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TRAINING BULLETIN #44

ROTARY SAWS

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## I. SAFETY OPERATIONS

The following safety equipment should be used at all times:

1. Gloves
2. Goggles
3. Helmet

If an electrical hazard is suspected or exists, gauntlet gloves shall be used. A safety member shall be utilized in all cases.

Two hazards unique to the rotary saw make it an extremely dangerous tool.

First, the blade continues to spin at high rpms long after the throttle is released, or after the saw is shut off. Leaving the saw unattended in this condition should not be done under any circumstances. The blade should be stopped in the work or monitored until it stops spinning.

Turning with a running saw in hand must be done with extreme caution.

The second hazard is the gyroscopic effect caused by the spinning blade. This makes the saw somewhat unwieldy when changing its cutting angle (this is inherent to the saw and the operator should be aware of this).

Particular care should be paid to the surrounding area. When cutting metal, the saw throws off hot sparks which can provide an ignition source in flammable atmospheres, or to combustible solids. Care should be taken to have firefighters and extinguishing equipment (loaded line and/or dry chemical extinguisher) in place prior to the cutting operation if the situation calls for these precautions (See Figure 1).

It may be necessary to use the aluminized ceramic blanket as well.

Care must be taken that the area in the path of the sparks is clear prior to cutting with the saw. Hot sparks can be thrown up to 15 feet from the cutting area.

## II. USE OF BLADES

Rotary saws in use by this Department require different diameter blades, depending on the style of saw. The Homelite XL98 Rotary Saw requires a 12 inch diameter blade, whereas the Partner K-1200 normally utilizes a 14 inch diameter blade. The Homelite 12" blades may be used on both the Homelite and Partner saws. However, the 14" blades will not fit on the smaller Homelite saws. The cutter wheels and blades are available in three basic types; carbide tipped blades (wood), abrasive wheels (masonry/metal), and diamond blades (concrete). Their uses include:

- A. The Wood Cutting Blade - A tempered metal blade, carbide tipped, used for cutting composition roofing material, wood, and lexan. Use on light sheet metals such as door cladding or aluminum sheet with care. (Available in 12" and 14" diameters)

### Figure 2

Carrying case, blades, spanner wrench, combination wrench.

There are two (2) types of composition blades; the masonry cutting blade and the metal cutting blade. Grit and resinoid epoxy agents are specially formulated to cut specific materials. Abrasive blades are fiber reinforced for added strength and longer wear.

B. Masonry Cutting Blade - A composition blade identified with a white or silver stripe. Blade life can be extended by applying water on the work surface as this cools the blade and reduces dust in the atmosphere. The blade can also be used as a backup blade to cut light metals. (Available in 12" and 14" diameters)

C. Metal Cutting Blade - A composition blade used to cut metals that may be encountered during rescue or forcible entry situations. This blade can be identified by a green blotter label. (Available in 12" and 14" diameters)

D. Diamond Blade - An expensive, fast cutting blade with a blend of hardened, synthetic diamond material fastened to the outer edge. Arrows are located near the hub indicating direction of blade rotation (see Figure 3). This blade can cut masonry, reinforced concrete, and mixed materials. Avoid cutting metal as this will reduce blade life. (Available in 14" diameter only.)

Figure 3

NOTE: This blade shall be reserved for emergency operations ONLY. A Diamond Blade is assigned to each Battalion Headquarters and shall be utilized for training sessions in each respective battalion.

### III. OPERATING TIPS

The rotary saw is a very versatile tool. A feature of the Homelite and Partner Rotary Saws is a reversible blade and guard (see Figure 4). For best results as a rescue saw, the blade and guard can be mounted in the outboard position. This allows cuts to be made in close proximity to walls, floors, etc.

#### Figure 4

The inboard position is optimum for ventilation use. With the blade centered, the saw can be dragged through the material, using the guard as a depth gauge and the lower portion of the carrying handle as a pivot and skid (see Figure 5). This method reduces blade bind. This type of cut could be accomplished with the blade and guard outboard, but extra care would have to be taken to prevent bind, since the blade and handle would be out of line with each other. If the saw is to be used primarily as a ventilation tool, the inboard blade and guard position should be considered.

To prevent the blade from binding during cutting operations, use the following procedures:

1. Adjust blade guard to control cutting depth.
2. Enter all cuts at full rpm.
3. While cutting vertical surfaces, make certain blade is kept at right angle to surface.
4. Always cut in straight line (do not twist saw to, either side).
5. Release throttle and immediately remove blade from cutting surface if binding occurs to avoid belt damage.

#### Figure 5

The rotary saw is excellent when used for cutting thick or heavy roof composition as found on flat or older types of roof construction.

The operator may experience problems if attempting to use the rotary saw for ventilation purposes on steep pitched roofs. Judgment should be used prior to operating the saw on any roof that is more than slightly pitched. This is mainly due to reduced reach and gyroscopic effect.

In addition, the ability to feel structural members is difficult. If used for ventilating light weight roofs, particular care should be taken to assure the proper depth of cut.

During emergency operations, the combination wrench should be carried to facilitate adjustment of the belt or provide blade change. A saw can be rendered unserviceable very quickly if the belt is improperly adjusted. I

A portable carrier can be used to bring each blade type to the cutting site, providing greater flexibility to the operator (see Figure 2).

Additional information for uses of this tool is available through the Department Video Library.

#### IV. MAINTENANCE INSTRUCTION

##### A. Daily Checks

1. Check fuel for level.
2. Check the blade for sharpness and proper mounting.
3. Check the blade guard for damage.
4. Check the belt for tension.
5. Make a visual check of the saw for loose nuts and bolts.
6. Check the controls for proper starting position.  
Check the carrying strap and hooks for condition.

##### B. Weekly Checks

1. Start the saw and operate until warm.
2. Run up rpm to verify that the blade runs true and smooth without wobble or vibration.
3. Listen for abnormal sounds.

### C. Monthly Checks

1. Maintain a clearance of .025" at the spark plug gap on the Homelite and .020" on the Partner. Clean plug as necessary or replace.
2. Remove the cutting blade and check the bearings on the arbor. The arbor should rotate freely, without roughness. If roughness is felt, the saw should be sent to the Division of Supply and Maintenance for repair.
3. Inspect the engine case for cracks or leaks.
4. Inspect the fuel assembly for leaks, crack or soft fuel lines DO NOT operate saw if there is a fuel leak.
5. Before replacing blade, check the condition of the blotters. Abrasive blades with damaged blotters should not be used. Replacement blotters can be obtained through Supply and Maintenance.
6. Check the belt for condition and tension. If the belt is worn or frayed, replace.
7. If a tank of fuel has not been used in the previous 30 days, drain fuel and refill with fresh 32:1 mix.

### D. After Use

1. Refuel saw as necessary.
2. Examine cutting blades after each use. Blade should meet the criteria in the following section titled "Mounting or Changing Blades."

If a carbide tipped wood cutting blade was used, check for tip damage and sharpness. If a missing tip or a visible radius appears, send the blade to Supply and Maintenance for replacement.

3. Check the air filter for accumulation of debris and fiber condition. To remove trapped debris, tap the filter gently on the palm of your hand. Compressed air or solvents should not be used to clean paper filters. Contact Supply and Maintenance for replacement when the filter is unserviceable.
4. Check for loose or bare wires, loose nuts and screws, and cracked or broken parts. Tighten or repair as necessary, or send the saw to Supply and Maintenance for repair.

5. The rotary saw shall be thoroughly cleaned after each use. Particular attention should be paid to cylinder and head fins if soiled with molten tar. Use only approved cleaning agents. Water shall not be used.
6. Rotary saws should have all abrasive dust removed by blowing with compressed air (wear goggles, and respiratory protection). If abrasive material is allowed to build up in the guard it can break loose in the form of small rocks and be thrown out by the force of the blade. These projectiles can cause injuries.

#### E. Mounting or Changing Blades

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1. Before mounting any abrasive blade, new or used, on a rotary saw or on a blade carrier board, blades shall be inspected for signs of deterioration, petroleum product contamination, wear, and cracks, which could render the blade unsafe. After use, blades shall be similarly inspected, if they are to remain on the saw.
2. Blades shall be measured and meet the following requirements for emergency use.

Minimum 12" for Partner 14" Saw  
Minimum 10" for Homelite 12" Saw

NOTE: Blades used during emergency operations may become smaller while performing extensive cutting operations. During such operations, you may continue using a blade until it is no longer adequate for safety and/or effectiveness.

3. Blades which are worn beyond the guidelines above, may be used for drill purposes.
4. Only blades suitable for emergency operations shall be carried on the blade carrier board.
5. Abrasive blades (metal and masonry cutting blades) shall not be forwarded for exchange unless the total blade diameter is nine inches or less.
6. Blades which have been damaged and are no longer safe for use shall be marked with a F-175 Tag and the word "UNSAFE" shall be marked on the blade before forwarding for replacement.

NOTE: Abrasive blades must be rated for spindle speeds of 5000 rpm or higher and must be sandwiched between blade blotters to take up any irregularities in thickness.

## Homelite

1. Engage the spanner wrench in the two holes of the outer washer to lock the shaft from turning (as an alternative method, a gloved hand may be used to hold the blade). Then use the combination wrench to unscrew the blade bolt.
2. Remove only the outer washer (leave the inner washer on the shaft).
3. When mounting the abrasive blades always use new blotters if the old ones are damaged. Sandwich the blade between two blotters. Mount it on the shaft and secure with outer washer and blade bolt. Again using the spanner wrench to hold the shaft from turning, tighten the blade bolt fully, DO NOT FORCE!
4. Some cutting blades have the blotters permanently affixed to the blade. If these blotters become damaged, peel the damaged blotter off and remount blade with a new blotter. Never mount an abrasive blade without a good blotter on each side.

## Partner

1. Insert the spindle pin (provided in each tool kit) into the slot provided on the cutter arm to secure the spindle (see Figure 6 A). As an alternative method, a gloved hand may be used to hold the blade (see Figure 6 B).

2. Remove the blade retaining bolt on the opposite side of the cutter arm by turning it counterclockwise with the combination wrench.
3. Remove the large flange washer.
4. Mount desired blade in proper position, and secure against opposite flange washer.

NOTE: Abrasive blades require blade blotters in good condition be mounted on each side of the blade. Additionally, carbide-tipped wood blades and diamond blades must be mounted to rotate in the proper direction.

5. Replace outer flange washer against blade and secure retaining bolt, wrench-tight.

CAUTION:

When replacing a shattered blade, examine the blade guard for damage. A damaged blade guard must be replaced to protect the operator.

F. Homelite Blade and Guard Position

The following procedure can be used to change blade and guard position on the Homelite XL98 Rotary Saw:

1. Remove the two hex nuts from the mounting studs and lift off the drive case cover.
2. Decide whether you wish to mount the arm with the blade on the left side or the right side. Inboard mounting provides better balance of the saw during operation. Outboard mounting permits making flush cuts.
3. If guard and blade are not on the desired side of the arm, turn the arm over. Then loosen the guard locking bolt and retighten it after rotating guard to a position in which it will protect you during operation. Tighten the guard locking bolt fully.
4. Pull the belt so there is a loop at the rear to fit-over the drive pulley. Angling the arm, slip, the belt over and onto the pulley, and slide the arm onto-the mounting studs.
5. Slide the arm forward to take up slack in the belt.

Note the position of the belt tension pin and the tension pin hole. If the pin is not in line with the hole, turn the belt tension adjusting screw in the direction required for pin and hole engagement.

6. Fit the tension pin into the hole, and gently push the arm flush against the mounting pad. Hold arm in place (with pin engaged in hole) while fitting the drive case cover back onto the studs.
7. Hold arm and drive case cover in position and put the two hex nuts back on the studs. Tighten these nuts only finger-tight because the arm must be free to slide while you are setting the belt tension.

#### G. Homelite Tensioning Procedures

The tensioning procedure for the Homelite Rotary Saw is described below. The tension on the belt is correct when increased to where it lifts and holds the arm, blade, and guard assembly at the upper limit of the play between the arm mounting slot and the mounting studs.

Accordingly, tensioning should be done only with guard and blade mounted on the arm (See Figure 7).

1. With the mounting stud nuts only finger tight (so the arm is free to move), begin turning the tension adjusting screw to the right (clockwise).
2. As you turn the screw, watch for the arm to begin to rise. Push down the blade guard and see if it comes back up. Increase tension to where arm pops back up to the limit of play on the mounting studs. This is the correct adjustment of tension. The belt will be too tight if tensioned more than a half-turn beyond this setting.

3. Tighten the mounting stud nuts fully with the combination wrench.

#### H. Partner Adjustment Procedures

The following procedure can be used to reposition the cutting arm (inboard/outboard), adjust the guard position and adjust belt tension on the Partner K-1200 Rotary Saw.

1. Remove the drive belt protective casings.
2. Loosen the retaining nuts for the cutter arm.
3. Insert the screwdriver end of the combination wrench in the slot provided on the eccentric and rotate it clockwise to relieve drive belt tension (see Figure 8).
4. Remove the drive belt from the front pulley.
5. Remove the mounting bolts and rotate the cutter arm 180°. Reposition the cutter arm on the opposite side.
6. Replace the mounting bolts and fasten retaining nuts hand-tight. Insure eccentric is resting in line with spring tensioning rod (see Figure 9).

7. Slip the drive belt over front pulley.
8. Tension the drive belt by inserting the screwdriver end of the combination wrench in the slot provided on the eccentric and rotate it counterclockwise until it stops. At this point the belt will self adjust. (Reverse the procedure described in Step 3.- See Figure 8.)
9. Tighten the retaining nuts on the cutter arm wrench tight.
10. Replace the drive belt protective casings.
11. Properly position the guard by lifting the "T"-handle to release guard and rotate it into position.

NOTE: NEVER attempt to reposition blade guard while saw is running.

#### I. Storage

1. Store saw in an upright position. When replacing on the apparatus, make sure the blade guard is in a position so that the cutting blade is protected.
2. Store blades in a safe dry location to protect them from damage and possible contact with petroleum products. If one of the composition blades becomes contaminated with a petroleum product, it should be sent to Supply and Maintenance for replacement.

NOTE: Contamination of a composition blade with petroleum products may cause the blade to shatter when used.

3. When sent to Supply and Maintenance, the saw shall be clean and empty of fuel.

#### J. Starting and Stopping

1. Hold saw firmly on the ground, floor, or roof with the cutting blade in the clear.
2. Pull the starter cord just enough to engage the starter pawls. Then crank engine smartly with a quick pull. Do not pull cord out to the end. Hold cord while rewinding ... do not let cord snap back into starter. In warm weather, the engine should fire after one to five pulls.
3. If the engine fires but does not continue to run, move choke in halfway and crank again. When engine runs, squeeze and release trigger immediately. Do not operate with the trigger latched in starting position. As engine warms up, push choke in all the way to Lull open position.
4. If the saw is to be used in a smokey environment, start saw in a clear atmosphere, allow it to warm up briefly, and shut it off. Restart saw as soon as possible in proximity to the work area.
5. To stop engine, flip switch to "OFF". A hot engine usually can be restarted in idle position without choking.

#### CAUTION:

Do not let the blade contact anything except the material to be cut. After finishing a cut, shut off the engine and wait for the blade to stop turning before setting the saw down.

#### V. TROUBLE SHOOTING

- A. Saw will not start-check the following:
  1. On/Off switch and wiring.
  2. Fuel level.
  3. Choke.
  4. Spark plug condition and gap (.025" on Homelite and .020" on Partner)

5. Flooded cylinder (use procedures below):

- a. Place on/off switch in "off" position.
- b. Turn saw on its side (exhaust side down).
- c. Push in choke ("off" position).
- d. Pull starter rope, 4-5 times, to clear cylinder of fuel.
- e. Place switch in "on" position and use normal starting procedures.

B. Blade Binds While Cutting

1. Improper cutting technique.
2. Mechanical Problem
  - a. Immediately discontinue cutting.
  - b. Shut off saw.
  - c. Check belt tension and adjust as necessary.
  - d. Check blade retaining nut and tighten as necessary.
  - e. If blade or belt does not turn, check condition of centrifugal clutch. If the saw rpms increase proportionally with the throttle and the belt and blade do not, the centrifugal clutch is bad. The saw should be sent to Supply and Maintenance for repair.

C. If an abrasive blade shatters

1. Examine blade guard for damage in every case.
2. Inspect any areas of the saw that were exposed to fragments.
3. Major damage should be repaired at Supply and Maintenance.

D. Rough Running

1. Check for fouled or improperly gapped spark plug. Replace defective plug (.025" gap on Homeite and .020" on Partner).

2. Check spark plug wire for cracks, breaks, and proper connection to spark plug.
3. Use only regular or unleaded fuel (32:1 mix).
4. Check fuel filter (must be removed from fuel tank with wire hook), inspect fuel line connections and condition.
5. Check carburetor adjustments, throttle linkage, choke butterfly, debris in carburetor.
6. Check muffler - clogged muffler creates very high back pressure which results in incomplete combustion and contributes to overheating, hard starting, loss of power, and fouled spark plugs (see Maintenance Section for proper cleaning).
7. Dirty Air Filter - Creates loss of power, hard starting, improper fuel air mixture.
8. Choke must be pushed in all the way as saw warms up.