BENELLI

125, 200 AND 250cc

MODEL	125cc SPRITE	200cc BARRACUDA	250cc BARRACUDA
Displacement—cc	124	198	245
Bore—mm	54	66.5	74
Stroke—mm	54	57	57
Ignition—			
Spark plug type	Marelli CW260L or Champion N-3		
Electrode gap—mm	0.6	0.6	0.6
Inch	0.023-0.024	0.023-0.024	0.023-0.024
Point gap—mm	0.4	0.4	0.4
Inch	0.016	0.016	0.016
Valve clearance (hot)			
Both valves—mm	0.15	0.15	0.15
Inch	0.006	0.006	0.006
Electrical system voltage	6	6	6
Battery terminal grounded	Negative	Negative	Negative
Tire size—front	2.75x18	3.00x18	3.00x18
Rear	3.00x18	3.25x18	3.25x18
Tire pressure—			
Front—kg/cm²	1.68	1.68	1.68
Psi	24	24	24
Rear—kg/cm²	1.82	1.82	1.82
Psi	26	26	26
Rear chain free play—mm	19	19	19
Inch	¾	¾	¾
Number of speeds	4 or 5	4 or 5	4 or 5

Illustrations courtesy Cosmopolitan Motors, Inc.

MAINTENANCE

SPARK PLUG. Recommended spark plug for normal use is Marelli CW 260 L or Champion N-3. Spark plug electrode gap should be 0.4mm (0.023-0.024 inch).

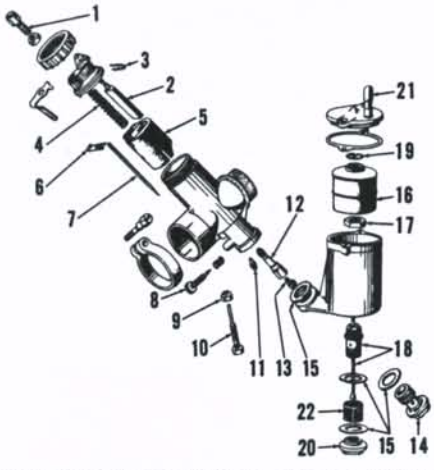


Fig. BE2-1–Exploded view of Del'Orto carburetor. Float bowl must be vertical when installed.

1. Cable adjuster
2. Choke
3. Choke rod clip
4. Throttle spring
5. Throttle slide
6. Clip
7. Valve needle
8. Idle mixture needle
9. Locknut
10. Idle stop screw
11. Idle jet
12. Nozzle (atomizer)
13. Main jet
14. Bowl retainer
15. Fiber washers
16. Float
17. Nut
18. Fuel inlet valve
19. Clip
20. Inlet fitting nut
21. Primer
22. Filter screen

CARBURETOR. Del'Orto UB type carburetor is used on all models. Idle speed is adjusted by turning stop screw (10—Fig. BE2-1). Make certain lock nut (9) is tightened after adjustment is complete. Idle mixture is adjusted at needle (8). Normal setting for idle mixture needle is 1½ turns open. Clip (6) should normally be positioned in second groove from top of needle (7). Refer to the following for correct jet sizes.

Sprite 125cc

Main jet (13) 95
Idle jet (11) 40

Barracuda 200cc

Main jet (13)—
With air filter 100
With air horn 105
Idle jet (11) 40

Barracuda 250cc

Main jet (13)—
With air filter 100
With air born 108
Idle jet (11) 45

IGNITION AND ELECTRICAL. All models are equipped with an energy transfer ignition system. The low tension ignition coil (6—Fig. BE2-2), breaker points, condenser and generator coil (7) are located under the flywheel on left end of crankshaft. Ignition breaker point gap should be 0.4mm (0.016 inch) and can be set through the holes in flywheel. Ignition timing should be checked using timing mark "A" stamped on the flywheel and "O" mark stamped on crankcase. With breaker point gap correctly set, the points should open when "A" mark just passes the mark on crankcase. If timing is incorrect, remove the flywheel and move the ignition stator plate in the three elongated mounting holes (5). The air gap between coil pole shoes and flywheel magnets should be 0.3mm (0.012 inch). Flywheel retaining nut should be tightened to 55-60 Ft.-Lbs. torque.

VALVE SYSTEM. The valves are actuated by a camshaft located in the crankcase via cam followers, push rods and rocker arms. Clearance between rocker arms and both valve stems should be 0.15mm (0.006 inch) when engine is **Hot.** Valve clearance should be set when piston is at TDC on compression stroke and both valves are closed.

LUBRICATION. The engine and gear box are lubricated by 2 quarts of oil contained in the crankcase. SAE 30 oil should be used in winter. SAE 40 oil in summer. The oil should be drained and filter cleaned every 1200 to 1800 miles. When installing filter and plug,

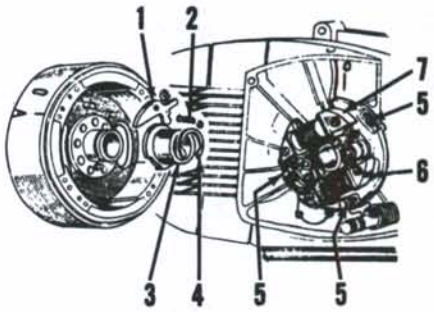


Fig. BE2-2–View of the ignition and generator with flywheel removed. Make certain that ignition advance (1, 2 & 3) operates freely.

1. Advance weight
2. Spring
3. Ignition cam
4. Snap ring
5. Stator retaining screws
6. Ignition coil
7. Generator coil

make certain that end of pick up screen (5—Fig. BE2-3) enters hole in pump correctly before installing plug.

The oil pump is shown in Fig. BE2-3. The pump is driven by the worm gear in the middle of the camshaft and delivers pressurized oil to the engine via a drilled passage in the crankcase. Oil is supplied to the connecting rod crankpin through the right side of the crankshaft. Oil to the rocker arms is fed into the cam followers and up through the push rods.

To remove the oil pump, first remove the filter (1 through 5—Fig. BE2-3) from left side of crankcase, then unbolt and withdraw pump from bottom. The pump is aligned with one dowel pin which will correctly align the ports in pump with passages in crankcase. When installing pump, use new seal ring (14). When installing inlet screen (5) the tube and dowel must engage holes in pump.

CLUTCH CONTROLS. The clutch cable should be adjusted to provide the hand lever with some free play. Adjustment can normally be accomplished at ends of cable. Additional adjustment is possible by turning the adjusting screw on the clutch lever (40—Fig. BE2-15) under the engine left side cover.

SUSPENSION. Each front suspension unit contains 4 fl. oz. of SAE 20 motor oil. Units can be drained at small screw on lower side and refilled at the top retaining screw. To disassemble the front suspension, unscrew the valve (8—Fig. BE2-4) from the lower sliding tube (1).

The adjustable rear suspension units should both be set the same. If the shock absorber is bent, leaking or otherwise damaged, renew the unit.

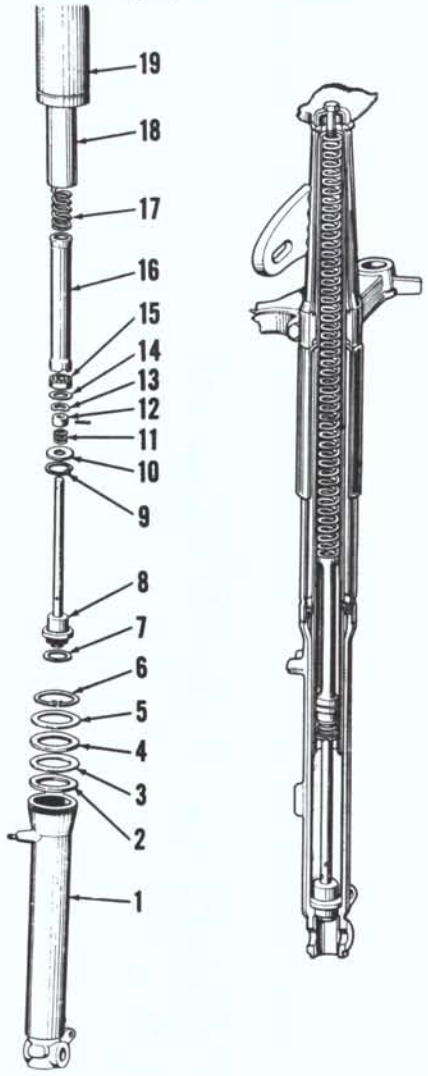


Fig. BE2-4–View of the front suspension unit. To disassemble, turn plug end of valve (8) clockwise through hole in bottom of lower sliding tube (1).

1. Lower sliding tube
2. Oil seal
3. Washer
4. Felt washer
5. Washer
6. Snap ring
7. Gasket
8. Hydraulic valve
9. Snap ring
10. Washer
11. Spring
12. Spacer
13. Spring washer
14. Washer
15. Valve
16. Tube
17. Spring
18. Fork tube
19. Cover

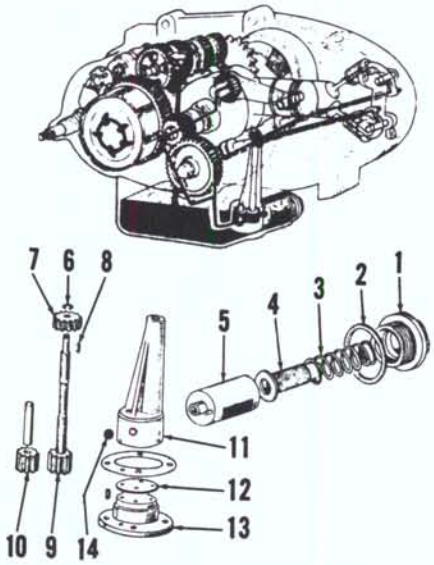


Fig. BE2-3–Cross section of engine showing lubrication system and exploded view of pump and filter.

1. Filter (drain) plug
2. Gasket
3. Spring
4. Inner filter
5. Pick up screen
6. Snap ring
7. Pump drive gear
8. Key
9. Drive shaft and gear
10. Gear
11. Housing
12. Thrust plate
13. Bottom plate
14. Seal

REPAIR

CYLINDER HEAD AND VALVES. The cylinder head can be removed after disconnecting exhaust pipe and removing carburetor, rocker arm cover, rocker arms assembly and push rods. Make certain that piston is at TDC on compression stroke before loosening the retaining stud nuts. Refer to the following specifications:

Valve face and seat angle
- Both valves ..... 45 degrees

Valve seat width (both valves)
- Desired ..... 3/32 inch
- Max. limit ..... ⅛ inch

Valve stem to guide clearance
- 125cc, inlet ..... 0.01-0.035mm (0.0004-0.0014 inch)
- Wear limit ... 0.1mm (0.004 inch)
- 125cc, exhaust ..... 0.02-0.045mm (0.0008-0.0018 inch)
- Wear limit .. 0.01mm (0.004 inch)
- 200 & 250cc, both valves ..... 0.02-0.045mm (0.0008-0.0018 inch)
- Wear limit ... 0.1mm (0.004 inch)

Inner valve spring
- Free length ..... 34mm (1.34 inch)
- Pressure @ 1.02 in. (26mm) ..... 31 pounds
- Minimum limit .... 23.25 pounds
- Pressure @ 0.768 in. (19.5mm) ..... 56 pounds
- Minimum limit ..... 42 pounds

Outer valve spring
- Free length ..... 37.4mm (1.47 inch)
- Pressure @ 1.08 in. (27.5mm) ..... 58 pounds
- Minimum limit ..... 43.5 pounds
- Pressure @ 0.827 in. (21mm) ..... 98 pounds
- Minimum limit ..... 73.5 pounds

The cylinder head should be heated to 380-420°F. for renewing the valve seat inserts. To renew the valve guides, heat cylinder head to 220-260°F. Valve guides should have 0.3-0.5mm (0.0012-0.0020 in.) interference fit in cylinder head. Make certain that the guide is pressed tight against the valve spring seat (13—Fig. BE2-6). The inlet push rod is longer than the exhaust. Make certain that oil passages in both push

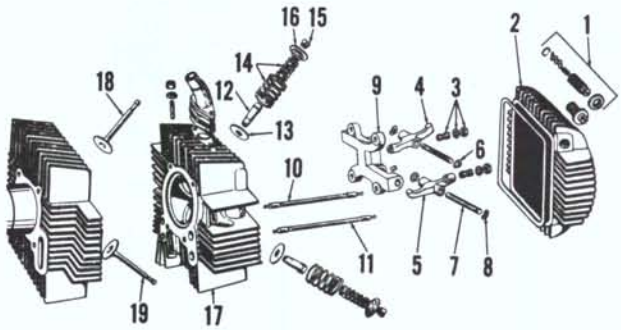


Fig. BE2-6–Exploded view of the cylinder head and rocker arms.

1. Breather
2. Rocker arm cover
3. Adjusting screw, washer & lock nut
4. Inlet rocker arm
5. Exhaust rocker arm
6. Thrust washer
7. Rocker arm shaft
8. Spring washer
9. Support bracket
10. Inlet push rod
11. Exhaust push rod
12. Valve guide
13. Spring lower seat
14. Springs
15. Keepers
16. Retainer
17. Cylinder head
18. Inlet valve
19. Exhaust valve

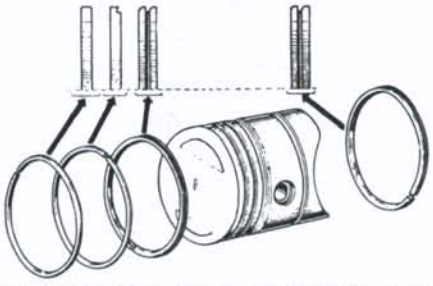


Fig. BE2-7–Piston rings must be installed as shown.

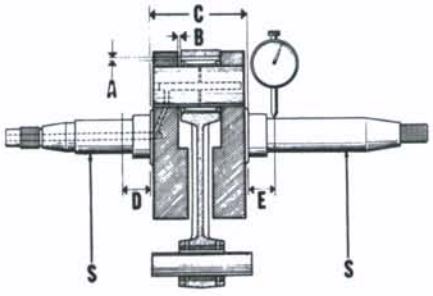


Fig. BE2-9–Refer to text for crankshaft and connecting rod specifications. Crankshaft should be supported near ends as shown at (S).

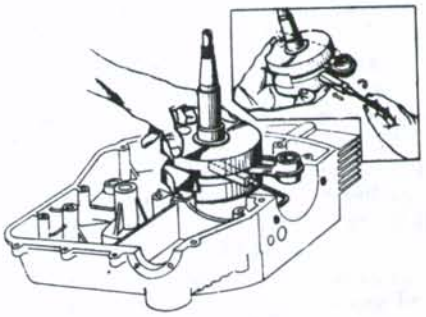


Fig. BE2-10–When installing the crankshaft, use a wedge block between center of flywheels. Remove wedge block after crankcase halves are assembled.

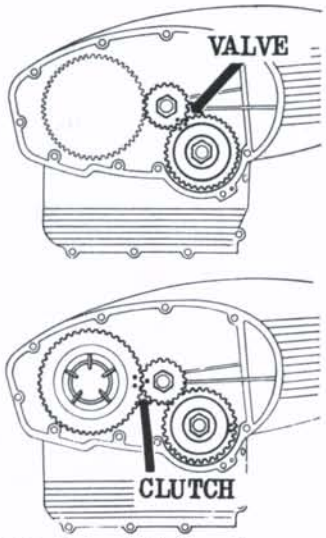


Fig. BE2-8–The crankshaft gear has one marked tooth which must align with the two marked teeth of camshaft gear for correct valve timing, as shown at top. The marked tooth of crankshaft gear should align with marked teeth of clutch gear as shown at bottom to prevent uneven wear of gear.

rods are clean. The oil passages in the top (inlet) rocker arm should also be cleaned. The cylinder head stud nuts should be tightened to 22-24 Ft.-Lbs. torque. Valve clearance should be adjusted to 0.15mm (0.006 in.) when hot.

Install one aluminum washer and steel washer between the rocker arm cover and each of the retaining nuts. The aluminum washers should be next to the cover and nuts should be tightened to 7-8 Ft.-Lbs. torque.

PISTON, RINGS AND CYLINDER. The cylinder can be removed after removing the cylinder head. Nominal cylinder bore diameter is 54mm (2.126 inch) for 125cc models; 66.5mm (2.618 inch) for 200cc models; 74mm (2.913 inch) for 250cc models. When measuring the clearance between piston and cylinder, measure piston diameter at right angles to pin at bottom of skirt for 125cc models; just above bottom ring groove for 200cc models; just below the bottom ring groove for 250cc models. Refer to the following clearances:

Piston to cylinder clearance
- 125cc ..... 0.03-0.05mm (0.0012-0.0020 inch)
- Wear limit .. 0.12mm (0.004 inch)
- 200cc ..... 0.035-0.055mm (0.0014-0.0022 inch)
- Wear limit .. 0.15mm (0.006 inch)
- 250cc ..... 0.045-0.065mm (0.0018-0.0026 inch)
- Wear limit .. 0.15mm (0.006 inch)

Ring end gap
- Compression rings ... 0.20-0.25mm (0.008-0.010 inch)
- Oil rings ..... 0.25-0.30mm (0.010-0.012 inch)

Piston pin to rod bushing ..... 0.015-0.020mm (0.0006-0.0008 inch)
- Wear limit ..... 0.050mm (0.002 inch)

Make certain that piston rings are installed as shown in Fig. BE2-7. The piston should be heated to 100-120°F. before installing piston pin. A paper gasket should be installed on each side of the aluminum (cylinder to crankcase) gasket.

CAMSHAFT AND TIMING GEARS. The camshaft and crankshaft are accessible after removing the right side cover. To remove the camshaft, it is necessary to separate the crankcase halves. After the camshaft is removed, the cam followers can be withdrawn. Cam followers are drilled to provide oil pressure to the rocker arms and valves via the hollow push rods. The cam follower bushings are renewable.

The single dot on the crankshaft should first be aligned with the two marked teeth of the clutch gear as shown at top of Fig. BE2-8. Rotate the crankshaft until the mark on crankshaft gear is in (4 o'clock) position as shown at bottom of Fig. BE2-8. The two marks on camshaft gear should be aligned with the mark on crankshaft gear. Gear retaining nuts on crankshaft should be tightened to 45-50 Ft.-Lbs. torque. The second (lock) nut should be torqued to 40-45 Ft.-Lbs.

When installing the engine right side cover, make certain that oil passage is clean. The crankshaft oil seal should be installed in cover with lip toward inside of seal bore. A new seal should be installed at (S—Fig. BE2-11) before installing the right side cover. Oil for the connecting rod bearing enters the oil passage in cover at seal (S—Fig. BE2-11) and is directed into end of crankshaft. Gaskets are not used between crankcase halves or for the right side cover. Use a suitable sealer between crankcase halves and on the right side cover. NOTE: Do not allow sealer to enter the oil passages.

CRANKSHAFT AND CONNECTING ROD. The crankcase halves must be separated to remove the crankshaft. Disassembly of the connecting rod flywheels and crankpin should not be attempted unless a press and crankshaft alignment jig are available. The crankpin is a press fit into each flywheel and can be removed by supporting the inner side of one fly-

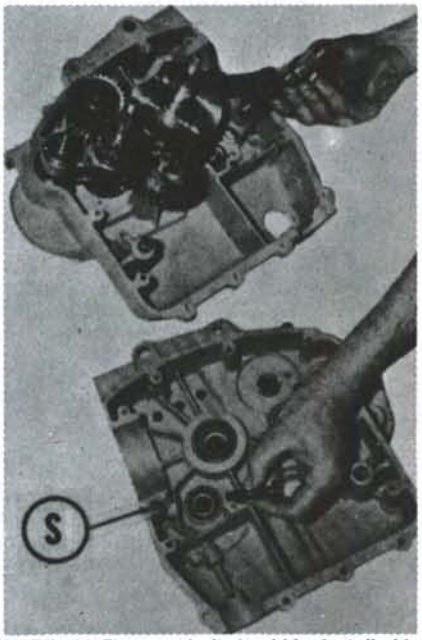
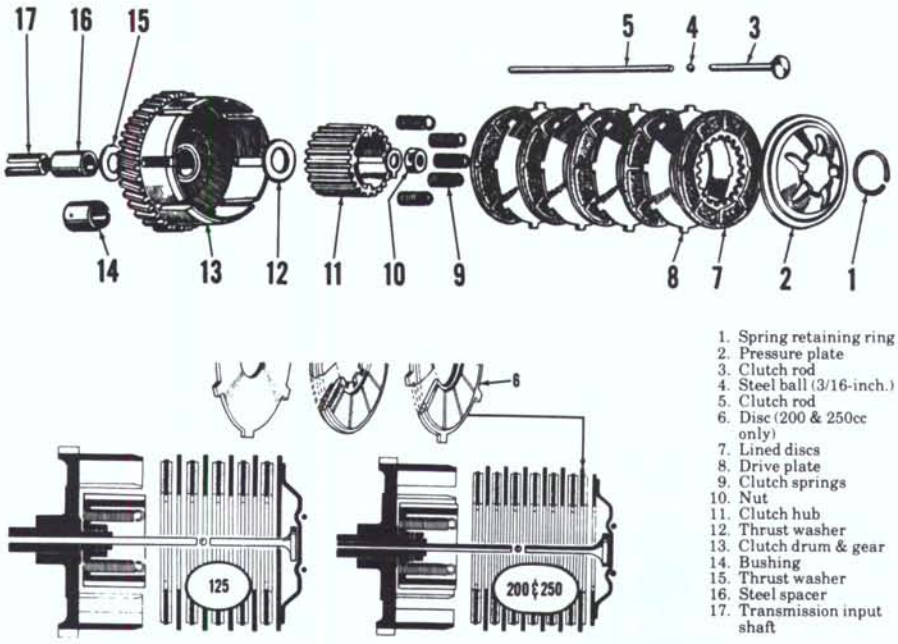


Fig. BE2-11–The camshaft should be installed in left crankcase half with both cam lobes toward rear. Make certain that oil seal (S) is on tube and cam follower is in right half of crankcase.

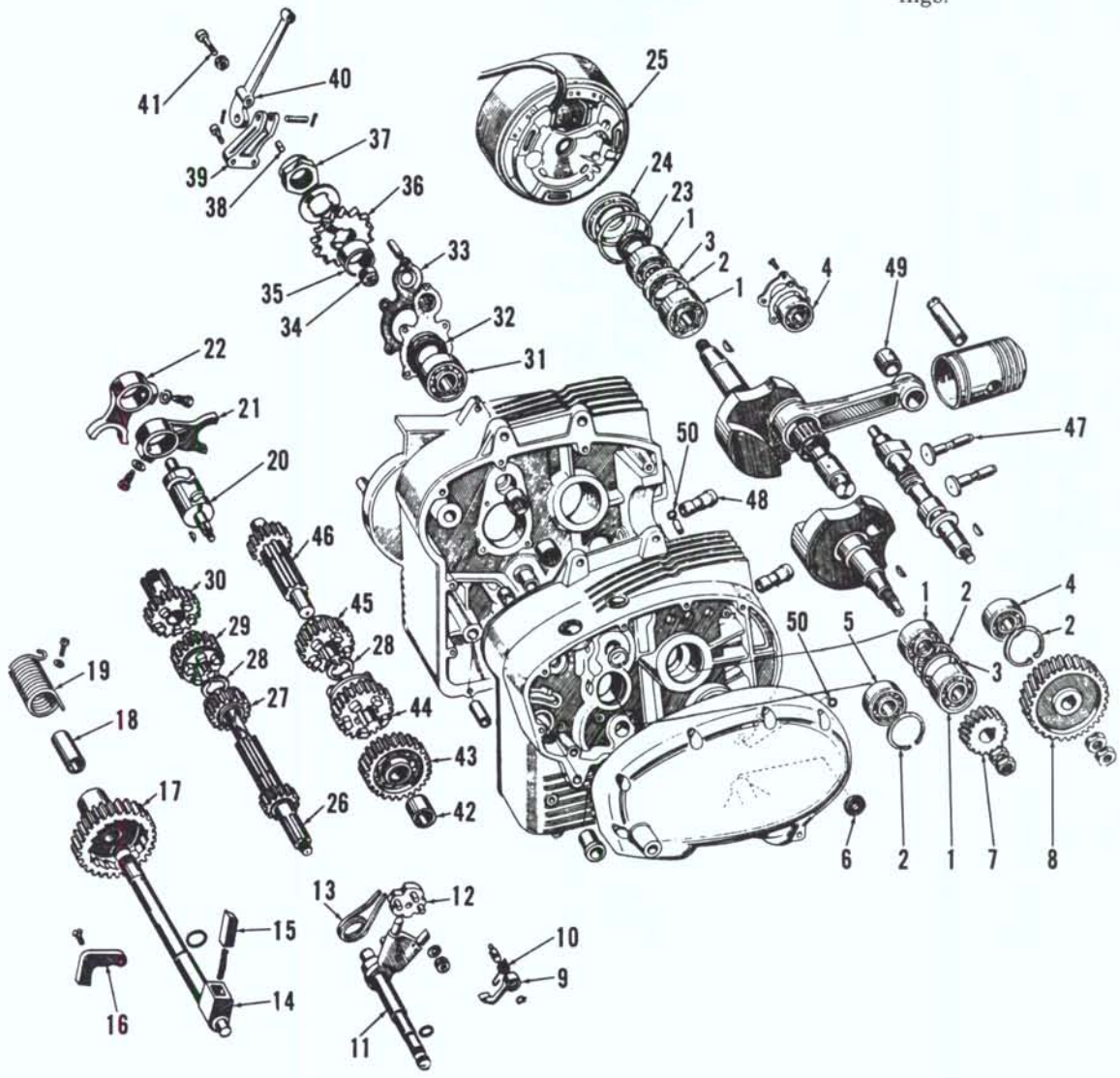


1. Spring retaining ring
2. Pressure plate
3. Clutch rod
4. Steel ball (3/16-inch.)
5. Clutch rod
6. Disc (200 & 250cc only)
7. Lined discs
8. Drive plate
9. Clutch springs
10. Nut
11. Clutch hub
12. Thrust washer
13. Clutch drum & gear
14. Bushing
15. Thrust washer
16. Steel spacer
17. Transmission input shaft

Fig. BE2-14–The clutch used on 125cc models uses five lined discs (7) and four drive plates (8). The clutch used on 200cc and 250cc models use one disc (6) that is lined on only one side, six lined discs (7) and five driven plates (8).

wheel and pressing the crankpin out. Connecting rod side play (B—Fig. BE2-9) should be 0.004-0.006 inch with wear limit of 0.0157 inch. Connecting rod to crankpin clearance (A) should be 0.0004-0.0008 inch and wear limit is 0.002 inch. Crankshaft eccentricity is measured 20mm (0.787 inch) from machined surfaces of flywheels as shown at (D & E). Maximum allowable eccentricity is 0.0008 inch. Distance (C) between the machined surfaces of flywheels should be 56.120-56.190mm (2.2087-2.2115 inch) as shown at (C). When assembling crankshaft, make certain that oil passage in crankpin is aligned with passage in the right flywheel.

When positioning the crankshaft in the main bearings, use a wedge block (spacer) between the center of crankshaft flywheels as shown in Fig. BE2-10. If a wedge block is not used, crankshaft clearances and alignment may change while attempting to push the crankshaft main journals into the bearings.



1. Crankshaft main bearing
2. Snap rings
3. Bearing spacers
4. Camshaft bearings
5. Transmission input bearing
6. Crankshaft oil seal (in cover)
7. Crankshaft gear
8. Camshaft gear
9. Shift detent
10. Spring
11. Shift ratchet
12. Shift drum rotor
13. Return spring
14. Kick starter shaft
15. Starter ratchet
16. Stop bracket
17. Starter gear
18. Bushing
19. Return spring
20. Shift drum
21. Shift fork (1st and 3rd)
22. Shift fork (2nd and 4th)
23. Seal
24. Seal & bearing retainer
25. Magneto
26. Input shaft
27. Gear (2nd)
28. Snap ring
29. Sliding gear (3rd)
30. Output shaft
31. Bearing
32. Seal
33. Cover plate
34. Clutch rod seal
35. Spacer
36. Output sprocket
37. Nut
38. Clutch push rod
39. Bracket
40. Clutch lever
41. Adjuster
42. Bushing
43. Gear (1st)
44. Sliding gear (2nd)
45. Gear (3rd)
46. Counter shaft
47. Cam follower
48. Cam follower bushing
49. Piston pin bushing
50. Oil passage seals

Fig. BE2-15–Exploded view of crankcase and four speed transmission. Refer to Fig. BE2-17 for view of five speed transmission.

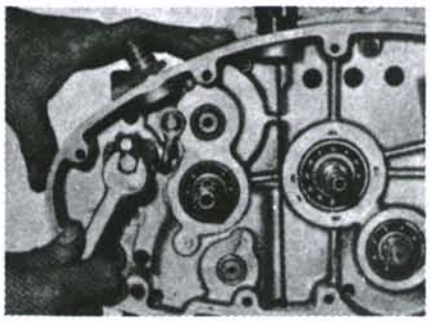


Fig. BE2-16–The shift drum rotor should be removed before separating crankcase halves.

1. Input shaft
2. Gear (2nd)
3. Sliding gear (3rd)
4. Gear (4th)
5. Shift coupling (5th)
6. Bearings
7. Output shaft
8. Bearing
9. Counter shaft
10. Snap rings
11. Gear (3rd)
12. Sliding gear (2nd)
13. Gear (1st)
14. Bushing
15. Shift fork (5th)
16. Shift drum
17. Shift fork (2nd & 4th)
18. Shift fork (1st & 3rd)

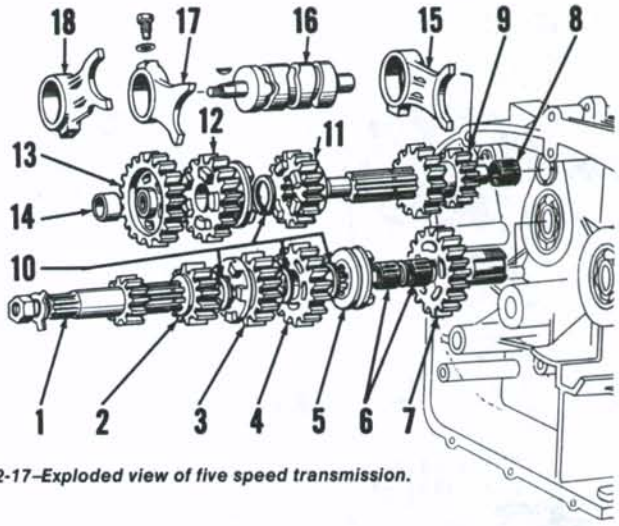


Fig. BE2-17–Exploded view of five speed transmission.

When reassembling, install transmission gears and shafts, crankshaft, inlet cam follower and camshaft in the left crankcase half as shown in Fig. BE2-11. Install the exhaust cam follower, oil tube and seal in the right crankcase half. Coat the crankcase coating surfaces with a suitable sealer and reassemble. NOTE: Do not allow sealer to enter oil passages. Gasket is not used between crankcase halves. Refer to preceding paragraphs CAMSHAFT AND TIMING GEARS for remainder of assembly.

CLUTCH. The clutch, located on the right end of the transmission input shaft, is shown in Fig. BE2-14. The clutch assembly used on 125cc models is shown at left and assembly used for 200 & 250cc models is shown at right. When assembling, align marked tooth on crankshaft gear with the two marked teeth on clutch gear as shown in Fig. BE2-8. Tighten the hub retaining nut (10—Fig. BE2-14) to 45-50 Ft.-Lbs. torque and lock in place with tab washer. The clutch springs should be threaded into hub until the hook is flush with hub and open end is toward center.

CRANKCASE AND GEAR BOX. The crankcase and associated parts are shown in Fig. BE2-15. To separate the crankcase halves, remove the cylinder head, cylinder, clutch and magneto. Remove the retaining nuts and use a suitable puller to remove the crankshaft and camshaft gears. Remove the nut, then use a suitable puller to remove the shift drum rotor as shown in Fig. BE2-16. Remove the oil filter and oil pump. Remove woodruff keys from crankshaft, camshaft and shift drum shaft. Remove the screws and separate the crankcase halves. Exploded view of four speed transmission is shown in Fig. BE2-15; five speed is shown in Fig. BE2-17.

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