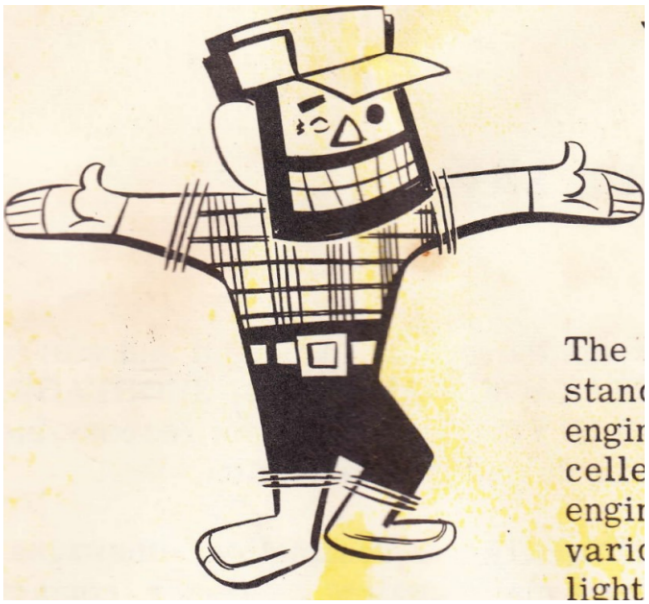
McCulloch Le Sabre

Direct Drive Chain Saw

Operating Instructions



McCulloch Motors Corporation - 1956

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SERVICE ORGANIZATION

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BY McCULLOCH MOTORS CORPORATION To provide prompt and efficient service on McCulloch Motors products,

authorized dealers and distributors are located throughout the United States and Canada. Each authorized dealer and distributor carries

stock of parts for McCulloch products. Each is equipped with tools for servicing; and all mechanics are factory-trained, assuring expert repair service.

The company maintains constant contact with dealers and distributors

through trained representatives, who keep the dealers and distributors fully informed as to the latest design advances and techniques.

McCulloch Motors Warranty

Be sure to fill in and mail the warranty card which accompanied the product at time Of purchase. Unless the warranty card is returned to the factory, the warranty is not effective.

For thirty days from purchase date, McCulloch Motors Corporation will replace for the original

purchaser, free-of-charge, any part or parts found upon examination at any factory-authorized distributor or at our factory at Los Angeles, California to be defective under normal use and service, because of defects in material or workmanship.

All transportation charges on a part or parts submitted for replacement under this warranty must be paid for by the purchaser.

No service charges, labor, or other expenses will be allowed unless they have been previously approved and authorized by the factory. This warranty shall not apply to any part or parts which have been subjected to misuse, negligence, or accident; nor if it has been repaired or altered outside of our factory or authorized dealers or distributors.

WARRANTY INSTRUCTIONS

part or parts covered under this warranty should be returned to the

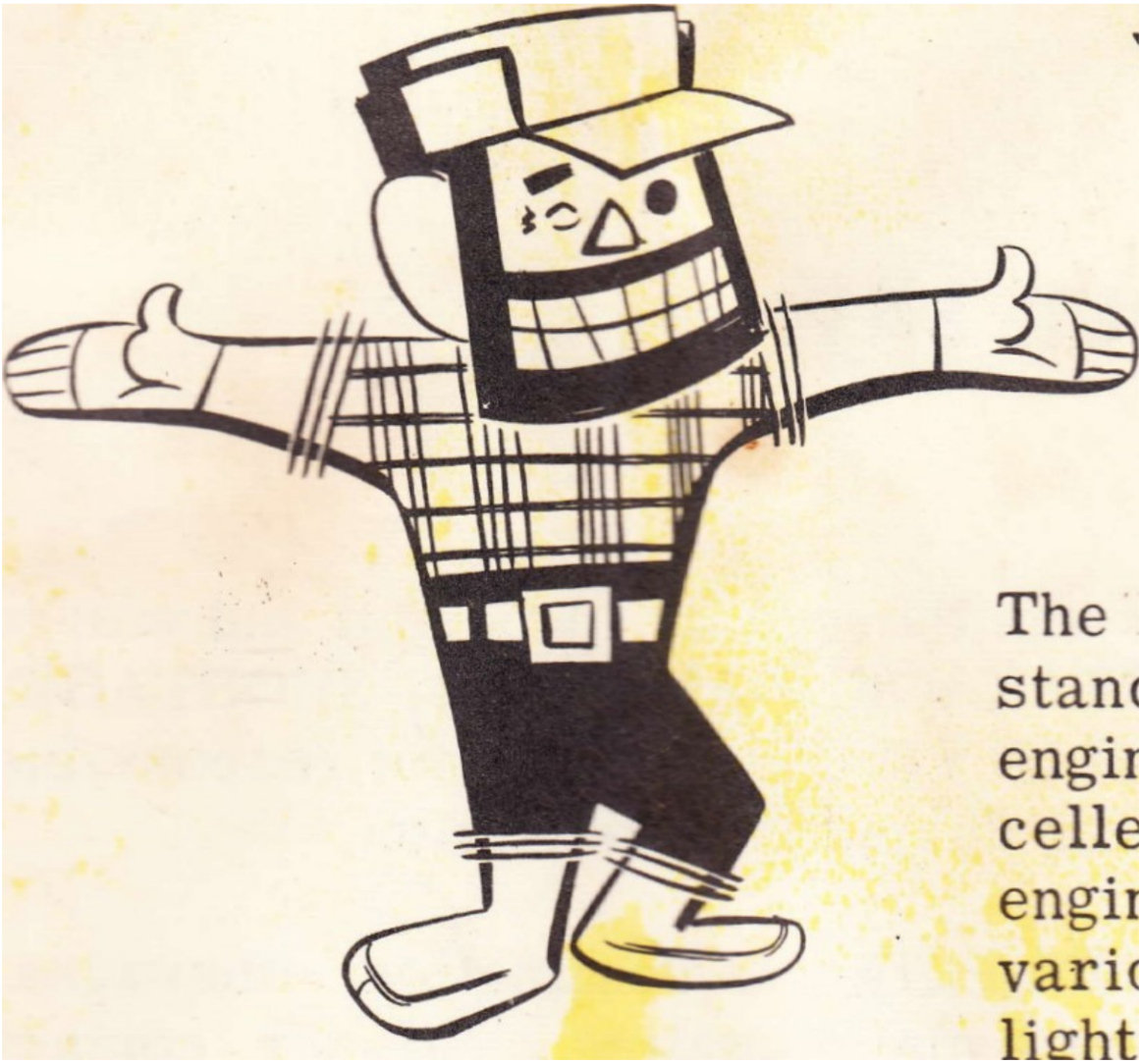
authorized dealer or to the authorized distributor. (See distributor list on back cover page of Manual). No parts are to be returned to the factory without written approval which can be obtained by writing letter, giving the description and number of the part, the nature of the defect or failure, engine serial number, and the name and address of the purchaser. This is to be addressed to the Service Manager, McCulloch Motors Corporation, 6101 W. Century Boulevard, Los Angeles 45, California.

YOUR MCCULLOCH DIRECT DRIVE

CHAIN SAW

MODEL LE SABRE

The McCulloch name on your chain saw signifies the highest standard of quality available. It means that your saw was engineered and assembled by a firm which for years has excelled in the manufacture of light-weight two-cycle gasoline engines. Thousands of McCulloch engines are now powering various types of equipment which demand dependability and lightest possible weight.



Your Model Le Sabre chain saw has been designed and built for smooth, trouble-free operation. Rugged, powerful, it will serve you faithfully for a long time, providing you operate it correctly and observe a few rules for proper maintenance. This instruction manual will assist you in getting acquainted with your saw. Read it carefully and keep it at hand for reference.

Before you start using your new saw you will want to know, in gen eral, how it is constructed. The following paragraphs will explain the various major units and their functions.

ENGINE

Your Model Le Sabre chain saw is powered with a one-cylinder, air-cooled, two cycle engine. Light-weight die castings of magnesium or aluminum are used to give it added strength. Precision bearings support the moving parts, insuring long wear and smooth operation. Ignition current is provided by a magnetized flywheel, special waterproof

McCulloch coil, condenser and breaker assemblies. The efficient diaphragm type carburetor makes it possible to operate the saw in any position.

STARTER

The starter automatically rewinds after the starter handle has been pulled and released. To prevent corrosion and insure smooth action, the starter rope is made of high strength nylon.

CLUTCH

The clutch is automatically operated by centrifugal force and does not require manual engagement. At idle engine speed the clutch shoes are retracted and the cutting chain is not driven. When the throttle is opened and

engine speed increases, centrifugal force causes the clutch shoes to move outward and tightly engage the clutch drum, which drives the sprocket and rotates the chain. CHAIN OILER

The chain oiler, manually operated by thumb pressure, supplies oil under positive pres- sure to the blade and chain.

UPON RECEIVING YOUR SAW

UNPACK THE LJNIT CAREFULLY. Your McCulloch saw was thoroughly inspected and was in perfect condition when packed. If you should find any BREAKAGE, DAMAGE, or SHORTAGE, due to mishandling in transit, please, DO NOT RETURN IT TO US. We are not responsible for ANY BREAKAGE, SHORTAGE, or DAMAGE occurring during transportation.

Please hold equipment in original cartons, available for inspection at destination; otherwise, your claim for damages cannot be successful. When filing a claim against a carrier, contact the dealer from whom you purchased the saw and he will assist you in filing a shipment damage claim.

No deductions can be made from remittances for BREAKAGE, DAMAGE or SHORTAGE, occurring during transportation. For checking, you should receive all items listed below.

EACH MODEL LE SABRE SAW INCLUDES THE FOLLOWING ITEMS:

Complete saw assembly.

Blade, chain, and sprocket.

An envelope of spare parts for chain.

A chain file.

A set of feeler gages for checking spark plug gap, and coil-to-flywheel clearance.

A spark plug wrench.

Combination wrench and screwdriver.

An instruction manual, including parts catalog.

A timing pin for breaker point adjustment.

INSTALLING BLADE AND CHAIN

With the exception of attaching blade, chain,

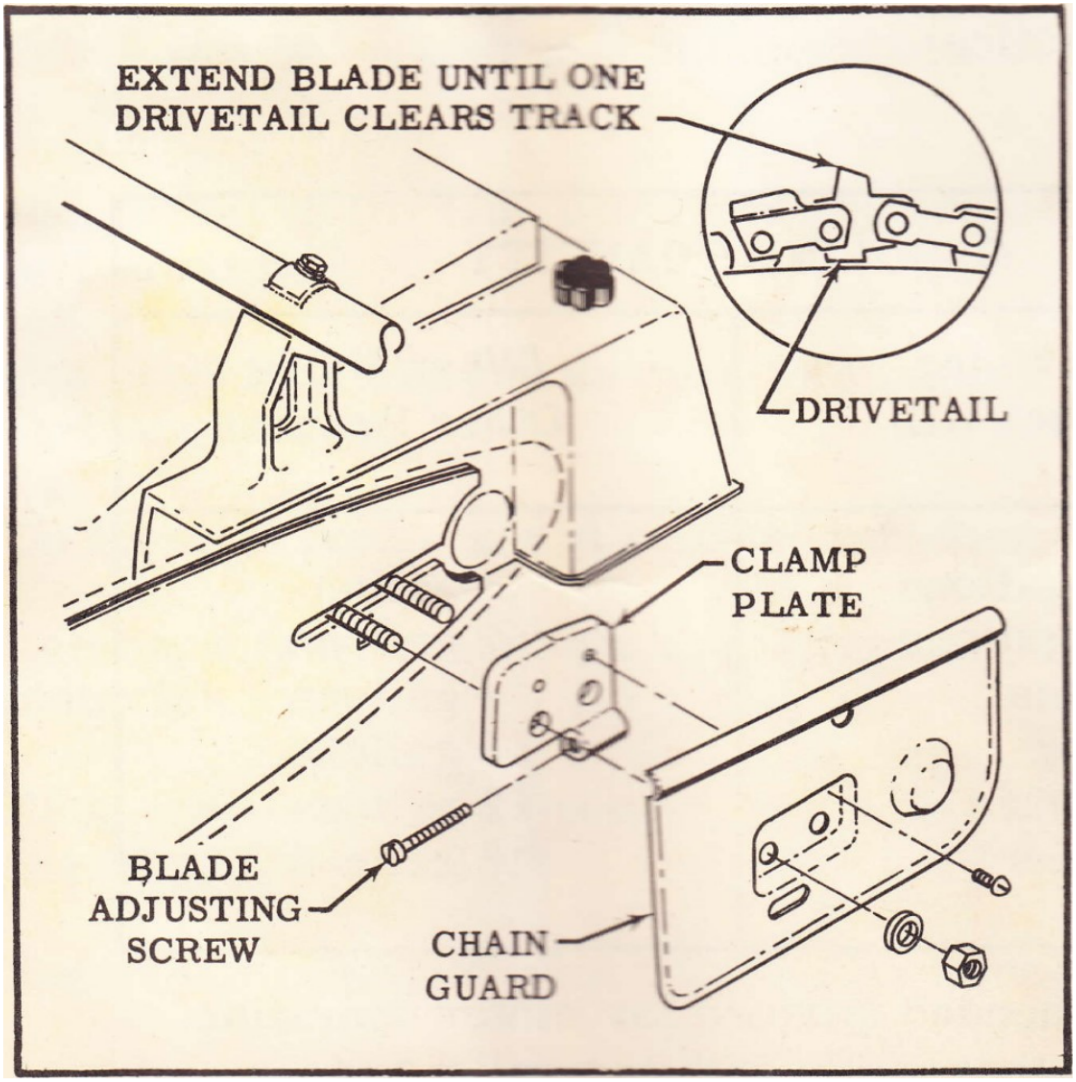
and drive sprocket. you will find your Le Sabre chain saw completely assembled and ready for use. The blade is held securely to the saw by a lockplate and two hex nuts. A blade adjusting screw, keyed into a recess in the saw blade, serves as a positive lock once the initial adjustment of blade and chain has been made.

As a new chain will stretch (lengthen) noticeably during the first several hours of cutting and then will stretch gradually over a period of cutting time, the lockplate and blade adjusting screw permit ready adjustment. To tighten the chain, merely loosen the lockplate retaining hex nuts and turn the adjusting screw counterclockwise until the correct chain tension has been reached. (See illustration.)

To install the sprocket, blade, and chain:

1. N,Then you receive your Le Sabre chain saw you will find the sprocket shrouds and retaining nut loosely assembled to the sprocket shaft, and the Woodruff key taped in position.

To assemble, remove retaining nut, outer sprocket shroud and unwrap tape from around shaft and key. Place sprocket on shaft and carefully align the sprocket keyway with the Woodruff key in the sprocket shaft. Use a



Attaching Blade and Chain

Attaching Blade and Chain

light hammer to tap the sprocket into position on the shaft.

CAUTION

Sharp, heavy blows on either the sprocket or sprocket shaft can cause serious damage to the assembly.

After the sprocket is seated, install the outer sprocket shroud and tighten the retaining nut securely.

Place the slotted end of the blade over the studs and push the blade backward until the end of the slot contacts the forward stud. Turn the blade adjusting screw in (clockwise) until edge of screw head fits into recess in blade.

To clamp the blade in place, install the chain guard and clamp plate assembly over the two studs in bearing housing. Install the original self-locking nuts and flat washers (2 each). Do not tighten nuts, but allow enough looseness between clamp plate and blade so that blade may be moved by turning adjusting screw.

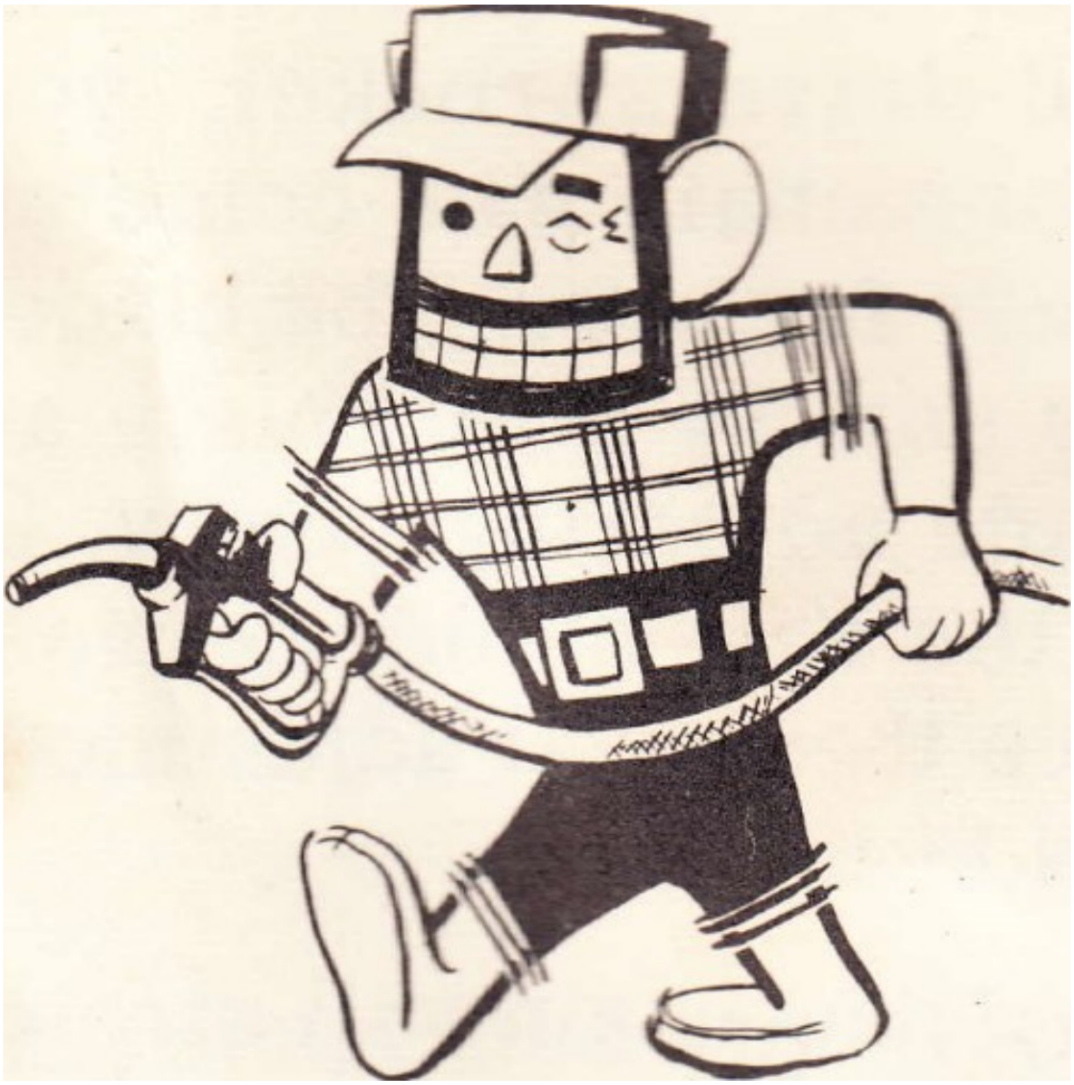
Fit the chain into the groove along the TOP of the blade, making sure the cutting edges of the teeth face the free end of the blade. Draw the chain around the curved end of the blade, fitting it into the lower groove and over the sprocket. Connect the chain by installing the master connecting pin.

Although the chain may appear tight on the blade, it should be adjusted for correct ten- sion. To do this, turn the adjusting screw counterclockwise to move the blade out. Lift the chain at the center of the blade and continue to adjust until one drivetail just clears the track. At this point the self-locking nuts which retain the lockplate and guard assembly should be securely tightened.

CAUTION

Do not adjust chain too tightly. If the chain is too tight on the blade, drag friction will cause loss of power and overheating that will damage both the blade and chain.

FUEL AND LUBRICATION



ENGINE

The internal moving parts of the engine are lubricated by oil which is mixed with the fuel. Either leaded or unleaded gasoline of good quality, with a minimum octane rating of 70, may be used but the unleaded type is recommended when available. Mix the gasoline and oil in accordance with the Fuel Mixture Table shown below. Be sure to measure the proportion of oil to gasoline accurately. Insufficient oil in the fuel mixture will cause overheating and scoring; excessive oil will foul spark plugs and build excessive carbon. Use a large, clean container and mix thoroughly by shaking or stirring with a clean paddle. Cleanliness of all implements used in mixing is essential. We recommend using an underwriter's approved fireproof container with a strainer in the flexible spout. This helps to filter out any dirt or foreign matter when filling the engine fuel tank. Best results will be obtained with the specially-compounded McCulloch Oil. If McCulloch Oil is not available, use any good grade, non-detergent SAE 30 oil.

IMPORTANT

NEVER run the engine without the proper fuel mixture. Always make certain fuel and oil are mixed well before filling fuel tank.

FUEL MIXTURE TABLE

(Oil to Gasoline)

Oil quantity	Gasoline - McCulloch Oil	Gasoline - Other Brands
1/2 pint	1-1/4 gallons	1 gallon
1 pint	2-1/2 gallons	2 gallons
1 quart	5 gallons	4 gallons
2 quarts	10 gallons	8 gallons
3 quarts	15 gallons	12 gallons
4 quarts	20 gallons	16 gallons

Note: Do not alter the above recommended mixture for winter operation. 12 oz. can - special McCulloch; Mix thoroughly with two gallons of gasoline.

CHAIN OILER

A manually operated chain oiler pump, actuated by pushing the push button at the left of the handle grip, provides for lubrication of the chain and blade.

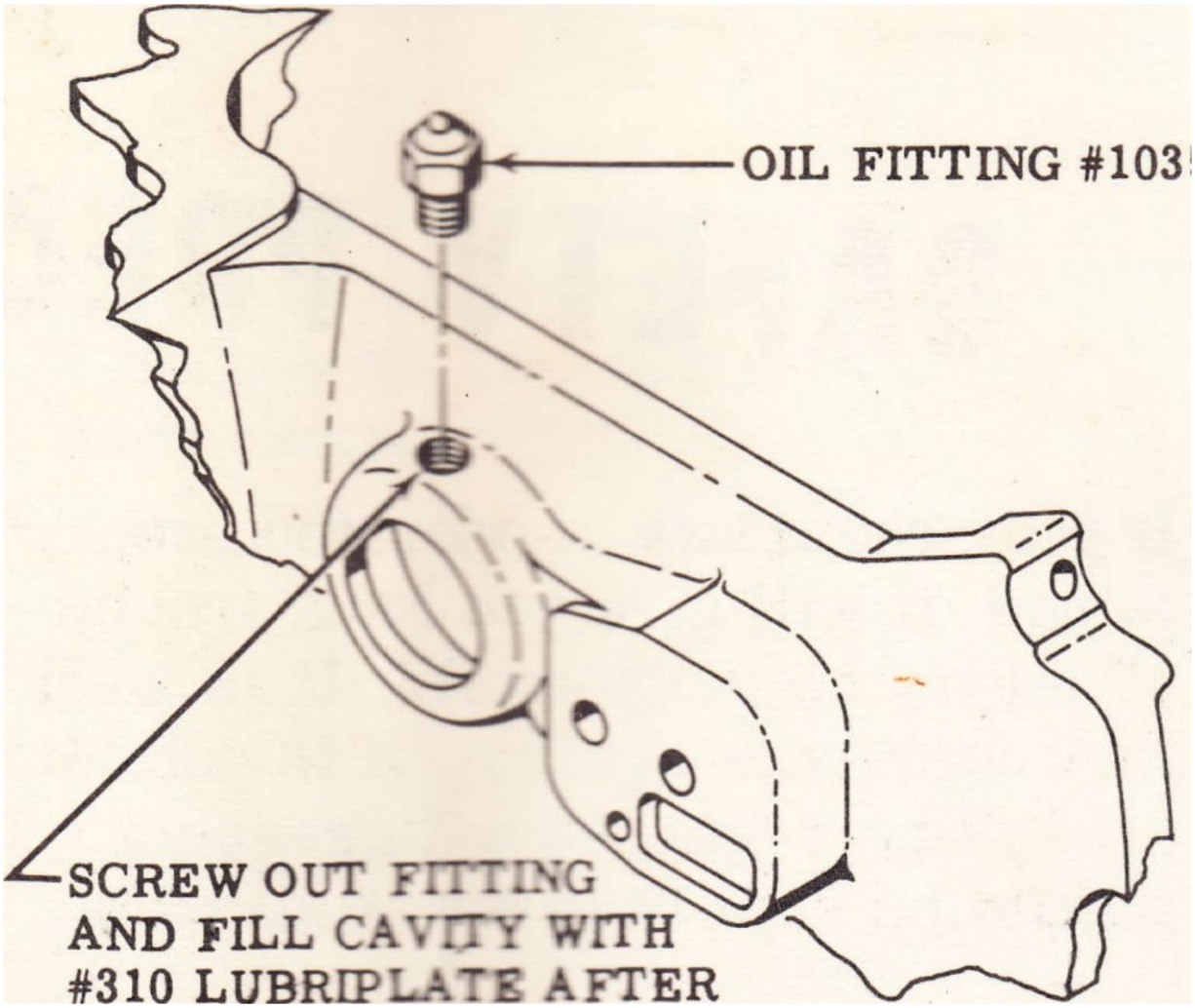
To fill the chain oil reservoir, remove the oil filler cap. Use only clean oil in the tank to prevent possibility of plugging the oiler system. It is recommended that the following weight of oils be used at the temperature specified. Above 400 F use SAE 30 weight oil. Below 400 F use SAE 10 weight oil. If cutting conditions require, such as in heavy pitch wood, further thinning may be necessary. Under such conditions we recommend a mixture of 50% oil and kerosene.

NOTE

Thinning the oil with a greater quantity of kerosene than specified is not recommended.

SPROCKET BEARING

For lubrication of the sprocket bearing, an



Sprocket bearing lubrication

Sprocket bearing lubrication

oil fitting has been provided in the bottom of the bearing housing. The fitting should be removed after every 50 hours of cutting time and the cavity filled with Lubriplate #310. Emergency lubrication in the field can be accomplished by inserting tip of oil can into fitting, thereby depressing check ball, and filling cavity with clean SAE 30 engine oil.

FIRE PRECAUTIONS

Refuel saw on an area of uninflammable ma-	Keep a filled fire extinguisher with power saw
terial.	at all times.
Use funnel to fill tank and avoid spilling of	Clear inflammable material from area where
fuel mixture.	saw cut is to be made.
Use proper oil and gas mixture to minimize carbon deposits. Do not start power saw at place of refueling. Keep saw free of sawdust and inflammable	Do not smoke in restricted areas. Extinguish and break all burned matches. Extinguish and shred all used cigarettes.
material. Keep muffler in good condition and on saw	Put out any fires started and report them to the foreman, together with causes.
engine at all times.	All fires reported to the foreman should be filed as a record with the state protection
Keep spark plug and wire connections tight.	agency.

BE ALERT AND FIRE-CONSCIOUS. KEEP THE FOREST GROWING

SAFETY PRECAUTIONS

If your chain saw is operated properly and is efficiently maintained, it will give you long, trouble-free service with no risk of injury to personnel. It is well to remember, however, that chain saw equipment is potentially dangerous and should always be regarded with respect. The following precautions should be kept in mind at all times.

Never touch or try to stop a moving chain with your hand.

Keep your chain sharp and in good condition. A dull or improperly filed chain will cause the saw to buck and jump. This

can result in personel injury.

The operator should start the engine without assistance. A moving chain can inflict serious injury.

Stop the engine before carrying the saw between cuts. This will eliminate the possibility of a branch or twig opening the throttle and causing the chain to revolve.

Be sure of your footing when operating the saw.

Select a safe exit path prior to felling the tree.

Plan your work before starting a cut.

Use wedges to help control felling and prevent binding.

Beware of falling branches.

LOCATION OF CONTROLS

All operating controls are conveniently located. The placement of controls is a result of careful engineering, practical experience and suggestions from the thousands of men who use our saws. Acquaint yourself with the operation of each control.

1-ÐGH SPEED MWIURE CONTROL: Control lever located at front of carburetor. Move lever to LEFT to lean out fuel mixture; move lever to RIGHT to enrich fuel mixture.

PRIMER: Positive injection type actuated by push button at right-hand front of carburetor. (See inset.)

IGNITION SWITCH: Toggle-type switch located just in front of starter in fan housing. Push switch forward to stop engine; push to rear before starting engine.

STARTER: Mounted on right-hand side of engine. Handle must be pulled STRAIGHT up during starting procedures.

THROTTLE: Trigger type, conveniently located in pistol grip.

CHAIN OILER: Positive displacement type pump actuated by push button at left of handle grip.

OPERATING INSTRUCTIONS

The cutting operation when using a direct drive chain saw differs from the cutting operation of a geared-type chain saw. First, due to the higher chain speed, it is unnecessary to apply extreme pressure when the saw is cutting. To do so will not speed up the cutting and will possibly serve only to stall the chain in the cut. For the same reason of higher chain speed, the saw engine assembly is not equipped with a bucking spike as such device will hinder more than help during cutting operations. With a direct drive saw there is less possibility of "kick-back", but the operator must always exercise caution to avoid personal injury.

It is recommended that the operator make several practice cuts with the direct drive chain saw, to become familiar with both controls and operational peculiarities, before attempting more critical



IDLE SPEED CONTROL: Slot-head screw located in left-hand face of carburetor. Adjustment made through hole in chain guard. type cutting.

BEFORE STARTING

Fill fuel tank with correct gasoline and oil mixture. (See page 4.)

Be sure the chain oil sump has been filled with the proper lubricant.

Check the chain tension and make sure the blade is tightly clamped in place.

TO START ENGINE

Press the primer button down two or three times to supply a quantity of fuel mixture to the engine for initial starting.

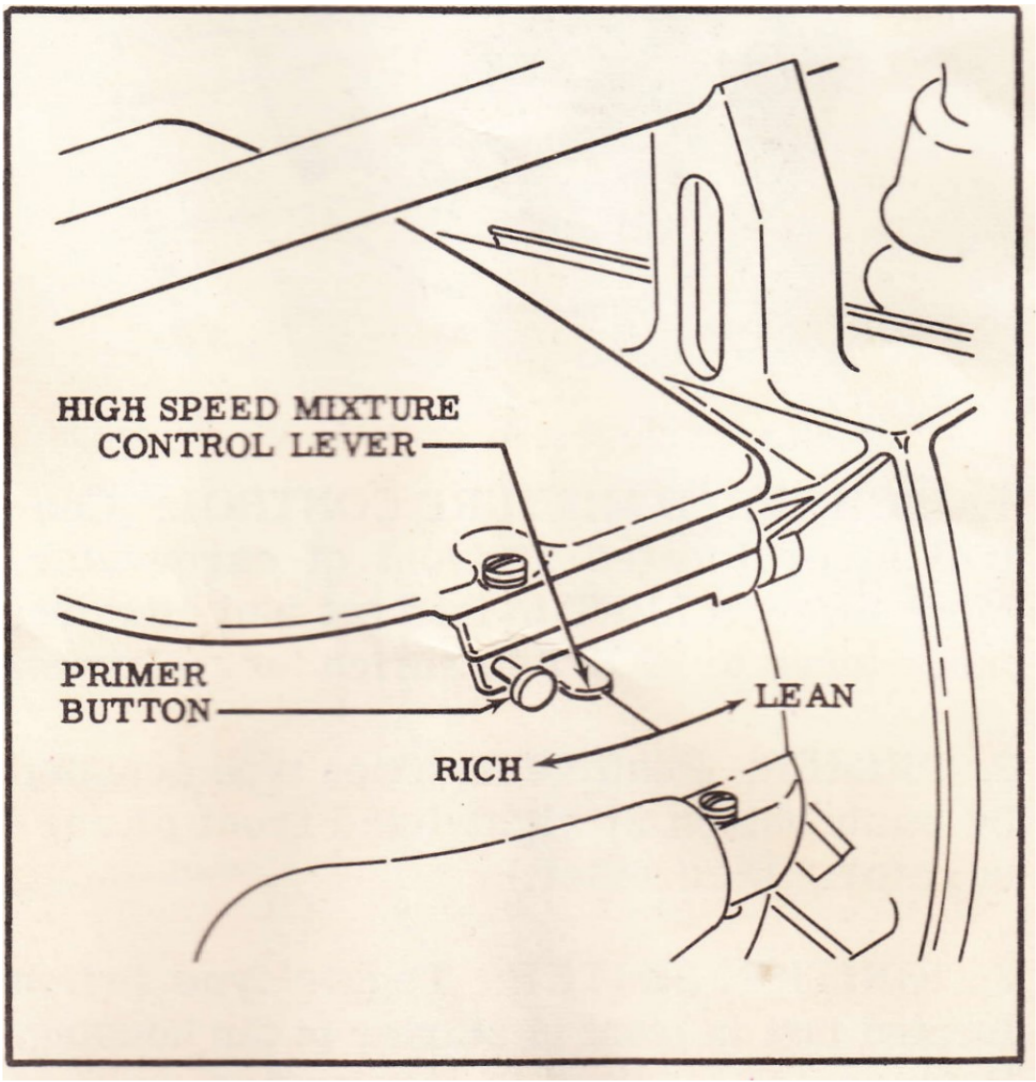
Move ignition switch to the down or "ON" position.

Pull back on the throttle trigger, opening the throttle. Pull the starter rope sharply to start the engine. The engine should start on the first few pulls. If not, repeat the priming operation and crank again. Do not overprime or the engine will flood, making it very hard to start.

After engine starts, press the chain oiler button several times to pump oil to the chain groove of the saw blade. This will oil the chain sufficiently for the start of the cut. During the cutting operation the chain oiler

should be pumped often enough to insure adequate chain and blade lubrication.

Allow engine to warm up. If the engine runs rough or lacks power, the fuel mixture is probably too rich. In such case adjust the high speed mixture control at the top of the carburetor. Push the lever forward to lean out mixture.



High Speed Adjustment

High Speed Adjustment

CAUTION

Do not operate the engine with the fuel mixture "leaned out" too far. If the engine is operated ' 'too lean" you will not get full power output and the service life of the engine will be reduced.

i,Then "breaking in" a new engine it is well to run the engine with a fairly rich mixture for the first ten hours of engine operation. This will insure ample lubrication of the internal moving parts of the engine.

When the high speed mixture control is in the normal (center) position the engine should accelerate from idle to high speed without hesitation. Should there be a "flat spot" during acceleration, it may be necessary to adjust the needle seat assembly, which is located at the bottom cf the carburetor body.

The assembly, held in adjustment by a set screw and tongue washer, has an adj ustment factor of one turn only. To adj ust, loosen, but do not remove set screw. Turn the needle seat assembly clockwise in 1/8 turn steps until the engine will accelerate without hesitation. When this adj ustment is reached, secure the assembly by tightening the set screw.

CAUTION

Do NOT remove the needle assembly from the carburetor housing. If correct adjustment cannot be obtained within the one turn limit of the needle seat assembly, take the saw to your McCulloch dealer and have him check for correct initial adjustment.

With fuel mixture properly adj usted, check idling speed. Adj ust, if necessary, by turning the idle speed control screw which is located in the left-hand face of carburetor. Access to screw is through hole located top-center of chain guard and clamp plate assembly. The adjustment screw controls the position of the throttle gate when the engine is idling.

The idle speed control screw should be adjusted until the engine idles at a rate of speed that does not cause engagement of the automatic clutch (cutting chain does not turn).

High speed engine adjustment must be made when the engine is warm and the saw is actually cutting at full throttle. Adjust the high speed mixture control lever to obtain maximum high speed engine output. The control lever, which can be adj usted during cutting, incorporates a cam action to either reduce or extend throttle trigger travel.

STARTING A FLOODED ENGINE

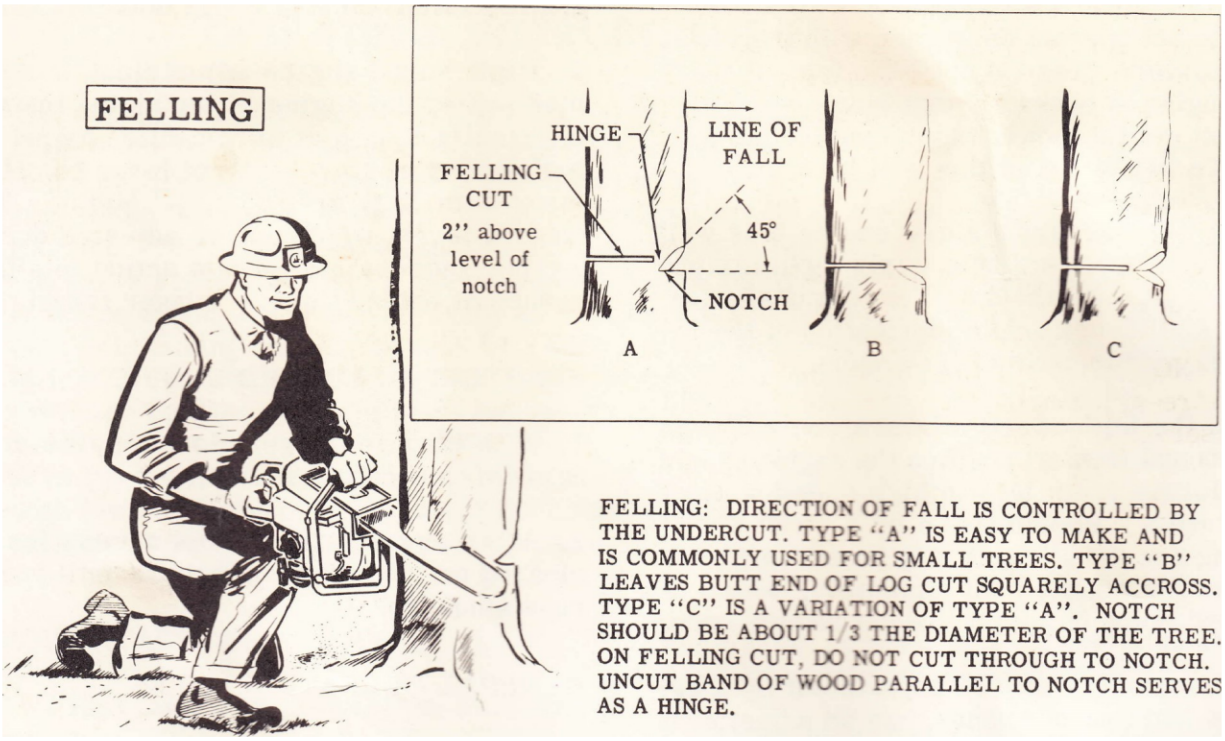
1. With throttle trigger closed, pull starter briskly until engine starts.
2. After engine starts, and excess fuel is cleared out, slowly open throttle until engine runs smoothly.

GENERAL OPERATION NOTES

FELLING. Small to medium sized timber can be felled with the Le Sabre chain saw. To prevent excessive breakage of timber, it is important to make a good beginning if the timber to be felled is closely spaced. Note predominating lean of the trees in your planning. Select a "lead" (direction most trees will lay when felled), considering such things as saving timber from breakage, bucking and other trees to felled.

If brush exists around the tree, clear a working space for safety. Make the undercut. Several types may be used as shown in the accompanying illustration. Be sure to clean all wood out of the notch so the tree will fall true. Make the felling cut horizontally, as shown, moving the saw blade in an arc. On a small tree the felling can be completed from the same side where you began. On a larger tree you should saw from each side. You will then know how much wood is remaining to be cut from each side.

Be sure to figure out a path of retreat before the felling cut is started. Be alert all the time you are cutting. If the falling tree rubs against another, watch for limbs that might be thrown back.


FELLING
HINGE
LINE OF FALL
FELLING CUT
2'' above level of notch
45°
NOTCH
A
B
C
FELLING: DIRECTION OF FALL IS CONTROLLED BY THE UNDERCUT. TYPE "A" IS EASY TO MAKE AND IS COMMONLY USED FOR SMALL TREES. TYPE "B" LEAVES BUTT END OF LOG CUT SQUARELY ACCROSS. TYPE "C" IS A VARIATION OF TYPE "A". NOTCH SHOULD BE ABOUT 1/3 THE DIAMETER OF THE TREE. ON FELLING CUT, DO NOT CUT THROUGH TO NOTCH. UNCUT BAND OF WOOD PARALLEL TO NOTCH SERVES AS A HINGE.

Felling



Pruning



Bucking

BUCKING. When bucking, normal safety precautions should be observed to prevent accidents. If possible, the log should be supported off the ground and the cut made in such manner to prevent binding of the chain and blade in the cut. The use of wooden wedges driven into the cut will often aid in preventing binding. Extreme care should be taken that the cutting chain does not dig into the ground while sawing, as this will cause rapid dulling of the cutter teeth.

LIMBING. When limbing either standing or fallen trees, normal safety precautions should be observed to prevent accidents. If the fallen tree lies on steep or sloping ground, cut off the limbs which are off the ground before

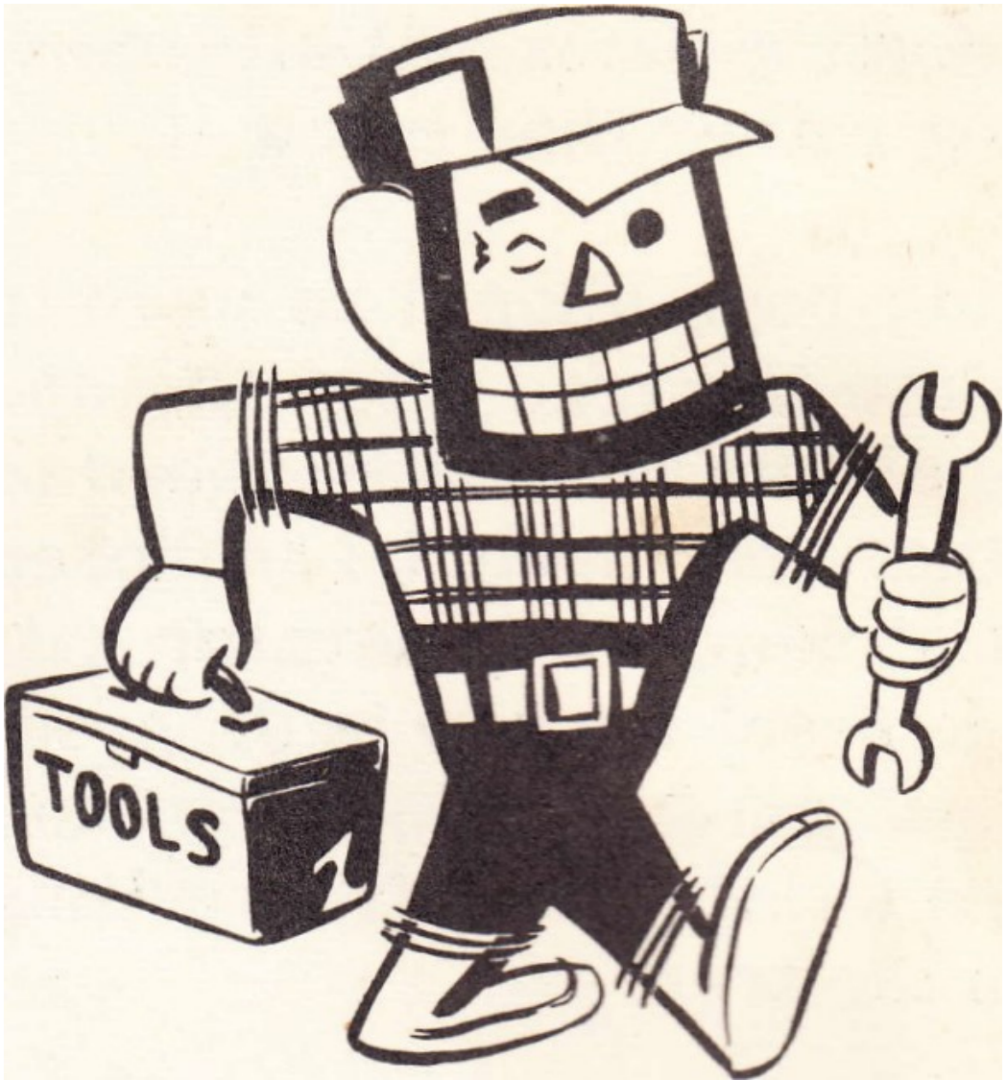
cutting off the supporting limbs. At all times, stand above the log rather than below it.

PRUNING. A sling rope should be used to haul the saw up into the tree after the operator. The rope should remain fastened to the saw and the other end should be anchored BELOW the point at which the operator will be working. This, in event the saw is dropped, will prevent the saw from falling to the ground and also prevent the swinging rope from pulling the operator from the tree.

As a safety precaution, a sling rope should be fastened to large limbs before cutting so the man or crew on the ground can control their fall.

MAINTAINING YOUR SAW

Your McCulloch Cháin Saw is a precision tool manufactured to high mechanical standards and should be treated as such. Proper care and maintenance of it will insure good performance and a long, trouble free service life. Form the habit of checking over and maintaining your saw at recrular intervals. Any loose parts should be tightened and any worn or damaged parts should be replaced.



SPARK PLUG

A 14 mm. spark plug, specially designed for two-cycle engines, is used in the Le Sabre saw engine. The spark plug is accessible by lifting the spark plug cover at the front of the saw housing. A spark plug wrench is provided with the saw and should be used for easy removal of the spark plug.

The spark plug should be checked and cleaned periodically as a dirty or corroded spark plug will be a cause of hard starting and poor engine performance. The gap should be adjusted to .025 inch by bending the side electrode only. Do not attempt to bend the center electrode as it will crack the insulator.

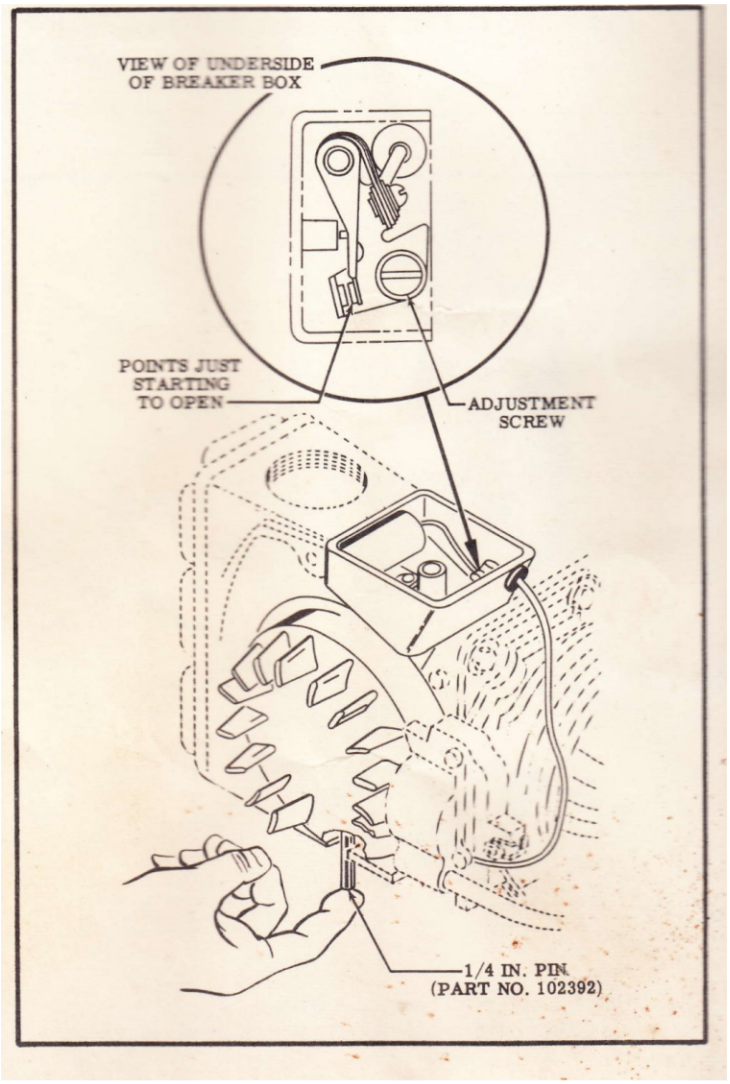
If the electrodes are burnt, replace the spark plug. Also, if too much oil is used in the fuel mixture (see Fuel Mixture Chart) it will cause fouling of the spark plug. A badly fouled spark plug will short out internally and must be replaced.

ADJUSTING BREAKER POINTS

Breaker points that are either badly pitted or oxidized, or do not have the proper gap setting will cause poor engine performance. Should the engine run erratically or fail to start, check for proper breaker point setting as follows:

Remove fuel cap. engine cover by removing two retaining screws, and then replace fuel cap. Remove cover and gasket from the breaker point box which is located just above fuel cap.

Insert the 1/4-inch diameter timing pin, furnished with the saw, into the slotted hole located in the side of the crankcase, directly opposite the breaker point box. Push STRAIGHT in on the pin until it presses lightly against the rim of the flywheel. (See illustration.)



Breaker Point Adjustment

Breaker Point Adjustment

Slowly rotate the flywheel by pulling out on the starter rope until the pin-pushes into the timing hole drilled into the flywheel.

CAUTION

Be sure to push the timing pin STRAIGHT in and not at an angle. There is a series of shallow holes drilled along the outer edge of the flywheel rim for balancing purposes and if the pin engages in one of these holes it will fit very loosely.

The timing hole is drilled to a depth of 1/2-inch and when the timing pin is engaged in this hole it will lock the engine against further rotation.

With the flywheel locked at the timing point, the breaker points should be set so they just begin to open. After setting, tighten the breaker point adj usting screw securely.

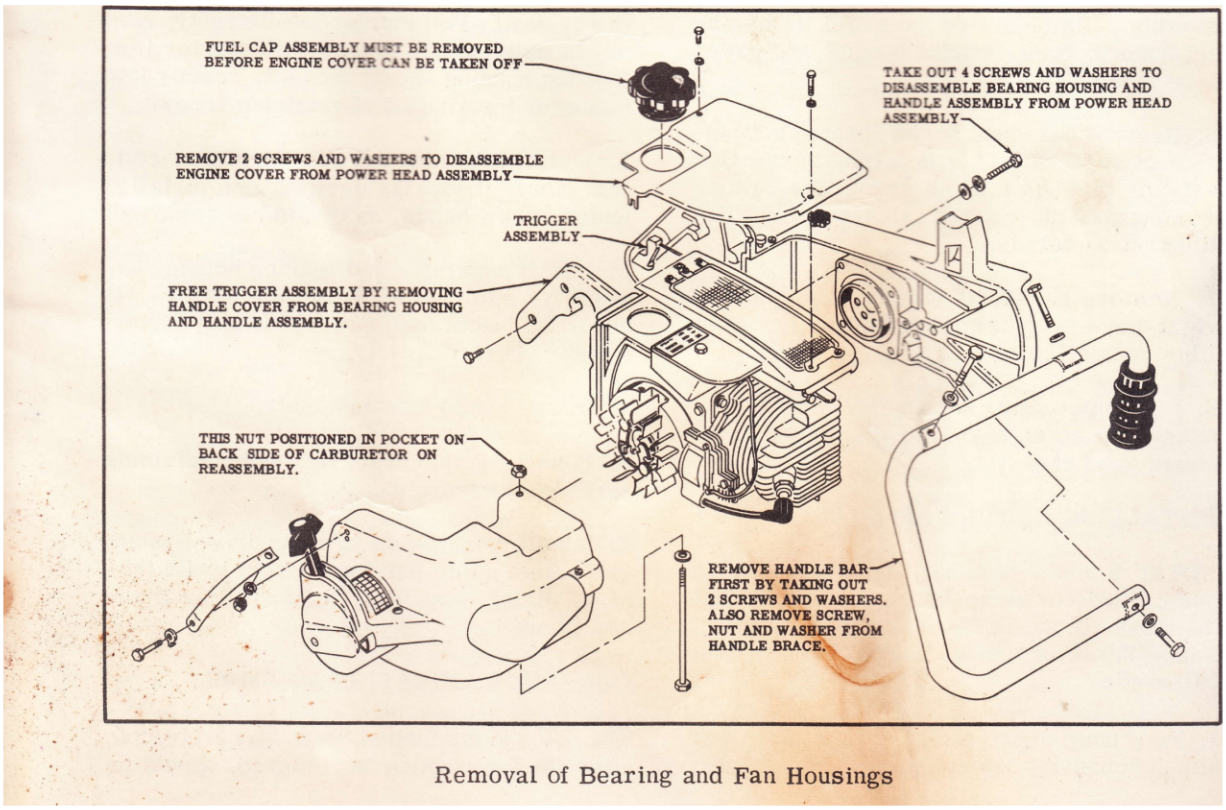
A strip of cellophane or thin paper placed between the points will aid in determining when the points just begin to open. Turn the eccentric screw until the points are completely closed and then insert the strip of cellophane between the points. Pull lightly on the cellophane and turn the eccentric screw until the cellophane can be pulled from between the points with a slight amount of drag. At this position the eccentric screw should be held firmly while the breaker point plate retaining nuts are securely tightened.

NOTE

Always replace badly pitted or oxidized points. In such cases always check the condenser, as a faulty condenser will cause excessive point pitting.

REMOVING HOUSING ASSEMBLIES

Both the bearing housing assembly and the fan housing assembly (which covers the cylinder, flywheel, and coil and lamination



Removal of Bearing and Fan Housings

assembly) must be removed to gain access to the engine power head. The fan housing assembly consists of two housing halves and the starter assembly. When removing this unit, be certain to follow the instructions as given to avoid separation of the two halves. Separation of the two halves will permit disengagement of the starter spring from its anchor point and will necessitate reassembly of the starter and spring.

Remove retaining screws (2) and remove engine cover.

Remove handle bar assembly.

Remove cover from handle (4 retaining screws).

4. Remove chain guard and clamp plate assembly, chain, guide bar, sprocket, and sprocket shrouds.
5. Remove retaining screws (4) and pull bearing housing away from power head assembly. Use caution to avoid damaging separator between bearing housing and power head assembly.

Remove hex-head screw located bottomside of engine. (This is a long screw that extends through lugs on crankcase casting and engages nut located in carburetor. See illustration details.)

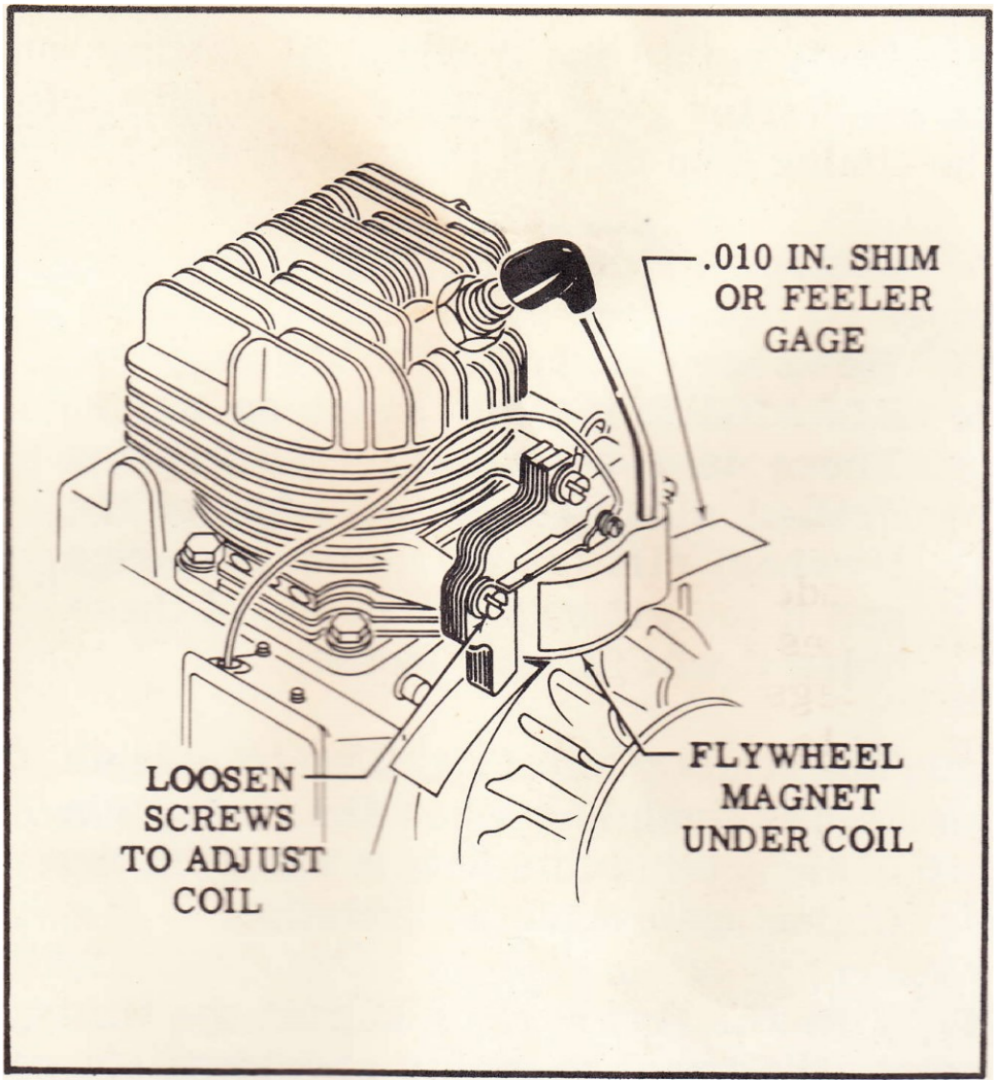
Remove hex-head screws (2) located at right-hand side of engine assembly. (See illustration.)

Lift engine assembly and pull fan housing assembly straight out to disengage from power head assembly.

INSTALLING HOUSING ASSEMBLIES

NOTE: If power head has been disassembled and carburetor removed, make certain that the attaching nut for the long, fan ousing retaining screw is in place before assembling carburetor.

Turn ignition switch to "ON" position and slide fan housing assembly into position over



Adjusting Coil and Lamination Assembly

Adjusting Coil and Lamination Assembly

power head. Pull starter handle gently until pawls on flywheel engage with starter jaw. The fan housing should then slip readily into place for installation of retaining screws.

Install retaining screws, making certain that correct locking devices are installed under screw heads, as originally removed.

Install separator and bearing housing assembly, and tighten retaining screws (4) securely. Install handle cover, making certain trigger operates freely.

Install handle bar assembly.

Install engine cover, tightening retaining screws (2) securely.

Install components of chain drive system and adj ust guide bar for correct chain tension. Refer to section on "Installing Blade and Chain".

COIL AND LAMINATION ASSEMBLY

The coil and lamination assembly, accessible after the fan housing is removed, should be adjusted to have a .010 inch clearance from the outer rim of the flywheel. Normally, this unit will not require any maintenance but if it is removed for any purpose or becomes loosened, readj ust as follows:

Loosen, but do not remove the three mounting screws.

Raise the coil assembly up from the flywheel and place a .010 inch feeler gage or shim under each leg. A strip approximately six inches long will lie between all three pole piece legs and the flywheel rim and will be easier to use and more accurate.

Holding the .010 shim in place, rotate the flywheel until the magnetized section is directly beneath the legs of the coil. The magnets will now hold the loosened coil and shim

firmly against the flywheel. Tighten the three mounting screws, starting with the right hand one; then the left hand one; and last, the center one.

Remove the shim stock and rotate the flywheel through a full revolution to check that there is a minimum of .008 inch clearance between the coil lamination legs and the flywheel rim.

CLEANING CYLINDER FINS

Clogged cylinder fins will cause the engine to overheat and will result in scoring of the piston and cylinder. For this reason the cylinder fins must be, kept free from sawdust, dirt or any material which would obstruct the cooling air circulated by the blower-type flywheel. To clean the cylinder fins:

1. Rem ove the frame assembly and fan housing. (Follow the steps listed on page 13, "Removing Housing Assemblies".)
2. Use compressed air, if available, for blowing out the dirt around the cylinder fins. If compressed air is not available, the dirt should be loosened with either a length of stiff wire or a wooden rod, shaped to fit between the fins, and then brushed out with a stiff, wire brush.

CAUTION

DO NOT use a screw driver to clean dirt from between the cylinder fins. To do so may result in broken fins which will cause overheating of the engine.

EXHAUST PORTS AND MUFFLER

Exhaust ports and/or muffler clogged with carbon will cause loss of engine power. This condition will be found in engines which have been used over a long period of time, or engines which have been run with a fuel mixture containing too much oil. (see Fuel Mixture Table, page 4.) To correct such condition.

Remove housing assemblies. (Refer to

"Removing Housing Assemblies", page 13.)

Remove muffler, using caution not to damage gasket.

Rotate crankshaft (by grasping flywheel and turning clockwise) until piston covers exhaust ports.

Dislodge and remove all carbon from ports, using a wooden scraper. Use caution not to scratch or damage piston or cylinder walls.

CAUTION

Never use a screwdriver or other metal object for cleaning the exhaust ports as there is danger of damaging the walls of the cylinder. Any scratching of the cylinder walls will result in scoring of the piston, which will necessitate replacement of both cylinder and piston.

Use compressed air, if available, to blow out loose arbon or lift the engine and, with exhaust por 9$own, shake out all dislodged carbon.

Before installing muffler, use screwdriver to dislodge any formation of carbon at throat or within muffler.

Reinstall muffler and gasket. For best engine performance the gasket should be in good condition. If the old gasket is torn or mutilated, it must be replaced, using a new gasket.

NOTE

Do not run the engine without the muffler installed. To do so can result in dirt or other foreign matter being drawn into the compression chamber which will result in piston and cylinder scoring. Also, the lack of muffler may possibly result in an uncontrollable lean mixture condition which will result in engine failure.

CARBURETOR

The Le Sabre saw engine is equipped with an efficient, diaphxagm type carburetor designed to operate in any position that the saw might be held. It is fed by a pulse-actuated fuel



pump and wick system that is also designed to deliver fuel regardless of the position of the saw.

The carburetor consists basically of three sections: filter element and retainer; cover assembly; and carburetor body assembly. Access to the carburetor filter element, when cleaning is required, is gained by removal of the engine cover.

The filter element should be cleaned as often as necessary to maintain maximum engine output. A clogged filter will cause the engine to slow down, lose power under full throttle operation, and run excessively rich.

When cleaning the filter element, the use of certain commercial solvents (toluene, carbon tetrachloride, and/or chlorethylene base types) should be avoided as they will cause loosening of the flocking material from the frame. Instead, use straight gasoline, such as is used in preparing the fuel mixture.

CHAIN AND BLADE MAINTENANCE

An efficiently operating chain saw depends not only upon maintenance of the power unit, but also upon the selection and maintenance of the cutting chain. As many types of chains are available, you should select a chain that is most suitable for your particular type of work. Then, the cutters should be kept sharp and the depth gages properly set for fast and efficient cutting. Your authorized McCulloch dealer will be glad to aid you in selection of cutting chain and information pertaining to sharpening procedures.

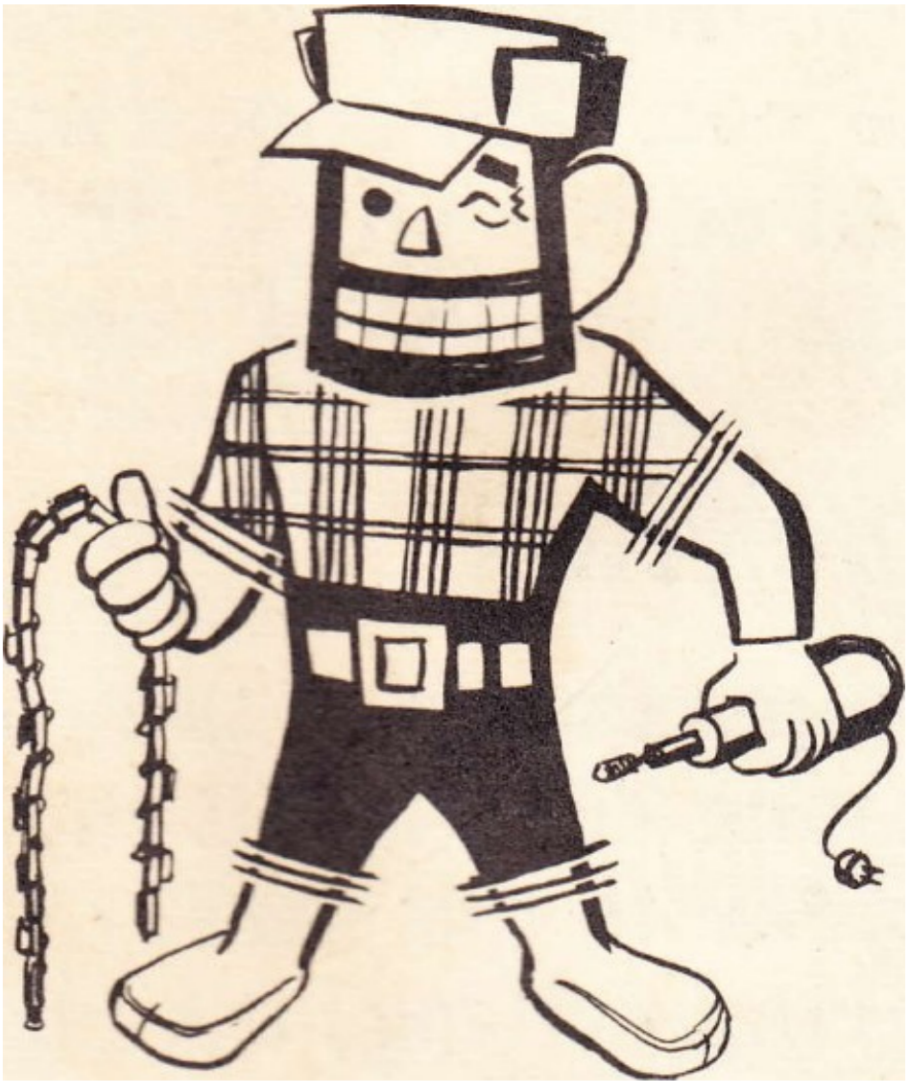
SELECTION OF CHAIN

The best chain available will not cut satisfactorily if it is not used on the type of wood for which it was designed. A chain designed for cutting hardwood (or frozen wood) has minimum chip clearance, as only a small bite can be taken in such wood. If the chain is used for cutting softwoods, where the depth of bite is much greater, the cutting teeth will choke up as the chip cannot be cleared.

A chain designed for cutting soft-type woods has a high cutter tooth. While the chain will cut very efficiently in softwood, if it is used for hardwood cutting the life of the chain will be greatly shortened. This is because of excessive shock loads imparted by the digging action of the high cutter teeth.

If medium type woods (semi-hard or semisoft) are to be cut, a chain should be selected that will fall between the two extremes of wood types.

The diameter of wood to be cut should also be taken into consideration when selecting a chain. For small diameter timber, the cutting teeth should be closely spaced on the chain so more teeth will be in the cut. If the cutting teeth are wide spaced, the chain will tend to be erratic and jump while in the cut. For large timber, the cutting teeth should be widely spaced to prevent choking up in the cut.



CHAIN SHARPENING

After the correct chain has been selected and put into operation, it must be kept sharp. (New chains are shipped from the factory pre-ground to a sharp edge, with a medium cutting angle.) When re-sharpening your chain, determine the angle of sharpening that will give best cutting results for your particular type of work. Also; the depth gages should be set to permit the cutting teeth to bite only to a depth that will result in efficient cutting for the type of chain and type of wood being cut.

If you are in doubt, consult your McCulloch dealer as he will gladly help you with your chain problems.

CUTTER BLADE

It is i portant that the cutter blade of your saw b in good condition for efficient cutting and long chairtlife. If the blade becomes badly worn il cannot properly support the chain. This will result in short chain life, loss of en •ne power, and poor cutting.

If the chain 00 tight on the blade, flaring of the blade no I result. This will cause the chain to jtynp the blade rails, excessive burning of the blade nose, and even breakage of the chain.

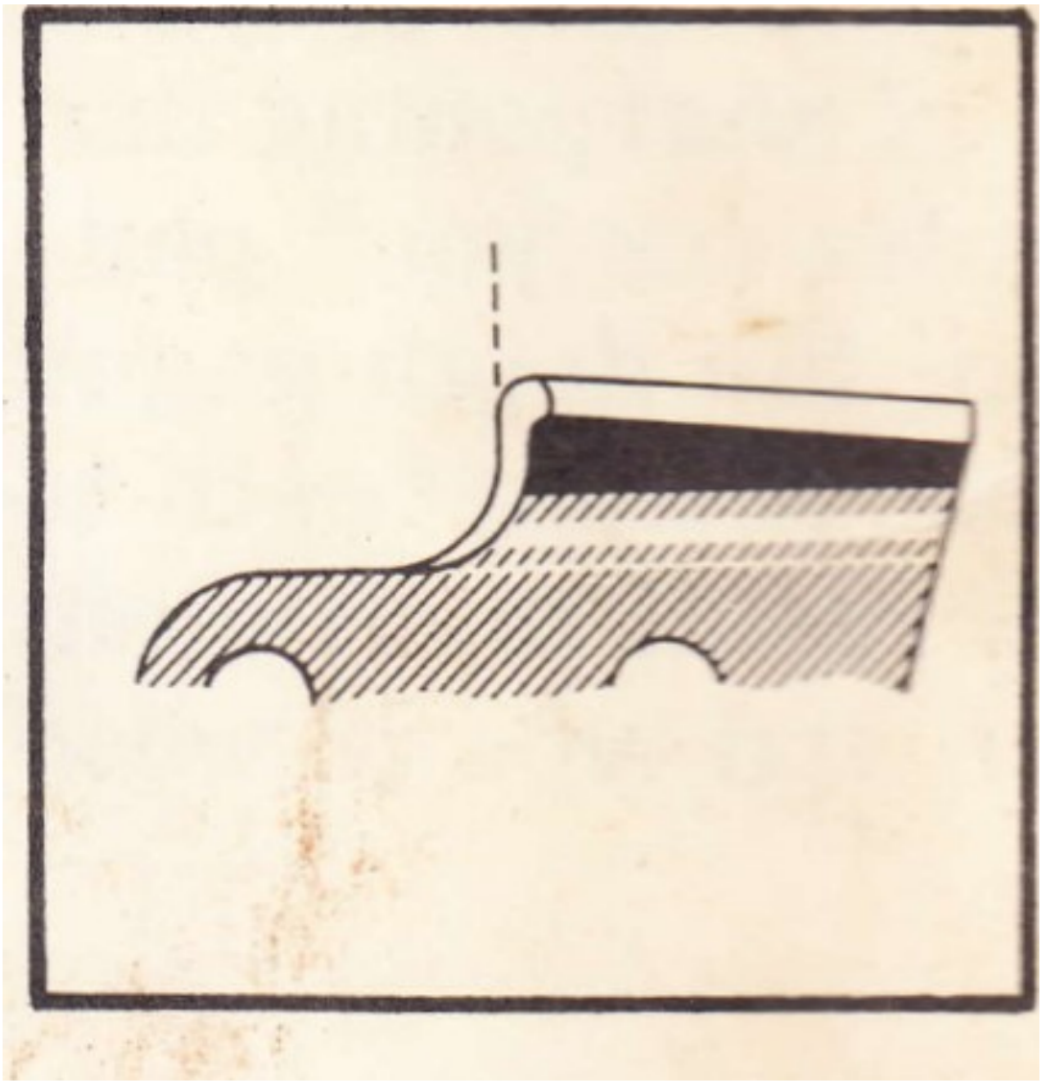
Should the blade groove become plugged with dirt and pitch, the chain will not seat and ride the blade rails correctly. This will cause excessive wear on the inside of the blade groove and also on the blade rails. When the blade rails become worn, engine power is lost and there will be definite tendency for the chain to bind in the cut. As undue stresses will then be placed on the chain, the rivets will be loosened and breakage of component parts will result.

CHAIN LUBRICATION

It is vitally important that the chain be kept lubricated during cutting. If the chain oiler is not used prior to the start of the cut and frequently during cutting, the chain will run dry on the blade. This will cause excessive wear and overheating through friction and will result in short service life for both blade and chain.

CHAIN FILING

KEEP THE SIDE CUTTING EDGE VERTICAL. Filed correctly, the teeth will feed smoothly into the wood, cutting the cross grain cleanly before the top cutting edge routs out the chip. Each tooth will hold its edge longer without resharpening, which will increase your production. To file the side edge vertically, hold the file level with ap-

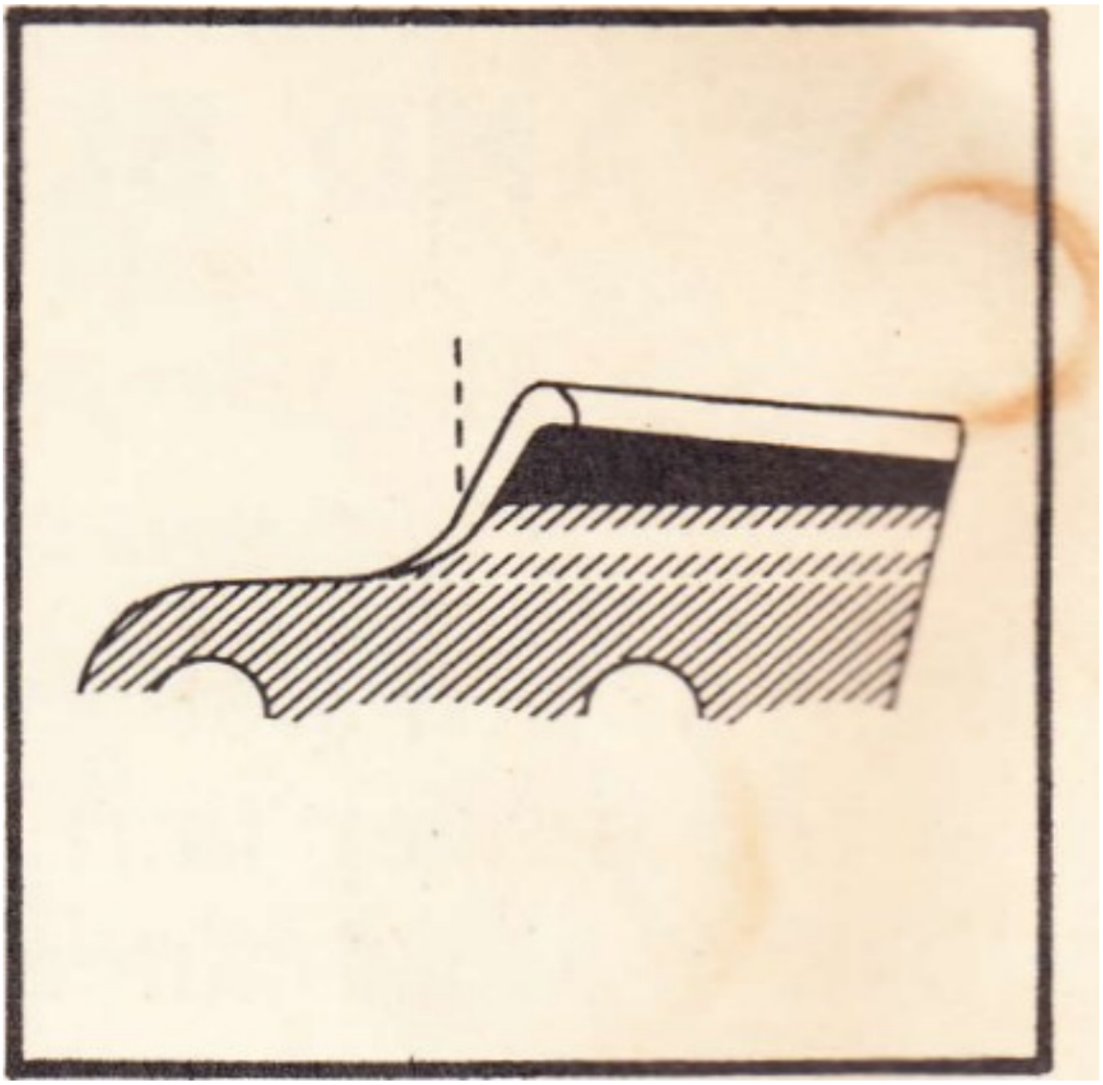


proximately one-fifth of the file above the top cutting edge (as shown). Be careful not to cut into the side links by pressing downward on the file.

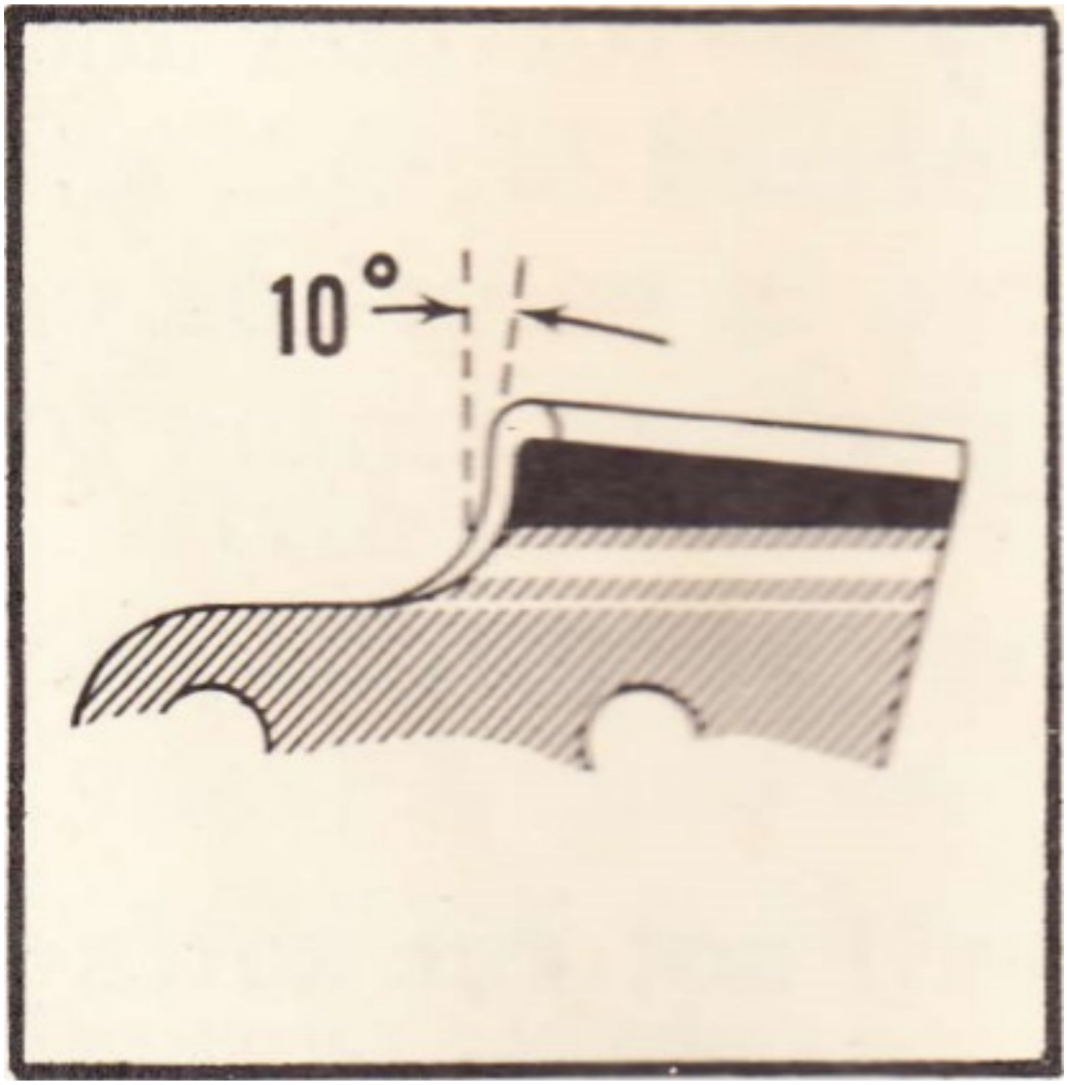
DON'T LET THIS HAPPEN TO YOUR CHAIN

A HOOK in the cutting edge causes your chain to jerk roughly, to grab and hang Alp in a cut. A EQ¥ in the cutting edge is made by holding your file too low and by pr sing down on the fi or by using small di-

TOO MUCH SLOPE will create a tendency for your chain to run out of the cut and not feed as it should. The engine will overspeed and you have to press harder to get any work done. TOO MUCH SLOPE is caused by holding the file too high on the tooth.



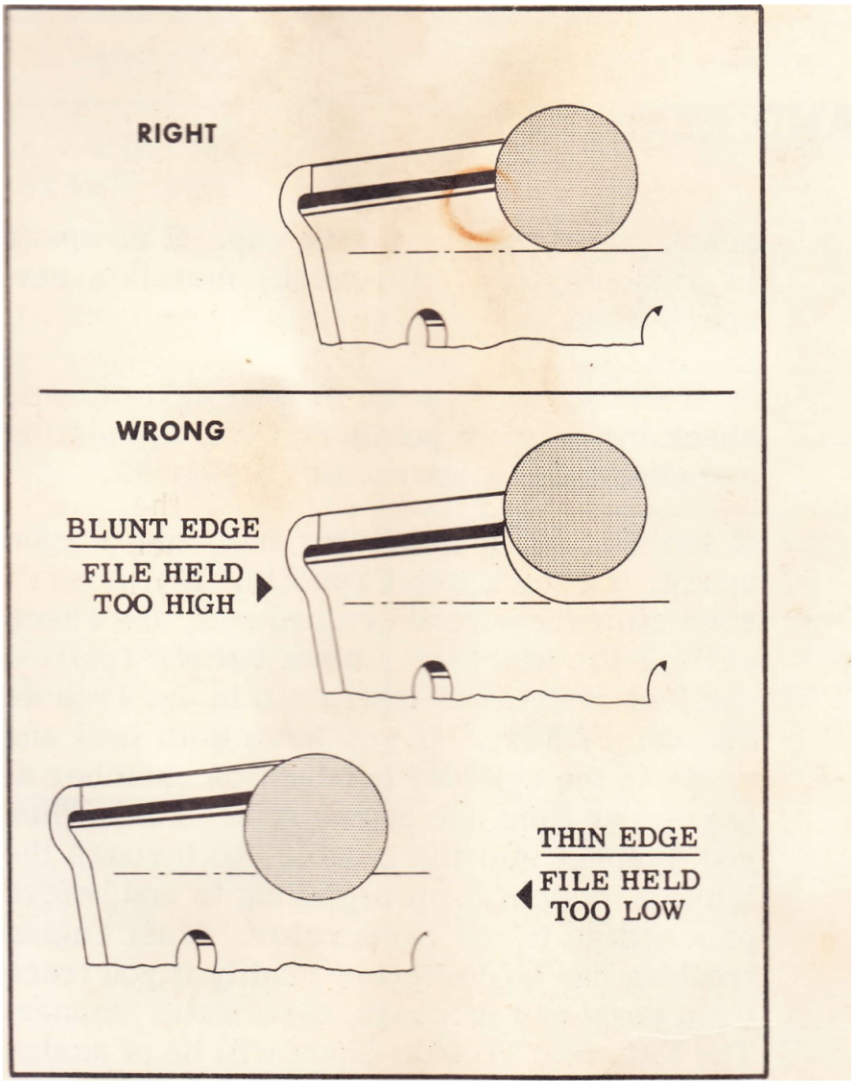
A SMALL AMOUNT OF SLOPE in the cutting edge helps when cutting in extremely hard or frozen wood. A SMALL AMOUNT OF SLOPE gives a smoother cutting action, but will dull faster and require more feed pressure. Hold the slope to a maximum of 100 from vertical at most.



SHAPE THE TOP CUTTING EDGE CORRECTLY. The best hollow ground cutting edge is obtained by keeping one-fifth of the file above the top cutting edge. This cutting edge provides two qualities; fast-cutting, slow-dulling. If the file is held too high on the tooth, the top cutting edge will be blunt and cut slowly. If the file is held too low, the cutting edge will be thin. The thin edge may cut slightly faster for a few cuts, but it will dull quickly. For very soft woods, a slightly thinner than normal cutting edge can be used with good results.

KEEP ALL DEPTH GAGE CLEARANCES THE SAME. It is very important to maintain the same clearance between the depth gage and the cutter teeth. If one depth gage is lower than the other, the tooth will be forced deeper in the wood. If the depth gage is not filed enough, the tooth will not do its share of cutting. The result of misfiled gages will be a rough cutting chain. The amount of depth gage clearance may be as little as .015 for extremely hard wood and as much as .045 for soft wood. The clearance, as set at the factory and recommended for general cutting is between .020 and .030. Consult your dealer

for the most suitable clearance in your locality. Whatever depth clearance you choose, remember one thing. Keep the depth gage clearance for all teeth the same.



Each time the chain is sharpened, check the depth gage clearances. Maintain the proper clearance, as needed, with a flat file. In filing the depth gages, form a round contour to the leading edge so that the depth gages will run smoothly through the cut and not catch nor gouge. Be careful not to round off the depth gages too much, since this may destroy the gaging surface.

KEEP ALL CUTTER TEETH EQUAL IN LENGTH

It is very important to maintain an equal length of all cutter teeth. You will note that each cutter tooth slopes to the rear. If the cutter teeth are of varying lengths it will be impossible to set the depth gages properly, resulting in a rough, inefficient chain. If the teeth on one side are shorter than the other, the longer teeth will take a bigger bite and cause the chain to cut in an arc.

TROUBLES AND REMEDIES

ENGINE FAILS TO START

If the engine fails to start after following the correct starting procedure, make sure the engine is receiving fuel, then check the ignition spark as follows:



Remove the wire from the spark plug. To prevent shock, hold the wire by means of the insulating material so that the metal terminal is approximately 3/8-inch from a paint-free metal surface. Pull the starter rope sharply to rotate the flywheel as fast as possible. There should be a strong blue spark jumping the gap.

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE FAILS TO START	(FUEL TROUBLES)	
ENGINE FAILS TO START	*Empty fuel tank.	Fill with correct fuel mixture.
ENGINE FAILS TO START	Flooded.	See operating instructions.
ENGINE FAILS TO START	Water or dirt in fuel.	Drain fuel tank and flush thoroughly with plain gasoline. Refill with proper fuel mixture.
ENGINE FAILS TO START	Fuel mixture adjustment set to ean.	Correct setting.
ENGINE FAILS TO START	Primer fails to operate due to dirt.	Clean or replace parts as required.
ENGINE FAILS TO START	(N " ARK)	
ENGINE FAILS TO START	plug wire grounding against metal.	Check and move wire from point of contact.
ENGINE FAILS TO START	plug wire grounding against metal.	Check and move wire from point of contact.

If a spark jumps the gap, remove the spark plug. Clean and dry the spark plug electrodes if they are wet. Connect the wire to the spark plug and ground the metal side of the spark plug against a paint-free metal surface. Crank the engine to see if a blue spark jumps th park plug gap. If no spark is evident after this check, install a new spark plug.

If the spark is weak or yellow in Step 1, check the breaker points and coil for setting and condition as instructed on page 12.

If the engine is receiving fuel and a good spark, it should start readily. If it doesn't start after the second or third pull, don't keep pulling the starter. Check out the ignition and fuel systems as instructed in the Trouble Shooting Chart. If you have both fuel and spark in the cylinder combustion chamber at the proper time, the engine should run. When you suspect ignition trouble, go through the ignition system from beginning to end before proceeding to the carburetor. Most engine troubles can be corrected readily if you trace them in a thorough, systematic manner. The following Trouble Chart will be of

assistance in helping you trace such troubles.

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE FAILS TO START (cont)	Fouled or defective spark	Clean or replace spark plug. Adjust to proper gap.
ENGINE FAILS TO START (cont)	Incorrect breaker point gap, points not opening, burned or pitted.	Adjust to proper gap. Replace if necessary.
ENGINE FAILS TO START (cont)	*Coil failure.	Replace coil.
ENGINE FAILS TO START (cont)	*Condenser failure.	Replace.
ENGINE FAILS TO START (cont)	Connections loose or wiring grounding.	Tighten the connector or insulate, as required.
ENGINE HARD TO START	All above conditions. Those preceded by an asterisk (*) will prevent any possible start.	
ENGINE OVER- HEATS AND LACKS POWER CAUTION Any of these conditions can cause piston and cylinder scoring.	Incorrect fuel mixture.	See FUEL MIXTURE, page 4.
ENGINE OVER- HEATS AND LACKS POWER CAUTION Any of these conditions can cause piston and cylinder scoring.	Fuel mixture adjustment set too lean.	Correct fuel mixture adjustment.
ENGINE OVER- HEATS AND LACKS POWER CAUTION Any of these conditions can cause piston and cylinder scoring.	Cooling air restricted.	Clean cylinder fins. Check flywheel for broken fins.
ENGINE OVER- HEATS AND LACKS POWER CAUTION Any of these conditions can cause piston and cylinder scoring.	Spark plug cover not in place.	Keep spark plug cover in place to prevent escape of cooling air.
ENGINE LACKS POWER	Incorrect fuel mixture.	See FUEL MD<TURE, page 4.
ENGINE LACKS POWER	Fuel mixture adjustment rich. (Excessively blue exhaust fumes.)	Correct adjustment.
ENGINE LACKS POWER	Ball check in carburetor diaphragm chamber not seating properly.	Clean or replace parts as nece sary.
ENGINE LACKS POWER	Cylinder exhaust ports clogged.	C an ports.
ENGINE LACKS POWER	Muffler outlet holes clogged.	Cle hoíes.
ENGINE LACKS POWER	Air filter element plugged.	Remo e a clean thoroughly.
ENGINE LACKS POWER	Poor compression, or piston and cylinder scored.	See you ealer. Replace rings; or rings, pi n and cylinder, as required:

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE STARVES ON ACCELERATION OR IDLES TOO FAST	Idle fuel mixture adjustment too lean.	Readjust.
ENGINE STARVES ON ACCELERATION OR IDLES TOO FAST	Muffler loose.	Inspect for damaged gasket; replace if necessary. Tighten muffler cap screws.
ENGINE STARVES ON ACCELERATION OR IDLES TOO FAST	Loose cylinder base bolts.	Tighten carefully.
ENGINE STARVES ON ACCELERATION OR IDLES TOO FAST	Worn or damaged crankshaft seals.	See your dealer. Replace.

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE STARVES ON ACCELERATION OR IDLES TOO FAST	Air leak in engine.	Check condition of all gaskets and seals.
CHAIN MOVES AT ENGINE IDLING SPEED	Idle speed too fast.	Readjust idle speed control screw.
CHAIN MOVES AT ENGINE IDLING SPEED	Clutch dragging.	Worn or broken clutch springs or damaged clutch drum. Replace as required.
ENGINE FLOODING (See list on page 23.)	Ball check valve in carburetor diaphragm chamber not seating properly.	Clean or replace ball and seat as necessary.
ENGINE CUTS OUT OR MISFIRES	Short circuit in ignition system.	Check all wiring and connections. Make all wiring secure and free from grounding.
ENGINE CUTS OUT OR MISFIRES	Fouled or defective spark plug.	Clean or replace.
ENGINE CUTS OUT OR MISFIRES	Breaker p nts sticking or bur ed.	Replace points and check condenser.
ENGINE CUTS OUT OR MISFIRES	Bre er oints clearance incorre	Adjust to proper clearance. See page 12.
ENGINE CUTS OUT OR MISFIRES	Bg er point push rod st • ng.	Clean guide holes and replace push rod, if necessary.
ENGINE CUTS OUT OR MISFIRES	Coil failure.	Replace coil.

CHAIN MAINTENANCE

TROUBLE	PROBABLE CAUSE	REMEDY
CHAIN BINDING IN CUT OR CUTS OUT OF LINE	Impro er filing. Blade track wor wn on one side. Cau by improper teeth angle on one side.	Replace blade and sharpen chain correctly.
CHAIN OILER FAILS TO DELIVER OIL TO BLADE	Oil rese oir empty.	Fill with clean, good grade oil.
CHAIN OILER FAILS TO DELIVER OIL TO BLADE	Dirt in pump assembly.	Retnove pump components and clean thoroughly.
CHAIN OILER FAILS TO DELIVER OIL TO BLADE	Oil not entering pumping chamber - caused by stiff oil.	Use lighter weight oil. For winter conditions, thin 50% with kerosene.
CHAIN OILER FAILS TO DELIVER OIL TO BLADE	Oil outlet plugged.	Clean by running a fine wire or common straight pin into opening.

SOURCES OF ENGINE FLOODING

Should the engine flood repeatedly, the following sources should be checked to determine cause.

Loose carburetor attaching screws.

Carburetor diaphragm gasket not sealing.

Rupture fuel pump diaphragm.

Loose fuel pump attaching screws.

Fuel tank vent opening plugged.

Defective primer.

NOTES

June, 1956

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