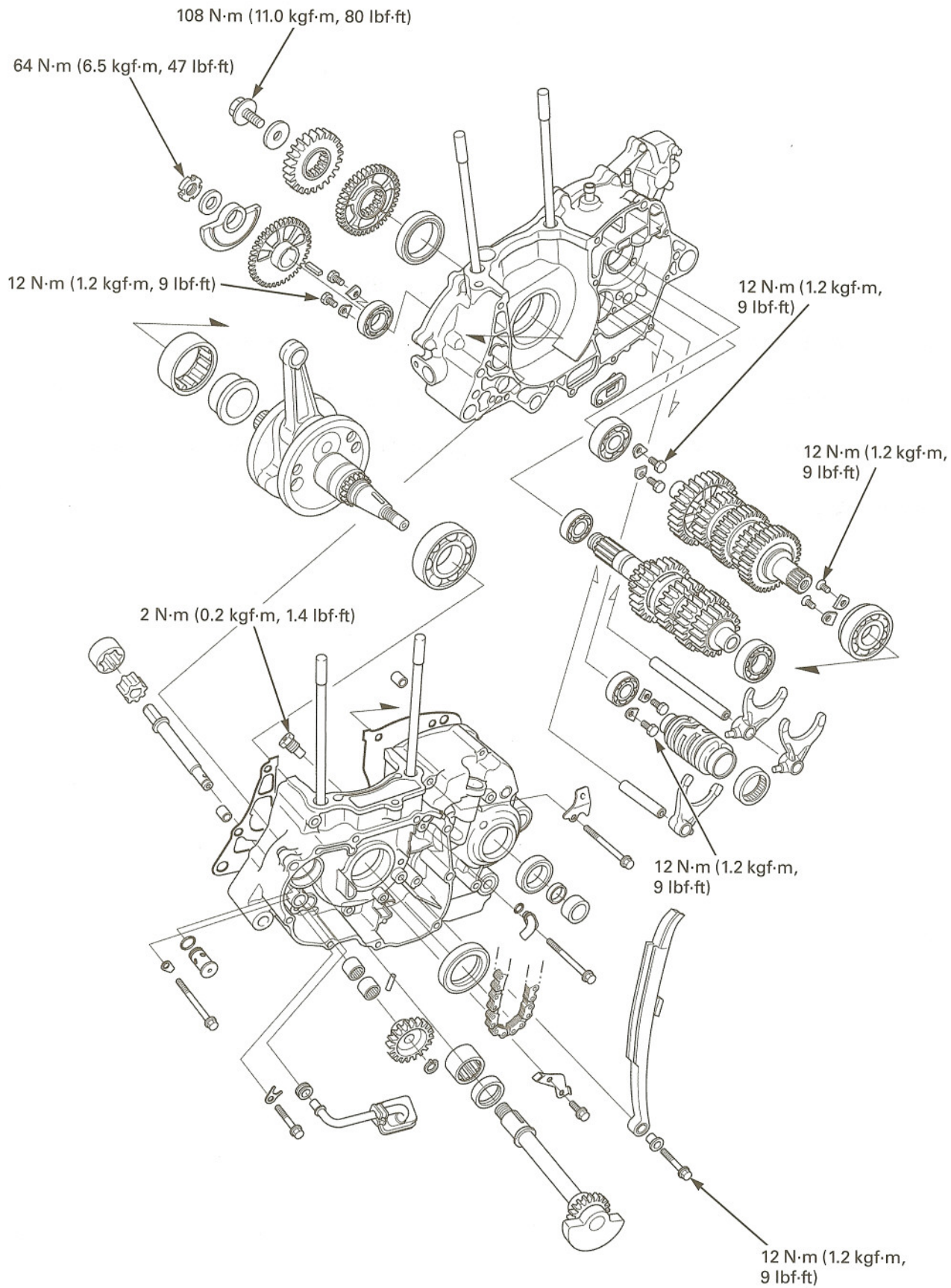


12. CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

SYSTEM COMPONENTS	12-2	TRANSMISSION	12-13
SERVICE INFORMATION	12-3	CRANKSHAFT	12-17
TROUBLESHOOTING	12-6	CRANKCASE BEARING	12-20
BALANCER GEAR/BALANCER	12-7	CRANKCASE ASSEMBLY	12-24
CRANKCASE SEPARATION	12-11		

SYSTEM COMPONENTS



SERVICE INFORMATION

GENERAL

- The crankcase halves must be separated to service the transmission and crankshaft. To service these parts, the engine must be removed from the frame (page 8-4).
- Be careful not to damage the crankcase mating surfaces when servicing.

SPECIFICATIONS

Unit: mm (in)

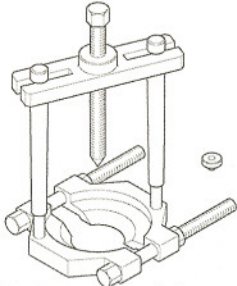
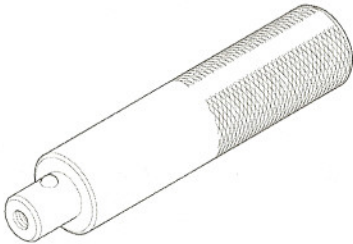
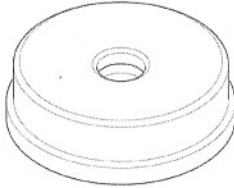
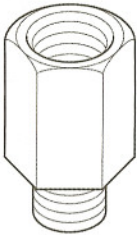

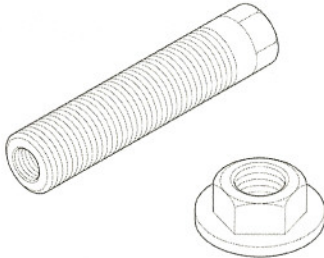
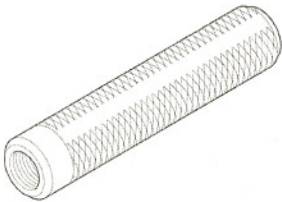
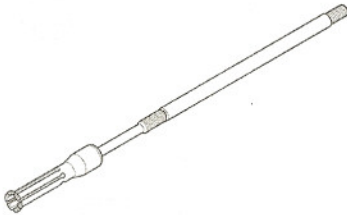
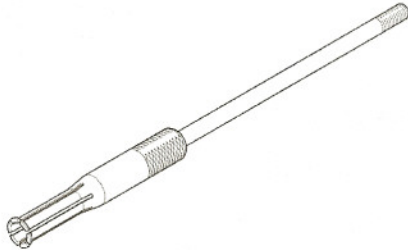
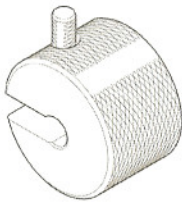
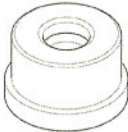

ITEM			STANDARD	SERVICE LIMIT
Shift fork, shaft	Fork I.D.	Left, right	12.003 – 12.024 (0.4726 – 0.4733)	12.04 (0.474)
		Center	11.003 – 11.024 (0.4332 – 0.4340)	11.04 (0.435)
	Shaft O.D.	Left/right	11.983 – 11.994 (0.4718 – 0.4722)	11.97 (0.471)
		Center	10.983 – 10.994 (0.4324 – 0.4328)	10.97 (0.432)
	Fork claw thickness		4.93 – 5.00 (0.194 – 0.197)	4.8 (0.19)
Transmission	Gear I.D.	M4	28.007 – 28.028 (1.1026 – 1.1035)	28.05 (1.104)
		M5	28.020 – 28.033 (1.1031 – 1.1037)	28.06 (1.105)
		C1	22.020 – 22.041 (0.8669 – 0.8678)	22.07 (0.869)
		C2	30.020 – 30.041 (1.1819 – 1.1827)	30.07 (1.184)
		C3	28.020 – 28.041 (1.1031 – 1.1040)	28.07 (1.105)
	Gear bushing O.D.	M4, M5	27.959 – 27.980 (1.1007 – 1.1016)	27.94 (1.100)
		C1	21.959 – 21.980 (0.8645 – 0.8654)	21.94 (0.864)
		C2	29.959 – 29.980 (1.1795 – 1.1803)	29.94 (1.179)
		C3	27.959 – 27.980 (1.1007 – 1.1016)	27.94 (1.100)
	Gear bushing I.D.	M5	25.020 – 25.041 (0.9850 – 0.9859)	25.06 (0.987)
		C1	19.020 – 19.041 (0.7488 – 0.7496)	19.06 (0.750)
		C2	27.020 – 27.041 (1.0638 – 1.0646)	27.06 (1.065)
		C3	25.020 – 25.041 (0.9850 – 0.9859)	25.06 (0.987)
	Mainshaft O.D.	at M5	24.967 – 24.980 (0.9830 – 0.9835)	24.95 (0.982)
	Countershaft O.D.	at C1	18.959 – 18.980 (0.7464 – 0.7472)	18.94 (0.746)
		at C2	26.959 – 26.980 (1.0614 – 1.0622)	26.94 (1.061)
		at C3	24.959 – 24.980 (0.9826 – 0.9835)	24.94 (0.982)
Crankshaft	Runout	Left	–	0.05 (0.002)
		Right	–	0.03 (0.001)
	Big end side clearance		0.05 – 0.60 (0.002 – 0.024)	0.75 (0.030)
	Big end radial clearance		0.006 – 0.018 (0.0002 – 0.0007)	0.05 (0.002)

TORQUE VALUE

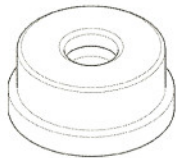
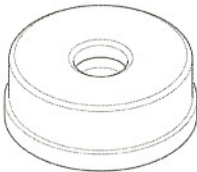
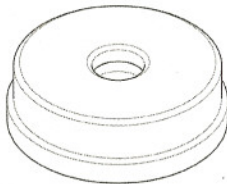
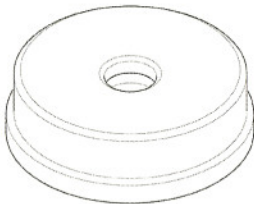




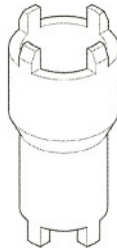
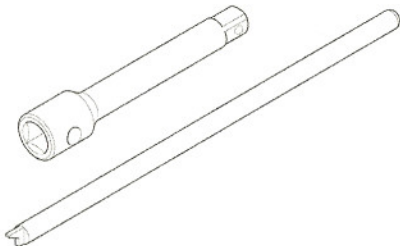


Balancer shaft lock nut	64 N·m (6.5 kgf·m, 47 lbf·ft)	Apply oil to the threads and seating surface. Replace with a new one and stake.
Cam chain tensioner bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply locking agent to the threads.
Primary drive gear bolt	108 N·m (11.0 kgf·m, 80 lbf·ft)	Apply oil to the threads and seating surface.
Bearing set plate bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply locking agent to the threads.
Oil jet	2 N·m (0.2 kgf·m, 1.4 lbf·ft)	Apply locking agent to the threads.

CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

TOOLS

<p>Universal bearing puller 07631-0010000</p>  <p>or equivalent commercially available in U.S.A.</p>	<p>Driver 07749-0010000</p> 	<p>Attachment, 72 x 75 mm 07746-0010600</p> 
<p>Threaded adapter 07WMF-KFF0300</p>  <p>or 07AMF-HP1A100 (U.S.A. only)</p>	<p>Assembly collar 07965-VM00100</p> 	<p>Threaded shaft 07965-VM00200</p>  <p>or 07931-ME4010B and 07931-HB3020A (U.S.A. only)</p>
<p>Bearing remover handle 07936-3710100</p> 	<p>Bearing remover, 17 mm 07936-3710300</p> 	<p>Bearing remover, 20 mm 07936-3710600</p> 
<p>Remover weight 07741-0010201</p>  <p>or 07936-3710200 or 07936-371020A (U.S.A. only)</p>	<p>Attachment, 32 x 35 mm 07746-0010100</p> 	<p>Attachment, 37 x 40 mm 07746-0010200</p> 

CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

<p>Attachment, 42 x 47 mm 07746-0010300</p> 	<p>Attachment, 52 x 55 mm 07746-0010400</p> 	<p>Attachment, 62 x 68 mm 07746-0010500</p> 
<p>Attachment, 72 x 75 mm 07746-0010600</p> 	<p>Pilot, 17 mm 07746-0040400</p> 	<p>Pilot, 20 mm 07746-0040500</p> 
<p>Pilot, 25 mm 07746-0040600</p> 	<p>Pilot, 30 mm 07746-0040700</p> 	<p>Lock nut wrench, 20 x 24 mm 07716-0020100</p> 
<p>Extension bar 07716-0020500</p>  <p>or commercially available equivalent</p>	<p>Gear holder, M2.5 07724-0010100</p>  <p>or 07724-001A100 (U.S.A. only)</p>	<p>Gear holder, M1.5 07724-0010200</p>  <p>or 07724-001A200 (U.S.A. only)</p>

TROUBLESHOOTING

Excessive engine noise

- Worn connecting rod big end bearing
- Worn crankshaft main journal bearing
- Worn balancer bearing
- Improper balancer installation
- Worn transmission gears
- Worn transmission bearings

Transmission jumps out of gear

- Worn gear dogs or dog holes
- Worn shift drum guide groove
- Worn shift fork guide pin
- Worn gear shifter groove
- Worn shift fork
- Bent shift fork shaft

Hard to shift

- Incorrect clutch adjustment
- Bent shift fork
- Bent shift fork shaft
- Bent shift fork claw
- Damaged shift drum guide grooves
- Damaged shift fork guide pin

Engine vibration

- Excessive crankshaft runout
- Improper balancer timing

BALANCER GEAR/BALANCER**REMOVAL**

Remove the following:

- flywheel (page 16-9)
- right crankcase cover (page 11-5)
- clutch (page 11-5)

Temporarily install the clutch outer guide, needle bearing and clutch outer onto the mainshaft. Install the special tool between the primary drive and driven gears as shown, and loosen the primary drive gear bolt.

TOOL:

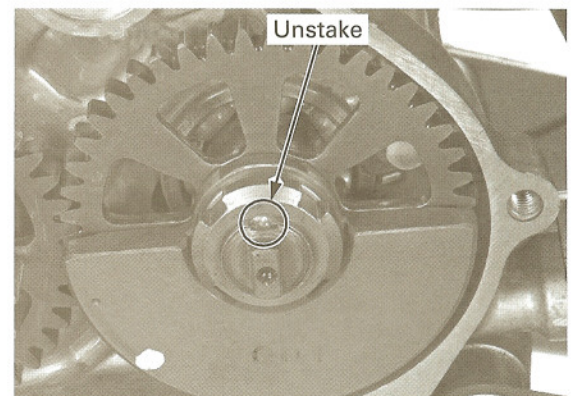
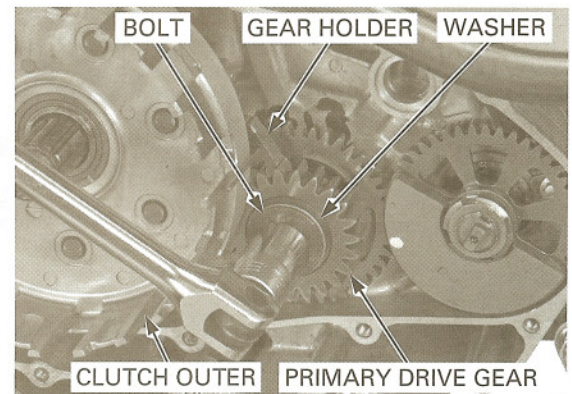
Gear holder, M2.5

**07724-0010100 or
07724-001A100
(U.S.A. only)**

Remove the clutch outer, needle bearing and clutch outer guide. Remove the primary drive gear bolt, washer and gear.

Be careful not to damage the balancer shaft threads.

Unstake the balancer shaft lock nut.



Install the special tool between the balancer drive and driven gears as shown, and loosen the balancer shaft lock nut using the special tool.

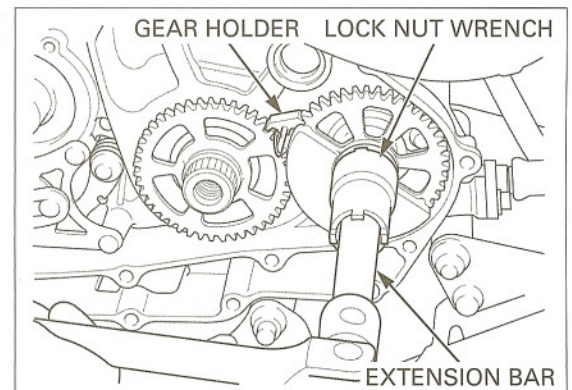
TOOL:

Gear holder, M1.5

**07724-0010200 or
07724-001A200
(U.S.A. only)**

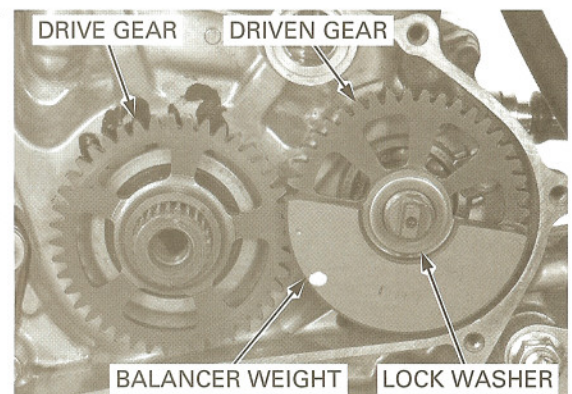
**Lock nut wrench, 20 x 24 mm
Extension bar**

**07716-0020100
07716-0020500 or
commercially
available
equivalent**



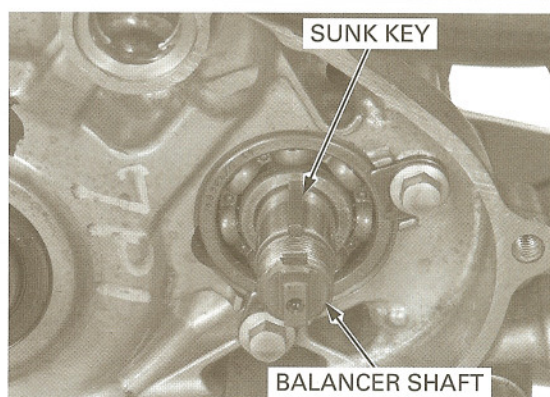
Remove the lock nut.

Remove the lock washer, balancer weight, balancer drive and driven gears.

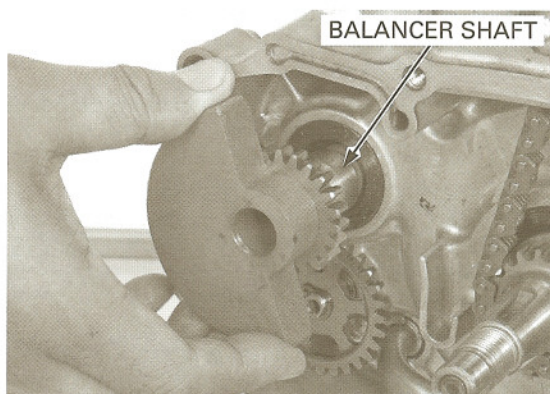


CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

Remove the sunk key from the balancer shaft.



Position the balancer shaft as shown and remove it.



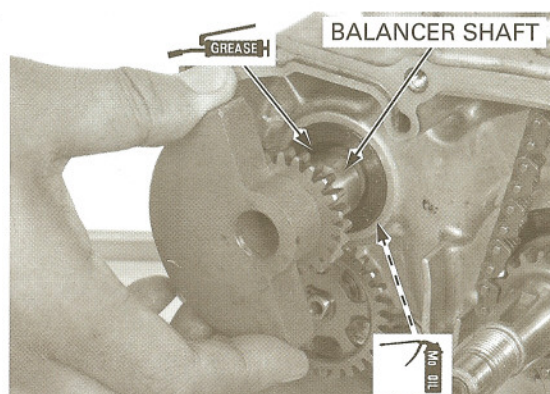
INSPECTION

Check the balancer shaft for wear, damage or scratches.

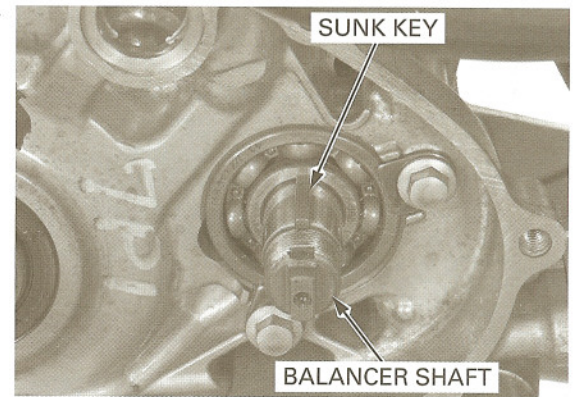


INSTALLATION

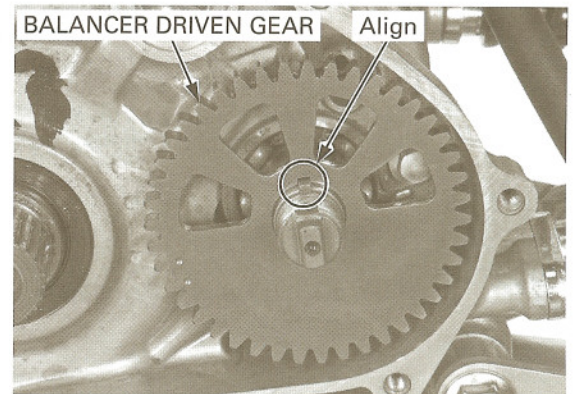
Apply molybdenum oil solution to the balancer shaft ball bearing and needle bearing. Install the balancer shaft into the crankcase at the angle as shown.



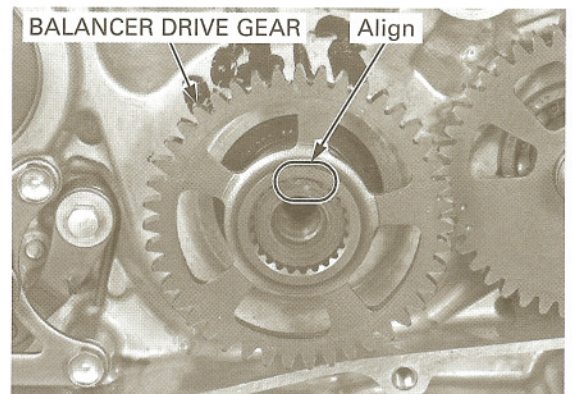
Install the sunk key into the key groove in the balancer shaft.



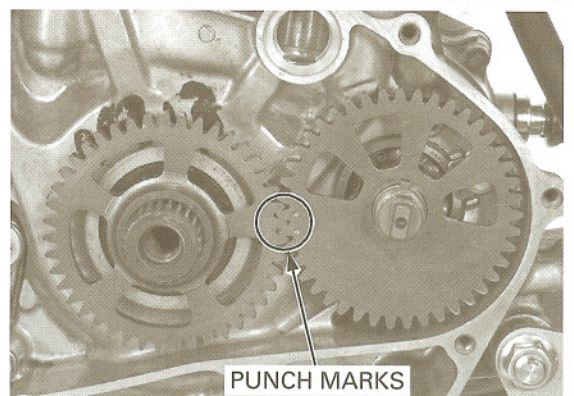
Install the balancer driven gear onto the balancer shaft by aligning the key groove with the key.



Install the balancer drive gear onto the crankshaft by aligning the wide groove with the flat tooth (punch mark).



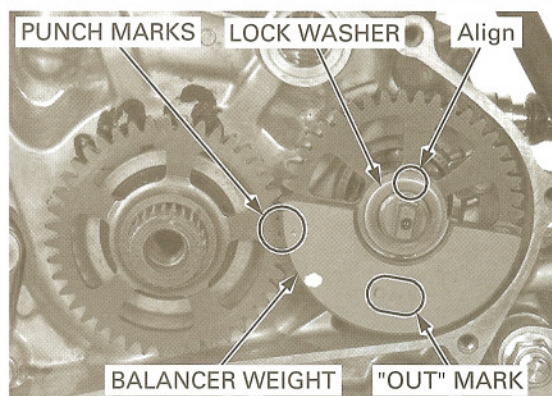
Mesh the balancer drive and driven gears while aligning the punch marks as shown.



CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

The punch marks on the balancer weight and drive gear should align.

Install the balancer weight onto the balancer shaft with the "OUT" mark facing out and by aligning the key groove with the key. Install the lock washer.



Apply oil to a new balancer shaft lock nut threads and seating surface, and install it onto the balancer shaft.

Install the special tool between the balancer drive and driven gears as shown, and tighten the balancer shaft lock nut using the special tool.

TOOL:

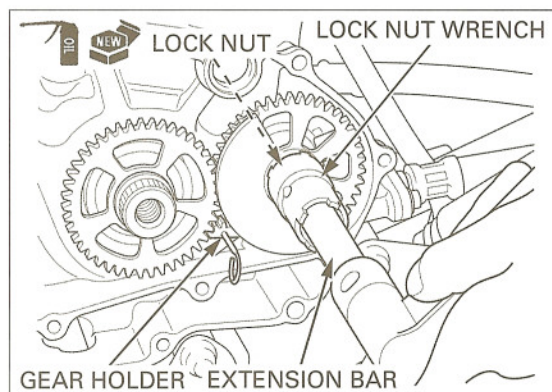
Gear holder, M1.5

Lock nut wrench, 20 x 24 mm

Extension bar

07724-0010200 or
07724-001A200
(U.S.A. only)

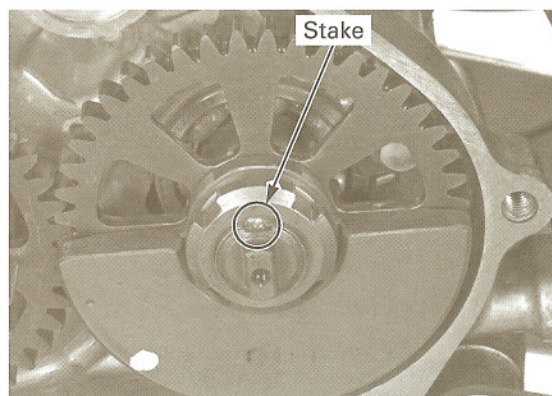
07716-0020100
07716-0020500 or
commercially
available
equivalent



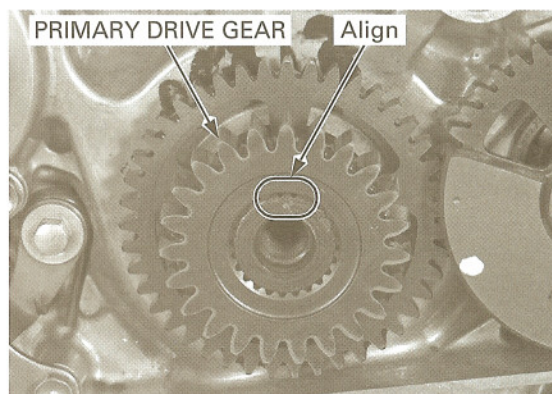
TORQUE: 64 N·m (6.5 kgf·m, 47 lbf·ft)

Be careful not to damage the balancer shaft threads.

Stake the balancer shaft lock nut into the balancer shaft groove.



Install the primary drive gear onto the crankshaft by aligning the wide groove with the flat tooth (punch mark).



Temporarily install the clutch outer guide, needle bearing and clutch outer onto the mainshaft. Apply oil to the primary drive gear bolt threads and seating surface, and install the washer and bolt. Install the special tool between the primary drive and driven gears as shown, and tighten the primary drive gear bolt.

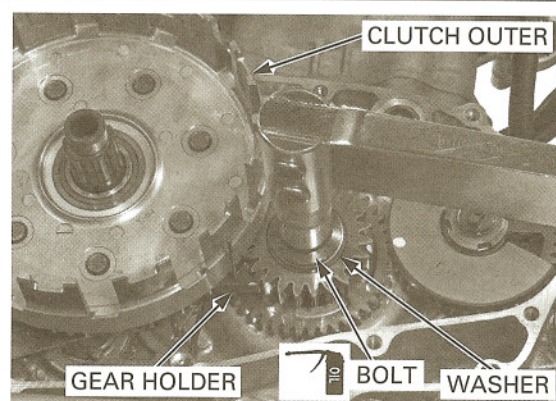
TOOL:

Gear holder, M2.5

07724-0010100 or
07724-001A100
(U.S.A. only)

Install the following:

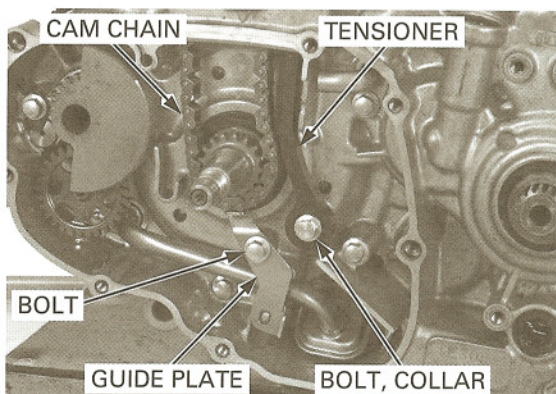
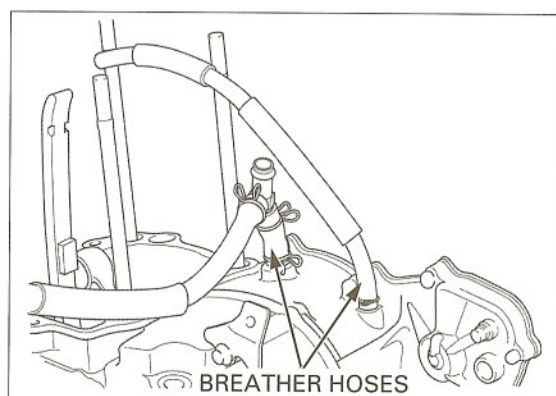
- clutch (page 11-10)
- right crankcase cover (page 11-22)
- flywheel (page 16-9)



CRANKCASE SEPARATION

Remove the following:

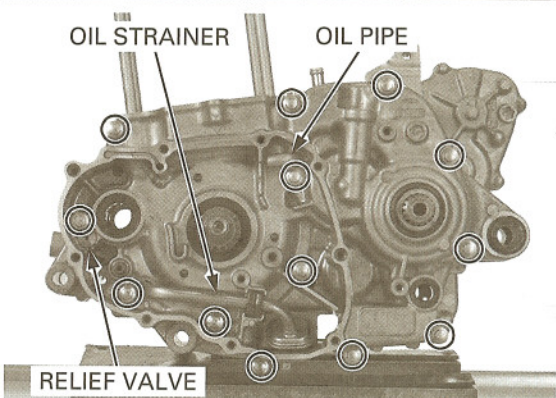
- engine (page 8-4)
- cylinder head (page 9-12)
- cylinder, piston (page 10-4)
- clutch (page 11-5)
- gearshift linkage (page 11-18)
- flywheel (page 16-9)
- breather hoses
- balancer shaft (page 12-7)
- oil pump driven gear (page 5-4)
- bolt and guide plate
- cam chain
- bolt, cam chain tensioner and collar



Loosen the thirteen crankcase bolts in a crisscross pattern in 2 or 3 steps.

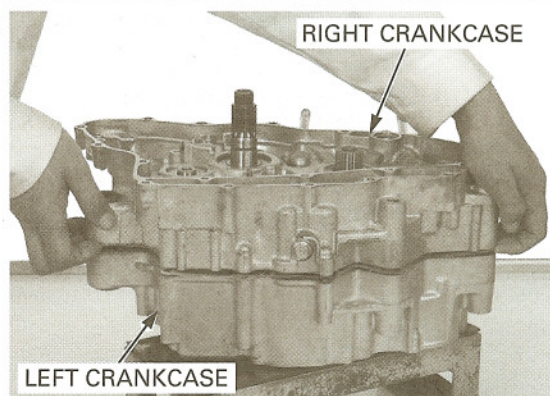
Remove the bolts, relief valve set plate and oil strainer pipe set plate.

Remove the relief valve, oil strainer and oil pipe.

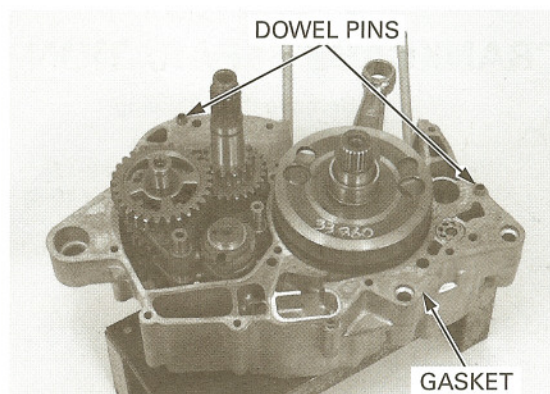


CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

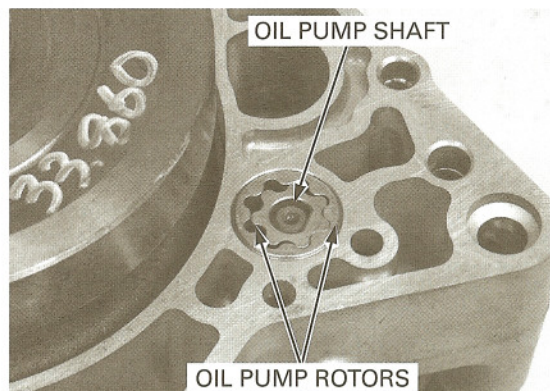
Place the left crankcase down, separate the right crankcase from the left crankcase.



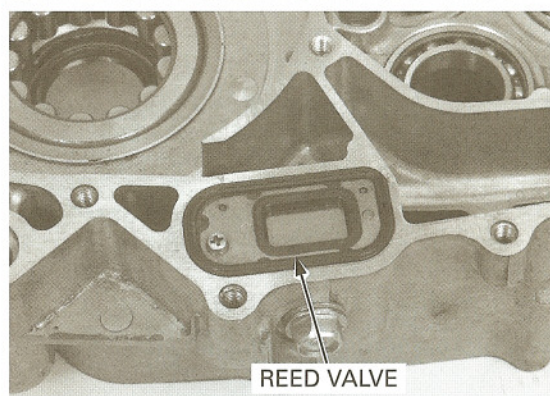
Remove the dowel pins and gasket.



Remove the oil pump shaft, inner and outer rotors from the left crankcase if necessary.

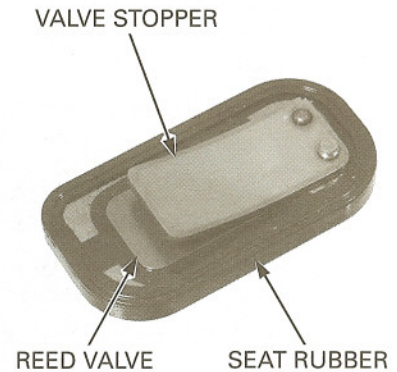


Remove the reed valve from the right crankcase.



REED VALVE INSPECTION

Check the reed valve for fatigue or damage.
Check the reed valve stopper for cracks, damage or deformation.
Check the seat rubber for deterioration or damage.



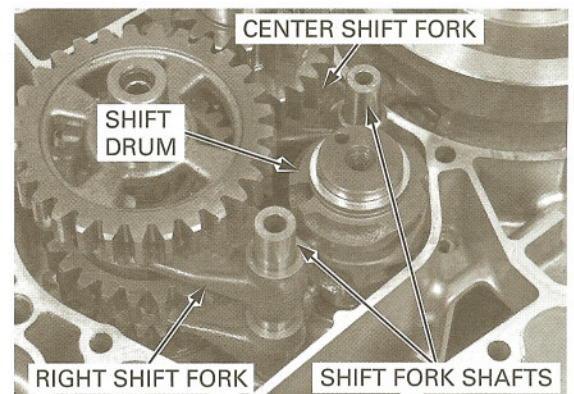
TRANSMISSION

DISASSEMBLY

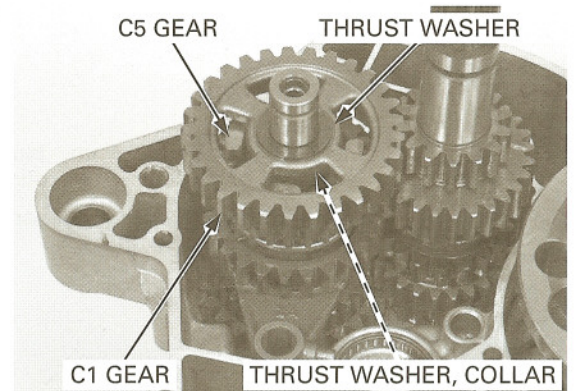
Separate the crankcase halves (page 12-11).

Pull out the shift fork shafts.

Remove the right shift fork, center shift fork and shift drum.



Remove the thrust washer, C1 gear, collar, thrust washer and C5 gear from the countershaft.



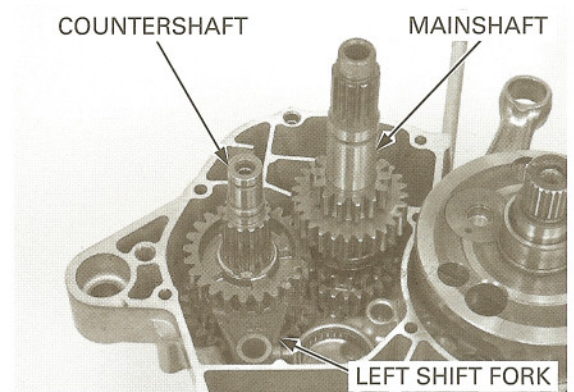
Remove the mainshaft, countershaft and left shift fork as an assembly.

Do not expand the snap ring more than necessary for removal.

Remove the left shift fork from the C4 gear. Disassemble the mainshaft and countershaft.

NOTE:

- Keep track of the disassembled parts (gears, bushings, washers and rings) by sliding them onto a tool or slipping them onto a piece of wire.



INSPECTION

Check the gear shifter groove, dogs, dog holes and teeth for abnormal wear or damage.

Measure the I.D. of each gear.

SERVICE LIMITS: M4: 28.05 mm (1.104 in)
M5: 28.06 mm (1.105 in)
C1: 22.07 mm (0.869 in)
C2: 30.07 mm (1.184 in)
C3: 28.07 mm (1.105 in)

Check the bushings for abnormal wear or damage.
Measure the O.D. of each bushing.

SERVICE LIMITS: M4, M5: 27.94 mm (1.100 in)
C1: 21.94 mm (0.864 in)
C2: 29.94 mm (1.179 in)
C3: 27.94 mm (1.100 in)

Measure the I.D. of each bushing.

SERVICE LIMITS: M5: 25.06 mm (0.987 in)
C1: 19.06 mm (0.750 in)
C2: 27.06 mm (1.065 in)
C3: 25.06 mm (0.987 in)

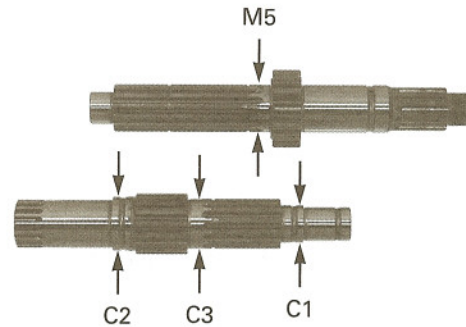
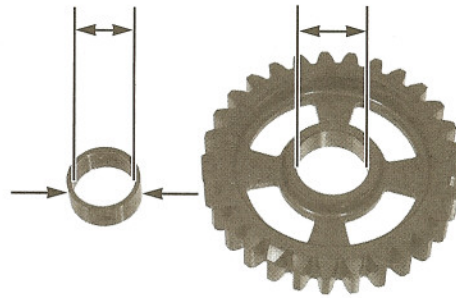
Check the spline grooves and sliding surfaces of the mainshaft and countershaft for abnormal wear or damage.

Measure the O.D. of the mainshaft and countershaft.

SERVICE LIMITS: at M5: 24.95 mm (0.982 in)
at C1: 18.94 mm (0.746 in)
at C2: 29.94 mm (1.061 in)
at C3: 24.94 mm (0.982 in)

Inspect the shift drum journals for scoring, scratches or evidence of insufficient lubrication.

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



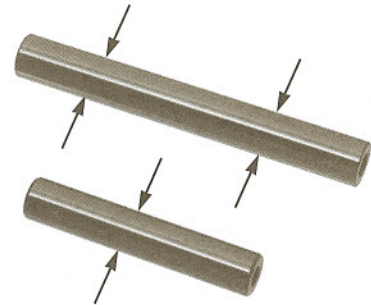
Check the shift fork shafts for abnormal wear or damage.

Measure each shift fork shaft O.D.

SERVICE LIMITS:

Left and right: 11.97 mm (0.471 in)

Center: 10.97 mm (0.432 in)



Check the shift forks for abnormal wear or damage.

Measure the I.D. of each shift fork.

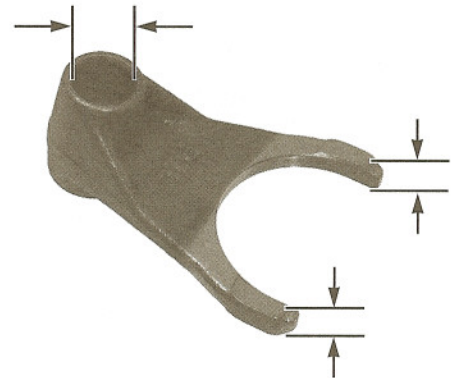
SERVICE LIMITS:

Left and right: 12.04 mm (0.474 in)

Center: 11.04 mm (0.435 in)

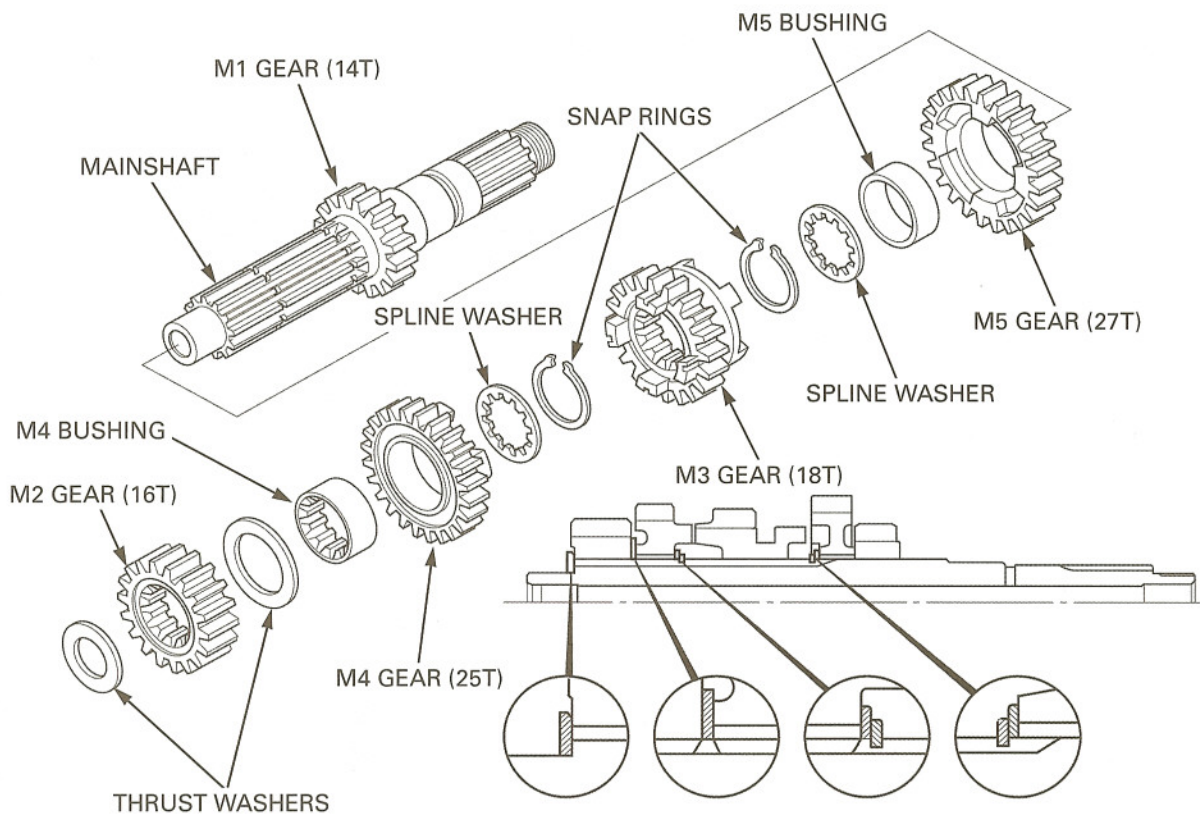
Measure claw thickness of each shift fork.

SERVICE LIMIT: 4.8 mm (0.19 in)

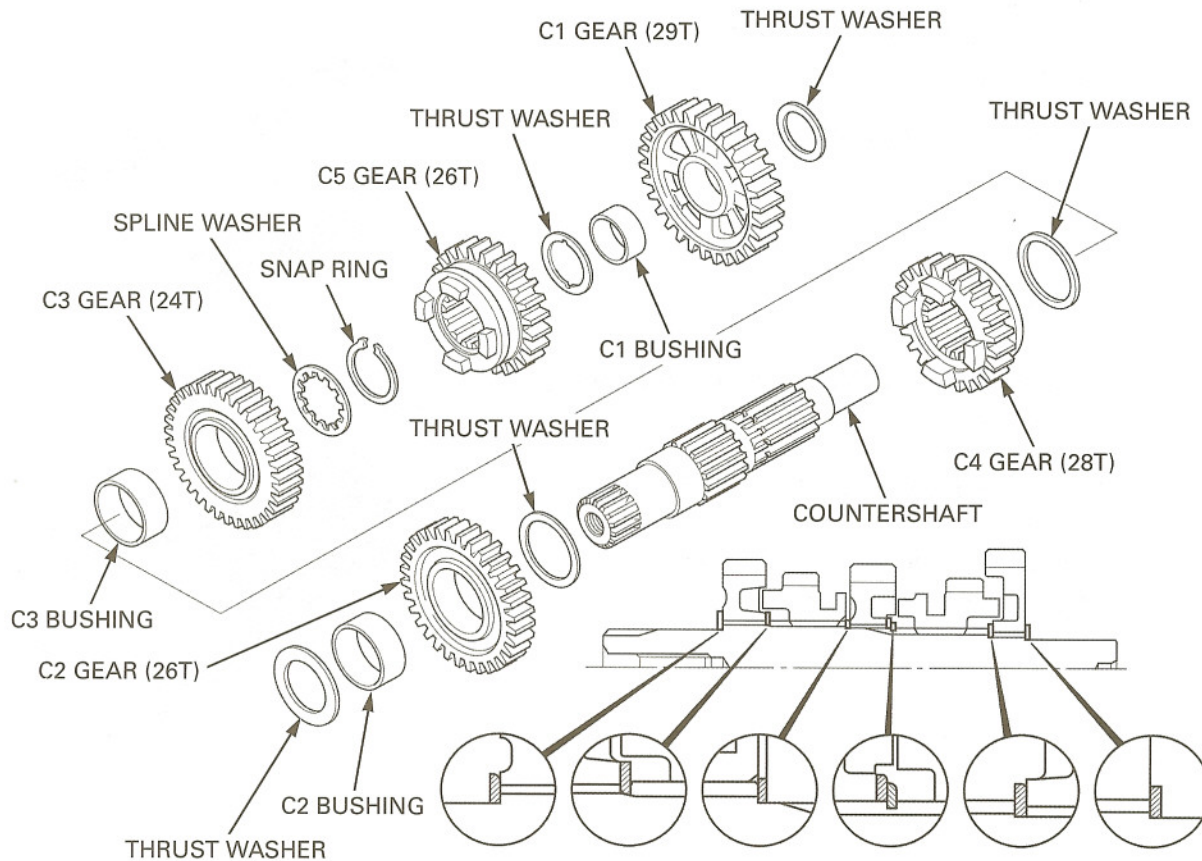


ASSEMBLY

MAINSHAFT



COUNTERSHAFT



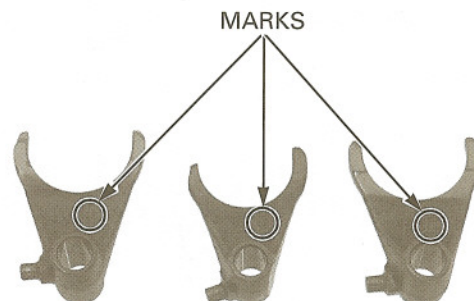
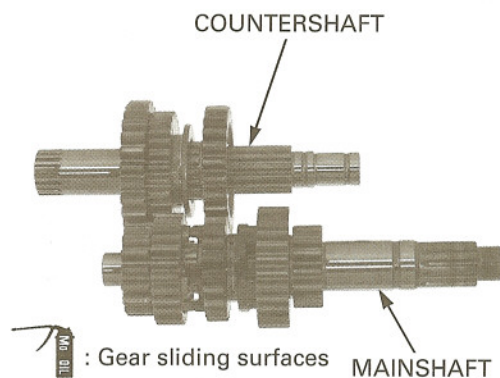
Apply molybdenum oil solution to the sliding surfaces of the transmission gears.

Assemble the mainshaft and countershaft except C5 gear, thrust washer, C1 gear, collar and thrust washer.

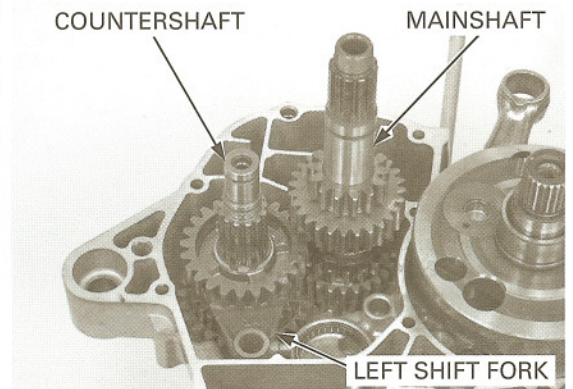
NOTE:

- Always install the washer and snap ring with the chamfered (rolled) edge facing away from the thrust load.
- Do not reuse worn snap ring which could easily spin in the groove.
- Install the snap ring so that its end gap aligns with the groove in the splines.
- Make sure that the snap ring is fully seated in the shaft groove after installing it.

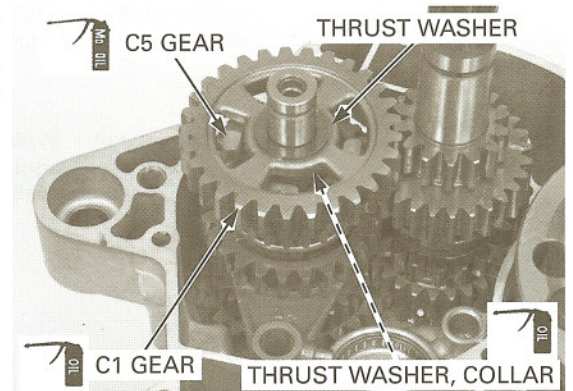
Make sure the shift fork identification marks. The left shift fork has an "L" (Left) mark, the center shift fork has a "C" (Center) mark and the right shift fork has an "R" (Right) mark.



Apply molybdenum oil solution to the claw and guide pin of the left shift fork.
Install the left shift fork into the C4 gear shifter groove so that the identification mark faces to the left crankcase.
Install the mainshaft, countershaft and left shift fork as an assembly into the left crankcase.



Apply molybdenum oil solution to the C5 gear sliding surface and install it onto the countershaft.
Apply oil to the C1 gear and bushing sliding surfaces, and install the thrust washer, C1 gear, bushing and thrust washer onto the countershaft.

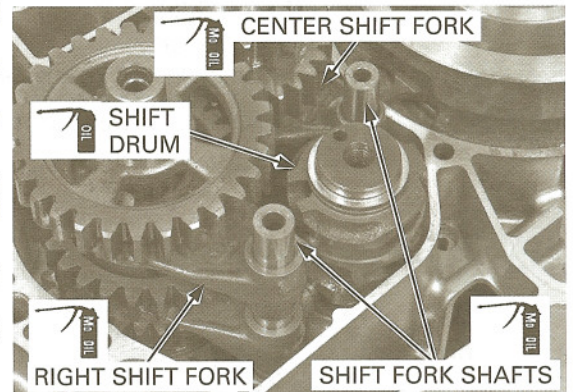


Apply molybdenum oil solution to the claws and guide pins of the center and right shift forks.
Install the center shift fork into the M3 gear shifter groove with the identification mark facing up.
Install the right shift fork into the C5 gear shifter groove with the identification mark facing down.

Apply molybdenum oil solution to the shift fork shafts and install them through the shift forks and into the left crankcase.

Apply oil to the shift drum guide grooves and install it into the left crankcase.
Install the shift fork guide pins into the shift drum guide grooves.

Assemble the crankcase halves (page 12-24).

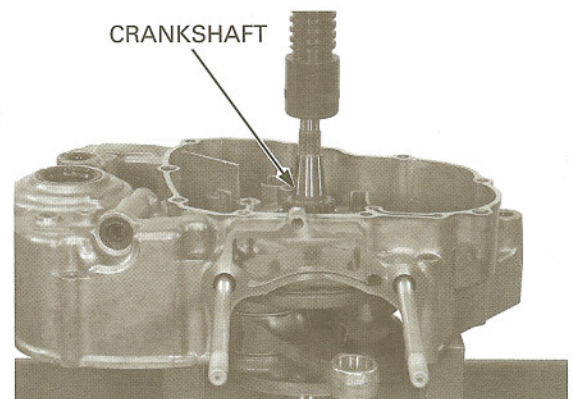


CRANKSHAFT

REMOVAL

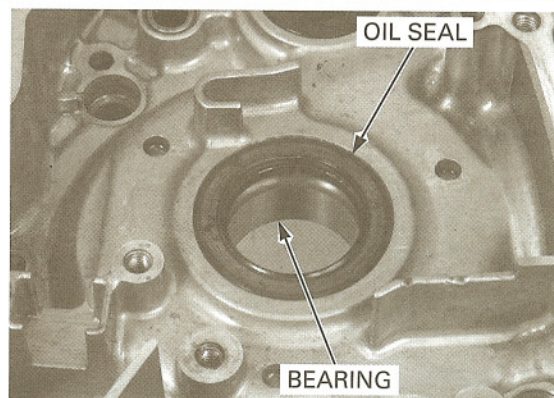
Separate the crankcase halves and remove the oil pump (page 12-11).
Remove the transmission (page 12-13).

Remove the crankshaft from the left crankcase using a hydraulic press while holding it.



CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

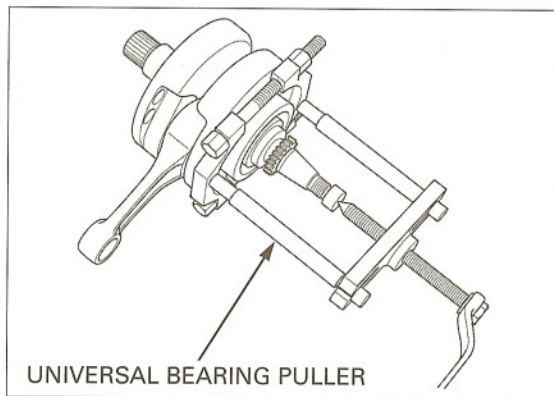
Remove the oil seal from the left crankcase.
Drive the crankshaft bearing out of the left crankcase.



Remove the left crankshaft bearing using the special tool if it comes out with the crankshaft. Discard the bearing.

TOOL:

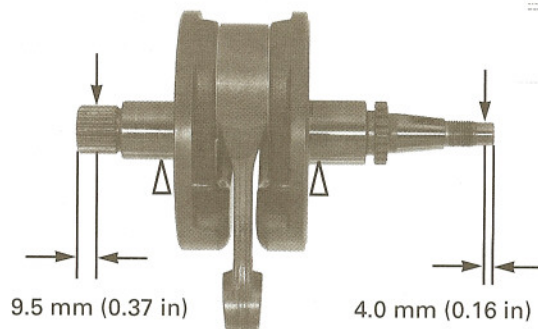
Universal bearing puller 07631-0010000 or equivalent commercially available in U.S.A.



INSPECTION

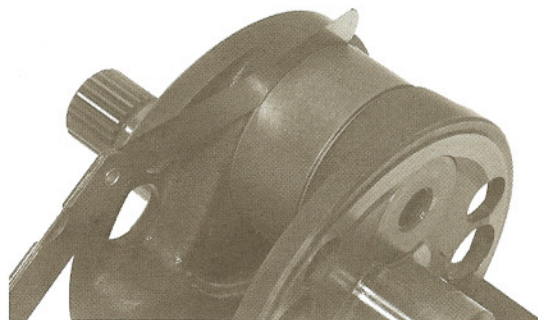
Set the crankshaft on a stand or V-blocks and measure the runout using a dial indicator.

SERVICE LIMIT: 0.03 mm (0.001 in)



Measure the connecting rod big end side clearance.

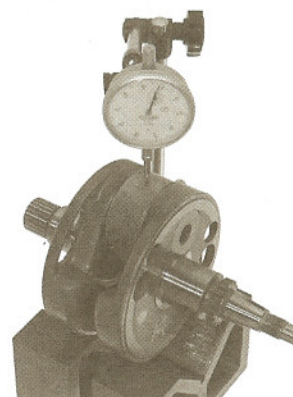
SERVICE LIMIT: 0.75 mm (0.030 in)



CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

Measure the connecting rod big end radial clearance.

SERVICE LIMIT: 0.05 mm (0.002 in)

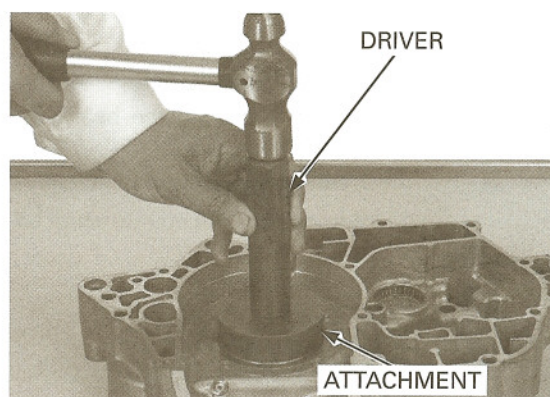


INSTALLATION

Drive a new left crankshaft bearing into the left crankcase.

TOOLS:

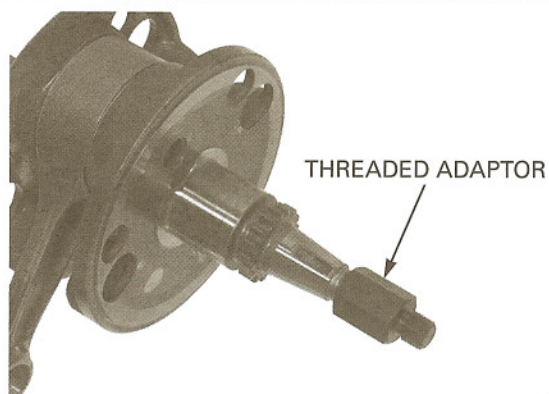
Driver	07749-0010000
Attachment, 72 x 75 mm	07746-0010600



Install the special tool onto the crankshaft end.

TOOLS:

Threaded adaptor	07WMF-KFF0300 or
	07AMF-HP1A100
	(U.S.A. only)



Set the special tools onto the crankshaft and left crankshaft bearing.

TOOLS:

Assembly collar	07965-VM00100
Threaded shaft	07965-VM00200

U.S.A.TOOLS:

Assembly shaft	07931-ME4010B and
Special nut	07931-HB3020A and
Assembly collar	07965-VM00100

Be careful not to bend the connecting rod by letting it press against the crankcase mating surface.

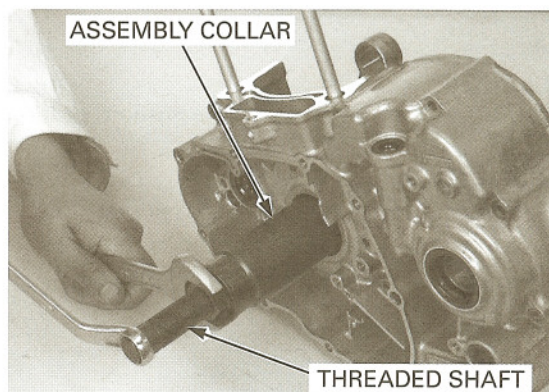
Draw the crankshaft into the left crankshaft bearing inner race (left crankcase).

Coat the oil seal contacting surface of the crankshaft with oil.

Apply grease to a new crankshaft oil seal lip and install it into the left crankcase.

Install the transmission (page 12-15).

Assemble the crankcase halves (page 12-24).



CRANKCASE BEARING

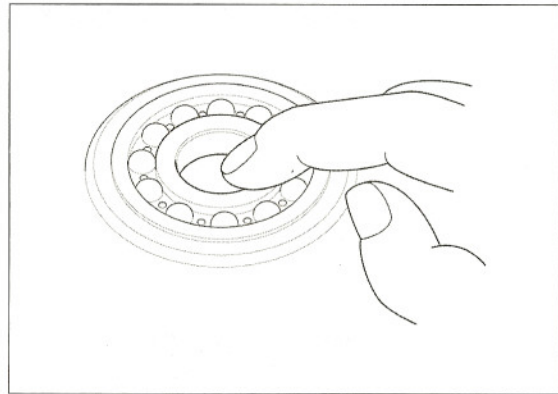
INSPECTION

Remove the crankshaft (page 12-17).

Turn the inner race of each crankcase bearing with your finger. The bearing should turn smoothly and quietly.

Also check that the bearing outer race fits tightly in the crankcase.

Replace any bearing if the inner race does not turn smoothly, quietly or if the outer race fits loosely in the crankcase.

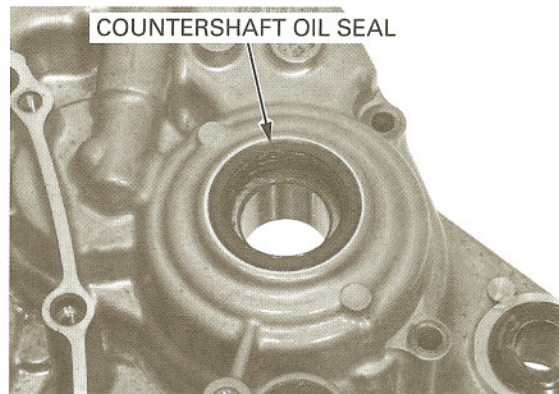


LEFT CRANKCASE BEARING REPLACEMENT

Before removing the bearings, heat the crankcase evenly using a heat gun.

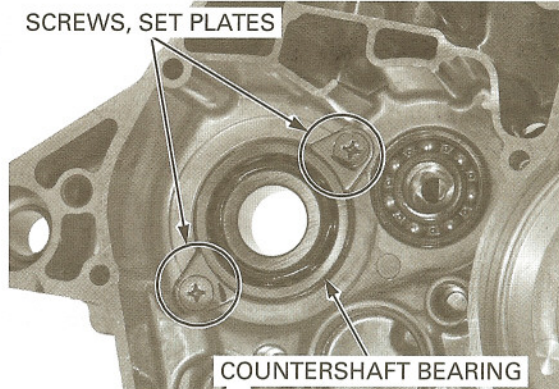
Remove the countershaft collar.

Remove the left countershaft oil seal.



Remove the screws and set plates.

Drive the countershaft bearing out of the left crankcase.



Remove the mainshaft bearing using the special tools.

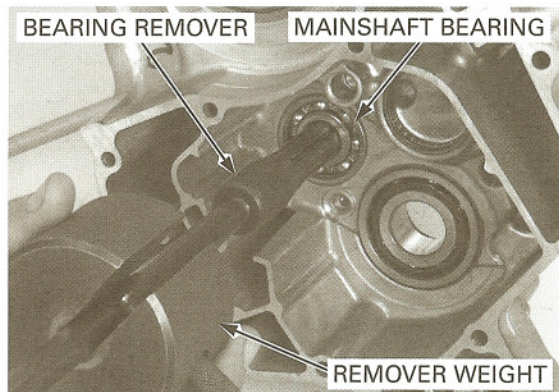
TOOLS:

Remover handle

Bearing remover, 17 mm

Remover weight

07936-3710100
07936-3710300
07741-0010201 or
07936-3710200 or
07936-371020A
(U.S.A. only)

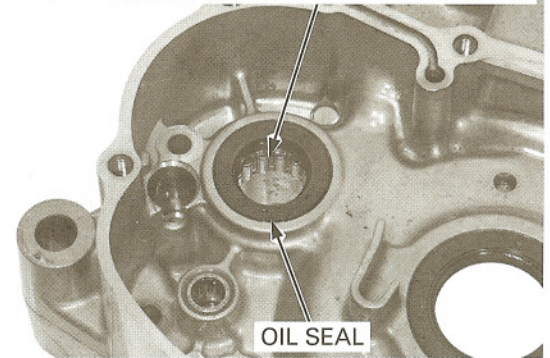


Remove the balancer shaft oil seal.
Remove the balancer shaft needle bearing using the special tools.

TOOLS:

Remover handle	07936-3710100
Bearing remover, 20 mm	07936-3710600
Remover weight	07741-0010201 or 07936-3710200 or 07936-371020A (U.S.A. only)

BALANCER SHAFT NEEDLE BEARING



Drive new mainshaft and countershaft bearings into the left crankcase with the markings facing up, using the special tools.

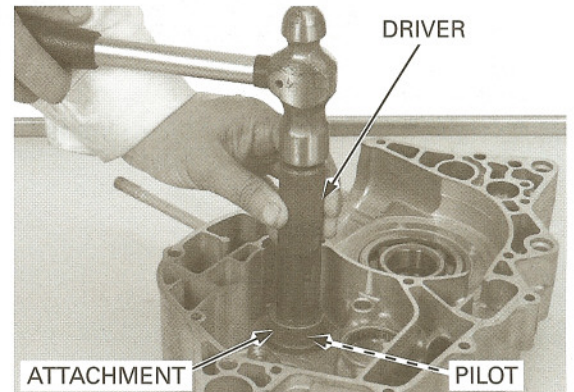
TOOLS:

Mainshaft bearing:

Driver	07749-0010000
Attachment, 37 x 40 mm	07746-0010200
Pilot, 17 mm	07746-0040400

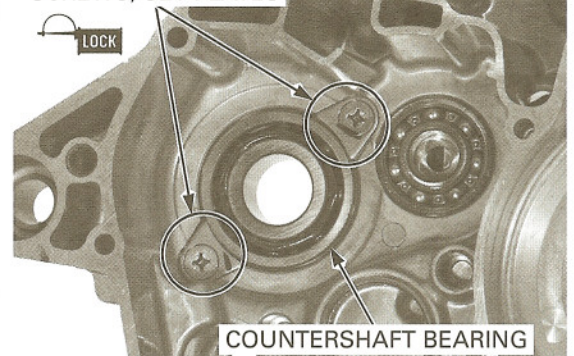
Countershaft bearing:

Driver	07749-0010000
Attachment, 52 x 55 mm	07746-0010400



Apply locking agent to the set plate screw threads.
Install the countershaft bearing set plates and tighten the screws securely.

SCREWS, SET PLATES



Apply grease to a new countershaft oil seal lip and install it into the left crankcase.



CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

Press a new balancer shaft needle bearing into the left crankcase using the special tools.

TOOLS:

Driver	07749-0010000
Attachment, 32 x 35 mm	07746-0010100
Pilot, 20 mm	07746-0040500

Apply grease to a new balancer shaft oil seal lip and install it into the left crankcase.

BALANCER SHAFT NEEDLE BEARING

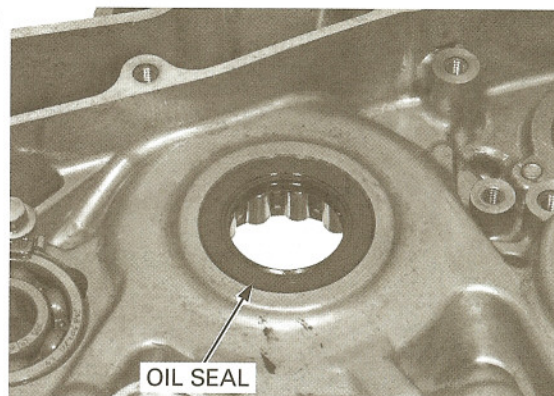


RIGHT CRANKCASE BEARING REPLACEMENT

Always wear insulated gloves when handling a heated crankcase.

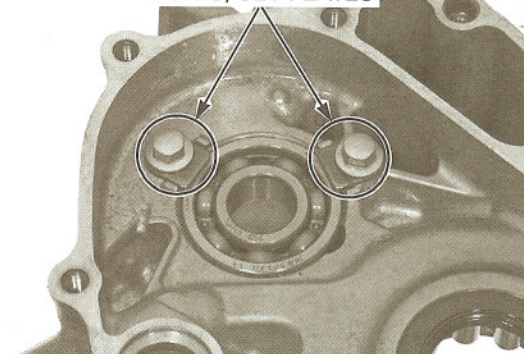
Before removing the bearings, heat the crankcase evenly using a heat gun.

Remove the crankshaft oil seal.



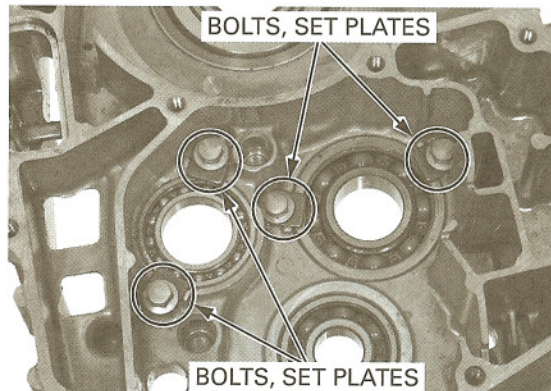
Remove the bolts and balancer shaft bearing set plates.

BOLTS, SET PLATES



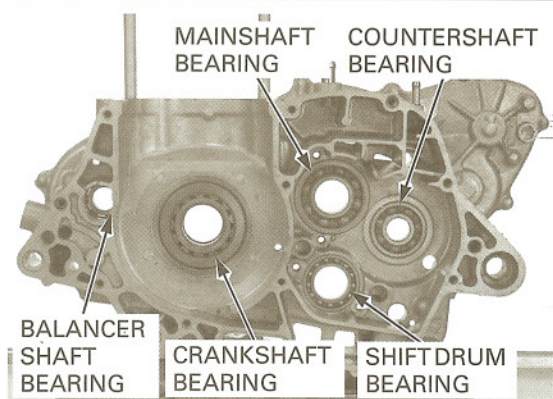
Remove the bolts and, mainshaft and shift drum bearing set plates.

BOLTS, SET PLATES



CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

Drive the crankshaft, mainshaft, countershaft, shift drum and balancer shaft bearings out of the right crankcase.



Drive new bearings into the right crankcase with the markings facing up, using the special tools.

TOOLS:

Crankshaft bearing:

Driver	07749-0010000
Attachment, 62 x 68 mm	07746-0010500
Pilot, 30 mm	07746-0040700

Mainshaft bearing:

Driver	07749-0010000
Attachment, 52 x 55 mm	07746-0010400
Pilot, 25 mm	07746-0040600

Countershaft bearing:

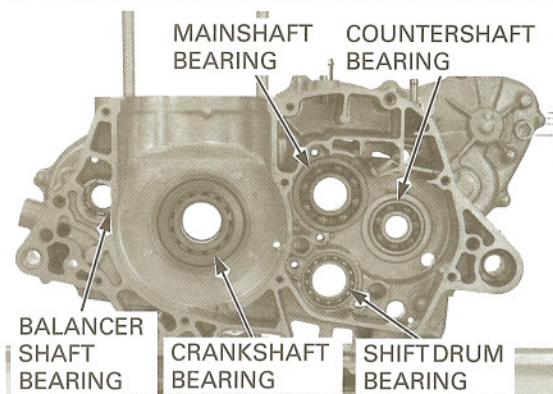
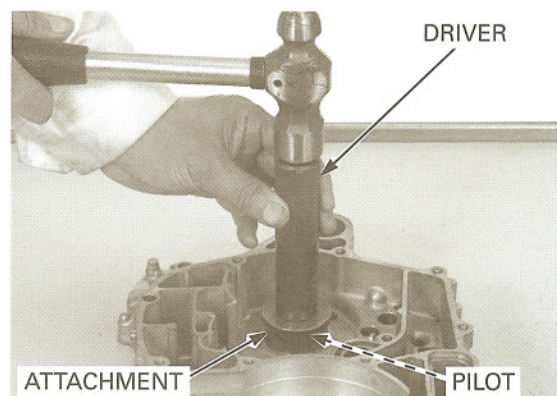
Driver	07749-0010000
Attachment, 42 x 47 mm	07746-0010300
Pilot, 17 mm	07746-0040400

Shift drum bearing:

Driver	07749-0010000
Attachment, 42 x 47 mm	07746-0010300
Pilot, 25 mm	07746-0040600

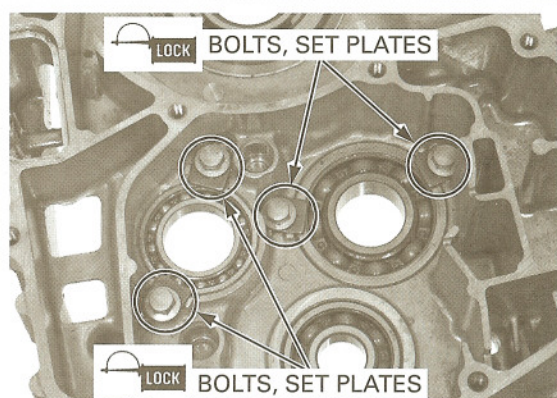
Balancer shaft bearing:

Driver	07749-0010000
Attachment, 42 x 47 mm	07746-0010300
Pilot, 17 mm	07746-0040400



Apply locking agent to the set plate bolt threads. Install the mainshaft and shift drum bearing set plates, and tighten the bolts.

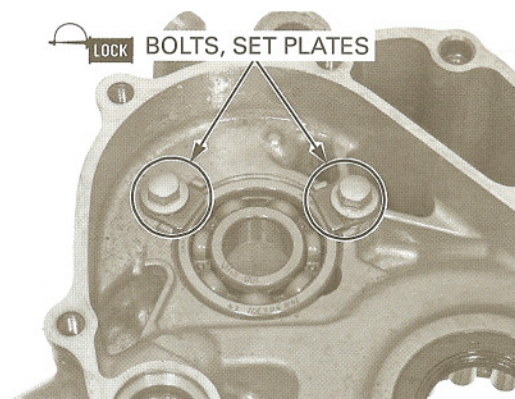
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

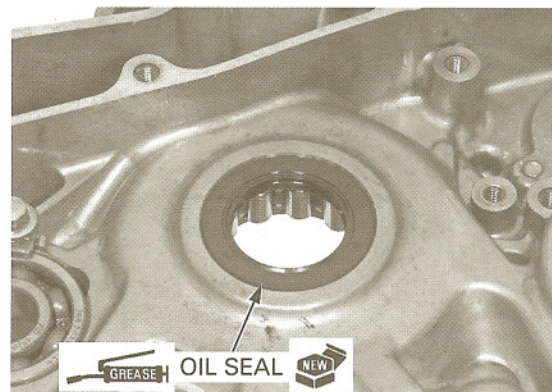
Apply locking agent to the set plate bolt threads.
Install the balancer shaft bearing set plates and tighten the bolts.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



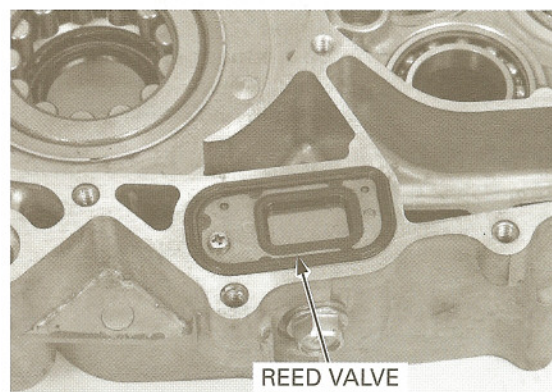
Apply grease to a new crankshaft oil seal lip and install it into the right crankcase.

Install the crankshaft (page 12-19).

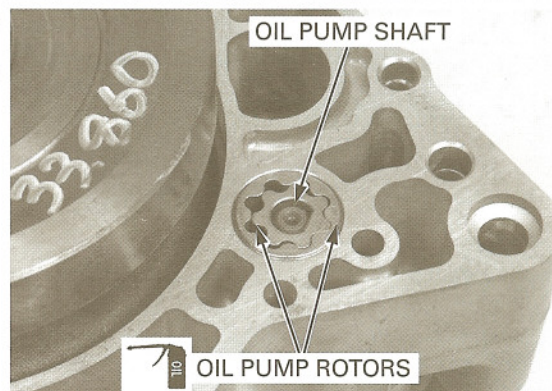


CRANKCASE ASSEMBLY

Install the reed valve into the right crankcase.

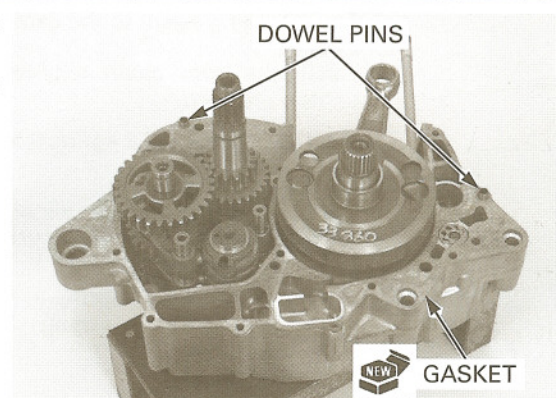


Dip oil pump inner and outer rotors in clean engine oil.
Install the oil pump shaft, inner and outer rotors into the left crankcase.

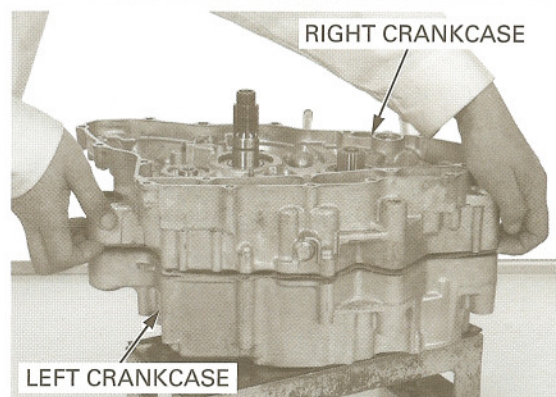


Install the dowel pins and a new gasket onto the left crankcase.

Coat the oil seal contacting surface of the crankshaft with oil.



Install the right crankcase onto the left crankcase.

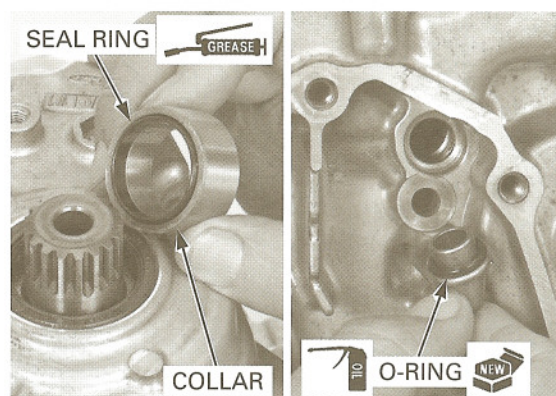


Coat the countershaft seal ring with grease and install the countershaft collar onto the countershaft.

Coat a new O-ring with oil and install it onto the oil pipe.

Install the oil pipe into the right crankcase.

Install the relief valve and oil strainer (page 5-5).



Apply locking agent to the threads of the crankcase bolt attaching the relief valve set plate.

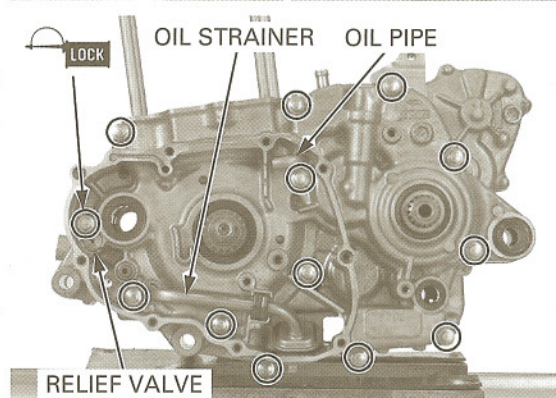
Install the relief valve set plate, oil strainer pipe set plate and thirteen crankcase bolts.

Tighten the bolts in a crisscross pattern in 2 or 3 steps.

Carefully trim the protruding gasket material from the cylinder gasket surface.

NOTICE

- Do not let the gasket material fall into the crankcase.
- Do not damage the cylinder gasket surface.



CRANKCASE/TRANSMISSION/CRANKSHAFT/BALANCER

Apply locking agent to the cam chain tensioner bolt threads.

Install the cam chain tensioner and collar, and tighten the bolt.

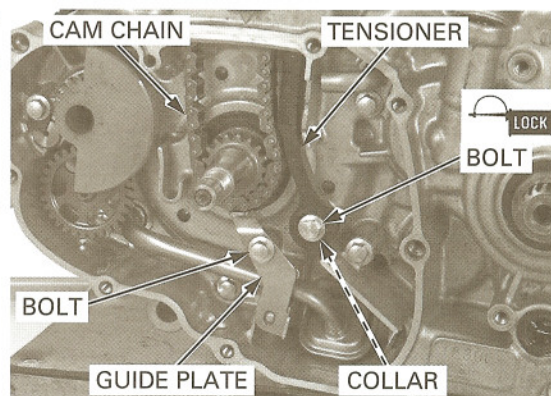
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Install the cam chain.

Install the guide plate by aligning the hole with the boss and tighten the bolt securely.

Install the following:

- oil pump driven gear (page 5-6)
- balancer shaft (page 12-8)



Install the following:

- breather hoses
- flywheel (page 16-9)
- gearshift linkage (page 11-20)
- clutch (page 11-10)
- cylinder, piston (page 10-8)
- cylinder head (page 9-22)
- engine (page 8-7)

