McCULLOCH

POWER MAC 6®

Shop Manual

McCULLOCH CORPORATION

PART NUMBER 83323
R1

Table of Contents

Section One - General Information

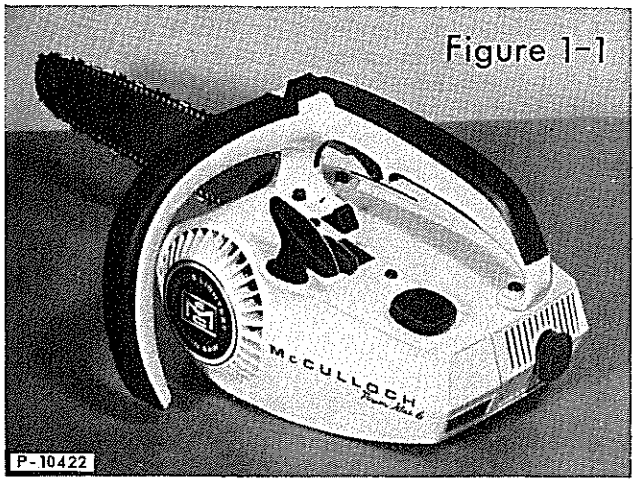

Figure 1-1

The general information in this section covers (1) specications, (2) fuel mixture, oils and other lubricants, (3) special tools, adhesives and sealants, (4) torque values, (5) carburetor operation and adjustment and (6) timing adjustment.

SPECIFICATIONS

Compression	6.5 to 1
Bore and Stroke	1.438 x 1.201 inches
Displacement	2 cubic inches
Ignition Timing (Arrow on Flywheel)	26° BTDC
Breaker Point Gap	0.018 inch
Lamination Gap	0.010 inch
Clutch Engagement Speed	2300 to 3000 RPM
Best Cutting Speed	7000 RPM
Spark Plug	AC CS45T
Spark Plug Gap	0.025 inch
Gasoline	Regular grade
Oil	McCulloch 40/50 oil
Fuel/Oil Mixture (McCulloch 40/50 oil)	40 to 1
Fuel Tank Capacity (Refill)	8.7 ounces
Oil Tank Capacity (Refill)	3.1 ounces

FUEL MIXTURE

GASOLINE

Use regular grade automotive gasoline. Where the octane rating of several gasolines is known, use the gasoline with the lowest octane rating. Do not use exotic fuels of any type. Exotic fuels have no business in a chain saw engine and will only cause service problems when they are used.

OIL

The fuel mixture is a combination of gasoline and oil. Two-cycle engines have no oil sump for lubricating oil as in an automobile engine and the oil in the fuel mixture lubricates the moving interior parts. It is for this reason, that the kind of oil used is so important.

McCulloch 40/50 oil should be used whenever possible. In the event McCulloch 40/50 Oil is not available, SAE 40 non-detergent, two-cycle oils can be used. The use of detergent type oils and of other oils designed for use in four-cycle automobile engines, except in an emergency, should be avoided.

MIXTURE

The use of freshly mixed fuel is recommended. The customer should mix only small quantities so that he does not store fuel for long periods. Stored fuel can deteriorate because the lighter fractions of gasoline evaporate and moisture can condense in a container of fuel.

Deteriorated, stale fuel is the cause of most hard starting complaints. Fuel should be mixed in quantities to last for one day's cutting only.

Mix the fuel in the ratio specified in the table.

FUEL MIXTURE TABLE - GASOLINE TO OIL RATIO

WITH McCULLOCH 40/50 OIL (40 TO 1 RATIO)		WITH SAE 40 TWO-CYCLE MOTOR OIL (16 TO 1 RATIO)	
GASOLINE	OIL	GASOLINE	OIL
2 U.S. GALLONS	1 (6 OZ.) CAN	1 U.S. GALLON	1/2 U.S. PINT
1-1/2 IMPERIAL GALLONS	1 (6 OZ.) CAN	1 IMPERIAL GALLON	1/2 IMPERIAL PINT
7 LITERS	1 (6 OZ.) CAN	4 LITERS	1/4 LITER
5 U.S. GALLONS	1 (16 OZ.) CAN	2 U.S. GALLONS	1 U.S. PINT
4 IMPERIAL GALLONS	1 (16 OZ.) CAN	2 IMPERIAL GALLONS	1 IMPERIAL PINT
19 LITERS	1 (16 OZ.) CAN	8 LITERS	1/2 LITER

OTHER LUBRICANTS

SAE 30 MOTOR OIL

SAE 30 motor oil should be used for lubricating the chain at temperatures above 40°F. SAE 10 motor oil should be used at lower temperatures.

The oil must be clean or the oiler pump will be plugged and the chain and bar damaged. Avoid reclaimed and cheap oils. The oil tank should be refilled each time the fuel tank is refilled. Before starting work each day, the manual oiler button should be pushed several times to make sure the oiler pump operates. The chain saw should never be used if the pump does not work.

SAE 30 motor oil is required during several reassembly steps and also should be applied to all bearings immediately after they are cleaned in solvent or gasoline.

BEARING LUBRICANTS

The sprocket bearing should be lubricated with any standard light automotive chassis grease. These greases contain lithium and provide better long term lubrication than other types such as cup grease. Cup grease should never be used. The long term lubrication provided by light automotive chassis greases should not be an excuse to put off lubrication. Sprocket bearings should be lubricated after at least every forty hours of operation.

Light automotive chassis greases are also used on the crankcase seals during assembly or reassembly. In this application, the grease provides lubrication to the seals during the time necessary for the oil in the fuel mixture to work its way past the bearings to the seals.

This same type of grease can also be used to hold the needle rollers on the connecting rod and cap when mounting the connecting rod on the crankshaft.

SPECIAL TOOLS

Two kits of special tools are available for use in servicing Power Mac saws.

PISTON ASSEMBLY TOOL KIT, P/N 68915

This kit is required to properly remove and install the connecting rod and two closed-end piston bearings. The kit contains a holding block (P/N 68911), a guide (P/N 68913) and a driver (P/N 68912). These tools are shown in Figure 4-13 and directions for use appear on page 3-36. A 1/4-inch drift pin or a 1/4-inch diameter punch is also required and is not a part of the kit. The tools in the kit should only be used with an arbor press or a vise. The tools can be damaged by hammering on them. Replacement tools are available separately.

PRESSURE TEST TOOL KIT, P/N 68916

The parts in this kit are used with Pressure Test Tool, P/N 62849, for pressure testing Power Mac engines during servicing operations. The parts are shown in Figure 1-2 and listed below. The pressure tool is not a part of the kit. Parts are available separately. Instructions for assembling the parts in the kit accompany the kit.

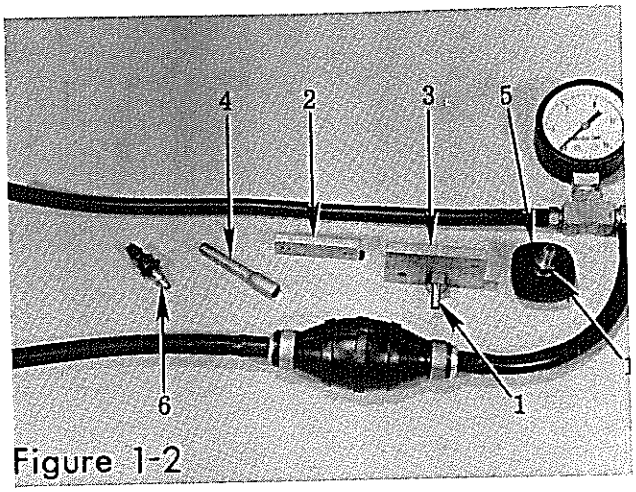

Figure 1-2

13251304	Connector - 1/8-27 NPTF	2
68917	Adapter Plate - Exhaust	1
68918	Adapter Plate - Intake	1
68919	Connector - Tubing	1
68920	Fuel Cap - Test	1
76518	Fitting	1
110289	Screw - Hex hd 8-32 x 1-1/8	2
104895	Screw - Skt hd 10-24 x 5/8	2

The use of the parts is described on pages 14 and 34.

ADHESIVES

McCulloch Loctite, P/N 67537, should be used on the threads of all screws except the fan housing attaching screws, bar mounting bolt, the connecting rod screws and carburetor adjustment screw and needles. Loctite is a chemical adhesive which hardens when removed from contact with air. Because of this it is supplied in a bottle containing air and Loctite liquid. The Loctite will remain liquid during the application time and sets up when surrounded by metal excluding the air.

SEALANTS

A gasoline resistant sealant is required during assembly of the crankcase cylinder and crankcase bottom. The sealant is also used during other assembly operations. Any of the following and similar sealants can be used.

Permatex
Gastite
Pliobond

An epoxy should be used to seal the fuel tank/starter housing seams if they develop leaks. Any two-part, air-drying epoxies can be used. Mix and apply the epoxy in accordance with the manufacturer's instructions. A non-conductive sealant such as Dow-Corning Silastic RTV 732 or similar non-conductive sealant is used to seal the primary wire/coil connection on those engines which do not have plastic insulators at that connection.

TORQUE VALUES

Torque values given in the text should be met when installing screws and nuts during assembly operations. These torque values are also shown on the exploded views next to the screws or nuts concerned.

CARBURETOR OPERATION

The carburetors used on Power Mac saws are similar to the Walbro and Tillotson carburetors used on other McCulloch saws, except that fuel feeds to the idle speed adjustment needle and idle fuel chamber after going past the high speed adjustment needle and through the main fuel chamber. This is shown in the schematic diagrams in Figures 1-3 to 1-6 inclusive.

STARTING

When starting a cold engine, the choke is normally closed (Figure 1-3). This causes the suction created in the crankcase during the compression stroke, to pull raw fuel through the idle, secondary and air bleed orifices from the idle chamber and through the main orifice from the main chamber into the air passage of the carburetor.

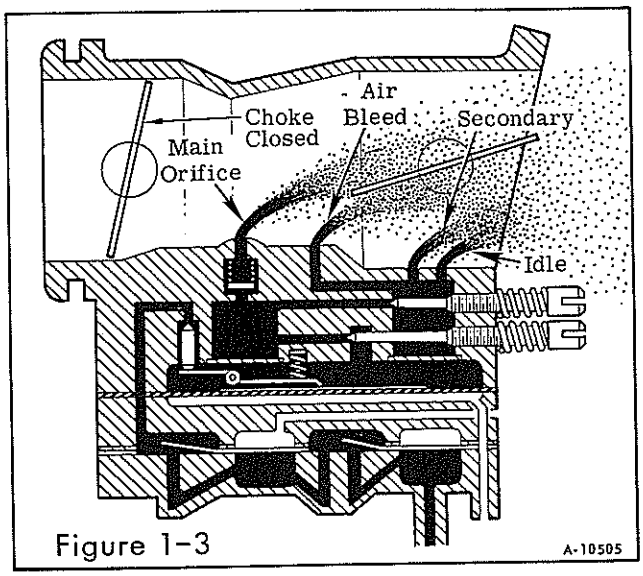

Figure 1-3 A-10505

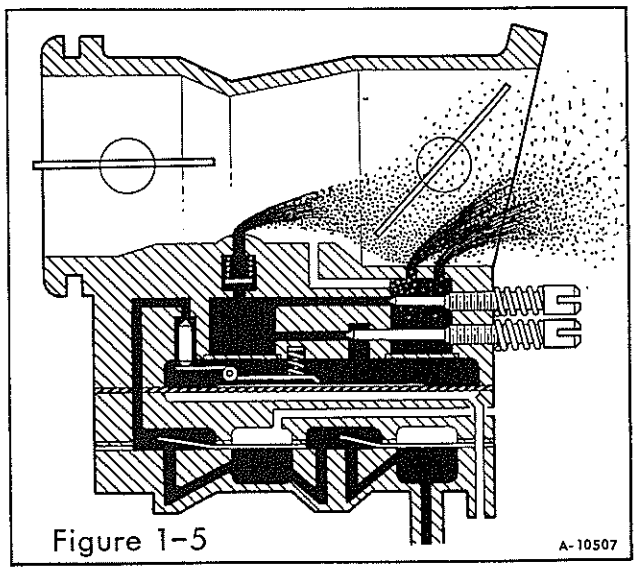
Figure 1-5 A-10507

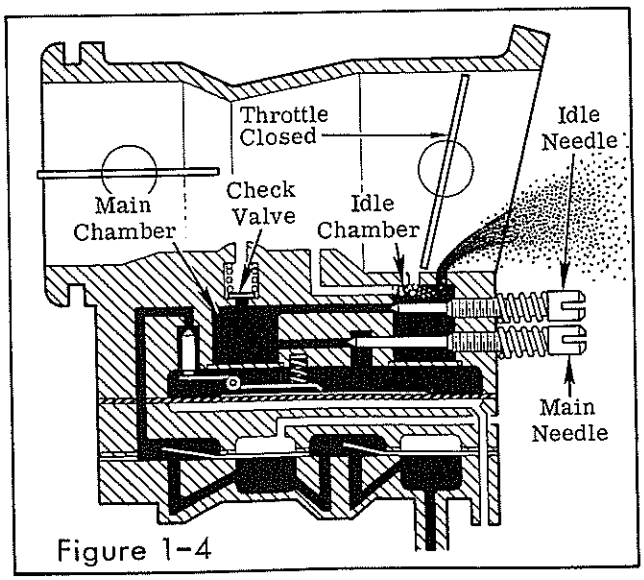

Figure 1-4

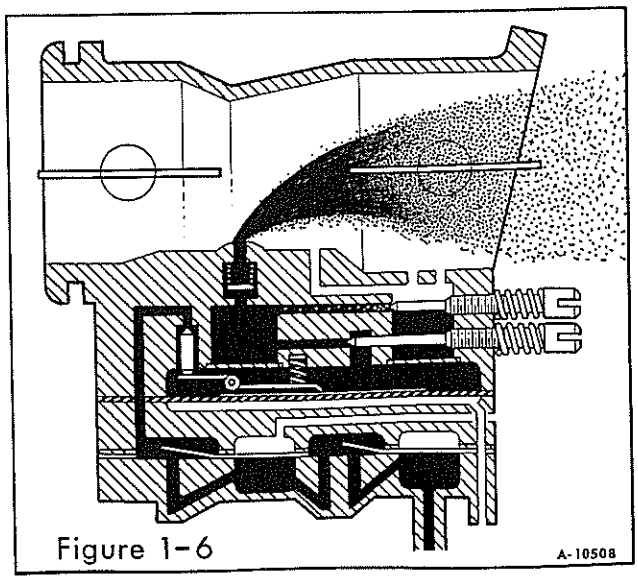
Figure 1-6 A-10508

IDLE

The throttle is closed at idle speed. With the throttle plate in closed position fuel can only be drawn by crankcase suction through the idle orifice (Figure 1-4). The secondary orifice is upstream of the throttle plate and permits air to be drawn through it into the idle fuel chamber. The secondary orifice acts as an air bleed just as the air bleed orifice does. The air from the secondary and air bleed mixes with the fuel in the idle chamber and assists in atomization as the fuel is drawn into the air passage through the idle orifice. The spring-loaded check valve in the main orifice prevents air from entering the main fuel chamber and flowing into the idle chamber. If air were permitted to flow in this manner, fuel would stop moving into the idle chamber and only air would flow, because the air is easier to move than the fuel.

PART THROTTLE

As the throttle plate is opened (Figure 1-5), it swings across the secondary orifice and crankcase suction begins to act on the orifice. The orifice changes from an air bleed to a fuel discharge orifice. Air continues to enter the idle fuel chamber through the regular air bleed. As the speed of the air moving through the air passage and venturi increases, the spring pressure on the check valve is overcome and fuel begins to flow from the main orifice. As the air speed increases and the pressure drops in the venturi, more and more fuel comes from the main orifice.

During deceleration this process is reversed. The speed of the air in the venturi slows and pressure begins to rise toward normal. The flow of fuel from the main orifice slows and finally spring pressure closes the check valve cutting off the flow of fuel and preventing any air from passing through the main fuel chamber. As the throttle plate swings across the secondary orifice, the secondary orifice ceases to act as a fuel discharge and becomes an air bleed. Finally, with the throttle plate closed, only fuel mixed with air comes from the idle orifice and the engine idles.

HIGH SPEED

Action of this carburetor at high speed is different from the action of most other carburetors. In this carburetor, fuel for the idle chamber is drawn from the main fuel chamber. As a result during high speed operation when fuel is drawn off rapidly from the main chamber through the main orifice, fuel in the idle chamber is drawn back into the main chamber (Figure 1-6). The air bleed, secondary and idle orifices act as air bleed orifices but the "air" which they bleed back into the main chamber is the air/fuel mixture moving through the air passage.

CARBURETOR ADJUSTMENT

PRELIMINARY

1. Carefully turn the idle and high speed adjustment needles (Figure 1-7) clockwise until resistance is felt. Do not turn the needles in further or you will damage the tips of the needles and/or the seats. Open (turn counterclockwise) each needle 3/4 of a turn.

2. Turn the idle speed screw counterclockwise until the throttle rod and crank (or lever) as seen through the oblong inspection hole just to the right of the idle speed screw, stop moving forward. Now turn the idle speed screw clockwise just until the crank and rod begin to move rearward.

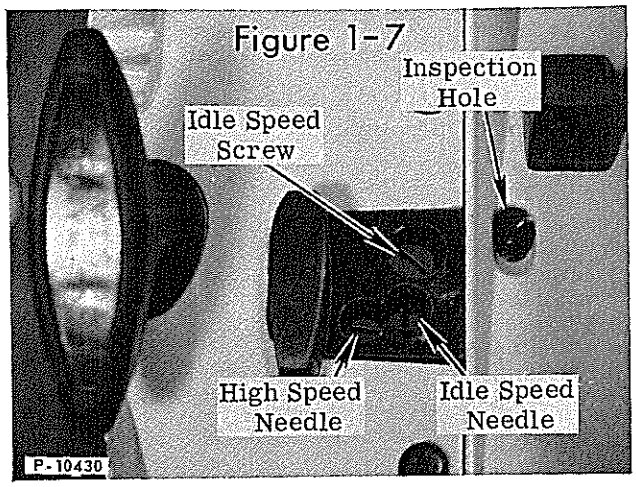

Figure 1-7

FINAL ADJUSTMENT

1. Start the engine and let it warm up for at least three minutes. Do not race the engine. If the engine keeps stopping, turn the idle speed screw clockwise until the motor keeps running. If the chain or sprocket moves, turn the screw counterclockwise until the chain or sprocket stops.

2. With the engine front end (bar nose end) pointing down, turn the idle adjustment needle until the engine idles smoothly and accelerates without hesitation or stumbling. Final position of the idle adjustment needle will usually be between 1/2 and 3/4 of a turn open. Turn the engine to see that it idles smoothly in all positions.

3. Readjust the idle speed screw to a point just below where the chain starts to move or the sprocket starts to turn.

4. While cutting wood with the saw, adjust the high speed adjustment needle for best power. Do not judge by the sound; judge by the way the saw cuts. Final position for high speed adjustment needle should be 1/2 to 3/4 of a turn open but closer to 1/2 than 3/4 of a turn.

5. Check idle operation again. It may be necessary to readjust the idle adjustment needle to obtain best idle performance after setting the high speed needle.

TIMING

A timing check can be made with a Merc-O-Tronic tester or with a simple timing light. If adjustment is necessary, remove the flywheel to obtain access to the breaker points. For removal of the flywheel, place a socket wrench on the flywheel nut, lock the crankshaft with a screwdriver between a flywheel boss and the socket wrench on the nut. Be careful that the screwdriver does not bear on one of the flywheel fins either when removing or tightening the nut after replacement.

USING THE MERC-O-TRONIC

1. Turn the selector switch on the tester to the number 3 position. Short the small red and black leads together and adjust the meter set knob for scale 2 and 3 until the meter pointer lines up with the SET line on the number 3 scale (Figure 1-8).

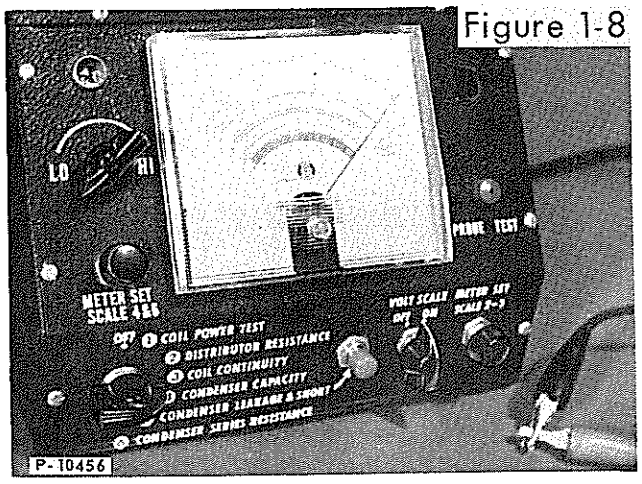

Figure 1-8

2. Use whichever of the two following is easiest for you.

   a. Make sure the lower attaching screw of the two screws holding the lamination is securely tightened. Disconnect the coil ground wire from the upper lamination attaching screw and connect the small red lead to the ground wire. Connect the small black lead to any good ground on the engine (Figure 1-9). If the lamination slips, it will be necessary to adjust the lamination gap to 0.010 inch at the conclusion of the test.

   b. Disconnect the primary wire from the coil and connect it to the small red lead. Connect the small black lead to ground on the engine (Figure 1-10). Be sure to reseal the primary wire connection at the coil on those engines without plastic insulators after concluding the timing check.

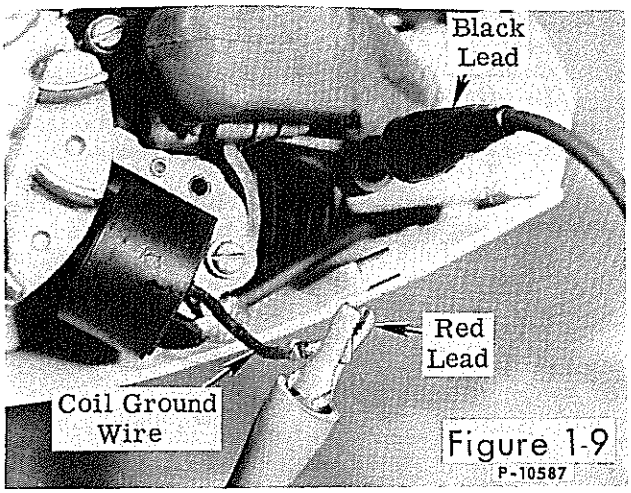

Figure 1-9

3. Turn the flywheel counterclockwise until the meter pointer indicates the points are opening by moving to the left side of the scale. The timing mark on the flywheel should line up with the leading edge of the outer leg of the lamination. This is the correct position for the timing - 26° BTDC.

4. Turning the flywheel approximately 1/32 inch either way should result in a full scale deflection of the meter pointer. If it does not do this, the breaker points must be adjusted.

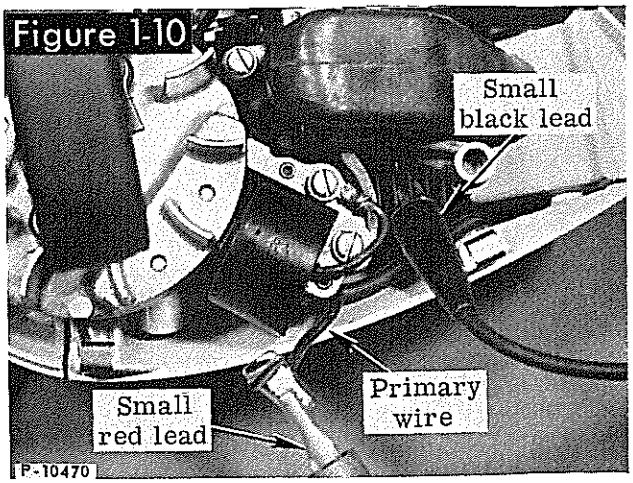

Figure 1-10

USING A TIMING LIGHT

1. Attach the timing light to the engine in either one of the following methods.

   a. Make sure the lower attaching screw of the two screws holding the lamination is securely tightened. Disconnect the coil ground wire from the upper lamination attaching screw and connect one lead of the timing light to the coil ground wire. Connect the other lead to a good ground on the engine. If the lamination slips, it will be necessary to adjust the lamination gap to 0.010 inch at the conclusion of the test.

b. Detach the primary wire from the coil and connect it to one of the leads of the timing light. Connect the other lead to ground on the engine. Be sure to reseal the primary wire connection at the coil on those engines without plastic insulators after concluding the timing check.

2. Turn the flywheel counterclockwise until the timing light goes out indicating that the breaker points have opened. The timing mark on the flywheel should line up with the leading edge of the outer leg of the lamination. This is the correct position for the timing - 26° BTDC.

HOW MUCH TO ADJUST THE BREAKER POINT GAP

Approximately 1/16 inch on the perimeter of the flywheel is equal to 1° of timing, which in turn is equal to approximately 0.001 inch in point gap. Using this guide, if the points open when the timing mark on the flywheel is 1/8 inch past the lamination reference point, the timing is retarded 2° and the point gap should be opened 0.002 inch. If the breaker points open 1/8 inch before the flywheel mark reaches the reference point, timing is advanced 2° and the breaker points must be closed 0.002 inch.