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)*

<table>
<thead>
<tr>
<th>Item</th>
<th>Requirement</th>
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<tbody>
<tr>
<td>Hard Hat</td>
<td>Full brim or cap style</td>
</tr>
<tr>
<td>Eye Protection</td>
<td>Safety glasses, goggles or shield (ANSI z87.1)</td>
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<tr>
<td>Hearing Protection</td>
<td>Plugs or muffs</td>
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<tr>
<td>Long-sleeve Shirt</td>
<td>Required at all times</td>
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</table>
| 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
2. Guide bar
3. Bar studs
4. Front and side chain tensioners
5. Chain sprocket
6. Chain brake
7. Clutch
8. Chain catcher
9. Starter grip
10. Bumper spikes (dogs)
11. Handlebar
12. Hand guard
13. Gunning marks
14. Throttle handle
15. Throttle trigger
16. Throttle interlock
17. On/off switch
18. Choke
19. Air filter cover
20. Air filter
21. Oil and fuel caps
22. Muffler
23. Spark arrester
24. Spark plug
25. Carburetor adjustments

*From Chain Safety Manual, permission by Stihl, Inc.*
Parts of the Chain Saw

- chain tension adjustment screw
- muffler and spark arrester
- chain brake
- front handlebar
- clutch
- chain catcher
- throttle trigger
- decompression valve cooling fins
- throttle interlock
- rear handle
- throttle
- interlock dogs
- guide bar
- bar studs
- chain tension pin
- clutch cover removed
- chain
- cooling fins
- bar studs
- guide bar
Parts of the Chain Saw

- Flywheel/fan
- Oil tank
- Magneto
- Starter cover removed
- Fuel tank
- Throttle trigger
- Air filter cover
- On/off switch and choke
- Throttle interlock
- Gunning mark
- Safety information
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*
Reduced weight bars have hollow body (laminated) or are milled and filled with aluminum or polymer.
Standard Chain recommended up to 24" bars

Skip chains recommended for 28" and above, especially when cutting softer wood

**Caution** – Skip Chains are not recommended for brushing (higher kickback potential and harsh operation, due wide tooth spacing)

**Markings on Chain Bar**

- **Brand**
- **Model and Bar Mount**
- **Gauge**
- **Pitch**
- **Bar length**
- **Number of drivers**

**Bar length**

50 cm/20” 3/8

**Brand**

STIHL 3003 000 8921

**Model and Bar Mount**

M-13

**Gauge**

72

**Pitch**

3/8
Chain Saw Cutter

Parts of a Cutter

- Top Plate
- Cutting Corner
- Side Plate
- Gullet
- Depth Gauge
- Heel
- Toe
- Rivet Hole

Raker Depth (typically 0.025” or 0.030”)

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

- Head injuries: 3,418
- Upper body area: 2,141
- Arm and hand area: 17,994
- Leg area: 16,348
- Foot area: 2,885

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 srench 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](https://www.stihlusa.com) (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

https://www.youtube.com/watch?v=d8g2iCnGAYk
2016 WFSTAR: Fireline Fuel Safety from National Interagency Fire Center

Fuel Tank Geysering
Fuel boils as cap is released

(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