# McCULLOCH

| Model | Bore Inches | Stroke Inches | Displ. Cu. In. | Drive Type |
|---|---|---|---|---|
| 10-10, 10-10 Auto, 10-10E & CP-55 | 1¾ | 1-3/8 | 3.3 | Direct |
| LG-2 | 1¾ | 1-3/8 | 3.3 | Gear |
| 6-10, 6-10 Auto, 7-10 Auto & CP-70 | 2.0 | 1-3/8 | 4.3 | Direct |
| PM700, LG-6 & G-70 | 2.0 | 1-3/8 | 4.3 | Gear |
| PM55, PM555 | 1.812 | 1.375 | 3.5 | Direct |
| PM60 & SP60 | 1-7/8 | 1-3/8 | 3.8 | Direct |
| PM850, SP80 & SP81 | 2.06 | 1.5 | 5.0 | Direct |

## MAINTENANCE

**SPARK PLUG.** Recommended spark plug is AC CS45T for models with 3.3 or 3.5 cu. in. engines; for models with 3.8, 4.3 or 5.0 cu. in. engines, AC CS42T is recommended. Spark plug electrode gap is 0.025. Tighten spark plug to 144-180 inch-pounds torque and note plug has a conical seat which does not require a gasket.

**CARBURETOR.** A McCulloch "W" series, Tillotson HS or Walbro SDC carburetor may be used. Refer to Tillotson or Walbro carburetor section in SERVICE FUNDAMENTALS section for service on those carburetors.

Some PM850 models are equipped with a Zama C-2 diaphragm type carburetor. Service information was not available at time of publication. Refer to Fig. MC6-2A for exploded view.

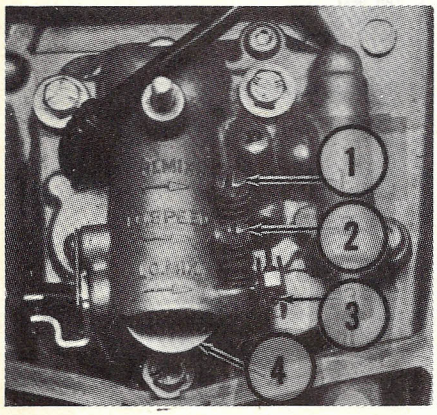



*Fig. MC6-1—Air cleaner cover and filter element removed to show carburetor adjustment points of early Models "W" series carburetor. Later models are similar except for high speed mixture screw.*

1. High speed mixture screw
2. Idle speed screw
3. Idle speed mixture screw
4. Throttle butterfly

Initial adjustment of mixture needles on Tillotson and Walbro carburetors is one turn open for both idle and high speed mixture needles. Adjust idle fuel needle to obtain smooth, rapid acceleration without hesitation. Adjust idle speed stop screw so that engine idles below clutch engagement speed. High speed mixture needle should be adjusted with saw under cutting load. Some chain saws with Tillotson or Walbro carburetors 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. MC6-3) on bottom of trigger. Engine should idle below clutch engagement speed.

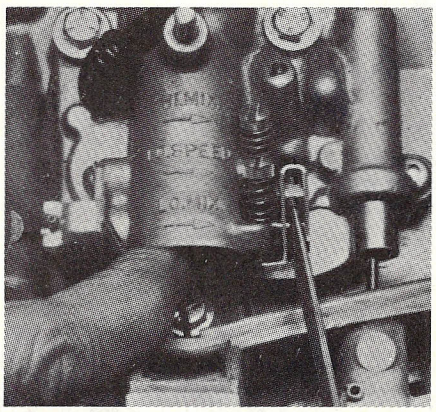
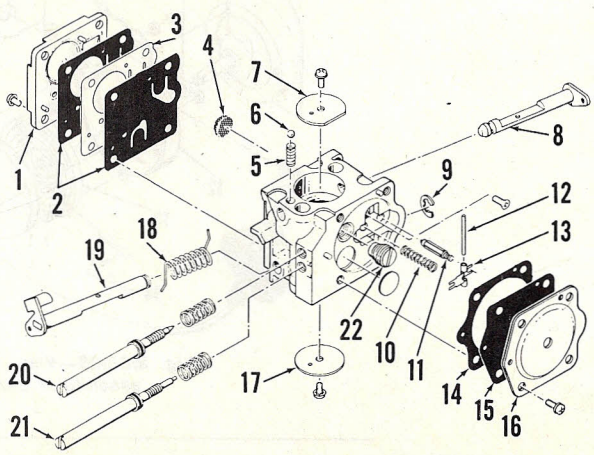


*Fig. MC6-2—Keep finger on throttle butterfly as shown when adjusting carburetor. Refer to text for procedure.*

McCulloch series "W" carburetor was manufactured as two different models. Early model is shown in Fig. MC6-4 and later model is shown in Fig. MC6-5. On early models, fuel is metered by an adjustable needle valve attached to the throttle shaft. On later models, this only adjusts idle mixture. High speed operation on early models is controlled by an adjusting screw which determines throttle plate opening. Later models utilize a fuel needle for high speed adjustment. Both models use a primer plunger for choking operation. Choking on early models is accomplished by forcing fuel past needle valve into the carburetor bore. Later models force fuel from a chamber into the carburetor bore.

*Fig. MC6-2A—Exploded view of Zama C-2 diaphragm carburetor used on some PM850 models.*

1. Fuel pump cover
2. Gaskets
3. Fuel pump diaphragm
4. Filter
5. Spring
6. Choke friction ball
7. Choke plate
8. Choke shaft
9. "E" ring
10. Spring
11. Fuel inlet valve
12. Lever pin
13. Metering diaphragm lever
14. Gasket
15. Metering
16. Cover
17. Throttle plate
18. Return spring
19. Throttle shaft
20. High speed mixture screw
21. Idle mixture screw
22. Main jet



Be sure primer operates correctly as fuel leaking into bore will change fuel mixture. Primer "O" rings must be installed correctly to prevent leakage. Some plungers shown in Fig. MC6-4 have a cup to retain "O" ring (25). Install cup 5/64-inch from end of primer housing bore as shown in Fig. MC6-6. Two types of primer plungers have been used on the carburetor shown in Fig. MC6-5. The rear groove of the plunger is 0.090 or 0.120 inch wide as shown in Fig. MC6-7. An "O" ring is used in the narrow groove while "V" packing is used in the wide groove as a service replacement.

If carburetor has been disassembled, make a preliminary adjustment prior to starting engine and make final adjustment after engine has been started and brought to operating temperature.

To make the preliminary adjustment on "W" series carburetors, refer to Fig. MC6-1 and proceed as follows: Turn the idle speed screw (2) counter-clockwise until throttle butterfly (4) is completely closed. Hold a finger against the closed butterfly as shown in Fig. MC6-2 and turn the idle mixture screw (3—Fig. MC6-1) clockwise until the butterfly starts to open, then turn the idle mixture needle three turns counter-clockwise. Return to the idle speed screw (2) and while holding finger against butterfly (4), turn idle air screw clockwise until butterfly begins to open, then continue to turn idle screw clockwise an additional ½-turn. Hold the throttle trigger in the wide open position, turn the high speed mixture screw (1) as required until throttle butterfly is in horizontal position. Now turn screw (1) clockwise until throttle butterfly (4) starts to close, then turn the high speed mixture screw two turns counter-clockwise. On later models, initial adjustment of main fuel needle (1—Fig. MC6-5) is 1 turn. Do not attempt to adjust throttle plate opening.

With preliminary adjustment made as outlined, start engine and bring to operating temperature. Let engine run at idle rpm and if necessary, adjust idle speed screw until engine is operating just below chain creep speed. Now accelerate engine rapidly several times and check engine operation. If engine falters during acceleration, the mixture is too lean and idle mixture needle should be turned counter-clockwise as necessary. If engine runs rough and smokes excessively during acceleration, the mixture is too rich and the idle mixture needle should be turned clockwise as necessary. Make this adjustment in small increments and check engine operation after each adjustment. If the idle mixture is changed it may also be necessary to readjust the idle speed screw to keep engine idle rpm below chain creep speed. Refer to Fig. MC6-8 and set the tension governor spring so engine idles smoothly in all positions. Reduce tension on spring if chain creeps.

With engine idle rpm and mixture adjusted, load engine (make a cut) and turn the high speed adjustment screw (1—Fig. MC6-1) on early models counter-clockwise in small increments until engine operation begins to roughen, then turn the screw clockwise just

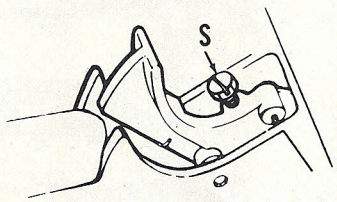



*Fig. MC6-3—Fast idle adjustment on some models is performed by turning adjusting screw (S) on bottom of trigger.*

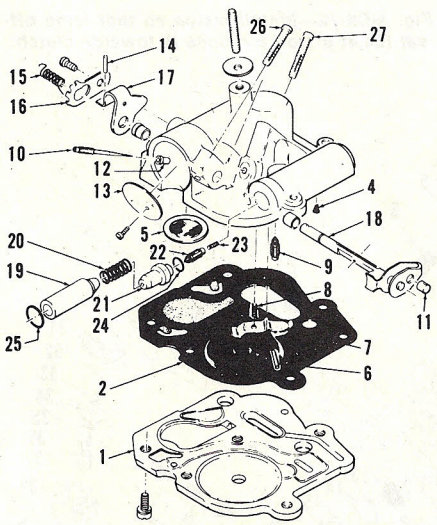



*Fig. MC6-4—Exploded view of early Model "W" series carburetor. Refer to Fig. MC6-1 for view of carburetor installed.*

1. Base plate
2. Diaphragm
3. Valve disc
4. Check valve
5. Capillary seal
6. Inlet valve pin
7. Inlet lever
8. Spring
9. Inlet valve needle
10. Metering (low idle mixture needle
11. Swivel
12. Air orifice
13. Throttle butterfly
14. Roll pin
15. Idle governor spring
16. Clip
17. Throttle lever
18. Throttle shaft
19. Primer plunger
20. Plunger spring
21. Seat
22. Primer needle
23. Needle spring
24. "O" ring
25. "O" ring
26. Idle speed screw
27. High speed mixture screw

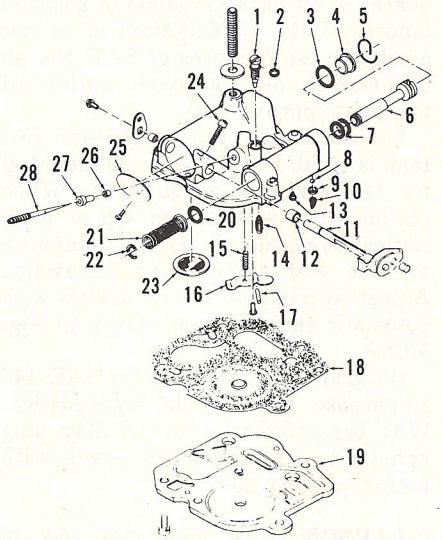



*Fig. MC6-5—Exploded view of later Model "W" series carburetor. Refer to Fig. MC6-4 for view of early model.*

1. High speed mixture needle
2. "O" ring
3. "O" ring
4. Plug
5. Retainer
6. Primer plunger
7. "O" ring or "V" packing
8. Ball
9. Ball seat
10. Valve
11. Throttle shaft
12. Bushing
13. Valve
14. Fuel inlet valve
15. Spring
16. Inlet lever
17. Pin
18. Diaphragm
19. Base plate
20. "O" ring
21. Spring
22. Retaining ring
23. Seal
24. Idle speed screw
25. Throttle plate
26. Fuel orifice
27. Air orifice
28. Idle metering needle

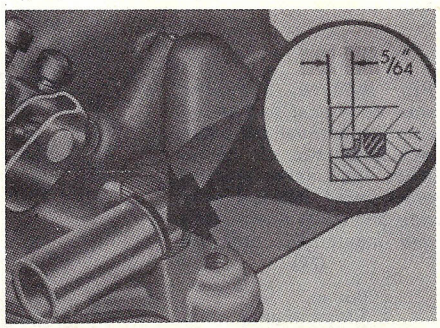



*Fig. MC6-6—Some early "W" series carburetors have a seal cup which must be installed 5/64-inch inside primer bore as shown above.*

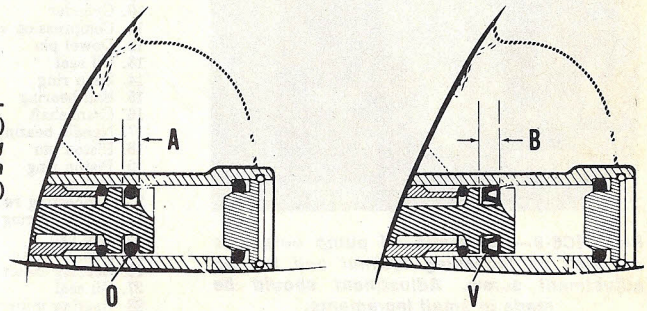



*Fig. MC6-7—Primer plunger with narrow (0.090) groove (A) uses "O" ring (O). Primer plunger with wide (0.120) groove (B) uses "V" packing (V).*

enough to eliminate the engine roughness. On later models of "W" carburetor, the high speed mixture screw is turned clockwise to lean fuel mixture.

**IGNITION.** Early models are equipped with a breaker-point type flywheel magneto ignition system while later models use an electronic ignition system.

On models equipped with breaker points, breaker point gap should be 0.019 inch. Clearance between ignition coil legs and flywheel magnets should be 0.010-0.012 inch and can be adjusted after loosening coil mounting screws. Ignition timing is 26° BTDC and is not adjustable, however, incorrect breaker point gap will affect ignition timing.

Clearance between ignition coil module legs and flywheel magnets should be 0.011-0.015 inch on models equipped with electronic ignition. Ignition timing is 26° BTDC but is not adjustable.

Note that two different electronic systems have been used on later models. Individual components should not be interchanged. The different systems may be identified by noting color of components which are all black on one of the ignition systems.

**LUBRICATION.** Engine is lubricated by a mixture of regular gasoline and 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 6 ounces of SAE No. 40 two-stroke oil for each gallon of gasoline (approx. 1:20).

Fill chain oiler tank each time fuel tank is filled. Use SAE No. 30 motor oil for temperatures above 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. Adjust oil pump output on models with automatic chain oiler as shown in Fig. MC6-9.

On gear drive models, use SAE 140 all-purpose gear oil in transmission. With bar pointed down and filler plug removed, oil should be level with bottom of filler hole.

**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.

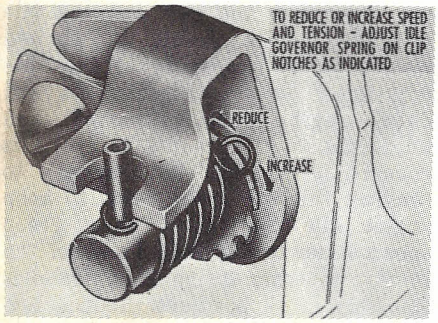



*Fig. MC6-8—View showing installation of idle governor spring. Later "W" series carburetors do not have governor spring. Adjust spring as shown so engine will idle smoothly in any position.*

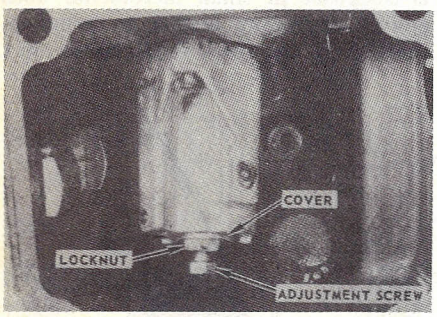



*Fig. MC6-9—Automatic oil pump output is adjusted by loosening locknut and turning adjustment screw. Adjustment should be made in small increments.*

## REPAIRS

**CONNECTING ROD.** Removal of connecting rod requires separating cylinder and crankcase. To gain access to the cylinder and crankcase, remove clutch guard and starter assembly, clutch, fan housing, flywheel, ignition

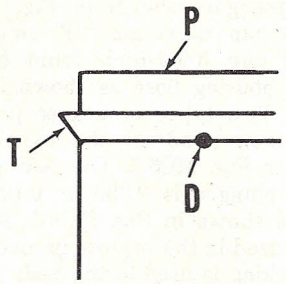



*Fig. MC6-11—Tapered piston rings on some models must be installed so that taper (T) is towards top of piston (P). Locating dot (D) on ring will be towards bottom when installed correctly.*

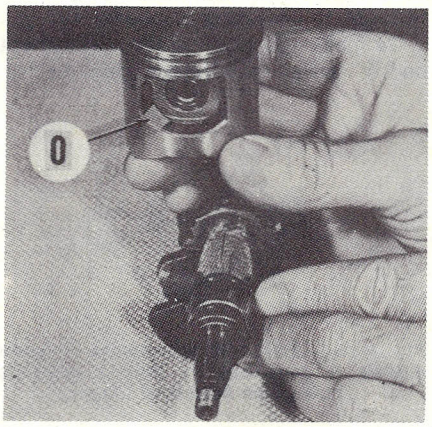



*Fig. MC6-12—Install piston so that large offset (O) at piston pin boss is towards clutch.*

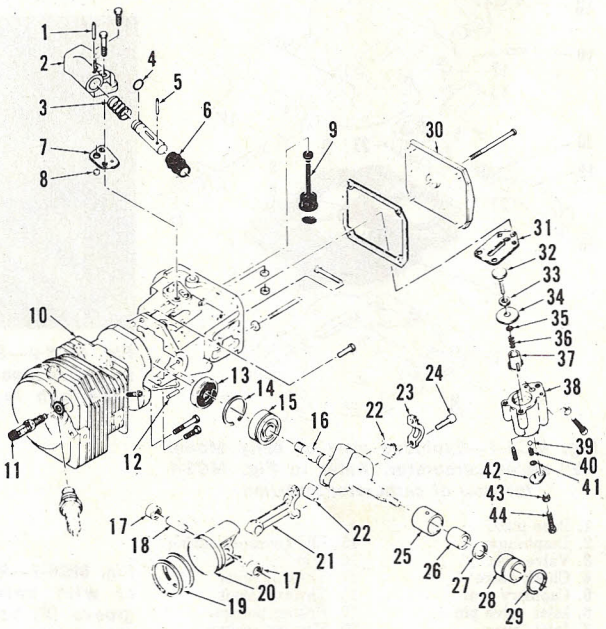


*Fig. MC6-10—Exploded view of typical engine assembly, manual oil pump and automatic oil pump. Note that early models used insert (28) and snap ring (29) while late models use insert (25) and pin (12).*

1. Roll pin
2. Manual oil pump housing
3. Spring
4. "O" ring
5. Roll pin
6. Boot
7. Gasket
8. Valve
9. Oil hose
10. Cylinder
11. Compression valve
12. Dowel pin
13. Oil seal
14. Snap ring
15. Ball bearing
16. Crankshaft
17. Needle bearing
18. Piston pin
19. Piston ring
20. Piston
21. Connecting rod
22. Roller bearing
23. Rod cap
24. Rod screws
25. Bearing insert
27. Oil seal
28. Bearing insert
29. Snap ring
30. Oil tank cover
31. Gasket
32. Piston
33. Teflon washer
34. Piston ring
35. "O" ring
36. Spring
37. Adjustment sleeve
38. Automatic oil pump housing
39. Outlet ball valve
40. Spring
41. "O" ring
42. Valve cover
43. Locknut
44. Adjusting screw

components, air cleaner cover and air cleaner screen, carburetor, spark arrester, cylinder shroud and fuel tank assembly.

With the above assemblies removed, drain chain oiler tank, if necessary, then remove the crankcase cover. Remove the four interior and four exterior cylinder retaining cap screws and separate crankcase from cylinder. Remove the rod cap screws and remove rod and piston from crankshaft. Do not lose any of the 22 loose rollers used in PM850, SP80 and SP81 or 20 loose rollers used in all other models. Heat piston evenly to about 200 degrees F., support piston boss on a 9/16-inch deep socket and using a driver smaller than piston pin, press piston pin from rod.

**NOTE: Piston support tool is P/N 63093 and driver is P/N63094.**

Inspect connecting rod for worn or scored bearing surfaces, bends or twists. If any of these defects are found, renew rod.

To reassemble, heat piston pin end of rod to about 300 degrees F. and reinstall by reversing removal procedure. Install rod in piston with pips on rod and cap aligned. Use grease to hold rollers in crankshaft end of rod. Tighten rod cap screws to 65-70 in.-lbs. with oiled threads.

**PISTON, PIN, RINGS AND CYLINDER.** Later models are equipped with a chrome cylinder bore. On these models, standard size pistons and rings only are available. Cylinder bore and piston on Model 850 are graded "A, B or C" according to size. Letter size should be the same on piston and cylinder to obtain desired clearance. If cylinder is unmarked, use a piston marked "B". Piston letter size is marked on crown while cylinder is marked adjacent to compression release valve. Oversize pistons and rings are available on models with a cast iron liner in the cylinder.

Models with cast iron liner should conform to the following specifications: Piston-to-wall clearance should be 0.003-0.005 inch measured at piston skirt. Cylinder taper or out-of-round should not exceed 0.005 inch. Piston ring end gap should be 0.006-0.017 inch on unpinned rings and 0.051-0.066 inch on models with pinned piston rings. Maximum piston ring end gap should be 0.0055 inch on models with 3.3 cu. in. engine and 0.006 inch on models with 4.3 cu. in. engine. Minimum ring side gap is 0.003 inch for 3.3 and 4.3 cu. in. engines. If cylinder is bored to an oversize, the tip of the compression release valve (DSP) must be cut one-half the amount of the oversize. For example, the compression valve would be cut 0.010 inch if the cylinder is bored 0.020 inch oversize. Be sure valve does not protrude into cylinder and contact piston or piston rings.

Recommended piston-to-cylinder clearance is measured 3/8-inch from bottom of piston skirt. On models with chrome cylinder bore clearance should be 0.002-0.004 inch except for Model PM850 which is 0.0024-0.0038 inch. Cylinder should be inspected and renewed if chrome has cracked, flaked or worn away and exposed soft base metal underneath. Pistons and rings are available in standard sizes only. Piston ring end gap should be 0.055-0.091 inch for Models PM555, PM700 and PM850. Piston rings used with chrome cylinder are tapered on some models and must be installed with taper pointing up as shown in Fig. MC6-11.

If needle bearings in piston require renewal, support piston on outer end of pin boss, place insert support or McCulloch special tool between piston bosses (in place of rod) and press top bearing out toward inside. Turn piston over and repeat operation on opposite bearing. Note: Bearing enters hole in insert support as it is pressed out. Do not reuse any bearings that have been removed. To install new bearings in piston, heat piston to about 200 degrees F. and reverse procedure but use solid end of insert support and press bearing into piston until bearing butts against the insert support. This positions bearing inner end flush with inner ends of piston pin boss.

Pistons on all engines have piston pin offset in piston. Piston must be installed on connecting rod with large offset (O—Fig. MC6-12) towards clutch. The piston on most engines is also

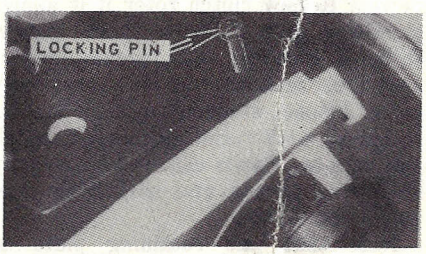



*Fig. MC6-13—Flywheel may be locked in place on SP60, SP80, SP81, PM700 and PM850 Models by inserting ¼-inch locking pin through base plate into notch in flywheel.*

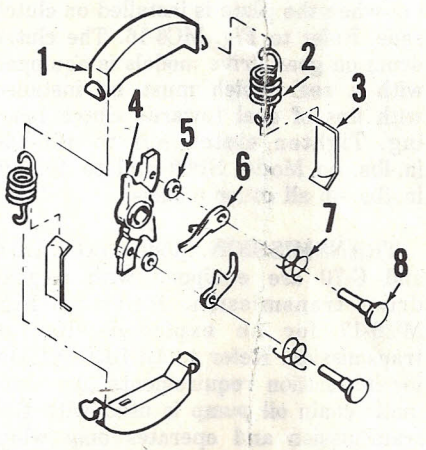



*Fig. MC6-14—Exploded view of clutch used on all models except SP80.*

1. Shoe
2. Spring
3. Retainer
4. Rotor
5. Washer
6. Pawl
7. Spring
8. Rivet

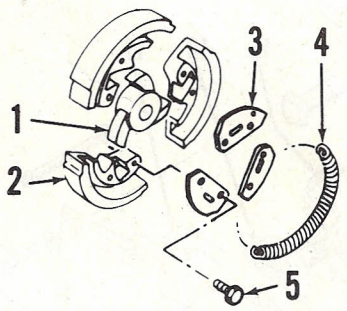



*Fig. MC6-15—Exploded view of clutch shoe assembly used on Model SP80.*

1. Rotor
2. Clutch shoes
3. Retainer plates
4. Clutch spring
5. Cap screw

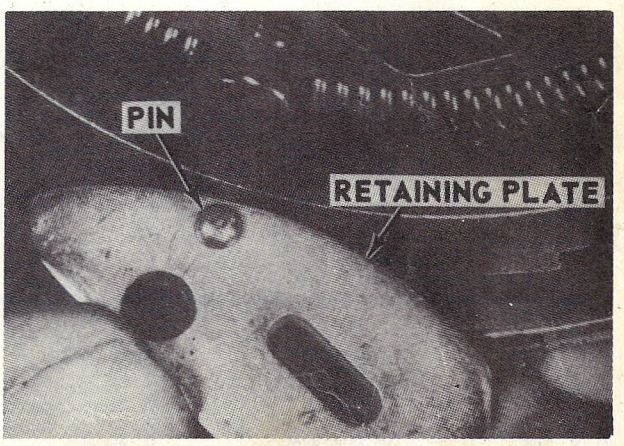



*Fig. MC6-16—Install clutch spring (4—Fig. MC6-15) so that spring ends will contact locating pin in clutch spring retaining plate.*

marked with "EX" and must be installed with "EX" side adjacent to exhaust port. Heat connecting rod eye to approximately 300°F before installing piston and pressing in piston pin.

**CRANKSHAFT.** The crankshaft is supported by a ball bearing at flywheel end and a needle bearing at clutch end. Crankshaft should be discarded if it shows uneven or excessive wear, or any other signs of damage. When installing bearing on crankshaft, place shielded side of ball bearing next to counterweight of crankshaft and press bearing on shaft until it bottoms. When crankshaft and piston assembly is positioned in cylinder, be sure inner end of needle bearing is positioned 1/8-inch away from counterweight of crankshaft and that shaft seals are installed with lips facing inward. Tighten the four interior crankcase bolts to 55-60 in.-lbs. and the four exterior crankcase bolts to 35-40 in.-lbs. torque.

**AUTOMATIC OILER.** All models except Model 10-10 have an automatic chain oiler in addition to the manual chain oiler. The oil pump on direct drive models is operated by crankcase pulsations while the oil pump on gear drive models is driven by a worm gear on gearshaft (15—Fig. MC6-17). The oil pump on gear drive models operates only when the chain is driven and is non-adjustable.

The oil pump on direct drive models is adjusted as shown in Fig. MC6-9. Chain oil is routed first through the manual oiler then through the automatic oiler before it exits at the bar pad. This allows the manual oiler to be used independently as well as providing priming for the automatic oiler. The oil pump is contained within the oil tank and may be removed after draining oil tank and removing tank cover. Oil pump should be cleaned and inspected for damage or excessive wear. Be sure all oil passages are open and clean and renew piston disc if warped or cracked. Before starting chain saw, prime automatic oil pump by operating manual oiler several times.

**CLUTCH.** To remove clutch, remove clutch guard and starter assembly, bar, chain and fan (flywheel) housing. Removal of bar and chain is not necessary on gear drive models. Lock flywheel by inserting a screwdriver between bossed portion of flywheel and leg of coil lamination (DO NOT use flywheel fin). Flywheel on SP60, SP80, SP81 and PM850 models is secured by inserting a ¼-inch locking pin through the base plate as shown in Fig. MC6-13 and rotating flywheel until pin engages notch in flywheel. Remove clutch retaining nut and pull clutch from crankshaft. Remove clutch drum and bearing, and shims. Refer to Figs. MC6-14 and MC6-15.

Inspect all parts for signs of excessive wear or other damage. Clutch shoes must be renewed as a unit. Clutch spring(s) should also be renewed. Renew clutch rotor if it allows excessive play of clutch shoes. Renew shims if grooved or damaged. Inspect sprocket and renew if excessively worn. Inspect starter pawls on models equipped with recoil starter on clutch side of saw. Pawls can be renewed by removing rivets and installing new pawls and rivets.

Note that one retaining plate of clutch assembly used on Model SP80 has a pin which prevents the clutch spring from rotating. The clutch spring must be installed so that the ends of the spring will be underneath retaining pin when the plate is installed on clutch shoe. Refer to Fig. MC6-16. The clutch drum on gear drive models is equipped with a seal which must be installed with lips of seal towards clutch bearing. Tighten clutch nut to 400-420 in.-lbs. on Model SP80 and to 160-170 in.-lbs. on all other models.

**TRANSMISSION.** Models LG-2, LG-6 and G-70 are equipped with a gear drive transmission. Refer to Fig. MC6-17 for an exploded view of transmission. Refer to LUBRICATION for lubrication requirements. An automatic chain oil pump is used with this transmission and operates only when the chain is turning. Oiler is plunger type and non-adjustable.

Disassembly and overhaul of transmission is evident after inspection of unit; however, the following points

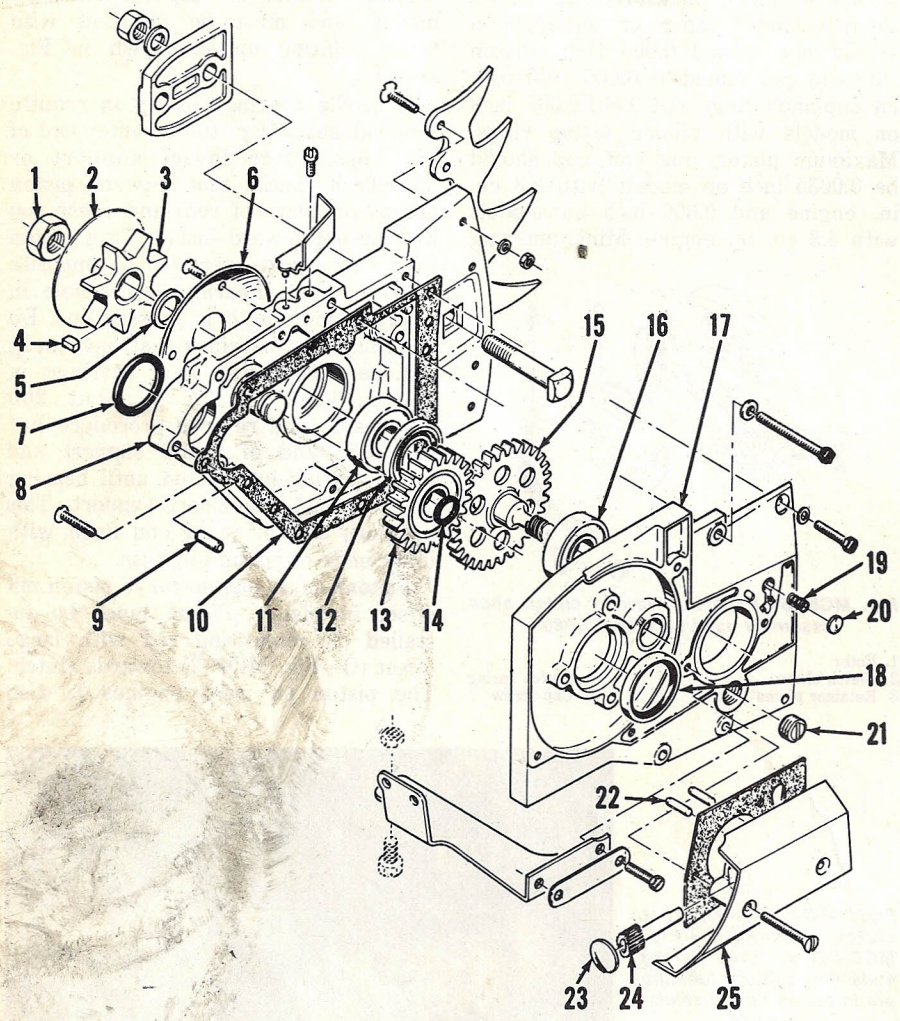



*Fig. MC6-17—Exploded view of gear transmission used on Models LG-2, LG-6 and G-70.*

1. Nut
2. Plate
3. Sprocket
4. Key
5. Spacer
6. Plate
7. "O" ring
8. Gearcase
9. Dowel pin
10. Gasket
11. Bearing
12. Seal
13. Idler gear
14. "O" ring
15. Gear
16. Bearing
17. Gearcase cover
18. Seal
19. Spring
20. Valve
21. Plug
22. Pin
23. Plug
24. Oil pump plunger
25. Cover

should be followed. Idler gear and bearing (13—Fig. MC6-17) must be renewed as a unit assembly. Install seal (12) with lips toward gear. Seal should be greased to prevent damage until oil reaches seal. Closed side of bearing (11) should be on sprocket side of shaft. Install seal (18) with lips to inside of case and metal housing of seal flush with case. Seal should be greased. Loctite should be used on all screws.

**RECOIL STARTER.** Chain saw may be equipped with a recoil starter mounted on right or left side. Refer to Fig. MC6-18 for exploded view of recoil starter mounted on right side of chain saw. Rewind spring is wound in counter-clockwise direction in housing and rope is wound in counter-clockwise direction around rope pulley as viewed installed in housing. New rope length is 50 inches. Early models have a hole in the rope pulley and a nail or other device can be inserted through the hole to hold the rewind spring on the rope pulley as shown in Fig. MC6-19. Note that the spring is wound clockwise if this method is used to install rewind spring.

An early and late type of rewind spring and rope pulley have been used. Refer to Fig. MC6-20. Early and late spring and pulley should not be interchanged. Early type spring and pulley must be used in early starter housing. Later type spring and pulley can be used in early or later starter housing.

Place tension on rope by pulling rope handle then hold rope pulley so that notch on outer edge of pulley aligns with rope outlet. Pull loose rope into housing and rotate rope pulley one or two turns in counter-clockwise direction. Release rope and check starter operation.

Refer to Fig. MC6-21 for view of left hand starter found on saws manufactured in United States and some export models. Install rewind spring on fan housing in counter-clockwise direction. Wind rope on rope pulley so it is wound in counter-clockwise direction when viewed with pulley installed on housing. New rope length should be 42 inches. Check operation of starter to be sure there is sufficient rewind spring tension to rewind rope but rewind spring is bottomed when rope is pulled to its full length. Spring tension is altered by turning rope pulley while housing cover is removed.

Left hand starter used on some saw models manufactured for export is shown in Fig. MC6-22. Rewind spring is wound in clockwise direction as viewed with pulley installed in housing. Place tension on rope by pulling rope handle and then hold rope pulley so that notch on outer edge of pulley aligns with rope outlet. Pull loose rope into housing and rotate rope pulley one or two turns in clockwise direction. Release rope and check starter operation.

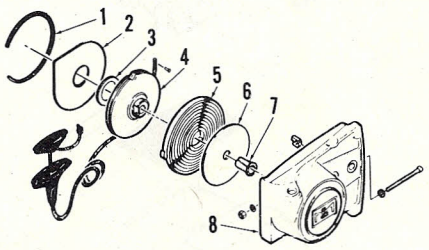



*Fig. MC6-18—Exploded view of typical right hand starter.*

1. Snap ring
2. Dust shield
3. Thrust washer
4. Rope pulley
5. Rewind spring
6. Spring shield
7. Nylon bushing
8. Fan housing

*Fig. MC6-19—Some rope pulleys have a hole which allows the rewind spring to be held in position by inserting a nail or other device as shown.*

## Electric Start Models

Model 10-10E is equipped with an electric starter/generator. Ten 1.2 volt battery cells are used to drive the 12 volt starting motor at a cranking speed of 500-900 rpm. At 4000-4500 rpm the starter motor will begin to generate current to recharge the nickel cadmium batteries. When battery pack voltage reaches 14.9-15.4 volts, the voltage regulator/starter switch will cut out the generator to prevent battery overcharge. A resistor in the circuit limits current through the regulator when the regulator cuts current from the generator to the batteries.

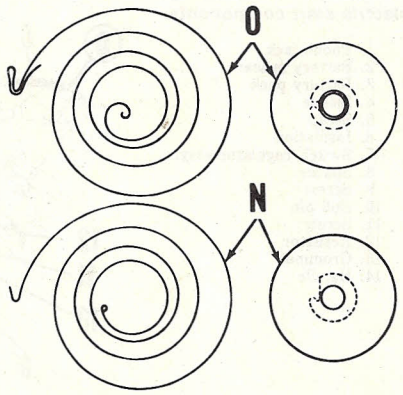



*Fig. MC6-20—Note difference between old (O) and new (N) style rewind springs and rope pulleys. See text.*

**TROUBLE SHOOTING.** Determine if trouble is mechanical or electrical. If chain saw will not start by depressing the electric start button, attempt to start chain saw manually to check for mechanical obstructions and operation of the compression release valve. The engine should rotate easily with the compression release valve open. If fault is not mechanical proceed with checks of electrical system.

Solder a red wire to the center pin and a black wire to the outer shell of a phono-plug. Insert plug in phono-jack on side of battery pack; red wire is positive and black wire is negative. Connect a voltmeter to the leads. Voltmeter scale should read 40 volts although a scale of 20 volts may be used if careful attention to meter readings is used to prevent meter damage while running saw.

Manually start engine and observe voltmeter readings. Voltage should rise at an engine speed of 4000-5000 rpm until 15.4 volts is reached and the

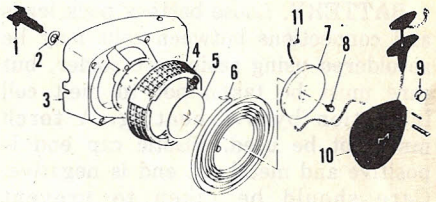



*Fig. MC6-21—Exploded view of left hand starter used on U.S. models and some export models.*

1. Starter shaft
2. Wave washer
3. Fan housing
4. Sawdust guard
5. Spring shield
6. Rewind spring
7. Rope pulley
8. Cap screw
9. Rope roller
10. Cover
11. Rivet

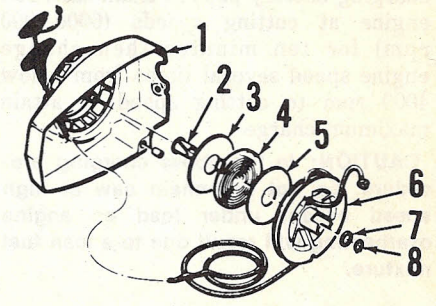



*Fig. MC6-22—Exploded view of left hand recoil starter used on some export models.*

1. Fan housing
2. Nylon bushing
3. Spring shield
4. Rewind spring
5. Dust shield
6. Rope pulley
7. Washer
8. Snap ring

regulator cuts the generator out of the battery circuit. If voltage exceeds 15.4 volts, stop engine to prevent battery damage due to overcharge. Remove housing and check resistor (5—Fig. MC6-23) for continuity or bad connections. **If resistor is not faulty refer to regulator repair section as regulator is faulty. If voltage reading was below** 12 volts trouble may be faulty generator, bad wire connections or faulty battery. If there was any voltage indication during test and wire connections are good, then generator is defective; proceed to generator repair section. If there was no voltage and connections are good, problem may be generator or faulty battery. It will be necessary to recharge battery in chain saw or obtain a charged battery to determine which component is defective. **If there is still no generator output with saw engine speed above 4000 rpm with a charged battery installed, the generator is defective. Refer to generator repair section. If generator output meets specifications, refer to battery repair section.**

If generator, regulator and battery were found to be operating correctly but saw will not start when starter button is depressed, then wiring connections or starter switch are defective. Refer to regulator/starter switch repair section.

BATTERY. Loose battery pack leads and connections between cells may be resoldered using resin core solder, but care must be taken not to melt cell insulation by overheating. A torch must not be used. Plastic cap end is positive and metal cap end is negative. Care should be taken to prevent shorting of battery leads as prolonged shorting results in overheated cells and loss of fluid. Batteries are shipped discharged and must be charged either by chain saw operation, or by use of McCulloch Battery Pack Charger P/N 66086; connection is made by phono-jack on side of battery pack. When charging battery pack in chain saw, run engine at cutting speeds (6000-7000 rpm) for ten minutes then change engine speed several times from below 4000 rpm to cutting speed to attain maximum charge.

**CAUTION: In the above charging procedure, do not run chain saw at high speed except under load as engine overheating will result due to a lean fuel mixture.**

GENERATOR/STARTER. To determine which section of generator is defective, proceed as follows: Connect one lead of an ohmmeter to the generator wire terminal. Connect the other lead to the field coil housing. If a reading of 5-6 ohms is not obtained, renew field housing. Disconnect the ohmmeter lead at the field coil housing and connect it to the ungrounded brush lead coming from the field coils. With the first ohmmeter lead still connected to the generator wire terminal, the ohmmeter should read negligible resistance. If an open is indicated, renew field coil housing. Check flywheel armature on a growler for shorted coils. Check for shorts between commutator segments and flywheel for grounded segments by attaching one ohmmeter lead to the flywheel and placing the other ohmmeter lead in contact with each commutator segment. If growler test or grounded segment test indicate short circuits, flywheel armature assembly must be renewed.

REGULATOR/STARTER SWITCH. Regulator consists of solid state components which cannot be renewed individually but must be renewed as an assembly. A blocking diode is connected in parallel with the starting switch to prevent reverse current while charging battery pack. Blocking diode must be renewed as part of regulator/starter switch assembly. Regulator/starter switch must be grounded to saw handle for starter/generator circuit to operate. IF trouble has been isolated to regulator/starter

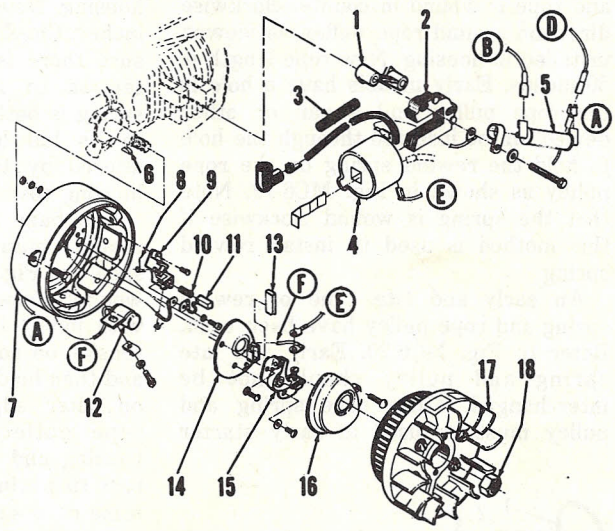



*Fig. MC6-23—View of starter-generator and ignition system used on electric start chain saws. Electrical connection is made between points with same letters, such as wire (F) with wire (F). Refer also to Fig. MC6-24.*

1. Spacer
2. Laminations
3. Insulation
4. Coil
5. Resistor
6. Key
7. Field coil
8. Spring
9. Brush holder
10. Spring
11. Brush
12. Condenser
13. Wiper
14. Base
15. Breaker points
16. Breaker box
17. Armature & flywheel assy.
18. Nut

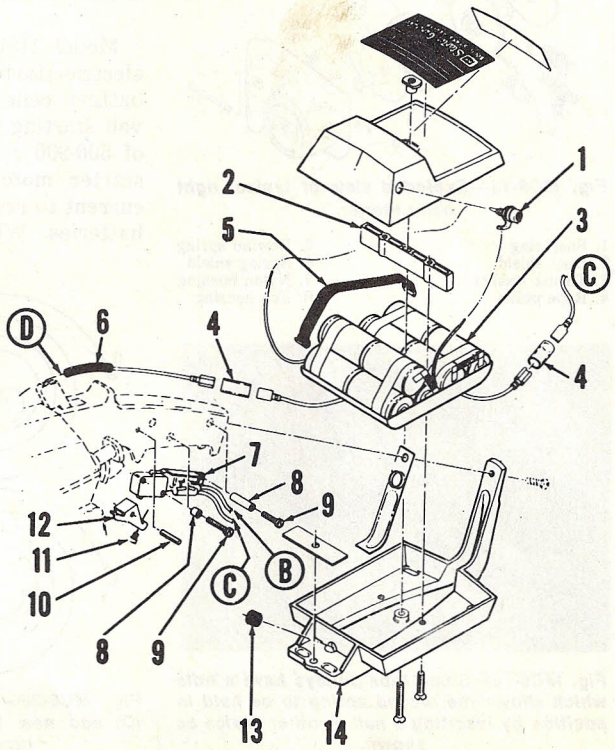



*Fig. MC6-24—View of battery and handle assemblies on electric start models. Refer to Fig. MC6-23 for remainder of electric start components.*

1. Phono jack
2. Battery spacer
3. Battery pack
4. Sleeve
5. Strap
6. Insulation
7. Switch/regulator assy.
8. Spacer
9. Screw
10. Roll pin
11. Screw
12. Actuator
13. Grommet
14. Handle

switch, be sure a good ground connection exists before renewing regulator/starter switch assembly.

**CHAIN BRAKE.** Some later models are equipped with the chain brake mechanism shown in Fig. MC6-25. The chain brake stops chain motion when the operator's hand contacts brake lever (11) and steel strap (3) tightens around the clutch drum thereby stopping chain motion. Chain brake components must operate freely for the chain brake mechanism to be effective.

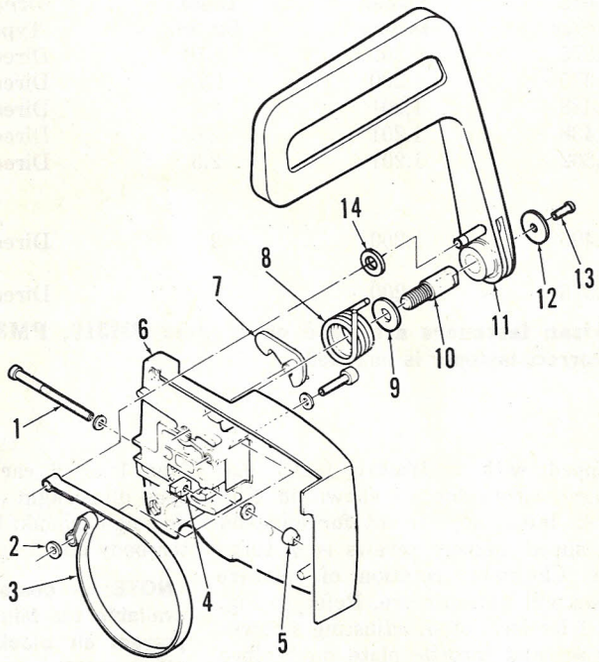



*Fig. MC6-25—Typical view of chain brake used on some later models.*

1. Chain adjusting screw
2. Washer
3. Brake strap
4. Adjusting block
5. Nut
6. Housing
7. Latch
8. Spring
9. Washer
10. Shaft
11. Brake lever
12. Washer
13. Screw
14. Washer