

## Chapter 8

# TREE CLIMBING



**LESSON PLAN OUTLINE**

**PROGRAM: SMOKEJUMPER**

**LESSON: TREE CLIMBING**

**OBJECTIVES:** Upon completion of this lesson, the trainees will demonstrate the ability to safely, efficiently, and expediently climb (including free climbing) according to proper procedures. They will demonstrate the ability to identify defective equipment and make minor repairs.

**INTRODUCTION:** FSH 6701.11 Health and Safety Code Handbook authorizes the climbing procedures and equipment outlined in this guide, for climbing in support of the smokejumper mission. The National Climbing Guide should be referred to for project climbing missions.

Tree climbing is one of many skills that smokejumpers must master. Fire jumps often result in timber landings for smokejumpers and paracargo. Parachutes and cargo must be retrieved skillfully to minimize damage and repair cost. Safe and competent tree climbing is an important part of an effective smokejumper program. Each jumper must possess the ability to safely and expediently retrieve fire equipment from timber hang ups to effectively perform initial attack on wildland fires. Tree climbing has also become an effective means for utilization of smokejumpers in resource management and requires highly skilled, trained individuals.

**SMOKEJUMPER TREE CLIMBING**

**A. Preplanning**

1. Locate climbing trees 24 to 36” in diameter with nearly uniform trunk size and few limbs for 30 to 40 feet from ground level.
2. Obtain the necessary number of smokejumper tree climbing sets.

**B. Equipment**

1. Tree spurs (lightweight, adjustable and equipped with shin guards).
2. Climbing harness meeting ANSI A10.14 type 1 standards



3. Steel core flip line with, locking snap on one end, and steel core prusik with locking snap, meeting ANSI A10.14 type 1 standards. Minimum length 16'
4. Sharp, clean, folding pruning saw.
5. Safety lanyard with locking carabiners or snaps, meeting ANSI A10.14 Type 1 standards.

**C. Pre-Climbing and Safety Procedures**

**1. Equipment Inspection**

- a. Climbing Harness
  - (1.) Check for cuts in the webbing and for broken stitching.
  - (2.) Inspect hardware for cracks and for broken stitching at attachment points.

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- b. Flip line & Safety lanyard
  - (1.) Check for any cuts or excessive wear and abrasion.
  - (2.) Check the loop splices.
  - (3.) Check the snaps and carabiners for proper operation and for any cracks in the metal.
  - (4.) Check that prusiks are tied properly
  
- c. Tree Spurs
  - (1.) Check for worn out or cracked stirrups.
  - (2.) Check the ankle and cuff straps for cuts, excessive wear and any broken buckles.
  - (3.) Check the gaffs for proper length, tightness, sharpness, and cracks. (Do not field sharpen the gaffs with a file).
  - (4.) Check for any missing or damaged pins and retainer rings.
  
- d. Pruning Saw
  - (1.) Make sure the screw between the blade and handle is secure.
  - (2.) Make sure the handle is in good shape.
  - (3.) The saw should have a lanyard of suspension line to facilitate attachment to harness for hands free climbing.

### **2. Wear proper Personal Protective Equipment**

- a. Gloves.
- b. Long-sleeved shirt.
- c. Leather boots, 8” uppers.

- d. Hard hat with chinstrap down.

**3. Tree Inspection**

- a. Inspect trees before climbing. Determine whether the tree can safely be climbed.
  - (1.) Identify hazards from adjacent trees.
  - (2.) Rot – Do not climb.
  - (3.) Lean – Always climb on the high side of the lean. If lean is excessive, do not climb.
  - (4.) Snags – Do not climb except to retrieve an injured jumper. Consider establishing a belay point in a nearby tree if available.

**4. Some additional Safety Considerations**

- a. Do not walk around unnecessarily while wearing climbing spurs. Put the guards on the gaffs when not climbing.
- b. Do not climb without climbing harness, flip line, and safety lanyard unless free climbing.
- c. Keep safety rope properly adjusted to the size of the tree being climbed. Do not wait and put this off, but keep adjusting as the tree bole narrows.
- d. Always use a pruning saw for trimming limbs. Never use an ax, pulaski, or power saw.
- e. Take care to avoid cutting any safety gear or yourself with the pruning saw or with the gaffs.
- f. Do not climb unless there is another jumper to assist as a ground person.
- g. Ground personnel should not stand directly under climber.
- h. Climbing above the 4” bole diameter requires a safety tie-in at or below that point.

**5. Equipment Adjustments and Fitting**

a. Spurs

- (1.) Adjust shank (shin guards and cuffs should fit in the hollow between the knee and the calf).
- (2.) Fit the stirrup in the arch indentation of the boot.
- (3.) Buckle the foot strap as securely as possible.

b. Climbing harness should fit just below the hip bones with the leg straps passing between the legs and secured at the buckle.

c. Attach the flip line and safety lanyard prusik snaps to the load rings on the harness. Which side they go on may depend on if the climber is right or left-handed.

d. Tie the pruning saw to an attachment point on the back of the harness.

**D. Climbing Procedures**

**1. Load Ring Attachments.**

- a. Anytime a climber attaches a flip line or safety lanyard to a load ring, they will visually check to ensure the hardware is hooked to the proper attachment point, and securely locked.

**2. Secure the Flip Line.**

- a. Route the snap end of the flip line around the tree and attach it to the load ring opposite the prusik.
- b. Take up all of the slack.
- c. Adjust the length to allow the body to set an arm's length away from the trunk of the tree.

**3. Climbing**

- a. On trees less than 36” DBH, grip the rope with both hands and flip it up, approximately 18” above waist level. On larger trees, the “Western Roll” is sometimes necessary to advance the rope up the tree. This technique requires the climber to maintain approximately 15-20” of slack in the flip line between the right hand and the prusik. This slack allows the climber to vigorously snap the wrist while slipping the right arm up and out, while maintaining a positive grip with the flip line. The brisk nature of the throw will cause the flip line to travel in a wave around the tree until it reaches the left hand at which time the rope is then lifted. This technique also enables the climber to advance the flip line over rough bark and short “stubs” or limbs without the need to contour around the tree and manually free the flip line.
- b. Place the right or left spur into the tree with the knees out and away from the tree.
- c. Step up onto the spur embedded in the tree bark and sink the opposite spur into the bark about 8-12” above the first spur.
- d. Keep the body straight and lock the knee of the lower or trailing knee.
- e. Repeat the steps.
  - (1.) Pull the upper body next to the tree to release tension on the rope before moving it up.
  - (2.) Flip the rope up about 18”.
  - (3.) Step up two steps at a time before the next flip of the rope.
  - (4.) Avoid allowing the flip line to drop below waist level.
- f. Establish a smooth rhythm.

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- g. Keep the body weight near the tree by keeping the back straight and thrusting the hips toward the tree with each step. If a spur sticks, rotate the heel away from the tree and pry it out.
- h. The climber should stop periodically and relax by setting the spurs firmly in the bark, locking the knees and leaning back on the flip line.
- i. To descend, step down, allowing the body weight to engage the spur. Throw the rope down to about waist level with every two steps.

### **4. Properly Adjusting the Flip Line.**

- a. Place the flip line about waist level.
- b. Place feet at an even level. Keep at least one knee locked.
- c. Taking up slack when ascending the tree.
  - (1.) Grasp the flip line behind the prusik, tension the rope and use the other hand to slide the prusik to the desired length.
- d. Letting out the slack while descending the tree.
  - (1.) Grasp the flip line in front of the prusik with one hand and use the other hand to slide the prusik to the desired length.
- e. In the classroom or in the field before climbing, practice making adjustments.

### **5. Limbing**

- a. It may be necessary to remove small limbs, which impede progress by snarling the flip line.
- b. Use a pruning saw or for small dead limbs, cut a green limb to use as a beater stick.
- c. Remove broken or small and dead limbs. This will keep the climber from inadvertently using them for climbing steps.

- d. Prune far enough above the flip line to prevent damaging or cutting it.
- e. Undercut larger limbs to prevent breakage or unnecessary damage to the tree.
- f. Cut all limbs flush with the trunk and avoid cutting blind.

**6. Burning Out of the Tree.**

- a. Occasionally, spurs will break loose from the tree, due to misplaced spur position. This is caused mainly by knees too close to the tree, spurs not securely embedded in the bark or cambium, rotten bark, spurs placed in a crack, crevice, thick bark, a knot, or not locking the knees when stopping.
- b. Corrective action is to:
  - (1.) Immediately pinch the flip line in by pulling the elbows down and into the torso.
  - (2.) Keep legs clear to prevent gaffing of lower legs.
  - (3.) Throw your head back or to the side to prevent contact with the tree trunk.
  - (4.) Replace spurs in sound bark and continue.

**7. Limb-over. (with safety lanyard)**

- a. This procedure is used to go over a limb too large to cut or to make the transition from spurs to free climb or vice versa. This procedure requires the use of a safety lanyard.
- b. Climb as high as possible up to the limb.
- c. Throw the safety lanyard around the tree, above the limb, and then snap it into the opposite load ring on the harness.

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- d. Unsnap your flip line.
- e. Continue up the tree, utilizing the safety lanyard in lieu of the flip line to reduce the overall number of limb-over procedures.
- f. Throw the snap end of the flip line around the tree above limbs and snap into the opposite load ring.
  - 1. This procedure can take some skill and timing to perform. Try throwing the snap as far out, slightly above your head and with as much force as possible, then catch the snap as it comes around the tree trunk. Often, multiple tries are required.
- g. When the flip line snap is secured to the load ring, unsnap the safety lanyard and continue.
- h. If the tree is too large to get the safety lanyard around.
  - (1.) Climb as high as possible.
  - (2.) Place a double wrap around the limb with the safety lanyard, as close to the tree as possible and snap it into the load ring.
  - (3.) Limb should be a minimum of four inches in diameter and not downward sloping.
  - (4.) Take up all the slack and test the load on the safety lanyard.
  - (5.) Unsnap the flip line and then reattach before continuing on.
  - (6.) Release the safety lanyard and continue.
- i. Reverse these procedures when descending.

### **E. Free Climbing**

- 1. Free climbing presents additional hazards as the flip line or safety lanyard is not used as a safety line while ascending.

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- a. Maintain three sure points of contact at all times.
  - (1.) Two feet and one hand or two hands and one foot at ALL times.
- b. Do not free climb on **ANY** dead limbs.
- c. Do not free climb if the limbs are spaced too far apart to maintain good hand and feet positions.
- d. Always take species and condition of the tree into considerations before free climbing.
  - (1.) Cedar and Western Larch (Tamarack) trees are brittle and limbs break easily.
- e. When free climbing, keep feet and hands close to the bole of the tree.
- f. If spurs are removed during free climb, be certain that they are secured in the tree before continuing on.
  - (1.) Lash with parachute cord or binding straps.
  - (2.) Take care in leaving spurs behind...some areas above may require the use of spurs to ascend safely.
  - (3.) If free climbing with spurs on, be extra cautious with spur placement, and stepping on limbs.
  - (4.) Free climbing can save time, effort, energy, and should be used whenever possible. It takes more time for some climbers to become comfortable with free climbing, but the alternative of numerous limb-overs and tedious sawing is time consuming and ultimately dangerous as it can leave the climber in a state of exhaustion.

### **F. Tree climbing let-down and rappel systems**

- 1. At this time none of the bases are teaching this. Ongoing research and development may make it necessary to add these back in at a later date.

**G. Evaluation parameters for Tree Climbing**

At the completion of this unit, the trainee will demonstrate the following smokejumper tree climbing skills:

1. Ascend a tree or pole (preferably 30+ dbh) to a height of 45 feet and perform a limb-over. Safely descend back down the tree in a time not to exceed 5 minutes. This is a minimum. Most bases will exceed this parameter by having the trainee climb to the top of a 100-150' tall tree, using limb over techniques, and free climbing techniques following all correct procedures.
2. Describe the components of the smokejumper tree climbing equipment and the care and maintenance of each part, including:
  - a. Flip line
  - b. Safety lanyard
  - c. Spurs
  - d. Fanno saw
  - e. Climbing harness
3. Demonstrate the correct attachment of the prusik to flip line or safety lanyard.

**TREE CLIMBING** is an important smokejumping skill that must be mastered so that smokejumpers can be efficient and safe in performing their duties. All smokejumpers should take opportunities to practice tree climbing whenever possible to develop and master this skill. Confidence and muscular coordination are keys to safe climbing.