McCULLOCH

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Model	Bore	Stroke	Displacement
MC-2, MC-7, MC-8, MC-9, MC-30, MC-40, MC-45	2.165 in. (55 mm)	1.635 in. (41.5 mm)	6.1 cu. in. (99 cc)
MC-5	2.125 in. (54 mm)	1.375 in. (35 mm)	4.9 cu. in. (80 cc)
MC-6, MC-10	2.125 in. (54 mm)	1.500 in. (38.1 mm)	5.3 cu. in. (87 cc)
MC-20	2.125 in. (54 mm)	1.635 in. (41.5 mm)	5.8 cu. in. (95 cc)
MC-70	2.217 in. (56.3 mm)	1.835 in. (46.6 mm)	7.1 cu. in. (116 cc)
MC-75	2.250 in. (57.2 mm)	1.835 in. (46.6 mm)	7.3 cu. in. (120 cc)

MAINTENANCE

SPARK PLUG. Recommended spark plug for average conditions is a Champion J6J. Spark plug heat range may have to be changed for certain operating conditions. Set electrode gap to 0.025 inch (0.63 mm) on all models.

CARBURETOR. Models MC-5 and MC-6 use Tillotson Series HL carburetor as shown in Fig. MC1. All other models use McCulloch carburetors as shown in Fig. MC2 or Fig. MC3. All carburetors are diaphragm type with integral fuel pump.

Initial carburetor adjustment for Models MC-40 and MC-70 is 2 turns open on both idle and main fuel mixture needles on both carburetors. On remaining models, initial adjustment is 1¼ turns open on idle fuel mixture needle and 1½ turns open on main fuel mixture needle. Make final adjustments with engine at operating temperature and running. Adjust idle speed regulating screw so engine idles at 1500-1700 rpm. Turn idle fuel needle slowly in clockwise direction until engine idles smoothly. If engine starts to accelerate while turning needle in clockwise direction, turn needle back counterclockwise until engine slows down. If engine misfires during acceleration, enrich fuel mixture by turning idle fuel needle counterclockwise a fraction of a turn at a time until engine accelerates smooth-

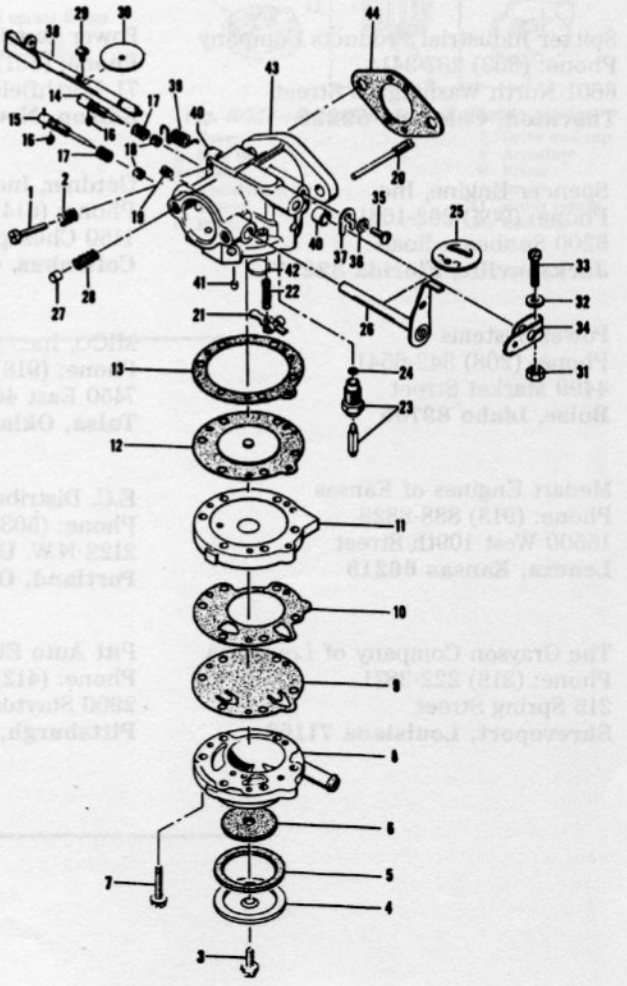


Fig. MC1—Exploded view of typical Tillotson carburetor used on Models MC-5 and MC-6.

1. Idle speed screw
2. Spring
3. Screw
4. Strainer cover
5. Gasket
6. Strainer screen
7. Screw
8. Fuel pump body
9. Pump diaphragm
10. Gasket
11. Diaphragm cover
12. Diaphragm
13. Gasket
14. Idle fuel needle
15. Main fuel needle
16. Washer
17. Spring
18. Packing
19. Plug
20. Inlet lever pin
21. Inlet lever
22. Spring
23. Inlet needle & seat
24. Gasket
25. Choke plate
26. Choke shaft & lever
27. Friction pin
28. Spring
29. Screw
30. Throttle plate
31. Nut
32. Washer
33. Screw
34. Throttle lever
35. Screw
36. Washer
37. Clip
38. Throttle shaft & lever
39. Spring
40. Bushing
41. Plug
42. Plug
43. Carburetor body
44. Gasket

Illustrations courtesy McCulloch Corp.

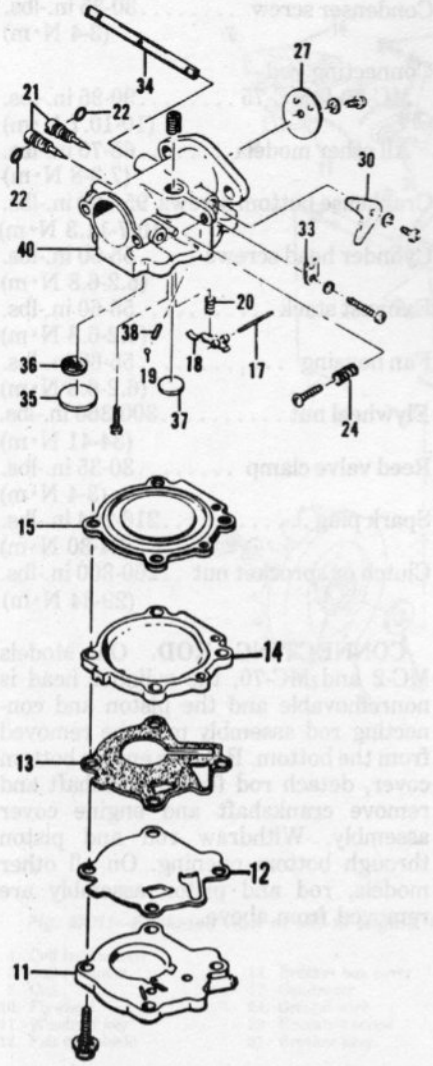
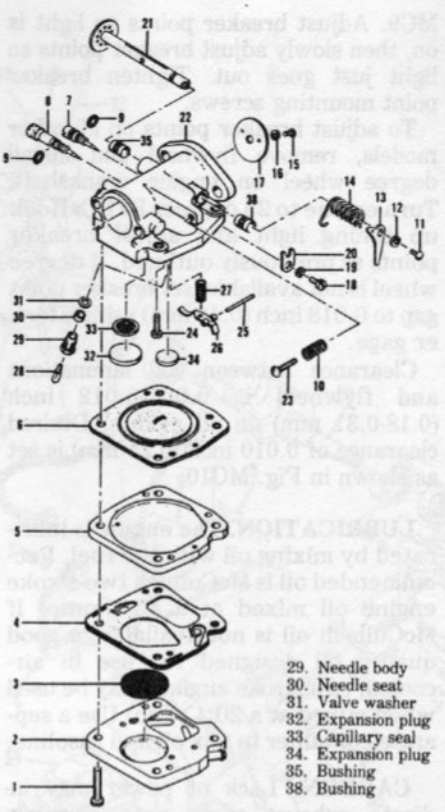


Fig. MC2—Exploded view of McCulloch 50070C diaphragm carburetor and diaphragm type fuel pump assembly used on MC-10 engine.

11. Fuel pump body
12. Pump diaphragm
13. Pump gasket
14. Diaphragm plate
15. Carburetor diaphragm
17. Inlet lever pin
18. Inlet control lever
19. Ball
20. Inlet lever spring
21. Metering needles
22. "O" rings
27. Throttle plate
30. Throttle shaft arm
33. Clip
34. Throttle shaft
35. Expansion plug
36. Filter
37. Expansion plug
38. Ball check seat
40. Carburetor body



29. Needle body
30. Needle seat
31. Valve washer
32. Expansion plug
33. Capillary seal
34. Expansion plug
35. Bushing
38. Bushing

Fig. MC3—Exploded view of McCulloch carburetor used on MC-7, MC-8, MC-20, MC-30, MC-40 and MC-70 models. Carburetors used on Models MC-2, MC-45 and MC-75 are similar.

1. Screw
2. Fuel pump body
3. Fuel pump filter
4. Pump diaphragm
5. Diaphragm plate
6. Diaphragm
7. Idle fuel needle
8. Main fuel needle
9. "O" ring
10. Spring
11. Screw
12. Washer
13. Throttle arm
14. Spring
15. Screw
16. Washer
17. Throttle plate
18. Screw
19. Washer
20. Clip
21. Throttle shaft
22. Carburetor body
23. Idle speed screw
24. Screw
25. Inlet lever pin
26. Inlet lever
27. Spring
28. Needle valve

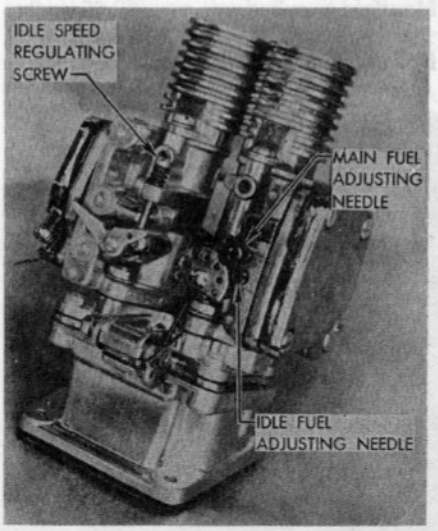


Fig. MC4—View of dual carburetor installation on Models MC-40 and MC-70 showing carburetor adjustment points. Main fuel adjusting needle and idle fuel adjusting needle are on rear side of left carburetor.

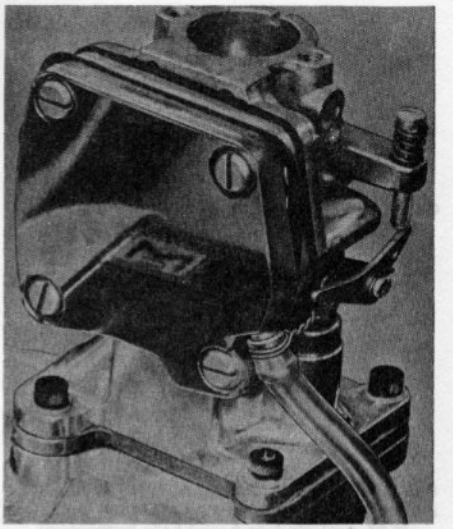


Fig. MC5—Always secure fuel tube with wire at each end as shown.

Fig. MC6—On Tillotson carburetor, be sure diaphragm lever is flush with diaphragm chamber surface as shown.

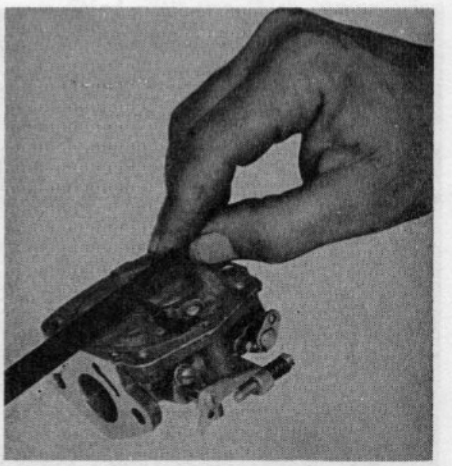


Fig. MC7—On McCulloch carburetors, be sure diaphragm lever is flush with machined gasket surface of carburetor body as shown.

ly and rapidly. If engine appears sluggish on acceleration, a leaner fuel mixture may be required. Turn idle needle a fraction of a turn at a time in clockwise direction until engine acceleration is at maximum. Because main fuel needle has not had final adjustment at this time, acceleration may not be at maximum peak.

Test engine at high speed under load. If engine four-strokes (fires every other stroke), lean the fuel mixture by turning the main fuel needle in small increments in clockwise direction until engine fires

Illustrations courtesy McCulloch Corp.

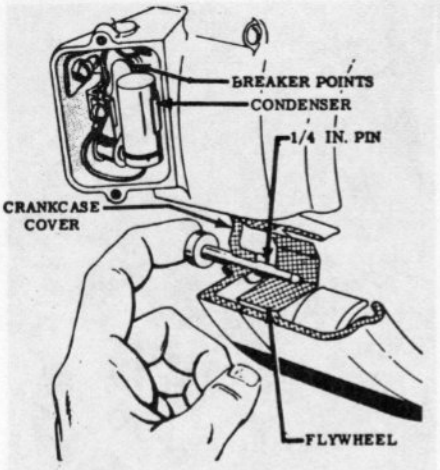


Fig. MC8 – On MC-10 engines, crankshaft can be locked in firing position by inserting a ¼-inch (6.35 mm) pin into bored hole in flywheel.

on every stroke at peak rpm. Never attempt to adjust the main fuel mixture needle unless engine is under load.

After adjusting the main fuel needle, it may be necessary to readjust the idle fuel needle as previously outlined.

MAGNETO AND TIMING. The magnet is cast into the flywheel on all models. The breaker points and condenser on the Model MC-10 are mounted in a breaker box outside the engine crankcase. The flywheel must be removed on all other models to gain access to the breaker points and condenser. Breaker point gap on all models is 0.018 inch (0.46 mm).

To adjust breaker point gap on Model MC-10, insert a ¼-inch (6.35 mm) pin through the hole in the crankcase cover (Fig. MC8) and turn engine until pin goes into timing hole in flywheel. Disconnect primary lead from breaker point terminal. Connect timing light in series between breaker point terminal and engine ground as shown in Fig. MC9. Adjust breaker points so light is on, then slowly adjust breaker points so light just goes out. Tighten breaker point mounting screws.

To adjust breaker points on all other models, remove flywheel and install degree wheel on engine crankshaft. Turn engine to 25 degrees BTDC. Hook up timing light and adjust breaker points as previously outlined. If degree wheel is not available, set breaker point gap to 0.018 inch (0.46 mm) using a feeler gage.

Clearance between coil laminations and flywheel is 0.007-0.012 inch (0.18-0.31 mm) on all models. Desired clearance of 0.010 inch (0.25 mm) is set as shown in Fig. MC10.

LUBRICATION. The engine is lubricated by mixing oil with the fuel. Recommended oil is McCulloch two-stroke engine oil mixed at a 40:1 ratio. If McCulloch oil is not available, a good quality oil designed for use in air-cooled, two-stroke engines may be used when mixed at a 20:1 ratio. Use a separate container to mix oil and gasoline.

CARBON. Lack of power may indicate exhaust ports need cleaning. Clean ports with wooden scraper.

REPAIRS

TIGHTENING TORQUES. Recommended tightening torques are as follows:

Breaker point screws	30-35 in.-lbs. (3-4 N·m)
Carburetor to adapter	90-100 in.-lbs. (10-11.3 N·m)
Adapter to manifold	60-65 in.-lbs. (6.8-7.3 N·m)
Manifold to cylinder	60-65 in.-lbs. (6.8-7.3 N·m)
Coil and lamination screws	55-60 in.-lbs. (6.2-6.8 N·m)
Condenser screw	30-35 in.-lbs. (3-4 N·m)
Connecting rod – MC-70 & MC-75	90-95 in.-lbs. (10-10.7 N·m)
All other models	65-70 in.-lbs. (7.3-8 N·m)
Crankcase bottom screws	95-100 in.-lbs. (10.7-11.3 N·m)
Cylinder head screws	55-60 in.-lbs. (6.2-6.8 N·m)
Exhaust stack	55-60 in.-lbs. (6.2-6.8 N·m)
Fan housing	55-60 in.-lbs. (6.2-6.8 N·m)
Flywheel nut	300-360 in.-lbs. (34-41 N·m)
Reed valve clamp	30-35 in.-lbs. (3-4 N·m)
Spark plug	216-264 in.-lbs. (24-30 N·m)
Clutch or sprocket nut	260-300 in.-lbs. (29-34 N·m)

CONNECTING ROD. On Models MC-2 and MC-70, the cylinder head is nonremovable and the piston and connecting rod assembly must be removed from the bottom. Remove engine bottom cover, detach rod from crankshaft and remove crankshaft and engine cover assembly. Withdraw rod and piston through bottom opening. On all other models, rod and piston assembly are removed from above.

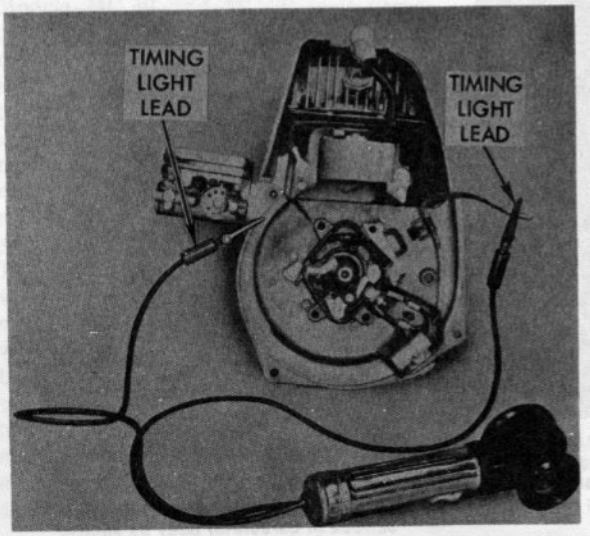


Fig. MC9—Illustrating proper use of static timing light in adjusting breaker point gap on McCulloch engines.

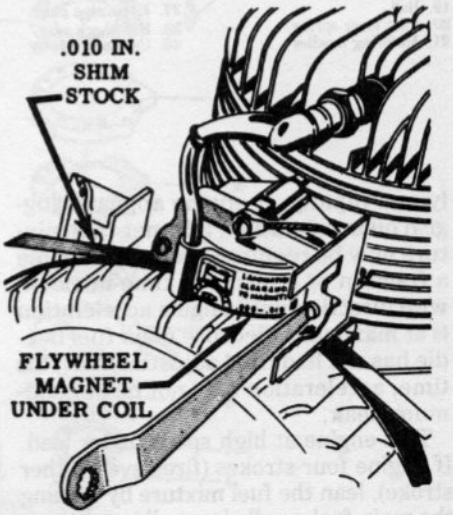


Fig. MC10 – Recommended magneto air gap is obtained by shifting coil on mounting screws.

Illustrations courtesy McCulloch Corp.

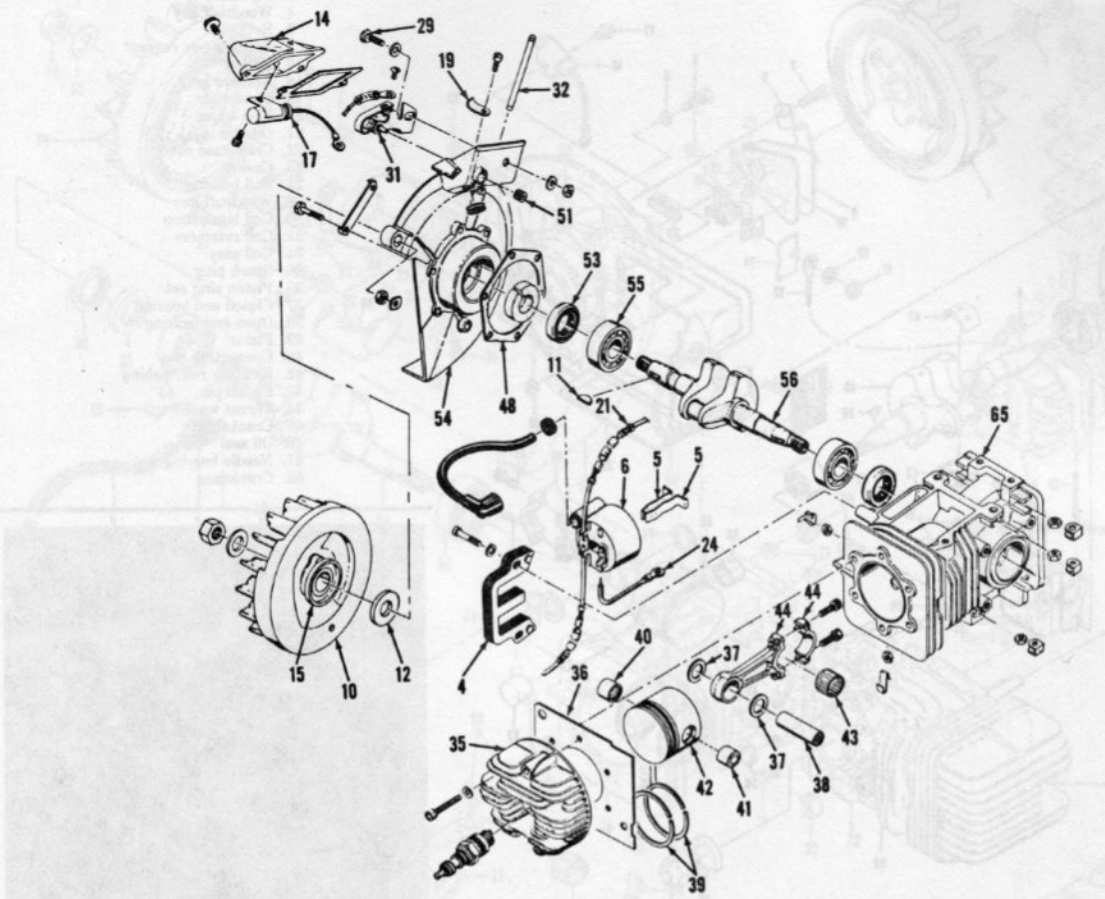


Fig. MC11—Exploded view of MC-10 engine. Note external breaker box on crankcase cover (54) and push rod (32) that actuates breaker points.

4. Coil laminations
5. Coil retainers
6. Coil
10. Flywheel
11. Woodruff key
12. Felt dirt shield
14. Breaker box cover
17. Condenser
24. Ground wire
29. Eccentric screw
31. Breaker assy.
32. Push rod
35. Cylinder head
36. Gasket
37. Thrust washers
38. Piston pin
39. Rings
40. Open needle bearing
41. Closed end needle bearing
42. Piston
43. Needle rollers (24)
44. Connecting rod
48. Gasket
51. Bushing
53. Crankcase seal
54. Crankcase cover
55. Ball bearing (2)
56. Crankshaft
65. Crankcase and cylinder

The crankpin bearing on Model MC-2 is a two-piece floating bushing. On all other models, 24 uncaged needle roller bearing are used. Renew rod, bushings, or crankshaft on Model MC-2 if scored or worn excessively. On all other models, crankpin nominal diameter is 0.6298 inch (15.997 mm). Clearance between end of rollers and side of crankpin journal (needle end clearance) should be 0.008-0.018 inch (0.20-0.46 mm). Accumulative clearance between rollers should be 0.008-0.010 inch (0.20-0.025 mm). Side clearance between rod and crankshaft should be 0.100-0.110 inch (2.54-2.79 mm). Renew rod and/or crankshaft if scored or if any wear spots are visible.

Install crankpin needle rollers by sticking 12 rollers in the rod and 12 in the rod cap with grease. Align "pips" (Fig. MC12) on rod and cap when installing on crankpin. Parting faces of connecting rod and cap are fractured to provide the dowel effect on the meshing of the consequent uneven surface. It is advisable to wiggle the rod cap back and forth while tightening to make sure the surfaces of the fractured joint are in perfect mesh. When properly meshed, no "catch points" will be felt when fingernail is rubbed along parting line of rod and cap (Fig. MC13).

PISTON, PIN AND RINGS. Piston in early MC-5 and MC-10 model engines was fitted with two thick compression

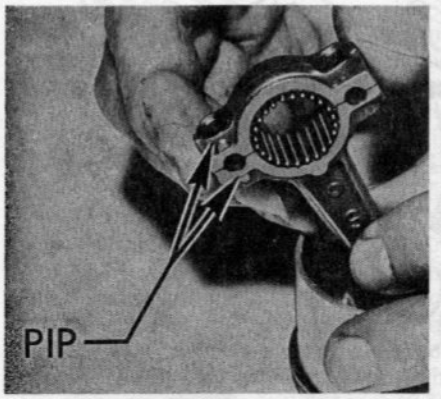


Fig. MC12—Install cap on connecting rod with "pips" on rod and cap aligned.

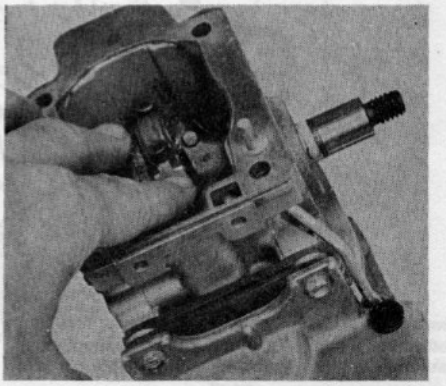
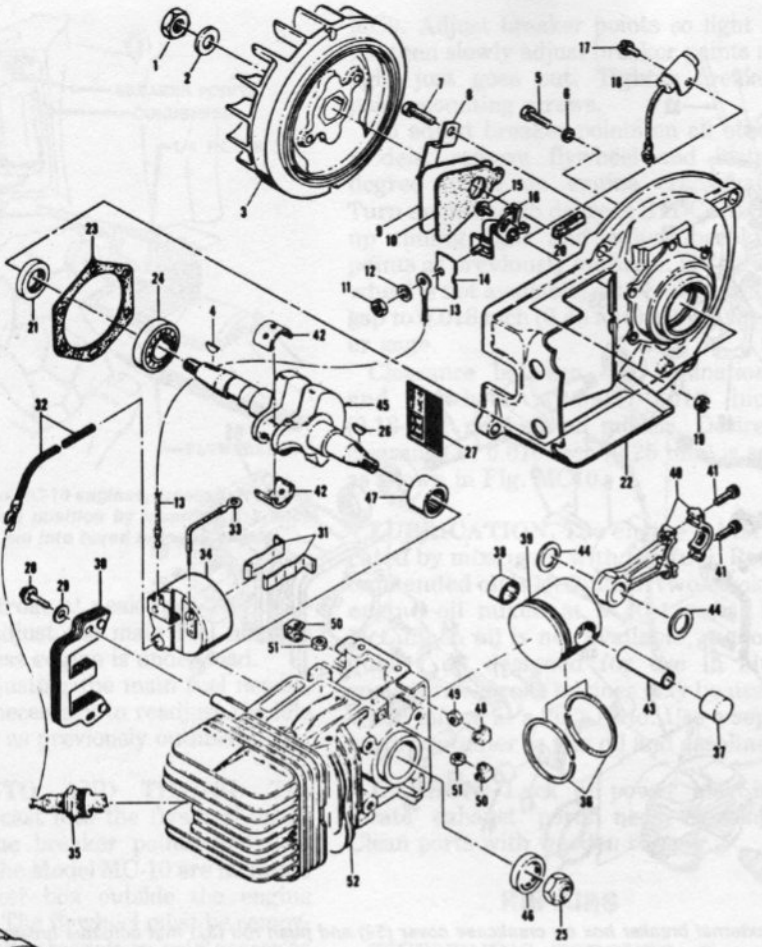


Fig. MC13—When properly assembled, parting line on rod and cap is practically invisible and no "catch points" can be felt with fingernail.

Illustrations courtesy McCulloch Corp.



3. Flywheel
4. Woodruff key
8. Retainer
9. Breaker box cover
10. Gasket
16. Breaker assy.
18. Condenser
20. Felt wiper
21. Oil seal
22. Crankcase cover
23. Gasket
24. Ball bearing
26. Woodruff key
30. Coil lamination
31. Coil retainers
34. Coil assy.
35. Spark plug
36. Piston ring set
37. Closed end bearing
38. Open end bearing
39. Piston
40. Connecting rod
42. Floating rod bushing
43. Piston pin
44. Thrust washers
45. Crankshaft
46. Oil seal
47. Needle bearing
52. Crankcase

Fig. MC14—Exploded view of Model MC-2 bushing engine.

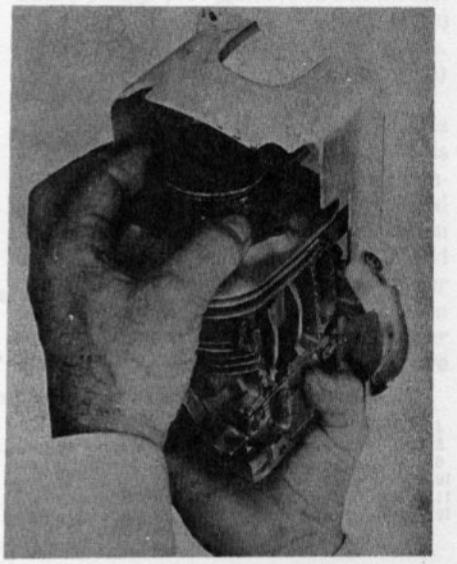
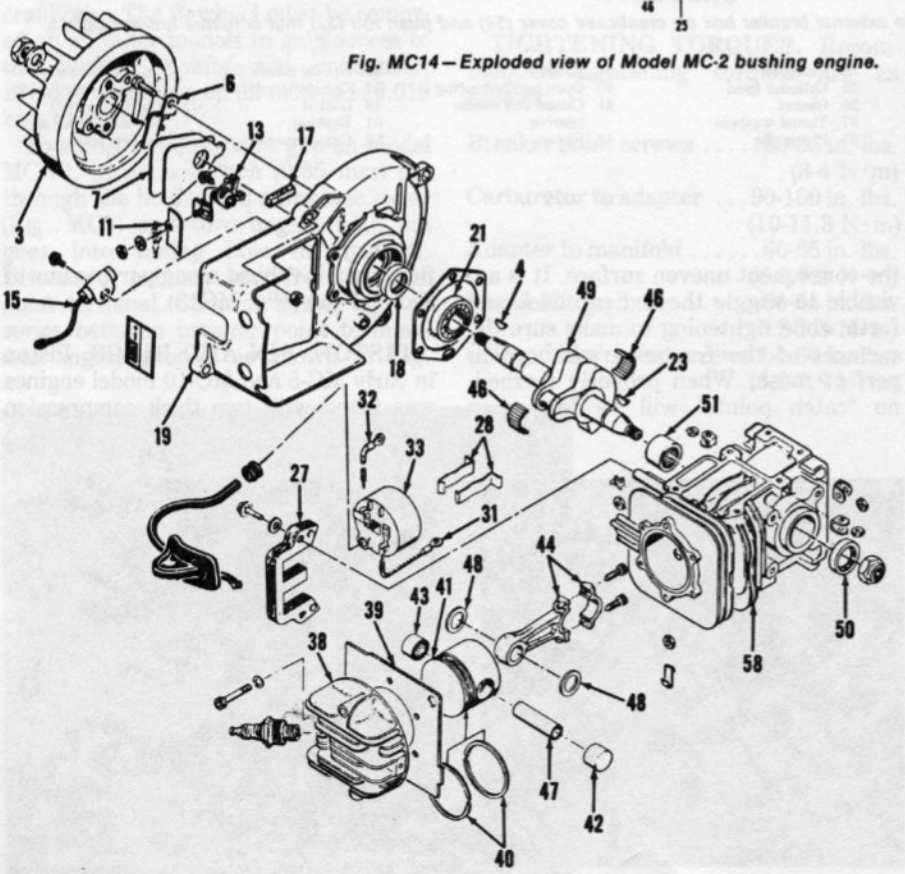


Fig. MC15—Removing connecting rod and piston assembly from models with removable cylinder head. It is not necessary to remove crankcase cover or crankshaft to remove piston and rod on models with removable cylinder head.



3. Flywheel
4. Woodruff key
6. Breaker box cover retainer
7. Breaker box cover
11. Insulator
13. Breaker points
15. Condenser
17. Felt wiper
18. Crankcase seal
19. Crankcase cover
21. Ball bearing
23. Woodruff key
27. Coil laminations
28. Coil retainers
31. Ground wire
32. Primary wire
33. Coil
38. Cylinder head
39. Gasket
40. Rings
41. Piston
42. Closed-end needle bearing
43. Open needle bearing
44. Connecting rod
46. Needle rollers (24)
47. Piston pin
48. Thrust washers
49. Crankshaft
50. Crankcase seal
51. Needle bearing
58. Crankcase & cylinder

Fig. MC16—Exploded view of MC-6 engine; MC-5, MC-7 and MC-8 are similar except that MC-7 and MC-8 use an "O" ring in place of crankcase cover gasket shown adjacent to ball bearing (21).

Illustrations courtesy McCulloch Corp.

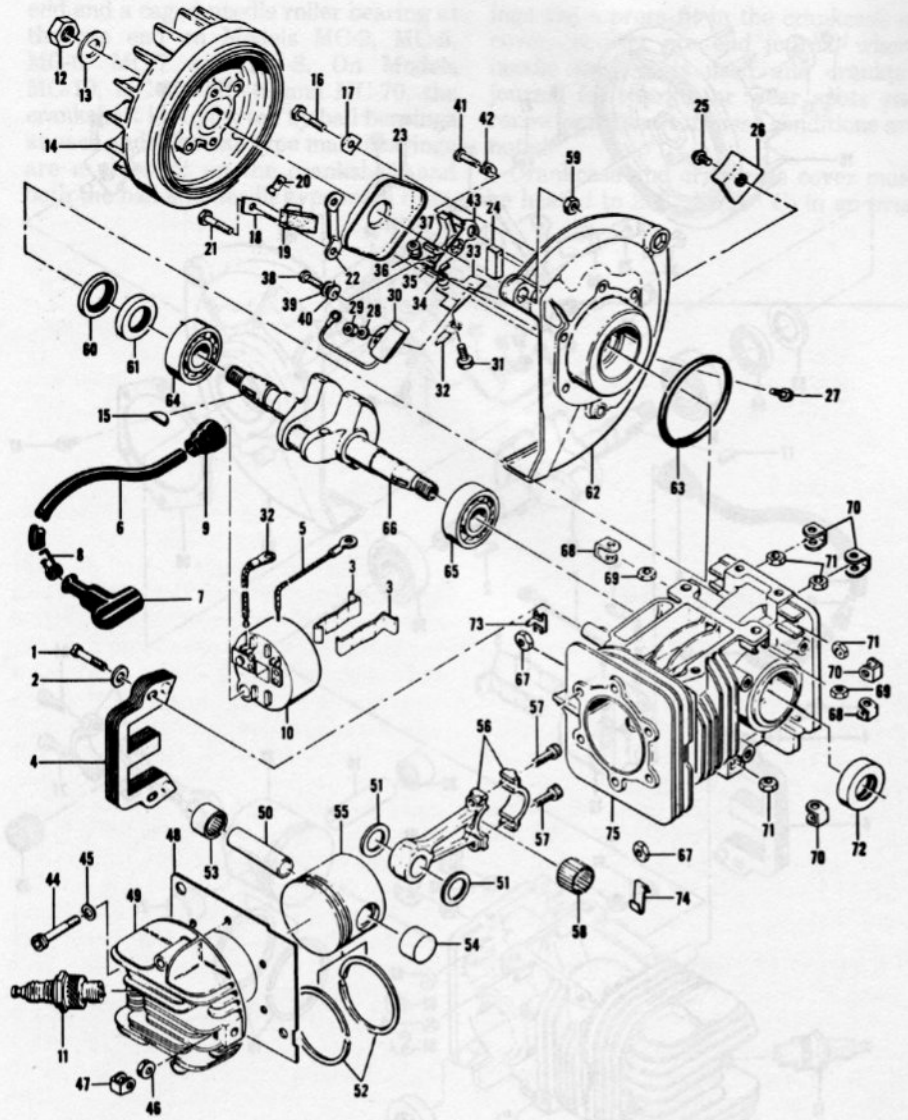


Fig. MC17—Exploded view showing construction of Models MC-20, MC-30, MC-40 engines. Model MC-45 is similar except for nine-port crankcase. Model MC75 is also similar except for nine-port crankcase and gasket is used instead of "O" ring (63).

4. Coil laminations
5. Grounding wire
6. Spark plug wire
10. Coil assy.
11. Spark plug
14. Flywheel
23. Breaker box cover
24. Felt cam wiper
30. Condenser
32. Primary coil wire
43. Breaker point assy.
49. Cylinder
50. Piston pin
51. Thrust washers
52. Piston rings
53. Needle bearing
54. Needle bearing
55. Piston
56. Connecting rod
58. Needle rollers
60. Oil seal
62. Crankcase cover
64. Ball bearing
65. Ball bearing
66. Crankshaft
75. Crankcase

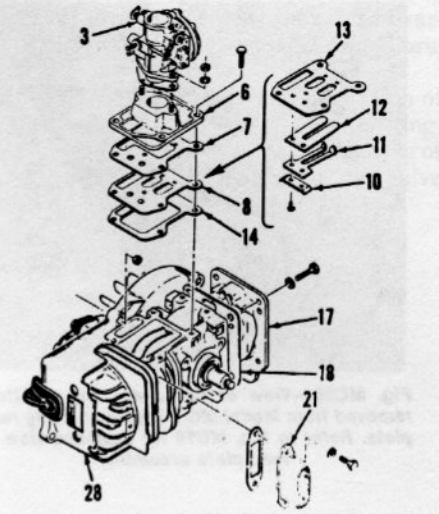


Fig. MC18—View of MC-6 reed assembly.

3. Carburetor
6. Inlet manifold
7. Gasket
8. Reed valve assy.
10. Lockplate
11. Reed guard
12. Valve reed
13. Reed plate
14. Gasket
17. Crankcase bottom
18. Gasket
21. Exhaust header

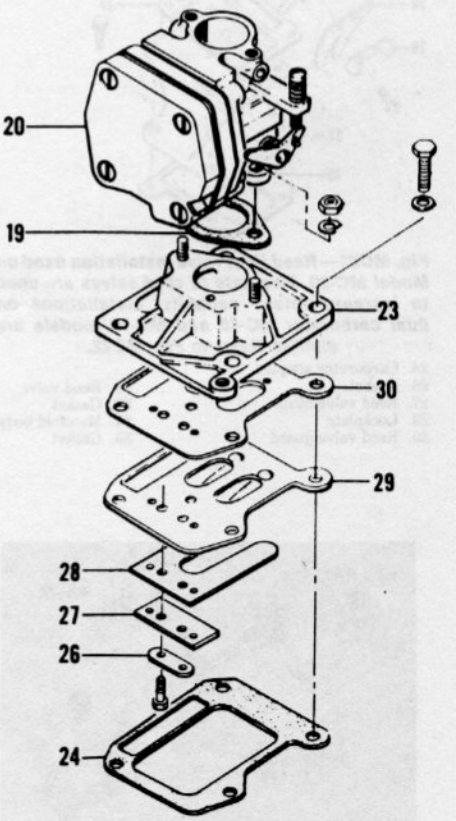


Fig. MC19—Carburetor mounting and inlet reed valve system on Models MC-2 and MC-20. Some other models are similar except reed guards are used.

19. Gasket
20. Carburetor
23. Intake manifold
24. Gasket
26. Lockplate
27. Reed clamp
28. Reed valve
29. Reed plate

rings. Ring end gap should be 0.007-0.010 inch (0.18-0.25 mm). If piston skirt-to-cylinder wall clearance exceeds 0.005 inch (0.13 mm) or ring end gap exceeds 0.010 inch (0.25 mm) with new piston ring, hone or rebore cylinder to next oversize or renew cylinder. If ring side clearance in top ring groove exceeds 0.004 inch (0.10 mm), renew the piston. Piston rings should always be renewed whenever engine is disassembled for service. Piston and rings are available in oversizes. Install the chrome plated ring in top ring groove and install cast iron ring in second ring groove.

On late production MC-5 and MC-10 model engines and all other models, piston is fitted with two thin chrome compression rings. Ring end gap should be 0.051-0.091 inch (1.27-2.31 mm) on Models MC-40, MC-45, MC-70 and MC-75 which have ring retaining pins in the ring grooves. Ring end gap on all other thin-ring pistons is 0.004-0.050 inch (0.10-1.27 mm). If piston skirt-to-cylinder wall clearance exceeds 0.007 inch (0.18 mm) or new rings cannot be fitted within end gap tolerance, hone or rebore cylinder to next oversize for which piston and rings are available or renew cylinder. If ring side clearance in top ring groove exceeds 0.004 inch (0.10 mm) with new piston ring, renew piston. Piston rings should always be renewed

Illustrations courtesy McCulloch Corp.

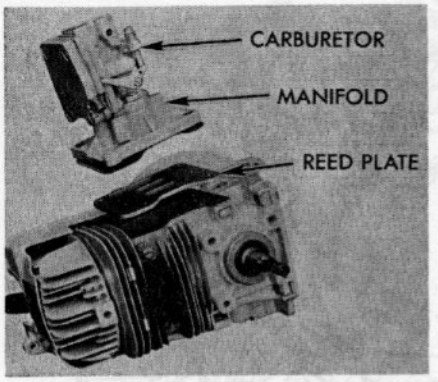


Fig. MC20—View of carburetor and manifold removed from Model MC-8 engine showing reed plate. Refer to Fig. MC19 for exploded view of reed plate assembly.

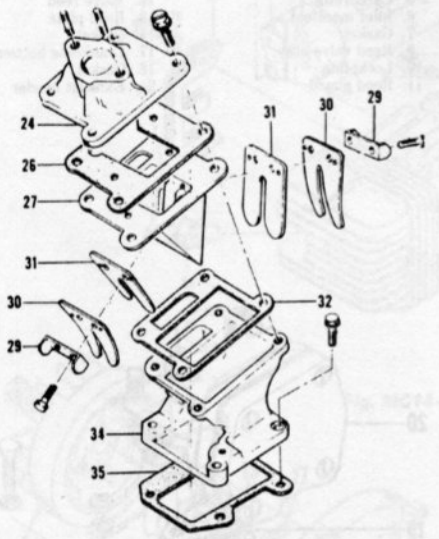


Fig. MC21—Reed inlet valve installation used on Model MC-30. Two sets of reed valves are used to increase intake capacity. Installations on dual carburetor MC-40 and MC-70 models are similar. Refer to Fig. MC22.

24. Carburetor adapter
26. Gasket
27. Reed valve block
29. Lockplate
30. Reed valve guard
31. Reed valve
32. Gasket
34. Manifold body
35. Gasket

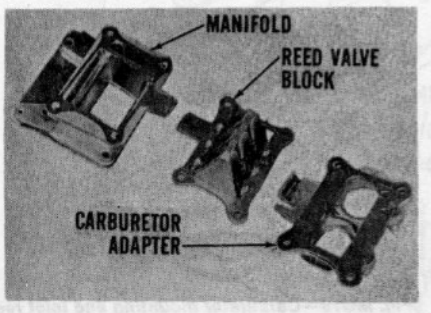


Fig. MC22—View of manifold, reed valve block with six reeds and carburetor adapter used with dual carburetor MC-40 and MC-70 models. Refer to Fig. MC21 for exploded view of reed valve block for single carburetor MC-30 engine which is of similar construction.

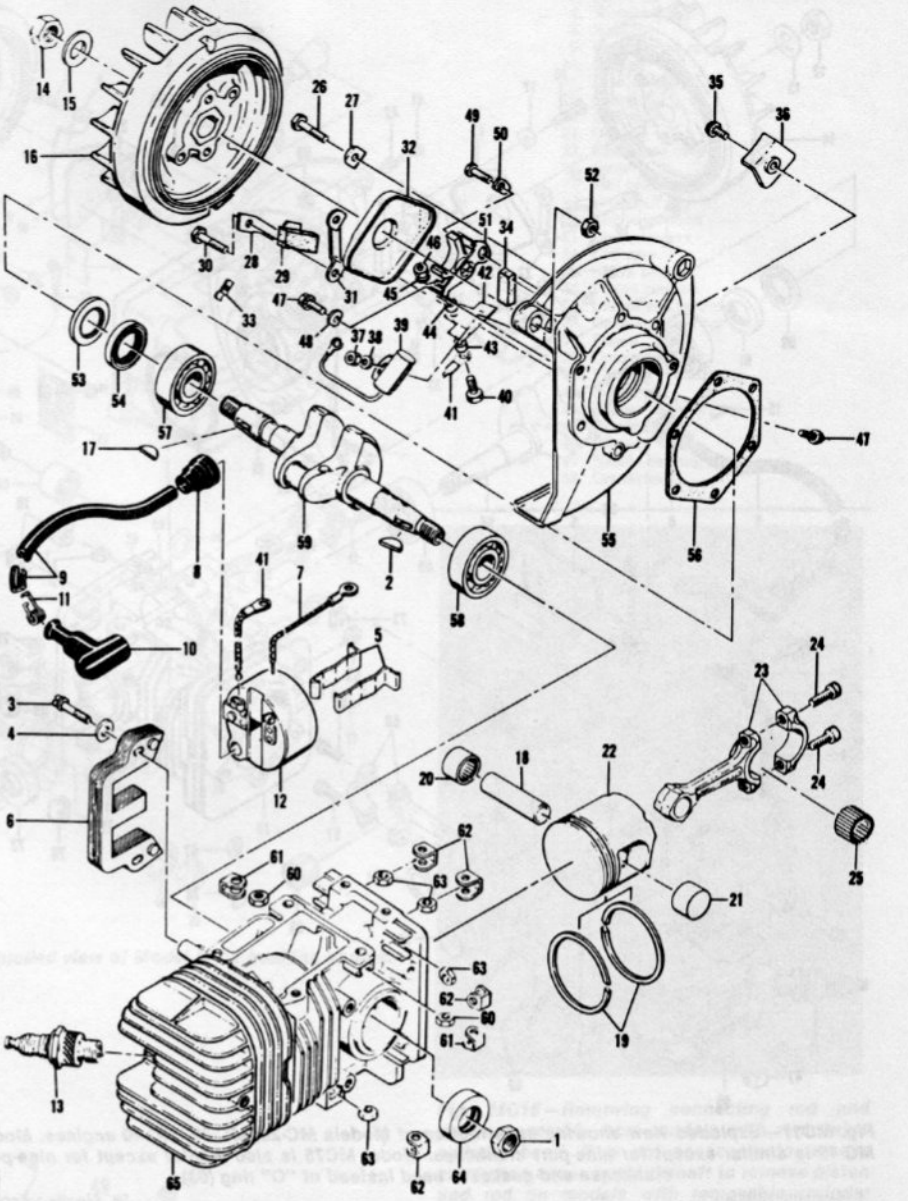


Fig. MC23—Exploded view of Model MC-70 engine.

whenever engine is disassembled for service. Piston and rings are available in a variety of oversizes as well as standard size.

Piston pin is a press fit in connecting rod of all models. Model MC-5 piston has nonrenewable oilite bushings in piston pin bore; all other models use one open needle bearing and one closed end needle bearing in piston. Piston must be supported in special support block available from McCulloch Corporation when pressing pin in or out of piston and rod. The closed end needle bearing used in the piston of all models except MC-5 must be installed in the side of the piston towards the exhaust port in cylinder wall.

CRANKSHAFT. The crankshaft is supported by a ball bearing at the flywheel

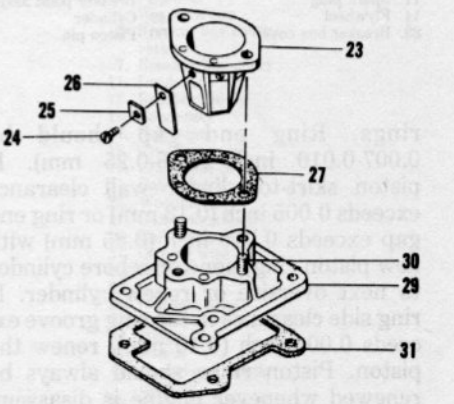


Fig. MC24—Exploded view of pyramid type reed inlet valve assembly and carburetor adapter used on Models MC-45 and MC-75. Six steel reeds (26) are used.

23. Valve block
24. Screws
25. Reed clamp plate
26. Reed valves
27. Gasket
29. Adapter
30. Stud bolts
31. Gasket

Illustrations courtesy McCulloch Corp.

end and a caged needle roller bearing at the pto end on Models MC-2, MC-5, MC-6, MC-7 and MC-8. On Models MC-10, MC-20, MC-40 and MC-70, the crankshaft is supported by ball bearings at each end. The ball type main bearings are a press fit on the crankshaft and both the ball and needle type main bearings are a press fit in the crankcase or cover. Inspect pto end journal where needle bearing is used and crankpin journal for scoring or wear spots and renew crankshaft if these conditions are noted.

Crankcase and crankcase cover must be heated to 200° F (93° C) in an oven when installing ball or needle type bearings to prevent damage to bearing bore.

VALVE SYSTEM. A combination of reed and third port (piston porting) valve system is used. The smooth side of the valve reed should face the valve plate.