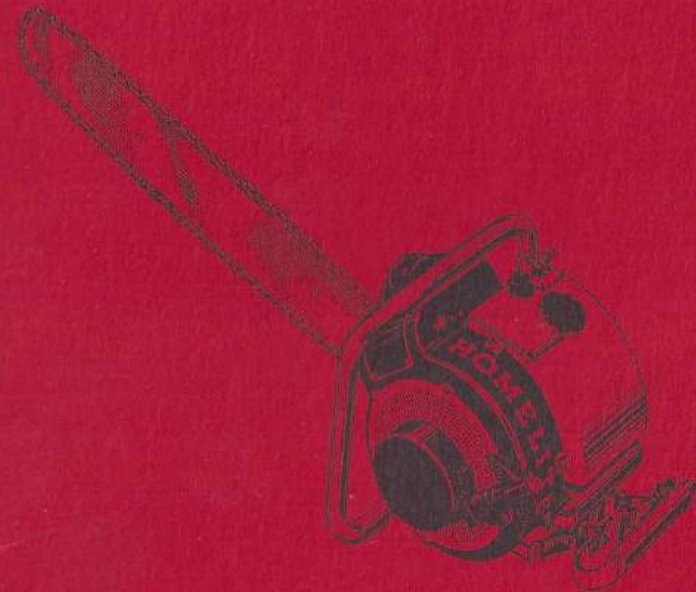


HOMELITE *Carryable* **PRODUCTS**

INSTRUCTION BOOK

HOMELITE CHAIN SAW

MODEL 26LCS



Gasoline-Engine-Driven

Bulletin L-544

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HOMELITE GASOLINE CHAIN SAW MODEL 26LCS

Operating and Servicing Instructions

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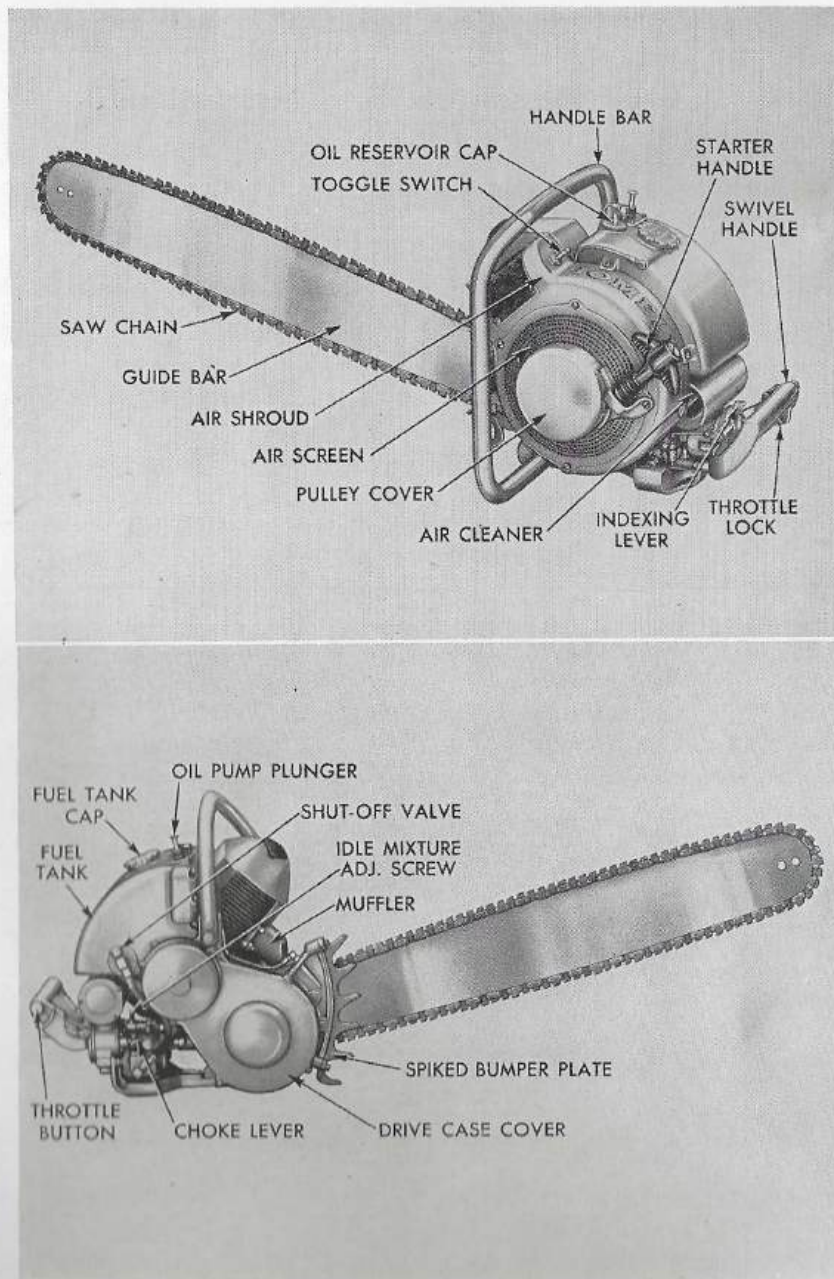


Figure 1—Homelite Gasoline Chain Saw — Model 26LCS-28

Section I OPERATION

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1. GENERAL INFORMATION

This instruction book is furnished so that each operator can familiarize himself with the Homelite Gasoline-Engine-Driven Chain Saw Model 26 LCS. A thorough understanding will help to maintain top efficiency and continuous service. Routine servicing and inspection will result in maximum service life of the equipment. This book contains general information on maintenance, disassembling, inspection, repair and assembling the Model 26 LCS units. The engine is a Homelite single-cylinder air-cooled 2-cycle gasoline engine with a governed speed of 4600-4700 R.P.M. The saw chain speed is approximately 1400 feet per minute.

2. PREPARING SAW FOR USE

a. Unpacking

The saw is shipped partially disassembled. A kit of tools and replacement chain links is included with each saw.

b. Assembling Saw (See Figure 2)

- (1) To assemble, place guide bar on locating studs, guide bar shim between guide bar and drive case. Place chain tension device on studs and fasten in place with a $\frac{3}{8}$ " lockwasher and a $\frac{3}{8}$ -16 hex nut on each stud. Tighten nuts just enough to hold tension device and guide bar in place.
- (2) Turn adjusting screw counterclockwise as far as it will turn without forcing to give clearance for assembling chain.
- (3) Slide chain over chain drive sprocket and feed into guide bar groove. Sprocket and chain travel in a counterclockwise direction when looking at sprocket from engine end of saw. Check to be sure cutting edge of chain rotates toward bottom of sprocket.

c. Adjusting Chain

To adjust the tension of the chain, turn guide bar adjusting screw clockwise until chain can be lifted approximately $\frac{1}{4}$ " from the guide bar groove with two fingers, tighten two hex nuts to lock tension device. Check the tension of a new chain after the first few cuts and readjust if necessary.

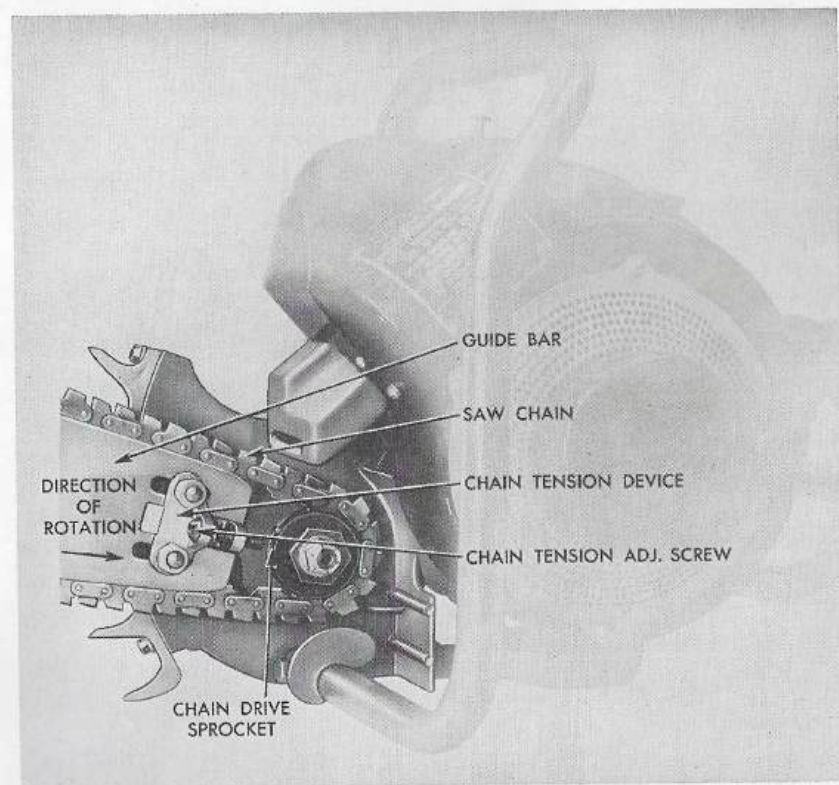


Figure 2—Assembling Guide Bar

d. Chain Lubrication

Fill oil reservoir with any good SAE-30 engine oil in the summer and SAE-10 motor oil in the winter. In temperatures below 0°F, dilute 4 parts of SAE-10 motor oil with 1 part of kerosene. Operation of the pump plunger forces oil from the reservoir to the guide bar. It is necessary to operate pump at regular intervals when cutting to insure proper lubrication of the chain and guide bar.

e. Mixing Fuel

CAUTION

Always mix oil and gasoline thoroughly before pouring fuel into fuel tank.

- (1) Mix thoroughly $\frac{1}{2}$ pint of any good SAE-30 engine oil with each gallon of gasoline before pouring fuel mix into fuel tank.
- (2) If a Homelite Safety Can is used, fill it half full of gasoline. (See Figure 3) Fill oil measuring cup, attached to cap, 4 times to the $\frac{1}{3}$ pint line with any good SAE-30 engine oil. (The same oil as used in oil reservoir for chain lubrication.)



Figure 3—Mixing Gasoline and Oil in Homelite Safety Can

tion.) Replace cap, position pouring spout in clip and shake well to mix oil and gasoline thoroughly. Then fill can with gasoline to about 2 inches from the top. Shake again to mix fuel thoroughly. This mixture is $\frac{1}{2}$ pint of oil to each gallon of gasoline. (Capacity of safety can is $2\frac{1}{2}$ gallons.)

(3) Always strain fuel through a chamois or filter, before pouring fuel into fuel tank, for best results.

3. STARTING AND STOPPING

a. Starting (See Figure 1)

- (1) Push toggle switch to "ON" position.
- (2) Open the fuel shut-off valve all the way.
- (3) Put choke lever in "CHOKE" position.
- (4) Press throttle button all the way in with thumb and lock throttle open with throttle lock located on underside of swivel handle. Operate oil pump plunger 3 times to lubricate chain.
- (5) Be sure chain is clear of all obstructions before pulling starter, because chain will rotate with throttle wide open; chain will not rotate when engine idles.
- (6) Pull starter slowly until it engages; then pull rapidly. (Do not let starter handle snap back.) Repeat, if necessary, until engine starts.

(7) Slowly return choke lever to "RUN" position. If engine falters after starting, operate the choke lever at short intervals until engine warms up.

(8) Press throttle button to release throttle lock. When engine idles, the automatic clutch disengages chain drive. Automatic governor keeps engine from over speeding.

(9) To start hot engine lock throttle open — don't choke.

b. Stopping

NOTE

At the end of each day's operation, close the fuel shut-off valve and let the engine run until it stops. This uses up all the fuel in the carburetor and permits easy starting.

(1) Push toggle switch on air shroud to "STOP" position, after engine stops, return to "ON" position.

(2) If saw is to be idle for more than a month, close shut-off valve all the way and start engine. Let engine run until it stops, to use up any fuel in the carburetor. Remove fuel cap and drain fuel tank. This will prevent the fuel tank and carburetor from plugging up with gum or varnish.

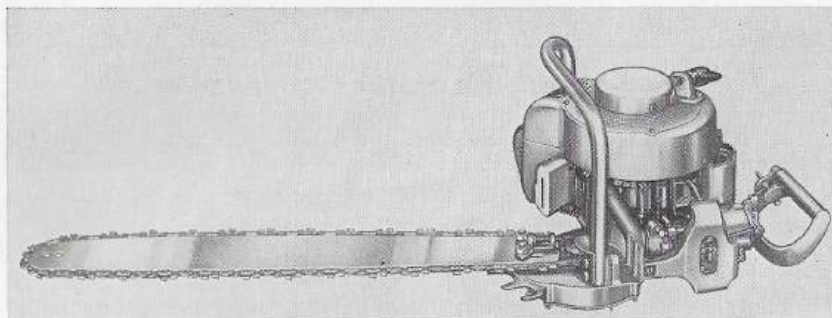


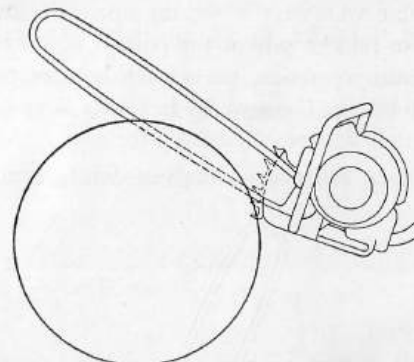
Figure 4—Homelite Chain Saw in Felling Position

4. OPERATING SAW

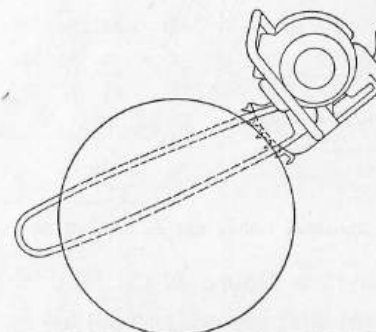
a. General (See Figure 4)

(1) For felling operations, press indexing lever and turn engine (take hold of handle bar) to the right 90° (so engine rests on drive case cover). Be sure indexing lever is in the locking slot. This places chain and guide bar horizontal. For bucking, limbing or flush cutting, the chain and guide bar should be vertical.

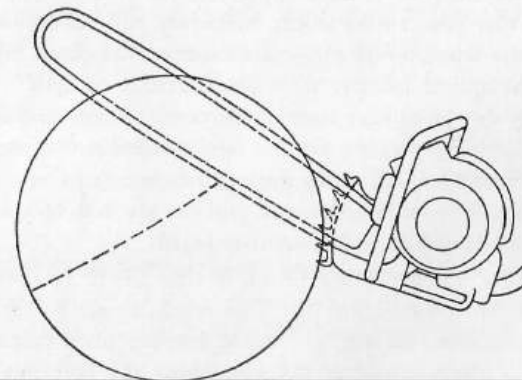
(2) On all felling and normal bucking operations, the spiked steel bumper plate should be placed against the work since the chain travel will otherwise pull the engine end of the saw against the wood to be cut. (See Figure 5.) The operator's judgement should dictate the position which the saw is to be used in the various operations. Stresses of the wood should be analyzed by the



SAW STARTING TO CUT. SPIKED BUMPER PLATE HAS ENGAGED WOOD AND ACTS AS PIVOT FOR THE SAW.



SAW IS PIVOTED TO THIS POSITION, THEN SPIKED BUMPER PLATE IS DISENGAGED FROM THE WOOD.



SAW IS PUSHED DOWN AT THE ENGINE END AND SPIKED BUMPER PLATE RE-ENGAGED. SAW IS THEN PIVOTED TO COMPLETE THE CUT.

Figure 5—Pivot Action of Chain Saw

operator to determine whether the bucking operation should be accomplished from the top side or bottom side of the portion of the tree to be cut. When bucking with two-man operation, the smooth bumper plate should be placed against the wood to be cut. Use a wedge in felling large trees or in heavy bucking cuts where there is danger of pinching the saw.

(3) Operate oil pump at frequent intervals during cutting operations.

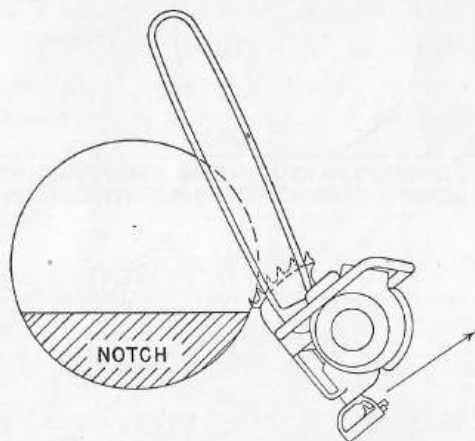


Figure 6—One-Man Felling Cut on a Small Tree

b. One-Man Operation (See Figure 6)

(1) On all cuts, the spiked steel bumper plate should be placed and held against the wood before the saw is fed into the wood. (See Figure 5.) With the chain traveling at full speed, throttle fully open, pivot the saw on the spiked bumper plate until the chain engages into the wood. When the saw has been pivoted so that you can no longer effectively pull on the handle and have the chain cut the wood, or if there is danger of the chain hitting some foreign material, the spiked bumper plate should be re-engaged. To re-engage push down firmly on the tubular handle. Be careful not to misalign the saw in the cut when applying pressure on the tubular handle with the left hand. Keep the chain running at all times during the process of re-engaging the spiked bumper plate. The chain action will pull the saw tightly against the wood after the spiked bumper plate has been re-engaged.

(2) In felling, a notch should be cut in that side of the tree toward which the tree should fall. (See Figure 6.) This notch should be about $\frac{1}{4}$ through the tree. In completing the cut, the spiked bumper plate should be engaged near the corner of the notch about 2 inches above the horizontal cut of the notch. The pivoting action of the saw will make the bottom of the guide bar come parallel to the notch. Do not cut through to the notch. Always leave a section of wood parallel to the notch to act as a hinge.

(3) If the saw stalls or jams in a cut, release the throttle immediately and pull saw free. Start the saw, and when the chain reaches full speed, re-engage into the cut.

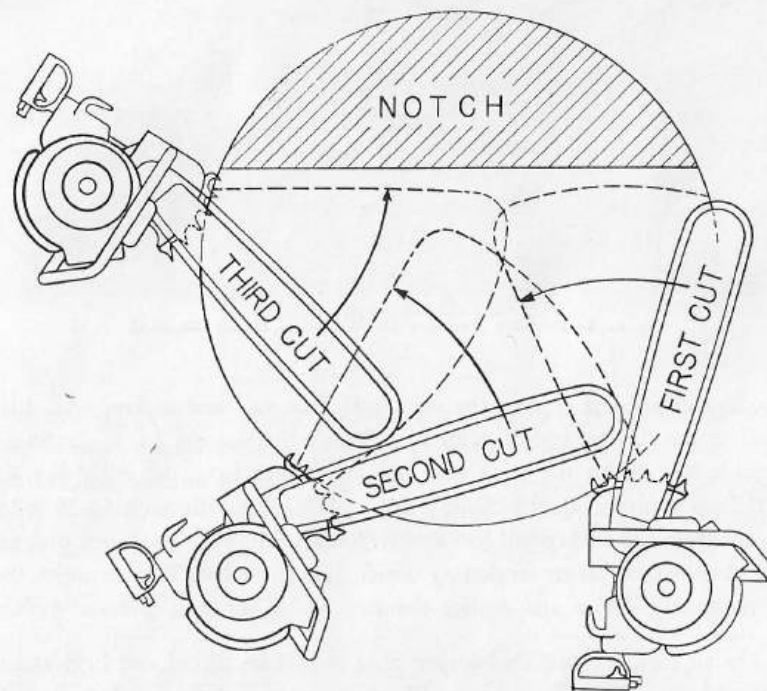


Figure 7—One-Man Felling Cut on a Large Tree

c. Felling Trees Larger Than Guide Bar (See Figure 7)

The tree should be notched for directional felling. After notching, the felling operation is clearly illustrated in Figure 7. The felling is accomplished by a series of cuts as illustrated. It is very important to make the first cut in the correct position relative to the notch. The final cut must be made with the guide bar moving toward the notch to assure proper direction of fall.

d. Two-Man Operation (See Figure 8)

(1) The 26 LCS-34 and 26 LCS-42C Chain Saws are built for two-man operation. The Model 26 LCS-28 and 26 LCS-23 Chain Saws may be adapted for two-man operation by the addition of a helper's end handle, chain guard and two-man bumper shoe. Remove the spiked bumper plate from the saw and replace with a smooth bumper plate. Remove the two $\frac{3}{8}$ -16 hex nuts and lock-washers which fasten tensioning device and guide bar. Place bumper shoe over

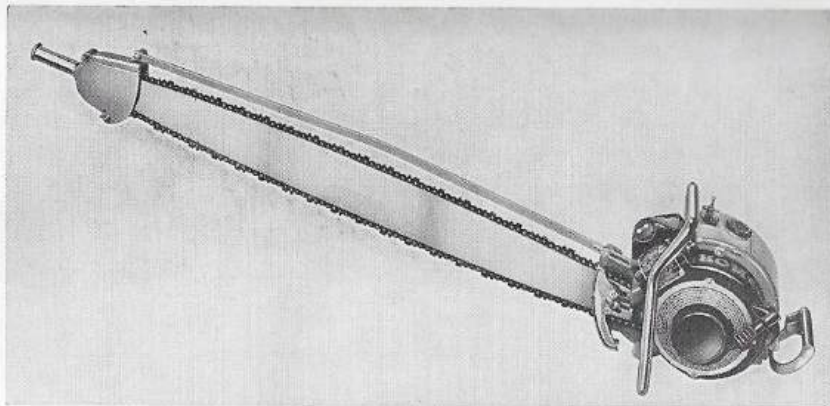


Figure 8—Homelite Gasoline Chain Saw — Model 26LCS-42

tensioning device and replace the two $\frac{3}{8}$ -16 hex nuts and lockwashers. Place the helper handle over end of guide bar. Engage the locating pin in the hole in the guide bar. Insert the wing bolt and lockwasher from the guide bar side and tighten securely. Fasten chain guard to helper's handle with $\frac{1}{4}$ -20 x $\frac{1}{2}$ " fil. head screw and shakeproof lockwasher. Remove the two $\frac{3}{8}$ -16 hex nuts and lockwashers which fasten tensioning device and guide bar. Place bumper shoe over tensioning device and replace the two $\frac{3}{8}$ -16 hex nuts and lockwashers.

(2) On all cuts, the smooth bumper plate should be placed and held against the wood before the chain is engaged in the wood and the saw fed through the wood by alternate pressure on the helper's end and the power end of the saw.

(3) Much time and needless effort can be saved by determining whether the bucking operation should be performed from the top side or from the under side of the tree. If the position of the tree indicates that top side bucking will result in pinching the guide bar, then bucking from under side should be employed where possible. For undercutting remove the chain guard and cut with the top of the guide bar, using the helper handle as the bumper.

(4) For two-man felling, a notch should be cut in that side of the tree toward which the tree should fall. (See Figure 9.) This notch should be about $\frac{1}{4}$ through the tree.

(5) Because of the hazard involved in felling large trees, safe positions should be selected, previous to the felling cut, to which each man can proceed when the tree starts to fall. It is not always possible to determine the exact direction of the "kick back" which may occur after the tree hits the ground.

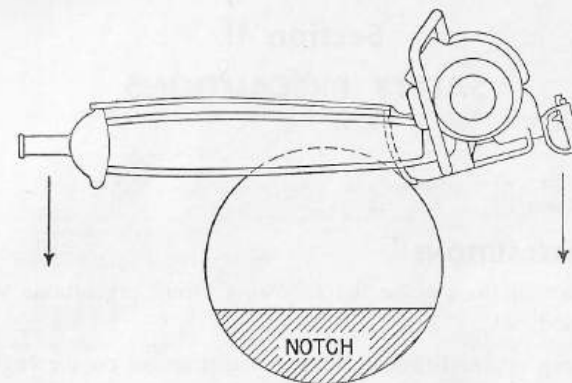


Figure 9—Two-Man Felling Cut

(6) When safety precautions have been observed, the saw should be engaged on the side opposite the notch about two inches higher than the horizontal cut of the notch. Do not cut through to the notch. Always leave a section of wood parallel to the notch to act as a hinge.

Section II

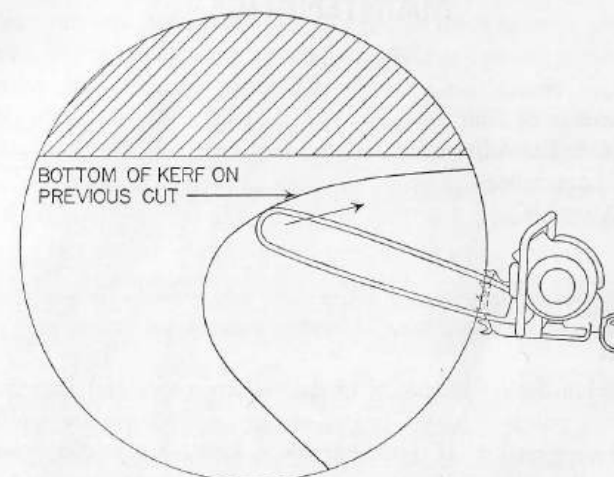
SAFETY PRECAUTIONS

| | |
|--------------------------|-------------|
| Safety Precautions | Paragraph 5 |
|--------------------------|-------------|

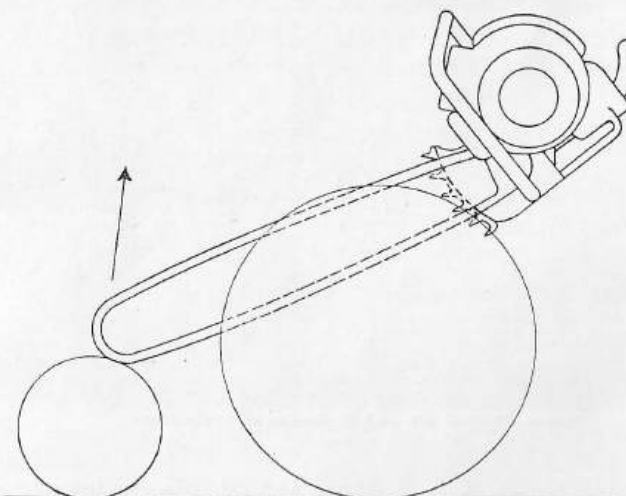
5. SAFETY PRECAUTIONS

It is very important to observe the following safety precautions whenever a chain saw is used:

- (1) Always stop engine before making any adjustment on the engine or saw chain.
- (2) Always keep one hand on the handle bar and the other hand on the swivel handle when cutting, as the balance point of the saw is at the handle bar. Never lock throttle open — use throttle lock for starting only.
- (3) Remove all tree limbs before starting bucking operations, in order to have full pivot action of the saw. The saw will kick back if the top or end of the guide bar is allowed to come in contact with other branches. Any spectators or observers should remain a safe distance away from all sawing operations as a general safety precaution.
- (4) The tension of the saw chain should be checked occasionally and the chain tightened if necessary.
- (5) Never allow any operator, whether for one-man or two-man operation, to wear any loose fitting gloves, ties, shop coats, or clothing.
- (6) Never carry a running saw — stop engine — play safe.



WHEN SAWING TREES LARGER IN DIAMETER THAN THE LENGTH OF THE GUIDE BAR, BE CAREFUL WHEN REINSERTING SAW IN CUT NOT TO LET THE END OR TOP HIT AGAINST THE BOTTOM OR SIDES OF THE KERF. SAW MAY KICK OUT OF CUT IN DIRECTION OF ARROW.



IF END OF SAW HITS BRANCH OR OBSTRUCTION THE SAW WILL KICK BACK IN DIRECTION OF ARROW.

Figure 10—For Safe Cutting Avoid Using Top or End of Saw

Section III MAINTENANCE

| | Paragraph |
|--------------------------------------|-----------|
| General | 6 |
| Daily Maintenance of Unit | 7 |
| Chain and Guide Bar Adjustment | 8 |
| Saw Chain Maintenance | 9 |
| Drive Case Assembly | 10 |
| Spark Plug | 11 |
| Ignition | 12 |
| Carburetor and Fuel Tank | 13 |

6. GENERAL

(1) This section deals with points of daily maintenance and inspection. The most important points to insure proper engine performance are ignition, carburetion and compression. If trouble develops, look for it in this order.

(2) A group of service tools and a chain repair kit are shipped with each saw. (See Figure 11.) (Magneto Rotor Puller, AA-22560, No Longer Supplied.)

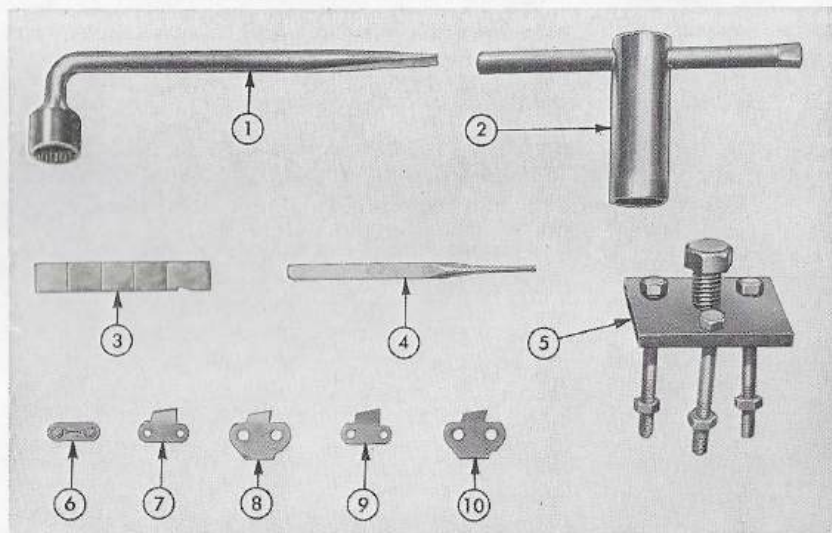


Figure 11—Tool Kit and Replacement Chain Links

| | | | |
|---|--------------------------------|-------------|---------------------------------|
| 1. 22183 | Wrench, Socket — $\frac{5}{8}$ | 6. AA-31735 | Connecting Link and Rivet Assy. |
| 2. 22719 | Wrench, Socket — Spark Plug | 7. 29501-1 | Cutter, Right |
| 3. 31247 | Gauge, Clearance | 8. 29502-1 | Raker, Right |
| 4. 31249 | Punch, Pin | 9. 29501-2 | Cutter, Left |
| 5. (Sold only as Special Service Tool.) | | 10. 29502-2 | Raker, Left |

7. DAILY MAINTENANCE OF UNIT

a. Saw End

(1) Clean the saw chain, guide bar and guide bar groove to remove sawdust and pitch. When cutting wood with a high pitch content, a mixture of pitch and sawdust may clog the guide bar groove. Clean groove with gasoline or kerosene.

(2) Check chain for sharpness. File if necessary. (See "Saw Chain Maintenance".)

(3) Inspect chain for damaged teeth or loosened rivets; replace if necessary.

(4) Fill oil reservoir. For proper oil see Section I, paragraph 2(d).

b. Engine End

(1) Clean the air cleaner with the captive brush. Unsnap brush, pull out and rotate a few times. Repeat this operation until all loose sawdust is removed. Secure brush to air shroud.

(2) If saw has been used all day long, it is advisable to remove the spark plug to check point gap and cleanliness. Point gap setting is .025".

(3) If carburetor is covered with dirt, leaves or sawdust, wash off with gasoline.

(4) All the linkage of the swivel handle assembly must be oiled daily. Use a very light oil on the throttle plunger, indexing lever plunger and throttle lever.

8. CHAIN AND GUIDE BAR ADJUSTMENT

a. Chain Tension

(1) The saw chain must have sufficient tension to keep it in the guide bar groove and prevent it from slipping on the drive sprocket. If the chain can be lifted $\frac{1}{4}$ " from the edge of the bar with two fingers, the tension is correct.

(2) To adjust the chain tension, loosen the two $\frac{3}{8}$ -16 hex nuts which lock the chain tension device. Turn the adjusting screw clockwise to tighten chain and counterclockwise to loosen chain. When tension is correct, tighten the two $\frac{3}{8}$ -16 hex nuts to lock the chain tension device.

(3) The chain should slide freely in guide bar when pulled by hand. If the chain does not slide freely, the tension may be too great or the guide bar groove may be pinched or filled with pitch and sawdust.

(4) If the chain rotates when engine idles, it may be too loose or the engine is idling too fast.

b. Guide Bar

(1) If the groove in the guide bar is worn wider than approximately .070" on the bottom side, the life of the guide bar may be prolonged by reversing it top for bottom.

(2) Check the guide bar groove for uneven wear. If one side is higher than the other, file the guides square with the guide bar groove. Remove all burrs which result from wear of the guide bar.

(3) If the guide bar groove is pinched so that the chain drags, open the groove.

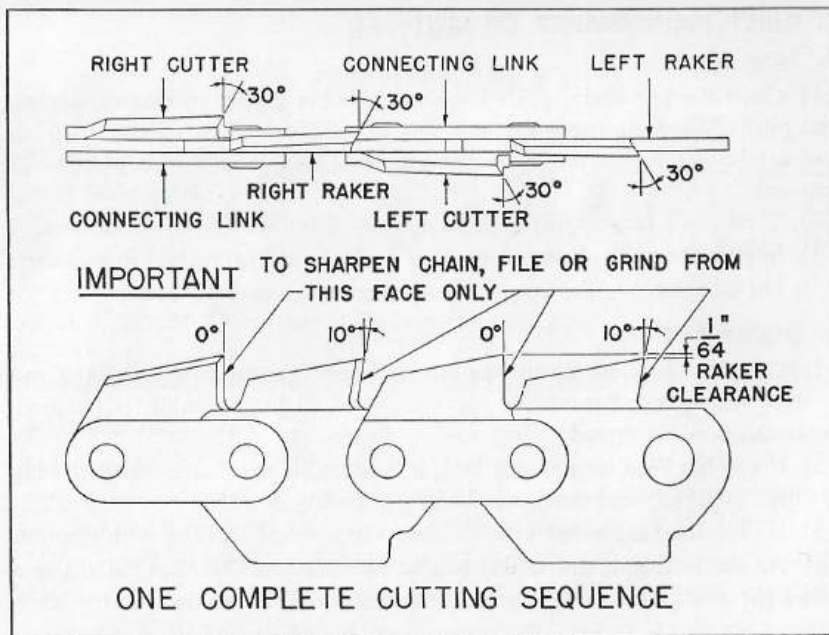


Figure 12a—Construction of Homelite Saw Chains

9. SAW CHAIN MAINTENANCE

a. Homelite Chain

(1) Construction (See Figure 12a)

(a) The construction of the saw chain is illustrated in Figure 12a. Every set of 4 teeth forms a cutting sequence as follows: right cutter, right raker, left cutter and left raker. This sequence is repeated throughout the entire chain.

(b) The rakers and cutters are riveted together with plain connecting links, and the entire chain is supplied as an endless unit. The rivets are made with a shoulder against which the cutters and connecting links are riveted. The shoulder maintains sufficient clearance for flexibility. The saw chain usually requires only filing of the front edges of the teeth to keep it sharp. However, other maintenance is occasionally required.

(2) Filing

(a) To sharpen the teeth (See Figure 12a)

(b) File **ONLY** the front cutting edge. Never file the top of the tooth.

(c) Do **NOT** alter the original angle.

(d) Use a fine-toothed mill bastard file.

(3) Jointing

(a) Jointing the chain consists of filing the rakers so that they are lower than the cutters. This is done by filing the front cutting edge only.

(b) The clearance of the rakers is approximately 1/64 inch. A gauge is provided to check this clearance.

(4) Replacing Damaged Teeth

(a) To replace a cutter, grind off the heads of the two rivets that hold the

plain connecting link paired with the cutter. Do **NOT** attempt to remove one rivet at a time because the drive shoulder will not pass through the cutter.

(b) Remove the damaged cutter together with the rivets.

(c) Before replacing the cutter, insert rivets in the connecting link assembly with the two rakers.

(d) Assemble the cutter on the rivets and check the parts for proper sequence. Peen over the rivet heads with a hammer.

(e) To replace a raker, grind off the heads of the rivets holding connecting links to cutter, ahead and behind the raker.

(f) To assemble, place rivet in rakers and set connecting links and cutters in pairs in position and peen over rivet heads.

(g) File and joint the replaced tooth so that it matches the other teeth.

b. Oregon (Cox) Chain

(1) Construction

The Oregon (Cox) chain consists of a right hand raker, left hand raker, drive link and connecting link (tie strap). This sequence is repeated throughout the entire chain.

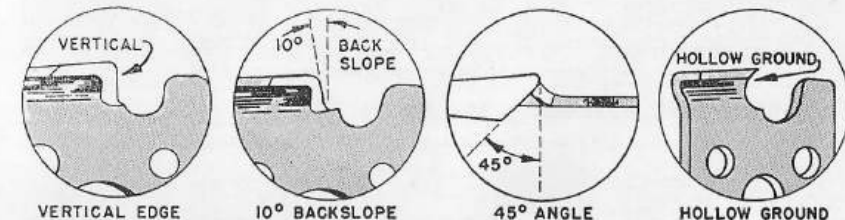


Figure 12b—Filing Oregon (Cox) Chain

(2) Filing (See Figure 12b)

(a) Keep side of cutting edge vertical. This permits easy feeding into the cut, and cuts the cross grain cleanly before the top plate routes the chip. It also makes the chain stay sharp longer.

(b) For hardwood or frozen timber more efficient results are obtained by permitting the side edge to slope about 10° backward, instead of being kept vertical as recommended above. This slight slope will provide a smoother cut, though it causes the chain to dull somewhat faster and requires more feed pressure by the operator.

(c) Keep top plate angle at 45°. Maintain this angle on all cutters, both left and right, thereby obtaining a straight, accurate cut and preventing excessive bar wear. Equal angles eliminate side draft; otherwise, the chain will run to the side which has the more acute angle. The bar rail on this side will wear down faster. The most common cause of variation in this angle is the different position taken by the filer when he changes sides.

(d) Get the hollow-ground form on the leading edge of the top plate. Obtain this efficient edge by using a 1/4" round chain saw file, held level and with 1/5 of its diameter showing above the top plate. If the file is held too high, the cutting edge will be blunt; if held too low, the edge will be thin and dull quickly.

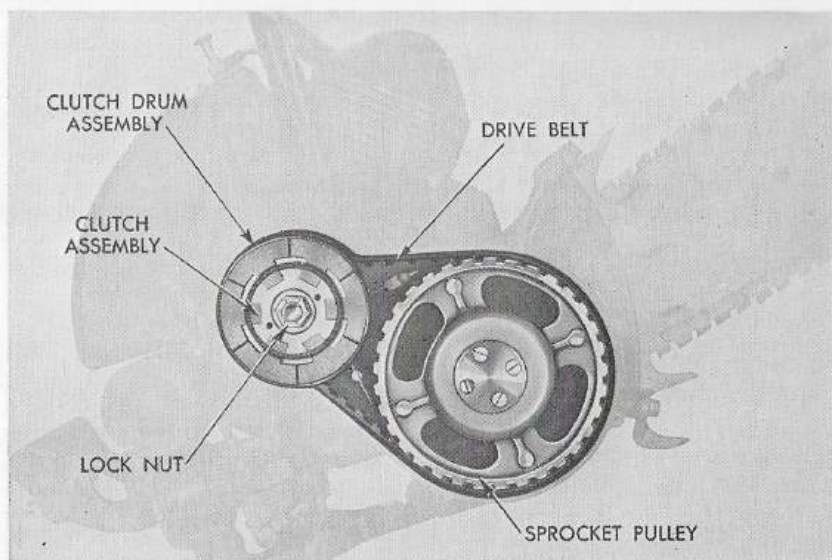


Figure 13—Drive Case Assembly

10. DRIVE CASE ASSEMBLY (See Figure 13)

(1) Remove the five 8-32 x 1/2" fil. head screws and lockwashers holding cover to drive case. Gasket is shellaced to drive case cover.

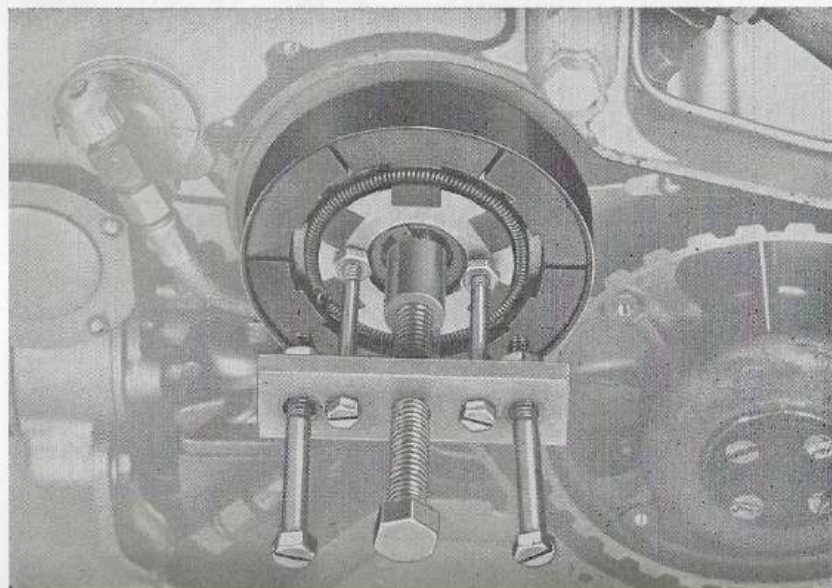


Figure 14—Pulling Clutch Spider Assembly

(2) If clutch spider assembly is oily or full of dirt, flush assembly clean with plain gasoline. (Not fuel mix).

(3) If drive belt is defective, remove the 1/2-20 flex locknut and flatwasher holding clutch assembly on shaft. Prevent shaft from turning by inserting a pointed tool through the air screen and blocking a rotor fin. Use puller as shown in Figure 14 to remove spider assembly. To remove clutch drum, use puller as shown in Figure 15.

(4) Start clutch drum on shaft. Place drive belt on clutch sprocket and start belt on large sprocket. Push clutch down on shaft slowly and at the same time turn drum to thread drive belt on large sprocket.

(5) Slide clutch spider on shaft with hub of spider toward drum. Line up the keyways and insert two keys between the shaft and the spider. Replace the flatwasher and lock assembly into position with the 1/2-20 flex locknut. Replace cover and fasten to drive case with five 8-32 x 1/2" fil. head screws and lockwashers.

(6) If, after these repairs, the saw does not operate properly, see Section V, paragraph 19.

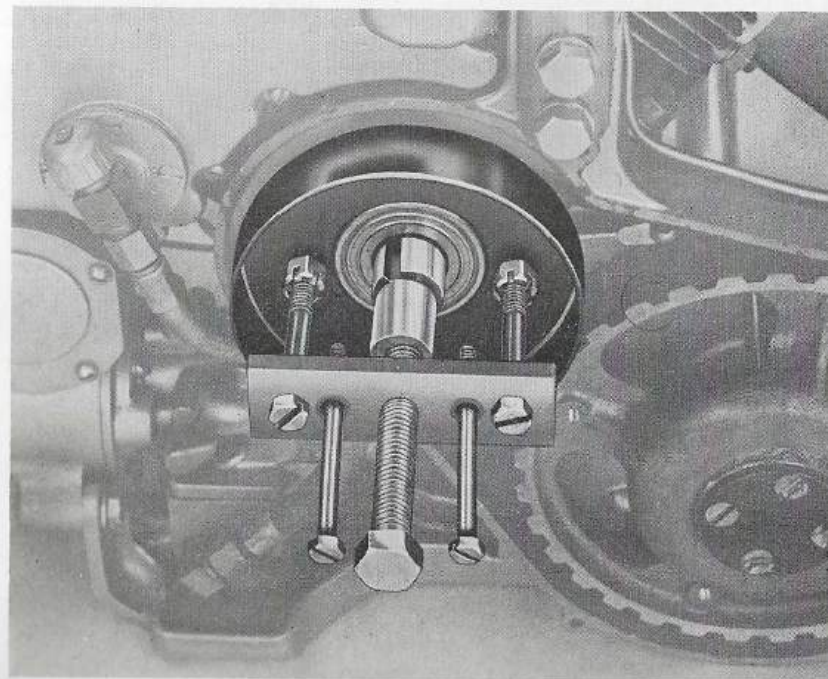


Figure 15—Pulling Clutch Drum Assembly

11. SPARK PLUG**a. Inspection**

Remove and inspect spark plug every 50 hours of operation. Clean both points and porcelain and adjust to .025" gap. If points are badly burned or porcelain is cracked, replace with a new spark plug, always using a Champion HO-8A or J-6 spark plug, with gasket in place.

b. Testing

(1) In locating engine trouble (first make certain there is fuel in the tank) it is always advisable to install a new spark plug to see if this corrects the difficulty. If it does not, leave the new plug in while checking further. Fouling of the plug may be caused by an excessive amount of oil. For correct mixing of oil see paragraph 2.e.

(2) If the spark plug is very wet, it indicates excess fuel in the cylinder. Too rich a setting of the carburetor tends to foul the plug and cause excess carbon. For correct setting of carburetor see paragraph 13.

c. Type

Spark plugs are made in a wide range of types to suit the temperature requirements of different engines. It is extremely important that a spark plug of the proper heat range be used with this Homelite engine. The Champion HO-8A or J-6 must always be used.

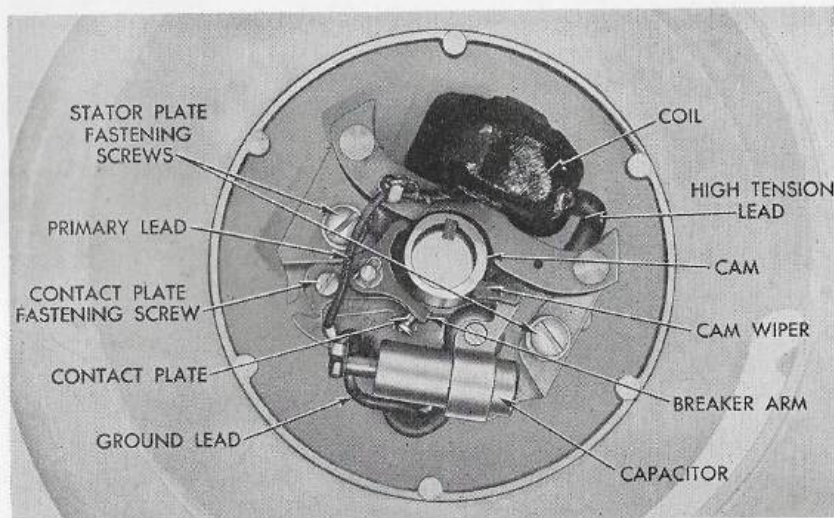


Figure 16—Magneto

12. IGNITION (See Figure 16)**a. Description**

The engine ignition is a high-tension flywheel type magneto mounted as a complete assembly on the crankshaft. It consists of a magnet mounted in the

rotor, a high-tension coil with laminated core mounted on the stator plate, contact point assembly and a condenser.

b. Testing Ignition Spark

Disconnect the high-tension lead from the spark plug and hold metal connector $\frac{1}{4}$ " from the cylinder shield. Spin the engine rapidly. If a strong spark jumps the gap, the ignition system is perfectly correct; check for the trouble in the spark plug. If there is a weak spark or no spark at all, check the magneto. *Be sure the toggle switch is in "on" position.*

NOTE

To prevent breaking the starter cable or recoil spring a slipping device is installed in the ball drive hub. If the engine does not turn over when the starter cable is pulled, this slipping device may need adjustment. Take your saw to your nearest Homelite branch or dealer for repair.

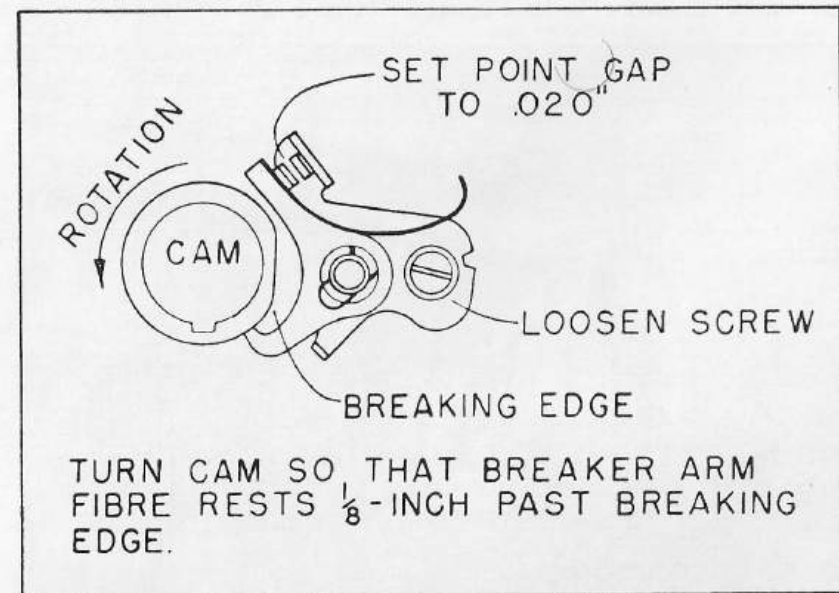


Figure 17—Adjusting Contact Points

c. Contact Point Adjustment (See Figure 17)

(1) The only magneto adjustment is at the contact points. The point-gap should be maintained at .020".

(2) Remove rotor.

(a) Pry pulley cover off air screen.

(b) Pull starter handle until about one foot of cable is exposed.

(c) Hold pulley and unwind cable from pulley, two turns. Let pulley turn under hand until recoil spring tension is released. Do not force pulley to turn. Unwind cable from pulley. Do not remove starter handle from cable.

(d) Place unit on drive case. Remove four 6-32 x 3/4" fl. head screws and lockwashers holding pulley to hub of ball drive assembly. Lift off pulley, being careful not to lose any of the plastic ring shims in pulley register. Shims are for adjusting the clearance between pulley and recoil spring cover.

(e) Remove four 10-32 screws and lockwashers holding air screen and recoil spring assembly to air shroud. Lift screen and recoil spring assembly slightly and with a screw driver push recoil spring loop away from hub. Lift assembly off shroud.

(f) Remove 7/16-20 flex locknut from end of shaft using socket wrench furnished in tool kit. Hold rotor to prevent shaft from turning.

(g) Remove the three LARGE flat head screws, not small screws, holding ball drive assembly to rotor. Turn hub clockwise until the flat side is located at screw to be removed. (Flat head screws are 1/4-20 x 5/8").



Figure 18—Pulling Magneto Rotor

(h) Slide ball drive assembly off shaft and remove thrust washers. If bearing sleeve remains on shaft, remove it and slide sleeve into ball drive assembly.

(i) Position rotor puller as shown in Figure 18 and turn down on jack screw until rotor is free of shaft; then remove rotor.

(3) Lift rubber spark plug cover (from name plate side) disconnect hi-tension lead and remove spark plug to relieve engine compression and permit turning the shaft.

(4) Turn shaft *counterclockwise* until breaker-arm cam-follower rests on highest point of cam (1/8" past breaking edge). Check gap with feeler gauge. Correct setting is .020".

CAUTION

It is highly important to separate points by hand and insert gauge between surfaces. Sliding gauge over the points will damage the surface.

(5) To adjust gap, slightly loosen screw which fastens contact plate to stator plate.

(6) Move the contact plate away from cam to increase gap, toward cam to decrease.

(7) Tighten contact plate fastening screw securely.

(8) Recheck gap with thickness gauge. Readjust if necessary. Tightening of screw sometimes changes adjustment.

(9) Uneven or pitted contact points can be restored to a true even condition by using a contact point dressing tool; after which all dust particles should be removed with a dry cloth. However, if contact points are in this condition, a new set is recommended. *Do not use a steel file on contact point surfaces.* Stiff paper or cardboard will remove the oxide formation resulting from long idleness.

(10) Reassemble Rotor.

(a) Align rotor keyway with key and slide rotor on shaft as far as possible.

(b) Place bearing sleeve from ball drive assembly on shaft. With 7/16-20 locknut, push rotor securely on shaft. Remove locknut and bearing sleeve. If wick between needle bearings is dry, reoil with a few drops of any good SAE-10 engine oil. Do not overoil. Replace bearing sleeve in balldrive assembly.

(c) Place one thrust washer on shaft. Replace ball drive assembly on shaft and fasten to rotor with three 1/4-20 x 5/8" flat hd. screws and crimped lockwashers. Rotate hub clockwise to align flat side with screw hole to replace screws. Draw down on screws evenly, be sure assembly is not cocked in rotor register. Position thrust washer and flat aluminum washer on shaft. Replace 7/16-20 locknut and tighten securely.

(d) Replace air screen and spring assembly on shroud so that all four holes are aligned. Fasten screen to shroud with three 10-32 x 1/2" and one 10-32 x 3/8" (through the casting) round head screws and lockwashers.

(e) Rotate hub of ball drive assembly clockwise until recoil spring hook drops into notch. Replace all shims in pulley. Position pulley assembly on hub with pin through hole in hub, and engage spring hook. Fasten pulley assembly to hub with four 6-32 x 3/4" fil. head screws and lockwashers.

(f) Place bead end of cable in pulley slot and wind cable on pulley counter-clockwise. Pull starter handle until approximately two feet of cable are exposed. Hold pulley and wind cable around the pulley two turns to set the proper tension on the recoil spring. Replace pulley cover. Reinstall spark plug, connect high tension lead and replace spark plug cover.

d. Coil and Condenser

If no spark, or only a weak one, is obtained after adjusting the points, trouble is most likely to be in the condenser or coil, although failure of these parts is not common. Replace condenser first and then the coil, after carefully checking all other parts of the magneto. (Coil and condenser can be checked at any reliable magneto service station). If no spark is obtained, one of the insulated wires may be grounded. Repair or replace defective wire.

e. Lubrication

The magneto should require no lubrication over a long period of service. After several hundred hours of operation, or if magneto is disassembled for any reason, it is advisable to check the wick for lubrication. Press wick between fingers; if lubricant appears on fingers, wick is in good order. When no lubricant appears on fingers, replace wick. If a new wick is not available, apply a few drops of SAE-10 engine oil to wick. Do not overoil.

f. High Tension Cable

A chafed or broken cable which causes continuous or intermittent misfiring should be replaced. Strip one end 1/2", twist strands and insert in coil. The bare end must be short and folded down close to the coil. (Do not solder).

13. CARBURETOR AND FUEL TANK

a. Carburetor

(1) This engine is equipped with an adjustable jet carburetor. Fuel is fed to the carburetor from the pressurized fuel tank. Fuel flows by gravity to the jet, which meters the flow of fuel to the venturi where it is vaporized and drawn into the engine.

(2) The mixture of fuel and air is controlled by the main adjustment screw. The normal setting of the main adjustment screw is 1 1/2 turns open from the closed position. Check the setting of the main adjustment needle by cutting wood with the saw. If exhaust is smoky, the setting of main adjustment screw is too rich; close needle slightly. If engine slows down when cutting or hesitates when throttle is opened suddenly, setting of main adjustment screws is too lean; open needle slightly.

(3) The setting of the idle mixture adjustment screw is 1 to 1 1/2 turns open from the closed position. Check setting when unit is idling and set idle mixture adjustment screw so unit runs smoothly.

(4) When unit is idling, the chain should not rotate. If chain rotates, turn throttle stop screw to the left until chain does not rotate. Check setting of idle mixture adjustment screw again and set for smoothest operation.

(5) If the engine will not idle or a new carburetor is installed, set the adjustments as follows:

(a) Set idle mixture screw 1 to 1 1/2 turns open from the closed position.

(b) Set main adjustment needle 1 1/2 turns open from the closed position.

(c) Start engine. If engine idles when the throttle button is depressed slightly, but stalls when button is completely released, gradually turn idle stop screw clockwise until engine keeps running.

(d) If engine will not idle at all, the idle by-pass tube may be plugged. Remove carburetor and clean, as instructed in Section V, paragraph 21(b).

(e) After trouble has been corrected, set carburetor as instructed above.

b. Fuel Tank

(1) The fuel tank is slightly pressurized from the crankcase. The pressure line and fuel tank cap must be tight.

(2) Inside the fuel tank is a flexible fuel outlet line which drops to the bottom of the tank in any position. This flexible line must be clean and tight and the strainer in the end must be clear.

(3) If fuel does not flow from fuel tank with shut-off valve open and fuel line to carburetor disconnected, remove the outlet fitting. It is held to the tank by four flat head screws. Clean the strainer in the end of the flexible fuel outlet line and flush out line and shut-off valve. Flush fuel tank with clear gasoline and reassemble outlet fitting in tank. Reconnect fuel line to carburetor.

c. Gum and Varnish

(1) To prevent formation of gum or varnish in fuel tank and carburetor, *always drain the fuel tank and carburetor* if the engine is to be idle for more than a month.

(2) If the engine is to be idle for a long period of time, remove outlet fitting and drain the fuel tank. Start the engine and run until it stops to use up all fuel in the carburetor.

(3) To clean gum or varnish from carburetor, remove carburetor and disassemble as instructed in Section V, paragraph 20. Immerse the carburetor body, cover, adjusting screw assembly, needle and seat assembly, float lever pin and float in Bendix Solvent and let them stand for 30 minutes. Remove and wash thoroughly in clean gasoline and blow air through holes in body, tubes and nozzle to clear.

Section IV TROUBLE SHOOTING

| | Paragraph |
|-------------------------|-----------|
| General | 14 |
| Engine Check List | 15 |
| Saw Check List | 16 |

14. GENERAL

The following check lists will be of considerable aid in locating and correcting troubles which may develop in the unit. It is advisable to make adjustments listed in Section III before disassembling the unit.

15. ENGINE CHECK LIST

In locating engine trouble, install a new spark plug to see if this corrects the difficulty. If not, leave new plug in while checking further.

| Trouble | Probable Cause | Remedy |
|--|--|-------------------------------------|
| Will not start | No fuel in tank | Fill. |
| Hard to start | Shut-off valve closed | Open. |
| | Engine throttled | Open throttle. |
| | Spark plug defective | Clean, adjust gap or replace. |
| | Weak spark | Check. See Para. 12. |
| | Filter in fuel tank clogged | Remove and clean. |
| | Water or dirt in fuel | Drain and clean. |
| | Carburetor jet clogged | Remove and clean. See Para. 20. |
| | Improper setting of needle | Adjust. See Para. 13. |
| | Loose or broken high tension lead | Tighten or replace. |
| | Contact points out of adjustment | Adjust. See Para. 12. |
| | Loose or grounded connections in magneto | Check. See Para. 12. |
| | Defective coil or condenser | Check. See Para. 12. |
| | Wrong type plug | Use Champion HO-8A or J-6. |
| | Overheating | Carburetor set too lean |
| Dirty carburetor jet | | Clean. See Para. 20. |
| Oil not thoroughly mixed with gasoline | | Drain tank and refill. See Para. 2. |
| Spark plug loose | | Tighten or replace gasket. |
| Spark plug defective | | Clean, adjust gap or replace. |
| Wrong type plug | | Use Champion HO-8A or J-6 |
| Contact points out of adjustment | | Adjust. See Para. 12. |
| Exhaust ports clogged | | Remove muffler and clean. |
| Piston and cylinder carbonized | Clean. See Para. 23. | |
| Muffler clogged | Clean. | |

| Trouble | Probable Cause | Remedy |
|--------------------------|--|-----------------------------|
| Low Power | Carburetor out of adjustment | Adjust. See Para. 13. |
| | Dirty jet | Clean. See Para. 20. |
| | Water or dirt in fuel | Drain fuel tank and refill. |
| | Oil not thoroughly mixed with gasoline | Drain fuel tank and refill. |
| | Contact points out of adjustment | Adjust. See Para. 12. |
| | Piston and cylinder carbonized | Clean. See Para. 23. |
| | Poor compression | Check. See Para. 23. |
| | Muffler clogged | Clean. |
| Defective crankcase seal | Replace. See Section V. | |

16. SAW CHECK LIST

Stop engine whenever any adjustment or inspection is made.

| Trouble | Probable Cause | Remedy |
|-----------------------|--------------------------|--|
| Will not cut | Chain dull | Sharpen. |
| | Chain reversed | Be sure cutting edge of chain rotates toward sprocket. |
| Chain will not rotate | Chain too tight | Adjust tension. |
| | No oil | Fill reservoir and lubricate chain. |
| | Chain jammed | Clean groove and free. |
| | Bar pinched | Remove chain. Open pinch. |
| | Dirty guide bar or chain | Remove chain and clean both. |
| | Guide bar worn | Replace. |
| | Clutch not working | Check. |
| Drive belt broken | Replace. | |

Section V

MAJOR OVERHAUL

| | Paragraph |
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| Swivel Handle | 19 |
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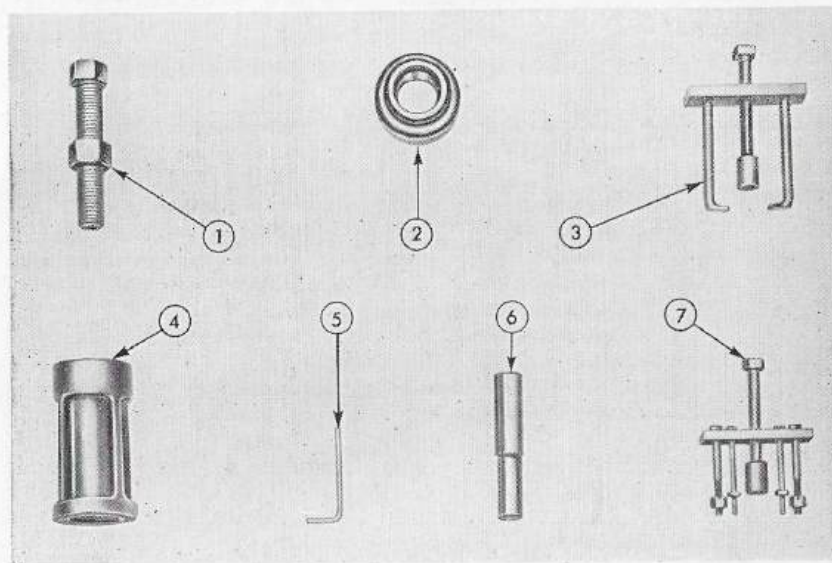


Figure 19—Special Service Tools

- | | |
|---|---|
| 1. AA-22680 Jack Screw Assembly | 5. 22126 Key, Allen |
| 2. 22678 Adapter Assembly | 6. 22692 Remover, Bearing |
| 3. AA-22592 Puller, Clutch drum bearing | 7. AA-22803 Clutch and Clutch Drum Puller |
| 4. AA-22557 Assembly fixture | AA-22560 Magneto Rotor Puller (See Figure 11, No. 5) |

17. GENERAL

The complete unit should be inspected at least once a month for general condition, cleanness and proper operation. If the operation of the engine is faulty or

the saw is operating poorly, refer to the Trouble Chart, Section IV. If disassembling is found necessary, follow instructions in this section. When ordering parts always refer to the parts list for correct part number and description.

18. CHAIN, GUIDE BAR AND DRIVE CASE

a. Disassembly

- (1) Loosen two $\frac{3}{8}$ -16 hex nuts locking tension device and guide bar. Turn adjusting screw counterclockwise a few turns to relieve chain tension.
- (2) Remove the two nuts and lockwashers. Remove adjusting device, guide bar and chain. Remove guide bar shim.
- (3) Remove five 8-32 x $\frac{1}{2}$ " fillister head screws and lockwashers holding drive case cover to drive case.
- (4) Prevent shaft from turning by inserting a pointed tool through the air screen and blocking a rotor fin. Remove the $\frac{1}{2}$ -20 flex locknut and flat washer

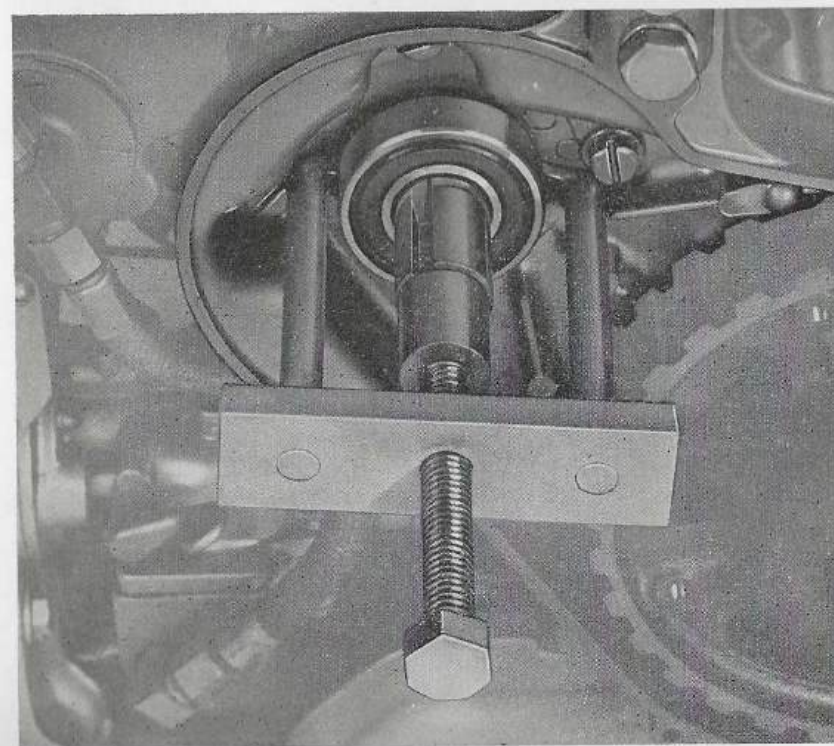


Figure 20—Pulling Rear Clutch-Drum Bearing

holding clutch assembly to crankshaft. Position puller as shown in Figure 14 and turn down on jack screw until clutch spider assembly is free. Be careful not to lose the two clutch keys.

(5) Position puller as shown in Figure 15 and turn down on jack screw. Turn clutch drum to the right to thread drive belt off sprocket pulley. Turn down on jack screw until clutch drum is free of shaft. Remove clutch drum assembly and drive belt. If bearing remains on shaft, remove with puller as shown in Figure 20

(6) Disconnect oil line at pump end and at drive case and remove oil line. Remove the 10-32 x $\frac{3}{8}$ " round head screw and lockwasher holding fuel tank to drive case.

(7) Remove the $\frac{1}{4}$ -20 x $\frac{3}{4}$ " hex head bolt and lockwasher holding carburetor guard to drive case.

(8) Remove four $\frac{1}{4}$ -20 x $\frac{3}{4}$ " hex head screws and lockwashers (around crankshaft) holding drive case to crankcase. Angle drive case so handle will clear engine and remove case and handle together.

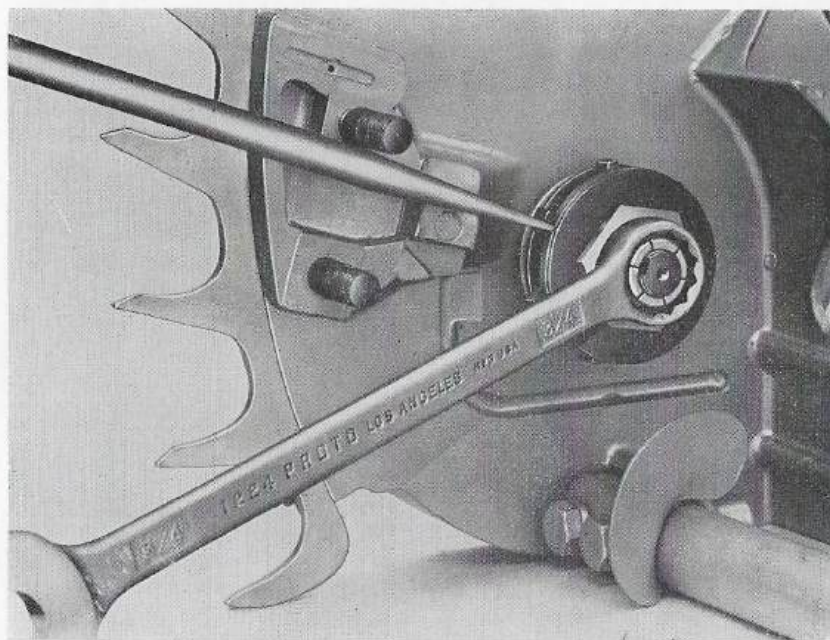


Figure 21—Blocking Chain Drive-Sprocket to Remove Locknut

(9) To remove chain drive sprocket, remove the $\frac{1}{2}$ -20 flex locknut holding sprocket to shaft. To prevent shaft from turning, block sprocket with screw driver against teeth as shown in Figure 21. With a soft mallet, tap on threaded

end of shaft to drive shaft out of drive case. Be careful not to lose the sprocket key.

(10) Use a Tru-Arc snap ring tool to remove bearing retaining snap ring. Insert bearing remover and drive bearings from drive case.

b. Inspecting Chain, Guide Bar and Drive Case

(1) Inspect chain for damaged teeth or loosened rivets. To repair damaged chain, refer to Section II, Paragraph 9c.

(2) Inspect guide bar groove for wear. If groove is worn wider than approximately .070" on the bottom side (cutting side), the guide bar should be reversed top for bottom. If this has been done, replace guide bar. All burrs resulting from wear should be removed. Check the guide bar groove for uneven wear. If one side is higher than the other, file the guides square with the guide bar groove.

(3) Replace the spiked bumper plate if any of the spikes are broken. Dull spikes should be sharpened.

(4) The chain drive sprocket should be inspected for wear at the point of contact with the chain. If badly worn, replace sprocket.

(5) Inspect sprocket shaft for excessive wear. Key must fit tightly in keyway.

(6) Sprocket shaft bearings are the shielded type and require no lubrication. Bearings should rotate smoothly; if a bearing is rough turning or has excessive radial play, replace it.

(7) If the large pulley sprocket is loose on the shaft or shows any sign of wear, it must be replaced.

(8) To inspect clutch drum bearings, place the clutch drum assembly upon drum and with a punch drive the bottom bearing from recess. Use the slot in the spacer to locate punch on inner race to drive out. Use bearing remover to drive out the other bearing.

(9) Both clutch drum bearings are the same and are the shielded type requiring no lubrication. Bearings should rotate smoothly; if a bearing is rough turning or has excessive radial play, replace it.

(10) Clutch drum must be smooth, free of ridges and cracks. Bearings must fit tightly into bearing bore in clutch drum.

(11) Inspect clutch assembly for broken springs and broken or cracked shoes. Broken springs or shoes must be replaced.

(12) If guide bar shim is worn or damaged, it must be replaced.

c. Assembling Drive Case Subassembly

(1) Replace the small sprocket shaft bearing with seal side toward chain drive sprocket. Replace bearing spacer. Replace the large sprocket shaft bearing. Use bearing remover tool to replace bearings. Replace Tru-Arc snap ring.

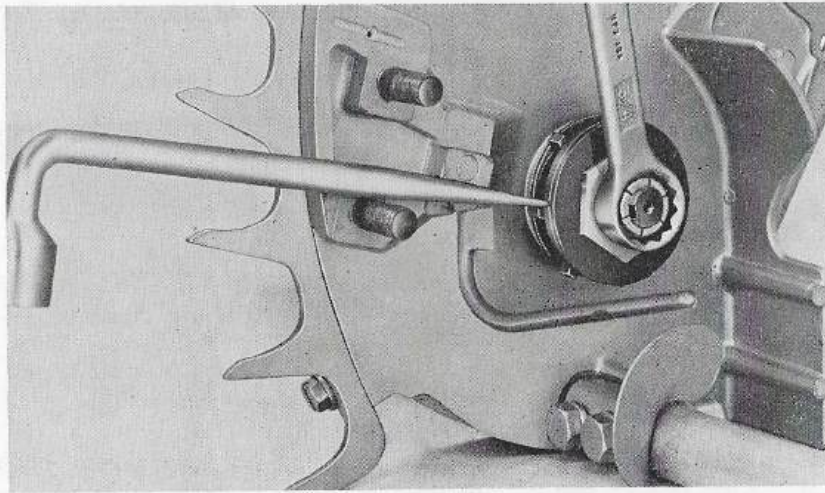


Figure 22—Blocking Chain-Sprocket to Tighten Locknut

(2) If sprocket pulley has been removed from sprocket shaft, replace it. Fasten sprocket pulley to shaft with four 10-32 x 1/2" flat head screws. Stake screws to shaft.

(3) With a mallet, drive the sprocket shaft into position. Place the small spacer on sprocket shaft. Replace chain drive sprocket key. Position chain drive sprocket on shaft, hex nut away from drive case, replace flex locknut and tighten securely. Block shaft with screw driver against sprocket as shown in Figure 22.

(4) If handle bar has been removed, replace handle bar and fasten to drive case with four 5/16-18 x 1 1/2" aluminum hex head bolts and lockwashers.

(5) If clutch drum bearings have been removed, replace one bearing from drum side. Then replace spacer and the other bearing from the rear.

19. SWIVEL HANDLE

a. Disassembling Swivel Handle Assembly

- (1) Close fuel shut-off cock all the way.
- (2) Disconnect fuel line at fuel tank and at carburetor inlet connector.
- (3) Loosen screw holding long throttle rod to throttle lever, depress throttle button and remove throttle rod from carburetor.
- (4) Unsnap cleaning brush and remove.
- (5) Depress swivel handle indexing lever and turn swivel handle to the left until lever drops into indexing slot. Remove two 1/4-20 x 7/8" hex head screws and lockwashers holding swivel handle to crankcase and remove swivel handle.

NOTE

No further disassembly of the swivel handle is necessary unless some part is known to be defective.

(6) To remove indexing lever, drive out pin holding lever to handle from left side. Remove indexing lever, plunger and plunger spring from recess.

(7) Remove four 6-32 x 3/8" fillister head screws and lockwashers holding swivel handle plate to swivel handle. Remove swivel handle plate and shim. Hold bracket and pull and turn handle to slide handle assembly from bracket.

(8) Remove three 6-32 x 3/8" round head screws and lockwashers holding air filter cap to bracket and remove cap. Remove air filter from recess. Be careful not to lose the two rubber gaskets.

(9) Remove throttle lever screw, nut and washer holding throttle lever to handle assembly. Remove throttle lever. Do not remove throttle lock pin and spring unless defective. To remove throttle button retaining screw, located in guide slot, press throttle button until screw is clear and can be turned with a small screw driver. Release throttle button slowly; remove throttle button and throttle button spring from handle.

b. Inspecting Swivel Handle Assembly

- (1) Swivel handle must fit snugly in bracket bushings. If handle is very loose fitting, the bracket must be replaced. If the "O" ring gaskets are deteriorated, replace them.
- (2) All springs must have good tension and no broken coils.
- (3) Throttle button and indexing lever plunger must fit freely in recesses.
- (4) Swivel handle shim must be smooth and free of ridges.
- (5) Air filter must be clean. It can be washed in clear gasoline (not fuel mix). Filter must be replaced or cleaned if the engine exhaust is very smoky when the carburetor setting is normal.
- (6) If carburetor guard is broken, replace it.

c. Reassembling Swivel Handle Assembly

- (1) Wash all parts in clean gasoline (not fuel mix) and dry thoroughly.
- (2) Position one air filter gasket in bracket; slide air filter into position. Install second gasket and fasten air filter cap to bracket with three 6-32 x 3/8" round head screws and lockwashers.
- (3) Lubricate bushing with a few drops of oil and spread oil with finger. Position "O" ring gaskets in recesses of handle bracket. Slide swivel handle into bracket in bucking position. Position swivel handle shim and fasten swivel handle plate to handle with four 6-32 x 3/8" fillister head screws and lockwashers.

NOTE

The smaller of the two grooves in the swivel handle plate must face up, toward air cleaner.

- (4) Replace indexing-lever-spring and plunger into recess in bracket. Position indexing lever and drive in lever-pin from the right (outside).
- (5) Place throttle button spring in handle. Push throttle button in handle and replace throttle button retaining screw.
- (6) Position throttle lever and fasten to handle with throttle lever screw, washer and nut.
- (7) All the plungers, levers and linkage should have a thin coating of very light engine oil.

20. CARBURETOR**a. Disassembly of Carburetor**

- (1) Disconnect idle fuel line at carburetor swivel flange and crankcase inlet connector and remove carburetor.
- (2) To remove intake manifold, remove two $\frac{1}{4}$ -20 x $\frac{3}{4}$ " hex head screws and lockwashers holding manifold to crankcase.

CAUTION

Before any disassembling or inside adjustments are performed, the main adjustment needle assembly must be removed from the carburetor.

- (3) Remove main adjustment needle assembly from carburetor.
- (4) Remove four screws and lockwashers holding float bowl (lower half) to upper half of carburetor body. Remove float bowl gasket.
- (5) Remove idle mixture adjustment screw and spring. Remove idle tube (screw in center of top of upper half of carburetor body) and gasket.
- (6) Turn upper half of carburetor body over and remove main-nozzle-channel plug-screw. It is not necessary to remove the main nozzle.
- (7) Remove float-lever pinion-screw from float bowl. Be careful not to drop the float.
- (8) Remove large float-bowl plug-screw. Remove inlet needle and, with a screw driver with blade wide enough to fill screw slot, remove inlet needle seat and gasket. For normal inspection and repair, no further disassembly is required.

b. Inspection and Service of Carburetor

- (1) Clean all metal parts with cleaning solution and rinse in solvent.
- (2) Blow out all passages in the upper and lower halves of the carburetor body. The main jet, inlet needle seat and idle tube must be blown clean. Do not use a drill or wire to clean jets, passages, tubes or seats.

(3) Inspect main adjustment needle, idle mixture adjustment needle and inlet needle for ridges or other signs of wear. They must be smooth and free of ridges.

(4) The float assembly must be air-tight and free of dents. Inspect the vertical float lever for wear at the point of contact with the inlet needle. This spot should be smooth. Inspect the float pinion bearing and the float lever pinion screw for wear.

(5) Replace all gaskets. Use new gaskets and fiber washers every time the carburetor is disassembled.

c. Reassembly of Carburetor

- (1) Replace main-nozzle-channel plug-screw.
- (2) Replace idle mixture adjustment screw and spring.
- (3) Replace idle by-pass tube and gasket.
- (4) Replace inlet needle seat and gasket. Replace inlet needle and large float-bowl plug-screw.
- (5) Position float and replace float-lever pinion-screw.
- (6) Check float level: Invert carburetor bowl (lower half) and measure float setting. The float setting is measured from the machined surface of the carburetor float bowl (without gasket) to the bottom side of the float at the lowest point. This measurement should be $\frac{1}{32}$ " (see Figure 23.) To level the float remove float and slightly bend (using long-nose pliers) the vertical flat lever to obtain the proper measurement.

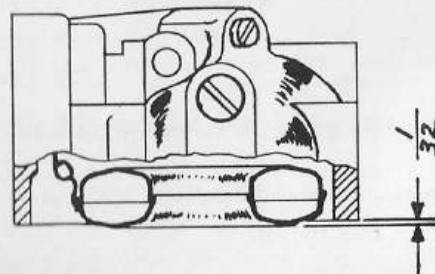


Figure 23—Float Setting

The float setting is measured from the machined surface of the carburetor float bowl (without gasket) to the bottom of the float at the lowest point.

CAUTION

Be careful not to bend or twist the float body.

- (7) Replace the float bowl gasket and join the two halves of the carburetor with four screws and lockwashers.
- (8) Replace main adjustment needle assembly and gasket. Back needle out of packing gland a few turns before tightening.
- (9) If carburetor swivel flange has been removed, place a new flange gasket

on studs. Be sure the idle hole in gasket is aligned with hole in carburetor and swivel flange. Fasten flange to carburetor with two 1/4-20 hex nuts and lockwashers. Idle elbow connector must be on top. Connect idle fuel line to elbow. An aluminum spacer and a swivel gasket are cemented to the inlet flange of the carburetor (opposite the swivel flange). If they become loose, fasten them to the carburetor flange with shellac. Be sure the cut-out sections of the spacer face the top of the carburetor and that the two dimples in the spacer fit into the holes in the carburetor flange.

(10) Adjust carburetor as instructed in Section III, paragraph 13.

21. FUEL TANK

a. Disassembly of Fuel Tank

- (1) Disconnect the pressure line. Remove two 10-32 x 3/8" round head screws and lockwashers holding fuel tank to air shroud and remove fuel tank.
- (2) Remove four 6-32 x 1/4" flat head screws holding outlet fitting to fuel tank and remove outlet fitting assembly and gasket.
- (3) Remove shut-off cock from outlet fitting only if shut-off cock is known to be defective.

NOTE

Disassemble oil pump only if it fails to operate properly.

- (4) Remove four 6-32 x 3/8" round head screws and lockwashers holding oil pump in oil reservoir. Angle oil pump and lift up and out of reservoir. Remove cover plate gasket.
- (5) With a 1/2" wrench, remove the plunger button assembly, being careful not to lose the plunger or plunger spring.
- (6) Remove straight adapter (for oil line), 90° elbow connector and the adapter fitting.
- (7) Remove the check ball spring screw from pump body. Remove check ball spring and check ball.
- (8) Remove inlet screen assembly, elbow adapter, check ball and spring from intake side (long side) of pump body.

b. Inspection of Fuel Tank

- (1) Inspect flexible outlet fitting strainer for dirt, holes or deterioration. If found faulty, clean or replace.
- (2) Inspect flexible feed line for ruptures or deterioration. If found faulty, replace.
- (3) If inside of fuel tank is dirty, flush out with clean gasoline.
- (4) Wash all parts of oil pump in clean gasoline and inspect parts for excessive wear. Springs must have full tension. Check balls must be smooth and free of ridges. Plunger must fit snugly into pump body. Blow all passages in pump body clear.

c. Assembly of Fuel Tank

- (1) Replace outlet fitting assembly with gasket in fuel tank and fasten with four 6-32 x 1/4" flat head screws.
- (2) If shut-off cock has been removed, replace.
- (3) To reassemble oil pump, place one check ball spring into intake side (long side) of pump body, inserting the large end of the taper first.
- (4) Position check ball against end of spring and reassemble elbow adapter and inlet screen assembly.
- (5) Drop the other check ball into recess on short end of pump body, insert check ball spring (small end of taper against ball) and replace check ball spring screw.
- (6) Replace oil pump cover, adapter fitting (through small hole in cover), elbow connector and oil line adapter.
- (7) Through large hole in cover insert plunger spring, plunger and plunger button. Tighten both discharge adapter and plunger button assembly securely to cover.
- (8) Replace pump cover gasket and replace pump assembly in oil reservoir. Fasten into position with four 6-32 x 3/8" round head screws and lockwashers.

22. IGNITION

a. Disassembly of Ignition System

- (1) Remove two sheet metal screws holding cylinder shield to air shroud and slide off cylinder shield.
- (2) Disconnect high-tension lead from spark plug.
- (3) Remove spark plug from cylinder.
- (4) Remove three 1/4-28 hex nuts and lockwashers holding muffler to cylinder. Remove muffler and flange gasket.
- (5) Pry off starter pulley cover. Pull starter handle until about one foot of cable is exposed. Hold pulley and unwind cable from pulley two turns. Let pulley turn under hand until recoil spring tension is released. Do not force pulley to turn. Unwind cable from pulley and remove cable. Do not remove handle from cable.
- (6) Remove four 6-32 x 3/4" fillister head screws and lockwashers (center of pulley) holding pulley to hub of ball drive assembly. Lift pulley off, being careful not to lose any of the plastic ring shims in pulley register. Shims are for adjusting the clearance between pulley and recoil spring cover.
- (7) Remove four round head screws and lockwashers holding air screen and recoil spring assembly to air shroud. Lift screen and recoil spring assembly slightly and with a screw driver, push recoil spring loop away from hub. Lift assembly off shroud.

(8) Remove 7/16-20 flex locknut from end of shaft using socket wrench furnished in tool kit. Hold rotor to prevent shaft from turning. Remove lock-washer, flat washer and thrust washer.

(9) Remove the three large flat head screws and washers, not small screws, holding ball drive assembly to rotor. Turn ratchet clockwise until the flat side is located at screw to be removed. (Flat head screw size, 1/4-20 x 3/4".) Slide ball drive assembly off shaft. If bearing sleeve has remained on shaft, remove bearing sleeve and insert in ball drive to protect needle bearings. Remove the other thrust washer.

(10) Position rotor puller as shown in Figure 18 and turn down on jack screw until rotor is free of shaft, then remove rotor.

(11) Disconnect pressure line from crankcase. Remove toggle stop switch, the lead to the switch and the clip which holds the pressure line, high-tension lead and toggle switch lead. Remove spring washer from crankshaft. Remove two 1/4-20 x 1 1/8" fillister head screws and lockwashers holding stator plate. Lift up stator plate assembly and at same time push high-tension lead and toggle switch lead through grommet from behind the back plate. Remove rotor key, cam and cam key. Remove 1/4-20 x 3/4" fillister head screw and lockwasher. Remove air shroud and back plate from crankcase.

b. Inspection of Magneto

Refer to Section III, paragraph 12, for detailed inspection. For testing purposes, the resistance reading of the coil and condenser are listed below.

Condenser reading—Infinity

Primary coil winding—Approximately .55 ohms

Secondary coil winding—Approximately 5500-6000 ohms

23. ENGINE

a. Disassembly of Engine

(1) Remove four 5/16-24 hex nuts and lockwashers holding cylinder to crankcase and lift off cylinder.

(2) Remove cylinder gasket.

NOTE

Do not disassemble the crankcase to replace a piston, piston ring or piston pin needle bearing. These parts can be replaced without taking the crankcase apart. If the main bearing or the needle rollers in the connecting rod are known to be defective, then the crankcase must be disassembled.

(3) Remove seven 1/4-20 x 7/8" hex head bolts and lockwashers holding two halves of the crankcase together.

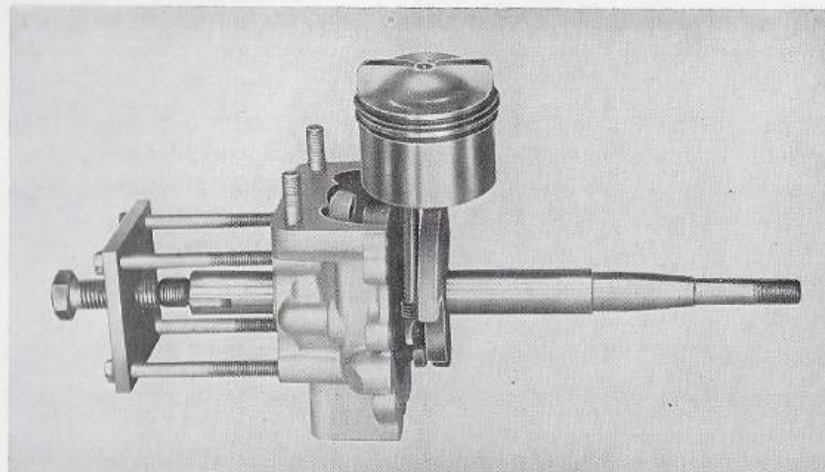


Figure 24—Disassembling Crankshaft

(4) To remove the front-half of crankcase, tap the end of the crankshaft lightly and slide front-half of crankcase from shaft.

(5) To remove governor, hold governor weight away from shaft and slide governor off shaft.

(6) Remove two special screws and thin lockwashers which hold the main bearing in position in the rear-half of the crankcase. Set these screws and lockwashers to one side; they are special.

(7) Use four screws, 1/4-20 x 3", through the four holes of the rotor puller and position puller on rear-half crankcase as shown in Figure 24. Turn down on jack screw to push shaft from rear-half crankcase.

(8) The main bearing is not to be removed from the crankshaft unless it is defective. To remove, pry off snap ring by inserting knife point in the retaining ring groove. Hold crankshaft in hand and tap on the outer edge of bearing.

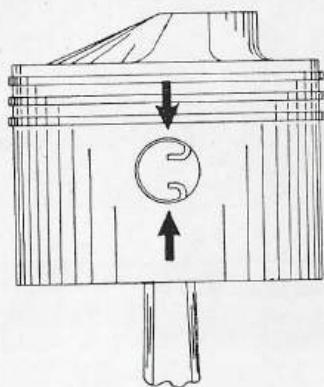
(9) Remove crankcase sealing gasket from crankcase.

(10) To disassemble the connecting rod and piston, lay crankshaft on bench and remove two Allen screws holding bearing cap, lower-half of connecting rod, to the top-half of connecting rod. Be very careful to watch the needle rollers as the cap is removed. There are 31 needles.

(11) Remove the two piston pin retaining rings and drive out the piston pin.

b. Inspecting Engine

(1) Ball Bearings. It is highly important that all open bearings be thoroughly cleaned with solvent and oiled immediately. Wrap in paper until ready for assembly. Bearings should rotate smoothly. If a bearing is rough turning or has excessive radial play, replace it.



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

Figure 25—Testing Piston and Pin

(2) Cylinder and Piston.

(a) If the piston is badly scored, the ring grooves worn or the piston pin loose in the piston, replace both piston and pin. To test the fit of the piston and pin, hold the piston in one hand with the end of the pin toward you. Push the connecting rod toward the head of the piston. If you can see the pin move in the direction of the arrows in Figure 25, replace both piston and pin. These parts are furnished together, as the piston pins are selectively fitted to each piston.

(b) Scrape all carbon or lead deposits from the cylinder head and ports, piston head and ring grooves in the piston.

(c) Maximum clearance in the cylinder and piston assembly permissible for satisfactory performance is as follows:

| | Max. | Min. | Remedy |
|--|---------|---------|---|
| Between cylinder and piston assembly | .006" | .002" | If over .006", replace cylinder. |
| Side clearance for piston rings | .004" | .0025" | If over .004", replace rings or piston. |
| End or butt clearance with ring in place in cylinder | .075" | .070" | If over .075", replace rings. |
| Piston ring tension | 6½ lbs. | 4½ lbs. | If less than 4½ lbs., replace rings. |

(3) Connecting Rod and Bearings.

(a) One needle bearing is installed in the small end of the connecting rod and should not be removed unless defective.

(b) The 31 needle rollers in the large end of the connecting rod at the crankthrow are not to be replaced unless they are burred or burned, or known to be otherwise defective.

(4) Crankcase.

(a) The mating faces of the crankcase halves must be smooth and clean to insure a proper seal.

(b) The crankcase sealing gasket seat must be smooth and free of ridges.

(c) The intake valve plate must be smooth and free of ridges. If deteriorated, replace.

(d) The bushing in the front-half of the crankcase must be smooth and not scored. If bushing is badly worn, the front-half of the crankcase must be replaced. The bushing is die cast into position and cannot be replaced separately.

CAUTION

If the front-half of the crankcase is replaced, polish the crankshaft with a strip of 5/0 emery cloth of 180 grit to remove any high spots or ridges. Wipe the crankshaft clean before assembling crankcase halves. If both crankcase and crankshaft are replaced, do not polish the NEW crankshaft.

(e) The seals at the end of the crankcases are rubber and should be soft to give a proper seal. If seals are deteriorated or hard, they must be replaced.

(f) Inspect the idle line elbow and pressure line connector in front half of crankcase. If threads are defective, replace.

c. Reassembling Engine

(1) Assembling Piston Assembly.

(a) Assemble needle bearing in small end of connecting rod.

NOTE

Replacement connecting rod has the needle bearing assembled in the wrist pin hole.

(b) Line up piston with connecting rod and drive piston pin into place. Install two new piston pin retaining rings. Slide piston rings into grooves. All three piston rings must be aligned with the piston ring retaining pin.

(c) Pack top-half of connecting rod with a sufficient amount of grease to hold needles in place. With a pair of tweezers, position 15 needle rollers in the top-half. Apply a light coating of grease to the bearing cap and with a pair of tweezers position 16 needle rollers. *When assembling piston onto crankshaft, be sure exhaust side of piston, the tapered side, is to the left of the crankshaft looking at the crankshaft from the long tapered timing end (see Figure 26).*

Check mating marks on connecting rod. Slide top-half of connecting rod with piston over crankshaft. Place bearing cap into position and lock with two Allen screws. Lightly tighten screws first before final locking. Rotate piston and connecting rod assembly around crankshaft to be sure there is no binding. If binding occurs, one or more needles are out of alignment or overlapping each other.

CAUTION

Always install a new crankcase sealing gasket behind the main bearing whenever the crankshaft is removed. Oil the gasket before installation and carefully wipe off any excess oil.

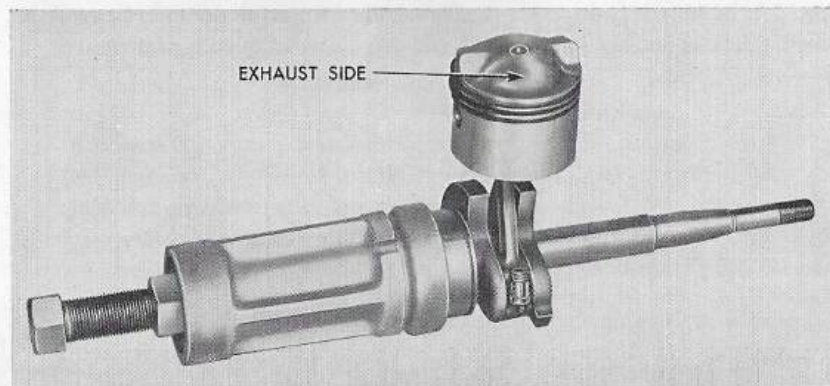


Figure 26—Assembling Main Bearing

(d) If main bearing has been removed from crankshaft, reassemble bearing with assembly fixture, adapter and jack screw as follows (see Figure 26): Slide bearing onto crankshaft with retaining groove toward the crankthrow. Place large end of the adapter next to bearing. Place assembly fixture next to adapter and screw jack screw onto crankshaft stud (right-hand thread). Turn down on hex nut of jack screw, holding head of jack screw with a wrench, until bearing is in place on crankshaft. Remove jack screw assembly fixture and adapter, and slide the snap ring into position.

(2) Assembling Crankshaft in Crankcase (Figure 27).

(a) Place a new crankcase sealing gasket in position in rear-half crankcase.

(b) Start crankshaft through crankcase as far as possible by hand. Place assembly fixture over shaft and against register of crankcase; insert jack screw and screw it onto the crankshaft stud (right-hand thread). Turn down on the nut, holding head of jack screw with a wrench, until crankshaft is drawn into place. Remove the jack screw and assembly fixture.

(c) Fasten the main bearing in place with the two special main bearing retaining screws and special thin lockwashers.

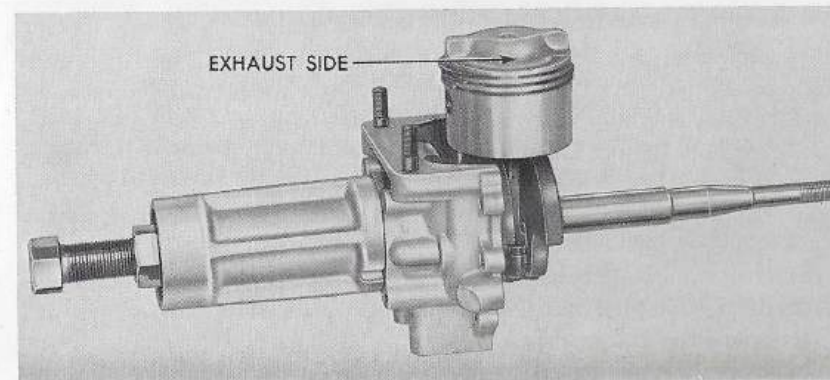


Figure 27—Assembling Crankshaft

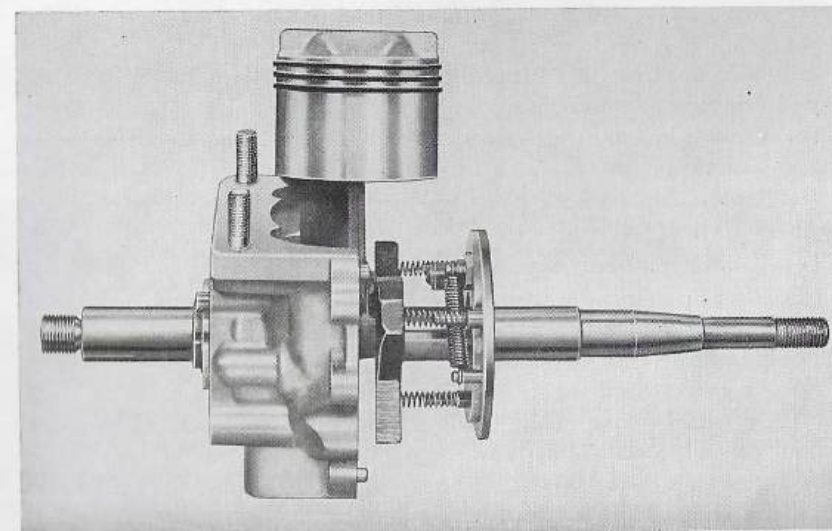


Figure 28—Assembling Governor

(3) Assembling Governor (Figure 28).

Hold governor weight open and slide governor onto shaft. Line up the three springs with the spring holes in the crankshaft.

(4) Assembling Crankcase.

Slide front-half of crankcase onto crankshaft and into position; lock securely with seven $\frac{1}{4}$ -20 x $\frac{7}{8}$ " slotted hex head bolts and lockwashers. Apply a light coat of grease to crankcase face and position a new cylinder gasket on studs. If idle line elbow or pressure line connector were removed from the front-half of the crankcase, replace them.

(5) Assembling Cylinder.

Oil piston, piston rings and cylinder bore. Locate piston rings over the piston ring retaining pin (pin keeps rings from rotating), compress the piston rings and slide cylinder onto piston. Fasten into position with four 5/16-24 hex nuts and lockwashers. Be sure exhaust ports are facing to the left side of the engine. (Toward the intake manifold flange).

(6) Assembling Ignition.

(a) If air shroud and back plate assembly have been disassembled, reassemble and position back plate on shaft. Fasten into place with one 1/4-20 x 3/4" fillister head screw and lock washer.

(b) Insert high-tension and toggle switch lead through grommet, position stator plate on back plate and fasten with two 1/4-20 x 1 1/8" fillister head screws and lockwashers.

(c) Replace cam with arrow for direction of rotation toward you and slots to the rear.

(d) Slide small cam key between shaft and cam, beveled side in shaft and toward crankcase. Replace spring washer.

(e) Connect lead to toggle switch and install in air shroud. Connect pressure line to crankcase.

(f) Replace clip on back plate over pressure line, high-tension lead and toggle switch lead.

(g) Position rotor key, align rotor with key and slide rotor onto shaft.

(h) Place bearing sleeve from ratchet assembly on shaft against rotor. With 7/16-20 flex locknut, push rotor securely on shaft. Remove 7/16-20 flex locknut and bearing sleeve.

(i) Place steel thrust washer and formica washer on shaft against the rotor.

(j) Oil wick between needle bearings if wick has been replaced or is dry. Do not over-oil. Slide bearing sleeve into position. Slide ratchet assembly on shaft. Fasten ratchet assembly to rotor with three 1/4-20 x 3/4" flat head screws and special crimped lockwashers. Rotate hub of ball drive assembly clockwise to align flat side with screw hole to replace screws. Draw down on screws evenly; be sure assembly is not cocked in rotor register.

(k) Place one thrust washer, flat aluminum washer and lockwasher on shaft. Place 7/16-20 flex locknut on shaft and tighten securely. Hold rotor to prevent shaft from turning.

(l) Replace air screen and recoil spring assembly on air shroud. Use a screw driver to push spring hook to one side so assembly will go over hub. Fasten screen to shroud with three 10-32 x 1/2" and one 10-32 x 3/8" (through cable bracket) round head screws and lockwashers.

(m) Rotate hub of ball drive assembly clockwise until recoil spring hook drops into notch. Replace all shims in pulley assembly. Position pulley assembly on hub with pin through hole in hub, and engage spring hook. Fasten pulley

assembly to hub with four 6-32 x 3/4" fillister head screws and lockwashers. Check clearance between pulley assembly and recoil spring cover. This clearance must be at least 1/32" all the way around. (Shims are 1/32" thick.)

(n) If cable has been removed, feed end of cable through bushing in bracket. Position bead of cable in pulley slot and wind cable on pulley in a counter-clockwise direction. Pull starter grip slowly until about two feet of cable are exposed. Hold pulley and wind cable on pulley two turns to set the proper recoil tension of recoil spring. Replace pulley cover.

(o) Place muffler gasket on studs. Position muffler on studs and fasten with three 1/4-28 hex nuts and lockwashers.

(p) Replace spark plug with gasket in place and tighten securely. Connect high-tension lead to spark plug.

(q) Position shield on cylinder and fasten to air shroud with two sheet metal screws.

24. REASSEMBLING SAW**a. Assembling Fuel Tank to Engine****NOTE**

If fuel tank has been disassembled in detail follow instructions in Paragraph 21c. to reassemble fuel tank.

(1) Fasten fuel tank to air shroud with two 10-32 x 5/8" round head screws and lockwashers.

(2) Connect pressure line to adapter in fuel tank.

b. Assembling Swivel Handle to Engine

(1) If carburetor guard has been removed, assemble guard to swivel handle with two 1/4-20 x 3/4" hex head bolts and lockwashers.

(2) Position swivel handle on crankcase and over fuel tank bracket and fasten to crankcase with two 1/4-20 x 7/8" hex head screws and lockwashers. Insert air cleaner brush into air filter and snap on to fastener on air shroud.

c. Assembling Carburetor and Intake Manifold to Engine

(1) Place engine so it rests on fuel tank and on swivel handle, cylinder pointing left, muffler up.

(2) Connect idle fuel line to elbow in crankcase.

(3) Align the carburetor with swivel gasket in place, in the recess of the swivel plate. Position manifold gasket and manifold, with the other swivel gasket, and fasten to crankcase with two 1/4-20 x 3/4" hex head screws and lockwashers.

d. Assembling Drive Case to Engine

(1) Position drive case on crankcase, so that the locating holes in the drive

case fit over the two dowel pins in the crankcase (spiked bumper facing up). Fasten drive case securely with four $\frac{1}{4}$ -20 x $\frac{3}{4}$ " hex head screws and lockwashers.

(2) With a $\frac{1}{4}$ -20 x $\frac{3}{4}$ " hex head bolt and lockwasher fasten carburetor guard to drive case through remaining hole in carburetor guard.

(3) Turn unit over into normal position and with a 10/32 x $\frac{3}{8}$ " round head screw and lockwasher, fasten fuel tank lug to drive case.

(4) Connect fuel line to fuel shut-off and to carburetor inlet connection.

(5) Connect oil line to connector on drive case and to outlet adapter of oil pump.

(6) Slide clutch drum on shaft. Place drive belt on clutch sprocket and start belt on large sprocket. Push clutch drum down on shaft slowly and at the same time turn drum to thread drive belt on large sprocket.

(7) Slide clutch spider on shaft with hub of spider toward drum. Line up the keyways and insert two keys between the shaft and the spider. Replace the flat washer and lock assembly into position with a $\frac{1}{2}$ -20 flex lock nut. Prevent shaft from turning by inserting a pointed tool through the air screen and blocking a rotor fin. Replace cover and fasten to drive case with five 8-32 x $\frac{1}{2}$ " fillister head screws and lockwashers, being careful not to damage the drive case cover gasket during assembly.

(8) Insert hook of long throttle rod, from the outside, through hole in throttle lever on carburetor. Insert the throttle rod in the hole of throttle lever on swivel handle while the throttle button is locked open and while holding the carburetor throttle in the fully open position. Lock in position with throttle rod screw.

e. Assembling Guide Bar and Chain

(1) With guide bar shim in place next to drive case, place guide bar over guide bar studs. Place the chain tension adjusting bracket over the two studs, with the threaded end of the adjusting screw toward the chain drive sprocket, making certain that the pin lug of the adjustment bracket engages in the corresponding hole of the guide bar. Hold in place with two $\frac{3}{8}$ lockwashers and hex nuts. Tighten nuts just enough to hold guide bar in place.

(2) Turn guide bar adjustment screw counterclockwise as far as it will turn without forcing to give clearance to assemble the chain.

(3) Slide chain over chain drive sprocket and feed into guide bar groove. Sprocket and chain travel counterclockwise when looking at sprocket from engine end of saw. Check to be sure the cutting edge of the chain rotates toward the bottom of the sprocket.

(4) To adjust the tension of the chain, turn guide bar adjustment screw clockwise until the chain can be lifted approximately $\frac{1}{4}$ " from the guide bar groove with two fingers, tighten two hex nuts to lock guide bar in position. On a new chain, the tension should be checked after the first few cuts and readjusted, if necessary.

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