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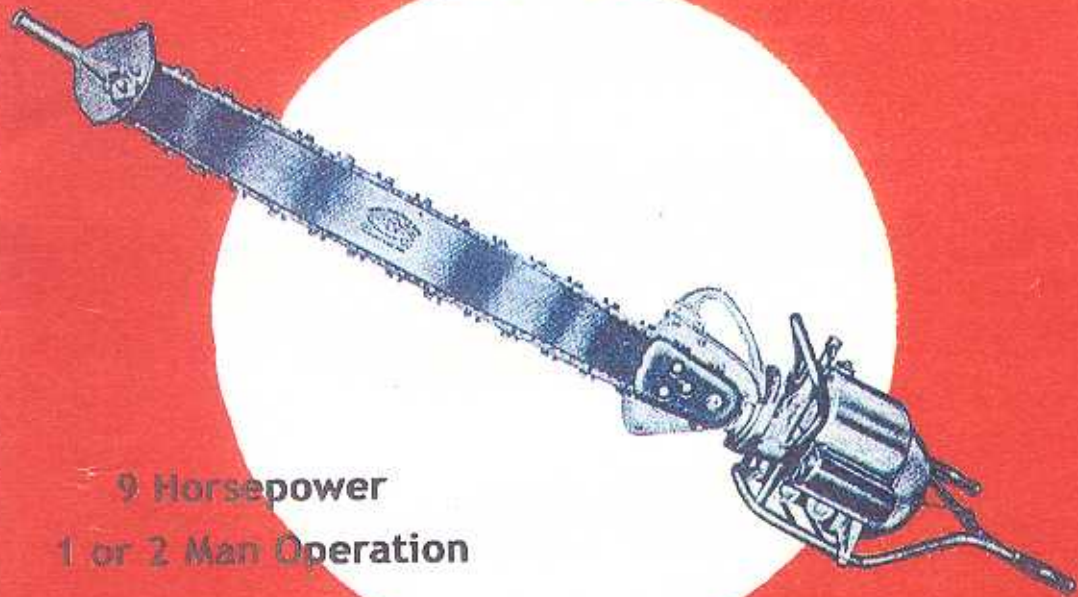
MODEL DA-211
CHAIN SAW

ESTABLISHED 1848



REG. U.S. PAT. OFF.

OPERATOR'S HANDBOOK



9 Horsepower

1 or 2 Man Operation

HENRY DISSTON & SONS, INC., PHILADELPHIA 35, PA., U.S.A.

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IND

GENERAL INFORMATION

Pages 3 & 4

- Service Recommendations
- Serial Number
- Directional References
- Cylinder Numbering and Firing Order
- Specifications

LUBRICATION

Pages 6 & 7

- General Lubrication Recommendations
- Recommended Fuel Mixture
- Fuel Mixing Procedure
- Transmission Lubrication
- Chain Lubrication
- Control Linkage Lubrication
- Starter Lubrication

ASSEMBLY OF SAW

Pages 8 to 10

- Guide Rail
- Chain
- Correct Chain Tension
- Tailstock
- Bow Saw

CONTROLS AND STARTING

Pages 11 to 13

- Controls
- Clutch
- Starting Engine
- Stopping Engine
- Flooding
- Break-In Recommendations

OPERATION

Pages 14 & 15

- Bucking
- Swiveling Transmission
- Felling
- Inverted Bucking
- Safety Precautions

PREVENTIVE MAINTENANCE

Pages 16

- Daily Preventive Maintenance Inspection
- Weekly Preventive Maintenance Inspection
- Monthly Preventive Maintenance Inspection

TROUBLE CHART

Page 17

- Does Not Start
- Starts Momentarily and Cuts Out
- Runs Irregularly or Misses
- Does Not Idle Properly
- Does Not Develop Normal Power
- Overheats

ADJUSTMENTS AND SERVICE

Pages 18

- Servicing Fuel System and Carburetor
- Servicing Chain Lubrication System
- Servicing Magneto Timing Ignition
- Servicing Spark Plugs
- Servicing and Cleaning Exhaust Ports
- Servicing Air Filter
- Servicing Cooling System
- Servicing Starter

CUTTING CHAINS

Pages 29

- DL Type
- DC Type
- DH Type

GENERAL INFORMATION

3

SERVICE RECOMMENDATIONS

This publication includes operating instructions and service instructions applying to the Model DA-211 chain saw. In the preparation of this manual, careful consideration has been given to such adjusting and service operations as are usually required in normal service. Also included are certain emergency repairs which should be done only in the case of extreme necessity, when Authorized Disston Service facilities are not immediately available.

It is urgently recommended that the owner should not attempt repair operations which are not specifically covered in this manual. Other repairs, particularly those requiring extensive disassembly or replacement of internal parts, should be done only by Authorized Disston Service Stations which have the necessary factory-designed tools and equipment plus the knowledge and experience required to do the job correctly.

SERIAL NUMBER

Serial number is stamped into data plate attached to starter and clutch housing. This number is the KEY to various engineering details applying to your DA-211 chain saw; therefore, when ordering parts, accessories and tools or when corresponding in regard to service matters, always specify this serial number.

DIRECTIONAL REFERENCES

All references to right side and left side of unit are made as they appear to operator on engine end of unit, facing toward tailstock; thus, spark plug cover is on right side, air cleaner is on left side.

CYLINDER NUMBERING AND FIRING ORDER

Cylinders fire alternately at 180° intervals. Number one cylinder is on fan side of engine; number two cylinder is on clutch side of engine.

SPECIFICATIONS

Model DA-211 is a lightweight intermediate Chain Saw de for use by either one or two men. Rails are available in l from 24" to 84". Rails designed to permit use of DC or DI chains.

Engine is Mercury built and designed, 2 cycle, 2 cylinde cooled. Clutch is of automatic centrifugal type. Chain oiler matic piston type with flow adjusted by needle valve.

Horsepower.....

Weight Dry (less cutting mechanism).....

Piston Displacement..... 10.99

Bore.....

Stroke.....

Clutch..... Automatic Centrifuga

Carburetor..... Tillotson Float

*Carburetor High Speed Needle Valve Adjustment... 1 1/2 Turn

*Carburetor Low Speed Needle Valve Adjustment... 1/2 Turn

*Above are approximate initial settings to permit starting engine wh buretor is found badly out of adjustment; these settings will be four too rich and final adjustments will therefore have to be made in acc with instructions on Page 17.

Magneto..... Bendix-Scintilla Point Gap

Spark Plug..... Champion

Plug Gap.....

Ignition Timing..... 26° BTDC or .111"

Fuel Mixture—Thoroughly mix gasoline and oil in the exa portion of 8 ounces (1/2 pint) of oil to each gallon of ga Use best quality non-detergent S.A.E. 30 automotive oil refined from 100% Pennsylvania crude base. Use st commercial automotive gasoline of not less than 72 rating.

Fuel Capacity.....

Chain Lubrication—When temperature is above 0° F. use 30 engine oil; when temperature is below 0° F. use 10 engine oil.

Transmission Lubrication—When temperature is above 0° S.A.E. 90 automotive gear lubricant; when tempera below 0° F. use S.A.E. 80 automotive gear lubricant.

Chain Oiler Feed Adjusting Knob..... 1/2 to 3/4 Turn

Chain Lubricator Capacity..... 1 qt.

LUBRICATION

5

GENERAL LUBRICATION RECOMMENDATIONS

Lubrication is a matter of prime importance in the successful operation and maintenance of your chain saw. In fact, lubrication is the most important single factor determining whether or not your chain saw will give the full measure of service and reliability for which it has been designed and built. It is, therefore, our earnest commendation that the following lubrication instructions be carefully and diligently complied with.

RECOMMENDED FUEL MIXTURE

Thoroughly mix gasoline and oil in the exact proportion of 8 ounces ($\frac{1}{2}$ pint) of oil to each gallon of gasoline. Use best quality non-detergent S.A.E. 30 automotive engine oil refined from 100% Pennsylvania crude oil base. Use standard commercial automotive gasoline having an octane rating of not less than 72.

IMPORTANT! The DA-211 chain saw is engineered for maximum performance on standard commercial automotive gasoline and no advantage can be obtained from the use of white gasoline, naphtha, trick fuels, ready-mixed fuels or additives. Special fuels containing alcohol, benzol and the like will cause operational difficulties and are harmful to certain engine parts, in particular oil seals, rubber gaskets, rubber grommets, ignition wiring and other parts fabricated wholly or partly of rubber.

FUEL MIXING PROCEDURE

Observe fire prevention rules, particularly the matter of smoking. Mix fuel outdoors or at least in a well-ventilated location. Never put oil or gasoline into tank separately; mix fuel in a clean container. Measure accurately the required amounts of oil and gasoline. Pour oil into mixing container and add a small amount of the gasoline—about the same amount as the oil. Mix thoroughly, add balance of gasoline and mix again. Pour mixture into fuel tank through a fine screen strainer. Cleanliness is most important because even a very tiny particle of foreign matter in a fuel system can cause carburetion trouble.

CAUTION! Using less than the recommended proportion of oil will cause overheating and very likely serious engine damage. Using more than the recommended proportion of oil will cause spark plug fouling, erratic carburetion, excessive exhaust smoke and faster than normal carbon accumulation. Be consistent in preparing fuel mixtures; carburetor is sensitive to fuel mixture variations resulting from use of different oils and gasolines or due to careless measuring or mixing; this requires frequent readjustment of carburetor.



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6 LUBRICATION (cont.)

TRANSMISSION LUBRICATION

Every 10 hours of operation, remove oil filler plug and oil level plug. With unit standing level and saw in normal bucking position, add lubricant as required to bring oil level up to oil level plug opening. Above 0° F. use standard commercial S.A.E. 90 automotive gear lubricant; below 0° F. use standard commercial S.A.E. 80 automotive gear lubricant.

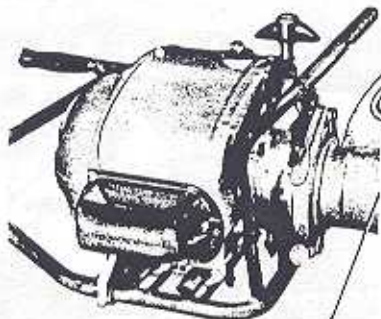


MAKE SURE OF THIS!

To avoid entrance of dirt, sawdust or other foreign matter into transmission, clean outside of transmission carefully before removing plugs. When replacing plugs, start threads one or two turns with fingers to avoid danger of cross-threading. Do not overtighten, particularly when transmission is warm; otherwise, difficulty may be experienced when removal is again required.

CHAIN LUBRICATION

Chain is lubricated automatically by a plunger-type oil pump actuated by an eccentric cam on the sprocket shaft. Rate of oil feed is adjustable by means of adjusting knob provided on transmission case. Normal setting is $\frac{1}{2}$ to $\frac{3}{4}$ turns open, but this may be varied to suit operating conditions.



Daily, remove filler cap and fill chain oil reservoir with engine oil. At use S.A.E. 30; below 0° F. use S.A.E. 10.

Special care must be taken to avoid entrance of dirt, sawdust and other matter into chain lubricating system. Therefore, before removing reservoir filler cap, clean outside of transmission carefully.

CONTROL LINKAGE LUBRICATION

Daily, apply a drop of engine oil to each throttle and choke control link

STARTER LUBRICATION

Lubrication of starter mechanism requires complete disassembly of ; instructed under "Servicing Starter Assembly", Page 24. Lubricate ; starter is disassembled for service and when seasonal grease change is Above 0° F. use standard commercial high melting point grease. Below 0 very light grease. If grease is too heavy for operation in cold weather, start function properly, particularly on rewind stroke.

ASSEMBLY OF SAW

The engine, guide rail, cutting chain, and tailstock are shipped disassembled. To install guide rail, remove the **Sprocket Cover** using "T" handle $\frac{3}{8}$ " wrench provided in tool kit. Make sure transmission is in normal position with the sprocket to the left hand engine side. Slide guide rail on tensioning key. **Guide rail** should slide under lip of tensioning key. Turn the tensioning screw counterclockwise until the key is in the rearmost position. Push guide rail back while turning tensioning key in.

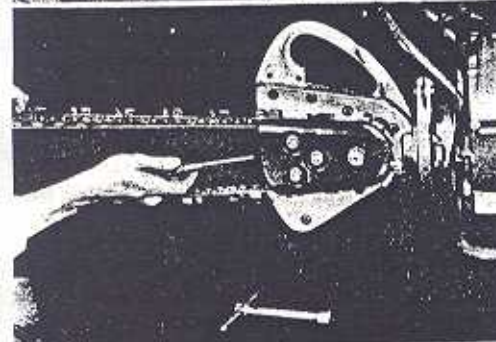
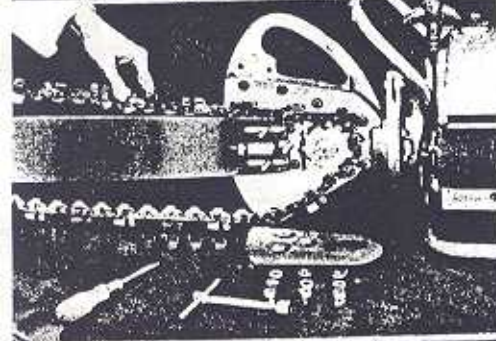
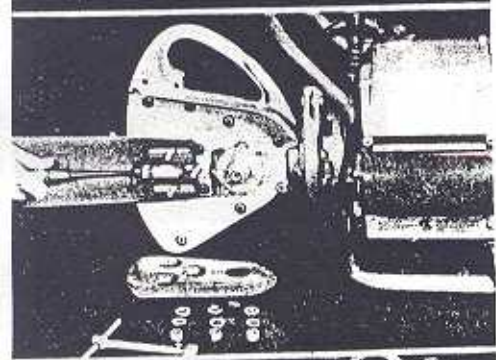
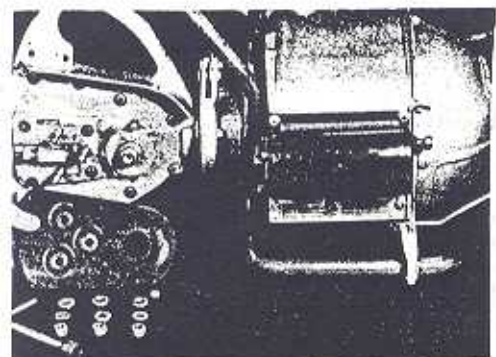
Install chain over drive sprocket and then lay in top groove of rail. The chain moves towards the transmission along the bottom rail groove. This is where the cutting action occurs. The chain is merely on its back travel when it moves away from the engine along the top portion of the rail. Always install chain so that front of cutting teeth are travelling towards transmission along bottom of rail.

Chain tension is accomplished by turning tension screw clockwise. This in effect moves guide rail outward. Correct chain tension is such that the chain may be lifted upwards $\frac{3}{8}$ " of the groove depth at a point about 6" forward of the abutment. Secure all three sprocket cover nuts. The sprocket cover clamps the guide rail against the transmission and prevents the guide rail from shifting.

The tailstock is a complete one piece unit with no parts to lose if detached in the field. To install, loosen large nut, turn toggle cam lock in center stud lengthwise to stud, slip tailstock in hole, turn cam lock crossways and tighten large nut securely.

The abutment horn on the tailstock is designed to allow cutting on the back-travel of the chain at the tailstock end.

NEVER operate the engine with the transmission removed. This may cause serious damage to the engine because there will be no restraint for the clutch mechanism.



DA-211 25" CAPACITY BOW SAW

Operating Instructions

The DA-211 Bow Saw is a versatile tool enabling the operator to finish pinching and bucking cuts without wedging. The Bow Saw may be used for felling although it is recommended that a straight rail be used for continuous felling or where a considerable number of felling cuts are to be made. Weight of complete DA-211 25" capacity bow attachment and engine is 78 lbs.



OILER—A film of oil should always be present on the guide rail at bearing surfaces. Use S.A.E. No. 30 oil for normal usage. A mixture of No. 30 and kerosene may be found more desirable when pitchy wood is encountered. A few pumps on the plunger type pump at the outboard end of the Bow frame will be sufficient to last for several minutes. When finishing a felling cut the helper should keep close watch on the amount of oil going to the chain and after gaining experience in the amount for good lubrication he can adjust the number of strokes necessary.

CHAIN TENSION—Chain tension should be such that the chain is snug on the guide rail all along the length of the guide rail. Do not over-tension. Excessive wear to both rail and chain will occur. Use of the plunger type tensioning handle is recommended as the tensioning handle will have a tendency to back off due to vibration.

RETRACTABLE HANDLE—The lower outboard handle is retractable. Bucking cuts may be made where two logs lie close together.

GUIDE RAIL—The guide rail is reversible end to end. If excessive wear appears at the engine end, reverse the rail to equalize the wear to both ends. Normally, there will be greater wear at the engine end of the guide rail.

IDLERS—The chain idlers mounted in the Bow frame have sealed and lubricated bearings. These bearings are lubricated for the life of the bearing. Any further lubrication is unnecessary.

CHAINS—The performance of the DA-211 Bow Saw depends greatly on the condition of the cutting chains used on it. **ABOVE ALL KEEP CUTTING CHAINS SHARP.** The Disston "L" or "C" chain is recommended for use on this attachment.

INSTALLATION OF BOW SAW ATTACHMENT ON STANDARD TRANSMISSION

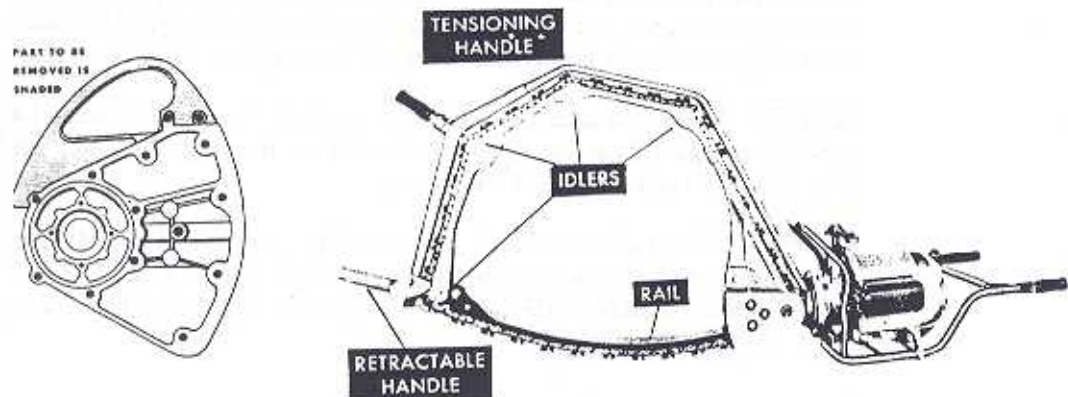
In order to adapt the DA-211 bow attachment to a DA-211 saw equipped with a straight guide rail using the original transmission, the operations outlined below should be followed.

1. Remove sprocket cover, chain and guide rail.
2. Turn transmission to felling position to prevent oil spillage and to facilitate removal of cover plate. Remove the eleven Phillips Head screws which secure the transmission cover plate—Part No. 212-127 to the transmission housing. Lift the cover, transmission shaft and gear clear.
3. Remove bolt Part No. 212-133 which fastens the guide rail key assembly to the cover and remove the key assembly.
4. Install special bolt in the hole which formerly accommodated bolt Part No. 212-133 and secure on the inside with lock washer and nut provided. Make sure fibre washer is under head of nut on the inside.
5. Firmly support the cover and remove the chip protecting flange and handle by hacksawing along the upper edge as shown by shaded area in the picture at left.

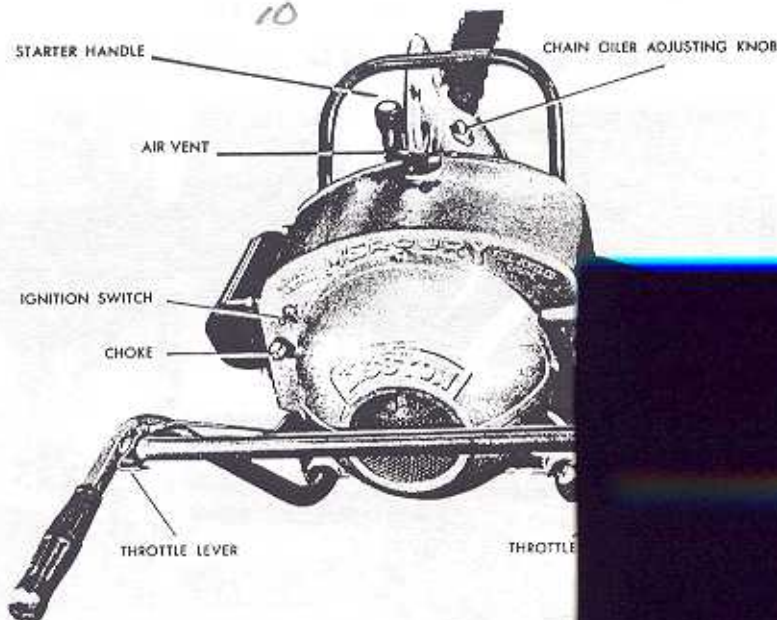
Finish by filing to remove burrs. Check to see that correct portion has been removed. Take care to see that no chips remain which may enter oiler chamber or gear chamber after reassembly.

If it is desirable to keep the transmission cover in original condition for future use with straight Guide Rails, covers which have been altered for Bow Saw use are available separately as Part No. 271-197.

6. Reassemble cover to transmission housing using new gasket provided. Omit two screws in upper outboard corner. These holes will be used later to attach Bow frame.
7. Install Spacer Part No. 271-193 on uppermost guide rail mounting stud.
8. Install Bow frame on the three mounting studs, first sliding the guide rail Part No. 271-194 over the lower and rear mounting studs. Install screws Part No. 271-189 in the upper holes provided. Tighten all fasteners including rail attachment bolt at outboard end.
9. Install chain over idlers and in the slot in the guide rail. Tighten chain using upper outboard handle which acts as tensioning device.
10. Fill outboard chain oiler reservoir with S.A.E. No. 30 engine oil.



CONTROLS AND STARTING



CONTROLS

There are four controls which are used for normal operation:

1. Choke
2. Throttle control
3. Chain Lubricator Adjustment
4. Ignition Switch

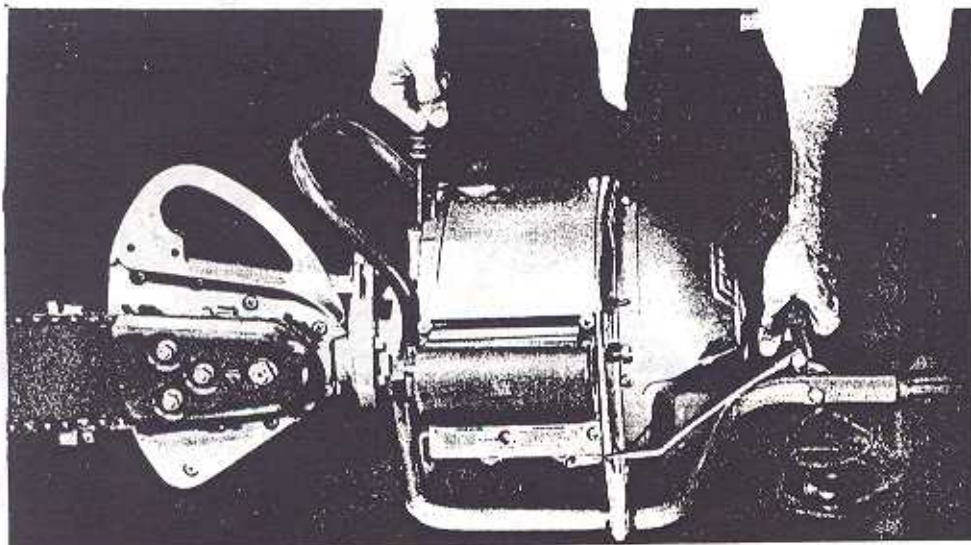
The choke is located on the left hand side and is normally used to start a cold engine. Pull choke lever out to choke. The throttle control is a crosspiece providing a large range of hand positions for one-man operation while convenient thumb rests are provided for two-man operation. The ignition switch is located on the bearing housing in the "On"- "Off" type. The chain lubricator is located on the transmission housing. Turning the control knob clockwise increases oiler output—turning the control knob *in* or clockwise decreases output. Turn the control knob all the way in to shut off oiler output.

CLUTCH

Clutch is of centrifugal type designed to engage and disengage at engine speed; therefore, no manual control is required. If clutch is closed, as indicated by cutting chain "creeping," idling speed should be increased as instructed on Page 17.

WARNING! Since clutch is centrifugal type and engine speed is high, cutting chain may run when the engine is started. Make sure you are clear of the cutting chain before starting engine.

CONTROLS AND STARTING (cont.)

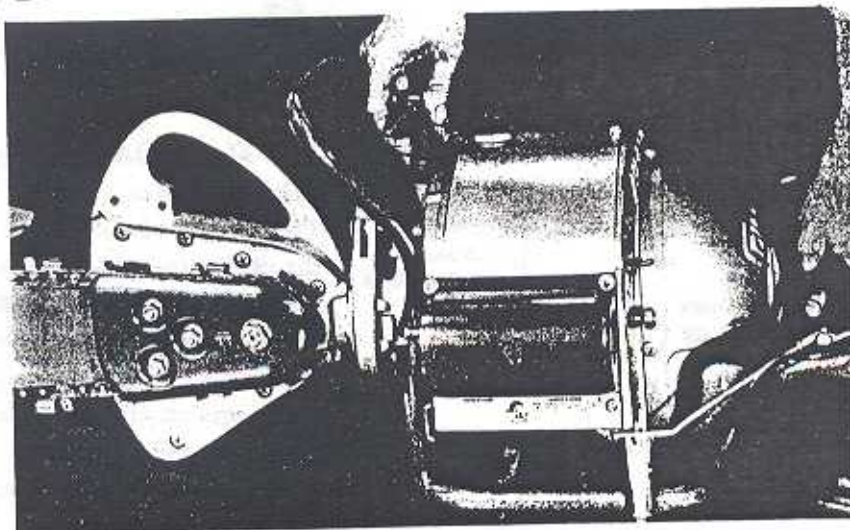


STARTING ENGINE

1. Be sure fuel tank contains a sufficient amount of recommended fuel mixture.
2. Open air vent valve on fuel tank filler cap.
3. Open fuel shut-off valve.
4. Set choke in fully-closed position (knob pulled out).
5. Flip ignition switch to "On" position.
6. Operate starter with throttle lock engaged until engine fires, indicating that cylinders are primed with fuel charge.
7. Set choke in fully-open position (knob pushed in) and again operate starter, this time with throttle $\frac{1}{4}$ to $\frac{1}{2}$ open. The instant engine starts, manipulate throttle and choke as required to keep engine running until it warms up enough to idle with wide-open choke. Avoid running at high speed until engine has warmed up thoroughly.

IMPORTANT! Starter is of the automatic rewind type. Proper operating technique will add many hours of life to starter cable and to starter internal mechanism. Grasp handle firmly and pull upward slowly until engagement of ratchet mechanism can be felt, then continue upward pull with a full vigorous stroke. Do not release handle at end of stroke and allow it to snap back; retain grip on handle and allow cable to rewind slowly. Ratchet release mechanism is designed so starter can not engage during rewind, even though engine is running. If engine "kicks back" while starting, it may be due to excessive spark advance.





STOPPING ENGINE

If engine is to be immediately restarted for a period of further use, stopped by merely flipping ignition switch to "Off" position; if engine is idle for a period of time, stop by closing fuel shut-off valve and allow to run until it stops of its own accord, due to fuel supply to carburetor exhausted; then flip ignition switch to "Off" position and close air vent fuel tank filler cap.

FLOODING

Flooding refers to an accumulation of excess fuel in crankcase and is usually due to excessive use of choke. When engine is in a flooded condition, an over-rich fuel-air mixture is induced into the cylinders; this mixture does not readily burn and sometimes fouls spark plugs. To clear a flooded engine, close fuel shut-off valve on fuel tank filler cap, close fuel shut-off valve, set choke in full choke position and remove spark plugs; then, with wide-open throttle, operate engine until excess fuel is exhausted. *Do this with ignition in off position.* After installing spark plugs, be sure electrodes and insulator tip are clean.

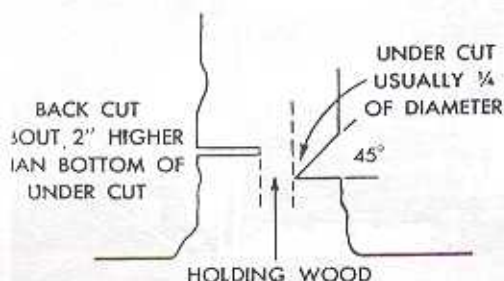
BREAK-IN RECOMMENDATIONS

Unit is ready for normal service when shipped from factory; however, a break-in period of consideration during initial operating period will prevent possibility of engine damage. Therefore, during first four hours of operation, observe the following precautions:

1. Avoid sustained operation under heavy load; stop engine frequently to allow to cool.
2. Do not race engine under no-load condition; this applies at all times, particularly important during break-in period.
3. Do not use more than recommended proportion of oil in fuel mixture; too much oil can be harmful.
4. Do not add freak "break-in" compounds to fuel mixture; these can do more harm than good.

OPERATION

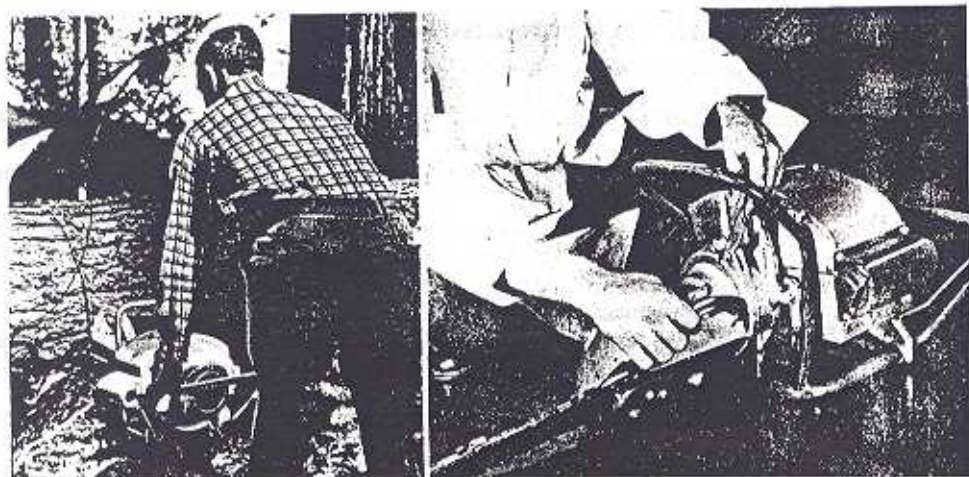
The Model DA-211 may be used either for one or two-man operation. The engine should be run at full throttle in the cut but care should be taken not to run the engine at full throttle unless it is under load. When starting a cut hold the engine abutment against the log to be cut. The force of the chain cutting action will hold the saw firmly against the log.

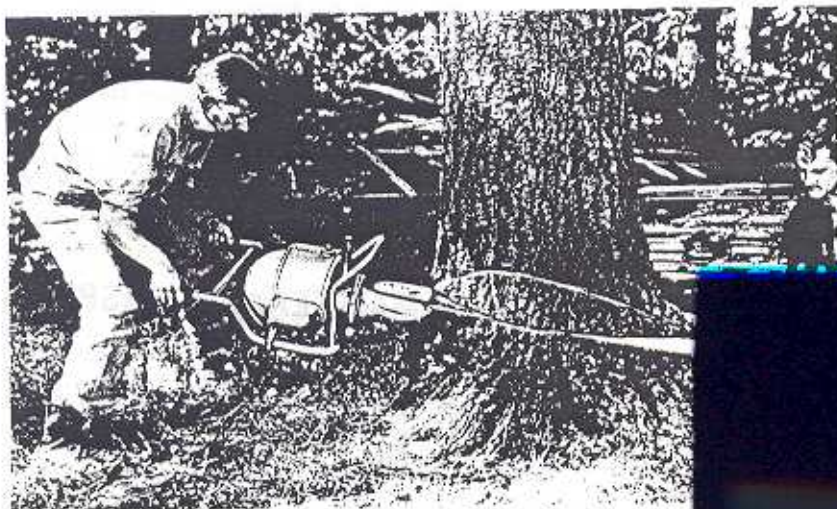


When bucking, the saw is in the normal upright position. If used as a one-man saw, logs considerably larger than the guide rail length may be cut by working the saw around the far side of the log first. The engine will continue to operate as its position approaches the vertical.

The transmission and guide rail may be indexed to any desired positions by releasing the transmission clamping ring and rotating the transmission. The transmission may be rotated to 90 degrees for felling or 180 degrees for inverted bucking. It is recommended from a safety standpoint that the engine be stopped when changing the rail index.

During saw operation, a visual check should be made from time to time to see that the chain and rail are receiving sufficient lubrication. Slight adjustment of the oil flow control may be necessary during prolonged operation.





SAFETY PRECAUTIONS

1. Always stop engine when making any adjustments.
2. Always hold saw securely when operating.
3. Place saw on ground when starting and be sure all power is away before pulling starter cable.
4. Make sure all spectators or other workers are at least 6 feet away from cut.
5. Never wear loose fitting clothing when cutting.
6. Before starting every cut make sure all limbs, branches, etc. are cut because the saw may kick backwards if the back of the saw is in contact with a branch.
7. Never carry a saw that is running—play it safe—stop engine.
8. This is a gasoline powered engine. Follow usual precautions for fuel. Never run engine in closed room.
9. Handled properly, the saw is not a fire hazard. Never use saw if it was fueled. Avoid spilling fuel. Watch for fire in the area.



PREVENTIVE MAINTENANCE

Preventive Maintenance is a schedule of continuous systematic maintenance designed as to prevent frequent or major breakdowns before they occur. Chain saws, because they are light and relatively high powered, need a good schedule for preventive maintenance which must be closely adhered to.

In the following pages, a preventive maintenance schedule for Daily, Weekly and Monthly checks is outlined. Following a preventive maintenance schedule, such as this, will greatly increase the life of your saw and lower your operating costs—increasing your profits.

✓ DAILY PREVENTIVE MAINTENANCE INSPECTION

- Clean off saw thoroughly.
- Check all nuts, bolts and screws for tightness.
- Check all controls for free operation.
- Apply a drop of oil to each throttle and choke control linkage joint.
- Check stop switch for proper operation.
- Clean air filter.
- Clean fan housing air intake screen.
- Check chain tension.
- Check condition of chain and sharpen if necessary.
- Immediately replace any broken parts.
- Fill fuel tank and lubricator reservoir before leaving saw overnight.
- Check tools, equipment, spares, etc. to be sure all items are on hand and in their proper place.
- Check starter cable.

✓ WEEKLY PREVENTIVE MAINTENANCE INSPECTION

- All items listed in daily inspection.
- Remove fan cover—clean fan and cooling passages.
- Check transmission lubricant.
- Check guide rail for wear and reverse if necessary.
- Operate engine and check general performance. Note any irregularities of performance or abnormal mechanical sounds which might indicate developing trouble. Check carburetor adjustments and note particularly whether idling speed is satisfactory as explained on Page 17. Also, be sure automatic chain lubricator is functioning properly.

✓ MONTHLY PREVENTIVE MAINTENANCE INSPECTION

1. All items on Daily.
2. All items on Weekly.
3. Remove fuel tank and cylinder baffle and clean cylinder fins.
4. Check exhaust ports and clean if necessary. See Page 21.
5. Drain carburetor bowl and flush.
6. Remove and clean air filter. See Page 23.
7. Remove and clean fuel filter in fuel tank.
8. Check and service magneto contact points. See Page 20.
9. Operate engine and check general performance. Note any irregularities of performance or abnormal mechanical sounds which might indicate developing trouble. Check carburetor adjustments and note particularly whether idling speed is satisfactory as explained on Page 17. Also, be sure automatic chain lubricator is functioning properly.
10. Drain and refill transmission.
11. Service spark plugs. See Page 21.

16 TROUBLE CHART

A	B	C	D	E	F	POSSIBLE CAUSE	SUGGESTED RE OR REPAIR REF)
x	x	-	-	-	-	Fuel Tank Empty	Refill with recom fuel mixture.
x	x	-	-	-	-	Fuel Shut-Off Valve Closed	Open fuel shut-of
x	x	x	-	-	-	Fuel Filler Cap Air Vent Clogge	
x	x	x	-	-	-	Water Or Dirt In Fuel System . .	
-	-	-	-	x	x	Wrong Oil In Fuel Mixture	
-	-	x	-	x	x	Wrong Gasoline In Fuel Mixture	
-	-	-	-	x	x	Not Enough Oil In Fuel Mixture	
x	x	x	x	x	x	Too Much Oil In Fuel Mixture	
-	-	x	x	-	-	Low Speed Mixture Mis-Adjuste	
x	-	x	-	x	x	High Speed Mixture Mis-Adjuste	
-	-	x	-	x	-	Air Filter In Need Of Cleaning .	
x	x	-	-	-	-	Engine Flooded	
x	-	x	x	x	x	Spark Plugs Fouled Or Defecti	
-	-	x	x	x	x	Wrong Type Spark Plugs	
x	-	-	-	-	-	No Spark	
x	x	x	x	x	x	Weak Or Intermittent Spark	
-	-	-	x	x	x	Ignition Timing Not Correct . . .	
-	-	-	-	x	x	Cooling System In Need of Cleanin	
-	-	x	-	x	x	Excessive Carbon Accumulation	

A—DOES NOT START

B—STARTS MOMENTARILY AND CUTS OUT

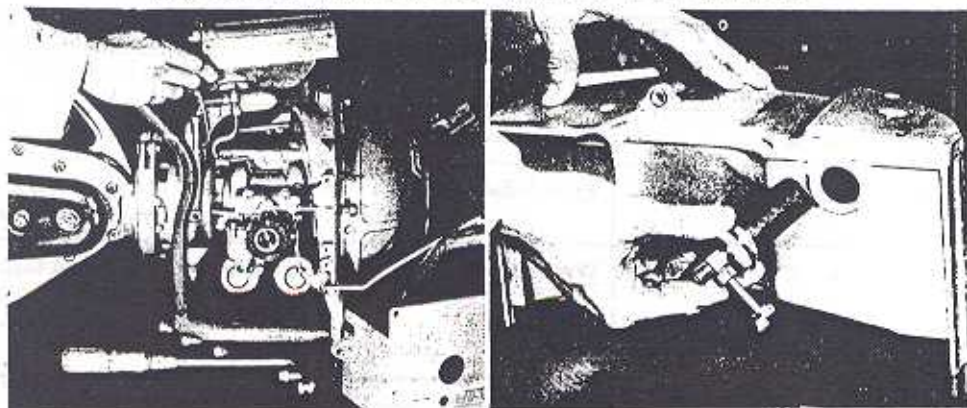
C—RUNS IRREGULARLY OR MISSES

D—DOES N

E—DOES N

F—OVERHE

ADJUSTMENTS AND SERVICE



SERVICING FUEL SYSTEM AND CARBURETOR

The fuel system consists essentially of a fuel tank, fuel strainer, fuel line, and carburetor.

The fuel tank may be disassembled from the engine by removal of four cap screws. Loosen fuel line connection at the fuel tank. The fuel tank and air cleaner assembly may now be lifted clear as an assembly. Notice the sealing gasket between the air cleaner adaptor and choke body. The fuel strainer is located within the fuel tank on the hex shaped fuel filter body. The strainer is a ribbon type and should be cleaned by air blast. Do not attempt to disassemble the filter element.

The carburetor is a Tillotson float type. Adjustments will be infrequent but included are those to the high speed fuel system, idle mixture system and the idle throttle valve setting.

Before Adjusting Carburetor

Before attempting to correct faulty engine performance by readjusting carburetor, check for other possible causes of trouble as outlined in "Trouble Chart," Page 15.

Adjustments Provided

Carburetor is provided with three adjustments, namely, high speed mixture needle, low speed mixture needle and idle speed adjusting screw. High speed mixture needle turns inward (clockwise) for leaner mixture, outward (counter-clockwise) for richer mixture. Low speed mixture needle turns inward (clockwise) for richer mixture, outward (counter-clockwise) for leaner mixture. Refer to illustration.

Approximate Initial Setting

If carburetor is so badly out of adjustment that engine can not be started, an approximate initial setting can be attained as follows: turn both needles inward (clockwise) until they seat lightly. Back high speed needle out $1\frac{1}{2}$ turns; back low speed needle out $\frac{1}{2}$ turn. This setting will permit starting but will be found too rich; therefore, as soon as engine starts, make final correct adjustments as instructed under "High Speed Mixture Adjustment" and "Low Speed Mixture Adjustment".

NOTE: Before attempting to adjust carburetor, warm engine up thoroughly and be sure

TROUBLE CHART

A	B	C	D	E	F	POSSIBLE CAUSE	SUGGESTED REMEDY OR REPAIR REFER
x	x	-	-	-	-	Fuel Tank Empty.....	Refill with recomme
x	x	-	-	-	-	Fuel Shut-Off Valve Closed....	
x	x	x	-	-	-	Fuel Filler Cap Air Vent Clogg	
x	x	x	-	-	-	Water Or Dirt In Fuel System.	
-	-	-	-	x	x	Wrong Oil In Fuel Mixture	
-	-	x	-	x	x	Wrong Gasoline In Fuel Mixture	
-	-	-	-	x	x	Not Enough Oil In Fuel Mixture	
x	x	x	x	x	x	Too Much Oil In Fuel Mixture	
-	-	x	x	-	-	Low Speed Mixture Mis-Adjust	
x	-	x	-	x	x	High Speed Mixture Mis-Adjust	
-	-	x	-	x	-	Air Filter In Need Of Cleaning	
x	x	-	-	-	-	Engine Flooded.....	
x	-	x	x	x	x	Spark Plugs Fouled Or Defect	
-	-	x	x	x	x	Wrong Type Spark Plugs.....	
x	-	-	-	-	-	No Spark.....	
x	x	x	x	x	x	Weak Or Intermittent Spark	
-	-	-	x	x	x	Ignition Timing Not Correct..	
-	-	-	-	x	x	Cooling System In Need of Clean	
-	-	x	-	x	x	Excessive Carbon Accumulation	

A—DOES NOT START

B—STARTS MOMENTARILY AND CUTS OUT

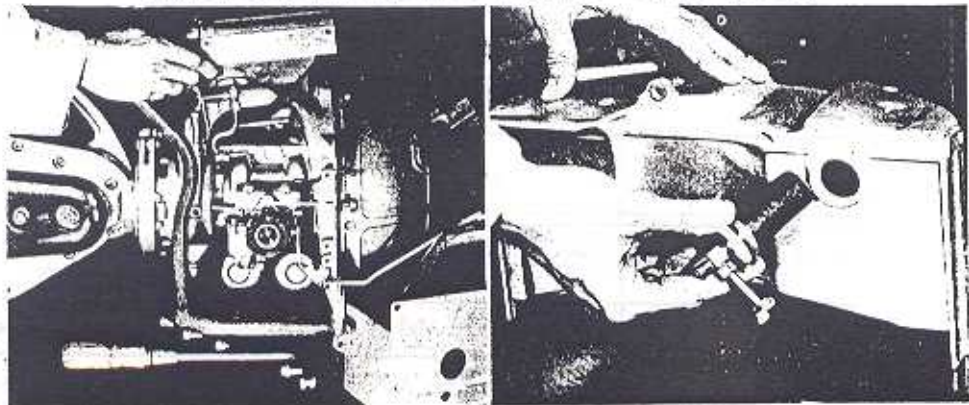
C—DOES IMMEDIATELY OR MISFIRE

D—DOES

E—DOES

F—OVERS

ADJUSTMENTS AND SERVICE



SERVICING FUEL SYSTEM AND CARBURETOR

The fuel system consists essentially of a fuel tank, fuel strainer, fuel line, and carburetor.

The fuel tank may be disassembled from the engine by removal of four cap screws. Loosen fuel line connection at the fuel tank. The fuel tank and air cleaner assembly may now be lifted clear as an assembly. Notice the sealing gasket between the air cleaner adaptor and choke body. The fuel strainer is located within the fuel tank on the hex shaped fuel filter body. The strainer is a ribbon type and should be cleaned by air blast. Do not attempt to disassemble the filter element.

The carburetor is a Tillotson float type. Adjustments will be infrequent but included are those to the high speed fuel system, idle mixture system and the idle throttle valve setting.

Before Adjusting Carburetor

Before attempting to correct faulty engine performance by readjusting carburetor, check for other possible causes of trouble as outlined in "Trouble Chart," Page 15.

Adjustments Provided

Carburetor is provided with three adjustments, namely, high speed mixture needle, low speed mixture needle and idle speed adjusting screw. High speed mixture needle turns inward (clockwise) for leaner mixture, outward (counter-clockwise) for richer mixture. Low speed mixture needle turns inward (clockwise) for richer mixture, outward (counter-clockwise) for leaner mixture. Refer to illustration.

Approximate Initial Setting

If carburetor is so badly out of adjustment that engine can not be started, an approximate initial setting can be attained as follows: turn both needles inward (clockwise) until they seat lightly. Back high speed needle out $1\frac{1}{2}$ turns; back low speed needle out $\frac{1}{2}$ turn. This setting will permit starting but will be found too rich; therefore, as soon as engine starts, make final correct adjustments as instructed under "High Speed Mixture Adjustment" and "Low Speed Mixture Adjustment".

NOTE: Before attempting to adjust carburetor, warm engine up thoroughly and be sure choke control is in fully-opened position.

ADJUSTMENTS AND SERVICE (cont.)

SERVICING CHAIN LUBRICATOR SYSTEM

The chain lubricator is of the automatic positive pressure type. Flow control to the guide rail is achieved by an infinite position needle valve. There is no internal maintenance required to the lubricator system. Most difficulty will arise from the entrance of dirt and sawdust through the reservoir filler cap which may in turn clog oil flow passages.

Should the oiler fail to function, it is suggested the oil flow control needle valve be removed and the engine run in order to flush the system. If this does not remedy the situation, the transmission cover must be removed and the entire oiler system flushed and cleaned and inspected for damaged parts.

During operation of the saw, the oil flow should be checked from time to time to make sure that proper chain and rail lubrication is maintained. Excessive oiling when making low cuts in sandy soils may cause undue wear since the soil can mix with the oil to produce a fine grinding compound.

When cutting pitchy woods, kerosene should be used to dilute the lubricating oil in the oiler reservoir.

Proper adjustment of the oiler is approximately $\frac{1}{2}$ to $\frac{3}{4}$ of a turn open, or such that the fuel tank and oil reservoir should empty at about the same time.

From time to time, depending upon cutting conditions, the guide rail groove will require cleaning near the oil transfer hole. It may be that sawdust will pack the guide rail groove and prevent entrance of chain lubricating oil.

SERVICING MAGNETO

Failure to start, hard starting, missing, erratic performance or lack of normal power can result from a number of causes outside of ignition system. Therefore, before assuming that ignition system is at fault, first check entire unit as outlined in "Trouble Chart," Page 15.

TIMING IGNITION

Ignition timing determines exact instant in operating cycle of each cylinder when fuel mixture is ignited by spark plug. Correct setting must be accurately maintained for best engine performance. Engine is fitted with duplex magneto having a separate coil, condenser and set of points for each cylinder; top set fires number one cylinder (nearest cooling fan). Magneto is designed so that, with contact points correctly adjusted and magneto positioned at correct

ADJUSTMENTS AND SERVICE (cont.)

High Speed Mixture Adjustment

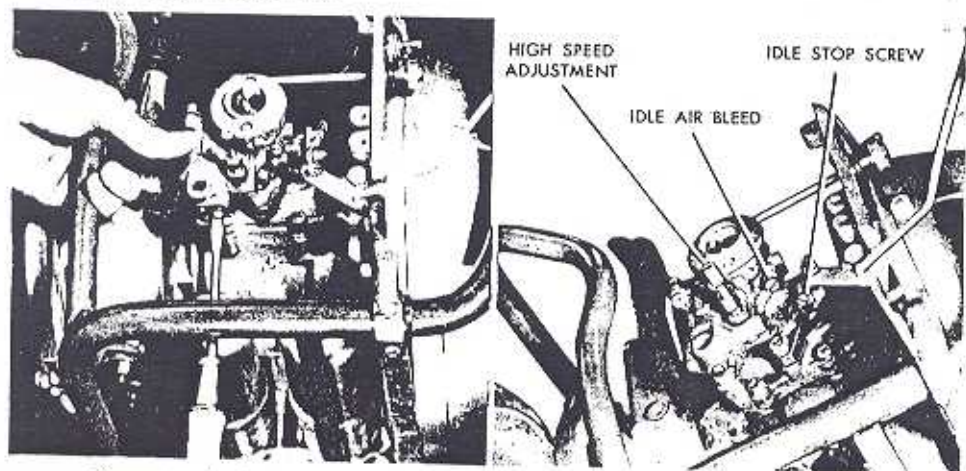
While running engine at wide-open throttle, slowly turn high speed mixture adjusting needle clockwise until engine starts to miss and slow down, indicating that mixture is becoming too lean, then back needle out until engine again runs smoothly; this adjustment is satisfactory for no-load operation but is too lean for good performance under sawing load; therefore, back needle out an additional fraction of a turn until engine just starts to fire unevenly. When high speed mixture is correctly adjusted, engine will fire unevenly under no-load condition but will "settle down" and run smoothly as soon as operating load is applied. When in doubt, it is safer to set mixture slightly rich rather than too lean, because operating engine under load with a lean mixture will cause overheating and possible engine damage. High speed adjustment should be re-checked for need of final correction after low speed adjustment has been made.

Low Speed Mixture Adjustment

If necessary, first adjust idling speed as required so engine will continue running with throttle closed. Turn low speed mixture adjusting needle inward (clockwise) until engine starts to "load up" or fire unevenly due to over-rich mixture; then slowly turn needle outward (counter-clockwise) until engine picks up speed and again fires evenly. Do not adjust leaner than necessary to attain reasonably smooth idling, because it is preferable to have mixture set slightly rich rather than too lean.

Idling Speed Adjustment

This adjustment is critical but is not difficult to attain. With engine operating at idling speed (throttle closed), increase idling speed gradually by turning adjusting screw on throttle shaft lever clockwise to a point where centrifugal clutch just starts to engage, as indicated by slight "creeping" of cutting chain; then reduce idling speed slowly to exact point where slight "rattle" can be detected in clutch housing, indicating that friction shoes are "floating" between retracted and engaged position; this is exact required idling speed. If idling speed is set too fast, clutch will drag while engine is idling; if idling speed is set too slow, engine will tend to cut out while idling.



Removing bowl drain screw

22 ADJUSTMENTS AND SERVICE (cont.)

when corresponding piston reaches .111 in. before top dead center, correct firing position; this piston position can be accurately determined by means of Timing Gauge (Tool No. S-61-504), applied as follows:

1. Clean and adjust contact points as instructed under "Servicing Magneto Contact Points", but do not re-install parts until ignition timing check has been completed.
2. Set timing gauge pin in retracted position, that is, with crosspin in slot.
3. Screw timing gauge into spark plug hole and locate top dead center of piston by turning timing gauge inward, a little at a time, until gauge pin just starts to contact piston crown as crankshaft is rocked back and forth over top dead center. Do not change this setting until timing adjustment has been completed.
4. Rotate crankshaft about $\frac{1}{8}$ turn in direction opposite normal rotation. While holding gauge body so it cannot turn from position set in step 3, pull down gauge pin and turn it 90° in either direction to lock it in extended position.
5. Turn crankshaft slowly in direction of normal rotation until piston is in contact with gauge pin; piston will then be in exact firing position (approximately .111 in. before top dead center) and points should be just starting to separate.

NOTE! Exact instant of point separation must be accurately determined. This can be done by inserting a narrow strip of shim stock (.0015 in. less in thickness) between point faces and exerting slight pulling tension. While points are closed, they will grip shim stock with noticeable tension. The instant points start to separate, shim stock will be released. In emergency, when no shim stock is available, thin cellophane or paper may be substituted; however, care must be taken to avoid possibility of cellophane or paper particle tearing off and remaining lodged between point faces, preventing point contact.

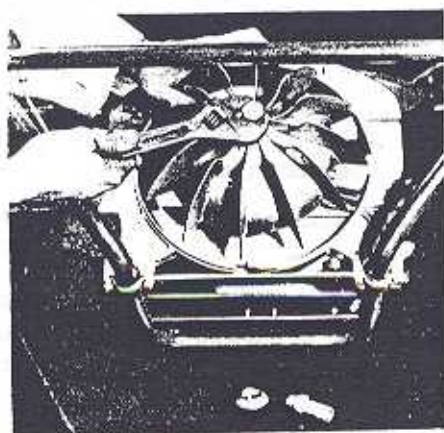
6. If points do not start to separate by the time firing position is reached, spark is retarded; if points open before firing position is reached, spark is advanced too far; in either case, angle of magneto on mounting plate must be adjusted. To adjust, loosen the two lock screws and shift magneto housing against direction of normal rotation to increase spark advance, with clockwise rotation of normal rotation to decrease spark advance. When correct adjustment has been attained, tighten lock screws securely. Re-check contact point gap after lock screws are tightened, because tightening screws sometimes changes magneto position.

7. Re-install magneto cover, fan, fan housing, spark plugs and spark plug cover as instructed under "Servicing Magneto Contact Points".

ADJUSTMENTS AND SERVICE (cont.)

REMOVING MAGNETO CONTACT POINTS

At the time of each Monthly Preventive Maintenance Inspection and whenever "Double Chart" check shows attention needed, service magneto contact points as follows:



Remove spark plug cover and spark plugs. This will eliminate cylinder compression so that crankshaft can be rotated more freely.

Remove fan housing.

Remove fan. First remove fan hub nut; then thread fan puller (Tool No. SKA-10073) into fan hub and turn clockwise until fan hub breaks free of crankshaft taper.

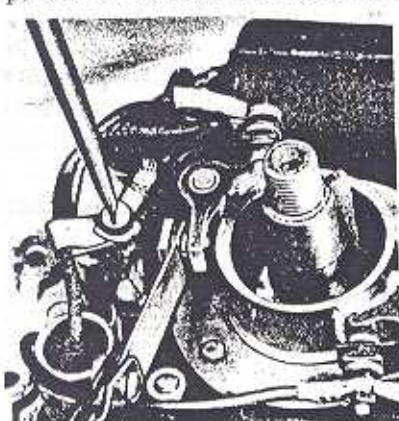
NOTE! To prevent rotation of fan while removing fan hub nut and while applying puller, wedge fan with a block of wood. Be careful to locate block in such a manner that wedging load will be applied to root of fan blade, close to hub shell; otherwise, blade may crack or break off when load is applied.

Remove magneto cover. Avoid damaging gasket unless a new replacement gasket is available.

Clean contact points. If merely oxide coated or slightly pitted, they may be conditioned for further use by dressing contact faces with a clean, fine-cut contact point file; if badly pitted or burned to the extent that smooth, matching faces cannot be restored by filing, points should be replaced. Excessive pitting or burning indicates faulty condenser.

NEVER USE EMERY CLOTH or sandpaper to clean points; even a microscopic particle of emery dust or sand lodged between point faces can cause ignition failure.

Adjust point gap as follows: Turn crankshaft in direction of normal rotation and, with feeler gauge, determine exact cam position where points reach maximum separation. Without moving cam from this position, loosen lock screw and ground wire screw and, by applying screwdriver to adjusting slots, adjust points so they have a gap of .015 to .016 inch. Lock in this position by tightening lock screw and ground wire screw.



7. *Install magneto cover.* Be sure gasket is in good condition.

8. *Install fan.* Be sure fan hub key has remained in position after fan is in place. To prevent rotation of crankshaft while tightening nut, wedge fan with a block of wood.

9. *Install fan housing.*

10. *Install spark plugs and spark plug cover.* Be sure each cable is securely connected to proper spark plug.

ADJUSTMENTS AND SERVICE (cont.)

when corresponding piston reaches .111 in. before top dead center, w correct firing position; this piston position can be accurately determi means of Timing Gauge (Tool No. S-61-504), applied as follows:

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7. Re-install magneto cover, fan, fan housing, spark plugs and spar cover as instructed under "Servicing Magneto Contact Points" P

SERVICING MAGNETO CONTACT POINTS

At time of each Monthly Preventive Maintenance Inspection and whenever "Trouble Chart" check shows attention is needed, service magneto contact points as follows:

1. Remove spark plug cover and spark plugs. This will eliminate cylinder compression so that crankshaft can be rotated more freely.

2. Remove fan housing.

3. Remove fan. First remove fan hub nut; then thread fan puller (Tool No. SKA-10073) into fan hub and turn clockwise until fan hub breaks free of crankshaft taper.

NOTE! To prevent rotation of fan while removing fan hub nut and while applying puller tool, wedge fan with a block of wood. Be careful to locate block in such a manner that wedging load will be applied to root of fan blade, close to hub shell; otherwise, blade may crack or break off when load is applied.

4. Remove magneto cover. Avoid damaging gasket unless a new replacement gasket is available.

5. Clean contact points. If merely oxide coated or slightly pitted, they may be reconditioned for further use by dressing contact faces with a clean, fine-cut contact point file; if badly pitted or burned to the extent that smooth, matching faces cannot be restored by filing, points should be replaced. Excessive pitting or burning indicates faulty condenser.

NEVER USE EMERY CLOTH or sandpaper to clean points; even a microscopic particle of emery dust or sand lodged between point faces can cause ignition failure.

6. Adjust point gap as follows: Turn crankshaft in direction of normal rotation and, with feeler gauge, determine exact cam position where points reach maximum separation. Without moving cam from this position, loosen lock screw and ground

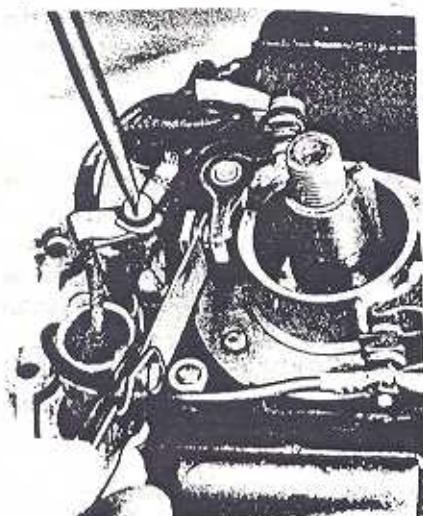
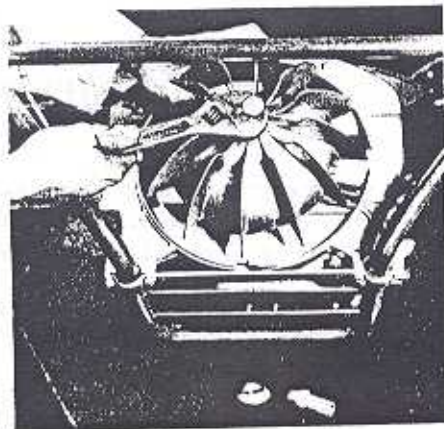
wire screw and, by applying screwdriver to adjusting slots, adjust points so they have a gap of .015 to .016 inch. Lock in this position by tightening lock screw and ground wire screw.

7. Install magneto cover. Be sure gasket is in good condition.

8. Install fan. Be sure fan hub key has remained in position after fan is in place. To prevent rotation of crankshaft while tightening nut, wedge fan with a block of wood.

9. Install fan housing.

10. Install spark plugs and spark plug cover. Be sure each cable is securely connected to proper spark plug.



ADJUSTMENTS AND SERVICE (cont.)

SERVICING SPARK PLUGS

Operation with defective or wrong type spark plugs will be reflected in engine performance, as indicated by hard starting, fouling, missing, over-heating, pre-ignition or lack of normal power. Therefore, at time of each weekly preventive maintenance inspection and whenever check of ignition system indicates that spark plugs are in need of attention, remove for inspection and service as follows:

1. Remove spark plug cover (secured by 3 screws and lock washers).
2. Disconnect spark plug cables and remove spark plugs.



CAUTION! Ceramic insulation of spark plugs is easily damaged by shock stresses or bending stresses such as may be imposed by dropping, striking with hard objects or overtightening. Therefore, if spark plug has been subjected to such accidental abuse, it should be carefully inspected and tested before further use.

3. Clean each spark plug and inspect carefully. If tip of insulator core is cracked, broken or blistered or if electrodes are burned away to the extent they are thin or can not be satisfactorily adjusted to recommended .025" replace with new plug. For replacement, use only Champion Type J-6-J spark plug.
4. Re-install spark plugs. Be sure gaskets are in good condition. Start them one or two turns with fingers to avoid danger of cross-threading. Do not tighten more than necessary to attain a gas-tight seal.
5. Connect spark plug cables; be sure each cable is securely connected to proper spark plug.
6. Install spark plug cover; tighten screws securely.

CLEANING CARBON

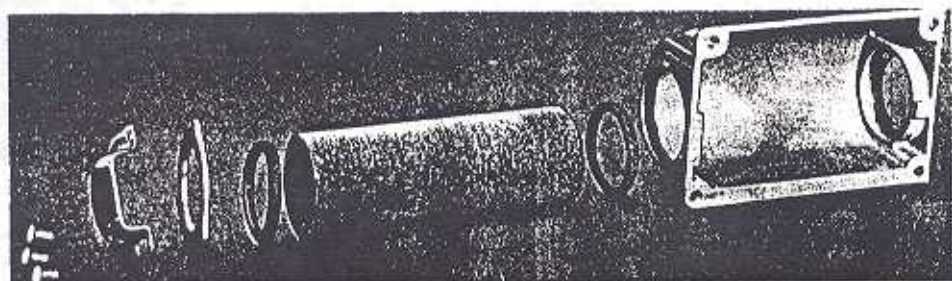
Excessive accumulation of carbon in exhaust ports and mufflers will obstruct flow of exhaust gases to the extent that engine performance will be noticeably reduced. Therefore, at time of each Monthly Preventive Maintenance Inspection and whenever muffler outlet pipes show an excessive accumulation of carbon, clean carbon from mufflers, muffler adapter blocks and cylinder exhaust ports as follows:

1. Disconnect throttle rod from left side handle. Remove the four screws and two caps which secure frame to crankcase legs. Remove castellated nut which secures frame of handle assembly at forward point. Now lift frame assembly clear.
2. Remove mufflers. This requires removing the 4 muffler stud nuts and lock washers; with these removed, muffler strap, mufflers and muffler adapter blocks are free to be removed. Note gasket assembled between each muffler adapter block and cylinder.

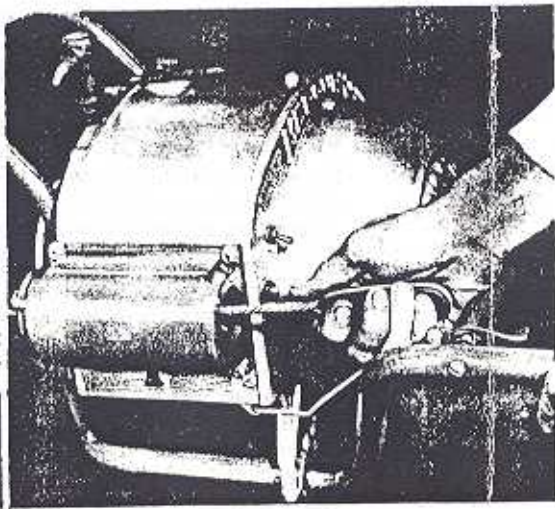
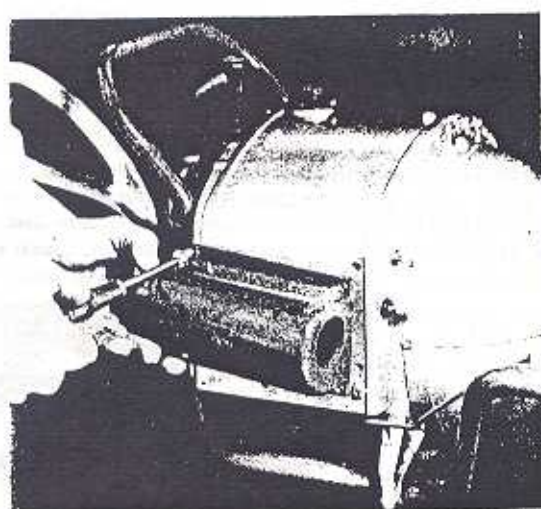


27 ADJUSTMENTS AND SERVICE (cont.)

3. Clean carbon from muffler adapter blocks.
4. Clean carbon from muffler outlet pipes; while doing so, hold mufflers with outlet pipes downward, so loosened carbon falls free instead of becoming trapped in mufflers. Mufflers can be further cleaned by immersion in a commercial carbon solvent. However, after cleaning in this manner, they must be thoroughly flushed with water and dried by the application of moderate heat.
5. Scrape carbon from cylinder exhaust ports. In doing this, two precautions must be observed: First, avoid scratching pistons and rings; second, avoid allowing loosened carbon to become trapped in cylinders. Engine should be in normal position, or nearly so, with exhaust ports facing downward; each piston should be located at bottom dead center while scraping carbon from port holes.



6. After carbon has been scraped from all parts, wash in suitable solvent and dry with compressed air.
7. Install muffler adapter blocks on studs with new gaskets; these gaskets are important because they prevent leakage of hot exhaust gases into cooling system.
8. Install mufflers, muffler strap, lock washers and nuts. Tighten nuts snugly, but avoid tightening to the extent that studs may twist or snap off. Reinstall frame assembly.



SERVICING AIR FILTER

Inspect filter element daily to determine need of cleaning. If not cleaned regularly, filter element may become clogged to the extent that air flow to carburetor becomes restricted; this will upset carburetion and affect engine performance noticeably. Clean filter element with the special brush (Accessory No. 271-917). Apply with a rotary motion—not a back-and-forth motion.

Once or twice a year, depending on operating conditions and amount of usage, replace filter element as follows:

1. Take off air filter assembly by removing the four fastening screws and lock washers.
2. Remove the 3 filter element retaining plate screws. With retaining plate removed, filter element can be withdrawn from housing. Be careful not to damage rubber gasket assembled to each end of filter elements.
3. Clean all parts, particularly inside of housing.
4. Apply rubber gasket to each end of replacement filter element.
5. Insert filter element into housing and install retaining plate with the 3 screws.
6. Install air filter assembly on engine with the 4 fastening screws and lock washers. Tighten securely.

**SERVICING COOLING SYSTEM**

Engine cooling is accomplished by forcing air around the cylinders and the space between the cylinder fins. A highly efficient fan is attached directly to the crankshaft taper.

It is inevitable that the cooling air passages will eventually become clogged with sawdust and other foreign matter. At periodic intervals, the fan and cylinder baffle should be removed in order that the various air passages be inspected and cleaned if necessary.

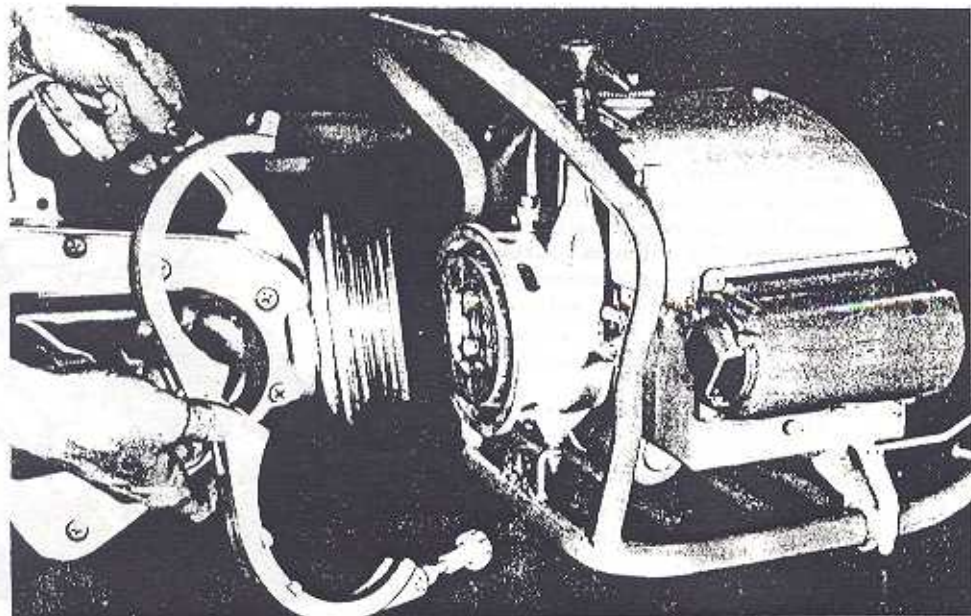
Use compressed air or a stiff bristle brush to remove accumulated sawdust from the cylinder fins and fan fins.

In the Preventive Maintenance Schedule, this cleaning procedure is recommended monthly; however, under certain conditions it should be done more frequently.



29

ADJUSTMENTS AND SERVICE (cont.)



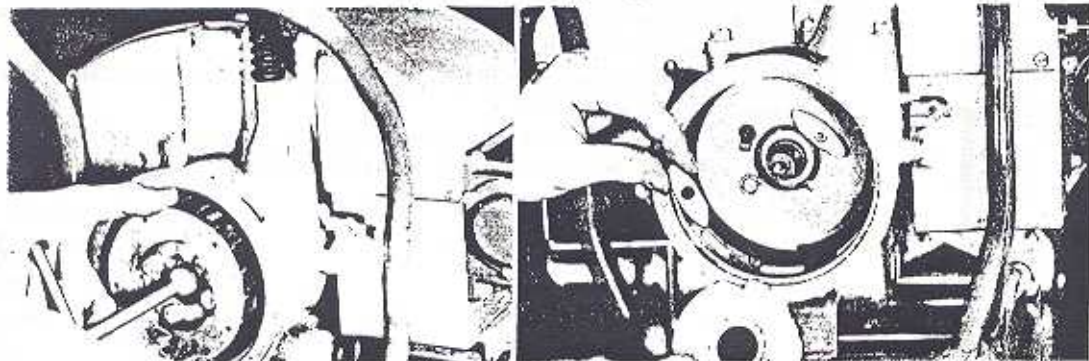
SERVICING STARTER ASSEMBLY

Disassembling Starter

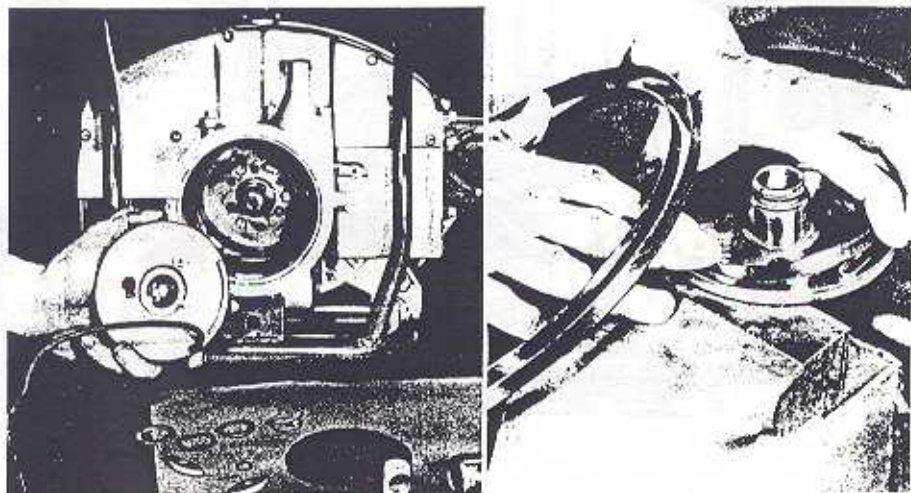
1. *Separate transmission and saw unit from engine.*
2. *Remove fan housing.*
3. *Remove clutch assembly.* Turn clutch hub screw counterclockwise until clutch hub breaks free of crankshaft taper; collar on clutch hub screw acts as puller when it engages internal lock ring in clutch hub. Do not remove screw from clutch hub unless it requires replacement.

IMPORTANT! To prevent rotation of crankshaft while loosening clutch hub screw, wedge fan with a block of wood. Be sure to locate block in such a manner that wedging force will be applied to root of blade, close to shell; otherwise blade may crack or break off when load is applied.

4. *Remove pawl retainer.* First remove spiral lock ring from groove in sheave pilot; then remove brass thrust washer, pawl retainer, spring washer and steel thrust washer.



ADJUSTMENTS AND SERVICE (cont.)



5. *Remove starter pawls.* Note spring washer assembled under each pawl; the important and must be in place when starter is again assembled.
6. *Remove starter cable handle.* Withdraw starter cable a short distance and temporary knot to prevent cable from retracting into housing when handle removed. Push cable end plug out of handle, force knot out of end plug, knot and remove end plug and handle. Untie temporary knot and allow sheave unwind slowly to relieve initial tension.
7. *Remove starter cable guide.* Guide is secured to bell housing by two screw lock washers.
8. *Remove starter sheave.* Relieved sector in outer edge of sheave is provided allow cable clearance between sheave and bell housing.

CAUTION! When lifting sheave off of pilot, be careful not to lift starter spring out of retainer. Spring is coiled with considerable tension and, if release suddenly, will expand with sufficient force to cause injury. Do not attempt to remove spring from retainer while sheave pilot is mounted in bell housing. When removing spring, lift out one coil at a time, always hold remaining coils in place with thumb.

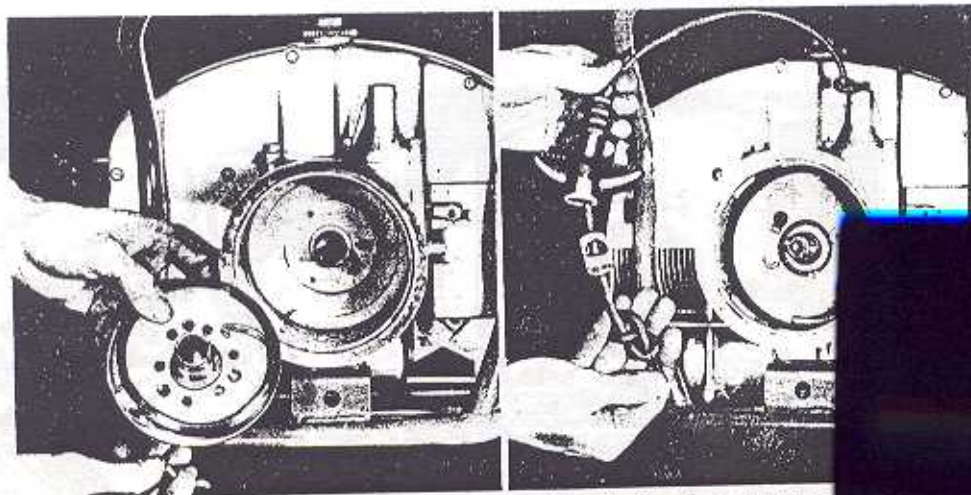
9. *Remove sheave pilot.* This need not be done unless starter spring requires re-ment. To remove, take out the four flat head screws which secure pilot flat crankcase. After pilot is removed, starter spring may be released from retainer one coil at a time, as explained in foregoing "CAUTION."
10. *Remove starter cable from sheave.* Note that first turn of cable passes snubber rivet.

Reassembling Starter

If new starter spring is to be installed, inner end of spring must be pre-form bending around a 2-inch radius for a distance of about 7 inches. This is necessary to bring inner hook of spring into position where it will be in alignment to engage sheave anchor pin while sheave is being installed on pilot.

1. *Install starter spring in retainer.* Locate outer hook of spring over anchor hole in spring retainer and insert spring into retainer one coil at a time, bearing in mind the preceding "CAUTION" note.
2. *Install sheave pilot.* Engage outer hook of starter spring on anchor pin in

ADJUSTMENTS AND SERVICE (cont.)



case while setting sheave pilot into position. Install the three flat head screws and tighten securely. To prevent screws from loosening in service, stake metal into one end of each screw slot with a sharp punch.

3. *Lubricate starter spring and sheave pilot with grease.* Carefully work grease into spring coils. See starter lubrication instructions on Page 7.

4. *Wind starter cable in sheave.* Insert end of cable through anchor block under snubber rivet; pull cable tight, so anchor block seats in anchor block. Balance of cable on sheave.

5. *Mount sheave on pilot.* Be sure sheave anchor pin engages inner hole of spring. Relieved sector on outer edge of sheave is provided to allow clearance between sheave and bell housing. Before inserting end cable through sheave opening, sheave must be pre-wound counterclockwise more than two turns to give starter spring the necessary initial tension. With sheave in pre-wound position, insert end of cable through cable guide in bell housing through cable guide; then tie a temporary knot in cable to prevent it from slipping into housing.

6. *Mount cable guide on bell housing.* Secure with the two screws and washers.

7. *Install starter cable handle.* Insert end of cable through handle anchor plug. Tie a "Figure-8" knot in end of cable as shown in Illustration 7. Pull knot right; pull knot very tight and work it into end plug recess. Pull handle until flush. Untie temporary knot and allow handle to rest against stop. Check operation at this point to be sure cable unwinds and rewinds.

8. *Install starter pawls.* Mount with curved edge outward. Be sure to use spring washer under each pawl.

9. *Install pawl retainer.* Mount steel thrust washer, spring washer and brass thrust washer on sheave pilot in the order named and secure with spiral lock ring; be sure lock ring is securely engaged in sheave pilot. Check operation.

10. *Install clutch assembly.* Be sure key remains in place in keyway. Clutch assembly is in place on shaft. Engage clutch hub screw threads on shaft with fingers to avoid danger of cross threading; then tighten securely. Prevent rotation of crankshaft while tightening clutch hub screw, wedge fastener or pull starter handle until pawls engage, then rest handle against stop.

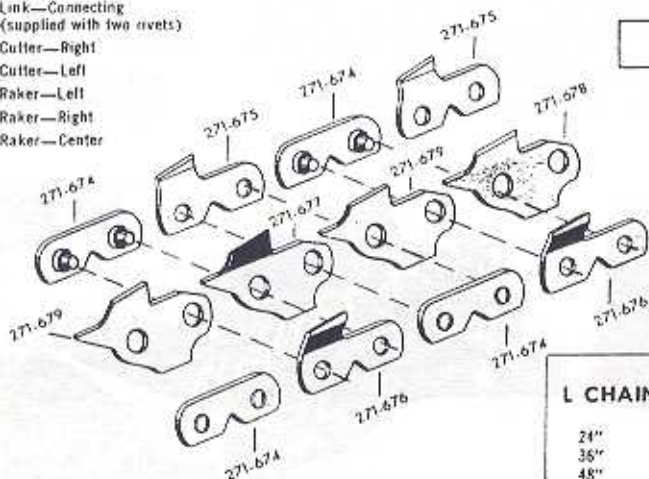
11. *Install fan housing.*

12. *Install transmission and saw unit on engine.*

SHARPENING AND REFITTING CHAIN



- 271-674 Link—Connecting
(supplied with two rivets)
271-675 Cutter—Right
271-676 Cutter—Left
271-677 Raker—Left
271-678 Raker—Right
271-679 Raker—Center



L-TYPE

Teeth are identified by looking at the cutting face. If the pitch is to the right, it is a right hand raker or right hand cutter, etc. The center raker tooth is straight.

L CHAIN LENGTH

24"	271-1
36"	271-1
48"	271-1
60"	271-1
72"	271-1
84"	271-1

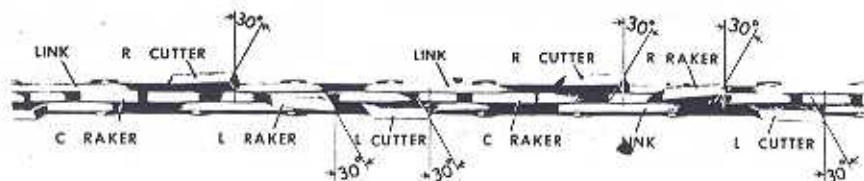
THE FUNDAMENTALS OF PROPER CHAIN C
SHARPNESS?

The most important factor for fast, smooth cutting is sharpness. Dull chains waste power and cut less wood.

CUTTERS: Sharpness is affected by angle of face bevel and top bevel. Long, needle-sharp points (made by increasing bevel angles) will not stand up except in very soft woods. Always leave "backing-up" metal when increasing face bevel angles. Do this by reducing (flattening) the top bevels.

RAKERS: The job of the rakers is to rip up material scored by the sharp cutters. They always work inside the scoring left by the cutters.

On the Disston L-type chain, the rakers do two jobs—they break up chips and do some actual cutting in addition to their normal duty of plowing wood. For this reason they have a large face bevel and a 57 degree top



Remember . . . Leader Chains are sharpened only on the face bevels.

TOP BEVEL



HOOK ANGLE

33

Hook angle is the angle of approach to the wood by the cutters and rakers.

For cutting softwood and for ripping, hook angle should vary from zero to positive. For hardwood and frozen wood, zero to negative hook angles should be used.

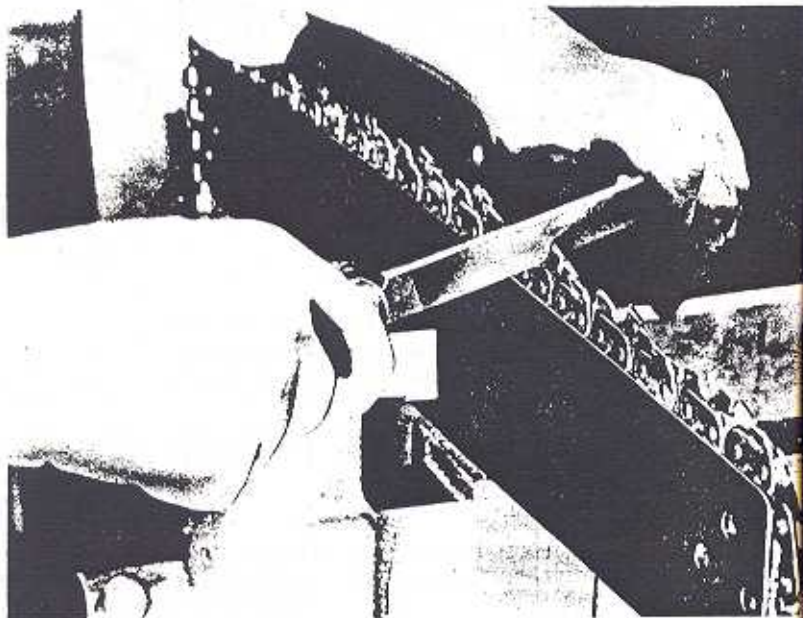
In all special chain fitting, it will be found that a combination of small changes in hook and bevel angles, joint and set, will accomplish more than a drastic change in any one factor.



If tooth is shaped to dig in—Positive Hook.



If tooth is shaped to pull away—Negative Hook. For hard or frozen wood.



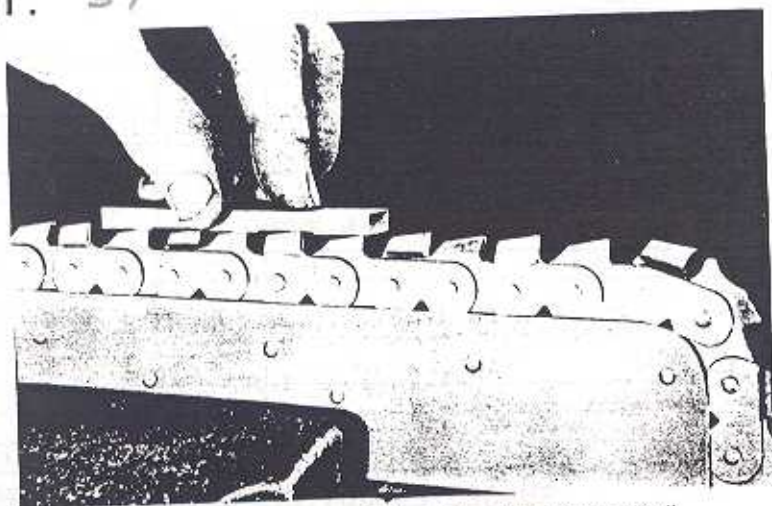
HAND FILING: "Touch up" the chain with the Disston Chain Saw File, a file with both edges rounded for filing gullets. Eight inches long, it is single cut on sides and edges . . . parallel in width and thickness. File the face bevels.

Use a long, even stroke in filing the teeth. Maintain the face angles and hook angles on the teeth as originally furnished unless special fitting is desired. (See chart.)

Never use a file that does round edges as it will produce corners in the gullets. The Chain Saw File is designed to file the teeth at the bottom of the gullet as to produce a smooth round edge. Sharp corners in the gullets will probably result in cracked teeth.

After sharpening—wash the chain in kerosene to remove abrasive grit. After drying, dry relubricate and prevent rust.

JOINT: 39



Checking the height of the teeth, or "checking the joint."

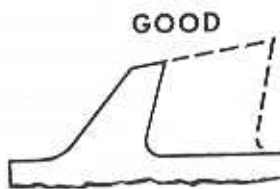
Joint is the difference in height between the cutters and rakers. Cutters must always be higher than rakers. The greater the difference between cutter and raker height, the more joint has been given the chain. Joint generally is advantageous when cutting softwood.

To use the jointing gauge, rest each end of it on adjacent center teeth. When the teeth have been properly sharpened, the cutting teeth and the side raker teeth will just touch the corresponding portions of the gauge.

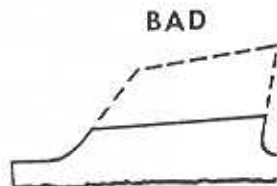
Care should be exercised to insure the gauge being level in both directions. If it is not held perfectly level it is possible to misjudge the joint and have the cutting teeth on one side or the other higher than those on the opposite side of the chain.

If the gauge does not touch the two center raker teeth, remove more metal from the **FACES** of the cutting teeth or side rakers.

If, on the other hand, the cutting teeth and side raker teeth do not touch the gauge when supported on the center raker teeth, more metal must be removed from the **FACES** of the center rakers.



Chain teeth which have been properly filed should look like this after sharpenings.

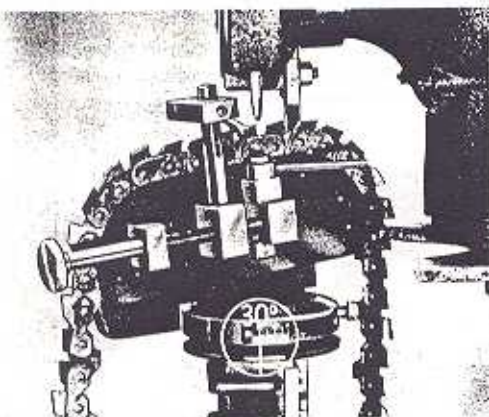
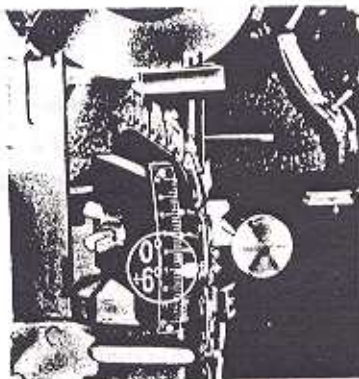


Here is a tooth which has had too much metal removed by sharpenings on the top. Chain life is drastically decreased due to this.

SHARPENER MODEL E3C6

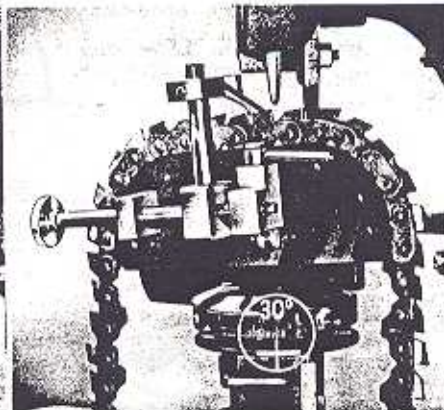
36
Remove the chain runway insert since the Leader Chain must run in the groove. Put the chain in the runway with the cutting faces of the teeth pointing toward the grinding wheel. Loosen the Allen screw and lower the head until the finger firmly grips the back of the right cutter. Tighten the Allen screw.

Consult the fitting chart for the desired hook angle. Loosen the wing nuts and adjust the vertical protractor scale. Retighten the wing nuts.

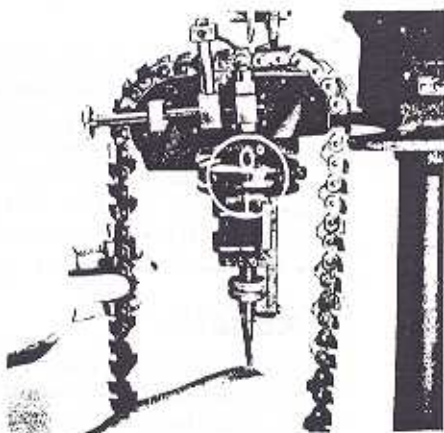


Start with a right cutter. Adjust horizontal protractor scale to 30° to the left of the 0. Tighten screw (574). Turn the adjusting stud (624A) until the tooth just clears the face of the grinding wheel *with motor off*. Raise lever until wheel just clears gullet of tooth. Adjust the length of the stroke and make final adjustment of indexing stud. Sharpen all right cutters.

Now do the center rakers. Set horizontal protractor scale on 0. No face bevel is needed on center rakers.



Remove horizontal protractor scale. Grind the left rakers. Change horizontal protractor scale back to 30° to the left of the 0. Grind all right rakers.



SHARPENING AND REFITTING CHAIN



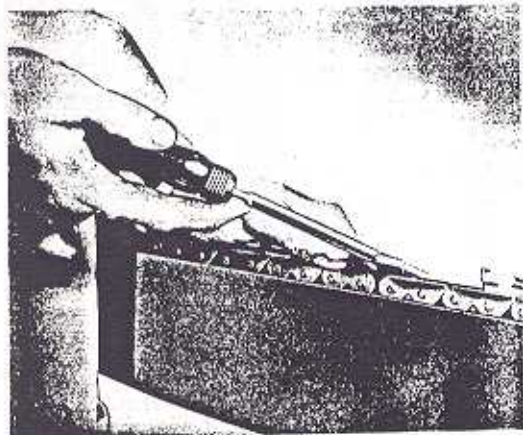
SHARPENING

The chain is sharpened by dressing the inside bevels of the cutting teeth with a special Disston file, bringing the outside corner to a sharp point.

KEEP POINT ~~X~~ SHARP!



SIDE CLEARANCE 3°



See how the diamond-shaped Disston 531 file is held between the two cutting angles. The angle of the bevels can be made less than 45° for softwood. This gives a sharper, longer bevel. However, for hardwoods maintain the factory angles of 45°. This is generally acceptable. Alter hook angles by hand filing or with Disston Sharpener.

REMEMBER

Do not file too much. Many light sharpenings mean longer life of chain and better cutting. Don't allow the chain to run dull. Maintain equal bevels and even teeth by dressing each tooth by the same amount.

THEN... S

Use a 384 Disston file to dress the point of the tooth to a slight flat. Hold file parallel to the cutting edge. Dress point of the tooth. This prevents the tooth from chipping.



DON'T DO

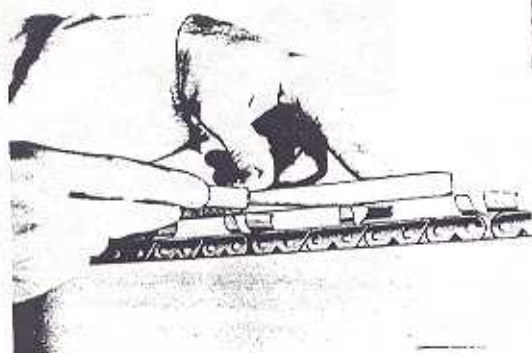
Failure to dress the point of the tooth equally divides the cutting edge. The shaded area (shaded). The tooth, gives the chain a weak cutting edge.

HOOK ANGLE 38

This is the angle of approach to the wood by the cutters. You should find that negative hook of -5° gives smoother cutting.

BORE-BUCKING

Round off joint lugs, leaving only $\frac{3}{16}$ " land. Joint is .025". -5° hook angle always! Push bar straight in, then cut up or down to avoid pinching. Apply side pressure to prevent chain "walking out".

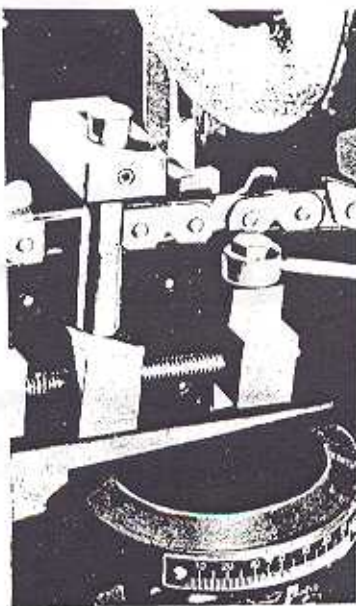


CHECK THE JOINT:

Place chain in flat-surfaced runway. Lay jointing bar over three cutters. File top chisel edge of all high cutters until bar lies perfectly flat. Go around chain until all cutting edges are an even height. Resharpen chain until bright spots on top of teeth disappear. Then with bar and thickness gauge, check joint of all depth limiting lugs.

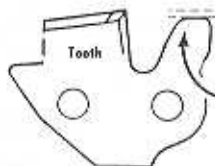
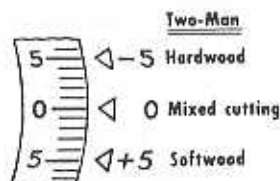
LOOK AT THE LUGS:

They're important since they determine the speed of the cut. Standard Joint .025". For fast cutting in soft timber the lugs may be .040" below the cutting edges. It is easy to shorten the lugs with a 384 Disston file—impossible to lengthen them!



THE DISSTON ELE CHAIN SHARPENER

refaces and rejoins Chise tooth after a number of h The indexing finger assembl (loosen Allen screw) and re of tooth. Set horizontal sc proper draw knife angle. scale for hook angle de this chart.



SHARPENING AND MAINTENANCE OF DH CHAINS



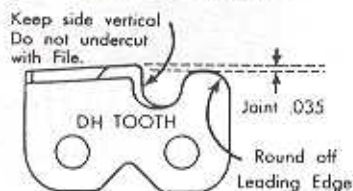
CHAIN

The new Disston "DH-2" Hooded type chisel chain, with chrome plated cutter, has been produced for use with the DA-211 unit. This $\frac{3}{8}$ " pitch chain can be sharpened with a Disston $\frac{1}{4}$ " round file, Part No. 535. The sides of the cutter teeth are rounded, and the drive lugs are



gauge. A special 8 point sprocket, Part No. 271-029 is required to drive DH chain on the DA-211 unit.

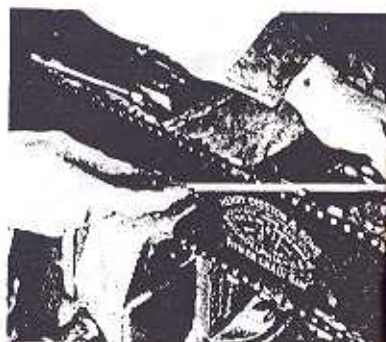
DH TOOTH-SIDE



DH-2 Sprocket



Part No. 271-029

Sharpening DH Chain with Disston $\frac{1}{4}$ " round file, No. 535

Draw knife angle of DH-2 tooth should be maintained at 45° for left and right cutters. Keep $\frac{1}{4}$ " of the diameter of the $\frac{1}{4}$ " diameter round grind stone above the top of the cutting tooth. This prevents undercutting of the tooth as produced by filing under the tooth, or prevents blunt edges as produced by filing too high on the tooth. Using the file correctly will give a vertical side cutting edge without a hook, giving longer life between sharpening. Electric hand grinders with $\frac{1}{4}$ " diameter stones can be used in place of $\frac{1}{4}$ " diameter round stones following the sharpening specifications as shown below. Joint can be varied from original factory setting of .035" to .050" for soft wood cutting. Too much joint can stall low horsepower units and pull tops from chains in very hard or frozen woods. Do not over-joint chains because they are very difficult to correct. Joint the rider lugs with the flat chain saw Part No. 384—keep the front edge rounded off.

DH TOOTH-TOP

