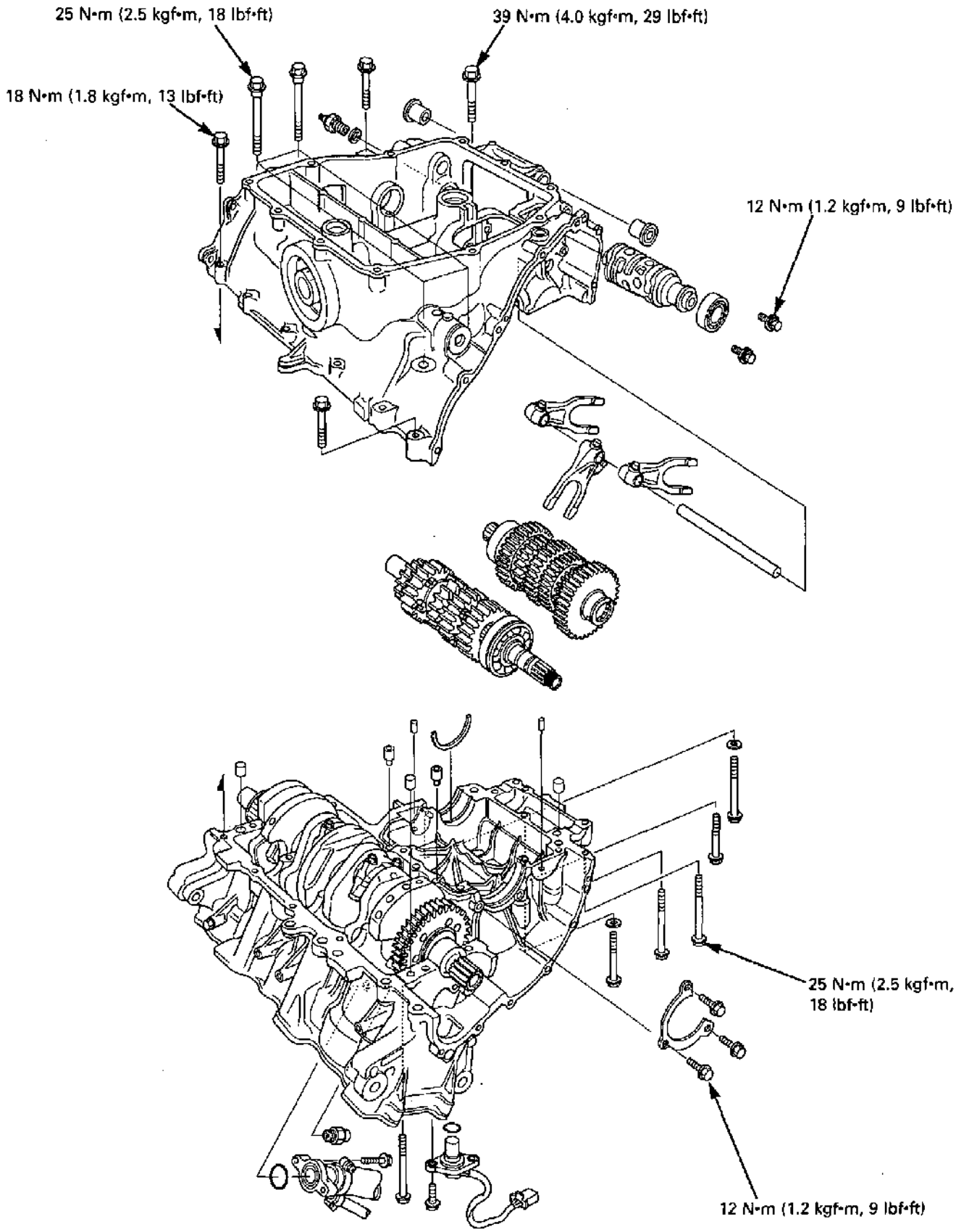

25 N•m (2.5 kgf•m, 18 lbf•ft)
39 N•m (4.0 kgf•m, 29 lbf•ft)
18 N•m (1.8 kgf•m, 13 lbf•ft)
12 N•m (1.2 kgf•m, 9 lbf•ft)
25 N•m (2.5 kgf•m, 18 lbf•ft)
12 N•m (1.2 kgf•m, 9 lbf•ft)

11. CRANKCASE/TRANSMISSION

SERVICE INFORMATION

GENERAL

- The crankcase must be separated to service the following:
  - Transmission
  - Crankshaft (Section 12)
  - Piston/connecting rod (Section 12)
- The following components must be removed before separating the crankcase:
  - Alternator/flywheel (Section 10)
  - Clutch/gearshift linkage (Section 9)
  - Cylinder head (Section 8)
  - Engine (Section 7)
  - Oil pan, oil pump and oil cooler (Section 4)
  - Starter motor (Section 18)
  - Water pump (Section 6)
- Be careful not to damage the crankcase mating surfaces when servicing.
- Prior to assembling the crankcase halves, apply sealant to their mating surfaces. Wipe off any excess sealant thoroughly.

11

SPECIFICATIONS

Unit: mm (in)

ITEM			STANDARD	SERVICE LIMIT
Shift fork, fork shaft	I.D.		12.000 – 12.021 (0.4724 – 0.4733)	12.03 (0.474)
	Claw thickness		5.93 – 6.00 (0.233 – 0.236)	5.9 (0.23)
	Shift fork shaft O.D.		11.957 – 11.968 (0.4707 – 0.4712)	11.95 (0.470)
Transmission	Gear I.D.	M5, M6	28.000 – 28.021 (1.1024 – 1.1032)	28.04 (1.104)
		C2, C3, C4	31.000 – 31.025 (1.2205 – 1.2215)	31.04 (1.222)
	Gear bushing O.D.	M5, M6	27.959 – 27.980 (1.1007 – 1.1016)	27.94 (1.100)
		C2	30.955 – 30.980 (1.2187 – 1.2197)	30.94 (1.218)
		C3, C4	30.950 – 30.975 (1.2185 – 1.2195)	30.93 (1.218)
	Gear-to-bushing clearance	M5, M6	0.020 – 0.062 (0.0008 – 0.0024)	0.10 (0.004)
		C2	0.020 – 0.070 (0.0008 – 0.0028)	0.10 (0.004)
		C3, C4	0.025 – 0.075 (0.0010 – 0.0030)	0.11 (0.004)
	Gear bushing I.D.	M5	24.985 – 25.006 (0.9837 – 0.9845)	25.016 (0.9849)
		C2	27.985 – 28.006 (1.1018 – 1.1026)	28.021 (1.1032)
	Mainshaft O.D.	at M5	24.967 – 24.980 (0.9830 – 0.9835)	24.96 (0.983)
	Countershaft O.D.	at C2	27.967 – 27.980 (1.1011 – 1.1016)	27.96 (1.101)
	Bushing-to-shaft clearance	M5	0.005 – 0.039 (0.0002 – 0.0015)	0.06 (0.002)
		C2	0.005 – 0.039 (0.0002 – 0.0015)	0.06 (0.002)

TORQUE VALUES

Mainshaft bearing set plate bolt	12 N•m (1.2 kgf•m, 9 lbf•ft)	Apply a locking agent to the threads.
Gearshift drum bearing/fork shaft set bolt/washer	12 N•m (1.2 kgf•m, 9 lbf•ft)	Apply a locking agent to the threads.
Crankcase bolt (main journal)	25 N•m (2.6 kgf•m, 19 lbf•ft)	Apply molybdenum disulfide oil to the threads and seating surface (after removing anti-rust oil additive).
Crankcase bolt, 10 mm	39 N•m (4.0 kgf•m, 29 lbf•ft)	
7 mm	18 N•m (1.8 kgf•m, 13 lbf•ft)	
Crankcase bolt (upper side 8 mm bolt)	25 N•m (2.5 kgf•m, 18 lbf•ft)	

TOOLS

Inner driver C	07746–0030100
Attachment, 25 mm I.D.	07746–0030200

TROUBLESHOOTING

Hard to shift
- Improper clutch operation (section 9)
- Incorrect transmission oil weight
- Bent shift fork
- Bent shift fork shaft
- Bent shift fork claw
- Damaged shift drum cam groove
- Bent gearshift spindle

Transmission jumps out of gear
- Worn gear dogs
- Worn gear shifter groove
- Bent shift fork shaft
- Broken shift drum stopper arm
- Broken shift drum stopper arm spring
- Worn or bent shift forks
- Broken gearshift spindle return spring

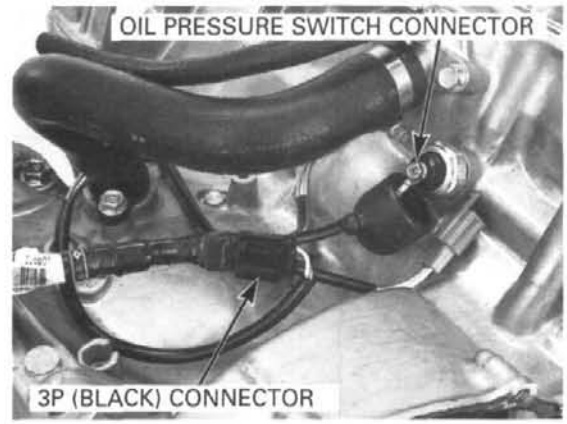
Excessive engine noise
- Worn or damaged transmission gear
- Worn or damaged transmission bearings

CRANKCASE SEPARATION

Refer to Service Information (page 11-1) for removal of the necessary parts before separating the crankcase.

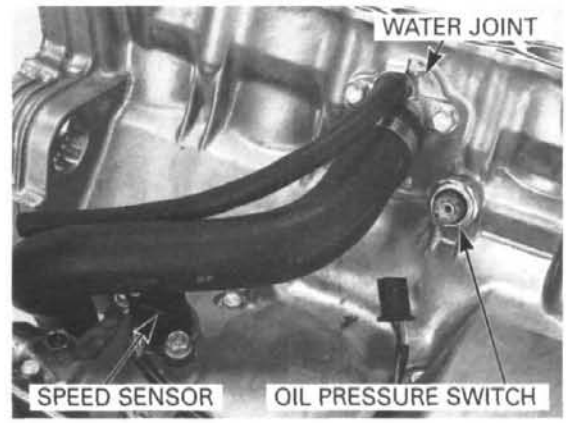
Disconnect the following connectors and remove the engine sub-harness;
- Speed sensor 3P (Black) connector
- Oil pressure switch connector
- Neutral switch connector

Remove the speed sensor before separating the crankcase. Do not separate or assemble the crankcase with the speed sensor installed.

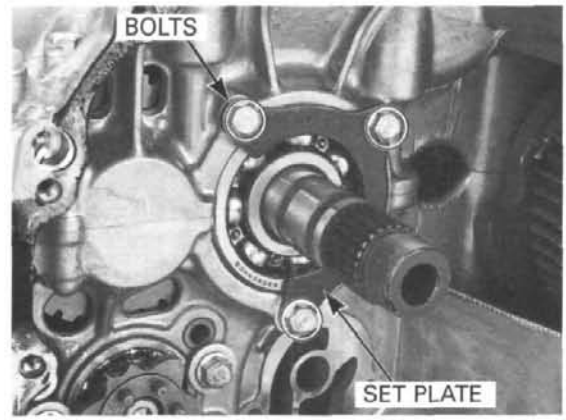


Remove the following:
- Oil pressure switch (page 19-16)
- Speed sensor (page 19-12)
- Cam chain tensioner/guide (page 8-21)

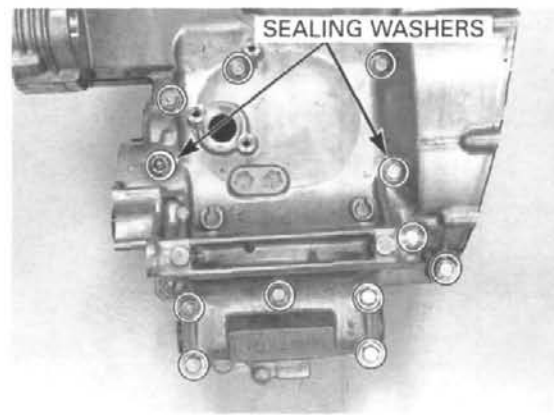
Remove the bolts and water hose joint.



Remove the mainshaft bearing set plate bolts and plate.

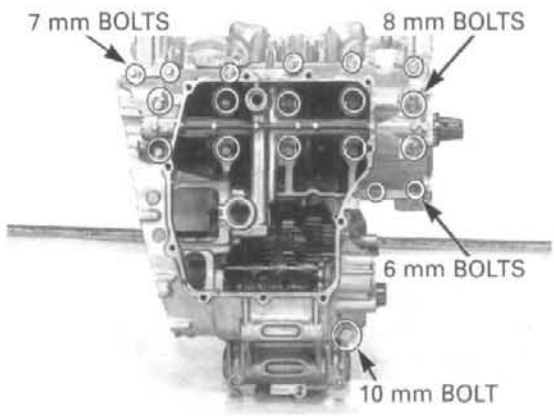


Loosen the seven 6-mm bolts and five 8-mm bolts in a crisscross pattern in two or three steps.
Remove the bolts and sealing washers.



Place the engine with the upper side down.
Loosen the two 6-mm bolts, six 7-mm bolts, ten 8-mm bolts and 10-mm bolt in a crisscross pattern in two or three steps.
Remove the bolts and sealing washers.

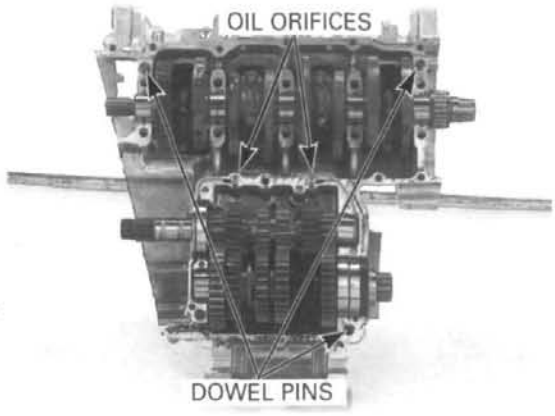
Separate the lower crankcase from the upper crankcase.



Remove the three dowel pins and two oil orifices.

If necessary, remove the swingarm pivot collar from the lower crankcase.

Clean any sealant off from the crankcase mating surface.

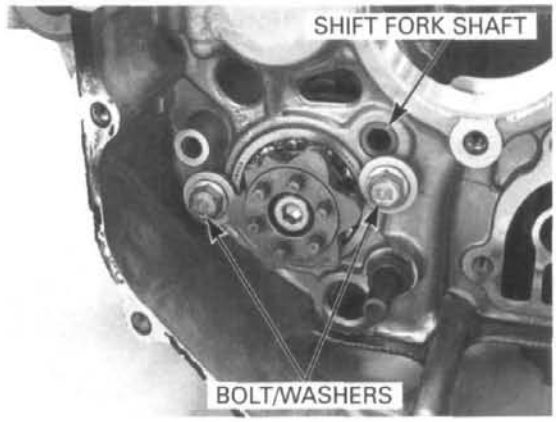


SHIFT FORK/SHIFT DRUM

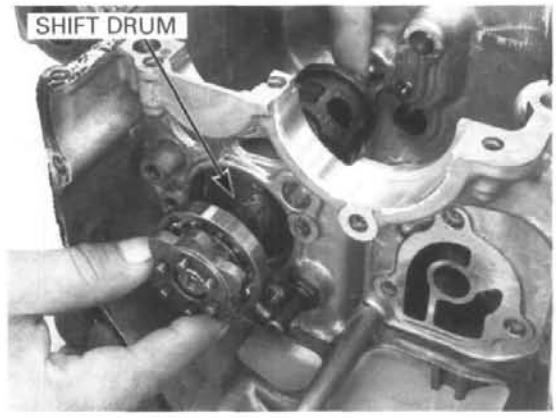
REMOVAL

Separate the crankcase halves (page 11-3).

Remove the shift drum bearing set plate bolt/washer.
Remove the shift fork shaft and shift forks.



Remove the shift drum.



SHIFT DRUM/SHIFT FORK INSPECTION

Check the shift fork guide pin for abnormal wear or damage

Measure the shift fork I.D.

SERVICE LIMIT: 12.03 mm (0.474 in)

Measure the shift fork claw thickness.

SERVICE LIMIT: 5.9 mm (0.23 in)

Measure the shift fork shaft O.D.

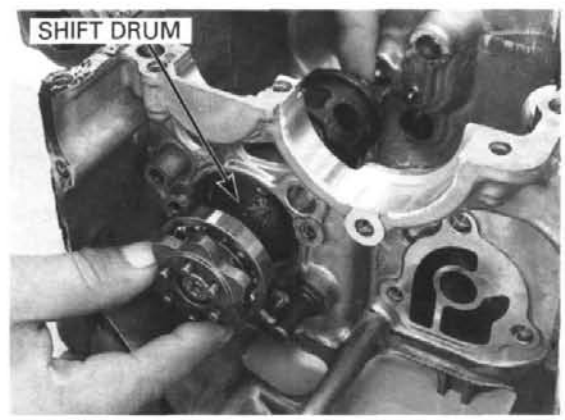
SERVICE LIMIT: 11.95 mm (0.470 in)

Inspect the shift drum guide grooves for abnormal wear or damage.

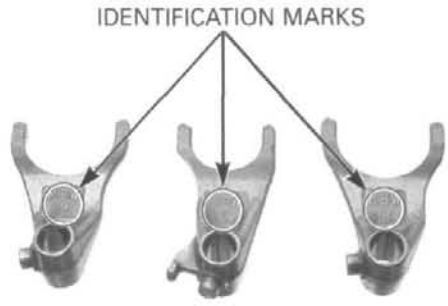
Turn the outer race of the shift drum bearing with your finger.
The bearing should turn smoothly and freely without excessive play.
If necessary, replace the bearing.

INSTALLATION

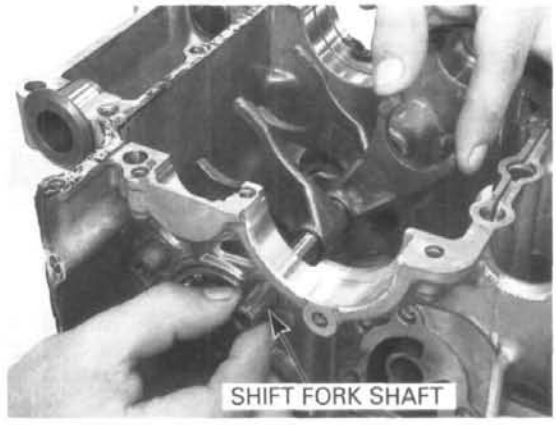
Install the shift drum into the lower crankcase.



The shift forks have the following location marks:
"RL" for right and left
"C" for center



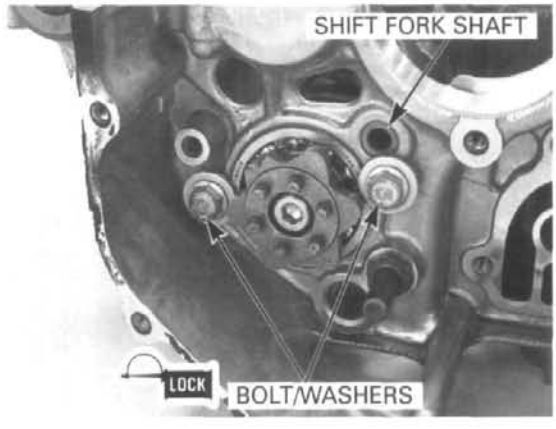
Install the shift forks into the shift drum guide groove with the identification marks facing toward the right side of the engine and insert the fork shaft.



Apply a locking agent to the threads of the bolt/washer.
Install the bolt/washer, then tighten them to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Assemble the crankcase halves (page 11-11).

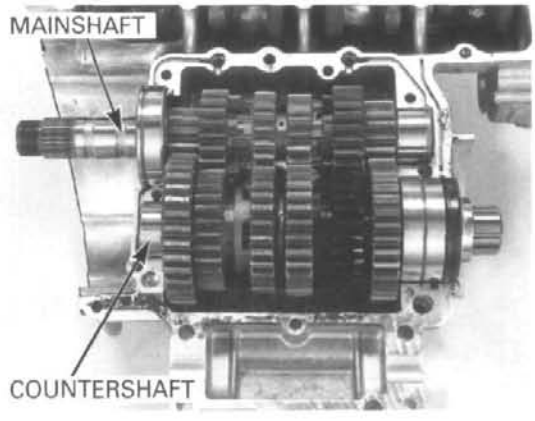


TRANSMISSION

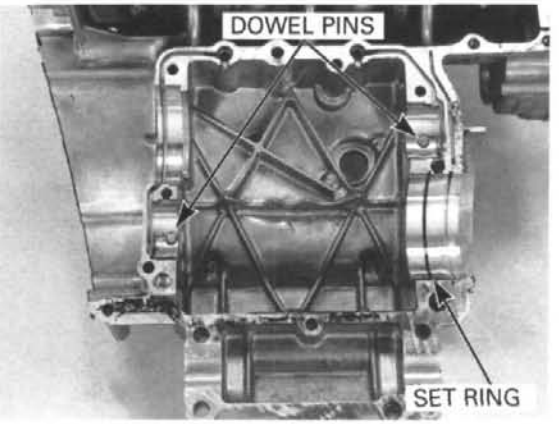
REMOVAL/DISASSEMBLY

Separate the crankcase halves (page 11-3).

Remove the mainshaft and countershaft assemblies.



Remove the dowel pins and countershaft bearing set ring.



Disassemble the mainshaft and countershaft.
Clean all disassembled parts in solvent thoroughly.

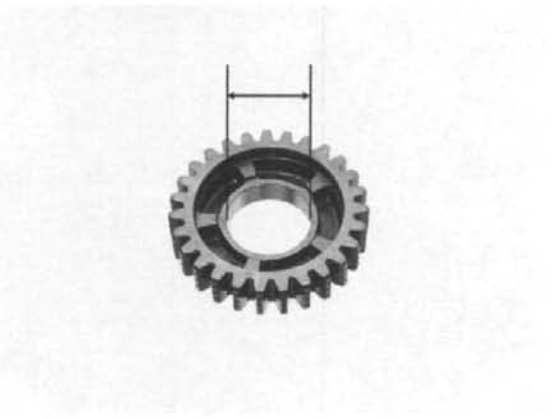
Check the mainshaft and countershaft needle bearings for abnormal wear or damage.

Check the gear shifter groove for abnormal wear or damage.

Check the gear dogs, dog holes and teeth for abnormal wear or lack of lubrication.

Measure the I.D. of each gear.

SERVICE LIMITS:
M5, M6: 28.04 mm (1.104 in)
C2, C3, C4: 31.04 mm (1.222 in)

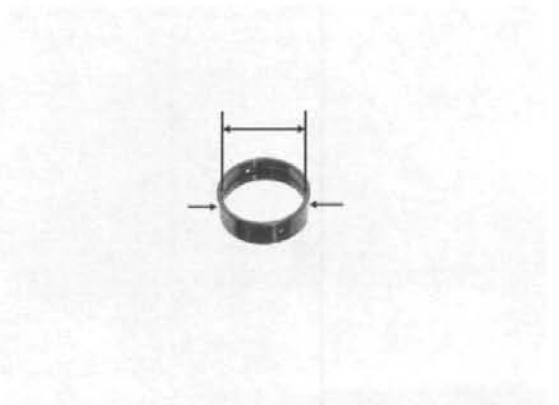


Measure the O.D. of each gear bushing.

SERVICE LIMITS:
M5, M6: 27.94 mm (1.100 in)
C2: 30.94 mm (1.218 in)
C3, C4: 30.93 mm (1.218 in)

Calculate the gear-to-bushing clearance.

M5, M6: 0.10 mm (0.004 in)
C2: 0.10 mm (0.004 in)
C3, C4: 0.11 mm (0.004 in)



Measure the O.D. of each gear bushing.

M5: 25.016 mm (0.9849 in)
C2: 28.021 mm (1.1032 in)

Check the mainshaft and countershaft for abnormal wear or damage.

Measure the mainshaft O.D. at the M5 gear.

SERVICE LIMIT: 24.96 mm (0.983 in)

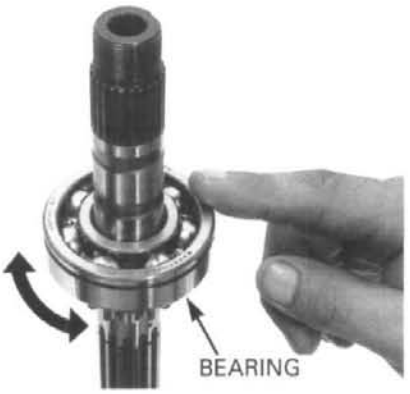
Measure the countershaft O.D. at the C2 gear.

SERVICE LIMIT: 27.96 mm (1.101 in)

Calculate the gear bushing-to-shaft clearance.

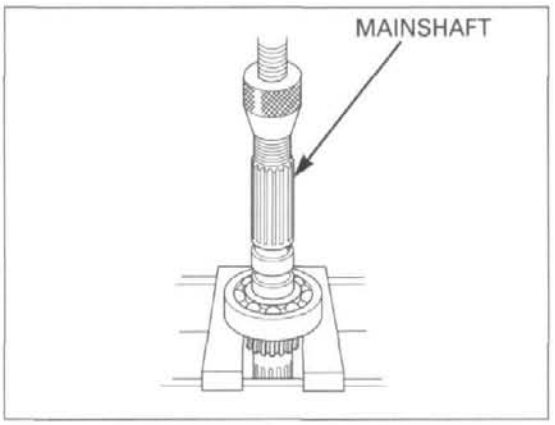
SERVICE LIMITS:
M5: 0.06 mm (0.002 in)
C2: 0.06 mm (0.002 in)

Turn the outer race of each bearing with your finger. The bearings should turn smoothly and quietly.
Also check that the bearing inner race fits tightly on the shaft.
Remove and discard the mainshaft bearing if the race does not turn smoothly, quietly, or fits loosely on the mainshaft.
Replace the countershaft, collar, and bearing as an assembly if the race does not turn smoothly, quietly, or fits loosely on the countershaft.



MAINSHAFT BEARING REPLACEMENT

Press out the mainshaft from the bearing using a hydraulic press.

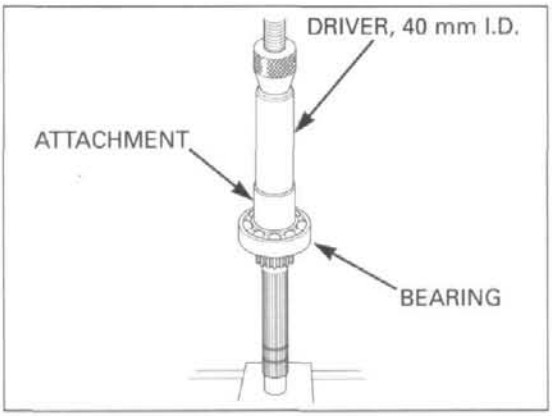


Install with the groove side facing up.

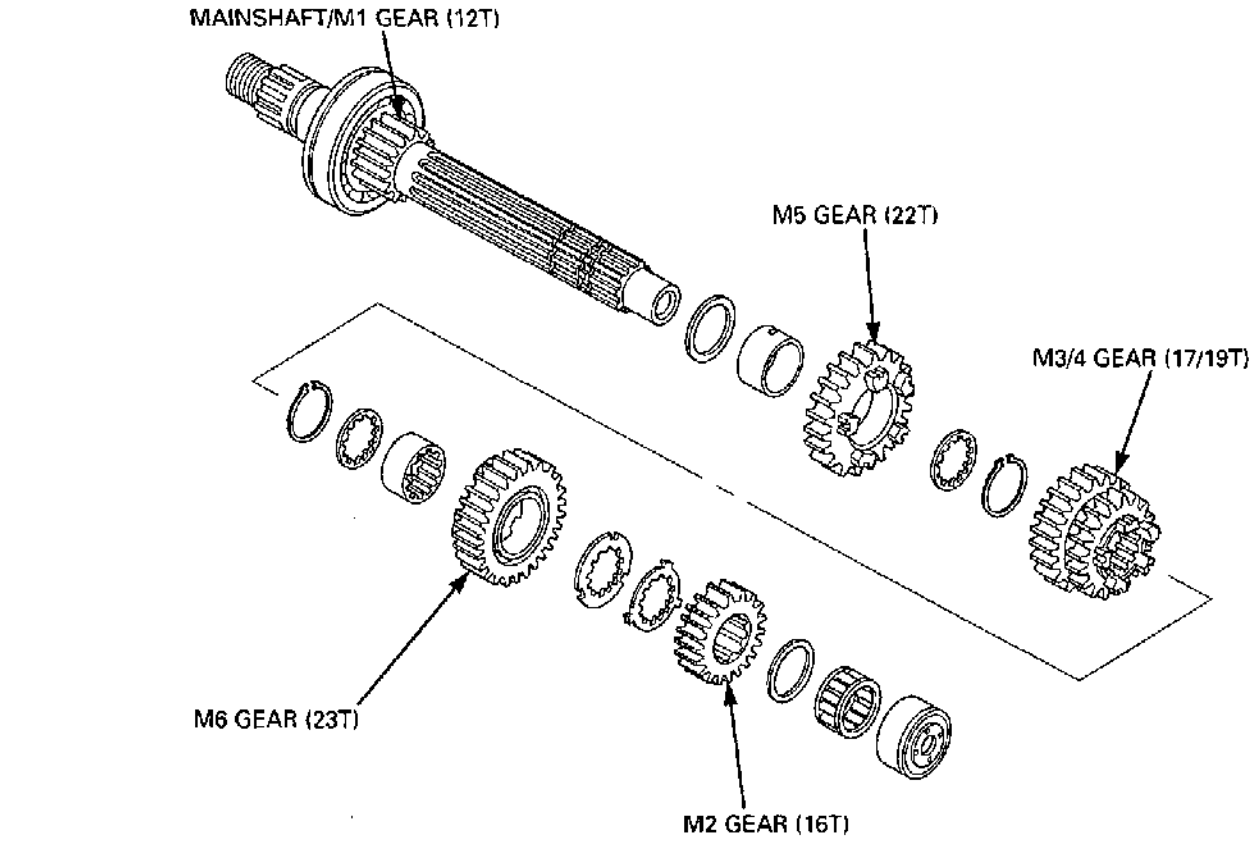
Install a new mainshaft bearing onto the mainshaft by pressing the mainshaft bearing inner race using the special tools.

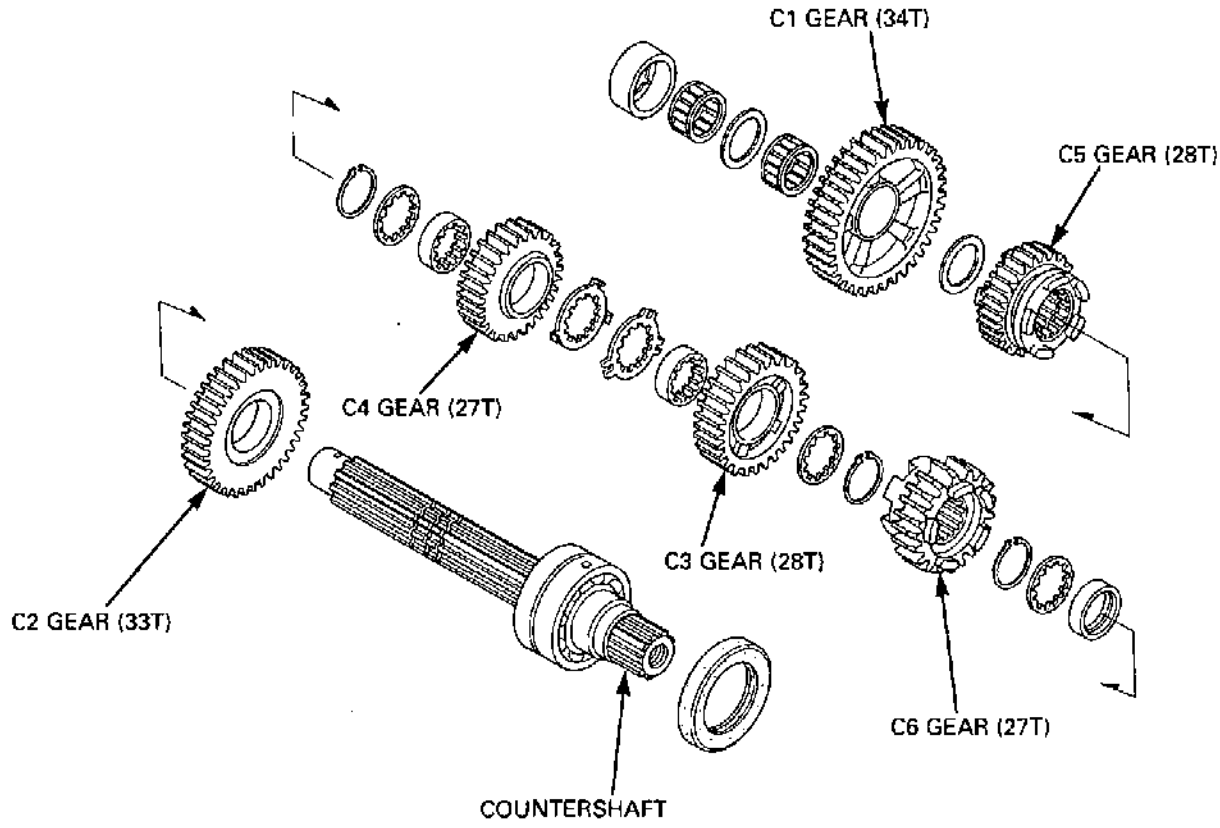
TOOLS:

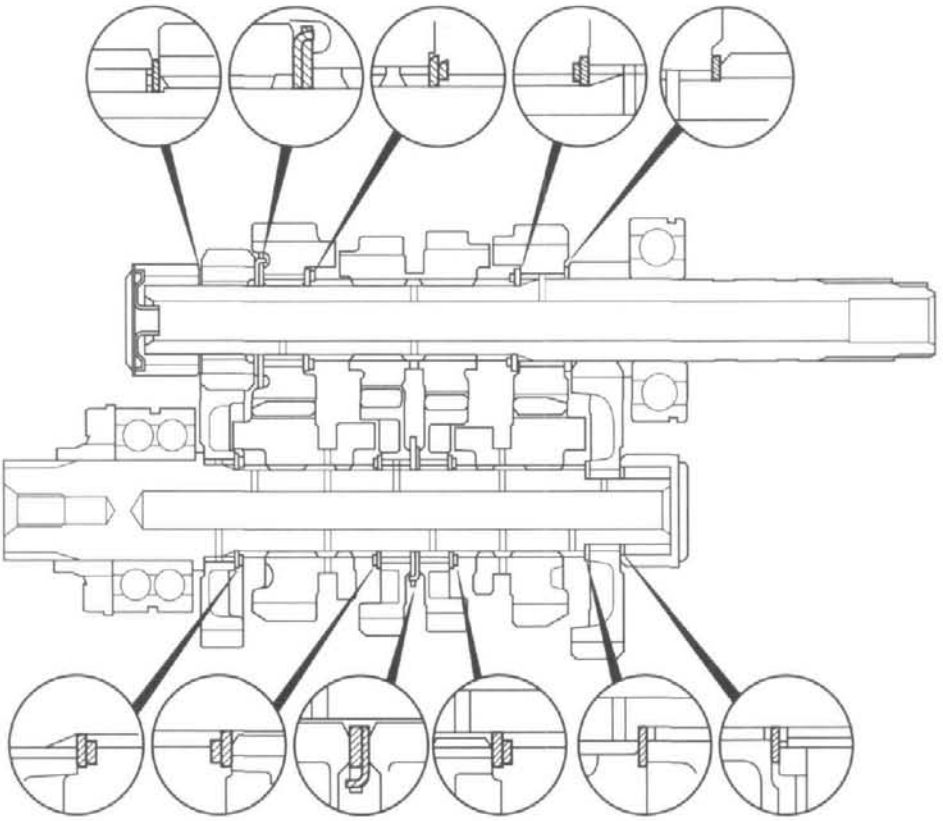
Inner driver C	**07746–0030100**
Attachment, 25 mm I.D.	**07746–0030200**



ASSEMBLY


MAINSHAFT/M1 GEAR (12T)
M5 GEAR (22T)
M3/4 GEAR (17/19T)
M6 GEAR (23T)
M2 GEAR (16T)


C1 GEAR (34T)
C5 GEAR (28T)
C4 GEAR (27T)
C2 GEAR (33T)
C3 GEAR (28T)
C6 GEAR (27T)
COUNTERSHAFT

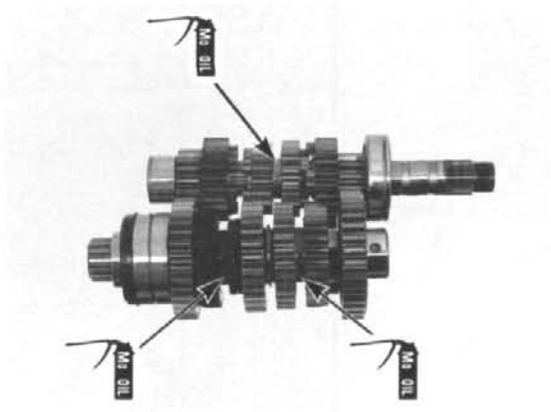


Assemble the transmission gear and shafts.
Coat each gear with clean engine oil and check for smooth movement.
Align the oil holes in the M6 bushing and mainshaft, and the C3, C4 spline bushings and countershaft.

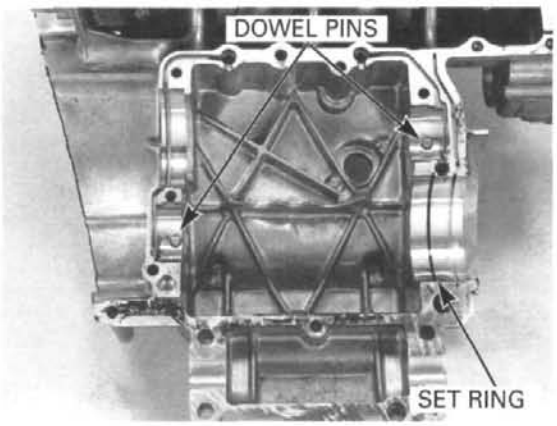
- Align the lock washer tabs with the spline washer grooves.
- Always install the thrust washer and snap ring with the chamfered (rolled) edge facing away from the thrust load.
- Install the snap ring so that its end gap aligns with the groove in the splines.
- Make sure the snap ring is fully seated in the shaft groove after installing it.

INSTALLATION

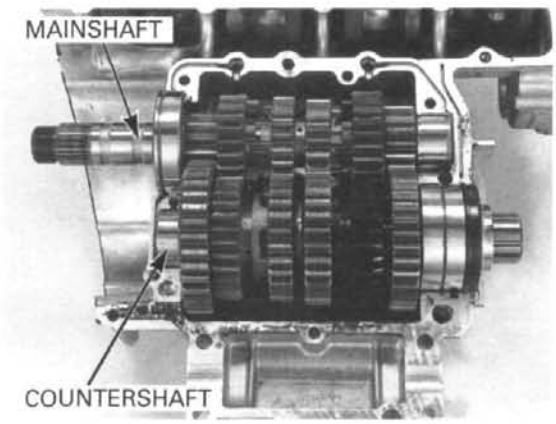
Apply molybdenum oil solution to the shift fork grooves in the M3/4, C5 and C6 gear.



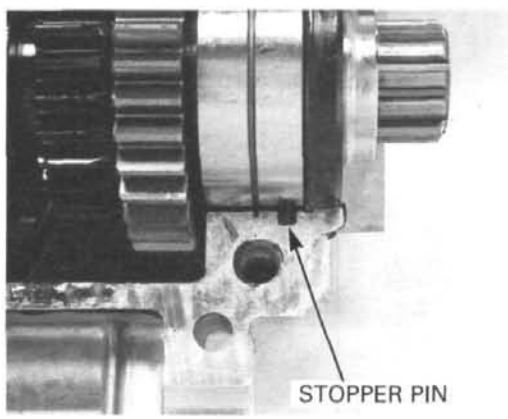
Install the dowel pins in the upper crankcase holes. Install the countershaft bearing set ring into the upper crankcase groove.



Install the mainshaft and countershaft by aligning the countershaft bearing groove with the set ring on the crankcase, and align the bearing cap holes with the dowel pins.

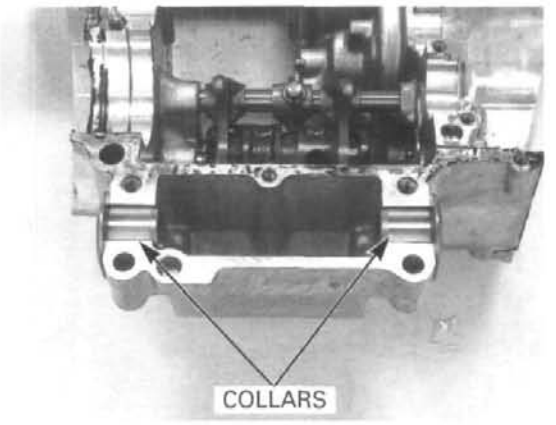


Align the countershaft bearing stopper pin with the groove in the crankcase.

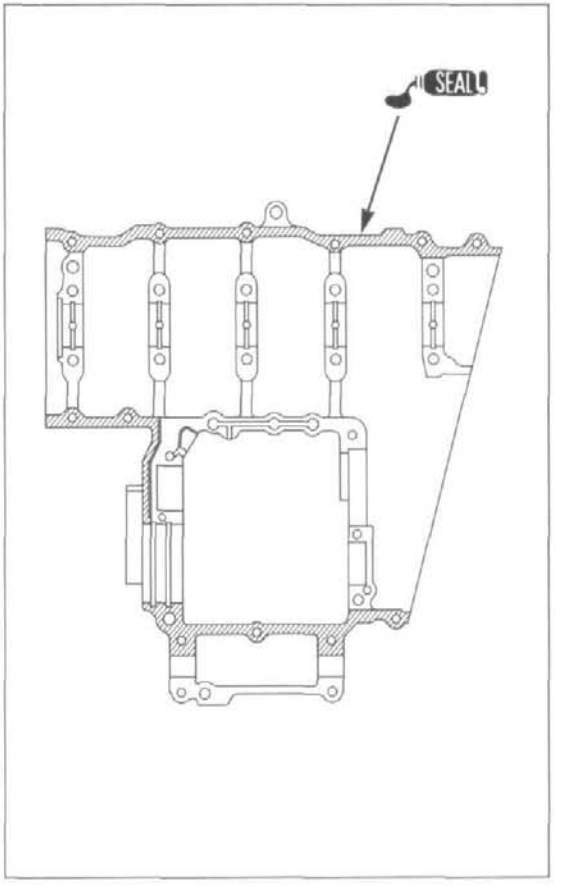


CRANKCASE ASSEMBLY

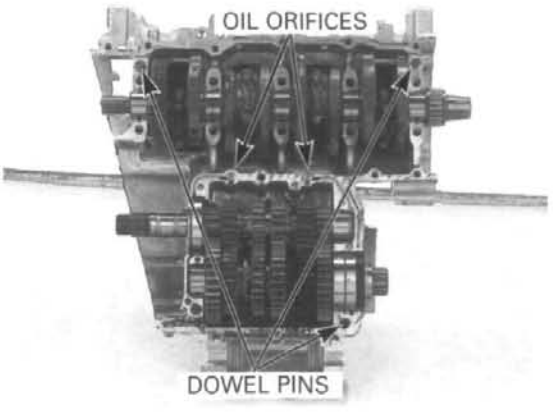
Install the swingarm pivot collars into the lower crankcase.



Apply a light, but thorough, coating of liquid sealant to the crankcase mating surface. Do not apply sealant to the main bearing journal bolt (lower crankcase bolt, 8 mm) area and the oil passage area as shown.



Install the three dowel pins.
Install oil orifices aligning their cut-outs with the groove in the upper crankcase.



Install the lower crankcase onto the upper crankcase. Clean the new crankcase 8-mm bolts thoroughly with solvent and blow them dry.
Apply oil to the 8-mm bolt threads and seating surface, and install them.
Install the 10-mm bolt, six 7-mm bolts and two 6-mm bolts.

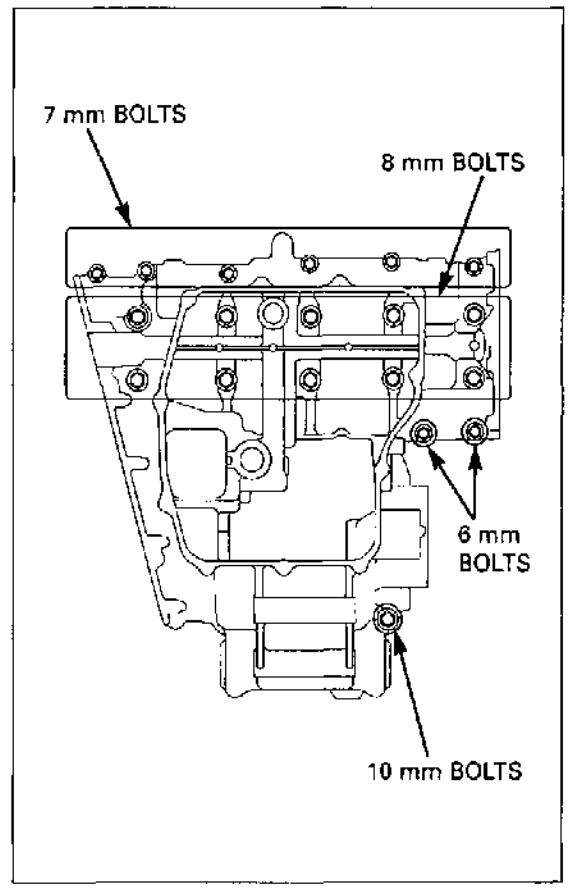
Make sure the upper and lower crankcases are seated securely.

From the inside to outside, tighten the lower crankcase 8-mm bolts (main journal bolts) in a crisscross pattern in two or three steps.

TORQUE: 25 N·m (2.6 kgf·m, 19 lbf·ft)

Tighten the 10-mm bolt to the specified torque, and then tighten 7-mm bolts and 6-mm bolts.

TORQUE: 10-mm bolt: 39 N·m (4.0 kgf·m, 29 lbf·ft)
7-mm bolt: 18 N·m (1.8 kgf·m, 13 lbf·ft)



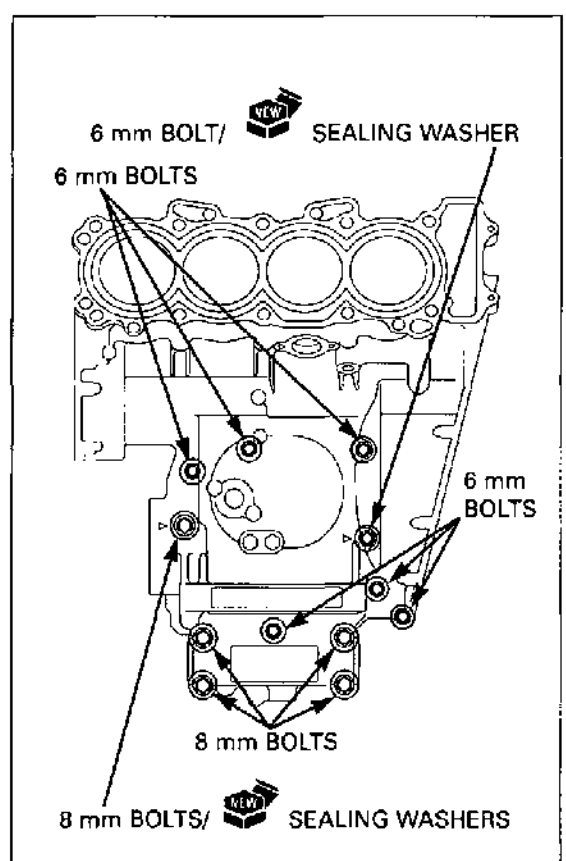
The sealing washer locations are indicated on the upper crankcase using the "Δ" mark.

Install the upper crankcase five 8-mm bolts and seven 6 mm bolts with new sealing washers.

Tighten the 8-mm bolts in a crisscross pattern in two or three steps.

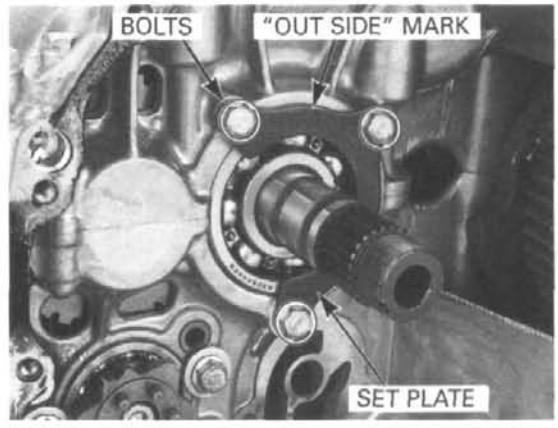
TORQUE: 25 N·m (2.5 kgf·m, 18 lbf·ft)

Tighten the 6-mm bolts in a crisscross pattern in two or three steps securely.



Apply a locking agent to the set plate bolt threads.
Install the mainshaft bearing set plate with its "OUT SIDE" mark facing.
Install and tighten the bolts to the specified torque.

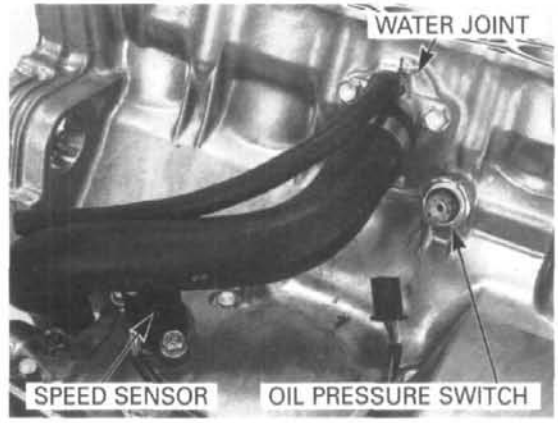
TORQUE: 12 N•m (1.2 kgf•m, 9 lbf•ft)



Install a new O-ring into the groove in the water hose joint groove.
Install the water hose joint to the cylinder block.

Install and tighten the water hose joint bolts securely.

Install the oil pressure switch (page 19-16).
Install the speed sensor (page 19-12).



Install the engine sub-harness and connect the following connectors;
- Speed sensor 3P (Black) connector
- Oil pressure switch connector
- Neutral switch connector

Install the removed parts in the reverse order of removal.