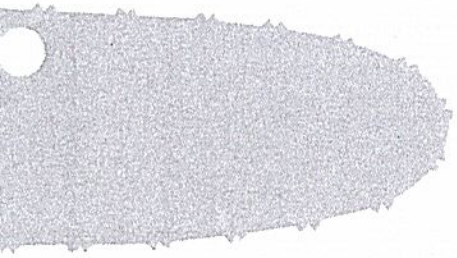
HOMELITE

Chain Saw Service Manual

CONTENTS



The information in this Service Manual covers theory of operation, design and performance specifications, trouble diagnosis, and dealer service of Homelite Chain Saws.

The data contained have been compiled by the Sales and Factory Service Departments for the benefit of Homelite Dealers. The testing routines and service procedures have been developed and proved by our Homelite Factory Service Representatives.

Printed in U.S.A.

INTRODUCTION

The purpose of this manual is to aid the Homelite Chain Saw Dealer in supplying good dependable service to customers. The contents have been selected and arranged with one thought in mind—that a thorough understand- of chain saws and the establishment of a routine for trouble diagnosis helps to pin-point the trouble. Eliminating haphazard trouble-shooting and disassembly practices keeps the customer satisfied and makes service work highly profitable for the dealer.

Arrangement Of Contents

Homelite Chain Saws, Section 1, is a general treatise covering the theory of operation of internal combustion engines with special reference to the operating principles of Homelite 2-cycle chain saw engines. Model identification sheets and special reference charts, giving important data on each model Homelite saw (and variations thereof) are provided. This is basic material on which to build a rich background of practical experience. Just as all Eskimos may at first look alike to an Englishman, chain saw troubles may seem alike to the mechanic, until he learns to look for and distinguish their characteristic symptoms.

Systematic Service, Section 2, describes the recommended routine for handling incoming service work. A check list of symptoms and a series of simple tests lead to quick diagnosis and location of the trouble. Often simple troubles can be remedied on-the-spot without further reference to the manual. If they are only approximately located, however, this section refers to one or more sections of the manual where specific diagnosis, disassembly and detailed service routines can be followed.

The main body of the Service Manual is divided into sections beginning with Systematic Service, Section 3. Other sections contain operational theory, trouble diagnosis, and service of a particular system or group of parts having a common relationship to the unit. Paragraph subdivisions in each section describe the operation and service of each of the important mechanisms within the system.

Assembly Guide, Section 9, gives brief disassembly and assembly steps which the mechanic may follow during service.

Service Tools and Instruments, Section 10, illustrates both required and optional service tools and apparatus, and describes their use.

Provision has been made at the beginning of each section to write in the subject title, reference number and date of Dealer Service Memos. Dealer Service Memos should be filed in the Dealer Service Memo Section. Dealers are urged to keep their parts and parts-price literature up to date by procuring latest copies of these lists as they appear from time to time.

Section 1

HOMELITE CHAIN SAWS

(General Principles)

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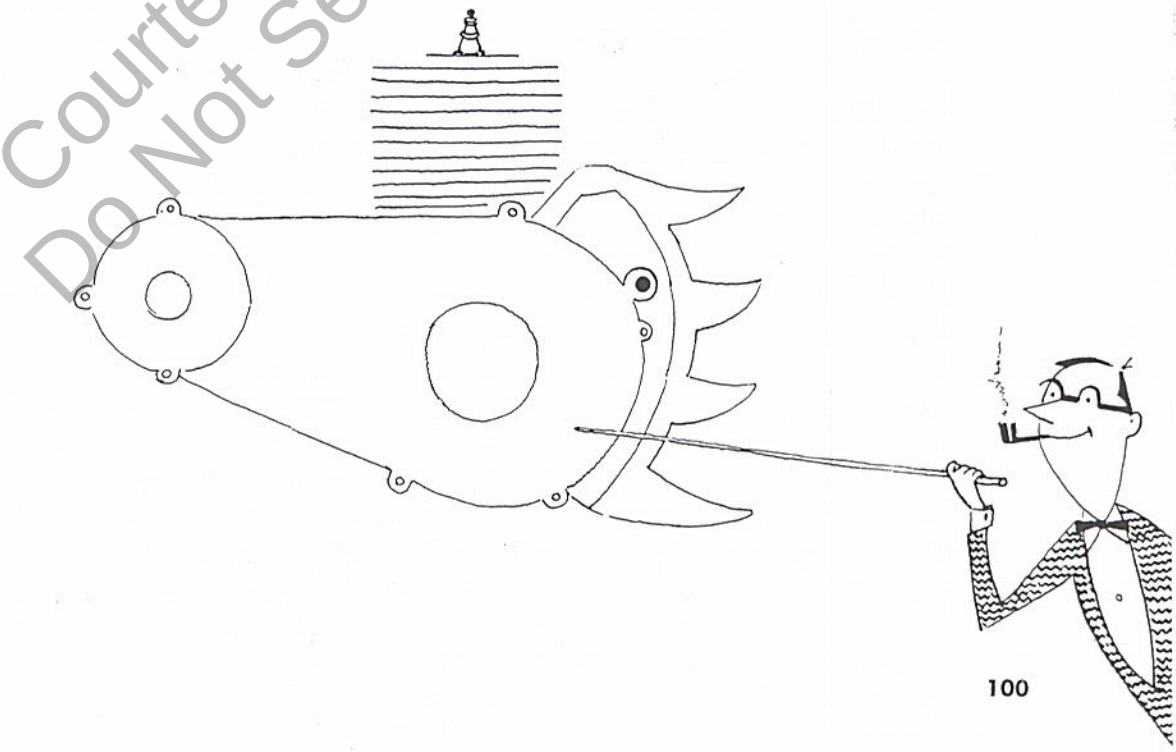
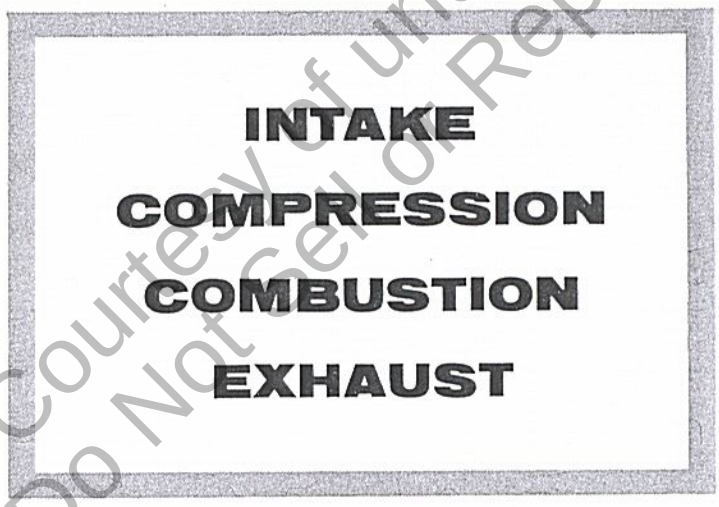


INTERNAL COMBUSTION (THEORY OF ENGINE COMBUSTION)

The internal combustion engine, through combustion, releases the latent energy of fuel and converts it mechanically into usable force. In order to function, the engine must complete a cycle of four operations.



1—2 INTERNAL COMBUSTION (THEORY OF ENGINE COMBUSTION)

The internal combustion engine, through combustion, releases the latent energy of fuel and converts it mechanically into usable force. In order to function, the engine must complete a cycle of four operations.

INTAKE—Fuel vapor and air must be introduced into the firing chamber by some means.

COMPRESSION—The charge must be highly compressed to insure rapid combustion and expansion of the gases.

COMBUSTION—Following ignition, the expanding gases must drive the piston in a power stroke.

EXHAUST—The burnt gases must be removed to prepare the firing chamber to accept a fresh charge.

1—2.1 Four Stroke-cycle Engine Operation

If one complete piston stroke were required for each of the above functions, it would require four strokes (up and down, up and down), to complete each cycle. Accordingly, such an engine would be called a four-cycle engine. (See Figure 1—2.)

1—2.2 Two Stroke-cycle Engine Operation

1. A two-cycle engine is one which completes each cycle of operation in two piston strokes—an upstroke and a downstroke. The piston acts as a moving wall which divides the engine cavity into two chambers—the crankcase and the firing chamber. Movement of the piston creates a vacuum condition in one chamber and a high pressure condition in the other chamber. Thus two jobs can be performed on each piston stroke as follows: (See Figure 1—3.)

ON THE UPSTROKE—(a) Air rushes through the air cleaner, through the carburetor barrel where it picks up fuel and enters the crankcase in the form of vapor.

(b) The charge (from previous cycle) in the firing chamber is compressed. Near the top of the stroke this charge is ignited by the spark plug.

ON THE DOWNSTROKE—(c) Combustion, resulting in rapid expansion of the gases in the firing chamber, drives the piston in a power stroke. The descending piston uncovers the exhaust ports, through which the burnt gases escape.

(d) The intake valve in the crankcase is closed during the downstroke, so the charge in the crankcase is precompressed. When the piston descends far enough to uncover the intake by-pass ports, which connect the crankcase and the firing chambers, the vapor escapes into the firing chamber. The entry of the new charge helps to expel the last fumes of burnt gas from firing chamber and places the charge in the chamber for compression on the next upstroke.

NOTE

Unless fuel from a previous cycle of operation is present in the firing chamber, the engine requires cranking through at least three strokes to provide a compressed charge for combustion. The fuel drawn into the crankcase during the upstroke of one cycle is not consumed until the downstroke of the next succeeding cycle.

Figure 1—2 Four Stroke-cycle Engine Operation

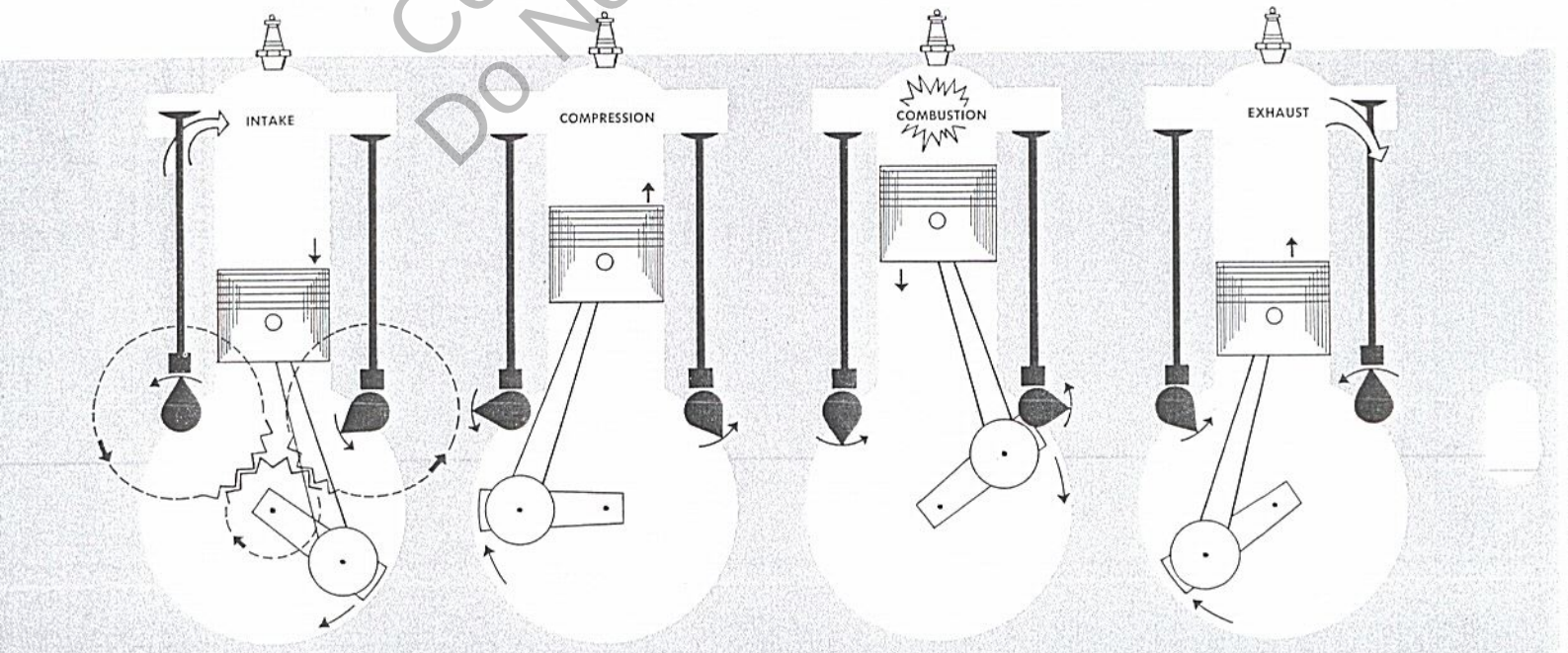
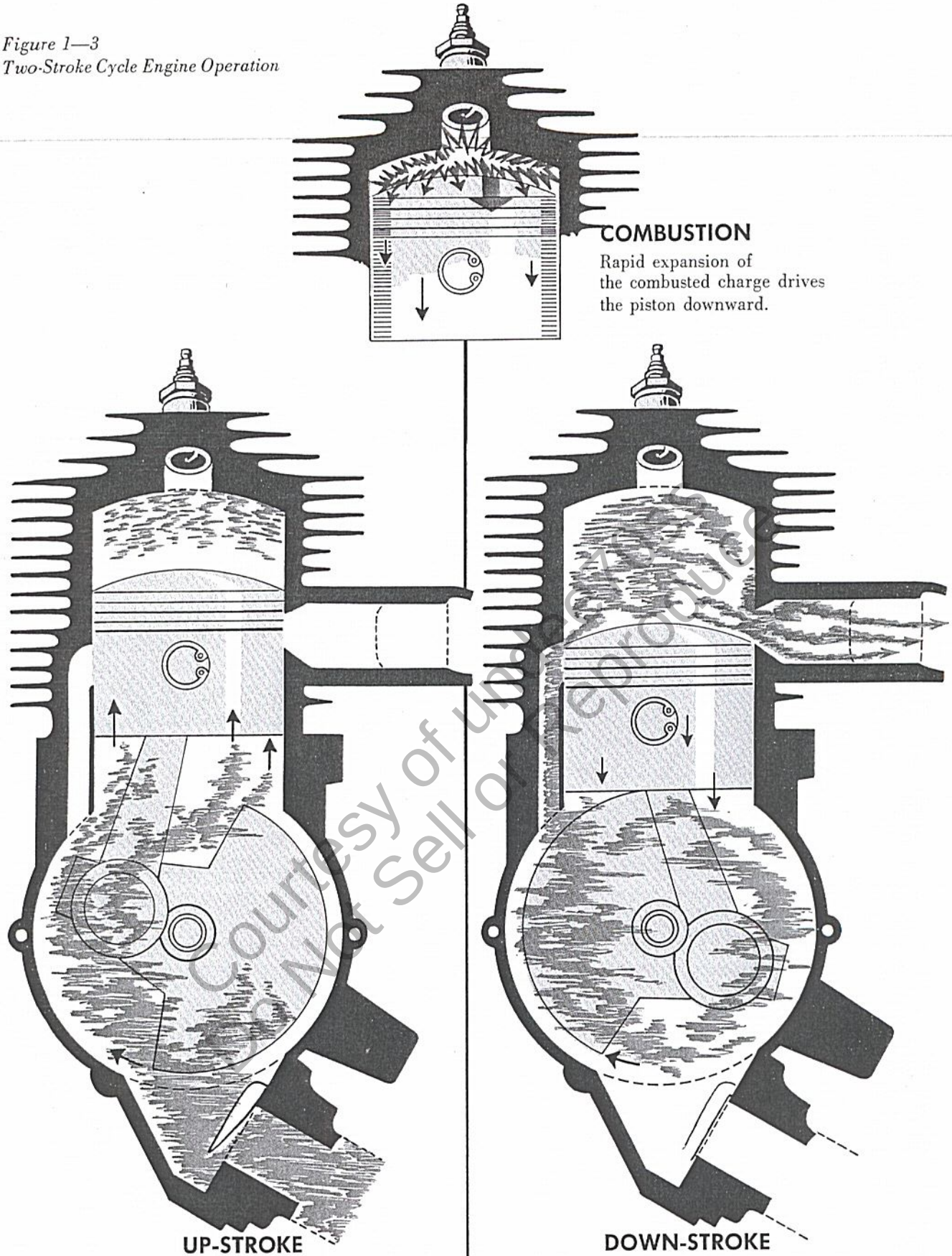


Figure 1—3
Two-Stroke Cycle Engine Operation



COMBUSTION

Rapid expansion of the combusted charge drives the piston downward.

UP-STROKE

Vacuum condition in crankcase results in entry of fuel through intake valve into crankcase. The charge from a previous cycle of operation is trapped in the firing chamber and compressed. The ignition spark is timed to occur just before completion of the up-stroke.

DOWN-STROKE

The descending piston first uncovers the exhaust ports to expell the burnt charge, then puts the crankcase under compression and uncovers the intake by-pass ports to force vapor in crankcase to enter firing chamber. Entry of the new charge helps expel the last fumes of the burnt charge.

2. Every piston downstroke results in a power stroke. Because of this, the two-cycle engine does not need timing gears and cam shafts to mechanically actuate an intake and exhaust valving system; nor does it require the extremely heavy flywheel necessary to maintain momentum during the three non-power strokes of a four-cycle engine. However, because the two-cycle engine draws fuel into the crankcase on every crankshaft revolution, all internal surfaces of the engine can be kept lubricated by mixing a quantity of oil with the fuel. For chain saw and other applications where lightness, compactness, and maneuverability are prime factors, the two-cycle engine is the logical power choice.

The relatively greater rate of carbon build-up in two-cycle engines results from the oil content in the fuel vapor. Some of this oil is burnt with the fuel, but most of it falls out of the vapor under high compression and heat prior to ignition. Homelite uses Champion HO—series spark plugs with special platinum electrodes to minimize spark plug failure due to carbon. However, inspection and cleaning of the spark plug and the cylinder exhaust ports at regular intervals is necessary to prevent hard-starting and loss of engine power due to carbon.

1—3 ENGINE SPEED GOVERNING

As the speed of the chain saw engine increases past a certain point, the actual cutting power of the unit begins to fall off. (See Figure 1—4.) Homelite Chain Saw engines, therefore, are carefully calibrated and timed to perform within the optimum speed range. The engine is maintained within this optimum range by the action of a governor which automatically controls the amount of the fuel and air fed to the engine.

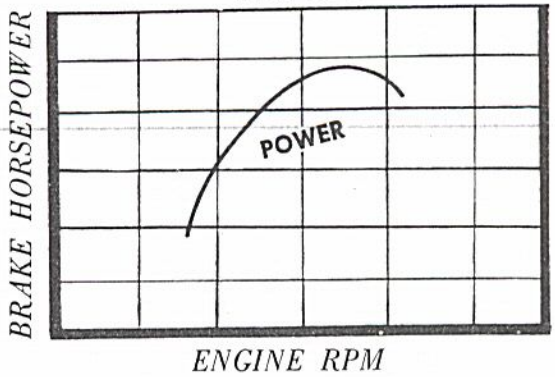
CAUTION

Never attempt to gain power by tampering with or removing the governor. At higher than optimum speeds the engine will sound louder, but the unit will not cut any faster.

1—3.1 Rotary Governor (Models 26, 5-30, and 7-29)

1. For optimum operation and safe maintained engine speed, centrifugal action rotary type governors are supplied only as complete and accurately pre-set assemblies. The rotary governor also functions as an intake valve. In fact, the mechanism could be called an automatic throttling intake valve.

Figure 1—4 Characteristic Horsepower—RPM Curve



2. A circular intake valve plate, with an opening corresponding with the manifold opening, is pinned in position against the crankcase. The governor valve plate has a similar opening and is held against the intake valve plate by pressure from three springs. The governor is keyed to, and rotates with the engine shaft. It covers the intake manifold opening except on the engine upstroke.
3. At full throttle, an engine without governor control would race, unless enough work load were applied to prevent it. With the Homelite rotary governor-equipped engines at full throttle, the engine speed can be maintained within the optimum range no matter how light the load. As engine speed increases, centrifugal force becomes sufficient to overcome opposing governor spring tension on the governor weight. Accordingly, the leaf-type weight moves to a new position, at which it partially covers the intake opening and throttles the engine. As the throttled engine slows down, the centrifugal force diminishes until the governor spring tension can pull the weight away from the intake opening. Governor speed control is heard as oscillation (series of changes in engine sound).

1—3.2 Air Governor

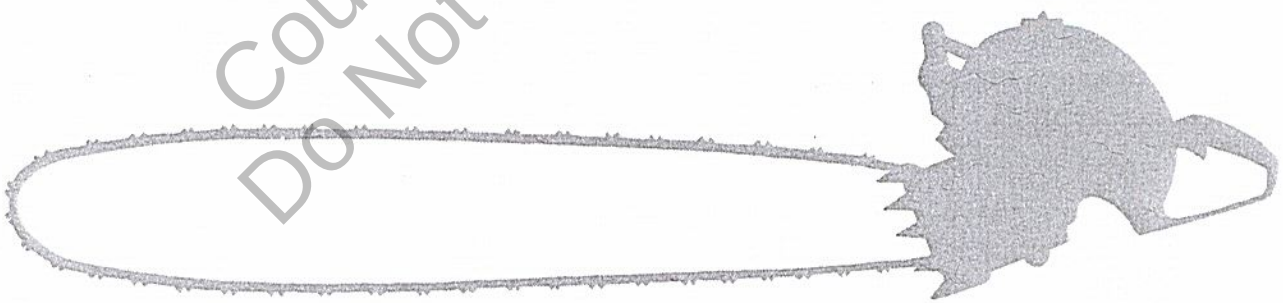
1. Air governors are incorporated in the Homelite Saws which have reed type intake valves. Homelite air governors all operate on the same principle.
2. When the operator presses the throttle trigger to release the throttle lever, governor spring tension takes over and pulls the throttle open.
3. A small air vane, connected to a shaft and lever assembly on the back plate (the lever is connected to the throttle shaft lever) is located in the air stream created by the spinning rotor. When the air velocity is high enough to overcome the governor spring tension, the governor closes the throttle. The governor is adjustable to provide control at optimum r.p.m. When switching from bar and chain operation to Brushcutter operation, governor spring tension must be reduced to its minimum.

1—4 SAWS WITHOUT ENGINE SPEED GOVERNOR

1. Many operators who habitually race their saw engines for seconds at a time *without applying any cutting load* would refuse to floor the gas pedal of a car and let the engine race for fifteen seconds *in neutral.* Racing *any* engine without load results in excessive vibration, friction, heat, and wear, and materially shortens the life of the engine. Just like the experienced driver, the wise chain saw operator needs no governor to prevent him from useless over-racing of his engine—experience and common sense tell him to keep his engine speed low until a cutting load is applied.

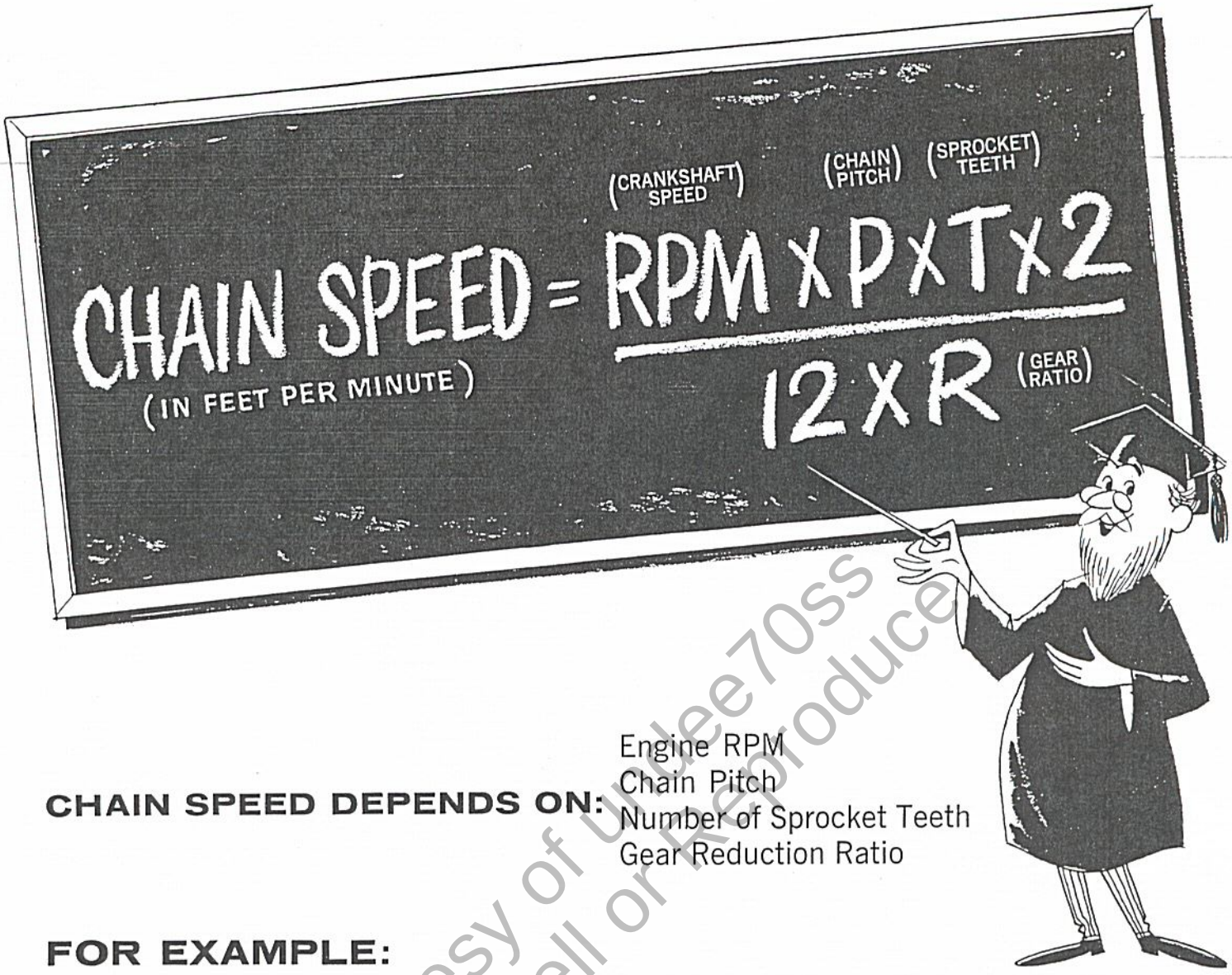
2. The operators manuals issued with saws which do not have governors warn the operator not to use full throttle except when actually cutting wood.

3. Fortunately, for ourselves and our customers alike, carburetor mixture settings which produce smooth acceleration and maximum power at full load are usually richer than the engine can cope with wide open at no load. The over-fed engine "four-cycles" or runs excessively rich with decreasing power and speed, and the effect is somewhat like that of a governor. Presence of excess oil helps to protect the engine during the above process, but contributes to carbon build-up. Actually, no engine should ever be run at full throttle without a suitable load.



FEET PER MINUTE CHAIN SPEED FOR EACH 1000 RPM ENGINE SPEED

	NO. OF TEETH	.404" PITCH CHAIN	7/16" PITCH CHAIN	1/2" PITCH CHAIN	9/16" PITCH CHAIN	5/8" PITCH CHAIN
DIRECT DRIVE 1:1 RATIO	6 Tooth	404.0	437.5	500.0	562.5	625.0
	7 Tooth	471.3	510.4	583.3	656.3	729.2
	8 Tooth	538.7	583.3	666.7	750.0	833.3
2:1 RATIO	6 Tooth	202.0	218.7	250.0	281.3	312.5
	7 Tooth	235.7	255.2	291.7	328.2	364.6
	8 Tooth	269.4	291.7	333.3	375.0	416.7
2.75:1 RATIO	6 Tooth	146.9	159.1	181.8	204.5	227.3
	7 Tooth	171.4	185.6	212.1	238.7	265.2
	8 Tooth	195.9	227.0	242.4	272.7	303.0
2.84:1 RATIO	6 Tooth	142.2	144.0	176.1	198.1	220.1
	7 Tooth	165.9	179.7	205.4	231.0	256.8
	8 Tooth	189.7	205.4	234.7	264.1	293.4
3.57:1 RATIO	6 Tooth	113.2	122.6	140.1	157.6	172.2
	7 Tooth	132.0	143.0	163.4	181.0	204.3
	8 Tooth	150.9	163.4	186.7	210.1	233.4



CHAIN SPEED DEPENDS ON:

Engine RPM
Chain Pitch
Number of Sprocket Teeth
Gear Reduction Ratio

FOR EXAMPLE:

If engine turns 6000 RPM, Chain Pitch is ½", sprocket has seven teeth, and the gear ratio is 2.84:1, how many feet per minute does chain travel?

SOLUTION USING FORMULA:

$$\text{CHAIN SPEED} = \frac{\overset{\text{(RPM)}}{6000} \times \overset{\text{(Pitch)}}{\tfrac{1}{2}''} \times \overset{\text{(Teeth)}}{7} \times 2}{\underset{\text{(ratio)}}{12 \times 2.84}} = 1232.4 \text{ ft. per minute.}$$

SIMPLE SOLUTION USING CHAIN SPEED TABLE

Figures in the table represent chain speed for each 1,000 RPM of engine speed. Locate the horizontal line for 2.84:1 ratio and seven tooth sprocket combination. Read across until you come to the number 205.4 listed under the ½" pitch chain column. Multiplying 205.4 by 6 gives you a total of 1232.4 feet per minute chain speed at 6000 RPM.

CLASSIFICATION OF UNITS

Reference to units solely by the Model number has become increasingly more difficult.

With perhaps eight or ten chain saw models in production each year, and with modifications resulting in fine subdivision becoming standard procedure, it is practical to establish a system of group classification. This edition classifies saws by

1. Basic Crankcase
2. Type Transmission
3. Special Features

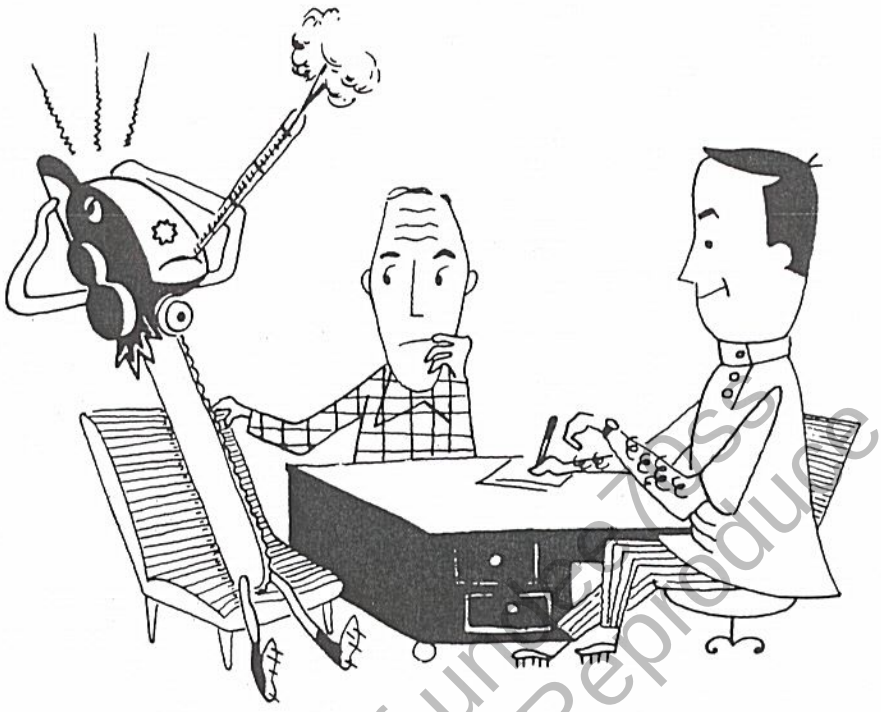
In each of the above categories further subdivision may be made because of

1. Slight variation or modification in design, enough to affect assembly or service.
2. Dimensional changes of shafts or housings for shafts, bearings and seals. Wherever assembly and disassembly of a particular parts group are discussed, the text lists all special tools required for the job.

   In addition, whenever assembly of bearings and seals is undertaken, the text quotes parts sizes and lists the proper assembly tools.

   For handy reference, the unit specifications printed on the reverse side of each of the model identification sheets in Section I contain information on basic crankcase design, together with certain housing and seal measurements.

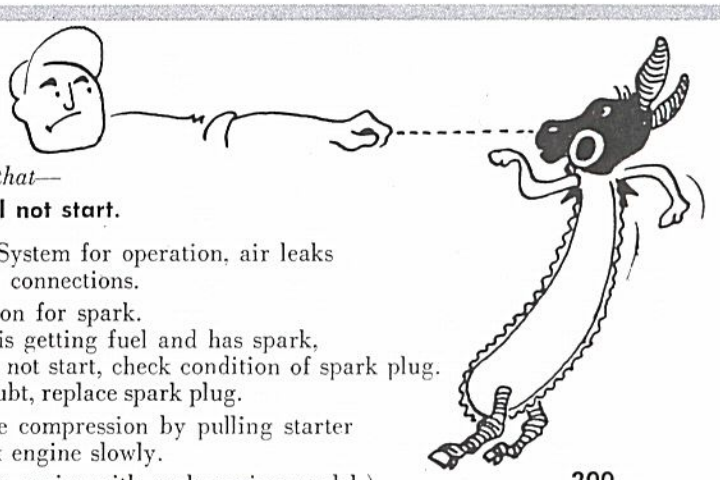
SYSTEMATIC SERVICE



A physician always asks the patient what's wrong and then checks him over systematically before attempting diagnosis and treatment. The chain saw mechanic should use a similar system . . . should never blindly tear down a unit.

Always rely on tests, not testimony, in making trouble diagnosis. When trouble-shooting, always begin by making the checks listed in group 1, below. The results of these tests will almost invariably tell you in which section or system of the saw the trouble lies. Then go on from there until you have pin-pointed the trouble.

Even though you do not rely on the customer's opinion of the trouble, always jot his remarks down on the test ticket when accepting the saw. Later on, you can show him which repairs, if any, were necessary to remedy his particular complaints. This courtesy of hearing the customer out will build confidence in him that you are a trustworthy, top-notch serviceman.



If you find that—

2-1. Saw starts hard or will not start.

Check Fuel System for operation, air leaks or loose connections.

Check Ignition for spark.
If unit is getting fuel and has spark, but will not start, check condition of spark plug. If in doubt, replace spark plug.

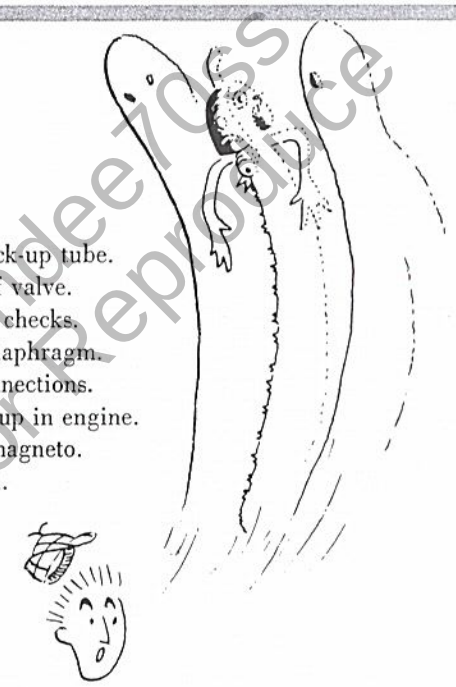
Check engine compression by pulling starter to crank engine slowly.
(Compression varies with each engine model.)

If you find that . . .

2-2. Engine lacks power.

Check for properly sharpened chain, including depth gauge setting.
Check for dirty or plugged air filter.
Check carburetor adjustments.
Check for dirty, improperly mixed, or stale fuel.
Check for low compression.
Check setting of contact points.
Check for excessive carbon, plugged exhaust ports.
Check for air leaks.
Check air governor for dirt, sticking, faulty adjustment.

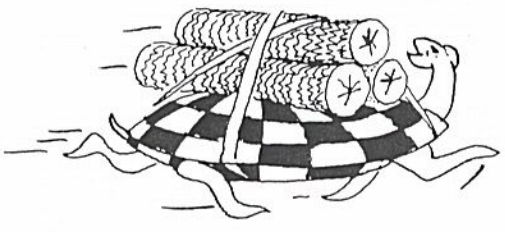
2-3. Saw fades, or cuts-out.

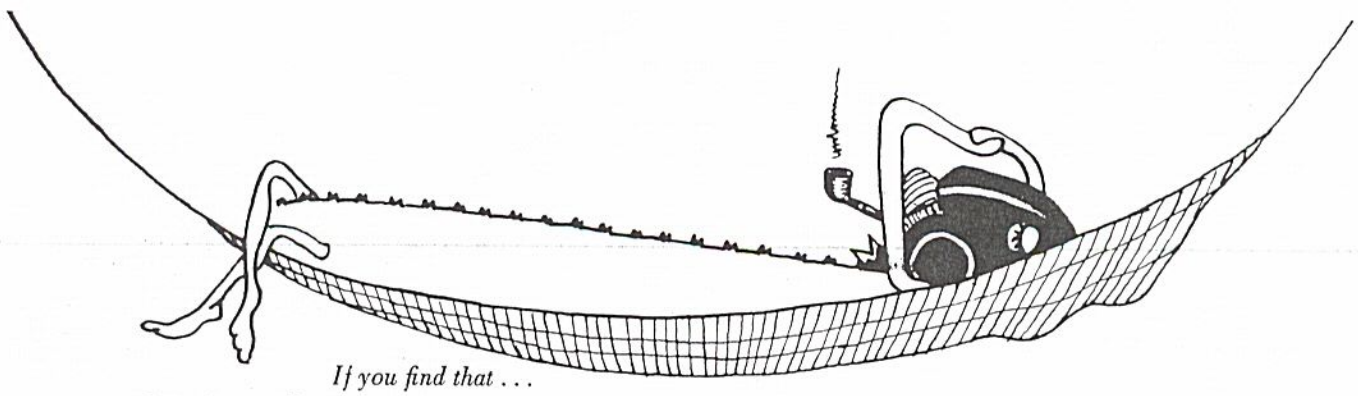


Check for dirty fuel filters.
Check for dirty carburetor.
Check for plugged fuel line or pick-up tube.
Check operation of fuel cap relief valve.
Check for inoperative fuel pump checks.
Check for ruptured fuel pump diaphragm.
Check for air leaks and loose connections.
Check for excessive carbon build-up in engine.
Check for faulty connections in magneto.
Check for leaky high-tension lead.

2-4. Engine leans out under load.

Check for air leaks and loose connections.
Check for porous or slit flexible pick-up tube.
Check for faulty outlet fitting, leaking fuel line.

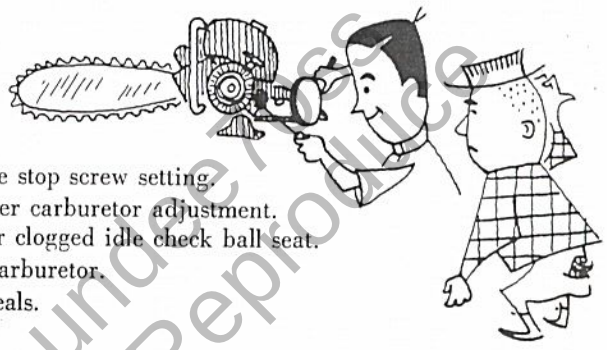




If you find that . . .

2-5. Saw will not accelerate.

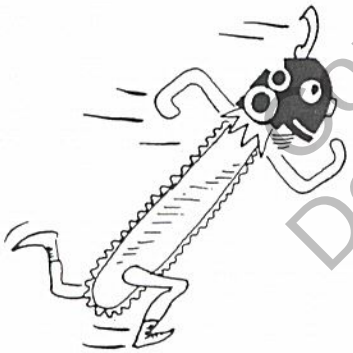
Check carburetor idle (or low speed) adjustment for low setting.
Check for sawdust build-up on governor vane.
Check for dirty or plugged air filter.
Check for dirty fuel filter, fuel tank and poorly operating relief valve or check valves.
Check for dirt in carburetor idle system.
Check for plugged exhaust.



2-6. Saw will not idle.

Check for low idle stop screw setting.
Check for improper carburetor adjustment.
Check for dirty or clogged idle check ball seat.
Check for dirty carburetor.
Check for leaky seals.

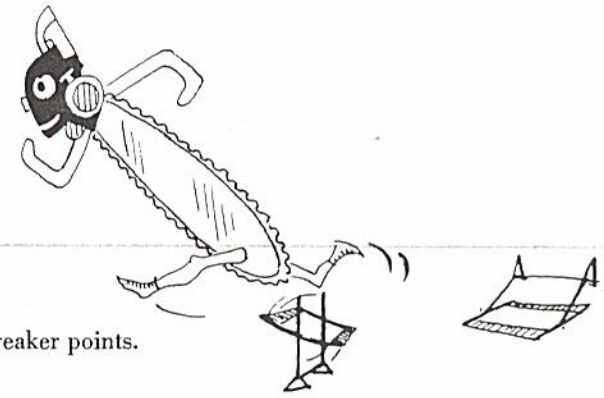
2-7. Saw idles too fast.



Check idle stop screw setting and for build-up of dirt or twigs under screw.
Check for worn throttle butterfly sticking in orifice.
Check for lean carburetor setting.
Check for leaky seals or air leaks between carburetor and crankcase.

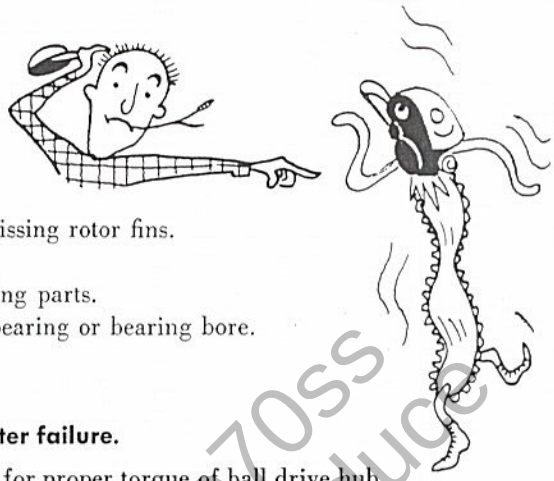
2-8. Engine overheats.

Check chain and bar assembly for sharpness and correct tension.
Check for clogged air screen.
Check for improper fuel mixture.
Check for lean carburetor setting.
Check for aluminum pick-up on piston.



2-9. Engine misses at high speed.

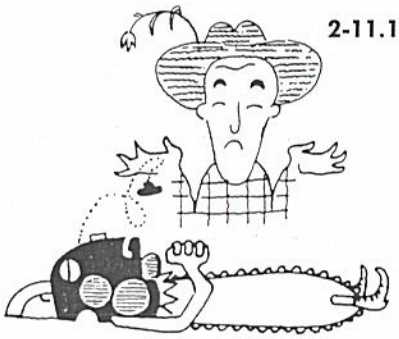
Check spark plug.
Check for short circuit in ignition system.
Check for sticking, burned, or incorrectly set breaker points.
Check for faulty high-tension lead.
Check magneto for coil failure.



If you find . . .

2-10. Excessive vibration.

Check for loose rotor.
Check for broken or missing rotor fins.
Check for loose clutch.
Check for loose fastening parts.
Check for worn main bearing or bearing bore.
Check engine speed.



2-11.1 Ball Drive Starter failure.

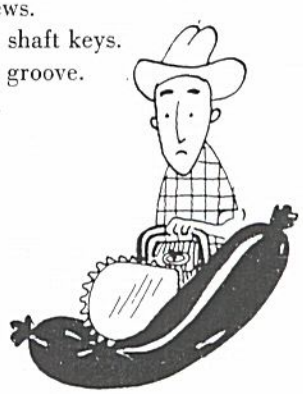
Check for proper torque of ball drive hub.
Check for dirty drive ball pockets.
Check for lack of spring tension or broken spring.
Check for ratchet teeth wear.
Check for worn or missing formica or thrust washers.
Check clearance between pulley and spring housing cover.
Check for sawdust in spring housing.
Check for bent ball retainer plate.

2-11.2 F-M Starter failure.

Check for dull friction shoe.
Check for improper angle on friction shoe.
Check for weak or broken spring.
Check for improper assembly.

2-12. Chain will not rotate.

Check chain for proper tension.
Check for inoperative clutch.
Check for broken drive gears or belt.
Check for sheared sprocket shaft screws.
Check for sheared or missing sprocket shaft keys.
Check for dirty chain and chain guide groove.
Check for worn or damaged guide bar.

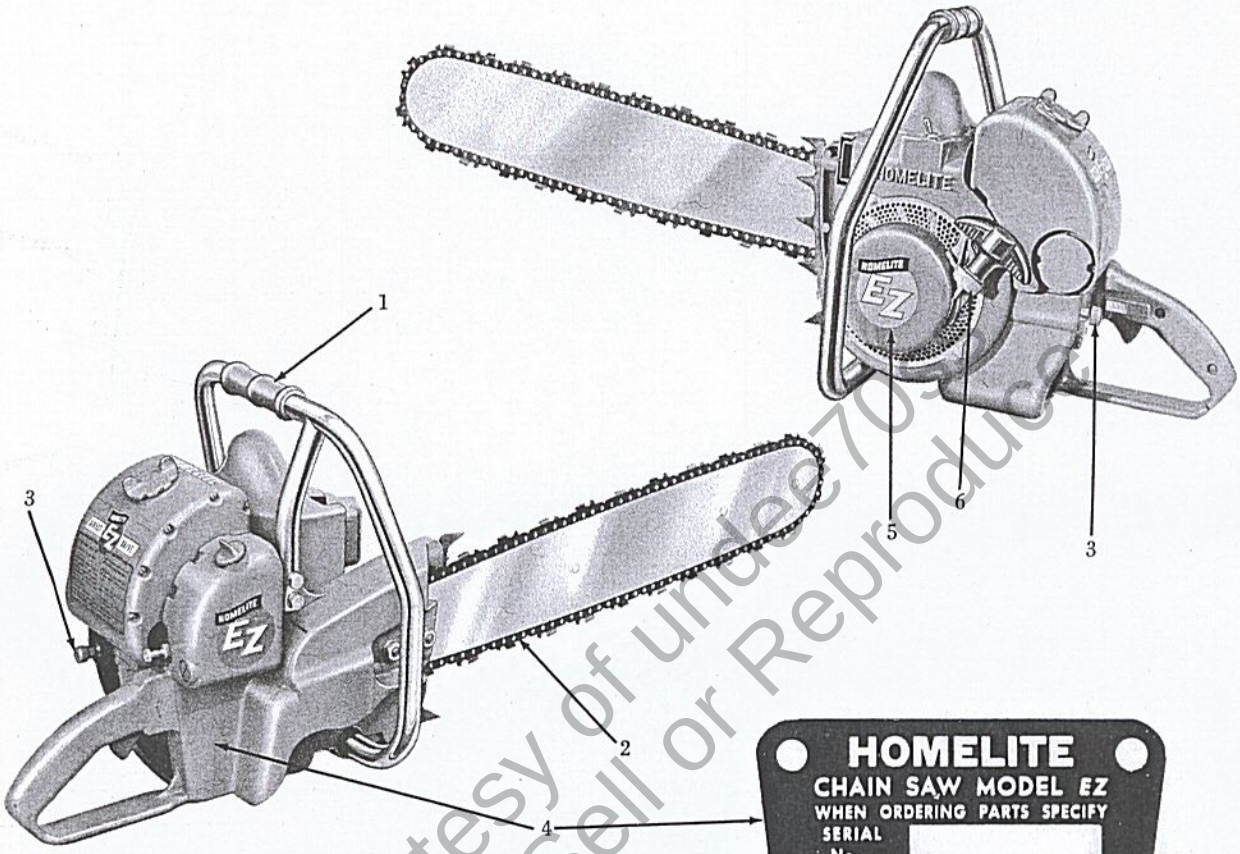


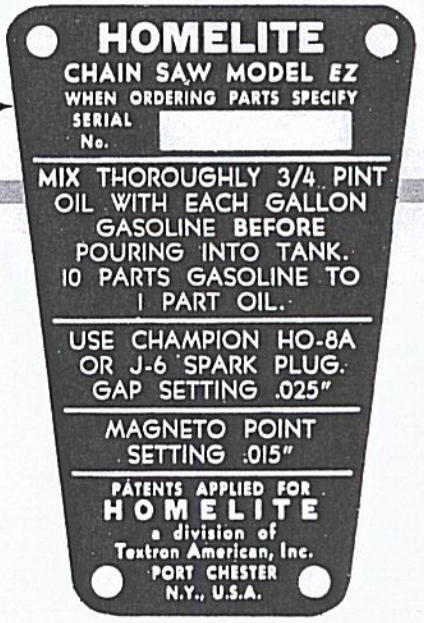
2-13. Chain will not cut.

Check for reversed chain installation.
Check for dull or improperly sharpened chain.

MODEL EZ

Direct Drive Model Introduced March, 1956.
COLORS: Homelite Red





1. Handle bars have plastic grip.
2. Chain and bar mount on clutch side. Gear case cover assembly includes adjusting device.
3. Fuel shut-off located on ignition side. Flexible fuel line runs to inlet of turret-shaped fuel pump cover on either TILLOTSON Model HL series or BROWN Model CS series fuel pump carburetor. Actuator and carburetor supply lines internal on these carburetor models.
4. Irregular trapezoid-shaped name plate under chain oil reservoir. Letter "B" after serial number indicates BROWN Model 5-CS Carburetor.
5. Identified by "EZ" Decals on pulley cover, fuel tank and chain oil reservoir.
6. Engine rotates in same direction as chain.

UNIT SPECIFICATIONS

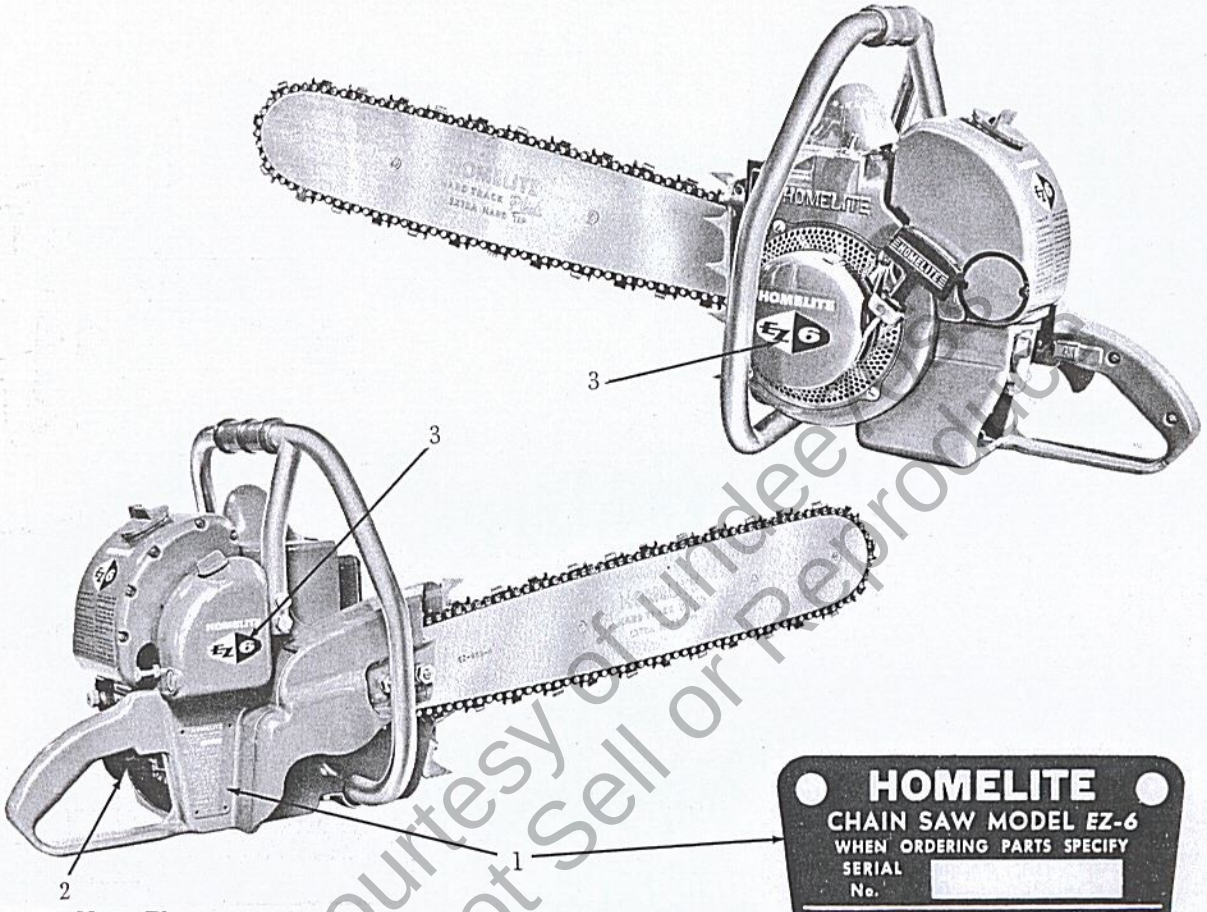
MODEL EZ

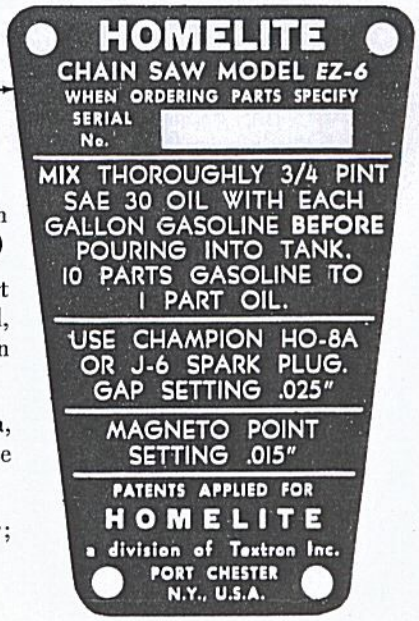
BASIC STYLE	Integral Crankcase-Drivecase includes pistol grip and oil reservoir
TRANSMISSION	
Type	Direct Drive
Ratio	1:1
Sprocket Pitch/No. of Teeth	7/16"-7
Chain Oil Reservoir	Part of Crankcase
Reservoir Capacity	13 ounces
STARTER TYPE	Ball Drive
Rotation (from starter side)	Counterclockwise
ENGINE	
Bore	2 1/16"
Stroke	1 1/2"
Displacement—cu. in.	5.01
Main Bearing I.D.	.6693/.6690
Seal—Magneto Side	Double Garlock
Seal—Main Bearing	Vellumoid Gasket Plus Double Garlock
Piston Rings—Height Width End Gap	1/16" .090/.080 .070" min.-.080" max.
Governor Type	Air
Peak horsepower at	6000 RPM
IGNITION SYSTEM	
Spark Plug	HO-8A
Spark Plug Gap	.025"
Type Magneto	(W) Wico or (P) Phelon
Breaker Point Setting	.015"
Primary Coil Resistance	(P) .65-.80 ohms (W) .41-.47 ohms
Secondary Coil Resistance	(P) 7500-9000 ohms (W) 3500-4500 ohms
Condenser Capacity	(P) .18-.22 mfds. (W) .16-.20 mfds.
FUEL INDUCTION SYSTEM	
Tank Construction	Die-cast
Fuel Capacity	45 ounces
Fuel Feed	Pump
Type Carburetor	Diaphragm
Model	HL-1A or 5-CS
May be replaced with	HL-104A
Air Filter	Skinner
Type Intake Valve	Single Reed

MODEL EZ-6

Replaced EZ in Production June, 1957*

COLORS: Homelite Red with Green Air Screen





*1. Name Plate:

a) Six-digit serial numbers below 739839; first units built in Port Chester with 5-1/4″ rotor. (See Parts List #23218.)

b) Six-digit serial numbers above 739839; also built in Port Chester, but with 6″ rotor, larger opening in air shroud, longer ball drive, 1/4″ wider handlebar to clear air screen and pulley cover. (See Parts List #23218-1.)

c) Units with seven-digit serial numbers built in Gastonia, feature thicker shaft and larger I. D. main bearing. (See Parts List #23218-2.)

2. All EZ-6 units have Brown 5-CS or Tillotson HL-27B carburetor; 4-reed intake valve design.

3. EZ-6 foil on sides and tank.

UNIT SPECIFICATIONS

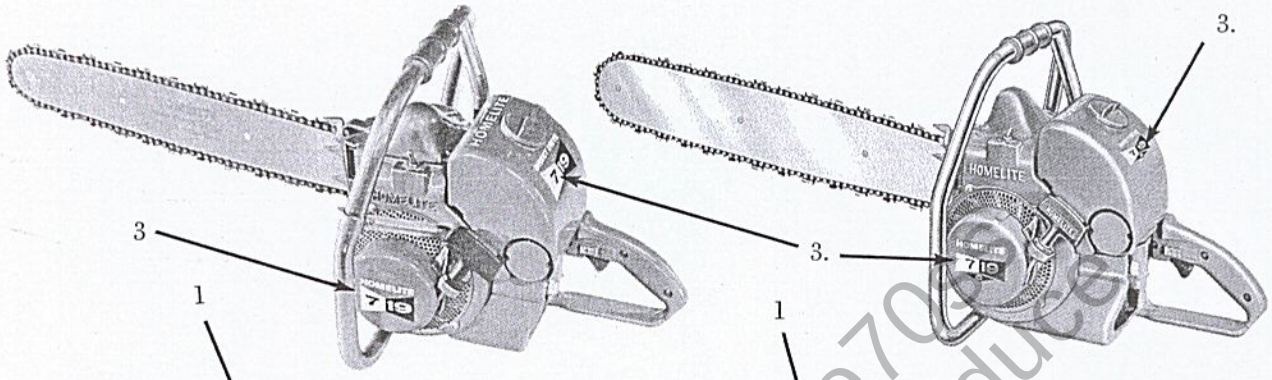
	EZ-6 (1)	EZ-6 (2)	EZ-6 (final)
BASIC STYLE	Integral Crankcase-Drivecase includes pistol grip and oil reservoir	Integral Crankcase-Drivecase includes pistol grip and oil reservoir	Integral Crankcase-Drivecase includes pistol grip and oil reservoir
TRANSMISSION			
Type	Direct Drive	Direct Drive	Direct Drive
Ratio	1:1	1:1	1:1
Sprocket Pitch/No. of Teeth	7/16"-7	7/16"-7	7/16"-7
Chain Oil Reservoir	Part of Crankcase	Part of Crankcase	Part of Crankcase
Reservoir Capacity	13 ounces	13 ounces	13 ounces
STARTER TYPE	Ball Drive	Ball Drive	Ball Drive
Rotation (from starter side)	Counterclockwise	Counterclockwise	Counterclockwise
ENGINE			
Bore	2 1/16"	2 1/16"	2 1/16"
Stroke	1 1/2"	1 1/2"	1 1/2"
Displacement—cu. in.	5.01	5.01	5.01
Main Bearing I.D.	.6693/.6690	.7188/.7185	.7188/.7185
Seal—Magneto Side	Double Garlock	Double Garlock	Double Garlock
Seal—Main Bearing	Vellumoid Gasket plus Oilite Bushing	Vellumoid Gasket plus Oilite Bushing	Vellumoid Gasket plus Oilite Bushing
Piston Rings—Height Width End Gap	.070" min.-.080" max.	.070" min.-.080" max.	.070" min.-.080" max.
Governor Type	Air	Air	Air
Peak horsepower at	6000 RPM	6000 RPM	6000 RPM
IGNITION SYSTEM			
Spark Plug	HO-8A	HO-8A	HO-8A
Spark Plug Gap	.025"	.025"	.025"
Type Magneto	Covered Phelon	Covered Phelon	Covered Phelon
Breaker Point Setting	.015"	.015"	.015"
Primary Coil Resistance	.65-.80 ohms	.65-.80 ohms	.65-.80 ohms
Secondary Coil Resistance	7500-9000 ohms	7500-9000 ohms	7500-9000 ohms
Condenser Capacity	.18-.22 mfds.	.18-.22 mfds.	.18-.22 mfds.
FUEL INDUCTION SYSTEM			
Tank Construction	Separate Fuel Tank	Separate Fuel Tank	Separate Fuel Tank
Fuel Capacity	1 qt. 13 oz.	1 qt. 13 oz.	1 qt. 13 oz.
Fuel Feed	Pump	Pump	Pump
Type Carburetor	Diaphragm	Diaphragm	Diaphragm
Model	5-CS or HL-27B	5-CS or HL-27B	5-CS or HL-27B
May be replaced with	HL-104A	HL-104A	HL-104A
Air Filter	Skinner	Skinner	Skinner
Type Intake Valve	Pyramid Reed	Pyramid Reed	Pyramid Reed

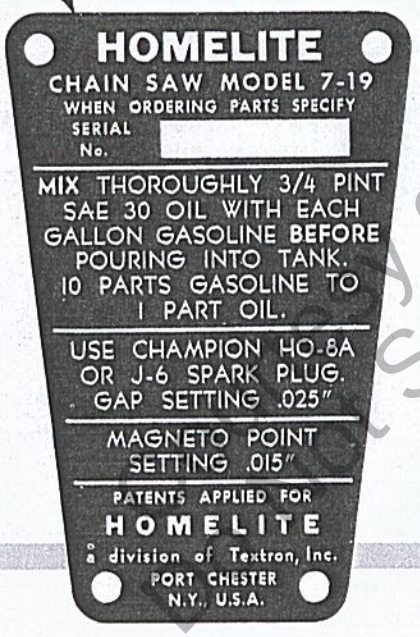
MODEL 7-19

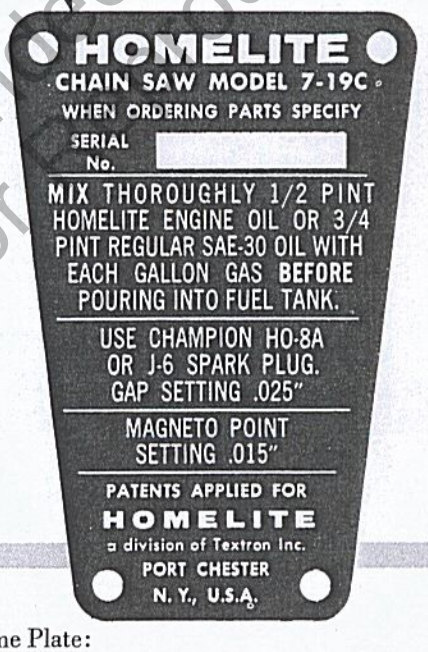
Model 7-19 Direct Drive Saw replaced Model EZ6 in production April, 1958

MODEL 7-19C

Superseded Model 7-19 March, 1959







1. Name Plate:
   Model 7-19
   Serial No._____
2. Colors: Red and Opalescent Green.
3. Decals: 7-19 on pulley cover and fuel tank.

1. Name Plate:
   Model 7-19C
   Serial No._____
   1959 Models: Name Plate includes ½ pint Homelite Engine Oil fuel mix.
2. Colors: Canyon Green instead of Opalescent Green.
3. Decals: Letter "C" enclosed in a lozenge added to decal design.

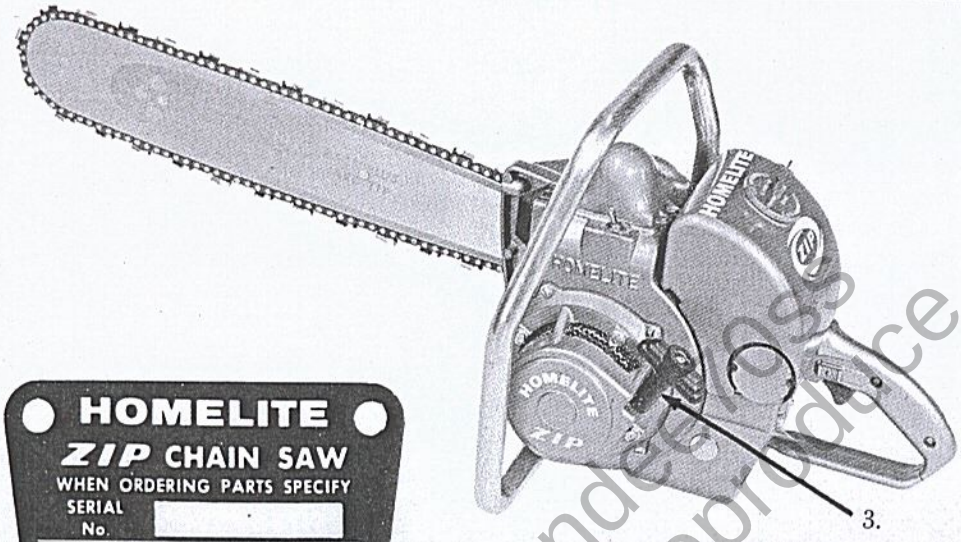
UNIT SPECIFICATIONS

	MODEL 7-19	MODEL 7-19C
BASIC STYLE	Integral Crankcase — Drivecase includes pistol grip and oil reservoir	Integral Crankcase — Drivecase includes pistol grip and oil reservoir
TRANSMISSION		
Type	Direct Drive	Direct Drive
Ratio	1:1	1:1
Sprocket Pitch/No. of Teeth	7/16"-7	7/16"-7
	1/2"-6	1/2"-6
Chain Oil Reservoir	Part of Crankcase	Part of Crankcase
Reservoir Capacity	13 ounces	13 ounces
STARTER TYPE	Ball Drive	Ball Drive
Rotation (from starter side)	Counterclockwise	Counterclockwise
ENGINE		
Bore	2 1/16"	2 1/16"
Stroke	1 1/2"	1 1/2"
Displacement—cu. in.	5.01	5.01
Main Bearing I.D.	.7188/.7185	.7188/.7185
Seal—Magneto Side	Double Garlock	Double Garlock
Seal—Main Bearing	Vellumoid Gasket plus Oilite Bearing	Vellumoid Gasket plus Oilite Bearing
Piston Rings—Height Width End Gap	1/16" .090/.080 .070" min.-.080" max.	1/16" .090/.080 .070" min.-.080" max.
Governor Type	Air	Air
Peak horsepower at	6000 RPM	6000 RPM
IGNITION SYSTEM		
Spark Plug	HO-8A	HO-8A
Spark Plug Gap	.025"	.025"
Type Magneto	Covered Phelon	Covered Phelon
Breaker Point Setting	.015"	.015"
Primary Coil Resistance	.65-.80 ohms	.65-.80 ohms
Secondary Coil Resistance	7500-9000 ohms	7500-9000 ohms
Condenser Capacity	.18-.22 mfds.	.18-.22 mfds.
FUEL INDUCTION SYSTEM		
Tank Construction	Separate Fuel Tank	Separate Fuel Tank
Fuel Capacity	1 qt. 13 oz.	1 qt. 13 oz.
Fuel Feed	Pump	Pump
Type Carburetor	Diaphragm	Diaphragm
Model	HL-27B or 6-CP	HL-27B or 6-CP
May be replaced with	HL-104A w/friction spring	HL-104A w/friction spring
Air Filter	Skinner	Skinner
Type Intake Valve	Pyramid Reed	Pyramid Reed

MODEL ZIP and ZIP5

Direct Drive Saw Introduced July, 1958

COLOR: Homelite Blue Metallic



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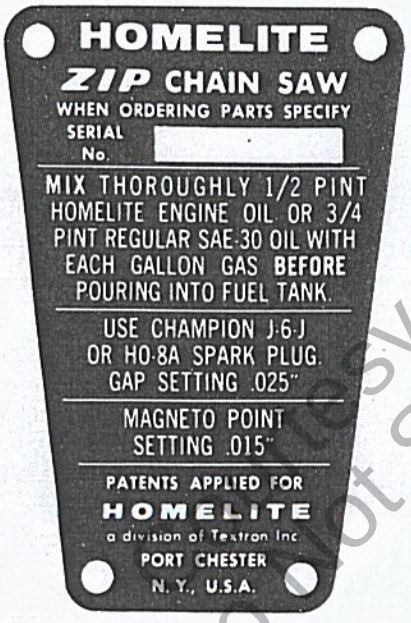


1. Name Plate:
   Same location as on 7-19 and EZ-6.
   Model ZIP
   Serial No._____
   Original production model name plates specify ¾ pint per gallon fuel mix. Beginning May 15, 1959, name plates revised to specify ½ pint of Homelite Oil per gallon of gasoline.
2. Original Equipment: Rubber fuel line; diaphragm pump carburetor (single reed intake valve); 7/16" pitch 7-tooth sprocket.
3. F-M starter, lack of governor linkage, blue paint job distinguish ZIP from 7-19 and EZ series saw models.

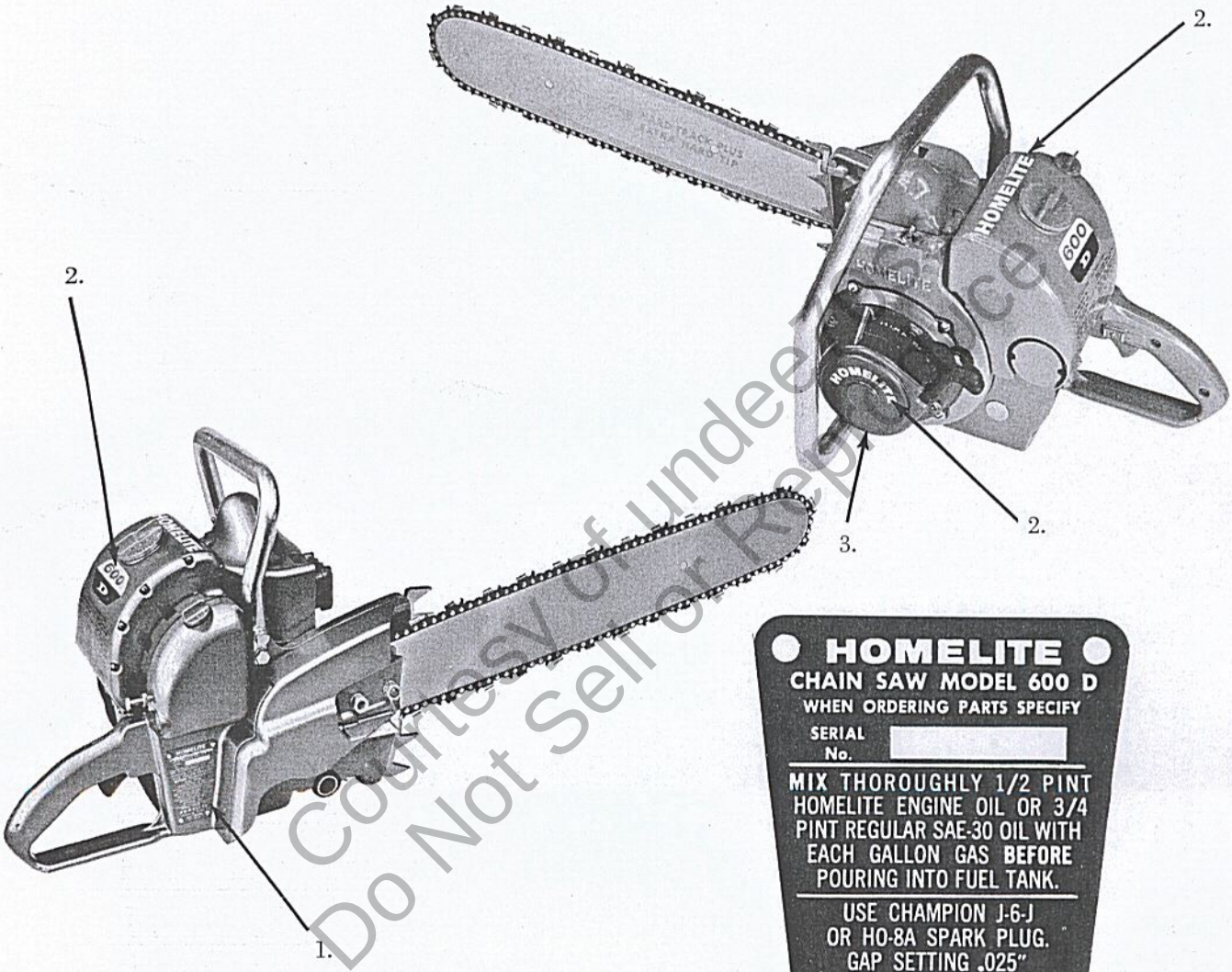
UNIT SPECIFICATIONS

	MODEL ZIP	MODEL ZIP5	
BASIC STYLE	Integral Crankcase-Drivecase includes pistol grip and oil reservoir	Integral Crankcase-Drivecase includes pistol grip and oil reservoir	
TRANSMISSION			
Type	Direct Drive	Direct Drive	
Ratio	1:1	1:1	
Sprocket Pitch/No. of Teeth	7/16"-7 – ½"-6	7/16"-7 – ½"-6	
Chain Oil Reservoir	Part of Crankcase	Part of Crankcase	
Reservoir Capacity	13 ounces	13 ounces	
STARTER TYPE	Fairbanks-Morse	Fairbanks-Morse	
Rotation (from starter side)	Counterclockwise	Counterclockwise	
ENGINE			
Bore	2"	2 1/16"	
Stroke	1½"	1½"	
Displacement—cu. ip.	4.71	5.01	
Main Bearing I.D.	.7188/.7185	.7188/.7185	
Seal—Magneto Side	Double Garlock	Double Garlock	
Seal—Main Bearing	Vellumoid Gasket plus Oilite Bearing	Vellumoid Gasket plus Oilite Bearing	
Piston Rings—Height Width End Gap	1/16" .090/.080 .070" min.-.080" max.	1/16" .090/.080 .070" min.-.080" max.	
Governor Type	None	None	
Peak horsepower at	6000 RPM	6000 RPM	
IGNITION SYSTEM			
Spark Plug	HO-8A	HO-8A	
Spark Plug Gap	.025"	.025"	
Type Magneto	Covered Phelon	Covered Phelon	
Breaker Point Setting	.015"	.015"	
Primary Coil Resistance	.65-.80 ohms	.65-.80 ohms	
Secondary Coil Resistance	7500-9000 ohms	7500-9000 ohms	
Condenser Capacity	.18-.22 mfds.	.18-.22 mfds.	
FUEL INDUCTION SYSTEM			
Tank Construction	Separate Fuel Tank	Separate Fuel Tank	
Fuel Capacity	1 qt. 13 oz.	1 qt. 13 oz.	
Fuel Feed	Pump	Pump	
Type Carburetor	Diaphragm	Diaphragm	
Model	2-CP,6-CP or HL-46B	2-CP,6-CP or HL-46B	
May be replaced with	HL-104A	HL-104A	
Air Filter	Wix	Wix	
Type Intake Valve	Single Reed	Single Reed	

MODEL 600D

A direct drive saw very similar to the ZIP-5 which it superseded in April, 1960.

COLORS: Homelite Red with Canyon Green starter cover.



1. Name Plate:
   Model No. 600D
   Serial No._____
2. Decals: "Homelite" on starter cover and tank; 600D on tank.
3. F-M starter.

UNIT SPECIFICATIONS

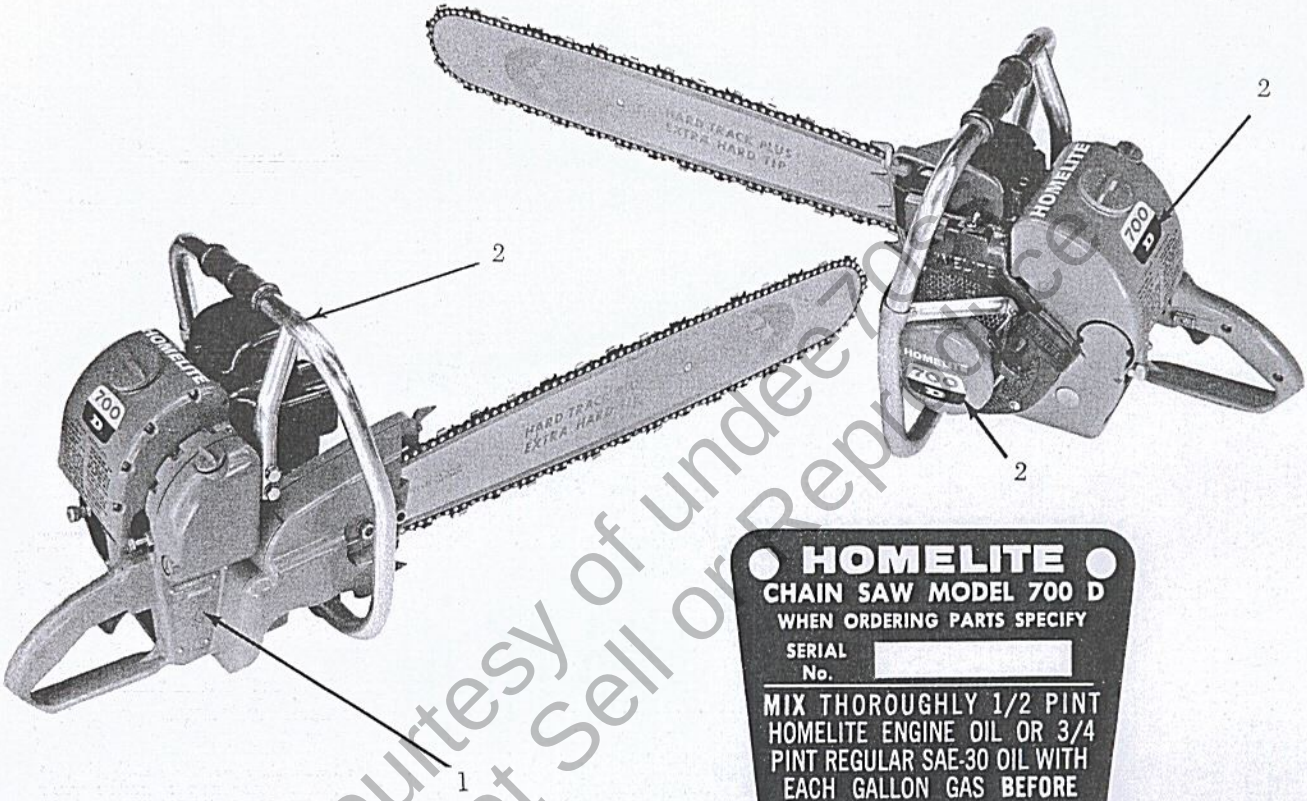
MODEL 600D

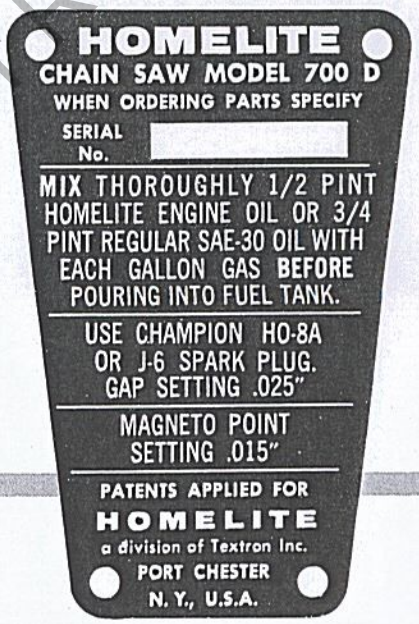
BASIC STYLE	Integral Crankcase-Drivecase includes pistol grip and oil reservoir
TRANSMISSION	
Type	Direct Drive
Ratio	1:1
Sprocket Pitch/No. of Teeth	7/16"-7
Chain Oil Reservoir	Part of Crankcase
Reservoir Capacity	13 ounces
STARTER TYPE	Homelite Ball Drive
Rotation (from starter side)	Counterclockwise
ENGINE	
Bore	2 1/16"
Stroke	1 1/2"
Displacement—cu. in.	5.01
Main Bearing I.D.	.7185/.7188
Seal—Magneto Side	Double Garlock
Seal—Main Bearing	Vellumoid Gasket plus Oilite Bearing
Piston Rings—Height Width End Gap	1/16" .080/.090 .070" min.-.080" max.
Governor Type	None
Peak horsepower at	6000 RPM
IGNITION SYSTEM	
Spark Plug	J-6-J
Spark Plug Gap	.025"
Type Magneto	Covered Phelon
Breaker Point Setting	.015"
Primary Coil Resistance	.65-.80 ohms
Secondary Coil Resistance	7500-9000 ohms
Condenser Capacity	.18-.22 mfd.
FUEL INDUCTION SYSTEM	
Tank Construction	Tank Includes air filter compartment
Fuel Capacity	45 ounces
Fuel Feed	Carb. Diaphragm Pump
Type Carburetor	Diaphragm
Model	HL-46B or 6-CP
May be replaced with	HL-104A
Air Filter	Wix Pleated Paper
Type Intake Valve	Pyramid Reed

MODEL 700D

Premium quality direct drive model of outboard sprocket design, replaced Model 7-19C in production April 1960.

COLORS: Red tank, carburetor shield and starter cover; Canyon Green air screen, shroud and cylinder shield.





1. Name Plate:
   Model No. 700D
   Serial No._____
2. Decals: "Homelite" on cylinder shield; "Homelite 700D" on pulley cover and tank. New style cylinder shield with "Homelite" decal gives 700D a different appearance from all earlier direct drive models.

UNIT SPECIFICATIONS

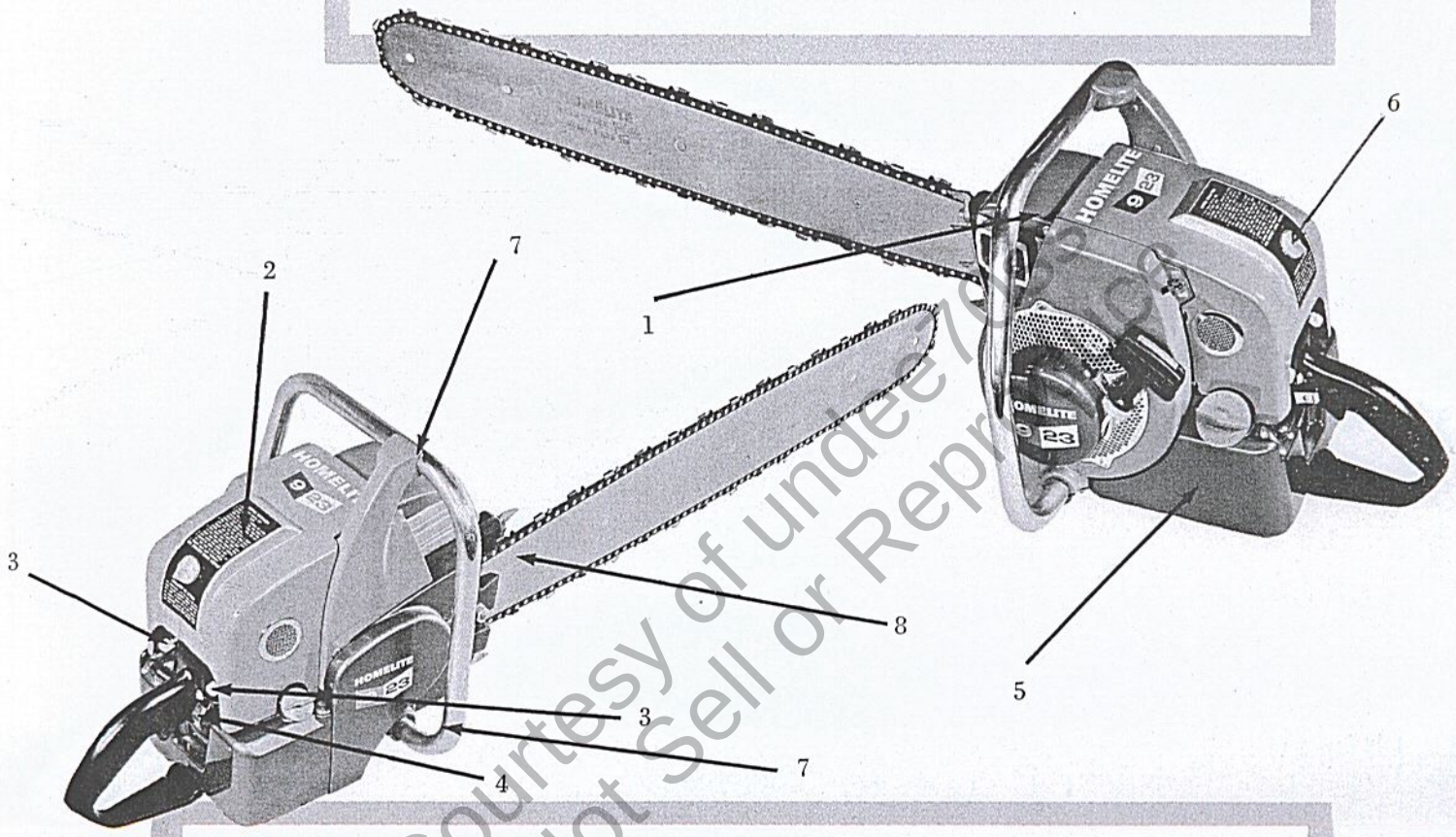
	MODEL 700D (Original with governor)	MODEL 700D (without governor)	MODEL 700DI (with governor)
BASIC STYLE	Integral Crankcase-Drivecase and pistol grip	Same as Model 700D (left) but without governor	Same as Model 700D (left) but with air governor
TRANSMISSION			
Type	Direct Drive		
Ratio	1:1		
Sprocket Pitch/No. of Teeth	7/16"-7		
Chain Oil Reservoir	Part of Crankcase		
Reservoir Capacity	13 ounces		
STARTER TYPE	Homelite Ball Drive		
Rotation (from starter side)	Counterclockwise		
ENGINE			
Bore	2 3/16"		
Stroke	1½"		
Displacement—cu. in.	5.64		
Main Bearing I.D.	.7185/.7188		
Seal—Magneto Side	Double Garlock		
Seal—Main Bearing	Vellumoid Gasket plus Oilite Bearing		
Piston Rings—Height Width End Gap	1/16" 086/.096 .070" min.-.080" max.		
Governor Type	Vane	*	*
Peak horsepower at	6000 RPM		
IGNITION SYSTEM			
Spark Plug	HO-8A		
Spark Plug Gap	.025"		
Type Magneto	Covered Phelon		
Breaker Point Setting	.015"		
Primary Coil Resistance	.65-.80 ohms		
Secondary Coil Resistance	7500-9000 ohms		
Condenser Capacity	.18-.22 mfds.		
FUEL INDUCTION SYSTEM			
Tank Construction	Separate, with air filter and chain oil compartments		
Fuel Capacity	45 ounces		
Fuel Feed	Carb. Diaphragm Pump		
Type Carburetor	Diaphragm		
Model	Tillotson HL-27B; Brown 6-CP	Tillotson HL-104A	HL-104A
May be replaced with	HL-104A		
Air Filter	Microbon Ribbon type element		
Type Intake Valve	Pyramid Reed		

*These models now supplied without governor.
Earlier models have Air-Vane governor.

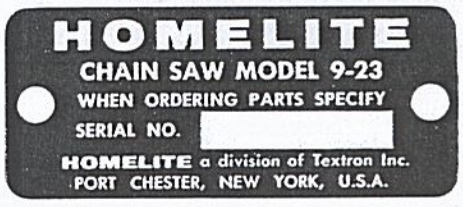
MODEL 9-23

Highest quality direct drive chain saw for professional use.
This is a completely original design incorporating the Homelite Model 9 engine. All parts except drive case, crankcase and transmission are completely interchangeable with the Model 9-26 gear driven chain saw.

COLORS: Homelite red air shroud, cylinder shroud and handle support; Canyon Green fuel tank and pulley cover; black pistol grip.



1. Name Plate:
   A small plate mounted on the front of the air shroud.
   Model No. 9-23
   Serial No._____



2. Instruction decal is on cylinder shroud.
3. Twin chain oiler buttons.
4. Choke lever conveniently located at right side of grip.
5. Fuel tank on bottom of engine unit.
6. Cylinder shroud removable by turning captive nuts for easy access to air filter and spark plug. Air filter cover secured with toggle bolts and wing nuts for quick filter change.
7. Handle bar supported at 3 points; no auxiliary bracing.
8. Guide bar located closer to center line of unit than with previous direct drive models.

UNIT SPECIFICATIONS

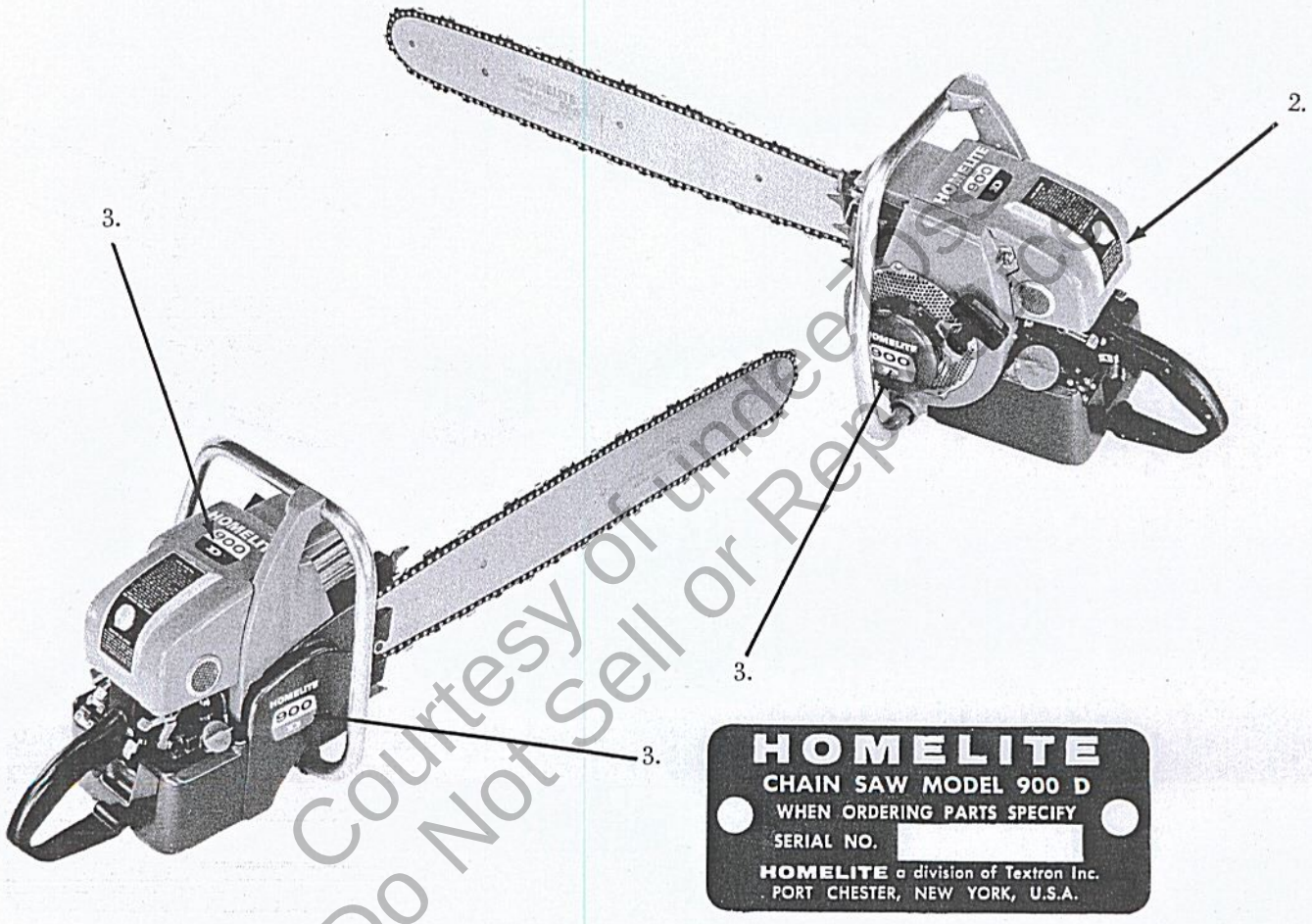
MODEL 9-23

BASIC STYLE	Integral Crankcase — Drivecase Tank on bottom		
TRANSMISSION			
Type	Direct Drive		
Ratio	1:1		
Sprocket Pitch/No. of Teeth	½"-7		
	7/16"-7		
Chain Oil Reservoir	Integral Part of Fuel Tank		
Reservoir Capacity	13 ounces		
STARTER TYPE	Ball Drive		
Rotation (from starter side)	Counterclockwise		
ENGINE			
Bore	2 3/16"		
Stroke	1 5/8"		
Displacement—cu. in.	6.11		
Main Bearing I.D.	.7870/.7874		
Seal—Magneto Side	Single Garter Type Garlock		
Seal—Main Bearing	Vellumoid plus Single Garlock		
Piston Rings—Height Width End Gap	1/16" 086/.096 .070" min.-.080" max.		
Governor Type	Air	West Coast models may have had governors removed	
Peak horsepower at	6000 RPM		
IGNITION SYSTEM			
Spark Plug	HO-3		
Spark Plug Gap	.025"		
Type Magneto	Covered Phelon		
Breaker Point Setting	.015"		
Primary Coil Resistance	.65-.80 ohms		
Secondary Coil Resistance	7500-9000 ohms		
Condenser Capacity	.18-.22 mfds.		
FUEL INDUCTION SYSTEM			
Tank Construction	Integral fuel and chain oil compartments		
Fuel Capacity	1 qt. 24 oz.		
Fuel Feed	Pump		
Type Carburetor	Diaphragm		
Model	HL-62A or HL-62AX		
Air Filter	Wix		
Type Intake Valve	Pyramid Reed		

MODEL 900D

An improved version of the 9-23 chain saw released in April, 1960.

COLOR SCHEME: Black pistol grip; Red cylinder shield, cylinder shroud, air shroud; Canyon Green crankcase, drivecase and fuel tank.



1. Name Plate:
   Model No. 900D
   Serial No._____
2. 900D modifications, such as shortened cylinder shroud have probably been made to many 9-23 units in the field. The name plate is the only reliable source of identification of these models.
3. Decals: 900D on pulley cover, cylinder shroud and drivecase cover.

UNIT SPECIFICATIONS

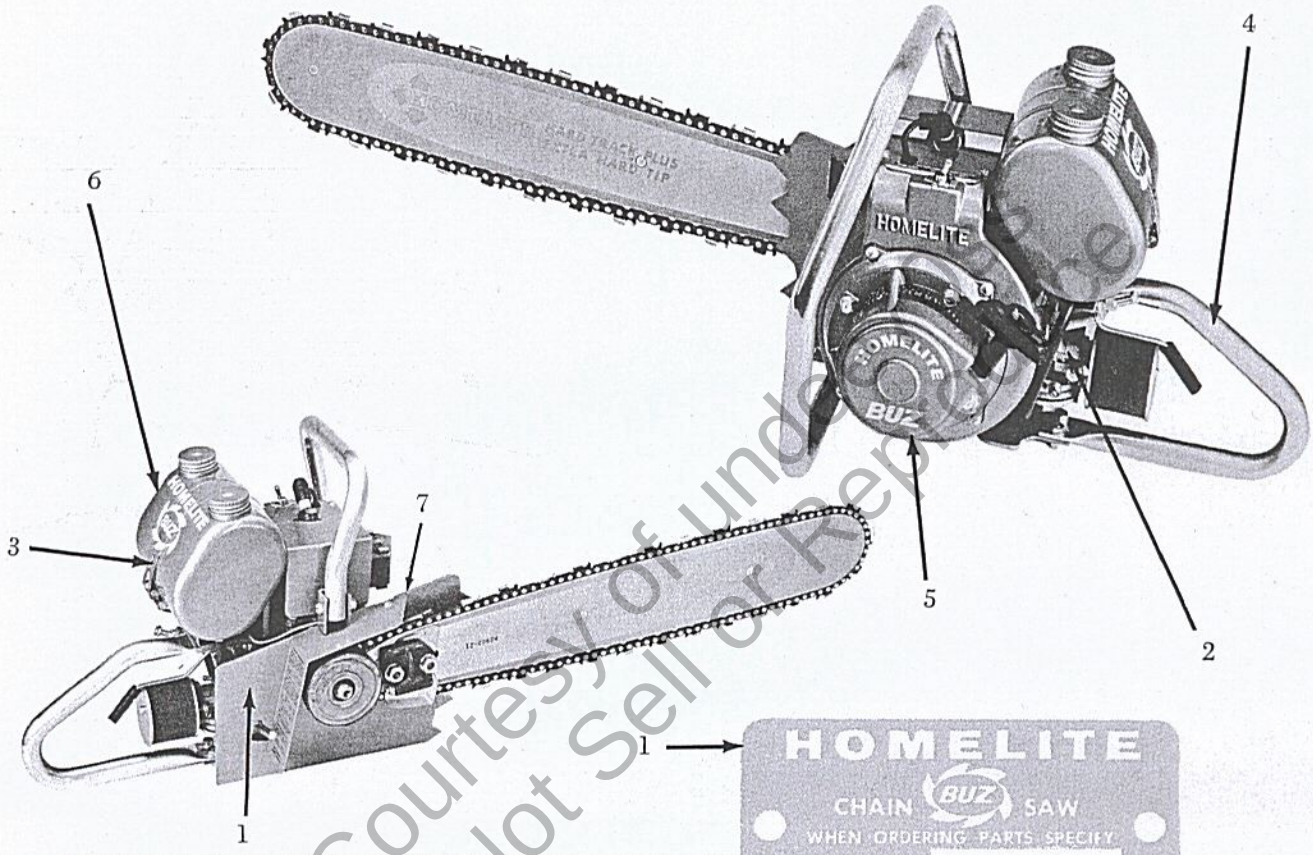
	MODEL 900D (Original w/governor)	900D (no governor)	
BASIC STYLE	Integral Crankcase-Drivecase Tank on Bottom	Same as original but less governor	
TRANSMISSION			
Type	Direct Drive		
Ratio	1:1		
Sprocket Pitch/No. of Teeth	½"-7		
Chain Oil Reservoir	Integral with fuel tank		
Reservoir Capacity	13 ounces		
STARTER TYPE	Homelite Ball Drive		
Rotation (from starter side)	Counterclockwise		
ENGINE			
Bore	2 5/16"		
Stroke	1⅝"		
Displacement—cu. in.	6.83		
Main Bearing I.D.	.7870/.7874		
Seal—Magneto Side	Garlock w/Garter Spring		
Seal—Main Bearing	Garlock w/Garter Spring plus Vellumoid Gasket		
Piston Rings—Height Width End Gap	1/16" .097/.107 .070" min.-.080" max.		
Governor Type	Air-Vane	None	
Peak horsepower at	6000 RPM	6000 RPM	
IGNITION SYSTEM			
Spark Plug	HO-3		
Spark Plug Gap	.025"		
Type Magneto	Covered Phelon		
Breaker Point Setting	.015"		
Primary Coil Resistance	.65-.80 ohms		
Secondary Coil Resistance	7500-9000 ohms		
Condenser Capacity	.18-.22 mfd.		
FUEL INDUCTION SYSTEM			
Tank Construction	Bottom Mounted		
Fuel Capacity	56 ounces		
Fuel Feed	Carburetor Diaphragm Pump		
Type Carburetor	Diaphragm		
Model	HL-62A or HL-62AX	HL-62AX	
Air Filter	Wix Pleated Paper Fiberglas optional		
Type Intake Valve	Pyramid Reed		

BLANK SPACES IN THIS COLUMN SAME AS LEFT COLUMN

MODEL BUZ

A quality low cost direct drive saw, introduced Sept., 1959

COLOR: Surf Green (light metallic green)



1. Name Plate:
   Small ($1\frac{1}{8}$ x $2\frac{5}{16}$) metal plate mounted on drive plate below fuel tank.
   Model BUZ (separate instruction decal on chain guard).
   Serial No._____
2. Exposed spark plug and high-tension lead.
3. Strap-mounted fuel tank.
4. Tubular aluminum pistol grip. Has no throttle lock. Exposed ribbon-skinner air filter.
5. F-M starter.
6. BUZ decals on tank
7. Crankcase bolted to separate steel drive plate.

UNIT SPECIFICATIONS

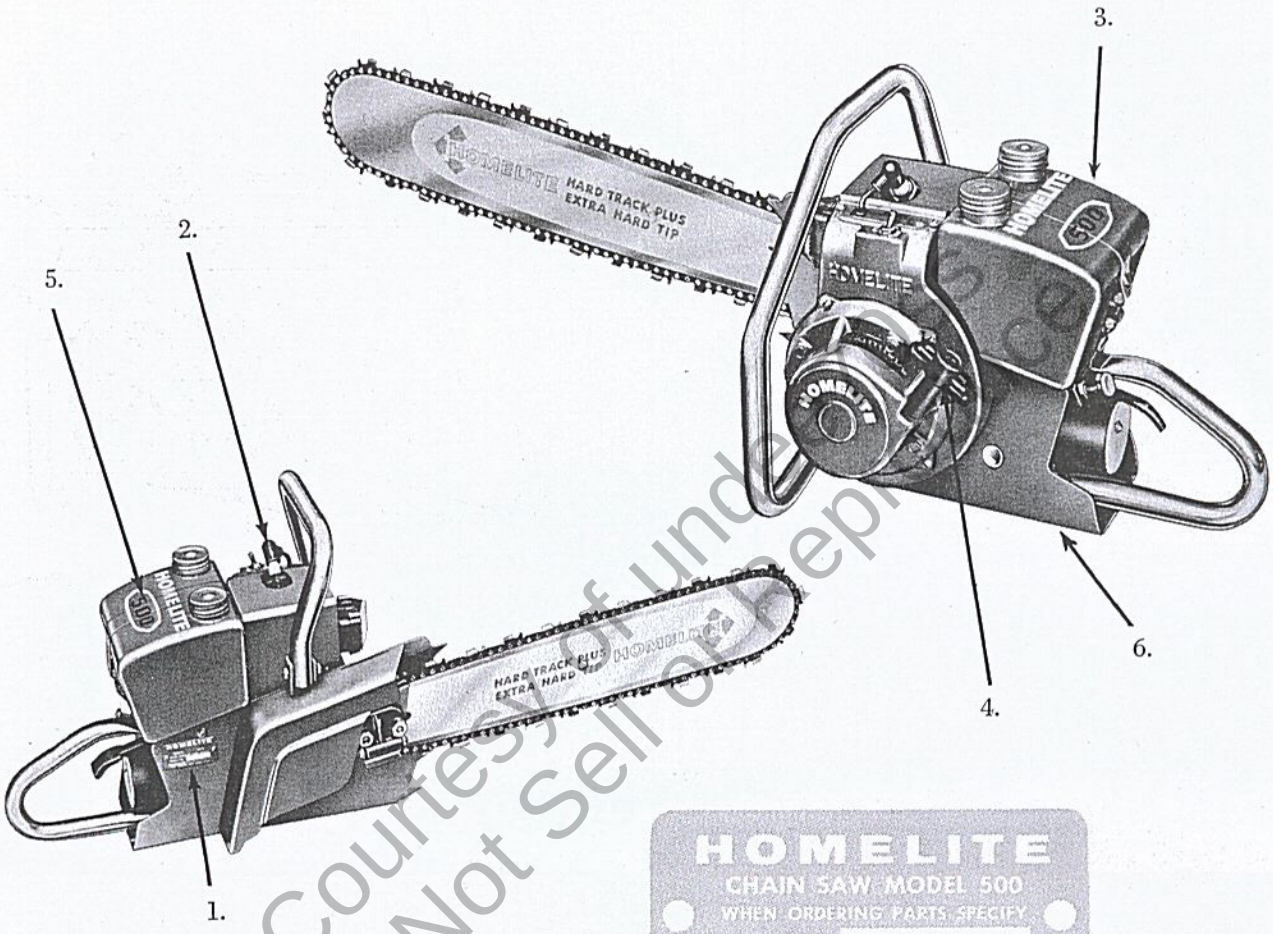
	MODEL BUZ	BUZ (m)	
BASIC STYLE	Separate drive plate, throttle grip and tank bolted to 1-Piece Crankcase		
TRANSMISSION			
Type	Direct Drive		
Ratio	1:1		
Sprocket Pitch/No. of Teeth	7/16"-7		
	½"-7		
Chain Oil Reservoir	Integral fuel tank and chain oil reservoir		
Reservoir Capacity	23 ounces		
STARTER TYPE	Fairbanks-Morse		
Rotation (from starter side)	Counterclockwise		
ENGINE			
Bore	2"		
Stroke	1½"		
Displacement—cu. in.	4.71		
Main Bearing I.D.	.7188/.7185		
Seal—Magneto Side	Double Garlock		
Seal—Main Bearing	Vellumoid Gasket plus Oilite Bearing		
Piston Rings—Height Width End Gap	1/16" .090/.080 .070" min.-.080" max.		
Governor Type	None		
Peak horsepower at	6000 RPM		
IGNITION SYSTEM			
Spark Plug	J-6-J		
Spark Plug Gap	.025"		
Type Magneto	Covered Phelon		
Breaker Point Setting	.015"		
Primary Coil Resistance	.65-.80 ohms		
Secondary Coil Resistance	7500-9000 ohms		
Condenser Capacity	.18-.22 mfds.		
FUEL INDUCTION SYSTEM			
Tank Construction	Integral fuel and chain oil compartments		
Fuel Capacity	1 qt. 8 oz.		
Fuel Feed	Pump		
Type Carburetor	Diaphragm		
Model	HL-82 or 9-CP		
May be replaced with	HL-82		
Air Filter	Skinner (Exposed)		
Type Intake Valve	Single Reed		

All features same as original Buz except for 500-type chain oiler.

MODEL 500

A quality, low cost direct drive saw introduced July, 1960.

COLOR: Light Blue Metallic (Red after January, 1961).



1. Name Plate:
   Model No. 500
   Serial No._____
2. Exposed spark plug and high-tension lead.
3. Formed-metal, strap-mounted fuel tank contoured to shape of engine.
4. F-M starter.
5. 500 decals on tank.
6. Carburetor and air filter protected by rear guard, bolted to the drive plate and fuel tank saddle.

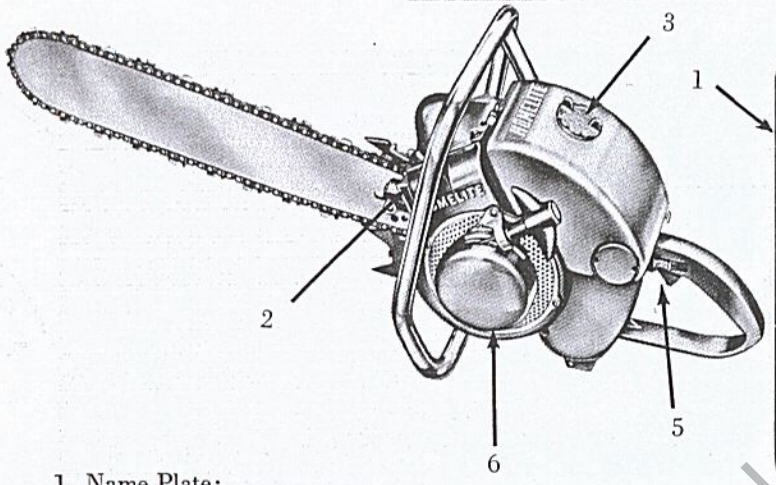
UNIT SPECIFICATIONS

	MODEL 500		
BASIC STYLE	One-piece Crankcase. Separate pistol grip, fuel tank, and drive plate		
TRANSMISSION			
Type	Direct Drive		
Ratio	1:1		
Sprocket Pitch/No. of Teeth	⅛"		
Chain Oil Reservoir	Integral w/ Fuel Tank		
Reservoir Capacity	20 ounces		
STARTER TYPE	Fairbanks-Morse		
Rotation (from starter side)	Counterclockwise		
ENGINE			
Bore	2"		
Stroke	1½"		
Displacement—cu. in.	4.71		
Main Bearing I.D.	.7188/.7185		
Seal—Magneto Side	Double Garlock		
Seal—Main Bearing	Vellumoid Gasket		
Piston Rings—Height Width End Gap	 .080/.090 .070-.080		
Governor Type	None		
Peak horsepower at	6000 RPM		
IGNITION SYSTEM			
Spark Plug	J6J/HO-8A		
Spark Plug Gap	.025"		
Type Magneto	Phelon		
Breaker Point Setting	.015"		
Primary Coil Resistance	.65-.80 ohms		
Secondary Coil Resistance	7500-9500 ohms		
Condenser Capacity	.18-.22 mfds.		
FUEL INDUCTION SYSTEM			
Tank Construction	Die-Cast: integral fuel and chain oil compartments		
Fuel Capacity	1 qt. 14 oz.		
Fuel Feed	Diaphragm pump on carburetor		
Type Carburetor	Diaphragm		
Model	TILL HL-82A		
May be replaced with	Brown 9-CP		
Air Filter	Skinner		
Type Intake Valve	Flat Reed		

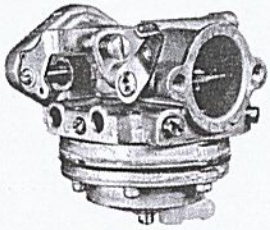
MODEL 17

Introduced February, 1954—Superseded July, 1956 by Model 17L

COLORS: Red with Green Pulley Cover,
Air Shroud and Cylinder Shield.



1. Name Plate:
   Model No. 17
   Serial No.—Letter "W" stamped after serial number designates Wico Magneto.
   Letter "P" or no letter indicates Phelon Magneto.
2. Muffler smaller than on 5-20 engines.
3. Fuel cap has relief valve installed.
4. Tillotson Model HP-1B Pump diaphragm carburetor fed by brass fuel line.
5. Throttle trigger on underside of pistol grip.
6. Pulley and gear case covers have no identifying decals.



MODEL 17L

The letter "L" after the Model Number on the Saw's Name Plate indicates incorporation of a flexible fuel line and Tillotson Model HL-4 series pump Carburetor. The Model HL Carburetors have a white nylon fuel pump cover.

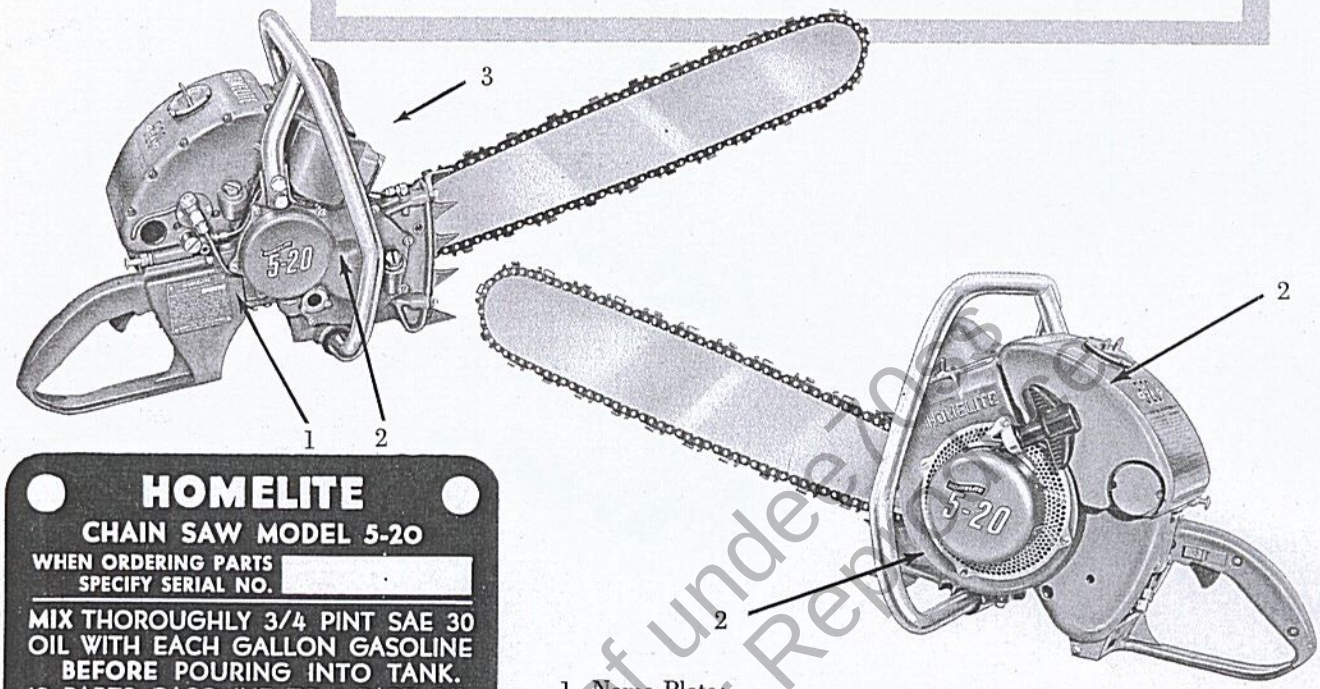
UNIT SPECIFICATIONS

	MODEL 17	MODEL 17L
BASIC STYLE	Integral Crankcase – Gearcase. Tank and pistol grip separate.	Integral Crankcase – Gearcase. Tank and pistol grip separate.
TRANSMISSION		
Type	Two-gear	Two-gear
Ratio	3.57:1	3.57:1
Sprocket Pitch/No. of Teeth	½"-6	½"-6
Chain Oil Reservoir	Integral fuel tank and chain oil reservoir	Integral fuel tank and chain oil reservoir
Reservoir Capacity	5 ounces	5 ounces
STARTER TYPE	Ball Drive	Ball Drive
Rotation (from starter side)	Clockwise	Clockwise
ENGINE		
Bore	2"	2"
Stroke	1⅜"	1⅜"
Displacement—cu. in.	4.32	4.32
Main Bearing I.D.	.6693/.6690	.6693/.6690
Seal—Magneto Side	Double Garlock	Double Garlock
Seal—Main Bearing	Vellumoid Gasket plus Double Garlock	Vellumoid Gasket plus Double Garlock
Piston Rings—Height Width End Gap	1/16" .090/.080 .070" min.-.080" max.	1/16" .090/.080 .070" min.-.080" max.
Governor Type	Air	Air
Peak horsepower at	6000 RPM	6000 RPM
IGNITION SYSTEM		
Spark Plug	HO-8A	HO-8A
Spark Plug Gap	.025"	.025"
Type Magneto	(P) Phelon or (W) Wico	(P) Phelon or (W) Wico
Breaker Point Setting	.015"	.015"
Primary Coil Resistance	.77 ohms	.77 ohms
Secondary Coil Resistance	3500 ohms	3500 ohms
Condenser Capacity	(P) .16-.18 mfds. (W) .16-.20 mfds.	(P) .16-.18 mfds. (W) .16-.20 mfds.
FUEL INDUCTION SYSTEM		
Tank Construction	Integral fuel and chain oil compartments	Integral fuel and chain oil compartments
Fuel Capacity	1 qt. 8 oz.	1 qt. 8 oz.
Fuel Feed	Pump (on carburetor)	Pump (on carburetor)
Type Carburetor	Diaphragm	Diaphragm
Model	HP-1B	HL-4A*
Air Filter	Skinner	Skinner
Type Intake Valve	Single Reed	Single Reed

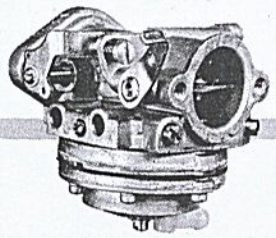
* For replacement carburetor on Model 17L, use HL-104A with throttle friction spring.

MODEL 5-20

Introduced September, 1955 – Superseded April, 1956 by Model 5-20L
COLORS: Red with Green Shroud,
Pulley Cover and Cylinder Shield.



1. Name Plate:
   Model No. 5-20
   Serial Number: "W" designates WICO Magneto; letter "P" or no letter designates PHELON Magneto.
2. "HOMELITE 5-20" Decals on pulley cover, gear case cover; "HOMELITE" and "5-20" with starting instructions appear on fuel tank.
3. Muffler larger than on Model 17 saws.



MODEL 5-20L

The letter "L" after the Model Number on the Saw's Name Plate indicates incorporation of a flexible fuel line in conjunction with either Tillotson Model HL series or Brown Model CS series Carburetor. The HL type Carburetors have a white nylon fuel pump cover. CS type Carburetors have a metal fuel pump cover. Letter "B" added to saw's serial number indicates CS type Carburetor.

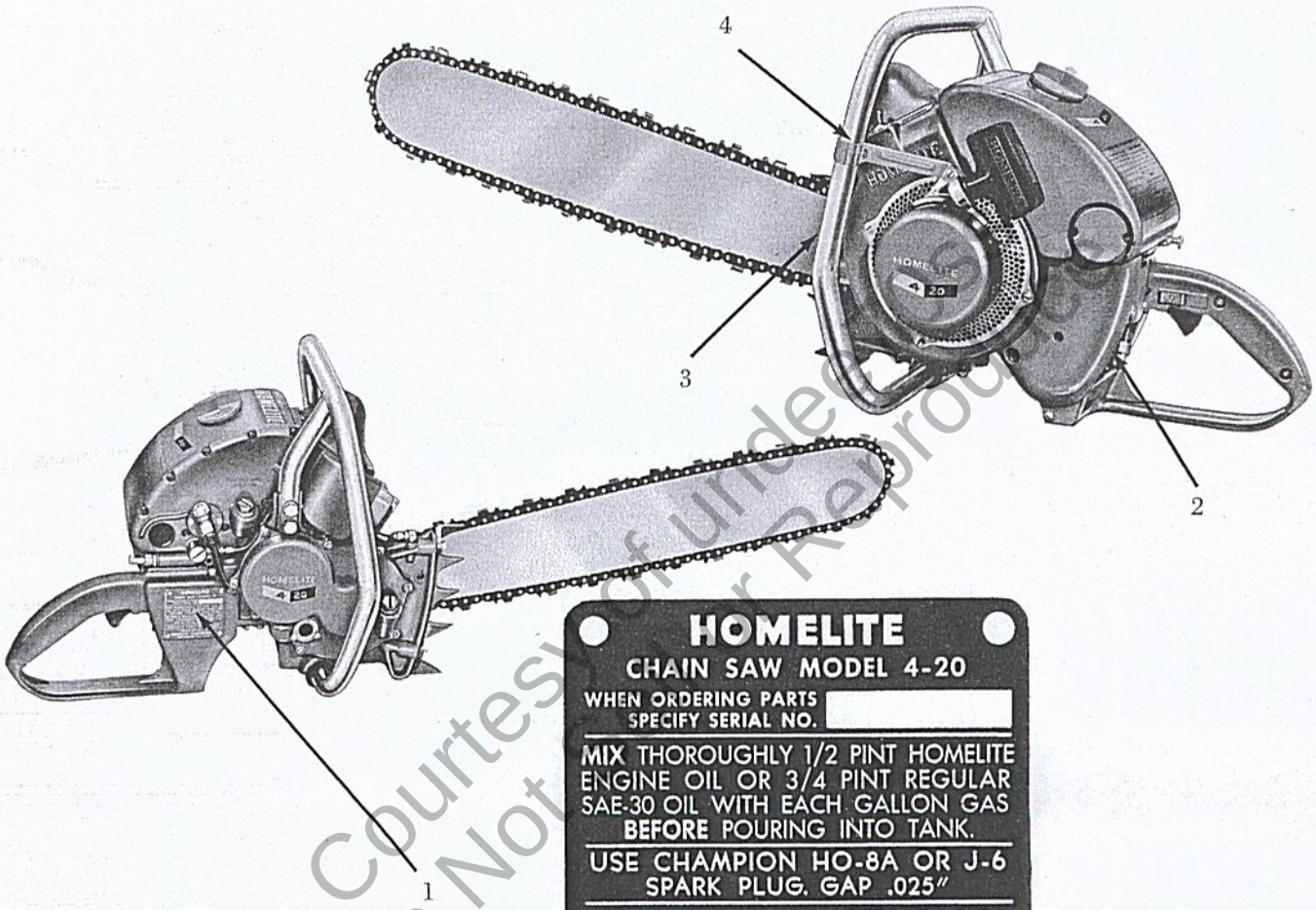
UNIT SPECIFICATIONS

	MODEL 5-20	5-20L	
BASIC STYLE	Integral Crankcase — Gearcase. Tank and pistol grip separate.	Integral Crankcase — Gearcase. Tank and pistol grip separate.	
TRANSMISSION			
Type	Two-gear	Two-gear	
Ratio	3.57:1	3.57:1	
Sprocket Pitch/No. of Teeth	½"-6 — ½"-8	½"-6 — ½"-8	
Chain Oil Reservoir	Integral fuel tank and chain oil reservoir	Integral fuel tank and chain oil reservoir	
Reservoir Capacity	5 ounces	5 ounces	
STARTER TYPE	Ball Drive	Ball Drive	
Rotation (from starter side)	Clockwise	Clockwise	
ENGINE			
Bore	2 1/16"	2 1/16"	
Stroke	1½"	1½"	
Displacement—cu. in.	5.01	5.01	
Main Bearing I.D.	.6693/.6690	.6693/.6690	
Seal—Magneto Side	Double Garlock	Double Garlock	
Seal—Main Bearing	Vellumoid Gasket plus Double Garlock	Vellumoid Gasket plus Double Garlock	
Piston Rings—Height Width End Gap	1/16" .090/.080 .070" min.-.080" max.	1/16" .090/.080 .070" min.-.080" max.	
Governor Type	Air	Air	
Peak horsepower at	6000 RPM	6000 RPM	
IGNITION SYSTEM			
Spark Plug	HO-8A	HO-8A	
Spark Plug Gap	.025"	.025"	
Type Magneto	(P) Phelon or (W) Wico	(P) Phelon or (W) Wico	
Breaker Point Setting	.015"	.015"	
Primary Coil Resistance	(P) .65-.80 ohms (W) .41-.47 ohms	(P) .65-.80 ohms (W) .41-.47 ohms	
Secondary Coil Resistance	(P) 7500-9000 ohms (W) 3500-4500 ohms	(P) 7500-9000 ohms (W) 3500-4500 ohms	
Condenser Capacity	(P) .18-.22 mfds. (W) .16-.20 mfds.	(P) .18-.22 mfds. (W) .16-.20 mfds.	
FUEL INDUCTION SYSTEM			
Tank Construction	Integral fuel and chain oil compartments	Integral fuel and chain oil compartments	
Fuel Capacity	1 qt. 13 oz.	1 qt. 13 oz.	
Fuel Feed	Pump	Pump	
Type Carburetor	Diaphragm	Diaphragm	
Model	HP-15B	HL-4A	
May be replaced with		HL-104A	
Air Filter	Skinner	Skinner	
Type Intake Valve	Single Reed	Single Reed	

MODEL 4-20

Replaced Model 17L in Production September, 1957

COLORS: Red with Green Pulley Cover and 4-20 Decals. Later Production Models changed to Canyon Green.



1. Name Plate:
   Model No. 4-20
   Serial Number — Six-digit series has Wico Magneto.
   Seven-digit series has covered Phelon Magneto.
   1959 Models: Name Plate includes ½ pint Homelite Engine Oil fuel mix.
2. Has 4-reed intake valve and Brown 5-CS carburetor; rubber fuel line with nylon clip.
3. Originally factory built with 6-tooth, 1/2" pitch sprocket.
4. Has handle bar brace.

UNIT SPECIFICATIONS

	MODEL 4-20	4-20(m) ((m) = modified)	
BASIC STYLE	Integral Crankcase – Gearcase. Tank and pistol grip separate.	Integral Crankcase – Gearcase. Tank and pistol grip separate.	
TRANSMISSION		Changed to 700-type Sprocket Shaft	
Type	Two-gear		
Ratio	3.57:1		
Sprocket Pitch/No. of Teeth	7/16"-7	½"-8	
	½"-6		
Chain Oil Reservoir	Integral fuel tank and chain oil reservoir	Same	
Reservoir Capacity	5 ounces		
STARTER TYPE	Ball Drive		
Rotation (from starter side)	Clockwise		
ENGINE			
Bore	2"		
Stroke	1⅜"		
Displacement—cu. in.	4.32		
Main Bearing I.D.	.6693/.6690	.7185"/.7188"	
Seal—Magneto Side	Double Garlock		
Seal—Main Bearing	Vellumoid Gasket plus Double Garlock	Garlock w/Garter Spring plus Vellumoid Gasket	
Piston Rings—Height Width End Gap	1/16" .090/.080 .070" min.-.080" max.		
Governor Type	Air		
Peak horsepower at	6000 RPM		
IGNITION SYSTEM			
Spark Plug	HO-8A		
Spark Plug Gap	.025"		
Type Magneto	Covered Phelon or Wico		
Breaker Point Setting	.015"		
Primary Coil Resistance	(P) .65-.80 ohms (W) .77 ohms		
Secondary Coil Resistance	(P) 7500-9000 ohms (W) 3500 ohms		
Condenser Capacity	(P) .18-.22 mfds. (W) .16-.20 mfds.		
FUEL INDUCTION SYSTEM			
Tank Construction	Integral fuel and chain oil compartments		
Fuel Capacity	45 ounces	45 ounces	
Fuel Feed	Pump	Pump	
Type Carburetor	Diaphragm	Diaphragm	
Model	5-CS, 1-CP, 6-CP, HL-27B	HL-104A	
May be replaced with	HL-104A		
Air Filter	Skinner	Skinner w/plastisol ends	
Type Intake Valve	Pyramid reed	Pyramid reed	

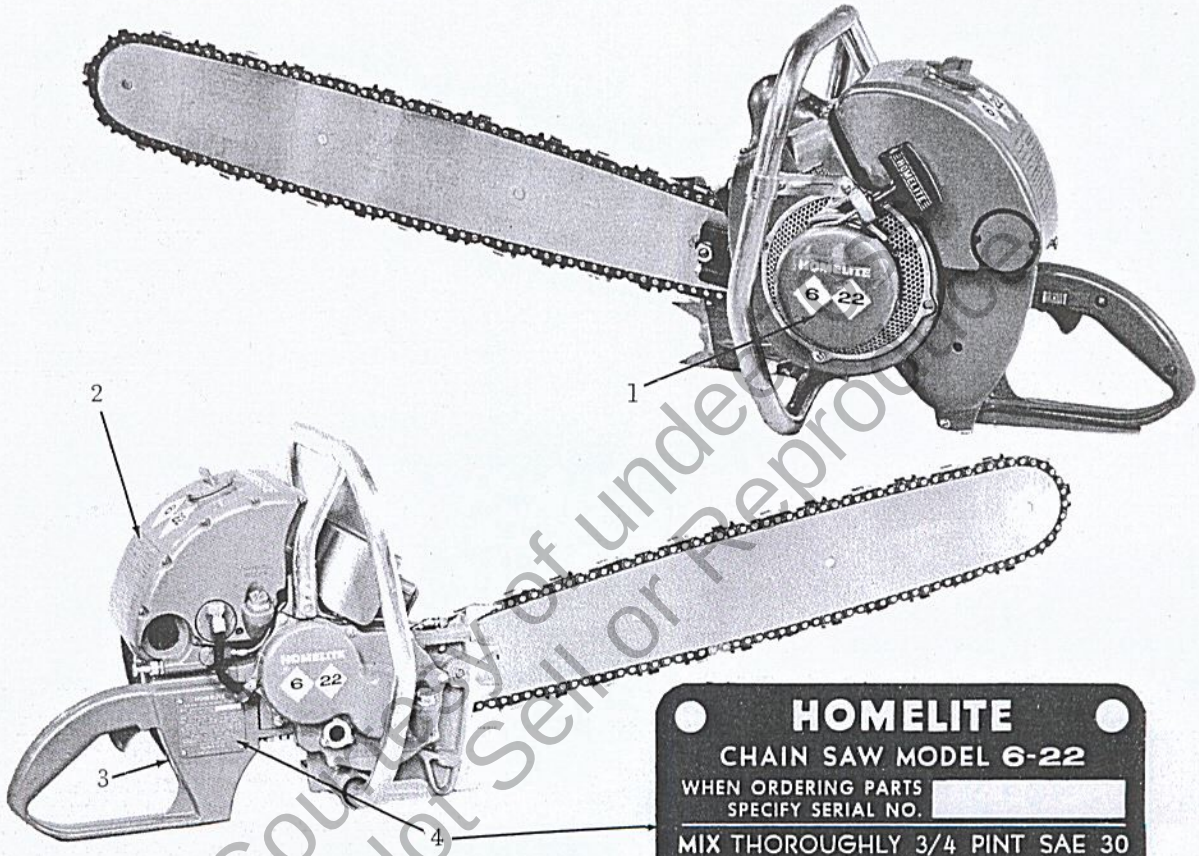
BLANK SPACES IN THIS COLUMN SAME AS LEFT COLUMN

MODEL 6-22

Gear Drive Model (3.57:1 ratio) Introduced June, 1957.

Gear Drive Model (2:1 ratio) Produced September, 1957 (from Serial No. 758245 and on all 7-digit serial No. units.)

COLORS: Red with Green Cylinder Shield, Air Shroud and Pulley Cover.



1. Black and Green 6-22 foils on tank and sides.
2. Wider fuel tank than on earlier gear drive models.
3. May have either Brown 5-CS or Tillotson HL-27B pump carburetor; 4-reed intake valve design.
4. Name Plate:
   a) Serial number below 758245 – built in Port Chester, with 3.57:1 gear ratio. (See Parts List #23210.)
   b) Seven digit serial numbers and six digit numbers from 758245 — built in Gastonia — these units have 2:1 ratio gears, larger bore drive gear bearing and clutch spider, thicker crankshaft with large I. D. main bearing and new garlock seal. (See Parts List #23210-1.)

UNIT SPECIFICATIONS

	MODEL 6-22(1)	MODEL 6-22(2)	
BASIC STYLE	Integral Crankcase — Gearcase. Tank and pistol grip separate.	Integral Crankcase — Gearcase. Tank and pistol grip separate.	
TRANSMISSION			
Type	Two-Gears	Two-Gears	
Ratio	2:1	3.57:1	
Sprocket Pitch/No. of Teeth	½"-8	½"-8	
Chain Oil Reservoir	Integral fuel tank and chain oil reservoir	Integral fuel tank and chain oil reservoir	
Reservoir Capacity	6¾ ounces	6¾ ounces	
STARTER TYPE	Ball Drive	Ball Drive	
Rotation (from starter side)	Clockwise	Clockwise	
ENGINE			
Bore	2 1/16"	2 1/16"	
Stroke	1½"	1½"	
Displacement—cu. in.	5.01	5.01	
Main Bearing I.D.	.6693/.6690	.7188/.7185	
Seal—Magneto Side	Double Garlock	Double Garlock	
Seal—Main Bearing	Vellumoid Gasket plus Double Garlock	Vellumoid Gasket plus Double Garlock	
Piston Rings—Height Width End Gap	1/16" .090/.080 .070" min.-.080" max.	1/16" .090/.080 .070" min.-.080" max.	
Governor Type	Air	Air	
Peak horsepower at	6000 RPM	6000 RPM	
IGNITION SYSTEM			
Spark Plug	HO-8A	HO-8A	
Spark Plug Gap	.025"	.025"	
Type Magneto	Covered Phelon	Covered Phelon	
Breaker Point Setting	.015"	.015"	
Primary Coil Resistance	.65-.80 ohms	.65-.80 ohms	
Secondary Coil Resistance	7500-9000 ohms	7500-9000 ohms	
Condenser Capacity	.18-.22 mfds.	.18-.22 mfds.	
FUEL INDUCTION SYSTEM			
Tank Construction	Integral fuel and chain oil compartments	Integral fuel and chain oil compartments	
Fuel Capacity	2 quarts	2 quarts	
Fuel Feed	Pump	Pump	
Type Carburetor	Diaphragm	Diaphragm	
Model	5-CS or HL-27B	HL-27B or 6-CP	
May be replaced with	HL-104A	HL-104A	
Air Filter	Skinner	Skinner	
Type Intake Valve	Pyramid Reed	Pyramid Reed	

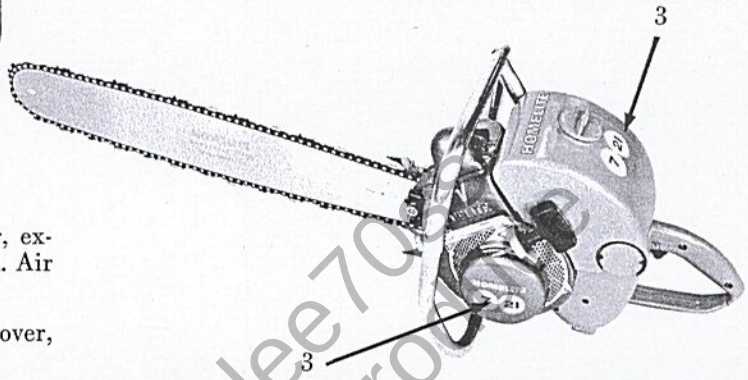
MODEL 7-21

A gear driven chain saw resembling the Model 6-22 which it superseded in April, 1958

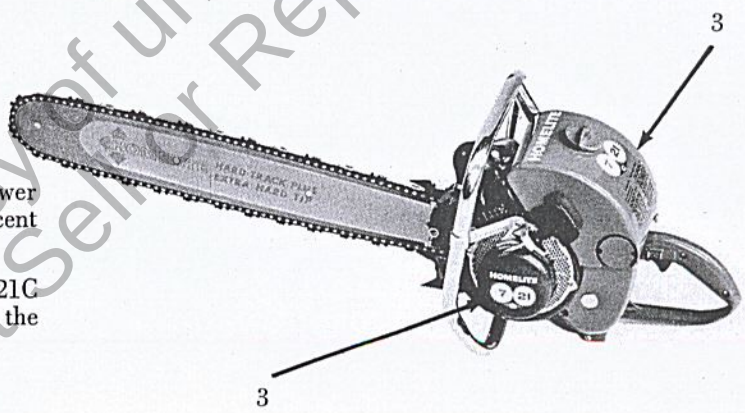
Reduction ratios offered:

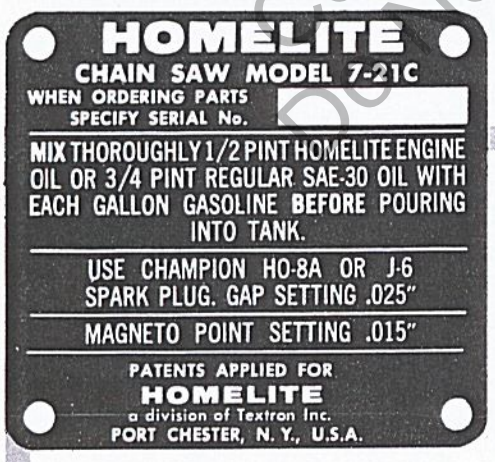
Standard ratio: 2:1
Optional ratio: 3.57:1

1. Name Plate:
   Model No. 7-21
   Serial No._____
2. Color scheme:
   Red with Opalescent Green pulley cover, exhaust cap, cylinder shield and air shroud. Air screen painted silver.
3. Decals: "Homelite 7-21" on pulley cover, drive case cover and fuel tank.



1. Name Plate:
   Model No. 7-21C or 7-21CFM
   Serial No._____
2. Color scheme:
   Same as Model 7-21 except for use of newer "Canyon Green" in place of "Opalescent Green".
3. Decals: Both 7-21C and 7-21CFM carry 7-21C decals which feature a lozenge bearing the letter "C".





MODEL 7-21C and 7-21CFM

Model 7-21C replaced 7-21 in production March, 1959. Model 7-21CFM is a variation of Model 7-21C incorporating an F-M type recoil starter.

Reduction ratios offered:

Standard ratio: 2.84:1
Optional ratios: 3.57:1 or 2:1

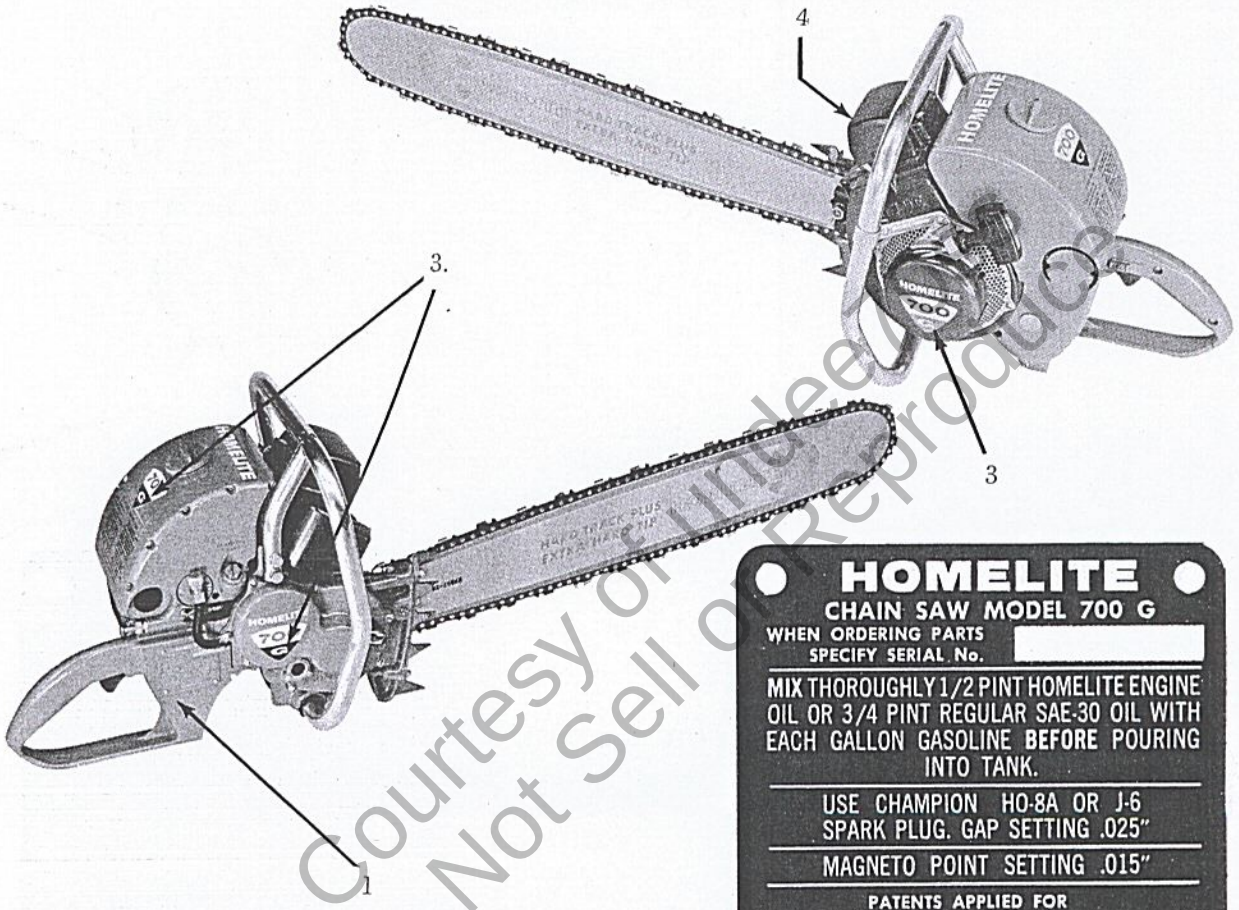
UNIT SPECIFICATIONS

	MODEL 7-21	7-21C	7-21CFM
BASIC STYLE	Integral Crankcase — Gearcase. Tank and pistol grip separate.	Integral Crankcase — Gearcase. Tank and pistol grip separate.	Integral Crankcase — Gearcase. Tank and pistol grip separate.
TRANSMISSION			
Type	Two-gear	Two-gear	Two-gear
Ratio	2:1	2.84 : 1	2.84 : 1
Sprocket Pitch/No. of Teeth	½"-8	½"-8	½"-8
Chain Oil Reservoir	Integral fuel tank and chain oil reservoir	Integral fuel tank and chain oil reservoir	Integral fuel tank and chain oil reservoir
Reservoir Capacity	6¾ ounces	6¾ ounces	6¾ ounces
STARTER TYPE	Ball Drive	Ball Drive	Ball Drive
Rotation (from starter side)	Clockwise	Clockwise	Clockwise
ENGINE			
Bore	2 1/16"	2 1/16"	2 1/16"
Stroke	1½"	1½"	1½"
Displacement—cu. in.	5.01	5.01	5.01
Main Bearing I.D.	.7188/.7185	.7188/.7185	.7188/.7185
Seal—Magneto Side	Double Garlock	Double Garlock	Double Garlock
Seal—Main Bearing	Vellumoid Gasket plus Single Garlock	Vellumoid Gasket plus Single Garlock	Vellumoid Gasket plus Single Garlock
Piston Rings—Height Width End Gap	1/16" .090/.080 .070" min.-.080" max.	1/16" .090/.080 .070" min.-.080" max.	1/16" .090/.080 .070" min.-.080" max.
Governor Type	Air	Air	Air
Peak horsepower at	6000 RPM	6000 RPM	6000 RPM
IGNITION SYSTEM			
Spark Plug	HO-8A	HO-8A	HO-8A
Spark Plug Gap	.025"	.025"	.025"
Type Magneto	Covered Phelon	Covered Phelon	Covered Phelon
Breaker Point Setting	.015"	.015"	.015"
Primary Coil Resistance	.65-.80 ohms	.65-.80 ohms	.65-.80 ohms
Secondary Coil Resistance	7500-9000 ohms	7500-9000 ohms	7500-9000 ohms
Condenser Capacity	.18-.22 mfd.	.18-.22 mfd.	.18-.22 mfd.
FUEL INDUCTION SYSTEM			
Tank Construction	Integral fuel and chain oil compartments	Integral fuel and chain oil compartments	Integral fuel and chain oil compartments
Fuel Capacity	2 quarts	2 quarts	2 quarts
Fuel Feed	Pump	Pump	Pump
Type Carburetor	Diaphragm	Diaphragm	Diaphragm
Model	5-CS or HL-27B	HL-27B, 1-CP or 6-CP	HL-27B, 1-CP or 6-CP
May be replaced with	HL-104A	HL-104A	HL-104A
Air Filter	Skinner	Skinner	Skinner
Type Intake Valve	Pyramid Reed	Pyramid Reed	Pyramid Reed

MODEL 700G and 700GFM

The 700G and 700GFM, respectively, superseded 7-21C and 7-21CPM models in April, 1960.

700G Model Variations: supplied with either 2.84:1 or 3.57:1 gearing, some models with and some without air governor.



1. Name Plate:
   Model No. 700G (700GFM same as 700G except with F-M starter).
   Serial No._____
2. Color scheme:
   Red tank, carburetor guard, pistol grip, gearcase cover.
   Canyon Green starter cover, cylinder shield and air shroud.
3. Decals: 700G on tank, starter pulley cover, gearcase cover; "Homelite" decal on starter of 700GFM.
4. Has new shape cylinder shield with "Homelite" decal.

UNIT SPECIFICATIONS

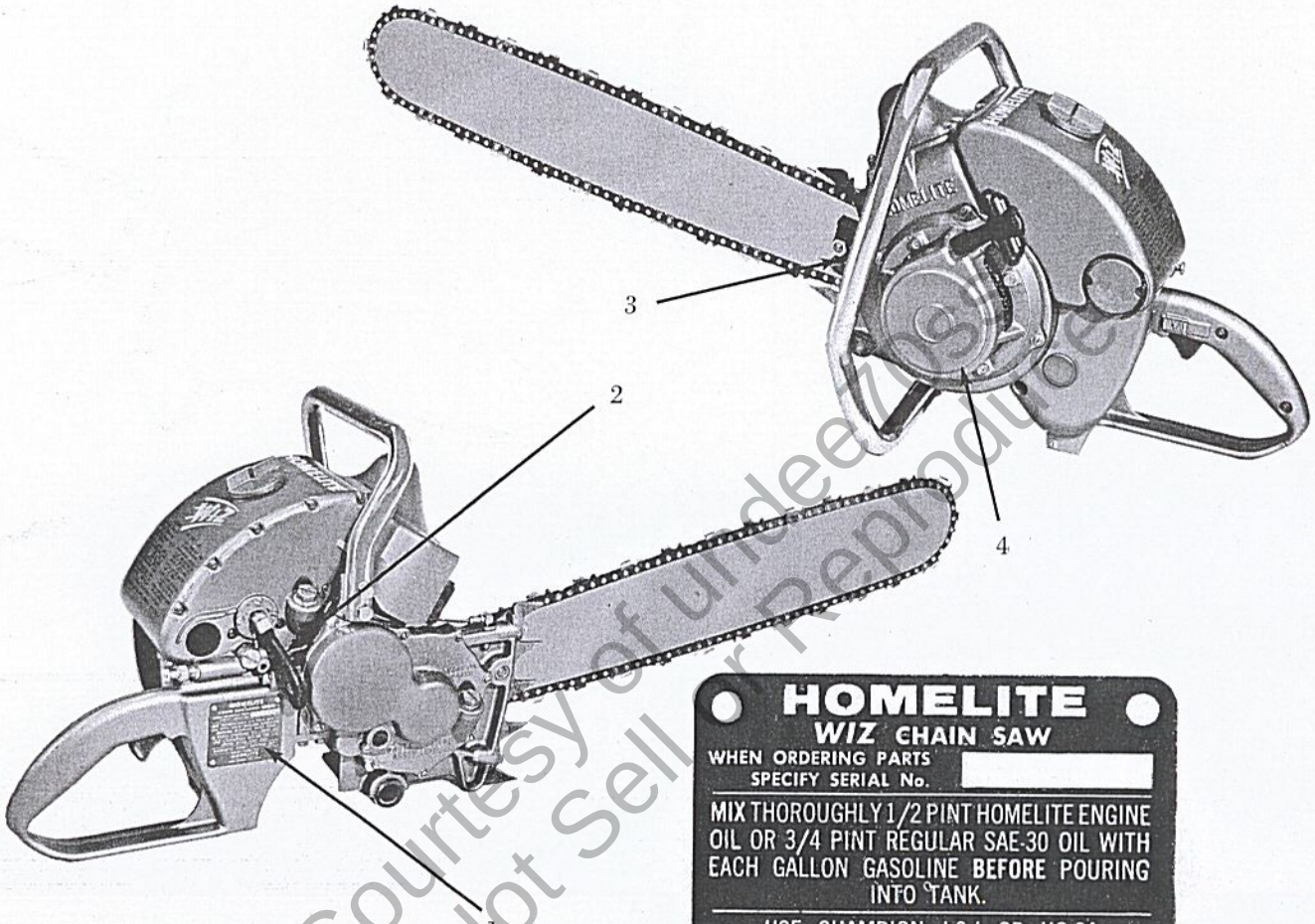
	MODEL 700G	700GFM	700GI (governor model)
BASIC STYLE	Integral Crankcase — Gearcase. Tank and pistol grip separate.	Integral Crankcase — Gearcase. Tank and pistol grip separate.	Same as original Model 700G except for newer carburetor
TRANSMISSION			
Type	Two-gear	Two-Gear	
Ratio	2.84:1	2.84:1	
Sprocket Pitch/No. of Teeth	½"-8	½"-8	
Chain Oil Reservoir	Integral with fuel tank	Integral with fuel tank	
Reservoir Capacity	6.75 ounces	6.75 ounces	
STARTER TYPE	Homelite Ball Drive	Fairbanks-Morse	Homelite Ball Drive
Rotation (from starter side)	Clockwise	Clockwise	
ENGINE			
Bore	2 3/16"	2 3/16"	
Stroke	1½"	1½"	
Displacement—cu. in.	5.64	5.64	
Main Bearing I.D.	.7185/.7188	.7185/.7188	
Seal—Magneto Side	Double Garlock	Double Garlock	
Seal—Main Bearing	Garlock plus Vellumoid Gasket	Garlock plus Vellumoid Gasket	
Piston Rings—Height Width End Gap	1/16" 086/.096 .070" min.-.080" max.	1/16" 086/.096 .070" min.-.080" max.	
Governor Type	Vane	Vane	
Peak horsepower at	6000 RPM	6000 RPM	
IGNITION SYSTEM			
Spark Plug	HO-8A	HO-8A	
Spark Plug Gap	.025"	.025"	
Type Magneto	Covered Phelon	Covered Phelon	
Breaker Point Setting	.015"	.015"	
Primary Coil Resistance	.65-.80 ohms	.65-.80 ohms	
Secondary Coil Resistance	7500-9000 ohms	7500-9000 ohms	
Condenser Capacity	.18-.22 mfds.	.18-.22 mfds.	
FUEL INDUCTION SYSTEM			
Tank Construction	Separate with air filter and chain oil compartment	Separate with air filter and chain oil compartment	
Fuel Capacity	60 ounces	60 ounces	
Fuel Feed	Carburetor diaphragm pump	Carburetor diaphragm pump	
Type Carburetor	Diaphragm	Diaphragm	
Model	HL-27B or 6-CP	HL-27B or 6-CP	HL-104A
May be replaced with	HL-104A*	HL-104A*	HL-104A*
Air Filter	Microbon Ribbon type element	Microbon Ribbon type element	
Type Intake Valve	Pyramid Reed	Pyramid Reed	

Governor Note: Original 700G to Serial #1072185 had vane governors. All 700G above #1072184 have no governors. After #1072184 governor-equipped models identified as Model 700G1.

* HL-104A Carburetor supersedes HL-27B and 6-CP carburetors. Install HL-104A as is on saws without governors; replace return spring with friction spring (supplied) for use with air governor models.

MODEL WIZ

3.:57:1 Reduction Gear Saw Introduced Spring, 1959
COLOR: Homelite Blue Metallic



1. Name Plate:
   Located in same position as 4-20 and 7-21 models.
   Model WIZ
   Serial No._____
   Fuel Mixing Instructions specify ½ pint Homelite Oil per gallon.
2. Original Equipment: Rubber fuel line, diaphragm pump carburetor (single reed intake).
3. 3.57:1 ratio gearing; 8-tooth – ½" pitch sprocket.
4. Equipped with F-M starter; otherwise resembles Model 4-20 in shape.

UNIT SPECIFICATIONS

	MODEL WIZ	WIZ(m) (modified)	
BASIC STYLE	Integral Crankcase — Gearcase. Tank and pistol grip separate.	Integral Crankcase — Gearcase. Tank and pistol grip separate.	
TRANSMISSION		Changed to 700-type Sprocket Shaft	
Type	Two-Gear		
Ratio	3.57:1		
Sprocket Pitch/No. of Teeth	½"-8		
Chain Oil Reservoir	Integral Part of Fuel Tank		
Reservoir Capacity	5.14 ounces		
STARTER TYPE	Fairbanks-Morse		
Rotation (from starter side)	Clockwise		
ENGINE			
Bore	2"		
Stroke	1⅜"		
Displacement—cu. in.	4.32		
Main Bearing I.D.	.6693/.6690	.7185"/.7188"	
Seal—Magneto Side	Double Garlock		
Seal—Main Bearing	Vellumoid Gasket plus Double Garlock	Garlock w/Garter Spring plus Vellumoid Gasket	
Piston Rings—Height Width End Gap	1/16" .090/.080 .070" min.-.080" max.		
Governor Type	None		
Peak horsepower at	6000 RPM		
IGNITION SYSTEM			
Spark Plug	J-6-J		
Spark Plug Gap	.025"		
Type Magneto	Covered Phelon		
Breaker Point Setting	.015"		
Primary Coil Resistance	.65-.80 ohms		
Secondary Coil Resistance	7500-9000 ohms		
Condenser Capacity	.18-.22 mfds.		
FUEL INDUCTION SYSTEM			
Tank Construction	Integral fuel and chain oil compartments		
Fuel Capacity	45 ounces		
Fuel Feed	Pump		
Type Carburetor	Diaphragm		
Model	HL-46B	HL-46B or 6-CP	
May be replaced with	HL-104A	HL-104A	
Air Filter	Wix	Wix	
Type Intake Valve	Single Reed	Single Reed	

BLANK SPACES IN THIS COLUMN SAME AS LEFT COLUMN

MODEL 9-26

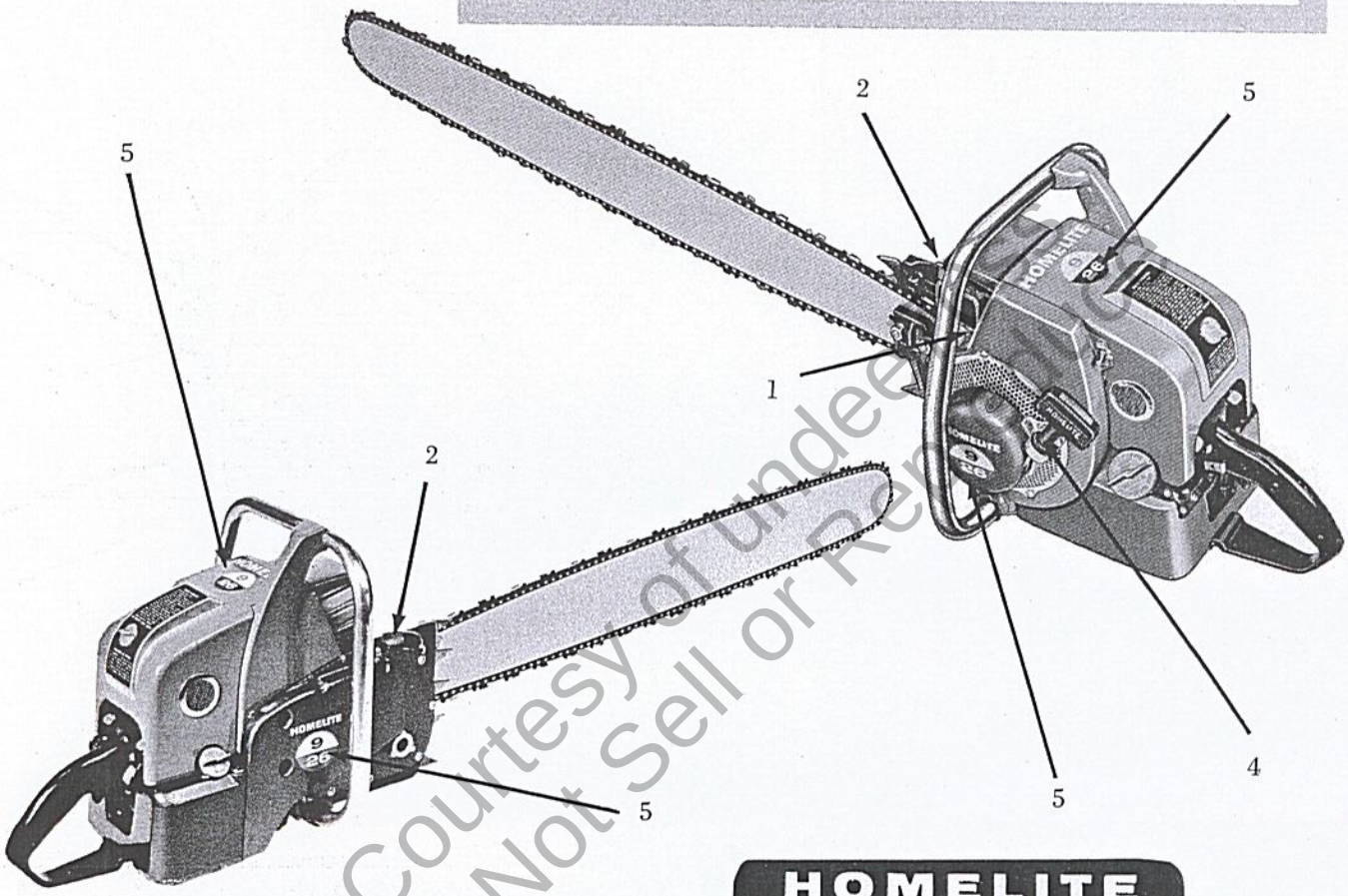
8 t. ½" Pitch (2.84:1) and 7 t. – 9/16" Pitch 9-26A (3.51:1)

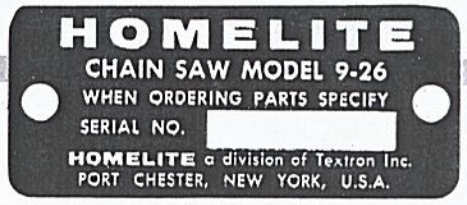
Gear Driven Chain Saw Introduced June, 1959

Standard Model: 2.84:1 ratio gearing. Optional 3.57:1 gearing.

Like the 9-23 direct drive, a brand new Homelite design.

COLORS: Red shrouds: Canyon Green fuel tank and puller cover.





1. Name Plate:
   Located on front of air shroud.
   Model 9-26
   Serial No._____
2. Distinctive, sturdily ribbed crankcase – drive case – Bar and chain mounted on center line of engine. Gear oil filler hole is in gear case, not in gear case cover.
3. Engine parts interchangeable with Model 9-23.
4. Homelite Starter – Same parts and appearance from starter side as Model 9-23.
5. Identifying 9-26 decals on starter, cylinder shroud and drive case cover.

UNIT SPECIFICATIONS

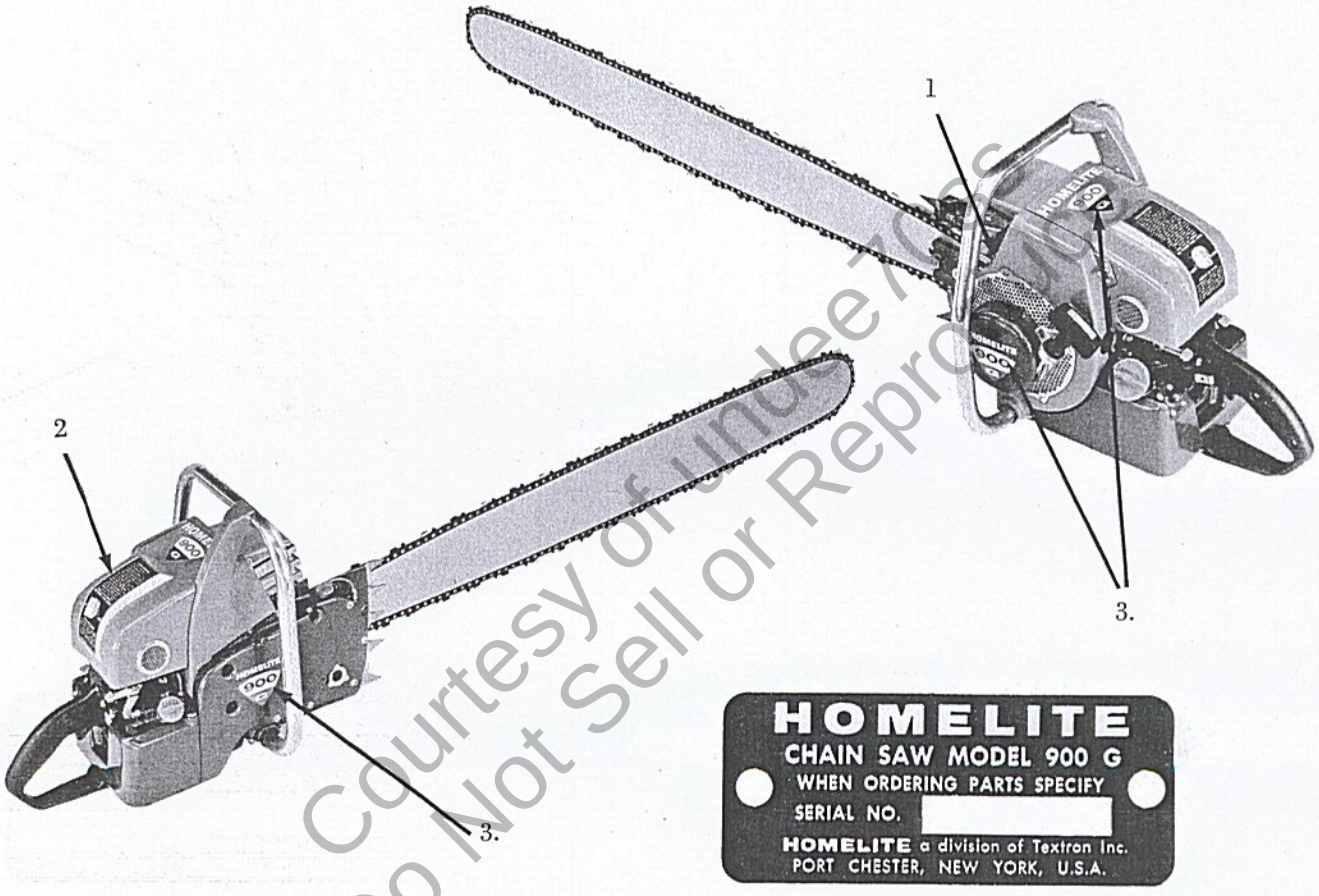
	MODEL 9-26	MODEL 9-26A
BASIC STYLE	Integral Crankcase-Drivecase Bottom Mounted Tank	Integral Crankcase-Drivecase Bottom Mounted Tank
TRANSMISSION		
Type	Three Gears	Three Gears
Ratio	2.84:1 3.57:1	3.57:1 2.84:1
Sprocket Pitch/No. of Teeth	½"-8	⅝"-7
	⅝"-7	½"-8
Chain Oil Reservoir	Integral Part of Fuel Tank	Integral Part of Fuel Tank
Reservoir Capacity	13 ounces	13 ounces
STARTER TYPE	Ball Drive	Ball Drive
Rotation (from starter side)	Counterclockwise	Counterclockwise
ENGINE		
Bore	2 3/16"	2 3/16"
Stroke	1⅝"	1⅝"
Displacement—cu. in.	6.11	6.11
Main Bearing I.D.	.7874/.7870	.7874/.7870
Seal—Magneto Side	Garter Type Single Garlock	Garter Type Single Garlock
Seal—Main Bearing	Vellumoid Gasket plus Single Garter Type Garlock	Vellumoid Gasket plus Single Garter Type Garlock
Piston Rings—Height Width End Gap	1/16" 086/.096 .070" min.-.080" max.	1/16" 086/.096 .070" min.-.080" max.
Governor Type	Air	Air
Peak horsepower at	6000 RPM	6000 RPM
IGNITION SYSTEM		
Spark Plug	HO-3	HO-3
Spark Plug Gap	.025"	.025"
Type Magneto	Covered Phelon	Covered Phelon
Breaker Point Setting	.015"	.015"
Primary Coil Resistance	.65-.80 ohms	.65-.80 ohms
Secondary Coil Resistance	7500-9000 ohms	7500-9000 ohms
Condenser Capacity	.18-.22 mfds.	.18-.22 mfds.
FUEL INDUCTION SYSTEM		
Tank Construction	Integral fuel and chain oil compartments	Integral fuel and chain oil compartments
Fuel Capacity	1 qt. 24 oz.	1 qt. 24 oz.
Fuel Feed	Pump	Pump
Type Carburetor	Diaphragm	Diaphragm
Model	HL-62A	HL-62A
Air Filter	Wix	Wix
Type Intake Valve	Pyramid Reed	Pyramid Reed

MODEL 900G

An improved model of the 9-26 three-gear chain saw released in April, 1960.

GEAR RATIOS: 2.84:1 and 3.57:1.

COLOR SCHEME: Black pistol grip; Red cylinder shield, cylinder shroud, air shroud; Canyon Green crankcase, gearcase, and fuel tank.



1. Name Plate:
   Model No. 900G
   Serial No._____
2. Shortened cylinder shroud and other modifications not reliable in identifying Model 900 units as these new designs may have been added to earlier models in the field.
3. Decals: 900G on pulley cover, cylinder shroud and gearcase cover.

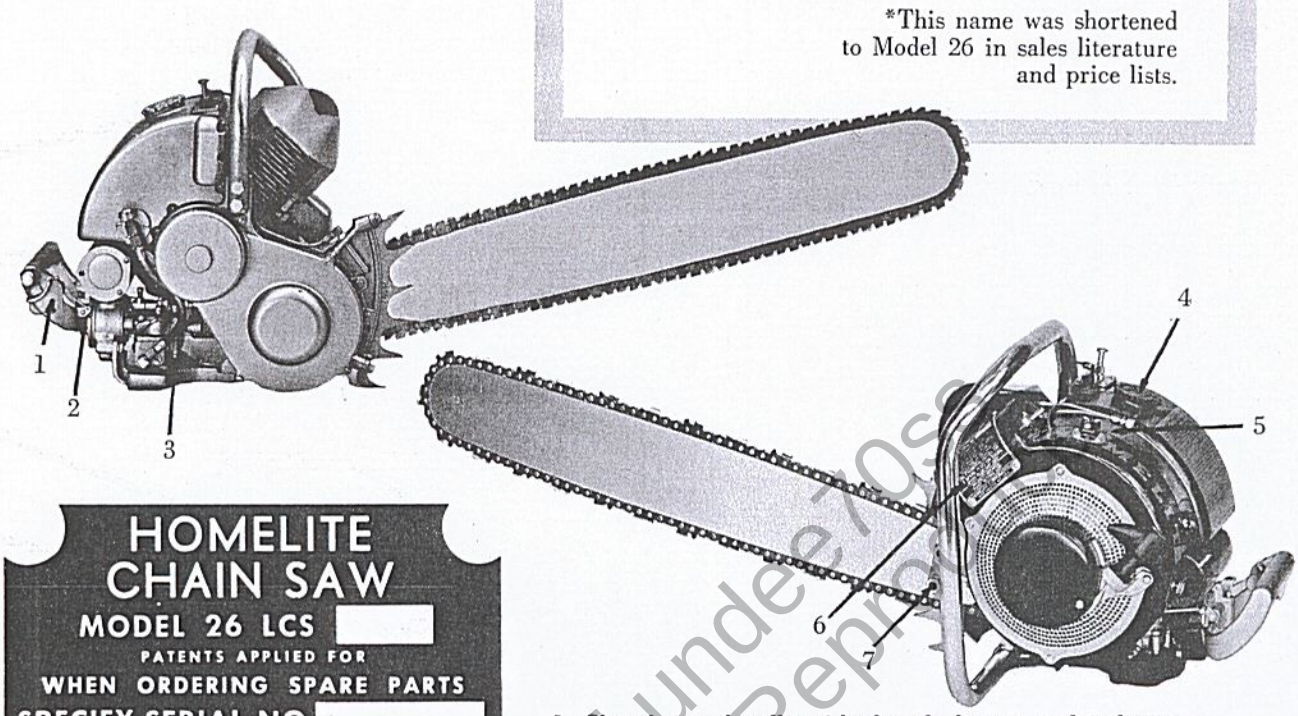
UNIT SPECIFICATIONS

	*MODEL 900GA		
BASIC STYLE	Integral Crankcase-Drivecase Bottom Mounted Tank		
TRANSMISSION			
Type	Three Gears		
Ratio	2.84:1 standard 3.57:1 optional		
Sprocket Pitch/No. of Teeth	5/16"-7		
Chain Oil Reservoir	Integral with fuel tank		
Reservoir Capacity	13 ounces		
STARTER TYPE	Homelite Ball Drive		
Rotation (from starter side)	Counterclockwise		
ENGINE			
Bore	2 5/16"		
Stroke	1 5/8"		
Displacement—cu. in.	6.83		
Main Bearing I.D.	.7870/.7874		
Seal—Magneto Side	Garter-type Garlock		
Seal—Main Bearing	Garter-type Garlock and Vellumoid Gasket		
Piston Rings—Height Width End Gap	1/16" .097/.107 .070" min.-.080" max.		
Governor Type	*		
Peak horsepower at	6000 RPM		
IGNITION SYSTEM			
Spark Plug	HO-3		
Spark Plug Gap	.025"		
Type Magneto	Phelon		
Breaker Point Setting	.015"		
Primary Coil Resistance	.65-.80 ohms		
Secondary Coil Resistance	7500-9500 ohms		
Condenser Capacity	.18-.22 mfds.		
FUEL INDUCTION SYSTEM			
Tank Construction	Bottom Mounted		
Fuel Capacity	56 ounces		
Fuel Feed	Carb. Diaphragm Pump		
Type Carburetor	Diaphragm		
Model	Tillotson HL-62A or HL-62AX		
Air Filter	Wix Pleated Paper Fiberglas optional		
Type Intake Valve	Pyramid Reed		

*These models now supplied without governor.
Earlier models have Air-Vane governor.

MODEL 26LCS*

Introduced April, 1951—Discontinued August, 1953
COLORS: Red with Black Shroud
*This name was shortened to Model 26 in sales literature and price lists.



HOMELITE
CHAIN SAW
MODEL 26 LCS
PATENTS APPLIED FOR
WHEN ORDERING SPARE PARTS
SPECIFY SERIAL NO.
MIX THOROUGHLY 1/2 PINT SAE-30 OIL WITH EACH GALLON GASOLINE BEFORE POURING INTO TANK
16 PARTS GASOLINE TO 1 PART OIL
USE CHAMPION HO-8A OR J-6 SPARK PLUG OR EQUAL
SPARK PLUG GAP .025"
MAGNETO BREAKER POINT SETTING .020"
HOMELITE CORPORATION
PORT CHESTER, N.Y., U.S.A.

1. Shovel type handle with throttle button and indexing lever.
2. Indexing mechanism allows 90° rotation of carburetor to keep float bowl vertical during felling operation.
3. Tillotson MD-56 type float carburetor connected to tank outlet by flexible fuel line.
4. Fuel cap contains no relief valve or vent hole.
5. Pressure line containing check valve maintains slight pressure in tank.
6. Name plate on air shroud at cylinder.
7. Originally equipped with 9/16" pitch slipper sprocket.

MODEL 26LCSA

Superseded Model 26LCS, was in turn discontinued with production of the 5-30 chain saw.

Visual Differences from Model 26LCS

1. Pressure relief line added to fuel tank.
2. Has Tillotson Model H-2A Diaphragm Carburetor (with no fuel pump).

UNIT SPECIFICATIONS

	26LCS	26LCSA	
BASIC STYLE	2-Piece Crankcase with separate drivecase	2-Piece Crankcase with separate drivecase	
TRANSMISSION			
Type	Belt Drive	Belt Drive	
Ratio	2.75:1	2.75:1	
Sprocket Pitch/No. of Teeth	5/16"-7	5/16"-7	
Chain Oil Reservoir	Integral fuel tank and chain oil reservoir	Integral fuel tank and chain oil reservoir	
Reservoir Capacity	5 ounces	5 ounces	
STARTER TYPE	Ball Drive	Ball Drive	
Rotation (from starter side)	Counterclockwise	Counterclockwise	
ENGINE			
Bore	2 3/8"	2 3/8"	
Stroke	1 1/2"	1 1/2"	
Displacement—cu. in.	6.63	6.63	
Main Bearing I.D.	.9843/.9839	.9843/.9839	
Seal—Magneto Side	Double Garlock	Double Garlock	
Seal—Main Bearing	Vellumoid Gasket plus Single Garlock	Vellumoid Gasket plus Single Garlock	
Piston Rings—Height Width End Gap	1/16" .090/.100 .070" min.-.075" max.	1/16" .090/.100 .070" min.-.075" max.	
Governor Type	Rotary	Rotary	
Peak horsepower at	4200 RPM	4200 RPM	
IGNITION SYSTEM			
Spark Plug	HO-8A	HO-8A	
Spark Plug Gap	.025"	.025"	
Type Magneto	Wico	Wico	
Breaker Point Setting	.020"	.020"	
Primary Coil Resistance	.55 ohms	.55 ohms	
Secondary Coil Resistance	5500-6000 ohms	5500-6000 ohms	
Condenser Capacity	.16-.20 mfds.	.16-.20 mfds.	
FUEL INDUCTION SYSTEM			
Tank Construction	Integral fuel and chain oil compartments	Integral fuel and chain oil compartments	
Fuel Capacity	1 qt. 15 oz.	1 qt. 15 oz.	
Fuel Feed	Pressurized Tank	Pressure-Gravity	
Type Carburetor	Float	Diaphragm	
Model	MD-56A	H-2A	
Air Filter	Skinner	Skinner	
Type Intake Valve	Rotary	Rotary	

MODEL 5-30

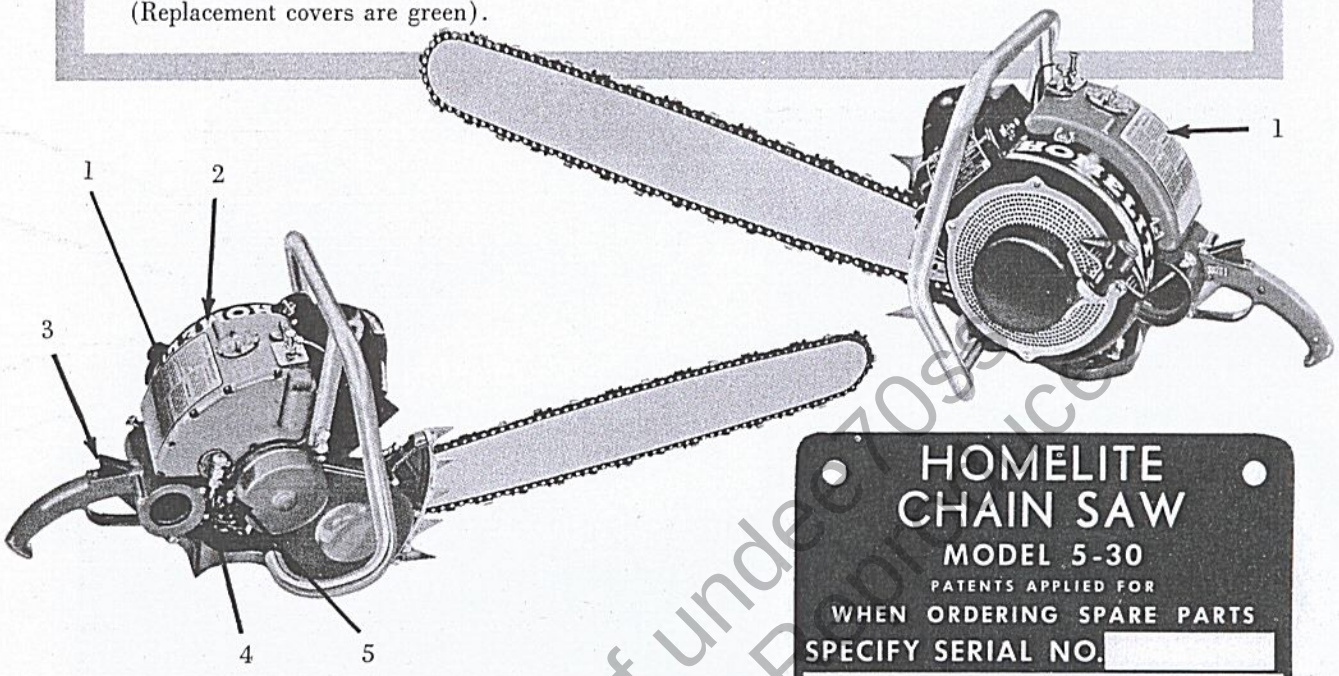
Original 5 h.p. Diaphragm Carburetor Chain Saw Introduced August, 1953
Superseded August, 1954 by Model 5-30N

COLORS: Red with Black Air Shroud, Cylinder Shield and Pulley Cover. (Replacement covers are green).

MODEL 5-30N

Replaced Model 5-30 in production, August, 1954

COLORS: Red and Black (same as 5-30).



1. Name plate located on air shroud at cylinder.
   Model No. 5-30
   Serial No.
2. Tank with crankcase pressure line, also has pressure relief line with check valve.
3. Pistol grip with throttle trigger on top, first introduced with this saw.
4. Brass fuel line connected directly to carburetor inlet connection.
5. TILLOTSON Model H-6A Diaphragm Carburetor does not have a fuel pump.

Name Plate: Model Number is stamped 5-30N
Serial Number

Early models have TILLOTSON HP-6B fuel pump diaphragm carburetor. Brass fuel line connects to pump inlet. Later models have 1-CS or HP-19B carburetor with quick-connect flexible fuel line to pump inlet; pulse line through intake manifold.

Fuel cap has vent hole and pressure relief valve similar to Models 17, 5-20 and EZ. Pressure and pressure relief lines eliminated from fuel tank.

UNIT SPECIFICATIONS

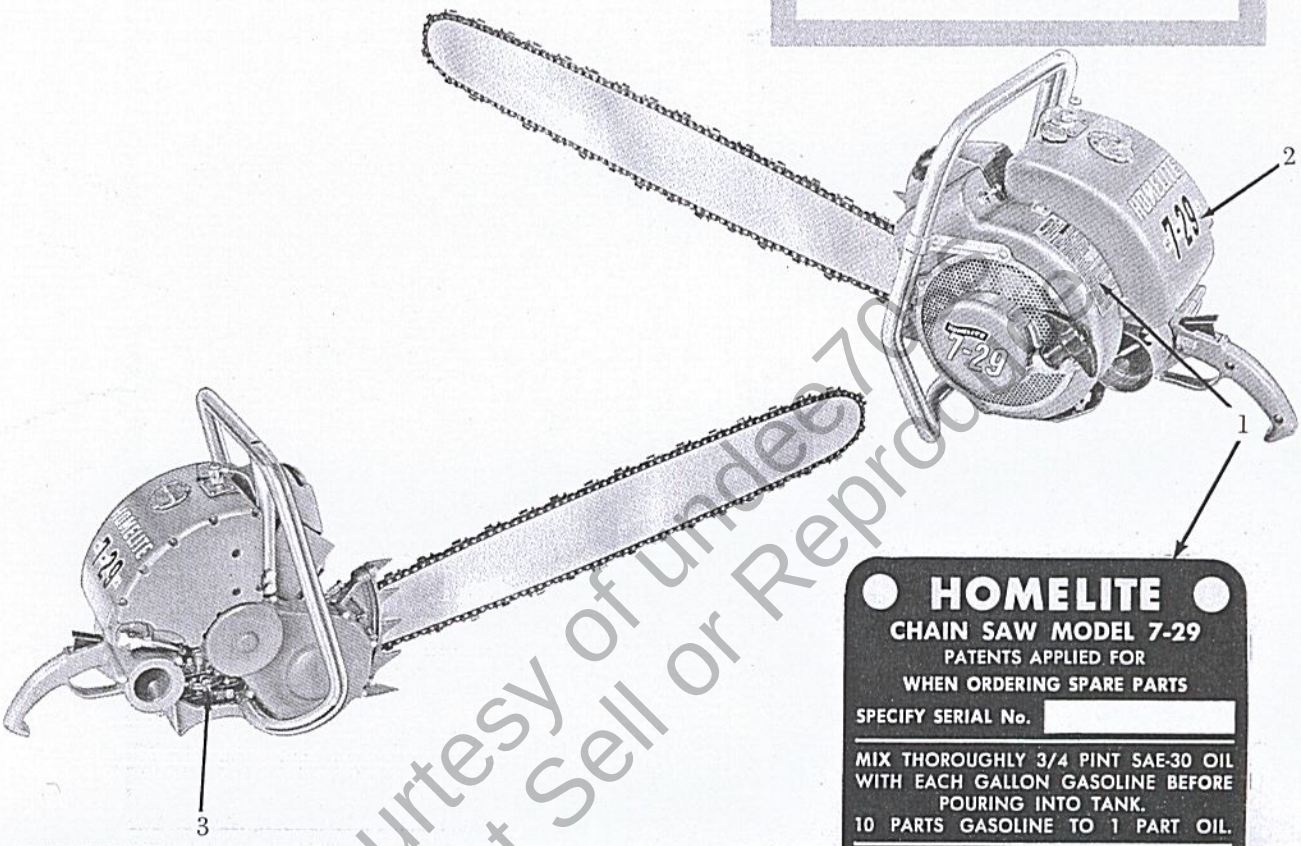
	MODEL 5-30	5-30N(1)	5-30N(2)
BASIC STYLE	2-Piece Crankcase with separate drivecase	2-Piece Crankcase with separate drivecase	2-Piece Crankcase with separate drivecase
TRANSMISSION			
Type	Belt	Belt	
Ratio	2.75:1	2.75:1	
Sprocket Pitch/No. of Teeth	½"-8	5/16"-7	
	5/16"-7	½"-8	
Chain Oil Reservoir	Integral fuel tank and chain oil reservoir	Integral fuel tank and chain oil reservoir	
Reservoir Capacity	5.58 ounces	5.58 ounces	
STARTER TYPE	Ball Drive	Ball Drive	
Rotation (from starter side)	Counterclockwise	Counterclockwise	
ENGINE			
Bore	2-7/16"	2-7/16"	
Stroke	1½"	1½"	
Displacement—cu. in.	6.97	6.97	
Main Bearing I.D.	.9843/.9839	.9843/.9839	
Seal—Magneto Side	Single Garlock	Single Garlock	
Seal—Main Bearing	Vellumoid Gasket plus Single Garlock	Vellumoid Gasket plus Single Garlock	
Piston Rings—Height Width End Gap	1/16" .113/.103 .070" min.-.075" max.	1/16" .113/.103 .070" min.-.075" max.	
Governor Type	Rotary	Rotary	
Peak horsepower at	4800-5000 RPM	4800-5000 RPM	
IGNITION SYSTEM			
Spark Plug	HO-3	HO-3	
Spark Plug Gap	.025"	.025"	
Type Magneto	Wico	Wico	
Breaker Point Setting	.020"	.020"	
Primary Coil Resistance	.55 ohms	.55 ohms	
Secondary Coil Resistance	5500-6000 ohms	5500-6000 ohms	
Condenser Capacity	.16-.20 mfds.	.16-.20 mfds.	
FUEL INDUCTION SYSTEM			
Tank Construction	Integral fuel and chain oil compartments	Integral fuel and chain oil compartments	
Fuel Capacity	47 ounces	47 ounces	
Fuel Feed	Pressure-Gravity	Pump w/ball checks	Pump w/flapper valves
Type Carburetor	Diaphragm	Diaphragm	Diaphragm
Model	H-6A	HP-6B	1-CS or HP-19B
May be replaced with	HP-19B (after conversion)		HP-19B
Air Filter	Skinner	Skinner	
Type Intake Valve	Rotary	Rotary	

BLANK SPACES IN THIS COLUMN SAME AS LEFT COLUMN

MODEL 7-29

Introduced May, 1956
COLORS: Red and Green

Model shown has
TILLOTSON carburetor*



1. Name plate located on air shroud between fuel tank lugs.
   Information—Model No. 7-29
   Serial Number*
   Fuel Mixture
   Starting Instructions
   Spark Plug Information
2. Starter cover and fuel tank carry 7-29 Decals.
3. *May have EITHER TILLOTSON HP-19B or BROWN 1-CS Carburetor. BROWN Carburetor has turret type metal fuel pump cover and flexible fuel line. Serial number may have letter "B" for BROWN Carburetor.

HOMELITE
CHAIN SAW MODEL 7-29
PATENTS APPLIED FOR
WHEN ORDERING SPARE PARTS
SPECIFY SERIAL No.

MIX THOROUGHLY 3/4 PINT SAE-30 OIL WITH EACH GALLON GASOLINE BEFORE POURING INTO TANK.
10 PARTS GASOLINE TO 1 PART OIL.

USE CHAMPION HO-3 OR J-3 SPARK PLUG OR EQUAL SPARK PLUG GAP .025"

MAGNETO BREAKER POINT SETTING .020"

STARTING INSTRUCTIONS

1. Push switch "ON" and open fuel valve.
2. Pull out choke button, lock throttle open. Be sure chain is clear of obstructions.
3. Pull starter slowly until it engages, then pull rapidly. DO NOT LET HANDLE SNAP BACK.
4. After 5 spins push choke in half way. Pull starter until engine starts. As engine warms up, push choke in completely. Don't choke hot engine.
5. Carburetor settings: Hi-Speed 1 to 1¼ turn open; Lo-Speed 1/2 to 3/4 turn open.
6. Oil chain frequently.

HOMELITE
a division of Textron American, Inc.
PORT CHESTER, N.Y., U.S.A.

UNIT SPECIFICATIONS

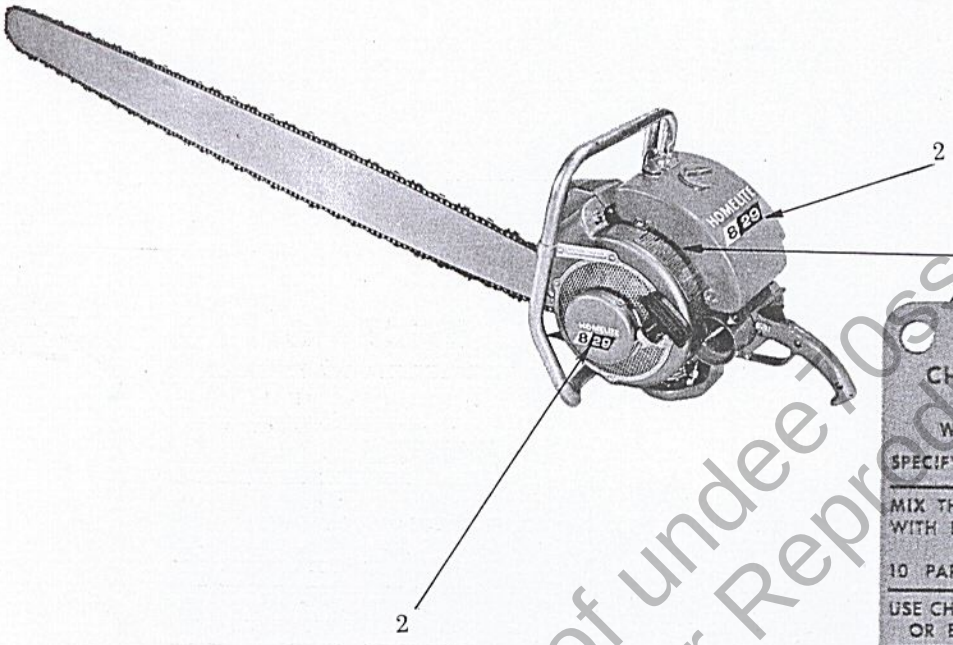
MODEL 7-29

BASIC STYLE	2-Piece Crankcase with separate drivecase
TRANSMISSION	
Type	Belt Drive
Ratio	2.75:1
Sprocket Pitch/No. of Teeth	½"-8
	9/16"-7
Chain Oil Reservoir	Integral fuel tank and chain oil reservoir
Reservoir Capacity	7 ounces
STARTER TYPE	Ball Drive
Rotation (from starter side)	Counterclockwise
ENGINE	
Bore	2½"
Stroke	1⅝"
Displacement—cu. in.	7.88
Main Bearing I.D.	.9843/.9839
Seal—Magneto Side	Single Garlock
Seal—Main Bearing	Vellumoid Gasket plus Single Garlock
Piston Rings—Height Width End Gap	.0780/.0775 .116/.106 .008" min.-.018" max.
Governor Type	Rotary
Peak horsepower at	4800-5000 RPM
IGNITION SYSTEM	
Spark Plug	HO-3
Spark Plug Gap	.025"
Type Magneto	Wico
Breaker Point Setting	.020"
Primary Coil Resistance	.55 ohms
Secondary Coil Resistance	5500-6000 ohms
Condenser Capacity	.16-.20 mfds.
FUEL INDUCTION SYSTEM	
Tank Construction	Integral fuel and chain oil compartments
Fuel Capacity	1 qt. 30 oz.
Fuel Feed	Pump
Type Carburetor	Diaphragm
Model	HP-19B or 1-CS
May be replaced with	HP-19B
Air Filter	Skinner
Type Intake Valve	Rotary

MODEL 8-29

Model 8-29 Belt Drive Saw
Replaced 7-29 in Production September, 1958.

COLORS: Red and Opalescent Green.



1. Name Plate:
   Model 8-29
   Serial No._____

   Note: Instructions on name plate vary according to original carburetor.
   Brown: Hi-Speed ½-¾ turn; Lo-Speed ¾-1 turn.
   Tillotson: Lo-Speed 1-1¼; ½-¾.

2. DECALS: 8-29 on pulley cover and fuel tank.

UNIT SPECIFICATIONS

	MODEL 8-29	MODEL 8-29AS	
BASIC STYLE	2-Piece Crankcase with separate drivecase	2-Piece Crankcase with separate drivecase	
TRANSMISSION			
Type	Belt	Belt	
Ratio	2.75:1	2.75:1	
Sprocket Pitch/No. of Teeth	½"-8	5/16"-7	
	5/16"-7	½"-8	
Chain Oil Reservoir	Integral Part of Fuel Tank	Integral Part of Fuel Tank	
Reservoir Capacity	7 ounces	7 ounces	
STARTER TYPE	Ball Drive	Ball Drive	
Rotation (from starter side)	Counterclockwise	Counterclockwise	
ENGINE			
Bore	2½"	2½"	
Stroke	1⅝"	1⅝"	
Displacement—cu. in.	7.88	7.88	
Main Bearing I.D.	.9843/.9839	.9843/.9839	
Seal—Magneto Side	Single Garlock	Single Garlock	
Seal—Main Bearing	Vellumoid plus Single Garlock	Vellumoid plus Single Garlock	
Piston Rings—Height Width End Gap	5/64" .116/.106 .070" min.-.080" max.	5/64" .116/.106 .008" min.-.018" max.	
Governor Type	Rotary	Rotary	
Peak horsepower at	4800-5000 RPM	4800-5000 RPM	
IGNITION SYSTEM			
Spark Plug	HO-3	HO-3	
Spark Plug Gap	.025"	.025"	
Type Magneto	Wico	Wico	
Breaker Point Setting	.020"	.020"	
Primary Coil Resistance	.55 ohms	.55 ohms	
Secondary Coil Resistance	5500-6000 ohms	5500-6000 ohms	
Condenser Capacity	.16-.20 mfds.	.16-.20 mfds.	
FUEL INDUCTION SYSTEM			
Tank Construction	Integral fuel and chain oil compartments	Integral fuel and chain oil compartments	
Fuel Capacity	1 qt. 30 oz.	1 qt. 30 oz.	
Fuel Feed	Pump	Pump	
Type Carburetor	Diaphragm	Diaphragm	
Model	HP-19B or 1-CS	HP-19B or 1-CS	Replace with HP-19B
Air Filter	Skinner	Skinner	
Type Intake Valve	Rotary	Rotary	

*Part No. 74626-2 used for all service.

LUBRICATION

INDEX

3—1 OIL IN FUEL MIX

The oil in the fuel mixture lubricates the internal parts of the 2-cycle engine. For maximum engine life and performance, adding the exact amount of oil to each gallon of gasoline, and thoroughly pre-mixing the fuel before pouring it into the fuel tank are imperative.

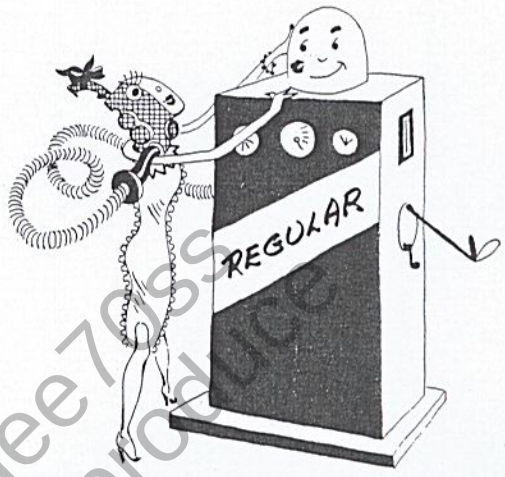
In the crankcase, the connecting rod and rotating crankshaft act as a centrifuge to drive some of the oil out of the vapor. This oil lubricates the crankcase. When the remainder of the charge enters the combustion chamber, heat forces more oil out of the vapor, and this quantity bathes the piston and cylinder. Any oil left in the compressed fuel charge is burnt during combustion.

If the fuel contains too much oil after lubrication, the engine will smoke excessively, and deposits will foul the spark plug, build up on the piston and in the piston ring grooves, and clog the exhaust ports. Restriction of the exhaust causes loss of engine power and hard-starting.

If the fuel does not contain enough oil, the amount forced out of the vapor will be insufficient for proper lubrication. Lack of oil (or poor grade oil) exposes the engine surfaces to excess friction and overheating. Overheating destroys the protective film of lubricant and the engine may seize up.

Unless the fuel is thoroughly agitated the oil and gasoline will not be well mixed. Oil in unmixed fuel settles to the bottom and is drawn out first. Then, becoming leaner and leaner as the tank level drops, the remaining supply of fuel will be nearly all gasoline and the engine might be ruined.

Homelite Chain Saw Engine Oil (See Figure 3—1) or a good grade SAE-30 Engine oil should always be used. The Homelite is a detergent type oil which minimizes the rate of carbon and gum formation in the engine. Since any carbon and gum deposits loosened by detergent action are eliminated in the exhaust of a 2-cycle chain saw engine, switching from regular grade to Homelite detergent oil can be done at any time.



3—2 GASOLINES

Clean, fresh, regular automotive gasoline should be used. Straining the gasoline through chamois will remove moisture condensation and foreign matter from the gasoline prior to mixing. Fuel containers should be rinsed occasionally with clean gasoline or solvent, and drained to remove any water or sediment accumulation. Safety fuel containers are recommended for use.

Figure 3—1
Homelite Detergent Type Chain Saw Oil

Figure 3–2

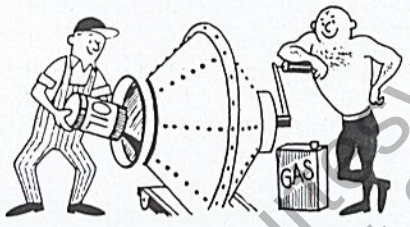
FUEL MIXING TABLE

	QUANTITY OIL PER GALLON OF GASOLINE	QUANTITY OIL PER 2 GALLONS GASOLINE	QUANTITY OIL PER 3 GALLONS GASOLINE	QUANTITY OIL PER 4 GALLONS GASOLINE	QUANTITY OIL PER 5 GALLONS GASOLINE
BREAK-IN MIXTURE* **ALL SAWS**	HOMELITE OIL ¾ PINT OR (1 PINT ORDINARY SAE 30 OIL)	HOMELITE OIL 1½ PINTS OR (2 PINTS ORDINARY SAE 30 OIL)	HOMELITE OIL 2¼ PINTS OR (3 PINTS ORDINARY SAE 30 OIL)	HOMELITE OIL 3 PINTS OR (4 PINTS ORDINARY SAE 30 OIL)	HOMELITE OIL 3¾ PINTS OR (5 PINTS ORDINARY SAE 30 OIL)
NORMAL MIXTURE **ALL SAWS**	HOMELITE OIL ½ PINT OR (¾ PINT ORDINARY SAE 30 OIL)	HOMELITE OIL 1 PINT OR (1½ PINTS ORDINARY SAE 30 OIL)	HOMELITE OIL 1½ PINTS OR (2¼ PINTS ORDINARY SAE 30 OIL)	HOMELITE OIL 2 PINTS OR (3 PINTS ORDINARY SAE 30 OIL)	HOMELITE OIL 2½ PINTS OR (3¾ PINTS ORDINARY SAE 30 OIL)

*Use break-in mixture for first few tankfuls of fuel through engine. Do not make heavy cuts with saw during break-in period.

3–3 FUEL MIXING INSTRUCTIONS

Pour about half the total amount of gasoline to be mixed into the safety can. Pour the required amount of oil into the can, then add the remainder of the gasoline. Shake the can vigorously until you are positive the oil and gas are thoroughly mixed. Thorough mixing is important because oil and gasoline will not combine unless vigorously agitated.



3–4 ENGINE BREAK-IN PERIOD

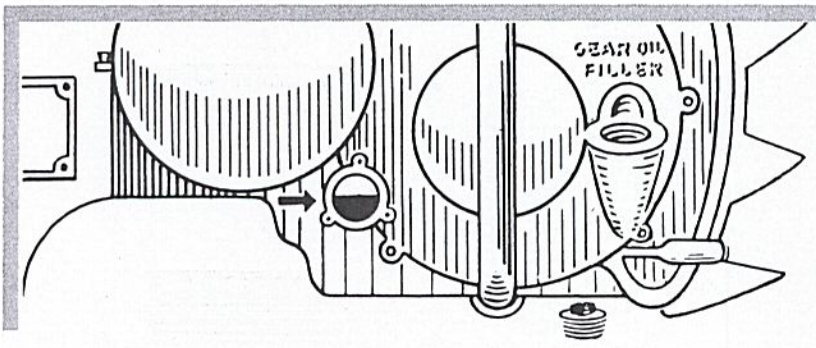
New engines should be protected by using the special break-in fuel mixture during operation for the first gallon of fuel only. From then on, use only the normal mixture recommended for the unit. (See Figure 3—2.)

Overhauled engines which have had piston or cylinder replacement should be treated as new, and broken-in with a gallon of break-in fuel.

3–5 GEAR CASE LUBRICATION

On gear model saws, an oil inspection window and a small arrow on the gear case cover make it easy to maintain the gear oil at proper level. Check the oil level frequently and add oil whenever necessary. If the oil level is allowed to drop appreciably, the gears will not have adequate lubrication. Avoid over-filling, however, since the excess oil, in addition to escaping from the bleed hole, may cause the clutch to slip at higher speed than desirable. Principally, the gear case should be drained, cleaned and filled with clean gear oil. With everyday use or steady production cutting, the frequency of cleaning should be about once a month; with only occasional cutting operation, the frequency may be every six months.

1. Always use Homelite Gear Oil, Part No. 55291-B in the gear cases of Homelite Saws.
2. Wipe away sawdust and dirt before unscrewing the oil filler plug.
3. Place the saw on a level surface, so you will get an accurate reading of the oil level, as seen through the inspection window. (See Figure 3—3.)



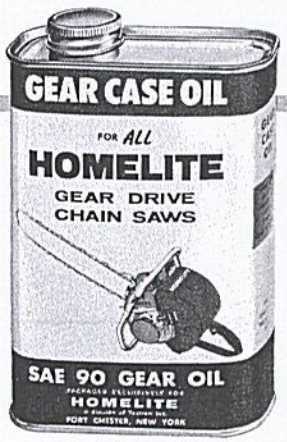


Figure 3–3 Fill to Level of Arrow with Homelite Gear Oil

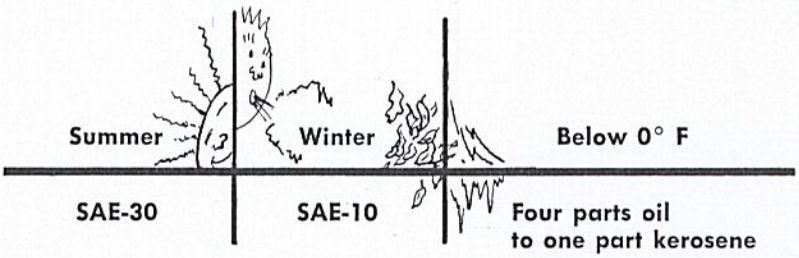


Figure 3—4 Chain Lubrication Chart

3—6 CHAIN LUBRICATION

All Homelite Saws have manually operated chain oil lubricators because manual operation allows the operator to supply as much oil to the chain as it needs, regardless of the cutting conditions. In contrast, automatic oilers either fail to supply enough oil for heavy cutting, or oversupply oil during idling and light cutting. To keep friction and wear to a minimum, the chain must be oiled regularly and frequently during cutting. Operation of the chain oil plunger (or lever) forces oil into the guide bar groove. Chain rotation distributes the lubricant around the entire bar.

All models with a die-cast-oil reservoir have an *oil finder* consisting of a strainer attached to a flexible pick-up tube connected to the oil pump inlet fitting. (See Figure 3—5.) On Economy Model Saws with stamped metal tanks, the strainer is mounted in stationary fashion, directly on the inlet connection on the bottom of the tank. Oil pumps with a stationary pick-up cannot be operated in inverted position, and must be kept reasonably full for the oiler to pump when the saw is angled over during operation.

3—7 OPERATING PRINCIPLE OF PRESSURE LUBRICATOR

Although construction details and parts location may vary with each type of unit, all Homelite lubricators use the same principle of operation. (See Figure 3—5.) The pump consists of a plunger and plunger return spring in the pump cavity, an inlet connection leading from the reservoir into the pump, and an outlet connection and oil line running to the guide bar. The inlet and outlet connections both contain ball check valves. Except for actuation by plunger instead of actuation by pulsations from the crankcase, the oil pump is similar to a Homelite fuel pump in operation. The letters in the following paragraph are keyed to the letters in Figure 3—5.

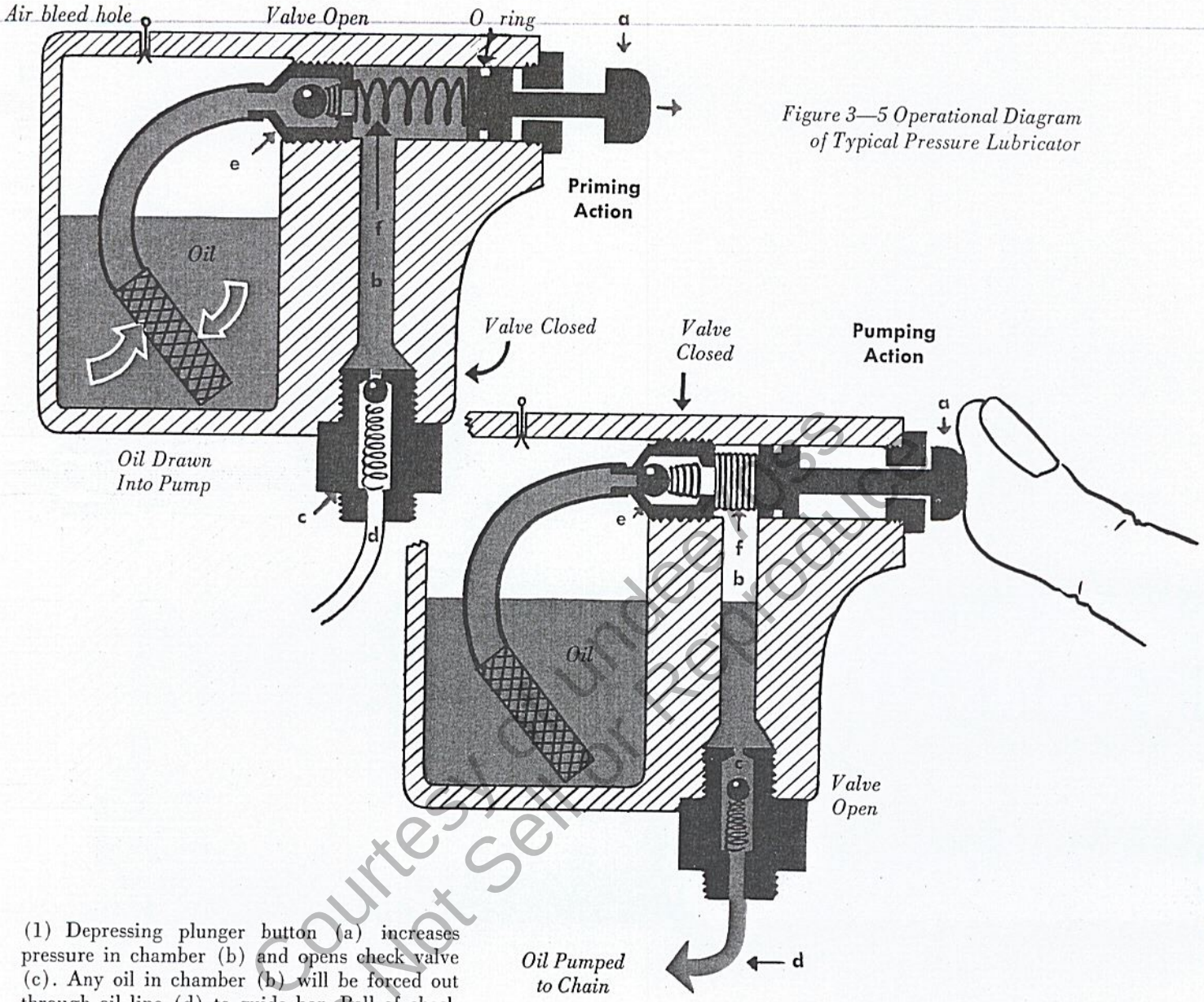


Figure 3—5 Operational Diagram of Typical Pressure Lubricator

(1) Depressing plunger button (a) increases pressure in chamber (b) and opens check valve (c). Any oil in chamber (b) will be forced out through oil line (d) to guide bar. Ball of check valve (e) remains seated during this operation. (2) Releasing plunger button (a) allows return spring (f) to push plunger back out of cylinder. Check valve (c) is closed and check valve (e) is opened by the vacuum in the pump cavity. Oil from reservoir flows through tube and strainer and open check valve into pump chamber (b), from where it will be pumped into oil line the next time button is depressed.

3—8 LUBRICATOR DIAGNOSIS

Pressure lubricator failure is usually due to air leaks or dirt, deterioration or damaged condition of the flexible tube, or to failure of one of the check valves to operate.

3—8.1 Diagnosis of hard-to-prime condition

1. Oil too thick for cold weather operation.
2. Loose connections or faulty O-ring gaskets causing air leakage.
3. Failure of pump inlet and outlet check balls to seat properly.
4. Check valve at oil line stuck open.
5. Porous or cracked flexible sleeve leaking air.
6. Pick-up tube and screen assembly not immersed in oil. (Reservoir not full enough.)
7. Air bleed clogged, pick-up tube clogged or flexible sleeve kinked or collapsed. (Plunger will not return rapidly).
8. Air bleed valve in oil cap inoperative. (Economy type units only.)

3—8.2 Diagnosis of failure to pump (Plunger hard to push in)

1. Oil line plugged.
2. Oil entry hole in guide bar plugged.
3. Wrong guide bar plate being used; plate covers oil hole.

3—9 PRESSURE LUBRICATOR SERVICE

Direct drive and all gear drive models

3—9.1 Disassembly

1. Disconnect oil line and remove check valve from oil pump outlet.

   (a) On Direct drive models remove the one-piece check valve assembly.

   (b) On two gear transmission models remove straight adapter from outlet connection. Hold hand over outlet, turn saw over, and shake out the check valve spring and check ball.
2. Remove supply line cap and gasket to expose the intake check valve assembly. Hold hand over the hole and turn saw over to remove check valve spring and check ball.
3. Use a cabinet type (straight round shank) screwdriver of proper diameter to unscrew the supply line check valve fitting. During removal, be careful to damage neither the female threads of the supply line hole nor the screwdriver slot and check ball seat of the check valve fitting. Remove fitting with flexible sleeve and oil finder (pick-up tube) attached.
4. Unscrew the plunger button assembly. (Apply 15/32″ wrench at hex part.) Pull the plunger button with plunger tube and O-ring assembly and the plunger return spring from the pump body.

3—9.2 Inspection and Reassembly

Direct drive and two-gear transmission models

1. Wash and clean all parts thoroughly. Blow air through the disassembled oil line. Be sure bleed holes, pump passages and valve seats are clean. *Do not blow air* through the flexible sleeve.
2. Examine all sealing gaskets and O-rings. These must be perfect for an adequate seal. Pump operation depends on it.
3. Replace the flexible sleeve if it is cracked, porous, or kinked, or if the material has deteriorated. A porous or cracked sleeve or one which does not fit the pick-up tube or check valve fitting snugly will cause an air leak. A kinked or weak-walled sleeve will collapse and prevent oil from being drawn into the pump.
4. The oil finder (pick-up tube) strainer must be clean.
5. The plunger return spring must operate freely with sufficient tension (to push the depressed plunger back out rapidly) to create enough vacuum to draw oil into the pump.
6. Check-valves should operate properly and be correctly installed.

   (a) Test the operation of the Direct Drive outlet check valve assembly by applying lip suction at the end of the valve. The valve should allow air to pass through when lip suction is applied at the oil line connection end, and should not allow air to pass when lip suction is applied to the pump connection end.

(b) Check-balls used in assembling outlet check valve assemblies on two-gear transmission models for all pump inlet (supply line) installation should be perfectly round and free of wear. Check-valve-springs should have proper shape and length.

(c) Replace the supply line fitting if the recessed check ball seat is worn or damaged and check ball does not seat properly.

7. Place gasket on supply line fitting, and complete oil supply line assembly by attaching flexible sleeve and oil finder. Drop oil finder and sleeve into oil reservoir and screw fitting into position with a cabinet screwdriver. Be sure fitting is tight.
8. Install check balls and springs (small end of single-tapered springs to ball) in proper assembly order for proper direction of flow. Complete assembly of pressure lubricator by reversing the order of disassembly. Be sure all fittings and connections are tight.

3—10 PRESSURE LUBRICATOR SERVICE
Belt Transmission Models 26, 5-30, 7-29 and 8-29

3—10.1 Disassembly

1. Disconnect oil line at tank. (On pressure tank models 26LCSA and early 5-30, also disconnect pressure relief line.)
2. Remove four screws and lift complete oil pump assembly and gasket from tank.
3. Bend down ears of pump locking plate. Turn hex fitting counterclockwise to unscrew plunger button assembly from pump body. Lift plunger assembly, plunger tube and spring out of pump body.
4. If necessary, remove oil line connectors (connector adapter, 90° elbow and straight adapter. Pump locking plate and lubricator body cover can then be separated from pump body.
5. Remove screw plug to expose the outlet check valve in short side of pump body. Remove valve spring and check ball.
6. Disconnect flexible sleeve and pick-up tube and screen assembly (oil finder) from long (inlet) side of pump body. Disconnect assembly consisting of two 90° elbows and straight adapter, and remove the check ball and spring from long (inlet) side of pump body.

3—10.2 Lubricator Inspection and Reassembly Belt Transmission Models

1. Wash all disassembled parts in solvent and clean them thoroughly. Blow air through the pump body passages, air bleed holes, and through the oil line. Do not blow air through the flexible sleeve.
2. The plunger return spring must be perfectly formed and have enough tension to assure prompt return movement of the plunger. The pump plunger must fit the pump chamber well enough for efficient priming and pumping action. If there is too much clearance, replace worn parts.
3. Check balls should be round and free of wear. The pump will not operate efficiently if the check balls or valve seats in the pump body are worn or damaged. Check ball springs should have proper shape and tension.

   (a) Drop a check ball into the outlet (short) side of pump body. Install a check ball spring, small-end-to-ball, and complete outlet check valve assembly by installing the plug screw, tightening securely.

   (b) Drop large end of remaining check ball spring into pump inlet opening, drop check ball in on top of spring, and reassemble the cleaned connectors (two 90° elbows and one adapter) at pump inlet connection.
4. Be sure flexible sleeve is in perfect condition. Replace deteriorated, pinched, kinked, cracked, porous, or loose-fitting sleeves. Attach sleeve and (oil finder) pick-up tube assembly to inlet connection, and make sure all fittings and connections are tight.
5. Install lubricator in tank by reversing order of parts disassembly.

3—11 PRESSURE LUBRICATOR SERVICE OF ORIGINAL BUZ

3—11.1 Physical Description

1. The lubricator piston pump design is the same as that used for years in belt transmission models such as 5-30N. The BUZ pump body is mounted externally to a bracket which also holds the throttle trigger in place.
2. The oil reservoir is one compartment of the formed metal fuel tank. Fuel and oil reservoir caps are interchangeable and are vented. Therefore, the air bleed hole with cotter pin (See Figure 3—5.) used to vent die-cast construction reservoirs on other models has been eliminated.
3. A flexible oil line connects the pump inlet fitting to the oil outlet fitting in the bottom of the BUZ tank. A stationary strainer is connected directly to the outlet fitting.

3—11.2 Disassembly — Original BUZ

1. Drain oil reservoir or invert saw before disconnecting oil line. Remove oil supply line from unit.
2. Remove oil outlet fitting and strainer from tank.
3. Unscrew plunger button assembly; apply wrench at the hexagon area of plunger housing. Remove plunger assembly, including plunger tube.
4. Disconnect chain oil line at both ends. Remove lubricator body.
5. Unscrew discharge elbow; remove check valve spring and check ball.
6. Unscrew pump inlet tube carefully; remove inlet check ball and spring.
7. The brass plug screw in the pump body should not be disturbed unless the plug is leaking air.

3—11.3 Inspection and Assembly — Original BUZ Lubricator

1. Wash all parts in solvent. Blow air through the disassembled oil line; also clean the straight adapter and the oil hole in the guide bar pad with air.
2. Replace the flexible pump inlet if it has deteriorated. A porous or cracked line, or one which does not grip the connections tightly will cause an air leak. A kinked or weak-walled line will collapse under pump suction, and prevent oil from being drawn from the reservoir.
3. Be sure the oil strainer is clean.
4. Check valve springs should have proper shape and length. The check balls should be perfectly round and free of wear. Replace the inlet tube if the valve seat is worn so the check ball cannot seat perfectly. To test: Place a check ball against seat and apply lip suction to tube. If air leaks past ball, replace ball and seat. While the pump is disassembled, test the discharge check valve by dropping check ball into discharge opening, sealing plunger opening with a finger, and applying lip suction at pump inlet.
5. Plungers of the type originally furnished without "O" ring seals depended on the presence of sufficient oil in the pump cylinder for an air-tight fit. For longer service, however, pump plungers now supplied for factory production as well as service replacement are equipped with "O" rings. Examine the cleaned surfaces of the cylinder and plunger for wear or excessive scoring. When pump piston replacement is necessary, always install the new type.
6. Put a check ball spring into the pump inlet connection and drop a check ball in over the ball. Screw pump inlet tube into the inlet. Use a small amount of sealing compound on the threads, but not enough for compound to ooze into the pump.
7. Drop a check ball into the outlet connection, cover ball with check ball spring, apply sealing compound to threads of the elbow, and install elbow in discharge connection.
8. Squirt some oil into pump cavity as a primer before reassembling the return spring, plunger, and plunger button (through mounting bracket) into pump cavity.
9. Reassemble remaining oil line and fittings in reverse order of disassembly.
10. Test the assembled and primed pump, which should now pump full volume.

3—12 PRESSURE LUBRICATOR SERVICE MODEL 500 TYPE

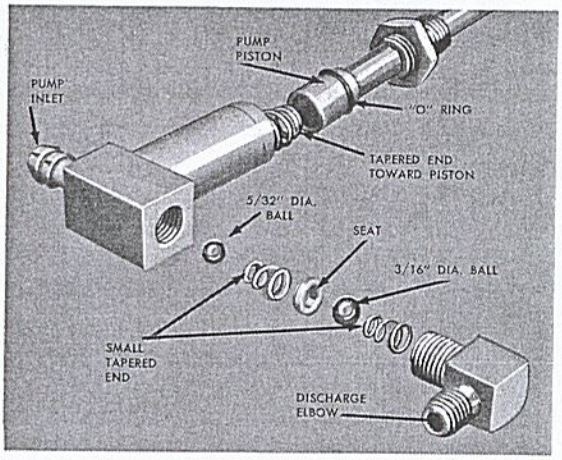
Replacement Pump Body for Original BUZ Standard Pump Body for Economy-price class Models since BUZ

3—12.1 Physical Description

The new design lubricator introduced with Model 500 chain saws (see figure 3-6) is a piston pump fitted, like its predecessor, with inlet and discharge ball check valves. Both the external ap-

pearance and internal construction of the "500" type oil pump differ from the pump on the original BUZ.

Figure 3—6



3—12.2 Disassembly

1. If the unit has a rear guard, such as used on the "500" saw, this must first be removed to expose the oil line connections and pump body for disassembly.
2. Drain oil reservoir, or invert saw before disconnecting the oil pump supply line.
3. Remove the oil outlet fitting and strainer from the tank.
4. Disconnect the chain oil line at both ends.
5. Pull (comes off with a pop) the large nylon oil button off the pump piston. Then unscrew the hex nut and push the pump body down, clear of the fuel tank saddle bracket for removal.
6. Unscrew the piston nut and remove the pump piston and "O" ring, then the piston return spring from the pump cylinder.
7. Unscrew and remove the pump discharge elbow. The tapered discharge check ball spring and the large ($\frac{3}{16}$" diameter) check ball can now be removed from the pump body. The seat for the discharge check ball, however, is installed in the body with a press fit. This seat retains the inlet check ball and spring in the inlet side of the pump cavity. These elements should not be removed unless replacement is indicated. (See instructions for testing and replacement of inlet check valve and discharge seat in Section 3—12.3.)

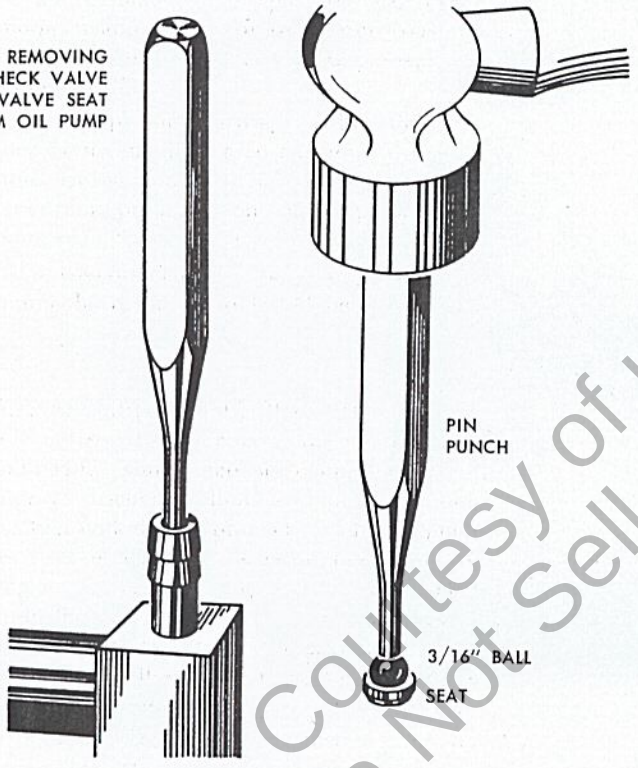
3—12.3 Inspection and Reassembly of "500" type Oil Pump

1. Wash all lubricator parts in solvent. Then blow air through all passages and cavities (except flexible pump service line). Don't forget to clean lubricator reservoir and strainer.
2. The pump body should be in good condition, with no cracks or porous areas. The pump piston should be in good condition and the return spring of proper length. During overhaul, always install a new "O" ring gasket on the piston.
3. TEST OPERATION OF INLET CHECK VALVE by applying alternate pressure and suction at the pump inlet connection with the lips. . . . If the check ball passes no air during suction and passes air freely during applied pressure, it is functioning properly. Decision whether or not to remove check valve, however, depends upon the outcome of the test for discharge check valve operation. Drop $\frac{3}{16}$" diameter check ball into the discharge opening, put valve spring into cavity with small end toward check ball, and screw discharge elbow into pump body.
4. TEST OPERATION OF OUTLET CHECK VALVE by sealing the inlet connection with a finger and alternately applying lip suction, then pressure at the pump cylinder opening. . . . If the check ball passes no air during suction application, but passes air through the discharge connection under pressure, the discharge valve seat, check ball and check valve spring are functioning properly.
5. Analysis of Inoperative Check Valve
   a) If the inlet check valve is not functioning, the entire check valve assembly must be removed from the pump for reasons discussed below.
   b) If the inlet check valve is functioning, but the discharge valve is faulty, first see whether installing a perfectly round, $\frac{3}{16}$" diameter check ball and a new valve spring of perfect shape will correct the condition. If the valve still does not operate satisfactorily, it must be concluded that the fault lies in a leaking or imperfect discharge valve seat.
   c) If the discharge valve seat is faulty, either install a new set of check valve parts

in a new pump body, or press the inlet check ball, spring and valve seat from the pump body with a pin punch applied to the ball through the inlet connection. When pressing against the check ball and valve spring in this manner, there is a danger of distorting one or more of the parts. Check carefully before completing assembly.

NOTE: "Seating" of a new check ball is improved by placing the ball against seat and striking ball once, lightly, with pin punch as shown in figure 3—7.

Figure 3—7



6. Order of assembly and position of the check valve parts is as follows:
   a) Drop in the $\frac{5}{32}$" diameter check ball.
   b) Drop in the first valve spring with small diameter end toward check ball.
   c) See that the seat or tapered inside edge of valve seat is away from intake check valve; press into cavity.
   d) Drop large $\frac{3}{16}$" diameter check ball in on top of valve seat.
   e) Drop remaining valve spring into pump with small diameter end toward check ball.
7. Put a small amount of sealing compound on threads of discharge elbow and screw elbow into pump discharge opening — on the last turn, tighten elbow until its line of discharge is approximately 300° past the line of the pump piston travel (or 60° before reaching the line of piston travel) for alignment with chain oil line.
8. Drop the piston return spring into the cylinder cavity, small tapered end toward the piston. Unless the old "O" ring is in good condition, put a new one on the pump piston and install piston in pump cylinder.
9. It is recommended that the reassembled pump be primed and tested before installation on the unit.
10. REASSEMBLING LUBRICATOR: Screw oil outlet strainer and connector assembly into tank; simultaneously connect chain oil line to discharge elbow and position pump in fuel tank saddle bracket . . . fasten pump to bracket with the hex nut, previously removed . . . pop the large nylon button back onto the pump piston . . . connect chain oil line to connector in guide bar mounting pad . . . connect flexible service line from reservoir to pump inlet connection.
11. If unit has a rear guard, install it on the saw. Then fill the oil reservoir with oil. Before using the saw, be sure that oil flows onto the guide bar and chain when pump is operated.

3—13 PRESSURE LUBRICATION SERVICE

Three gear models and companion design direct drives with bottom-mounted tank referred to as 900 series

3—13.1 Physical description

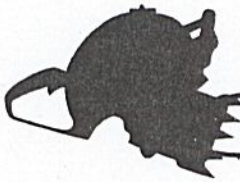
1. Three gear and companion design direct drive models such as the 9-23 and 9-26, and the 900 series saws, have pressure lubricators which are nearly identical, part-for-part, to lubricators used in Homelite direct drive and spur gear type units ever since Models EZ and 17.
2. For operating principles see paragraph 3—7.

3—13.2 Disassembly of 900 Series Lubricator

1. Unscrew captive nut and remove cylinder shroud.
2. REMOVING FUEL TANK TO GET AT LUBRICATOR: remove the screws which hold the throttle handle and air cleaner assembly to the crankcase. Then remove the screws, throttle handle to bottom of tank, and remove handle and cleaner assembly. Disconnect the chain oil line at tank end, disconnect rubber fuel line at either end. Then remove the four screws which hold the tank to the crankcase, and separate the tank and engine.
3. Remove oil pump from tank.
   a) Remove the one-piece pump discharge check valve.
   b) Unscrew plunger button. (Apply $^{15}/_{32}$" wrench at the hex part.) Remove plunger assembly consisting of button sub-assembly and plunger with "O" ring.
   Also remove plunger return spring.
   c) Unscrew oil supply line cap. Remove gasket with cap. Cup hand over opening and invert tank to remove (inlet) supply line valve spring and check valve safely.
   d) Use a cabinet type (straight, round shank) screw driver of proper diameter to unscrew the supply line check valve seat; carefully withdraw the complete oil finder including the check valve seat and gasket, flexible sleeve, and the strainer.

3—13.3 Inspection and Reassembly of 900 Series Lubricators

1. Lubricator service for this series is the same as given for the other direct drive saws. Please refer to Section 3—9.2 for inspection and reassembly of the oil pump.
2. At the same time as you are assembling the fuel tank to the crankcase (with four hex head screws), reconnect the chain oil line to the oil pump outlet check valve.
3. Before putting the throttle handle and air cleaner assembly back on the saw, fill the oil reservoir with oil and test the chain oiler to see that it works properly. If it does, reconnect fuel line between fuel pump and tank, and complete reassembly as follows.
4. Flip choke lever on carburetor to down position . . . Position throttle handle and cleaner assembly on saw so that fork of external choke lever engages button of carburetor choke lever . . . Throttle trigger arm should slide underneath carburetor throttle shaft lever roller. Fasten handle to crankcase and to bottom of fuel tank with screws previously removed.

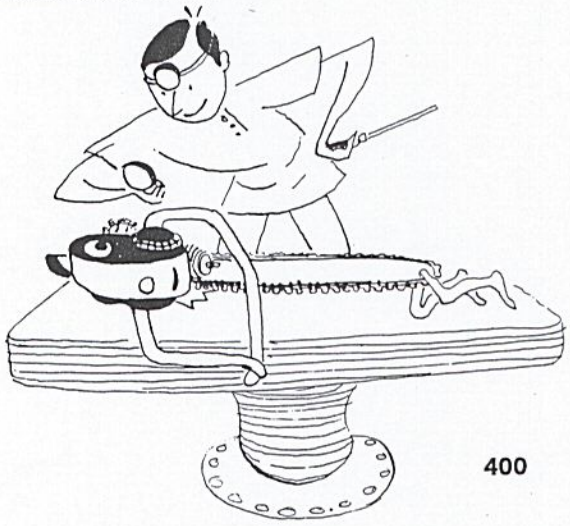


Section 4

FUEL SYSTEM

INDEX

ORIGINAL and SUPERSEDING MODELS.



THE FUNCTION OF THE FUEL SYSTEM is to keep the engine supplied with a combustible vapor of fuel and air. The fuel system includes a fuel tank, air and fuel filters, a carburetor and an intake manifold, plus all connecting fuel and pulse lines.

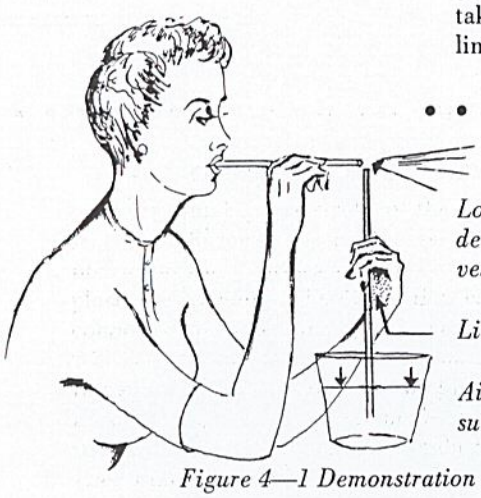
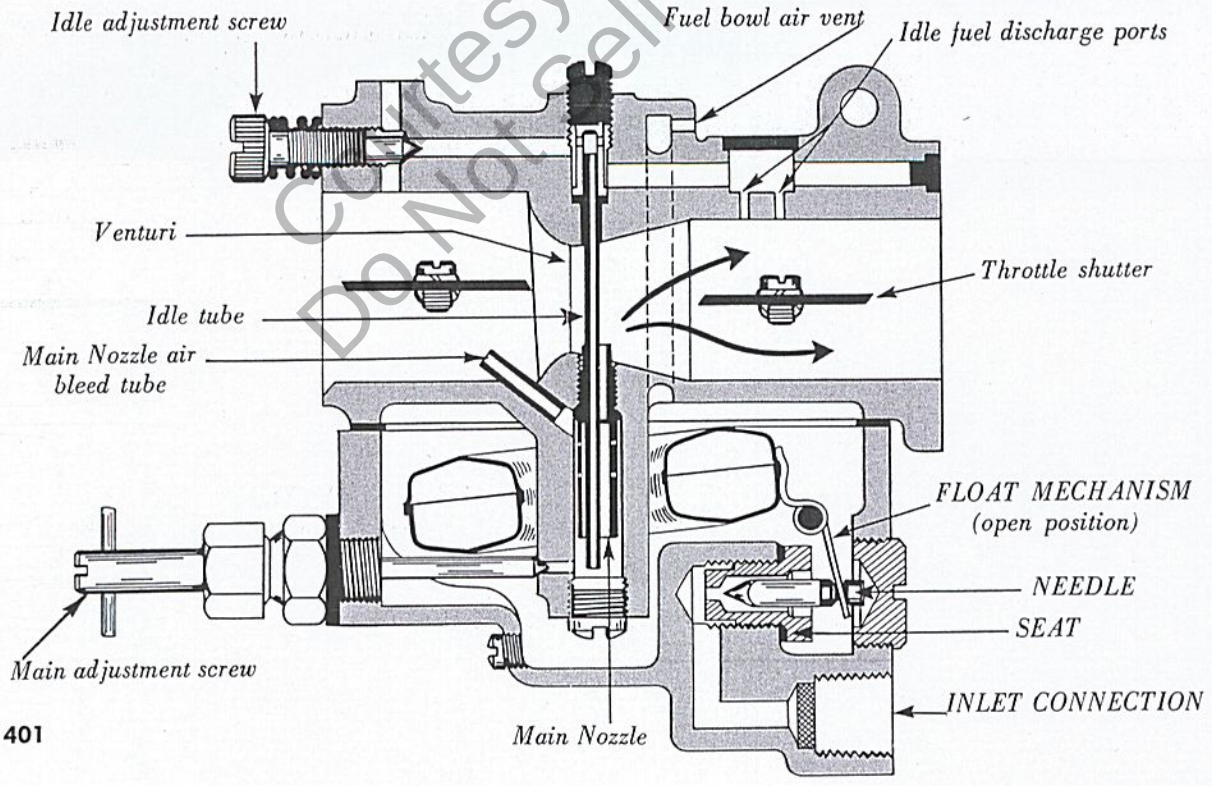


Figure 4—1 Demonstration of Atomizer Principle

4—1 OPERATION OF FUEL SYSTEM

Every intake or upstroke of the engine results in a vacuum inside the crankcase. Air, at atmospheric pressure, rushes into the crankcase to replace this vacuum. Therefore, if a carburetor is connected to the engine intake manifold, the air will rush through the carburetor on its way into the engine. The carburetor is nothing more than a complex atomizer which mixes a quantity of fuel with the air to form a combustible vapor. (See Figure 4—1.)

Figure 4—2 Float Control of Fuel Inlet Needle



4—1.1 Different Systems of Supplying Fuel to Carburetor.

Three different means of delivering fuel from tank to carburetor can be used—they are (1) fuel may be fed by gravity, or (2) it may be forced out by running a pressure line from the crankcase to the tank to keep the tank under slightly greater than atmospheric pressure; or (3) it may be pumped out of the tank and pumped into the inlet needle and seat by a fuel pump, which is activated by crankcase pressure pulsations. In cases (1) and (3) the fuel tank must be vented.

4—1.2 Inlet Control by Float or Diaphragm

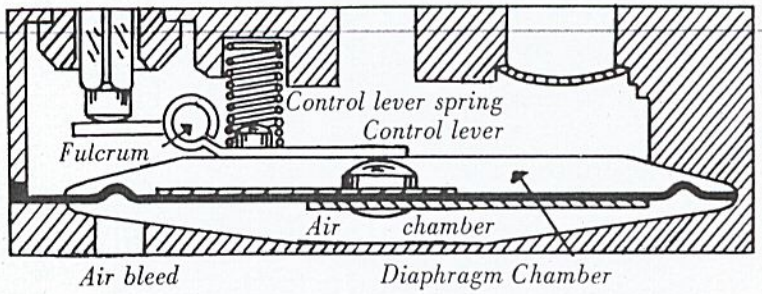
The carburetor fuel intake consists of an inlet needle and seat controlled by either float or diaphragm action. In a float type carburetor a constant level of fuel must be maintained in a float chamber by action of the float (See Figure 4—2), whereas, fuel in a diaphragm carburetor is more or less admitted directly—through action of a pressure-sensing diaphragm—without resort to a fuel storage chamber.

4—2 FLOAT FEED CARBURETOR OPERATION

4—2.1 Idle (Slow-Speed) Operation

1. The inlet needle and seat, and the float maintain a constant level of fuel in the float chamber. When the fuel level is low, the float is also low and the inlet needle is open; fuel enters the float bowl. As the fuel level rises the float rises also, and shuts off the flow of fuel. At idle (throttle butterfly almost closed), fuel passes through the main adjustment orifice into the channel which extends from the upper half of the carburetor into the float bowl. In addition to the main nozzle, the channel also contains an idle tube.
2. Fuel, seeking its own level in the channel, is drawn through the idle tube by the vacuum created in the crankcase. At the top of the idle tube, it is mixed with air—the amount of air controlled by setting of the idle mixture adjustment (or low speed) screw.
3. A small amount of the fuel-air mixture is discharged directly into the barrel through the idle discharge port, located directly over the top of the throttle butterfly. This volume then mixes with additional air being drawn past the (almost closed) throttle butterfly.

Figure 4—3 Diaphragm Inlet Control



4—2.2 High Speed Operation (Full Power)

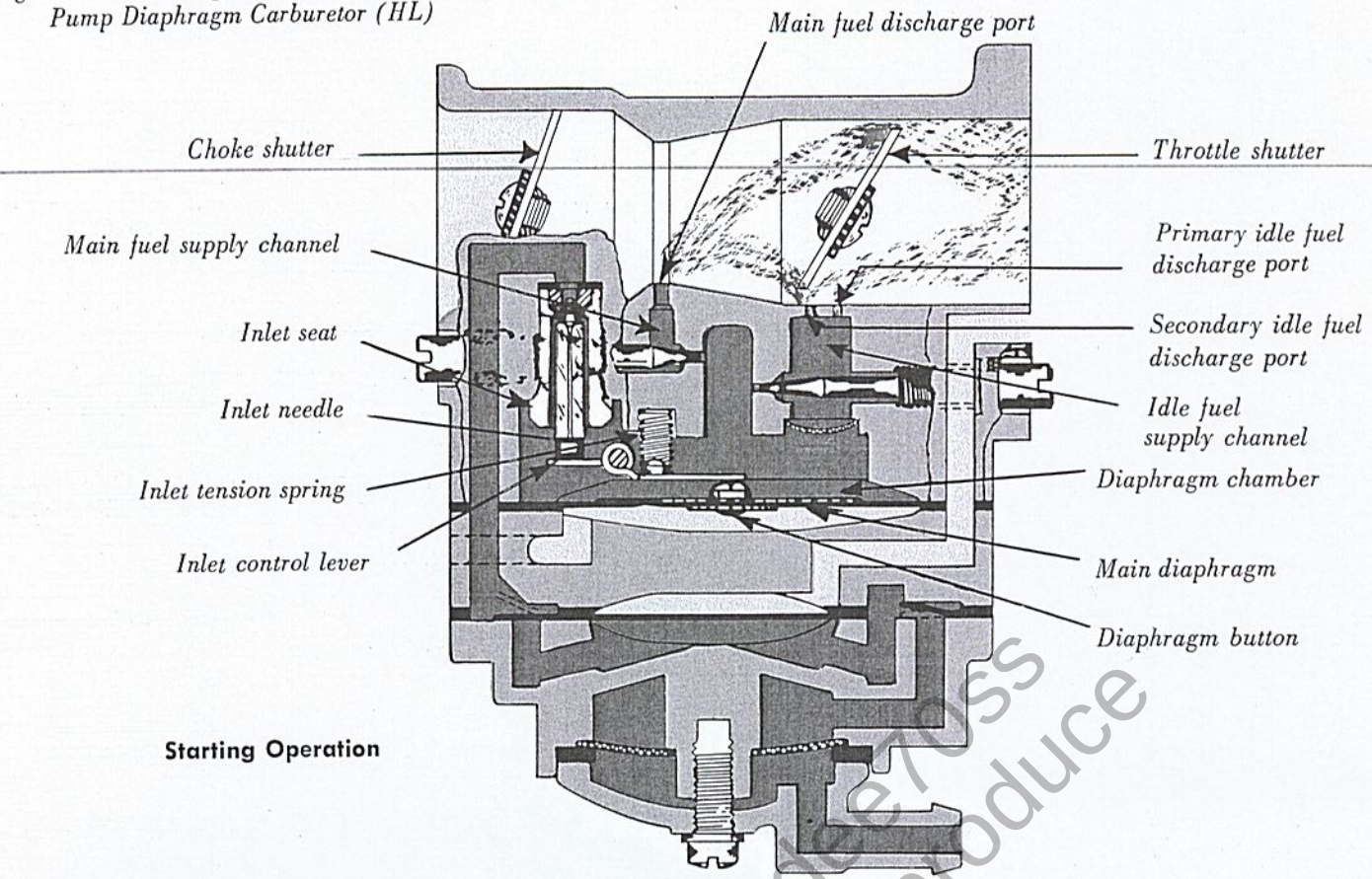
1. At high speed the throttle butterfly is open. This reduces the suction at the idle discharge port, accordingly reducing the discharge not only at the idle discharge port but also through the flexible idle line to the crankcase. Furthermore, the open throttle increases flow of air through the venturi (cone-shaped portion of barrel) to a high velocity.
2. The high velocity flow of air through the venturi acts as a siphon on the main nozzle to pull fuel around the high speed needle and up through the main nozzle into the barrel.
3. The proper proportion of air is bled into this fuel through the high speed air bleed, located on an angle on the air intake side of the carburetor just before the main nozzle.

4—3 DIAPHRAGM CARBURETOR OPERATION

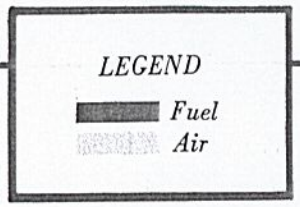
NOTE

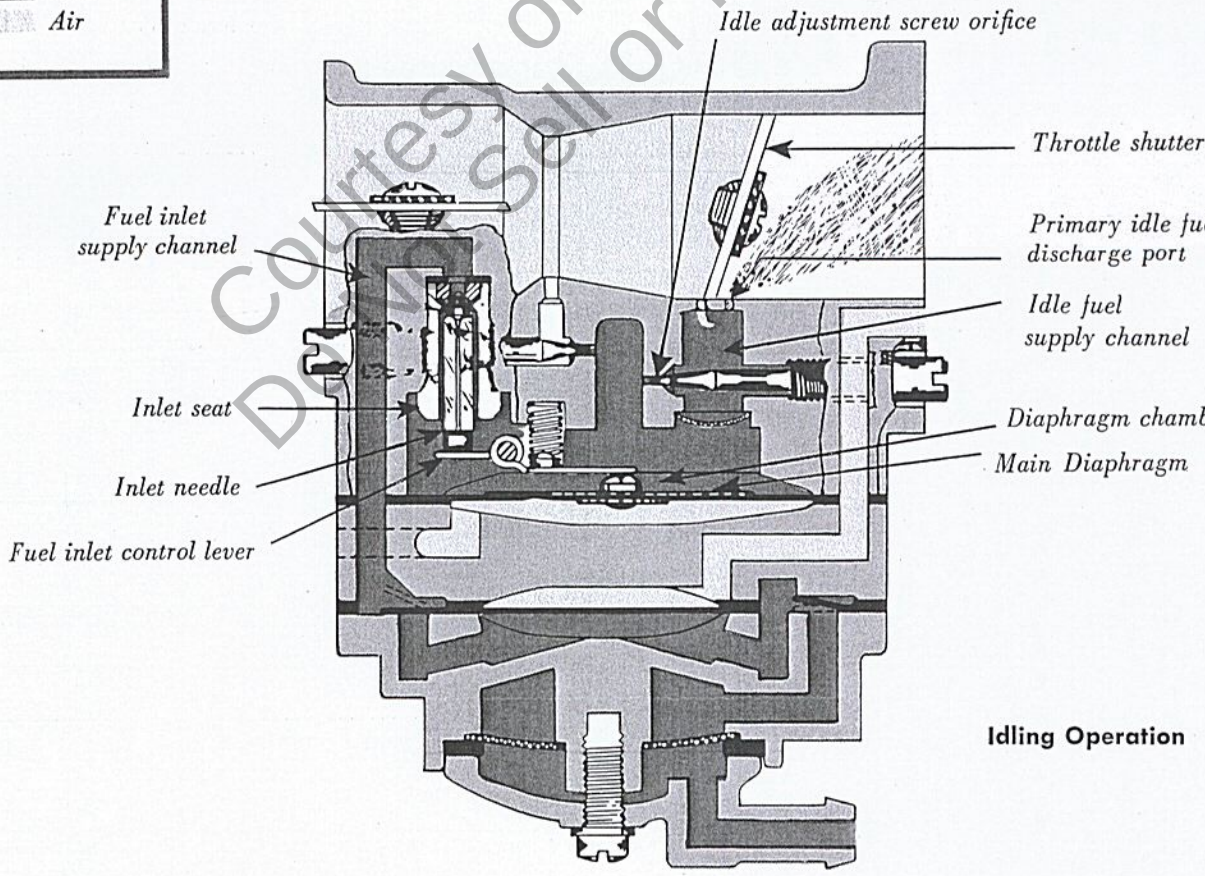
Although design and construction may vary somewhat between types, the basic operating features of type H, HP, HL, CS, and CP carburetors are the same. The fuel pump, although attached to the carburetor is regarded as part of the fuel delivery. This discussion begins with the intake of fuel and air into the diaphragm carburetor.

Figure 4—4 Starting and Idling operation of Pump Diaphragm Carburetor (HL)



Starting Operation





Idling Operation

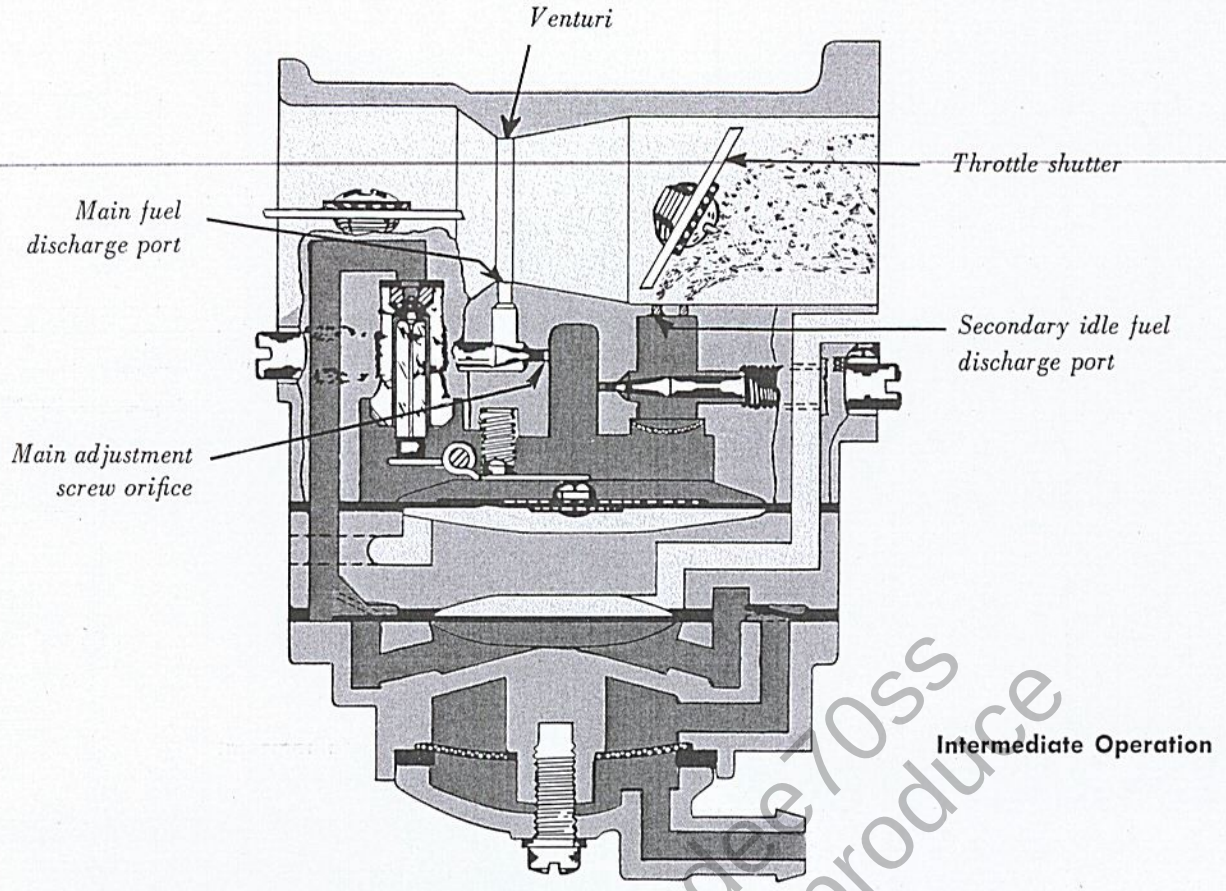
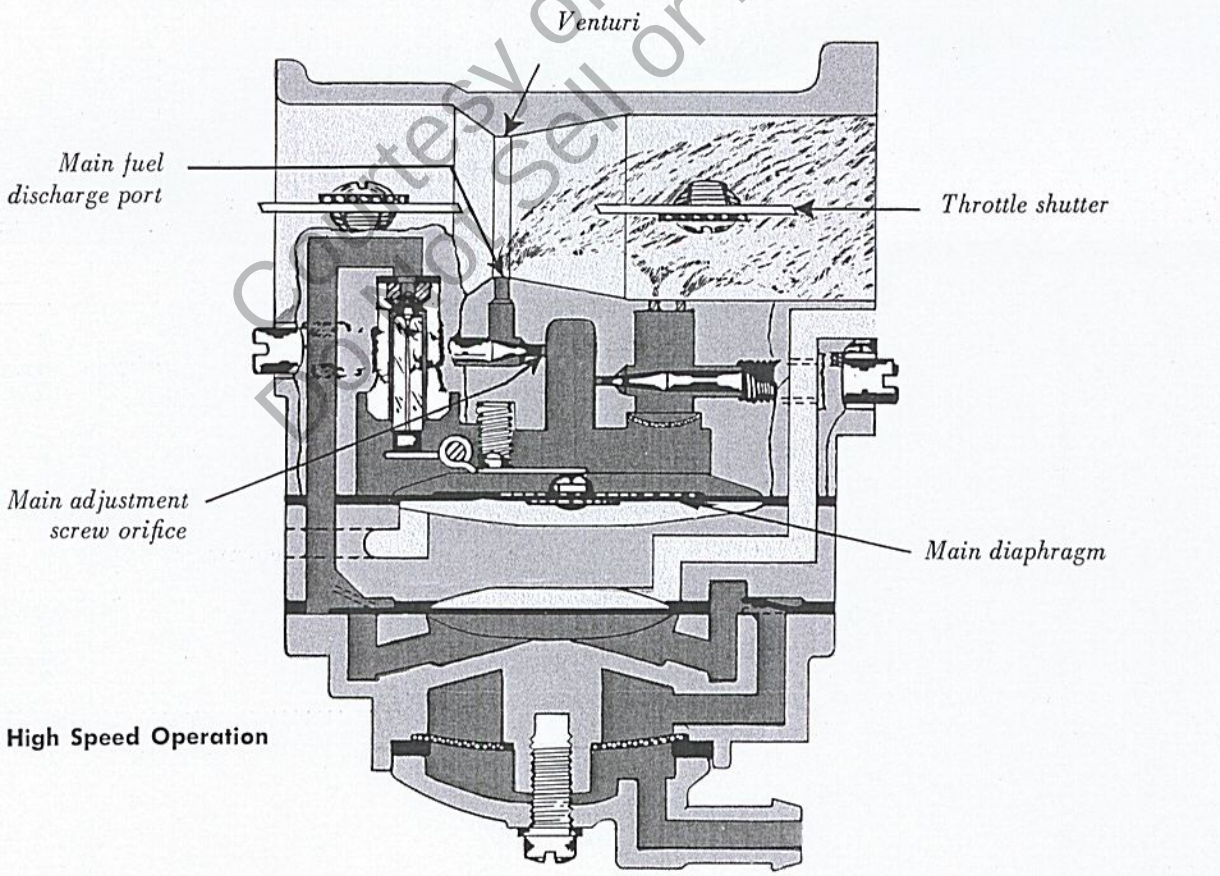


Figure 4—4.1 Intermediate and High Speed Operation of Pump Diaphragm Carburetor (HL)



4—3.1 Diaphragm Inlet Control

(See Figure 4—3.)

1. The diaphragm carburetor uses an inlet needle and seat to admit fuel. Control of the inlet needle is achieved by an inlet control lever. A tension spring exerts tension on the control lever to keep the inlet needle seated. Action of the main diaphragm, in response to engine demand, relieves enough of this tension to allow the inlet needle to be unseated by the weight of the incoming fuel. (The tension of this spring should never be altered.)
2. The main diaphragm is a pressure-sensing device of rubberized nylon cloth which divides the carburetor cavity into two chambers. Engine vacuum reduces the pressure in the (upper) diaphragm chamber. Whenever this chamber is so vacuumized, atmospheric pressure on the underside of the diaphragm pushes the diaphragm upward so that it contacts and actuates the inlet control lever.

4—3.2 Idling Operation of Diaphragm Carburetor

(See Figure 4—4.)

1. During idling the throttle butterfly is in a "cracked" or partly open position. Engine vacuum is transmitted to the fuel side of the *main diaphragm*. This vacuum holds the main nozzle check ball seated (See note), preventing air from bleeding in and breaking the vacuum.

> **NOTE**
>
> *On the HL, CS, and CP carburetors, which have neither a main nozzle nor a check ball, the size of the main orifice and the idle channel have been calibrated to a point where any air bled in through the main orifice is insufficient to break the vacuum in the diaphragm chamber.*

2. Fuel is drawn from the diaphragm chamber up the idle passage. A check ball and seat in the idle passage of H and HP carburetors, prevent the unit from flooding when idled in the upside-down position. The check valve seat has one fuel passage in the center and another smaller passage to the side. Although both passages are open during normal idling operation, only the small side passage is open during inverted idling.

> **NOTE**
>
> *To be idled upside down without flooding, the carburetor must contain an idle check valve and seat. HL, CS, and CP type carburetors contain no check ball, will flood in inverted idle position.*

3. The fuel is then mixed with air from the rear or secondary port, located just to rear of the partially open throttle butterfly. On"HP" carburetors, where there is only one discharge port in the barrel, the air is taken in by means of a valving system incorporated in the throttle shaft. This "valving" action results in a smooth idling characteristic rather than an abrupt acceleration type discharge from the primary idle port.

4—3.3 Intermediate Operation of Diaphragm Carburetor

(See Figure 4—4.1.)

When the throttle is opened to the point where both the primary and secondary idle ports are ahead of the butterfly (but not open enough to draw fuel from the main orifice), fuel will be drawn and discharged through *both* ports. This fuel is mixed with the air rushing past the partly opened butterfly. There is still insufficient air pressure in the venturi (barrel restriction) to unseat the main nozzle check ball (on units incorporating this feature).

4—3.4 Full Throttle Operation of Diaphragm Carburetor

(Figure 4—4.1.)

With the throttle butterfly opened completely, the upstroke of the piston causes an inrush of air through the carburetor barrel. This draws fuel through the main nozzle into the carburetor barrel where it is atomized, or mixed with the air, and then drawn into the engine. On type "H" and "HP" Carburetors, the main nozzle check ball is drawn off its seat by this same force.

4—4 FUEL PUMP OPERATION

4—4.1 Fuel Pump System

The fuel pump is a simple device utilizing pressure changes or pulsations from the crankcase to draw fuel from the tank (on the upstroke) and

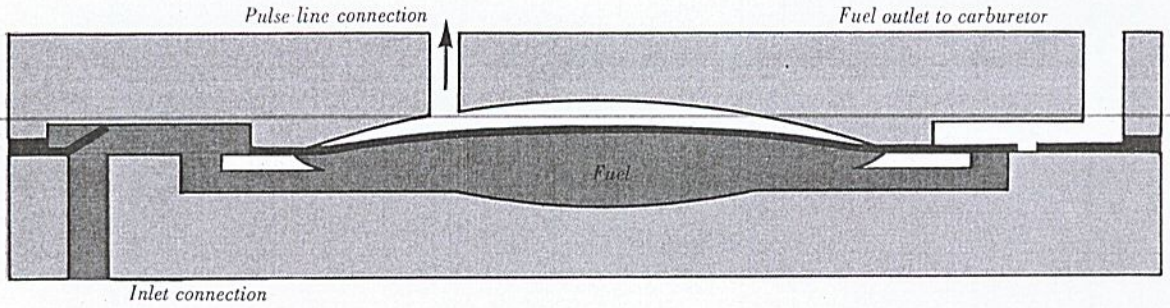
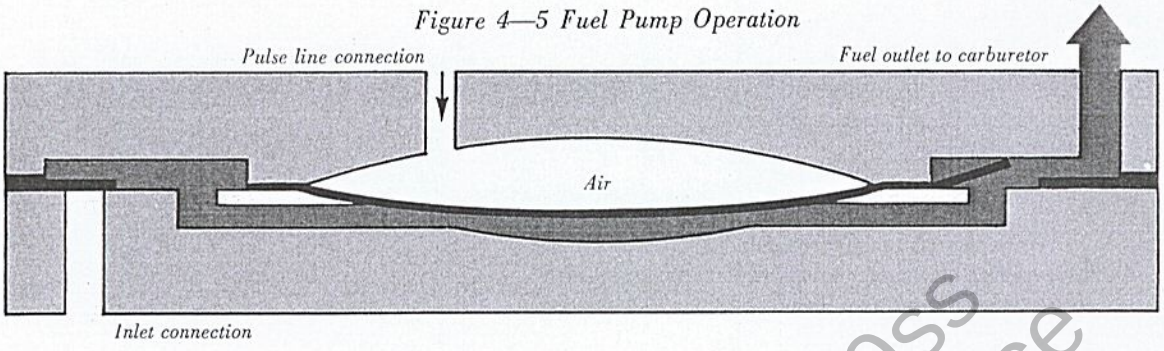


Figure 4—5 Fuel Pump Operation



push fuel to the inlet needle and seat (on the downstroke). The fuel pump consists of a pulse line from the crankcase, an inlet check valve and an outlet check valve, plus a rubberized cloth diaphragm which divides the internal space between the pump body and the diaphragm cover into two cavities.

4—4.2 Check Valves

1. Check valves are devices which allow the flow of gases or fluids in one direction and block the flow in the opposite direction. The check valves in the fuel pumps are either the ball, seat and spring type (See Figure 4—6) or the flapper valve type. (See Figure 4—5.)
2. Because a flapper valve freely passes dirt particles which would clog a ball-check valve, the newer type carburetors (CS, CP and HL series) employ flapper valves. The flappers are integral parts of the pump diaphragm. (See Section 4—4.3.)

4—4.3 Fuel Pump Diaphragm

1. On the piston upstroke, the diaphragm is drawn upward. This unseats the in-check valve and seats the out-check valve. Fuel is taken into the fuel pump.
2. On the piston downstroke, the conditions are reversed. The in-check valve is closed (so fuel cannot be pushed back into tank) and the out-check valve is opened. Fuel is delivered from the pump to the inlet needle and seat.
3. Sometimes age and continual pressure of fuel against the rubberized cloth take their toll on the fuel pump diaphragm. Pinholes result in failure; wrinkles in the diaphragm reduce pump volume; wrinkling of the valve flappers prevents them from seating properly. Latest Brown carburetors contain small compression springs over each valve flap for more positive valve seating. Replacement diaphragm cover castings for CP series carburetors contain drilled holes to house the springs. Use of the drilled covers in models without springs will not affect flapper valve operation.

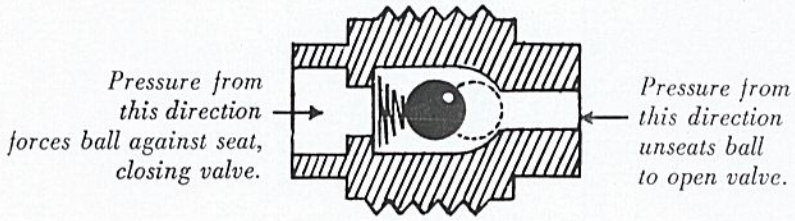


Figure 4—6 Check Valve Operation

NOTE

Early Model 5-30 saws utilize a pressurized tank instead of a fuel pump to deliver fuel to the diaphragm carburetor. Fuel tank pressure in this type system is maintained at the desired level by a system of in-check and out-check valves located at the fuel tank.

4—5 REED VALVE OPERATION

Homelite saws with externally mounted air governors have reed valves. When the crankcase is under vacuum condition (on the upstroke), atmospheric pressure outside the valve forces the flexible steel reed to open, permitting intake. Crankcase pressure on the downstroke forces the reed closed against the reed valve adapter, effectively blocking blow-back, and assuring transfer of the charge from the crankcase to the cylinder (for Reed Valve service see Section 4—12).

4—6 ROTARY VALVE OPERATION

On the Models 26, 5-30, 7-29 and 8-29, a rotary valve, which opens and closes the intake port in the crankcase, accomplishes the same purpose as a reed valve. Incorporated with the rotary valve is the governor. (See Section I for explanation of governor operation for all units.)

4—7 FUEL SYSTEM DIAGNOSIS

In diagnosing fuel system troubles, first be sure the air filter and fuel filter are clean, and a sufficient supply of fuel is available. Then check whether all fuel lines and connections are tight. Remember that air leaks and dirt are the arch enemies of proper carburetion. Cleaning a particular part, such as a check valve, will help only temporarily. If you find dirt, follow by a complete cleaning of the entire fuel system. (Also flush out fuel mixing container.) In diagnosing troubles be sure the carburetor adjustments are set within the proper range recommended for the particular type carburetor. (See Figure 4—7.)

Carburetor troubles can usually be grouped in one of the following categories:

1. Carburetor floods.
2. Engine will not accelerate.
3. Engine will not idle.
4. Engine runs out lean in cut.
5. Carburetor runs rich with the main adjustment shut off.
6. Engine idle speed cannot be adjusted slowly enough.

4—7.1 Diagnosis of Flooding

Carburetor flooding is usually due to failure of some part of the inlet system and is nearly always traceable to one or more of the following causes:

1. Diaphragm Carburetors:
   a. Inlet needle being held open by dirt.
   b. Loose plug under main nozzle, or faulty nozzle plug gasket.
   c. Distorted diaphragm plate resulting in constant tension on inlet control lever.
   d. Dirty or burred inlet control lever binding on pinion.
   e. Improperly adjusted or bent inlet control lever.
   f. Tension spring missing or improperly seated on inlet control lever.
   g. Flushing pin stuck in flushing position (H & HP Types).
2. Float Carburetors:
   a. Inlet needle being held open by dirt.
   b. Improper setting of float level.
   c. Improperly installed body gasket preventing float from rising far enough to seat the inlet needle.
   d. Worn yoke (slotted end of float lever) or float lever pinion, causing failure of inlet needle to seat.
   e. Collapsed or leaking float.

4—7.2 Diagnosis of Failure to Accelerate

The inability to accelerate from idle is usually caused by lean operation, traceable to improper (lean) setting of the idle adjustment, or to one or more of the following causes:

1. Diaphragm Carburetors:
   a. Fuel pump check valves dirty.
   b. Improper setting of diaphragm lever preventing inlet needle from opening completely.
   c. Inlet needle binding.
   d. Loose diaphragm cover screws or faulty main diaphragm gasket causing air leak.
   e. Main nozzle check ball stuck in closed position, preventing high speed operation. (H & HP)
   f. Main orifice restricted.
2. Float Feed Carburetors:
   a. Dirty main nozzle.
   b. Plugged high speed air bleed.

4—7.3 Diagnosis of Failure to Idle

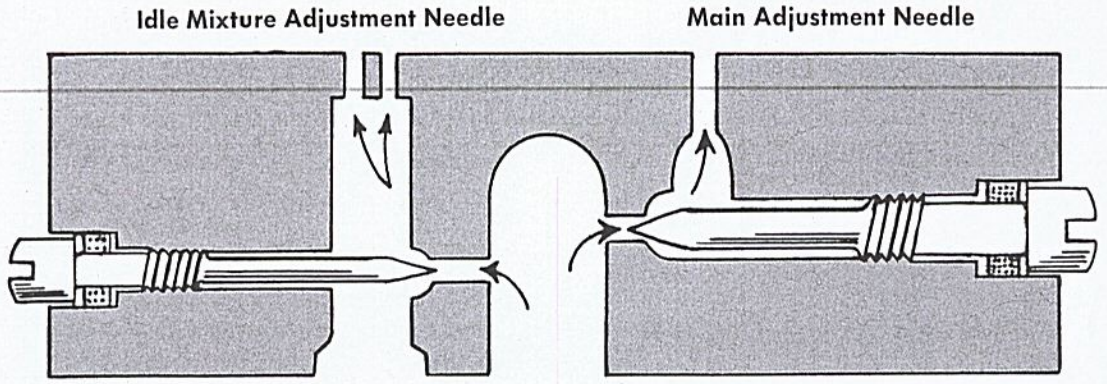
Failure to idle can usually be traced to incorrect adjustment of the idle mixture (lo-speed) needle, or to one or more of the following:

1. Diaphragm Carburetors:
   a. Idle discharge ports or channels clogged.
   b. Loose idle discharge port plug screws.
   c. Dirty idle check valve holes. (H & HP)
   d. Main nozzle check ball leaking. (H & HP)
   e. Main nozzle loose. (H & HP)
   f. Missing main nozzle gasket. (H & HP)
   g. Main diaphragm lever incorrectly set.
   h. Throttle shutter hitting side of barrel.
   i. Welch plug covering idle discharge ports not sealing (HL).
      (Engine idles with idle adjustment shut-off.)
   j. Air leak between carburetor and engine.
2. Float Carburetor
   a. Idle tube plugged or loose.
   b. Idle discharge port plugged.
   c. Porous idle fuel line.
   d. Swivel gasket not sealing.
   e. Air leak between carburetor and engine.

4—7.4 Diagnosis of Running Out Lean in a Cut

When a saw fades or runs out lean in a cut, the

Figure 4—7 How to Adjust Carburetor

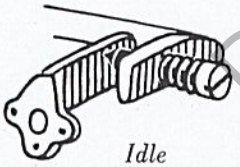


Approximate turns of Idle Mixture Adjustment Needle from Closed Position	Carburetor Models	Approximate turns of Main Adjustment Needle from Closed Position	Correct Adjustment Needle to be opened for Acceleration
1 to 1½	MD-56A (float)	1 to 1½	Main
¾ to 1	1-CS, HP-19B, HL-1A, HL-4A	1 to 1¼	Idle
¾ to 1	H-2A, HL-62AX	¾ to 1	Idle
¾ to 1	HP-15B	½ to ¾	Idle
½ to ¾	HP-6B, H-6A	¾ to 1	Idle
½ to ¾	1-CP, 2-CP, 6-CP, 7-CP, 9-CP	½ to ¾	Main
½ to ¾	5-CS, HP-1B, HL-27BX, HL-46B, HL-82A, HL-104A	½ to ¾	Idle

HOW TO ADJUST CARBURETOR FOR BEST PERFORMANCE

CAUTION: DO NOT FORCE ADJUSTMENT NEEDLES INTO THEIR SEATS AS FORCING DAMAGES BOTH THE SEAT AND THE METERING POINTS OF THE NEEDLES

1. Tension chain properly before adjusting carburetor. Make approximate settings given for carburetor model in above table. Start saw and make sure engine is warm. Adjust *Idle Stop Screw* for highest idle speed obtainable without causing chain rotation.
2. Set *Idle Mixture Adjustment* Needle for smoothest idling, then gun the engine. If the engine falters open either the *Idle Mixture Adjustment* of the *Main Adjustment Needle* (consult chart to determine which one), a little at a time, until engine accelerates without hesitation. If chain begins to creep, decrease idle speed by readjusting *Idle Stop Screw*.
3. To set the *Main Adjustment Needle* for maximum power, the engine must be under load . . . Jam chain momentarily in a cut and make needle adjustment while slipping of the clutch proves engine is under capacity load. Close *Main Adjustment Needle* until engine speed just begins to drop off, then open ⅛ turn from this position. This produces a slightly rich setting which prevents the engine from overheating.
4. Always gun the engine before turning saw over to a new cutting position. This clears the crankcase of a possible load and stabilizes it for the new position.



Idle stop screw

Distorted needle

usual trouble is either dirt or an air leak, or lack of pressure in pressurized tank, or inoperative vent in vented tank.

Check the following:

1. Diaphragm Carburetors:
   a. Fuel tank vent not operating properly.
   b. Filter in pick-up tube plugged, or plugged internal filter in CP carburetors.
   c. Inlet screen plugged.
   d. Leak in fuel system from tank to pump.
   e. Ruptured or porous pump diaphragm.
   f. Distorted check valves. (HL and CP carburetors)
   g. Dirt under one or both pump check valves. (HP)
   h. Main fuel orifice plugged. (HL, CS, or CP)

4—7.5 Diagnosis of Rich Operation (with main adjustment shut off)

This condition is caused by fuel which bypasses the main adjustment needle. Look for one or more of the following:

1. Diaphragm Carburetors:
   a. Loose main nozzle channel plug screw, or damaged channel plug screw gasket.
   b. The 1/8″ diameter nozzle channel plug is not sealing. (HL)
   c. Dirty air cleaner. (Runs rich with less than recommended main adjustment setting.)
   d. Gasket on wrong side of diaphragm.
2. Float Carburetor:
   a. Loose or missing channel plug screw under main nozzle.
   b. Bent or burred main adjustment (hi-speed) needle which fails to line up with the main adjustment needle seat.
   c. Main adjustment needle seat has become enlarged or elongated with wear.
   d. High speed bleed tube in barrel plugged. (Rarely occurs.)

NOTE

Often, two or more troubles existing simultaneously in the carburetor make detection difficult. Whenever the carburetor has been disassembled for any reason, a complete cleaning and inspection of its component parts should be performed.

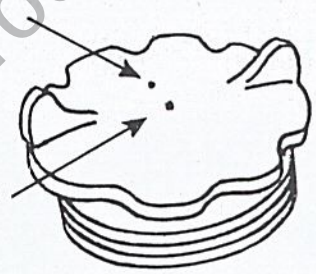
4—8 FUEL TANK SERVICE

4—8.1 Fuel Cap and Relief Valve

If the relief valve or the holes in the fuel cap become plugged, no air can be drawn into the tank to replace the fuel being used in the engine. The relief valve and fuel cap assembly should be checked periodically to be sure there is no sawdust or dirt present.

1. Obsolete type fuel caps similar to that shown in figure 4—8 have two small finger lugs and a scalloped edge. Two-piece relief valves composed of a rubber valve and a metal retainer were assembled in the cap with three screws. The cap design was modified by the addition of a second .021″ diameter venting hole. Whenever a cap of this design with but one hole is encountered, make an additional hole with a #75 drill at the point shown in figure 4—8. Always replace the two-piece relief valve with a one-piece valve for improved performance. This type fuel cap was, in turn, superseded by the cap assembly discussed below.

Figure 4—8 Adding a Second Vent to Old-Style Fuel Caps.



2. Newer design fuel caps, have a smooth edge and a finger lug extending from one side to the other (see figure 4—9). These caps are made in two sizes; one size for 900 series tanks and a smaller size for all other die-cast construction tanks. The new design fuel cap has a vertical drill hole which opens upon a hole drilled laterally through the nut of the finger lug (see figure 4—9). There are two non-interchangeable types of this cap design in each size:
   a. The original design cap accepts a one-piece construction relief valve, held with three screws.
   b. A modification of the original design accepts a new type relief valve which somewhat resembles a Garlock seal in that it is pressed into place inside the cap and is not retained with screws.
3. Caps for stamped metal tanks, such as BUZ and 500, are vented and are used interchangeably to cap both the fuel and chain oil compartments. The entire cap with gasket should be replaced when inoperative.

4—8.2 Fuel Tank and Fuel Line

When dirt has been discovered anywhere in the fuel system, the fuel tank should always be disassembled, drained, and cleaned with a suitable solvent to remove any sediment, gum or varnish deposits. The fuel line and flexible pick-up tube should be immersed in solvent. Use air to blow out the tank, the fuel outlet strainer, the outlet fitting tube and the brass fuel line. Don't blow air through the flexible pick-up tube. A dirty or plugged fuel filter should be replaced with a clean one.

4—8.3 Leaking Tank

A leaking fuel tank is a fire hazard. Because of the difficulty of obtaining a perfect seal, the fuel tank body and cover have been assembled and factory checked under pressure to guard against leakage. The painted screws holding the cover to the tank should never be removed. On pressurized tank systems, leakage due to extreme high tank pressure, caused by failure of the pressure relief check valve, may be prevented by cleaning or replacing the check valve. In tanks with integral chain oil reservoirs, a leak between the oil reservoir and fuel tank could result in rich operation due to seepage of chain oil into the fuel. Cracked or otherwise leaking fuel tanks should be replaced.

4—8.4 Crankcase Pressure Line

To maintain adequate pressure in the pressurized tank systems, the pressure line from the engine must be open and free from leaks, and the connections tight. The check-valve at the fuel tank must be clean and operating properly.

4—8.5 Fuel Finder and Filter in Die-cast Tanks

1. For fuel filter inspection, fish the fuel strainer out through fuel filler hole and remove the filter from the strainer body as shown in figure 4—10. Roll the filter between your finger tips — if it feels hard to the touch, it is loaded up and must be changed.
2. Clean the strainer body thoroughly before installing the clean filter.
3. After removing the fuel strainer, remove the outlet fitting (and gasket) with the flexible pick-up tube attached. The tube must be "live" and free of kinks and cracks. Kinked or weak-walled sections of the tube can collapse under fuel pump demand, restricting fuel supply. Cracked or porous sections of the tube will leak air whenever they are above the surface of fuel — saw may run well in some positions, lean in others.
4. Attach flexible pick-up tube to outlet fitting. Be sure outlet fitting gasket is perfect. Drop tube into tank through outlet fitting hole and tighten fitting so it does not leak. Fish end of tube out through fuel filler hole to attach strainer assembly.

4—8.6 Shut-Off Valve

The fuel shut-off valve is a valve-and-seat type. A packing nut and packing around the valve stem prevent leakage. If the valve leaks, tighten the packing nut slightly. (But only enough to stop leakage, since over-tightening will make the valve hard to turn.) A dirty valve which fails to seat can be disassembled and cleaned. However, if the threads are worn or stripped, the valve must be replaced. When the unit is not being used, the shut-off valve should be closed.

4—8.7 Fuel Lines

In all cases the fuel lines should be kept clean and the connections must be fuel and air tight. Especially with fuel pump type deliveries an air leak in the fuel line will cause lean operation. Connecting parts having worn or stripped threads should be replaced.

Figure 4—9 New Type Caps and Valves.

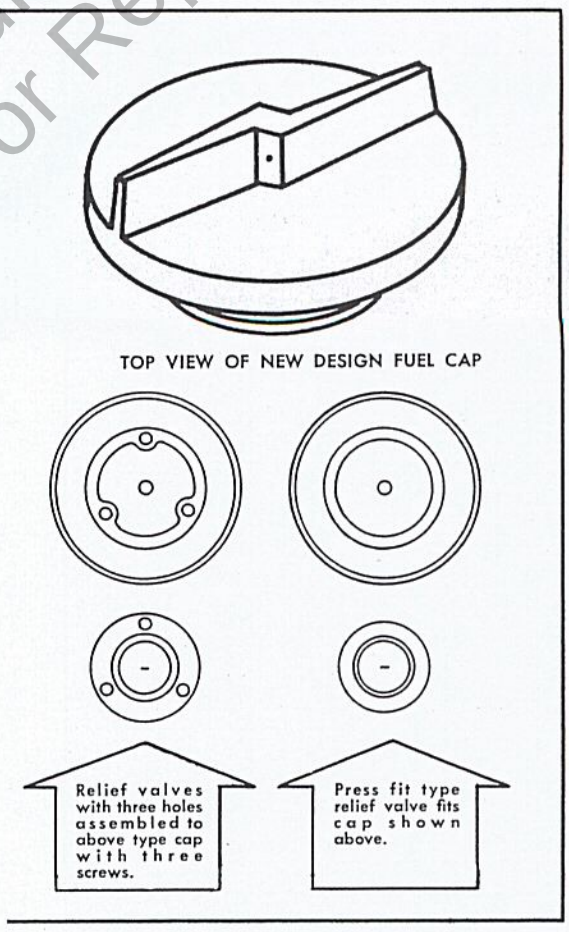
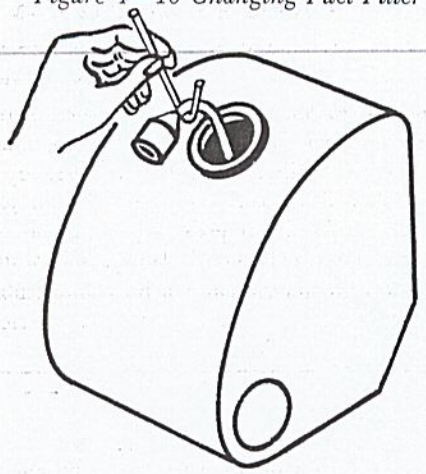


Figure 4—10 Changing Fuel Filter

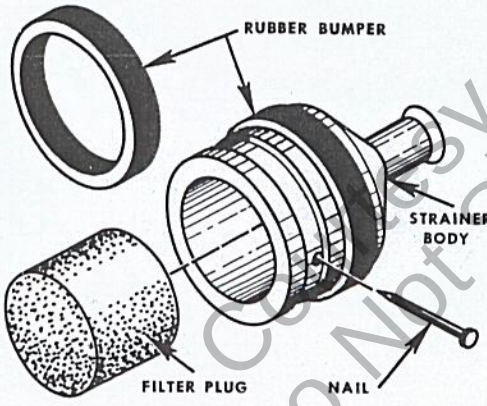


1. *Use a wire hook to lift fuel strainer out through fuel filler hole.*

2. *Pull nail under front bumper to free filter. Discard dirty filter.*

3. *Push new filter into cleaned strainer body — let felt stick out 1/16" — hold in place with brass nail.*

4. *Drop strainer back into tank.*



4—9 CARBURETOR SERVICE

4—9.1 Washing off Carburetor Before Disassembly

Before disassembling, the outside of the carburetor and connections should be cleaned with gasoline to prevent dirt from falling inside the carburetor during assembly. Also flush tools and hands spotlessly clean. Prepare a clean, hard surface on which to work. Remember, microscopic lint, sawdust and sand are deadly enemies of the carburetor.

NOTE

Do not blow air through any of the carburetor inlets, outlets or air bleed holes until disassembly has been completed.

4—9.2 How to Disassemble and Clean Float Carburetor

The correct order of disassembly of the MD series float carburetors is as follows:

1. IMPORTANT. First remove complete main adjustment screw (T) and gland assembly from float bowl.
2. Remove retaining screws and lockwashers to separate the upper body and float bowl assemblies.
3. Remove the float lever pinion and the float from the float bowl.
4. Remove the large plug screw on inlet side, then remove the inlet needle, seat and gasket assembly from the bowl. (Use large enough screwdriver.)
5. Remove idle adjustment screw and spring, idle tube and gasket, then remove the main nozzle channel plug screw from the upper body.
6. Remove throttle shaft and lever assembly.
7. Before reassembling (in reverse order of disassembly) wash all parts thoroughly in clean gasoline. Then blow air through the main nozzle and air bleed vent tube. Install idle tube and gasket in upper body, then blow the idle fuel supply channel clear by placing an air hose at the hole for the idle adjustment screw. Carefully blow air through the fuel inlet to clean the inlet channel. Be sure the inlet connection screen is clean and in place. Flush each part clean just before installation.

WARNING

Do not blow air into a fully assembled carburetor as this may cause collapse of or damage to the float.

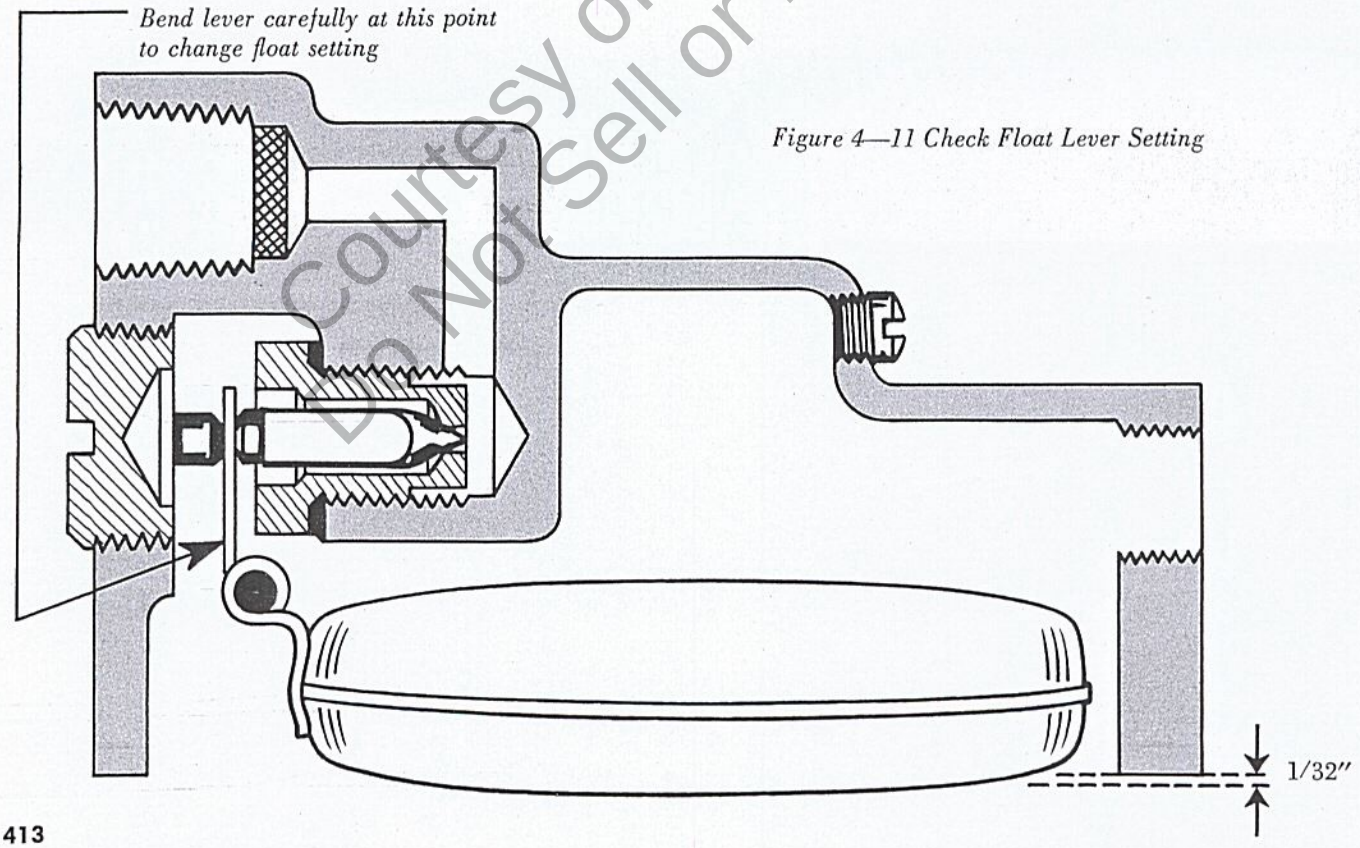


Figure 4—11 Check Float Lever Setting

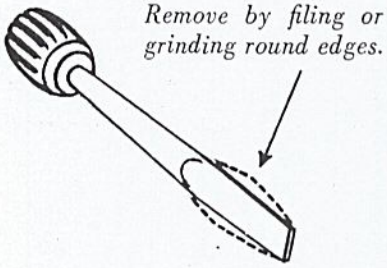
8. When installing float be sure to engage yoke, or slotted end of the float lever in the groove around the blunt end of the inlet needle so the needle will be controlled by float action.
9. To check float level, invert the float bowl (lower half) and measure the distance between the machined surface of the float bowl (without the gasket) to the bottom of the float at its lowest point. This measurement should be 1/32". (See Figure 4—11.) To adjust the float level, remove the float and use long-nose pliers to bend the vertical flat lever a trifle. The lever should be bent straight across at a point close to the pinion fulcrum to avoid cocking the float.

4—9.3 How to Disassemble H and HP Carburetors

Since many of the component parts, such as the main nozzle, are assembled in deeply threaded holes, the correct size screwdriver must be used. To prevent damage to the female threads, a cabinet type screwdriver should be used to remove the main nozzle. An ordinary blade type screwdriver can be made into a cabinet type by grinding off the excess edge as shown in Figure 4—12. Disassembly of H and HP Carburetors should be made in the following order:

1. IMPORTANT: First remove the complete main adjustment screw and gland assembly from the body.
2. Remove diaphragm cover retaining screws and lockwashers to separate diaphragm cover or fuel pump from body.
3. Remove main diaphragm and diaphragm gasket. Carefully pry off the cap and remove the inlet control lever pinion screw.
4. Remove inlet control lever, inlet needle, and tension spring.
5. Remove inlet needle seat and main nozzle channel plug screw.
6. Remove main nozzle, fuel inlet connection and tension spring retaining screw.
7. Remove Idle Adjustment Screw and spring, and body channel plug screws.
8. Use correct size cabinet type screwdriver to remove the idle check valve.
9. The carburetor should be reassembled by reversing the order of disassembly given above. Care should be taken to tighten the inlet connection securely to prevent leakage. Also be very careful not to cross-thread the main nozzle plug screw.

Figure 4—12 How to make a Cabinet Screw Driver



4—9.4 How to Disassemble CS, CP and HL Carburetors

The outside of the carburetor should be cleaned of all dirt and sawdust before the carburetor is disassembled. Do not blow air through the air bleed holes or discharge ports until disassembly has been completed. Disassemble as follows:

1. Remove fuel inlet turret (1 screw).
2. Remove fuel strainer gasket and screen.
3. Remove fuel pump body (6 screws).
4. Remove fuel pump diaphragm and gasket.
5. Remove main diaphragm cover plate.
6. Remove main diaphragm.
7. Remove main diaphragm gasket.
8. Remove the large brass filter plug screw and gasket from top of CP carburetors; the felt filter and wire screen should be discarded. (Do not install filter and screen when reassembling as they are no longer required.)
9. Remove inlet control lever pinion screw, control lever and tension spring. Then remove the inlet needle.
10. With a thin wall 5/16" hex socket wrench, carefully remove the inlet seat. Be careful not to turn up any brass chips when removing or replacing seat.

NOTE

The seat should not be removed unless persistent flooding of carburetor indicates a faulty seat, in which case the complete inlet needle, seat, and gasket assembly should be replaced. Care should be used to avoid cross-threading the seat.

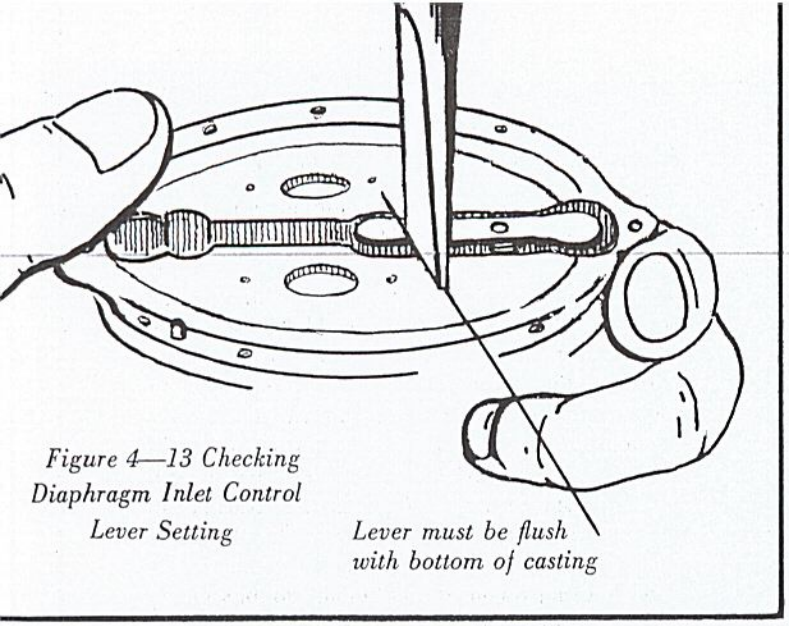


Figure 4—13 Checking Diaphragm Inlet Control Lever Setting

11. Remove Main Adjustment and Idle Mixture needles.
    Before reassembling the carburetor (in reverse order as outlined above) wash all component parts in clean gasoline and clean with air through the idle and main adjusting orifices. Clean all fuel passages in the three castings with air. Be sure the inlet control lever fulcrum pin does not cause binding of the lever — straighten and polish pin if sticking. Make sure fuel inlet control lever is set flush with casting surface as shown in Figure 4—13.

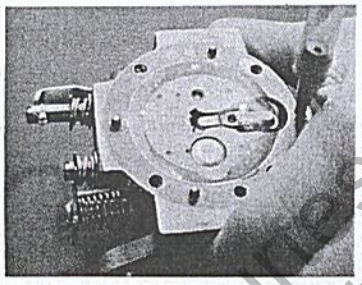
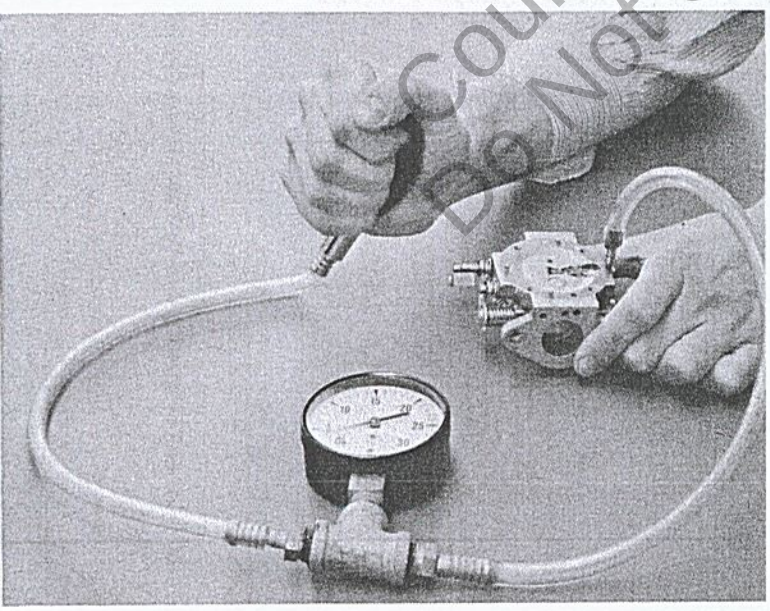


Figure 4—14



4—10 FUEL PUMP SERVICE

The fuel pump components must be clean. The gasket assembled over the fuel inlet screen must be in perfect condition. The pump diaphragm must be in good condition with no pin holes or porous spots. Ball type check valves can become plugged with dirt or sediment. To remove the IN-check and OUT-check valves, remove the adapters in the fittings, then unscrew the valves from the fittings. (Be careful not to damage threads with screwdriver, or leave any brass chips in the casting or assembly, when re-installing.)

1. The IN-check valve should permit air to pass through when lip suction is applied to its inner end, but should permit no air passage when suction is applied to its outer (slotted) end.
2. The OUT-check valve should permit air to pass through when lip suction is applied to its outer (slotted) end, but should permit no air to pass when suction is applied to its inner end.

4—11 TESTING FOR CARBURETOR LEAKAGE

4—11.1 Description

A carburetor leakage tester provides an easy and accurate method for checking carburetors. The tester consists of a rubber bulb to build up pressure, a pressure gauge, and a valve to control the flow of air. The tester can be obtained from Burco Chain Saw Specialties (See Section 10 for address), their number 1012.

4—11.2 Test Procedure

1. Remove carburetor from engine and clean thoroughly with solvent.
2. Connect discharge hose of tester to carburetor inlet turret.
3. Close valve on tester and squeeze bulb to build up 2 to 5 pounds of pressure.
4. Gauge should hold steady or drop at a very slow rate. If gauge needle drops more than one pound in 30 seconds, the carburetor is leaking and should be tested as shown in section 4—11.3. If gauge holds pressure, inlet needle and seat, fuel pump body, main diaphragm cover, and fuel inlet turret are not leaking.
5. Close main and idle adjustment screws.
6. Squeeze bulb until gauge indicates about 15 pounds. Inlet needle should now be off its seat and the main diaphragm cavity under pressure. Again, gauge needle should hold steady or drop very slowly. If needle drops rapidly a leak is indicated, and carburetor should be checked as shown in section 4—11.3.

7. Open main and idle adjustment screws. Pressure should drop rapidly until inlet needle closes, then the pressure should hold steady. If pressure drops all the way down to zero, the inlet needle is not seated properly.

4—11.3 Determining Source of Leak

1. If carburetor failed to hold 2 to 5 pounds of pressure, connect discharge hose of tester to inlet turret and immerse entire carburetor in solvent such as Varsol, Solvesso, or kerosene.
2. Squeeze bulb to obtain 2 to 5 pounds of pressure and look for air bubbles to indicate source of leak. If leak is not observed at inlet turret, pump cover, diaphragm cover, or filter cap screw, then inlet needle and seat should be tested for leakage as indicated below. Leaks at diaphragm cover or pump body may be caused by warped castings or damaged gaskets. Bubbles coming from the air bleed space between the diaphragms may be caused by either a leaking diaphragm or a porous casting.
3. If a carburetor held 2 to 5 pounds of pressure but would not hold 10 to 15 pounds, test by connecting discharge hose of tester to inlet turret, closing main and idle adjustment needles, and immersing entire carburetor in solvent. Then apply 10 to 15 pounds of pressure and look for air bubbles to indicate source of leak. If bubbles are coming from jets in barrel with adjustment needles closed, the carburetor body, Welch plugs, or adjustment needles are leaking. Leakage around the inlet lever fulcrum pin may be stopped by applying sealing compound to threads of pin.
4. While carburetor is still under 10 to 15 pounds of pressure, open each adjustment needle. A strong stream of bubbles indicates that jets and fuel passages are not clogged.
5. To test inlet needle and seat for leakage: (See Figure 4—14.)
   a. Remove pump body, diaphragm cover, and main diaphragm.
   b. Place carburetor on bench with barrel horizontal and inlet control lever facing up.
   c. Fill entire cavity around inlet control lever with fuel or solvent.
   d. Apply about 2 pounds of pressure to fuel supply channel (the hole in the carburetor body directly opposite the needle end of the control lever).
   e. Bubbles coming from the space between the needle and its brass seat indicate a damaged needle or seat, or dirt between the needle and seat. Bubbles coming around the outside of the brass seat indicate a leaky gasket and seat. A new gasket should always be used whenever the needle and seat have been removed.

4—12 REED VALVE SERVICE

The condition of the reed valve adapter assembly should be checked periodically. Whenever the carburetor must be removed for cleaning or service, always take the opportunity to check the reed valve carefully.

4—12.1 One-Reed Valves

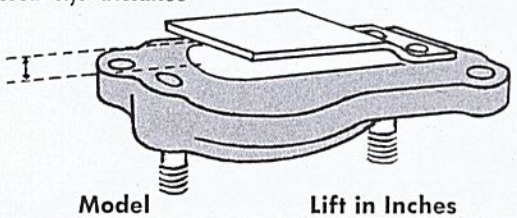
1. On reed adapters where screws are used to assemble the reed, reed spring and limit clamp, check the screws for tightness. If these screws have loosened up during operation, the screw holes may have become enlarged and the screws may have lost their holding power. In this case, it is advisable to install one of the newer riveted reed adapter assemblies.
2. The reed and adapter should be checked for signs of wear. Remember that the reed is forced once against its seat, and once against the limit stop during each revolution of the engine. For instance, if the engine R.P.M. is 6000, the reed hits 12,000 times each minute . . . there is bound to be wear.
3. Never use a reed that has been loose or has the two screw holes elongated. It will lead only to costly repairs at a later date. If any part of the reed valve adapter assembly is worn or damaged, always replace with a complete riveted adapter assembly.

NOTE

Always install the proper reed valve and adapter assembly for each particular unit. Two may look alike but the lift of the reed varies. (See Figure 4—15.) Improper lift will affect performance.

Figure 4—15 Checking Reed Lift Distance

Reed lift distance



Model	Lift in Inches
17	.160
5-20 and EZ	.180
ZIP	.085
WIZ	.190
BUZ and 500	.060

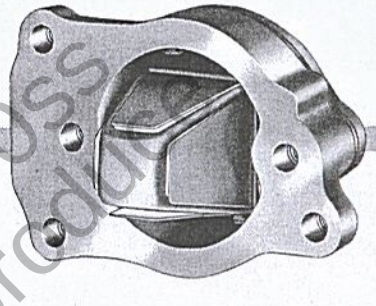
4—12.2 Pyramid Reed Valves

(See Figure 4—16)

The Pyramid Reed Valve is a smooth-breathing, easy-flow design with the capacity to satisfy fuel demands of the chain saw engine at all times. The four tapered reeds give larger area for fuel passage than the single reed valve. Because of their angular mounting, the reeds of the pyramid require less lift distance, offer less resistance to the fuel-vapor stream, create less turbulence in the crankcase, and, in turn, wear less against the valve seats than the single large reed.

Whenever the fuel system is stripped down for cleaning or service, always take the opportunity to check the reed valve carefully.

1. Inspect all four reeds. Replace any reeds which are cracked, broken, worn, or nicked on the edges.
2. Be sure all reeds are free to seat flush against their respective valve seats. Dirt may gradually accumulate beneath the reeds, preventing them from seating.
3. Inspect the valve seats of the reed valve adapter. Replace the adapter if *any* of the seats are badly worn.
4. Always be sure to tighten all eight of the screws during inspection and reassembly.



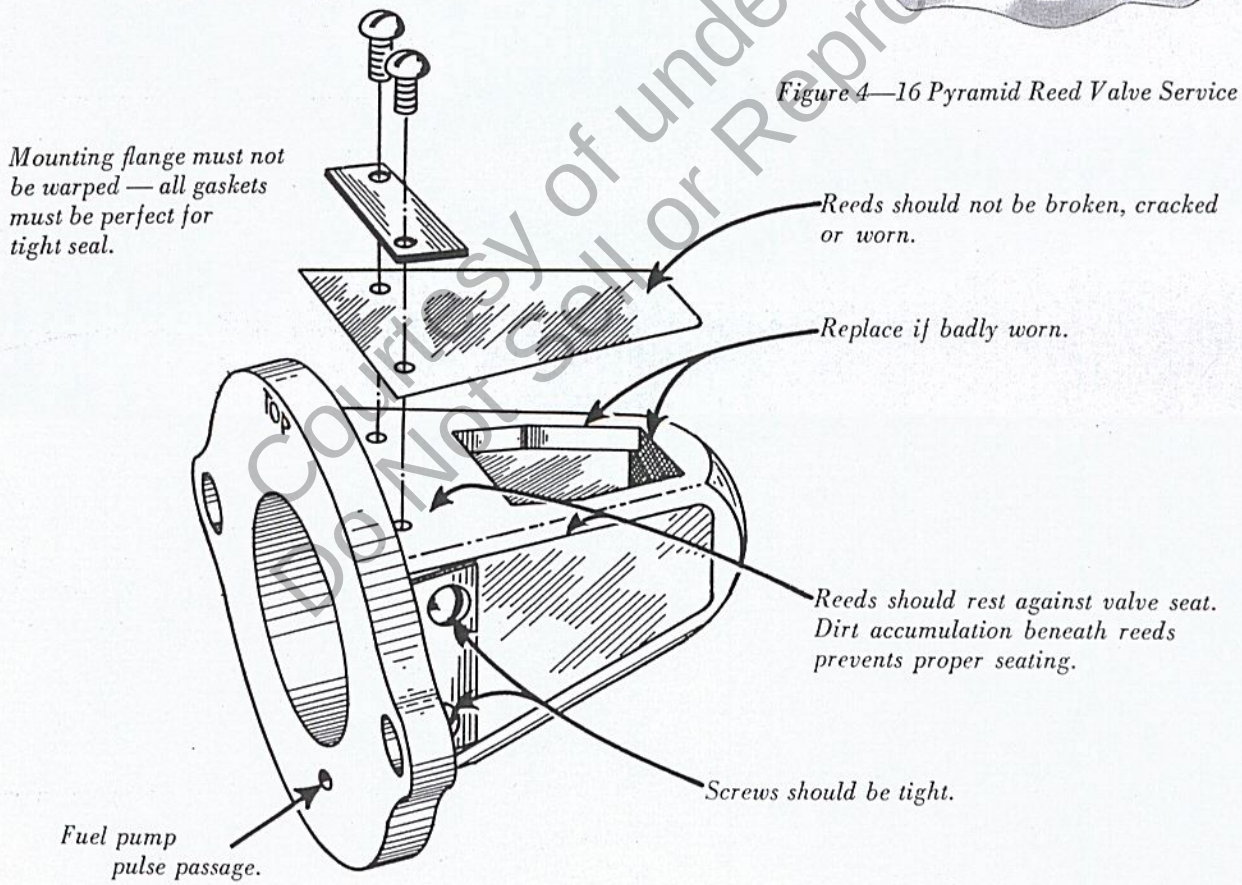


Figure 4—16 Pyramid Reed Valve Service

4—13.1 Carburetors for belt drive saws

Carb. Model (Usage)	Service Assy. Part No.	Repair Kit	Gasket Set	Main Diaphragm	Pump Diaphragm
H2A (26LCSA)	AA-72841	73090 RK-102	73089 GS-100	73070 (See Note 1)	None
H6A (5-30)	AA-73192	73428 RK-114	73089 GS-100	73070 (See Note 1)	None
HP-6A (5-30N)	A-73761 (See Note 2)	73830 RK-158	55345 GS-102	73070 (See Note 1)	55313 (See Note 3)
HP-19A See HP-19B					
HP-19B (7-29, 8-29 5-30N)	A-74576	77125 RK-324	77126 GS-124	73070 (See Note 1)	74865
1-CS (5-30N, 7-29 8-29)	See HP-19B (See Note 4)	77033 RK-150	77032 GS-150	A-77236 (See Note 5)	77026

NOTES:

(1) When installing main diaphragm 73070 put gasket on diaphragm cover side.

(2) Replacement with flapper valve-equipped Model HP-19B recommended . . . Install fuel shut-off valve 55738; flexible fuel line 74919, and actuator line A-73765-A.

(3) HP-6A has one-piece ball checks in fuel pump: In-check valve 55314; out-check valve 55315; main nozzle 73084. Pressure line to fuel tank eliminated. Actuator line A-73765-A not supplied with carburetor assembly. Metal fuel line runs from tank to pump inlet connection.

(4) 1-CS requires actuator line A-77037; HP-19B requires actuator line A-73765-A. Brown and Tillotson carburetor parts non-interchangeable.

(5) When installing A-77236 main diaphragm, put gasket next to main body.

4—13.2 Carburetor for two-gear saws and for direct drives which have pistol grip cast integrally with crankcase

Carb. Model (Usage)	Service Assy. Part No.	Repair Kit	Gasket Set	Main Diaphragm	Pump Diaphragm
HP-1A (Model 17)	See HP-1B				
HP-1B (Model 17)	(See Note 1)	55346 RK-137	55345 GS-102	73070 (See Note 2)	55313
HP-15A (5-20)	See HP-15B				
HP-15B (5-20)	(See Note 1)	55346 RK-137	55345 GS-102	73070 (See Note 2)	55313
HL-1A (EZ)	See HL-104A	75623 RK-357	55836 GS-122	A-55760 (See Note 3)	55753
HL-4A (5-20L, 17L)	See HL-104-A	75623 RK-357	55836 GS-122	A-55760 (See Note 3)	55753
HL-27A	See HL-27B				
HL-27B	See HL-104A	75623 RK-357	55836 GS-122	A-55760 (See Note 3)	55753
HL-27BX	See HL-104A				
HL-28A	See HL-27B				
HL-28B	See HL-27B				

(LISTINGS CONTINUE ON NEXT PAGE)

NOTES:

(1) Has AA-55266 external actuator line. Nylon check balls in fuel pump; IN-check Valve 55314; OUT-check Valve 55315. Main nozzle 73084 on HP-1A; 55310 on HP-1B, HP-15A and HP-15B. Replacement throttle shutter 55308 on HP-1A & B; 73272 on HP-15A & B. See HP Series carburetors for 17 and 5-20 Saws now obsolete: To install HL-104A carburetor, adapt saw with the following parts:

55735 Governor Rod
55738 Shut-off Valve
A-55801 Fuel line (flexible)
A-55800A Reed Valve assy. (with actuator hole).
28097 ⅛" Pipe Plug (to plug actuator line hole in crankcase).
55553 Gasket for A-55800-A
55019-2 Air Cleaner elbow
80638 Screw (2) for 55019-2

(2) When installing 73070 Main Diaphragm put the gasket next to the diaphragm cover.

(3) When installing A-55760 Main Diaphragm put the gasket next to the main body.

Carb. Model (Usage)	Service Parts Assy. No.	Repair Kit	Gasket Set	Main Diaphragm	Pump Diaphragm
5-CS (EZ, EZ-6)	See HL-104-A	77255 RK-151	77254 GS-151	A-77250 (See Note 1)	77026
5-CS1 (17L, 5-20L, 6-22, 4-20)	See 5-CS				
1-CP (7-19, 7-21, EZ, EZ-6, 4-20, 6-22, 5-20L)	See 6-CP (See Note 2)	77337	77336	A-77370 (See Note 3)	77304 (See Note 4)
2-CP (ZIP)	See 6-CP (See Note 2)	77337 RK-155	77336 GS-152	A-77370 (See Note 3)	77304 (See Note 4)
6-CP (EZ, EZ-6, 7-19, 4-20, 6-22, 7-21, 5-20L, 700 series)	See HL-104A	77337	77336 GS-152	A-77370 (See Note 3)	77304 (See Note 4)
7-CP	See 6-CP				
HL-46A (ZIP)	See HL-46B				
HL-46B (600D, WIZ, ZIP)	See HL-104A	77343 RK-378	77342 GS-145	A-55760 (See Note 5)	55753
HL-104A All saws except belt drives, three-gear series, BUZ and 500.	A-57440 For HP series replacement with HL-104A (See Note 6)	75623 RK-357 (See Note 5)	55836 GS-122	A-55760 (See Note 5)	55753
HL-105A	See HL-104A				

NOTES:

(1) Assemble main diaphragm between main body and diaphragm gasket.

(2) Regardless of pump body and main diaphragm covers originally specified, Homelite service parts department will supply the following for all CP series carburetors: A-77374 fuel pump body — center turret mount design — supersedes 77316 and 77377. 77301-A main diaphragm cover — has holes for #77405 springs — supersedes 77301, 77371, and 77371-A.

(3) A-77370 diaphragm replaces obsolete diaphragm A-77323 on all CP models. Assemble with gasket between diaphragm and main body.

(4) Use of springs #77405 improves fuel pump performance in CP carburetors. Main diaphragm cover #77301-A must be used to house the springs.

(5) Assemble with gasket between diaphragm and main body.

(6) When installing HL-104A carburetor as replacement on saws with governor-controlled throttle, replace throttle-opening spring #75756 with friction spring #56175. Both springs included in repair parts kit RK357.

4—13.3 Carburetors for three-gear and direct drive models of 9 and 900 series saws

Carb. Model (Usage)	Service Assy. Part No.	Repair Kit	Gasket Set	Main Diaphragm	Pump Diaphragm
HL-62-A (9-23, 9-26, 900)	See HL62AX	56649 / RK402	GS 145	A-55760 (See Note 1)	57062 (55753 orig.) (See Note 3)
HL-62-AX	A-57429 (See Note 2)	56649 / RK402	GS 145	A-55760 (See Note 1)	57062 (See Note 3)

4—13.4 Carburetors for one-piece crankcase saws with separate drive plate

Carb. Model (Usage)	Service Parts Assy. No.	Repair Kit	Gasket Set	Main Diaphragm	Pump Diaphragm
9-CP (BUZ) (See Note 4)	See HL-82A	77398 / RK-165	77336 / BGS-152	A-77370 (See Note 1)	77304
HL-82A (BUZ, 500) (See Note 4)	A-56760	77342 / GS-145	77392 / RK-420	A-55760 (See Note 1)	55753

NOTES:

(1) When installing main diaphragm put gasket next to main body.

(2) A-57429 Service Assembly consists of HL-62AX carburetor assembled with throttle closing spring #75756 for use without governor control, plus throttle friction spring #56630 for governor controlled throttle included in package.

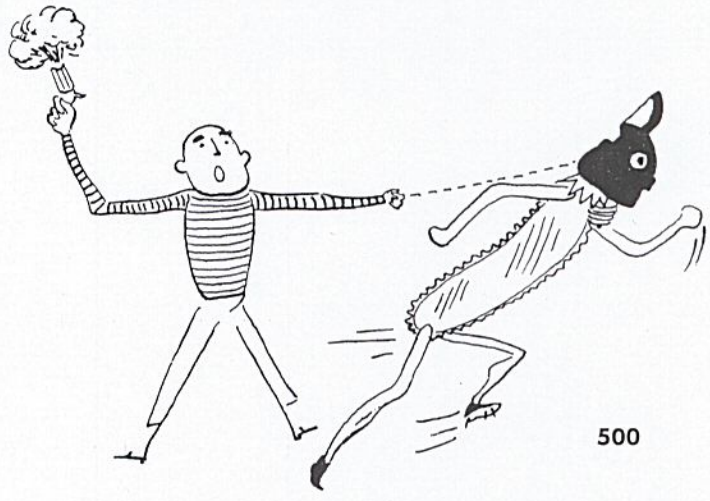
(3) Pump diaphragm 57062 replaces 55753 for HL-62A and HL-62AX usage only — do not otherwise interchange — continue using 55753 when specified for other models.

(4) These carburetors have throttle shaft and lever arrangement with throttle-closing spring.

Section 5

REWIND STARTER

INDEX



5—1 OPERATION OF HOMELITE REWIND STARTER

The Homelite starter is a centrifugal ratchet type which engages during cranking, and disengages during operation or rewinding. The recoil spring is wound by the rotation of the starter pulley during cranking. The spring rewinds the starting cord on the pulley. For safety in the event the engine backfires, a slipping clutch is incorporated between the ratchet hub and the crankshaft.

5—1.1 Ratchet and Ball Mechanism

The ball drive plate is screwed to the magneto rotor. During starting, the drive balls, contained in elongated pockets of the drive plate, drop to the bottom of the pockets and engage the teeth of the ratchet hub (connected to the starter pulley).

The ratchet teeth have sloped rear edges which cannot be engaged by the drive balls while the starter is being recoiled.

When the engine starts and picks up speed, centrifugal force throws the drive balls to the extreme outer position of the drive plate pockets, where they are completely out of contact with the ratchet.

NOTE

Care must be taken, as part of the starting technique, to insure positive engagement of the drive balls and ratchet teeth before cranking the engine. Improper starting technique will cause excessive wear of these parts.

5—1.2 Ball Drive Slipper Mechanism

The ball drive ratchet fits inside a split hub, to which the starter pulley is connected. The long screw through the side of hub is used to adjust the torque of the slipper mechanism. Tightening this screw reduces the inside diameter of the hub, thereby increasing friction between the hub and the ratchet. The proper torque is set at the Factory. (See Paragraph 5—4.1).

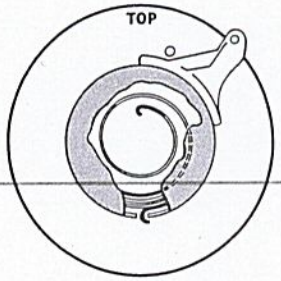
Slipping should not occur during cranking except if the engine should kick. Ball drive slipper torque should be adjusted carefully with a torque wrench.

5—1.3 Recoil Spring

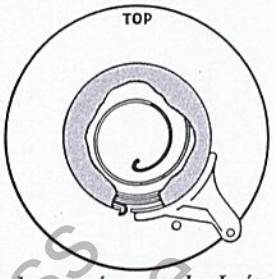
The recoil spring is housed under continuous slight tension in the recoil spring housing which is part of the air screen. The outer end of the recoil spring is hooked in a slot in the rim of the spring housing.

The pin in the end of the starting pulley protrudes through a small hole in the ratchet hub and engages the hooked end of the recoil spring's inner loop.

Figure 5—1 Rewind Starter



Hook must face to the Right
For counterclockwise rotation engines
(Direct drives, Belt drives, and
3-gear transmission models)



Hook must face to the Left
for all two-gear transmission models
with clockwise engine rotation

5—2 HOMELITE RECOIL STARTER DIAGNOSIS

1. Improper ball drive slipper tension.
2. Dirty pockets.
3. Lack of spring tension.
4. Too much spring tension
5. Worn, burred ratchet teeth, or pockets.
6. Bent ball retainer plate.
7. Worn or missing thrust washers.
8. Improper clearance between pulley and recoil housing.
9. Sawdust in spring housing.

5—3 REPLACEMENT OF RECOIL SPRING IN BALL DRIVE STARTER

1. Pry off spring housing cover and remove recoil spring a loop at a time, starting with the inner loop.

Figure 5—2 Checking ball drive torque

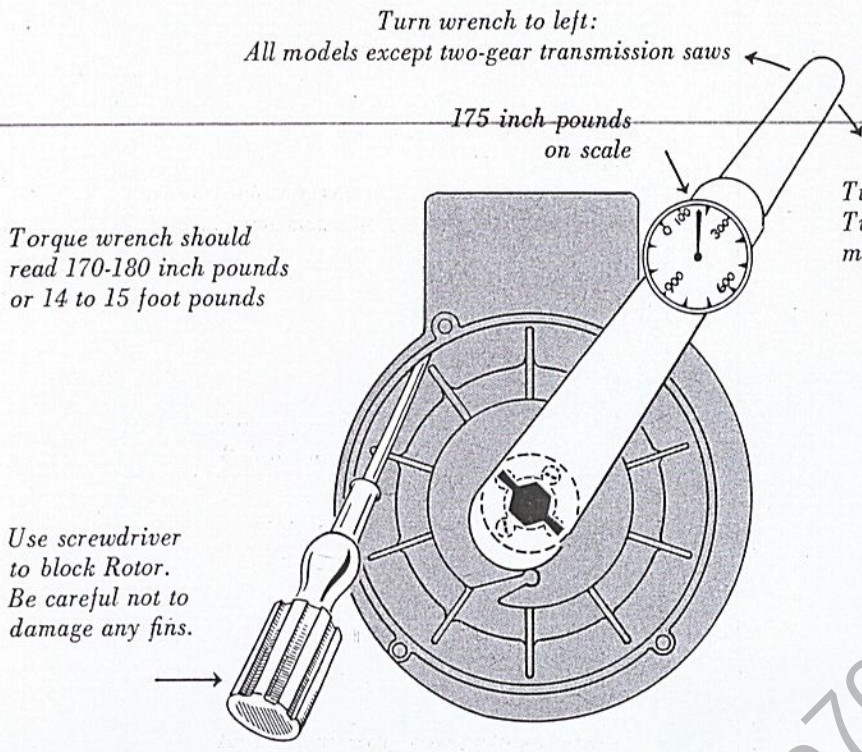
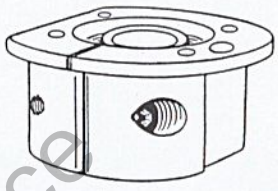


Figure 5—3
Ball drive torque adjustment



Location of Torque Adjusting Screw

Caution

Remember the recoil spring is under tension. Use extreme caution to prevent the spring from uncoiling or snapping out of place suddenly.

Note

Winding more than two turns tension on starting pulley will cause recoil spring to coil too tightly, straightening out end loops.

2. Clean the spring housing and coat the inner surfaces with a small amount of DC-4 compound for lubrication.
3. On direct drive or belt driven models, the extending loop should point toward the bracket and bushing assembly. On gear driven models, the loop should point away from the bracket. (See figure 5—1).
   Place outer hook of spring in slot of spring housing. Push down on spring—use edge of housing to remove the band or wire which holds the coils in place.
4. Install spring housing cover. Use shims to get 1/32″ minimum clearance between pulley and spring housing cover. Fasten pulley to ball drive hub.
5. Wind starting cord counterclockwise on direct, three-gear, and belt drive models; wind cord clockwise on two-gear drive models. Pull starter cord out about two feet past starter bracket, hold pulley from turning and wind no more than two additional turns onto pulley.

5—4 BALL DRIVE ASSEMBLY SERVICE

You will need a torque wrench and a ball drive adapter to perform ball drive assembly service properly. (See Section 10, Special Tools and Instruments.)

5—4.1 Ball Drive Torque Adjustment

The ball drive torque setting may be quickly checked after removal of the starter cord and two opposing screws in pulley. Remove air screen and lock the rotor against the back plate. Insert a ball drive adapter (See Section 10, Special Tools and Instruments) in these two screw holes. (See figure 5—2) Exert a steady pull with the torque wrench. Unless the dial reading is within the range specified below when slippage occurs, the ball drive slipper must be adjusted. Tightening the small screw through the split hub increases tension; loosening the screw decreases tension. (See figures 5—3 and 5—4.)

Figure 5—4

BALL DRIVE TORQUE SETTINGS

Belt Drive Models	170-180 inch-pounds
Two-Gear Transmission Models	170-180 inch-pounds
Three-Gear Transmission Models	170-180 inch-pounds
Direct Drive Models	170-180 inch-pounds

Note

When the rotor is blocked during torque adjustments, extreme caution should be exercised so the rotor fins will not be broken or the high-tension lead damaged.

5—4.2 Open Slot Type Ball Drive Plates

1. These ball drive plates have a slot in the outer wall of each drive ball pocket.
2. Older type plates should be improved by filing a 1/8″ slot into each of the pockets as shown in figure 5—5. Be sure to file the slot close to the trailing wall of the pocket, and slant it so it becomes a continuation of the pocket floor. (See figure 5—5.)
3. Centrifugal force will tend to clean out the slotted pockets whenever the saw is in operation. Naturally, it is still important to keep the plate, drive balls, and ratchet dry so sawdust and oil will not mix to a thick, sticky paste which would clog the starter.

5—4.3 Sealing Cup Type Ball Drive

1. These ball drive plates are covered with a clear plastic sealing cup which prevents fouling of drive ball pockets with sawdust and dirt.
2. A shorter (approx. 5/64″) ratchet hub is used to get clearance for the sealing cup.
3. The spiral locating pin is pressed through the hub. One end of the pin extends about 1/16″ at the ball retainer end to engage the matching hole in the new sealing cup. The other end of the pin extends about 1/4″ to engage the matching hole in the starter pulley; this relieves the strain on the four fastening screws and avoids elongating the screw holes.

5—4.4 Dirty Ball Drive Plate Pockets

Oil, dirt, and sawdust accumulation in the drive ball pockets restrict the movement of the balls. The ball drive assembly should be removed from the saw for cleaning.

1. Hold the hub vertically in one hand and rotate the ball drive plate to see whether the drive balls drop freely from the ball pockets. If they do not, further disassembling is required in order to clean and inspect the ball drive mechanism.

Slot located as shown for engine operation in direction of arrow. Slot for clockwise rotation engines located on opposite side of pocket.

1/8″ slot to floor of pocket slanted same angle as floor

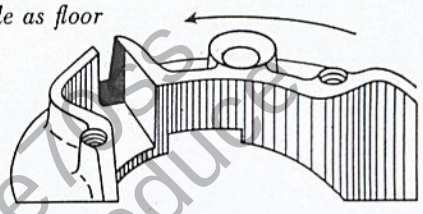


Figure 5—5
Detail of slotted ball drive plate pocket

2. To facilitate cleaning the ball drive pockets, remove the three small flat head screws which hold ball retainer to ball drive plate. Using care not to lose the three steel balls, lift the ratchet hub and ball retainer off the ball drive plate.
3. Clean the ball drive plate and the drive balls thoroughly. Then check the balls and the ball drive plate pockets for excessive wear, ridges, or galled spots which could cause failure of the drive balls to engage the ratchet teeth properly. Replace any faulty parts. Keep ratchet teeth, ball and plate dry. No lubricant of any kind should be used on either the drive balls or the pockets. Sawdust and dirt will build up rapidly on oiled surfaces.

5—4.5 Faulty Ball Drive Ratchet and Hub

1. Use air or a clean cloth to clean the ratchet before inspection. (Do not dip ratchet and bearings in solvent.) Replace the ratchet if the teeth are worn badly enough to engage improperly. Badly worn ratchet teeth with sloped forward edges will slip past the drive balls.
2. Check thrust washers and the formica washer. On models which have the formica washer bonded to the ratchet face, replace the ratchet and washer assembly if the washer is worn. The outside of the ratchet drum and the inside of the hub should be checked for dents, ridges and other signs of wear. To do this, completely remove the torque adjusting screw through side of hub and lift the hub off the ratchet drum.

Note

Always leave the inner race (or races) in the ratchet drum to protect the bearings and seals. If the inner races remained on the shaft when ball drive was removed, slip the races back in the ratchet drum carefully (from the rotor end to pass the seals safely). The ratchet bearings and seals seldom require replacement without accompanying ratchet failure. It is accordingly recommended that replacement consist of the complete ratchet and bearing assembly.

5—4.6 Bent or Worn Ball Retainer

A bent or worn ball retainer must be replaced to assure proper engagement of the drive balls and ratchet.

5—5 OPERATION OF F-M TYPE STARTER

Two parts groups, a recoil starter assembly and a starter cup and screen assembly, comprise the complete F-M starter assembly used on various Homelite Chain Saws:

The starter cup and screen assembly is mounted on the engine shaft and locked against the magneto rotor.

The recoil starter pulley cover assembly contains the recoil spring, rope, and pulley, plus the engaging mechanism — all these parts are mounted on a pin inside the pulley cover. The pulley cover is positioned over the face of the air shroud by means of an adapter so that the engaging mechanism is inside the starter cup.

1. Pulling the starter rope results in a slight shift in the position of the two friction shoes . . . enough to cause their sharp edges to engage the inner surface of the cup and crank the engine.
2. The design is such that the starter *must* drive the engine to remain engaged.

When the engine fires and engine speed is higher than cranking speed, the friction shoes are pushed out of engagement with the cup. When the pulley is allowed to rewind, the friction shoes return to their original neutral position and there is no contact with the starter cup.

5—6 ADAPTING STARTER FOR CORRECT CRANKING ROTATION

Although identical parts are used in replacement F-M starter pulley assemblies for BUZ, ZIP, WIZ, 7-21CFM and other units, only individual parts and not assemblies are available, because actual assembly must be in accordance with direction of rotation of the particular engine model. Starter cups, on the other hand, must match the rotor design of the particular engine unit.

5—7 F-M STARTER SERVICE

5—7.1 Disassembly of F-M Starter

1. Remove four screws and lift starter assembly off adapter. (Removing adapter from air shroud is optional.)
2. Place starter open-end-up on work surface. Hold large brake-retaining washer in place with thumb pressure to avoid losing parts; remove retaining ring from starter shaft (use snap ring pliers #22828).
3. Note the assembly position and order of each of the parts as removed . . . keep in order: retaining ring, large brake washer, small washer, friction brake assembly, small washer, small keyed brake washer and brake spring.
4. Pull starting rope out about two feet — hold pulley from unwinding — pull rope through slot in rim of pulley — hold rope and let pulley turn to unwind rope and relieve spring tension.
5. Prevent escape of recoil spring by lifting pulley carefully — about half an inch, then detach inside spring loop from pulley. If spring should escape, replace by coiling turn by turn into cover.

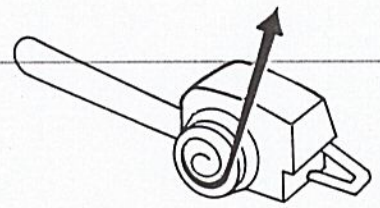
5—7.2 Rewind Spring Replacement

1. Starting with inner loop — hold back remaining turns with your fingers — remove spring from cover carefully, a loop at a time.
2. Spring holders furnished with replacement springs simplify assembly. PUT PULLEY COVER OPEN-END-UP ON FLAT WORK SURFACE. Refer to Figure 5—6.
   a. Installation for clockwise rotation engines such as WIZ and 7-21CFM: position spring in cover so spring spirals clockwise from inside to outside loop as shown in Figure 5—6 top. Engage outside loop around the pin, then press spring into cover cavity, thus releasing the spring holders.
   b. Installation for counterclockwise rotation engine (direct drive models): position spring in cover so spring spirals counterclockwise from inside loop to outside loop. Engage outside loop with pin as shown in Figure 5—6 bottom. Then press spring into cover cavity, thus releasing the spring holders.
3. Oil spring coils lightly with SAE-20 or 30 oil, and apply light grease to the cover shaft.

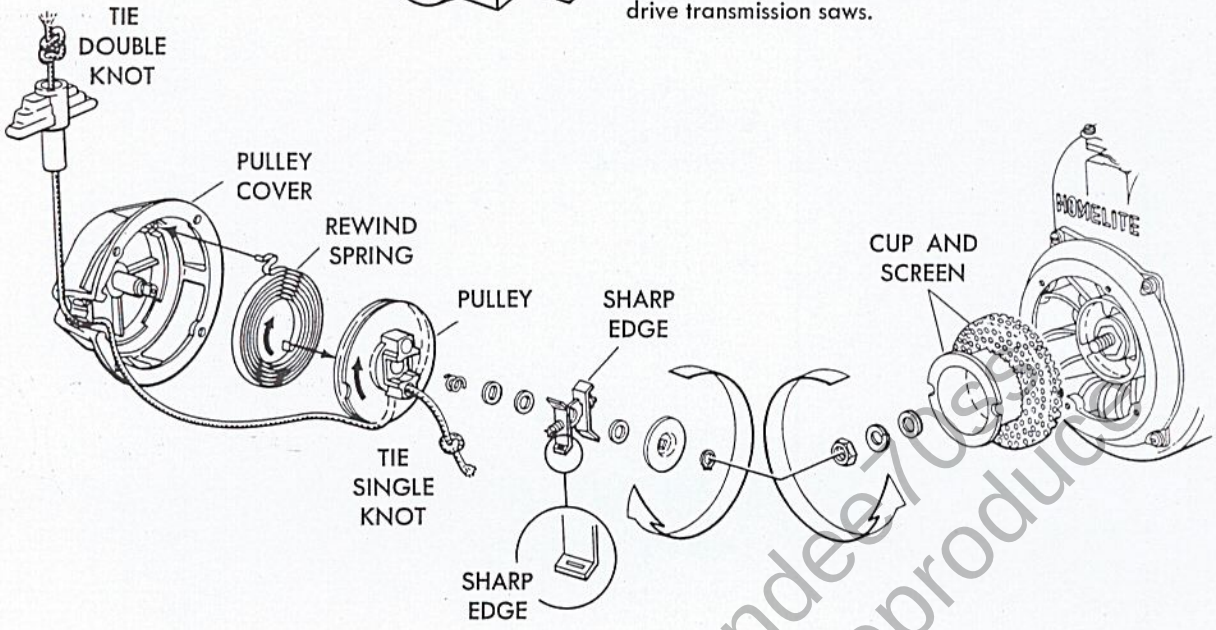
5—7.3 Assembly

1. When installing a new starter rope, tie a single knot in the pulley end, thread through pulley hole, then wind rope on pulley so that it unwinds in same direction as engine rotates. Thread end of rope through hole in pulley formed by slot and groove pin. Attach Homelite starter grip assembly to end of rope.
2. Be sure the rope is completely wound in proper rotation on pulley. Then position pulley on cover shaft. Using a screwdriver, hook the inside loop of the rewind spring to the pulley as shown in Figure 5—6.
3. Refer to Figure 5—7 for proper assembly and positioning of friction shoe assembly parts. Then complete assembly of the starter in the following order:

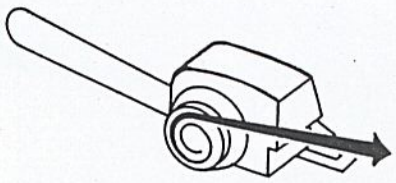
   brake spring, brake washer (keyed), small flat washer, friction shoe assembly, small flat washer, large (keyed) brake retaining washer, and retaining ring (in shaft groove). Be sure sharp side of retaining ring faces out (toward engine).
4. For pre-tension, pull starter rope out about two feet, hold pulley from turning and pull slack rope out through slot in rim of pulley. Now wind five extra turns on pulley with help of starter rope . . . push rope back into place on pulley and allow pulley to rewind. Recoil spring tension should be sufficient at this setting to take up all slack in starter rope.



CORRECT ASSEMBLY FOR COUNTERCLOCKWISE PULL
To match engine rotation as seen from starter side. Homelite direct drive, idler gear, and belt drive transmission saws.



CORRECT ASSEMBLY FOR CLOCKWISE PULL
For saws such as WIZ, 4-20 and 7-21, where driven gear meshes directly with drive gear



Engine rotation as seen from starter side is clockwise

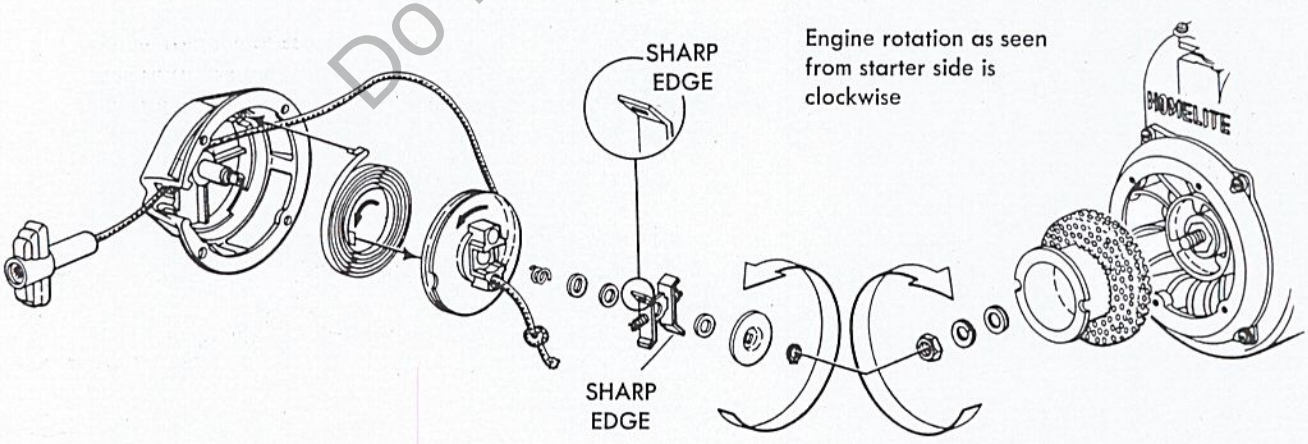
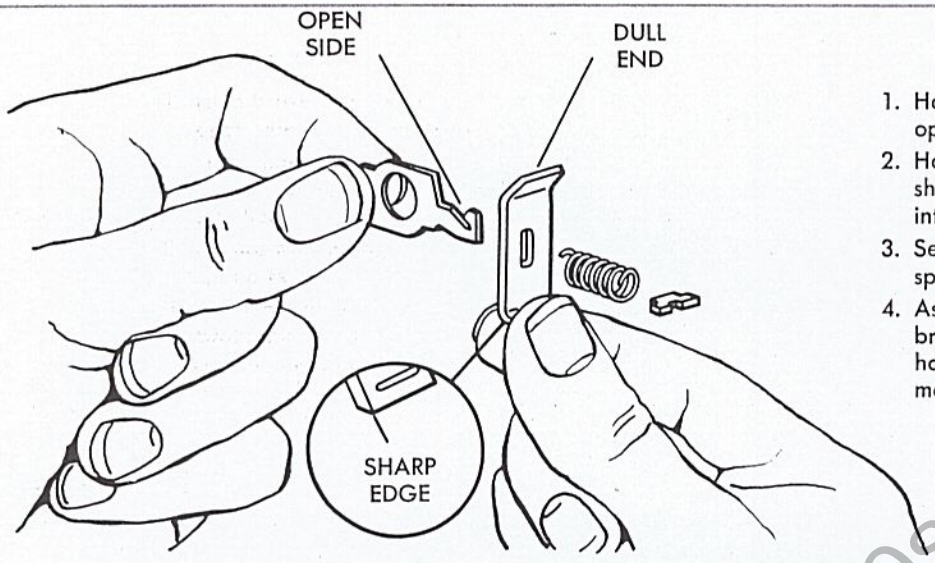


Figure 5—6

Figure 5—7 Correct Assembly of FM Brake Shoes on Brake Lever

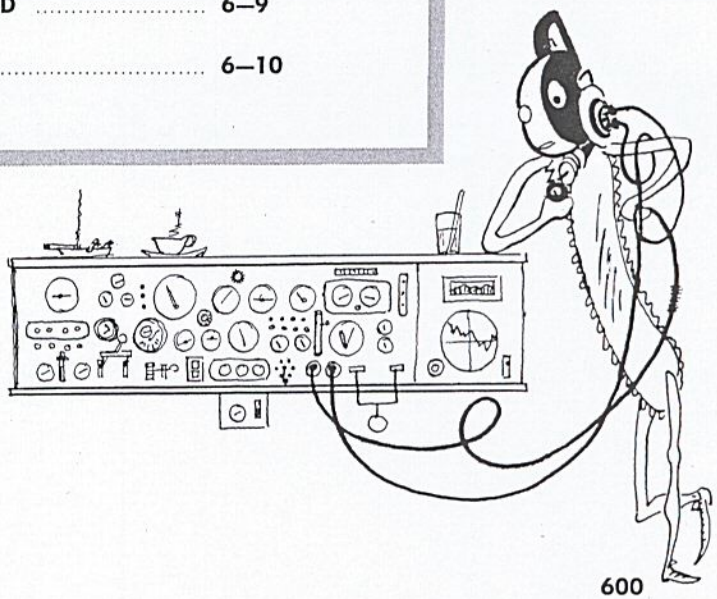


1. Hold brake lever with open side of hook upward.
2. Hold sharp end of brake shoe as shown and slide into hook.
3. Secure with spring and spring retaining plate.
4. Assemble the second brake shoe on the other hook in the same manner.

Section 6

IGNITION SYSTEM

INDEX



THE IGNITION SYSTEM generates low voltage current in the primary circuit of the magneto, steps it up to the required high voltage in the secondary, and produces a hot spark across the spark plug gap at the proper instant for combustion and power to result.

6—1 CHECKING IGNITION SPARK

All Homelite Chain Saws are equipped with a flywheel type magneto. Always check for ignition spark before attempting disassembly of the ignition system. (See Figure 6—1.) Disconnect the high-tension lead from the spark plug (Remove spark plug for easier cranking.) Hold the high-tension lead ¼" from any bare metal surface of the unit and spin the engine rapidly. If the magneto is functioning properly, a strong blue spark will jump this gap.

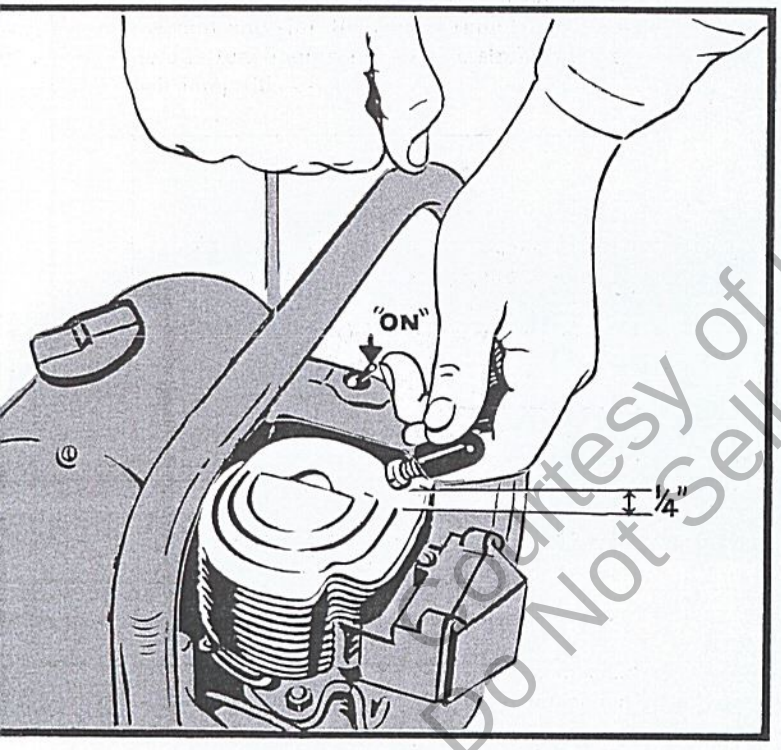


Figure 6—1 Checking Ignition Spark

NOTE

On units with "Sparky" connectors, insert a long ¼" screw in the connector to facilitate the test. Be sure starting switch is ON *during test for spark.*

6—2 OPERATION OF IGNITION SYSTEM

(See Figure 6—2.)

6—2.1 Rotor and Primary Circuit (low voltage generation)

The magneto is actually a permanent magnet generator. Permanent magnets are imbedded in the rotor. The low voltage-generating circuit consists of an insulated winding (the primary coil) wound onto a pole piece which is mounted on the stator plate. This primary circuit also includes a set of breaker points, across which a condenser has been shunted (connected), and a stop switch and ground lead assembly which is used to short the primary circuit when the engine is to be stopped.

As the rotor turns, voltage is induced in the primary winding of the magneto coil and the

Figure 6—2 Practical Diagram showing Primary and Secondary Circuits of Magneto.

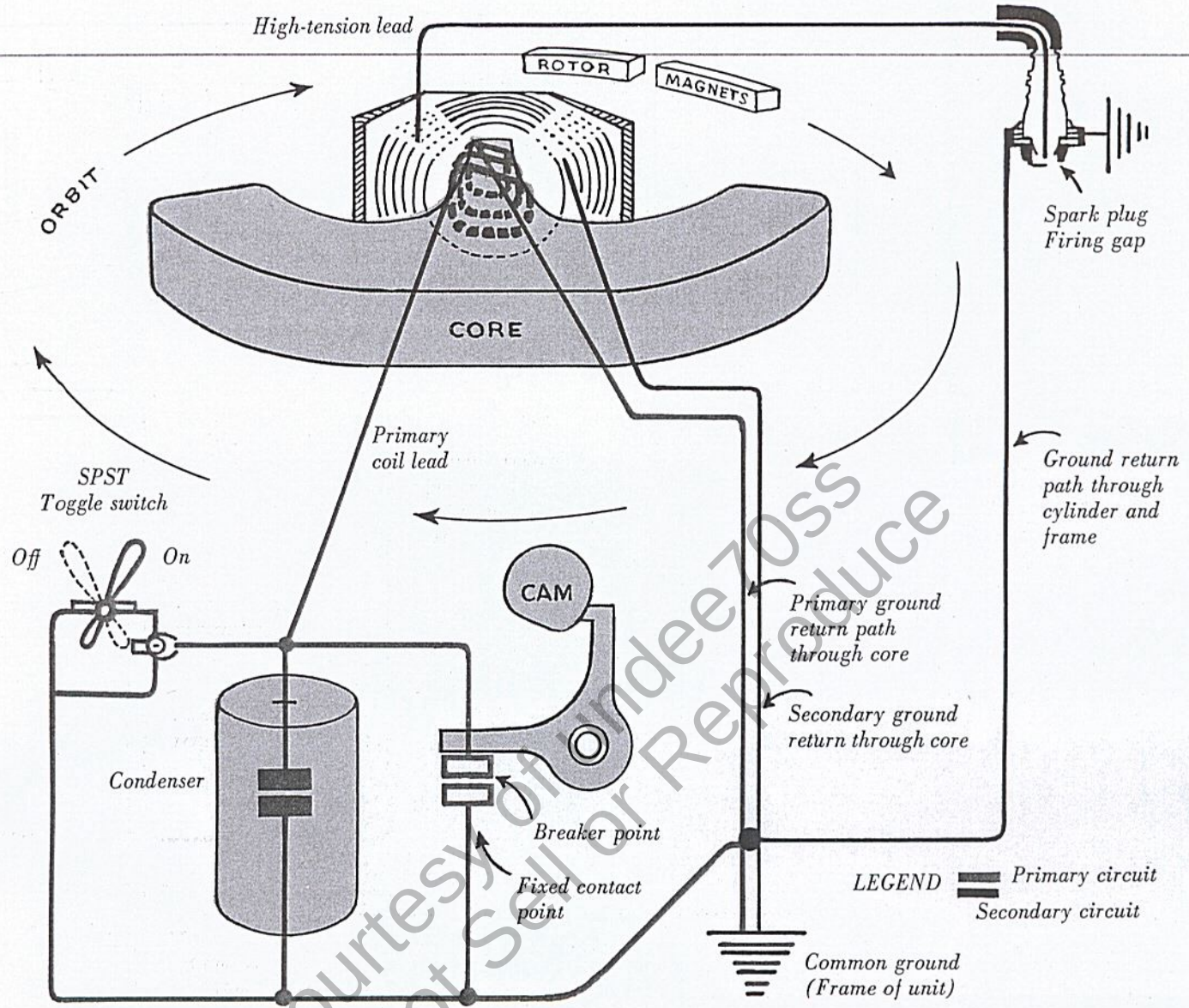
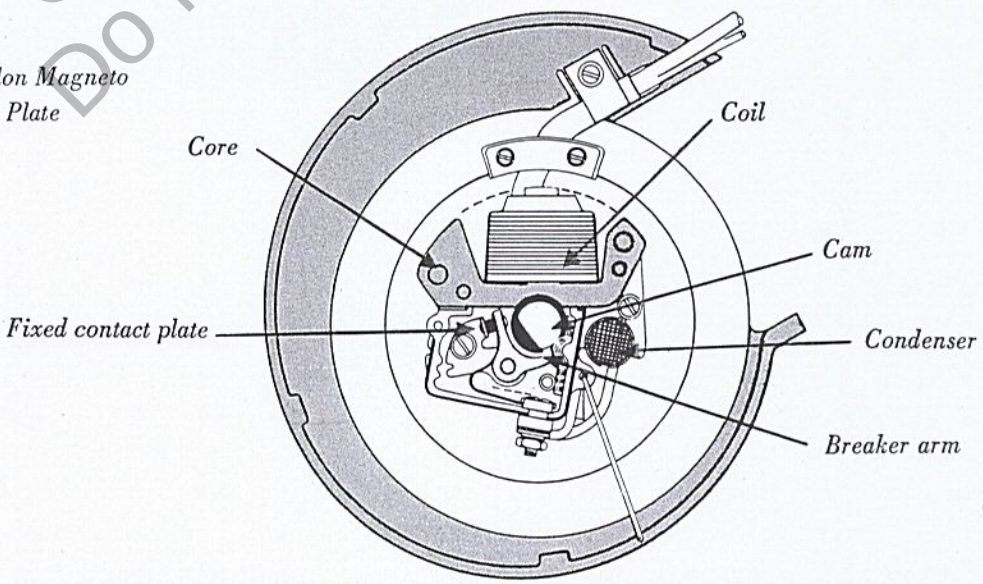


Figure 6—2.1 Phelon Magneto Shown on Back Plate



current flows through the coil, through the closed breaker points, and through the ground-return path. A magnetic field is thus established. This low voltage current must be transformed or stepped-up to higher voltage before it can fire a "hot" spark across the spark plug electrodes.

6—2.2 Secondary Circuit (transformation to high voltage)

The secondary circuit contains an insulated secondary winding of the magneto coil, the high-tension lead, and the spark plug. The secondary coil is wound on the coil core in proximity to the primary coil winding. Together, the primary and secondary coil function as an induction transformer.

The amount the voltage induced in the secondary circuit is stepped-up is in the proportion of the number of turns in the secondary coil to each turn in the primary coil, less a certain amount of loss. For instance, if the primary voltage were 10 volts, a winding ratio of 10 to 1 would induce close to 100 volts in the secondary; and a 100:1 ratio would induce nearly 1000 volts.

At just the right point, before the piston reaches top dead center, the breaker points open. Because of the continued rotation of the rotor, the opposite sign magnets now approach the pole pieces of the coil, and the magnetic field (which has been kept from collapsing by the choke-action of the coil) now reverses rapidly. This induces a very high voltage in the secondary winding. This voltage is sufficient to jump the gap at the spark plug electrodes, and fire the combustible charge.

The condenser has one main function. By absorbing current, it helps quench the spark at the breaker points so that burning and pitting of the points is prevented.

6—3 IGNITION DIAGNOSIS

1. Dirty, defective, or wrong type spark plug. (See 6—4)
2. Inoperative Switch. (See 6—5)
3. Faulty, dirty, misaligned, or burned points. (See 6—6)
4. Weak Coil. (See 6—7)
5. Faulty Condenser. (See 6—8)
6. Broken Leads.
7. Open, shorted, or leaky high-tension lead. (See 6—9)

6—4 SPARK PLUGS

(See Figure 6—3)

Maximum engine efficiency demands that spark plugs be in excellent condition. Champion HO-8A and J-6-J spark plugs are used in most saws for normal cutting. The HO-8A is equipped with platinum electrodes, and will last longer and have less tendency to foul than the J-6-J.

When a saw is used at high ambient temperatures, or when it is equipped with a long bar for heavy duty work, a Champion HO-3 spark plug should be used. The HO-3, which has platinum electrodes, is a "cold" plug, and will last longer under heavy duty operating conditions.

NOTE

Champion J-6-J spark plugs may be substituted for the HO-8A. However, the J-6-J is more susceptible to fouling and burning of the center electrode.

Spark plugs should be removed periodically for cleaning and inspection. Deposits should be scraped from the electrodes and the gap reset to .025" with a wire gauge. Porcelain should be clean and free of cracks. The spark plug terminals should be tight.

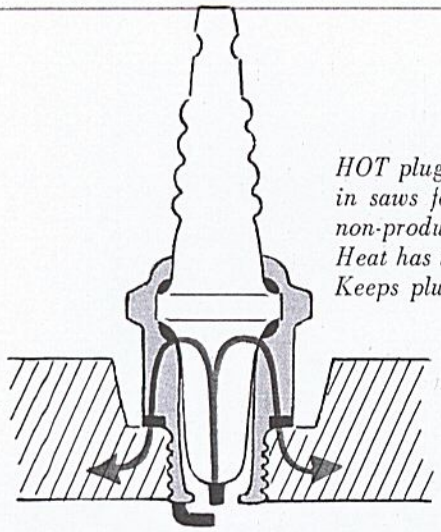
1. Spark plug does not fire or is weak
   a. Porcelain carbonized or burned
   b. Porcelain cracked
   c. Moisture or dirt accumulated on porcelain
   d. Improper electrode gap
   e. Weak ignition coil
2. Electrodes and porcelain burned after few hours of operation
   a. Using too hot a plug
   b. Poor grade of fuel
3. Fouled plug
   a. Use of too "cold" a plug
   b. Improper gas-oil ratio (too much oil)
   c. Improper fuel-air mixture (too rich)

6—5 SWITCH

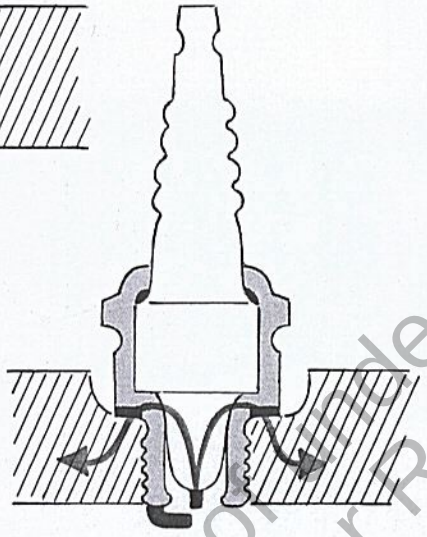
Flipping the starting switch to the "OFF" position grounds the primary circuit so that no spark can be generated. When the switch is flipped on, the grounding circuit is broken, and the magneto can function.

To test the installed switch, disconnect the

HOT AND COLD SPARK PLUGS

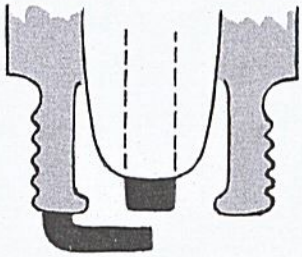


HOT plug design used in saws for occasional or non-production cutting. Heat has to travel further. Keeps plug hotter.

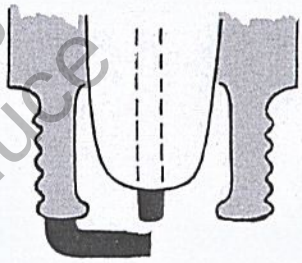


COLD plug design dissipates heat quickly. Used for heavy duty operation. Keeps engine cooler.

HO AND J SERIES SPARK PLUG ELECTRODES



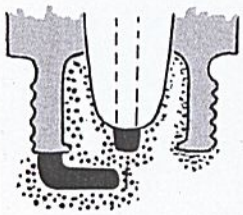
J-TYPE
Large center electrode



HO-TYPE
Thin platinum center electrode

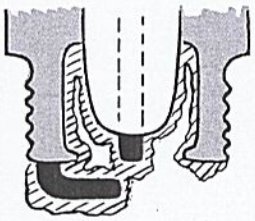
Figure 6–3 SPARK PLUGS

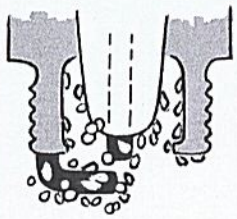
FOULING AND BURNING



Cold fouling with soft black carbon—mixture too rich or plug too cold.

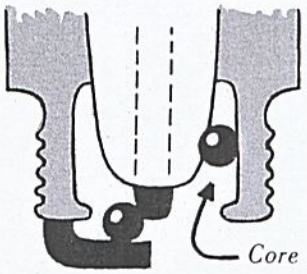
Hard Yellow-Brown deposit—mixture too rich or plug too hot





Spark Plug wet with fuel: Check for spark.

LEADED SPARK PLUGS



Electrodes bridged with shiny lead ball.

ground wire. Connect one lead of test instrument (circuit tester or ohmmeter) to the switch terminal, and the other lead to ground. With switch in "ON" position, no reading should be observed; with switch in "OFF" position, a continuity reading should be obtained.

6—6 CONTACT POINTS

The contact points are a cam-actuated device which, by breaking the circuit at the proper time, enable a spark to be produced. Contact points should be inspected periodically for proper gap setting, normal wear, alignment, dirt, oxidation and deposits.

NOTE

Contact points can be checked in the unit by disconnecting the condenser and primary lead, reconnecting the tension spring, and applying a circuit tester to the terminal.

To test, place one lead on the fixed contact, the other lead on the movable contact, and rotate the crankshaft. When the points separate, the test lamp should go out. If the light fails to light when the points close, some foreign material is preventing completion of the circuit.

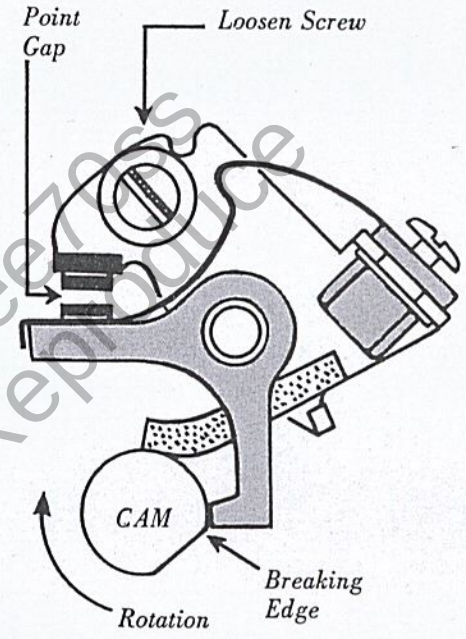
Dirty contact points can be cleaned by inserting a thin piece of clean cardboard (such as matchbook cover) between closed points to remove any metal filings or foreign material. Corroded, pitted, or worn points should be replaced with a new set, carefully aligned and adjusted.

The contact point spring should always be installed first, before attaching the primary and ground leads, so that proper spring tension will be maintained. On Models 26, 5-30, 8-29, and 7-29, the contact point-actuating cam is a separate part (removable from crankshaft). Caution should be taken to install the cam with the arrow in view. If the cam is installed backwards, poor spark will result and timing will be incorrect.

Adjust points to the recommended gap. (See Figure 6—4.) After setting gap, put points in closed position and snap them once or twice to dislodge any loose dust or dirt.

Figure 6—4 Adjusting Contact Points

Unit Type	Contact Point Gap Setting
Belt Drive	.020″
Two-Gear	.015″
Three-Gear	.015″
Direct Drive	.015″



Turn Cam so that Cam Follower rests just past breaking edge.

6—7 COIL AND CORE

Lack of spark or weak spark can sometimes be caused by a faulty coil. Coil failures can be caused by moisture in the windings, open or shorted primary windings, broken or shorted primary lead, or shorted turns in the secondary. Magneto coils can be tested using any good magneto coil tester. (See Figure 6— 6) The magneto coil can be tested either in or out of the magneto. However, all coils must be tested on the core.

NOTE

On magnetos with siamese coils, the cores must be connected with a "jumper" wire before testing the coils, or the primary winding will be burnt out during test. (See Figure 6—6.)

When installing replacement coils in models using the Wico Magneto, be sure the machined surfaces of the core shoes are perfectly aligned with the machined surfaces of the mounting pads of the backplate. On these units, the air gap between the rotor and the pole shoe is so slight that any deviation from the above instructions will cause the rotor to rub against the pole shoe.

When a new high-tension lead or replacement coil is installed on a Model 26, 5-30N, 8-29, or 7-29 saw, the new high-tension lead should be pulled through the backplate in such manner that the high-tension lead will not interfere with the spinning rotor or rub on the cylinder fins.

6—8 CONDENSER

The condenser is a device which absorbs the current when the contact points open. It is not always necessary to change the condenser each time new points are installed. Condensers can be tested with a condenser tester. (See Figure 6—6.) Occasionally the terminal on the pigtail of the condenser becomes broken. This is difficult to detect because the connector is covered with insulation. Condensers should be installed so the pigtail does not interfere with the spinning rotor.

6—9 HIGH TENSION LEAD

Weak spark or lack of spark can often be traced to a shorted or open high-tension lead. On models equipped with a "Sparky" connector, the "Sparky" should be checked to be sure the pin of the terminal spring is contacting the high-tension wire. Replace the "Sparky" terminal if the insulation is faulty as shown in Figure 6—5. On belt models which do not have "Sparky", check the metal grommet on the end of the high-tension lead and cylinder. On all saw models, high-tension lead insulation which has become water or oil impregnated will also cause high voltage leakage.

NOTE

Further checking of the high-tension lead must be done after removal of the starter mechanism and the rotor. For the proper rotor puller for each saw model, see Section 10.

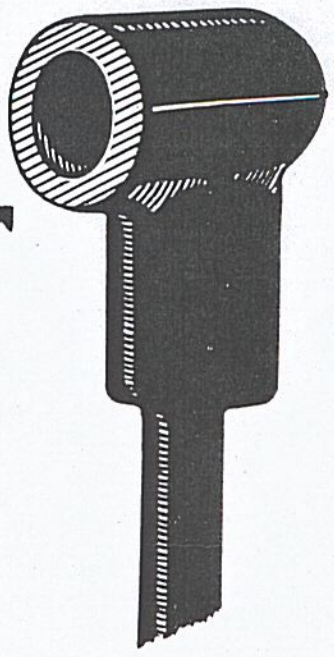
After removing the rotor, inspect the high-tension lead for insulation cracks or damage caused by contact with cylinder fins or the rotor (on improperly installed lead).

The high-tension lead can be checked for continuity by using an ohmmeter or similar continuity testing instrument. The high-tension lead connection at the coil should be checked.

6—10 MAGNETO ROTOR

The magneto rotor has several important functions. It supplies the magnetism for production of the high-voltage spark. It also provides cooling air for the engine, and in saws equipped with vane-type governors, this air also actuates the governor. Rotors on all units should be inspected for broken fins. Broken or missing fins affect governor performance and cause an unbalanced condition which will ultimately lead to excess vibration.

Figure 6—5 Checking "Sparky" Terminal



CHECK here for cracks or hardening and drying of the rubber. Replace if elasticity of rubber is gone.

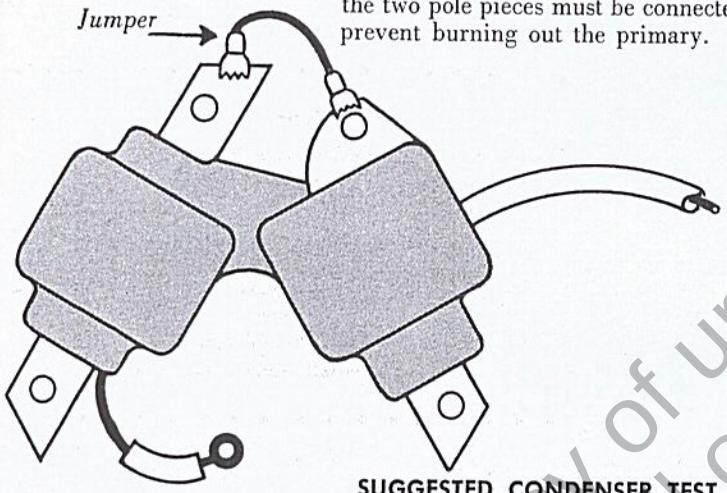
Figure 6—6 Suggested Test Values using King Coil and Condenser Tester

SUGGESTED COIL TEST VALUES

Coil Part No.	Coil Set Position	Test Position	Reading on top scale
28038	4	Coil	Appr. 5
72397	5½	Coil	Appr. 4½
32090	5	Coil	Appr. 4½
55232*	5	Coil	Appr. 4½
55403	5	Coil	Appr. 4½
55970	5½	Coil	Appr. 4½
55986	5	Coil	Appr. 4½

All coils must be tested with pole piece through coil.

*If 55232 (Model 17 Coil) is tested "off" back plate the two pole pieces must be connected (as shown) to prevent burning out the primary.



NOTE:

Suggested test values may not apply to your King Test Instrument. Check equipment by testing several pieces of each part number out of your stock. If the average readings differ from suggested readings, use the average reading obtained in each case with your instrument.

SUGGESTED CONDENSER TEST VALUES

Condenser Part No.	Coil Set Position	Test Position	Reading on bottom scale	Manufacturer's Rated Capacity
28035	**	Cap	.15	.16-.20
30257	**	Cap	.35	.30-.34
32091	**	Cap	.15	.16-.20
72396	**	Cap	.15	.16-.20
55233	**	Cap	.15	.16-.18
55987	**	Cap	.20	.18-.22

**It does not matter, what coil set position is—during condenser test. If no reading at all is obtained—Condenser is open. If needle goes all the way to right—Condenser is shorted. Check ability of Condenser to hold charge as follows:

Turn test dial from "Cap" to "Test" and observe needle. If condenser held a charge, the needle will jump to right. *Repeat this test a few times:* Since the condenser is being charged with AC for only an instant, it may not always pick up a good charge.

6—11 PHELON SERVICE HINTS

Late production Models EZ-6, 6-22, and Model 4-20 and all later model saws are supplied with the covered type Phelon Magneto shown in Figure 6—2.1. Special service hints for these magnetos are as follows:

6—11.1 Replacing Points

1. Remove the cover. Remove the stop switch lead and Jam-tite assembly from the terminal post. Slide the old breaker arm from the pivot pin, and pull the insulator from the slot in the box. Remove the old fixed contact plate.
2. Install the new fixed contact plate. Slide the new breaker arm onto the pivot pin—at the same time slide the nylon block into the breaker box slot.
3. Depress breaker arm lightly, and operate it a few times to align it. If the breaker arm still does not seat completely, depress the breaker arm SPRING lightly and operate the points again.
4. Replace the contact plate screw and washers; assemble Jam-tite terminal assembly and leads, flat washer, and switch lead, in this order and secure with the terminal nut.

IMPORTANT

Do not depress spring so far that there is danger of causing a short between spring and fixed contact plate. NEVER HIT the fiber or spring with a hammer, punch or screwdriver.

5. Set the point gap at .015″ and tighten the breaker screw. Recheck after tightening.

6—11.2 Replacing Condenser

1. The condenser should test between .18 and .22 microfarads.
2. Cut the lead off the old condenser as shown in Figure 6—7. Replacement condensers have their own terminal.
3. Remove the terminal nut and put the new condenser terminal over the switch lead terminal. Fasten with the terminal nut.

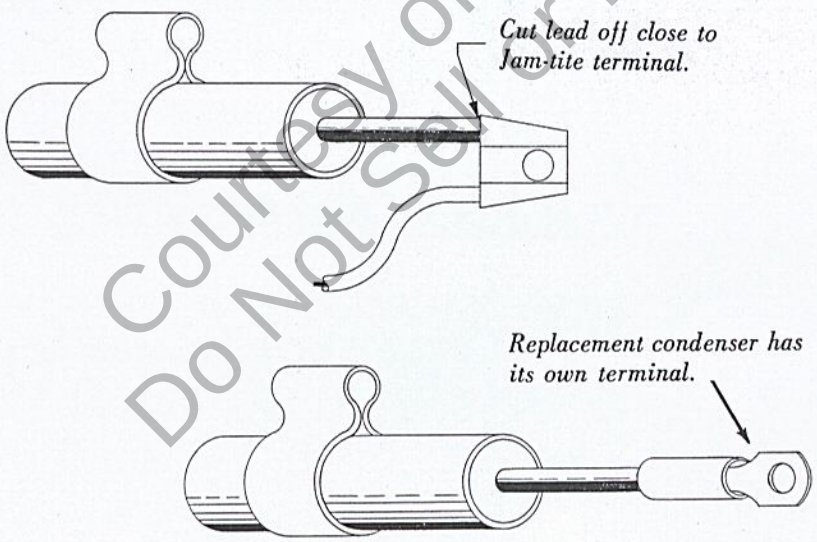
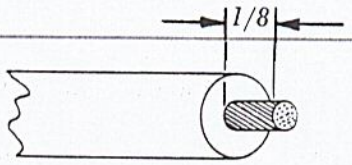
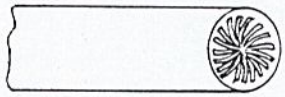


Figure 6—7 Replacing Condenser in Covered Phelon Magneto



1. Cut insulation off about 1/8" from end of the high-tension lead.



2. "Fan" the wire strands against the insulation.

3. Form a sealing ring with DC-4 compound applied 1/4" from the end of the lead. End must not be coated.

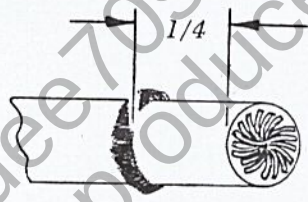


Figure 6—8 Installing High-Tension Lead In Coil After Parts Replacement

6—11.3 Replacing Coil

1. The primary circuit resistance should read between .65 and .80 ohms; the secondary circuit resistance should be between 7500 and 9000 ohms.
2. To remove a faulty coil; remove the stator from the backplate, loosen terminal nut and pull primary lead out of the Jam-tite terminal. (This lead may be cut off close to the terminal.) Remove the ground lead screw from the core and pull the old coil off.
3. PRESS—DO NOT HAMMER the new coil into place.
4. Remove terminal nut and put primary terminal over the switch lead terminal on the stud. Replace and tighten the nut. Put the ground screw back into the core.
5. Lay the insulated coil primary lead and the stop switch lead between the stator hub and the condenser UNDER the felt seal.
6. Strip about 1/8" of insulation off the inner end of the high-tension lead, and fan-out the protruding strands of wire. Make a moisture seal by forming a ring of DC-4 compound around the lead, 1/4" from the end. Do not let the compound spread toward the end of the lead, however, or the DC-4 compound (an effective insulator) may interrupt current flow from coil to lead. (See Figure 6—8.)
7. Push the high-tension lead into the coil socket FIRMLY BY HAND. (Make sure it seats all the way in.) Use no sharp tools or pliers which might damage the insulation.
8. Before securing the stator to the backplate, be sure no leads are pinched. Also be sure the stator group seats *absolutely flat* against all the mounting bosses.
9. Set contact points to .015". Recheck gap after tightening terminal nut.

6—12 BACKPLATE SERVICE

Homelite backplate designs have many construction features in common. Nevertheless, certain design variations may prevent interchanging backplates from one model to another, even though they appear to be identical.

Factors affecting backplate design may include (a) overall size or style of basic frame, (b) direction of engine rotation, (c) the type magneto and rotor to be used, (d) crankshaft dimensions plus type or size of bearings and seals to be installed in the backplate, and (e) space to be left clear inside the crankcase for fuel transfer or piston travel.

Slight changes made in existing sets of dies are often made either to improve current backplate designs or to adapt a current design for use in a new engine model. Once a die has been altered, all castings from it contain the alteration, regardless of whether the backplates are for new saw production or for replacement on older models.

6—12.1 Backplates for Models with Two-Piece Crankcases

1. Because they contain no bearings, seals, or breaker arm pivot pins, backplates for use with two-piece crankcases require a minimum of inspection. The casting should be neither broken nor cracked, nor should any of the threaded holes be stripped or enlarged.

6—12.2 Backplate Service — Direct Drive and Gear Models

1. Examine the backplate for cracks or porous spots, especially in the area where a fault could allow leakage from the crankcase. Leaks are most likely to develop along the sharp bend in the drivecase wall near the crankcase sealing gasket.
2. Service backplate assemblies have factory-installed bearings, seals, and breaker arm pivot pins. If the pivot pin is bent or loose, the backplate must be replaced.
3. CHANGING BACKPLATE BEARINGS AND SEALS — UNITS WITH WICO MAGNETO OR PHELON MAGNETO WITH SIAMESE COIL:

   Original production Model 17 and EZ saws used the Phelon Magneto with a siamese coil shown in figure 6—6. Later Model 17 and EZ units; and early Model 5-20 and 4-20 units had a Wico magneto. The backplates used with these magnetos contain two Garlock seals, installed back-to-back, and a .6251″/.6248″ I.D. needle bearing. Disassembly and assembly tools required to change backplate bearing and seals are listed below. (See Section 10 for installation instructions.)

   Bearing Assembly Tool #22831

   Garlock Seal Assembly Tool #22830

4. CHANGING BACKPLATE BEARING AND SEALS — UNITS WITH PHELON COVERED-TYPE MAGNETO:

   The final production group of 5-20L and all chain saws of more recent manufacture contain the covered-type Phelon magneto shown in Figure 6—2.1 and discussed specifically in Section 6—11.

   (a) If the backplate has a .6251″/.6248″ I.D. needle bearing and two Garlock seals installed, (This group includes EZ-6, 7-19, 7-19C, 5-20L, 4-20, 6-22, 7-21, 7-21C, 700G, 700D, ZIP, WIZ and BUZ) use the following disassembly and assembly fixtures:

   Bearing Assembly Tool #22831

   Garlock Seal Assembly Tool #22830-A

   (b) If the backplate (such as in the 9-23, 9-26, and 900 Models) contains a .6876″/.6873″ I.D. needle bearing and a single garter-type Garlock seal, use the following tools for disassembly and assembly of the bearing and seal:

   Bearing Assembly Tool #23391

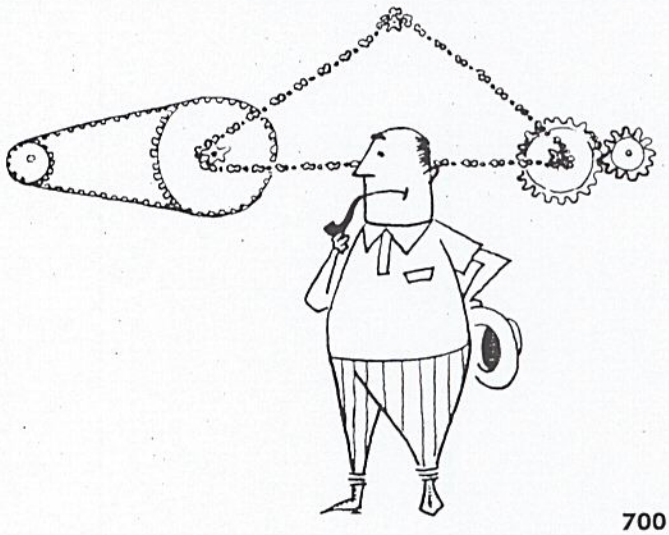
   (also used to disassemble Garlock seal)

   Garlock Seal Assembly Tool #23233

Section 7

TRANSMISSION

INDEX



7—1 OPERATION OF CHAIN SAW TRANSMISSION

The transmission is the means of transmitting the engine power to the cutting chain for work application. It includes a chain drive sprocket. This sprocket may be mounted directly on the engine shaft (direct drive), or it may be mounted on its own shaft, driven by a reduction gear (gear driven) or by a special belt (belt drive).

Homelite saws with reduction gear or belt transmissions have the lugging power necessary to perform saw log and other heavy work applications where long guide bars are used for large cuts.

Direct drive saw models have high chain speeds. Used with very slight feed-pressure, they perform exceedingly well, especially when the cutting chain is correctly sharpened and the depth gauges have been filed to get the proper cutting depth.

The direct drive chain sprocket is an integral part of the clutch drum assembly. Installed with a needle bearing on the crankshaft, the sprocket and drum assembly does not rotate until the automatic clutch engages.

Homelite Saw transmissions incorporate crankshaft-mounted centrifugal action safety clutches which disengage during idling (so chain does not rotate), engage the chain when the engine reaches sufficient speed, and slip to prevent engine damage in case safe operating torques are exceeded (such as when a closing cut pinches the chain).

7—1.1 Belt Drive — Dry Transmissions

1. This original series began with Model 20MCS, included Model 26LCS, 5-30, 5-30N, 7-29 and 8-29. All these models have been discontinued except for Model 5-30N saws for which a demand has continued into the 1960's.
2. The reduction ratio of these transmissions is 2.75:1.
3. The Belt Drive transmission is a dry type. The engine and clutch sprocket rotate in the same direction as the chain sprocket shaft and pulley. (See Figure 7—1.)

7—1.2 Two-Gear Drive — Wet Transmissions

1. The first two-gear saw designed by Homelite was the Model 17. Later models in which the driven gear meshes directly with the drive gear in an oil-filled crankcase are referred to as two-gear transmission saws.
2. The drive gear and driven gear rotate in opposite directions. Therefore engine rotation on these models is the opposite of chain rotation. (See Figure 7—1.)

NOTE ON REDUCTION RATIOS

Standard and optional gear reductions are listed for each particular saw model in Unit Identification, Section I. The reduction ratio can always be determined by counting the number of teeth of the driven gear and dividing by the number of teeth of the drive gear. If the customer desires to change over to another ratio, the proper drive gear and mating driven gear must be installed as a set. Three-gear wet transmissions contain two dowels for mounting the idler gear. The same (only one) idler gear is used for either 2.84:1 or 3.57:1 gear ratios. Mount the idler gear on the pin near the raised markings in the gearcase that describe the proper ratio for the gears being installed.

7—1.3 Direct Drive Transmissions with Sprocket on Outboard Side of Clutch Drum

1. These models, beginning with the Model EZ, all have the chain sprocket located on the outside or extreme end of the crankshaft. This design makes it possible to make flush-cuts with the blade right at ground level.
2. Since the clutch drum and chain drive sprocket are assembled on the engine shaft, the engine rotates in the same direction as the sprocket.

7—1.4 Direct Drive Transmissions with Sprocket on Inboard Side of Clutch Drum

1. Guide Bar positioning closer to the center is achieved by locating the chain sprocket between the engine and the clutch assembly on this group of chain saws.
2. The 9-23 in the heavy-duty class, and the Buz in the economy-price class were the first units with this type of construction.
3. Engine and sprocket rotate in the same direction.

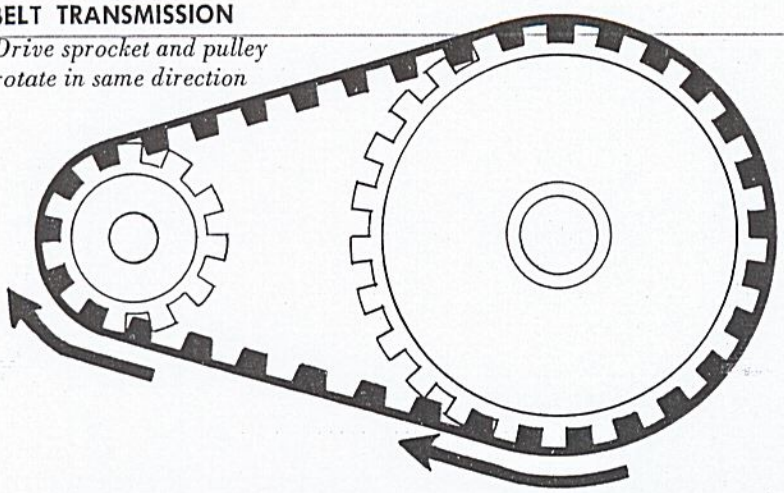
7—1.5 Three-Gear Drive-Wet Transmissions

1. Placing an idler gear in mesh between the drive and driven gears maintains the direction of rotation of the driven gear and chain sprocket with respect to crankshaft and drive gear rotation. This makes it possible to design both reduction gear and direct drive models around a basic engine. This was first accomplished with the 9-26 and 9-23 models.

Figure 7–1 Belt, Two-Gear and Three-Gear Transmission Facts

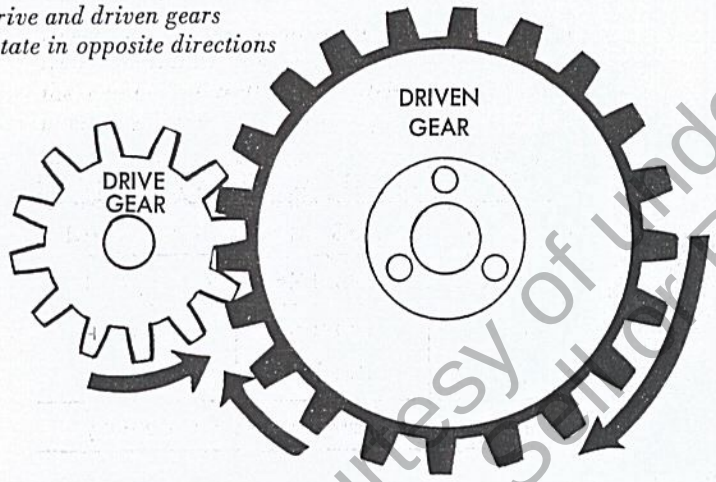
BELT TRANSMISSION

Drive sprocket and pulley rotate in same direction



TWO-GEAR TRANSMISSIONS

Drive and driven gears rotate in opposite directions



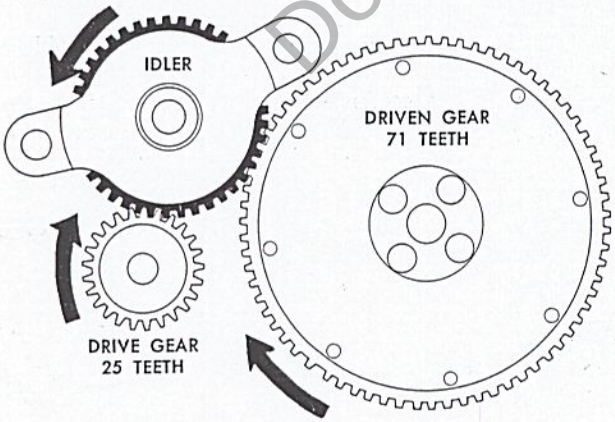
GEAR SPEED RATIO

Regardless of the number of gears in a direct train, the ratio is always determined by dividing the number of teeth in the driven gear by the number of teeth in the drive gear.

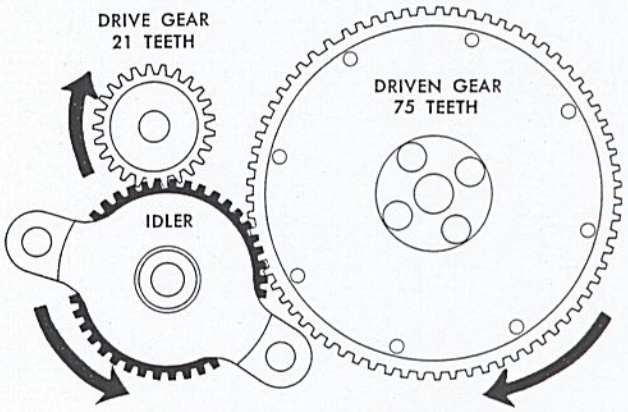
COMBINATIONS USED BY HOMELITE		
Driven Gear	**Drive Gear**	**Ratio**
64 teeth	32 teeth	2:1
44 teeth	16 teeth	2.75:1
71 teeth	25 teeth	2.84:1
75 teeth	21 teeth	3.57:1

THREE-GEAR TRANSMISSIONS

Drive and driven gears rotate in same directions



Arrangement resulting in 2.84:1 ratio



Arrangement resulting in 3.57:1 ratio

7—2 TRANSMISSION DIAGNOSIS

Aside from breakage, most transmission troubles are accompanied by one of the following symptoms of poor performance:

Transmission binds or makes a "squealing" noise when idling.
Clutch slips at high speed under load.
Chain rotates at idle speed after idle stop screw adjustment.
Clutch skips or chatters in operation.

7—2.1 Diagnosis of binding or squealing

1. Dry needle bearing in direct drive sprocket and drum assembly.
2. Clutch shoes were not replaced as a set; high shoes bind against clutch drum.
3. Dry, dirty and binding sprocket shaft bearings.
4. Teeth stripped from drive belt.
5. Reduction gears are broken.

7—2.2 Diagnosis of slipping clutch condition

1. Worn clutch shoes.
2. Solid type shoes installed in clutch assemblies calling for lined shoes.
3. Glazed condition of lined clutch shoes.
4. Solid shoes oil soaked.

7—2.3 Diagnosis of Chain Rotation during idling

NOTE

In belt driven saws, the grease in new clutch drum bearings is sometimes stiff enough to cause the drum and chain to rotate even though clutch is disengaged.

1. Broken or weak clutch retaining springs.
2. Thrust washer made up against bearing or sprocket instead of inner race (Direct Drives).
3. Faulty clutch drum bearing.

7—2.4 Diagnosis of skipping or chattering clutch

1. One or more clutch shoes are too high.
2. Clutch drum out of round.
3. Chain, bar and sprocket troubles.

7—3 CLUTCH

7—3.1 Disassembling 3 and 6 shoe clutches for service

1. Remove chain, guide bar, adjusting plate and guide bar shim or plates.
2. On gear drive saws, drain gear oil.
3. Remove gear case or drive case cover, with cover gasket.
4. Disassemble clutch as follows (according to unit).

   (a) Direct Drive with chain sprocket on outside: Remove flex-lock nut, flat washer, large thrust washer, sprocket and drum assembly, inner race and small thrust washer from crankshaft. Use Puller #A-23131 (See Special Tools, Section 10) to remove the clutch spider assembly. Remove two keys and the clutch cover from the shaft.

   (b) Direct drive with chain sprocket between clutch and engine: Remove locknut, flat washer and clutch cover. Use Puller #A-23131 to remove clutch spider assembly. Remove two clutch keys and outer thrust washer. Lift clutch drum and sprocket off shaft. Remove inner race from shaft and insert in clutch drum to keep the needle bearing clean.

   (c) Gear Drive: Remove the flex-lock nut, clutch washer and clutch cover. Pull clutch spider assembly with Puller #A-23131. Remove the two keys and the inner thrust washer, and slide the clutch drum and drive gear assembly from the shaft. Remove the bronze brushing and remaining thrust washer.

   (d) Belt Drive: Remove the flex-lock nut, washer, and clutch cover. Use Puller AA-22803 to remove the clutch spider assembly. Remove the two clutch keys. Turn the sprocket pulley continuously through at least four turns, to prevent damage to belt, and pull the clutch drum and sprocket assembly from the shaft. Use Puller AA-22803 if necessary.

CAUTION

While pulling the clutch drum and sprocket assembly, always rotate the sprocket pulley continuously through at least four turns, so the drive belt will work off the pulley gradually.

5. If the drive case on belt driven saws is to be disassembled from the unit, either for replacement or to facilitate crankcase service, remove four sets of screws and lockwashers (near crankshaft) and tap drive case lightly until drive case is free of unit.
6. Disassembly and assembly of bearings and spacers should be performed as necessary, during parts inspection.

7—3.2 Clutch spider and shoe inspection (3 or 6 Shoe Clutches)

1. Clutch shoes for "dry" transmission saws are of Oilite bronze construction. Clutch shoes for oil-filled transmission saws are made of Super Oilite and have a Raybestos brake lining. The correct type and size shoes should always be used in each saw model.
2. When any of the shoes in the unit are worn to the point where replacement is indicated, always replace the complete set. See the unit parts list for the number of shoes required per assembly. Mixing new and worn shoes may cause the high shoes to chatter, bind or toe against the clutch drum.
3. Any burrs or high spots on clutch braking surface should be removed. On shoes with Raybestoes brake lining, be sure lining is properly bonded to the shoe. Linings are approximately 1/16" thick on new shoes.
4. Inspect the clutch spider for wear, burrs, or high spots at points of contact with the clutch shoes. Try the clutch keys in the two keyways of the spider. The keys should not be loose.

NOTE

During operation of the saw, if the clutch slips at high speeds under load, check for excessive wear of clutch shoes. If clutch engages at engine idle speed adjustment, check for broken, weak, distorted or improperly installed clutch retaining springs.

5. If open, the clutch spring end loops should be closed with needle nose pliers before installation. Uncoiled or distorted springs should be replaced. When assembling clutch, be sure the end loops of the clutch springs are located at the center of a clutch shoe. This will prevent the loops from being caught between shoe and spider during the expansion-contraction operation of the clutch assembly.

7—3.3 Clutch sprocket and drum assembly (Direct Drive)

1. The needle bearing in the sprocket and drum assembly should be cleaned and oiled monthly, weekly or as often as necessary — depending on cutting conditions and frequency of operation.
2. Inspect the needle bearing for signs of wear. If the needles can be separated more than the width of one needle, or if there is a flat visible on any needle, the bearing must be replaced. Use correct size sprocket Bearing Tool (See Special Tools, Section 10) for removal or insertion of bearing. Remember to press on lettered end of needle bearing race to prevent damage to the bearing cage.
3. Inspect the clutch drum for cracks and for out-of-round or bent condition. Replace clutch drum if cracked or severely bent.
4. If there is a binding condition between clutch drum bearing and the inner race (after installation of a new bearing) replace the inner race.
5. Replace the sprocket and drum assembly if the chain drive sprocket teeth are worn out of pitch. (See Cutting Attachments, Section 11 for more detailed sprocket service and inspection.)

7—3.4 Drive gear and drum, sprocket and drum inspection (Gear and Belt Drive Models)

1. Check for broken, worn or burred sprocket or gear teeth.
2. Inspect clutch drum for out-of-round (bent or cracked shell).
   Replace drum if cracked or badly bent.
3. Check bronze bearings in gear models for excessive wear. Excessive wear can cause mismating of gear teeth, and chatter in mesh.
4. Check meshing of gears when transmission has been assembled. Work the gears, one against the other, to see if there is excessive play or backlash. Excessive backlash causes breakage of gear teeth.
5. Clutch drums in belt drive models contain two shielded bearings and bearing spacer. If the bearings are worn or damaged and require replacement, remove bearings and install a new pair as follows.
   (a) Place the assembly, drum face down, on a flat working surface. Use the slot in the spacer to locate a punch against the inner race of bearing. To protect the sprocket bore from being gouged or distorted during bearing removal, keep rotating the spacer 180° and tap alternately against one side, then the other of the bearing race—so bearing comes out straight. Remove spacer and drive out the second bearing with Remover #22692.
   (b) Assemble the first bearing flush with the top of the sprocket bore. Turn the drum over on the sprocket end, drop in the spacer, and press in the second bearing flush with the inner face of the clutch drum recess. These shielded bearings are sealed and require no maintenance.

> **NOTE**
>
> *Before assembly, degrease replacement clutch drum with any commercial agent such as Varsol, Stoddard's Solvent, or Solvesso. Replacement drums have been treated with Rust-Ban, a paraffin-like rust preventive. Failure to remove the Rust-Ban may cause the clutch to slip at very high speeds– as high as 5000 RPM — giving the impression that the engine lacks power.*

7—4 BELTS AND DRIVEN COMPONENTS (Sprocket Shafts, Pulleys, Driven Gears)

7—4.1 Drive belt

1. Drive belts with worn lugs, worn lining, or visible break-through of the steel strands, must be replaced.
2. With the belt assembled on the unit, the tension should be enough that the belt cannot be made to touch the wall of the drive case when thumb pressure is applied. (See Figure 7—2.)
3. If the used belt is still in good condition, the mechanic, with the approval of the customer, may wish to re-impregnate the belt by soaking it in DC-200 compound for at least six hours. Belt life may also be improved by soaking the sprocket part ONLY of the clutch drum overnight in DC-200 compound. Both original and replacement sprockets and belts are impregnated with DC-200 silicone at the factory.

7—4.2 Sprocket shaft and pulley

1. Use Tool #22750 to lock the chain drive sprocket. Remove flex-lock nut, sprocket spacer, outer flange, sprocket, two keys (Model 26 has only one key), inner flange and remaining spacer.
2. Block the drive case carefully to avoid cracking it during sprocket shaft removal. Press the sprocket shaft and pulley assembly from the drive case. If an arbor press is not available, screw the flex-lock nut back on shaft to protect threads, and remove shaft with a soft mallet.
3. The sprocket shaft and pulley are assembled with four slotted, flat head screws. The head of the sprocket shaft has been pin-punched at the ends of each screw slot. This keeps the screws staked in position. To free the screw slots for screw removal, tap the swaged metal from the screw slots with a chisel. An impact type screwdriver makes removal of these screws easy. (See Figure 7—3.)
4. After screw removal, as above, press the shaft from the pulley.
5. Check the belt pulley for broken, worn and rounded teeth, and for cracks in radius legs or hub of pulley. If faulty, replace pulley.
6. Inspect the sprocket shaft for damaged threads, enlarged keyways and for cracks around the countersunk holes of the shaft head.

NOTE

During assembly, the screw slots should be turned past the old punch marks on the shaft head so they can be staked with new metal. To stake, pin-punch the shaft head at the ends of each screw slot.

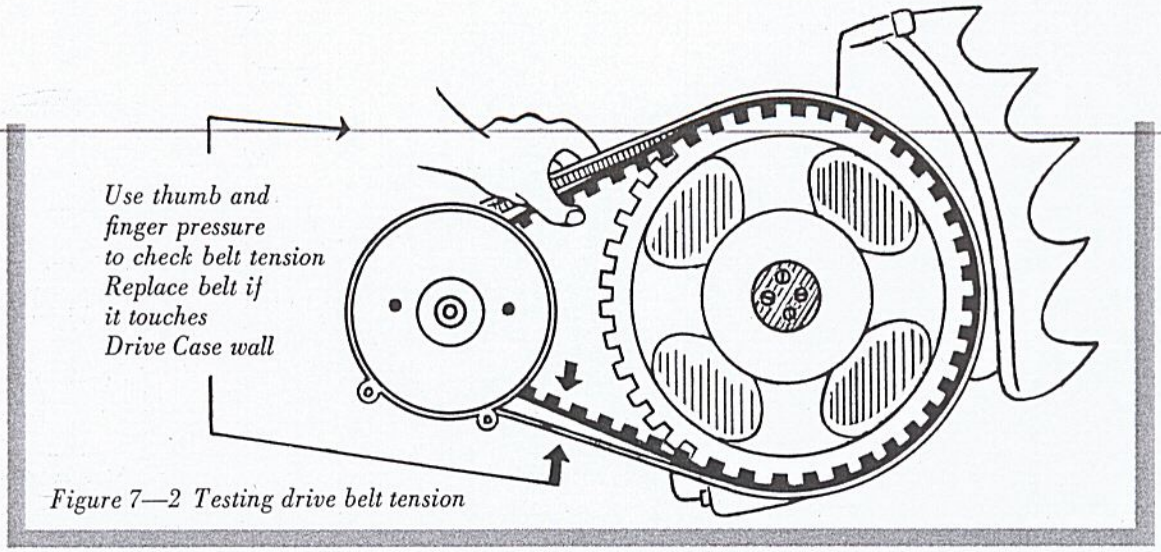


Figure 7—2 Testing drive belt tension

7—4.3 Sprocket shaft and driven gear (Two-Gear transmissions)

1. Lock chain drive sprocket with tool #22750. Remove flex-lock nut, outer washer, chain drive sprocket, two keys, inner washer and sprocket spacer.
2. Press the sprocket shaft out of the gear case carefully.
3. Remove the four screws with a 1/8″ Allen Wrench #22220, and press the sprocket shaft from the driven gear hub.
4. The driven gear should be checked carefully for burred, worn, cracked, broken or chipped teeth.
5. Check the driven gear assembly for warpage of the ring gear, which is riveted to the hub. If the ring gear is warped away from the hub at any point, or if the rivets are loose, replace the driven gear assembly. Loosening of the rivets and warping of the ring seldom occurs unless wear of drive and driven gears has caused excessive backlash conditions. Backlash should be checked by working one gear against the other in the assembled gear case.
6. Check the driven gear hub for cracks.
7. Check the sprocket shaft for damaged threads, enlarged threads, and for cracks in the head near the countersunk screw holes.

NOTE

On early Model 17 and 5-20 transmissions, slotted flat head screws were used to assemble the driven gear to the shaft head. The shaft head was pin-punched at the screw slots, to stake the screw heads in place. Screw removal with an impact type screw driver is easily accomplished after the swaged metal has been removed from the screw slots with a chisel. During assembly, swage the shaft head with a pin punch near the ends of each screw slot.

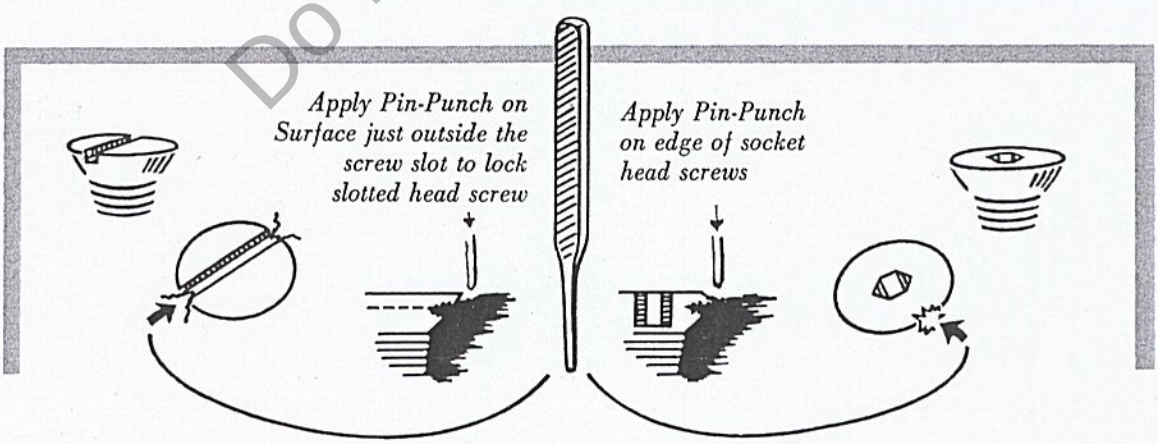


Figure 7—3 Staking screw heads with pin-punch

7—4.4 Sprocket shaft and driven gear (Three-Gear wet transmission with idler gear)

1. Drain oil from crankcase and pull clutch, sprocket and drum.
2. If crankcase contains a vent tube, loosen compression nut and move crankcase vent line far enough to the side to leave driven gear in the clear for removal.
3. Lock chain drive sprocket with tool #22750. Remove sprocket nut, outer spacer, outer flange, chain sprocket, large 3/8″ sq. key, inner flange and spacer.
4. Press sprocket shaft and gear out of crankcase carefully.
5. Remove the four socket head screws with an Allen wrench. These screws have been staked to the sprocket shaft head. (See Figure 7—3 and notes on staking in this section.) Press the sprocket shaft from the driven gear hub.
6. The driven gear should be checked carefully for cracked, broken, chipped, worn or burred teeth.
7. Check the driven gear for warpage or loosened rivets. If ring gear is warped away from the hub at any point, or if rivets are loose, replace the driven gear. After gear replacement, always check for backlash conditions of the reassembled gear train, by working one gear against the other. Warpage and loosened rivets usually indicate backlash due to excessive wear of gears.
8. Check for cracks in the driven gear hub, and in the sprocket shaft head near the countersunk screw holes. Check threaded end of sprocket shaft for enlarged or broken threads.

7—5 GEARCASE, DRIVECASE OR DRIVE PLATE INSPECTION

Detachable drive cases or drive plates can be inspected completely, using the points in this section as a guide. On units where the drive case or gearcase is part of a one-piece, die-cast crankcase, thorough inspection of the basic casting for cracks, porosity and other causes of leakage should be made in conjunction with internal engine inspection described in Section 8.

7—5.1 General inspection routines

1. Inspect die-cast drivecases and gearcases and their respective covers for perfect mating. The sealing edges should not be dented or nicked. The gaskets should be in good condition and fit properly all the way around. Sawdust leaking into a Belt Drive transmission will damage the belt. A poor cover fit on wet transmissions will result in loss of gear oil.
2. All threaded holes should be examined for enlargement or stripped threads. Also check for worn guide bar key and loose or burred studs.
3. On all reduction gear models, check the condition of the sprocket shaft bearings and seals. Bearings should rotate smoothly. Replace any bearing which is rough turning or has excessive radial play. As a general precaution, keep new and disassembled bearings wrapped, because dust and grime will harm bearings.
4. After bearing removal, inspect the bearing bore for roughness, scoring, or any other conditions which could cause a poor fit of the new bearing in the bore.
5. When the bearings have been removed from die-cast crankcases the castings may be cleaned in solvent, dried and then checked carefully for fine cracks, leaks and weakness — especially at high-stress points such as near guide bar studs and around all bearing bores.
6. Replace guide bar key on Belt Drive transmission crankcases if key is worn.
7. On units with a steel drive plate (such as a BUZ) be sure drive plate is not bent or warped out of shape. Note the handle bar-mounting tabs or lugs. If the tabs are beginning to break off at the right angle bends, repair the break by welding or replace drive plate.

7—5.2 Sprocket Shaft Bearings — Two-Gear Drive Models — Small Sprocket Shaft

1. This type of construction began with the original Model 17. The name "small shaft" applies to sprocket shafts with stepped-down shaft diameters as shown in Figure 7—4.
2. The single-row ball bearings are the shielded type and require no additional lubrication.
3. If bearings are to be removed from the casting, use #3 snap-ring Pliers #22726 to remove the bearing retaining ring from the sprocket shaft bore.
4. Use large end of Tool #22833 to drive or press the sprocket bearings, the spacer and the bearing shoulder from the bearing bore.
5. After inspection of the bearing bore, use the stepped end of Tool #22833 to push the small bearing in from the gear side. Be careful to press bearing in straight. Then drop in the bearing spacer and shoulder and press the large bearing into place with the stepped end of the tool.
6. Put the snap-ring back in the snap-ring groove to retain the bearing. Be sure sharp edge of snap-ring is toward the outside for a better bite. Rotate the snap-ring in the groove to be sure it is secure all the way around.

7—5.3 Sprocket Shaft Bearings Two-Gear Drive Models — Large Diameter Shaft

1. This type of construction began with the Model 6-22. The "large-diameter" sprocket shaft is so-called because it is not stepped-down like the Model 17 "small shaft" but has one large diameter throughout as shown in Figure 7—4.
2. Sprocket shaft bearings in Models 6-22 and 7-21 consist of one roller bearing and one single row ball bearing. This construction was changed to one long double row ball bearing, beginning with the Model 7-21C in 1959. Due to a supply shortage of the double row bearings, however, the factory was, for a short time, forced to revert to the roller bearing-ball bearing combination in 7-21C units. The only way to tell what is in the sprocket shaft bore in 1959 Model 7-21C units is by visual inspection.

NOTE

Whenever sprocket shaft bearings require service in 6-22, 7-21 and 7-21C units, we recommend that the long double row ball bearing be installed in place of the ball and roller bearing combination.

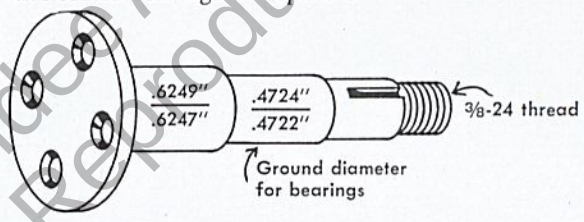
3. Remove the chain drive sprocket and press out the sprocket shaft and driven gear assembly. (Refer to Section 7—4.3 for details.)
4. Use snap-ring Pliers #22726 to remove the bearing retaining ring.
5. Use the 1-1/8″ diameter end of Tool #23228 to press the old bearings from the gear case.
6. Gearcases which contained one shielded bearing, and one roller bearing with removable inner race, have an annular lubrication groove in the bearing bore.
   (a) If the old bearings are still serviceable, clean the roller bearing and removable inner race in solvent. (DO NOT CLEAN THE SEALED BALL BEARING WITH SOLVENT.) Dry the roller bearing, then repack the bearing cage and rollers with Regal Starfak #2 grease (Homelite RM-4568) or Lubriplate.
   (b) Clean the old grease from the sprocket shaft bearing bore, and fill the annular groove with fresh #2 grease.
   (c) If one long double-row ball bearing is to be installed in replacement of the single row ball bearing and roller bearing combination, clean the old grease from the sprocket shaft bearing bore and annular groove as above, but do not apply new grease.
7. Now make bearing installation according to (a) or (b) below.
   (a) Slide the single row ball bearing, the completely assembled and greased roller bearing, and a new formica washer onto the small end of Tool #23228. Press these parts into the greased bore carefully.
   (b) Slide the long double row ball bearing and a new formica washer onto the small end of Tool #23228. Press these parts into the clean bearing bore carefully.
8. Remove assembly tool and install the bearing retaining ring in the groove.
9. Support the gear case on the sprocket shaft assembly Anvil #23267 (backplate must be removed from engine for working room) and press the sprocket shaft and driven gear assembly into the bearings.

WARNING

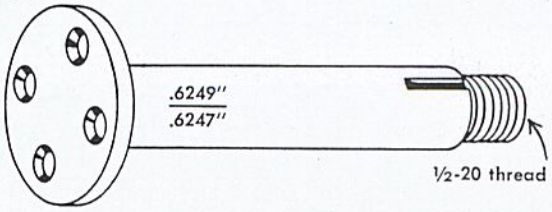
The components in this assembly will be damaged if the proper tools, recommended in this Section, are not carefully used. For instance, if the bearings are pressed home without support of Anvil No. 23267, the inner race will be driven through the seal.

Figure 7—4 Sprocket Shafts

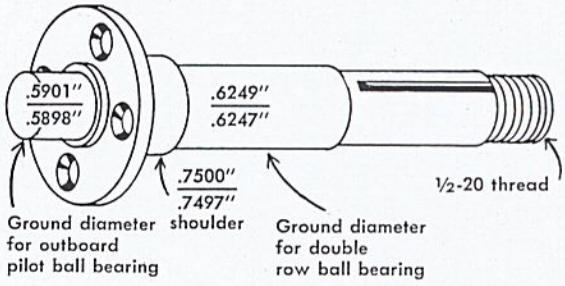
Stepped shaft used in two-gear transmissions with two sealed bearings and spacers.



Large diameter sprocket shaft used in two-gear transmissions — supported by ball and roller bearing combination, or by double row ball bearing — first used in 6-22 saws. Assembly includes formica and Garlock seals in sprocket shaft bore.



Shaft for three-gear transmissions supported by outboard bearing and by inboard double row ball bearing — sealed by garter-type Garlock seal in sprocket shaft bore.



7—5.4 Sprocket Shaft Bearings and Seal
Three-Gear Wet transmission types

1. In three-gear saws beginning with Model 9-26 the sprocket shaft is supported by ball bearings on both sides of the driven gear — by a double row ball bearing in the gearcase sprocket shaft bearing bore, and by a single row ball bearing in the gearcase cover. The outboard bearing in the gearcase cover adds stability to the sprocket shaft and maintains better gear alignment under all conditions. One garter-type Garlock seal is installed in the sprocket shaft bearing bore.
2. Examine the shielded bearing housed in the gearcase cover. If it is rough-turning or has excess radial play, replace it. Because the bearing is housed in a blind hole, knock-out plugs cannot be used. Commercial pullers, particularly Puller #A-78 (with small jaws) made by SNAP-ON TOOL CO. can be applied to pull the bearing without harming either the bearing or the casting.
3. Press sprocket shaft and driven gear assembly out of crankcase. (See Section 7—4.4 for details.)
4. Use snap-ring Pliers #22726 to remove the retaining ring from the groove in the sprocket shaft bearing bore.
5. Disassembly and assembly of the double row ball bearing and Garlock seal in the sprocket shaft bearing bore require use of two tools:
   (a) Sleeve #23390 (Seal Assembling)
   (b) Tool #23389 (Seal and bearing assembly plug)
6. To remove bearing and seal: Working from the ignition side, press the bearing and seal out of the bearing bore with the stepped end of Tool #23389.
7. Do not disassemble a serviceable bearing to change a leaking seal. Pry out the old seal and discard. Install a new seal as follows:
8. To install Garlock seal: Put sleeve #23390 *beveled-end-out* on the long, unstepped end of Tool #23389. . . . Slide Garlock seal, open-end-out onto the sleeve. Then, from the ignition side of the crankcase, press the seal carefully into the sprocket shaft bore, flush with the face of the casting. Check to be sure that the garter spring is still in place in the seal.
9. To install double row ball bearing: Slide lettered end of bearing onto the long, unstepped end of Tool #23389 . . . press bearing into sprocket shaft bearing bore from the transmission side.
10. Install the bearing retaining ring and rotate it in the groove to be sure it is secure.
11. Assemble sprocket shaft and driven gear. Stake the screw heads to the shaft head as shown in Figure 7—3. Press the sprocket shaft into the sprocket shaft bearing in the gearcase.
12. Reposition gearcase vent line over driven gear and tighten the compression nut.
13. Install idler gear in gearcase in correct position so it meshes with the driven gear. (See Note in Section 7—1.)
14. Reassemble clutch drum and drive gear assembly and clutch spider assembly on crankshaft. See assembly guide, Section 9, to complete assembly.

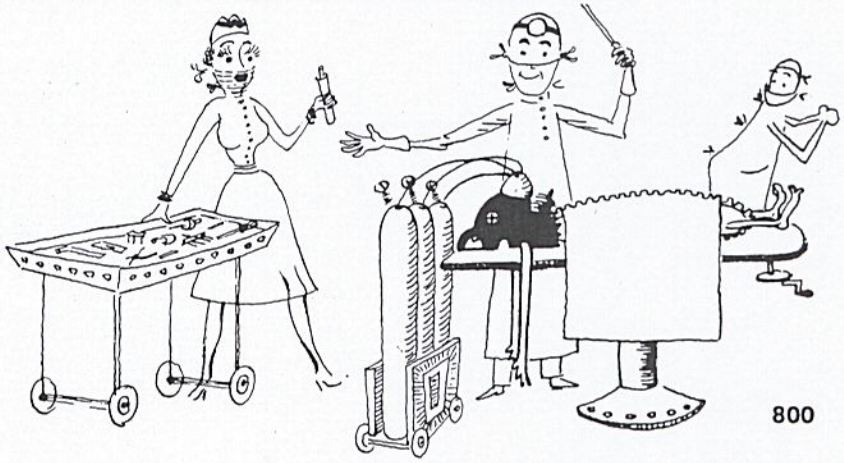
NOTE

Never submerge or wash drive case with sprocket bearings installed. This will dilute the grease and lead to bearing failure.

Section 8

ENGINE SERVICE (Internal)

INDEX



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Whenever the engine is to be opened for inspection or overhaul, the unit must be disassembled. Complete disassembly, service and reassembly can be facilitated with the use of the Special Service Tools and other recommended shop instruments and equipment. The "press-in, push-out" type tools (See Master Equipment List, Section 10) are necessary for proper removal or installation of the crankcase seals and bearings. It is preferable to use an arbor press whenever practical in conjunction with these tools. Crankshafts should always be installed with the jack screw type assembly tools.

8—1 BASIC ENGINE CONSTRUCTION

8—1.1 Belt Drives with Two-Piece Crankcase, Separately Cast Drivecase.

(26LCS, 5-30, 5-30N, 7-29, 8-29.)

The basic frame consists of two castings — a front-half and a rear-half crankcase — which are bolted together in register.

1. The front-half crankcases of Model 26LCS and 5-30 contained a bronze shaft bushing and a Garlock seal.
2. The front-half crankcases of Models 5-30N, 7-29 and 8-29 contain two shielded needle bearings and a Garlock seal.
3. The magneto backplate is registered against and secured to the front-half crankcase.
4. The drivecase is a separate casting which is registered against and bolted to the rear-half crankcase.
5. With this type construction, the crankshaft and main bearing and the connecting rod and piston should all be assembled and pulled into the rear-half crankcase before the front-half crankcase is added to the unit.
6. Any deviations in construction or service of these two-piece crankcases will be included in the text.
7. To push the crankshaft and main bearing from the rear-half crankcase you will need Puller #AA-22560. To assemble the Garlock seal in the rear-half crankcase, and to assemble main bearing on crankshaft and install in rear-half crankcase, you will need the following tools:
   Garlock Seal Sleeve #22720
   Garlock Seal Assembly Tool #22764
   Bearing Adapter #22678
   Jackscrew #AA-22680
   Assembly Fixture #AA-22557
8. For assembly and disassembly of bearing and seal in 5-30N, 7-29 and 8-29 front-half crankcases, use:
   Garlock Seal Tool #23176
   Needle Bearing Tool #23174

8—1.2 Direct Drives with Integrally Cast Crankcase, Drivecase, Oil Reservoir and Pistol Grip.

(EZ, EZ-6, 7-19C, ZIP, 700D, etc.)

The basic frames of all saws in this grouping are cast from the same dies. Slight modification of the dies from time to time accounts for variations among Models in this group. Each crankcase casting, however, includes drivecase, pistol grip less cover, and the oil reservoir. The oil reservoir cover is sealed to the reservoir at the factory and is supplied as part of the service crankcase assembly. (Cover and gasket also available separately.) All service crankcases include any necessary inserts and studs.

1. THE MODEL EZ — the only saw of this group to contain Garlock seals in the crankcase. (Supplied installed in service crankcase assembly.) To replace seals in the EZ crankcase, and to assemble the (.6693″/.6690″ I.D.) main bearing on the crankshaft and install in crankcase you will need:
   Tool #22831 (for seal removal)
   Seal Assembly Tool # 22830
   Main Bearing Adapter #23138
   Assembly Fixture Body #23136
   Jackscrew #A-23137
   Garlock Seal Sleeve #22819
2. EZ-6 SAWS WITH SIX-DIGIT SERIAL NUMBERS. These units are often referred to as "small-shaft EZ-6." Instead of Garlock seals in the crankcases, EZ-6 and all later direct drive units contain factory installed Oilite bushings. These bushings are integral parts of service crankcase assemblies and are not available separately. The main bearing (.6693″/.6690″ I.D.) and crankshaft are the same size as those of the EZ, and require the following tools for installation:
   Main Bearing Adapter #23138
   Assembly Fixture Body #23136
   Jackscrew #A-23137
   Aligning Plate #22812
3. EZ-6 SAWS WITH 7-DIGIT SERIAL NUMBERS and later units including 7-19, 7-19C, ZIP, ZIP-5 and 700D, contain crankshafts which are thicker on the clutch end — are accordingly referred to as "large shaft" or "thick shaft" units. These saws have a larger bore crankcase to house the "thick shaft," and a larger I.D. (.7188″/.7185″) main bearing and snap-ring, requiring the following special tools for assembly:
   Main Bearing Adapter #23138-1
   (for thick shaft)
   Assembly Fixture Body #23136
   Jackscrew #A-23137
   Aligning Plate #22812

8—1.3 Direct Drives with Integral Crankcase-Drivecase — Separate Pistol Grip (900 Series).

(900 Series includes 9-23, 900D)

The basic frame is a one-piece construction crankcase-drivecase. The pistol grip is bolted to the crankcase. A fuel tank, which houses the chain oil reservoir and oil pump is fastened to the crankcase under the pistol grip. The engine parts — in fact all parts of the saws except the crankcase castings and their respective transmissions — are interchangeable with those of the 900 series three-gear transmission saws. The main bearing I.D. (.7874″/.7870″) is larger than that of EZ or EZ-6 type units. Assembly tools and fixtures for installing the large Garlock "garter-type" seal, main bearing and crankshaft in the 900 crankcases are:

Garlock Seal Tool #23384
Jackscrew #A-23137
Assembly Fixture Body #23136
Assembly Fixture Spacer #23382
Garlock Seal Sleeve #23422
Crankshaft Aligning Plate #23383

8—1.4 Direct Drives with One-Piece Crankcases and Detachable Drive Plates.

(BUZ and 500 Type)

The basic frame consists of a one-piece crankcase to which a steel drive plate is bolted. BUZ and 500 Models differ in exterior construction and appearance, but internal engine inspection for both models will be the same as for "thick shaft" EZ-6 or 700D units. The service crankcase includes cylinder studs and a factory-installed Oilite bushing. To assemble main bearing and crankshaft and install in crankcase you will need to use:

Main Bearing Adapter #23138-1
(for thick shaft)
Jackscrew #A-23137
Assembly Fixture Body #23136
Aligning Plate #22812

8—1.5 Two-gear Transmission with Integrally Cast Crankcase-Gearcase.

The basic frame of two-gear saws, such as the two-gear Model 17 is a one-piece, die-cast crankcase-gearcase. The pistol grip is bolted to the crankcase. The die-cast tank, positioned above the pistol grip, has chain oil and fuel compartments, and houses the fuel pump. Any deviations in construction or assembly will be mentioned in the text.

1. Two-Gear Model 17 and other "small shaft" Models: Models 17, 17L, 5-20, 5-20L, 4-20, WIZ and 6-22 units with 6-digit serial numbers are assembled with what may be called a "small shaft," a small .6690″/.6693″ I.D. main bearing, and Garlock seals installed *back-to-back*. The following group of special assembly tools for assembling main bearing, crankshaft and seals in the crankcase are required:
   Garlock Seal Tool #22830
   Jackscrew #A-23137
   Body #23136
   Bearing Adapter #22820
   Garlock Seal Sleeve #22819
   Aligning Plate #22812
2. Two-Gear Models with Thick Crankshaft: Model 6-22 units with 6-digit serial numbers above 758245, or with 7-digit serial numbers have a crankshaft which is thicker on the clutch end. The main bearing I.D. for the "thick shaft" is .7185″/.7188″. Instead of the *back-to-back* type Garlock seals used in "small shaft" crankcases, crankcases for the "thick shaft" gear saws have a single Garlock seal which contains a "Garter" spring. For 6-22, 7-21, 7-21C and 700G; or for Modified WIZ and 4-20 and other units in this group, use the following group of special assembly tools for the main bearing, crankshaft and Garlock seal installation:
   Garlock Seal Tool #23233
   Jackscrew #A-23137
   Body #23136
   Main Bearing Adapter #22820-1
   Garlock Seal Sleeve #23232
   Aligning Plate #22812

8—1.6 Three-gear saws.

(900 Series includes 9-26 and 900G)

The basic frame of these units is a one-piece crankcase-gearcase combination cast from an entirely different set of dies than the two-gear crankcases are. In addition to shaft seals, studs and inserts normally supplied with all service crankcases, the service gearcases of the three-gear saws include the dowel pins for mounting the idler gear. The main bearing I.D. (.7874″/.7870″) is larger than that for 17 or 7-21 units. Assembly and disassembly fixtures for installing the crankshaft and main bearing and the large "garter" type Garlock seal in the 9-26 and 900G crankcases are as follows:

Garlock Seal Assembly Tool #23384
Jackscrew #A-23137
Assembling Fixture Spacer #23382
Assembly Fixture Body #23136
Garlock Seal Sleeve #23422
Crankshaft Aligning Plate #23383

8—2 ENGINE INTERNAL DIAGNOSIS

The symptoms of internal engine failure are difficult to distinguish from those purely external in nature. Before attempting diagnosis, the normal series of tests for chain and bar condition, and for engine fuel supply and spark production should be conducted. While the spark plug is out, the serviceman may get some clue to the general engine condition by noting the amount of carbon on the piston dome. He should look further for carbon by removing the muffler and checking both the muffler and the exhaust ports for carbon. He may also check the engine compression by applying a compression tester at the spark plug hole and cranking the engine. Certain problems, such as a cracked or porous crankcase (gear oil level drops rapidly, engine smokes badly and black oil oozes from muffler) may be detected during performance. Most internal faults, however, require disassembly and careful parts inspection during overhaul.

8—3 CRANKCASE INSPECTION— ALL MODELS

1. During overhaul and before inspection, the crankcase castings should be cleaned to facilitate careful inspection. If the crankcase contains sealed sprocket bearings, do not immerse the casting in solvent or the solvent may dilute the bearing grease.
2. Threaded screw or stud holes which have become enlarged or stripped, can be restored to original size by installing Heli-coil inserts. A Homelite Heli-coil Repair Kit, Part No. A-23523, containing sets of taps, Heli-coils, and special assembly tools, can be obtained for shop use.
3. Be sure all pressure line, actuator line, and idle line passages through the crankcase are clean and clear.
   a) Front-half crankcases of Models 5-30, 7-29, and 8-29 contain an idle line passage which runs from the intake manifold register through the intake valve plate register face, into the engine. Carbon and gum sometimes restrict this passage. Clean with a piece of wire, if necessary, and blow passage clear.
   b) On Model 26 Saws only, the idle line connection is a 90° elbow fitted in the side of the front-half crankcase. The passage from this fitting enters the crankcase through the intake valve plate register. Clean the passage. Be sure the fitting is tight and elbow is neither stripped nor cross-threaded.
   c) On pressurized fuel tank Models, (26 and 5-30 without fuel pump), be sure the passage for the tank pressure line is clear.
   d) On all fuel pump equipped models, be sure the passage for the actuator line is clear.
4. The main bearing bore and the seat for the crankcase sealing gasket must be in perfect condition. If there are any rough, scratched, gouged or worn spots, or if the bearing bore is worn, replace the crankcase casting. A loose fit allows the bearing and the sealing gasket to rotate in the crankcase and gives the worn metal surfaces a "lapped" or shiny, gray appearance. If this condition is apparent the crankcase and main bearing may both require replacement in order to obtain a press fit.
5. The surface for the cylinder gasket must be smooth and free of nicks, scratches, and burrs. The mating faces of two-piece crankcases should, likewise, be smooth and free of scratches, nicks, burrs and high or low spots, in order to mate perfectly. Bits of the old cylinder gasket should be scraped off with care. Deep scratches or nicks, especially those running all the way across, necessitate replacement of the damaged casting. If the damage is only slight, file off the burrs with a fine flat file. Remove all filings, then fill the low area with non-hardening type Permatex compound.
6. Models 26 and 5-30 have a bronze bushing, whereas the 5-30N, 7-29, and 8-29 have two needle bearings in the front-half crankcase.
   a) If the bronze bushing is badly scored or worn, replace the front-half crankcase (5-30 and 26). If you reuse the original casting during overhaul, install a new garlock seal (rubber lip inward) in the front-half crankcase. Use narrow end of Tool #23176 to install seal.
   b) Check the needle bearings in Models 5-30N, 7-29, and 8-29 front-half crankcase. The needles must be free. If the needles can be separated more than the width of one needle bearing, or if there is a flat visible on any needle, they are worn and the bearings must be replaced. (See Figure 8—1.) Use large end of Tool #23176 from inside crankcase to push out bearings and seal. See Special Tools, Section 10 for proper procedure to install new bearings and garlock seal in the front-half crankcase. When installing needle bearings, always press against the lettered end of the bearing race.

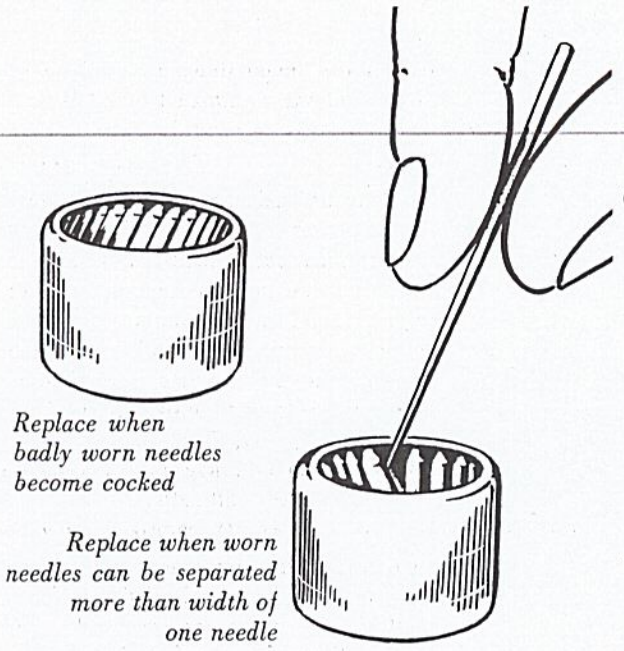


Figure 8—1 Needle Bearing Wear

8—4 CRANKSHAFT AND MAIN BEARING INSPECTION—ALL MODELS

1. Inspect the main bearing by rotating it on the crankshaft. If it is rough turning, or has excessive radial play (or "wobble"), or if there is any indication that the bearing has been turning in the crankcase, it must be replaced.
2. For bearing removal, pry the retaining ring from the crankshaft. Use Remover #A-23180 to pull the bearing from the shaft. Use the Special Tools and techniques shown in Section 10 to pull the new bearing onto the shaft. Then put the retaining ring back into the shaft groove. Be sure the ring is properly installed in the groove.
3. Inspect crankshaft for damaged threads, damaged or enlarged keyways, and for wear at spots mentioned in the remainder of this section.
4. It is especially important that the crankpin be entirely free of wear or galled spots. Look for first signs of wear on the side which receives the impact on the engine power stroke. Even slight wear at the crankpin indicates the shaft may fail before many hours' operation.
5. The crankshaft taper, on which the rotor mounts, must be undamaged. Any condition of the taper or keyway which causes the rotor to register too far up on the taper, or prevents straight assembly of the rotor on the shaft, may cause the rotor to hit the magneto coil core. If the saw has performed erratically, look for worn spots on the inside of the rotor where it may have been hitting the coil core. Assemble the rotor on the crankshaft taper. For proper fit, the rotor should be snug on the taper with the taper recessed slightly below the outer face of the rotor.
6. If the rotor and the crankshaft fit together properly, but the rotor does not turn true, the crankshaft may be bent. This condition is called "run-out". Shaft run-out up to .003″ is allowable. The amount of run-out can be checked simply with the crankshaft installed in the crankcase. Fasten a dial indicator to one of the cylinder studs, and check for shaft run-out near or on the bearing surface. If a dial indicator is not available, a pointer of some sort can be substituted and a reading obtained with clearance gauges.
7. If the shaft has a considerable amount of run-out, it could result in damage to the seals. Unfortunately, however, many cases of leakage diagnosed as shaft failure, are actually the result of faulty bearing and seal installation.
8. Following inspection, the crankshaft and bearing should be assembled in the crankcase on direct drive and gear saws only.
   a) Replacement crankcases requiring Garlock Seals are supplied with the seals installed. To change seal, see Special Tools, Section 10.
   b) Oil the crankcase sealing gasket and install it in the crankcase. (To assemble crankshaft in rear-half crankcase on Model 26, 5-30, 7-29 and 8-29, See No. 11 in Paragraph 8—8.) Put garlock seal protecting sleeve *beveled-end-out* on shaft. Start the crankshaft and main bearing through the crankcase bore by hand.
   c) Use the special tools and techniques listed in Section 10 to pull the main bearing and shaft into the crankcase.
   d) Install main bearing retaining screws and lockwashers *NOW*. Use new screws and washers to lock bearing.

8—5 CYLINDER INSPECTION

1. Clean the cylinder both inside and out. If the cylinder is cracked, or if more than three or four of the critical cylinder fins are broken off, replace the cylinder.
2. Scrape carbon and gum deposits from the roof of the combustion chamber and from the exhaust ports. When scraping carbon, be careful not to damage the finely chamfered edges of the exhaust ports. Any flashing or carbon accumulation at the edges of the spark plug hole should be removed carefully, leaving a smooth edge. This will eliminate the problem of incandescence (prolonged burning of these foreign elements) which could cause pre-ignition.
3. If the cylinder is worn or badly scored, replace it. When the chrome has been scored or scratched through, the soft aluminum underneath wears rapidly, and sometimes cakes on top of the chrome. This condition gives the cylinder bore a rough, flaky appearance. Especially when the engine has had insufficient lubrication, aluminum from the piston is also deposited on the cylinder. Try to remove the aluminum with a rubber-impregnated grinding wheel on a ¼" electric drill. After removing the aluminum deposits, run a screwdriver tip over the cleaned surface. If the surface cannot be marked by the screwdriver, the chrome is intact, and the cylinder is usable.
4. If the engine is to be asembled with a new piston and cylinder assembly, check the fit of the piston in the cylinder before installing the piston rings. Insert the piston in the cylinder, (ring retaining pin facing away from exhaust ports.) To check fit of piston, invert the cylinder and observe how the piston slides out. If the piston does not fall freely, replace the piston or cylinder, whichever is out of size.

8—6 MUFFLER INSPECTION

In addition to reducing engine noise, chain saw mufflers not only lower the exhaust gas temperature to safe levels, but also screen the carbon into particles too small to be a fire hazard. Mufflers should be cleaned and inspected periodically. Clean carbon from all interior surfaces. A clean muffler supplies the correct amount of back pressure for the Homelite Chain Saw engine. Be sure all the holes of perforated metal elements are clear. Clean wire mesh type elements or replace if badly clogged. Because the engine can be damaged by bits of carbon or metal, always remove all loose particles after cleaning, and change burnt or cracked elements before disintegration takes its toll.

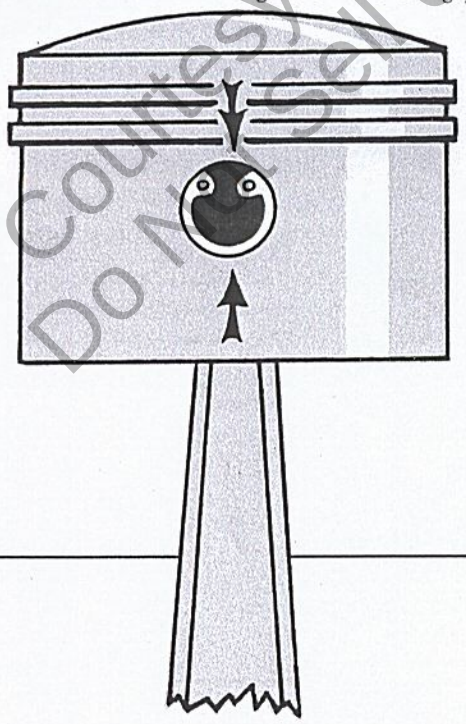
8—7 PISTON AND RING INSPECTION

1. Before disassembling the piston and connecting rod, check for a snug fit between the piston and piston pin. (See Figure 8—2.) If there is any vertical (up and down) play, replace the piston and pin assembly.
2. Piston rings should always be installed same-side-up, and in the same groove from which removed. Remove the piston rings carefully, and note which is which, with respect to their assembly positions.
3. Pistons become discolored and stained with use but should not be cleaned unless carbon is actually built up on the metal. Clean the piston ring grooves, then scrape off any hard carbon deposits built up on the piston dome or sides. (DO NOT USE A WIRE WHEEL.) Replace the piston if the ring grooves have been enlarged with wear.
4. Inspect the piston for cracks, wear, and also for holes in the dome. Air leaks, (usually from loose spark plug) directly into the firing chamber, cause lean operation and overheating. As a result, a hole is sometimes burnt in the top of the piston.
5. The piston's side walls should be smooth. Replace badly scored or worn pistons. Slight scoring at top or bottom does not matter unless the scratches are connected and permit a substantial amount of "blow-by".

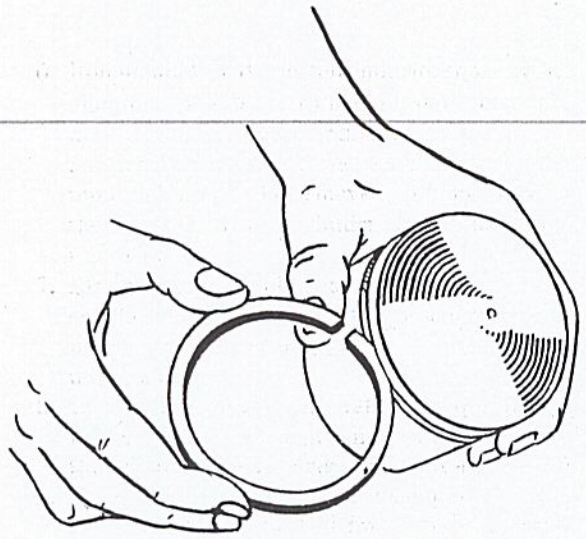
NOTE

Check for vertical play again after completing inspection and reassembly of piston and connecting rod.

Figure 8—2 Testing for Vertical Play between Piston and Pin



Push against the connecting rod. If you can see the piston pin move in direction of arrows, replace both piston and pin.



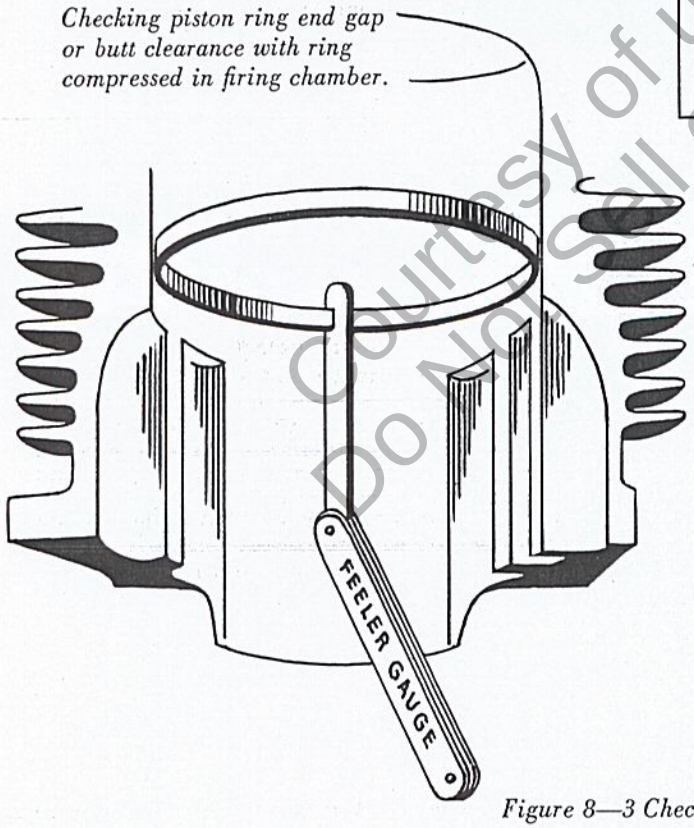
Ring Groove Clearance

Min.	Max.
—.0025″	—.004″

Check fit of piston ring in ring groove. Rotate ring around groove.

6. Rough sides of the piston indicate some of the aluminum may have rubbed off onto the cylinder. If this has occurred, replace the piston and test the cylinder to see whether the aluminum pick-up can be removed without marring the chrome. (See Cylinder Inspection, Section 8—5.)
7. Piston rings should not be cracked. They should be clean and smooth, the edges free of burrs, and the sealing surfaces smooth and unscored.
8. Inspect the piston ring retaining pin in the piston dome. Replace piston if the pin has worn thin at the ring grooves. (See Figure 8—3.)
9. Before assembling on the piston, the piston rings should be checked for wear by measuring the amount of end or butt play with the rings in place in the firing chamber. To do this, put ring in cylinder bore and use the piston to push ring to a position between the exhaust ports and the spark plug hole. Measure clearance between the butt ends of the rings with a feeler gauge. See Figure 8—3 for allowable amounts of butt clearance for each saw model.
10. Assemble each piston ring, same-side-up and in the same groove from which it was removed. Maximum clearances between rings and the side walls of the ring grooves are given in Figure 8—3.

Checking piston ring end gap or butt clearance with ring compressed in firing chamber.



Piston Ring
End or Butt Clearance

	17	5-20	EZ	26	5-30	7-29
Min.	.070″	.070″	.070″	.070″	.070″	.008″
Max.	*.080″	*.080″	*.080″	*.075″	*.075″	.018″

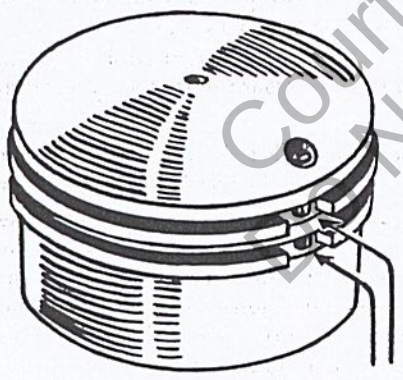
*Up to .100″ allowable

Figure 8—3 Checking Clearance of Piston Rings in Piston and Cylinder

8—8 CONNECTING ROD AND NEEDLE ROLLER INSPECTION

Two-piece construction connecting rods are used in all present model Homelite saws.

1. Use Allen wrench to remove cap screws holding bearing cap to connecting rod. The 8-32 Allen cap screws have *either* a 1/8″ *or* 9/64″ socket head; use wrench #22220 (1/8″) or wrench #23528 (9/64″) for respective sockets. The #10-32 Allen cap screws require wrench #22126 (5/32″).
2. The connecting rod must not be bent, nor should the screw holes for the Allen Cap Screws be distorted.
3. Inspect the surfaces of the connecting rod and cap which, together, form the outer race for the needle rollers at the crank-pin. These surfaces must be smooth and free of wear. Inspect the formica thrust washers which are connected to the backs of the connecting rod journal. They must be smooth and completely bonded to the rod.
4. Clean the piston pin needle bearing in solvent and blow it dry. Inspect the needle bearing for signs of wear. If the needle rollers can be separated more than the width of one needle, or if there is flat visible on any needle, the bearing must be replaced. (See Figure 8—1.) Oil and install the needle bearings in the connecting rod immediately after inspection. (Use bearing Tool #23234.)



If worn thin replace piston and pin.

Figure 8—4 Worn Piston Ring Retaining Pin

NOTE

In one-piece construction crankcases, the crankshaft and main bearing assembly must be installed in the crankcase before the connecting rod is connected to the shaft. (See Crankshaft Inspection.)

5. After assembling connecting rod and piston assembly, install new snap rings to retain the piston pin. (Use #1 snap-ring pliers #22828). Be sure they are fitted inside the snap ring grooves of the piston.

CAUTION

Always consult the unit parts list for the correct number of needle rollers in the crankpin bearing. Some models use only 27 needles, others require 31 needles. Always be sure not to leave any needles which may have dropped inside the crankcase during assembly or disassembly. Be sure the connecting rod is assembled with the exact number of rollers required for the engine model.

6. When overhauling unit always install new needle rollers. If any of the rollers are bent or have flat sides, they must be replaced. Always replace the needle rollers as a complete set.
7. Homelite packages needle rollers in strips of 27 and 31 rollers respectively.
8. When installing the needle rollers, be sure the mating marks on the connecting rod and cap are aligned, and assembly is made with the intake side of the piston, (the side with ring-retaining pin) away from the exhaust side of the engine. If assembly is made with the open ends of the rings at the exhaust side, the assembled engine will start and operate, but the rings will catch in the exhaust ports. Severe damage will result.
9. Be sure the correct number of rollers have been assembled in the crankpin connection and that none of the rollers are overlapping

one another. Use NEW Allen Cap Screws, tightened evenly, to secure the connecting rod and cap.

RECOMMENDED TORQUE
8-32 — Cap Screw — 55-60 Inch Pounds
#10-32 — Cap Screw — 70-80 Inch Pounds

10. Test the operation of the connecting rod and crankshaft assembly to be sure none of the rollers are binding or overlapping, and the action is free.
11. On Belt Drive Models, the crankshaft, connecting rod and piston assembly should now be installed in the rear-half crankcase. Oil and install the crankcase sealing gasket. Then use the special tools and techniques shown in Section 10 to pull crankshaft and bearing into rear-half crankcase. Lock main bearing in position NOW. Use new bearing retaining screws and lock washers.

8—9 GOVERNOR & INTAKE VALVE ASSEMBLY (BELT DRIVE MODELS)

8—9.1 Inspection

The governor and intake valve assembly should be inspected before completing assembly of the crankcase.

1. Test the governor weight and spring mechanism by moving the weight back and forth. The assembly should not stick or bind at any point.
2. The governor assembly must be replaced if any of the following conditions exist:
   a) Face of intake valve assembly is badly worn or scored.
   b) Spring posts are loose or are visible on the valve surface.
   c) Governor pivot post beginning to wear through surface of valve.
3. If the governor intake valve face is only slightly worn or scored, it may be restored to usable condition by careful polishing. Use a surface plate such as a flat piece of glass. Cover the glass with fine emery cloth and lay the governor, face-down, on the emery. Keep pressure evenly distributed on the valve and vary the grinding pattern to obtain an even polishing job.
4. The governor wear plate (intake valve plate, formica) should not be scored or badly worn. If wear is slight it may be used again.
5. Whenever a new governor is installed, always use a new wear plate with it. Soaking the wear plate in oil for 24 hours prepares it for installation and assures flatness of this part.

8—9.2 Installing in Engine

NOTE

Be sure crankcase is clean before installing intake valve wear plate.

1. Oil the intake valve wear plate and locate it on the pins in the recess of the front-half crankcase. Be absolutely sure the plate is registered on the pins. Also be sure these pins do not protrude beyond the plate.
2. Hold the governor weight in open position and slide the governor on the shaft. Align the three springs with the three sockets in the crankshaft counterweight.
3. Hold governor in position on shaft. Put garlock seal protecting sleeve #22721 (See Special Tools, Section 10) on shaft, beveled end out, and slide the front-half crankcase assembly onto the shaft.
4. Push front and rear-half castings together. Be sure the register pins and holes are aligned. Secure crankcase halves with seven bolts and lockwashers.
5. Remove the garlock sleeve protecting sleeve.

8—10 REASSEMBLING ENGINE ASSEMBLY AFTER SERVICE—ALL MODELS

1. Apply a light film of grease to the sealing face for the cylinder and put the cylinder gasket on the studs.
2. Squirt oil onto the cylinder walls. Compress piston rings in piston ring grooves and slide cylinder straight down over piston. Be careful not to twist or bend the connecting rod.
3. Lock cylinder to crankcase with four cylinder nuts and lockwashers, tightened alternately and evenly on studs.
4. Continue assembly of saw unit by following steps of Assembly Guide, Section 9.

ASSEMBLY GUIDE

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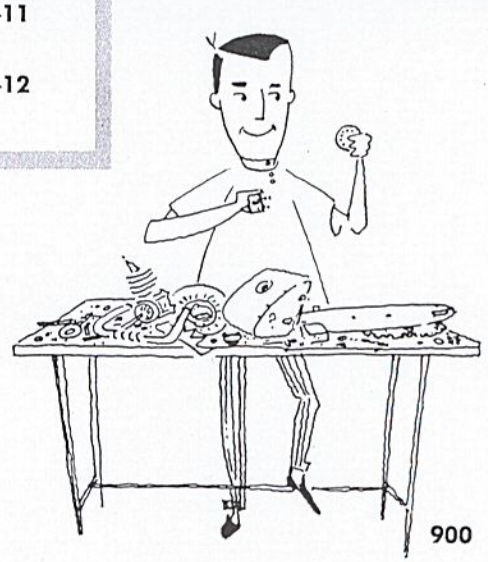

900

This Section is intended as a guide only, in disassembling and assembling the various saw units. Always refer to the other Sections of the Manual where disassembly and assembly techniques are thoroughly covered in conjunction with detailed inspection routines.

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9—1 DISASSEMBLY — DIRECT DRIVE SAWS WITH INTEGRAL CRANKCASE, DRIVE CASE, PISTOL GRIP, OIL RESERVOIR

ZIP, EZ, EZ-6, 719C, 600D, 700D

9—1.1 Drive Case

1. Remove two 3/8-16 nuts, washers, and drive case cover assembly. Remove chain, guide bar, and the two guide bar plates.
2. Remove the flex-lock nut, flat washer, thrust washer, sprocket and drum assembly, inner race and thrust washer.
3. Pull clutch assembly with Puller (see Section 10 for part number). Remove two clutch keys and the clutch cover.

9—1.2 Fuel System

1. Remove the air cleaner adapter, adapter gasket and air elbow gasket held by two sets of screws.
2. Remove carburetor shield.
3. Close fuel shut-off valve, then remove fuel line.
4. Remove the 10-32 screw, loosen the two 1/4-20 hex head screws, and lift the fuel tank off the unit.
5. Remove governor spring from unit. (Governor-equipped models.)
6. Remove three 10-32 screws which hold carburetor and reed valve assembly (with gasket) to unit. Unhook governor arm from throttle shaft lever while removing reed valve and carburetor from unit.

9—1.3 Ball Drive Starter

1. If unit has handle brace covering starter, remove screw at air screen and push brace out of the way. Remove starter pulley cover and starting cord.
2. Remove four fillister head screws and lift off pulley and plastic shim.
3. Remove screws holding screen and bracket. Lift off screen and bracket, with recoil spring and cover.
4. Lock rotor. Remove nut, lock washer, flat washer, and thrust washer.
5. Remove three 1/4-20 flat head screws and countersunk lock washers. Lift off ratchet and hub assembly. Remove two inner races and thrust washers. Put inner races back into ratchet to protect bearings.

9—1.4 F-M Starter

1. Remove four screws, adapter-to-air shroud, and lift pulley cover and starter adapter assembly from saw.
2. Block rotor from turning, or use impact-type wrench to remove shaft lock nut, lockwasher and flat washer. Lift starter cup and screen assembly from shaft.

9—1.5 Ignition System

1. Pull rotor with Puller (see Section 10 for part number).
2. Remove cylinder shield.
3. Disconnect high-tension lead from spark plug, and remove the spark plug and gasket.
4. Remove handle bar, rubber cushion, and clamp.
5. Remove six 10-32 screws and lift back plate and air shroud off engine. (Be sure governor arm has been disconnected.)

9—1.6 Engine

1. Remove heat damper.
2. Remove four 1/4-28 hex nuts and washers holding cylinder to crankcase. Lift cylinder with gasket off engine.
3. Use Allen wrench to remove Allen cap screws. Remove upper half connecting rod with piston and connecting rod cap. Be sure to recover all 27 of the needle rollers.
4. Remove two main bearing retaining screws and washers.
5. Press or tap crankshaft from crankcase. Remove crankcase sealing gasket.

9—2 ASSEMBLY — DIRECT DRIVE SAWS WITH INTEGRAL CRANKCASE-DRIVE CASE, PISTOL GRIP AND OIL RESERVOIR

ZIP, EZ, EZ-6, 7.19C, 600, 700

9—2.1 Engine

1. Oil and install a new crankcase sealing gasket.
2. Pull crankshaft and main bearing into crankcase. Use special tools to protect seals and insure straight assembly in EZ crankcase. All other crankcases contain an Oilite bushing — do not contain garlock seals. Use special tools to assemble crankshaft and bearing and insure straight assembly of the crankshaft into the crankcase. (See Section 10.)
3. Use new retaining screws and lockwashers to lock main bearing in crankcase.
4. Installation of new piston pin bearing, if necessary, should be made with Tool #23234. (See Section 10.)
5. Assemble connecting rod and piston. Use a new set of (27) needle rollers and new Allen cap screws; assemble piston and rod assembly on crankshaft.
6. Assemble cylinder gasket and cylinder to crankcase.
7. Fasten heat damper over muffler.

9—2.2 Ignition

1. Install back plate and air shroud assembly, with gasket, to crankcase.
2. Assemble rubber cushion, handle bar, and clamp to engine.

9—2.3 Starter

1. Put steel thrust washer, and inner races on shaft. Slide ratchet and hub assembly (with formica washer) on shaft over races. Put steel thrust washer, flat aluminum washer, lockwasher and nut on crankshaft. Lock rotor and tighten shaft nut.
2. Fasten ball drive assembly to rotor with three countersunk lockwashers and large flat head screws.
3. Assemble air screen and bracket assembly (with recoil spring) to air shroud.
4. Add shims for 1/32″ minimum clearance between starter pulley and spring housing. Fasten pulley to ball drive hub.
5. Wind starting rope on pulley; wind two more turns tension on pulley and push pulley cover onto air screen.

9—2.4 F-M Starter

1. Remove shaft lock nut and any flat washers used during assembly of rotor on crankshaft. Put starter cup and screen assembly on shaft and hold with flat washer, lockwasher and lock nut — block rotor and tighten lock nut securely.
2. Fasten starter adapter to air shroud with four screws. Attach starter pulley cover assembly to adapter with four screws.

9—2.5 Fuel System

1. Lock throttle lever (in pistol grip) in full throttle position to insure correct position for carburetor installation. Fasten reed valve and carburetor assembly with gasket to engine and, *at same time*, hook governor arm through lower hole of throttle stop lever. (See Figure 9—1.) (Be sure reed valve adapter is not locked or binding, before tightening screws.)
2. Hook long loop of governor spring through front hole of throttle stop lever as shown in Figure 9—1. Open end of hook must face away from carburetor or the spring will wear. Connect other end of spring to governor adjusting slide.
3. Assemble fuel tank on engine.
4. Install air cleaner adapter and gaskets between carburetor and fuel tank.
5. Assemble carburetor shield and cylinder shield to engine.

9—2.6 Drive Case

1. Put clutch cover on crankshaft, fit the clutch keys into the keyways (snug fit), fit clutch assembly on shaft over keys. Then add steel thrust washer, inner race, sprocket and drum, thrust washer, flat washer and flex-lock nut. Lock shaft to tighten nut.
2. Assemble inner guide bar plate, guide bar and chain, outer guide bar plate and drive case cover. Hold with lockwashers and nuts on studs. Adjust chain tension; then lock assembly in place.

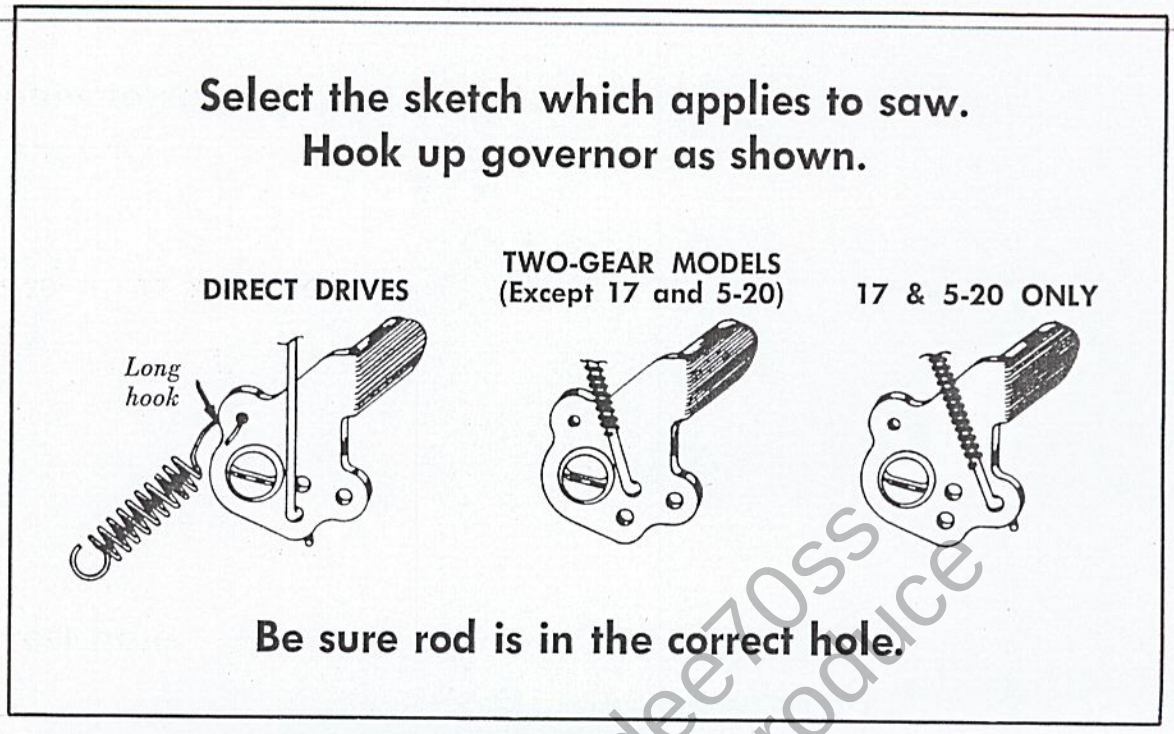


Figure 9—1 Correct Governor-to-Stop Lever Hook-up on Models with CS, CP, and HL Series Carburetors

9—3 DISASSEMBLY — DIRECT DRIVE SAWS WITH ONE-PIECE CRANKCASE AND SEPARATE DRIVE PLATE

BUZ-500 Series

9—3.1 Drive Plate

1. Remove chain guard.
2. Remove chain tension device, bar and chain, and bar shims.
3. Block crankshaft from turning; (or use impact wrench to) remove clutch lock nut. Remove clutch retaining washer and clutch cover.
4. If the keys are not too tight in the keyways, the drum and sprocket and clutch assembly may be lifted off the shaft together. If this is not possible, use correct puller (see Section 10) to remove clutch spider assembly first. Then retrieve clutch keys, and remove the large outer thrust washer. Lift the sprocket and drum, and inner race from shaft and remove the inner thrust washer.
5. Remove two screws which hold pistol grip to drive plate, and three 5/16-18 hex head screws which hold drive plate to crankcase. Lift drive plate with handle bar from engine.

9—3.2 Fuel System and Chain Oiler

1. Disconnect oil and fuel lines. Free the pistol grip and oil pump from the fuel tank angle bracket or saddle by removing first the hex nut, then the screw with lockwasher. Remove oil pump, pistol grip and throttle trigger.
2. Loosen the screws or nuts holding the angle bracket and fuel tank saddle to crankcase; remove tank and saddle assembly, and angle bracket. (Angle bracket is not used on Model 500.)
3. Remove three screws, reed valve adapter-to-crankcase, and lift complete carburetor and reed valve adapter assembly with air filter from engine. See Fuel System, Section 4, for complete servicing instructions on reed valve and carburetor.

NOTE

Split decals (with razor blade) alongside strap before disassembling fuel tank from strap and saddle. Otherwise fuel tank decals will require replacement.

NOTE

Inspection routines are the same for these engines as for previous direct drive models. Follow general instructions in this manual for inspection of seals, bearings and castings.

9—3.3 Starter and Ignition

1. Remove the four large hex head screws which hold the F-M starter adapter to the air shroud. Lift starter assembly and adapter from engine.
2. For F-M starter disassembly and inspection, see Section 5—5.
3. Unless an impact wrench is available for removing the shaft lock nut, block the shaft from turning, then remove the hex nut, lockwasher, 7/16″ flat washer, and the starter cup and screen assembly.
4. Use correct puller (see Section 10) to pull magneto rotor.
5. Disconnect "Sparky," remove spark plug and the cylinder shield.
6. Remove six screws and lift back plate and air shroud with back plate gasket, off the engine.
7. If necessary, use correct tool (see Section 10) to remove the back plate bearing and seals. Work carefully from the magneto side.

9—3.4 Engine Disassembly

1. Remove four 1/4-28 hex nuts and washers and lift the cylinder, with gasket, off the engine studs.
2. Use Allen wrench to remove the two cap screws from connecting rod. Remove piston and connecting rod assembly, including the connecting rod cap and the needle rollers. Be sure to recover all 27 of the rollers.
3. Remove the two main bearing retaining screws and lockwashers. Press or tap the crankshaft from the crankcase. Remove crankcase sealing gasket.

9—4 ASSEMBLY — DIRECT DRIVE SAWS WITH ONE-PIECE CRANKCASE AND SEPARATE DRIVE PLATE

BUZ-500 Series

9—4.1 Engine Assembly

1. Use jackscrew to pull main bearing onto crankshaft (see Section 10). Install snap ring on crankshaft.
2. Oil and install crankcase sealing gasket in main bearing bore.
3. Use jackscrew to pull crankshaft and bearing into crankcase (see Section 10).
4. Install the two main bearing retaining screws and lock washers.
5. Assemble piston and connecting rod to crankshaft. Use heavy grease to retain needles on bearing surface (14 on cap, 13 on rod) and use Allen wrench (see Section 10) to install new cap screws.
6. Oil piston rings and cylinder walls, compress rings, and slide gasket and cylinder over piston. Fasten cylinder to crankcase with four nuts and lockwashers.
7. Install spark plug and gasket in cylinder.

9—4.2 Starter and Ignition Assembly

1. Install back plate gasket and back plate and air shroud assembly on crankcase.
2. Assemble cylinder shield to air shroud and fasten "Sparky" to spark plug.
3. Install magneto rotor on crankshaft.
4. Install starter cup and screen and fasten with washers and nut. Block rotor from turning and tighten nut securely.
5. Assemble starter adapter ring and starter to air shroud.

9—4.3 Fuel System Assembly

1. Assemble carburetor and reed valve assembly to crankcase.
2. BUZ MODELS:
   a. Assemble oil pump, trigger and pistol grip to angle bracket with screw, nut and lockwasher.
   b. Fasten angle bracket assembly (above) and fuel tank mounting saddle to crankcase with two screws.
   c. Install fuel tank.
   d. Connect fuel and oil lines.
   e. Install drive plate and handle bar and fasten pistol grip to drive plate.
3. 500 MODELS:
   a. Assemble throttle trigger and oil pump to fuel tank mounting saddle.
   b. Fasten fuel tank mounting saddle to crankcase studs with nuts and lockwashers.
   c. Install fuel tank.
   d. Connect fuel and oil lines.
   e. Install pistol grip on saddle.
   f. Install drive plate and handle bar on crankcase and connect pistol grip to drive plate.
   g. Install rear guard.
4. Install oil line adapter and guide bar mounting pad on drive plate.
5. Install inner thrust washer, clutch drum and sprocket, bearing race, outer thrust washer, clutch spider, and clutch cover. Fasten with Flex-loc nut and clutch-retaining washer.
6. Install chain guard.
7. Install inner guide bar shim, guide bar and chain, outer guide bar shim, and chain tension device. Fasten with two nuts and lockwashers.

9—5 DISASSEMBLY — DIRECT DRIVE SAWS WITH INTEGRAL CRANKCASE-DRIVE CASE AND WITH BOTTOM-MOUNTED FUEL TANK

9-23, 900D

9—5.1 Drive Plate

1. Remove chain guard, outer guide bar plate, guide bar, chain, and inner guide bar plate. Remove spiked bumper plate.
2. Remove clutch-retaining nut and washer, and clutch cover. Remove clutch spider assembly — use clutch spider puller (see Section 10) if spider is tight on shaft.
3. Remove clutch drum and sprocket and inner race.

9—5.2 Fuel System

1. Remove handle bar mounting plate and handle bar.
2. Unscrew captive wing nut holding cylinder shroud to air filter case and remove cylinder shroud.
3. Remove screws holding throttle handle assembly to crankcase and fuel tank. Lift throttle handle assembly and air cleaner off saw.
4. Remove carburetor and reed adapter from crankcase (first remove governor rod on governor model saws).
5. Remove four screws holding fuel tank to crankcase, detach chain oil fitting, and pull fuel line off. Remove fuel tank from engine.

9—5.3 Ball Drive Starter

1. Pry starter pulley cover off and remove starter cord.
2. Remove four fillister head screws and lift off pulley and plastic shim or shims.
3. Remove screws holding screen and bracket. (Long screw goes through bracket, short screws go through screen only.) Lift off screen and bracket with recoil spring and cover.
4. Lock rotor (or use impact wrench). Remove nut, lockwasher, flat washer, and thrust washer.
5. Remove three 1/4-20 flat head screws and countersunk washers. On starters equipped with plastic sealing cups, the hole in the cup is designed to provide access to these screws for service.
6. Lift off ratchet and hub assembly and remove two inner races and thrust washers. Put inner races back into ratchet to protect bearings.

9—5.4 Ignition System

1. Remove cylinder shield and spark plug cover.
2. Disconnect ignition switch lead and remove air shroud.
3. Use correct puller (see Section 10) to remove magneto rotor.
4. Disconnect high-tension lead and remove spark plug and gasket.
5. Disconnect governor and remove back plate and gasket from crankcase.

9—5.5 Engine

1. Remove muffler body, shield and cap assembly from muffler adapter (held by two nuts and lockwashers).
2. Remove muffler adapter from cylinder (held by four screws).
3. Disconnect chain oil fitting from crankcase.

4. Remove the four hex nuts and washers and lift the cylinder and gasket (and sawdust shield on Model 900D) off the crankcase.
5. Use correct Allen wrench (see Section 10) to remove connecting rod screws. Be sure to recover all 31 needle rollers.
6. Remove two main bearing retaining screws and lockwashers.
7. Press or tap crankshaft and main bearing from crankcase. Remove crankcase sealing gasket.

9—6 ASSEMBLY — DIRECT DRIVE SAWS WITH INTEGRAL CRANKCASE-DRIVE CASE AND WITH BOTTOM-MOUNTED FUEL TANK

9-23, 900D

9—6.1 Engine

1. Oil and insert crankcase sealing gasket, then use jackscrew (see Section 10) to pull crankshaft and main bearing into crankcase. Insert main bearing retaining screws and lockwashers.
2. Assemble piston and connecting rod to crankshaft. Be sure all 31 needles are in place.
3. Assemble cylinder gasket and cylinder (and sawdust shield on Model 900D) to crankcase.
4. Connect chain oil fitting to crankcase.
5. Assemble muffler adapter, body, shield, and cap to cylinder.

9—6.2 Ignition

1. Assemble back plate and gasket to crankcase.
2. Install spark plug and gasket in cylinder and connect "Sparky" terminal to spark plug.
3. Install magneto rotor on crankshaft taper.
4. Assemble air shroud to back plate and connect stop switch lead.
5. Install cylinder shield and spark plug cover.

9—6.3 Ball Drive Starter

1. Put steel thrust washers and inner races from ball drive on shaft — slide ratchet and hub assembly (with formica washer) on shaft over inner races. Put remaining steel thrust washer, flat aluminum washer, lockwasher and nut on crankshaft — lock the rotor (or use the impact wrench) and tighten the shaft nut completely.
2. Fasten the ball drive assembly to the rotor with the three countersunk lockwashers and large flat head screws.
3. Assemble air screen and bracket (with recoil spring) to air shroud.
4. Add shim or shims for 1/32" minimum clearance between starter pulley and spring housing. Fasten pulley to ball drive hub with four fillister head screws.
5. Wind starting rope counterclockwise onto pulley; wind two more turns on pulley to set proper recoil spring tension and push pulley cover onto air screen.

9—6.4 Fuel System

1. Assemble fuel tank to crankcase and connect chain oil line to fuel tank.
2. Assemble gasket and carburetor and reed adapter assembly to crankcase and attach fuel line: connect governor rod on governor-equipped models.
3. Assemble throttle handle and air filter assembly to fuel tank and crankcase.
4. Fasten cylinder shroud to air filter case with captive nut.

9—6.5 Drive Plate

1. Assemble inner thrust washer, inner race, clutch drum and sprocket, and outer thrust washer on crankshaft.
2. Align keyways in clutch spider with keys in crankshaft and push spider onto crankshaft.
3. Slip clutch cover and clutch retaining washer onto crankshaft and fasten with lock nut.
4. Fasten spiked bumper to crankcase.
5. Install inner guide bar plate, guide bar and chain, outer guide bar plate, and drive case cover. Secure with two hex nuts and lockwashers.

9—7 DISASSEMBLY — TWO-GEAR SAWS WITH INTEGRAL CRANKCASE-GEARCASE

17, 5-20, 6-22, 700G, WIZ, 4-20, etc.

9—7.1 Remove Chain and Bar

1. Remove nuts and washers. Relieve chain tension, lift off adjusting plate and remove outer guide bar plate, guide bar, and inner plate.

9—7.2 Remove Pistol Grip

1. Remove three screws on right side of grip, and one screw holding carburetor guard to air shroud. Depress throttle trigger and lift pistol grip and carburetor guard off unit.

9—7.3 Remove Fuel Tank

1. Remove the two screws, elbow-to-carburetor.
2. Disconnect chain oil line at fuel tank.
3. Remove one screw, fuel tank-to-gearcase.
4. If unit has H or HP carburetor with brass fuel lines:
   a. Close fuel shut-off valve and disconnect the fuel line at the valve connection.
   b. Remove the pressure line, carburetor-to-crankcase.
   c. Loosen two hex head screws at base of tank and lift fuel tank off unit.
5. If unit has (HL, CS or CP) carburetor with flexible fuel line:
   a. Close fuel shut-off valve. (If unit such as WIZ has no fuel shut-off valve, keep fuel tank outlet uppermost.) If fuel line is held to the gearcase cover by one of the cover screws and a nylon clip, remove screw and clip. Remove fuel line.
   b. If the bottom of the fuel tank is held to the crankcase with hex head screws, loosen the screws; if held with crankcase studs and hex nuts, loosen the hex nuts. Lift fuel tank from engine.

9—7.4 Remove Ball Drive Type Starter

1. Remove pulley cover.
2. Remove starting cord.
3. Remove pulley and plastic shims.
4. Remove screws holding air screen and bracket and handle bar bracket to air shroud. If handle bar is not to be removed, twist handle bar brace (if unit has one) to one side.
5. Remove handle bar, clamp, and rubber cushion. Lift air screen and bracket assembly, containing recoil spring, off the air shroud.
6. Remove shaft nut with impact wrench. Remove three large pan head screws (or flat head screws and counter-sunk lockwasher) — lift ball drive assembly off shaft. If the inner races stayed on the shaft, remove them and insert them in the ball drive to protect the bearings.

9—7.5 Remove F-M Type Starter

1. Remove four screws, starter pulley cover-to-starter adapter. Lift complete starter pulley assembly off adapter. (To disassemble pulley assembly, see Section 5—5.) Remove starter adapter from air shroud if necessary.
2. Remove crankshaft nut with impact wrench. Remove the lockwasher and flat washer and lift the starter cup and screen assembly off the crankshaft.

9—7.6 Disassemble Ignition

1. Use Puller #AA-22810 to pull rotor from crankshaft.
2. Remove cylinder shield; pull "Sparky" connector off the spark plug and remove spark plug and gasket.
3. IF UNIT HAS A GOVERNOR: Remove six screws and lift back plate and air shroud assembly just enough off the engine to facilitate disconnecting the governor spring from both the governor slide and the throttle stop lever. After unhooking governor spring at both ends, lift back plate and gasket off crankcase.
4. IF UNIT HAS NO GOVERNOR: Remove six screws and lift back plate and air shroud assembly, with back plate gasket, off the engine.
5. Disassembly of the magneto should be done in conjunction with inspection and test. (See Section 6.)
6. All service back plates come with factory-installed bearings and seals. When making bearing and seal replacements in the back plate, refer to Section 6—12 for type of installation, and to Section 10 for use of the special tools required.

9—7.7 Remove Carburetor and Reed Valve

1. Remove the three screws which hold the carburetor and reed valve assembly to the crankcase; remove the assembly and the adapter gasket.
2. Disassemble reed valve and carburetor only for cleaning and inspection. (See Section 4.)

9—7.8 Disassemble Gearcase

1. Drain gear oil.
2. Remove gearcase cover and gasket.
3. Block engine shaft or use an impact wrench; remove the flex-lock nut, clutch washer and clutch cover.
4. Pull the clutch spider assembly with Puller #A-23131.
5. Remove two clutch keys, thrust washer, clutch drum, bronze bushing and the remaining thrust washer.
6. Lock chain drive sprocket with Tool #22750; remove sprocket lock nut, outer washer, sprocket and keys, inner washer and sprocket spacer.
7. Press sprocket shaft out of shaft bore carefully. If an arbor press is not available, use a rawhide mallet.
8. Use #3 Pliers #22726 to remove the retaining ring from the sprocket shaft bearing bore.
9. If sprocket shaft bearings must be removed from the gearcase, refer to Section 7—5 for detailed disassembly and inspection instructions.

9—7.9 Disassemble Crankcase

1. Remove four nuts and lockwashers from cylinder studs; lift cylinder off engine; remove cylinder gasket.
2. Use Allen wrench to unscrew the two connecting rod cap screws. Remove the connecting rod and piston assembly from the crankshaft. Since new Allen screws should always be used for reassembly, discard the old screws. Be sure all 27 needle rollers have been recovered from the crankcase.
3. Remove the two main bearing-retaining screws and lockwashers. Press crankshaft from crankcase; if an arbor press is not available, knock the crankshaft out with a rawhide mallet.
4. Refer to Section 8—1.6 for type and number of seals in the crankcase, and the special tools required to change seals. See Section 10 for use of these tools.

9—8 ASSEMBLY — TWO-GEAR SAWS

17, 5-20, 6-22, 700G, WIZ, 4-20, etc.

9—8.1 Crankcase

1. Oil and install crankcase sealing gasket.
2. Pull main bearing and crankshaft assembly into crankcase. (See Section 10, Special Tools.)
3. Lock bearing and shaft assembly in crankcase with new lockwashers and retaining screws.
4. Assemble connecting rod and piston assembly to crankshaft. Use new set of 27 needle rollers and new Allen cap screws.
5. Assemble cylinder gasket and cylinder to crankcase.
6. Assemble heat damper on muffler assembly.

9—8.2 Gearcase

1. Install sprocket shaft and drive gear in gearcase. (See Transmission, Section 7, for notes and detailed instructions on installing sprocket bearing, shaft and gear components of either 3.57:1 or 2:1 gear ratio design.)
2. The four screws used to assemble the sprocket shaft and drive gear should be staked in place. (See Section 7.)
3. Put the small spacer and inner sprocket washer on the sprocket shaft and fit keys into the shaft keyways. (Tight fit.) Slide chain sprocket on shaft, over keys, and put outer washer on shaft over sprocket.
4. Use correct tool (see Section 10) to lock the sprocket, and tighten the flex-lock nut on the shaft.
5. Put thrust washer, bronze bearing, clutch drum assembly, and second thrust washer on crankshaft. Fit clutch keys into keyways. Assemble clutch spider and shoe assembly on shaft over the keys; add clutch cover, washer and nut. Lock rotor from turning — tighten the flex-lock nut.
6. Install gearcase cover and gasket to gearcase. Some covers are atached with screws, later covers are assembled with Flex-loc nuts on gearcase studs. Tighten Flex-loc nuts with a torque wrench using 35 to 40 inch pounds torque. Fill gearcase with gear oil as recommended in Section 3—5.

9—8.3 Ignition

1. If necessary to install new back plate bearing and seals, see tools for Phelon magneto-equipped 6-22 in Section 10.
2. If magneto was disassembled, see Phelon Service Hints, Section 6—11.
3. Assemble back plate gasket, the back plate, and air shroud to the crankcase.
4. Adjust contact point gap to .015″. (See Section 6.)
5. Install spark plug with gasket. (Spark plug gap must be .025″.)
6. Connect high-tension lead to spark plug and install cylinder shield over cylinder.
7. Start rotor onto crankshaft taper by hand.

9—8.4 Starter

1. Slide thrust washer, inner race, ball drive with formica washer, thrust washer, flat washer, lockwasher, and nut on the shaft.
2. Fasten ball drive to rotor with three pan head screws. (Rotate hub: make sure it is free.)
3. Lock rotor, and tighten the shaft nut securely.
4. Assemble air screen to air shroud; fasten rubber cushion, handle bar and clamp to engine; fasten handle bar brace to air screen.
5. Use shims for 1/32″ minimum clearance between spring housing and starter pulley; fasten pulley to ball drive hub.
6. Wind starter cord clockwise on pulley — use only two turns tension — fasten pulley cover to air screen.

9—8.5 Fuel

1. Connect governor arm to throttle stop lever. (See Figure 9—1 for correct hook-up position for particular model.) Hook governor arm spring to governor slide.
2. Fasten pyramid reed valve and carburetor assembly to crankcase.
3. Install fuel tank. Connect fuel line from pump inlet to shut-off valve. Remove one screw from gearcase cover and fasten fuel line to gearcase with nylon clip installed under this screw head.
4. Assemble pistol grip to unit.
5. Mount bar and chain on unit and adjust chain tension.

9—9 DISASSEMBLY — THREE-GEAR SAWS

9-26, 900G

9—9.1 Drive Case

1. Remove guide bar retaining nuts and lockwashers. Remove chain tension device, outer guide bar shim (Model 9-26 does not use outer guide bar shim), guide bar, chain, and inner guide bar shim.
2. Remove nut, outer sprocket spacer, outer sprocket flange, sprocket, inner sprocket flange, and inner sprocket spacer.
3. Remove handle bar and spiked bumper plate. Disconnect oil line adapter.

9—9.2 Fuel System

1. Unscrew captive wing nut and remove cylinder shroud.
2. Remove four 1/4-20 screws holding throttle handle assembly to crankcase and fuel tank. Lift throttle handle and air cleaner assembly off unit.
3. Remove four screws holding fuel tank to crankcase, detach chain oil fitting and fuel line, and remove fuel tank from engine.
4. Remove carburetor and reed adapter from crankcase (disconnect governor rod on governor-equipped models).

9—9.3 Ball Drive Starter

1. Pry starter pulley cover off and remove starter cord.
2. Remove four fillister head screws and lift off pulley and plastic shim or shims.
3. Remove screws holding screen and bracket. Lift off screen and bracket, with recoil spring and cover.
4. Lock rotor (or use impact wrench). Remove nut, lockwasher, flat aluminum washer, and thrust washer.
5. Remove the three 1/4-20 flat head screws and washers. On starters equipped with clear plastic sealing cups, the hole in the cup is designed to provide access to these three screws.
6. Lift off the ratchet and hub assembly and remove two inner races and thrust washers. Put inner races back into ratchet to protect needle bearings.

9—9.4 Ignition System

1. Remove cylinder shield and spark plug cover.
2. Disconnect ignition switch lead and remove air shroud.
3. Use correct puller (see Section 10) to remove magneto rotor.
4. Disconnect high-tension lead and remove spark plug and gasket.
5. Take out screws and remove back plate from crankcase.

9—9.5 Engine

1. Remove muffler shield, muffler body and cap, and muffler adapter.
2. Remove four nuts and lockwashers and lift cylinder (and sawdust shield on Model 900G) from crankcase.
3. Take out Allen cap screws and remove piston and connecting rod. Be sure to catch all 31 needle rollers.
4. Remove main bearing retaining screws and lockwashers.

9—9.6 Transmission

1. Drain gearcase and remove the 11 screws holding the gearcase cover to the crankcase. Pry the cover off, being careful not to damage the gasket. If the outboard sprocket bearing stays in the cover, and it is desired to remove the bearing for any reason, heat the outside of the cover directly opposite the bearing with a torch until the bearing falls out. Very little heat should be required (not enough to blister paint).
2. Remove lock nut, washer, and clutch cover. Use correct puller (see Section 10) to remove clutch spider, then remove keys, thrust washer, clutch drum and drive gear, inner race, and thrust washer.
3. Remove two retaining screws and lift idler gear assembly off.
4. Remove gearcase vent tube, then press sprocket shaft and drive gear from crankcase. Thread nut on end of shaft, or use a piece of soft metal between the press and the end of the shaft to avoid damaging the threads.
5. Remove snap-ring and use correct tool (see Section 10) to remove double row ball bearing from crankcase.
6. Remove handle bar mounting plate.
7. Press out crankshaft and main bearing.

9—10 ASSEMBLY — THREE-GEAR SAWS

9-26, 900G

9—10.1 Transmission

1. Oil and install a new crankcase sealing gasket, then use correct tools (see Section 10) to pull crankshaft and main bearing into crankcase.
2. Install two new main bearing retaining screws and lockwashers.
3. Install handle bar mounting plate.
4. Install double row ball bearing in crankcase (see Section 10 for proper tool). Put snap-ring in groove to secure bearing.
5. Use correct tools to install sprocket shaft and

drive gear assembly in crankcase (see Section 10). Install gearcase vent tube.
6. Install idler gear assembly in crankcase. Secure with two 1/4-20 screws.
7. Install thrust washer, inner race, clutch drum and drive gear, thrust washer, keys, clutch spider, clutch cover, washer, and lock nut.
8. Install gearcase cover and gasket. Fill with gear oil to proper level.

9—10.2 Engine

1. Install piston and connecting rod on crankshaft, holding the 31 rollers in place with heavy grease. Be sure connecting rod pivots freely on crankpin.
2. Assemble cylinder and gasket (and sawdust shield on Model 900G) to crankcase.
3. Install muffler adapter, muffler body and cap, and muffler shield on cylinder.
4. Install spark plug and gasket in cylinder.

9—10.3 Ignition System

1. Assemble back plate and gasket to crankcase. Connect "Sparky" to spark plug.
2. Install magneto rotor on crankshaft taper.
3. Install air shroud and connect lead to ignition switch.
4. Assemble cylinder shield and spark plug cover to air shroud.

9—10.4 Ball Drive Starter

1. Install thrust washer and ball drive on crankshaft. Fasten ball drive to magneto rotor with three 1/4-20 flat head screws and tapered lockwashers. Now assemble thrust washer, aluminum washer, lockwasher, and nut on crankshaft. Lock rotor and tighten nut securely.
2. Assemble air screen and bracket, with recoil spring and cover, to air shroud. The long screw goes through the bracket, the short screws through the screen only.
3. Use plastic shim or shims to obtain at least 1/32" clearance between spring housing and starter pulley. Fasten pulley to ball drive hub with four fillister head screws and lockwashers.
4. Wind starter cord counter-clockwise on pulley — use only two turns tension. Fasten pulley cover to air screen.

9—10.5 Fuel System

1. Assemble carburetor, reed adapter, and spacer to crankcase. Connect governor rod (on governor-equipped models).
2. Install fuel tank on crankcase. Connect chain oil fitting and fuel line.
3. Fasten throttle handle and air cleaner assembly to crankcase and fuel tank with four 1/4-20 screws. Install cylinder shroud.

9—10.6 Drive Case

1. Connect oil line adapter and assemble spiked bumper and handle bar to engine.
2. Assemble sprocket spacer, inner sprocket cover, sprocket key, sprocket, outer sprocket cover, spacer, and lock nut to sprocket shaft.
3. Assemble inner guide bar shim, bar and chain, outer guide bar shim (on Model 900G), and chain tension device to engine. Secure with two nuts and lockwashers.

9—11 DISASSEMBLY — BELT DRIVE MODELS 26, 5-30, 7-29, 8-29

9—11.1 Remove Chain, Guide Bar, Adjusting Device, and Shim

9—11.2 Remove Fuel System — Models 5-30, 7-29, and 8-29 ONLY

1. Remove three hex nuts, one lockwasher, and long screw holding the carburetor guard and handle bar to drive case. Remove the carburetor guard.
2. Disconnect choke rod from choke lever, and loosen the set screw to free throttle wire from the throttle roller.
3. Remove two screws — air cleaner elbow to carburetor. Remove the two hex nuts holding pistol grip and fuel tank to crankcase. Remove pistol grip and air cleaner elbow with gasket, from the engine.
4. Disconnect oil line at fuel tank.
5. Close fuel shut-off valve. Disconnect fuel line at fuel tank.
6. Remove the screw — fuel tank to drive case. On early Model 5-30 saws with pressure tank, disconnect the pressure line at left side of tank. Lift fuel tank off unit.
7. Disconnect actuator line at carburetor. (Fuel pump-equipped models only.)
8. Remove the two manifold screws and lockwashers, and lift the carburetor and manifold assembly, with manifold gasket, off the engine.

9—11.3 Remove Fuel System, Throttle Handle and Bracket Assembly—Model 26LCS ONLY

1. Disconnect left hand throttle rod.
2. Close fuel shut-off valve and disconnect flexible fuel line at tank.
3. Remove the flexible idle line between carburetor and carburetor swivel flange.
4. Remove screw and lockwasher holding carburetor guard to drive case.
5. Remove the two screws holding swivel handle bracket and fuel tank to crankcase. Remove

carburetor guard and swivel flange. Remove handle and bracket assembly with carburetor guard attached.

6. Remove muffler assembly, held by three nuts and lockwashers. Remove manifold and gasket from engine.
7. Remove screws through the two lugs on the left side of fuel tank and lift off tank.

9—11.4 Disassemble Drive Case — Belt Drive Models

1. Remove the handle bar.
2. Remove the dust guard. (5-30, 7-29, and 8-29 only.)
3. Remove drive case cover and gasket.
4. Block shaft from turning, and remove clutch lock nut, flat washer and clutch cover.
5. Pull clutch spider assembly with the two inside screws of Puller #AA-22803. Remove two clutch keys.

> **NOTE**
>
> *When pulling clutch sprocket and drum assembly, turn the sprocket pulley continuously through at least four turns, so the drive belt will work itself off the pulley gradually.*

6. Use the two outside screws of Puller #AA-22803 to pull the clutch drum. (See above note.) Remove the drive belt.
7. Remove three screws and lockwashers (near crankcase). Free the drive case from the crankcase by tapping it lightly, and lift it off the unit.
8. Lock the chain drive sprocket with sprocket locking Tool #22750. Remove chain drive sprocket as follows:
   a. On 5-30, 7-29, and 8-29, remove flex-lock nut, sprocket spacer, outer flange, sprocket and two keys, inner flange and the remaining spacer.
   b. On Model 26, remove shaft lock nut, slipper sprocket assembly and one key, and sprocket spacer.
9. Tap the sprocket shaft and pulley assembly from drive case with a rawhide mallet.
10. Use #3 Snap-ring Pliers #22726 to remove sprocket bearing retaining ring.
11. Use Tool #22692 from ignition side to push out sprocket bearings and spacer. If an arbor press is used, block hub of bearing bore carefully to avoid cracking drive case.

9—11.5 Disassemble Starter — Belt Drive Models

1. Remove starter pulley cover and starting cord.
2. Remove the starter pulley with pin and plastic shims.
3. Remove four screws holding air screen to shroud. Lift the screen and bracket assembly off the unit.
4. Hold rotor from turning. Remove lock nut, lockwasher, flat washer and thrust washer from crankshaft.
5. Remove the three flat head screws and countersunk lockwashers from the ball retainer, and remove ball drive assembly, with formica washer, from the unit. If the inner races stayed on the shaft, remove and insert them in the ball drive to protect the bearings. Remove the remaining thrust washer.

9—11.6 Remove Ignition — Belt Drive Models

1. Remove cylinder shield, disconnect high-tension lead from spark-plug terminal, and remove spark plug from engine.
2. Use Puller #AA-22560 to pull rotor from crankshaft.
3. Remove the spring washer and rotor key.
4. Remove lead clamp on rear of back plate. Disconnect ground lead from starting switch terminal. Pull the high-tension and ground leads through the grommeted hole in the back plate. Remove the rotor, cam and key. Remove the stator group, held by two screws and lockwashers.
5. Remove the remaining screw holding the back plate to the crankcase. Lift air shroud and back plate assembly off the unit.

9—12 ASSEMBLY — BELT DRIVE MODELS
26, 5-30, 7-29, 8-29

9—12.1 Crankcase

1. Oil and install crankcase sealing gasket in rear half crankcase.
2. Assemble main bearing and crankshaft in rear half crankcase. (See Section 10, Special Tools.)
3. Fasten main bearing in place with lockwashers and retaining screws.
4. Assemble connecting rod and piston assembly to crankshaft.
5. Put governor on crankshaft.
6. Install wear plate in front half crankcase.
7. Assemble front half and rear half crankcase.
8. Fasten the cylinder gasket and cylinder to the crankcase.
9. Install spark plug gasket and spark plug.
10. Assemble muffler and heat damper to cylinder.

9—12.2 Drive Case

1. Assemble drive case to crankcase.
2. Install sprocket shaft bearing, spacers, second bearing, and retaining ring in drive case.
3. Assemble sprocket shaft to sprocket pulley.
4. Press sprocket shaft and pulley into drive case.
5. Assemble spacer, flange washer, two keys, sprocket, second flange washer, and nut on sprocket shaft.
6. Assemble spacer and bearings in clutch drum.
7. Place clutch drum on crankshaft; at the same time feed drive belt onto pulley and clutch sprocket.
8. Place keys in shaft keyways, assemble clutch, clutch cover, washer and nut on shaft.
9. Fasten drive case cover gasket and cover to drive case.

9—12.3 Ignition

1. Assemble back plate and air shroud to crankcase.
2. Fasten stator plate to back plate.
3. Connect ground lead to switch.
4. Connect high-tension lead to spark plug.
5. Install cam key, cam, rotor key, spring washer and rotor on crankshaft.
6. Install thrust washer, inner races, ball drive, thrust washer, flat washer, lockwasher and nut on crankshaft.
7. Fasten air screen to air shroud.
8. Assemble handle bar to unit and fasten handle bar bracket assembly to screen.
9. Assemble starter pulley, starting cord, and pulley cover.
10. Install cylinder shield on unit.

9—12.4 Fuel System

1. Fasten fuel tank to air shroud and drive case, oil line from tank to drive case.
2. Assemble dust guard to crankcase and drive case. (5-30 and 7-29 only.)
3. Assemble intake manifold and carburetor to crankcase, pump activator line to crankcase, fuel line to carburetor.
4. Fasten pistol grip to crankcase, choke rod and throttle shaft to carburetor. (On 26LCS assemble carburetor, swivel bracket and swivel handle.)
5. Fasten carburetor guard to crankcase and drive case.

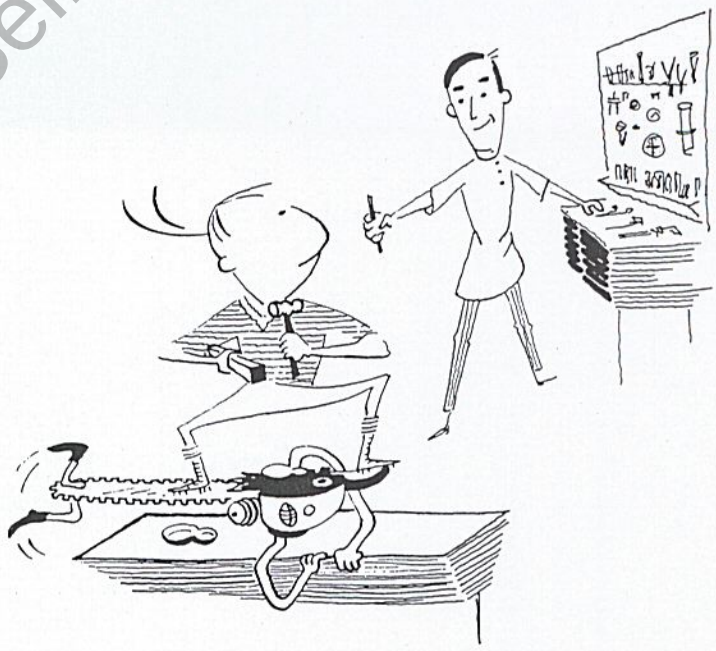
9—12.5 Bar and Chain

1. Assemble guide bar and chain.
2. Adjust tension of chain on bar.

Section 10

SPECIAL TOOLS & INSTRUMENTS

INDEX



Sections 10—1, 10—2, and 10—3 list various shop fixtures, hand tools and test instruments as a guide to the Dealer in equipping his service department for efficient, profitable operation. Although purchase of all this equipment is not necessary, the service-minded Dealer will want to keep most of it on hand to utilize his mechanics' time to the fullest extent.

10—1 RECOMMENDED SHOP FIXTURES

Work Bench and Vise (with brass jaws)
Arbor Press (small)
Grinder and Wire Wheel
Power Arm*
Compressor and Air Hose
Cleaning Tank
Parts Bins (36″ x 12″ x 6′ high)*
Parts Drawers (for above bins)
Special Saw Tool Board (min. equipt. kit)
Chain Sharpening Vise
Chain Breaker and Anvils
Fastening Parts Drawers or Cabinet
Heli-Coil Thread Repair Kit (#A-23523)

10—2 RECOMMENDED TEST EQUIPMENT

Torque Wrench
Coil and Condenser Tester*
Tachometer
Compression Tester*
Engine Test Equipment
Ohmmeter (optional)
Carburetor Tester*

10—3 RECOMMENDED HAND TOOLS

Drills
- 3/8″ Electric Drill
- Set of Drills

Gauges
- Set of Feeler Gauges—.001″ to .025″

Hammers
- Ball Peen
- Rawhide Mallet

Pliers
- 6″ Combination
- 6″ Long Nose
- Vise Grip Pliers
- 6″ Diagonal Cutter

Punches
- 1/4″ Pin Punch
- Center Punch
- 5/8″ Chisel

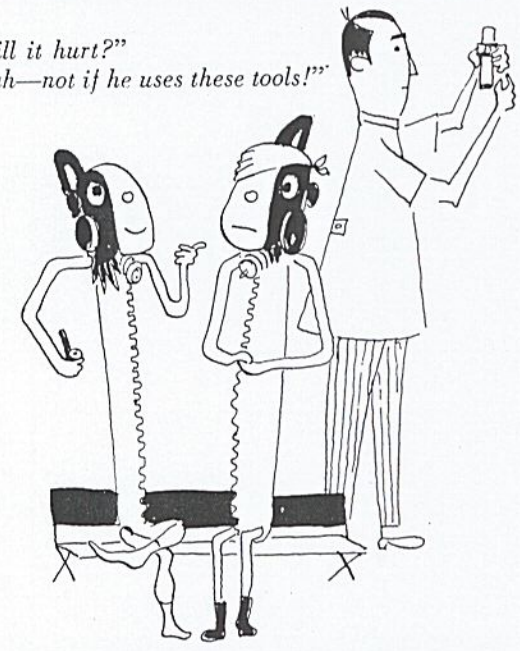
Screw Drivers
- Offset
- 5″ Screw Driver
- Screw Driver Set (3″, 6″, 7″, 10″, and 12″)
- 6″ Thin Blade x 3/16″ Dia.
- 3″ Thin Blade x 3/16″ Dia.

Taps:
- Tap Handle
- Tap Sizes: 6-32, 8-32, 10-32; 7/32-32, 1/4-32, 5/16-32, 1/4-20, 5/16-18, 1/8″ (pipe)

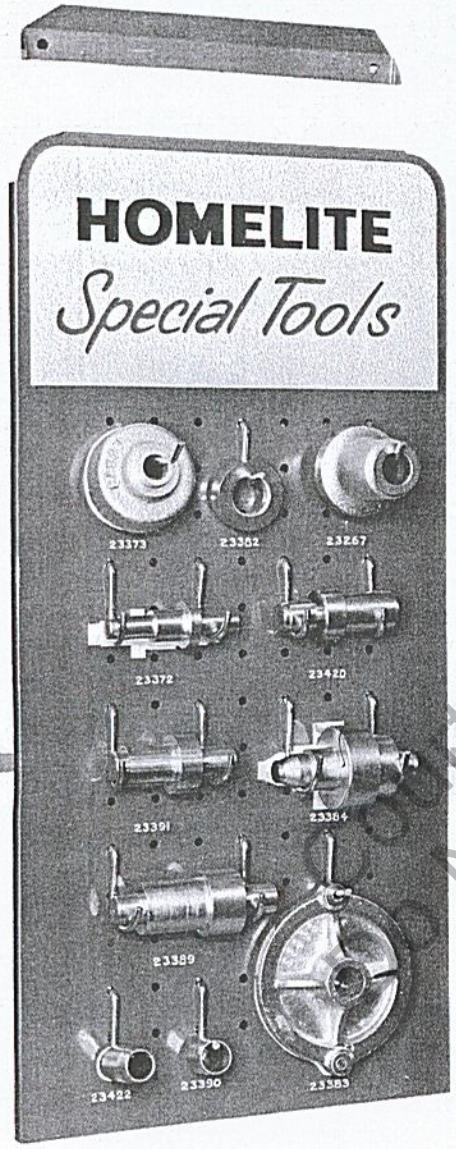
Wrenches
- Open End—Box (short handle) Sizes: 5/16″ (2), 3/8″, 7/16″ (2), 1/2″, 9/16″, 5/8″, 3/4″ and 7/8″
- Adjustable 6″ Wrench
- Socket Wrench Set—3/8″ Drive: Ratchet w/3″ and 6″ Extensions (universal) 3/8″ Drive Socket Sizes: 5/16″ (thin wall) Deep, 3/8″, 7/16″, 1/2″, 9/16″, 5/8″, 3/4″, 7/8″, 13/16″.
- Set of Allen Wrenches

Piston Ring Expander*
Piston Ring Compressor
Hack Saw
Set of "EZ-Outs"
Main Bearing Puller*

*Available from: Burco Chain Saw Specialties
Box 27 Brandywine Station
Schenectady 4, New York

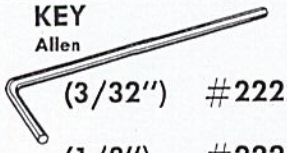
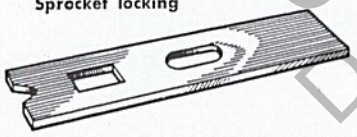
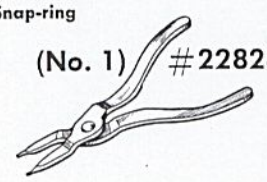


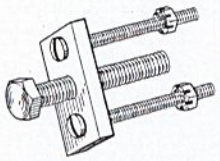
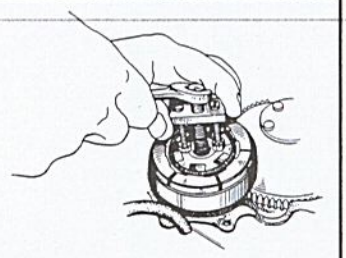
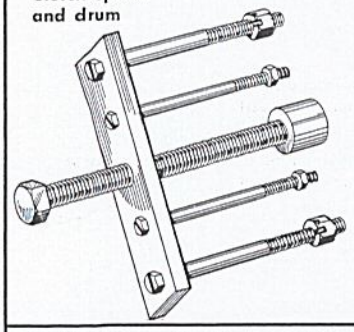
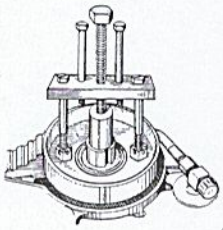
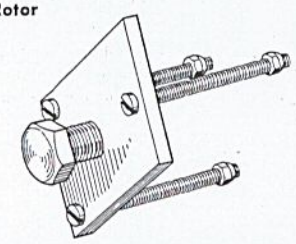
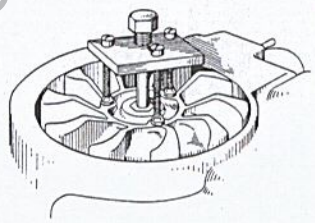
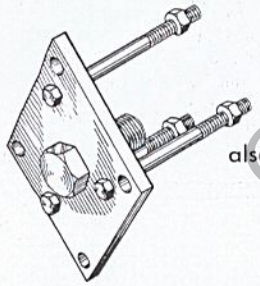
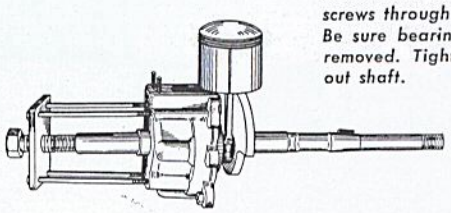
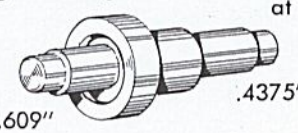
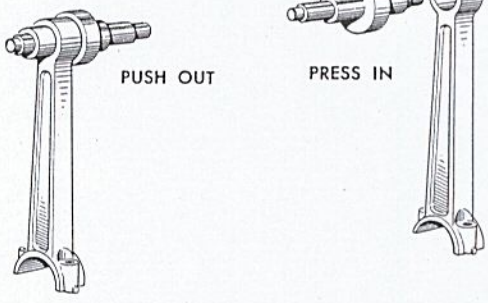
Tool Board
w/hangers (large)
21" high x 29" wide
— #A-23545

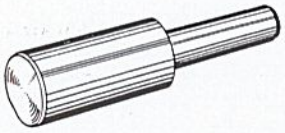
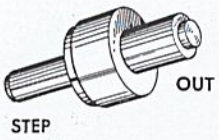
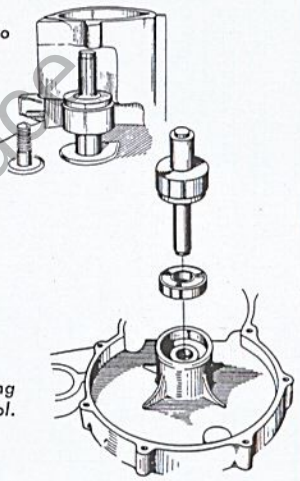
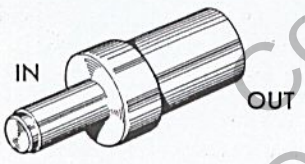
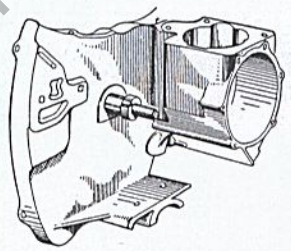
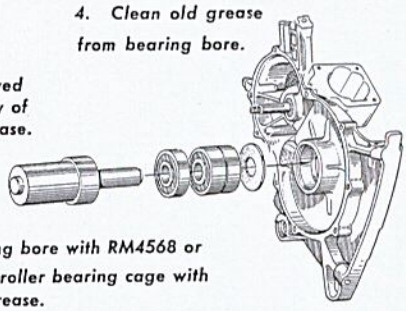


Tool Board
w/hangers (small)
21" high x 10" wide
— #A-23546

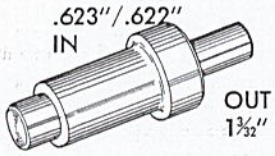
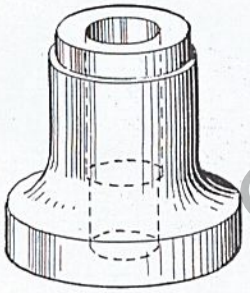
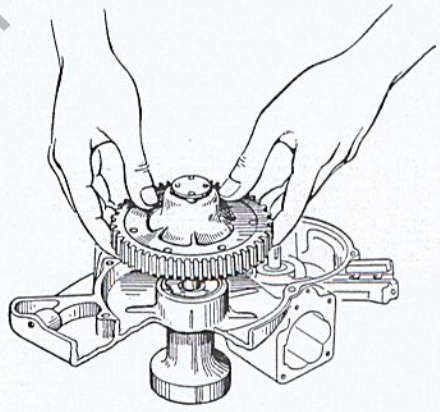
Section 10-4 illustrates and describes the use of the Special Service Tools. Manufactured by Homelite, these tools are necessary for the efficient repair of Homelite Chain Saws. Each dealer should equip his shop with all the special tools required for servicing the type saws he sells in his area or may be asked to repair.

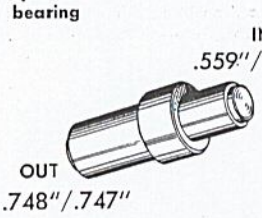
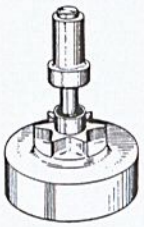
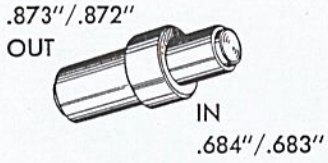
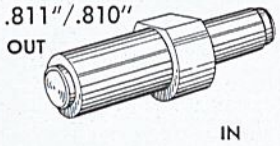
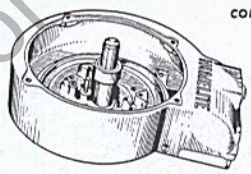
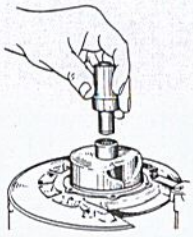
Tool Name & Part No.	Where—How Used	Procedure
ADAPTER #AA-22224 Ball drive 	**ALL BALL DRIVE STARTERS** Adapts torque wrench to ball drive.	*TO CHECK TORQUE* *1. Remove two opposing screws in starter pulley. Fit adapter into screw holes. Block shaft from turning.* *2. Place torque wrench on the ¾" drive of adapter and exert steadily increasing pressure on wrench until the ball drive slips. Reading on dial indicates torque at which slipping occurs.*
KEY Allen  (3/32") #22221 (1/8") #22220 (9/64") #23528 (5/32") #22126 (7/32") #22965	**ALL BALL DRIVE STARTERS** Ball drive tension screw adjustment. #8-32 Conn. rod cap screws with 1/8" socket heads. #8-32 Conn. rod cap screws with 9/64" socket heads. #10-32 Conn. rod cap screws with 5/32" socket heads. **BRUSHCUTTER** Cap screws in handlebar bracket, upper and lower heads.	
PLASTIC GAUGE  (.015") #22486  (.020") #22969	Setting .015" contact point gap on Wico or Phelon magnetos. Setting .020" contact point gap.	*TO SET CONTACT POINT GAP* *1. Turn shaft until cam-follower rests on highest point of cam surface (just past breaking edge).* *2. Loosen fixed contact plate fastening screw. Insert correct thickness plastic gauge between points.* *3. Move fixed contact plate until points are snug around gauge, then tighten screw.* *4. Check gap with same gauge. Tightening screw sometimes changes setting.*
TOOL #22750 Sprocket locking 	Locks sprocket on all saws except direct drive models.	
PLIERS Snap-ring (No. 1) #22828  (No. 3) #22726	Piston pin retaining ring. **ALL SAWS EXCEPT DIRECT DRIVES** Compress sprocket shaft bearing ret. ring for ass'y or disass'y.	

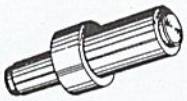
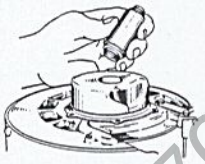
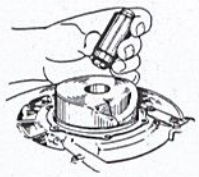
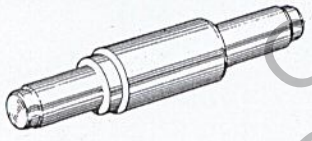
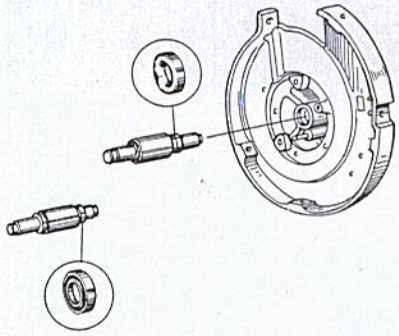
Tool Name & Part No.	Where—How Used	Procedure
PULLER #A-23131 Clutch spider 	**ALL SAWS EXCEPT BELT DRIVE MODELS** Pulls clutch spider and clutch drum.	*1. Thread the puller screws into the two holes in spider to depth of lock nuts (so puller bar is parallel to spider).* *2. Tighten jackscrew to pull spider from shaft.* 
PULLER #AA-22803 Clutch spider and drum 	**BELT DRIVE SAWS** Pulls clutch spider and clutch drum.	 *1. Pull spider as shown above (right). Use two inside screws of puller.* *2. Use outside screws through holes in drum. Tighten jackscrew to pull clutch drum.*
PULLER #AA-22810 Rotor 	**ROTORS WITH 10-32 TAPPED HOLES** Pulls rotor from tapered front end of shaft.	*1. Thread screws to equal depth in rotor so puller plate is perpendicular to shaft.* *2. Block rotor from turning. Be careful not to damage magneto leads. Tighten jackscrew to pull rotor.* 
PULLER #AA-22560 	**ROTORS WITH ¼-20 TAPPED HOLES** Pulls rotor from tapered front end of shaft. also on **BELT DRIVE SAWS** Pushes crankshaft from rear half crankcase.	*1. TO PULL ROTOR use three screws of puller same as shown above.* *2. TO PUSH CRANKSHAFT FROM REAR HALF use four 3¼" x ¼—20 screws through outer holes of rear half. Be sure bearing retaining screws are removed. Tighten jackscrew to push out shaft.* 
TOOL #23234 Bearing Assembling  .611"/.609" .4375"/.4370" **THREE GEAR SAWS** **TOOL #23372** OUT .674"/.672" IN .500"/.495"	Remove or install needle bearing at wrist pin.	 PUSH OUT PRESS IN

Tool Name & Part No.	Where—How Used	Procedure
REMOVER #22692 	**BELT DRIVE SAWS** Removes sprocket shaft bearings and spacer. Assembles small, then large sprocket shaft bearing.	1. *TO REMOVE (after removing retaining ring) use remover from starter side to push bearing and spacers from sprocket shaft bore. Block drive case carefully around bore to prevent breaking.* 2. *TO ASSEMBLE slide small bearing onto shaft of remover and press bearing into drive case. Drop spacer into drive case. Then use remover in same manner to press large bearing into drive case.*
TOOL #22833 	**TWO-GEAR SAWS** With double-step sprocket shaft. Press out sprocket shaft bearings and spacers, also press in small, then the large sprocket shaft bearing.	1. *Use large end from sprocket side to push bearings and spacers from sprocket shaft bore (after removing snap-ring).* 2. *ASSEMBLE SMALL BEARING—use stepped end of tool to push small bearing in from gear side.* 3. *ASSEMBLE LARGE BEARING—drop in spacers, then push large bearing into shaft bore with stepped end of tool.* 
TOOL #23228 **Sprocket Shaft Bearing** 	**TWO-GEAR SAWS** With single-step sprocket shaft. Disassemble or assemble either one sprocket, shaft bearing (double ball) or bearings (roller and single ball).	*Disassembly:* 1. *Remove chain sprocket; drive the shaft and gear assembly out of bearings.* 2. *Remove snap-ring with pliers #22726.* 3. *Use 1⅛" diameter end of tool #23228 to press old bearings from gear case.* 4. *Clean old grease from bearing bore.*  **NOTE** *Back plate must be removed from unit during assembly of sprocket shaft into gear case.*  *Assembly:* 1. *Fill groove in bearing bore with RM4568 or Lubriplate grease; pack roller bearing cage with RM4568 or Lubriplate grease.* 2. *Slide ball bearing; completely assembled and greased roller bearing, and NEW formica washer onto small end of tool #23228. Press these parts into the bearing bore, remove tool #23228 and install snap-ring in groove.* 3. *Support gear case on Anvil #23267 and press sprocket shaft and gear assembly into bearings.*

NOTE: In all cases where jackscrew butts against the crankshaft, screw shaft nut back on to protect end of shaft while using tool.

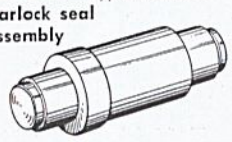
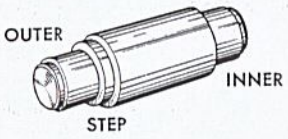
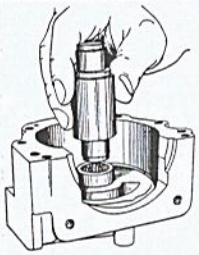
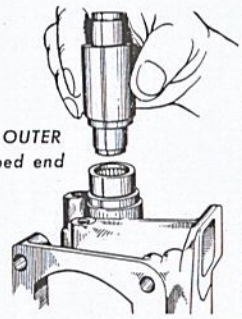
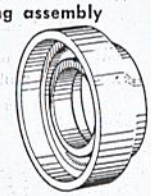
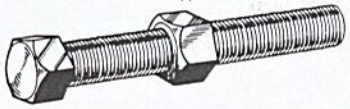
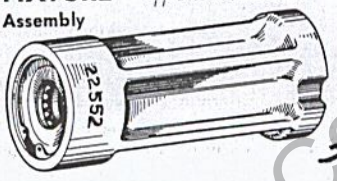
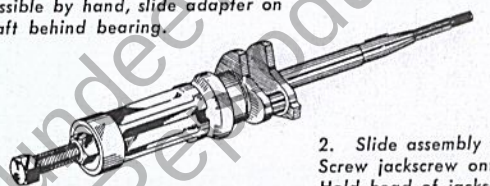
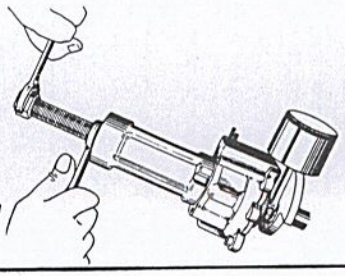
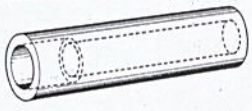
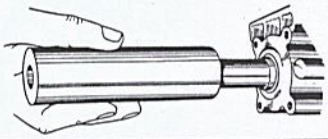
Tool Name & Part No.	Where—How Used	Procedure
TOOL #23389 Sprocket shaft bearing  **SLEEVE #23390** Garlock seal assembling 	**THREE-GEAR SAWS** Disassemble and assemble double-ball bearing and Garlock seal in sprocket shaft bore. Also use seal protecting sleeve.	1. *Press out bearing and seal from ignition side of bearing bore with stepped end of tool #23389.* 2. *Put sleeve #23390 beveled-end-out on unstepped end of tool #23389. Slide Garlock seal open-end-out onto sleeve. Press seal carefully into ignition side of bearing bore.* 3. *Slide lettered end of double-ball bearing on unstepped end of tool #23389. Press bearing carefully into transmission side of bearing bore.*
ANVIL #23267 	Support gear case when installing sprocket shaft and gear assembly.	 *CAUTION* *Do not attempt shaft installation without using Anvil 23267. Proper use of this tool keeps the inner race of the roller bearing from breaking the formica washer. After installation, always check formica washer for damage.*

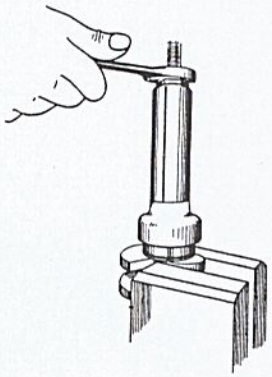
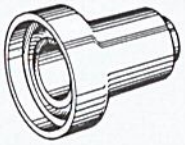
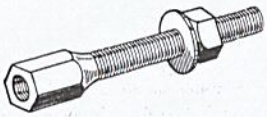
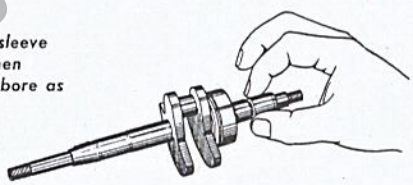
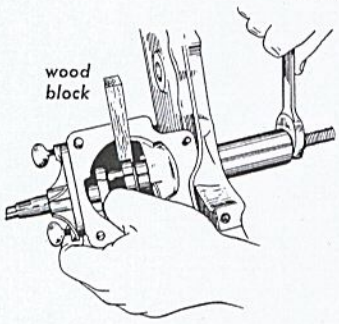
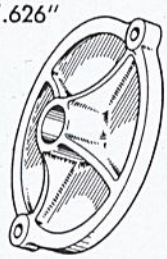
Tool Name & Part No.	Where—How Used	Procedure
TOOL #23139 Sprocket bearing  	**DIRECT DRIVE SAWS** Small I.D. bearing #55664 Press sprocket bearing in or out of drive sprocket.	1. *TO PUSH OUT use large end of tool.* 2. *TO PUSH IN use small end, as shown, to push bearing into sprocket bore.* 
NOTE: When assembling bearings always push against the lettered end of bearing—never against the plain end.		
TOOL #23420 Sprocket bearing  	**DIRECT DRIVE SAWS** Large I.D. bearing #56230 Press sprocket bearing in or out of drive sprocket.	1. *To PUSH OUT use large end of tool.* 2. *To PUSH IN use small end of tool.*
TOOL #22831 Bearing assembly  	Press out back plate bearing and seals or crankcase seals, also press bearing into back plate (after assembling seals).	1. *TO PUSH OUT BACK PLATE BEARING use large end of tool from magneto side. (On wico magneto, have flat side of tool aligned with boss for contact plate pivot post.)*  2. *TO PUSH OUT SEALS FROM CRANKCASE use large end of tool from clutch side.* 3. *TO PUSH NEW BEARING INTO BACK PLATE use small end of tool from the engine side. (Caution: first use tool #22830 to install both garlock seals).*  ***CAUTION*** *First use correct tool (#22830 or #22830-A) to install Garlock seals.*

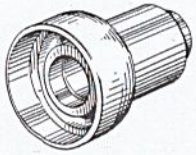
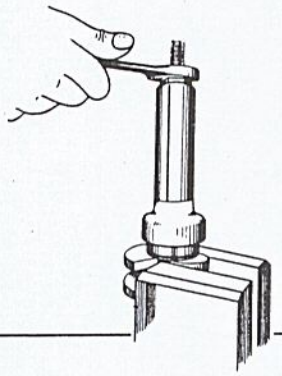
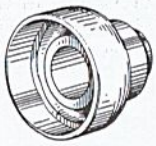
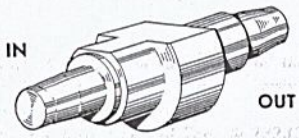
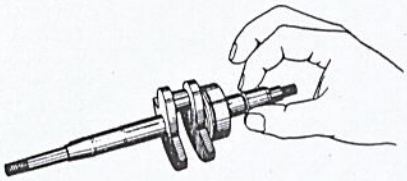
Tool Name & Part No.	Where—How Used	Procedure
TOOL #23391 **Bearing assembly** .6876"/.6873" I.D. needle bearing OUT  IN	Press out backplate bearing and seal. Also disassemble Garlock Seal. **NOTE** Use tool #23233 to assemble Garlock seal.	*1. To PUSH OUT use large end of tool.* *2. To PUSH IN use small end of tool.*
TOOL #22830 **Garlock seal assembly** NARROW STEP  WIDE STEP	Press first seal into crankcase or back plate, For backplate with Wico magneto or Phelon magneto with Siamese coil. also press second seal into crankcase or back plate. See note.	 *FIRST SEAL IN BACKPLATE OR CRANKCASE* *1. Put closed side of seal on end of tool having wide step.* *2. Assemble in crankcase from clutch side or in back plate from engine side.* *NOTE: Seals may be assembled in backplate from magneto side if needle bearing is not to be disassembled.* *SECOND SEAL IN BACKPLATE OR CRANKCASE* *1. Put open side of seal on end of the tool with narrow step.* *2. Assemble in crankcase from the clutch side, or in backplate from engine side.* 
TOOL #22830-A 	Install backplate seals on units with covered Phelon magneto	 *1. Use tool #22830-A from magneto side. Lubricate seals with "lubriplate" before installation.* *2. Assemble first seal—lip toward engine—with wide step end of 22830-A.* *3. Assemble second seal—lip away from engine—with narrow step end of 22830-A.*

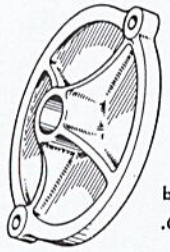
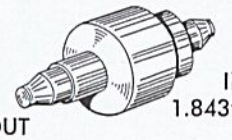
NOTE

Backplates used with covered Phelon magneto have a small recess on the seal side and require use of tool #22830-A. Units with Wico or other type magneto require use of tool #22830. (See instructions page 74).

Tool Name & Part No.	Where—How Used	Procedure
TOOL #23176 Garlock seal assembly 	**BELT DRIVE SAWS** Press bearings and seal from front half crankcase or push seal into front half.	1. *TO PUSH OUT use large end of tool from inside crankcase to push out bearings and seal.* 2. *TO ASSEMBLE SEAL (after assembly of bearings) use small end of tool to push seal (open end in) into crankcase in front of outer bearing.*
TOOL #23174 Needle bearing assembly 	**BELT DRIVE SAWS** Press bearings into front half crankcase.	 2. *To assemble inner bearing use non-stepped end of the tool from inside crankcase.* 1. *TO ASSEMBLE OUTER BEARING use stepped end of tool.* 
ADAPTER #22678 bearing assembly  **JACKSCREW #AA-22680**  **FIXTURE #AA-22557** Assembly 	**BELT DRIVE SAWS** Pull main bearing onto crankshaft. **BELT DRIVE SAWS** Pull shaft into rear half crankcase.	*TO ASSEMBLE BEARING ON SHAFT* 1. *Slide bearing on shaft as far as possible by hand, slide adapter on shaft behind bearing.*  2. *Slide assembly fixture on jackscrew. Screw jackscrew onto end of shaft. Hold head of jackscrew from turning and tighten hex nut to pull bearing into place.* *TO PULL SHAFT INTO CRANKCASE* 1. *Oil and install sealing gasket in crankcase.* 2. *Assemble main bearing retaining ring in shaft groove.* 3. *Start shaft through crankcase carefully—as far as possible by hand.* 4. *Attach fixture and jackscrew as above, and tighten nut to pull shaft and bearing into the rear half crankcase.* 
SLEEVE #22720  **TOOL #22764** Garlock seal assembly 	**BELT DRIVE SAWS** Press seal into rear half.	 *TO ASSEMBLE SEAL IN REAR HALF CRANKCASE* 1. *Slide sleeve #22720, beveled end out, on shaft. Put garlock seal, open end toward crankcase, on the shaft and slide it past sleeve #22720.* 2. *Use large bore end of tool #22764 to press seal into crankcase. Remove tool and sleeve.*
SLEEVE #22721 	**BELT DRIVE SAWS** Assembling crankcase Halves.	*TO ASSEMBLE CRANKCASE HALVES slide sleeve, beveled side out, on magneto end of shaft. Slide front half crankcase on shaft carefully. After securing crankcase halves, remove sleeve from shaft.*

Tool Name & Part No.	Where—How Used	Procedure
ADAPTER #22820 Main bearing I.D. — .6693"/.6690" 	Pull main bearing onto shaft.	 *TO PULL BEARING ONTO SHAFT* *1. Slip bearing onto shaft as far as possible by hand. Slide recommended adapter on shaft behind bearing, and screw jackscrew onto shaft threads.* *2. Remove nut and washer from jackscrew and put assembling fixture body on jackscrew. Then put washer and nut back on jackscrew.* *3. Hold shaft at rear crankthrow in vise with brass jaws. Tighten hex nut to pull bearing onto shaft.*
ADAPTER #23138 Main bearing I.D. — .6693"/.6690" 	Pull main bearing onto shaft.	
BODY #23136 Assembling fixture 	Use with Jackscrew #A-23137	*TO PULL SHAFT INTO CRANKCASE* *(After assembling garlock seal)* *1. Oil crankcase sealing gasket and place in crankcase. Assemble snap ring in groove behind bearing.*
JACKSCREW #A-23137 Assembly 	Use with Body #23136	*2. Slide seal protecting sleeve on shaft (bevel to rear) then start shaft into crankcase bore as far as possible by hand.* 
SLEEVE #22819 Garlock seal assembling 		*3. Slide aligning plate on magneto end of shaft and fasten plate to crankcase face with two 10-32 screws.* *4. Thread jackscrew on shaft, slide body on jackscrew. Put washer and hex nut on jackscrew.* *5. Use a wooden block at rear crankthrow to keep shaft from turning. Tighten hex nut to pull shaft and bearing into crankcase.*  wood block
PLATE #22812 Crankshaft aligning bore .627"/.626" (10-32 thumb screws not furnished) 		

Tool Name & Part No.	Where—How Used	Procedure
ADAPTER #23138-1 Main bearing I.D. — .7188"/.7185" 	EZ-6 Units with 7-digit, serial # *only*, pull main bearing onto shaft.	 *The Model EZ-6 wtih large O.D. shaft and large I.D. main bearing requires use of adapter #23138-1 (in place of 23138 which is used on EZ-6 units with 6 digit serial #'s).*
ADAPTER #22820-1 Main bearing I.D. — .7188"/.7185" 	6-22 from serial # 758245 up and all 7-digit serial #'s only, pull main bearing onto shaft.	*This adapter is of correct length for use in assembling the new large O.D. crankshaft and bearing on the Model 6-22. Use Body #23136 and jackscrew #A-23137 with this adapter. Note: See sleeve #23232 and tool #23233 (below) for use in installing garlock seal and crankshaft in crankcase of 6-22 units with 7-digit serial #'s.*
TOOL #23233 Seal Assembly  IN OUT	Remove old seal, install garter type seal. Also assemble Garlock seal in backplate with needle bearing. I.D. — .6876"/.6873" (See Tool #23391)	*Disassembly:* *1. Use small end of #23233 from clutch side to push out old garlock seal.* *2. Clean and inspect crankcase bore.* *Assembly:* *1. Garlock seal #56134, used in these engines, contains a "garter" spring. Be careful not to dislodge this spring during assembly. Never strike the seal.* *2. Use the larger end of Tool #23233 to install the seal with lip facing toward main bearing.*
SLEEVE #23232 I.D. — .565"/.563" 	Protect crankcase seal during shaft installation.	
SLEEVE #23422 I.D. — .570"/.565" (not illustrated)	Protect crankcase seal during shaft installation.	*3. Use protecting sleeve on crankshaft to protect seal during shaft installation.*

Tool Name & Part No.	Where—How Used	Procedure
PLATE #23383 Crankshaft aligning  bore .690"/.689"	**THREE-GEAR SAWS**	*Slide aligning plate on magneto end of shaft and fasten plate to crankcase face with two 10-32 screws.*
ADAPTER #23373 Main bearing I.D. — .7874"/.7870" 	**THREE-GEAR SAWS** Assemble main bearing to crankshaft.	*Use body #23136 and jackscrew #A-23137 with this adapter.*
SPACER #23382 	**THREE-GEAR SAWS** Assemble crankshaft in crankcase.	*Use body #23136, jackscrew #A-23137, and protective sleeve #23422 with this spacer.*
TOOL #23384 Seal assembly  IN 1.843"/1.841" OUT .927"/.922"	**THREE-GEAR SAWS** Remove and install main bearing seal.	

Section 11

CUTTING CHAIN & ATTACHMENTS

INDEX

11—1 CHAIN OPERATION

Properly maintained chain should cut smoothly and rapidly. The combination of depth gauge setting and manner in which the cutters are filed should produce a chain which feeds not only smoothly but willingly. That is, the chain should help feed itself into the wood to the degree that heavy operator pressure is not required for cutting. Such chain actually pulls itself away from the bar as it planes through the wood. This action, plus careful tension adjustment and frequent lubrication, keeps friction, heat, and wear to a minimum, and lengthens the life expectancy of the entire saw unit. Very often, faulty chain maintenance lies behind chronic trouble such as repeated failure of the sprocket shaft bearings. Trouble, in these cases, ceases when the owner learns to maintain his chain properly.

11—2 TEST UNITS BY CUTTING WOOD

Wherever it is possible for the dealer or serviceman to do so, the unit should be tested by actually cutting wood with the saw. Testing engines by applying an artificial load on a test stand is recommended practice, but it will not prove how well the chain can cut wood.

Many times, after whipping the engine into top shape, the mechanic or dealer releases the unit to the customer, but neglects to impress upon him the importance of chain maintenance and filing to the life and performance of the whole unit. The customer tries the unit out on the job, finds it cuts poorly and still seems to lack power (because of incorrectly filed chain), brings it back, and accuses the mechanic of doing a poor engine job. Unless this customer is tactfully instructed to maintain his chain properly, he may sooner or later trade his saw in for another make. For the dealer this is a great tragedy, since it takes ten times the effort to gain a new customer as it does to keep the old one satisfied.

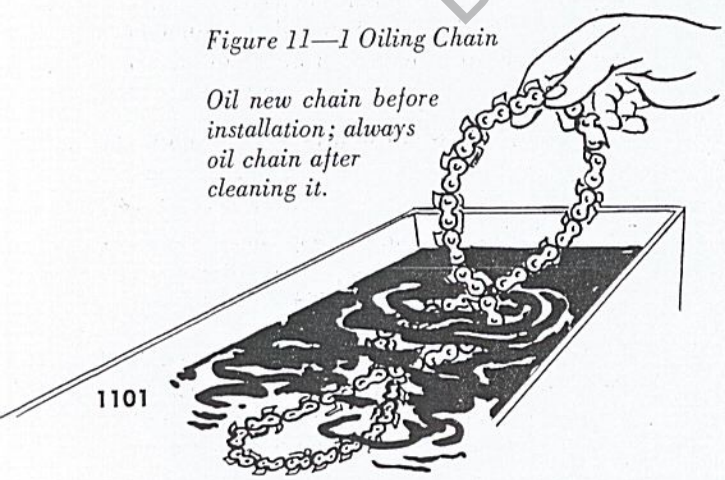


Figure 11—1 Oiling Chain

Oil new chain before installation; always oil chain after cleaning it.

11—3 CHAIN MAINTENANCE

11—3.1 Chain Lubrication

1. Lubricate a new chain thoroughly before installing it on the bar. The chemical that appears on new chain, as taken from the package, is a rust preventive, not a lubricant.
2. See that chain oiler operates. Always operate the oiler with chain slowly turning, never at high speed.
3. Chain should be lubricated regularly and frequently during operation. Use oil freely for the first half hour to break-in a new chain. (See Figure 11—1.)

11—3.2 Keep Bar and Chain Clean

1. Do not run chain into the dirt while cutting.
2. Clean chain thoroughly and soak it in oil, every so often, to remove chain filings, dust, sawdust, and to prevent rust.
3. Clean guide bar groove periodically to remove sawdust, grime, and pitch.

11—3.3 Keep Chain Properly Tensioned

(See Figure 11—2.)

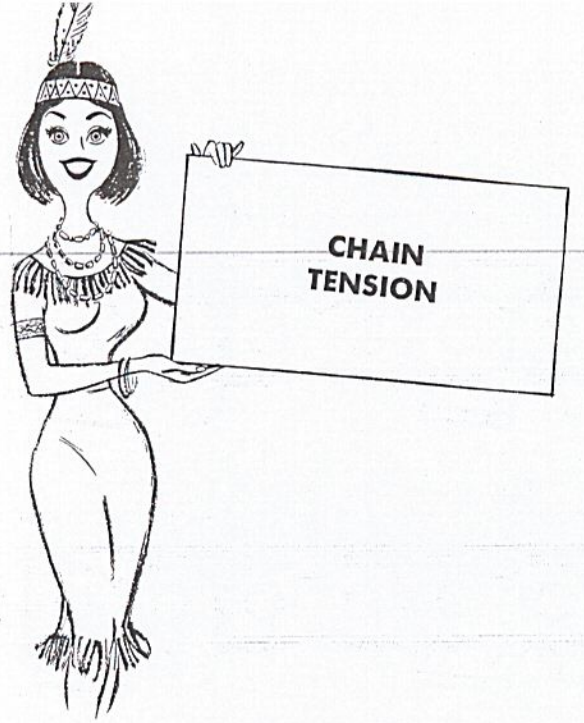
Maintaining correct chain tension is very important for maximum bar and chain life. Check tension often and adjust whenever necessary — don't continue cutting with an improperly tensioned chain, as bar, chain, and engine may be damaged.

1. Set the chain at the highest tension at which you can still pull the chain around the bar easily by hand. At the correct tension the amount of chain slack, as measured at the mid-point of the bar along the bottom edge, should be between 1/8″ and 3/16″. (See Figure 11—2.)
2. When a chain gets very hot it often appears loose on the bar, and should be allowed to cool before tension is adjusted.
3. Too little tension allows the drive links to jump out of the bar groove, and causes chatter and chain, bar, and sprocket damage.
4. Too much tension wears the chain and bar excessively.
5. Hold tip of bar up while adjusting tension. This will keep the bar from shifting on the mounting studs and changing the tension. Hold bar in this upward position until the stud nuts have been tightened.

11—3.4 Maintain Proper Depth Gauge Setting and Shape

(See Figure 11—3.)

1. Before using new chain always check depth gauge settings to be sure they are adequate for the particular engine unit and work application.
2. Always sharpen cutters *before* setting depth gauges — depth gauge settings change each time cutters are filed back and should be checked every fourth or fifth sharpening.



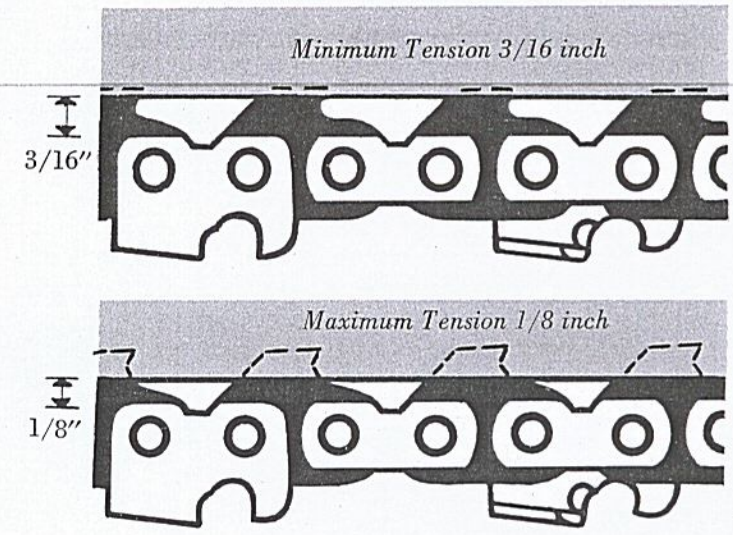


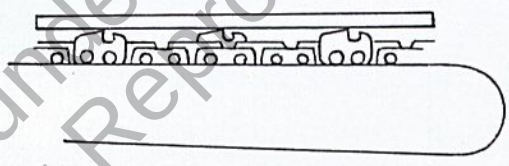
Figure 11—2 Maintain Proper Chain Tension

3. Set depth gauge clearance according to engine power and type of wood to be cut.
4. Keep all depth gauges uniformly filed. Use a HOMELITE ADJUSTABLE DEPTH GAUGE or "GAUGER" for accurate filing.
5. After filing to correct depth, round off the front third of the top edge on all gauges.

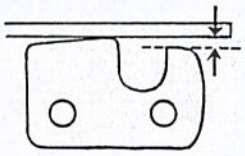
11—3.5 Keep Chain Sharp — File Properly

1. "Chipper" and "Chamfer" type chains should be filed with a round chain saw file of proper diameter to match the pitch of the chain.
   .404" and 7/16" pitch chains require 7/32" dia. file.
   1/2" Pitch chain requires 1/4" dia. file.
   9/16" and 5/8" pitch chains require 9/32" dia. file.
2. Use of a HOMELITE FILE HOLDER with 35° guide lines aids in filing equal top plate angles on both left and right cutters.
3. Hold file level and at a 35° angle to chain. File an equal number of strokes on each tooth to keep all teeth uniform. Use a straight filing motion. Do not allow the file to rock during the filing stroke. Control the filing so that approximately 1/10 of the file diameter remains above the top plate of the cutter. This technique will produce a hollow-ground cutter edge of most practical sharpness and durability. Keep the vertical (side plate) edges of the cutters vertical. (See Figure 11—4.)
4. Avoid nicking tie straps and drive links with the file when filing depth gauges and cutters.
5. If drive link tangs become dull, resharpen them to original factory shape. Sharp drive link tangs scrape dirt and pitch from bar groove — help keep the groove clean.

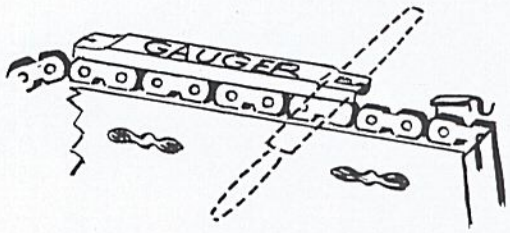
Figure 11—3 Setting Depth Gauge Clearances

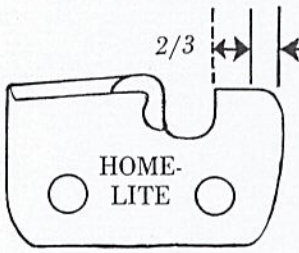


Check depth gauge setting



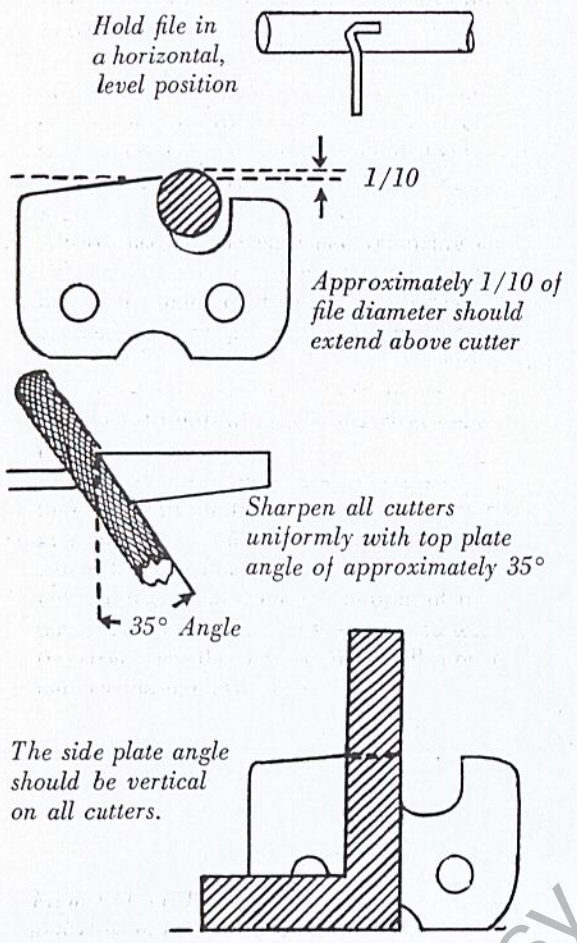
Use Adjustable Depth Gauge or "Gauger" and flat file.





Round off the front 1/3 of each depth gauge after setting clearance

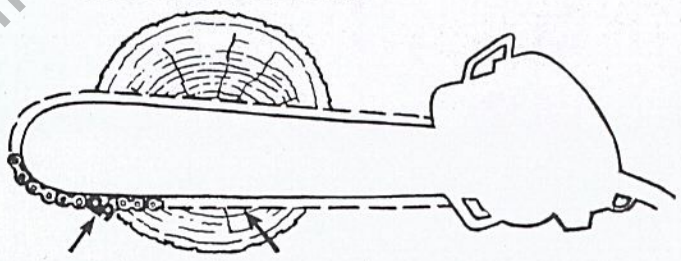
Figure 11—4 Chain Filing Technique



11—3.6 Maintain Proper Chain Parts Assembly (See Figure 11—5)

1. Be sure all replacement parts are of correct pitch and gauge. (Do not install #52 links in #62 chain, for example.)
2. Be sure no parts are backwards, inside-out, or upside-down. Install tie straps with notched edge facing toward guide bar (away from cutting side of chain), and the rounded side, with the countersunk rivet holes, facing out. (See Figure 11—6.)
3. Always use new rivets when repairing chain. Peen rivets over by tapping lightly with the ball of the hammer. Use as many light strokes as necessary to get a well-formed, rounded rivet head. (See Figure 11—6.) Do not overpeen or strike rivets with hard blows. Always check rivet joints after peening rivets—be sure none are tight.
4. When replacing a cutter, always install a new tie strap opposite the cutter. The new tie strap gives the support necessary for the tooth to cut wood. If necessary, when installing a new cutter in a used chain, file the bottom of the cutter to match the wear on the other cutters and tie straps so the new cutter will not bind against the bar rail or ride high.

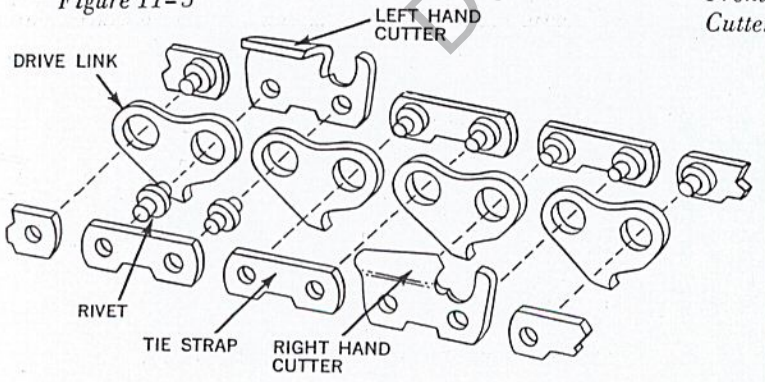
Figure 11—6 Tight Joints and How to Prevent Them



Front of cocked Cutter strikes wood

Stress occurs between jammed cutter and sprocket . . . chain breaks here.

Figure 11-5



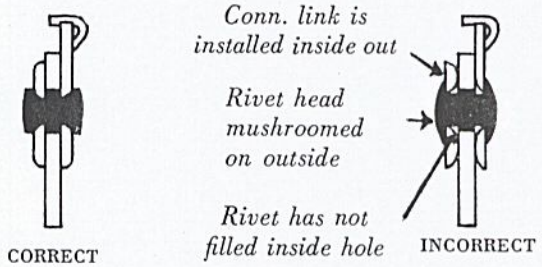


Figure 11—8 Guide Bar Maintenance

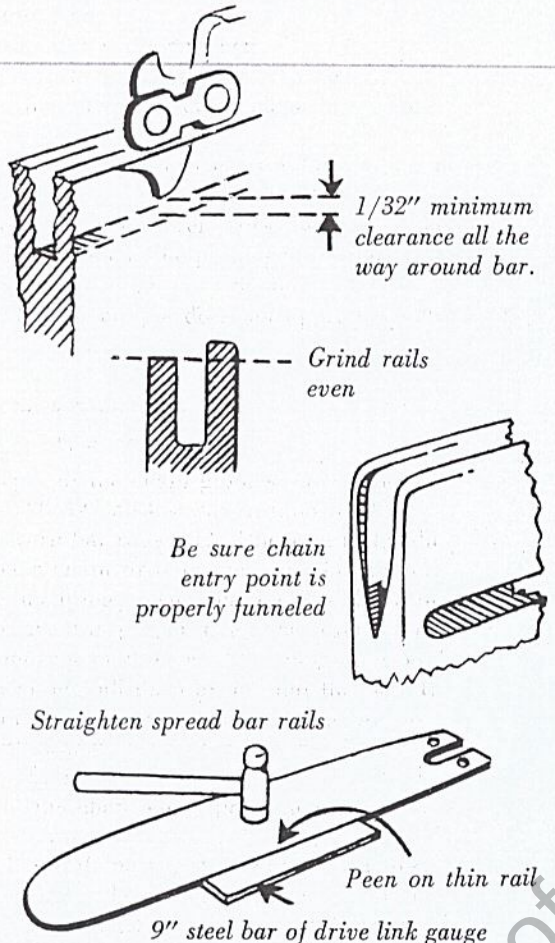
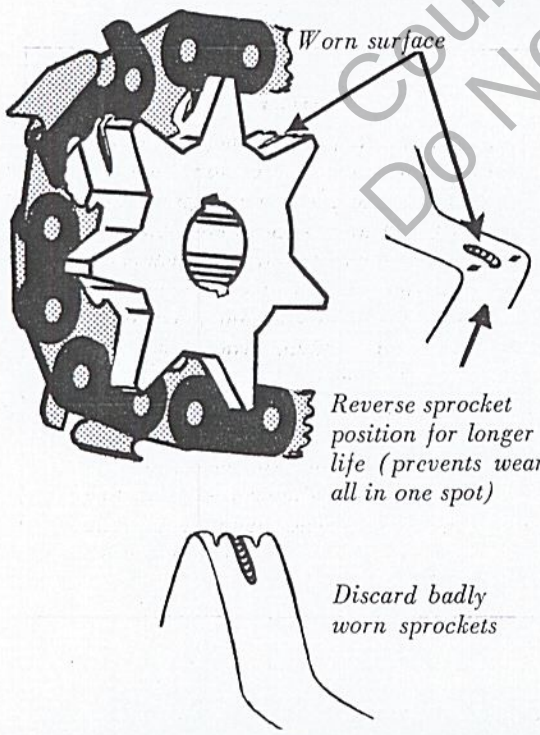


Figure 11—7 Sprocket Wear



11—3.7 Check Sprocket Periodically

(See Figure 11—7)

1. Discard badly worn sprockets.
2. If the sprocket exhibits more than slight wear at the time of chain replacement, also replace the sprocket.
3. Be sure the sprocket is correct for the chain being used.
4. On gear and belt-driven saws, the life of the solid sprockets may be prolonged by removing and reversing their position on the sprocket shaft. This technique does not apply to badly worn sprockets.

11—3.8 Check Guide Bar

(See Figure 11—8.)

1. The depth of the chain guide groove must be at least 11/32" all the way around the bar.
2. Grind worn bar rails even. Uneven rail height will make chain drift to one side during cutting. After filing down rails, recheck depth of bar groove for proper chain clearance. The chain tangs should have 1/32" minimum bottom clearance all the way around the bar. If drive link tangs rub on bottom of bar groove, they will become worn, and will not keep bar groove clean.
3. See that the chain entry point at the rear of the bar is properly funneled.
4. If the bar rails have been spread apart, they can sometimes be brought back to parallel condition by inserting an 8" or 9" steel bar of drive link thickness (.063") between the rails, laying bar on a flat surface, and carefully peening the bar on the side having the thinner of the two rails.
5. Avoid excessive use of the bar for boring. Try not to bore more than 10% of time. When boring, use plenty of chain oil.

NOTE

Guide bar plates with flared tops and bottoms, now used on all new gear and direct drive saws, may be used on older model saws. The flared portions help to funnel the chain into the guide bar smoothly and prevent the chain from jumping off the bar. The new plates are 56956 — inner, and 56957-A — outer for gear drive saws; 56871 — inner, and 56872-A — outer for direct drive saws. On some models, the upper edge of the guide bar pad must be ground back slightly to allow the inner plate to lie flush against the pad.

11—4 CHAIN TROUBLE DIAGNOSIS

Any condition which causes chain to cut poorly, chatter, drag, or run excessively hot should be remedied immediately before serious damage occurs.

11—4.1 Chain Does Not Cut Well or Feed Willingly

1. Dull chain.
2. Cutters filed with backslope. (Chain driven away from wood.)
3. Cutters filed too bluntly.
4. Depth gauges are too high.
5. Depth gauges not rounded off. (Gauges perform as cutters.)
6. Cutters on one side have hook and the other backslope.
7. Cutter bar rails worn uneven.

11—4.2 Chain Chatters

1. Depth gauges too high.
2. Drive links bottoming in shallow bar groove.
3. Sprocket teeth badly worn.
4. Chain badly stretched. (More than 1/4″ per foot.)
5. Bar improperly funneled.

11—4.3 Chain Dulls Quickly or Cannot Be Successfully Sharpened

1. Thin, feathered top plate edges broken off (File held too low.)
2. Teeth rubbing against wood. (High depth gauges.)
3. Attempt to improve cutting by filing off tops of cutters has ruined chain. (Sounds silly, but people actually try it.)
4. SCORED, DECHROMED CUTTERS. (Caused by hitting rocks, running in dirt or abrasives, operation with extremely high depth gauges.)

11—4.4 Worn Chain—Cracked Links

1. Cracked links at rear rivet holes. (Back-sloped or dull cutters are indicated.)
2. Cracks at front rivet holes. (Excessive friction and heat as result of high depth gauges.)
3. Chain worn straight across bottom—both rivet holes cracked (chain correctly filed)—the result of tight chain or poor lubrication.

11—4.5 Chain Breakage

1. Heat and excessive friction.
2. Tight rivet joints (Cocked cutters strike against the wood instead of straightening out and entering the cut. Chain breaks between the offending cutter and the sprocket.)
3. Shock—Chain strikes rear of improperly funneled bar.

11—4.6 Chain Pulls or Drifts to One Side

1. One guide bar rail lower than the other.
2. Teeth on one side have depth gauge settings lower than those on opposite side, therefore, do more cutting.
3. Filing angles (either top plate or side plate) of right cutters differ from those of left cutters.

11—5 CLEARING ATTACHMENT

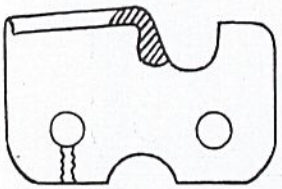
The Homelite Clearing Attachment can be used in place of a 28″ guide bar on the gear driven saws and still use the same chain. Chain mounting and tensioning practices, and maintenance procedures of the Clearing Attachment are similar to those of conventional guide bar and chain combinations. (See Chain Maintenance, Section 11.)

NOTE

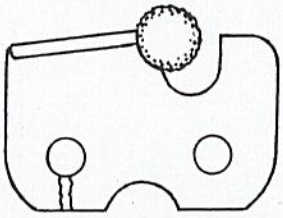
A 6-tooth, 1/2″ pitch sprocket was supplied with model 17, 5-20, and some 4-20 saws. This sprocket must not be used with the Clearing Attachment, Bow Attachment, or "Hard Track plus Extra Hard Tip" guide bars, or damage to bar and chain will result. Any other sprocket, including the 8-tooth, 1/2″ pitch one, will be satisfactory.

Figure 11—9 Avoid Making These Filing Mistakes

BACKSLOPE

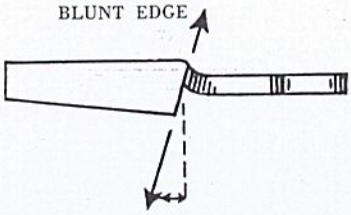


BLUNT TOP PLATE

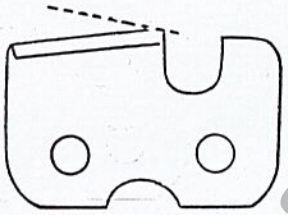


File held too high or tilted upward produces backslope on side plate or blunt edge on top plate . . . tooth pushes out of cut, forces operator to bear down heavily . . . friction and heat cause friction crack under rear rivet hole.

BLUNT EDGE

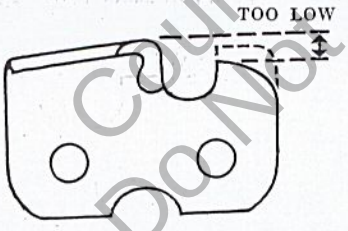


Top plate angle less than 35″ . . . tooth holds edge but is too blunt to cut well.



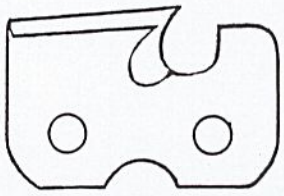
Filing edge off top plate ruins cutters. Teeth cannot cut.

TOO LOW

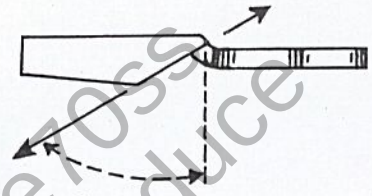


Depth gauge too low, rounded too far back, or filed off at angle . . . too large a bite allowed. Deprived of top area support, gauge sinks into the wood instead of guiding Cutter.

FORWARD HOOK

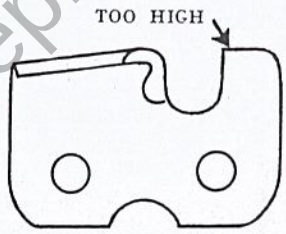


File held too low or tilted downward produces either forward hook or thin, feathered top plate edge (or both) . . . feathered edge breaks off, leaving dull tooth . . . forward hook grabs and jerks, puts extra strain on entire saw.

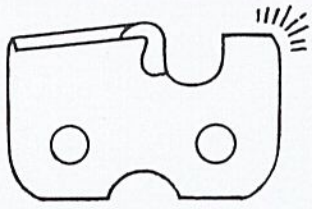


Top plate angle too great . . . cuts well after sharpening, but requires frequent sharpening or touch-up.

TOO HIGH

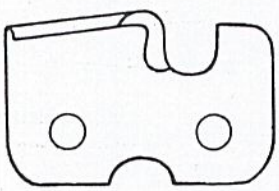


Depth gauge left to high after sharpening . . . chain chatters, won't cut . . . may develop friction cracks under rear rivet holes of cutters.



Depth gauge at proper depth but front 1/3 improperly rounded . . . strikes wood, cannot "FEEL" floor of cut.

Figure 11—9.1 Correctly Filed Cutters Should Look Like This.



Hollow ground cutting edge, vertical side plate, and 35° top plate angles. Depth gauges properly rounded after setting depth.

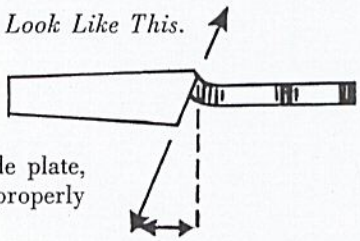
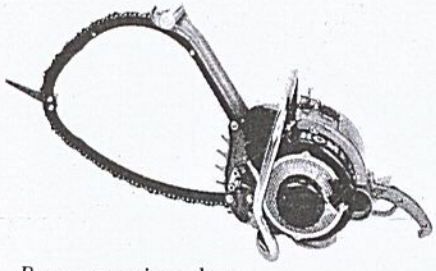
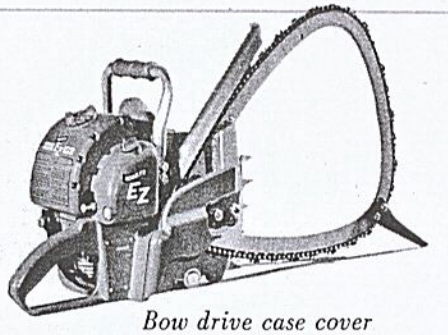


Figure 11—10 Comparison of Old and New Design Bow Attachments



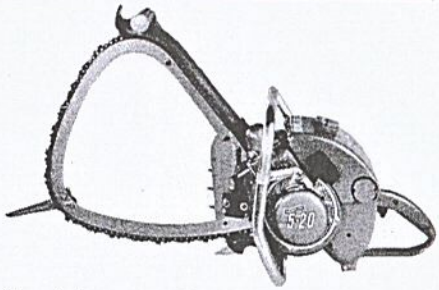
Bow mounting plate

Old design bow



Bow drive case cover

Direct drive bow (new design)



Special tension device for bow

Early design bow

11—6 PLUNGE CUT BOW ATTACHMENTS

11—6.1 Design Types

(See Figure 11—10)

There are three different designs of Homelite Plunge Cut Bow Attachments.

1. The most modern Bow Attachment is the 16″ size. It features a harder and more durable bow guide than previous models, and an improved spur design. The bow guide mounts directly on the engine, the same as a guide bar. Models are available for direct, gear, and belt drive saws.
2. An earlier Bow Attachment design also mounted directly on the engine, was available with 14″ (21″ chain for direct drive models, 23″ chain for gear drive models) and 18″ (uses 28″ chain) guides. This design has been superseded by the more modern one mentioned above.
3. Old design Bow Attachments with separate mounting plates were sold with 14″ (for 23″ chain) and 18″ (for 28″ chain) guides. These Bow Attachments are now obsolete, and are no longer supplied.
4. The listed size of all Bow Attachments and chain guides refers to the maximum diameter cut the bow guide can accommodate.

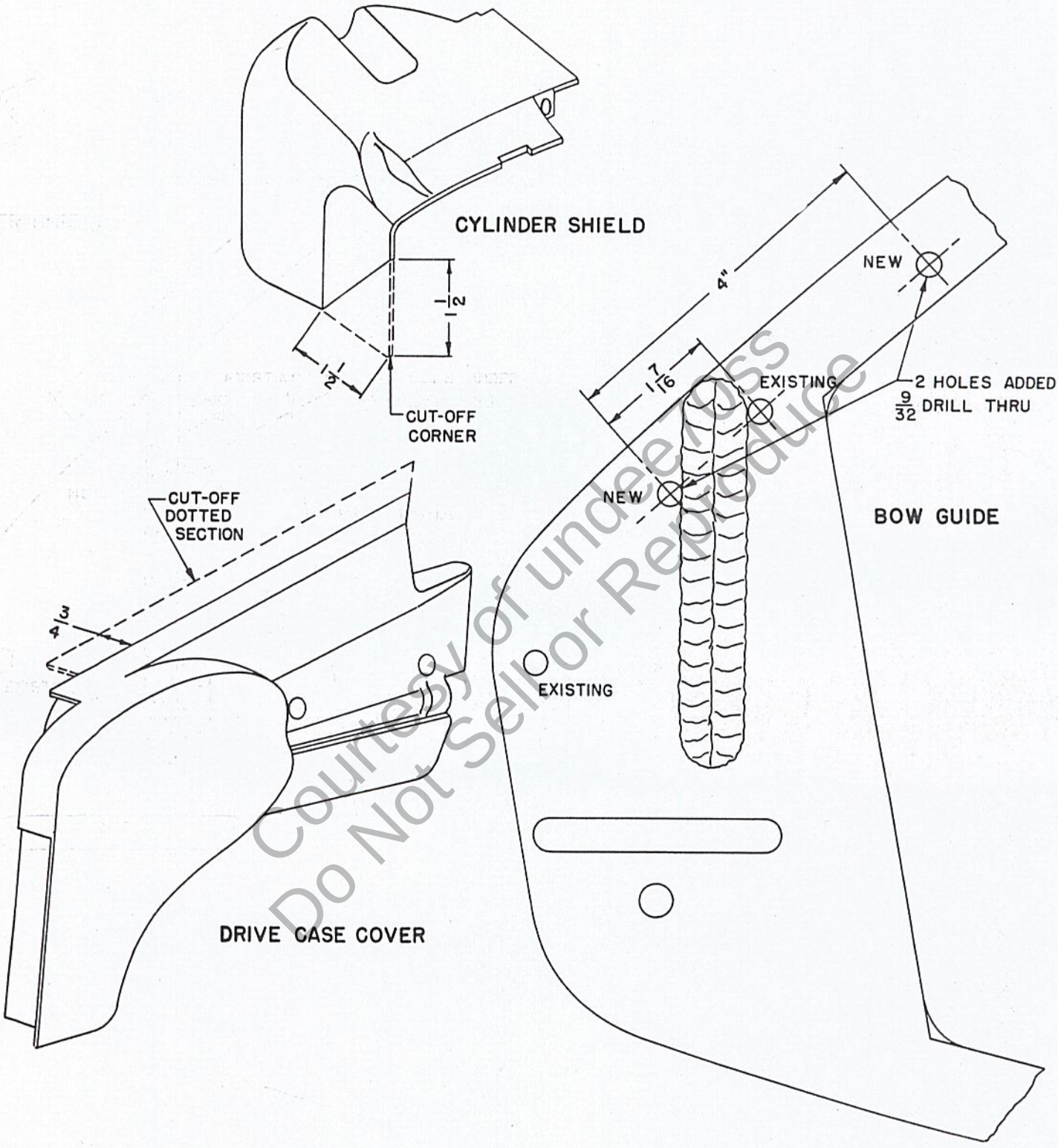
11—6.2 Bow Attachment Installation Hints

1. On some direct drive saws it will be found that the drive case cover interferes with the bow guide. If a special bow guide cover is not available, the old drive case cover should be cut back so it will fit over the bow guide.
2. When installing a Bow Attachment on 9 or 900 series direct drive saws, the bow guide, cylinder shield, and drive case cover must be reworked. (See Figure 11—11.)
   a) Two 9/32″ holes, located as shown in the illustration, must be drilled in the bow guide.
   b) Measure in 1-1/2″ from the cover of the cylinder shield along two edges, scribe a diagonal line, and remove corner section.
   c) Using a hack saw, remove 3/4″ from the inside upper edge of the drive case cover.
3. When installing a Bow Attachment on 9 or 900 series three gear saws, the standard muffler must be replaced with a special Bow Muffler (part #A-56617).
4. On some gear drive saws it will be found that the upper corner of the cylinder interferes with the mounting of the Bow Attachment. A special cylinder, which is recessed to clear the Bow Attachment, is available for these saws.

11—6.3 Bow Attachment Maintenance

1. See that all connections are tight.
2. See that the plunging spur is mounted on the correct side of the bow guide, so the chain will have clearance.
3. See that none of the chain guards are broken or missing from the Attachment.
4. See that chain is sharp and depth gauges are uniformly lowered to proper depth for efficient cutting.
5. *Check condition of the chain guide*
   a) Just as with a guide bar, the guide grooves must be of proper depth for chain clearance all the way around.
   b) Chain must enter guide groove smoothly, without hitting the back of the guide.
   c) Grind guide rails even if one rail is higher than the other.
   d) Straighten bent guides, be sure guide rails are parallel, and chain has proper side clearance in the groove.

Figure 11—11 Adapting 900 Series Saws for Bow Attachment.



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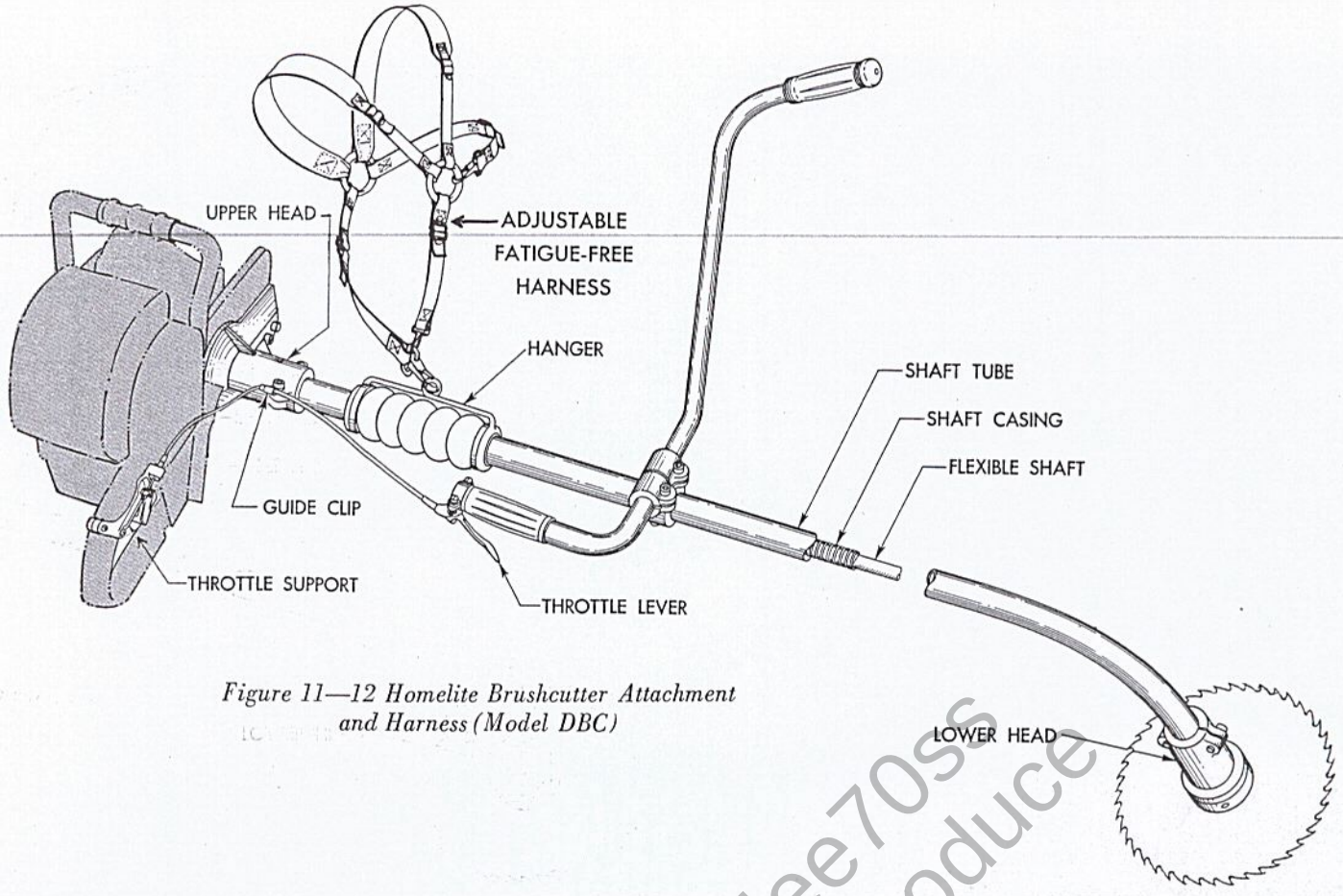


Figure 11—12 Homelite Brushcutter Attachment and Harness (Model DBC)

11—7 BRUSHCUTTER INSTALLATION, OPERATION AND SERVICE

(See Figure 11—12)

11—7.1 Description

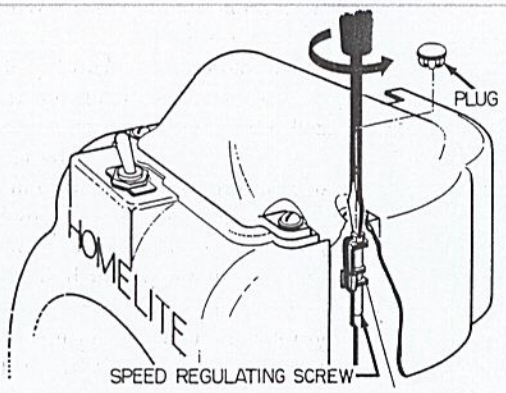
Governor equipped Homelite chain saw engines may be modified for Homelite Brushcutter application. The Brushcutter Attachment has its own clutch drum which is an integral part of the drive shaft coupling. Installation of the Brushcutter involves disassembling the engine clutch assembly and reassembling with some chain saw, and some special Brushcutter clutch assembly parts.

Model GBC Brushcutters (formerly Model BC) are designed for use with gear drive saw engines. Model DBC Brushcutters (formerly Model EZ-BC) are designed for use with direct drive saw engines. Brushcutters do not fit 900 series, BUZ, 500 series or belt drive engines.

NOTE

For Brushcutter application, the engine speed should be lowered by turning the governor adjusting screw counterclockwise, as far as possible, without forcing. When converting from Brushcutter to chain saw, the governor should be readjusted for optimum cutting speed. (See Figure 11—13.)

Figure 11—13 Adjusting Governor for Brushcutter Operations



1. Remove plug from cylinder or carburetor shield.
2. Turn speed regulating screw counter clockwise as far as it will go without forcing. Count the number of turns . . . make a note of this number.
3. Push plug back in place.
4. To readjust for chain saw operation, turn screw back to its original position. (Same number of turns noted above.)

CAUTION

Brushcutter should be used only *on governed saw engines. Due to the light cutting load, it is very difficult for the operator to maintain proper throttle setting without a governor, and excessive engine speed will result. Brushcutter blade may shatter at very high speed, presenting a safety hazard to operator and bystanders. Also, the service life of the engine and Brushcutter shaft will be shortened considerably by excessive engine speed.*

11—7.2 Adapting Engine for Brushcutter Use

Gear Drive Units:

1. Remove chain and guide bar from engine.
2. Remove spiked bumper plate from engine.
3. Drain gear oil from gear case.
4. Remove gear case cover from engine.
5. Refer to transmission section to remove clutch spider and drum assembly. All parts should be removed from the engine shaft except the flat washer and the bronze bushing.

Direct Drive Units:

1. Remove the drive case cover, outer guide bar plate, guide bar, chain, and inner guide bar plate.
2. Insert a small rod through the hole in the bottom of the air shroud to block the rotor and crankshaft from turning. Remove the flexlock nut from the shaft.
3. Remove the flat washer, large thrust washer, sprocket and drum assembly, inner race, and small thrust washer from the shaft. Wipe off the sprocket and drum assembly with a rag. (Do not use solvent.) Apply a protective film of oil to the drum and wrap it for storage.
4. Put the small thrust washer, inner race, large thrust washer, flat washer, and lock nut back on the shaft. Tighten the flexlock nut securely, then remove the rod from the air shroud to free the rotor.
5. Remove the spiked bumper plate from the drive case.

NOTE

To prevent rusting and deterioration of the chain saw parts which must be stored while the unit is being used as a Brushcutter, clean and oil the chain, guide bar, tension device, chain saw clutch drum and cover, gear case cover, and fastening parts, and wrap them in waterproof paper.

11—7.3 Assembling Brushcutter Clutch to Engine

Gear Drive Units:

1. Be sure *one* flat washer and the bronze bushing from the chain saw clutch assembly are on the engine shaft.
2. The Brushcutter Attachment has its own clutch drum and flat clutch cover. Put the flat clutch cover on the shaft, then install the clutch spider assembly with the two holes for the clutch puller facing out. Slide the two clutch keys into the keyways, put one more flat washer on the shaft and start the flex-lock nut on the shaft threads.
3. Block the rotor from turning and tighten the flex-lock nut.
4. Put the Brushcutter clutch drum over the clutch spider assembly, position the upper head (and gasket) on the gear case and secure with screws or nuts.
5. Place the unit on a level surface and fill the gear case with clean gear oil to the proper

level. Put the filler cap back in the gear case.

Direct Drive Units:

1. Put the upper head of the Brushcutter on the guide bar mounting studs.
2. Hold the upper head temporarily with a lockwasher and 3/8 - 16 hex nut on each stud. Do not tighten the nuts completely.
3. It is important to check the alignment of the clutch assembly and clutch drum at this point. Make sure the ignition switch is "off," then crank the engine. The Brushcutter spindle head should not rotate. If it does, shift the casting on the mounting studs until it is properly aligned. Now tighten the nuts securely.

11—7.4 Assemble Handles

1. Loosen the two Allen screws and insert the two handles in the handle clamp on the aluminum tube. (See Figure 11—14.) The handle for the right hand is shorter than the left handle.
2. The handle ends must both be visible through the center slot of the bracket to be properly clamped. Tighten the two Allen screws.
3. Adjustment of the handle position can be made at any time to suit the individual. With the two set screws at top loosened, the handles can be individually rotated in the clamp. Loosening the set screw at the bottom of the clamp allows the handle and clamp assembly to move up or down to change the balance point.

11—7.5 Assembling Throttle Control

(See Figure 11—15)

1. Remove one of the two clamping screws on the upper head. (See Figure 11—12.) Slide the guide clip of the throttle cable onto this screw and put the screw back into the head. Tighten this screw securely.
2. The throttle control assembly on the short handle bar is to be connected to the pistol grip of the engine. Remove the screws from the throttle support. Position the support on the pistol grip so the large trigger plate is directly under the saw trigger. (See Figure 11—14.) Replace and tighten the screws.
3. Loosen the adjusting screw in the cable adjusting collar. Set the trigger plate so it just touches the trigger on the saw, and secure the collar in this position by tightening the adjusting screw. (See Figure 11—14.)

11—7.6 Installing Saw Blade

(See Figure 11—16)

1. Lock spindle head by inserting ROD #22963 in one of the four holes in the spindle head. Remove drive nut (left hand thread for model DBC, right hand thread for model GBC) with the combination wrench.
2. If the drive washer and spring fall off the drive shaft adapter, put them back on. The spring must curve away from the spindle head

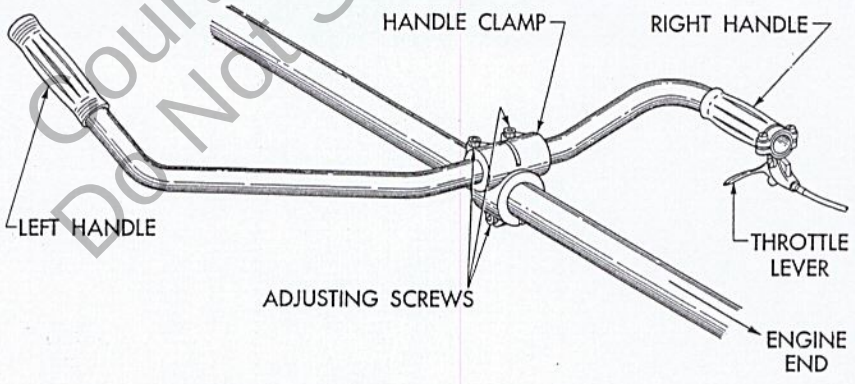


Figure 11—14 Handle Assembly

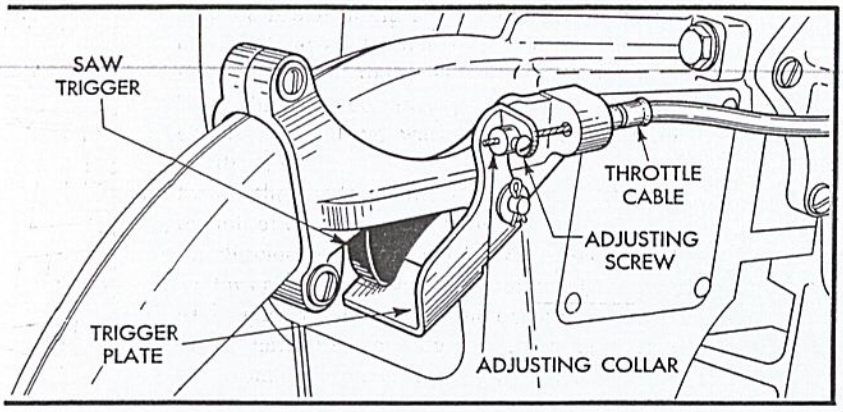
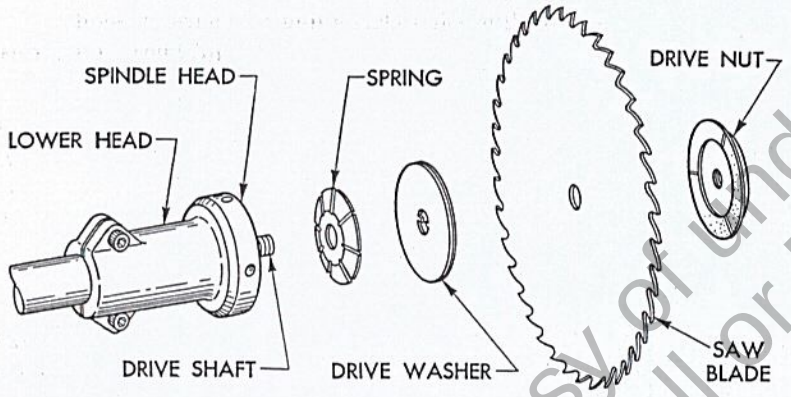


Figure 11—15 Assembling Throttle Support on Pistol Grip of Engine

and the brake lining side of the drive washer must face away from the spring. The spring rides freely, but the drive washer has integral keys which fit the keyways of the drive shaft adapter. The drive washer must rotate with the drive shaft.

3. Install the blade so the teeth face in the direction of rotation. (Clockwise for model GBC, counterclockwise for model DBC—see arrow on lower head.) Lock the spindle head with ROD #22963 and fasten the drive nut securely to shaft. Protect yourself by wrapping a rag around the blade during assembly.

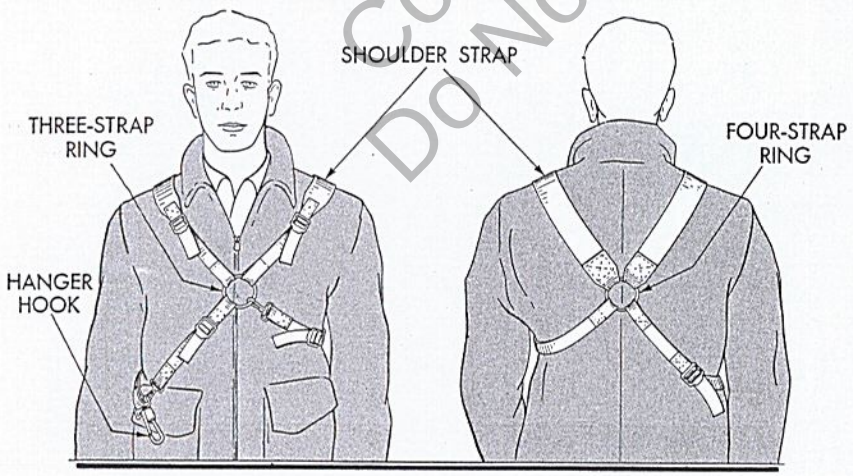
Figure 11—16 Assembling Saw Blade on Lower Head (Model GBC shown)



11—7.7 Adjusting Harness

The harness is adjustable for comfort and even distribution of weight. The harness is worn as shown in Figure 11—17. Note that the hanger hook, to which the unit attaches, lies at the operator's right hip.

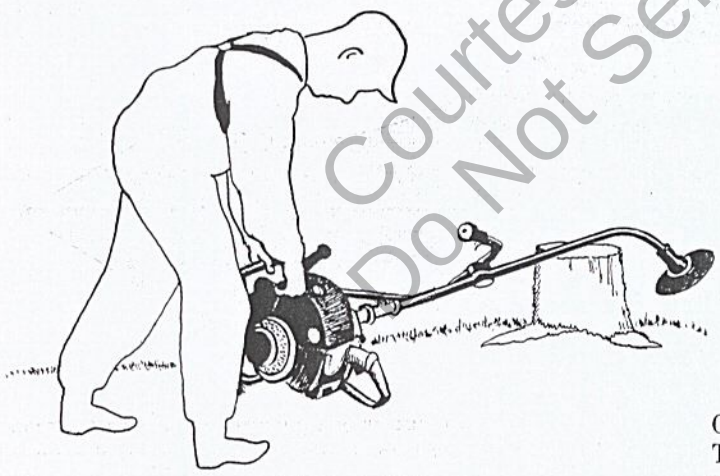
Figure 11—17 Harness



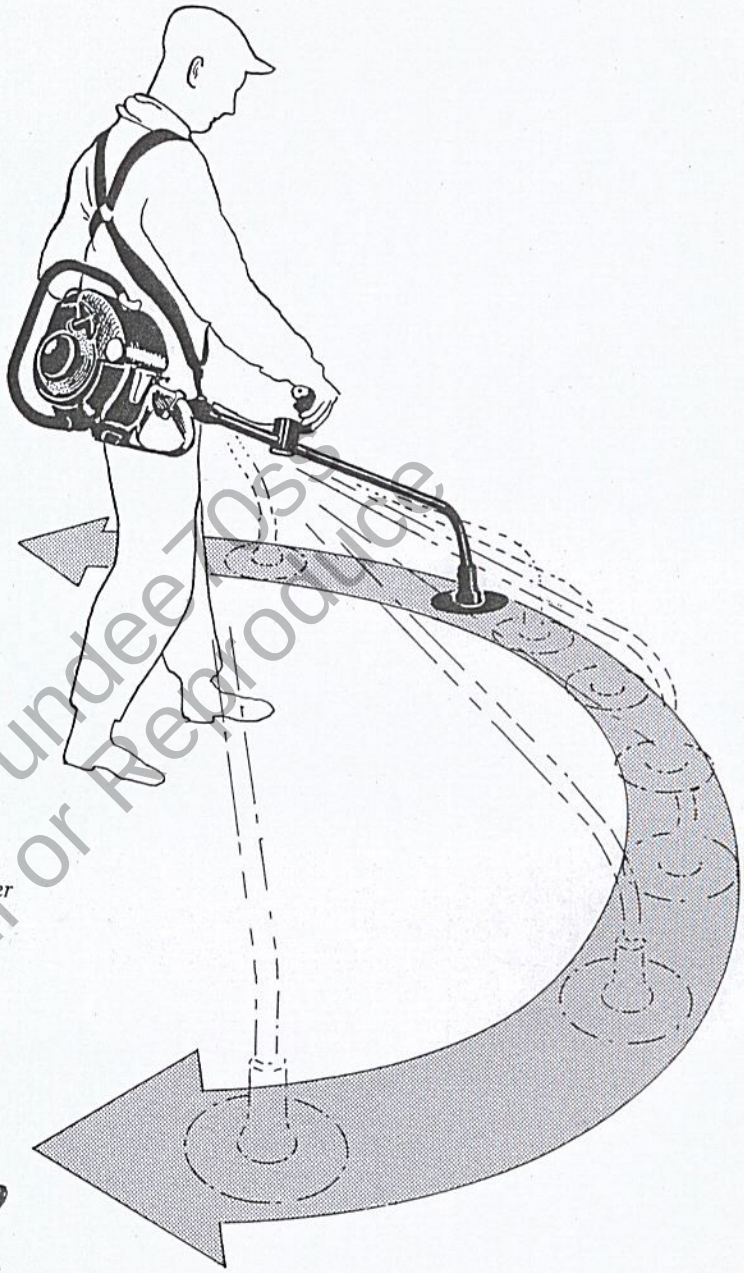
11—7.8 Starting and Operating

(See Figure 11—18)

1. The Brushcutter blade will rotate with the throttle wide open, and the unit will creep if the blade is in contact with the ground or any obstruction.
2. If the unit must be started with the blade lying on the ground, starting must be done with all controls at idle position. The operator should stand behind the engine and observers should stand behind the operator and a safe distance beyond the radius or sweep of the attachment. PULL CHOKE OUT, BUT BE SURE THROTTLE CONTROLS ARE AT IDLE POSITION.
3. If a cold engine cannot be started at idle position, rest the aluminum shaft tube on a sturdy object so the blade is in the clear. (BE SURE BLADE IS CLEAR OF ALL OBSTRUCTIONS.) Then lock throttle open to start the engine.
4. When engine is running, release the throttle lock so engine idles and set unit down. Pick up the unit at the hanger assembly and hook the harness snap through the eye of the hanger.
5. Some operators can successfully start a hot engine without having to unhook it and set it down. This technique is hard to master and is especially difficult for people with short arms to reach around and pull the starter cord.



Start engine in idle position. If cold engine must be started at full throttle position, rest shaft on some sturdy object so blade is clear of all obstructions.



Operate Brushcutter Attachment at full throttle. To quickly clear out large areas of brush and weeds, use a sweeping pendulum motion. Only a feather touch is required to guide the saw in a scything arc—even to those hard-to-get-at places around posts and poles. On growth over 2″ in diameter, feed the blade into the wood slowly.

Figure 11—18 Starting and Operating Brushcutter

11—7.9 Lubrication and Inspection of Flexible Shaft

The flexible shaft should be removed and greased after each full day or equivalent period of operation. To insure maximum service life of the flexible shaft, it is advisable to reverse the position of the shaft, end-for-end, in the shaft casing when reassembling.

1. Loosen the two Allen Screws on the lower head and use a twisting-pulling motion to remove lower head from shaft tube.
2. Remove flexible shaft from shaft tube. Wipe off the old grease, and inspect the shaft.
3. The square shaft ends should not be badly worn or rounded.
4. Replace the flexible shaft if there is excessive "corkscrew." (Wire strands are unwound, broken or badly separated.) Moderate corkscrew or separation of the strands, however, is a normal shaft condition.
5. Grease the entire length of the flexible shaft and insert it into the shaft tube. Push lower head back on shaft tube and tighten the two Allen screws.

11—7.10 Shaft Casing Inspection

1. To inspect the shaft casing, loosen the two Allen screws and separate the aluminum shaft from the upper head. Pull the casing from the aluminum shaft.
2. If the shaft casing has been damaged or its windings have been pulled apart at any point, install a new one.

11—7.11 Inspection of Upper and Lower Head Assembly

1. The *upper head* must be removed from the engine for clutch drum or bearing inspection.

Gear Drive Units:

a) Drain gear oil from crankcase.
b) Disconnect throttle lever from handle, and disconnect throttle clip from upper head.
c) Remove screws or nuts and lift upper head, and gasket, from gear case.

Direct Drive Units:

a) Disconnect throttle lever from handle, and free throttle clip from upper head.
b) Disconnect throttle control assembly from pistol grip.
c) Remove hex nuts and lock washers and lift upper head from engine.

Both Gear and Direct Drive Models:

2. Insert Rod #22963 (through a hole in the clutch drum) into the drilled hole in the upper head. This will prevent the drum and shaft assembly from turning. Use the square section wrench to remove the shaft coupling. (Left hand thread for model DBC, right hand thread for model GBC.) Remove the drum and shaft assembly.
3. Use Rod #22963 to hold the spindle head from turning. Use the square section wrench to unscrew the coupling from the lower head. (Left hand thread for model DBC, right hand thread for model GBC.) Remove coupling and shaft, and spindle head assembly from the lower head.
4. Bearing assemblies in the upper and lower heads are identical. For bearing inspection, remove the snap-ring from the snap-ring groove in each head, and press the bearings and spacers from the head assemblies.
5. Bearings are the sealed type and require no lubrication. The bearings, however, should *never* be cleaned in solvent, nor should assemblies containing sealed bearings be dipped in solvent. Cleaning solvents and degreasing agents will dilute the lubricant and ruin the bearing. Bearings should be wrapped immediately for protection against dust and grime. Replace any bearing if it is rough turning or has excessive radial play.
6. The clutch drum should be inspected for out-of-round or bent condition, and for cracks in the shell. Replace the drum and shaft assembly if the drum is cracked or badly bent.

11—7.12 Assembly

1. Clean all parts *except the sealed bearings* in solvent, and drain. Oil the bearing seats in the head assemblies before assembly.
2. Insert a spacer washer into the head assembly. Press the first bearing into the bearing bore. (Be sure bearings are not cocked during assembly.) Drop in the spacer and press in the second bearing. Install a snap-ring in the retaining groove over each bearing assembly.
3. Replace the shaft couplings if the square sockets are worn to the point of excessive play between the sockets and the square ends of the shaft.

Complete remaining assembly of Brushcutter by reversing the order of disassembly given in the above Section.

11—7.13 Converting for Chain Saw Operation

Gear Drive Units:

1. Remove saw blade from Brushcutter. Put the drive nut back on the lower head.
2. Drain gear case. Remove Brushcutter from engine.
3. Block rotor and remove shaft nut and flat washer.
4. Remove clutch spider with Puller #A-23131. Do not lose the two clutch keys. Remove the flat clutch cover.
5. Leave one steel thrust washer and the bronze bushing on the shaft. Slide the *chain saw* clutch drum on the shaft over the bushing. Add one more steel thrust washer.
6. Push the clutch spider onto the shaft—holes for clutch puller facing out. Fit the clutch keys (snug fit) into the keyways. Put *chain saw* clutch cover — projecting hub side toward clutch—on shaft. Fit the flat aluminum washer into the recess in the clutch cover.
7. Block rotor while tightening flex-lock nut on the crankshaft.
8. Assemble *chain saw* gear case cover gasket to gear case with screws or nuts. Put spiked bumper back on saw. Fill gear case with gear oil before use.
9. Set engine governor for chain saw operating speed. (See Figure 11—13.)

Direct Drive Units:

1. Remove saw blade from Brushcutter.
2. Remove Brushcutter Attachment.
3. Block rotor and remove shaft nut, flat washer and large thrust washer. Leave the small thrust washer and inner race on the shaft.
4. Slide drum and sprocket assembly over inner race on the shaft.
5. Assemble large thrust washer, flat washer and flex-lock nut on the crankshaft. Block the rotor from turning and tighten the flex-lock nut securely.
6. Assemble the spiked bumper to the drive case. Assemble guide bar shims, guide bar, chain and drive case cover.
7. Refer to Figure 11—13. Readjust engine governor for chain saw operating speed.

NOTE

Cutting 8-1/4" off the lower end of the flexible shaft casing will extend the service life of both the casing and the shaft. The cut should fall just before the third spacer (See Figure 11—19). After cutting, remove burrs from inside of casing. For replacement of old casing, use casing #A-55458-1, which has already been shortened. If A-55458-1 is no longer available, casing #A-57490 should be used. This casing has been shortened, and has neoprene collars replacing the former soldered spacers.

Figure 11—19 Shorten the Shaft Casing just below the third soldered spacer.