McCULLOCH

Model	Bore Inches	Stroke Inches	Displ. Cu. In.	Drive Type
200 & 250	2-1/8	1-3/8	4.9	Direct
300, 380 & 440	2-1/8	1.5	5.3	Direct
450	2.165	1.5	5.5	Direct
550	2.165	1.635	6.03	Direct
640	2-1/8	1-3/8	4.9	Gear
650 & 660	2-1/8	1.5	5.3	Gear
740	2.165	1.635	6.03	Direct
790, 795 & 795L	2.217	1.635	6.3	Direct
797 & Super 797	2.280	1.835	7.5	Direct
840	2.165	1.635	6.03	Gear
890, 895 & 895C	2.217	1.635	6.3	Gear
CP125, SP125 & SP125C	2.280	1.835	7.5	Direct
PM105 & SP105	2.250	1.635	6.5	Direct

MAINTENANCE

SPARK PLUG. Recommended spark plug for models 895C, PM105, SP105, SP125 and SP125C is AC CS42T or Champion CJ6. Recommended spark plug is AC CS45T or Champion DJ8 for models 790, 795, 795L, 797, Super 797, 890, 895 and CP125. Recommended spark plug for all other models is AC M45 or Champion J8J. Spark plug electrode gap for all spark plugs should be 0.025 inch.

CARBURETOR. Refer to SERVICE FUNDAMENTALS for carburetor overhaul on Tillotson and Walbro carburetors used on these McCulloch saws. Some models are equipped with McCulloch carburetor shown in Fig. MC5-1.

McCulloch carburetor has plunger type primer which provides a richer starting mixture by pumping fuel directly into carburetor throat. A fuel collector is mounted in the air box which collects the fuel spit-back and returns it to the carburetor via a tube

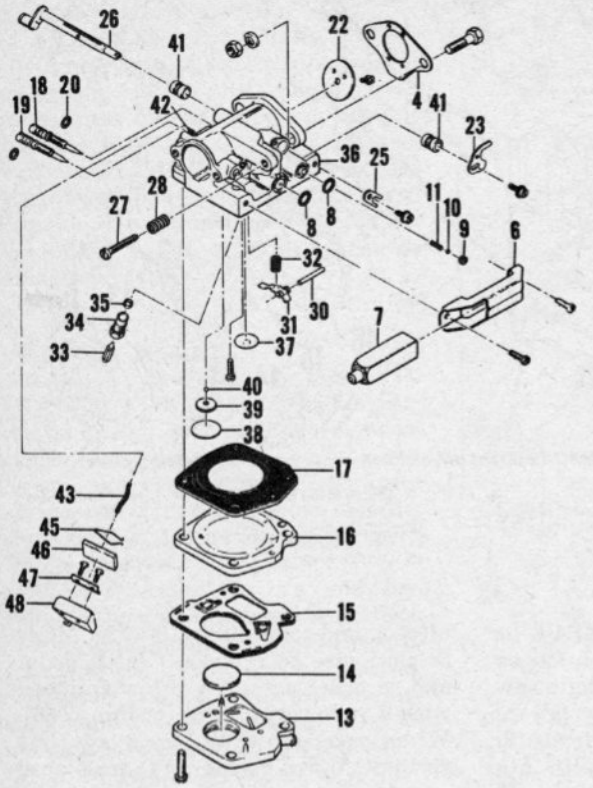


Fig. MC5-1–Exploded view of McCulloch carburetor used on models 380, 440, 640, 740, 790, 840, 890, 895, 250 (before 1964) and earlier 797 models. Current production units use a slightly different throttle shaft and linkage. Model 450 is similar except that it does not have fuel collector and a different throttle shaft from that shown is used.

4. Gasket
6. Primer bracket
7. Primer
8. "O" ring
9. Primer valve seat
10. Steel ball (⅛)
11. Spring
13. Fuel pump body
14. Filter
15. Diaphraghm, pump
16. Plate
17. Diaphragm, fuel
18. Idle adjustment needle
19. Main adjustment needle
20. "O" ring
22. Throttle disc
23. Throttle shaft arm
25. Clip
26. Throttle shaft
27. Throttle stop screw
28. Spring
30. Inlet control lever pin
31. Inlet control lever
32. Spring
33. Inlet needle
34. Inlet needle seat
35. Gasket
36. Body
37. Welch plug
38. Welch plug
39. Ball check seat
40. Ball check
41. Bushing
42. Collector inlet tube
43. Fuel collector hose
45. Retainer
46. Absorber
47. Retaining plate
48. Fuel collector

connecting the collector and carburetor.

If carburetor requires adjustment, the initial adjustment is one turn open for both idle and main adjustment needles. To adjust carburetor, proceed as follows: Remove air box cover and air cleaner screen or plug to gain access to adjusting screws. Turn idle and main adjustment needles (Fig. MC5-3 or Fig. MC5-5) in until they seat lightly, then open both needles one full turn. Start engine and run until it is at operation temperature. Adjust throttle stop screw (Fig. MC5-3 or Fig. MC5-5) until engine runs at just below chain creep speed. Accelerate engine rapidly several times and check engine operation. If engine sputters or hesitates during acceleration, the mixture is too lean and idle adjustment needle should be turned counterclockwise as required. If engine runs rough and smokes excessively, the mixture is too rich and idle adjusting needle should be turned clockwise as required. Make these adjustments in increments of 1/16-turn and check engine operation after each adjustment. Engine should operate as described in all positions. Readjust idle stop screw if necessary to keep engine low idle rpm below chain creep speed.

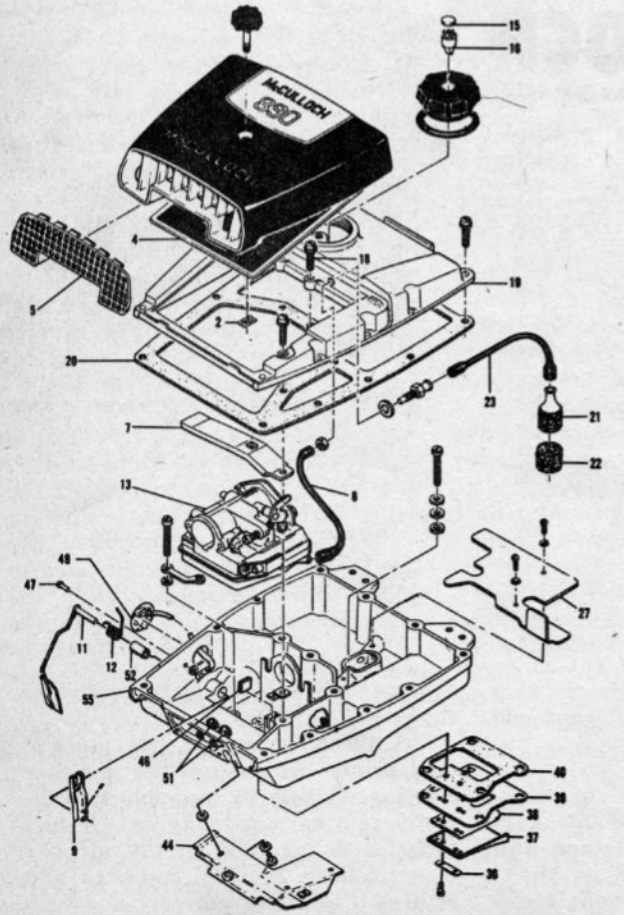


Fig. MC5-2—Exploded view of model 890 air box showing component parts and their relative positions. Other units except CP125, SP125 and SP125C are basically similar.

2. Speednut
4. Air cleaner screen
5. Cover grille
7. Anchor
8. Fuel hose
9. Governor lever
11. Governor arm
12. Governor spring
15. Filter
16. Check valve
19. Fuel tank cover
20. Gasket
21. Fuel pickup
22. Filter
23. Fuel pickup hose
27. Fuel tank liner
36. Lock plate
37. Fuel deflector
38. Reed valve
39. Reed plate
40. Gasket
44. Shield
46. Felt
49. Adjustment hole cover
51. Grommet
52. Bushing
55. Fuel tank bottom

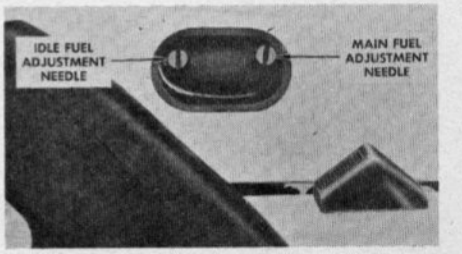


Fig. MC5-3–Fuel mixture adjustment needles for model 300 protrude through rubber grommet as shown. Refer to Fig. MC5-5 if a plug is used to cover adjustment screws.

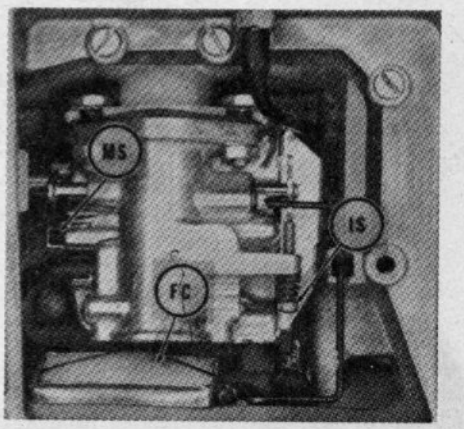


Fig. MC5-4–Carburetor installation on model 890. Note location of idle speed screw (IS), main fuel adjusting screw (MS) and fuel collector (FC). Other models equipped with McCulloch carburetors are similar.

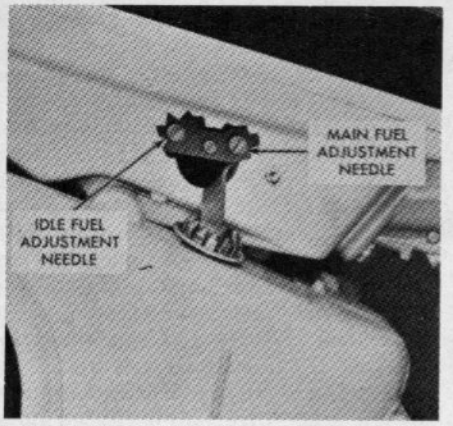


Fig. MC5-5–Remove plug as shown to gain access to fuel mixture adjusting screws on applicable models. Refer to Fig. MC5-3 for models using a rubber grommet in place of plug.

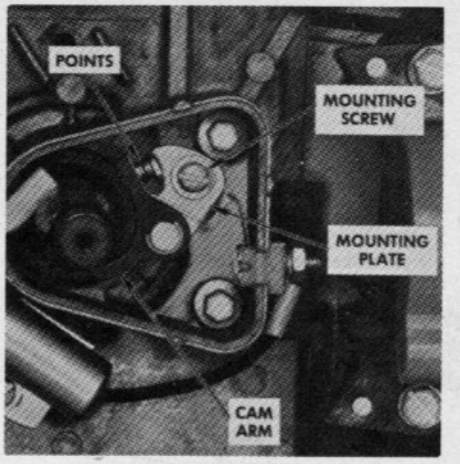


Fig. MC5-8–View of typical breaker box and breaker point assembly after flywheel and breaker box cover are removed.

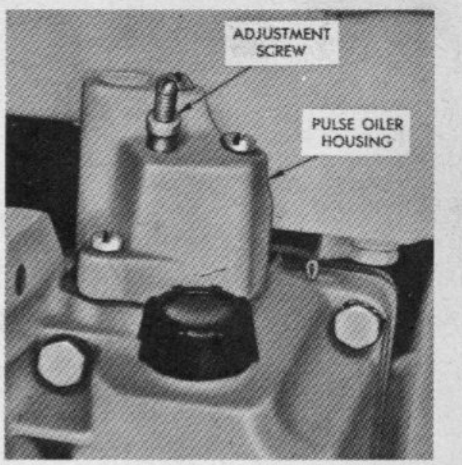


Fig. MC5-10–View of the pulse operated automatic chain oiler used on some models.

Fig. MC5-6—Adjust fast idle on models CP125, SP125 and SP125C by turning adjusting screw (S) on bottom of trigger.

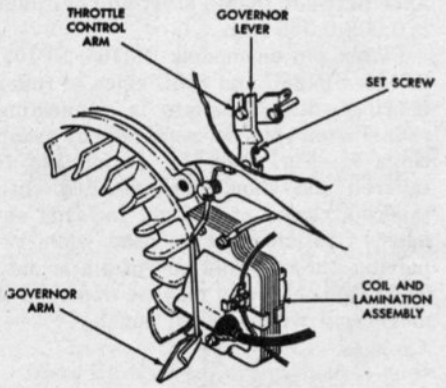


Fig. MC5-7–Typical air vane governor installation on models 790, 890 and 895.

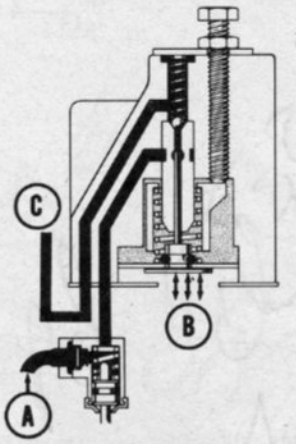


Fig. MC5-9—Cross-section of automatic chain oiler pump shown in Fig. MC5-10. Operation is as follows: Oil from oil tank enters at point (A) and travels through manual oil pump to piston assembly of automatic pump. Piston is actuated by crankcase pulsations (B) forcing oil by check ball to chain saw bar (C).

Models SP125 and SP125C and later model CP125 are equipped with a throttle latch to advance the throttle opening to a fast idle position for starting. Throttle opening is adjusted by turning adjusting screw (S—Fig. MC5-6) on bottom of trigger.

Start engine and be sure it is at operating temperature. Load engine (make a cut) and turn main adjustment needle counter-clockwise (richen) in increments of 1/16-turn until engine begins to run rough, then turn the main adjustment needle clockwise (lean) until engine roughness just disappears. BE SURE to make the main fuel adjustment while saw is under load which will provide a slightly rich mixture. If main fuel adjustment is made while saw is not under load, mixture will tend to be lean and damage to engine from overheating and insufficient lubrication could result.

GOVERNOR. Models 790, 890 and 895 are equipped with an air-vane type governor as shown in Fig. MC5-7. To adjust governor, remove fan housing, air box cover and air cleaner screen. Loosen set screw in governor lever, hold the vane on governor arm against coil and lamination assembly, then put carburetor throttle control arm in closed position and tighten the set screw.

MAGNETO AND TIMING. On all models, the magnet is cast in the flywheel and the breaker contact assembly is in a breaker box located directly below flywheel. The flywheel must be removed to adjust or renew the breaker contact assembly. Recommended point gap is 0.020 which will provide the correct timing of 26° BTDC. The air gap between legs of coil lamination and flywheel is 0.010 and is adjusted as follows: Turn flywheel until magnet is directly below coil lamination. Position one 0.010 feeler gage between each leg of coil lamination and flywheel, then loosen the coil lamination mounting screws and allow the flywheel magnet to draw the lamination assembly against the feeler gages. Tighten the mounting screws.

LUBRICATION. Engine is lubricated by a mixture of regular gasoline and engine oil. The gasoline and oil should be mixed in a separate container before being put in the engine fuel tank. If using McCulloch engine oil, use 3 ounces of oil for each gallon of gasoline (approx. 1:40). If McCulloch oil is not available, use ½-pint of SAE No. 40 two-stroke oil for each gallon of gasoline (approx. 1:16).

A crankcase pulse actuated oil pump is used on models 440, 450, 550, 740, 790, 795, 795L, Super 797, CP125, SP125, SP125C, PM105 and SP105. Refer to Fig. MC5-9 for operation of pump. Fill chain oiler tank each time fuel tank is filled. Use SAE No. 30 oil for temperatures above 40°F. or SAE No. 10 for temperatures below 40°F. When cutting wood with a high sap or pitch content, the chain oil may be diluted up to 50% with kerosene, if necessary.

On gear drive models fill gearcase to level of filler plug with "Type A" Automatic Transmission Fluid. DO NOT overfill.

CARBON. If a noticeable lack of power or a decrease in the exhaust noise level is evident, it is possible that the muffler and exhaust ports need cleaning. Use a wood scraper when cleaning exhaust ports to avoid damage to cylinder or piston.

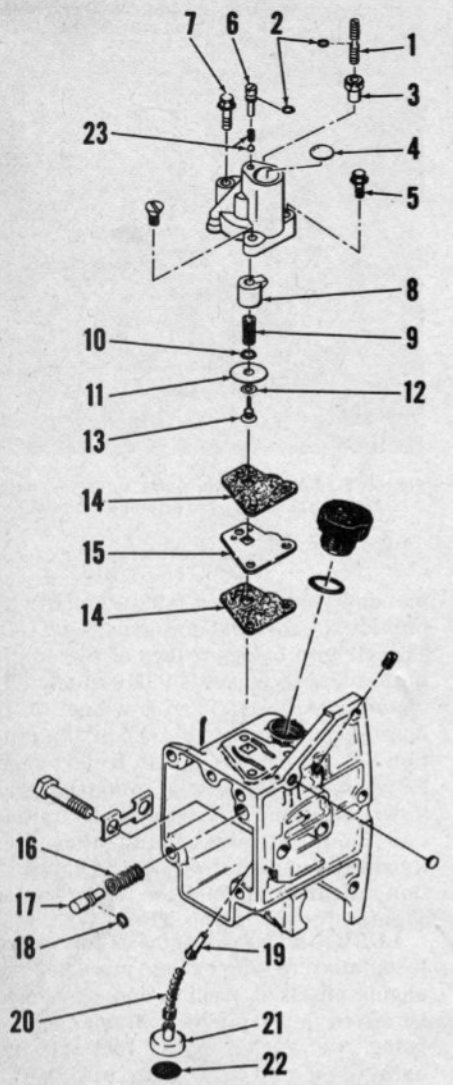


Fig. MC5-11—Exploded view of automatic chain oiler used on model 797. Oil pump used on models 440, 450, 550, 740, 790, 795, 795L, Super 797, 790, CP125, SP125, SP125C, PM105 and SP105 are similar.

1. Adjustment screw
2. "O" ring
3. Locknut
4. Plug
5. Screw
6. Screw
7. Screw
8. Piston sleeve
9. Spring
10. "O" ring
11. Piston ring
12. Washer
13. Piston, automatic
14. Gasket
15. Spacer
16. Spring
17. Oiler piston, manual
18. "O" ring
19. Check valve
20. Hose
21. Weight
22. Screen

REPAIRS

CONNECTING ROD. Cylinder and cylinder head are integral for all models and the piston and connecting rod are removed from bottom of crankcase. Remove engine bottom cover or fuel tank, detach connecting rod from crankpin and push piston as far into cylinder as possible. Remove crankshaft and withdraw piston and rod from bottom of crankcase. Be careful not to lose the needle roller crankpin bearings. All models have 24 uncaged rollers in the crankpin end of connecting rod. Refer to Fig. MC5-12 for method of locking flywheel.

To assemble rod to crankshaft, coat inside diameter of rod and cap with grease and place 12 rollers in rod and 12 rollers in cap. Carefully pull rod in position against crankpin, then with pips of rod and cap aligned, place cap on rod. Note that parting faces of rod and cap are fractured instead of being machined. Wiggle rod cap when installing it on rod to insure mating of rod and cap. No "catch points" should be felt when fingernail is rubbed along parting line. Tighten rod cap screws to 105-110 in.-lbs. on models 795L, Super 797, SP125, SP125C, PM105, SP105 and 895C, 90-95 in.-lbs. on CP125 and to 65-70 in.-lbs on all other models.

PISTON, PIN, RINGS AND CYLINDER. Pistons and rings are available in standard size as well as oversizes of 0.010, 0.020 and 0.030. Cylinder should be renewed or rebored to the next larger oversize and new piston installed when clearance between cylinder and skirt of piston exceeds 0.010, taper or out-of-round exceeds 0.005, or when cylinder is badly scored, pitted or scuffed. Desired clearance between piston skirt and cylinder is 0.003-0.005 inch.

Piston pin on models PM105, SP105, SP125, SP125C and 895C rides in roller bearing with 22 rollers in connecting rod. Piston pin is retained by snap rings (1—Fig. MC5-16). Piston pin is tapered and should be installed with tapered, closed end of pin towards exhaust. Caution must be used when removing pin as closed end of pin is only 0.040 inch thick and may be damaged if driven out with a sharp punch.

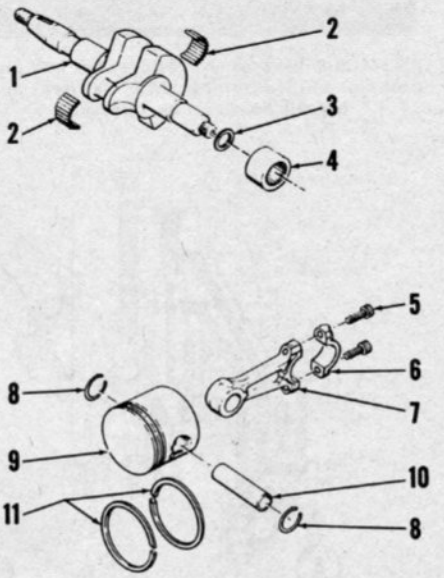


Fig. MC5-13–Exploded view of model 200 powerhead components. As opposed to other models, piston is fitted with nonrenewable Oilite bushings retained by snap rings (8).

1. Crankshaft
2. Needle rollers (24)
3. Washer
4. Needle bearing
5. Screw
6. Connecting rod cap
7. Connecting rod
8. Snap ring
9. Piston
10. Piston pin
11. Piston rings

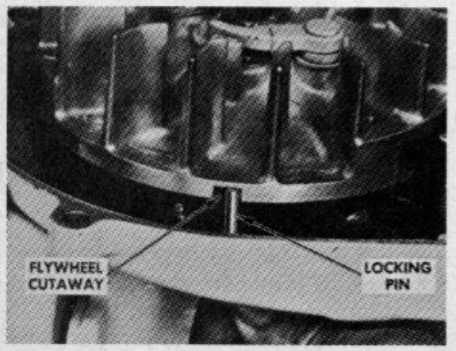
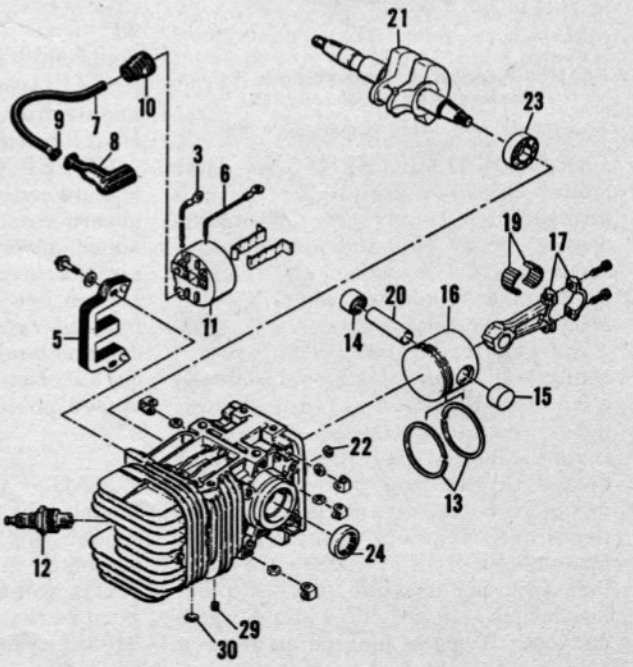


Fig. MC5-12–Flywheel can be locked in position by inserting a pin into cut-out of flywheel.

Fig. MC5-14–Exploded view of powerhead typical of most models. Refer to Figs. MC5-13, MC5-15 and MC5-16 for variations used on some models.



3. Primary wire
5. Lamination assy.
6. Ground wire
7. Spark plug wire
8. Boot
9. Connector
10. Nipple
11. Coil
12. Spark plug
13. Piston rings
14. Needle bearing
15. Needle bearing (closed end)
16. Piston
17. Connecting rod
19. Needle rollers (24)
20. Piston pin
21. Crankshaft
22. Pushrod seal
23. Ball bearing, main (2)
24. Oil seal
29. Insert
30. Expansion plug

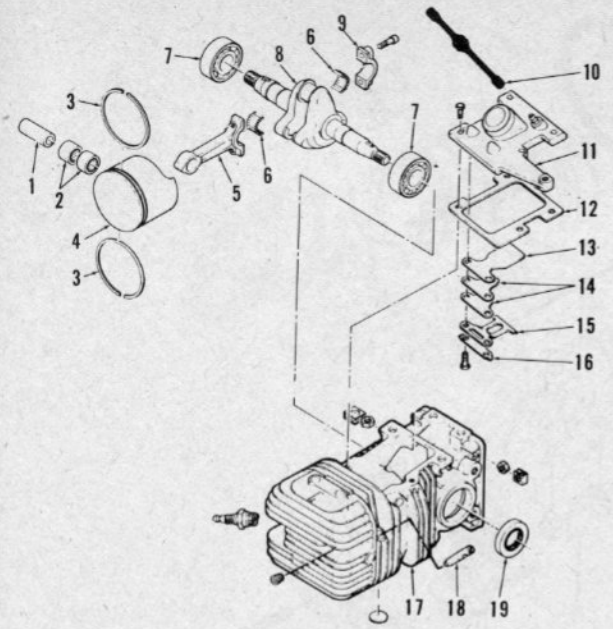


Fig. MC5-15–Exploded view of model CP125 engine.

1. Piston pin
2. Roller bearings
3. Piston rings
4. Piston
5. Connecting rod
6. Roller bearing (24)
7. Ball bearing
8. Crankshaft
9. Rod cap
10. Crankcase pulse hose
11. Manifold
12. Gasket
13. Reed
14. Reed springs
15. Reed stop
16. Lockplate
17. Cylinder
18. Decompression valve
19. Seal

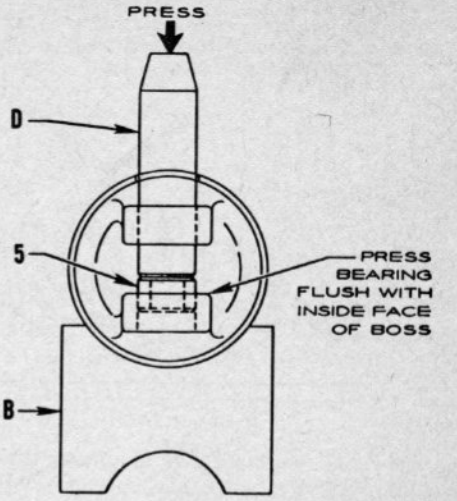


Fig. MC5-18–Use driver (D) and support block (B) to install piston pin needle bearings. After bearings are installed, a similar driver can be used to install piston pin.

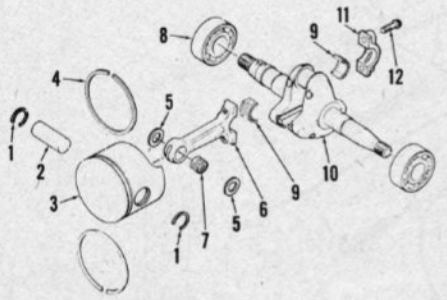


Fig. MC5-16—Exploded view of models PM105, SP105, SP125, SP125C and 895C engine crankshaft and associated parts.

1. Snap ring
2. Piston pin
3. Piston
4. Piston rings
5. Thrust washer
6. Connecting rod
7. Roller bearing
8. Ball bearing
9. Roller bearing
10. Crankshaft
11. Rod cap
12. Capscrew

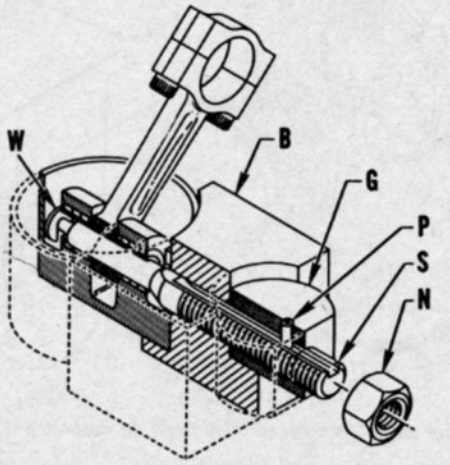


Fig. MC5-17–Cross-sectional view showing use of special McCulloch piston pin and needle bearing removal tool. A small washer (W) is inserted between piston skirt and pin boss to pull piston pin. After removing pin, a larger washer is used with tool to remove blind piston pin needle bearing.

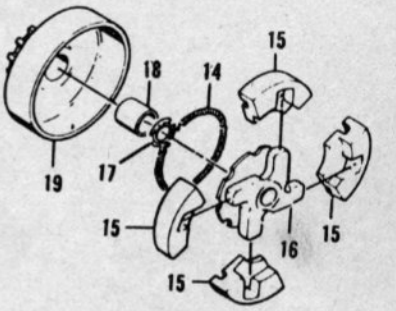


Fig. MC5-19—Exploded view of clutch used on early direct drive models except SP125 and SP125C. Later models are similar.

14. Clutch spring
15. Clutch shoe
16. Clutch rotor
17. Thrust spring
18. Sprocket bearing
19. Drum and sprocket

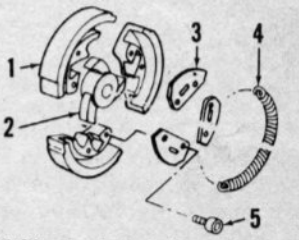


Fig. MC5-20—Exploded view of clutch shoe assembly used on models SP125 and SP125C.

1. Clutch shoes
2. Rotor
3. Spring retainer plates
4. Clutch spring
5. Socket head screws

Piston pin on all other models is an interference fit on connecting rod. Piston pin rides on roller bearings in piston except on model 200 which is fitted with non-renewable Oilite bushings. Piston and bushings must be renewed as a unit on model 200. Piston and connecting rod small end should be heated to aid in removal and installation of piston and needle bearings. On models other than 200 and CP125, remove closed end bearing by pressing piston pin out towards closed bearing, then press open end bearing out of piston. Bearings should be renewed as pressing operation usually distorts needle bearings. To remove bearings on model CP125, refer to Figs. MC5-17 and MC5-18 for views showing use of tool kit for piston pin and bearing removal and installation.

Install new needle bearings so that inner ends of bearing cages are flush with piston pin boss. Closed end bearing must be installed on exhaust side of piston. Press in piston pin until end of pin is flush with outer end of open end bearing.

REED VALVE. All models are equipped with a reed valve induction system. Correct seating of reed valves is essential to maintain crankcase pressure. Be sure that reeds and seats are clean and reeds lie flat against seat. Renew any broken or chipped reeds. Renew reed plate, seat or reed block if worn in seat area. If reed has a rough side and a smooth side, place smooth side of reed against seat.

CLUTCH. All models except models SP125 and SP125C use the type of clutch shown in Fig. MC5-19 or Fig. MC5-22. Clutch used on models SP125 and SP125C is shown in Figs. MC5-20 and MC5-22. Clutch shoes on all models must be renewed as a set. Clutch retaining nut has left hand threads. Clutch bearing on later models is lubricated by placing several drops of SAE 30 oil on felt seal behind sprocket.

Model SP125C and late model SP125 clutches have a shim washer 0.060 inch thick between clutch drum and crankcase. Early model SP125 saws without 0.060 inch thick washer should have this washer installed.

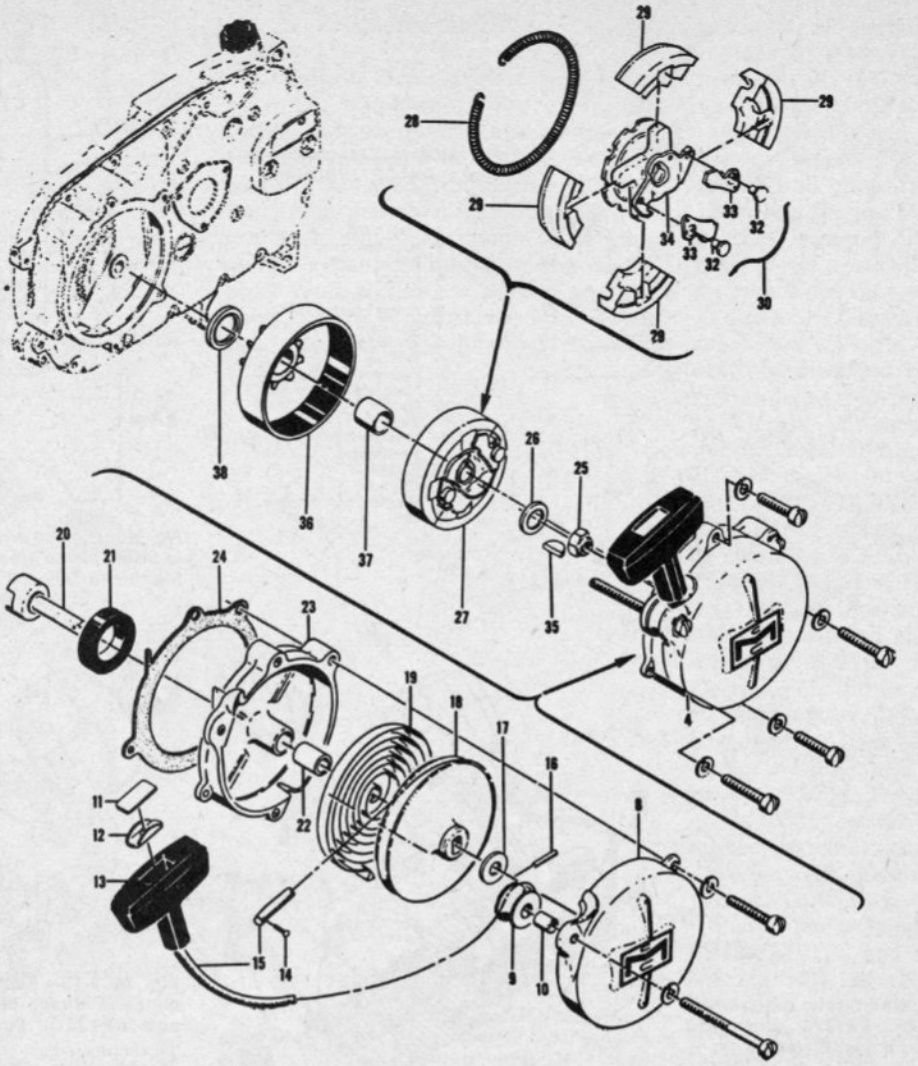


Fig. MC5-21—Starter and clutch assemblies used on models 640, 840, 890, 895 and 895C.

8. Starter cover
9. Rope pulley
10. Bearing
11. Handle plate
12. Cup
13. Handle
14. Rivet
15. Rope
16. Roll pin
17. Washer
18. Drum
19. Rewind spring
20. Starter shaft
21. Oil seal
22. Base bearing
23. Starter base
24. Gasket
25. Lock nut
26. Washer
27. Clutch assembly
28. Clutch spring
29. Clutch shoe
30. Pawl spring
32. Pin
33. Starter pawl
34. Rotor
35. Woodruff key
36. Drum
37. Bushing
38. Spacer

TRANSMISSION. Refer to Fig. MC5-23 for view of model 650 or 660 transmission and to Fig. MC5-24 for view of model 840, 890, 895 or 895C transmission.

Models 650 and 660 have a pulse operated chain oiler that operates whenever engine is operating. Models 840, 890, 895 and 895C have a chain oiler that operates only when the chain is turning. Oil output is determined by the length of plunger (75—Fig. MC5-24) stroke. Length of plunger stroke is controlled by a cam groove on the plunger shaft. To change chain oil output, a different plunger must be installed. To prevent binding between plug (72) and oiler plunger (75), install a 0.015 in. shim (73).

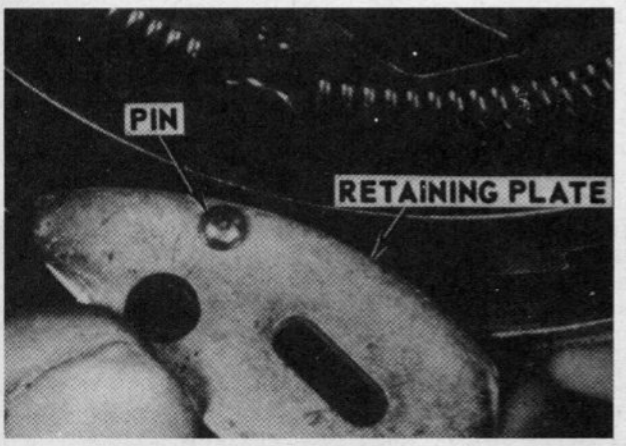


Fig. MC5-22–Install clutch spring (4–Fig. MC5-20) on model SP125 so that spring ends will contact locating pin in clutch spring retaining plate.

Disassembly and overhaul of the transmission will be evident after an examination of the unit and reference to Figs. MC5-23 and MC5-24. The model 840, 890, 895 or 895C transmission components can be rotated 180 degrees to allow installing bar and chain on right side of gearcase if desired. See Fig. MC5-25. However, when chain oiler is moved to left side of gearcase, it will not function as internal passages to bar pad are not normally drilled for pump operation

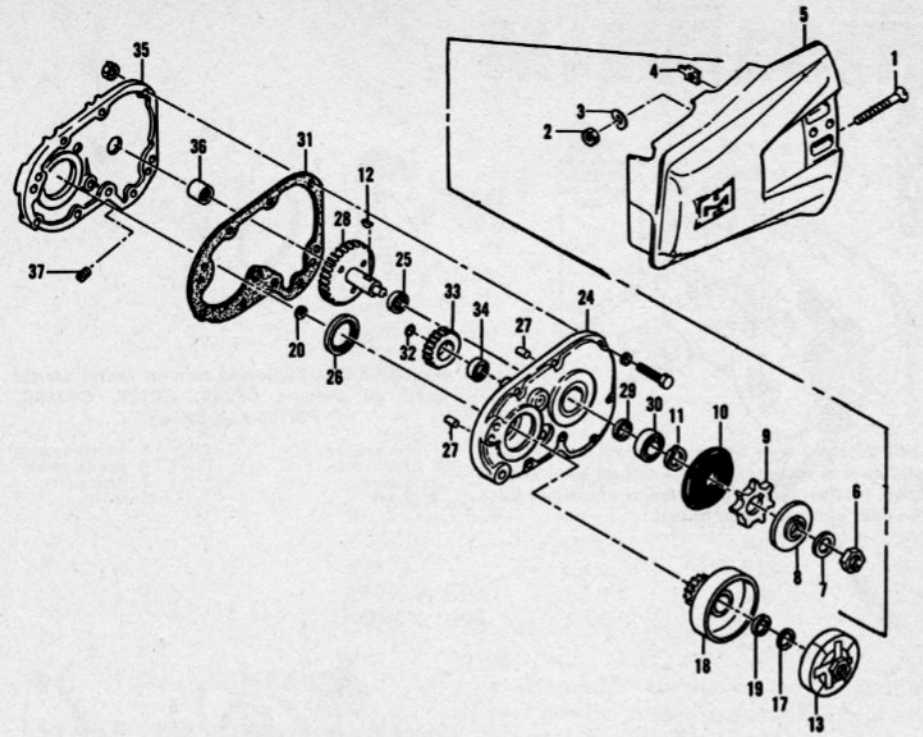


Fig. MC5-23–Exploded view of model 650 or 660 clutch guard and transmission. Input gear is on inner side of clutch drum (18).

1. Adjusting screw
2. Lock nut
3. Wave washer
4. Adjusting nut
6. Nut
7. Washer
8. Sprocket shroud
9. Sprocket
10. Sprocket washer
11. Spacer
12. Woodruff key
13. Clutch assy.
17. Special washer
18. Drum and gear
19. Oil seal
20. Thrust washer
24. Cover
25. Oil seal
26. Oil seal
27. Dowel
28. Sprocket gear and shaft
29. Sleeve
30. Ball bearing
31. Gasket
32. "O" ring
33. Idler gear
34. Bearing
35. Gearcase
36. Needle bearing
37. Plug

with pump in this location. Therefore, if automatic chain oiling is desired, take saw to a McCulloch dealer and have the bar mounting pad drilled to allow the pump to operate. If automatic chain oiling is not desired, either pack the pump plunger cavity with Lubriplate No. 110 (repeat as required), or completely remove the pump plunger and let the pump body serve as a bearing retainer only.

REWIND STARTER. Refer to Figs. MC5-22, MC5-26, MC5-27 or MC5-28 for exploded view of typical rewind starters. Rewind spring is coiled in housing in counterclockwise direction on models shown in Figs. MC5-26 and MC5-27 and in clockwise direction on models shown in Fig. MC5-22 and MC5-28. Wind rope on pulley so pulley will properly engage inner end of rewind spring when rope is pulled.

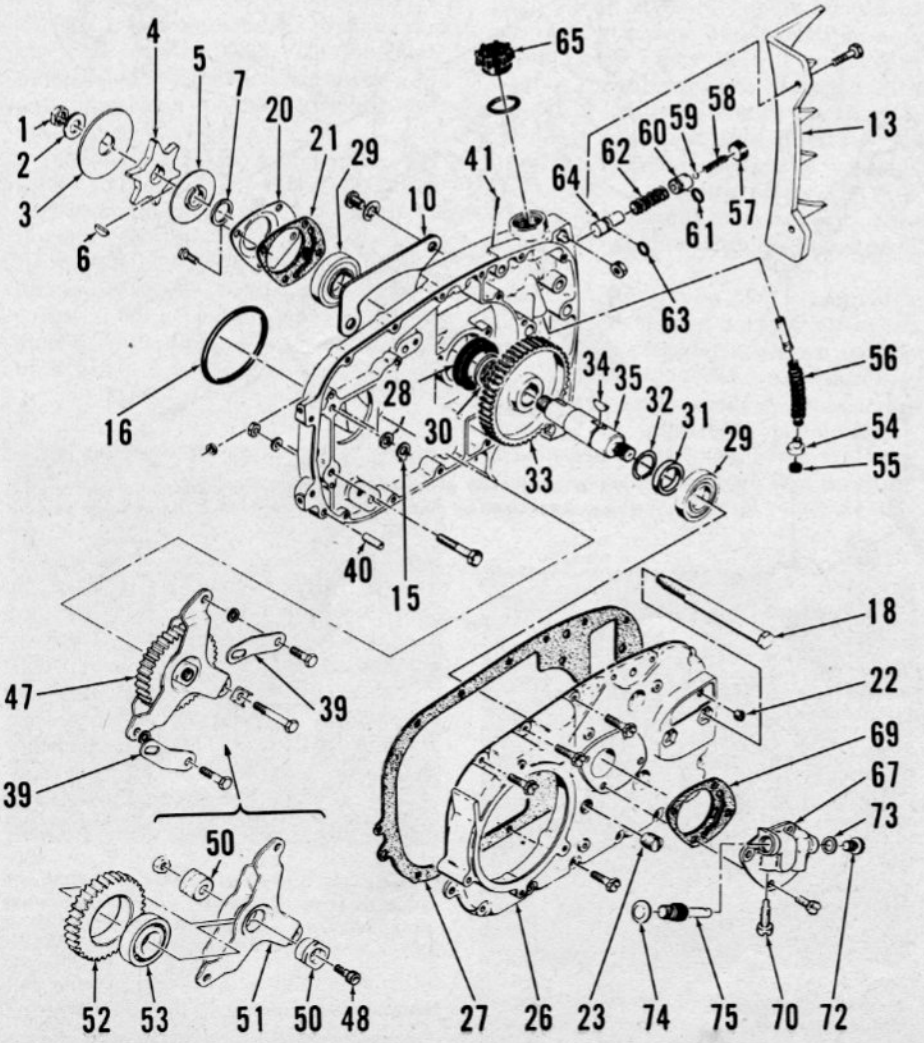


Fig. MC5-24—Exploded view of transmission used on models 840, 890, 895 and 895C. Input gear is part of clutch drum (36—Fig. MC5-21). Shims (73) are 0.015 thick.

1. Nut
2. Washer
3. Guide plate
4. Sprocket
5. Shroud
6. Woodruff key
7. Spacer
10. Pushrod cover
13. Spike
15. Lockplate
16. "O" ring
18. Bar mounting bolt
20. Bearing retainer
21. Gasket
22. Plug
23. Plug
26. Gearcase cover
27. Gasket
28. Oil seal
29. Bearing
30. Spacer
31. Spacer
32. Retaining ring
33. Sprocket gear
34. Woodruff key
35. Sprocket shaft
39. Yoke strap
40. Dowel
41. Cotter pin
42. Check valve
47. Yoke and gear assy.
48. Socket head screw
50. Bearing hub
51. Yoke
52. Idler gear
53. Bearing
54. Pickup weight
55. Screen
56. Pickup hose
57. Plug
58. Spring
59. Steel ball (0.188)
60. Oiler body
61. "O" ring
62. Spring
63. "O" ring
64. Oiler piston (manual)
65. Filler cap
67. Oiler body (automatic)
69. Gasket
70. Special screw
72. Plug
73. Shim (0.015)
74. Expansion plug
75. Oiler plunger

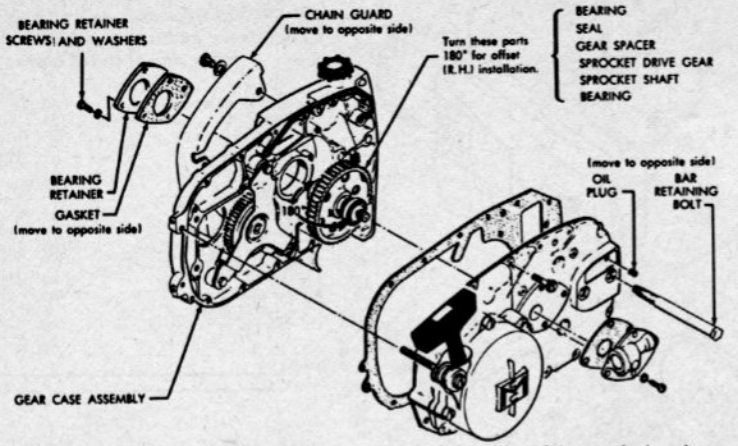


Fig. MC5-25–Chain bar can be moved from left side to right side of transmission by reversing transmission components as shown. When automatic oiler is mounted on left side of gear case it will not function unless bar pad oil passages are drilled. If offset operation is temporary, either pack oiler with Lubriplate or remove the oiler plunger. Refer to text.

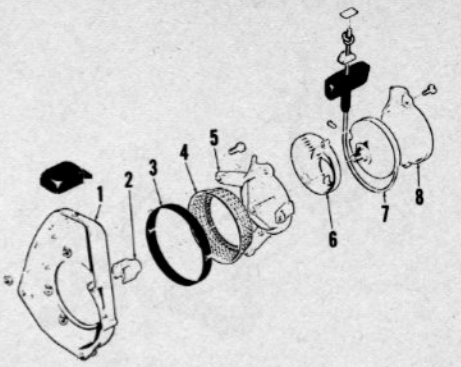


Fig. MC5-27—Exploded view of recoil starter used on models CP125, SP125, SP125C, PM105 and SP105.

1. Fan housing
2. Starter drive
3. Gasket
4. Screen
5. Starter housing
6. Rewind spring
7. Rope pulley
8. Cover

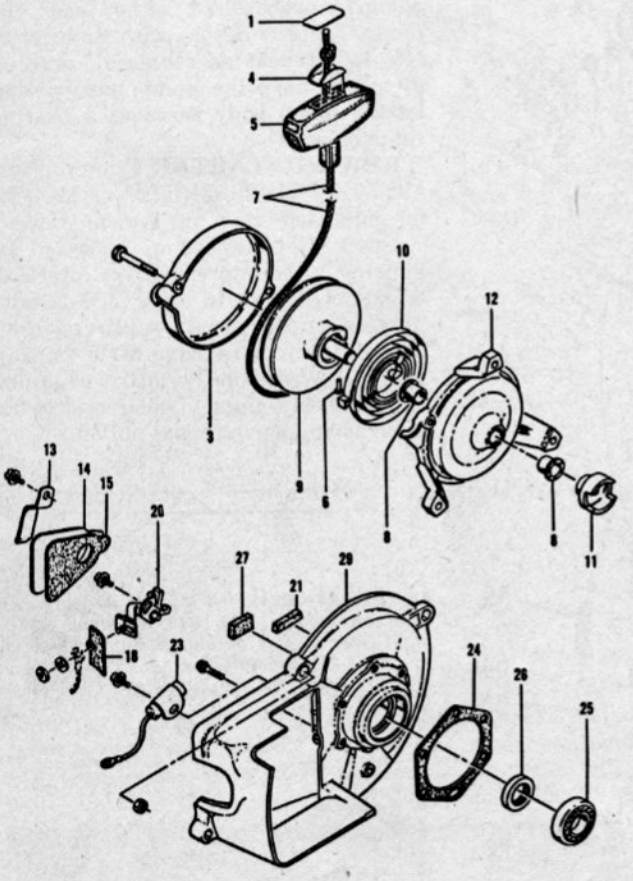


Fig. MC5-26–Crankcase cover and starter assembly typical of those used on models 200, 250, 300, 380, 450, 550, 650 and 660. Models 795 and 795L with serial number prefix (10) also use starter shown.

1. Handle plate
3. Cover
4. Cup
5. Starter handle
6. Rivet
7. Rope
8. Bushing
9. Drum
10. Rewind spring
11. Ratchet
12. Base
13. Retainer
14. Breaker box cover
15. Gasket
18. Insulator
20. Breaker assembly
21. Breaker box felt
23. Condenser
24. Gasket
25. Main bearing
26. Oil seal
27. Wiper felt
29. Crankcase cover

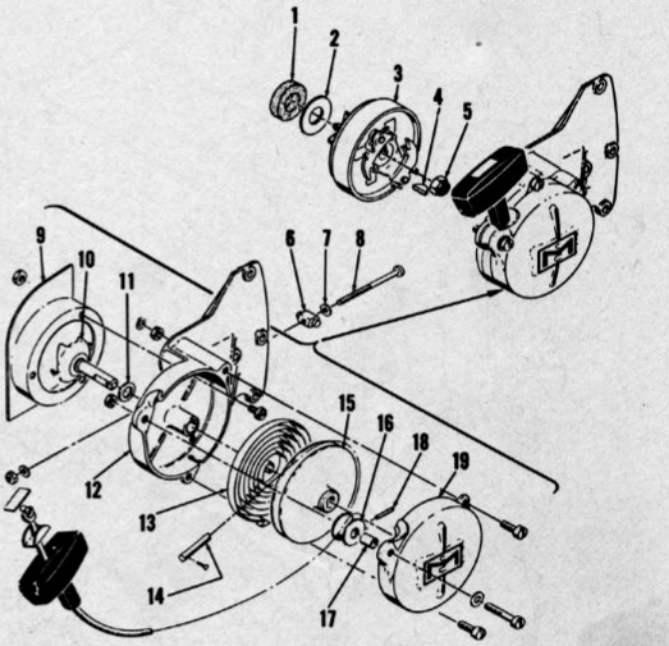


Fig. MC5-28–View showing disassembly of clutch and starter assemblies used on models 440, 740, 790, 795, 797 and Super 797.

1. Felt seal
2. Washer
3. Clutch assembly
4. Key
5. Nut
6. Chain bar adjusting nut
7. Washer
8. Screw
9. Cover
10. Starter shaft
11. Washer
12. Base
13. Rewind spring
14. Rope
15. Starter drum
16. Rope pulley
17. Pulley bearing
18. Roll pin
19. Cover