



Chain Saw Specific Training

[Link: Back to Crosscut Saw Specific Training](#)





Chain Saw Training Overview

- **Tools & Equipment**
- **Parts of a Chain Saw & Safety Features**
- **Starting Procedure & Operation**
- **Chain Saw-specific Hazards**
- **Saw Maintenance**
- **Fuel Pressurization & Fuel Geysers**
- **Transportation & Storage**





Tools: Required

- PPE
- First aid kit
- Communications
- Fire extinguisher
- Chain saw + bar cover
- Fuel + chain oil
(in approved containers)
- Bar wrench (Scrench)
- Single-bit, straight-handled axe + sheath
- Bucking wedges
- Pruning saw + sheath
- Flagging





Personal Protective Equipment (PPE)

Chain saw (All equipment must meet USFS standards)

Hard Hat	Full brim or cap style
Eye Protection	Safety glasses, goggles or shield (ANSI z87.1)
Hearing Protection	Plugs or muffs
Long-sleeve Shirt	Required at all times
Gloves	Slip-resistant, appropriate for the weather conditions Cut-resistant, when filing
Trousers	Loose fitting
Boots	Heavy-duty, cut resistant or leather, laced, with nonskid soles and 6 inch-high or adequate ankle support
First Aid	OSHA-compliant kit, one with each saw crew
Chaps	Meets USFS or ASTM specifications, 2" Overlap at hem





Chain Saw Chaps



- ▶ Must overlap boots at least 2 inches
- ▶ Use only clean saw chaps, uncut and undamaged by oils and solvents
- ▶ Must meet the current USFS/ASTM specifications





Tools: Recommended

- Extra chain(s) and/or filing kit with file guide and gauge
- Saw maintenance kit (air filter, fuel filter and spark plug)
- Extra bar
- Multi-tool
- Chain saw pack/padded saw cover
- Loppers/pruners/clippers
- Spare bar nuts & pull cord





Tools: Project Dependent

- Pulaski
- Peavey, cant hook
- Log carrier
- Double-bit axe + sheath
- Basic rigging: strap, rope, come-along





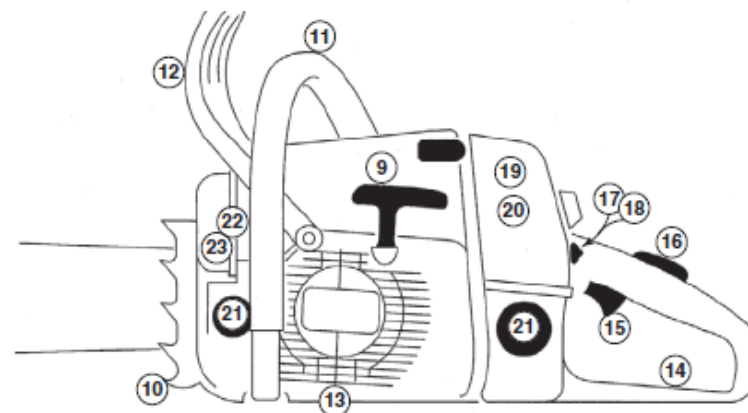
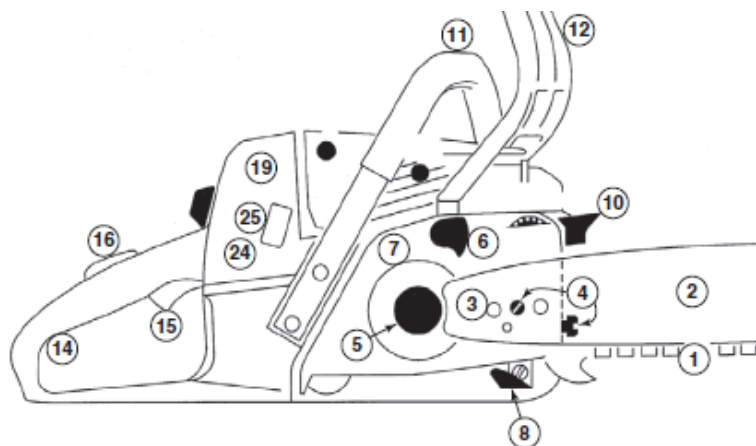
Fire Prevention

- Carry a fire extinguisher and shovel
- Higher levels of restriction require cutting operations cease at prescribe time
- May need to post watchman after cutting is completed
- Highest fire danger can result in no chain saw operations allowed, consider using crosscut saw
- Call land management agency for restrictions





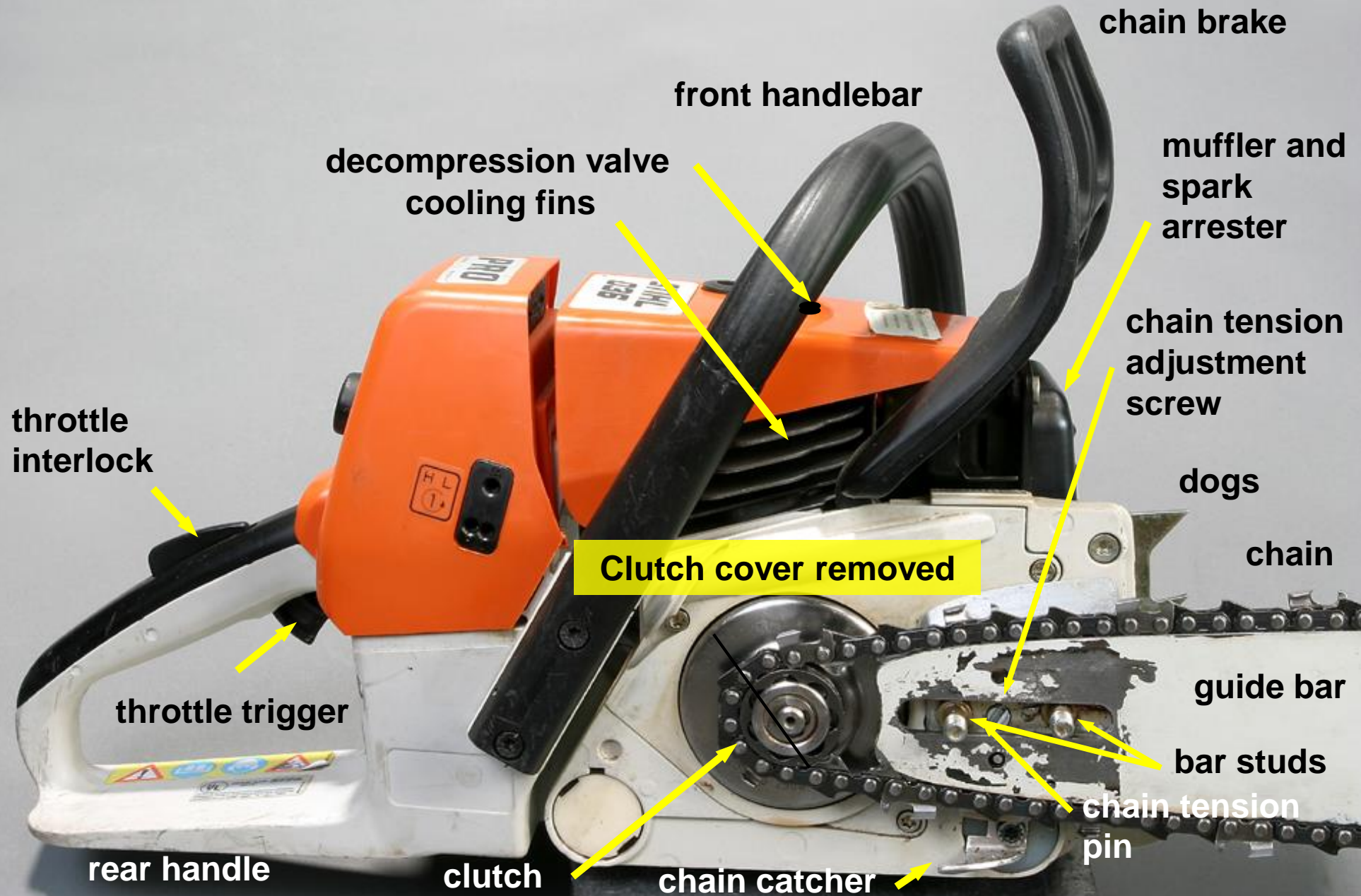
Parts of a Chain Saw



- | | | |
|-----------------------------------|-------------------------|---------------------------|
| 1 Saw chain | 9 Starter grip | 18 Choke |
| 2 Guide bar | 10 Bumper spikes (dogs) | 19 Air filter cover |
| 3 Bar studs | 11 Handlebar | 20 Air filter |
| 4 Front and side chain tensioners | 12 Hand guard | 21 Oil and fuel caps |
| 5 Chain sprocket | 13 Gunning marks | 22 Muffler |
| 6 Chain brake | 14 Throttle handle | 23 Spark arrester |
| 7 Clutch | 15 Throttle trigger | 24 Spark plug |
| 8 Chain catcher | 16 Throttle interlock | 25 Carburetor adjustments |
| | 17 On/off switch | |

From Chain Safety Manual, permission by Stihl, Inc.

Parts of the Chain Saw



Parts of the Chain Saw





Saw Safety Features

- **5-Point Safety Check**
 - ▶ Functioning chain brake
 - ▶ Functioning chain catcher
 - ▶ Functioning anti-vibration system
 - ▶ Functioning throttle interlock
 - ▶ Functioning spark arrester/muffler

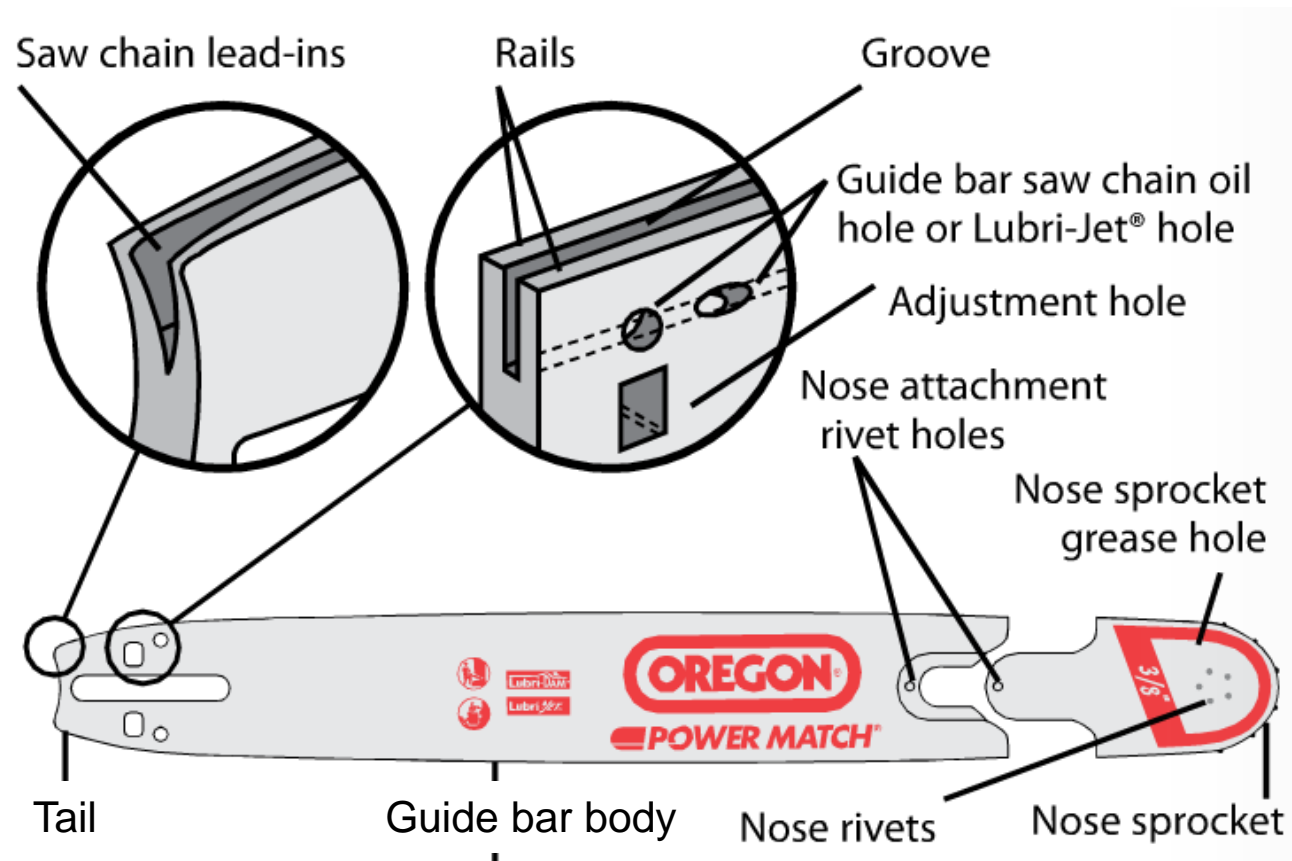
Stihl – Black

Husqvarna - Gray





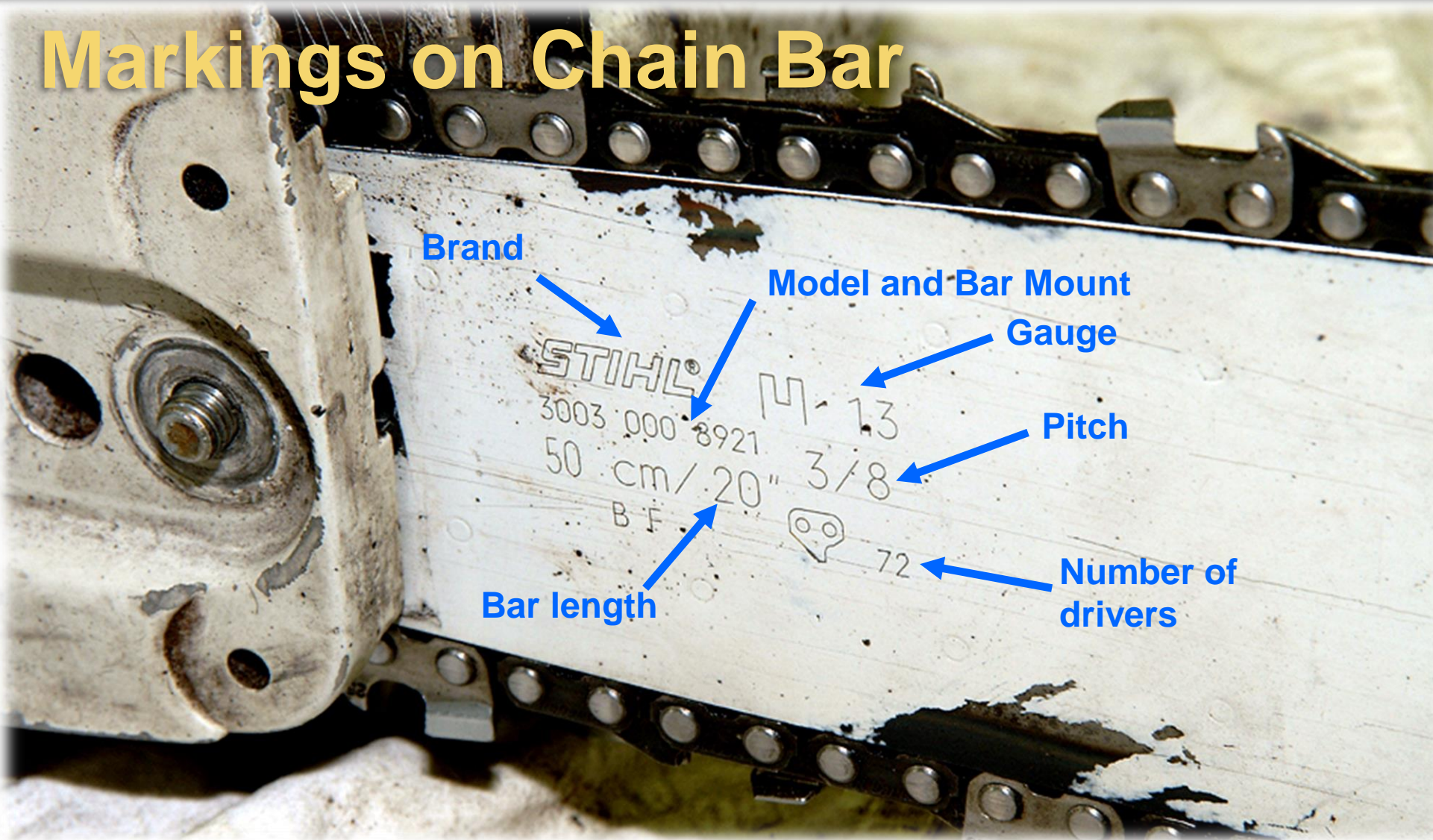
Saw Bar Terms



Reduced weight bars have hollow body (laminated) or are milled and filled with aluminum or polymer



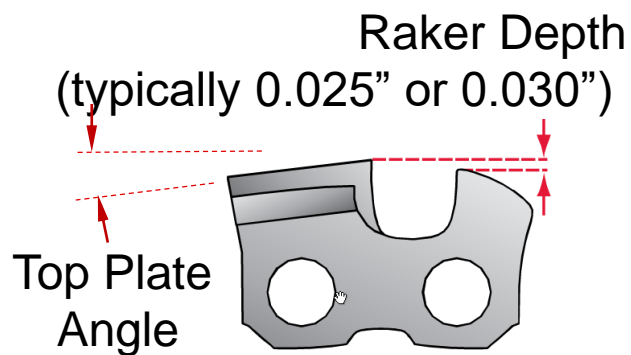
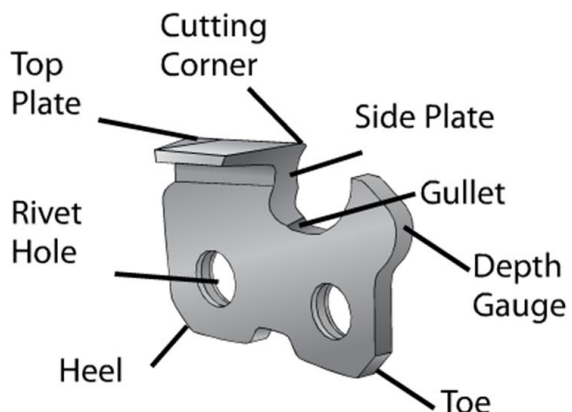
Markings on Chain Bar





Chain Saw Cutter

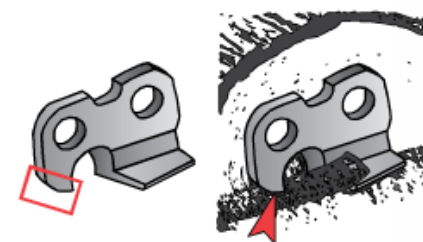
Parts of a Cutter



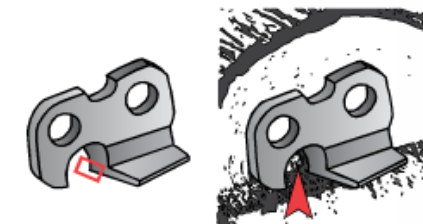
How a Cutter Works

Understanding how cutters work can help you see why proper saw chain maintenance is so important.

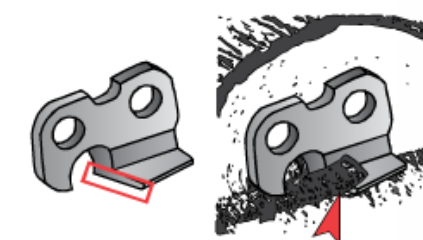
1. The depth gauge rides on the wood and controls the depth at which the working corner bites in.



2. The working corner and side plate sever the wood fibers across the grain. This is the hardest part of the work.



3. The top plate cutting angle chisels out the severed wood fibers, lifting them up and out of the kerf.





Chain Saw Size

- **Become familiar with the chain saw size/models**
- **Size is usually referenced in engine displacement (usually “cc” or cubic centimeter)**
 - ▶ Larger saws have more power and are heavier
 - ▶ Smaller saws are easier to handle and learn skills
- **Saw bar length is matched to saw size and power**
 - ▶ Smaller saws use shorter bars (16-20”)
 - ▶ Larger saws use longer bars (20-28”)
- **Only operate saws with bars and chains that you have experience with and can operate safely**





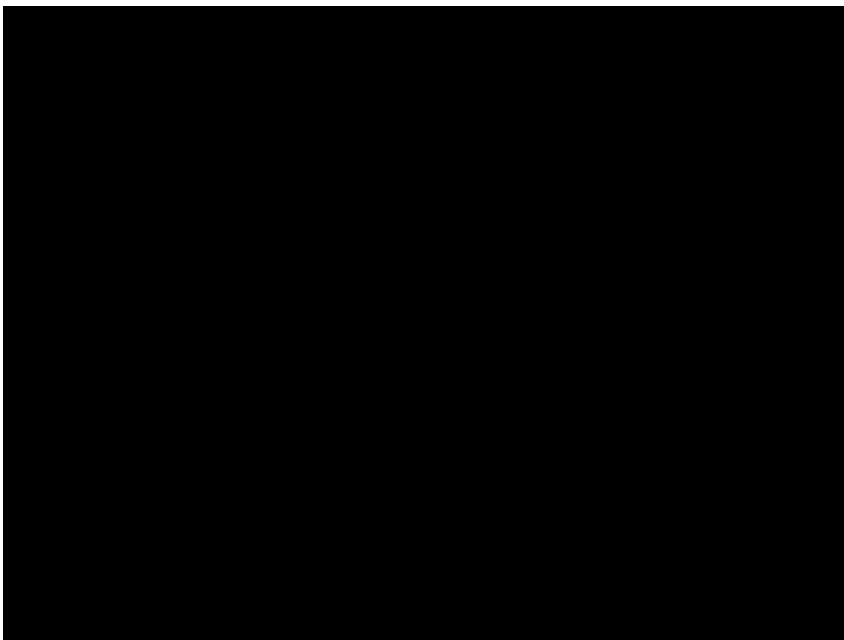
Chain Saw Starting Procedure

- Chain brake **MUST** be on when starting
- **NO DROP STARTING**
- **MUST** have 2 points of control when starting
 - ▶ Apply choke or half choke as described in operator manual for cold and warm starting
 - ▶ Use decompression valve
 - ▶ Remove choke, once saw “burps” or partially fires, then continue pulling starter cord until saw starts





Saw Starting Procedure Videos



Between legs



On the ground



Chain Brake

- **Apply brake with the back of the left hand**
- **Don't use right hand to apply chain brake**
 - ▶ Get comfortable applying and releasing brake with left hand without having to look at hand
 - ▶ Keep left hand tethered to handlebar, with left thumb
- **Apply brake when:**
 - ▶ moving around log or brush, or when distracted during cutting operation
 - ▶ when setting saw on the ground
 - ▶ when shutting off, so it's ready to start





Saw Operation

- Left hand **MUST** wrap around handlebar with thumb locked
 - ▶ Saw should be balanced in left hand so that bar is vertical and cuts straight, not at angle
 - ▶ Watch position of left hand on bar, so it returns to balance point on handlebar
 - ▶ Keep comfortable and firm, but relaxed grip on handlebar
- Right hand **MUST** wrap around rear handle with thumb locked





Saw Operation

- Stand perpendicular to the log with the saw in front of the body
- Keep out of the plane of the saw, in case of kickback
 - ▶ Can look down the bar to align cuts
- Don't overreach arms, stand close to log and saw
- Don't move feet when transitioning between cuts to ensure the cuts remain aligned
- MUST be prepared for kickback and reactive forces





Saw Operation

- **Don't apply throttle with the chain engaged in the wood**
- **Balance the throttle to increase the engine speed as the chain engages the wood – use finesse over force**
- **Keep engine speed high 75-100% throttle when in the wood**
 - ▶ Time the release of the throttle as the saw stops cutting to reduce fuel consumption and reduce wear
 - ▶ Don't bog down motor – this is a sign of forcing the cut or binding or twisting the saw bar



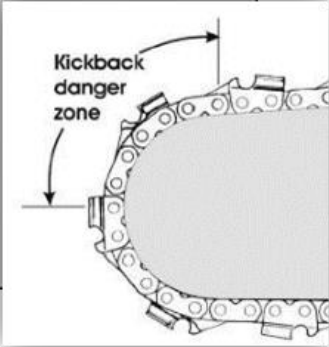
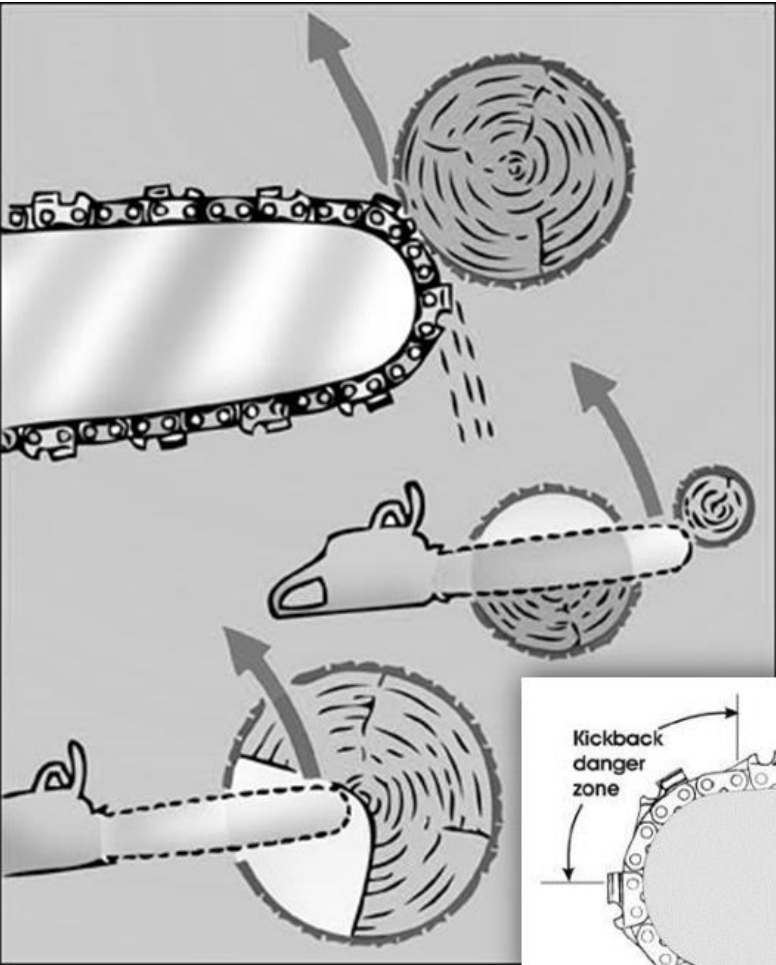


Saw Operation Video





Kickback





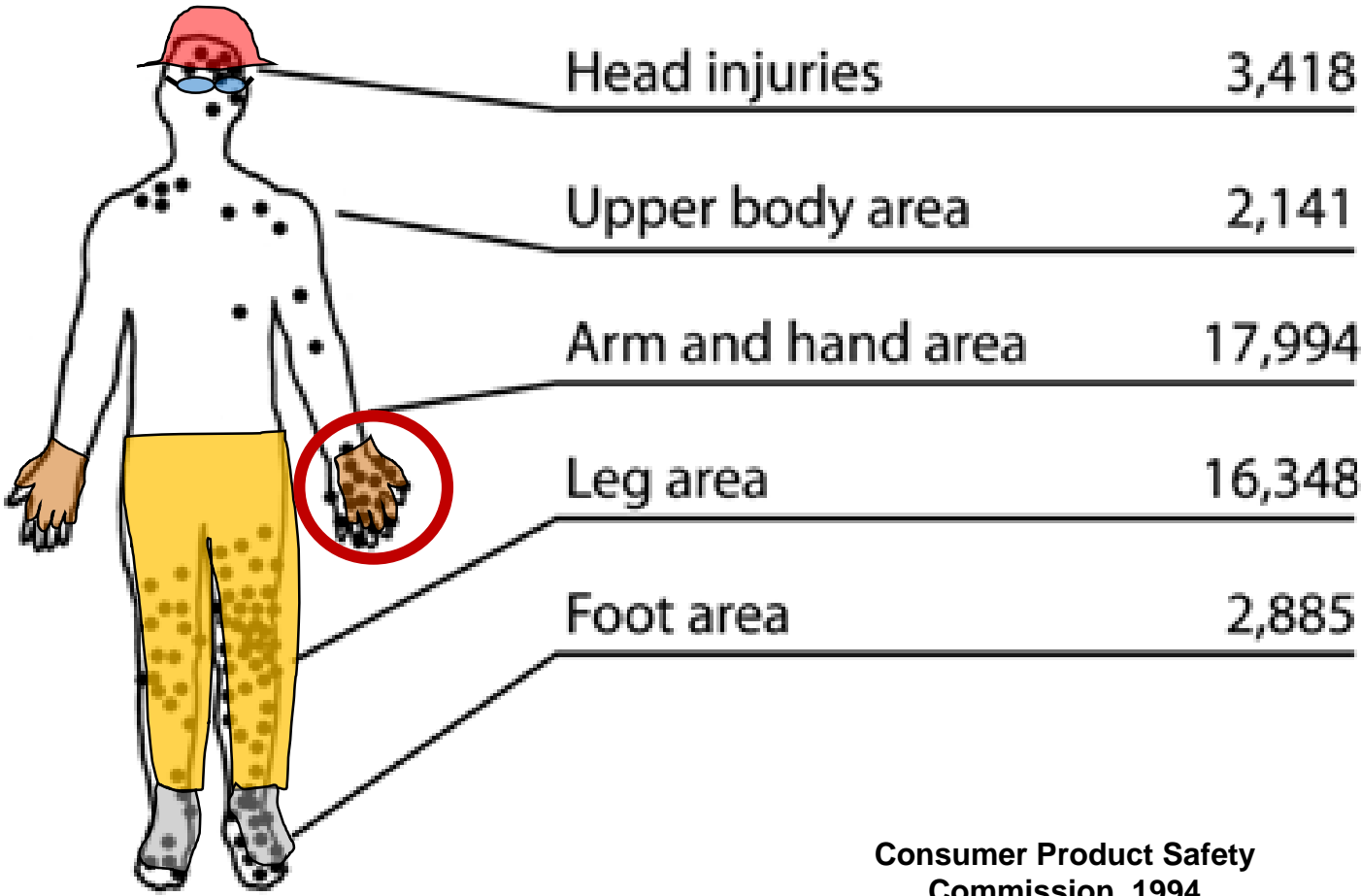
Kickback

- Occurs when the upper corner of the bar nose contacts wood
- Commonly occurs when cutting on top side of bar, such as undercutting or boring
- Can occur when bar is extended beyond the log and strikes other objects on other side of log
- Can occur when brushing, with risks of striking hidden objects and overreaching the bar





Saw Injury Location & Frequency



Consumer Product Safety
Commission, 1994





Saw Maintenance

● Keep chain sharp

- ▶ Monitor as cutting performance decreases
- ▶ Replace dull chain or file in field with proper file guide
- ▶ Using dull chain will increase wear on chain & bar

● Keep air filter clean

- ▶ Apply choke when removing filter to prevent dirt and saw chips from being ingested into carburetor
- ▶ Frequently remove and tap off excess dirt
- ▶ Check for dirty air filter if saw does not start
- ▶ Clean per instructions in manual (usually wash in soap or detergent and water)





Saw Maintenance

- **Maintain proper chain tension**
 - ▶ Chain will stretch as it warms with use and lose tension
 - ▶ New chains will stretch on initial use, watch closely
 - ▶ Loose chains increase wear on bar and chain
 - ▶ Loose chain tension can result in a thrown chain
 - *Most likely to throw chain when brushing, cutting small diameter trees and spring poles*
 - ▶ Check tension when refueling





Saw Maintenance

● Maintain proper chain tension

- ▶ Thrown chain will be caught in chain catcher
 - *Inspect thrown chain for burrs and tight links*
 - *Remove burrs on drivers of thrown chain with flat file, before reusing chain*
 - *Ensure chain has no tight links, fits properly in bar groove and moves freely around bar nose*
- ▶ Be aware of chain tension when saw cools
 - *Tension will increase and can cause high loading*
 - *Reduce tension when storing saw*





Saw Maintenance

- **Use scrench to adjust chain tension**
 - ▶ Loosen bar nuts and tighten chain to be snug to bar
 - ▶ For bars with a drive sprocket nose and cold saw:
 - *Hold bar up with spare hand*
 - *Tighten chain until the middle of chain just contacts bar*
 - *Check tension - pull on chain and it should snap back*
 - *Check tension - chain moves freely without any drag*
 - ▶ Tighten bar nuts, while supporting bar
 - ▶ [Link: Chain tension video](#) (online only, stihlusa.com)





Chain Tension Video





Saw Maintenance

● Replacing the Chain – Step 1

- ▶ Release chain brake, set saw on stable surface, with clutch cover oriented up
- ▶ Loosen bar nuts and turn chain tension adjuster all the way to increase slack in the chain
- ▶ Remove bar nuts (DO NOT LOSE!!) and remove clutch cover
- ▶ Remove chain from bar nose end or drive sprocket
- ▶ Remove bar by raising bar to clear chain adjuster and the lift over bar studs
- ▶ Clean out groove in bar to ensure proper flow of bar oil





Saw Maintenance

● Replacing the Chain – Step 2

- ▶ Flip saw bar so opposite side is facing out
- ▶ Slide the bar over the bar studs put bar in the rearmost position in the chain tension adjustment pin
- ▶ Put chains over drive sprocket and feed into top groove working toward bar nose and then around bar nose
- ▶ Ensure chain is seated properly in drive sprocket and bar groove and is not backwards
- ▶ Install clutch cover and snug up bar nuts to secure cover
- ▶ Set tension on chain and ensure chain moves freely
- ▶ Tighten bar nuts, confirm proper chain tension, set brake
- ▶ [Link: Chain replacement video](#) (online only)





Replacing Saw Chain Video





Saw Maintenance

- **Ensure Adequate Bar and Chain Lubrication**
 - ▶ Never operate a saw without bar oil in tank
 - ▶ **ONLY** use designated bar and chain oil with chain saw
 - ▶ Many saws have adjustable oil flow
 - *Match flow to bar length – longer bars require more flow*
 - *Set oil flow to run out of bar oil after running out of fuel*
 - ▶ **Allow oil to flow to chain - Clean bar of debris**
 - *Clean oil passage and groove in bar*
 - *Use groove cleaning tool (multi-tool or depth gauge)*
 - ▶ **Monitor oil flow - watch for oil splatter off chain**





Saw Fuel and Bar Oil

● Bar and Chain Oil

- ▶ Only use approved bar and chain oil
- ▶ Recommended to use biodegradable bar and chain oil

● Fuel

- ▶ Use non-Ethanol premium fuels
 - *Use of ethanol fuels can cause costly repairs*
- ▶ Mix with approved two-stroke oil at required ratio, usually 50:1 and only mix when needed





Saw Refueling

- **Pressure in fuel tanks and fuel bottles**
 - ▶ Allow at least 5 minutes for saw to cool before refueling
 - ▶ Aim opening away from body
 - ▶ Open cap slowly to relieve pressure
 - ▶ Turn cap to unlock, but do not remove cap
- **Do not overfill fuel tank**
 - ▶ Leave enough room for air pocket and fill cap
- **Do not start saw within 10 feet of area of refueling**
- **Do not refuel within 20 feet of ignition sources**





Fuel Pressurization

- **Pressure in fuel tanks and fuel bottles**
 - ▶ Systems not vented to relieve pressure
 - ▶ Fuel blends (summer and winter) behave differently, with winter fuels more volatile and higher risk if used in summer
 - ▶ Changes in environment (increased elevation and elevated temperatures) increases risk
- **Fuel in tanks and fuel bottles can become superheated**
- **Fuel will boil or geyser, when cap pressure is released**
- **High risk of sprayed fuel and highly flammable vapors exist leading to fires due to hot engine or muffler**
- **Remove any clothing or PPE soaked with fuel**





Fuel Pressurization

- **Vapor Lock is one symptom:**
 - ▶ Be aware of poor running saw, or poor starting saw, with ½ tank of fuel
 - ▶ Unstable engine speed, loss of power, or feels like running out of fuel
- **If Vapor Lock is suspected:**
 - ▶ Check fuel level without opening fuel cap (see thru tank)
 - ▶ Allow saw to cool at least 10 minutes before refueling

Training Video (online only):

<https://www.youtube.com/watch?v=d8g2iCnGAYk>





Fuel Pressurization Photos



Fuel Tank Pressurization
Fuel sprays out when cap released



Fuel Tank Geysering
Fuel boils as cap is released

<https://www.youtube.com/watch?v=d8g2iCnGAYk>

2016 WFSTAR: Fireline Fuel Safety from [National Interagency Fire Center](#)

(online only)



Transportation & Storage

● Vehicle Transport

- ▶ Always cover bar and chain with sheath
- ▶ Secure chain saw to prevent it from being damaged or fuel from spilling
- ▶ Never transport a chain saw or fuel in a vehicle's passenger compartment

● Transport by Hand

- ▶ Short distances: Let the saw idle and set the chain brake
- ▶ More than 50': Shut off the chain saw and carry in a safe manner
- ▶ Long distances: Cover with sheath, cover dogs, and carry on shoulder or safe manner





Questions?



Additional Maintenance & Chain Filing

- [Link: Additional info on Sprocket, Clutch Cover, Carburetor, Bars, Saw Chain, Chain Filing](#)

