**McCULLOCH**

<table>
<thead>
<tr>
<th>Model</th>
<th>Bore</th>
<th>Stroke</th>
<th>Displ.</th>
<th>Drive Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eager Beaver 2010, Mac 3210</td>
<td>36 mm (1.4 in.)</td>
<td>30 mm (1.2 in.)</td>
<td>32 cc (2.1 cu. in.)</td>
<td>Direct</td>
</tr>
<tr>
<td>Silver Eagle 2012</td>
<td>36 mm (1.4 in.)</td>
<td>30 mm (1.2 in.)</td>
<td>32 cc (2.1 cu. in.)</td>
<td>Direct</td>
</tr>
<tr>
<td>Eager Beaver 2014, Mac 3214, Silver Eagle 2014</td>
<td>36 mm (1.4 in.)</td>
<td>30 mm (1.2 in.)</td>
<td>32 cc (2.1 cu. in.)</td>
<td>Direct</td>
</tr>
<tr>
<td>Eager Beaver 2016, Mac 3216, Silver Eagle 2016</td>
<td>36 mm (1.4 in.)</td>
<td>30 mm (1.2 in.)</td>
<td>32 cc (2.1 cu. in.)</td>
<td>Direct</td>
</tr>
</tbody>
</table>

**MAINTENANCE**

**SPARK PLUG.** Recommended spark plug is Champion DJ7Y or equivalent for all models. Spark plug electrode gap is 0.025 in. (0.6 mm) for all models. Note that spark plug has a tapered seat and does not require a gasket. Tighten spark plug to 150 in.-lbs. (17 N.m).

**CARBURETOR.** A Zama C1Q-M27 diaphragm type carburetor is used on all models. Refer to CARBURETOR SERVICE section for overhaul procedures and exploded views of Zama carburetors.

Initial adjustment for both the low-speed and high-speed mixture screws is one turn open from a lightly seated position. Make final adjustment with engine warm and running. Make certain that the air cleaner is clean.

Adjust idle speed screw so engine idles just below clutch engagement speed. Adjust low-speed mixture screw to obtain highest possible engine speed, then turn screw out (counterclockwise) 1/8 to 1/4 turn. Engine should accelerate cleanly without hesitation. If engine stumbles or seems sluggish when accelerating, adjust low-speed mixture screw until engine accelerates cleanly. Readjust idle speed screw if necessary to obtain recommended idle speed of 2800-3300 rpm. Chain must not move when engine is idling.

High-speed mixture screw should be adjusted to obtain optimum performance with saw under cutting load. Do not adjust high-speed mixture screw too lean (turned too far clockwise) as maximum permissible engine speed may be exceeded and engine may be damaged from lack of lubrication and overheating. Maximum no-load speed (with bar and chain installed) must not exceed 11,000 rpm.

To remove carburetor (4—Fig. MC130), remove the air filter cover (1) and filter element. Remove the two screws securing the filter base (3) and carburetor. Remove the filter base and carburetor, and disconnect fuel line and throttle link. Tighten carburetor mounting screws to 30-40 in.-lbs. (3.4-4.5 N·m).

**IGNITION.** All engines are equipped with an electronic ignition system. The ignition coil and electronic circuitry are contained in a one-piece ignition module (10—Fig. MC130), which is serviced as a unit assembly.

Air gap between the flywheel magnets and the laminated legs of the module should be 0.010-0.015 in. (0.25-0.38 mm). Loosen ignition module mounting screws and move module to obtain desired air gap. If air gap is excessive, engine may be hard to start or may not start.

**LUBRICATION.** The engine is lubricated by oil mixed with the gasoline fuel. Recommended fuel:oil ratio is 40:1 when using McCulloch 2-cycle oil. If McCulloch oil is not used, a good grade oil designed for use in air-cooled, two-stroke engines should be mixed at a 20:1 ratio. Do not use oil designed for automotive use. Use a separate container to mix the fuel and oil.

All models are equipped with an automatic chain oiling system. Recommended oil is McCulloch Chain, Bar and Sprocket oil. Oil designed for automotive use may also be used. Select oil viscosity according to ambient temperature.

**REPAIRS**

**CRANKCASE PRESSURE TEST.** An improperly sealed crankcase can cause the engine to be hard to start, run rough, have low power and overheat. Refer to ENGINE SERVICE section of this manual for crankcase pressure test procedure. If crankcase leakage is indicated, pressurize the crankcase and use a solution of soap and water to check gasket, seals, pulse line and castings for leakage.

**PISTON, RINGS AND CYLINDER.** To remove the piston, it is necessary to remove the powerhead (12—Fig. MC131) and separate the cylinder from the crankcase as follows: Unbolt and remove chain brake housing (13—Fig. MC131), bar and chain. Remove the air filter cover (10), fan housing (24), fuel tank (7) and oil tank (20). Remove the ignition module, air filter assembly, carburetor and muffler.

Remove spark plug and install a suitable piston stop tool or insert the end of a rope in spark plug hole to prevent the crankshaft from rotating. Note that fly-
wheel retaining nut has right-hand threads (turn counterclockwise to remove) and clutch retaining nut has left-hand threads (turn clockwise to remove). Remove the flywheel nut and tap flywheel counterbalance with a plastic mallet to unseat the flywheel (18—Fig. MC132) from crankshaft taper. Remove the air shroud (19) and oil pump (15). Remove clutch retaining nut (33) and withdraw the clutch assembly.

Remove screws attaching the crankcase (27) to the cylinder (1), and separate the crankcase from the cylinder. Care should be taken not to damage the mating surfaces of the crankcase and cylinder. Remove the crankshaft (7), connecting rod (8) and piston (3) as an assembly from the cylinder. Remove retaining rings (5) and push piston pin (4) from the piston. Be careful not to apply side thrust to the connecting rod when removing the piston pin.

Cylinder bore is chrome plated and no oversize piston or piston ring is available. If chrome plating is worn away or if cylinder bore is scuffed or scored, cylinder should be renewed.

Apply a thin coat of sealant to mating surface of crankcase and cylinder when assembling. Tighten the crankcase screws to 60-70 in.-lbs. (6.8-7.9 N·m).

**CONNECTING ROD.** Refer to PISTON section to remove connecting rod (8—Fig. MC132) from engine. Remove rod cap to separate connecting rod from crankshaft. Rod cap needle bearings will be loose when rod cap is removed.

Inspect connecting rod for worn or damaged bearing surfaces. Connecting rod should not be bent or twisted. Inspect crankshaft crankpin for wear or scoring.

To reassemble, use grease to hold bearing rollers in place in connecting rod and cap. Install connecting rod on crankshaft making sure that match marks on rod and cap are aligned. Connecting rod and cap are fractured and serration must mate correctly. Tighten connecting rod cap screws to 35-40 in.-lbs. (4.0-4.5 N·m).

**CRANKSHAFT AND CRANKCASE.** Crankshaft (7—Fig. MC132) is supported in two caged needle roller bearings (10). Refer to PISTON section to remove crankshaft from engine. Remove the connecting rod cap and separate the connecting rod and piston from crankshaft.

Inspect crankshaft and bearings for wear or damage. Note that crankcase and cylinder have mated surfaces and must be renewed as an assembly. Apply a thin coat of sealer to mating surfaces of crankcase and cylinder during assembly. Tighten crankcase screws to 60-70 in.-lbs. (6.8-7.9 N·m). Make certain that the crankshaft rotates freely. If not, disassemble and locate problem. Tighten flywheel retaining nut to 180 in.-lbs. (20.3 N·m). Do not use impact tools to tighten flywheel nut and do not over-torque, otherwise flywheel hub can be cracked and distorted.

**CLUTCH.** To remove the clutch, detach chain brake housing (13—Fig. MC131), bar and chain. Remove the spark plug and install a suitable piston stop tool or insert the end of a rope in spark plug hole to prevent the crankshaft from rotating. Clutch retaining nut (33—Fig. MC132) has left-hand threads (turn clockwise to remove). Remove retaining nut, dust cover (32) clutch assembly (31), clutch drum (30) and needle bearing (29).

Inspect all parts for signs of overheating and excessive wear. If necessary to renew clutch shoes, renew as complete set. Check sprocket for worn rails and pins. Inspect the sprocket needle bearing for wear.

Tighten clutch retaining nut to 180 in.-lbs. (20.3 N·m). Nut has left-hand threads. The use of an impact wrench to loosen or tighten clutch nut is not recommended.

**AUTOMATIC CHAIN OILER.** The automatic chain oil pump is shown in Fig. MC132. Remove the fan housing, flywheel and air shroud for access to the oil pump. A plunger gear repair kit is available for the pump. Oil pump output is not adjustable.

**CHAIN BRAKE.** All models are equipped with a chain brake that stops the chain motion when the operator's hand contacts the chain hand guard (1—Fig. MC133). To check for proper
When reassembling, lubricate pivot points and latch engaging surface with light coat of multipurpose grease.

**REWIND STARTER.** To disassemble rewind starter, remove starter housing (2—Fig. MC134) from fan housing. Remove rope handle (1) and allow rope and pulley to slowly rewind. Remove pulley retaining screw (5) and withdraw rope pulley (4). Care should be taken when removing rewind spring (3) not to allow spring to unwind uncontrollled.

Inspect starter pawls (16—Fig. MC132) and springs (17) for wear or damage and renew as necessary.

Rewind spring is contained in a case (3—Fig. MC134). If spring becomes disengaged from the case, it should be wound into the case in a clockwise direction from outer end. Starter rope length is 50 inches (127 cm). Wind rope on pulley in clockwise direction viewed from flywheel side.

To pre-tension rewind spring, complete starter assembly and pass rope through housing outlet. Install rope handle, then pull a loop of rope back through the outlet and engage rope in notch of rope pulley. Rotate pulley one turn clockwise with rope in notch. Release rope from notch in pulley. Rope should be held snugly against the starter housing.

Pull rope handle and check rewind operation. With starter rope fully extended, it should be possible to turn pulley at least an additional 1/2 turn clockwise. Be sure excessive tension is not placed on rewind spring; otherwise spring may break when rope is pulled to its full length. Repeat spring pretension procedure until desired rewind action is obtained.
Fig. MC132—Exploded view of powerhead typical of all models.

1. Cylinder
2. Piston ring
3. Piston
4. Piston pin
5. Snap ring
6. Needle bearing
7. Crankshaft
8. Connecting rod
9. Seal
10. Main bearing
11. Needle rollers
12. Worm gear
13. Spring
14. Seal
15. Oil pump housing
16. Starter pawl
17. Spring
18. Flywheel
19. Air shroud
20. "O" ring
21. Washer
22. Spring
23. Oil pump plunger
24. Plug
25. Oil hose
26. Adjusting screw
27. Crankcase
28. Washer
29. Needle bearing
30. Clutch drum
31. Clutch hub & shoes
32. Dust cover
33. Nut

Fig. MC133—Exploded view of chain brake assembly.

1. Hand guard
2. Brake stop
3. Brake latch
4. Roller
5. Actuating lever
6. Brake spring
7. Bar pad spacer
8. Brake housing
9. Brake band
10. Foam seal
11. Shield
12. Shoulder bolt

Fig. MC134—Exploded view of rewind starter.

1. Rope handle
2. Starter housing
3. Rewind spring & case
4. Rope pulley
5. Screw
6. Fan housing