ENGINE

3

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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.

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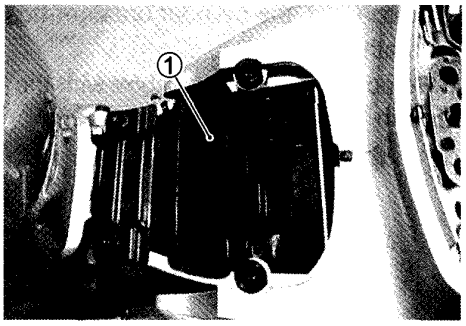
ENGINE REMOVAL AND INSTALLATION

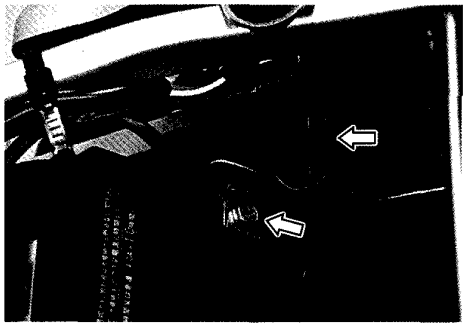
ENGINE REMOVAL

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.

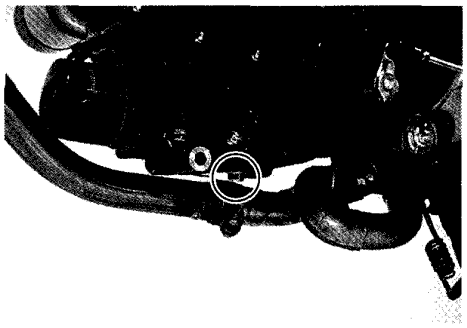
- Remove the front and rear seat. (☞ 6-3)
- Lift and support the fuel tank with the prop stay. (☞ 4-4)
- Remove the fuse box bracket ①.



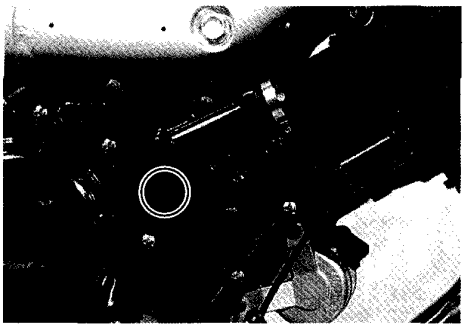
- Disconnect the battery ⊖ lead wire and coupler.



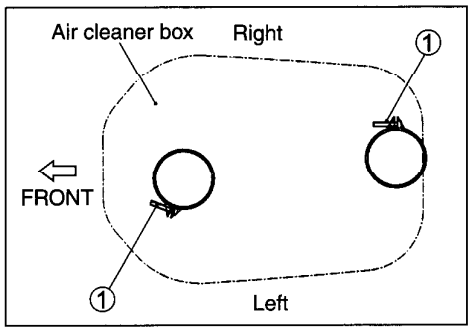
- Drain engine oil. (☞ 2-13)



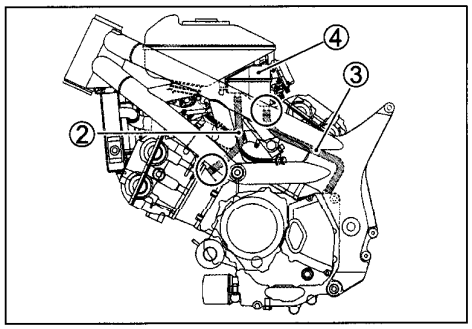
- Drain engine coolant. (☞ 2-18)



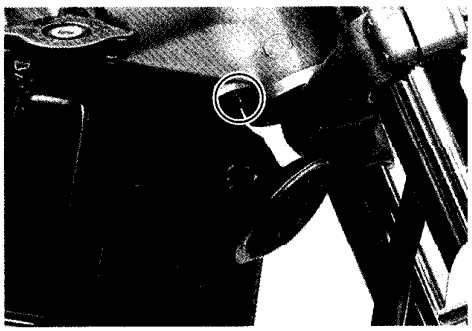
- Loosen the carburetor clamp screws ① at the air cleaner box side.



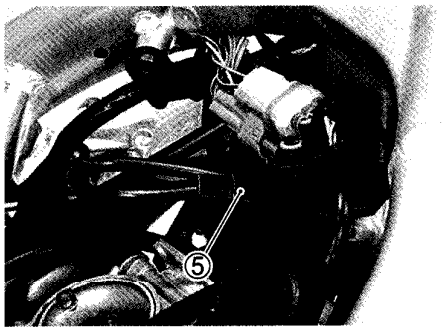
- Disconnect the cylinder breather hose ② and the crankcase breather hose ③.
- Remove the air cleaner box with the oil catch tank ④ and the drain hose.



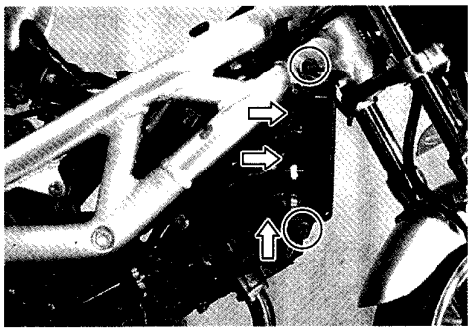
- Remove the horn with its bracket.



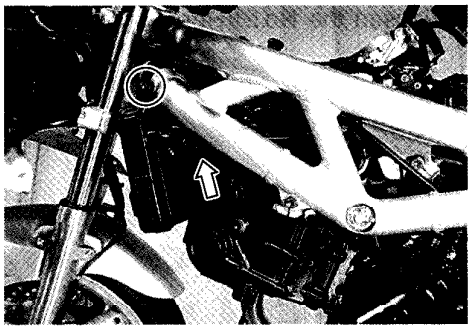
- Disconnect the cooling fan coupler ⑤.



- Disconnect the cooling fan thermo-switch lead wire coupler.
- Disconnect the radiator outlet hose.
- Disconnect the reserve tank hose.



- Disconnect radiator inlet hose.
- Remove the radiator mounting bolts.

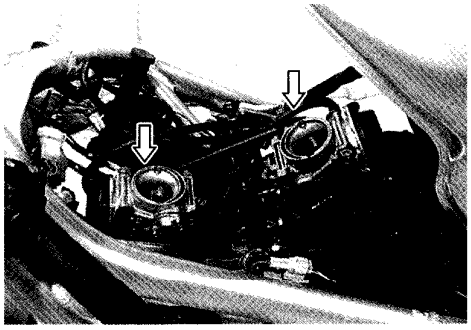


- Remove the radiator.

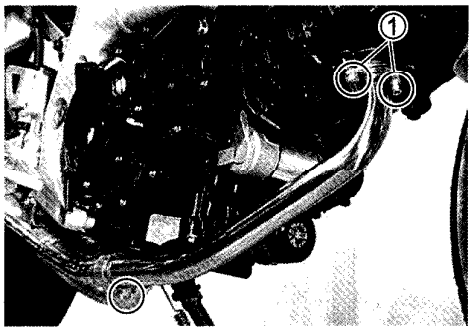
⚠ CAUTION

Be careful not to bent the radiator fin.

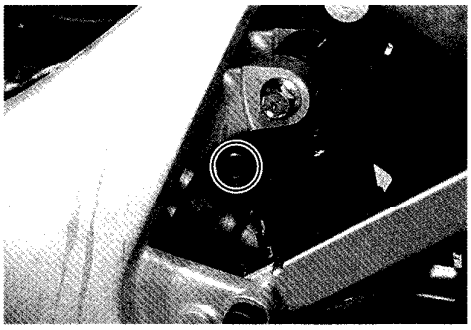
- Remove the carburetor. (☞ 4-18)



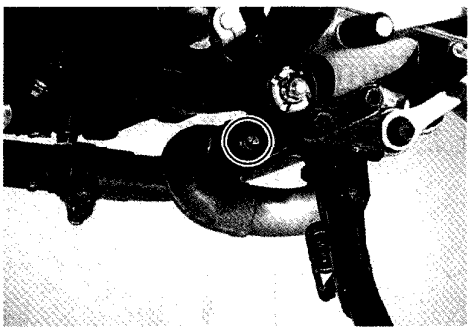
- Loosen the No.1 (Front) cylinder exhaust pipe bolt.
- Remove the No.1 (Front) cylinder exhaust pipe nuts ①.

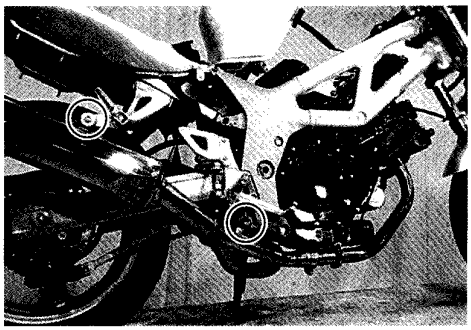


- Loosen the No.2 (Rear) cylinder exhaust pipe bolt.

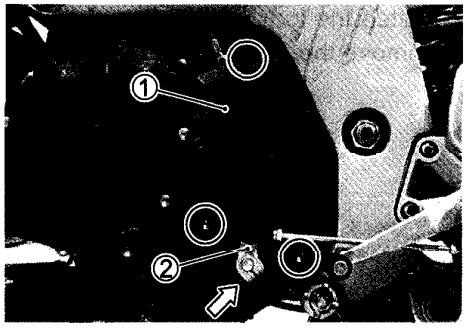


- Remove the muffler mounting bolt and nut.
- Remove the exhaust pipe mounting bolts and nut.
- Remove the exhaust pipe/muffler.

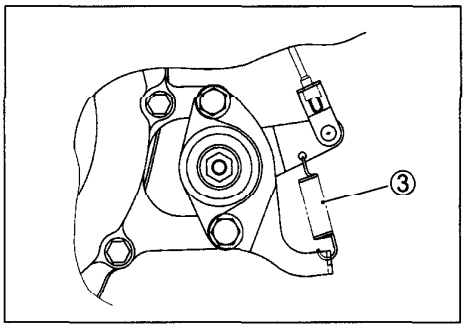




- Remove the engine sprocket cover ①.
- Remove the gearshift lever ②.

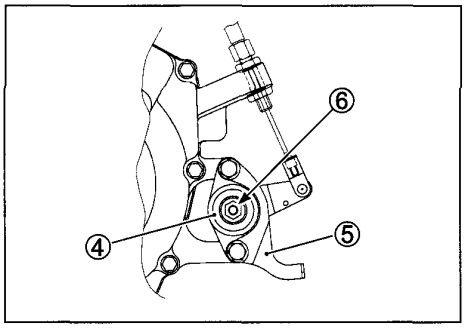


- Remove the clutch release return spring ③.

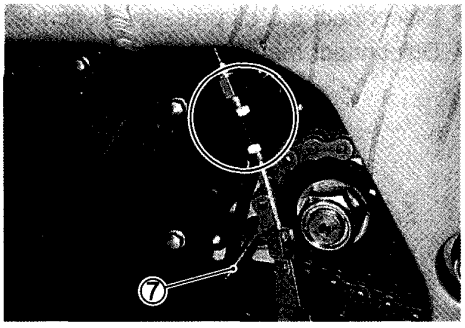


- Remove the clutch release assembly ④ and its support plate ⑤.

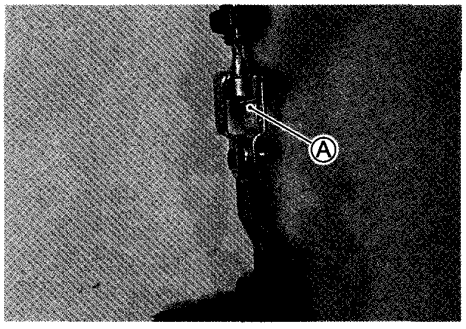
NOTE:
Slightly loosen the locknut ⑥ before removing the clutch release mounting bolts to facilitate subsequent installation.



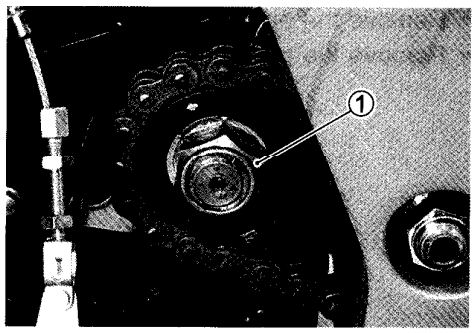
- Remove the clutch push rod ⑦.
- Remove the clutch cable from the generator cover.



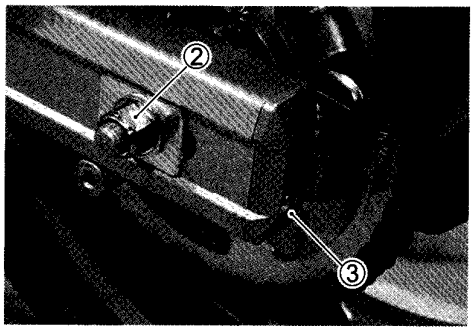
NOTE:
If it is necessary to replace the clutch cable or clutch release lever, pry up and bend down the stopper Ⓐ of the clutch release lever.



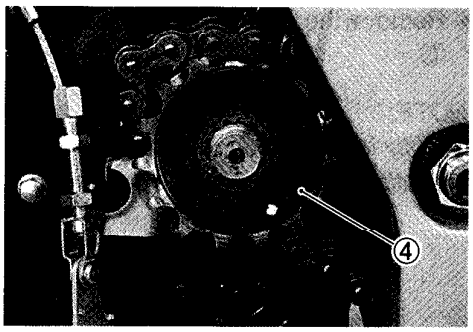
- Flatten the lock washer.
- Remove the engine sprocket nut ① and the lock washer .



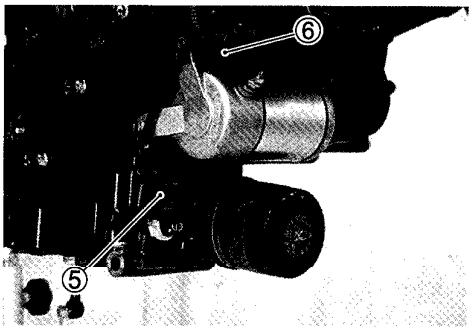
- Remove the cotter pin. (For E-03, 28, 33)
- Loosen the rear axle nut ②.
- Loosen the left and right chain adjusters ③.



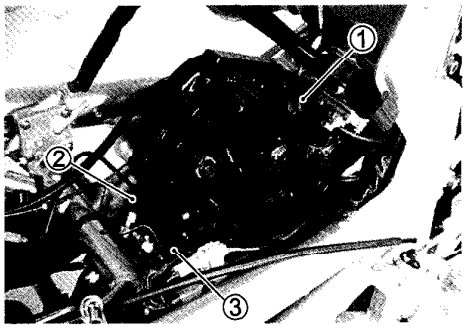
- Push the rear wheel front and make sure that the drive chain has enough slack.
- Disengage the drive chain with the rear sprocket.
- Remove the engine sprocket ④.



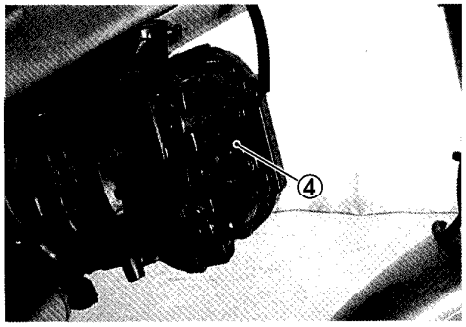
- Disconnect the oil pressure switch lead wire ⑤.
- Disconnect the starter motor lead wire ⑥.



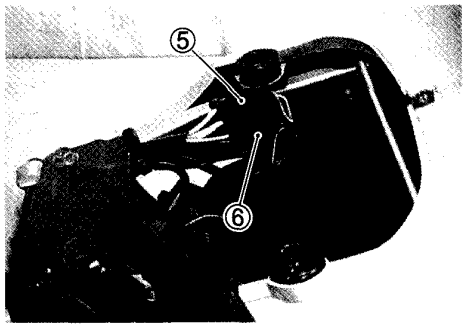
- Disconnect the No.2 (Rear) spark plug cap ①.
- Disconnect the engine coolant temperature switch lead wire ②.
- Disconnect the ground lead wire ③.



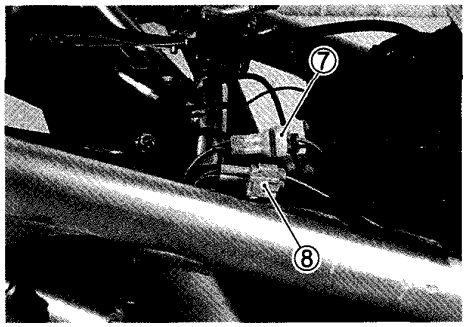
- Disconnect the No.1 (Front) spark plug cap ④.



- Disconnect the generator lead wire coupler ⑤.
- Disconnect the signal generator lead wire coupler ⑥.

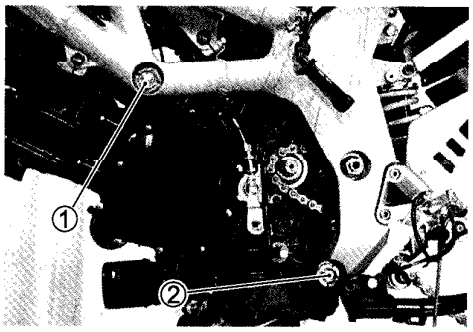


- Disconnect the neutral indicator light switch lead wire coupler ⑦.
- Remove the side-stand switch lead wire coupler ⑧.

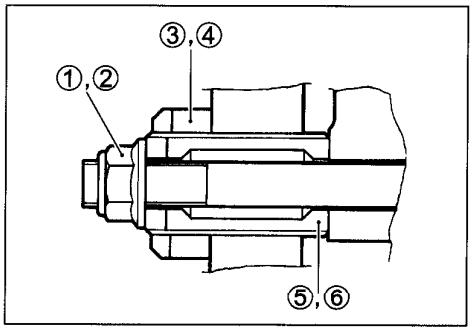


- Support the engine using an engine jack.

- Remove the engine mounting nuts ① and ②.



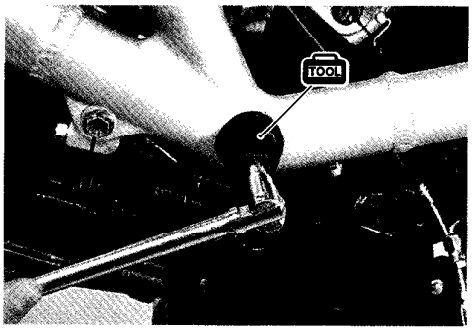
①, ② : Engine mounting nut
③, ④ : Engine mounting thrust adjuster lock nut
⑤, ⑥ : Engine mounting thrust adjuster

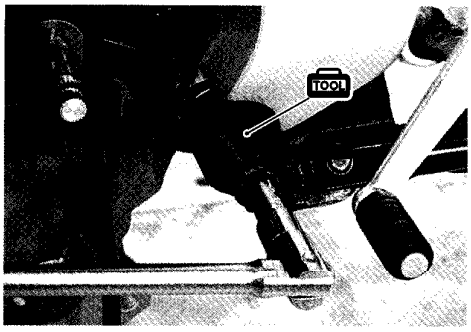


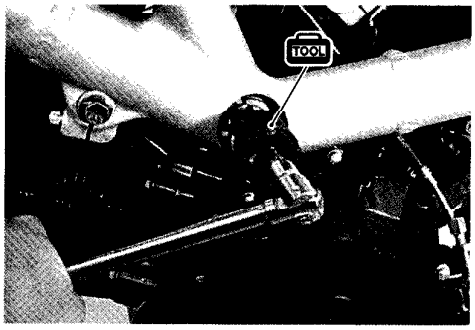
- Loosen the engine mounting thrust adjuster locknuts ③, ④ with the special tool.
- Loosen the engine mounting thrust adjusters ⑤, ⑥ fully with the special tool.

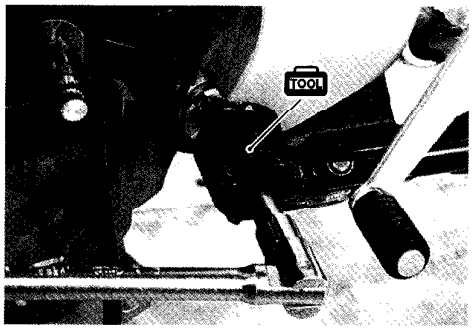
09940-14990: Engine mounting thrust adjuster socket wrench

NOTE:
Do not remove the engine mounting bolts at this stage.

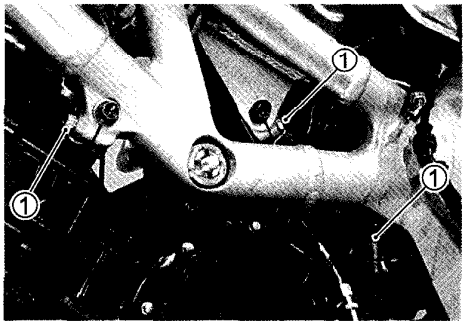




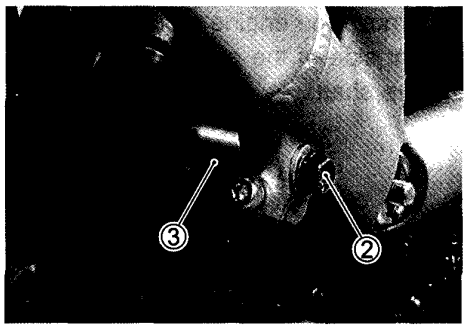




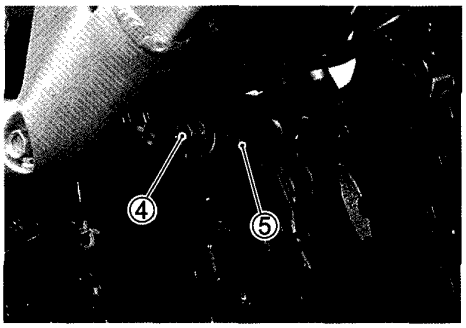
- Loosen the engine mounting clamp bolt ①.



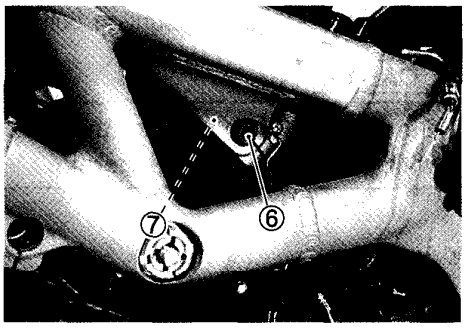
- Remove the No.1 (Front) left engine mounting bolt ② and the spacer ③.



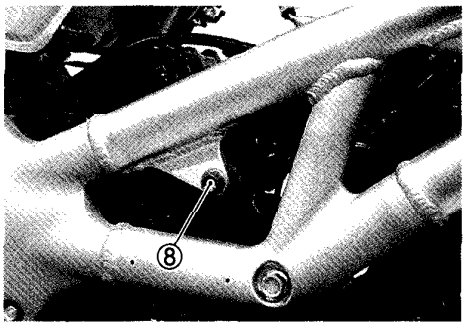
- Remove the No.1 (Front) right engine mounting bolt ④ and the spacer ⑤.



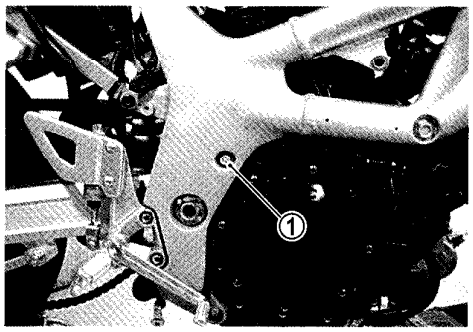
- Remove the No.2 (Rear) left engine mounting bolt ⑥ and the spacer ⑦.



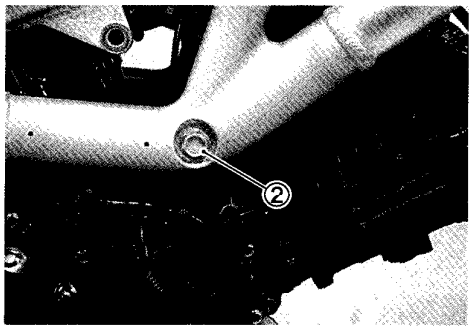
- Remove the No.2 (Rear) right engine mounting bolt ⑧.

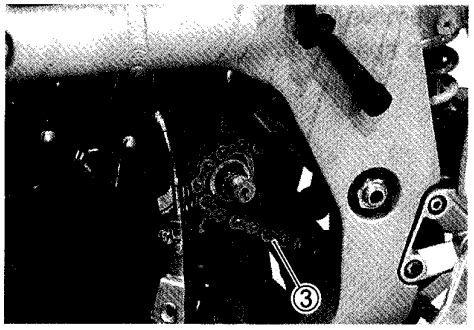


- Remove the engine mounting bolt ①.



- Remove the engine mounting bolt ② and gradually lower the front side of the engine. Then take the drive chain ③ off the drive shaft.

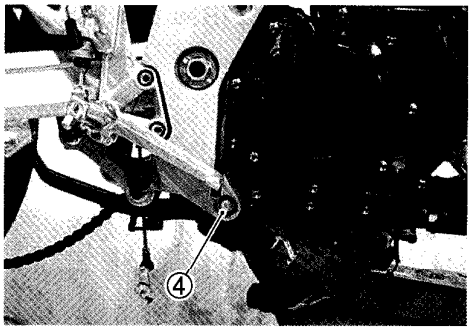


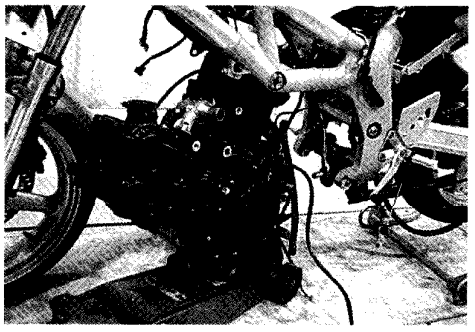


- Remove the engine mounting bolt ④ and lower the engine.

⚠ CAUTION

Be careful not to contact the No.2 (Rear) exhaust pipe with the frame and swingarm.



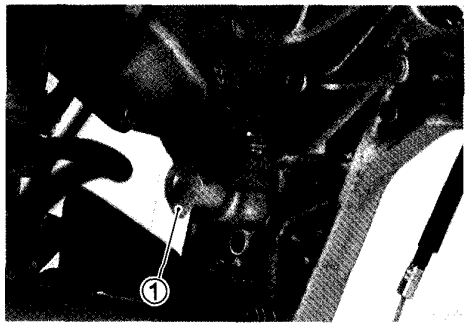


ENGINE INSTALLATION

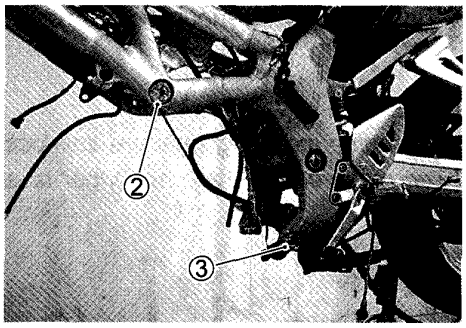
Install the engine in the reverse order of engine removal.
Pay attention to the following point.

- Be careful not to damage the frame and engine when installing the engine.

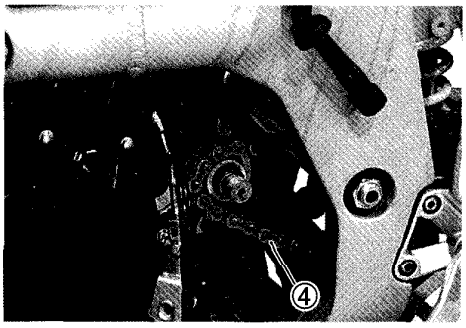
- Before installing the engine, install the spacer ①.



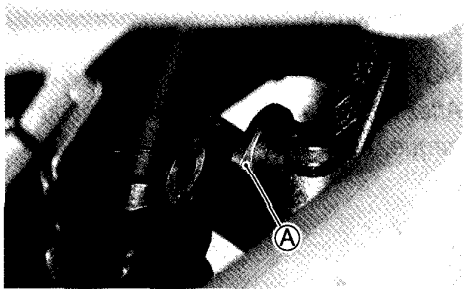
- Before installing the engine, install the engine mounting thrust adjusters ②, ③.



- Gradually raise the rear side of the engine assembly, and then put the drive chain ④ on the driveshaft.



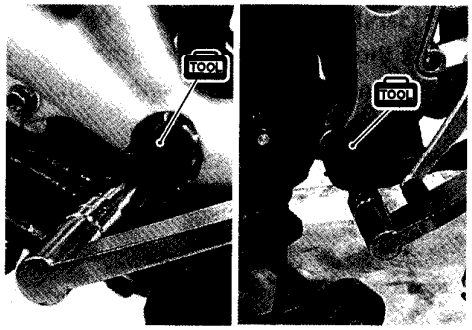
- Align the spacer flange Ⓐ to the crankcase groove.
- Install all engine mounting bolts and tighten them temporarily.



- Tighten the engine mounting thrust adjusters to the specified torque with the special tool.

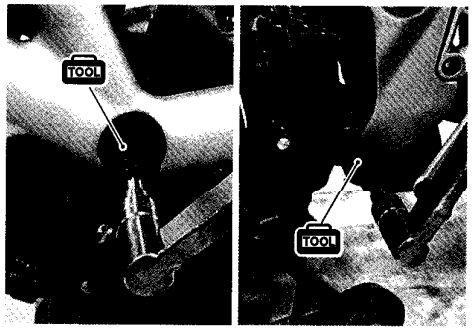
09940-14990: Engine mounting thrust adjuster socket wrench

Engine mounting thrust adjuster: 10 N·m (1.0 kgf·m, 7.0 lb-ft)



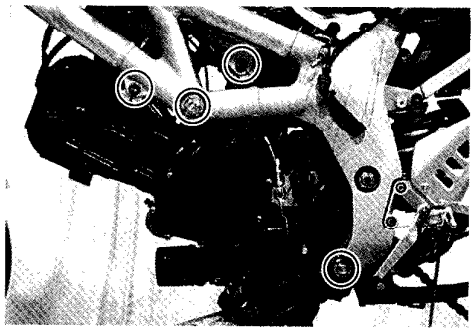
- Tighten the engine mounting thrust adjuster lock nuts to the specified torque with the special tool.

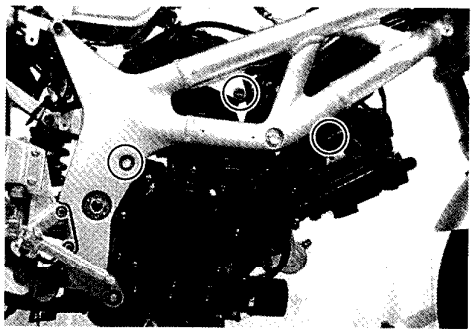
Engine mounting thrust adjuster locknut: 45 N·m (4.5 kgf·m, 32.5 lb-ft)



- Tighten all engine mounting bolts or nuts to the specified torque. (☞ 3-15)

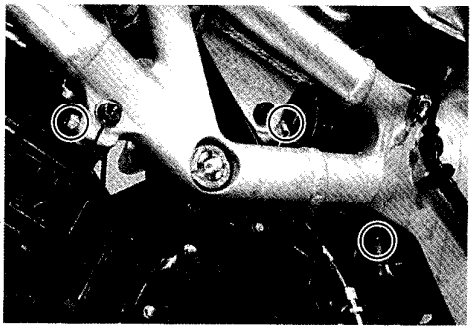
NOTE:
The engine mounting nuts are self-locking. Once the nuts have been removed, they are no longer of any use.

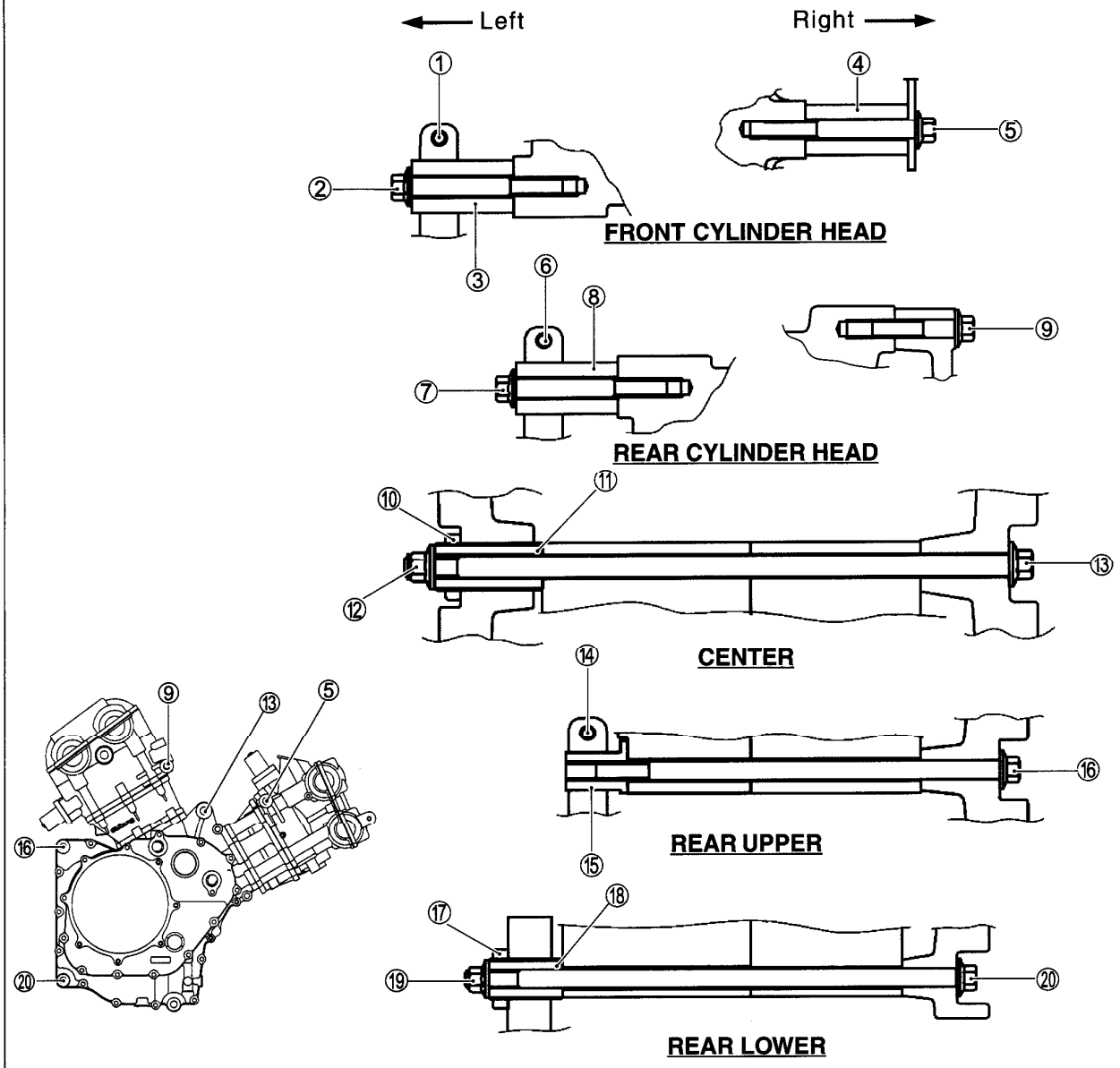




- Tighten all engine mounting clamp bolts to the specified torque. (☞ 3-15)

NOTE:
After tightening the engine mounting bolt or nut to the specified torque, tighten its clamp bolt.



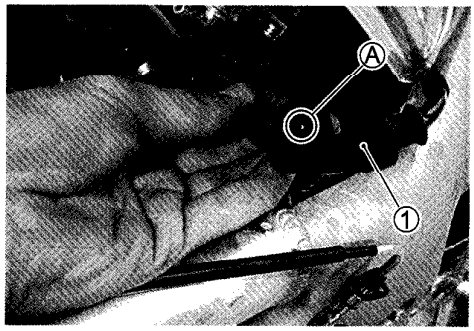


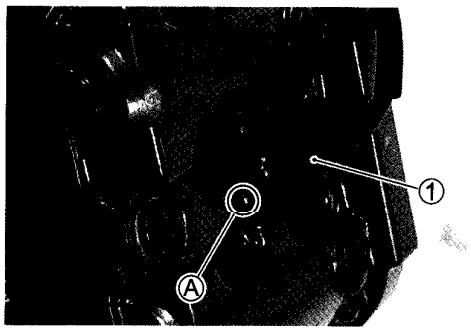
ITEM	N·m	kgf·m	lb-ft
① ⑥ ⑭	23	2.3	16.5
②⑤⑦⑨⑯⑲	55	5.5	40.0
⑩	45	4.5	32.5
⑪	10	1.0	7.3
⑫	93	9.3	67.5
⑰	45	4.5	32.5
⑱	10	1.0	7.3

LENGTH

ITEM		mm	in
Bolt	①⑥⑭	30	1.18
	②⑤⑦	80	3.15
	⑨	55	2.17
	⑬	310	12.20
	⑯	215	8.46
	⑳	260	10.24
Spacer	③④⑧	54	2.13
	⑮	33	1.30
Adjuster	⑪	57	2.24
	⑱	39	1.54

- When fitting the spark plug caps ①, the triangle marks Ⓐ on the water-proof covers should be faced to each cylinder exhaust side.
- Route wiring harness, cables and hoses properly referring to the sections for wire routing, cable routing and hose routing. (☞ 8-13)

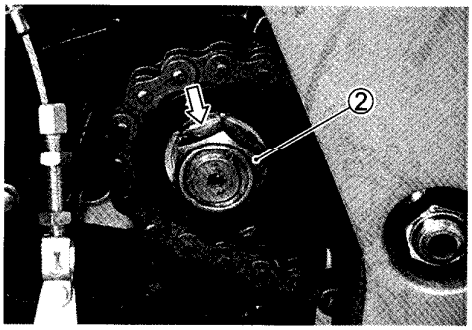




- Tighten the engine sprocket nut ② to the specified torque.

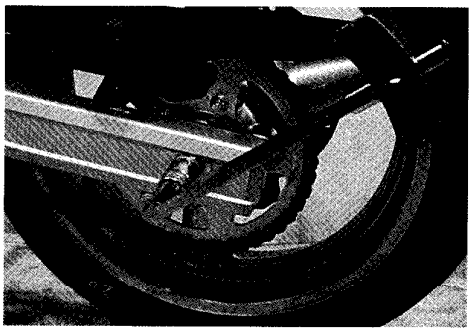
Engine sprocket nut: 145 N·m (14.5 kgf·m, 105 lb-ft)

- Bend the lock washer.



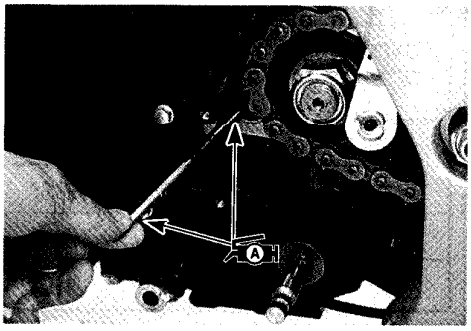
- Adjust the drive chain slack. (☞ 2-21)
- Tighten the rear axle nut to the specified torque.

Rear axle nut: 65 N·m (6.5 kgf·m, 47.0 lb-ft)



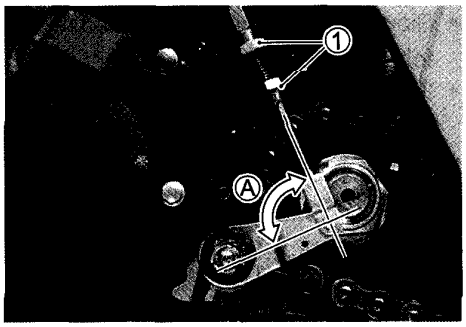
- Apply grease to the clutch push rod and install it.

99000-25030: SUZUKI SUPER GREASE "A"



- Install the clutch cable to the generator cover and put the clutch release lever onto the push rod.
- Adjust the clutch release lever end angle by turning the nuts ①.

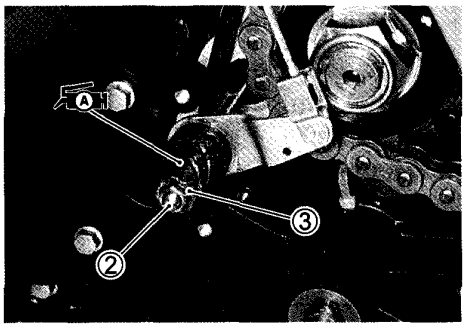
Ⓐ: 80° – 85°



NOTE:
Adjust the clutch release lever end angle while pulling the cable.

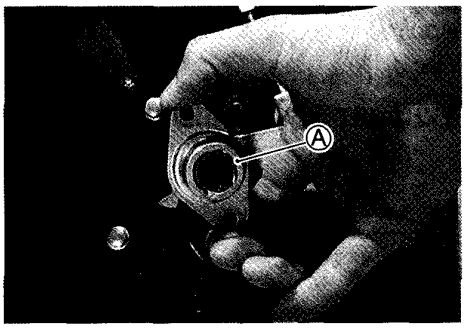
- Apply grease to the clutch release lever.

99000-25030: SUZUKI SUPER GREASE "A"



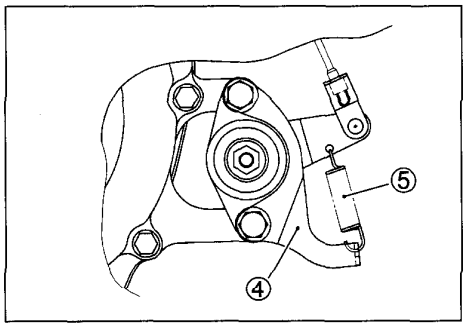
NOTE:
Loosen the clutch release screw ② and its locknut ③ fully before installing the clutch release assembly.

- Turn in the clutch release assembly.

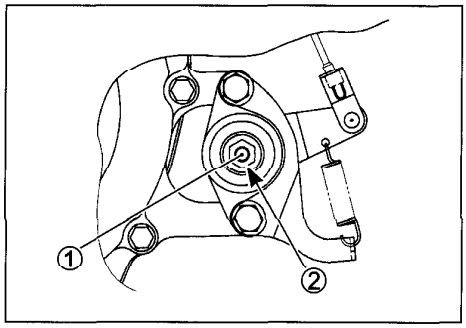


NOTE:
Face the portion Ⓐ of the clutch release assembly to outside.

- Install the clutch release assembly and its support plate ④.
- Install the clutch release return spring ⑤.



- Slowly turn in the clutch release screw ① until resistance is felt.
- From this position, turn out the clutch release screw ① 1/4 rotation and tighten the lock nut ②.



- Install the exhaust pipe/muffler.

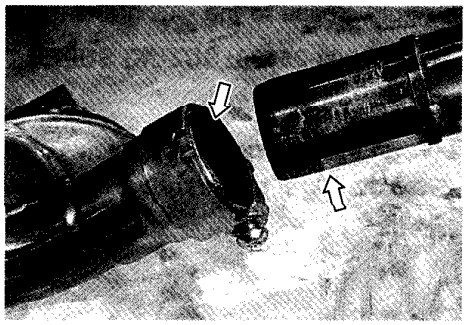
Exhaust pipe bolt/nut ③: 23 N·m (2.3 kgf·m, 16.5 lb-ft)
Exhaust pipe mounting bolt ④: 23 N·m (2.3 kgf·m, 16.5 lb-ft)
Muffler mounting nut ⑤: 23 N·m (2.3 kgf·m, 16.5 lb-ft)

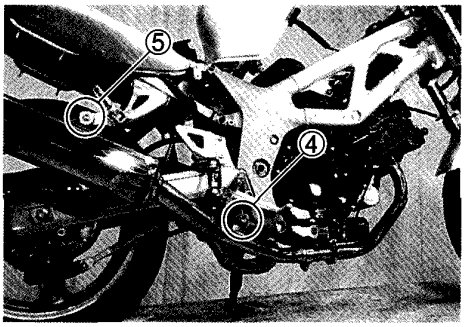
⚠ CAUTION

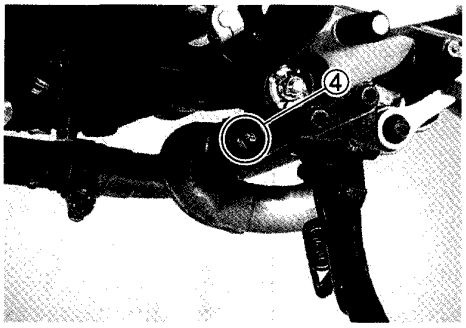
Replace the gaskets with new ones.

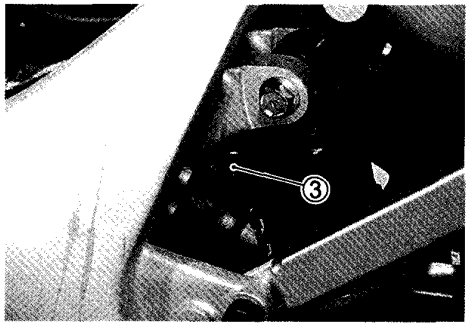
NOTE:
Apply gas sealer to inside and outside of the exhaust pipe connector.

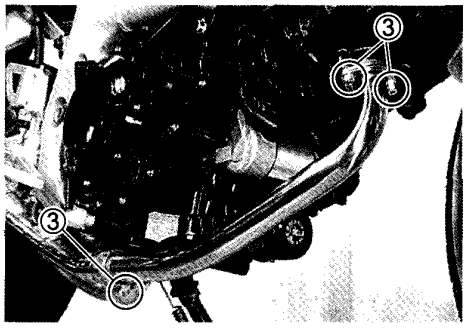
EXHAUST GAS SEALER: PERMATEX 1372



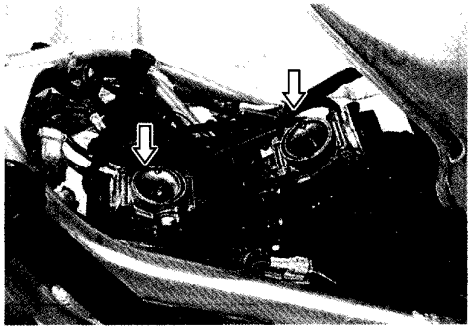








• Install the carburetor. (☞ 4-30)



• Install the radiator. (☞ 5-6)

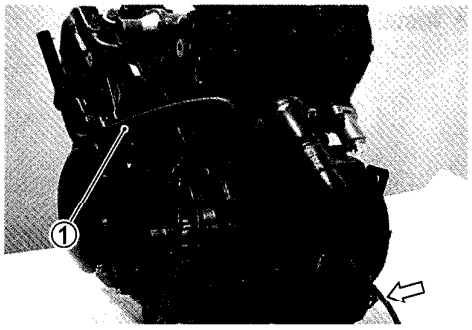
• Adjust the following items.
* Engine oil (☞ 2-13)
* Engine coolant (☞ 2-18)
* Throttle cable play (☞ 2-16)
* Clutch cable play (☞ 2-17)
* Idling adjustment (☞ 2-15)
* Carburetor synchronization (☞ 4-35)
* Drive chain slack (☞ 2-21)
* Gear shaft lever height (☞ 8-43)

ENGINE DISASSEMBLY

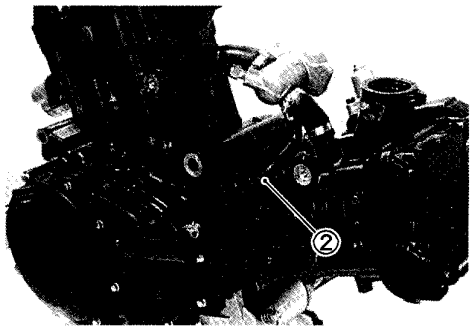
⚠ CAUTION

Identify the position of each removed part. Organize the parts in their respective groups (e.g., intake, exhaust) so that they can be reinstalled in their original positions.

- Remove the spark plugs. (☞ 2-5)
- Disconnect the ground lead wire.
- Disconnect the crankcase breather hose ①.

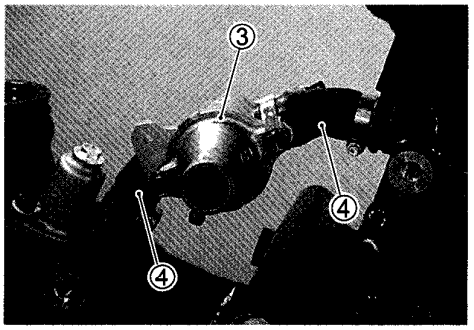


- Remove the hose ②.

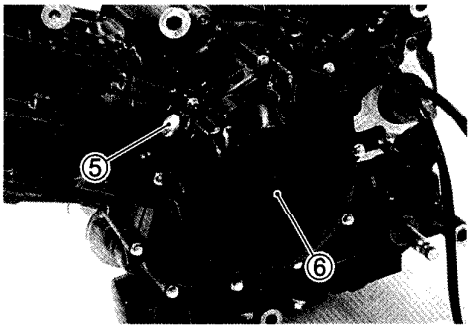


- Remove the thermostat case ③ with the hoses ④.

NOTE:
Refer to the section 5 for their servicing.

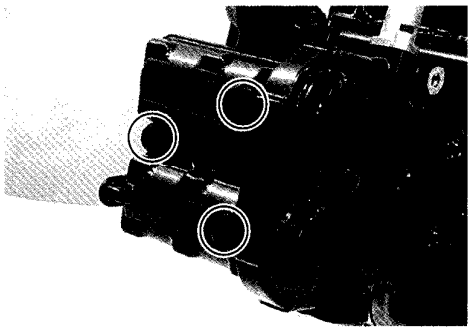


- Remove the valve timing inspection plug ⑤ and the generator cover plug ⑥.



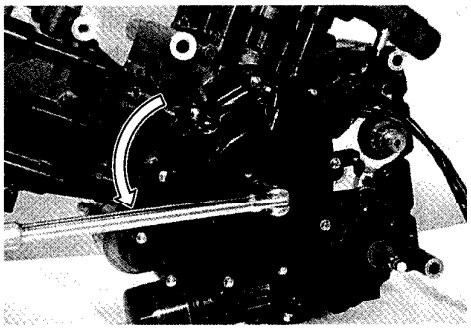
CYLINDER HEAD COVER

- Remove the front and rear cylinder head covers and their gaskets.



NO.1 (FRONT) CAMSHAFTS

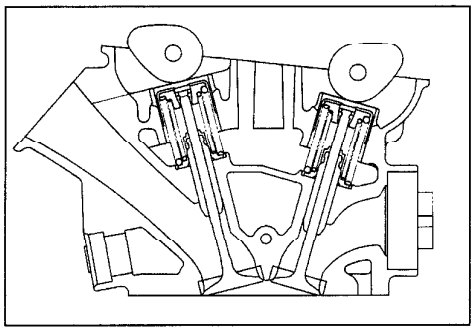
- Turn the crankshaft to bring the "| F" line Ⓐ on generator rotor to the index mark Ⓑ of the valve inspection hole and also to bring the cams to the position as shown.

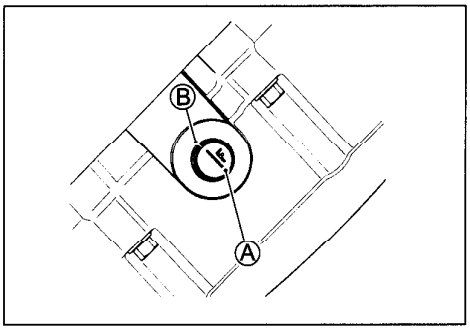


NOTE:

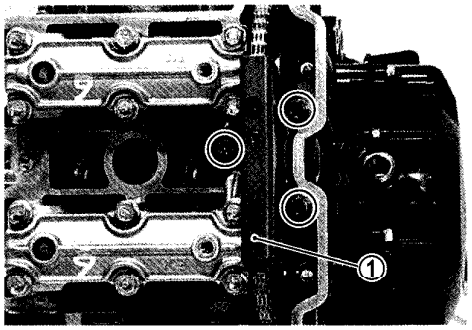
* *At the above condition, the No.1 (Front) cylinder is at TDC of compression stroke.*

* *Before removing the camshafts, inspect the tappet clearance. (☞ 2-8)*





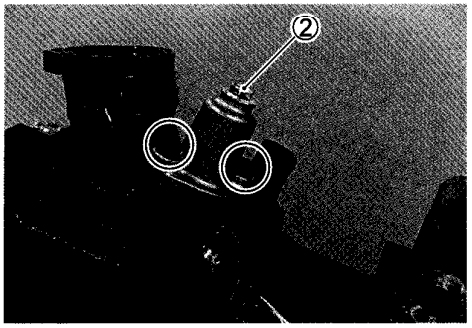
- Remove the cam chain guide ①.



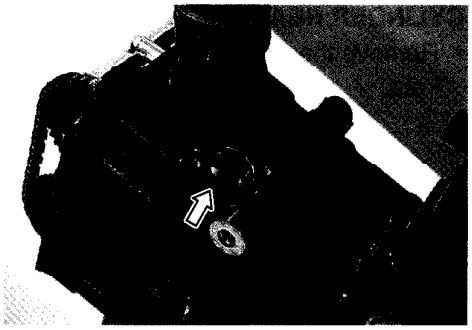
- Remove the cam chain tension adjuster.

NOTE:

Loosen the cam chain tension adjuster bolt ② to facilitate later reassembly.

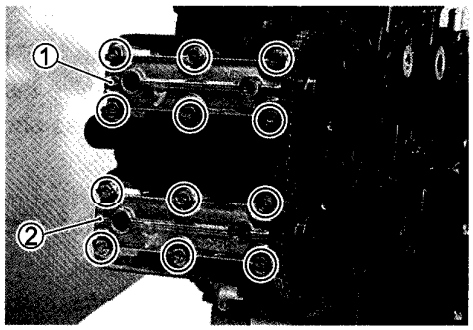


- Remove the gasket.

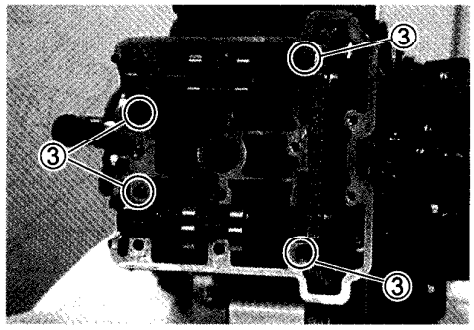


- Remove the intake camshaft housing ①.
- Remove the exhaust camshaft housing ②.

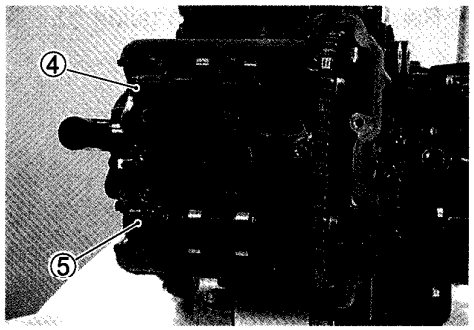
NOTE:
Mark the cylinder location as "F" to the camshaft housings.



- Remove the dowel pins ③.

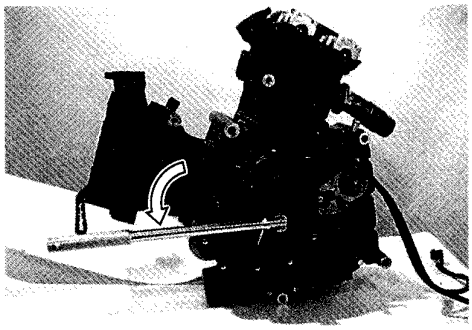


- Remove the intake camshaft ④.
- Remove the exhaust camshaft ⑤.



NO.2 (REAR) CAMSHAFTS

- Turn the crankshaft to bring the "| F" line mark Ⓐ on generator rotor to the index mark Ⓑ of the valve inspection hole and also to bring the cams to the position as shown.

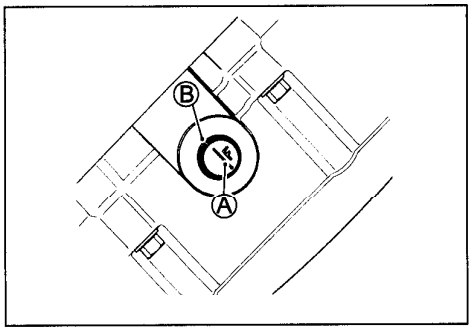


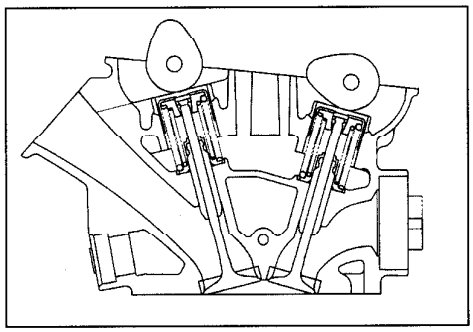
NOTE:

* *At the above condition, the No.2 (Rear) cylinder is at ATDC 90° on expansion stroke.*
* *Before removing the camshafts, inspect the tappet clearance.* *(☞ 2-8)*

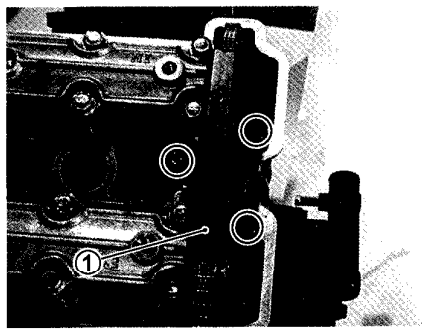
⚠ CAUTION

Pull the front cam chain upward, or the chain will be caught between the crankcase and the No.1 cam drive idle gear/sprocket when turning the crankshaft.





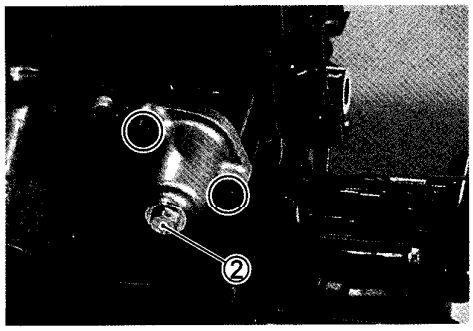
- Remove the cam chain guide ①.



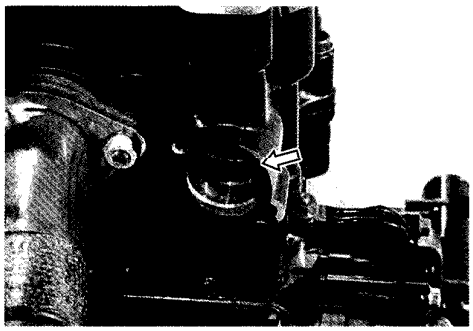
- Remove the cam chain tension adjuster.

NOTE:

Loosen the cam chain tension adjuster bolt ② to facilitate later reassembly.

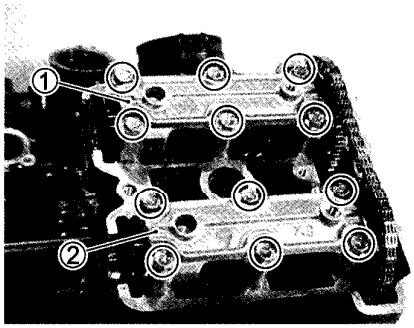


- Remove the gasket.

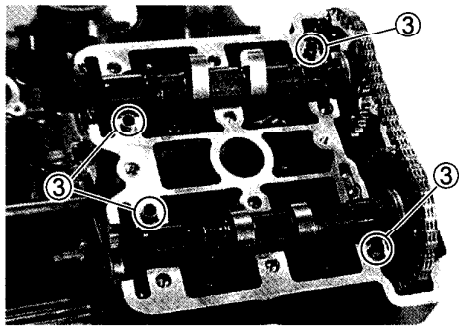


- Remove the intake camshaft housing ①.
- Remove the exhaust camshaft housing ②.

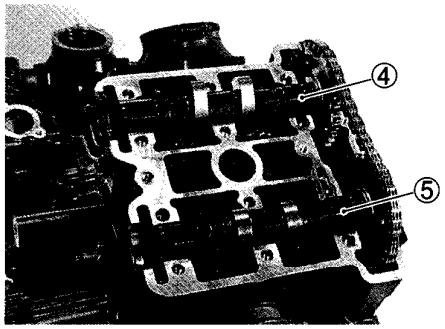
NOTE:
Mark the cylinder location as "R" to the camshaft housings.



- Remove the dowel pins ③.

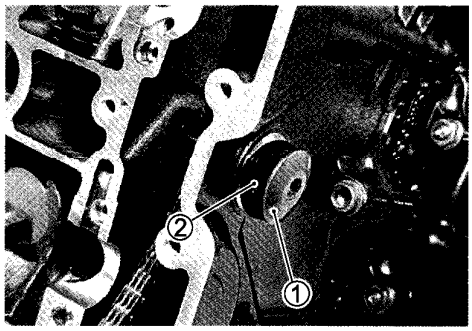


- Remove the intake camshaft ④.
- Remove the exhaust camshaft ⑤.

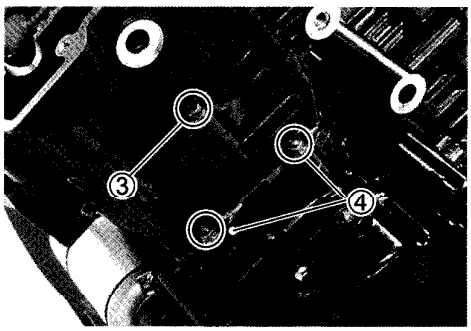


NO.1 (FRONT) CYLINDER HEAD

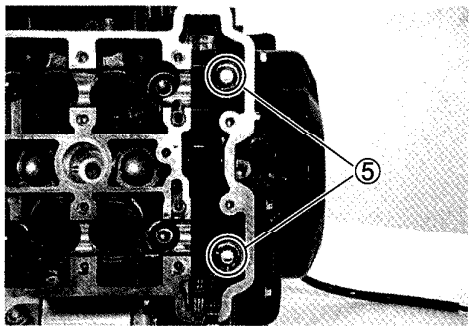
- Remove the cylinder head side bolt ① and its gasket ②.



- Remove the cylinder head bolt (M6) ③.
- Loosen the cylinder nuts ④.



- Remove the cylinder bolts (M6) ⑤.

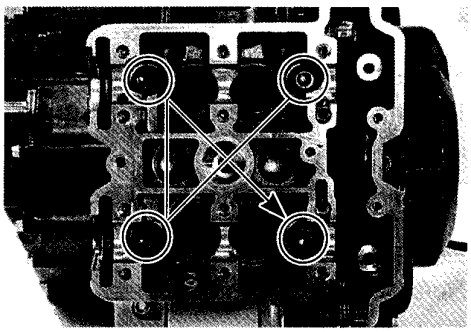


- Remove the cylinder head bolts and washers.

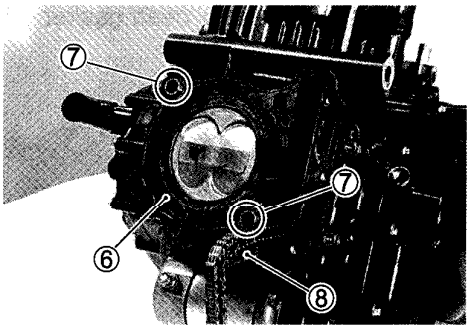
NOTE:
When loosening the cylinder head bolts, loosen each bolt little by little diagonally.

- Remove the cylinder head.

NOTE:
Refer to page 3-43 for cylinder head servicing.

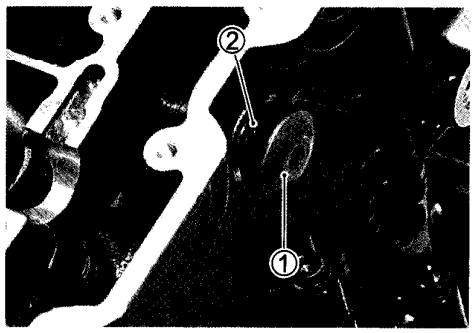


- Remove the cylinder head gasket ⑥, dowel pins ⑦ and cam chain guide ⑧.

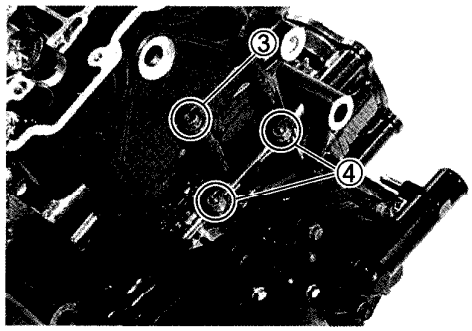


NO.2 (REAR) CYLINDER HEAD

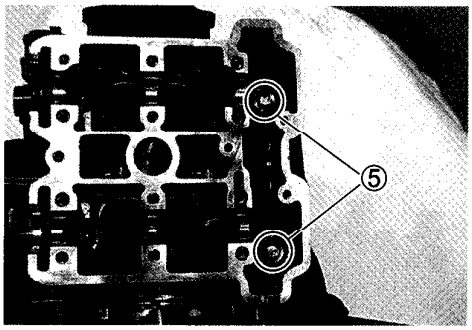
- Remove the cylinder head side bolt ① and its gasket ②.



- Remove the cylinder head bolt (M6) ③.
- Loosen the cylinder nuts ④.



- Remove the cylinder bolts (M6) ⑤.

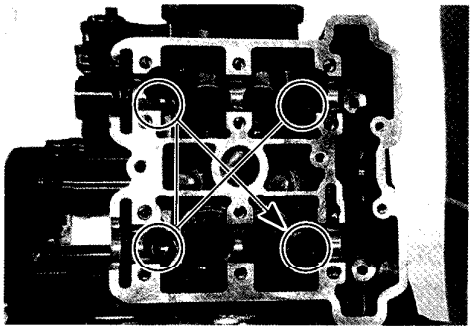


- Remove the cylinder head bolts and washers.

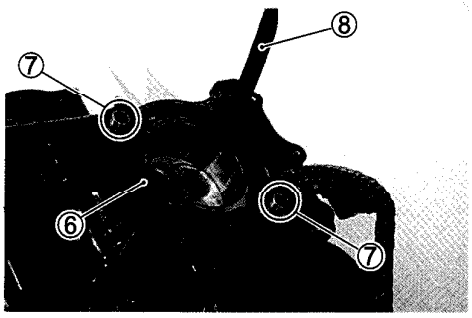
NOTE:
When loosening the cylinder head bolts, loosen each bolt little by little diagonally.

- Remove the cylinder head.

NOTE:
Refer to page 3-43 for cylinder head servicing.

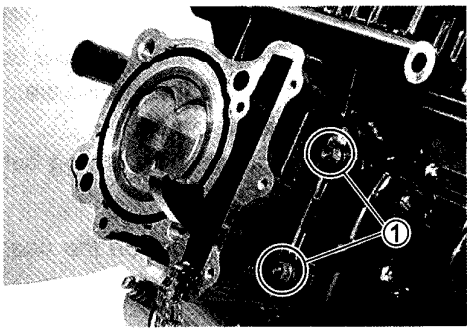


- Remove the cylinder head gasket ⑥, dowel pins ⑦ and cam chain guide ⑧.

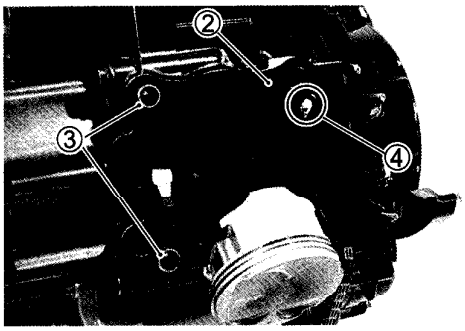


NO.1 (FRONT) CYLINDER

- Remove the cylinder nuts ①.
- Remove the cylinder.

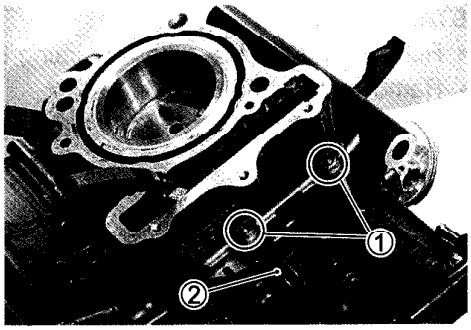


- Remove the cylinder base gasket ② and the dowel pins ③.
- Remove the oil jet (#14) ④.

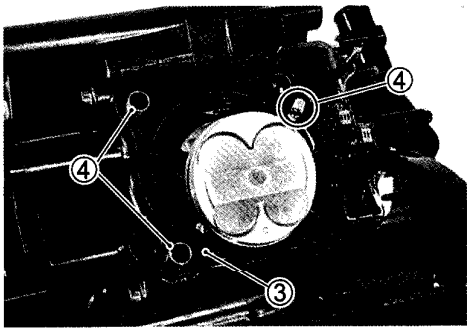


NO.2 (REAR) CYLINDER

- Remove the cylinder nuts ① and clamp ②.
- Remove the cylinder.



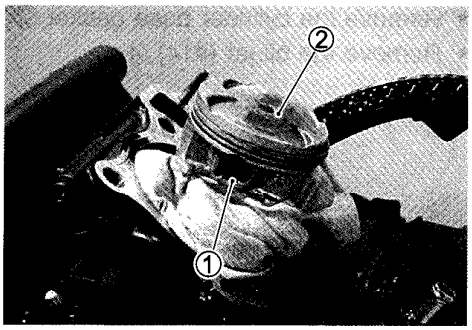
- Remove the cylinder base gasket ③ and the dowel pins ④.
- Remove the oil jet (#14) ⑤.



PISTON

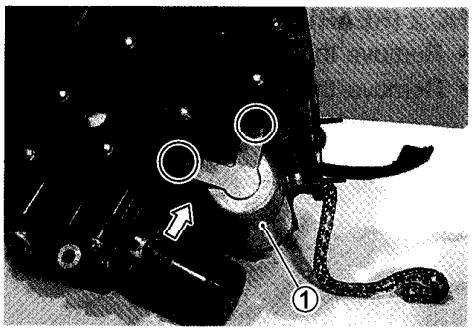
- Place a clean rag over the cylinder base so as not to drop the piston pin circlip into the crankcase.
- Remove the piston pin circlips ①.
- Remove the pistons ② by driving out the piston pins.

NOTE:
Scribe the cylinder number on the head of the piston.



STARTER MOTOR

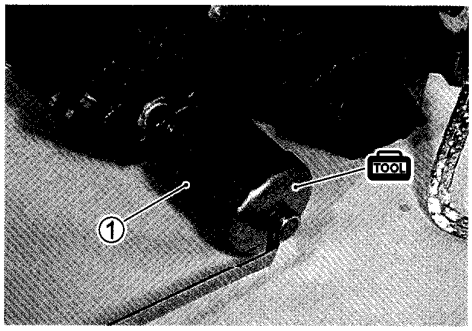
- Remove the starter motor mounting bolts and the clamp.
- Remove the starter motor ①.



OIL FILTER

- Remove the oil filter ① with the special tool. (☞ 2-14)

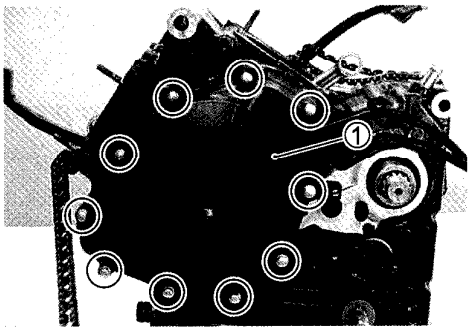
TOOL 09915-40610: Oil filter wrench



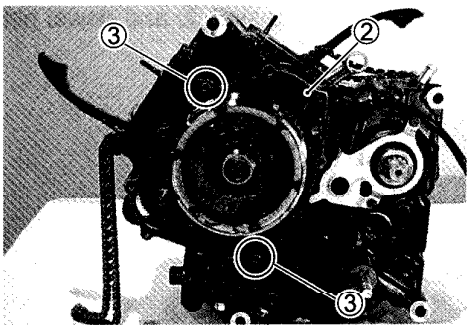
GENERATOR COVER

- Remove the generator cover ①.

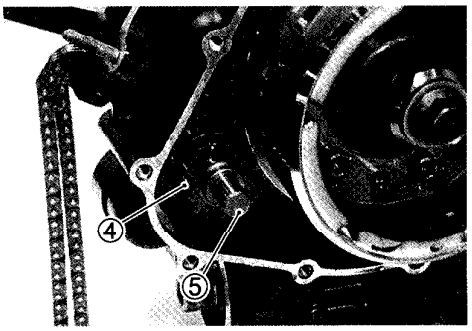
NOTE:
Refer to the page 3-85 for the generator cover servicing.



- Remove the gasket ② and the dowel pins ③.

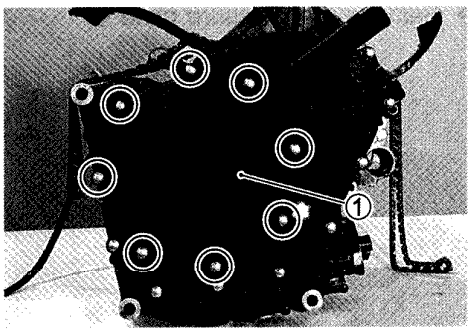


- Remove the starter idle gear ④ and its shaft ⑤.

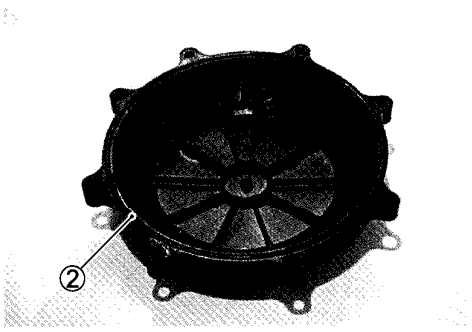


CLUTCH COVER

- Remove the clutch outer cover ①.

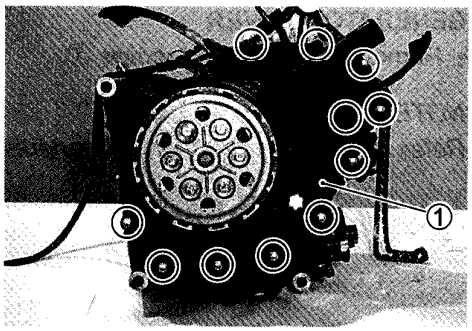


- Remove the O-ring ②.

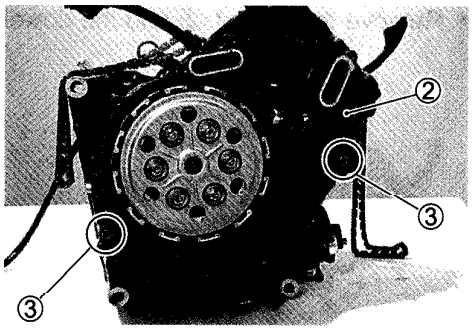


• Remove the clutch inner cover ①.

NOTE:
Refer to the page 5-12 for water pump servicing.



• Remove the gasket ② and dowel pins ③.



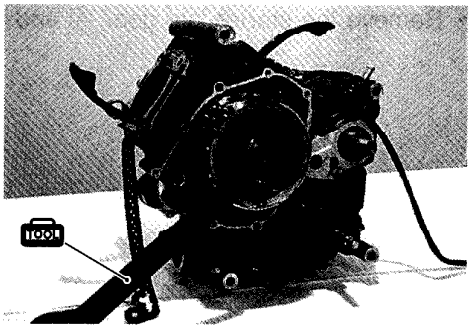
CLUTCH

• Hold the generator rotor with the special tool.

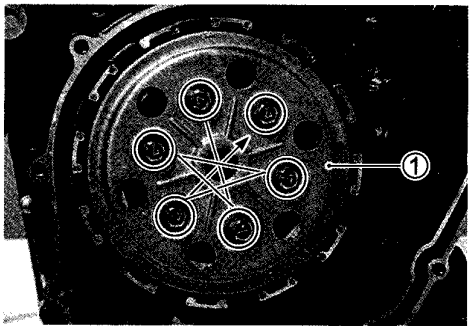
09930-44530: Rotor holder

• Remove the clutch springs.

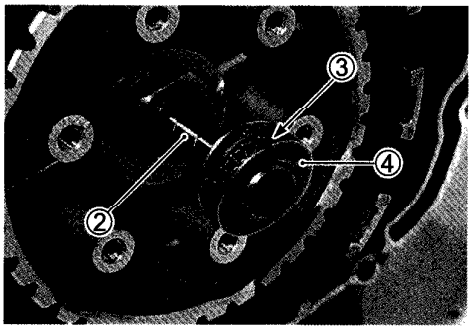
NOTE:
Loosen the clutch spring set bolts little by little and diagonally.



• Remove the pressure plate ①.

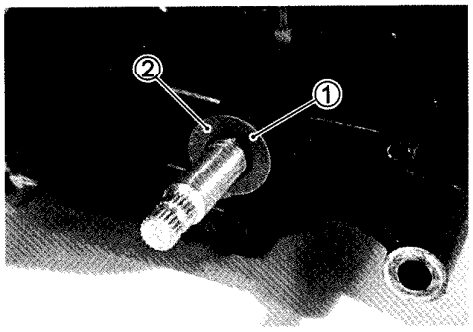


• Remove the clutch push piece ②, the bearing ③ and the thrust washer ④.



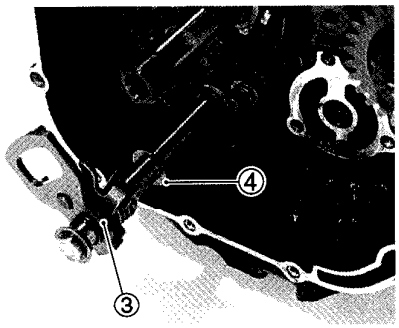
GEARSHIFT SYSTEM

- Remove the circlip ① and the washer ②.

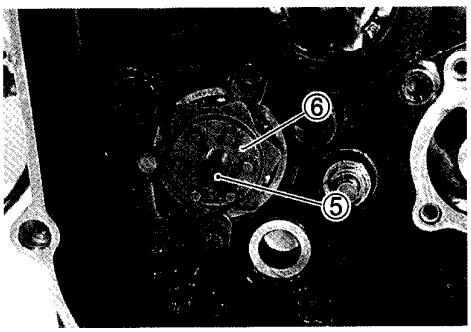


- Remove the gearshift shaft assembly ③ and the washer ④.

NOTE:
Refer to the page 3-77 for the gearshift shaft servicing.

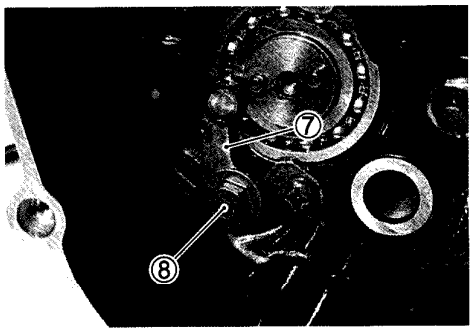


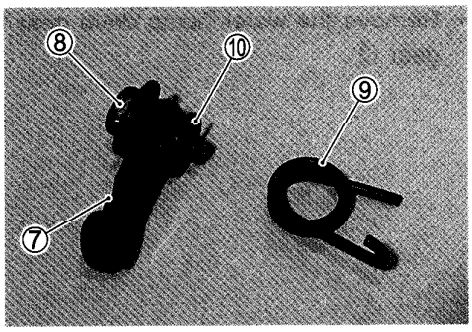
- Remove the gearshift cam plate bolt ⑤.
- Remove the gearshift cam plate ⑥.



- Remove the following items.

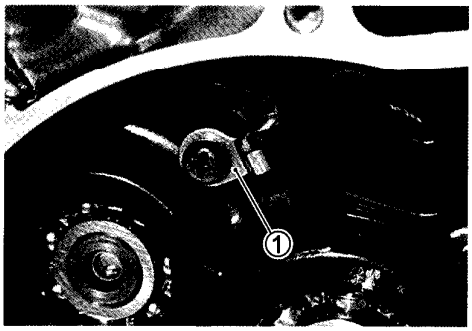
⑦ Gearshift cam stopper
⑧ Gearshift cam stopper bolt
⑨ Gearshift cam stopper spring
⑩ Washer



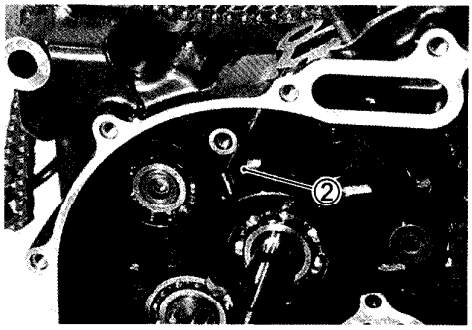


OIL PIPE

- Remove the oil pipe stopper ①.



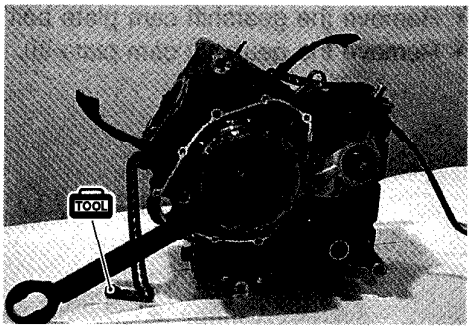
- Remove the oil pipe ②.



PRIMARY DRIVE GEAR

- Hold the generator rotor (crankshaft) with the special tool.

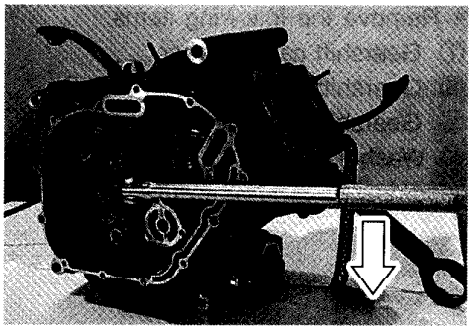
TOOL 09930-44530: Rotor holder



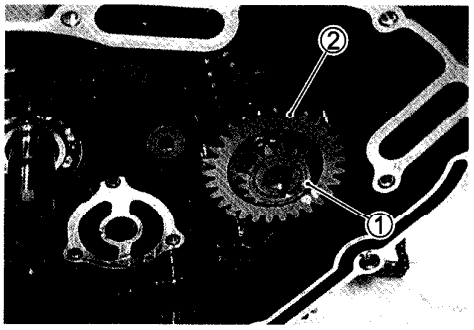
- Remove the primary drive gear bolt.

⚠ CAUTION

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

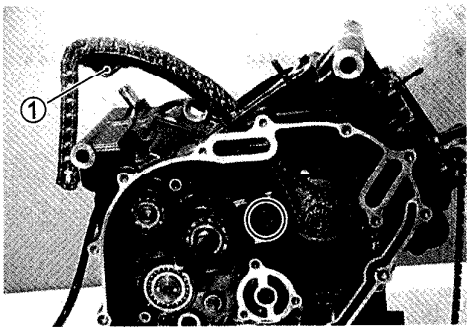


- Remove the water pump drive gear ① and the primary drive gear ②.

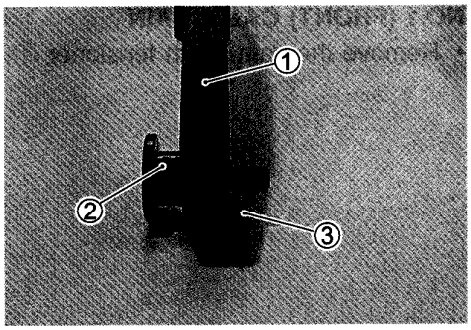


NO.2 (REAR) CAM CHAIN

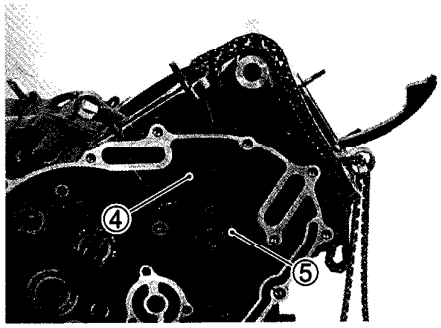
- Remove the cam chain tensioner ①.



① Cam chain tensioner
② Cam chain tensioner bolt
③ Washer



- Remove the No.2 (Rear) cam chain ④ and the cam chain drive sprocket ⑤.

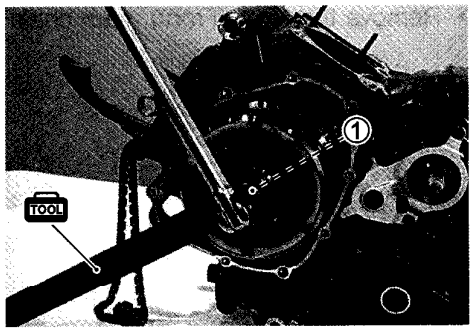


GENERATOR ROTOR

- Hold the generator rotor with the special tool.

TOOL 09930-44530: Rotor holder

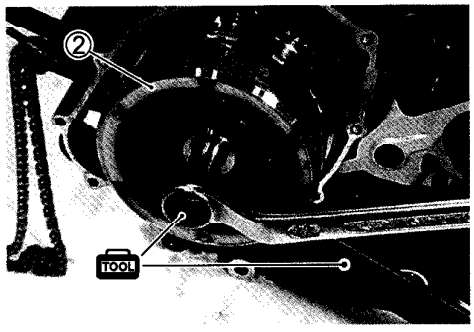
- Remove the generator rotor bolt ① and the washer.



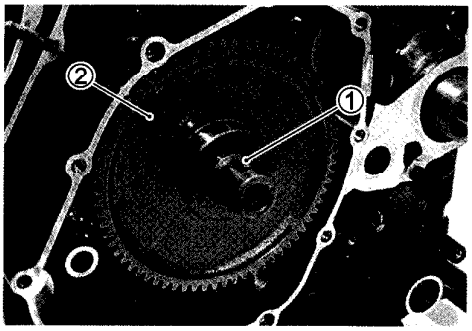
- Remove the generator rotor ② with the special tool.

TOOL 09930-30450: Rotor remover

NOTE:
Refer to the page 3-84 for the starter clutch removal.

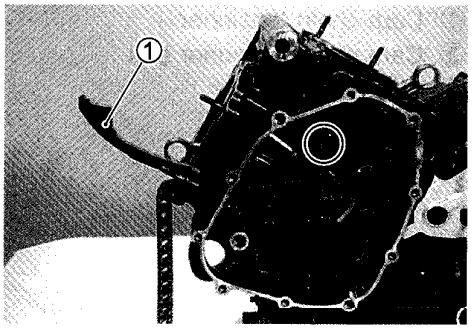


- Remove the key ①.
- Remove the starter driven gear ②.

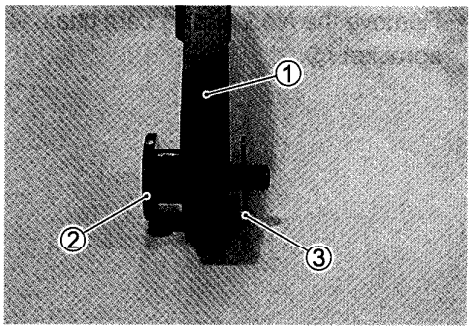


NO.1 (FRONT) CAM CHAIN

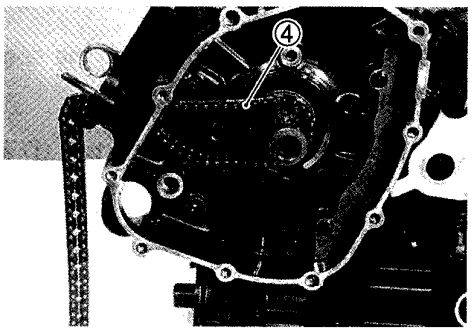
- Remove the cam chain tensioner ①.



① Cam chain tensioner
② Cam chain tensioner bolt
③ Washer



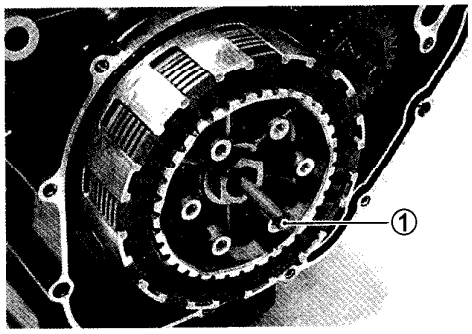
- Remove the No.1 (Front) cam chain ④.



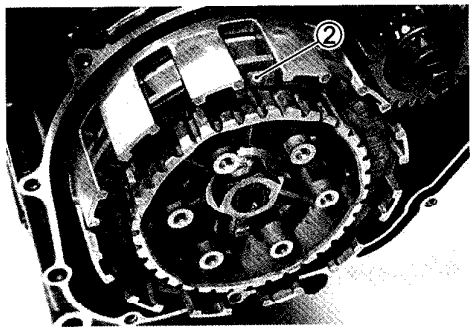
- Remove the clutch push rod ①.

NOTE:
If it is difficult to pull out the push rod ①, use a magnetic hand or a wire.

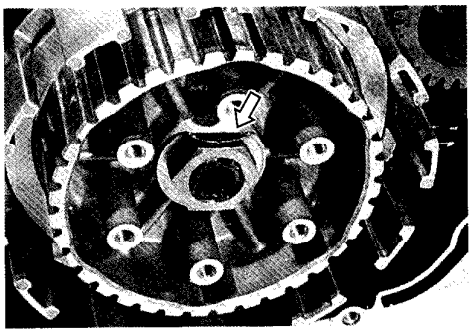
- Remove the clutch drive and driven plates.



- Remove the clutch drive plate (installed dampers) ②.



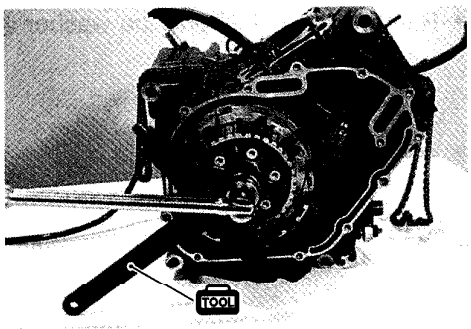
- Flatten the clutch sleeve hub nut lock washer.



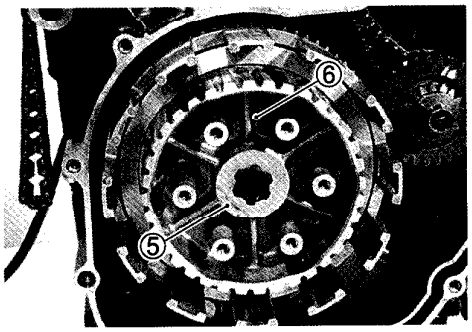
- Hold the clutch sleeve hub with the special tool.

09920-53740: Clutch sleeve hub holder

- Remove the clutch sleeve hub nut.

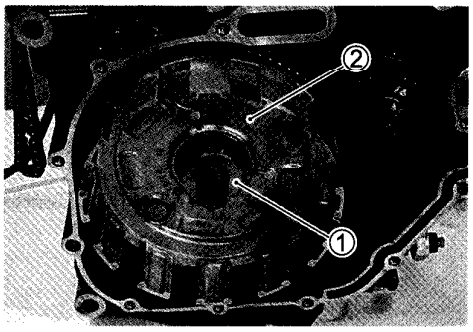


- Remove the lock washer ⑤.
- Remove the clutch sleeve hub ⑥.

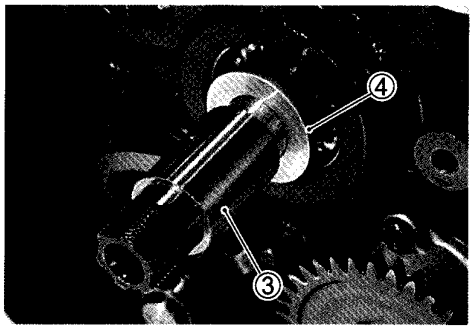


- Remove the thrust washer ①.
- Remove the primary driven gear assembly ②.

NOTE:
Refer to the page 3-76 for the primary driven gear assembly servicing.



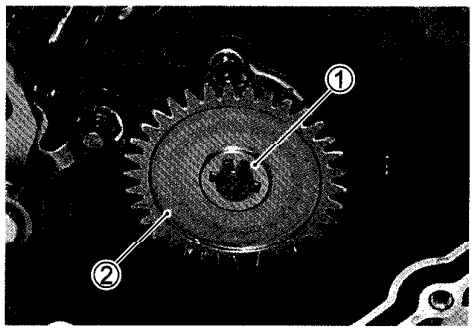
- Remove the spacer ③ and the washer ④.



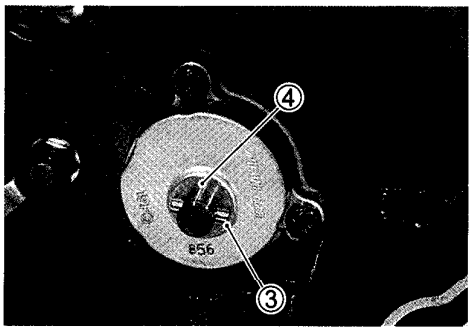
OIL PUMP

- Remove the circlip ①.
- Remove the oil pump driven gear ②.

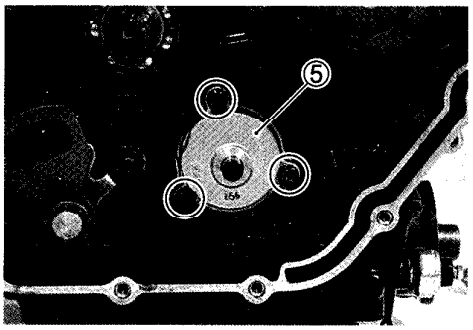
NOTE:
Do not drop the circlip ①, the pin ③ and the washer ④ into the crankcase.



- Remove the pin ③ and the washer ④.

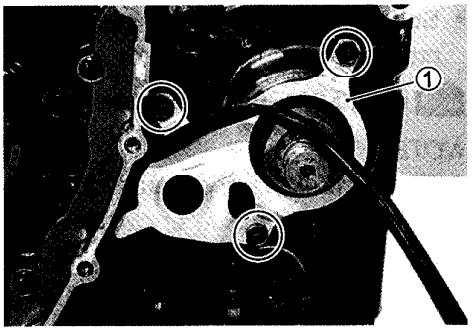


- Remove the oil pump ⑤.

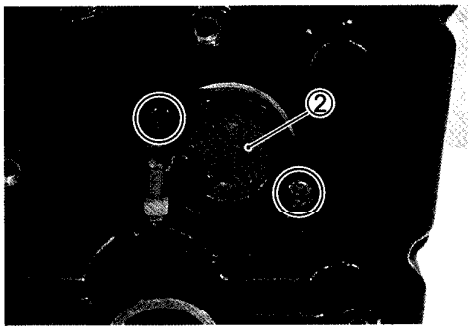


NEUTRAL INDICATOR LIGHT SWITCH

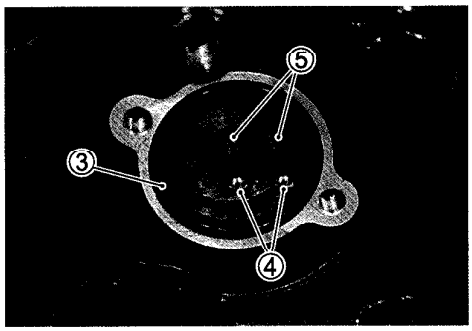
- Remove the driveshaft oil seal retainer ①.



- Remove the neutral indicator light switch ②.



- Remove the O-ring ③.
- Remove the switch contacts ④ and the springs ⑤.



CRANKCASE

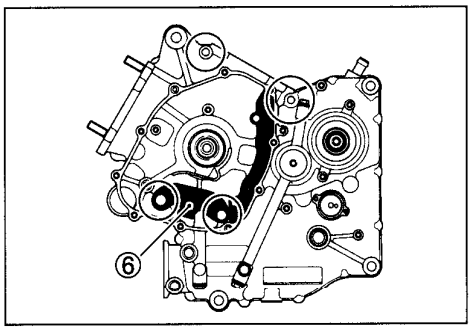
- Remove the crankcase bolts.

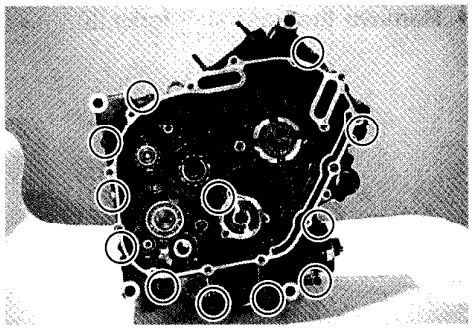
NOTE:
Loosen the crankcase bolt diagonally and the smaller sizes first.

- Remove the oil prate ⑥.

NOTE:
The oil plate ⑥ has been installed until the following engine.

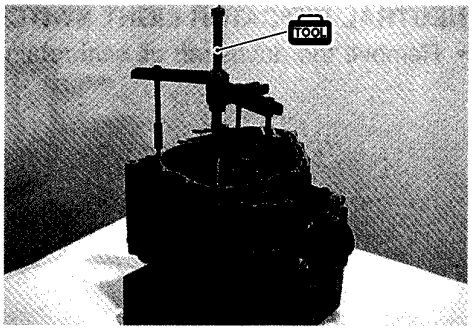
Engine serial number: Until P503-102260
Until P505-100113





- Separate the crankcase into 2 parts, right and left with the crankcase separating tool.

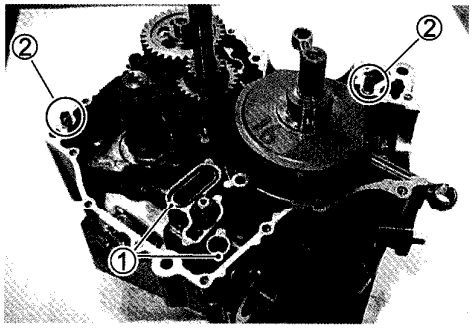
09920-13120: Crankcase separating tool



NOTE:

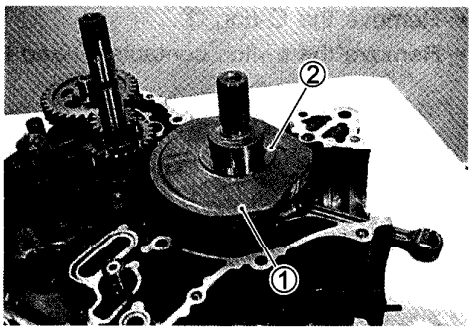
* *Fit the crankcase separating tool, so that the tool arms are in parallel with the side of crankcase.*
* *The crankshaft and transmission components should remain in the left crankcase half.*

- Remove the O-rings ① and the dowel pins ②.



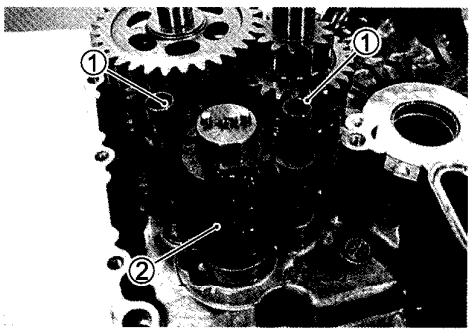
CRANKSHAFT

- Remove the crankshaft ① and the thrust washer ②.

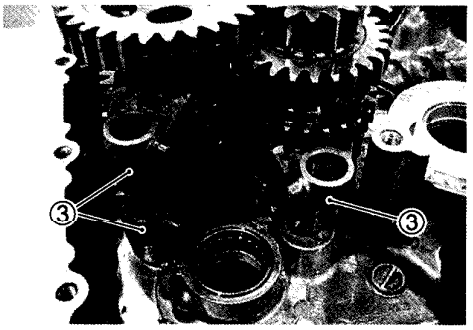


TRANSMISSION

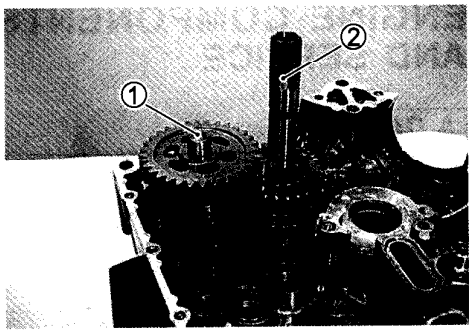
- Remove the gearshift fork shafts ①.
- Remove the gearshift cam ②.



- Remove the gear shift forks ③.

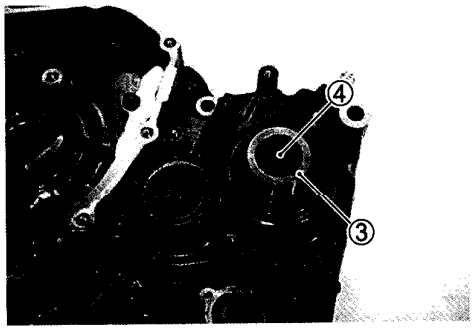


- Remove the driveshaft assembly ① and the countershaft assembly ②.



NOTE:
Refer to the page 3-78 for the driveshaft and the countershaft servicing.

- Remove the engine sprocket spacer ③ and the O-ring ④.



ENGINE COMPONENTS INSPECTION AND SERVICE

⚠ CAUTION

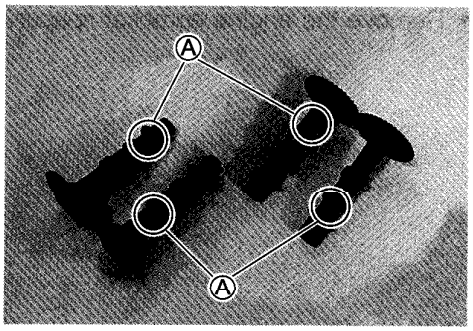
Identify the position of each removed part. Organize the parts in their respective groups (i.e., intake, exhaust, No.1 or No.2) so that they can be installed in their original locations.

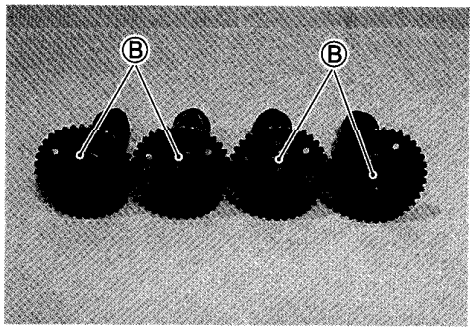
CAMSHAFT

CAMSHAFT IDENTIFICATION

- The camshafts can be identified by the embossed letters Ⓐ and the cords Ⓑ stamped on the camshaft ends.

	Letter Ⓐ	Cord Ⓑ
① No.1 (Front) intake camshaft	INF	A
② No.1 (Front) exhaust camshaft	EXF	B
③ No.2 (Rear) intake camshaft	INR	C
④ No.2 (Rear) exhaust camshaft	EXR	D



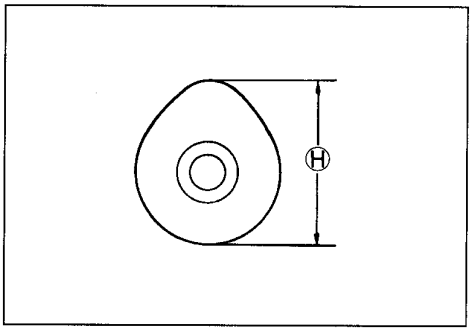


CAM WEAR

- Check the camshaft for wear or damage.
- Measure the cam height Ⓗ with a micrometer.

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

DATA Cam height Ⓗ
Service Limit: (Intake): 35.18 mm (1.385 in)
(Exhaust): 33.18 mm (1.306 in)

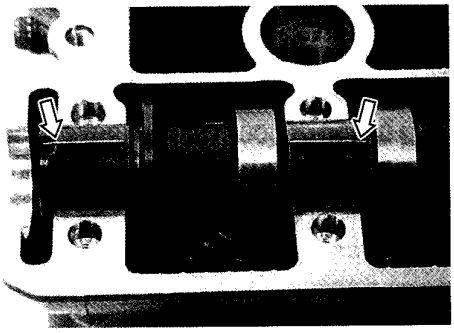


CAMSHAFT JOURNAL WEAR

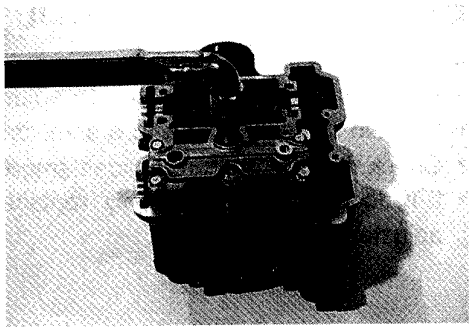
- Determine whether or not each journal is worn down to the limit by measuring the oil clearance with the camshaft installed in place.
- Use the plastigauge to read the clearance at the widest portion, which is specified as follows:

DATA Camshaft journal oil clearance
Service Limit: (IN & EX): 0.150 mm (0.0059 in)

TOOL 09900-22301: Plastigauge
09900-22302: Plastigauge



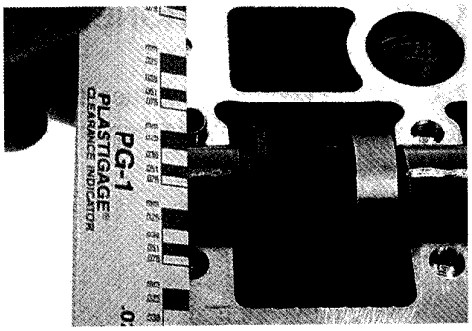
NOTE:
Install camshaft journal holder to their original positions.
(☞ 3-110, 3-114)



- Tighten the camshaft journal holder bolts evenly and diagonally to the specified torque.

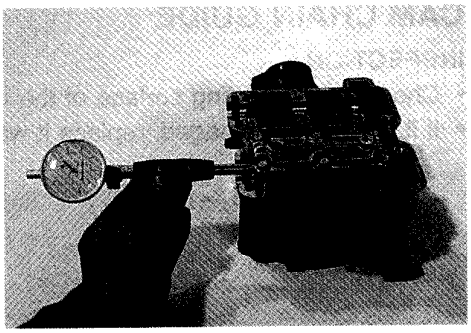
Camshaft journal holder bolt: 10 N·m
(1.0 kgf·m, 7.0 lb-ft)

NOTE:
Do not rotate the camshaft with the plastigauge in place.



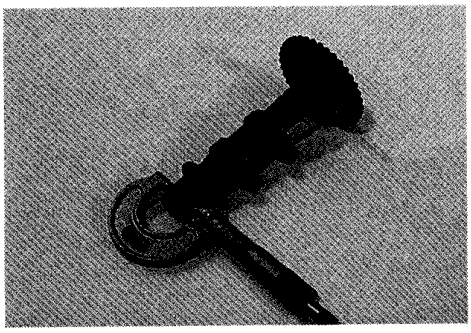
- Remove the camshaft holders, and read the width of the compressed plastigauge with envelope scale.
- This measurement should be taken at the widest part.

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



DATA Journal holder I.D.
Standard (IN & EX): 22.012 – 22.025 mm
(0.8666 – 0.8671 in)

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



DATA Camshaft journal O.D.
Standard (IN & EX): 21.959 – 21.980 mm
(0.8645 – 0.8654 in)

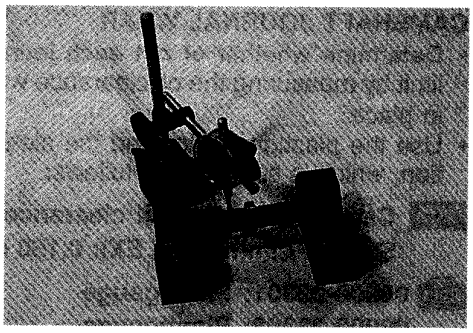
TOOL 09900-20205: Micrometer (0 – 25 mm)

CAMSHAFT RUNOUT

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

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

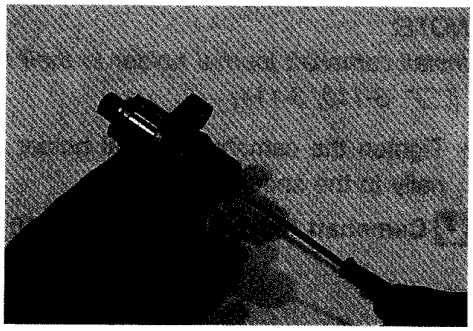
Camshaft runout
Service Limit (IN & EX): 0.1 mm (0.004 in)



CAM CHAIN TENSION ADJUSTER

INSPECTION

- Remove the cam chain tension adjuster bolt.
- Shorten the push rod with a screwdriver.
- Check that the push rod slides smoothly when releasing it.
- If it does not slide smoothly, replace the cam chain tension adjuster with a new one.



CAM CHAIN TENSIONER

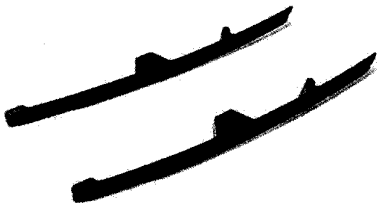
INSPECTION

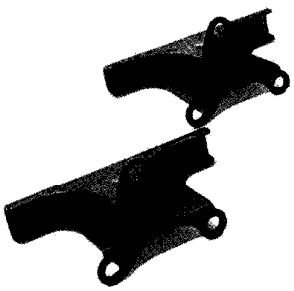
- Check the contacting surface of the cam chain tensioner.
- If it is worn or damaged, replace it with a new one.

CAM CHAIN GUIDE

INSPECTION

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





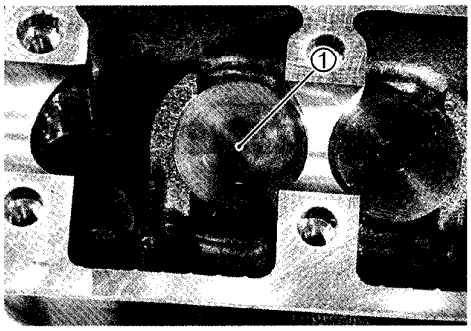
CYLINDER HEAD AND VALVE

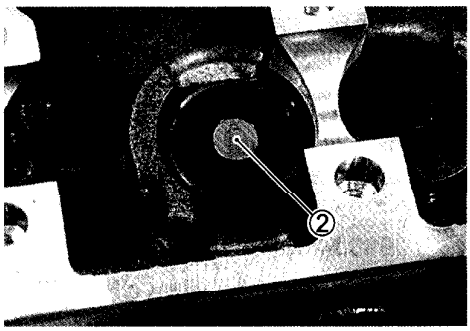
VALVE AND VALVE SPRING DISASSEMBLY

- Remove the tappets ① and shims ② by fingers or magnetic hand.

⚠ CAUTION

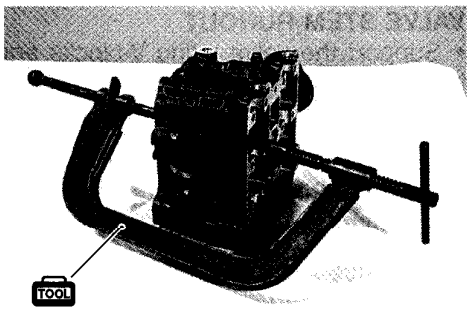
Identify the position of each removed parts.





- Using special tools, compress the valve springs and remove the two cotter halves ③ from valve stem.

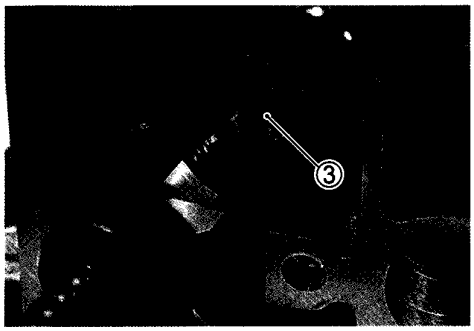
TOOL 09916-14510: Valve lifter
09916-14521: Valve lifter attachment
09916-84511: Tweezers

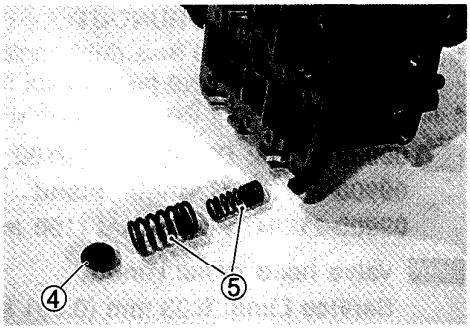


- Remove the valve spring retainer ④ and valve springs ⑤.

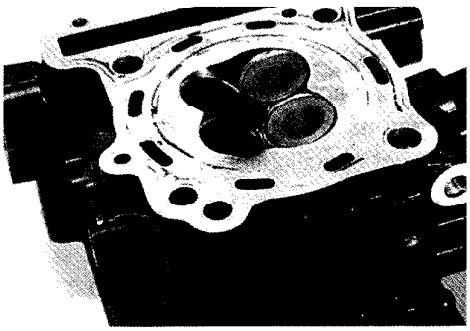
⚠ CAUTION

Be careful not to damage the tappet sliding surface with the special tool.

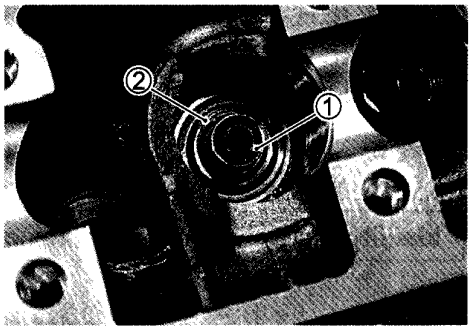




- Pull out the valve from the other side.



- Remove the oil seals ① and the spring seats ②.

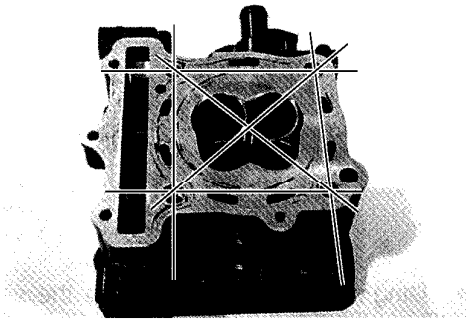


⚠ CAUTION

Do not reuse the removed oil seals.

CYLINDER HEAD DISTORTION

- Decarbonize the combustion chambers.
- Check the gasketed surface of the cylinder head for distortion with a straightedge and thickness gauge, taking a clearance reading at several places indicated.
- If the largest reading at any position of the straightedge exceeds the limit, replace the cylinder head.

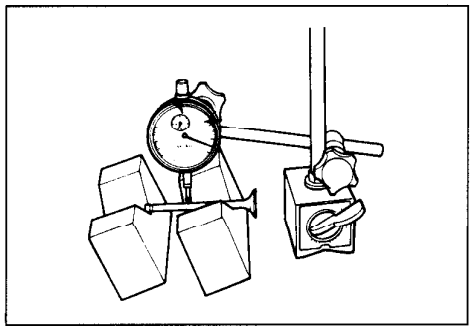


TOOL 09900-20803: Thickness gauge

DATA Cylinder head distortion
Standard: 0.05 mm (0.002 in)

VALVE STEM RUNOUT

- Support the valve using V-blocks and check its runout using the dial gauge as shown.
- If the runout exceeds the service limit, replace the valve.

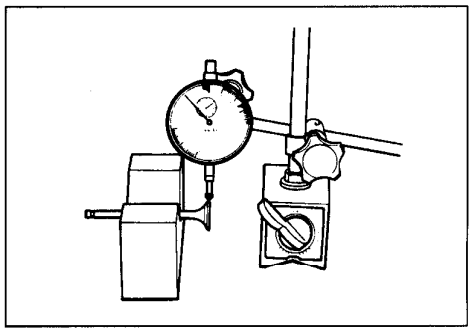


TOOL 09900-20606: Dial gauge (1/100 mm)
09900-20701: Magnetic stand
09900-21304: V-block set (100 mm)

DATA Valve stem runout
Service Limit: 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.

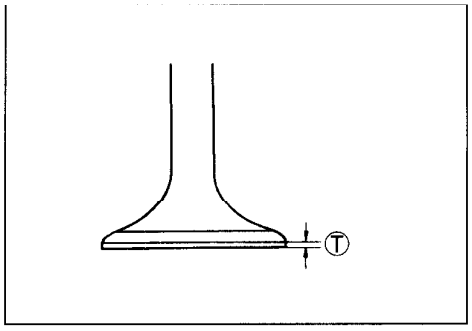


TOOL 09900-20606: Dial gauge (1/100 mm)
09900-20701: Magnetic stand
09900-21304: V-block set (100 mm)

DATA Valve head radial runout
Service Limit: 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 Ⓣ. If it is out of specification, replace the valve with a new one.

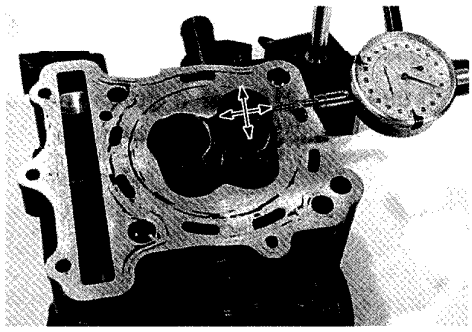


TOOL 09900-20102: Vernier calipers

DATA Valve head thickness Ⓣ
Service Limit: 0.5 mm (0.02 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, by positioning the dial gauge as shown.
- If the deflection measured exceeds the limit, then determine whether the valve or the guide should be replaced with a new one.

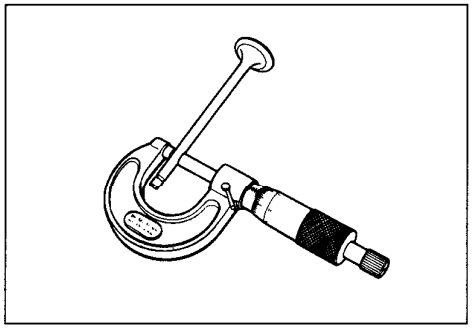


09900-20606: Dial gauge (1/100 mm)
09900-20701: Magnetic stand

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

VALVE STEM WEAR

- If the valve stem is worn down to the limit, as measured with a micrometer, where the clearance is found to be in excess of the limit indicated, replace the valve.
- If the stem is within the limit, then replace the guide.
- After replacing valve or guide, be sure to recheck the clearance.



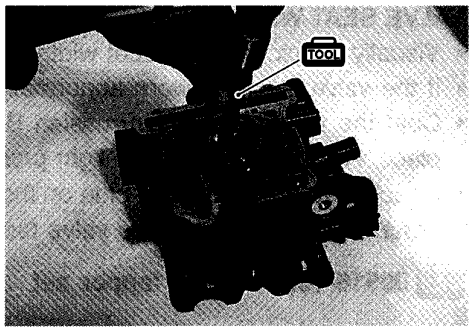
09900-20205: Micrometer (0 – 25 mm)

Valve stem O.D.
Standard(IN): 4.465 – 4.480 mm (0.1758 – 0.1764 in)
(EX): 4.455 – 4.470 mm (0.1754 – 0.1760 in)

NOTE:
If valve guides have to be removed for replacement after inspecting related parts, carry out the steps shown in valve guide servicing.

VALVE GUIDE SERVICING

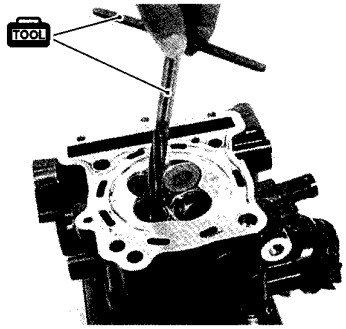
- Using the valve guide remover, drive the valve guide out toward the intake or exhaust camshaft side.



09916-43210: Valve guide remover/installer

NOTE:
** Discard the removed valve guide subassemblies.*
** Only oversized valve guides are available as replacement parts. (Part No. 11115-18D72)*

- Re-finish the valve guide holes in cylinder head with the reamer and handle.



09916-34580: Valve guide reamer
09916-34542: Reamer handle

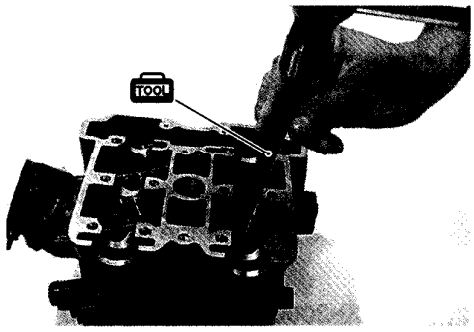
⚠ CAUTION

When refinishing or removing the reamer from the valve guide hole, always turn it clockwise.

- Apply engine oil to the valve guide hole.

- Drive the valve guide into the hole using the valve guide installer ① and attachment ②.

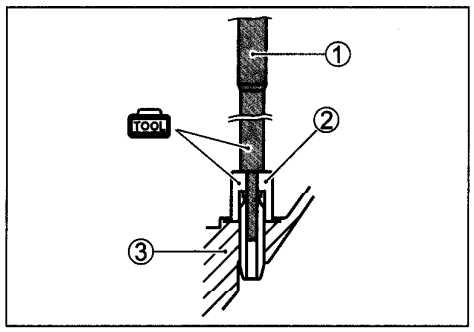
09916-43210: Valve guide installer/remover ①
09916-53330: Attachment ②



NOTE:
Install the valve guide until the attachment contacts with the cylinder head ③.

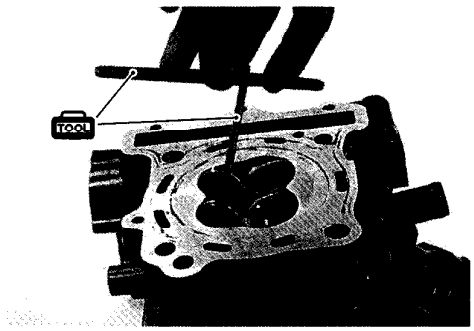
⚠ CAUTION

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



- After installing the valve guides, re-finish their guiding bores using the reamer.
- Clean and oil the guides after reaming.

09916-34570: Valve guide reamer
09916-34542: Valve guide reamer handle

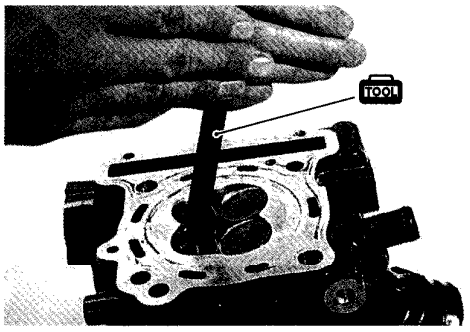


NOTE:
Insert the reamer from the combustion chamber and always turn the reamer handle clockwise.

VALVE SEAT WIDTH INSPECTION

- Visually check for valve seat width on each valve face.
- If the valve face has worn abnormally, replace the valve.
- Coat the valve seat with Prussian Blue and set the valve in place. Rotate the valve with light pressure.
- Check that the transferred blue on the valve face is uniform all around and in center of the valve face.

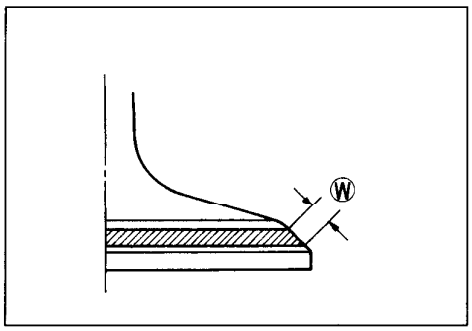
09916-10911: Valve lapper set



- If the seat width Ⓦ measured exceeds the standard value, or seat width is not uniform reface the seat using the seat cutter.

Valve seat width Ⓦ
Standard: 0.9 – 1.1 mm (0.035 – 0.043 in)

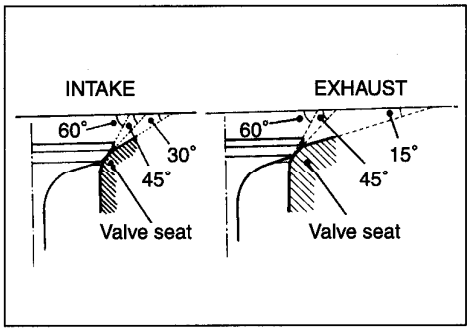
If the valve seat is out of specification, re-cut the seat.



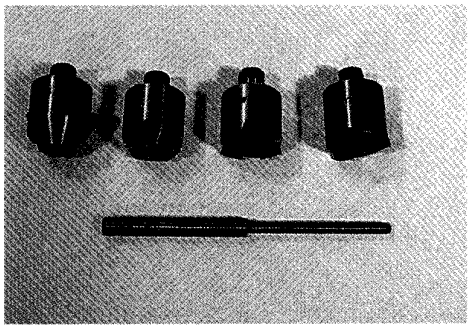
VALVE SEAT SERVICING

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

	INTAKE	EXHAUST
15°		N-121
30°	N-126	
45°	N-122	N-122
60°	N-111	N-111



09916-21111: Valve seat cutter set
09916-20630: Valve seat cutter (N-126)
09916-20640: Solid pilot (N-100-4.5)



NOTE:

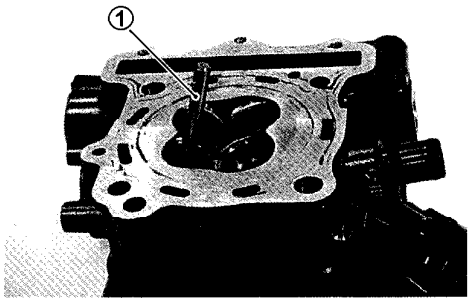
* *The valve seat cutters (N-121), (N-122) and (N-111) are included in the valve seat cutter set (09916-21111).*

* *Use the solid pilot (N-100-4.5) along with the valve seat cutter.*

⚠ CAUTION

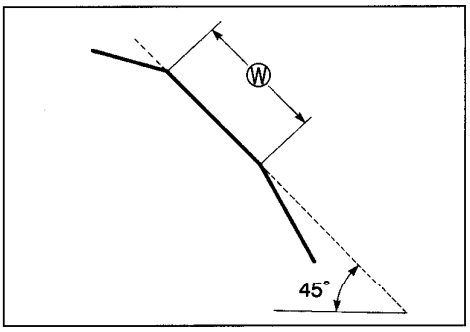
The valve seal contact area must be inspected after each cut.

- When installing the solid pilot ①, rotate it slightly. Seat the pilot snugly. Install the 45° cutter, attachment and T-handle.



INITIAL SEAT CUT

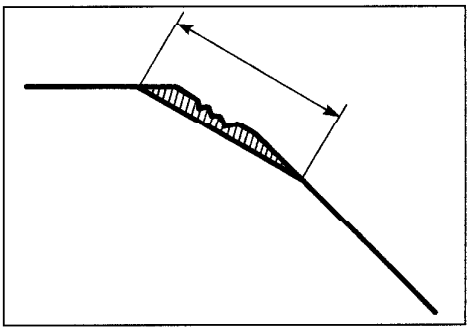
- Using the 45° cutter, descale and clean up the seat. Rotate the cutter one or two turns.
- Measure the valve seat width Ⓦ after every cut.



- If the valve seat is pitted or burned, use the 45° cutter to condition the seat some more.

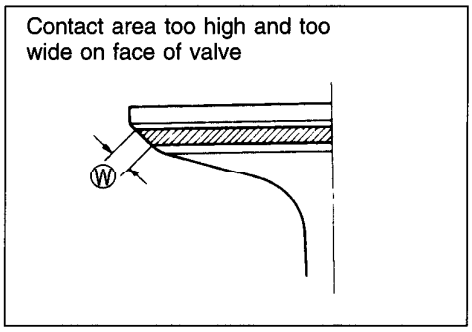
NOTE:

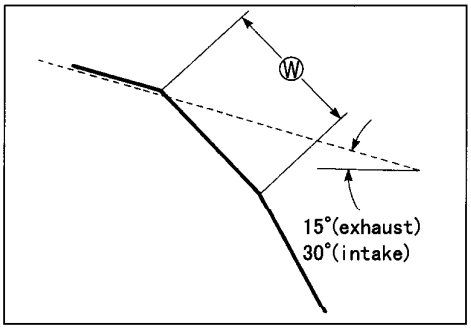
Cut only the minimum amount necessary from the seat to prevent the possibility of the valve stem becoming too close to the rocker arm for correct valve contact angle.



TOP NARROWING CUT

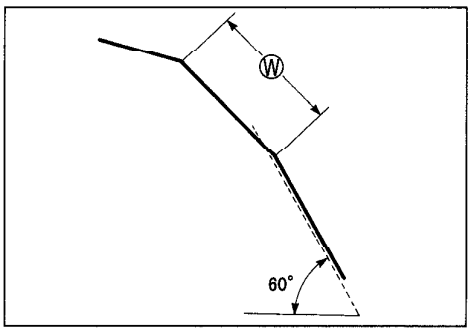
- If the contact area Ⓦ is too high on the valve, or if it is too wide, use the 15° (for the exhaust side) and the 30° (for the intake side) to lower and narrow the contact area.





BOTTOM NARROWING CUT

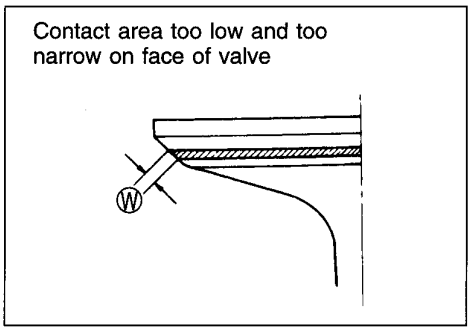
- If the contact area Ⓦ is too wide or too low, use the 60° cutter to narrow and raise the contact area.

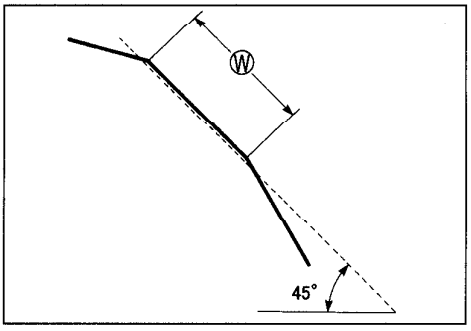


FINAL SEAT CUT

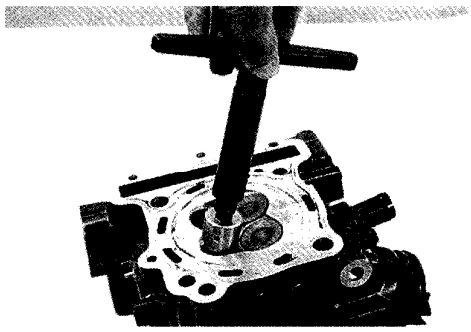
- If the contact area Ⓦ is too low or too narrow, use the 45° cutter to raise and widen the contact area.

NOTE:
After cutting the 15°, 30° and 60° angles, it is possible that the valve seat (45°) is too narrow. If so, re-cut the valve seat to the correct width.





- 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.

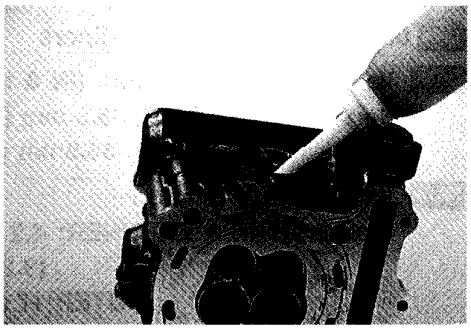


⚠ CAUTION

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.

NOTE:
After servicing the valve seats, be sure to check the tappet clearance after the cylinder head has been reinstalled. (☞ 2-8)

- 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.

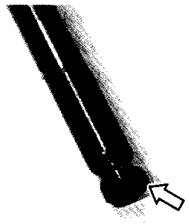


⚠ WARNING

Always use extreme caution when handling gasoline.

VALVE STEM END CONDITION

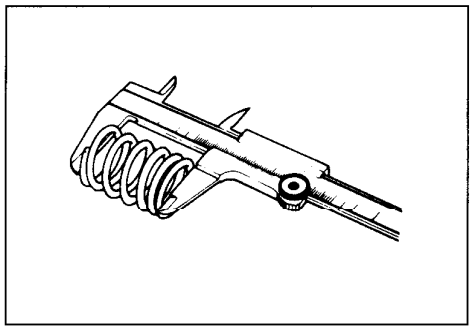
- Check the valve stem end face for pitting and wear.



VALVE SPRING

The force of the coil springs keeps the valve seat tight. Weakened springs result in reduced engine power output, and often account for the chattering noise coming from the valve mechanism.

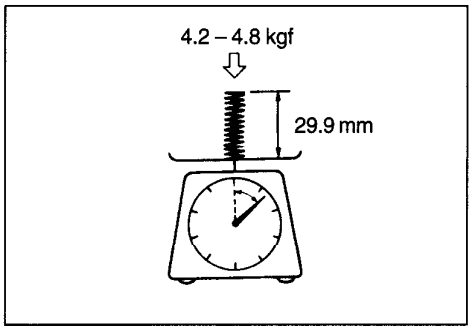
Check the valve springs for proper strength by measuring their free length and also by the force required to compress them. If the spring length is less than the service limit, or if the force required to compress the spring does not fall within the range specified, replace both the inner and outer springs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



09900-20102: Vernier calipers

DATA Valve spring free length (IN & EX)
Service limit: INNER: 36.8 mm (1.45 in)
OUTER: 39.8mm (1.57 in)

DATA Valve spring tension
Standard: (IN & EX) INNER: 4.2 – 4.8 kgf/ 29.9 mm
(9.26 – 10.58 lbs/1.18 in)
OUTER: 17.0 – 19.6 kgf/33.4 mm
(37.48 – 43.21 lbs/1.31 in)

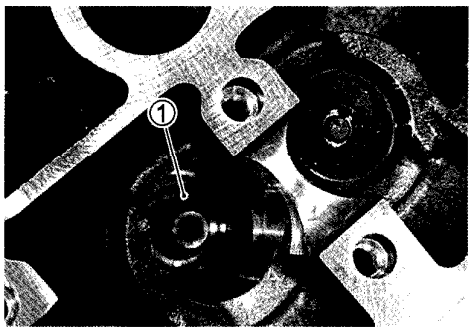


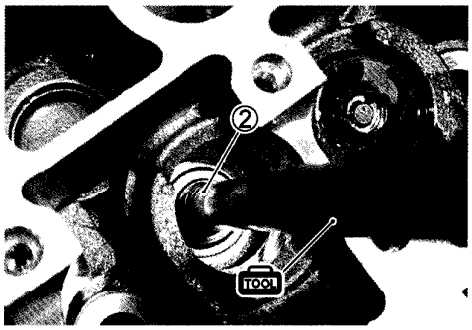
VALVE AND VALVE SPRING REASSEMBLY

- Install the valve spring seats ①.
- Apply oil and Moly paste to each oil seal ②, and press-fit them into position with the valve guide installer.

09916-43210: Valve guide remover/installer

99000-25140: SUZUKI MOLY PASTE

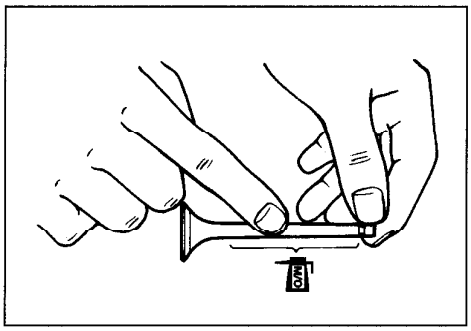




⚠ CAUTION

Do not reuse the removed oil seals.

- Insert the valves, with their stems coated with high quality molybdenum disulfide lubricant (SUZUKI MOLY PASTE) all around and along the full stem length without any break.



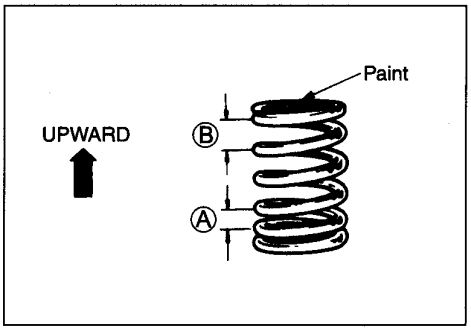
⚠ CAUTION

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

99000-25140: SUZUKI MOLY PASTE

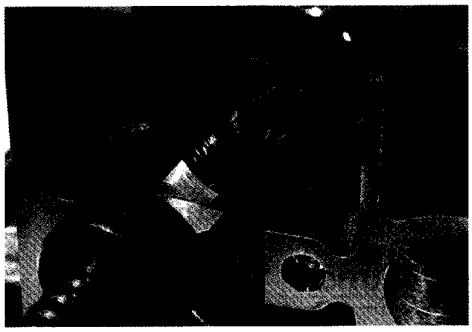
- Install the valve springs with the small-pitch portion Ⓐ facing cylinder head.

Ⓑ: Large-pitch portion



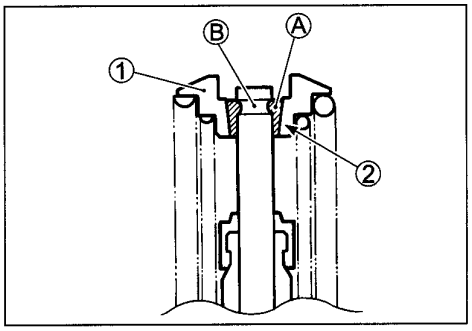
- Put on the valve spring retainer ①, and using the valve lifter, press down the springs, fit the cotter halves to the stem end, and release the lifter to allow the cotter ② to wedge in between retainer and stem. Be sure that the rounded lip Ⓐ of the cotter fits snugly into the groove Ⓑ in the stem end.

09916-14510: Valve lifter
09916-14521: Valve lifter attachment
09916-84511: Tweezers



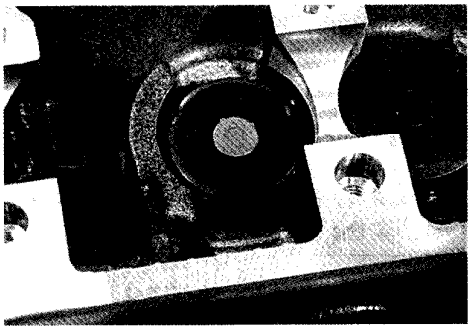
⚠ CAUTION

Be sure to restore each spring and valve to their original positions.



- Install the tappet shim and the tappet to their original position.

NOTE:
* *Apply engine oil to the shim and tappet before fitting them.*
* *When seating the tappet shim, be sure the figure printed surface faces the tappet.*

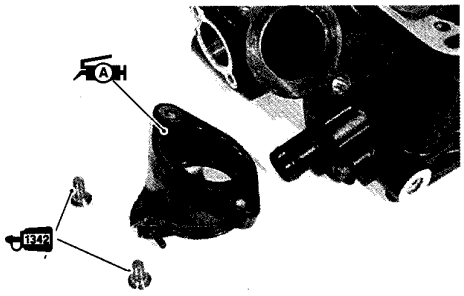


INTAKE PIPE
- Install the intake pipe as following procedure.
- Apply grease to the O-ring.

99000-25030: SUZUKI SUPER GREASE "A"

- Make sure that the "UP" mark Ⓐ comes upward.
- Apply a small quantity of THREAD LOCK "1342" to the screws and tighten it.

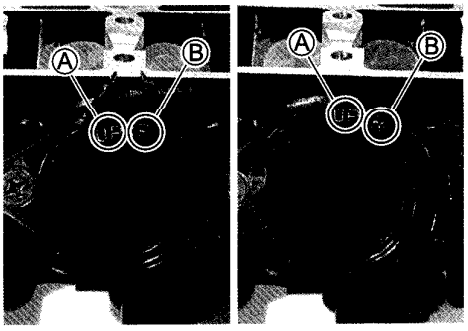
99000-32050: THREAD LOCK "1342"



⚠ CAUTION

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

NOTE:
The intake pipe can be identified by the mark Ⓑ.
F: No.1 (Front) intake pipe
R: No.2 (Rear) intake pipe



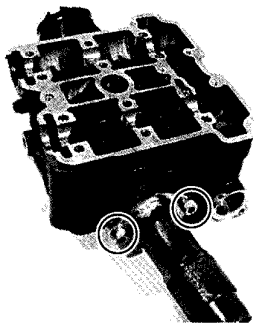
EXHAUST PIPE

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

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

⚠ CAUTION

Use the new gasket to prevent exhaust gas leakage.



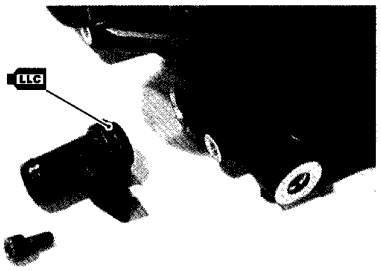
WATER UNION

- Install the O-ring to the water union.

⚠ CAUTION

Replace the O-ring with a new one.

- When installing the water union, apply engine coolant to the O-ring.



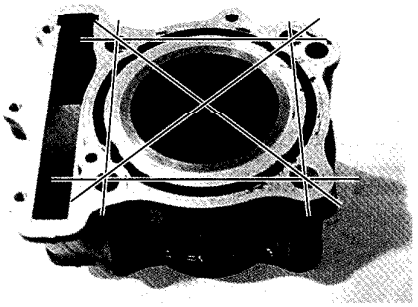
CYLINDER

CYLINDER DISTORTION

- Check the gasketed surface of the cylinder for distortion with a straightedge and thickness gauge, taking a clearance reading at several places as indicated.
- If the largest reading at any position of the straightedge exceeds the limit, replace the cylinder.

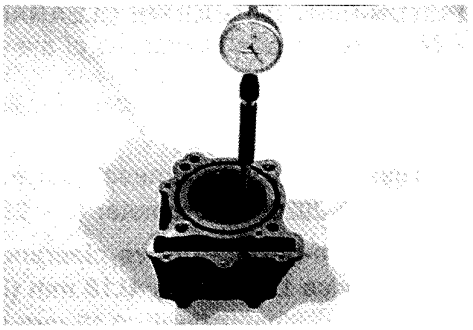
TOOL 09900-20803: Thickness gauge

DATA Cylinder distortion
Service Limit: 0.05 mm (0.002 in)



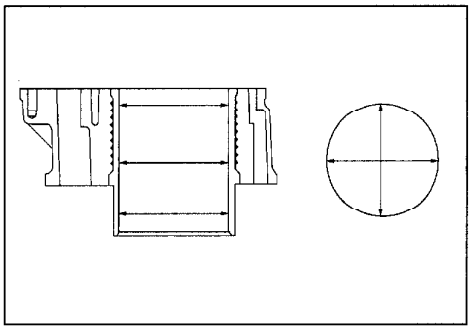
CYLINDER BORE

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

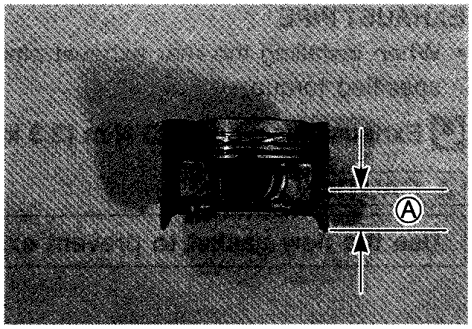


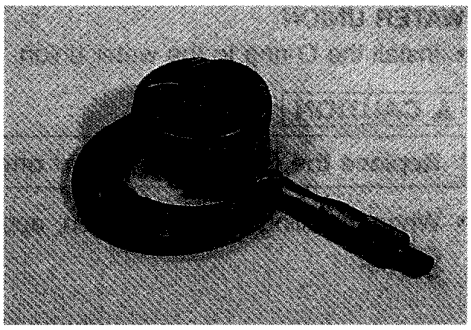
DATA Cylinder bore
Standard: 81.000 – 81.015 mm (3.1890 – 3.1896 in)

TOOL 09900-20508: Cylinder gauge set



PISTON AND PISTON RING





PISTON DIAMETER

- Using a micrometer, measure the piston outside diameter at 20 mm (0.79 in) Ⓐ from the piston skirt end.
- If the measurement is less than the limit, replace the piston.

DATA **Piston diameter**
Service Limit: 80.88 mm (3.184 in)
at 20 mm (0.79 in) from the skirt end

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

PISTON-TO CYLINDER CLEARANCE

- Subtract the piston diameter from the cylinder bore diameter.
- If the piston-to-cylinder clearance exceeds the service limit, rebore the cylinder and use an oversize piston or replace both the cylinder and the piston.

DATA **Piston-to-cylinder clearance**
Standard: 0.055 – 0.065 mm (0.0022 – 0.0026 in)

PISTON-RING-TO-GROOVE CLEARANCE

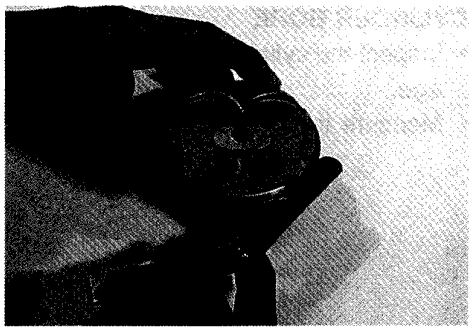
- Measure the side clearances of the 1st and 2nd piston rings using the thickness gauge.
- If any of the clearances exceed the limit, replace both the piston and piston rings.

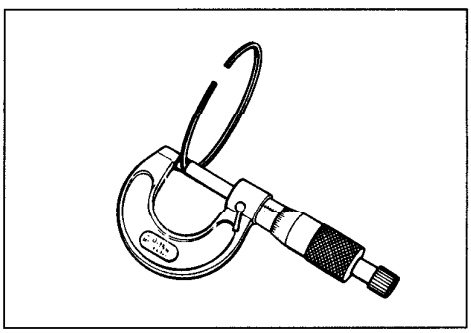
TOOL **09900-20803: Thickness gauge**
09900-20205: Micrometer (0 – 25 mm)

DATA **Piston-ring-to-groove clearance**
Service Limit (1st): 0.18 mm (0.0071 in)
(2nd): 0.15 mm (0.0059 in)

DATA **Piston ring groove width**
Standard (1st): 1.21 – 1.23 mm (0.0476 – 0.0484 in)
(2nd): 1.01 – 1.03 mm (0.0398 – 0.0406 in)
(Oil): 2.01 – 2.03 mm (0.0791 – 0.0799 in)

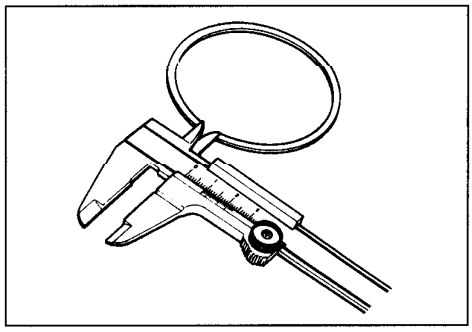
DATA **Piston ring thickness**
Standard (1st): 1.17 – 1.19 mm (0.0461 – 0.0469 in)
(2nd): 0.97 – 0.99 mm (0.0382 – 0.0390 in)





PISTON RING FREE END GAP AND PISTON RING END GAP

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



09900-20102: Vernier calipers

DATA Piston ring free end gap
Service Limit (1st): 7.9 mm (0.31 in)
(2nd): 8.4 mm (0.33 in)

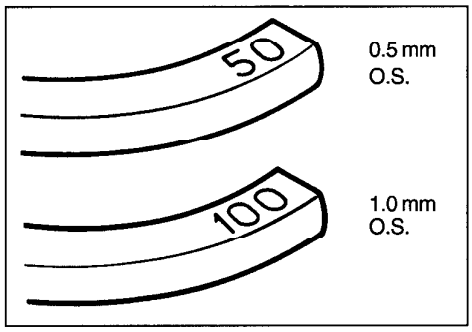
09900-20803: Thickness gauge

DATA Piston ring end gap
Service Limit (1st): 0.70 mm (0.028 in)
(2nd): 0.70 mm (0.028 in)

OVERSIZE PISTON RING

- The following two types of oversize piston rings are used.
- They bear the following identification numbers.

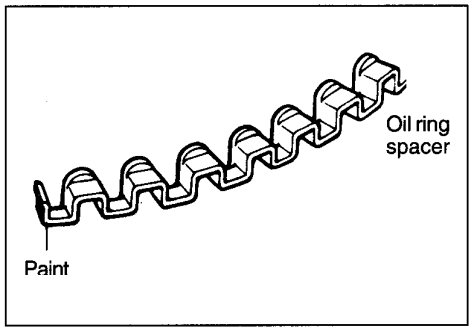
SIZE	1st	2nd
STD	NIL	NIL
0.5 mm O.S.	N50	N50
1.0 mm O.S.	N100	N100



OVERSIZE OIL RING

- The following two types of oversize oil rings are available as optional parts.
- They bear the following identification marks.

SIZE	COLOR
STD	NIL
0.5 mm O.S.	BLUE
1.0 mm O.S.	YELLOW

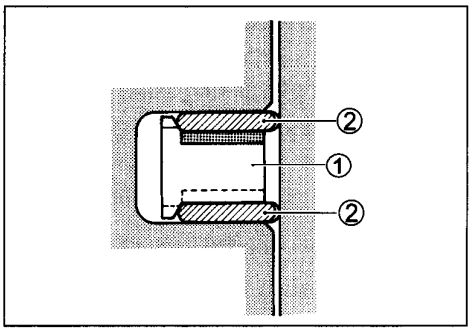


- Measure the outside diameter to identify the size.

PISTON RING REASSEMBLY

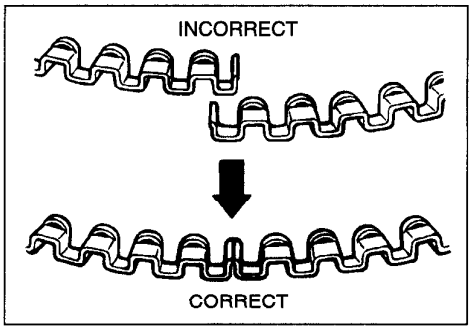
- Install the piston rings in the order of oil ring, 2nd ring and 1st ring.
- The first member to go into the oil ring groove is a spacer ①. After placing the spacer, fit the two side rails ②.

NOTE:
Side designations, top and bottom, are not applied to the spacer and side rails: you can position each either way.



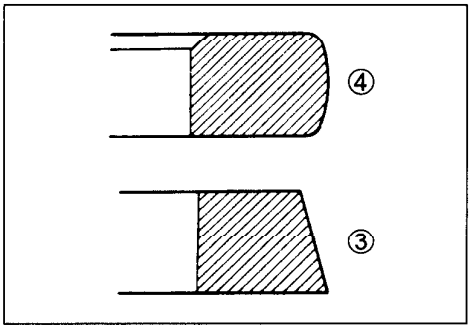
⚠ CAUTION

When installing the spacer, be careful not to allow its two ends to overlap in the groove.

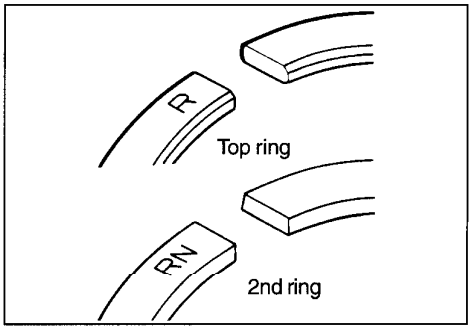


- Install the 2nd ring ③ and the 1st ring ④.

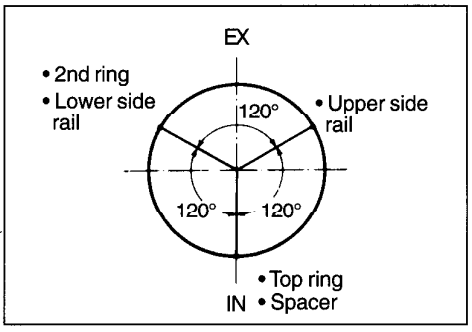
NOTE;
1st ring and 2nd ring differ in shape.



- 1st ring and 2nd ring have letters "R" and "RN" marked on the side. Be sure to bring the marked side to the top when fitting them to the piston.



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

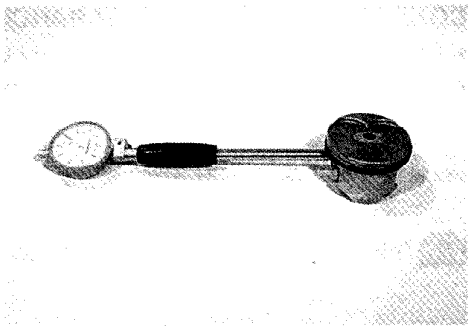


PISTON PINS AND PIN BORE

- Measure the piston pin bore inside diameter using the small bore gauge.
- If the measurement is out of specifications replace the piston.

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

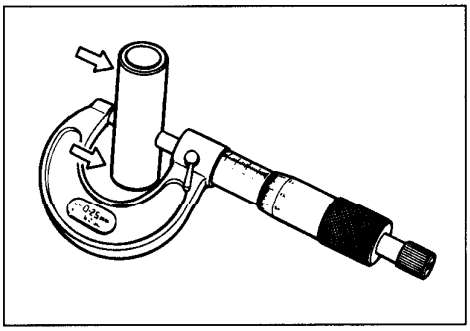
DATA Piston pin bore I.D.
Service Limit: 20.030 mm (0.7886 in)



- 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.

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

DATA Piston pin O.D.
Service Limit: 19.980 mm (0.7866 in)



CONROD AND CRANKSHAFT

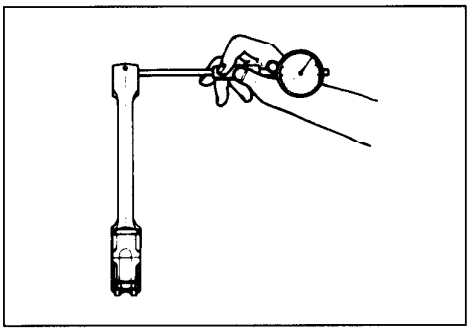
CONROD SMALL END I.D.

- Using a small bore gauge, measure the inside diameter of the conrod small end.

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

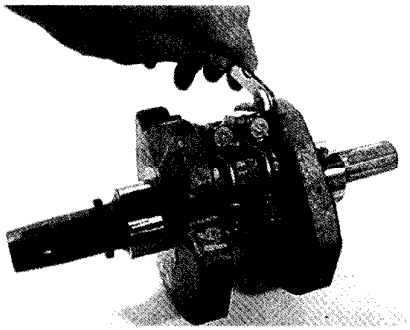
DATA Conrod small end I.D.
Service Limit: 20.040 mm (0.7890 in)

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



CONROD BIG END SIDE CLEARANCE

- Check the conrod side clearance by using a thickness gauge.
- If the clearance exceeds the limit, replace conrod or crankshaft.

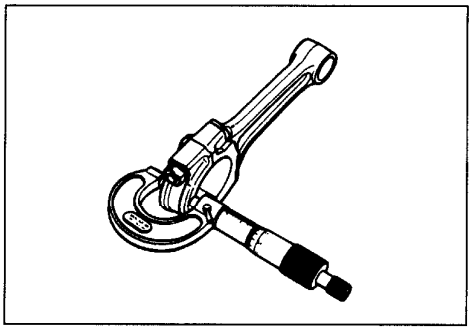


DATA Conrod big end side clearance
Service Limit: 0.50 mm (0.020 in)

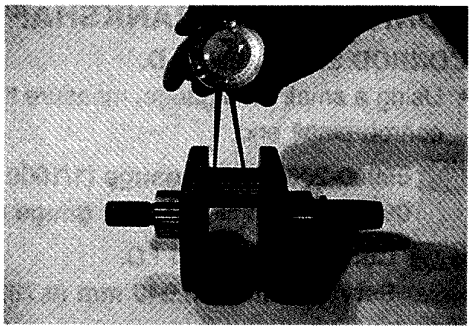
TOOL 09900-20803: Thickness gauge

DATA Conrod big end width
Standard: 20.95 – 21.00 mm (0.825 – 0.827 in)

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

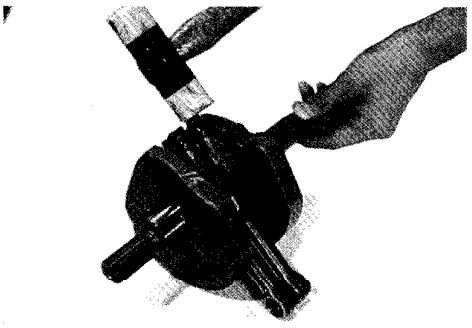


DATA Crank pin width
Standard: 42.17 – 42.22 mm (1.660 – 1.662 in)



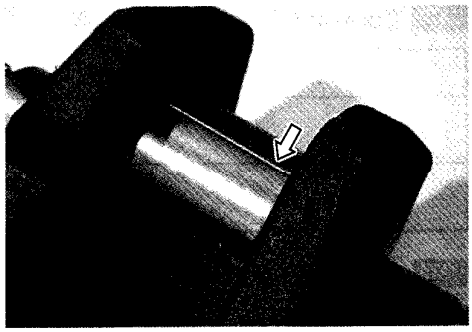
CONROD REMOVAL AND BEARING INSPECTION

- Loosen the bearing cap bolts, and tap the bearing cap bolt lightly with plastic hammer to remove the bearing cap.



- Remove the conrods, and mark them to identify the cylinder position.
- Inspect the bearing surfaces for any sign of fusion, pitting, burn, or flaws. If any, replace them with a specified set of bearings.

CONROD-CRANK PIN BEARING SELECTION



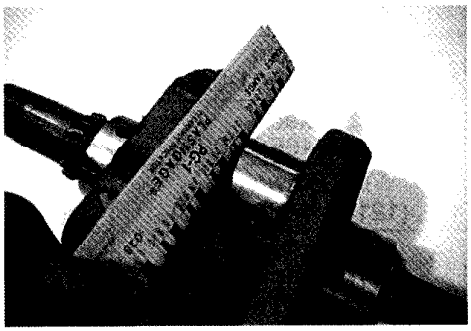
- Place the plastigauge axially along the crank pin, avoiding the oil hole, as shown.

TOOL 09900-22301: Plastigauge

- Tighten the conrod cap bolts to the specified torque, in two stages. (☞ 3-61)

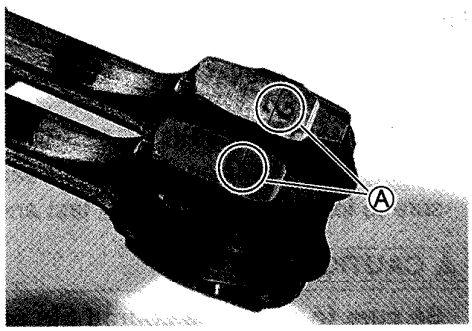
⚠ CAUTION

*** Apply engine oil to the conrod cap bolt.**
*** Never rotate the crankshaft or conrod when a piece of plastigauge is installed.**

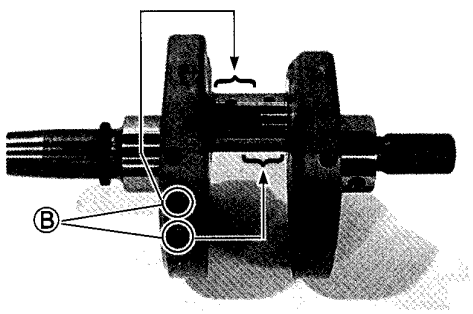


- Remove the bearing caps and measure the width of the compressed plastigauge using the envelope scale. This measurement should be taken at the widest part of the compressed plastigauge.

DATA Conrod big end oil clearance
Standard: 0.032 – 0.056 mm (0.0013 – 0.0022 in)
Service Limit: 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" or "2") Ⓐ.



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

Bearing selection table

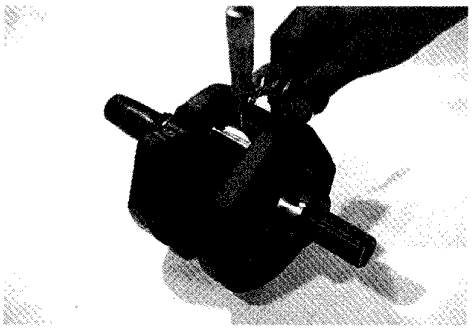
		Crank pin O.D. Ⓑ		
	Code	1	2	3
Conrod I.D. Ⓐ	1	Green	Black	Brown
	2	Black	Brown	Yellow

DATA Conrod I.D.

Code	I.D. specification
1	41.000 – 41.008 mm (1.6142 – 1.6145 in)
2	41.008 – 41.016 mm (1.6145 – 1.6148 in)

DATA Crank pin O.D.

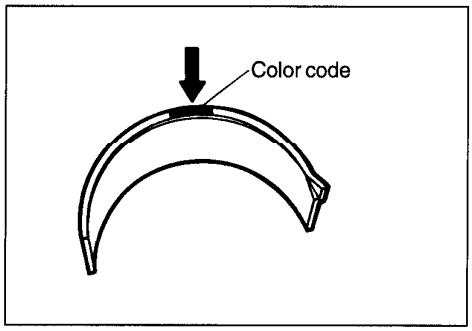
Code	O.D. specification
1	37.992 – 38.000 mm (1.4957 – 1.4961 in)
2	37.984 – 37.992 mm (1.4954 – 1.4957 in)
3	37.976 – 37.984 mm (1.4951 – 1.4954 in)



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

DATA Bearing thickness

Color (Part No.)	Thickness
Green (12164-46E01-0A0)	1.480 – 1.484 mm (0.0583 – 0.0584 in)
Black (12164-46E01-0B0)	1.484 – 1.488 mm (0.0584 – 0.0586 in)
Brown (12164-46E01-0C0)	1.488 – 1.492 mm (0.0586 – 0.0587 in)
Yellow (12164-46E01-0D0)	1.492 – 1.496 mm (0.0587 – 0.0589 in)

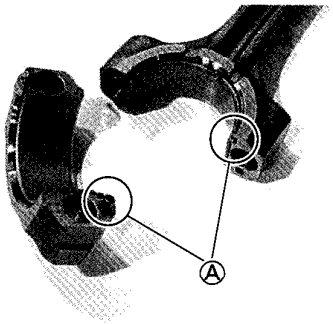


⚠ CAUTION

The bearings must be replaced as a set.

CONROD AND BEARING REASSEMBLY

- When fitting the bearings to the bearing cap and conrod, be sure to fix the stopper part Ⓐ first and press in the other end.

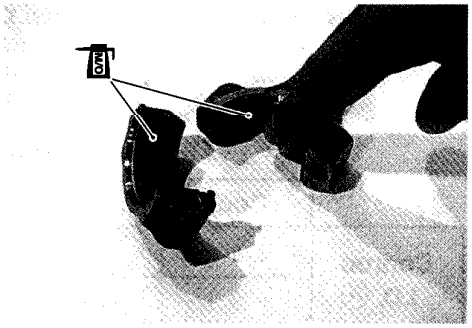


⚠ CAUTION

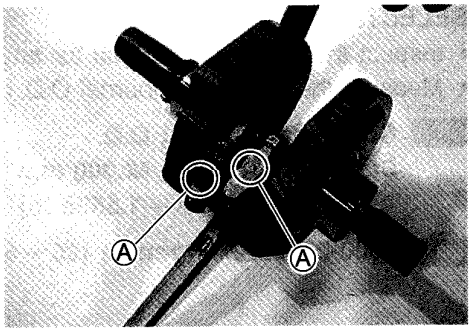
Be sure to clean the conrod big end.

- Apply engine oil and SUZUKI MOLY PASTE 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 Ⓐ of the conrods face each cylinder intake valve sides.



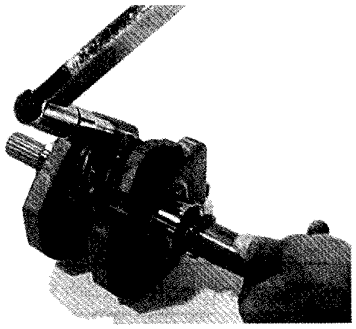
- Apply engine oil and SUZUKI MOLY PASTE to the bearing cap bolts.

99000-25140: SUZUKI MOLY PASTE

- Tighten the bearing cap bolt as following two steps.

Conrod bearing cap bolt
(Initial): 35 N·m (3.5 kgf·m, 25.5 lb-ft)
(Final): 67 N·m (6.7 kgf·m, 48.5 lb-ft)

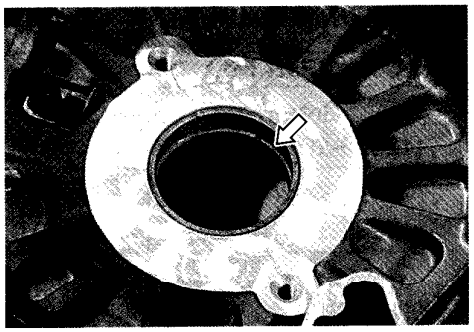
- Apply engine oil to the conrod big end side surfaces.
- Check the conrod movement for smooth turning.

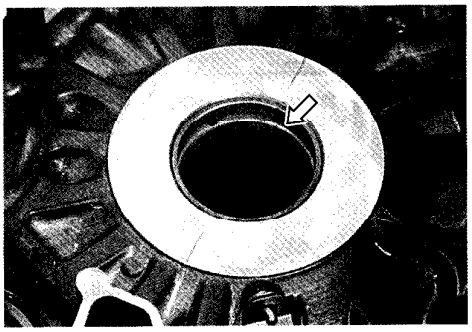


CRANKSHAFT JOURNAL BEARING

INSPECTION

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



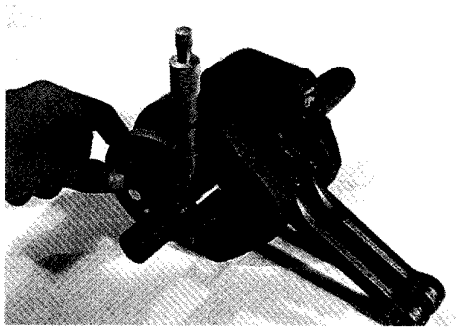


SELECTION

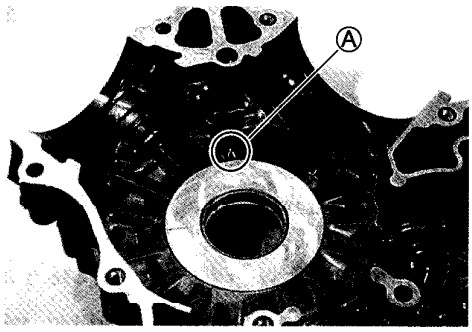
- Inspect the crankshaft journal for any damage.
- Measure the crankshaft journal O.D. by using the special tool.

DATA Crankshaft journal O.D.
Standard: 41.985 – 42.000 mm
(1.6529 – 1.6535 in)

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

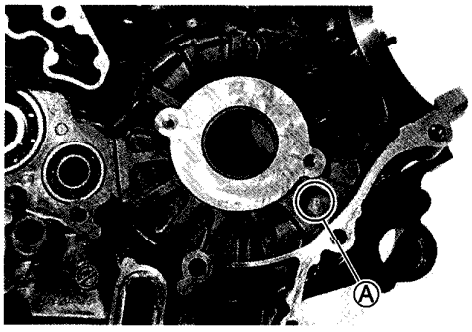


- Select the specified bearings from the crankcase bore I.D. code. The crankcase bore I.D. code Ⓐ "A", "B" or "C", is stamped on the inside of each crankcase half.



Bearing selection table

	Crankcase I.D. Ⓐ		
	A	B	C
Bearing color	Green	Black	Brown

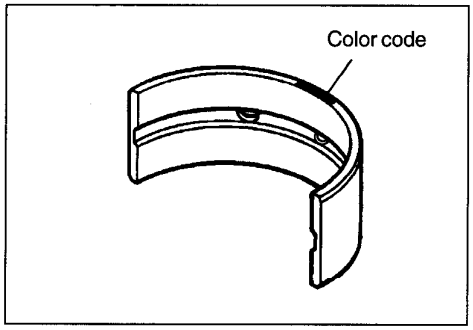


DATA Crank shaft journal I.D.

I.D. code Ⓐ	I.D. specification
A	46.000 – 46.006 mm (1.8110 – 1.8113 in)
B	46.0061 – 46.012 mm (1.8113 – 1.8115 in)
C	46.0121 – 46.018 mm (1.8115 – 1.8117 in)

DATA Bearing thickness

Color (Part No.)	Thickness
Green (12229-19F10-0A0)	1.993 – 1.996 mm (0.0785 – 0.0786 in)
Black (12229-19F10-0B0)	1.996 – 1.999 mm (0.0786 – 0.0787 in)
Brown (12229-19F10-0C0)	1.999 – 2.002 mm (0.0787 – 0.0788 in)



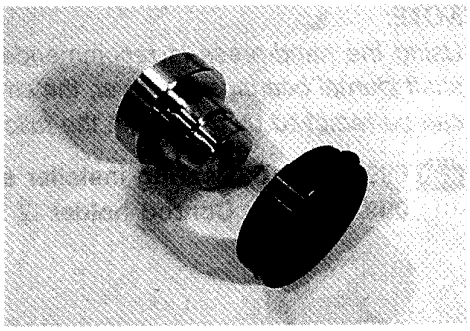
⚠ CAUTION

Bearing must be replaced as a set.

REPLACEMENT

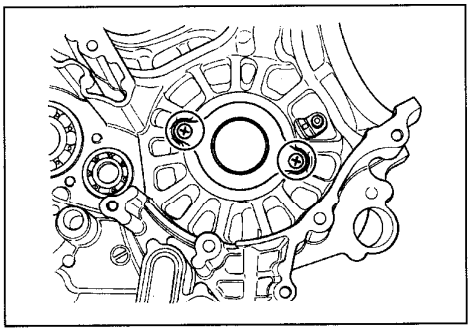
- Use the special tool to replace the crankshaft journal bearings. The replacement procedure is as follows.

09913-60220: Journal bearing remover/installer



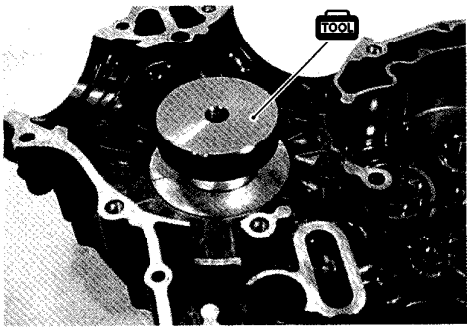
REMOVAL

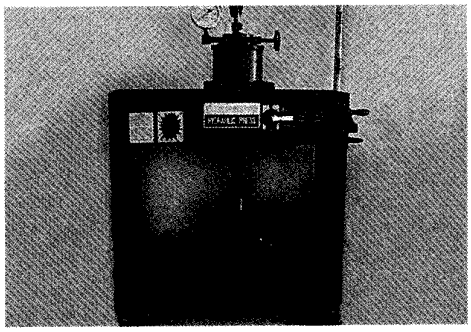
- Remove the left side journal bearing retainer.



- 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.

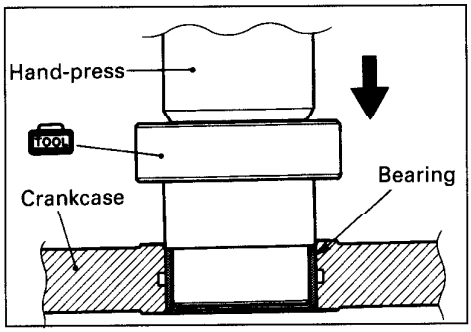




- Gradually press out the bearing with the special tool by using the hand-press.

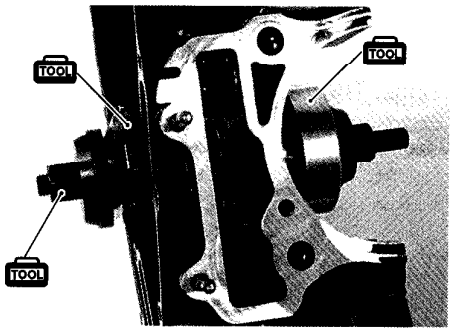
⚠ CAUTION

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.

09924-84510: Bearing installer set ①
09924-20116: Conrod holder ②

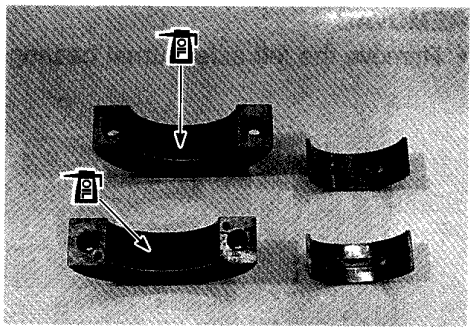


INSTALLATION

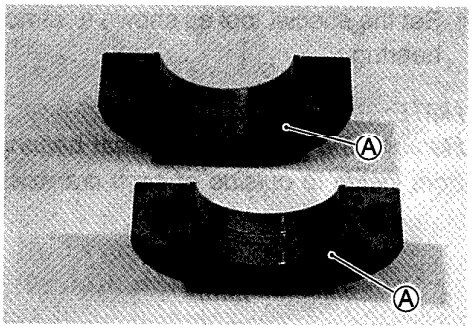
- Set the specified crankshaft journal bearings to the special tool.

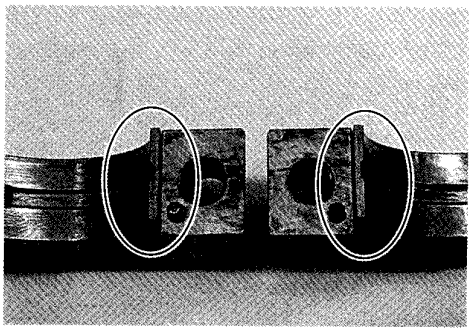
⚠ CAUTION

*** 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 Ⓐ and also the bearing edge with the mating surface of the special tool.**



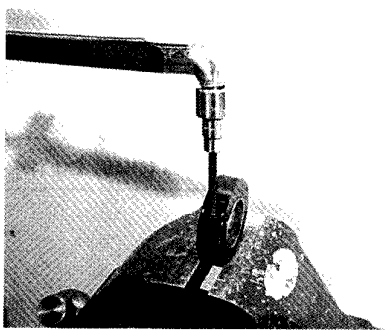
NOTE:
The upper and lower bearings are same.





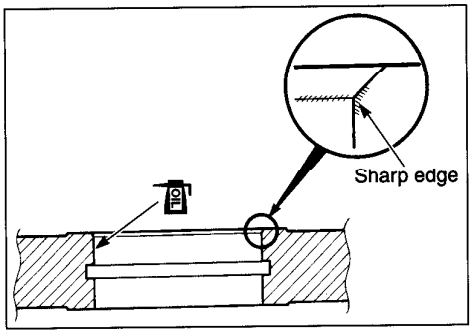
- Tighten the special tool bolt to the specified torque.

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

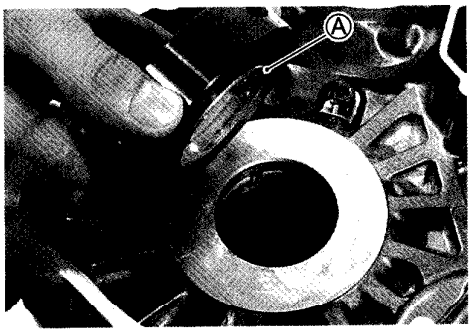


⚠ CAUTION

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



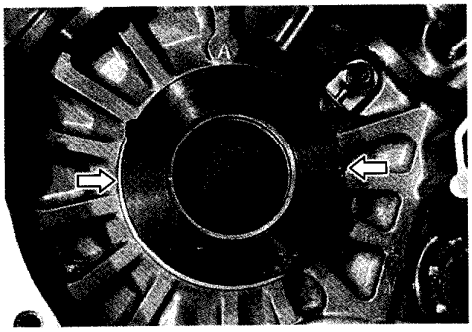
- Set the bearings installed in the special tool to the crankcase half as shown.



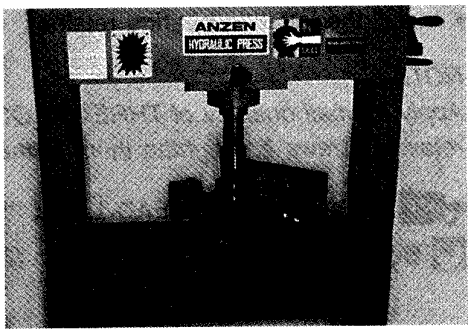
⚠ CAUTION

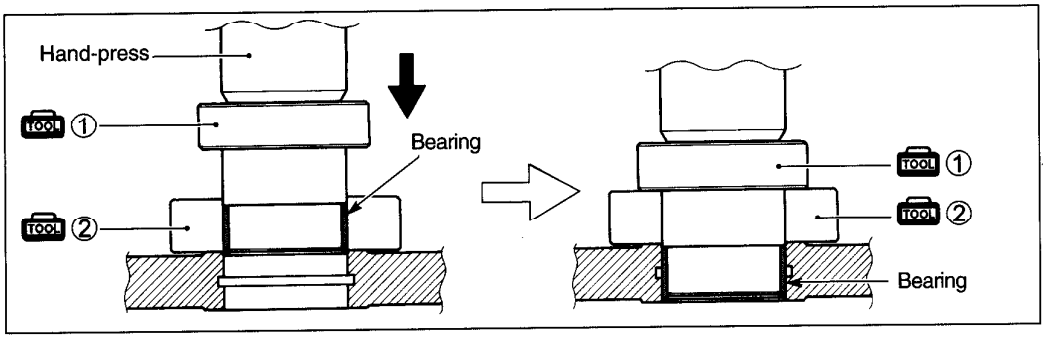
- *** Be sure the bearing protruded side Ⓐ faces the crankcase bore.**
- *** Align the bearing edges, special tool mating surface, with the line mark on the crankcase.**

NOTE:
Install the bearing from inside to outside of each crankcase halves.



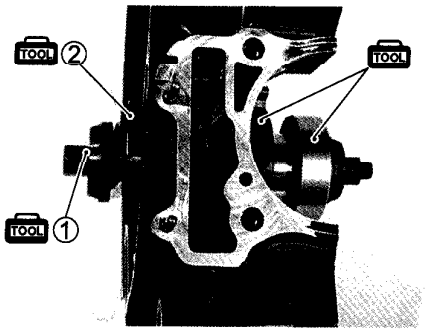
- Apply enough engine oil to the special tool and the bearings and then set the special tool carefully.
- Gradually press in the bearing into the main journal bore by using the hand-press until the special tool ① stops the special tool ②.



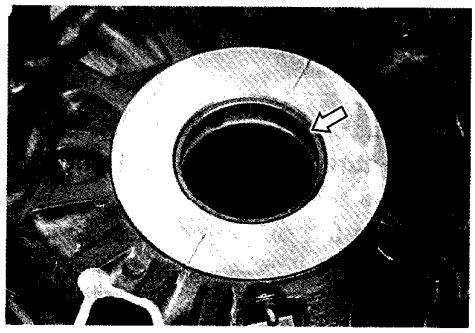


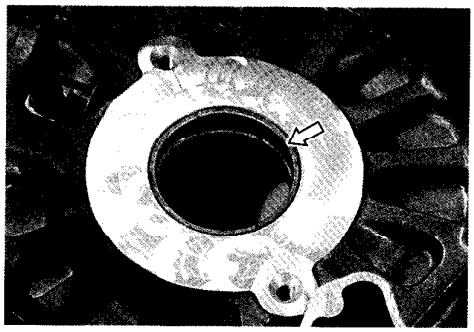
NOTE:
Using the hand-press is recommended to install the crankshaft journal bearings. However, the crankshaft journal bearings can be installed by using the following special tools.

09924-84510: Bearing installer set ①
09924-20116: Conrod holder ②



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

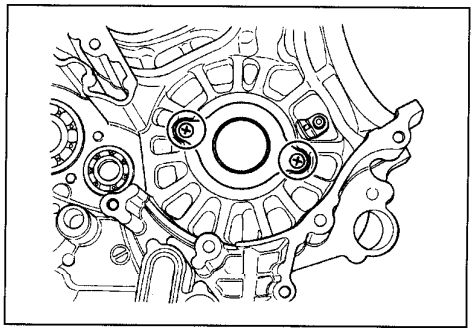




- Install the left side bearing retainer.

NOTE:
Apply a small quantity of THREAD LOCK "1342" to the bearing retainer screws and tighten them to the specified torque.

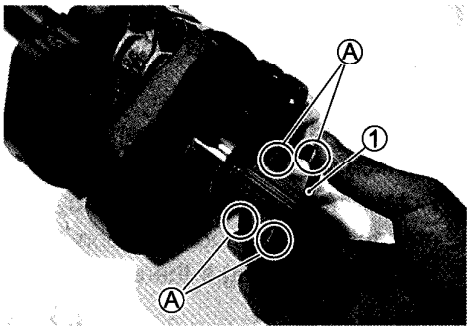
1342 99000-32050: THREAD LOCK "1342"
Bearing retainer screw: 8 N·m (0.8 kgf·m, 6.0 lb-ft)



CRANKSHAFT THRUST BEARING

INSPECTION

- Install the crankshaft into the left crankcase half and position the thrust shim ① on the crankshaft.
- Install the right crankcase half and tighten the crankcase bolts temporally.

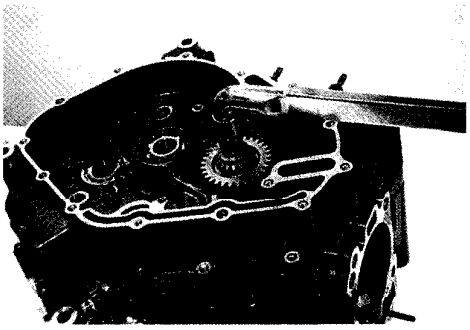


NOTE:

* *It is not necessary to apply SUZUKI BOND to the mating surface.*
* *The oil grooved face Ⓐof thrust shim ① is faced to crankshaft web side.*

- Install the generator rotor with the key and tighten its bolt temporally. (☞ 3-92)
- Install the cam chain drive sprocket, primary drive gear and the water pump drive gear on the right end of the crankshaft and tighten primary drive gear bolt to the specified torque. (☞ 3-93)

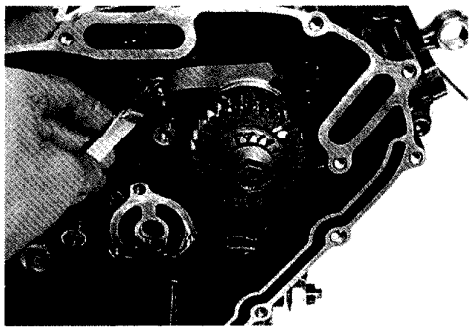
Primary drive gear bolt: 70 N·m (7.0 kgf·m, 50.5 lb-ft)



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

Crankshaft thrust clearance
Standard: 0.050 – 0.110 mm (0.0020 – 0.0043 in)

09900-20803: Thickness gauge

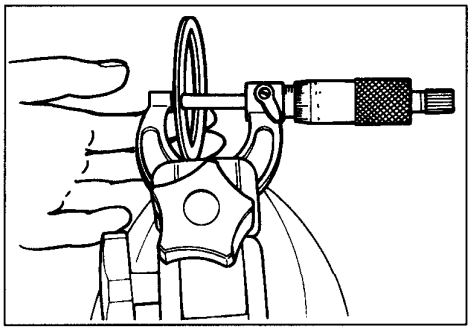


If the thrust clearance exceeds the standard range, adjust the thrust clearance by the following procedures.

REPLACEMENT

- 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 checking to make sure it is within standard.

09900-20205: Micrometer (0 – 25 mm)



Unit: mm (in)

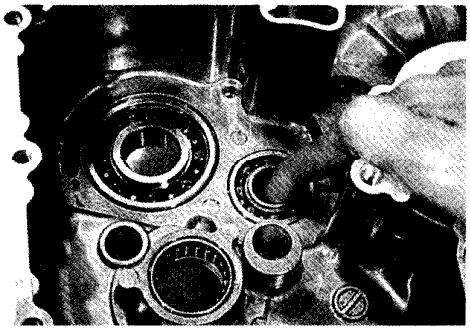
Part number	Thrust shim thickness
12228-19F00-0A0	1.925 – 1.950 (0.0758 – 0.0768)
12228-19F00-0B0	1.950 – 1.975 (0.0768 – 0.0778)
12228-19F00-0C0	1.975 – 2.000 (0.0778 – 0.0787)
12228-19F00-0D0	2.000 – 2.025 (0.0787 – 0.0797)
12228-19F00-0E0	2.025 – 2.050 (0.0797 – 0.0807)
12228-19F00-0F0	2.050 – 2.075 (0.0807 – 0.0817)
12228-19F00-0G0	2.075 – 2.100 (0.0817 – 0.0827)
12228-19F00-0H0	2.100 – 2.125 (0.0827 – 0.0837)
12228-19F00-0I0	2.125 – 2.150 (0.0837 – 0.0846)
12228-19F00-0J0	2.150 – 2.175 (0.0846 – 0.0856)

CRANKCASE

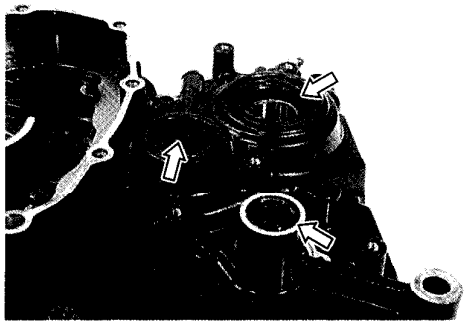
BEARING AND OIL SEAL

Inspection

- Inspect the play of the bearings by hand while they are in the crankcase.
- Rotate the bearing inner race by hand to inspect it for abnormal noise and smooth rotation.
- Replace a bearing if there is anything unusual.



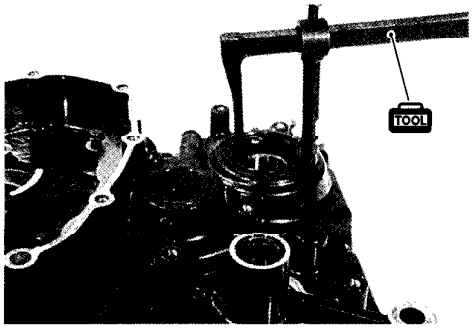
- Inspect the oil seal for any damage.



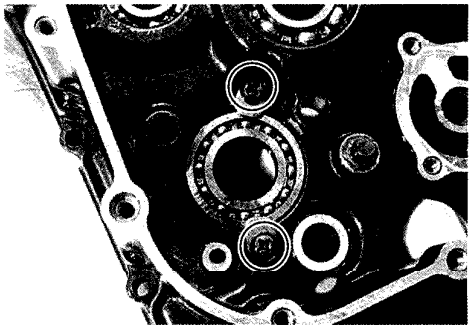
Removal

- Remove the oil seals using the special tool or a suitable bar.

TOOL 09913-50121: Oil seal remover



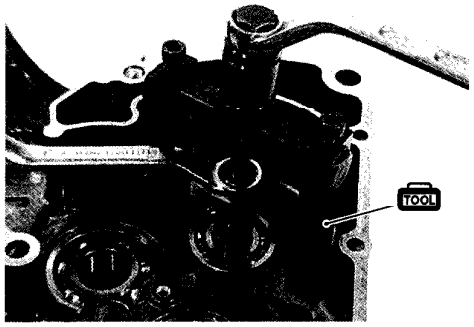
- Remove the bearing retainers.



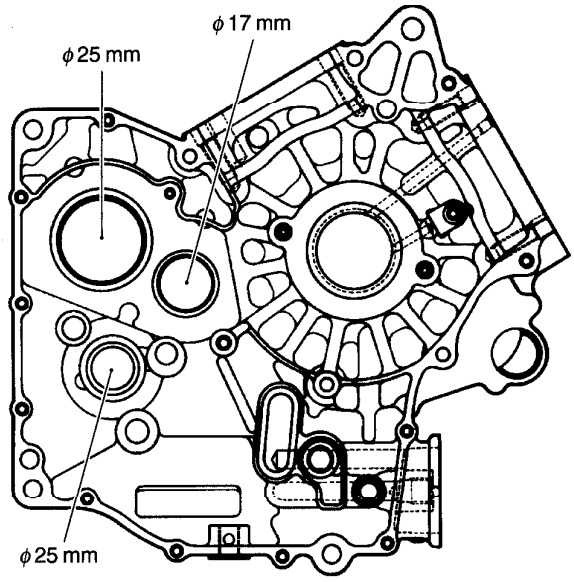
- Remove the crankcase bearings using the special tool.

TOOL 09921-20220: Bearing remover set

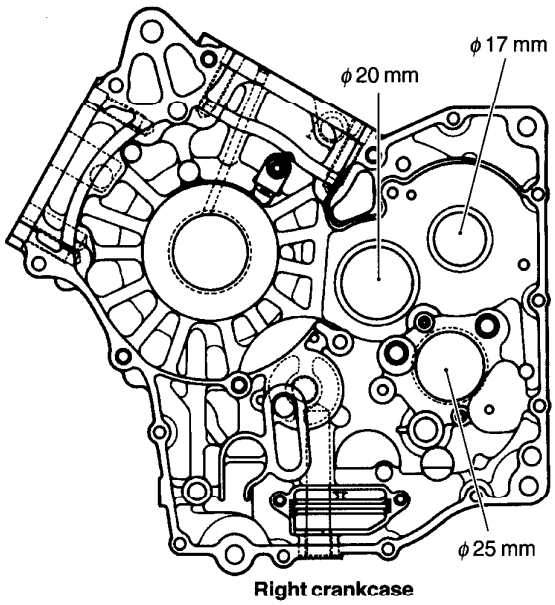
NOTE:
Select the suitable size attachment as following illustration.



Bearing remover attachment



Left crankcase

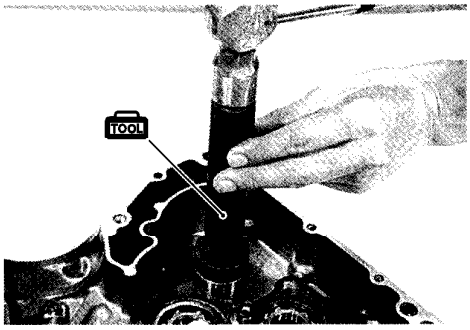


Right crankcase

Installation

- Install the crankcase bearings and the oil seals using the special tool.

TOOL 09913-70210: Bearing installer set

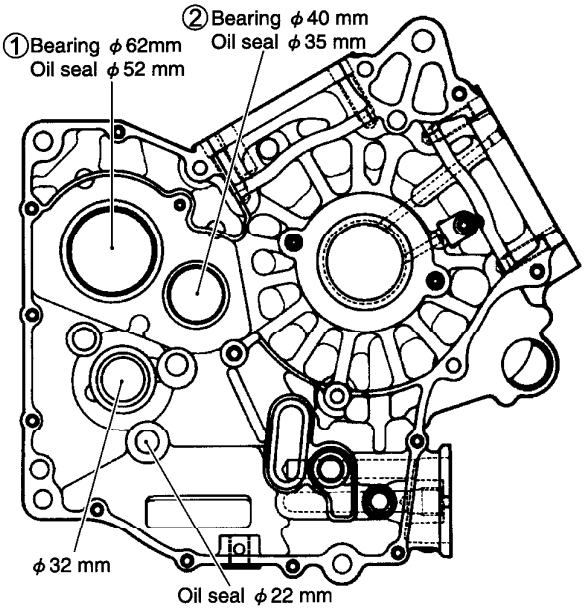


NOTE:

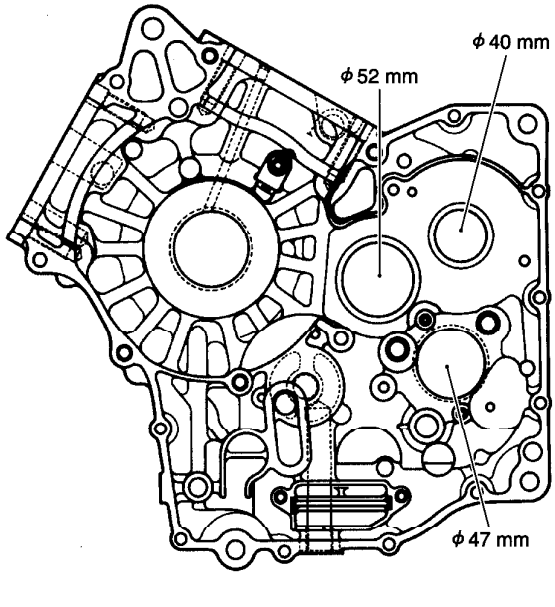
** Select the suitable size attachment as following illustration.*

** The sealed sides of the bearing ① and ② face outside.*

Bearing installer attachment



Left crankcase



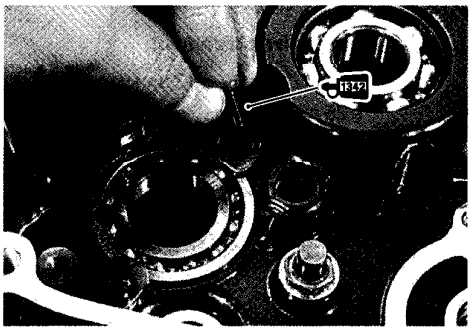
Right crankcase

- Install the bearing retainers.

NOTE:
Apply a small quantity of THREAD LOCK "1342" to the bearing retainer screws and tighten them to the specified torque.

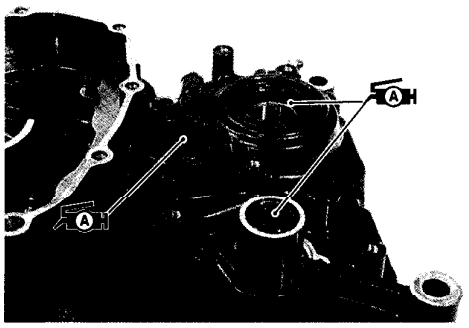
1342 99000-32050: THREAD LOCK "1342"

Bearing retainer screw: 8 N·m (0.8 kgf·m, 6.0 lb-ft)



- Apply grease to the oil seal lip.

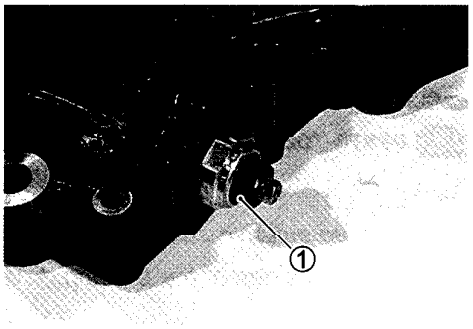
A 99000-25030: SUZUKI SUPER GREASE "A"



OIL PRESSURE SWITCH

Removal

- Remove the oil pressure switch ①.



Inspection

(☞ 7-40)

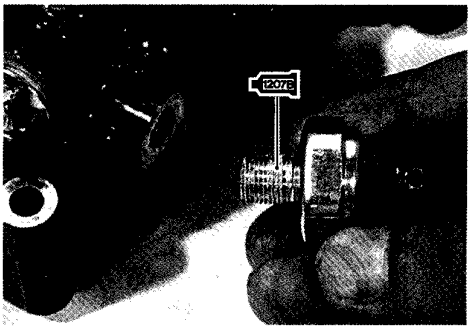
Installation

- 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"

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

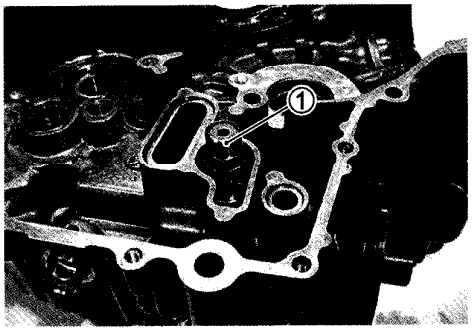
NOTE:
Be careful not to apply SUZUKI BOND "1207B" to the hole of the thread end.



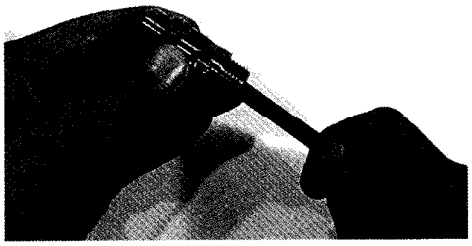
OIL PRESSURE REGULATOR

Inspection

- Remove the oil pressure regulator ①.

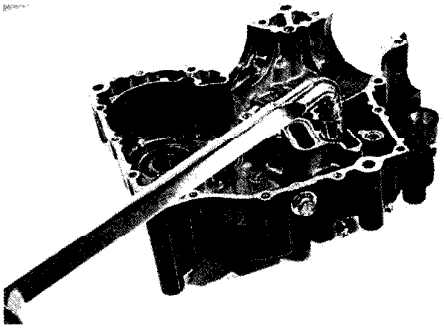


- Check the operation of the oil pressure regulator by pushing on the piston with a proper bar.
- If the piston does not operate, replace the oil pressure regulator with a new one.



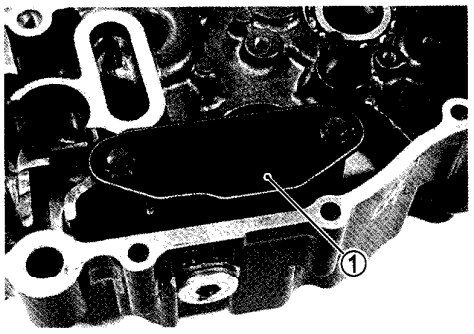
- Tighten the oil pressure regulator to the specified torque.

Oil pressure regulator: 27 N·m (2.7 kgf·m, 19.5 lb-ft)

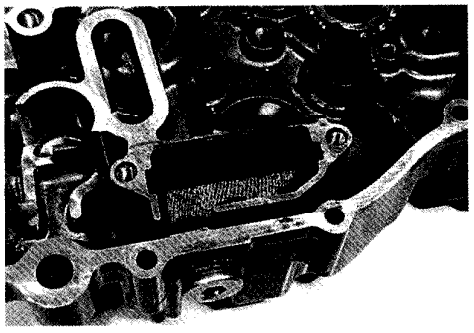


OIL STRAINER CLEANING

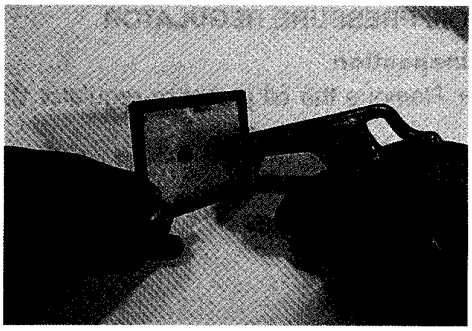
- Remove the oil strainer plate ①.



- Remove the oil strainer.

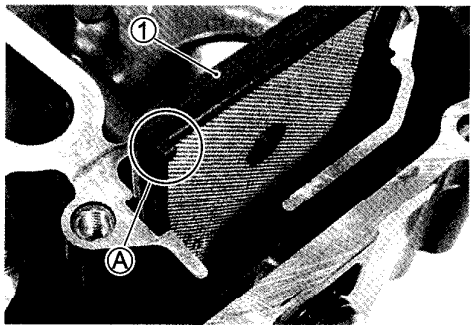


• Clean the oil strainer with a compressed air.



• Install the oil strainer ①.

NOTE:
The projection Ⓐ of the oil strainer ① faces to the bottom.

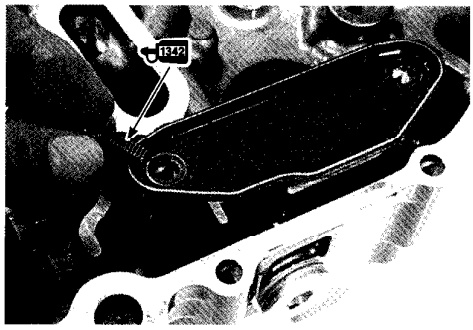


• Install the oil strainer plate.

NOTE:
Apply a small quantity of THREAD LOCK "1342" to the oil strainer plate screws and tighten them to the specified torque.

1342 99000-32050: THREAD LOCK "1342"

Oil strainer plate screw: 10 N·m (1.0 kgf·m, 7.0 lb-ft)

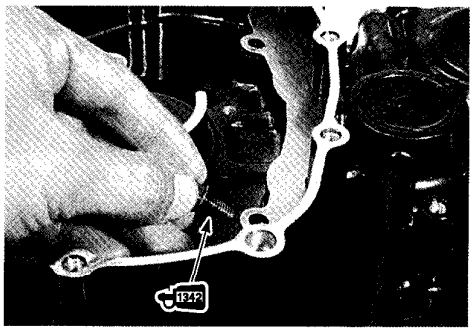


OIL PLATE

• When installing the oil plate, apply a small quantity of THREAD LOCK "1342" to its bolts and tighten them to the specified torque.

1342 99000-32050: THREAD LOCK "1342"

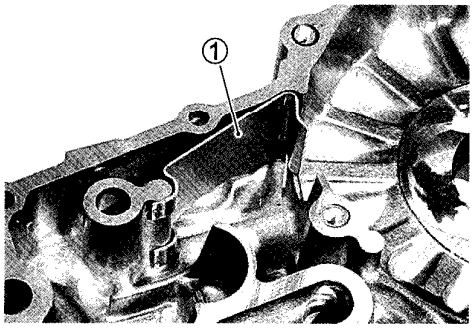
Oil plate bolt: 10 N·m (1.0 kgf·m, 7.0 lb-ft)



• Install the oil plate ① to the right crankcase half.

NOTE:
The oil plate ① has been installed to the fllowing engine.

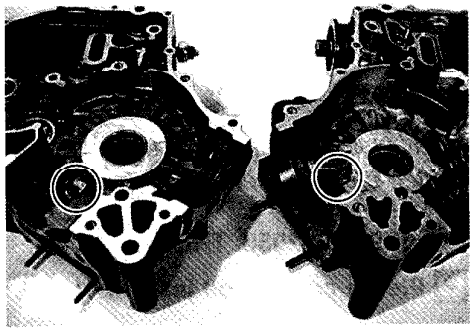
Engine serial number : From P503-102261
: From P505-100114

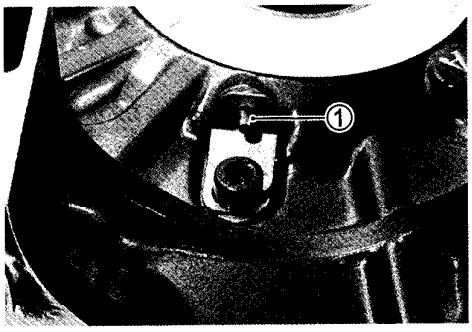


OIL JET

Removal

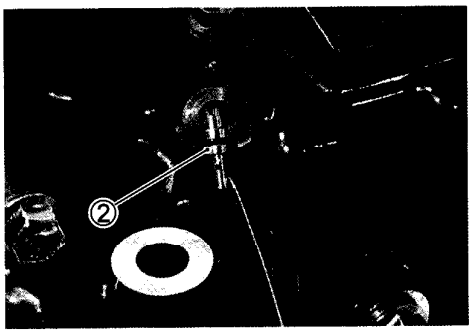
- Remove the piston cooling oil jets ① from left and right crankcase halves.





- Remove the oil jet ② from left crankcase half.

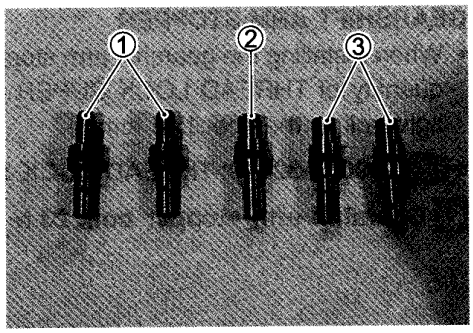
NOTE:
If it is difficult to remove the oil jet, use a sting.



Inspection and cleaning

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

① Piston cooling oil jet
② Oil jet (#14) (For transmission)
③ Oil jet (#14) (For each cylinder head)



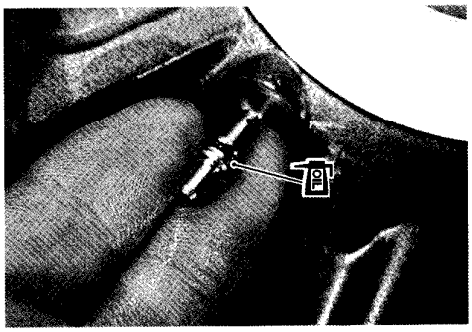
Installation

- Fit the new O-rings to each oil jets.

⚠ CAUTION

Use the new O-rings to prevent oil leakage.

NOTE:
Apply engine oil to the O-rings when installing the oil jets.

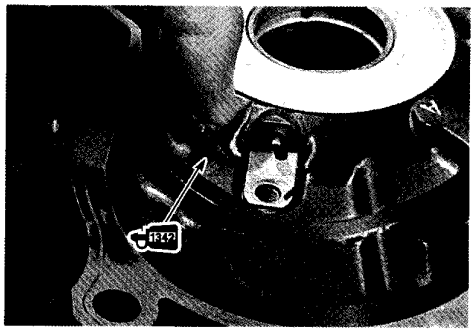


- Install the piston cooling oil jet to the left and right crankcase halves.

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

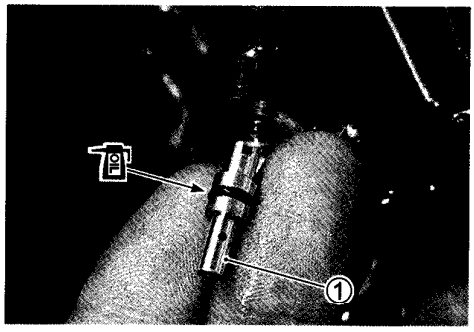
99000-32050: THREAD LOCK "1342"

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



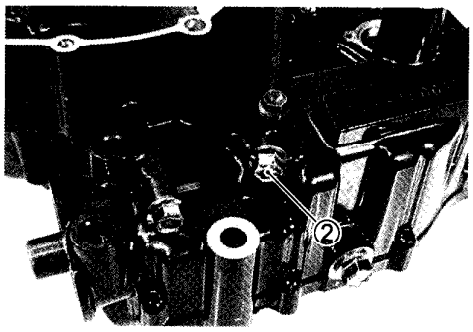
- Install the oil jet ① to the left crankcase half.

NOTE:
Install the oil jet into the oil hole fully.



- Tighten the oil gallery plug ② to the specified torque.

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

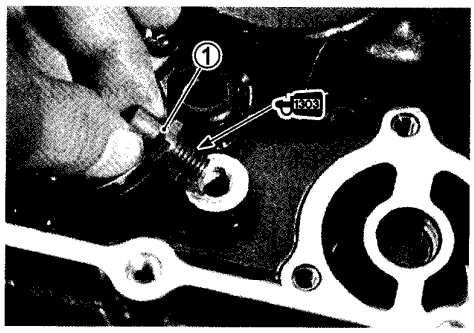


GEARSHIFT ARM STOPPER

- When installing the gearshift arm stopper bolt ①, apply a small quantity of THREAD LOCK SUPER "1303" to its thread and tighten it to the specified torque.

99000-32030: THREAD LOCK SUPER "1303"

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



CLUTCH

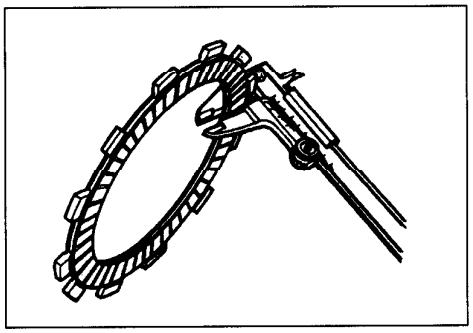
CLUTCH DRIVE PLATES

NOTE:
Wipe off engine oil from the clutch drive plates with a clean rag.

- Measure the thickness of drive plates with a vernier calipers.
- If each drive plate is not within the standard range, replace it with a new one.

DATA Drive plate thickness
Standard (No.1): 2.92 – 3.08 mm (0.115 – 0.121 in)
(No.2): 3.42 – 3.58 mm (0.135 – 0.141 in)

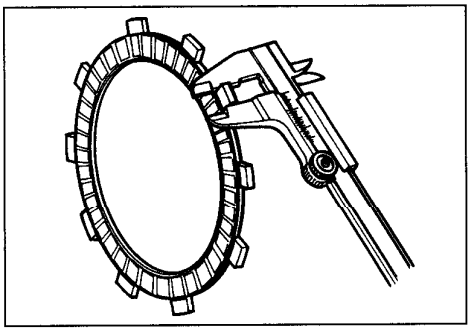
TOOL 09900-20102: Vernier calipers


Measuring thickness

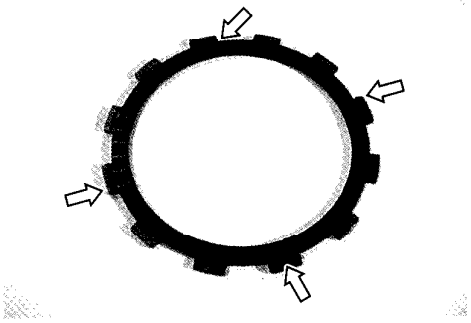
- Measure the claw width of drive plates with a vernier calipers.
- Replace the drive plates found to have worn down to the limit.

DATA Drive plate claw width (No.1 and No.2)
Service Limit: 15.1 mm (0.59 in)

TOOL 09900-20102: Vernier calipers


Measuring claw width

- Inspect the dampers of the No.2 clutch drive plate for any abnormality.



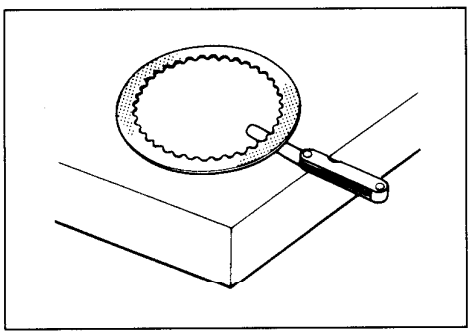
CLUTCH DRIVEN PLATES

NOTE:
Wipe off engine oil from the clutch driven plates with a clean rag.

- Measure each driven plate for distortion with a thickness gauge and surface plate.
- Replace driven plates which exceed the limit.

DATA Driven plate distortion (No.1 and No.2)
Service Limit: 0.10 mm (0.004 in)

TOOL 09900-20803: Thickness gauge


Measuring distortion

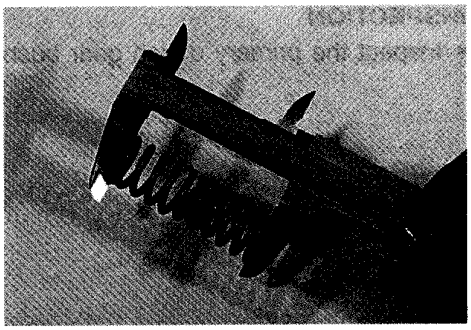
CLUTCH SPRING

Inspection

- Measure the free length of each coil spring with a vernier calipers, and compare the length with the specified limit.
- Replace all the springs if any spring is not within the limit.

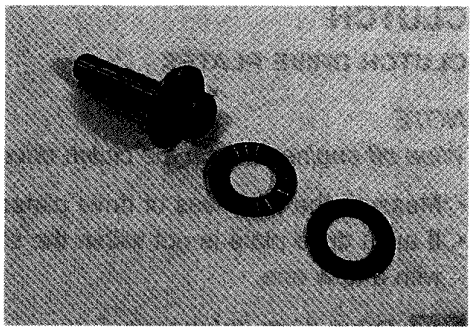
DATA Clutch spring free length
Service Limit: 56.0 mm (2.20 in)

TOOL 09900-20102: Vernier calipers



CLUTCH BEARING INSPECTION

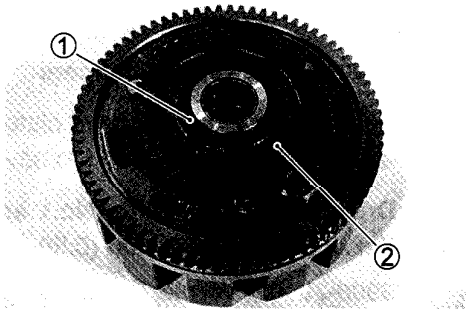
- Inspect the clutch release bearing for any abnormality, particularly cracks, to decide whether it can be reused or should be replaced.
- Smooth engagement and disengagement of the clutch depends on the condition of this bearing.



PRIMARY DRIVEN GEAR ASSEMBLY

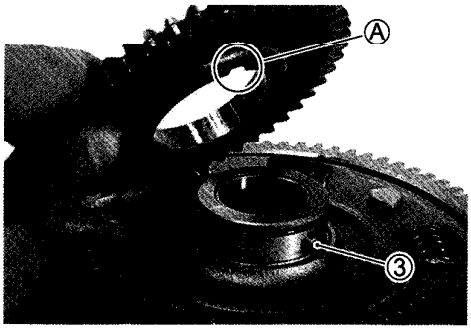
DISASSEMBLY

- Remove the circlip ①.
- Remove the oil pump drive gear ② and the pin ③.

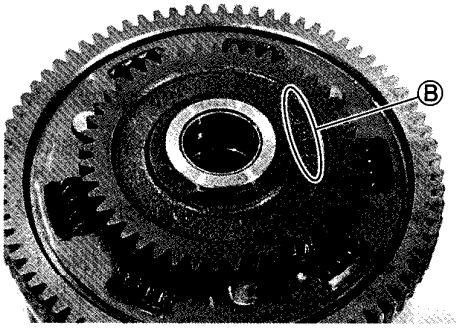


REASSEMBLY

- Install the pin ③.
- Align the oil pump drive gear slot Ⓐ with the pin ③.
- Face the letter Ⓑ of the oil pump drive gear to outside.

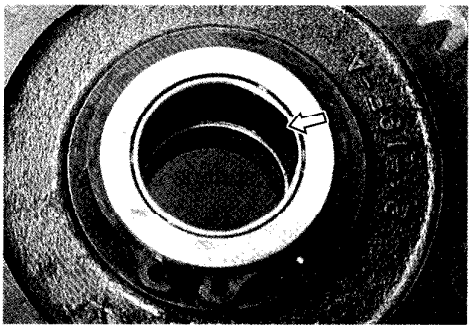


- Install the circlip.

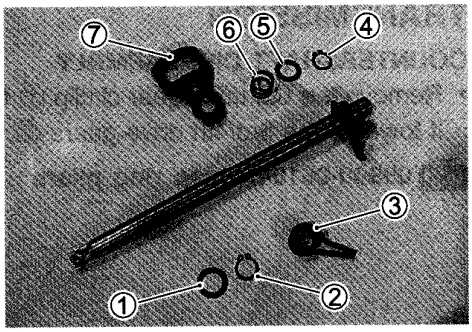


INSPECTION

- Inspect the primary driven gear bushing for any damage.



GEARSHIFT SHAFT/GEARSHIFT ARM



DISASSEMBLY

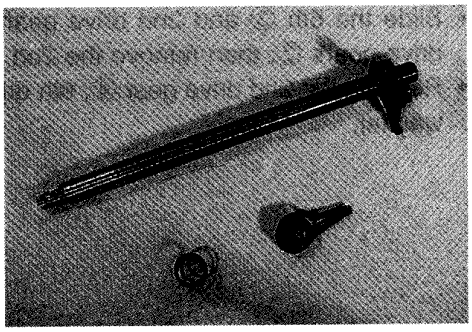
- Remove the following parts from the gearshift shaft/gearshift arm.

① Washer
② Circlip
③ Gearshift shaft return spring
④ Circlip
⑤ Washer
⑥ Plate return spring
⑦ Gearshift cam drive plate

09900-06107: Snap ring pliers

INSPECTION

- Check the gearshift shaft/gearshift arm for wear or bend.
- Check the return springs for damage or fatigue.

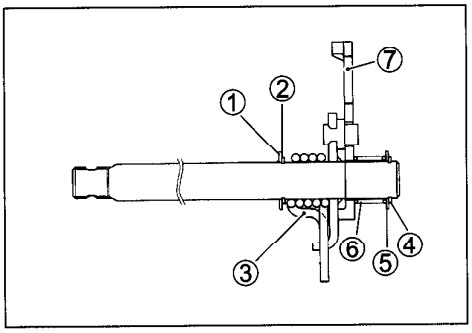


REASSEMBLY

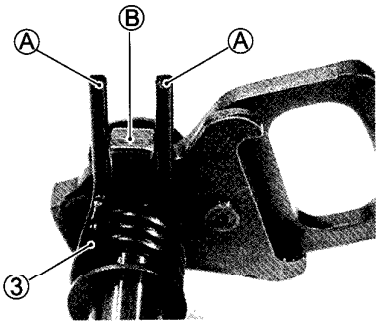
- Install the following parts to the gearshift shaft/gearshift arm as shown in the right illustration.

① Washer
② Circlip
③ Gearshift shaft return spring
④ Circlip
⑤ Washer
⑥ Plate return spring
⑦ Gearshift cam drive plate

09900-06107: Snap ring pliers



NOTE:
When installing the gearshift shaft return spring ③, position the stopper Ⓑ of the gearshift arm between the shaft return spring ends Ⓐ.

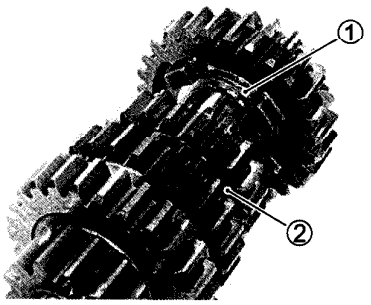


TRANSMISSION

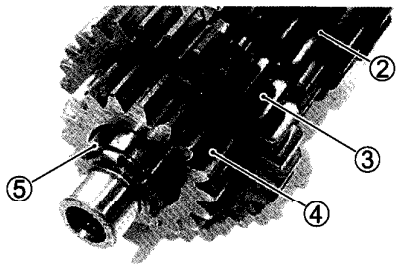
COUNTERSHAFT DISASSEMBLY

- Remove the 6th drive gear circlip ① from its groove and slide it towards the 3rd/4th drive gears ②.

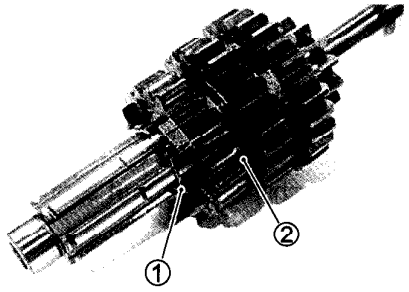
TOOL 09900-06104: Snap ring pliers



- Slide the 6th ③ and 2nd drive gears ④ toward the 3rd/4th drive gears ②, then remove the 2nd drive gear circlip ⑤.
- Remove the 2nd drive gear ④, 6th drive gear ③, bushing and washer.

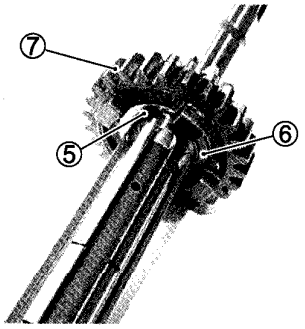


- Remove the circlip ① and 3rd/4th drive gears ②.

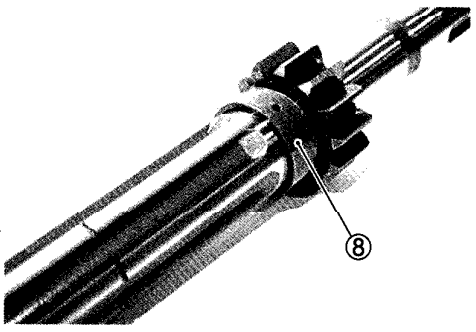


- Remove the circlip ⑤, washer ⑥ and 5th drive gear ⑦.

TOOL 09900-06104: Snap ring pliers

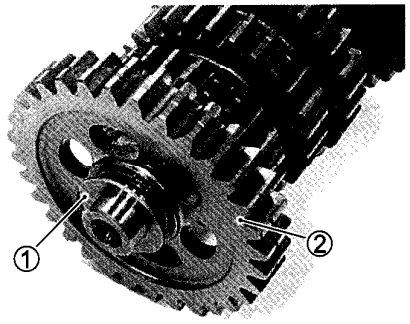


- Remove the 5th drive gear bushing ⑧.

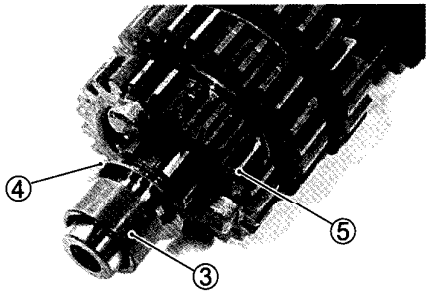


DRIVESHAFT DISASSEMBLY

- Remove the washer ① and 1st driven gear ②.

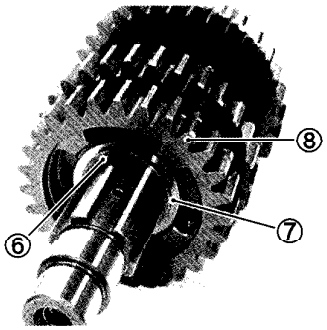


- Remove the 1st driven gear bushing ③, washer ④ and 5th driven gear ⑤.

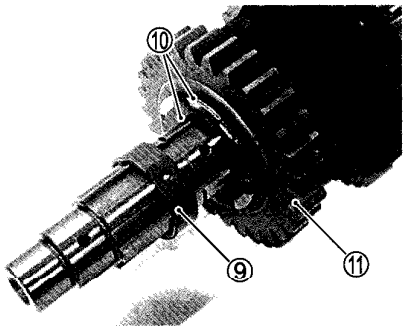


- Remove the circlip ⑥, washer ⑦ and 4th driven gear ⑧.

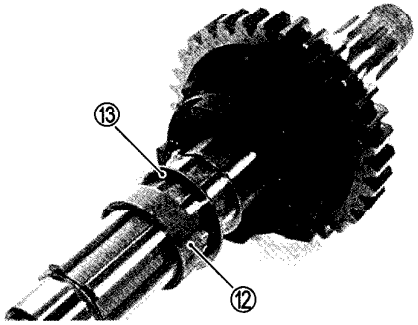
09900-06104: Snap ring pliers



- Remove the 4th driven gear bushing ⑨, lock washers ⑩ and 3rd driven gear ⑪.

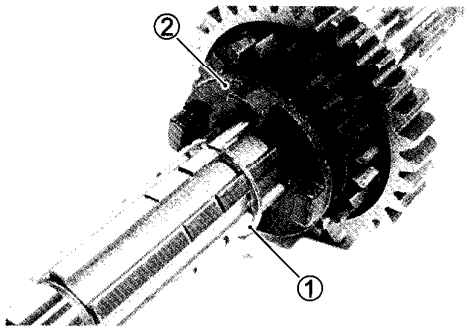


- Remove the 3rd driven gear bushing ⑫ and washer ⑬.



- Remove the circlip ① and 6th driven gear ②.

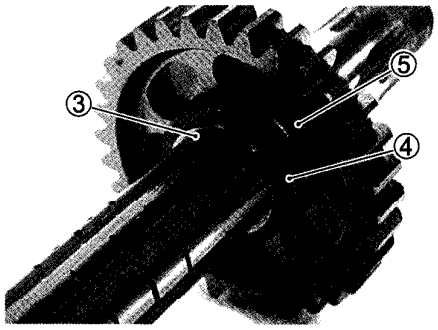
09900-06104: Snap ring pliers



- Remove the circlip ③ and 2nd driven gear bushing ④.

09900-06104: Snap ring pliers

- Remove the 2nd driven gear ⑤.



REASSEMBLY

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

NOTE:

* *Rotate the bushings by hand to inspect for smooth rotation. Replace the bushings if there is anything unusual.*
* *Before installing the gears, lightly coat moly paste or engine oil to the driveshaft and countershaft.*
* *Before installing the O-ring, apply grease to it.*

99000-25140: SUZUKI MOLY PASTE

99000-25030: SUZUKI SUPER GREASE "A"

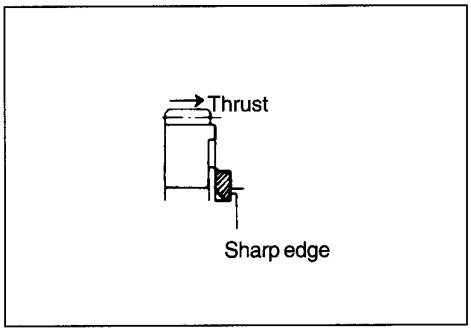
⚠ CAUTION

*** 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:

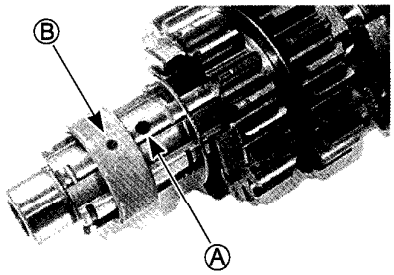
When reassembling the transmission, attention must be given to the locations and positions of washers and circlips. The cross sectional view shows the correct position of the gears, bushings, washers and circlips. (☞ 3-82)

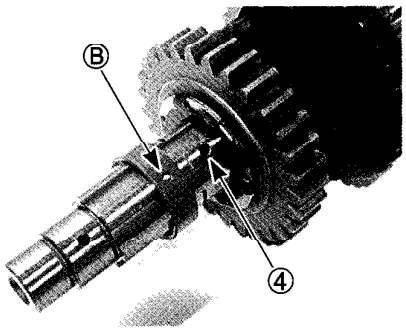
- When installing a new circlip, pay attention to the direction of the circlip. Fit it to the side where the thrust is as shown in the illustration.

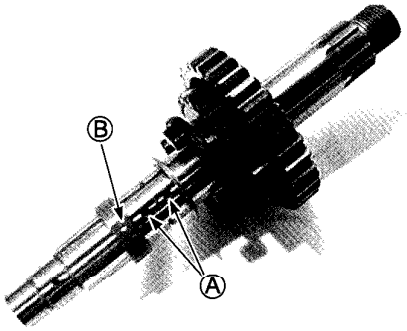


⚠ CAUTION

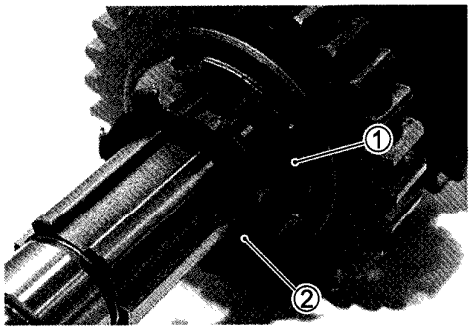
When installing the 6th drive gear, 3rd driven gear and 4th driven gear bushings onto the shaft, align the shaft oil hole Ⓐ with the bushing oil hole Ⓑ.

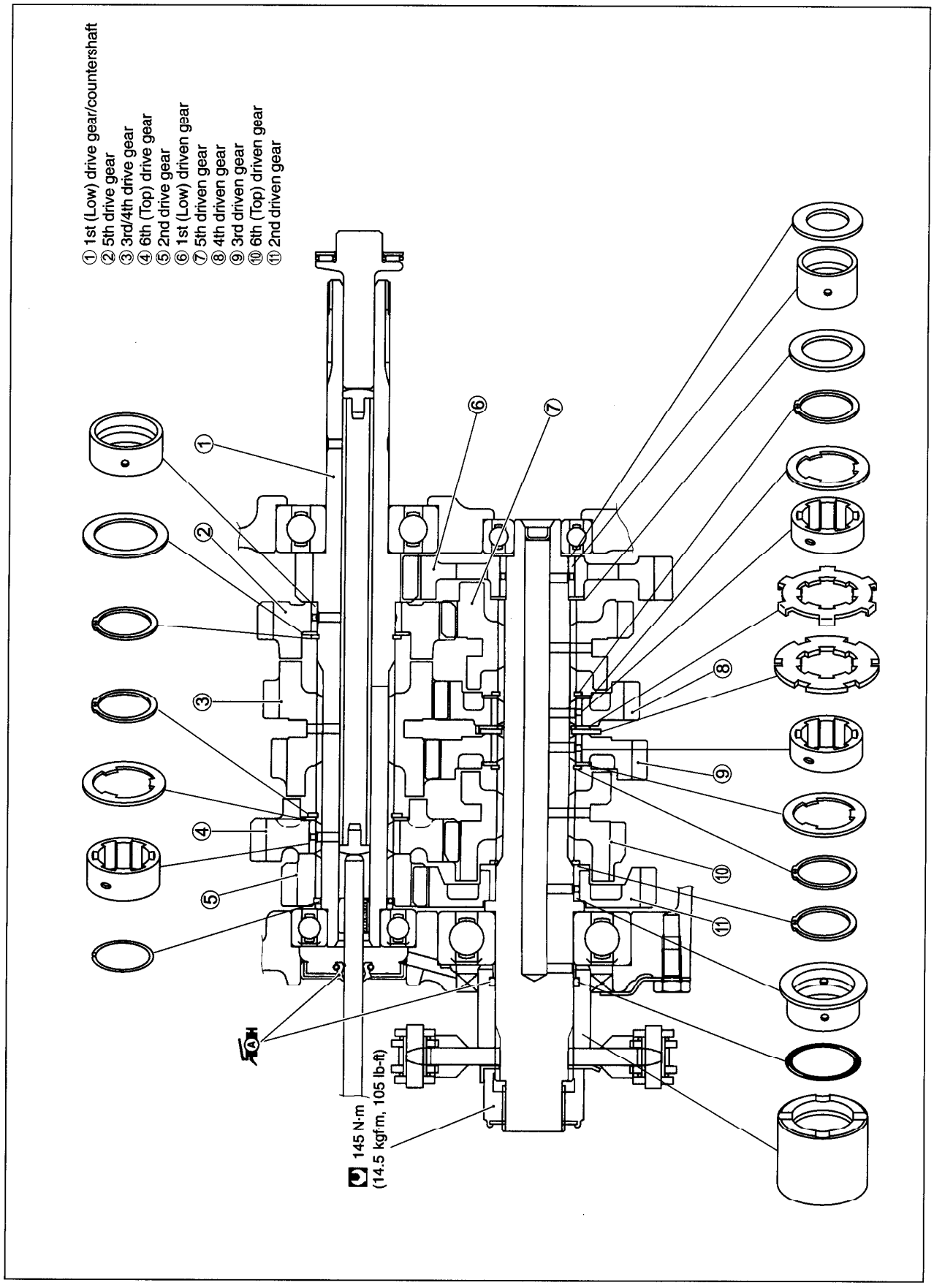






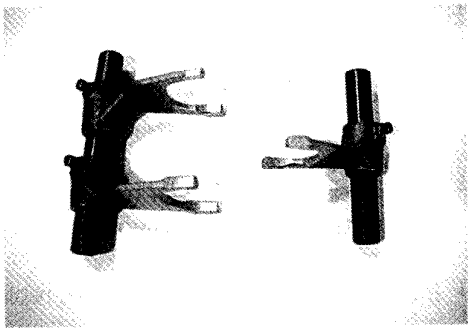
- After installing the 3rd driven gear onto the driveshaft, install lock washer #2 ① onto the driveshaft, and position it so it fits into the groove.
- Then, fit lock washer #1 ② into lock washer #2 ①.




① 1st (Low) drive gear/countershaft
② 5th drive gear
③ 3rd/4th drive gear
④ 6th (Top) drive gear
⑤ 2nd drive gear
⑥ 1st (Low) driven gear
⑦ 5th driven gear
⑧ 4th driven gear
⑨ 3rd driven gear
⑩ 6th (Top) driven gear
⑪ 2nd driven gear
145 N·m
(14.5 kgf·m, 105 lb-ft)

GEARSHIFT FORK TO GROOVE CLEARANCE

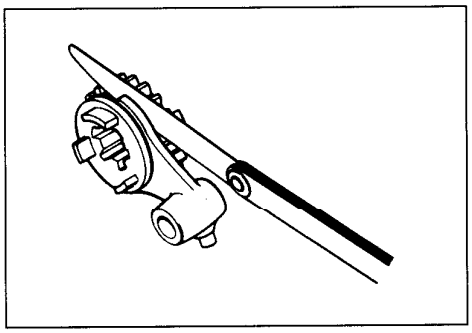
- Using a thickness gauge, check the gearshift fork clearance in the groove of its gear.
- The clearance for each gearshift fork plays an important role in the smoothness and positiveness of the shifting action.



DATA Shift fork to groove clearance
Service Limit: 0.50 mm (0.020 in)

- If the clearance checked is noted to exceed the limit specified, replace the fork or its gear, or both.

TOOL 09900-20803: Thickness gauge
09900-20102: Vernier calipers



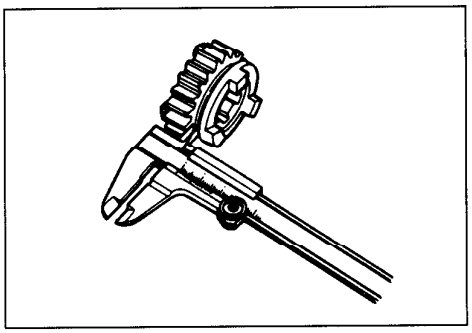
Checking clearance

GEARSHIFT FORK GROOVE WIDTH

- Measure the gearshift fork groove width using the vernier calipers.

DATA Shift fork groove width
Standard: 5.5 – 5.6 mm (0.217 – 0.220 in)

TOOL 09900-20102: Vernier calipers



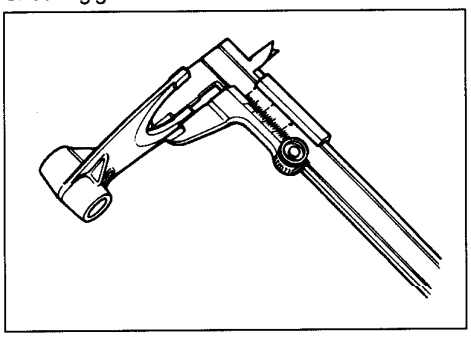
Checking groove width

GEARSHIFT FORK THICKNESS

- Measure the gearshift fork thickness using the vernier calipers.

DATA Shift fork thickness
Standard: 5.3 – 5.4 mm (0.209 – 0.213 in)

TOOL 09900-20102: Vernier calipers

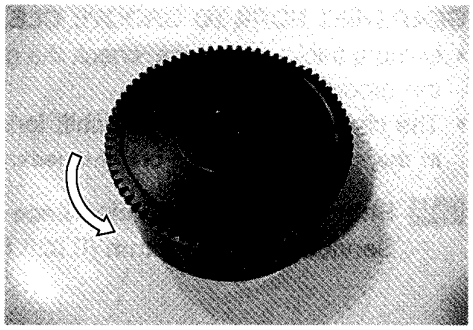


Checking thickness

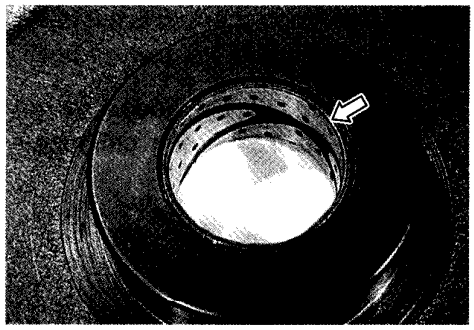
STARTER CLUTCH

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 in one direction only. If a large resistance is felt for rotation, inspect the starter clutch or the starter clutch contacting surface on the starter driven gear for wear and damage.
- If they are found to be damaged, replace them with new ones.



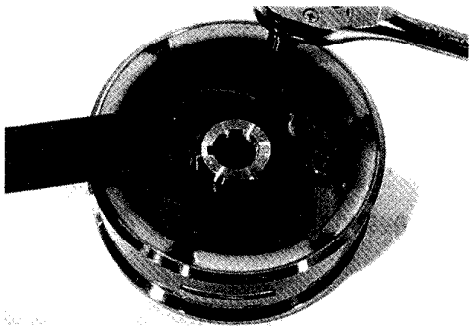
- Inspect the starter driven gear bearing for any damage.



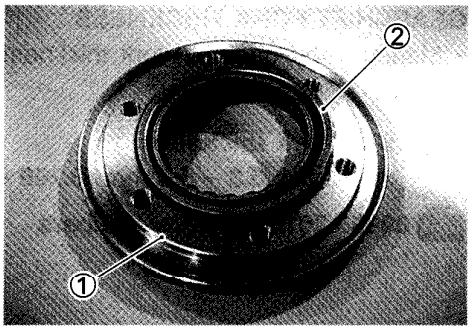
DISASSEMBLY

- Hold the generator rotor using the special tool and remove the starter clutch bolts.

09930-44530: Rotor holder

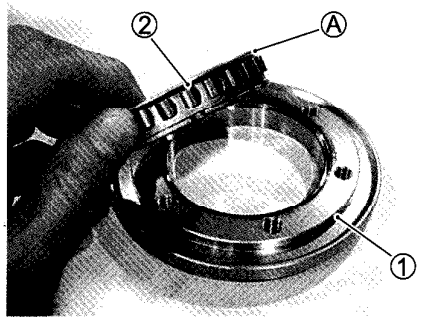


- Remove the one way clutch ② from the guide ①.

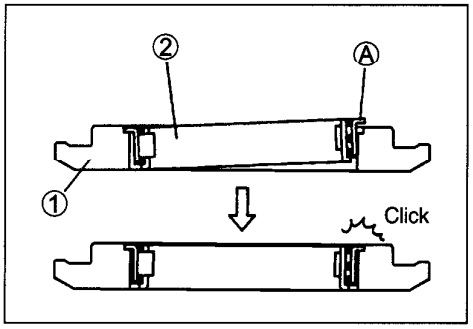


REASSEMBLY

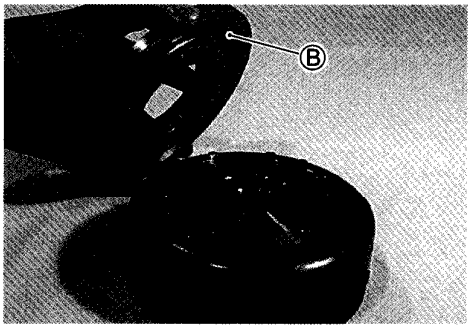
- When fitting the one way clutch ② to the guide ①, position flange side Ⓐ of one way clutch to the rotor side.



- Be sure to seat the flange Ⓐ of the one way clutch ② to the guide ①.



- Face the groove Ⓑ of the one way clutch guide to the generator rotor.

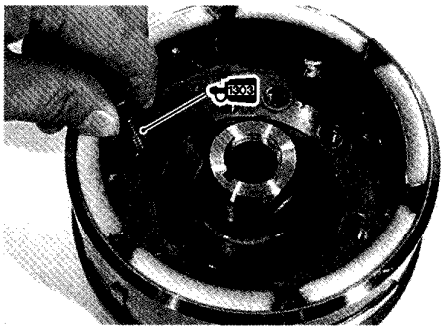


- Apply THREAD LOCK SUPER "1303" to the bolts and tighten them to the specified torque.

1303 99000-32030: THREAD LOCK SUPER "1303"

Starter clutch bolt: 25 N·m (2.5 kgf·m, 18.0 lb-ft)

- Apply engine oil to the one way clutch.



GENERATOR AND SIGNAL GENERATOR

INSPECTION

- Refer to the pages 7-10, 7-11 and 7-27 for generator and signal generator inspection.

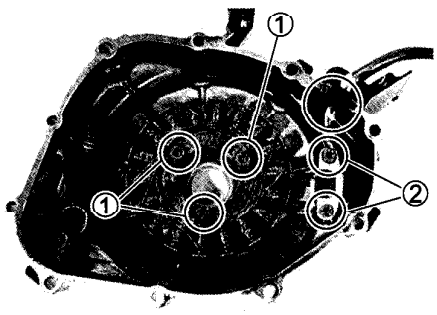
REASSEMBLY

- When installing the generator starter set bolts ① and the signal generator set bolts ②, apply THREAD LOCK "1342" to their thread and tighten them to the specified torque.

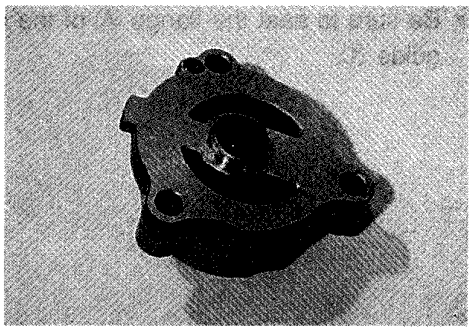
1342 99000-32050: THREAD LOCK "1342"

Generator starter set bolt ①: 10 N·m (1.0 kgf·m, 7.0 lb-ft)
Signal generator set bolt ②: 5.5 N·m (0.55 kgf·m, 4.0 lb-ft)

NOTE:
Be sure to install the grommet to the generator cover.



OIL PUMP



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.**

ENGINE REASSEMBLY

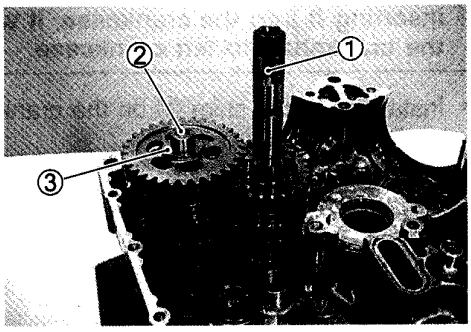
- Reassemble the engine in the reverse order of disassembly.
- The following steps require special attention or precautionary measures should be taken.

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

- Be sure to install the following items to the crankcase.
  * Crankshaft journal bearing (☞ 3-61)
  * Crankcase bearing (☞ 3-68)
  * Bearing retainer (☞ 3-68)
  * Oil seal (☞ 3-68)
  * Oil pressure switch (☞ 3-70)
  * Oil pressure regulator (☞ 3-71)
  * Oil strainer (☞ 3-71)
  * Oil plate (☞ 3-72)
  * Oil jet (☞ 3-73)
  * Gearshift arm stopper (☞ 3-74)
  * Oil gallery plug (☞ 3-74)
  * Oil drain bolt (☞ 2-13)

TRANSMISSION

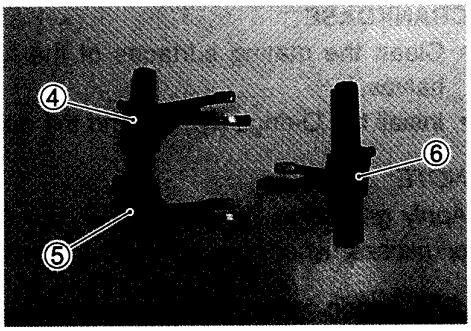
- Install the countershaft assembly ① and the driveshaft assembly ② to the left crankcase half.
- Install the washer ③ onto the driveshaft assembly ②.

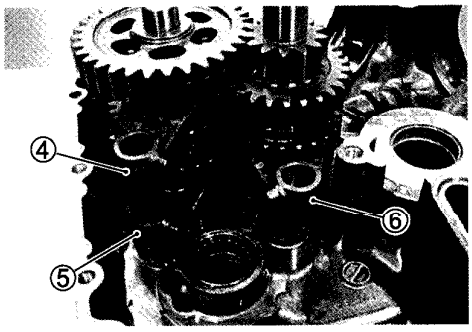


GEARSHIFT

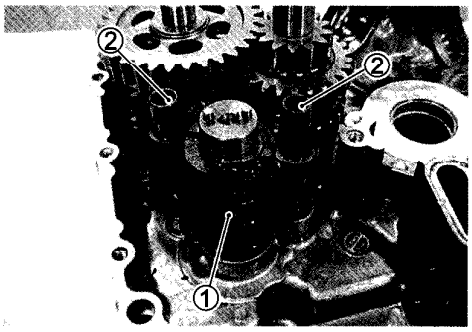
- Install the gearshift fork (④, ⑤ and ⑥).

④ For 5th driven gear
⑤ For 6th driven gear
⑥ For 3rd/4th drive gear





- Install the gearshift cam ① and the gearshift fork shafts ②.



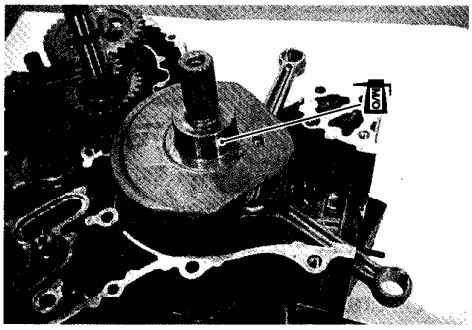
CRANKSHAFT

- Install the crankshaft into the left crankcase half.

NOTE:

* *Coat lightly engine oil and moly paste to the crankshaft journal bearings and the thrust shim.*
* *Refer to page 3-60 for the conrod installation.*

99000-25140: SUZUKI MOLY PASTE



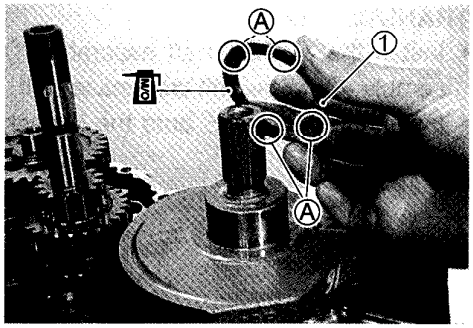
⚠ CAUTION

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 thrust shim ① on the crankshaft.

NOTE:

* *The grooved face Ⓐ of thrust shim ① faces to crankshaft web side.*
* *The thrust shim is selected according to the crankshaft thrust clearance. (☞ 3-67)*



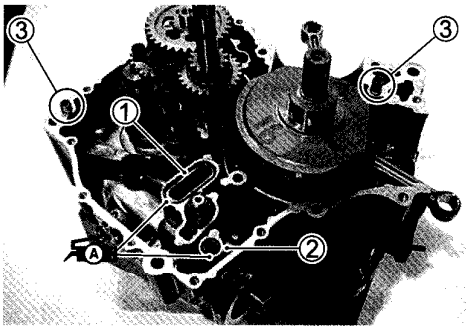
CRANKCASE

- Clean the mating surfaces of the left and right crankcase halves.
- Install the O-rings (①, ②) and the dowel pins ③.

NOTE:

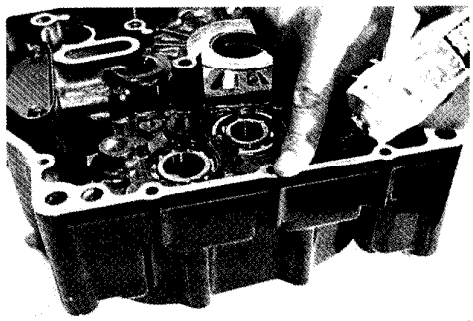
Apply grease to the O-rings (①, ②) to prevent dropping into crankcase, when assembling the crankcase.

99000-25030: SUZUKI SUPER GREASE "A"



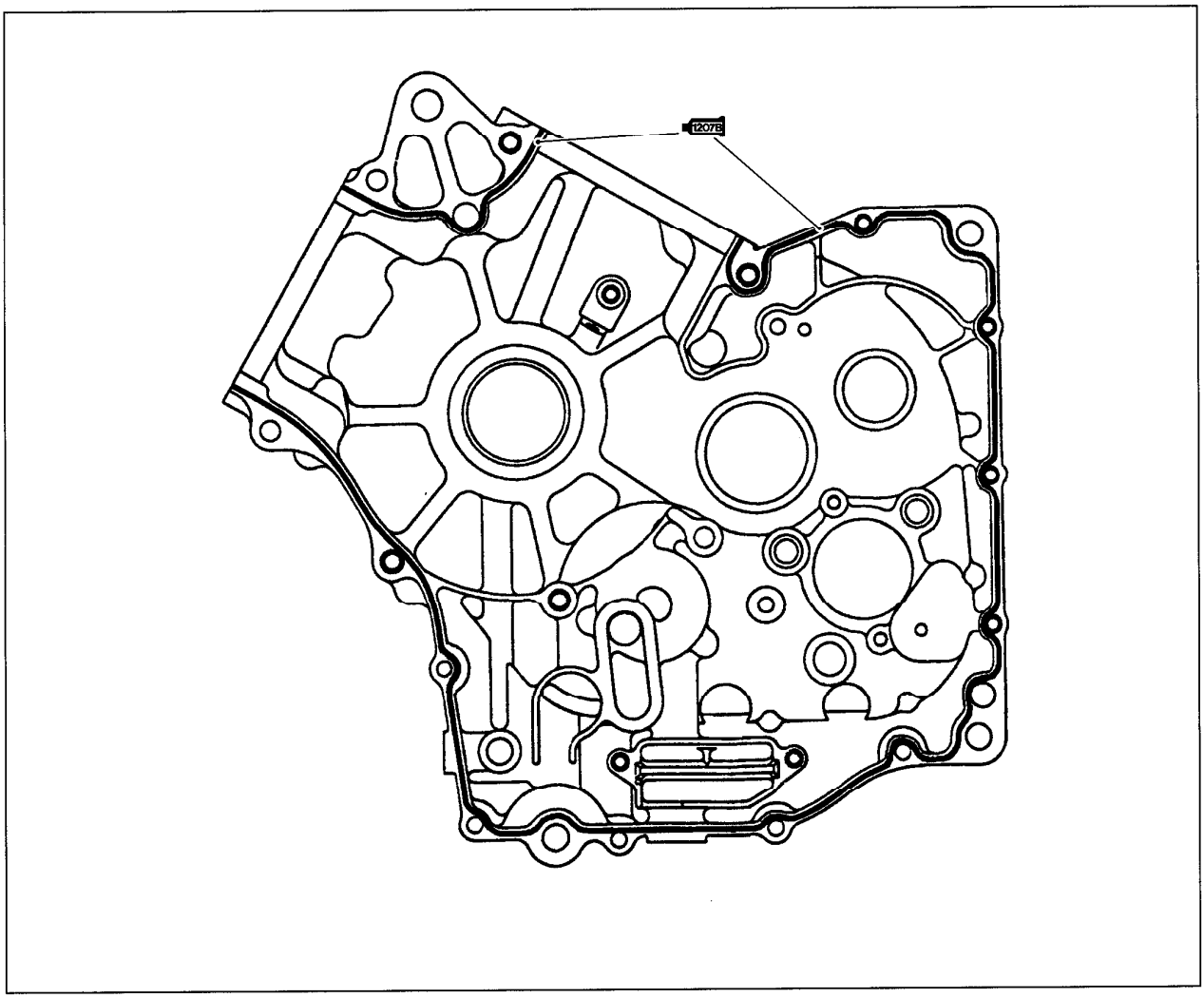
- Apply SUZUKI BOND "1207B" to the mating surface of the left crankcase.

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

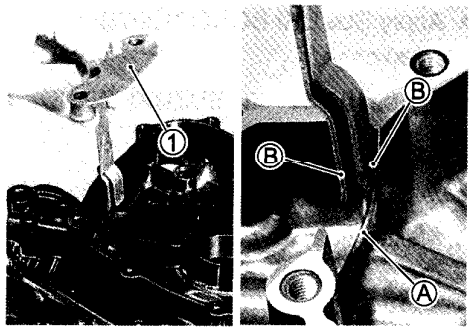


NOTE:
Use of SUZUKI BOND "1207B" is as follows:

* *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 installing the oil plate ① , put the right crankcase rib Ⓐ between to the oil plate ends Ⓑ securely.

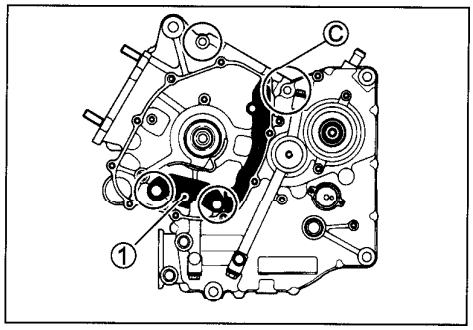


NOTE:
The oil plate ① has been inrtalled until the following engine.

Engine serial number : Until P503-102260
Until P505-100113

- 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.

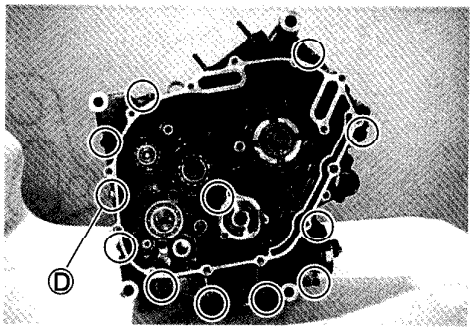
Crankcase bolt: (M8) 26 N·m (2.6 kgf·m, 19.0 lb-ft)
(M6) 11 N·m (1.1 kgf·m, 8.0 lb-ft)



⚠ 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.*
* *Fit the clamp to the bolt Ⓒ as shown.*
* *Fit the plating bolt Ⓓ as shown.*



ENGINE SPROCKET SPACER

- Install the new O-ring into the engine sprocket spacer ①.

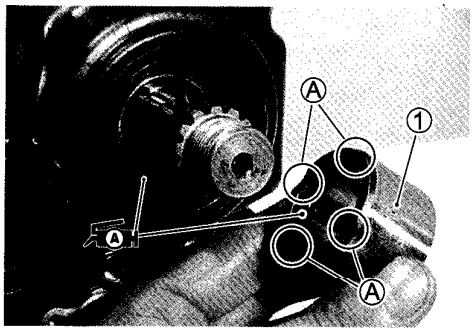
⚠ CAUTION

Use the new O-ring to prevent oil leakage.

- Install the engine sprocket spacer ①.

NOTE:
* *The grooved Ⓐ side of the engine sprocket spacer ① faces crankcase side.*
* *Apply grease to the oil seal lip and O-ring.*

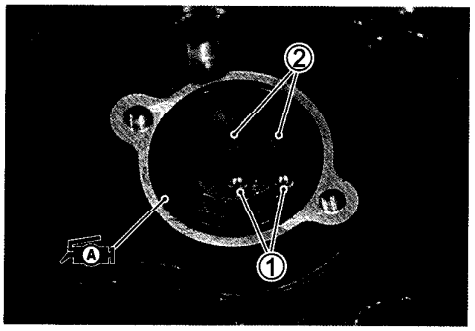
99000-25030: SUZUKI SUPER GREASE "A"



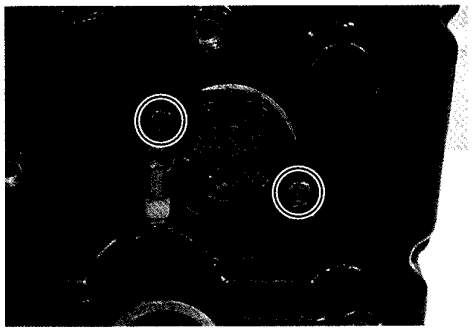
NEUTRAL INDICATOR LIGHT SWITCH

- Install the gear position switch contacts ① and the springs ②.
- Install the O-ring and apply grease to it.

99000-25030: SUZUKI SUPER GREASE "A"

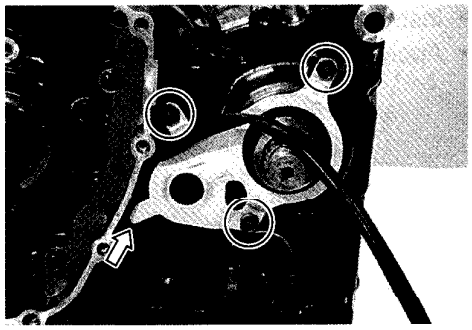


- Install the neutral indicator light switch as shown.



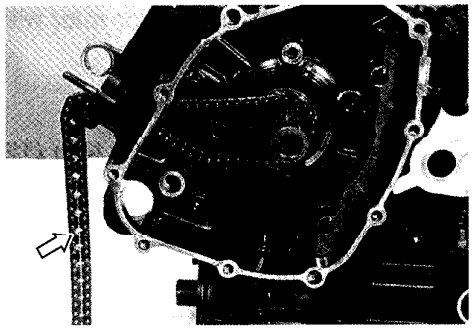
- Install the drive shaft oil seal retainer.

NOTE:
Pass through the neutral indicator light lead wire under the driveshaft oil seal retainer.



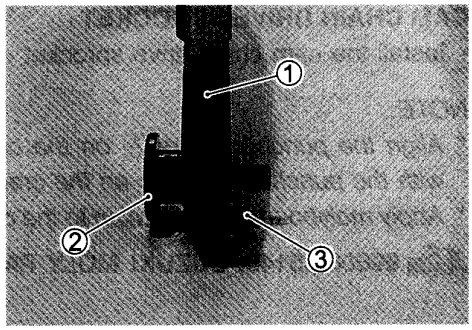
NO.1 (FRONT) CAM CHAIN

- Install the No.1 (Front) cam chain.

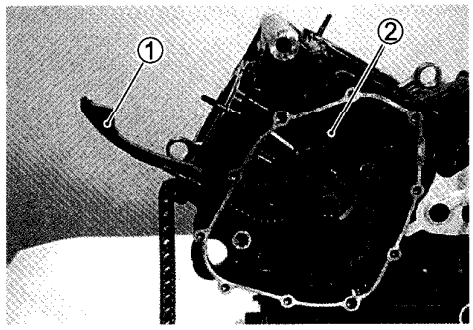


- Install the cam chain tensioner ①.
② Cam chain tensioner bolt
③ Washer
- Tighten the cam chain tensioner bolt ② to the specified torque.

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

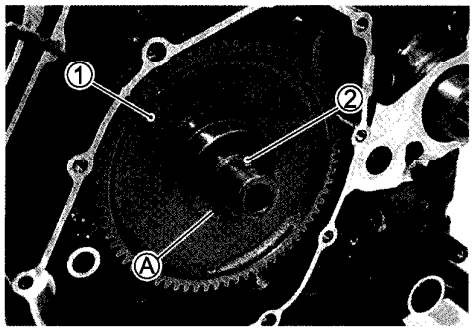


NOTE:
The front and rear cam chain tensioners are the same.

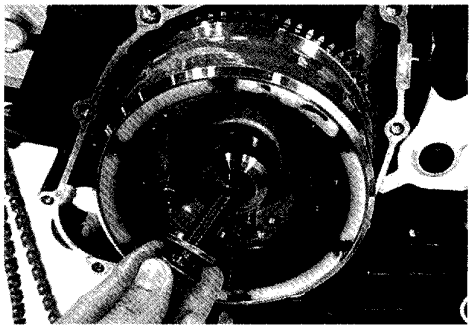


GENERATOR ROTOR

- 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 starter driven gear ①.
- Fit the key ② in the key slot on the crankshaft completely.



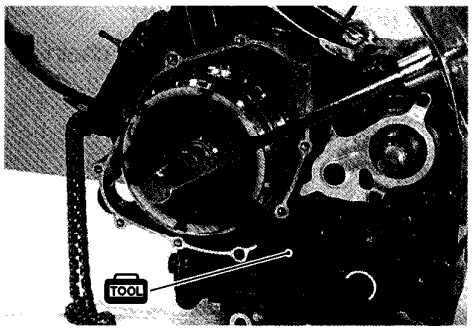
- Install the generator rotor assembly onto the crankshaft.
- Apply engine oil to the rotor bolt and install it with the washer.



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

09930-44530: Rotor holder

Generator rotor bolt: 120 N·m (12.0 kgf·m, 87 lb-ft)



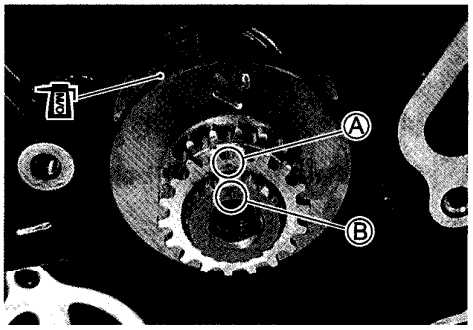
CAM CHAIN DRIVE SPROCKET

- Install the cam chain drive sprocket onto the crankshaft.

NOTE:

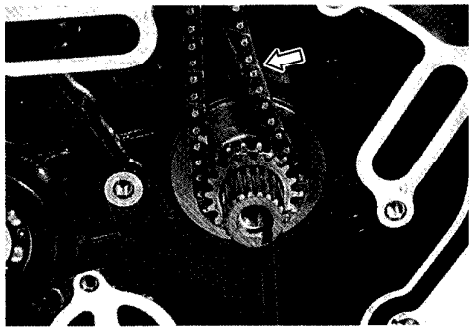
* *Align the punched mark Ⓐ on the cam chain drive sprocket with the punched mark Ⓑ on the crankshaft.*
* *Apply molybdenum oil solution to the cam chain drive sprocket.*

99000-25140: SUZUKI MOLY PASTE



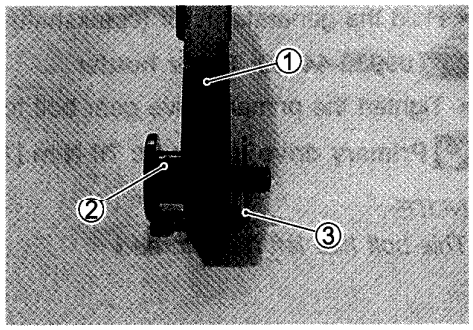
NO.2 (REAR) CAM CHAIN

- Install the No.2 (Rear) cam chain.

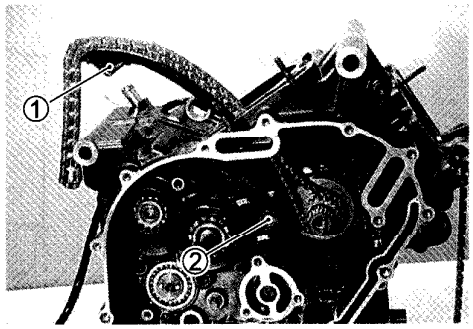


- Install the cam chain tensioner ①.
② Cam chain tensioner bolt
③ Washer
- Tighten the cam chain tensioner bolt ② to the specified torque.

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

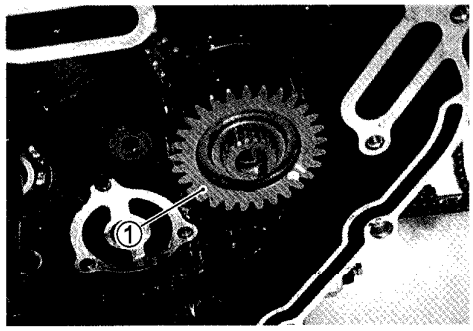


NOTE:
The front and rear cam chain tensioners are the same.



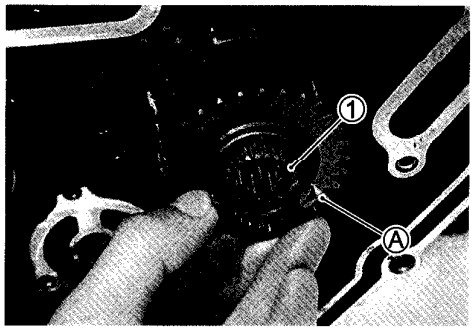
PRIMARY DRIVE GEAR

- Install the primary drive gear ①.



• Install the water pump drive gear ①.

NOTE:
The chamfer side Ⓐ of the water pump drive gear ① faces out.



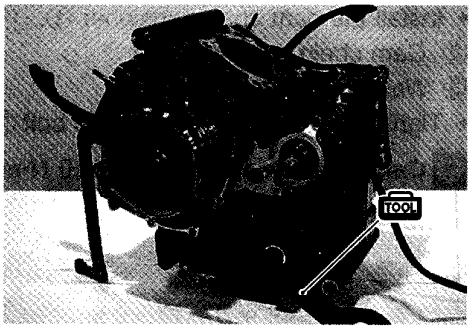
• Hold the generator rotor (crankshaft) with the special tool.

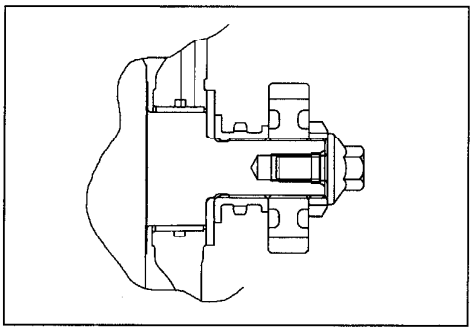
09930-44530: Rotor holder

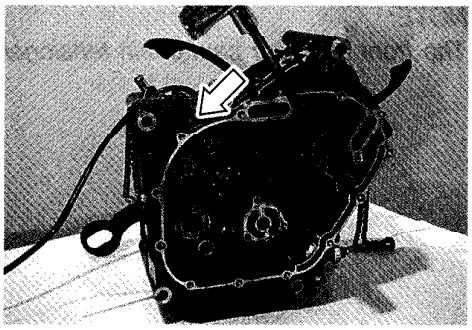
• Tighten the primary drive gear bolt to the specified torque.

Primary drive gear bolt: 70 N·m (7.0 kgf·m, 50.5 lb-ft)

NOTE:
This bolt has left-hand thread.



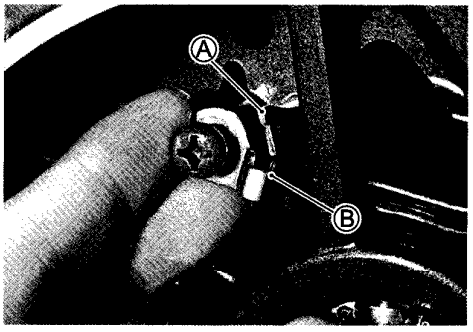




OIL PIPE

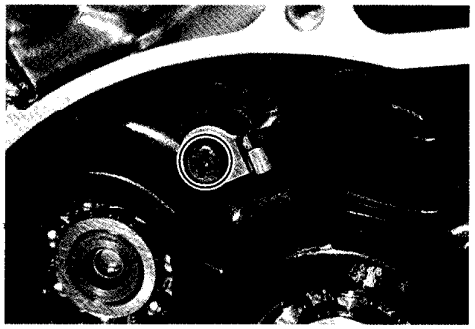
• Install the oil pipe.

NOTE:
Align the projection Ⓐ of the oil pipe with the groove Ⓑ of its stopper.



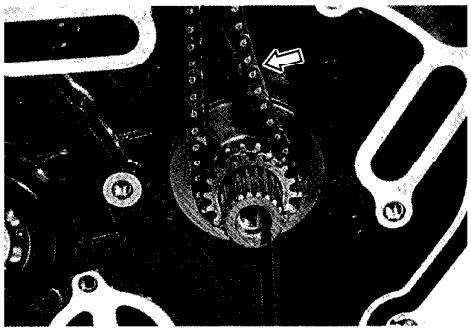
• Tighten the oil pipe stopper screw to the specified torque.

Oil pipe stopper screw: 8 N·m (0.8 kgf·m, 6.0 lb-ft)



NO.2 (REAR) CAM CHAIN

- Install the No.2 (Rear) cam chain.



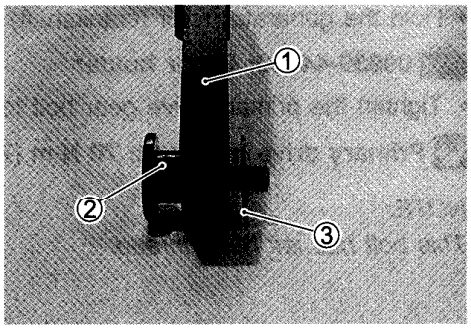
- Install the cam chain tensioner ①.

② Cam chain tensioner bolt

③ Washer

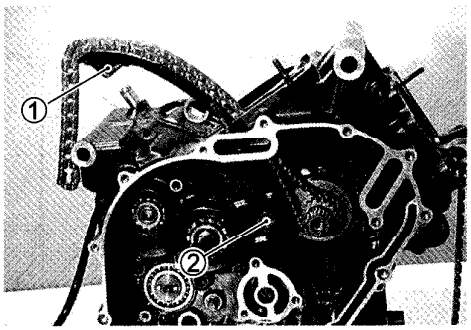
- Tighten the cam chain tensioner bolt ② to the specified torque.

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



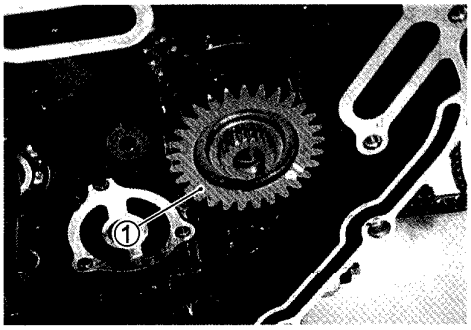
NOTE:

The front and rear cam chain tensioners are the same.



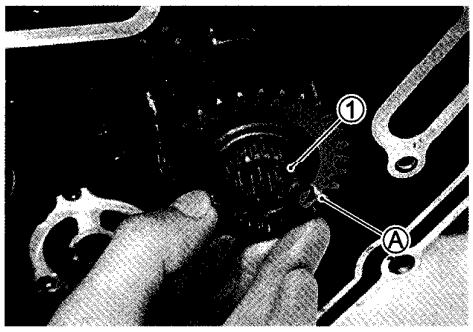
PRIMARY DRIVE GEAR

- Install the primary drive gear ①.



• Install the water pump drive gear ①.

NOTE:
The chamfer side Ⓐ of the water pump drive gear ① faces out.



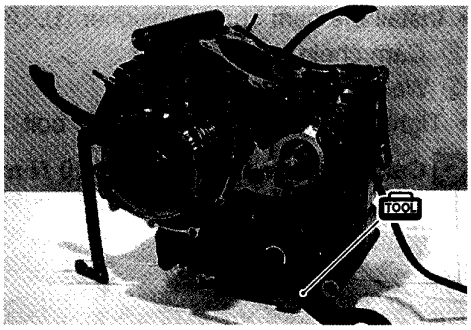
• Hold the generator rotor (crankshaft) with the special tool.

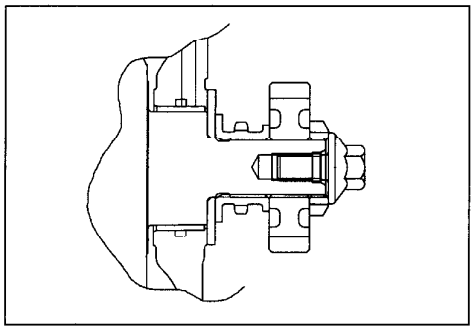
09930-44530: Rotor holder

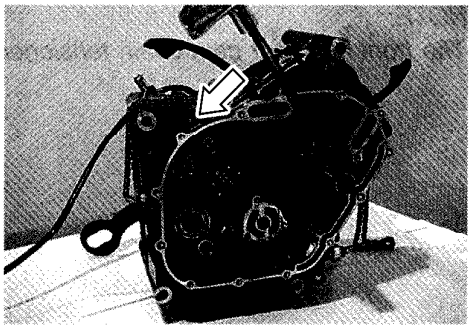
• Tighten the primary drive gear bolt to the specified torque.

Primary drive gear bolt: 70 N·m (7.0 kgf·m, 50.5 lb-ft)

NOTE:
This bolt has left-hand thread.



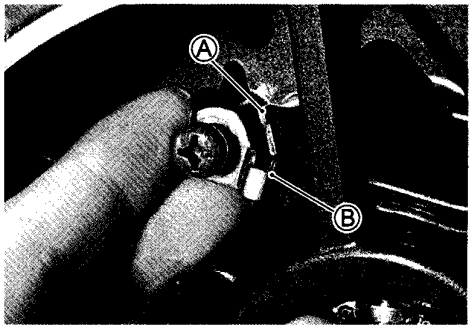




OIL PIPE

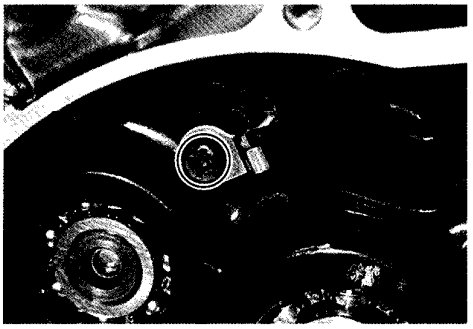
• Install the oil pipe.

NOTE:
Align the projection Ⓐ of the oil pipe with the groove Ⓑ of its stopper.



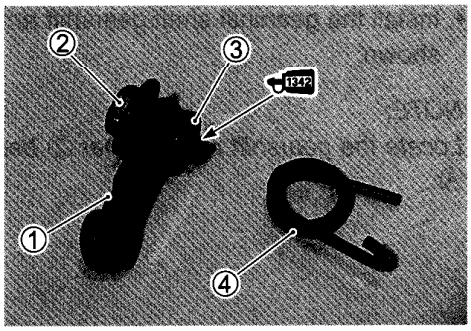
• Tighten the oil pipe stopper screw to the specified torque.

Oil pipe stopper screw: 8 N·m (0.8 kgf·m, 6.0 lb-ft)



GEARSHIFT SYSTEM

- Install the gearshift cam stopper ①, its bolt ②, the washer ③ and the return spring ④.



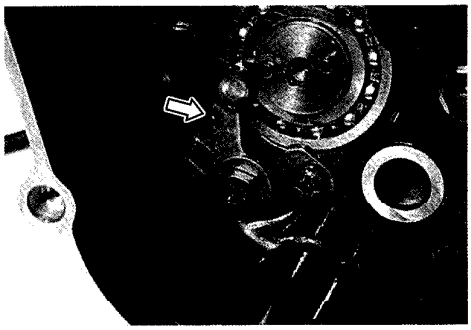
NOTE:
Apply a small quantity of THREAD LOCK "1342" to the gearshift cam stopper bolt ③ and tighten it to the specified torque.

1342 99000-32050: THREAD LOCK "1342"

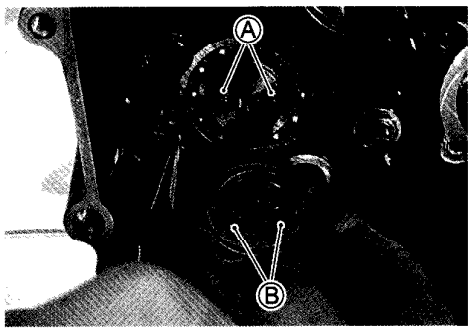
Gearshift cam stopper bolt: 10 N·m (1.0 kgf·m, 7.0 lb-ft)

NOTE:
Hook the return spring end to the stopper ①.

- Confirm the gearshift cam stopper movement.
- Check the neutral position.



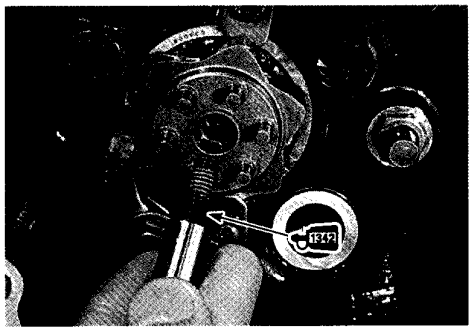
- Install the gearshift cam stopper plate after aligning the gearshift cam pins Ⓐ with the gearshift cam stopper plate holes Ⓑ.



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

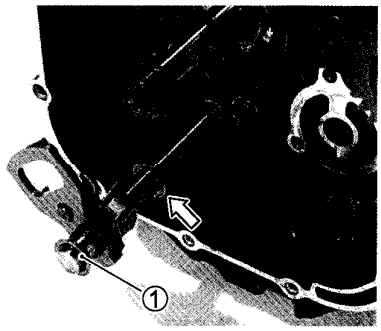
1342 99000-32050: THREAD LOCK "1342"

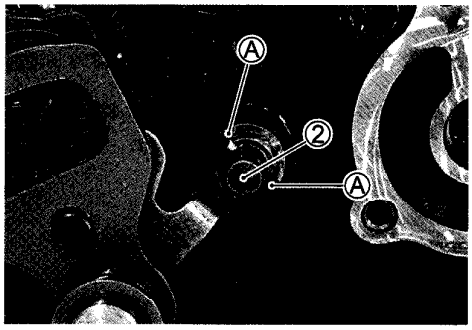
Gearshift cam stopper plate bolt: 10 N·m (1.0 kgf·m, 7.0 lb-ft)

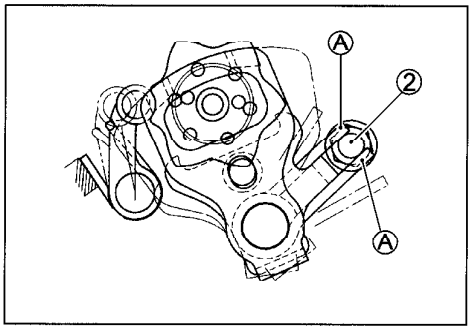


- Install the gearshift shaft/gearshift arm ① with the washers as shown.

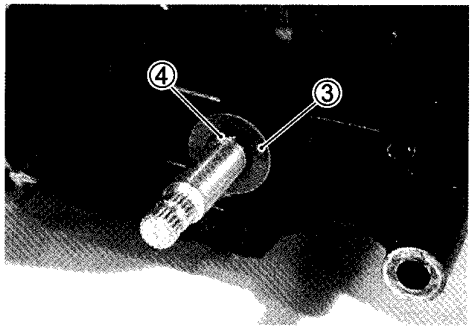
NOTE:
Locate the gearshift arm stopper ② between return spring ends Ⓐ.







- Install the washer ③ and the circlip ④.



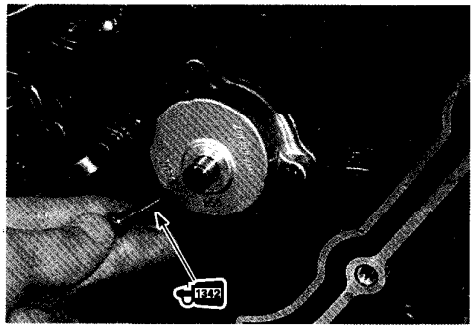
OIL PUMP

- Install the oil pump with the three screws and then tighten them to the specified torque.

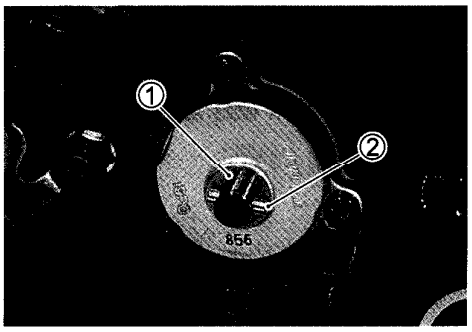
NOTE:
Apply a small quantity of THREAD LOCK "1342" to the screws.

1342 99000-32050: THREAD LOCK "1342"

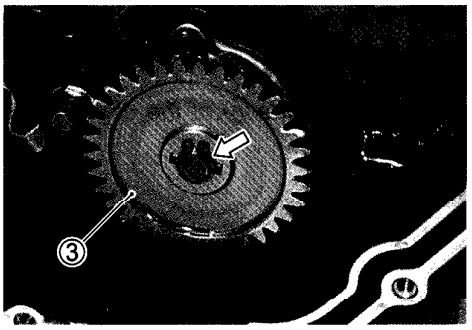
Oil pump mounting screws: 8 N·m (0.8 kgf·m, 6.0 lb-ft)



- Install the washer ① and the pin ②.

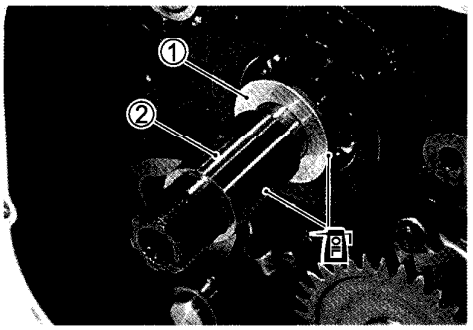


- Install the oil pump driven gear ③.
- Install the circlip.



CLUTCH

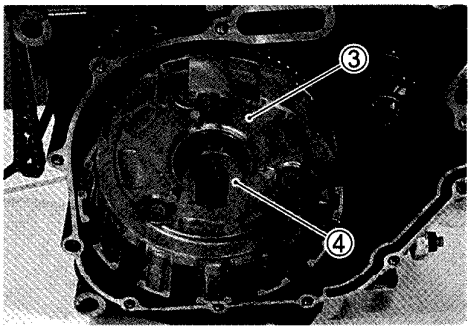
- Install the washer ① and spacer ② and apply engine oil to them.



- Install the primary driven gear assembly ③ onto the countershaft.

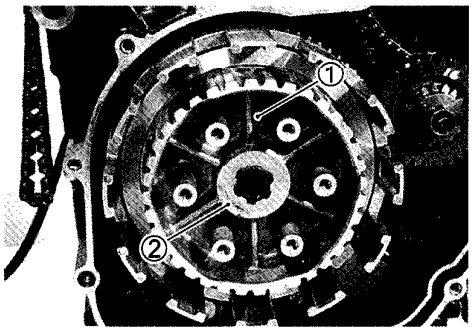
NOTE:
Be sure to engage the oil pump drive and driven gears, primary drive and driven gears.

- Install the thrust washer ④.



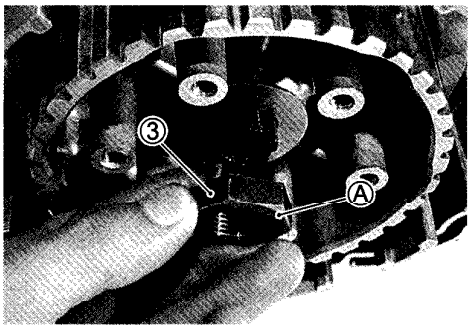
- Install the clutch sleeve hub ① and lock washer ②.

NOTE
Replace the lock washer ② with a new one.



- Install the clutch sleeve hub nut ③.

NOTE
The chamfer side Ⓐ of the clutch sleeve hub nut faces out.

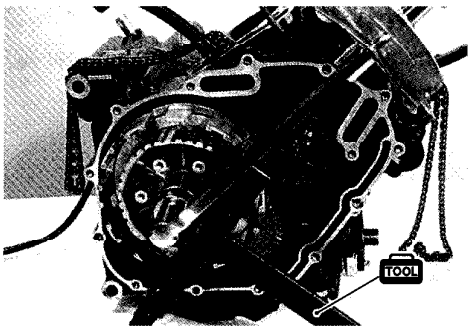


- Hold the clutch sleeve hub using the special tool.

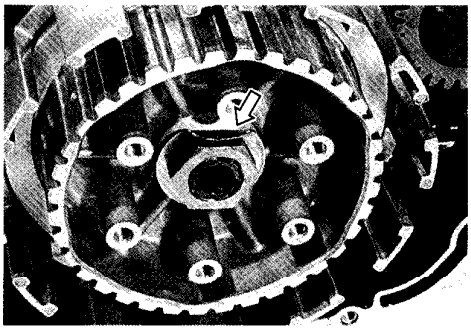
09920-53740: Clutch sleeve hub holder

- Tighten the clutch sleeve hub nut to the specified torque.

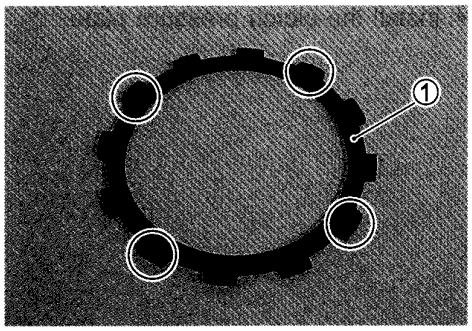
Clutch sleeve hub nut: 50 N·m (5.0 kgf·m, 36 lb-ft)



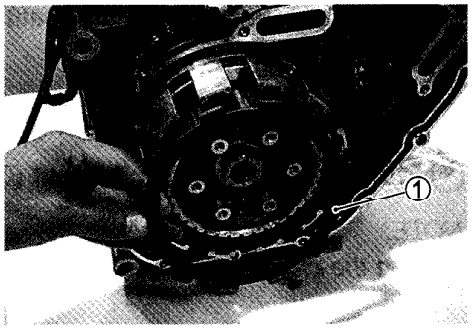
- Bend the lock washer to lock the nut.

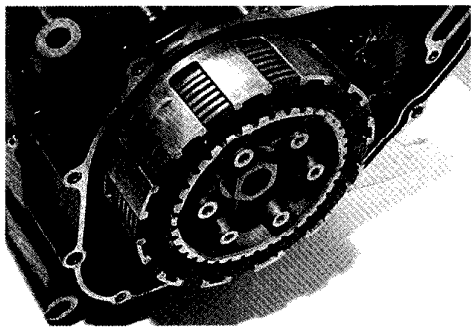


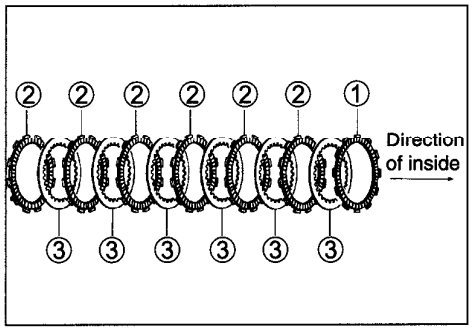
- Insert the clutch drive plates ①, ② and driven plates ③ one by one into the clutch sleeve hub in the prescribed order, No.2 drive plate ① being inserted first.



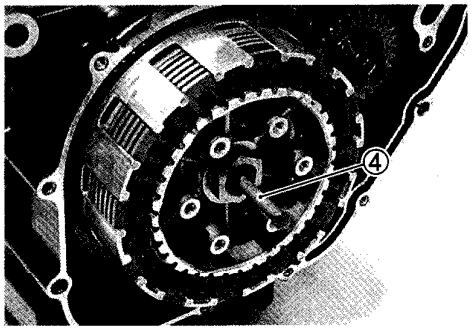
① No.2 Clutch drive plate (installed the dampers)
② No.1 clutch drive plate
③ Clutch driven plate (thickness: 1.6 mm)





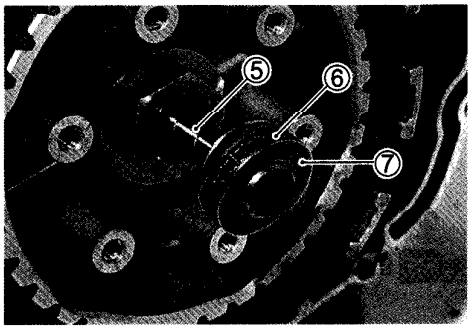


- Install the clutch push rod ④ into the countershaft.

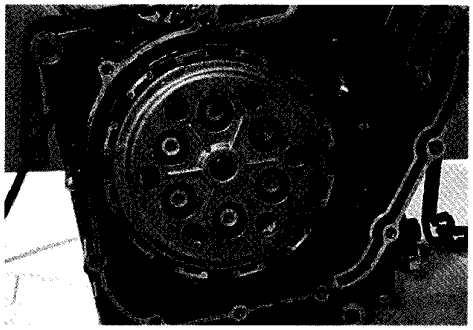


- Install the clutch push piece ⑤, the bearing ⑥ and the thrust washer ⑦ to the countershaft.

NOTE:
Thrust washer ⑦ is located between the pressure plate and the bearing ⑥.



- Install the clutch pressure plate.



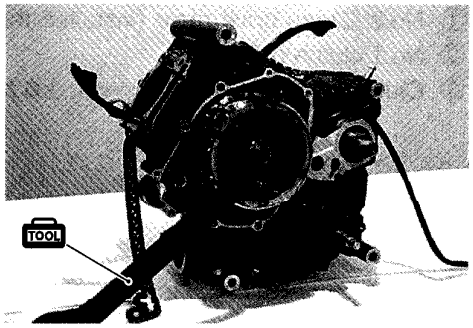
- Hold the generator rotor (crankshaft) using the special tool.

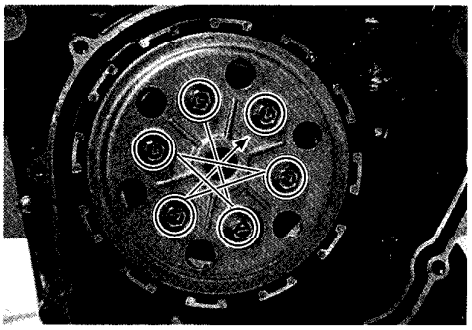
09930-44530: Rotor holder

- Tighten the clutch spring set bolts to the specified torque.

Clutch spring set bolt: 5.5 N·m (0.55 kgf·m, 4.0 lb-ft)

NOTE:
Tighten the clutch spring set bolt diagonally.



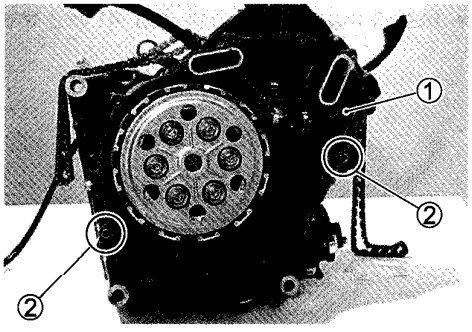


CLUTCH COVER

- Install the gasket ① and the dowel pins ②.

⚠ CAUTION

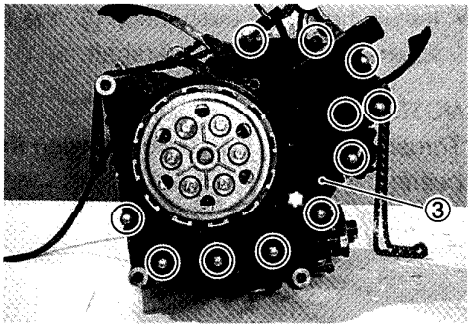
Use the new gasket to prevent oil leakage.



- Install the clutch inner cover ③ and tighten its bolts temporarily.

NOTE:
* *Be sure to install the water pump and its driven gear. (☞ 5-19)*
* *Apply THREAD LOCK "1342" to the clutch cover bolts.*

1342 99000-32050: THREAD LOCK "1342"



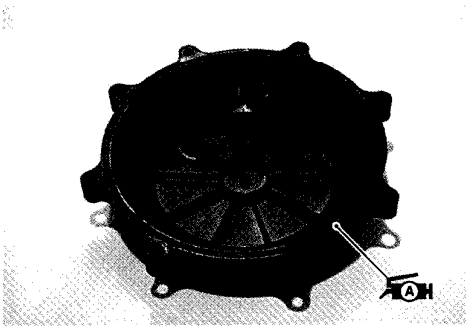
- Install the new O-ring onto the clutch outer cover.

⚠ CAUTION

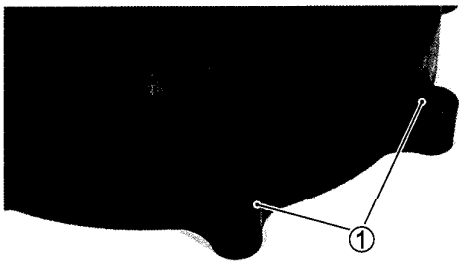
Use the new O-ring to prevent oil leakage.

- Apply grease to the O-ring.

99000-25030: SUZUKI SUPER GREASE "A"



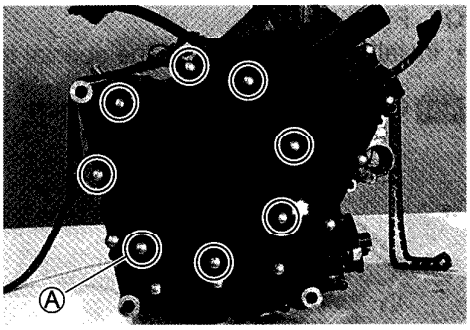
- Make sure that the spacer is installed on the clutch outer cover ①.



- Install the clutch outer cover and tighten its bolts temporarily.

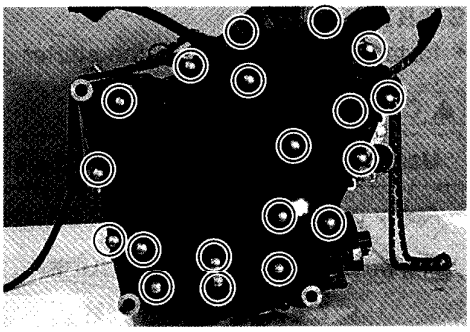
NOTE:
** Fit the clamp to the bolt Ⓐ as shown.*
** Apply THREAD LOCK "1342" to the clutch cover bolts.*

1342 99000-32050: THREAD LOCK "1342"



- Tighten the clutch outer and inner cover bolts to the specified torque.

Clutch cover bolt: 10 N·m (1.0 kgf·m, 7.0 lb-ft)

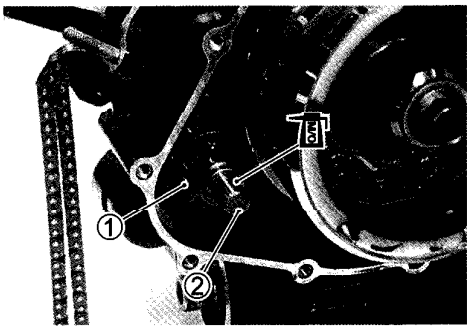


GENERATOR COVER

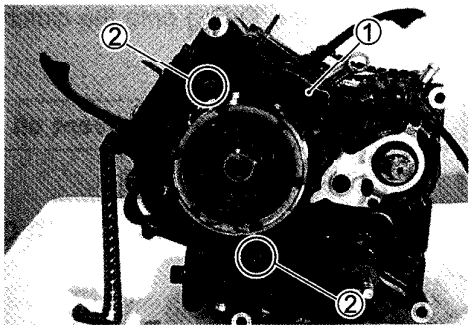
- Install the starter idle gear ① and the shaft ②.

NOTE:
Apply engine oil and the SUZUKI MOLY PASTE to the shaft ②.

99000-25140: SUZUKI MOLY PASTE



- Install the dowel pins ② and the gasket ①.

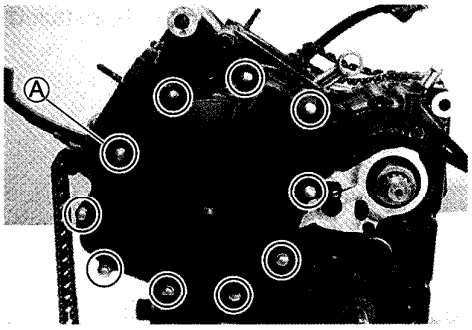


⚠ CAUTION

Use the new gasket to prevent oil leakage.

- Install the generator cover and tighten the generator cover bolts to the specified torque.

Generator cover bolt: 10 N·m (1.0 kgf·m, 7.0 lb-ft)



NOTE:
Fit the gasket washer to the generator cover bolt Ⓐ correctly as shown.

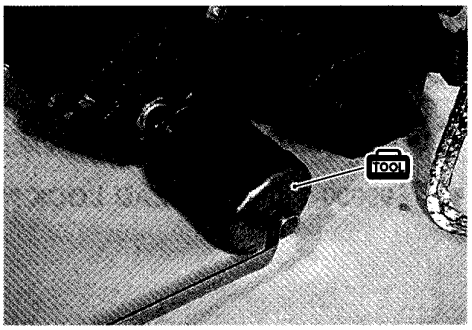
⚠ CAUTION

Use the new gasket washer to prevent oil leakage.

OIL FILTER

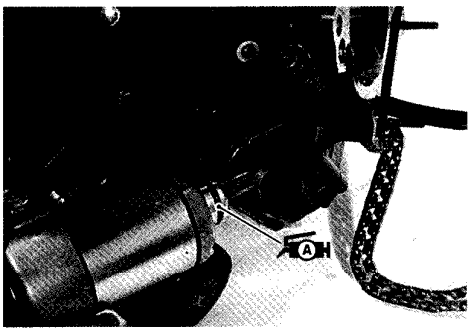
- Install the oil filter using the special tool.(☞ 2-14)

TOOL 09915-40610: Oil filter wrench



STARTER MOTOR

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



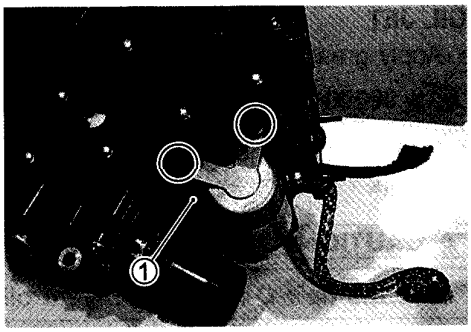
⚠ CAUTION

Use the new O-ring to prevent oil leakage.

- Apply grease to the O-ring.

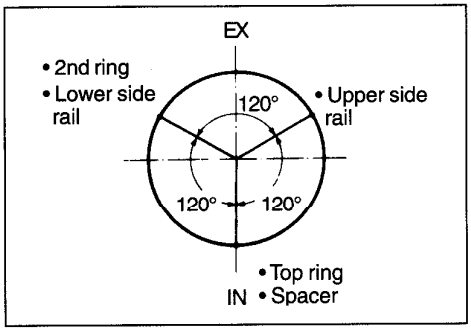
A·H 99000-25030: SUZUKI SUPER GREASE "A"

- Install the starter motor.
- Tighten the starter motor mounting bolts with the clamp ① securely.



PISTON

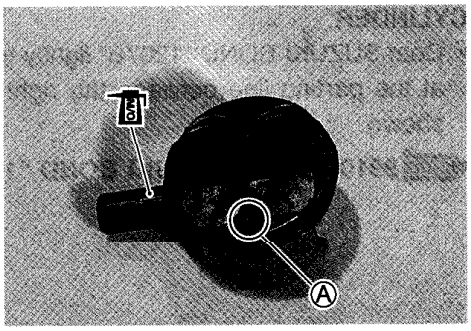
- Position the gaps of the three rings as shown. Before inserting each piston into the cylinder, check that the gaps are so located. (☞ 3-56)



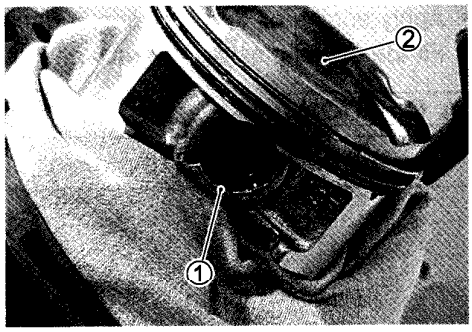
- Rub a small quantity of molybdenum oil solution onto each piston pin.

99000-25140: SUZUKI MOLY PASTE

NOTE:
When installing the pistons, front and rear, the indents Ⓐ 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 ②, front and rear.
- Install the piston pin circlips ①.



⚠ CAUTION

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

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

⚠ CAUTION

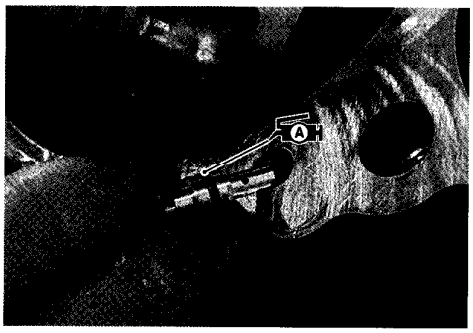
When turning the crankshaft, pull the cam chains upward, or the chains will be caught between the crankcase and the cam drive sprocket.

OIL JET

- Apply grease to the new O-rings.

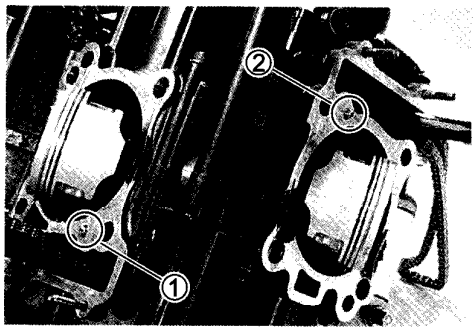
99000-25030: SUZUKI SUPER GREASE "A"

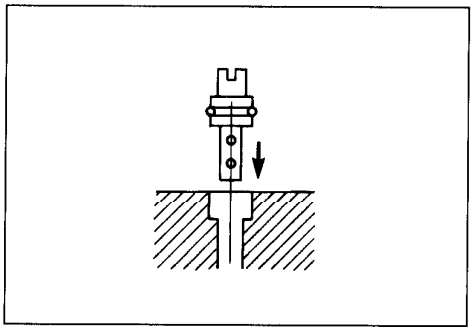
- Install each of the oil jets (#14) ①, ②, as shown in the photograph.



⚠ CAUTION

Use the new O-rings to prevent oil leakage.

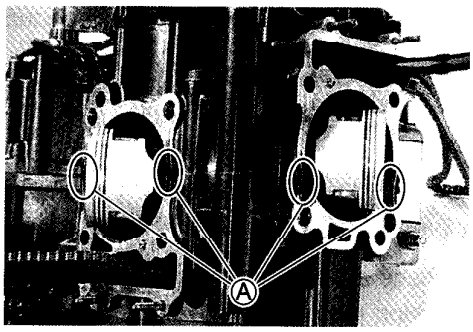




CYLINDER

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

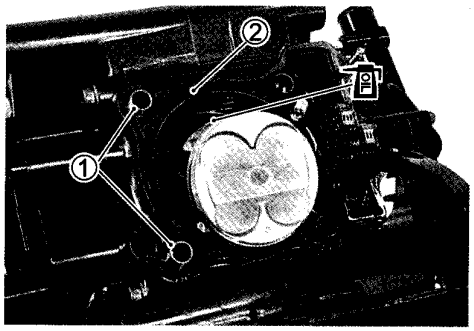
1207E 99104-31140: SUZUKI BOND "1207B"

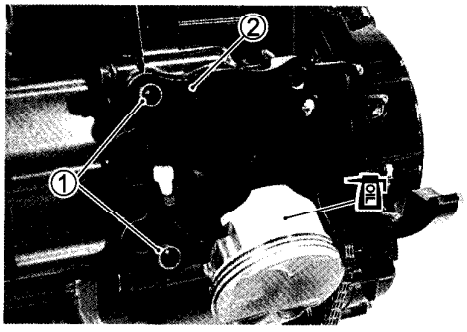


- Apply engine oil to the sliding surface of the pistons.
- Fit the dowel pins ① and new gaskets ② to the crankcase.

⚠ CAUTION

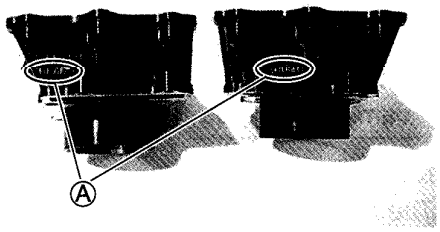
Use the new gaskets to prevent oil leakage.





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

NOTE:
The front and rear cylinders can be distinguished by the embossed-letters Ⓐ.
"FRONT": Front (No.1) cylinder
"REAR": Rear (No.2) cylinder

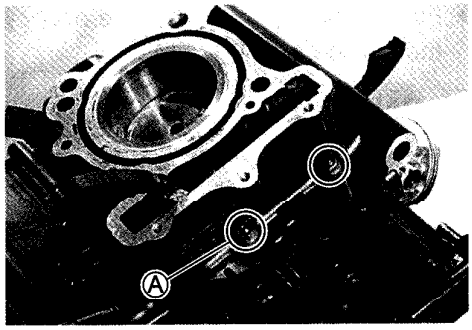


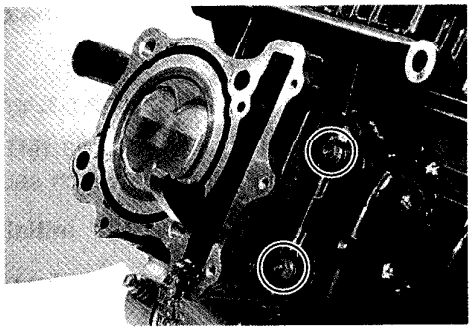
- Hold the piston rings in proper position, and insert each of the pistons into the respective cylinders.

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.

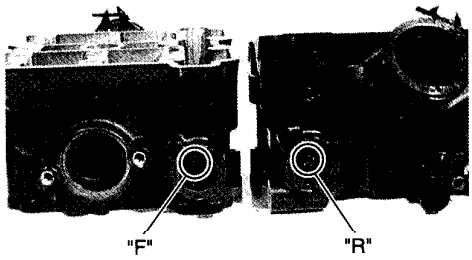
NOTE:
Fit the clamp to the front cylinder nut Ⓐ as shown.



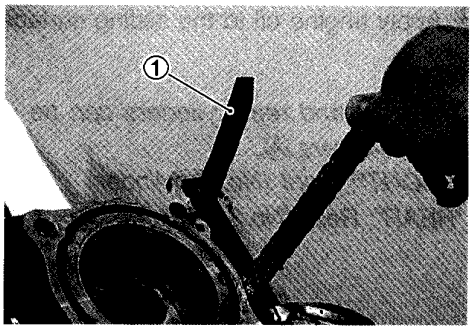


NO.2 (REAR) CYLINDER HEAD

- The cylinder heads can be distinguished by the embossed-letters, "F" and "R".
  "F" No.1 (Front) cylinder head
  "R" No.2 (Rear) cylinder head



- Pull the cam chain out of the cylinder and install the cam chain guide ①.

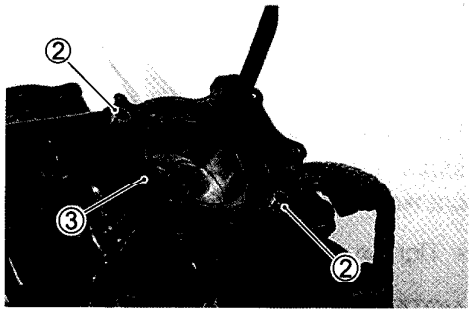


⚠ CAUTION

There is the guide holder for the bottom end of the cam chain guide ① cast in the crankcase. Be sure that the cam chain guide ① is inserted properly.

NOTE:
The front and rear cam chain guides are the same.

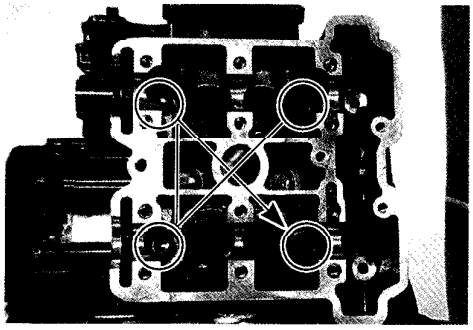
- Fit the dowel pins ② and the new cylinder head gasket ③ to the cylinders.



⚠ CAUTION

Use the new gasket to prevent gas leakage.

- Place the rear cylinder head on the cylinder.

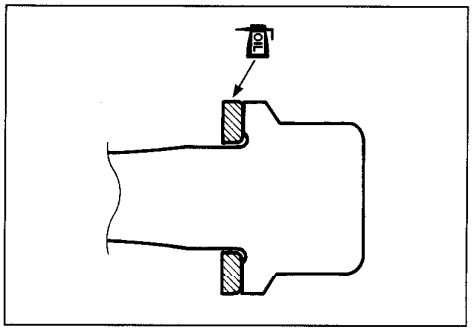


NOTE:
When installing the cylinder head, keep the cam chain taut.

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

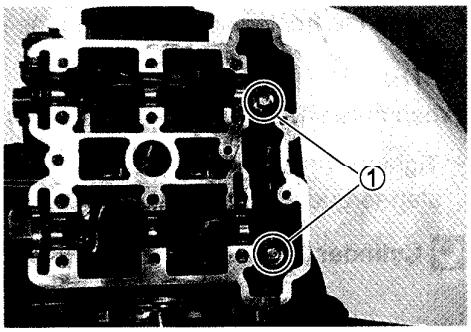
Cylinder head bolt (M10): Initial 25 N·m (2.5 kgf·m, 18.0 lb-ft)
Final 42 N·m (4.2 kgf·m, 30.5 lb-ft)

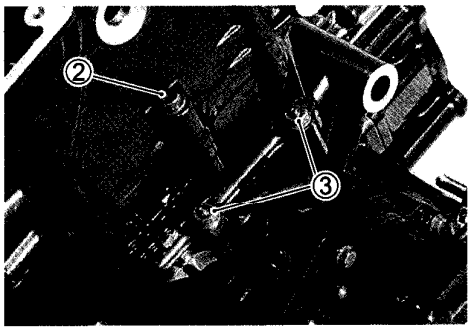
NOTE:
* *Install the washers to the cylinder head bolts (M10) as shown.*
* *Apply engine oil to the washers and thread portion of the bolts before installing the cylinder head bolts.*



- After firmly tightening the cylinder head bolts (M10), install the cylinder head bolts (M6) ①, ②.
- Tighten the cylinder head bolts ①, ②, and the cylinder nuts ③.

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)

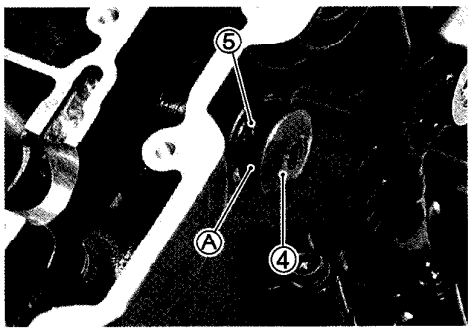




- Install the cylinder head side bolt ④ and gasket ⑤ and tighten it to the specified torque.

Cylinder head side bolt ④: 14 N·m (1.4 kgf·m, 10.0 lb-ft)

NOTE:
** The metal side Ⓐ of the gasket ⑤ faces out.*
** Install the cylinder head side bolt inside of the cam chain.*

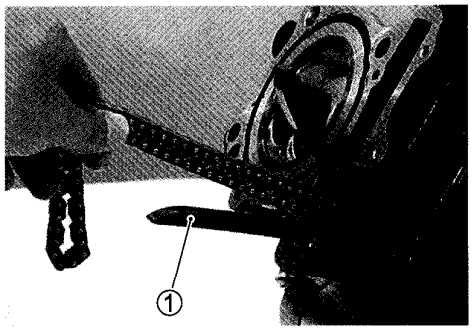


NO.1 (FRONT) CYLINDER HEAD

- Pull the cam chain out of the cylinder and install the cam chain guide ①.

⚠ CAUTION

*** There is the guide holder for the bottom end of the cam chain guide ① cast in the crankcase.**
*** Be sure that the cam chain guide ① is installed properly.**

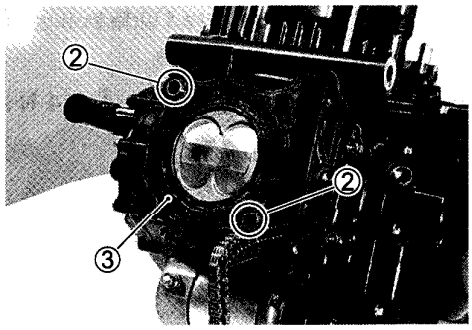


NOTE:
The front and rear cam chain guides are the same.

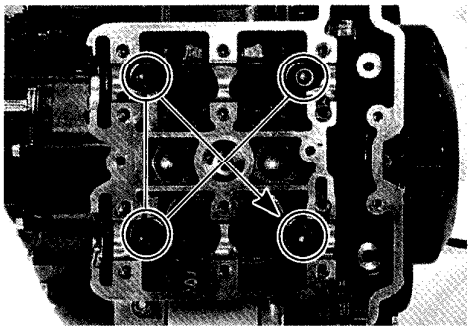
- Fit the dowel pins ② and the new cylinder head gasket ③ to the cylinder.

⚠ CAUTION

Use the new gasket to prevent gas leakage.



- Place the front cylinder head on the cylinder.

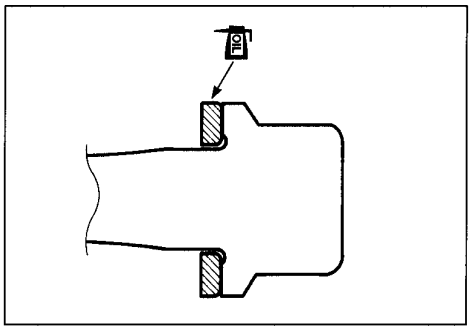


NOTE:
When installing the cylinder head, keep the cam chain taut.

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

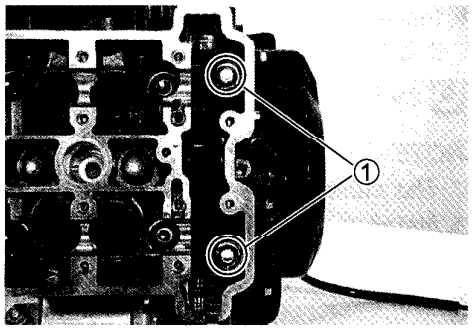
Cylinder head bolt (M10): Initial 25 N·m (2.5 kgf·m, 18.0 lb-ft)
Final 42 N·m (4.2 kgf·m, 30.5 lb-ft)

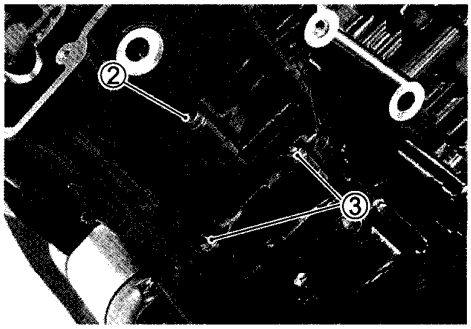
NOTE:
** Install the washers to the cylinder head bolts (M10) as shown.*
** Apply engine oil to the washers and thread portion of the bolts before installing the cylinder head bolts.*



- After firmly tightening the cylinder head bolts (M10), install the cylinder head bolts (M6) ①, ②.
- Tighten the cylinder head bolts ①, ② and the cylinder nuts ③.

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)

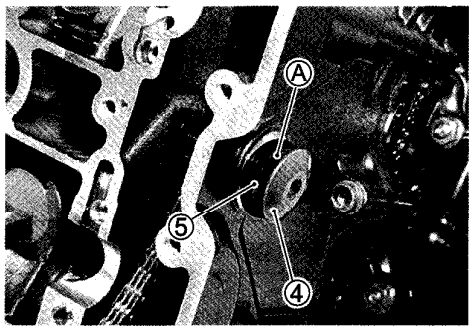




- Install the cylinder head side bolt ④ and gasket ⑤ and tighten it to the specified torque.

Cylinder head side bolt ④: 14 N·m (1.4 kgf·m, 10.0 lb-ft)

NOTE:
** The metal side Ⓐ of the gasket ⑤ faces out.*
** Install the cylinder head side bolt inside of the cam chain.*



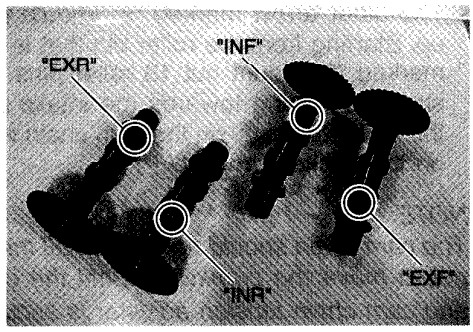
CAM TIMING

- The cam shafts are identified by the enbossed letters.

  INF No.1 (Front) intake camshaft
  EXF No.1 (Front) exhaust camshaft
  INR No.2 (Rear) intake camshaft
  EXR No.2 (Rear) exhaust camshaft

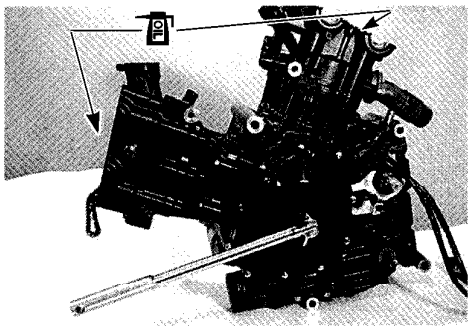
- Before placing the camshafts on cylinder head, apply SUZUKI MOLY PASTE to their journals.
- Apply engine oil to the camshaft journal holders.

99000-25140: SUZUKI MOLY PASTE



NO.1 Front Camshaft

- Turn the crankshaft counterclockwise with the box wrench and align "| F" line Ⓑ on the generator rotor with the index mark Ⓐ of the valve timing inspection hole while keeping the cam chains pulled upward.

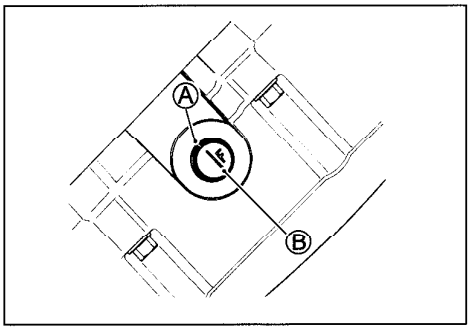


⚠ CAUTION

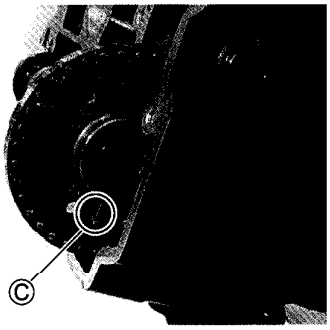
Pull the cam chains upward, or the chain will be caught between crankcase and cam drive sprocket.

⚠ CAUTION

To adjust the camshaft timing correctly, be sure to align "| F" line Ⓑ with the index mark Ⓐ and hold this position when installing the camshafts.

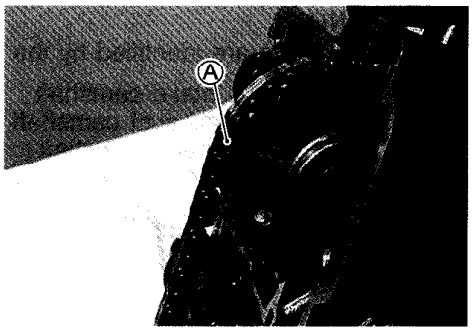


- Pull the cam chain lightly.
- The exhaust camshaft sprocket has an arrow marked "1" Ⓒ. Turn the exhaust camshaft so that the arrow is aligned with the gasket surface of the cylinder head.
- Engage the cam chain with the exhaust camshaft sprocket.



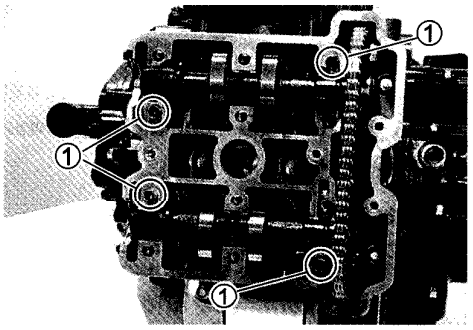
NOTE:
Before installing the camshaft, check that the tappets are installed correctly.

- The other arrow marked "2" should now be pointing straight up. Starting from the roller pin that is directly above the arrow marked "2", count out 16 roller pins (from the exhaust camshaft side going towards the intake camshaft side). Engage the 16 roller pin Ⓐ on the cam chain with the arrow marked "3" on the intake sprocket.

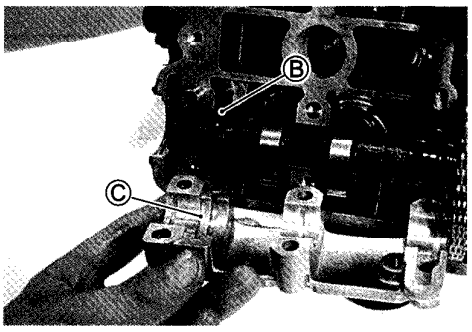


NOTE:
The cam chain should now be on all three sprockets. Be careful not to move the crankshaft until the camshaft journal holders and cam chain tension adjuster is secured.

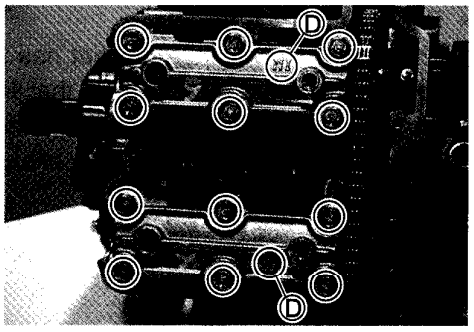
- Install the dowel pins ①.



- Install the camshaft journal holders, intake and exhaust.
- Fasten the camshaft journal holders evenly by tightening the crankshaft journal holder bolts sequentially and diagonally.



NOTE:
* *Align the flange Ⓑ of the camshafts with the groove Ⓒ of the camshaft journal holders.*
* *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 Ⓓ.*

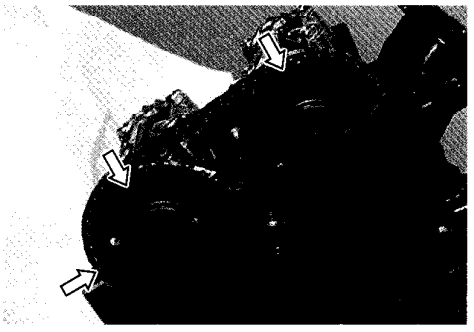


- Tighten the camshaft journal holder bolts to the specified torque.

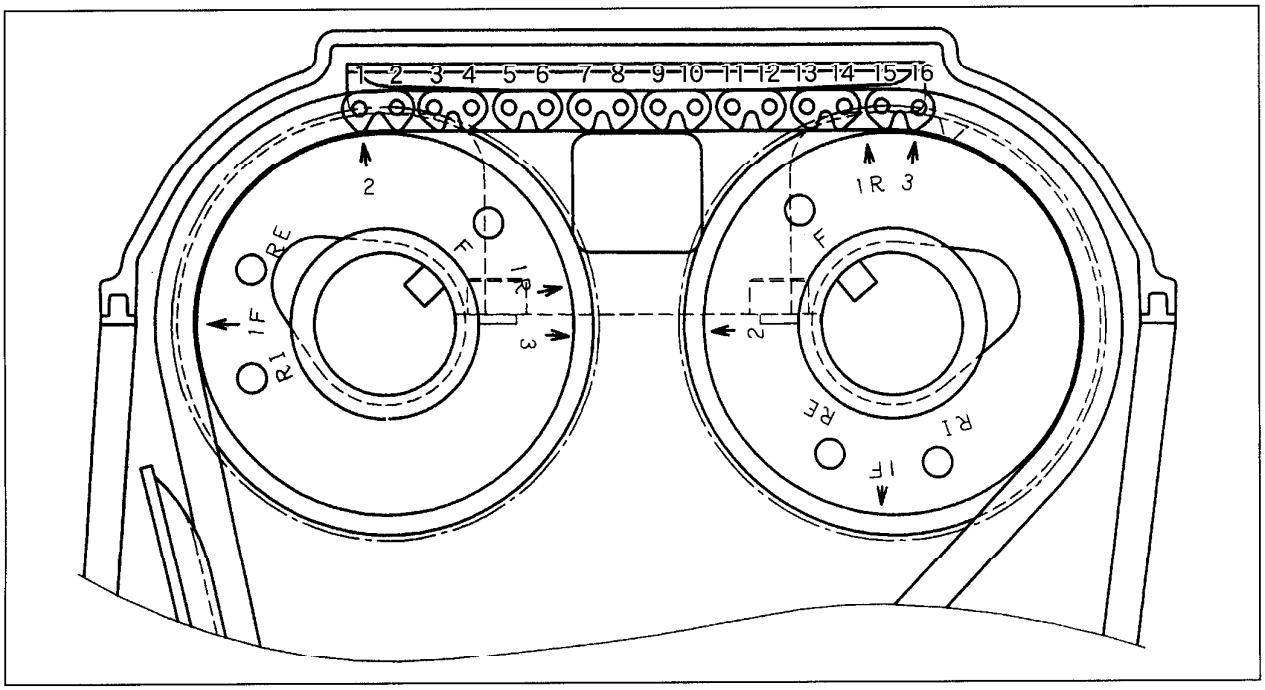
Camshaft journal holder bolt:10 N·m (1.0 kgf·m, 7.0 lb-ft)

⚠ 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.

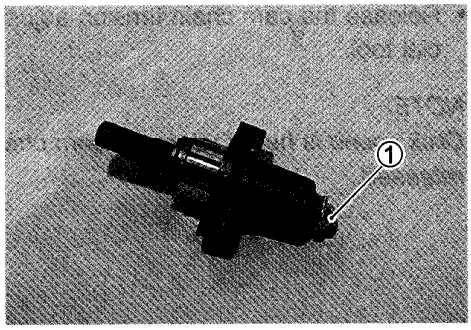


- Recheck the No.1 (Front) camshaft positions, intake and exhaust.

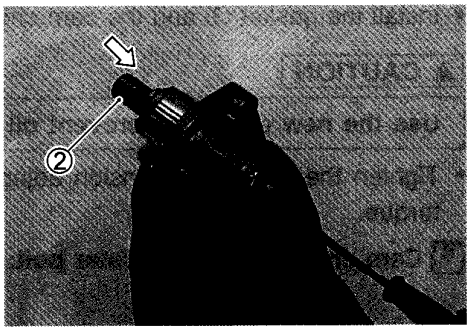


Cam chain tension adjuster

- Remove the cam chain tension adjuster bolt ① and gasket.

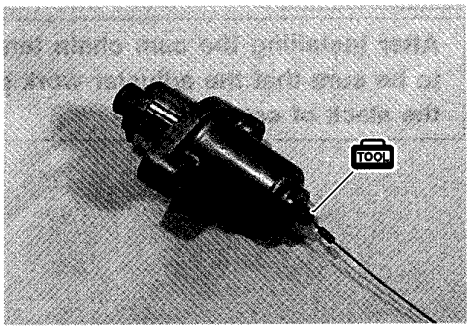


- Shorten the push rod ② with a screwdriver by turning it clockwise.

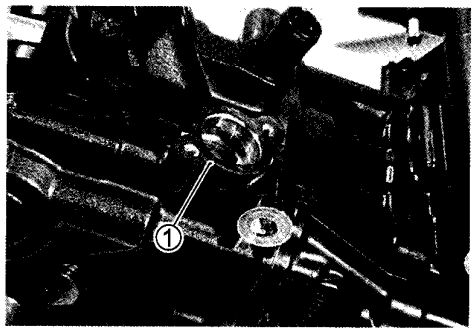


- Hold the push rod ② using the special tool. Now the cam chain tension adjuster is ready to install.

TOOL 09917-62430: Cam chain tension adjuster locking tool



- Install the new gasket ①.

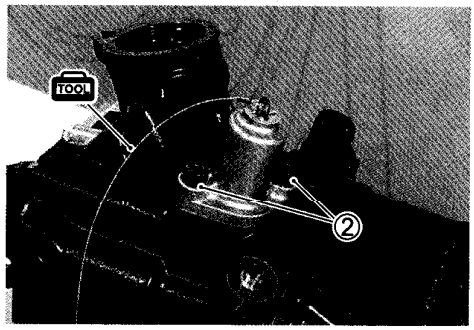


⚠ CAUTION

Use the new gasket to prevent oil leakage.

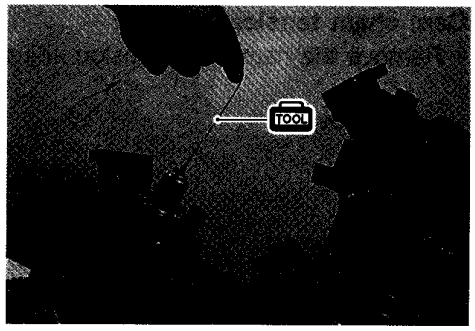
- Install the cam chain tension adjuster as shown and tighten its mounting bolts ② to the specified torque.

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



- Release the cam chain tension adjuster by removing the special tool.

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



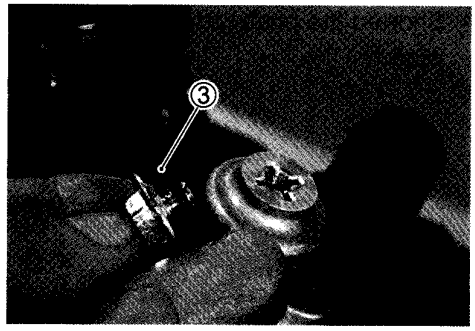
- Install the gasket ③ and the cam chain tension adjuster bolt.

⚠ CAUTION

Use the new gasket to prevent oil leakage.

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

Cam chain tension adjuster bolt: 8 N·m (0.8 kgf·m, 6.0 lb-ft)

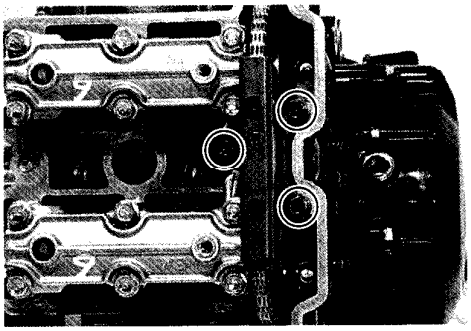


⚠ CAUTION

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

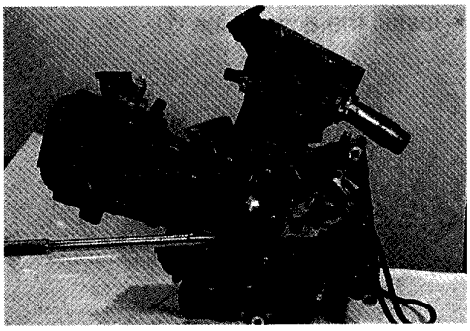
- Install the cam chain guide.

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



NO.2 (Rear) Camshaft

- 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" line Ⓑ on the generator rotor with the index mark Ⓐ of the valve timing inspection hole.

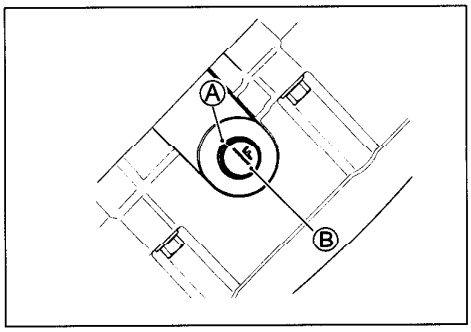


⚠ CAUTION

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

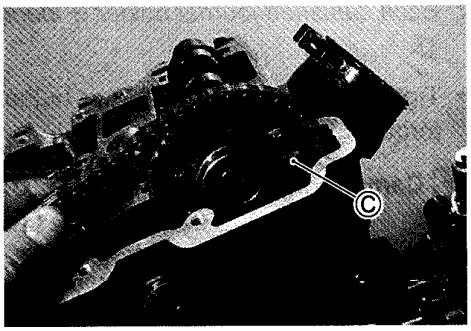
⚠ CAUTION

To adjust the camshaft timing correctly, be sure to align "| F" line Ⓑ with the index mark Ⓐ and hold this position when installing the camshafts.

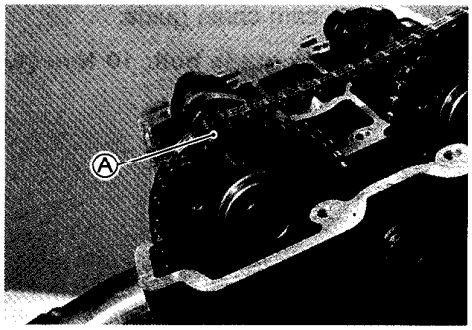


- Pull the cam chain lightly.
- The intake camshaft sprocket has an arrow marked "1" Ⓒ. Turn the intake camshaft so that the arrow is aligned with the gasket surface of the cylinder head.
- Engage the cam chain with the intake camshaft sprocket.

NOTE:
Before installing the camshaft, check that the tappets are installed correctly.

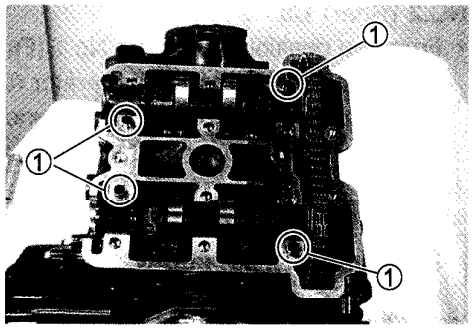


- The other arrow marked "2" should now be pointing straight up. Starting from the roller pin that is directly above the arrow marked "2", count out 16 roller pins (from the intake camshaft side going towards the exhaust camshaft side). Engage the 16th roller pin Ⓐ on the cam chain with the arrow marked "3" on the exhaust sprocket.

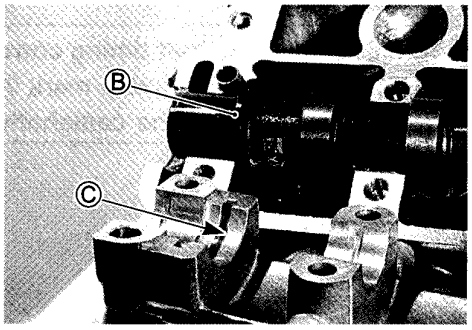


NOTE:
The cam chain should now be on all three sprockets. Be careful not to move the crankshaft until the camshaft journal holders and cam chain tension adjuster is secured.

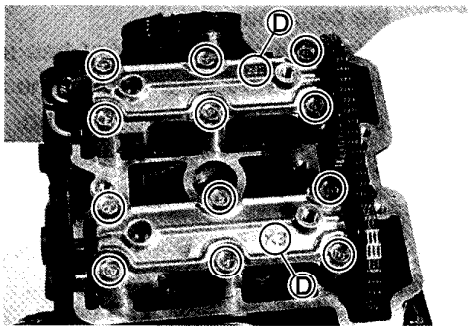
- Install the dowel pins ①.



- Install the camshaft journal holders, intake and exhaust.
- Fasten the camshaft journal holders evenly by tightening the camshaft journal holder bolts sequentially and diagonally.



NOTE:
* *Align the flange Ⓑ of the camshafts with the groove Ⓒ of the camshaft journal holders.*
* *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 Ⓓ.*

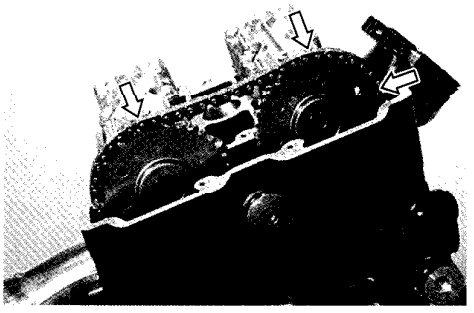


- Tighten the camshaft journal holder bolts to the specified torque.

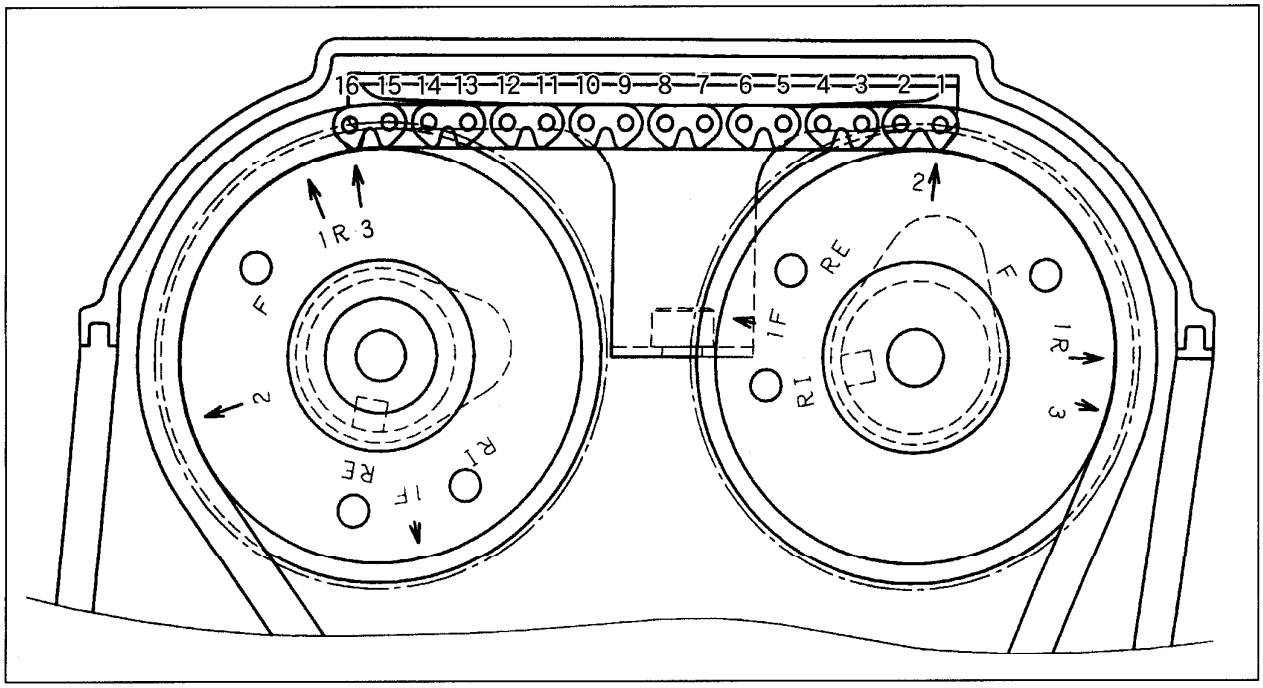
Camshaft journal holder bolt: 10 N·m (1.0 kgf·m, 7.0 lb-ft)

⚠ 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.

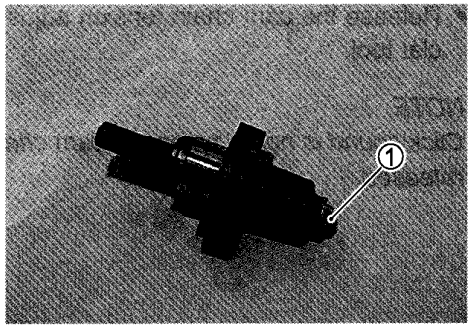


- Recheck the No.2 (Rear) camshaft positions, intake and exhaust.

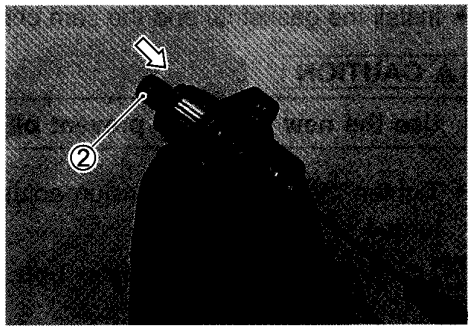


Camchain tension adjuster

- Remove the cam chain tension adjuster bolt ① and gasket.

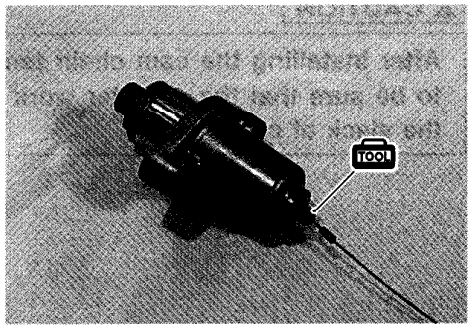


- Shorten the push rod ② with a screwdriver by turning it clockwise.



- Hold the push rod ② using the special tool. Now the cam chain tension adjuster is ready to install.

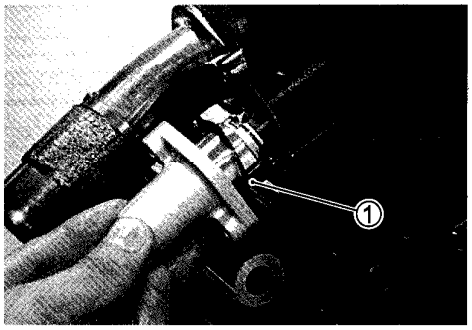
TOOL 09917-62430: Cam chain tension adjuster locking tool



- Install the new gasket ①.

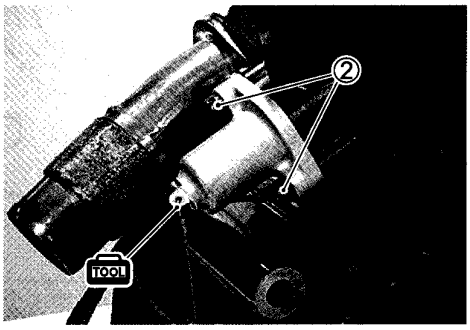
⚠ CAUTION

Use the new gasket to prevent oil leakage.



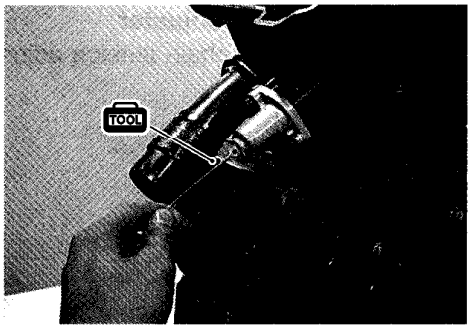
- Install the cam chain tension adjuster as shown and tighten its mounting bolts ② to the specified torque.

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



- Release the cam chain tension adjuster by removing the special tool.

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



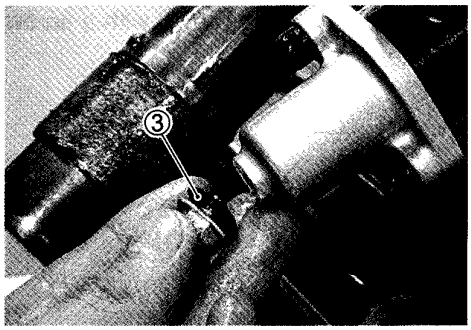
- Install the gasket ③ and the cam chain tension adjuster bolt.

⚠ CAUTION

Use the new gasket to prevent oil leakage.

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

Cam chain tension adjuster bolt: 8 N·m (0.8 kgf·m, 6.0 lb-ft)



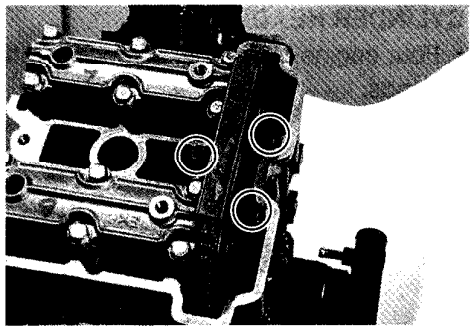
⚠ CAUTION

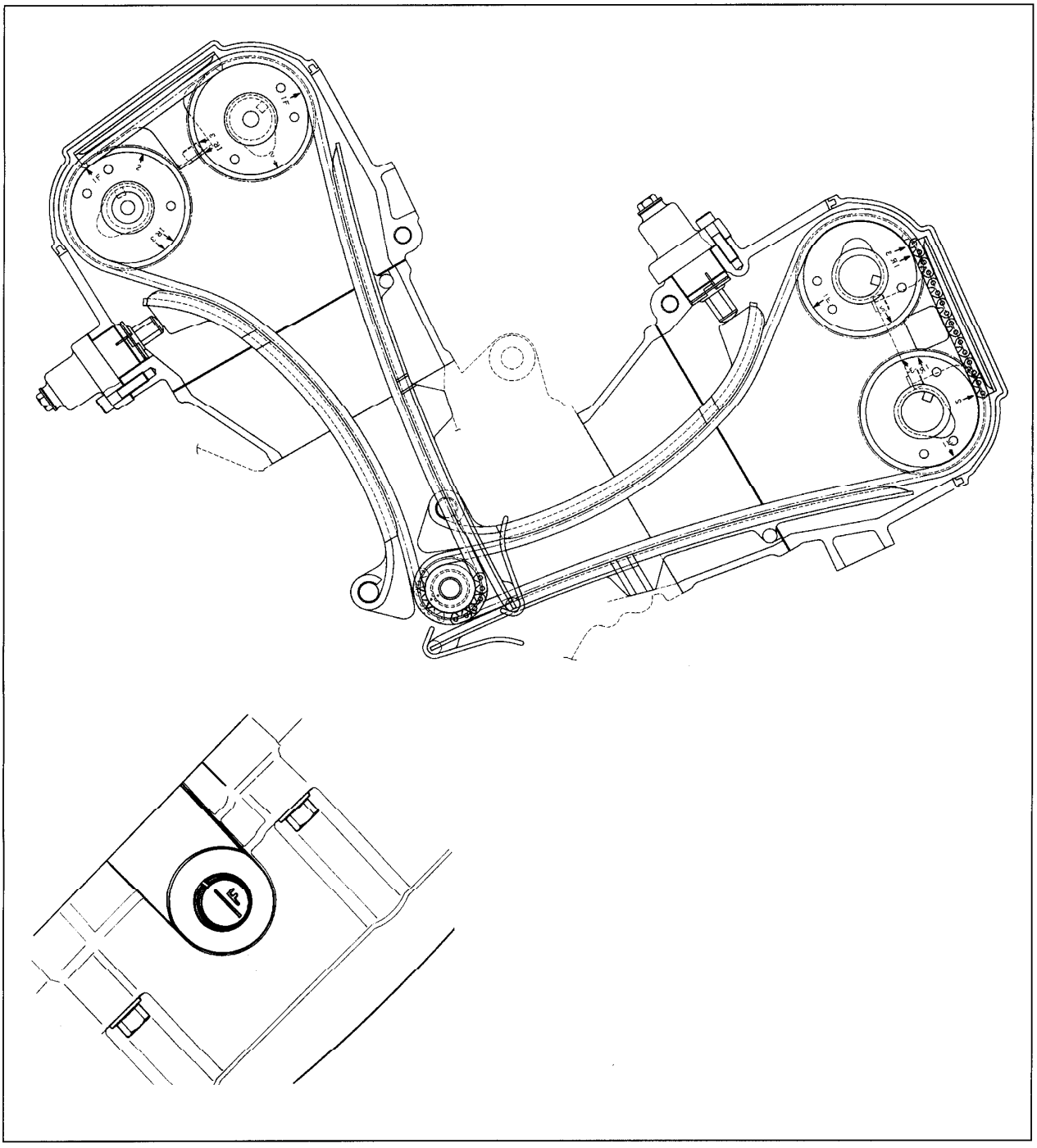
After installing the cam chain tension adjuster, check to be sure that the adjuster work properly by cheking the slack of cam chain.

- Install the cam chain guide.

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

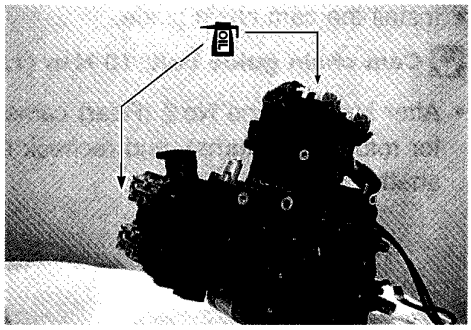
- After installing the No.2 (Rear) camshafts, rotate the generator rotor (some turns), and recheck the positions of the camshafts.





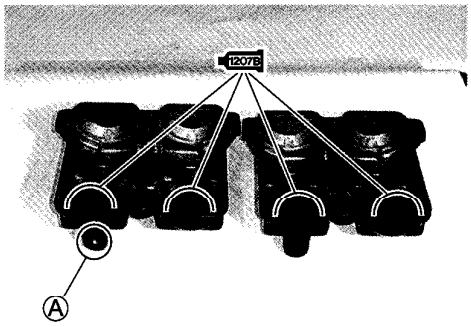
CYLINDER HEAD COVER

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



NOTE:
Be sure to check the tappet clearance. (☞ 2-8)

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



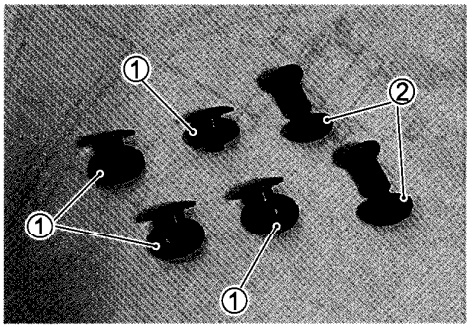
1207B 99104-31140: SUZUKI BOND "1207B"

⚠ CAUTION

Use the new gaskets to prevent oil leakage.

NOTE:
The front cylinder head cover has the radiator mounting bolt's thread Ⓐ.

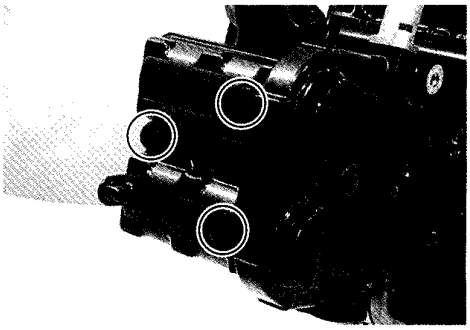
- Place the cylinder head covers on each cylinder head.
- Fit the gaskets ①, ② to each head cover bolt.



⚠ CAUTION

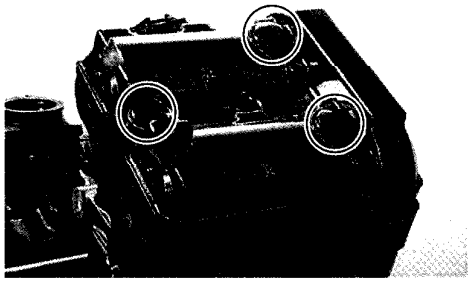
Use the new gaskets to prevent oil leakage.

- After applying engine oil to the gaskets ①, ②, tighten the head cover bolts to the specified torque.



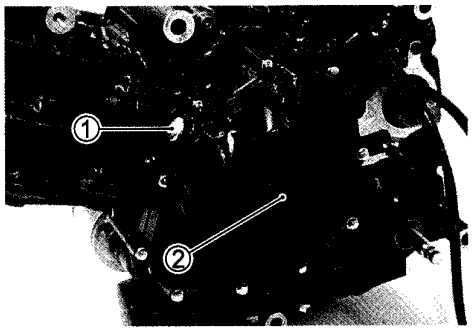
Head cover bolt: 14 N·m (1.4 kgf·m, 10.0 lb-ft)

NOTE:
The metal side of the gasket ② faces out.

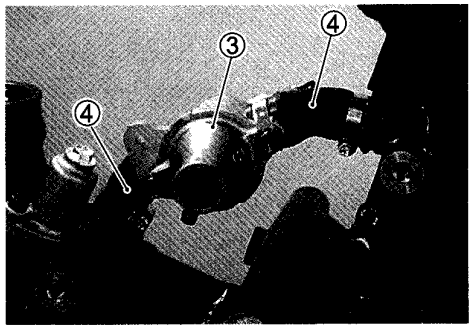


- Tighten the valve timing inspection plug ① and the generator cover plug ② to the specified torque.

Valve timing inspection plug: 23 N·m (2.3 kgf·m, 16.5 lb-ft)
Generator cover plug: 11 N·m (1.1 kgf·m, 8.0 lb-ft)



- Install the thermostat case ③ with the water hoses ④ and tighten the clamp screws securely. (☞ 8-19)



- Connect the hose ⑤.
- Connect the ground lead wire.
- Install the crankcase breather hose ⑥.
- Install the spark plugs. (☞ 2-7)