

Basic Chain Saw Maintenance

by Sharon Lilly and Mark Michaels

Learning objectives— The arborist will be able to

- explain why proper maintenance is necessary to the safety and performance of a chain saw
- perform the six steps of a daily chain saw inspection
- perform other routine maintenance on a chain saw

There is an old story about two men in Sweden who were applying for the same job with a logging company. The foreman, unable to choose between the two able workers, set up a competition to determine who would get the job. Each worker was issued a chain saw, and the one who cut the most wood during the working day would be hired. Both set out cutting at a strong, steady pace. After an hour, the first logger stopped and walked into the woods where he sat on a fallen log for a few minutes. The second man kept working, feeling that if he didn't stop to rest, he would have a distinct advantage. The day went on like that, with the first logger stopping every hour.

At the end of the day, the foreman returned to assess how much wood each man had cut. To the shock and dismay of the second man, the first logger had sawed more logs. "How can this be?" the second logger asked. "Every hour you stopped to rest while I kept working!"

"I wasn't resting," the first logger replied. "I was sharpening my saw."

This story illustrates the importance of proper chain saw maintenance. A saw that is maintained according to manufacturer's recommendations runs safely and efficiently and reduces down time. A poorly maintained saw may be unsafe and inefficient, and will probably wear out prematurely.

Daily Inspection

Air Filter

The air filter must be cleaned regularly to ensure proper air flow so that the engine will run efficiently (Figure 1). The filter can be cleaned by tapping it lightly to dislodge sawdust particles, or by lightly brushing it. It is a good idea to clean the filter occasionally with warm, soapy water. Be sure it is dry before replacing. *Never* use fuel or other solvents to clean it – the solvents may break down the filter and will attract dirt.

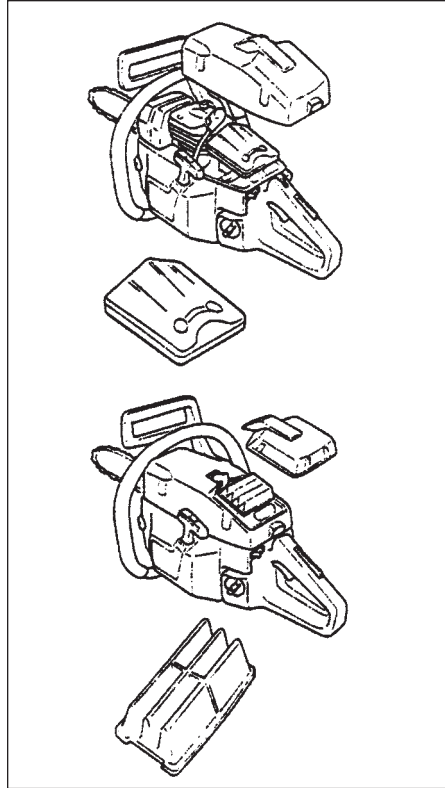


Figure 1. Air filters must be cleaned regularly. Do not use gasoline or other solvents.

Throttle Interlock/Trigger

The throttle interlock is a safety device designed to prevent accidental acceleration in the event that something gets caught in the trigger of the saw. The interlock must be depressed before you can depress the trigger. Check it daily for proper operation.

On/Off Switch and Choke Lever

Check that both the on/off switch and choke lever are operating properly. A saw that doesn't start because of a bad switch can create frustration. A saw that doesn't stop when shut off is a safety hazard.

Chain Brake

The chain brake is designed to stop chain rotation immediately in the event of saw kickback. Check proper operation by running the saw at full throttle and activating the brake. The chain should stop almost instantly.

Chain Catcher Pin

The chain catcher pin, located on the bottom of the saw, stops the chain if it comes off the bar or breaks. Be sure that this safety part is present and undamaged (Figure 2).

Cracks and Vibration

Inspect the saw casing, the bar and the chain for cracks and wear. A broken chain can be a hazard. Cracks in the saw assembly may lead to excessive vibration and noise and may cause the saw to run inefficiently.

Note: Within the first 100 hours of operation, it is important to check that the screws on the chain saw are all tight. Screws can vibrate loose, which leads to other problems.

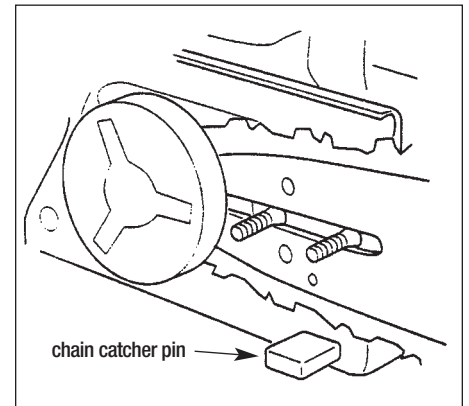


Figure 2. Be sure the chain catcher pin is present and undamaged.

Starting System

The starter system of a chain saw often is overlooked in daily maintenance. If not cleaned occasionally, the starter pulley can collect debris, which can cause it to become unbalanced. The starter cord can become frayed, causing it to break at the most inopportune time. Here are some maintenance tips for the starting system:

- Check the starter cord for frays.
- Check that the starter pulley turns when pulling the cord. Check that the starter engages.
- Do not pull the cord at an angle against the housing. Doing so can cause excessive wear on the rope and starter assembly.
- Be sure the cord returns all the way in. Do not let it slap (Figure 3).
- If necessary, adjust the tension of the starter pulley. If it is too tight, the spring may break.
- Make sure the starter cord isn't too short. If it is, it will be more difficult to start the saw, and the starter pulley may break.

- When installing or adjusting the pull cord, make sure there is still play in the starter spring when the cord is pulled all the way out.

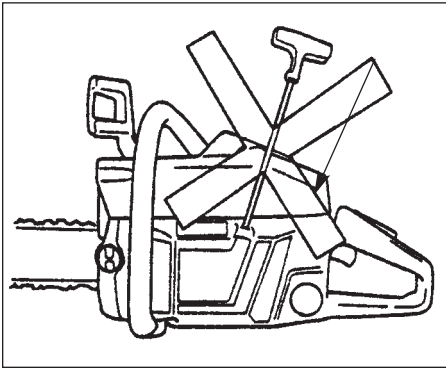


Figure 3. Do not release the starter handle from the fully pulled-out position because doing so can damage the saw.

Drive System

Check that the clutch, chain brake components, bar pad, and sprocket are all clean and free of debris. Check that the oil hole is clear and operating properly. Gently blow or lightly brush sawdust from the cylinder fins.

Ensure that the anti-vibration mounts are tight. Loose mounts produce excessive vibration, which can in turn reduce efficiency and saw control while adding to operator fatigue.

Sprocket

Chain saws ordinarily have one of two types of sprocket: a spur socket or a floating rim sprocket (Figure 4). Each has its benefits and drawbacks. Spur sprockets normally are used on smaller saws, which have shorter bars and lower power requirements. Saws with spur sprockets facilitate chain placement. Change the sprocket when wear becomes apparent. Excessive wear reduces the life of the bar and chain.

A floating rim sprocket is used on bigger saws with longer bars. It is independent of the clutch drum and has the advantage of excellent power transfer. It may require frequent replacement, but replacement is easy and inexpensive. Excessive wear causes excessive bar and chain wear, increased vibration and reduced efficiency.

Fuel Mix

Always consult the owner's manual for the proper fuel mix. Do not vary the fuel mix from the recommended ratio. Use the manufacturer's recommended types of mix oil (two-cycle) in the fuel. Some mix oils, such as outboard motor oil, are not suitable for chain saw use. It is best to use fresh fuel because gasoline can lose its octane rating over time. Some mix oils contain a fuel stabilizer to minimize this problem.

Carburetor Adjustment

If the carburetor is not adjusted properly, the saw will be difficult and/or unsafe to start. The carburetor supplies the engine with the appropriate mixture of vaporized fuel and air. Some saws have fixed jets that do not require operator adjustment. Others have limited adjustment jets.

Follow this five-step process for adjusting the carburetor:

1. Make sure the air filter is clean.
2. Balance the high (H) and low (L) rpm screws to manufacturer's specifications (Figure 5). Warm up the saw and run it at top speed, listening for a flutter or "four-stroking" sound. Turning the H screw clockwise will reduce the fuel mixture, making the saw "scream." From this point, gradually turn the screw counterclockwise until the flutter point is reached. Note: Running the saw on too lean a fuel mixture will ruin the engine.
3. Let the saw come to idle and check that the chain stops rotating. If the chain is still spinning, turn the throttle (T) screw (Figure 5) counterclockwise until the chain does not rotate while the saw idles.

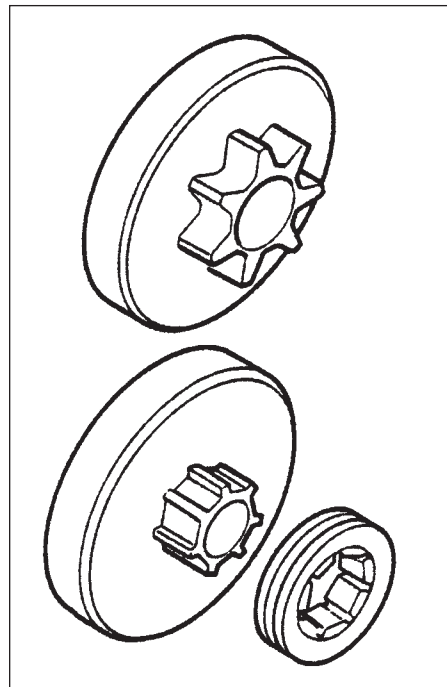


Figure 4. Spur sprocket (top); floating rim sprocket (bottom).

4. Engage the chain brake. Rotate the saw to check that it runs in all positions. If the saw stalls, then it is getting too much fuel, which is puddling below the cylinder. Turn the (L) screw clockwise a little, then repeat the test.
5. Release the chain brake. Throttle up the engine. If it hesitates, then the saw isn't getting enough fuel. Turn the (L) screw counterclockwise and

repeat the last two steps until the saw runs as desired, or take it to the dealer for adjustment.

Chain Saw Bars

There are two basic types of chain saw bars: laminate bars and solid bars. Laminate bars are constructed from three separate sheets of metal. The high-grade metal outer rails are durable. Laminate bars are lightweight. They usually are used on smaller saws with bars 20 inches or less in length.

Solid bars are formed from a single sheet of metal with a groove cut around the perimeter. The metal generally is less durable than that of laminate bars, though metal bars are more flexible. Solid bars often come with a replaceable tip. They are used for longer bars.

Chain saw bars require regular maintenance (Figure 6):

- Inspect the rails. They should be flat and straight to prevent the chain from rocking or running unevenly. Uneven rails can cause uneven wear and reduced performance. Be sure the rails are not splayed (splitting apart). Be sure there are no burrs. Keep the groove clean. Metal dust and shavings can cause premature wear. When the bar is hot, debris can become baked on. Remove sawdust and other debris and clear the oil hole. It is imperative that the oil hole be clear for proper lubrication. Be sure the bar pad is cleaned off and seated properly.
- Check for wear on the top/back and bottom/front of the bar. Such wear can be an indication of a loose chain. If the saw is run with the chain too loose, it may bypass the oil hole and not pick up oil. To avoid ruining chains and sprockets, replace bars with excessive wear. Check the sprocket nose (if present). Ensure that the sprocket is rotating freely and getting sufficient lubrication.

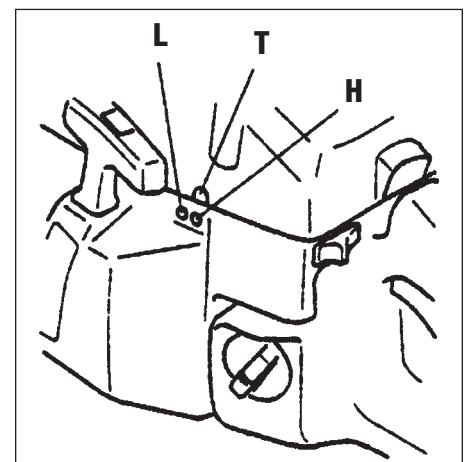


Figure 5. The carburetor may have adjustment screws for low speed (L), high speed (H), and idle (T).

- What about greasing? Some bar tips are equipped with a grease fitting. Tips should be greased frequently and generously—or not at all, instead allowing the bar oil to lubricate the tip. Occasional greasing can cause the grease to become an abrasive paste and may lead to premature wear.
- The use of proper bar oil is essential. High-viscosity oil is required (high tack/low sling). Use only chain saw bar oil that is pure and clean. *Never* use used motor oil. The viscosity will be too low and it may be abrasive.

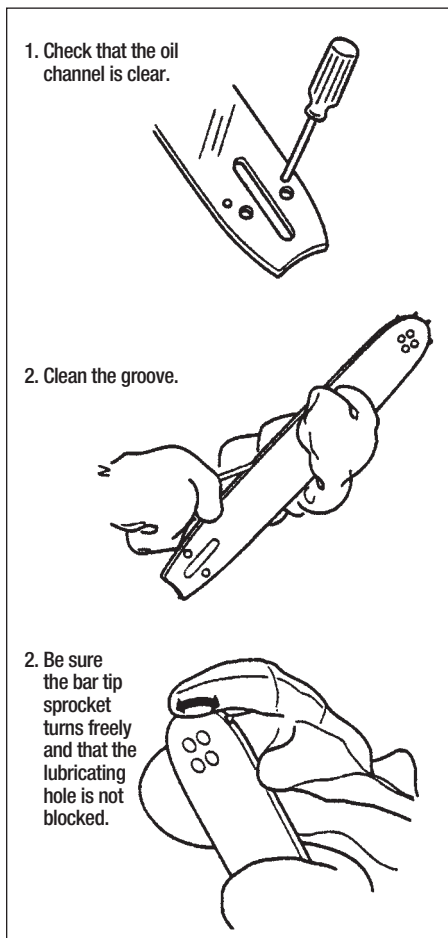


Figure 6. Bar maintenance.

Chains

Chain saw chains come in a variety of sizes and types. Selecting the best chain for your saw and its intended use requires a little knowledge of the basic elements of the chain.

There are two components of chain size, the pitch and the gauge. The pitch is measured by taking the distance between three consecutive rivets and dividing by two. The pitch size must match the sprocket size. The gauge (thickness) of the chain must match the bar groove width. Common gauges include .050 inch, .058 inch and .063 inch.

There are many types of chains ranging from consumer chains to professional

chains (Figure 7). They vary in the design of the cutting teeth and depth gauges. Consumer chains are designed to minimize kickback, but they may sacrifice performance. Professional chains have higher performance characteristics but less kickback resistance.

Chain maintenance cannot be overlooked. Check that the chain sits properly in the groove and runs smoothly along the rails. Check the rivets on the connecting links. Excess wear on the heel and toe of the “runners” can cause excessive wear on the bar. The chain should be tensioned so that it is taut, but it should rotate freely.

There are five parts of a cutting tooth on a chain. The depth gauge, sometimes called the raker, determines the thickness of the cut. The point of the tooth, where the side plate meets the top plate, starts the cut. The top plate cuts through the wood fibers, establishing the width of the cut. The angle of the chisel, which is beneath the top plate, determines the ease with which the wood chips slide under the tooth. The side plate cuts off the fibers. For optimal cutting efficiency, each component must be filed properly. Follow manufacturer’s recommendations.

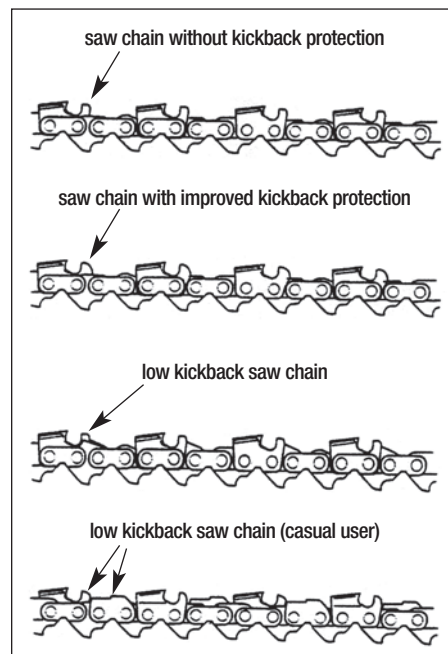


Figure 7. Saw chains come in a variety of types.

With today’s high-performance, low-tolerance chains it is best to use sharpening devices rather than simply relying on a flat file and “eyeballing” it. The depth gauges must be brought down as the teeth are sharpened. If the depth gauges are out of balance with the teeth, the result may be increased vibration and “bouncing”; increased wear on the chain, bar, and sprocket; and reduced performance. For optimal sharpening, the depth gauges should be individually tuned to each tooth.

Then each tooth could be a different length. Always wear gloves when working on a chain saw chain.

Thanks to Husqvarna for providing the graphics for this article.

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