Crankcase

Crankcase Assembly

CAUTION

Right and left crankcase halves are machined at the factory in the assembled state, so they must be replaced together as a set.

- Chip off the old gasket from the mating surfaces of the crankcase halves, and clean off the crankcase with a high flash-point solvent. After cleaning, apply engine oil to the transmission gears, shift drum, shift forks and bearings.
- Be sure to replace any oil seal removed with a new one. Press in the new oil seal using a press and suitable tools so that the seal surface is flush with the surface of the crankcase.

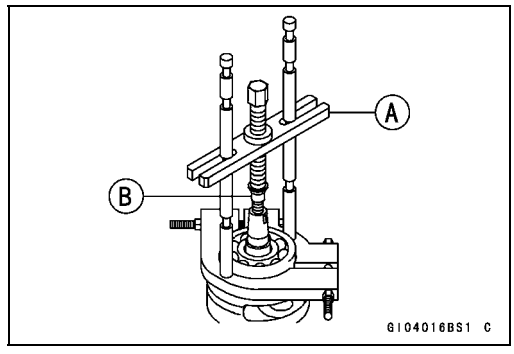
- Apply high temperature grease to the oil seal lips.
- Press in the ball bearings using the bearing driver set until the bearing is bottomed.

Special Tools - Bearing Driver Set: 57001-1129

★If the crankshaft bearings stay on the crankshaft when splitting the crankcase, remove the bearings from the crankshaft and reinstall them in the crankcase as follows.

○Remove the bearings from the crankshaft with a bearing puller.

Special Tools - Bearing Puller Adapter: 57001-136 [B]
Bearing Puller: 57001-158 [A]



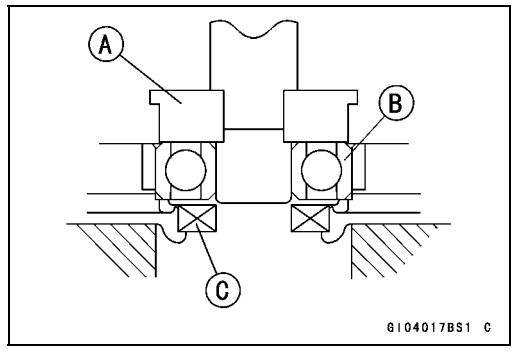
○Discard the bearing that is removed from the crankshaft.

○Position the crankcase half so that the main bearing housing is seated on a suitable press fixture.

○Press each crankshaft bearing [B] until it bottoms out using a bearing driver [A] from the driver set which contacts the bearing outer race.

Special Tool - Bearing Driver Set: 57001-1129 [A]

○Install the crankshaft bearing so that the ball retainer side faces in (to the oil seal [C] side).

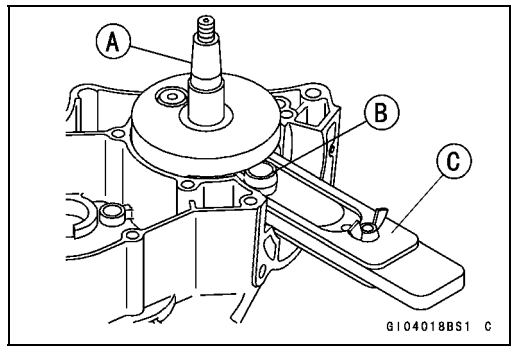


○Turn the crankshaft to BDC, and install the crankshaft jig between the crankshaft flywheels to protect flywheel alignment and press the crankshaft into the right crankcase half.

Special Tool - Crankshaft Jig: 57001-1174

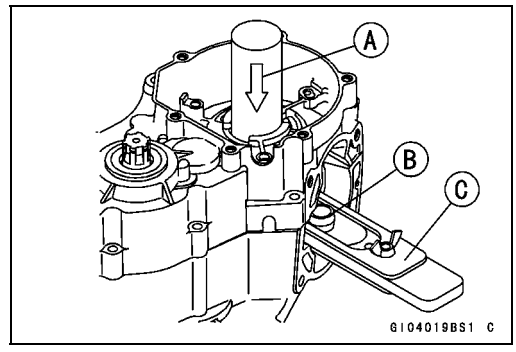
- Install the transmission shaft (see Transmission Shaft Installation).
- Check to see that the crankcase knock pins are in place on the right crankcase half. If any of them has been removed, replace it with a new one.
- Apply liquid gasket to the mating surface of the left crankcase half.

Sealant - Kawasaki Bond (Liquid Gasket - Silver): 92104 -002



Crankcase

- The crankshaft jig must be installed between the flywheel opposite the connecting rod big end with the crankshaft at BDC. This is to protect flywheel alignment
  [A] Crankshaft
  [B] Connecting Rod
  [C] Crankshaft Jig: 57001-1174



- Using a suitable tool on the left crankcase to press around the hole for the crankshaft, fit the crankcase halves together with a press on the tool.
  [A] Press
  [B] Connecting Rod
  [C] Crankshaft Jig

NOTE

○*Constantly check the alignment of the two crankcase halves, the position of the transmission shafts, and shift drum. The front and rear of the crankcase must be pushed together evenly.*

- Remove the crankshaft jig from the flywheel.
- Tighten the crankcase bolts to the specified torque starting with the ones around the crankshaft, and then the farther ones.

Torque - Crankcase Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

- Check to see that the crankshaft, drive shaft, and output shaft all turn freely (in the neutral position).

★If the crankshaft will not turn, probably the crankshaft is not centered; tap the appropriate end of the crankshaft with a mallet to reposition it.

- Spinning the output shaft, shift the transmission through all the gears to make certain there is no binding and that all the gears shift properly.
- Assemble the engine.
- Install:
  Clutch (see Engine Right Side chapter)
  Magneto Fly Wheel and Stator (see Electrical System chapter)
  Engine (see Engine Removal/Installation chapter)

Crankshaft, Connecting Rod

Crankshaft Removal

- See Crankcase Splitting.

Crankshaft Installation

- See crankcase Assembly.

Crankshaft Disassembly

Since assembly of the crankshaft demands exacting tolerances, the disassembly of the crankshaft can only be done by a shop having the necessary tools and equipment.

- If it should be necessary to disassemble the crankshaft, use a press to remove the crankpin.

Crankshaft Assembly

Since the assembly of the crankshaft demands exacting tolerances, the disassembly and reassembly of the crankshaft can only be done by a shop having the necessary tools and equipment.

- Check that the connecting rod radial clearance is within specification (see Connecting Rod Big End Radial Clearance Inspection).
- Press the crank halves onto the crankpin until the connecting rod side clearance is within specification (see Connecting Rod Big End Side Clearance Inspection).
- Adjust crankshaft runout until it is within specification (see Crankshaft Runout Inspection).

Big End Seizure Inspection

★In case of serious seizure with damaged flywheels, the crankshaft must be replaced.

★In case of less serious damage, disassemble the crankshaft and replace the crankpin, needle bearing, side washers, and connecting rod.

Crankshaft Bearing Inspection

Since the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement.

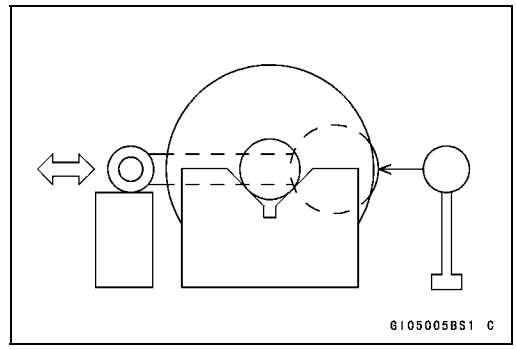
- Remove the following.
  Piston (see Engine Top End chapter)
  Primary Gear (see Engine Right Side chapter)
- Turn the crankshaft, using the connecting rod.

★If the bearings are noisy, do not spin smoothly, or have any rough spots, replace them.

Torque - Primary Gear Nut: 49 N·m (5.0 kgf·m, 36 ft·lb)

Crankshaft, Connecting Rod

Connecting Rod Big End Radial Clearance Inspection

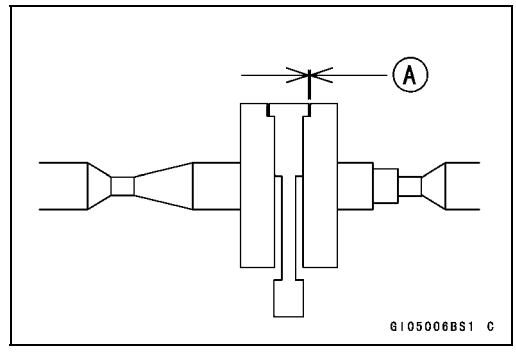


- Set the crankshaft in a flywheel alignment jig or on V blocks, and place a dial gauge against the connecting rod big end.
- Push the connecting rod first towards the gauge and then in the opposite direction. The difference between the two gauge readings is the radial clearance.

★If the radial clearance exceeds the service limit, the crankshaft should be either replaced or disassembled and the crankpin, needle bearing, and connecting rod big end examined for wear.

Connecting Rod Big End Radial Clearance
Standard: 0.029 ~ 0.041 mm (0.0011 ~ 0.0016 in.)
Service Limit: 0.09 mm (0.0035 in.)

Connecting Rod Big End Side Clearance Inspection

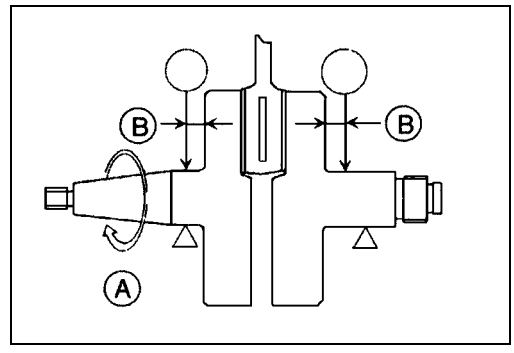


- Set the crankshaft on V blocks.
- Measure the side clearance [A] of the connecting rod with a thickness gauge.

★If the clearance exceeds the service limit, replace the crankshaft.

Connecting Rod Big End Side Clearance
Standard: 0.40 ~ 0.50 mm (0.016 ~ 0.20 in.)
Service Limit: 0.7 mm (0.028 in.)

Crankshaft Runout Inspection



- Set the crankshaft on V blocks, and place a dial gauge against the points indicated.
- Turn the crankshaft slowly. The maximum difference in gauge readings is the crankshaft runout.

Crankshaft Runout
Standard: TIR 0.03 mm (0.0012 in.) or less
Service Limit: TIR 0.08 mm (0.0031 in.)

[B] 7.5 mm (0.30 in.)

Crankshaft, Connecting Rod

Crankshaft Alignment Inspection

★If the runout at either point exceeds the service limit, align the flywheels so that the runout falls within the service limit.

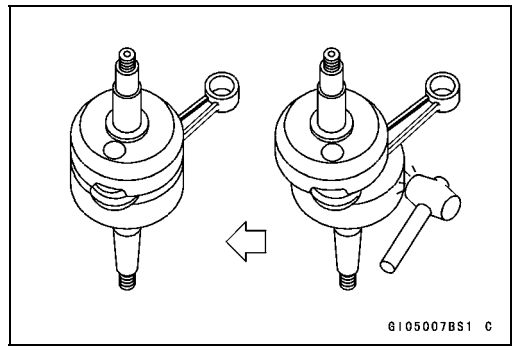
● In the case of horizontal misalignment, which is the most common, strike the projecting rim of the flywheel with a plastic, soft lead, or brass hammer as indicated in the figure.

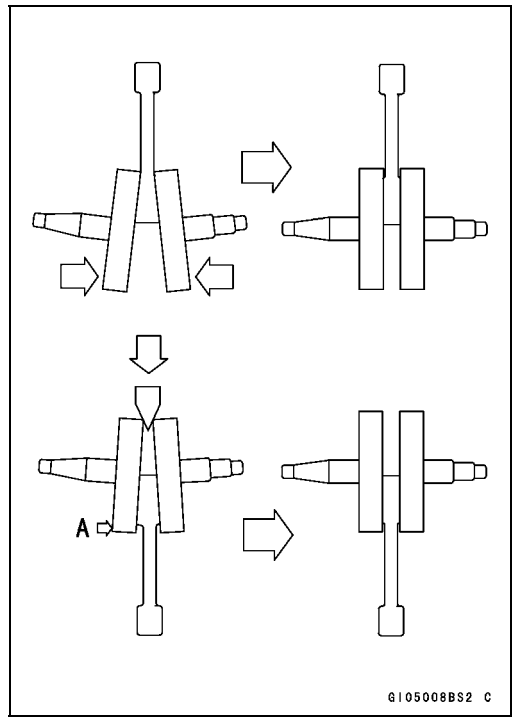
● Recheck the runout with a dial gauge, repeating the process until the runout falls within the service limit.

○Vertical misalignment is corrected either by driving a wedge in between the flywheels or by squeezing the flywheel rims in a vise, depending on the nature of the misalignment. In cases of both horizontal and vertical misalignment, correct the horizontal misalignment first.

★If flywheel misalignment cannot be corrected by the above method, replace the crankpin or the crankshaft itself.

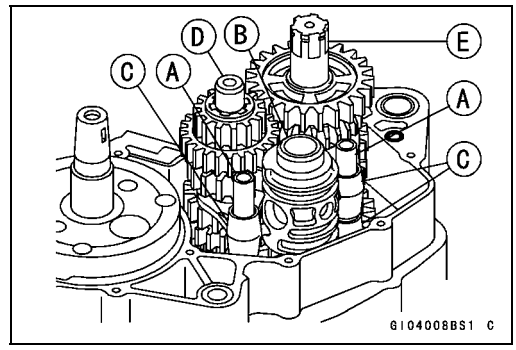
CAUTION
Don't hammer the flywheel at point "A".





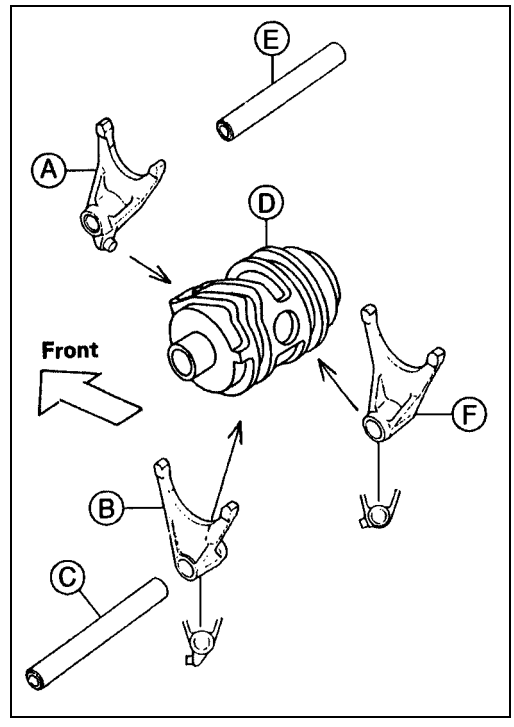
Transmission

Transmission Shaft Removal



- Split the crankcase (see Crankcase Splitting).
- Pull off the shift rods [A], and disengage the shift fork guide pins from the shift drum grooves.
- Remove the shift drum [B]
- Remove the shift forks [C] from the transmission gears.
- Take out the drive shaft [D] and output shaft [E] together with their gears meshed.

Transmission Shaft Installation



- Set the transmission shafts, shift drum, and shift forks together, and fit them into the right crankcase half.

○Apply transmission oil liberally to the transmission gears, bearings, shaft journals, and shift fork fingers.

○Fit each shift fork into the groove of the proper gear so that the shift fork guide pin is in the proper groove on the shift drum.

[A] Shorter Shift Fork (Drive Shaft)
[B] Left Shift Fork (Output Shaft)
[C] Longer Shift Rod (Output Shaft)
[D] Shift Drum
[E] Shorter Shift Rod (Drive Shaft)
[F] Right Shift Fork (Output Shaft)

- Apply small amount of engine oil to the shift rods, and install the rods.

Torque - Output Shaft Bearing Retaining Screws: 5.4 N·m (0.55 kgf·m, 48 in·lb)
Drive Shaft Bearing Retaining Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

NOTE

○*Be careful not to confuse the shift forks, or the shift rods.*

- Assemble the crankcase (see Crankcase Assembly).

Transmission Shaft Disassembly

- Remove the transmission shafts (see Transmission Shaft Removal).
- Using the outside circlip pliers, remove the circlips and disassemble the transmission shafts completely.

Special Tools - Outside Circlip Pliers: 57001-144

Transmission Shaft Assembly

- Apply engine oil liberally to the transmission shaft, gears and bearings.
- Install a new circlip on the drive shaft so that opening coincides with one of the spline grooves in the shaft.

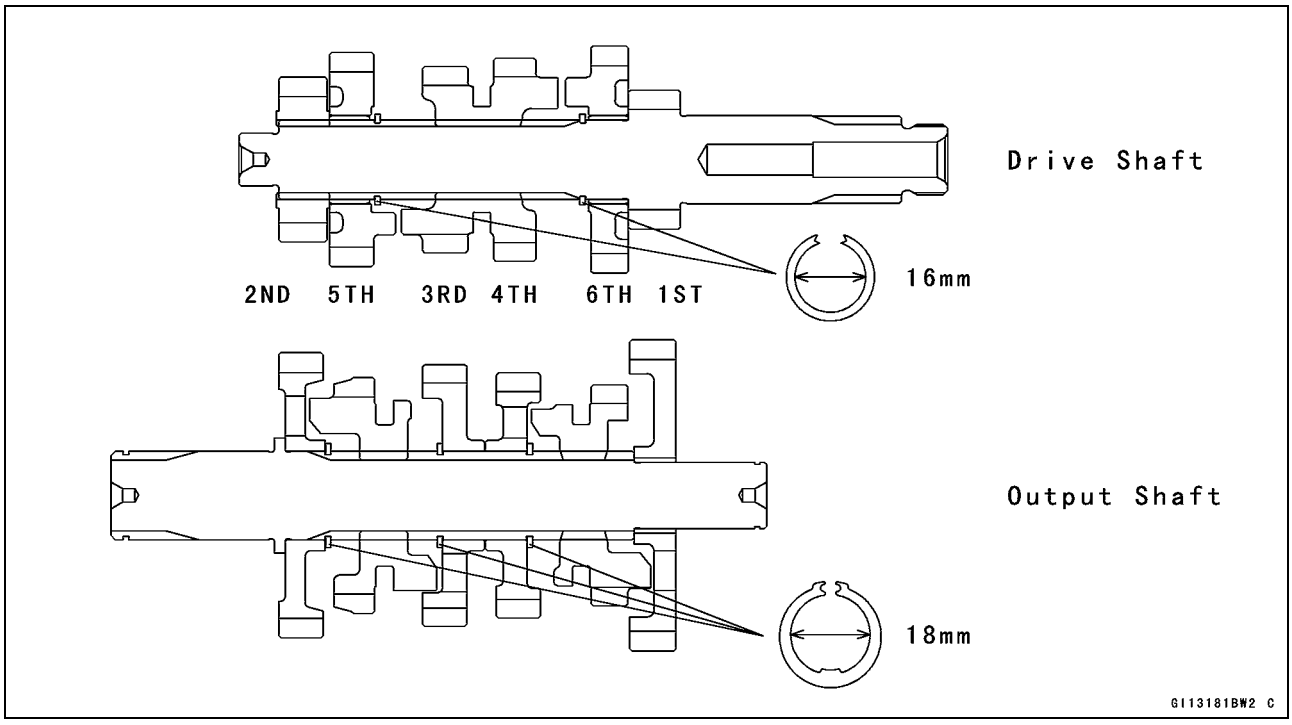
○Be careful not to install the gears backwards.

○The 2nd drive gear shall be installed so that the circle of identification groove face to outward (KX85-A1 ~ A4/B1 ~ B4, KX100-D1 ~D4).

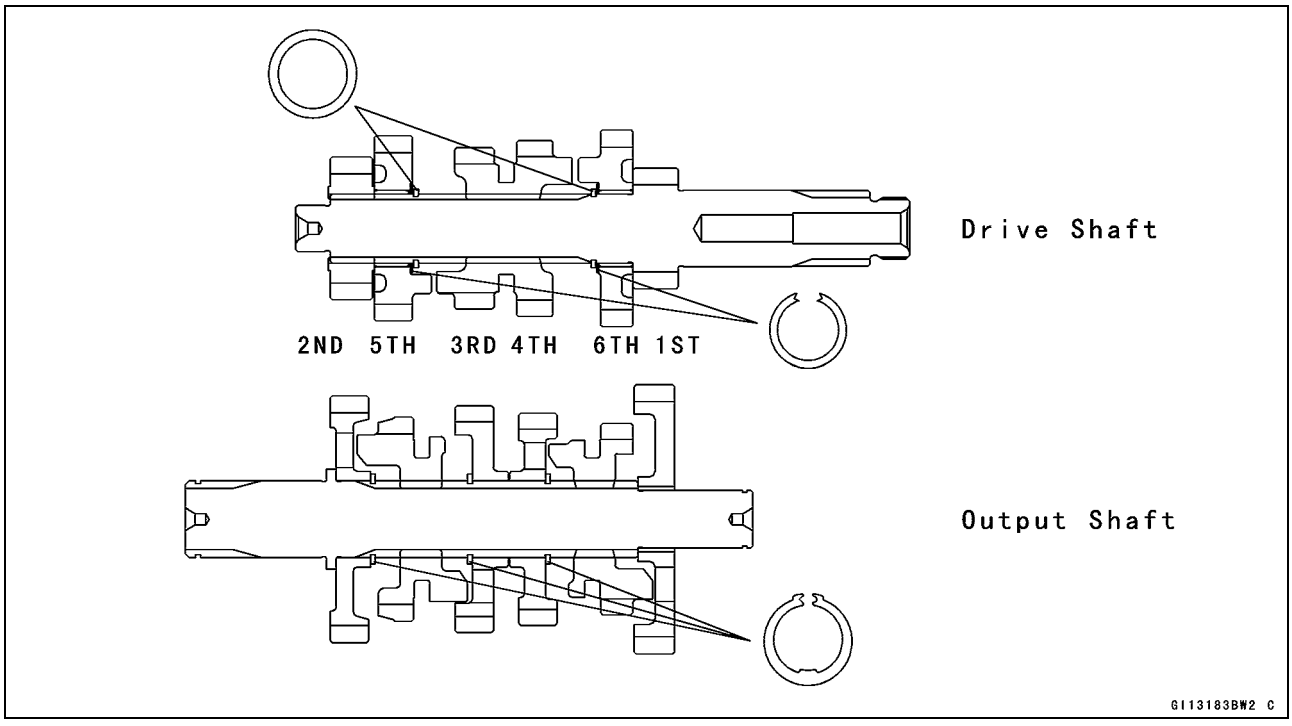
★If the first gear on the output shaft is a new one, apply molybdenum disulfide grease to the internal diameter.

Transmission

KX85-A1/B1, KX100-D1

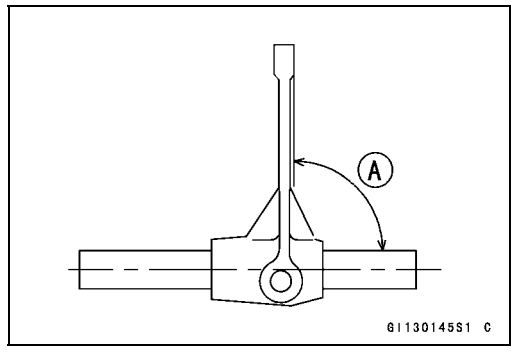


KX85-A2 ~/B2 ~, KX100-D2 ~



Shift Fork Bending Inspection

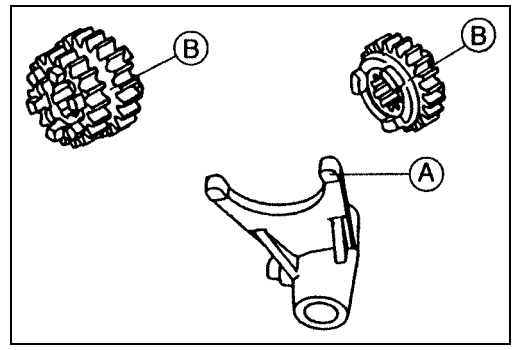
- Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause difficulty in shifting, or allow the transmission to jump out of gear when under power.
  [A] 90°



a

Transmission

Shift Fork/Gear Groove Wear Installation



- Measure the thickness of the shift fork ears [A], and measure the width of the shift fork grooves [B] in the transmission gears.

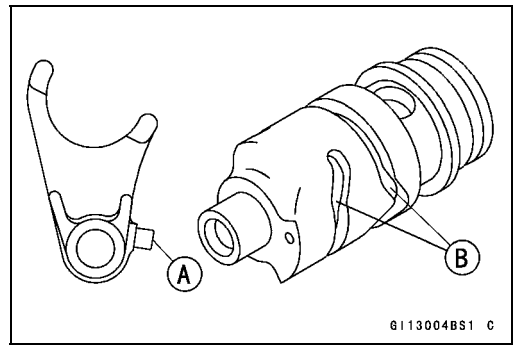
★If the thickness of a shift fork finger is less than the service limit, the shift fork must be replaced.

Shift Fork Finger Thickness
Standard: 3.9 ~ 4.0 mm (0.154 ~ 0.157 in.)
Service Limit: 3.8 mm (0.150 in.)

★If a gear shift fork groove is worn over the service limit, the gear must be replaced.

Gear Shift Fork Groove Width
Standard: 4.05 ~ 4.15 mm (0.159 ~ 0.163 in.)
Service Limit: 4.3 mm (0.169 in.)

Shift Fork Guide Pin/Shift Drum Groove Wear Inspection



- Measure the diameter of each shift fork guide pin [A], and measure the width of each shift drum groove [B].

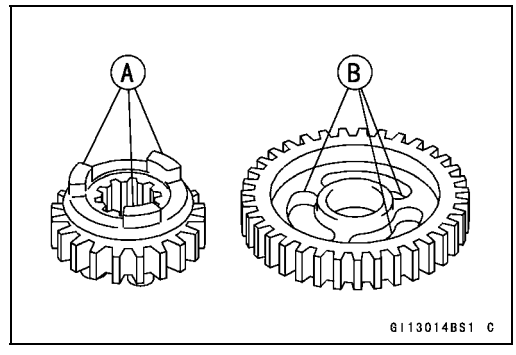
★If the guide pin on any shift fork is less than the service limit, the fork must be replaced.

Shift Fork Guide Pin Diameter
Standard: 5.9 ~ 6.0 mm (0.232 ~ 0.236 in.)
Service Limit: 5.8 mm (0.228 in.)

★If any shift drum groove is worn over the service limit, the drum must be replaced.

Shift Drum Groove Width
Standard: 6.05 ~ 6.20 mm (0.238 ~ 0.244 in.)
Service Limit: 6.3 mm (0.248 in.)

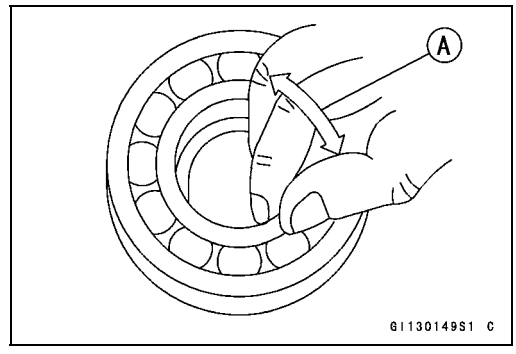
Gear Dog/Gear Dog Hole Damage Inspection



- Visually inspect the gear dogs [A] and gear dog holes [B].

★Replace any damaged gears or gears with excessively worn dogs or dog holes.

Ball Bearing Wear Inspection



- Check the ball bearing on the crankcase.

○Since the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement.

○Oil the bearing with transmission oil and spin [A] it by hand to check its condition.

★If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.

Wheels/Tires

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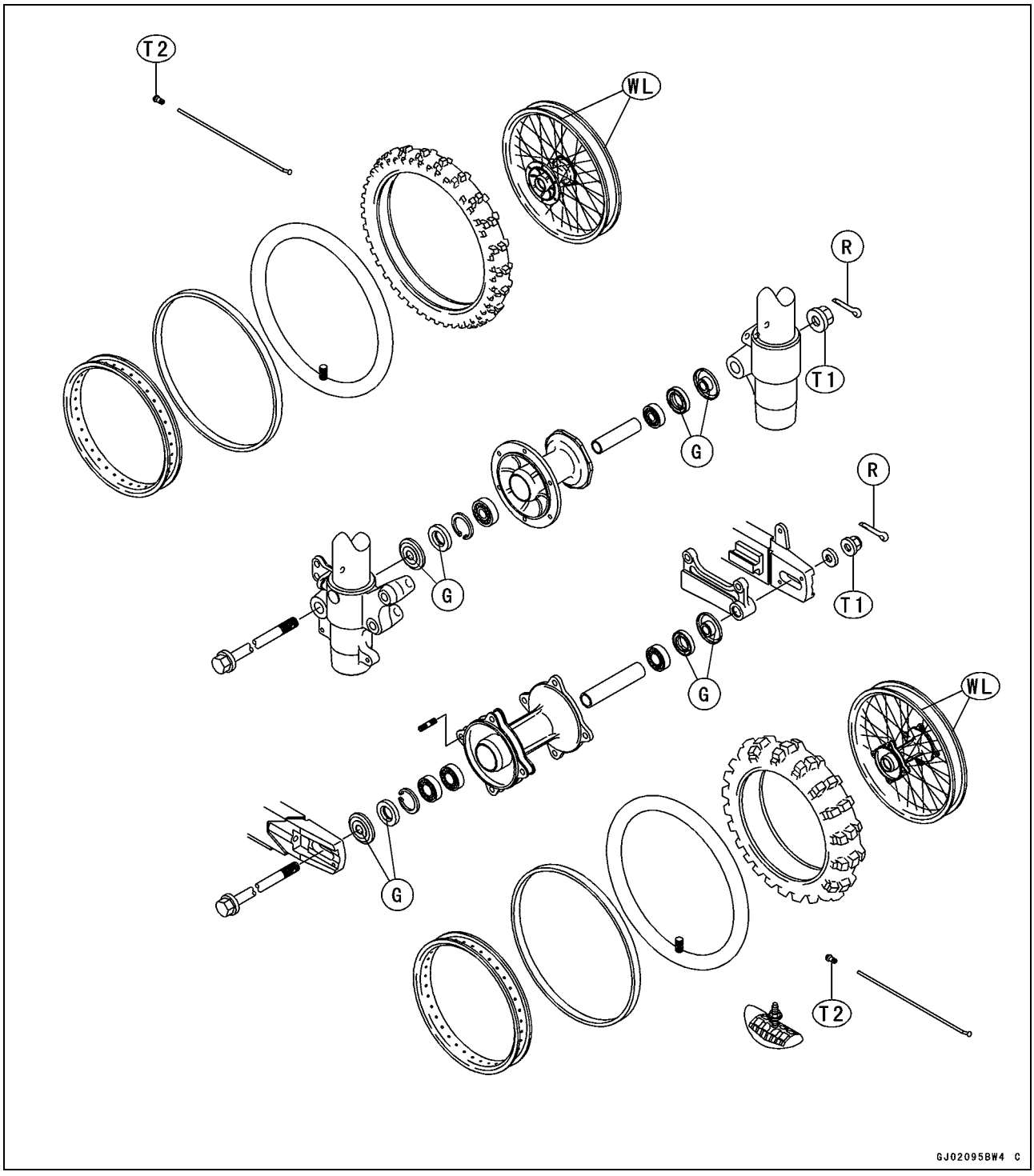
Exploded View



T1: 79 N·m (8.1 kgf·m, 58 ft·lb)
T2: 1.5 ~ 3.0 N·m (0.15 ~ 0.31 kgf·m, 13 ~ 27 in·lb)
G: Apply grease.
WL: Apply soap and water solution, or rubber lubricant.