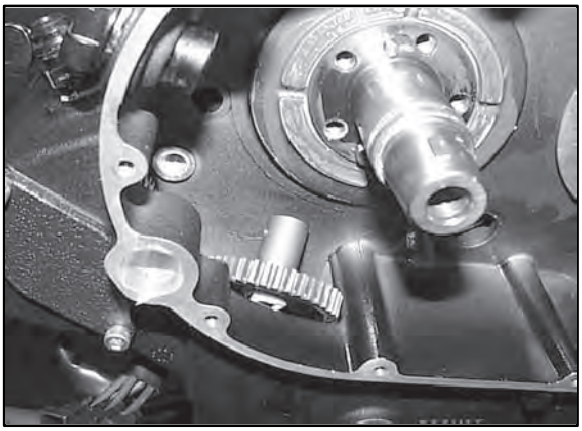
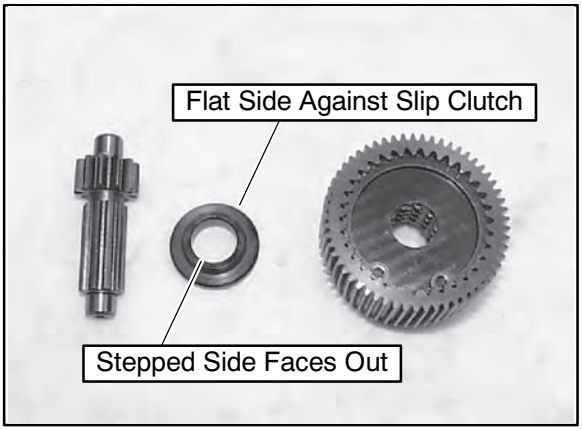
STARTER GEAR REMOVAL (cont.)

3. If idler gear must be removed from the engine, remove the crankshaft gear.



4. Remove starter clutch and shaft.

5. Installation is the reverse of removal. Apply lithium grease to shafts upon assembly.



STARTER GEAR INSTALLATION

1. Install starter gear (A), starter gear washer (B), and starter gear retaining ring (C).

NOTE: On 2002 models, Bevel on inner edge of retaining ring washer (B) faces out (toward retaining ring).

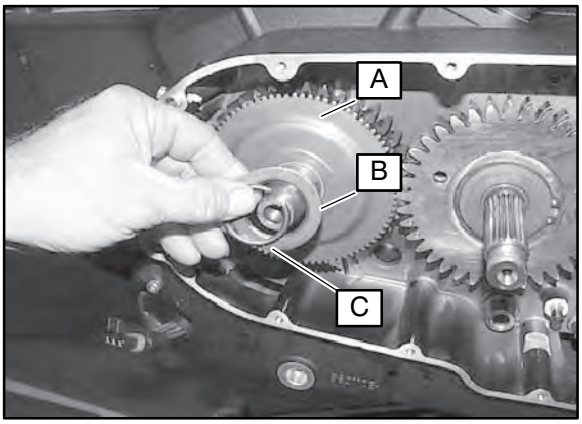
2. Install compensator assembly (refer to page 9.23).

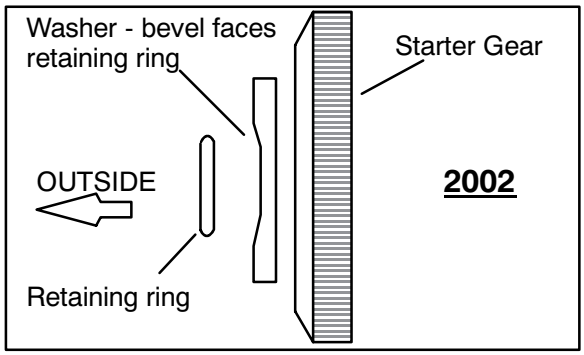
3. Install flywheel (refer to page 9.25).

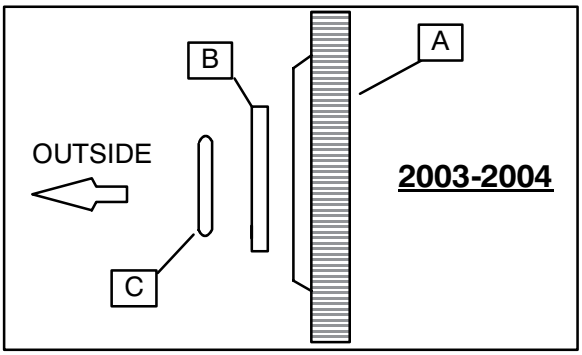
4. Install clutch (refer to page 9.20).

5. Install primary cover (refer to page 9.10).

6. Fill engine oil to specification (refer to Chapter 2).







TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	PART(s) AFFECTED	REPAIR RECOMMENDED
Clutch Lever Pulls Excessively Hard	Outer clutch cable housing damaged	Clutch Cable	Replace
	Clutch cable is dry, corroded, contaminated, worn, etc.	Clutch Cable	Lubricate or replace
	Clutch lever pivot needs lubrication	Clutch Lever Pivot Point	Lubricate
	Drive plates catching on primary driven gear basket	Clutch Primary Driven Gear/ Clutch Plates	Replace Necessary Parts
	Clutch cable routed incorrectly	Clutch Cable	Inspect for wear, replace if necessary, and / or re-route
	Clutch lifter plate bearing damage	Clutch Plate Bearing Lifter	Replace
	Damaged clutch lifter mechanism	Clutch Release Mechanism	Repair as Necessary
Clutch Slips	Clutch Cable Out of Adjustment (no lever free play)	Clutch Cable Adjustment	Adjust (refer to ch 2)
	Clutch Spring Weak	Clutch Spring	Replace
	Clutch Spring Snap ring Loose or Broken	Clutch Spring Snap ring	Repair or Replace as Necessary
	Pressure Plate Worn or Warped/Distorted	Pressure Plate	Replace
	Clutch Plate(s) Worn or Warped/Distorted	Driven Plates (possibly drive plates)	Replace
	Clutch Lifter Mechanism Sticking	Clutch Lifter Mechanism	Repair
	Engine Oil Level Low	Oil Level	Correct
	Oil Additives Present in Oil or Used Previously	Oil Quality	Replace oil & filter (clutch plates may need to be replaced)
Dragging Clutch (clutch doesn't disengage completely, motorcycle may creep with clutch disengaged)	Too Much Clutch Lever Free Play	Clutch Cable Adjustment	Adjust (refer to ch 2)
	Weak Clutch Spring(s)	Clutch Springs	Replace All
	Pressure Plate Worn or Warped/Distorted	Pressure Plate	Replace
	Clutch Plate(s) Warped/Distorted	Driven Plates (possibly drive plates)	Replace
	Oil Additives Present in Oil or Used Previously	Oil Quality	Replace oil & filter (clutch plates may need to be replaced)
	OIl Level Too High	Oil Level	Correct
	Oil Viscosity Too High	Oil Quality	Replace Oil & Filter

PROBLEM	POSSIBLE CAUSE	PART(s) AFFECTED	REPAIR RECOMMENDED
Transmission Will Not Shift	Broken Shift Drum	Shift Drum	Replace shift drum
	Bent Shift Forks	Shift Fork	Replace shift forks
	Worn Shift Drum	Shift Drum	Replace shift drum
	Broken Gears	Transmission Gears	Replace broken gear(s)
	Damaged/Broken Bearings	Transmission, Shift Cam Bearings	Replace bearings that fail inspection
	Worn Gear Shift Pawl Ratchet Mechanism	Shift Pawl Mechanism	Replace parts that fail inspection
	Broken or dislodged shift shaft return spring	Shift Shaft Return Spring	Repair or Replace
	Roller Detent Arm Seized	Roller Detent Arm	Repair or replace parts
	Bent Shift Shaft (internal)	Shift Shaft	Repair or Replace
	External Shift Linkage Binding or Damaged	External Shift Linkage	Repair or Replace as
	Bent or Distorted Shift Forks	Shift Forks	Replace
	Bent or Distorted Shift Fork Rails	Shift Fork Rails	Replace
	Broken Transmission Components	Transmission Components	Repair or Replace
Transmission Hard to Shift	Improper Clutch Operation	Clutch	Inspect, Repair
	Incorrect Oil Viscosity	Oil Quality	Replace Engine Oil
	Incorrect Clutch Adjustment	Clutch Adjustment	Adjust
	Bent, Rubbing, Sticky, Broken Shift Shaft (internal)	Shift Shaft Components	Repair or Replace
	Sticking Pivot Point, Bent External Shift Linkage	External Shift Linkage	Repair or Replace
	Bent or Distorted Shift Forks	Shift Forks	Replace
	Damaged Shift Drum Grooves	Shift Drum	Repair or Replace
	Shift Detent Plunger Stuck	Shift Detent Plunger	Repair or Replace
	Bent/Binding Shift Fork Rails	Shift Fork Rails	Repair or Replace
Transmission Jumps Out of Gear	Broken Shift Stop Pin	Shift Stop Pin	Replace
	Worn Shift Drum Pawls or Shift Drum Pawl Ratchet	Shift Drum or Shift Linkage	Replace as Necessary
	Broken Shift Return Spring	Shift Return Spring	Replace
	Damaged Shift Drum Grooves	Shift Drum	Repair or Replace
	Bent or Worn Shift Forks	Shift Forks	Repair or Replace
	Bent/Binding Shift Fork Rails	Shift Fork Rails	Repair or Replace
	Worn Engagement Dogs on Transmission Gears	Transmission Gears	Repair or Replace
Transmission Noise	Drive Belt Tension Incorrect	Drive Belt	Adjust or Replace
	Clutch Plates Bind or Drag (When Clutch is Disengaged)	Clutch Plates	Adjust / Repair / Replace
	Gear/Bearing Wear/Damage	Transmission Components	Inspect / Repair / Replace

CHAPTER 10

TRANSMISSION & CRANKSHAFT

10

GENERAL

- Remove engine from frame to service internal transmission and/or crankshaft components.
- The crankcase must be separated to access the internal transmission components and crankshaft. Remove:
  - Cylinder heads
  - Cylinders & pistons
  - Primary cover
  - Clutch
  - Torque compensator
  - Gear shift linkage
  - Starter motor
  - Starter motor drive assembly
  - Flywheel
  - Starter clutch
- Label and store parts neatly to speed the assembly process.
- Crankshaft main bearing replacement requires line boring. This procedure requires full machine shop capabilities and specialized knowledge. It is recommended that a qualified machine shop perform this procedure if it becomes necessary.
- Crankshafts and connecting rods are color coded for manufacturing tolerances with a white or red paint mark. White connecting rods must be used with white crankshafts and red connecting rods must be used with red crankshafts.
- Label and store connecting rods, crankshaft and bearings so parts can be installed in original location.
- All torque specifications are “dry” unless specified for oil or locking agent. Refer to exploded views.
- When locking agents are required, use Loctite Primer N™ to clean fastener before applying locking agent. Primer N™ reduces cure time of thread locking agent in addition to cleaning the surfaces.

SPECIAL TOOLS

Refer to page 1.11 for Special Tool information.

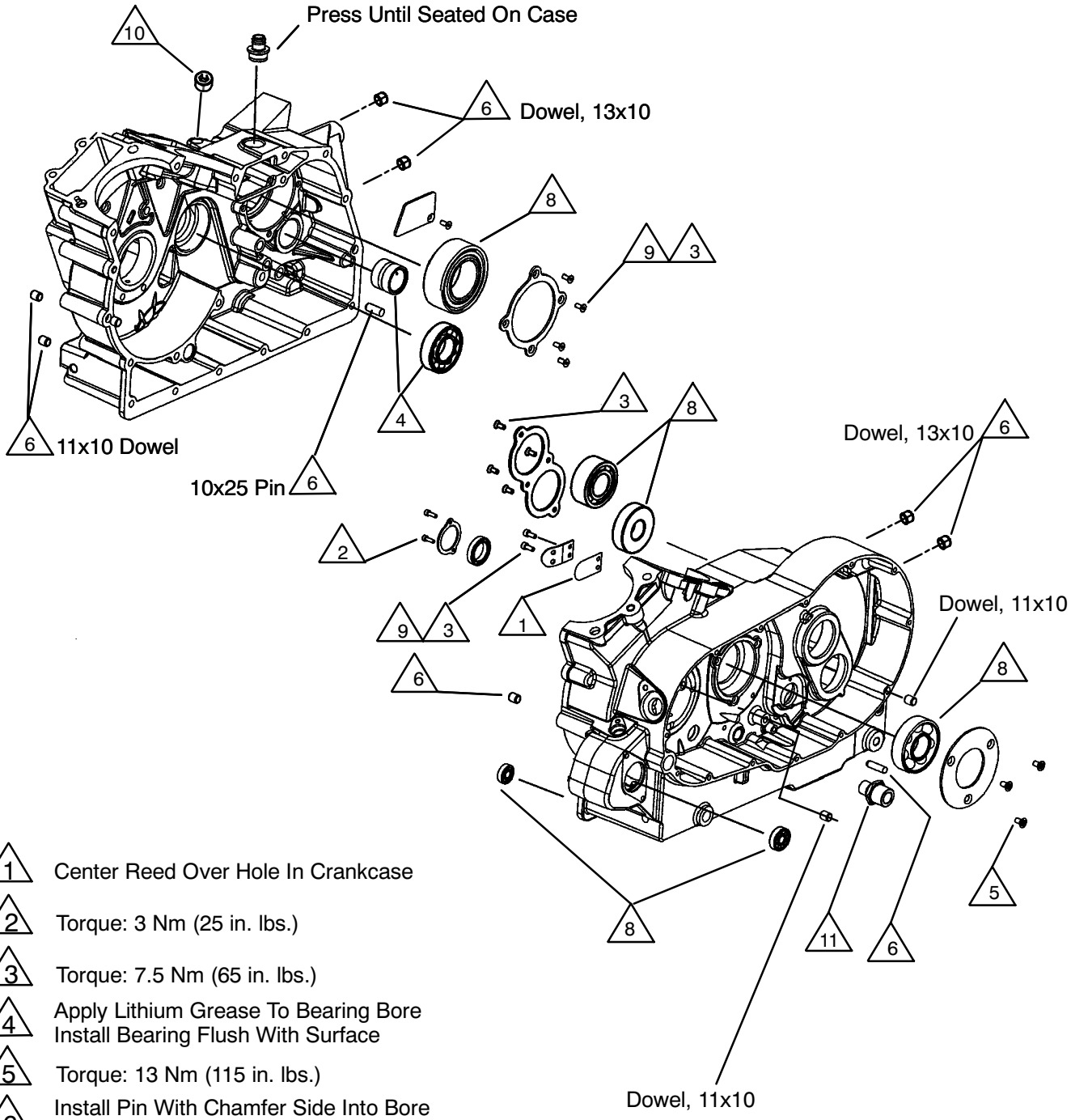
SPECIFICATIONS

Item		Specifications	
Drive Train (General)		**2002**	**2003-2004**
	Transmission	Direct Drive, 5 Speed Manual	
	Primary Reduction Ratio	1.50 : 1	1.50 : 1
	Final Reduction Ratio	2.13 : 1	2.13 : 1
Drive Train (Gear Ratios)	Gear Ratio: 1st Gear	3.20 : 1	2.96 : 1
	Gear Ratio: 2nd Gear	2.19 : 1	2.03 : 1
	Gear Ratio: 3rd Gear	1.53 : 1	1.53 : 1
	Gear Ratio: 4th Gear	1.24 : 1	1.24 : 1
	Gear Ratio: 5th Gear	1 : 1	1 : 1

CONNECTING ROD AND CRANKSHAFT SPECIFICATIONS

CRANKSHAFT and COMPONENTS			
Part	**Part Specific**	**Standard**	**Service Limit**
Connecting Rod	Connecting Rod to Crankshaft Side Clearance	.22 - .42 mm (.0087 - .0165″)	.65 mm (.025″)
	Connecting Rod Bearing to Crankshaft Oil Clearance	.0254 - .0635 mm (.001 - .0025″)	.11 mm (.0043″)
	Connecting Rod Small End I.D.	22.01 - 22.02 mm (.8665 - .8670″)	22.09 mm (.8694″)
	Connecting Rod Width	20.28 - 20.34 mm (.798 - .801″)	20.03 mm (.788″)
	Connecting Rod Big End I.D. (White)	50.84 - 50.85 mm (2.0016 - 2.0020″)	50.89 mm (2.0031″)
	Connecting Rod Big End I.D. (Red)	50.85 - 50.86 mm (2.0019 - 2.0024″)	50.89 mm (2.0034″)
Crankshaft Main Bearing / Rod Journals	Connecting Rod Journal Width	40.00 - 40.58 mm (1.5748 - 1.5976″)	41.35 mm (1.627″)
	Crankshaft Rod Journal O.D. (White)	47.970 - 47.978 mm (1.888 - 1.889″)	47.94 mm (1.8871″)
	Crankshaft Rod Journal O.D. (Red)	47.978 - 47.986 mm (1.8888 - 1.8891″)	47.95 mm (1.8875″)
	Main Bearing Oil Clearance	Left .013 -.060 mm (.0005-.0023″) Right .014 - .061mm (.0005 - .0024″)	.10 mm (.004″) .10 mm (.004″)
	Left Main Bearing Journal O.D.	64.952 - 64.973 mm (2.5571 - 2.5579″)	64.93 mm (2.556″)
	Right Main Bearing Journal O.D.	59.952 - 59.973 mm (2.3603 - 2.3611″)	59.93 mm (2.359″)
Balance Shaft	Journal O.D., Left (Primary Side) Journal O.D., Right (Oil Pump Drive Side)	29.980 - 29.992 mm 29.969 - 29.979 mm	- -
Transmission			
Shift Fork	Shift Fork I.D. (Dimension A, Page 10.12)	12.00-12.026 mm (.4725-.4732″)	12.05 mm (.4744″)
	Shift Fork Pin O.D. (Dimension B, Page 10.12)	6.04-6.14 mm (.2378-.2417″)	6.02 mm (.2370″)
	Shift Fork Width (Dimension D, Page 10.12)	5.10-5.30 mm (.2008-.2086″)	5.05 mm (.1988″)
Shift Fork Rail	Shift Fork Rail O.D. (Dimension C, Page 10.12)	11.96 mm (.470″)	11.80 mm (.4645″)
	Shift Fork Rail Runout	-	.025 mm (.001″)
Shift Drum	Shift Drum Groove	-	Replace drum if any wear is evident

CRANKCASE COMPONENT and FASTENER TORQUES



1. Center Reed Over Hole In Crankcase
2. Torque: 3 Nm (25 in. lbs.)
3. Torque: 7.5 Nm (65 in. lbs.)
4. Apply Lithium Grease To Bearing Bore
   Install Bearing Flush With Surface
5. Torque: 13 Nm (115 in. lbs.)
6. Install Pin With Chamfer Side Into Bore
   Press Until Completely Seated In Hole
7. Torque: 30 Nm (22 lb-ft.)
8. Apply Lithium Grease To Bearing Bore
   Press Until Completely Seated In Bearing Pocket
9. Apply Loctite 262
10. Apply Pipe Sealant
    Torque: 24 Nm (18 lb-ft)
11. Torque: 34 Nm (25 lb-ft)