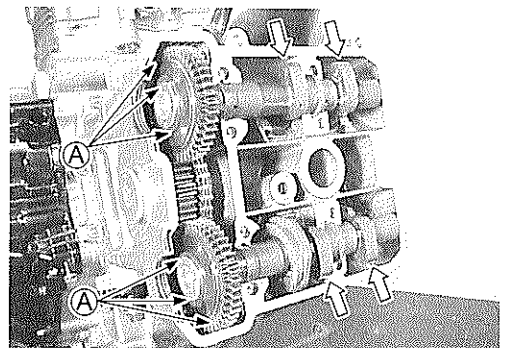
NOTE:

Before placing the camshafts on cylinder head, apply molybdenum oil solution to their journals and cam faces. Apply engine oil to the camshaft journal holders.

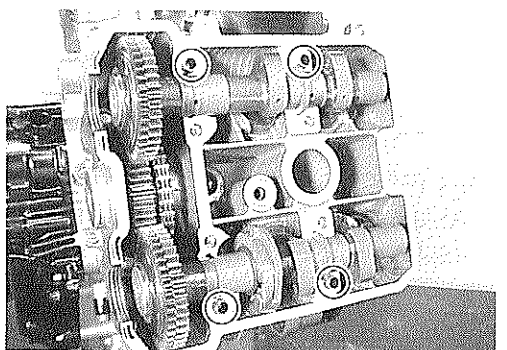
MOLYBDENUM OIL



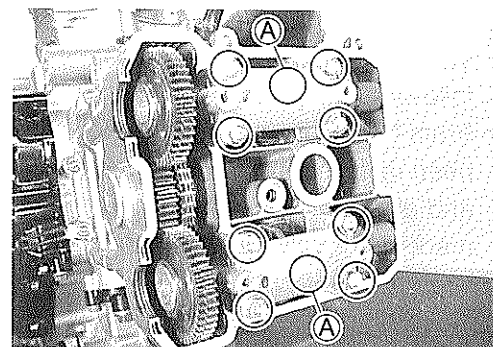
- Place the No.1 (front) camshafts, intake and exhaust.
- Align the engraved lines (A) on the camshafts so it is parallel with the mating surface of the cylinder head cover. Check that the cam faces are located as shown.



- Install the dowel pins.



- Install the camshaft journal holders, intake and exhaust.
- Fasten the camshaft journal holders evenly by tightening the camshaft journal holder bolts sequentially and diagonally. (Try to equalize the pressure by shifting the wrench in the above manner, to fasten the shafts evenly.)

**NOTE:**

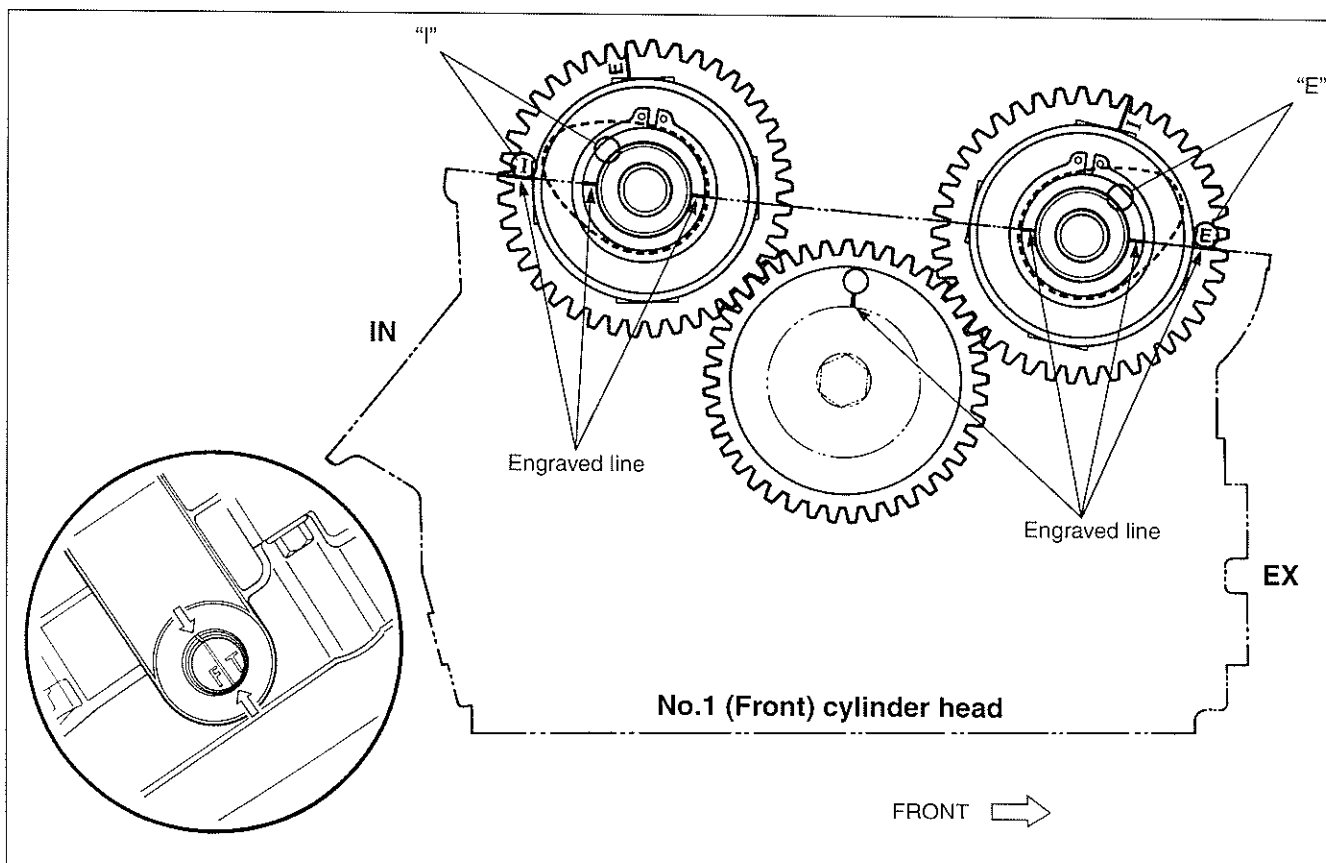
- * *Damage to head or camshaft journal holder thrust surfaces may result if the camshaft journal holders are not drawn down evenly.*
- * *Each camshaft journal holder is identified with a cast-on letters $\text{\textcircled{A}}$.*
- Tighten the camshaft journal holder bolts to the specified torque.

U Camshaft journal holder bolt: 10 N·m (1.0 kgf·m, 7.0 lb·ft)

CAUTION

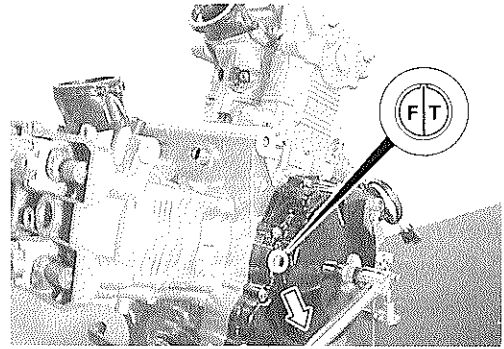
The camshaft journal holder bolts are made of a special material and much superior in strength, compared with other types of high strength bolts. Take special care not to use other types of bolts instead of these special bolts. To identify these bolts, each of them has a figure "9" on its head.

- Recheck the No.1 (Front) camshaft positions, intake and exhaust.



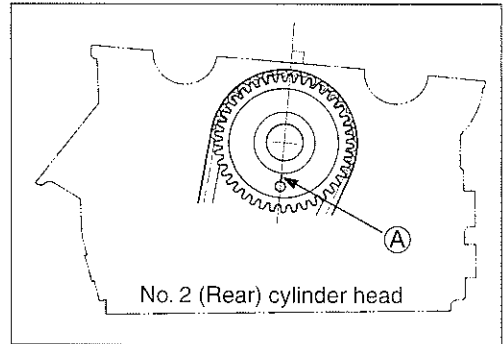
NO.2 (REAR) CAMSHAFTS

- Install the No.2 (Rear) camshafts, intake and exhaust, in the following procedure.
- From the position where the No.1 (Front) camshafts have now been installed, rotate the generator rotor 360 degrees (1 turn) and align the "F I T" line on the generator rotor with the index mark of the valve timing inspection hole.

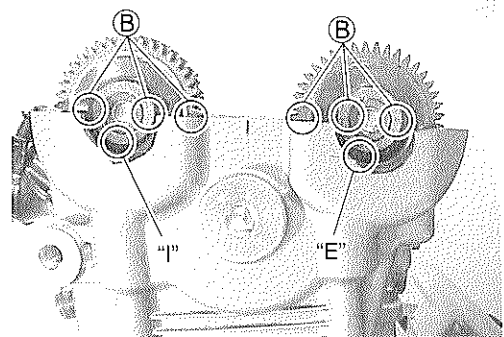
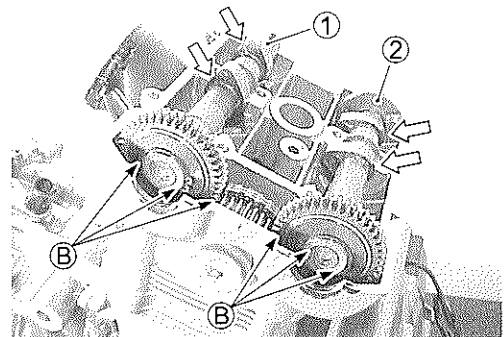


NOTE:

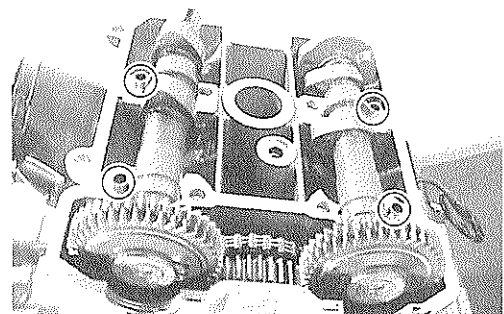
At this position, the engraved line (A) on the cam drive idle gear/sprocket is inside the cylinder head and not visible.



- Place the No.2 (Rear) camshafts, intake (1) and exhaust (2).
- Align the engraved lines (B) on the camshafts so that it is parallel with mating surface of the cylinder head cover. Check that the cam faces are located as shown.



- Install the dowel pins.



- Install the camshaft journal holders, intake and exhaust.
- Fasten the camshaft journal holders evenly by tightening the camshaft journal holder bolts sequentially and diagonally. (Try to equalize the pressure by shifting the wrench in the above manner, to fasten the shafts evenly.)

NOTE:

* Damage to head or camshaft journal holder thrust surfaces may result if the camshaft journal holders are not drawn down evenly.

* Each camshaft journal holder is identified with a cast-on letter **A**.

- Tighten the camshaft journal holder bolts to the specified torque.

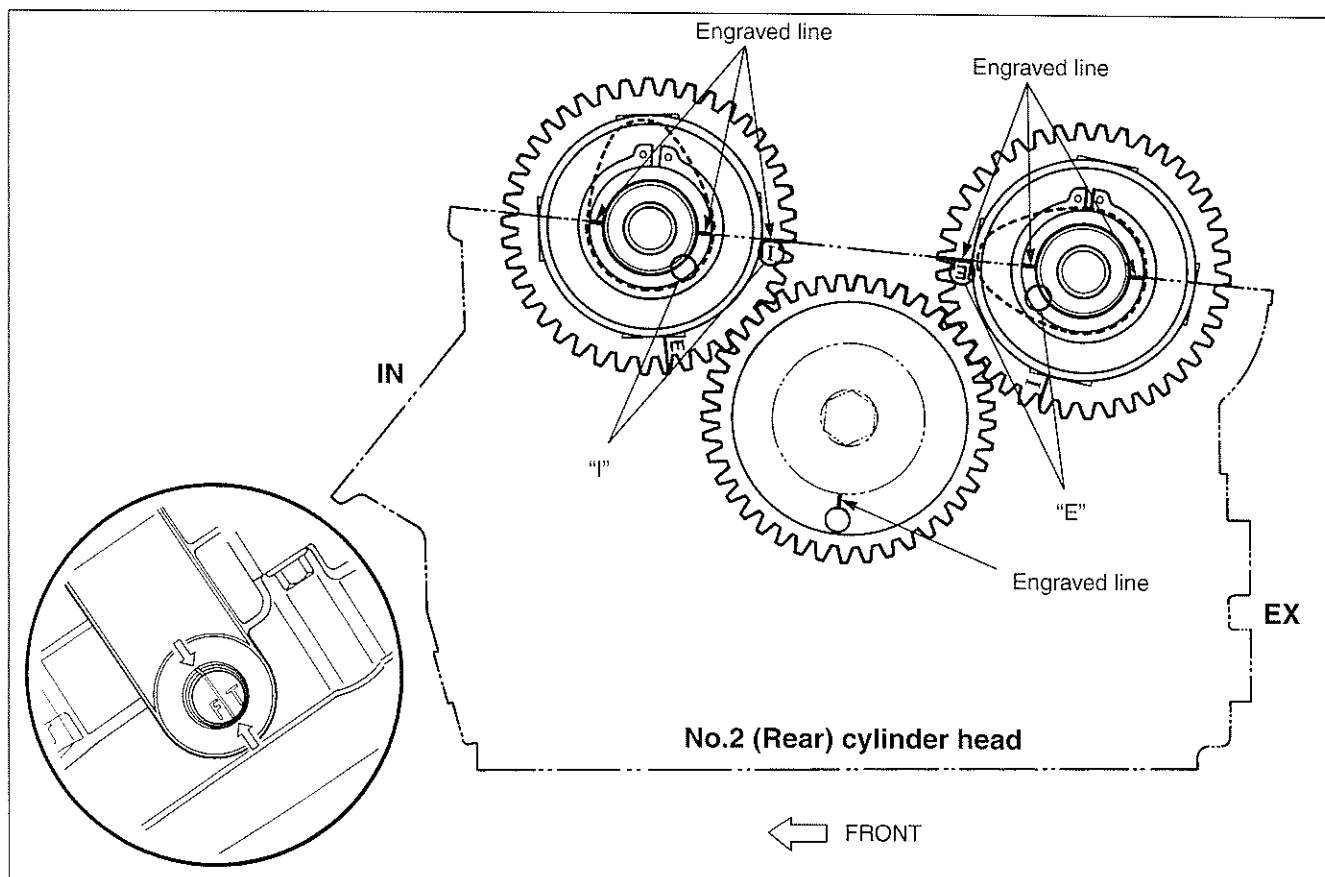
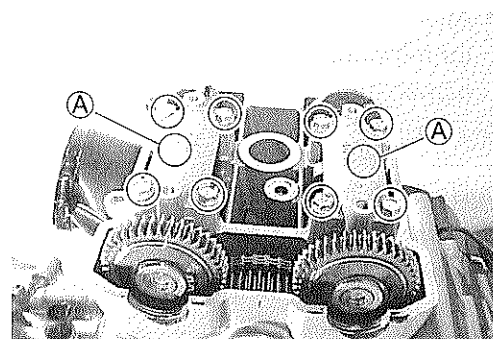
U Camshaft journal holder bolt: 10 N·m (1.0 kgf·m, 7.0 lb-ft)

CAUTION

The camshaft journal holder bolts are made of a special material and much superior in strength, compared with other types of high strength bolts.

Take special care not to use other types of bolts instead of these special bolts. To identify these bolts, each of them has a figure "9" on its head.

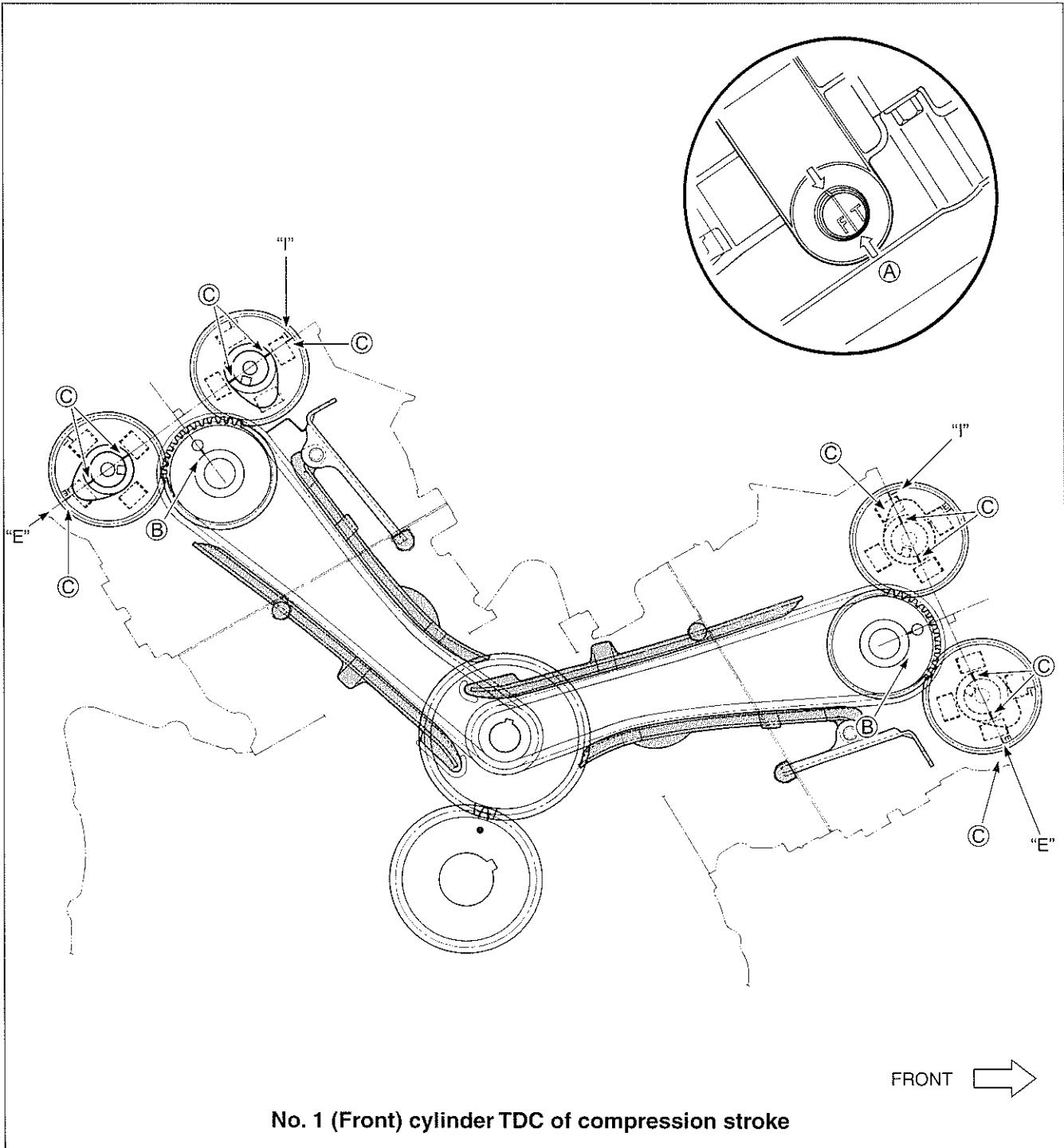
- Recheck the No.2 (Rear) camshaft positions, intake and exhaust.



- After installing the No.2 (Rear) camshafts, rotate the generator rotor 360 degrees (1 turn), and recheck the positions of the camshafts.

CAUTION

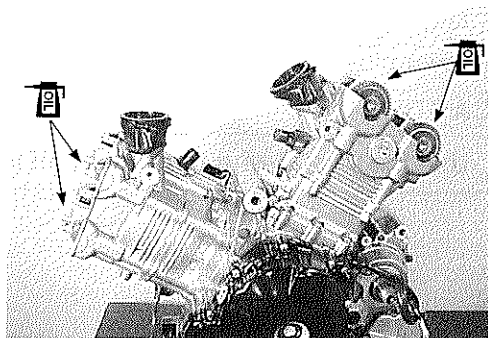
Be sure to check the positions of the "F | T" line (A) on the generator rotor, engraved line (B) on the cam drive idle gears/sprockets and the engraved line (C) on the camshafts.



- Pour engine oil in each oil pocket in the front and rear cylinder heads.

CAUTION

Be sure to check the tappet clearance.

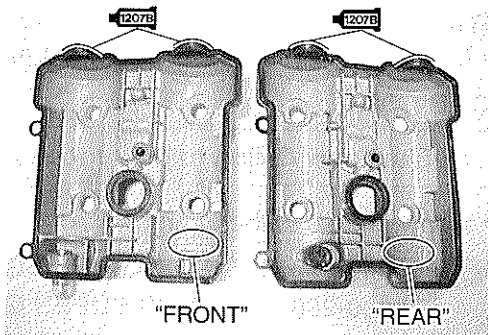
**CYLINDER HEAD COVER**

- Install the new gaskets (②, ③) to each cylinder head cover.
- Apply SUZUKI BOND "1207B" to the cam end caps of the gaskets as shown.

 99104-31140: SUZUKI BOND "1207B"

CAUTION

Use the new gaskets to prevent oil leakage.



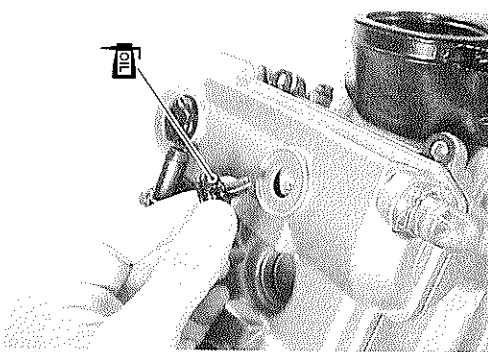
- Place the cylinder head covers on each cylinder head.
- Fit the gaskets to each head cover bolt.

CAUTION

Use the new gaskets to prevent oil leakage.

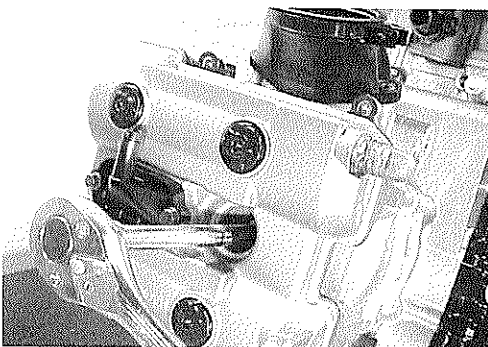
- After applying engine oil to the gaskets, tighten the head cover bolts to the specified torque.

 Head cover bolt: 14 N·m (1.4 kgf·m, 10.0 lb-ft)

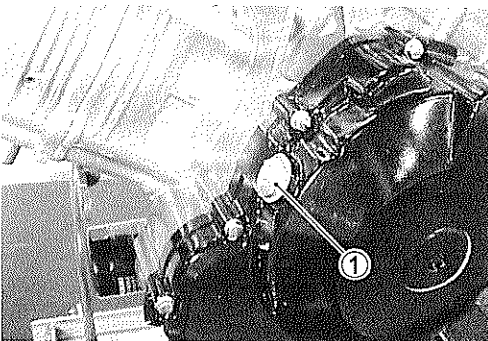
**SPARK PLUG**

- Install the spark plugs.

 09930-10121: Spark plug wrench set



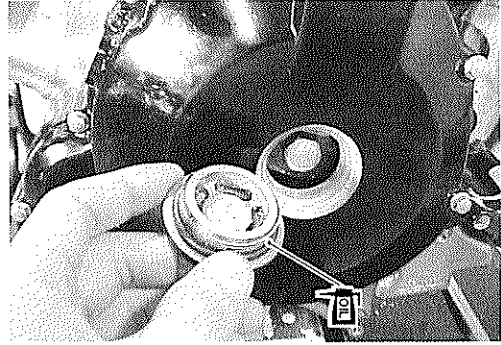
- Install the valve timing inspection plug ①.



- Apply engine oil to the new O-ring and install the generator cover plug.

CAUTION

Use the new O-ring to prevent oil leakage.




STARTER MOTOR

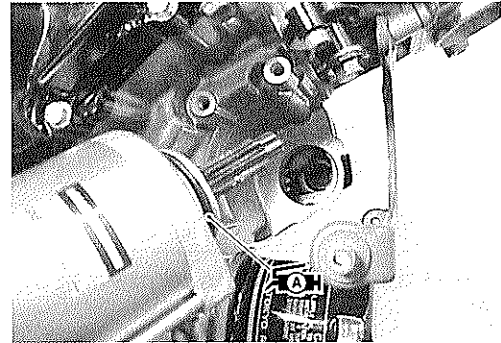
- Install the new O-ring to the starter motor.

CAUTION

Use the new O-ring to prevent oil leakage.


- Apply grease to the O-ring.

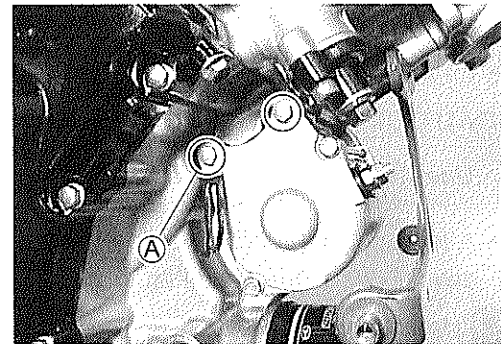
 99000-25030: SUZUKI SUPER GREASE "A" (USA)
99000-25010: SUZUKI SUPER GREASE "A" (Others)



- Install the starter motor.

NOTE:

Fit the clamp to the bolt .



- Install the thermostat case.

