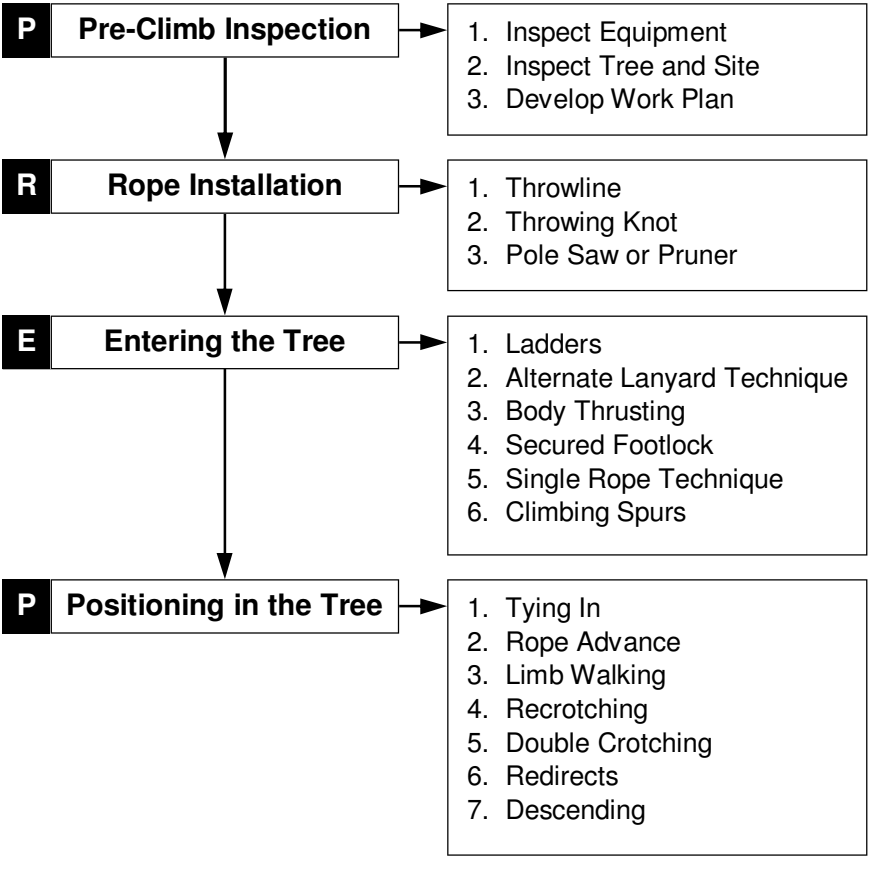
The P.R.E.P. Tree Climbing System

The P.R.E.P. tree climbing system is a step-by-step procedure that enables arborists to climb, work in, and descend trees safely and efficiently. This system follows a logical sequence of action providing the climber with numerous techniques to fit a variety of climbing situations. This climbing system was devised for and used successfully in training workshops by beginner and experienced tree climbers alike.

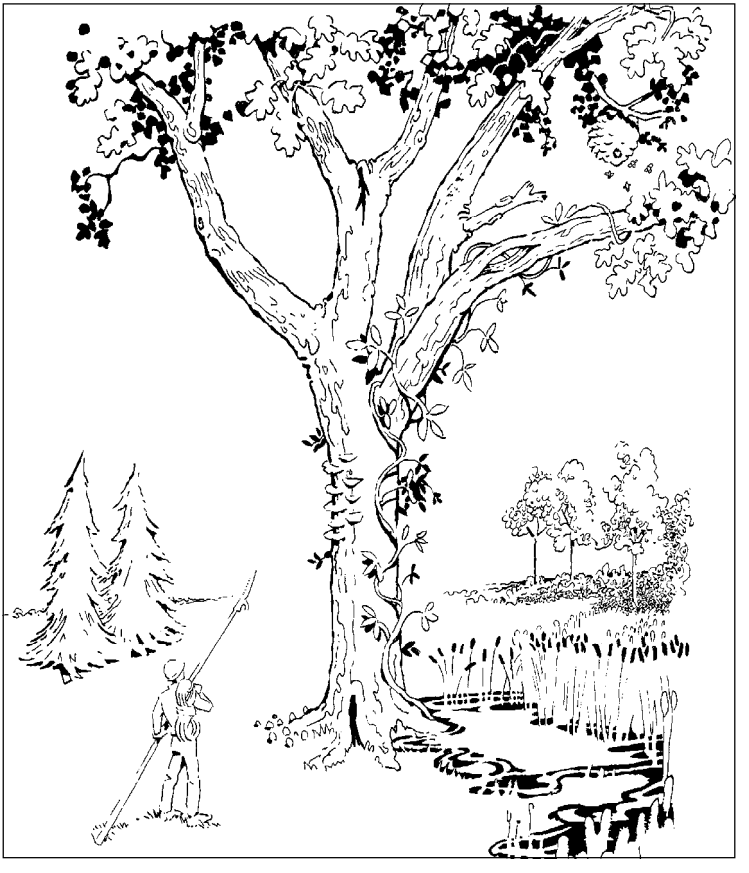
The old adage, "a chain is only as strong as its weakest link," is a relevant principle when climbing trees. Like the "weak link" in the chain, failure to perform or be proficient in any of the steps in this climbing system could result in disaster or, at the very least, an unproductive climb. The success of a climb and proposed work plan hinges on the skillful execution of each step of the P.R.E.P. climbing system as well as the appropriateness of the technique chosen for the situation. The pages that follow discuss in detail each step and technique of the climbing system outlined in the flow chart below.



2. Inspect Tree and Site

Visually inspect each tree completely from the ground for potential hazards before you climb or begin work. Examine all "sides" of the tree from the roots to the branches. A careful examination of the climbing and work site is also necessary. Most property damage results from neglecting this part of the pre-climb inspection.

Tree foliage will often obstruct the view of tree hazards hidden within the canopy. The use of binoculars will assist in locating them. As you climb and perform work aloft continue to perform a visual inspection of the tree, watching for problems which were not visible from the ground. In addition, be attentive to sounds that could indicate a potential hazard such as the buzzing of hornets and bees or any other animal noises.



Use the checklist on the following page to help locate the tree and site hazards illustrated above. Identify the crotch most suitable for rope installation mindful of these known hazards.

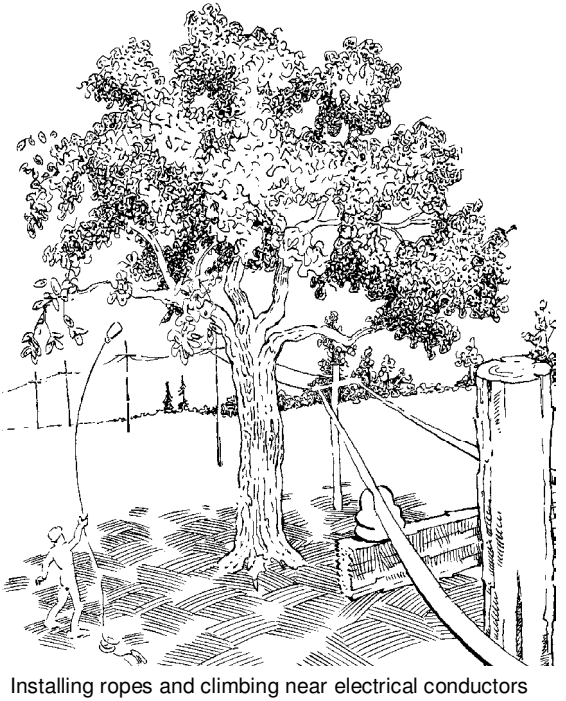
R—Rope Installation

Rope installation is the process of setting a climbing line from the ground over a suitable crotch in the tree. This line will provide access for climbers using the body thrust, secured footlock, or single rope technique. The climber has several rope installation options from which to choose including the following:

1. **Throwline**
2. **Throwing Knot**
3. **Pole Saw or Pruner**

These techniques can also be used, after the climber enters the tree, to advance or recrotch the climbing line to another location in the tree. This location is usually higher and more central in the tree, providing a more effective working position (pp. 56,58).

It is important for climbers to become proficient with all three techniques and determine which one is most suitable for the situation. It is a good practice to install a second line as well to be used as an access line for performing an aerial rescue in the event of an emergency. This line can also be used by the climber to work more efficiently in another part of the tree later on.



Installing ropes and climbing near electrical conductors is not for everyone!

Warning!

Climbing near electrical conductors is not for everyone! ANSI states "Only a qualified line-clearance tree trimmer or qualified line-clearance tree trimmer trainee shall be assigned to the work if it is found that an electrical hazard exists. A trainee shall be under the direct supervision of a qualified line-clearance tree trimmer."

When electrical or other potential hazards are present at or near the climbing site make certain that climbing lines are installed on the side of the tree away from them.

2. Alternate Lanyard Technique (ALT)

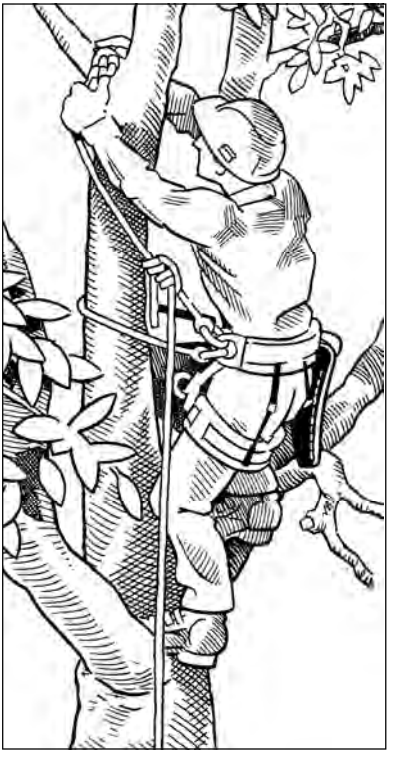
In smaller trees, or trees that have low and closely spaced branches, the climber may choose to enter the tree using the alternate lanyard technique or ALT. This technique involves the alternating use of two personal lanyards (hence the name) while the climber advances his or her position in the tree by using the limbs and trunk for hand and foot holds.

It is important that the climber maintain three points of contact with the tree while climbing. In addition, limbs should be tested before the climber commits weight on them. If possible, dead and broken branches should be removed as they are encountered.

To perform the ALT, the climber begins ascending the tree while secured with a personal lanyard. When a limb is encountered the second lanyard is employed by passing one end above the limb and back to the climber's saddle. At this point the climber releases the first lanyard and proceeds up the tree until another limb or obstacle is encountered. This process is repeated, alternating between lanyards, until the desired tie-in point is reached. It is absolutely necessary for the climber to be secured to the tree at all times.

The 2-in-1 or doubled-end lanyard is an excellent choice when using the ALT. This lanyard has a rope snap or carabiner on each end (p. 38). The climber alternates tying in with the ends of the lanyard instead of alternating between two separate lanyards. The lanyard length is adjusted with a Prusik knot, which, by its symmetrical configuration, grabs the lanyard when loaded from either direction.

A more versatile option yet, is to use a split-tail climbing system as a second lanyard. The range of adjustment is as long as the rope, and when equipped with a micro pulley, the length can be adjusted with one hand. In addition, the split-tail climbing system enables the climber to perform a quick tie in when a suitable crotch is reached.



This climber is using a split-tail climbing system as a second lanyard for secured positioning while passing a limb.

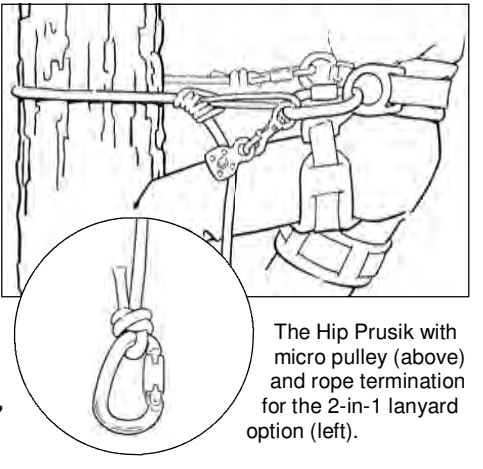
Tools of the Trade: Lanyards

Next to the climbing line, a lanyard is the climber's most important tool for securing his or her position while climbing and working in the tree. Lanyards that perform this function are referred to as personal, safety, or work positioning lanyards.

Lanyards consist of three main components: the lanyard itself (rope construction), connecting devices (carabiners, rope snaps, or screw links), and the lanyard adjuster. There are a variety of lanyard types available and combinations by which the lanyard components can be assembled. Several of the most commonly used types of lanyards are discussed below.

Hip Prusik Lanyards

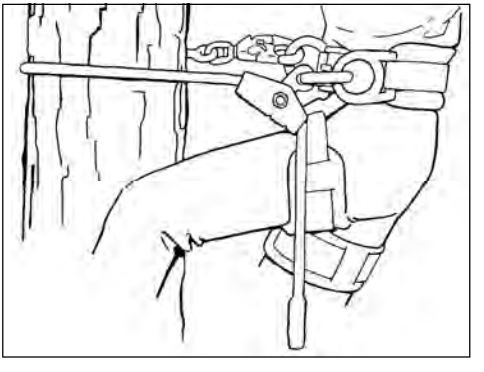
This type of lanyard utilizes a Prusik loop as the lanyard adjuster. It is tied to the lanyard with a Prusik loop and clipped-in to the side D-ring of the climber's saddle. When a micro pulley is attached to the lanyard below the friction hitch, one-handed length adjustment is possible. Another nice feature of the hip Prusik lanyard is that both ends may be used making it a 2-in-1 or double-ended lanyard, since the Prusik knot will grip when loaded from either direction. This is particularly useful when climbing with the alternate lanyard technique. ***In order for the 2-in-1 lanyard to function properly, the micro pulley must be removed.***



The Hip Prusik with micro pulley (above) and rope termination for the 2-in-1 lanyard option (left).

Camming Lanyards

Camming lanyards employ the use of a cammed ascender (p. 47) to adjust lanyard length. This method also allows for one-handed lanyard adjustment. Cammed ascenders, however, are designed to be loaded from one direction only, and are therefore not safe for use as a 2-in-1 lanyard. Replace the pin that comes with many cammed ascenders with a lock nut and bolt.



Camming lanyards provide one-handed length adjustment (not to be used as a 2-in-1 lanyard).

SRT Ascending Options

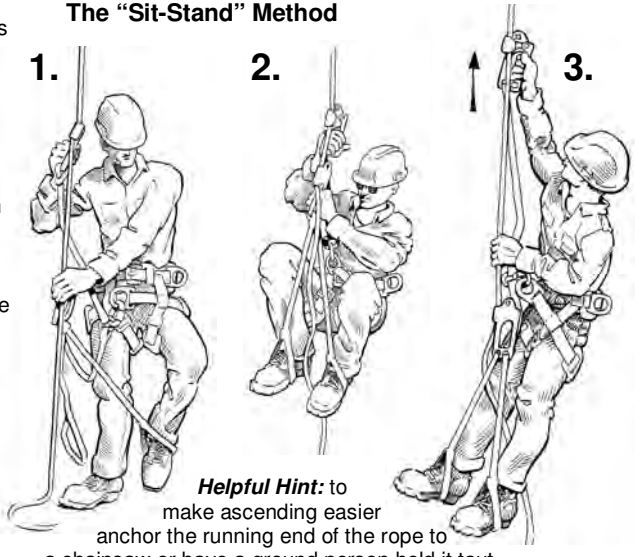
All SRT ascending systems incorporate at least two attachment points on the rope by which the climber alternates weight transfer. These attachment points are commonly referred to as "rope grab" devices, such as mechanical ascenders and friction hitches, or techniques, such as footlocking. When the climber's weight is applied to one rope grab, it becomes possible to advance the other one, thereby advancing the climber's position as well. However, not all rope grab or attachment point options provide fall protection (e.g., footlocking, foot loop). In those cases it is strongly recommended that the climber add an additional point of attachment that does. Illustrated below is the popular "sit-stand" method (which provides two means of fall protection) and several rope grab options which create a combination of at least two points of attachment.

The "Sit-Stand" Method

1 Place ascenders on the rope and attach the climbing system to the climbing saddle. Take up slack in the system.

2 Hang or sit from the upper ascender while raising both legs and the lower ascender at the same time.

3 Stand up in the foot loops and advance the upper ascender. This sequence of "sit and stand" is repeated until the destination has been reached.



Helpful Hint: to make ascending easier anchor the running end of the rope to a chainsaw or have a ground person hold it taut.

"Rope Grab" Options

Footlock | Foot ascender | Foot loop

6. Climbing Spurs

Climbing spurs provide an efficient means of entering the tree but are a valid choice *only* when climbing and working in trees that are to be removed. The only exception to this is in the event of an emergency to expedite an aerial rescue. These limitations are due to the potential for causing injury to the tree from wounds left by the gaffs, or spurs, particularly on thin barked trees.

The climbing spur, as a unit, is referred to as a "climber" and consists of several components: the stirrup, shank, lower strap, gaff, pads, and upper straps. For climbing spurs to function effectively it is important that they are inspected daily, sized and fastened properly, and that the gaffs are kept sharp.

Work boots used with spurs should have a reinforced shank to protect the arch of the foot. Boots with the traditional "loggers heel" work well for holding the stirrup in place. However, flat-soled boots can be worn when the lower strap of the "climber" is wrapped once around the shank before fastening.

Double wrapping the lanyard

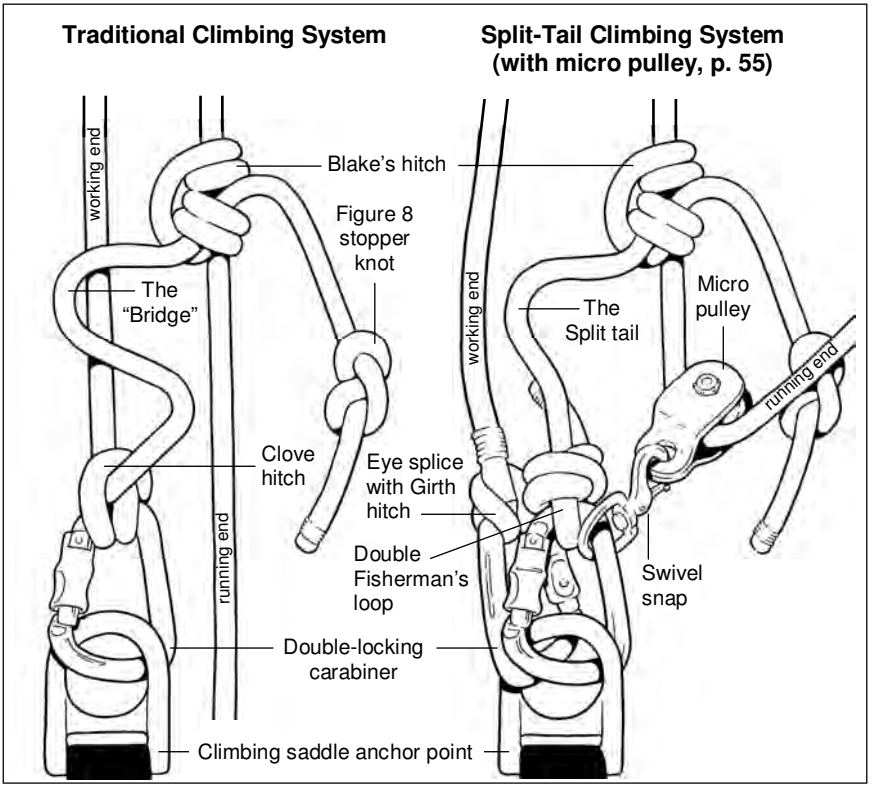
Climbing Tips

1. Set gaffs firmly into the tree at a distance apart no more than the width of your shoulders.
2. Step up on the stirrups and lock or slightly bend the knee. Repeat the process with the other leg. Alternate steps as you would when climbing a ladder.
3. Take short steps while learning, advancing the lanyard between steps. As skill improves, longer steps can be taken. Reverse this procedure when climbing down.
4. Keep the lanyard as horizontal to your climbing saddle as possible.
5. Place hands on the lanyard near the trunk to advance—watch the fingers and wear gloves.
6. Climb the backside of the tree, taking advantage of the lean.
7. Prevent gaff "kick-out" by maintaining a gaff angle of about 45º, avoiding sheets of loose bark, and having sharp gaffs.
8. When in a stationary position, lock one knee to relieve leg and foot fatique.
9. Double-wrap the lanyard to create a choker effect which will more effectively secure the climber's position.

3. Select a Climbing System

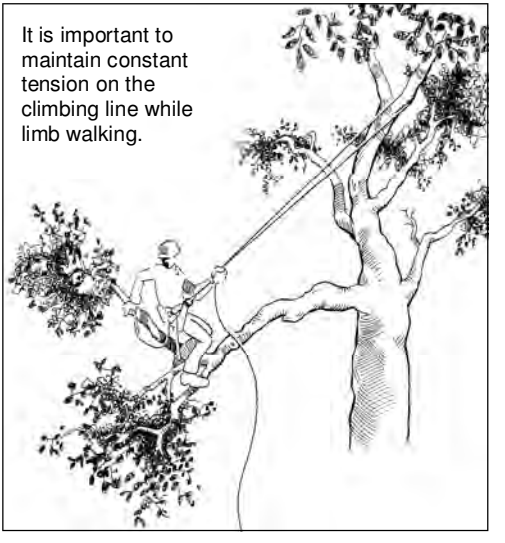
Selecting a climbing system completes the tie in procedure. The two most frequently used systems are the **traditional** and **split-tail** climbing systems. Both are examples of a dynamic climbing line system (p. 35). Beginning climbers should start by learning and becoming proficient with the traditional system before graduating to the "high performance" split-tail system which is more complex and gear intensive.

These systems can be broken down into several components: 1) the climbing line, 2) connecting device (rope snap or carabiner), 3) attachment knot or eye splice (secures the climbing line to the climber's saddle or connecting device), 4) bridge or split tail, 5) friction hitch (secures climber to the running end of the rope), and 6) micro pulley (functions as a slack tender and fair lead). For each component there are a variety of options from which to choose. For a complete selection and description of approved attachment knots and friction hitches turn to page 68. The drawings below show one method of "assembling" the climbing systems using only a few of the many knot and hardware choices available.



3. Limb Walking

Limb walking is an essential skill to learn for work positioning in the tree. This skill enables climbers to walk out to the ends of tree limbs using the climbing line as another point of balance. The most proficient limb walkers move about gracefully and freely within the tree, appearing as though they "belong up there." They rely heavily on their climbing line in addition to their developed sense of balance and technique. The use of a personal lanyard coupled with limb walking skills will oftentimes be sufficient for providing climbers with a good work position in the tree.



It is important to maintain constant tension on the climbing line while limb walking.

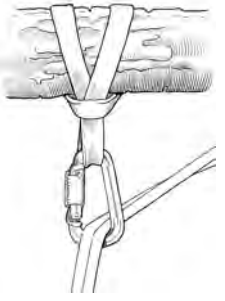
The preferred method of walking out on limbs is to walk sideways or backwards, while maintaining tension on the climbing line. It is generally considered easier to "go out on a limb" than it is to return from limb walking. Going out usually requires only one hand operation to control the friction hitch, freeing the other hand for balancing and performing tasks such as making pruning cuts or installing a redirect (p. 60) or personal lanyard. Pay attention to the angle of the climbing line while walking out on limbs away from the tie-in point. As the climbing line angle increases so does the risk of the climber taking a long and uncontrolled swing in the event of a fall. To minimize this risk tie in with a personal lanyard or redirect as soon as possible.

Returning from limb walks is a more awkward task to perform. Proper rope tension must be maintained by using one hand to pull and hold on the running end of the line, while the other hand advances the friction hitch. This situation can be remedied with the use of a micro pulley. This device not only allows the climber to tend rope slack with one hand but "fair leads" the climbing line into the friction hitch as well.

There are many limb walking techniques that will only be learned and discovered through experimentation. Many movement techniques used in rock climbing are applicable to tree climbing. These include using the hands and feet to jam in crotches or wrap under and around limbs for balance. An artificial foot hold can be produced by Girth hitching a webbing sling or Prusik loop around a suitable limb (p. 63).

The Versatile Webbing Sling

1 Redirect. Redirecting the climbing line is often vital for providing the climber with a more comfortable and safer work position in the tree. Redirect slings reserved specifically for rigging are equally effective when used in conjunction with blocks and lowering lines in directing the load away from obstacles below.



2 Speedline Sling. Webbing slings are the primary vehicle for securing limbs to be cut and sent down a speedline to a ground worker below.

3 False Crotch. A webbing sling can be fashioned into a false crotch for a climbing line by attaching a double-locking pearabiner to one end of the sling and a small screw link to the other end (see pp. 28-29 to install and retrieve).

4 Choker. Slide a long sling, or several slings Girth hitched together, under a pile of brush and choker the pile together. Use the remaining loop as a handle for dragging by hand or machine.

5 Foot loop. A webbing sling, when secured to the trunk or a limb, can provide the climber with a temporary foothold, thereby providing a better position to work from. They can also be attached to handled ascenders as a footloop when using the SRT.

6 Tool Lanyard. Webbing slings make excellent lanyards for chainsaws and cabling tools or as a means to attach anything that needs to be stored in the tree or sent up the tree to the climber. When used as a chainsaw lanyard, it should be designed to "break away" in the event it is pulled from the climber's grasp.

7 Personal Lanyard. A sling becomes a backup to the primary lanyard when Girth hitched around a stem or limb and secured to the climbing saddle. This arrangement also allows climbers to hang on the sling and rest, taking the load off their feet when using climbing spurs.

8 Anchor. Webbing slings can be used to attach a pulley, block or come-along during cabling (below) and rigging operations.

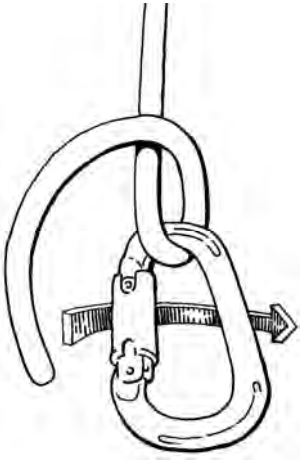
When attached to one or two carabiners, a sling can be used in lieu of a pulley when lowering small branches. A sling can also function as a "third hand" when removing a limb that is too small to lower. Girth hitch one end of the sling around the limb to be removed and hold the other end with one hand, or secure it to the tree until the cut is made. Afterwards, remove the sling and toss the limb.

9 Rope Grab. Webbing slings make reasonably good rope grabs during rigging operations when secured to the rope using either the Klemheist knot or French Prusik. It will be necessary to take more wraps with the sling than is required when using Prusik cord.

Buntline Hitch

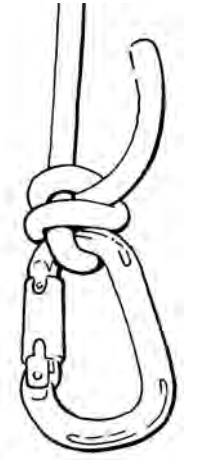
Nautical books are filled with praise of the Buntline hitch as an extremely simple, quick tying, compact, and secure hitch. This is a lesser known hitch with the professional tree climber, but those who have discovered it like it with good reason. The same virtues that have attracted seaman to the Buntline also hold true for the tree climber. The Buntline functions as an end-line knot for attaching the climbing line or personal lanyard to a connecting device, such as a rope snap or carabiner. Closer inspection of the Buntline will reveal that it is simply a Clove hitch tied around its own standing part. If you learn to tie the Clove hitch first, the Buntline will be easy to learn.

Of all the end-line attachment knots, the Buntline requires the least amount of rope length to tie—creating a very compact knot. Perhaps one of its best features, something the Anchor hitch and Double-Fisherman's loop also share, is how the hitch snugs up tightly against the carabiner. This prevents the carabiner from moving around in the knot and allowing the load to shift to the weaker, minor axis. If desired, the Buntline can be finished with a single Overhand or Double Fisherman's knot tied around the standing part for security, although the tail tends not to slip or creep. This hitch is not recommended for rigging because it is inclined to jam under extreme loads. However, even then, it is not difficult to pick apart.



1 Begin by making a turn around the carabiner, followed with a turn around the standing part.

2 Continue with the end around the turn and make a half hitch around the standing part.



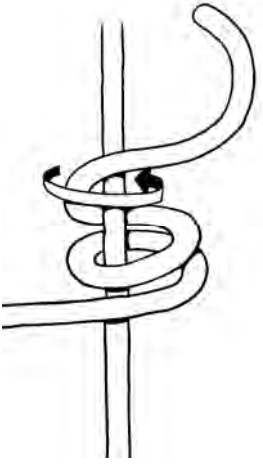
3 Dress, set, and tighten the hitch against the carabiner.

Tools of the Trade: Round and oval rope thimbles are often used with rope snaps and carabiners to reduce wear on the climbing line and minimize strength loss from excessive rope bending.

Blake's Hitch

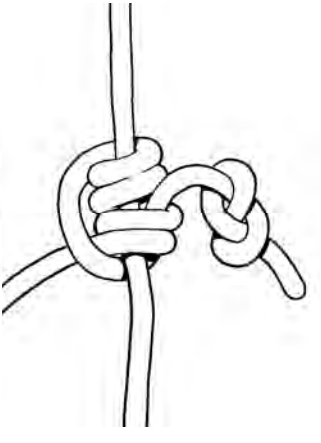
The Blake's hitch is a relative newcomer to the climbing scene, but it has been around long enough to prove itself worthy. The origin of this hitch is debatable, but it is firmly agreed that Jason Blake introduced and popularized it as an outstanding alternative to the Tautline hitch. Although identical in function to the Tautline, the Blake's hitch performs significantly better and has few limitations. Unlike the Tautline hitch, the Blake's hitch does not bind or tighten on the climbing line which allows for a smoother running friction hitch. This is especially noticeable when using a micro pulley as a slack tender device. In addition, the tail does not creep or roll, therefore preventing a lengthening bridge and a friction hitch that becomes out of reach. A Figure Eight stopper knot is still recommended in the tail of the rope.

The Blake's hitch is, however, slightly more difficult and slower to tie than the Tautline and cannot be tied with one hand. The most common mistake climbers make in tying this hitch is neglecting to pass the tail *between* the bridge and the climbing line (Fig. 2) before exiting through the first and second turns. In addition, the Blake's hitch has a high potential for causing friction damage to the section of tail that runs through the bottom turn of the hitch as it slides along the climbing line during descent. To reduce this effect, descend slowly.



1 Make four upward turns above the bridge around the climbing line.

2 Pass the end *between* the bridge (in front) and the climbing line (behind) and up through the first two



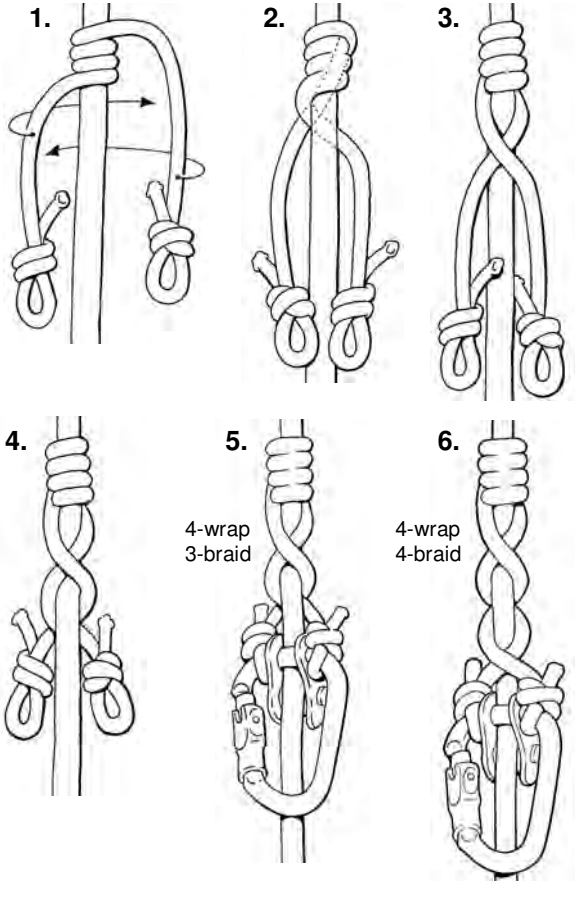
3 Dress and set the hitch. A Figure Eight stopper knot is recommended in the tail of the rope.

Helpful Hint: Make the first two turns of the hitch around your thumb. This creates a tunnel for the tail to be easily passed though.

Tying the Valdôtain Tresse

Currently, the V.t. is the more popular of the two French Prusik variations with professional tree climbers. The diameter of the cord used for tying the V.t. to a 1/2 inch rope should be between 5/16 inch (8 mm) and 3/8 inch (9mm). Cord length will vary between 48-54 inch (untied), depending on its diameter and how many wraps and braids are used. If the cord is too short there will be too much friction and it will not slide smoothly—too long and the cord will slip. The difference is subtle, so experiment with and adjust the length accordingly.

Both the M.t. and V.t. consist of a series wraps (above) and braids (below). There are two ways to configure the braids: with the same leg of the cord always crossing on top of the other (as described below) or by alternating the crossings. Climbers are split over which one performs best, but both are acceptable, and for most, little, if any difference is noticed. Before tying the V.t., make attachment loops in the cord using the Double Fisherman's Loop.



1 Begin by taking four wraps around the climbing line. Adjust the wraps so each leg of the cord is about the same length when hanging down.

2 Form the first braid by crossing the top cord over the bottom cord.

3 Form the second braid on the front side of the knot, by crossing the top cord over the bottom cord.

4 The third braid is formed by repeating step 3. The crossing will be on the back of the knot.

5 Clip the carabiner through each eye of the cord and micro pulley. Dress and set the knot by alternately pulling down and up on the carabiner.

6 If more friction is desired, additional braids can be taken by alternately crossing one leg of the cord over the other. Dress and set as above.