Safe and Efficient Tree Ascent: Doubled Rope Techniques (DdRT), Part Two

By Mark Adams

This article illustrates and describes some of the different systems that are available to tree climbers to make their ascent fast, safe, and efficient. It also looks at some of the gear and equipment that can be used in various combinations to create different types of ascent systems. Part one (see June 2007 issue of *Arborist News*) looked at different types of tethers, the secured footlock technique, and several types of ascenders. This article will show additional types of tethers and several other ascender setups. Readers are cautioned to practice using new gear and equipment carefully and thoroughly while on the ground before attempting to use them in a tree. Training organizations and additional reference materials are listed at the end of the article.

Corrections

On page 51 of the first article, it was stated:
D stands for "**D**escending device"—because the ascender cannot be used to descend …

The text should have read:
D stands for "**D**escending device"—because the friction hitch cannot be used to descend …

On page 54 of the first article, under the heading "Warning!" it was stated:
There is one method that has been used as a backup that will not work and should not be used.

The text should have read:
There is one method that has been used for secured ascent that should not be used.

Review

For all of the techniques that are discussed in this article, it is assumed that an arborist climbing line has been set high in the tree with a throwline. All of the techniques described in this article are examples of doubled rope technique (DdRT). Some DdRT systems allow the climber to alternate between ascending the doubled line in either a static or dynamic manner. It is important to understand that in both static and dynamic DdRT, both legs of the rope can move. In a dynamic system, their movement is what moves the climber up (or down) the tree. In a static system, the climber grasps both legs of the line and climbs them together as if they were one. But, if either leg of the doubled line were pulled by itself, the other leg would move in the opposite direction.

There are some precautions that the climber needs to take when using ascenders, and these precautions are easily remembered with the acronym THADDS.

T stands for "at**T**ach"—the ascender must be properly attached to the host line.

H stands for "**H**ands away from the cam(s)" so that the cam(s) is not accidentally released.

A stands for "**A**scent only"—ascenders are not to be used for descent.

D stands for "**D**escending device"—because the ascender(s) cannot be used to descend, the climber must carry some device that will allow him or her to descend to the ground in an emergency. Many climbers carry a figure-8 or an extra HMS carabiner specifically for forming a Munter hitch.

D stands for "**D**ebris"—if debris (small pieces of leaves, bark, twigs, or even candy) gets onto the rope and prevents the cam(s) from having consistent, steady friction with the host line, the ascender could fail. It is important to keep the rope and ascender clean and free of all types of debris.

S stands for "**S**pread"—ascenders on a doubled line will work only if both legs of the doubled line are close together. If the legs of the line are spread too far apart, one leg of the line may pop out of the ascender. To avoid this, the climber should stay below the branch a distance that is at least five times the diameter of the branch.

Tethers

The tethers shown in the first article were examples of what is commonly called a Prusik loop. The ends of a length of cord are tied together with a grapevine knot (often incorrectly called a double fisherman's knot) to form an endless loop. The loop is then secured to the doubled climbing line with a friction hitch, most often a three-wrap, six-coil Prusik or Klemheist.

One problem with any type of tether is that when the climber lifts his or her legs to move up the line, a loop of slack is created in the tether, and this loop can sometimes catch on some other part of the climber's equipment. Some climbers attach the tether to their shirt, run the tether through their shirt, or tape the two legs of the tether together so that there is less cord that can catch on something. Another solution is to use a single piece of line rather than a doubled line. Figure 1 shows five different types of tether setups, each of which uses a single length of line or cord. Note that ANSI Z133.1-2006 states:

> 8.1.9 Prusik loops, split-tails, and work-positioning lanyards used in a climbing system shall meet the minimum strength standards for arborist climbing lines [5,400 pounds].

When a Prusik loop is used for the tether, a cord or rope is doubled to form the loop, and each leg of the loop bears only half the load. The Z133.1 safety standard (quoted above) requires that the loop have a minimum strength of 5,400 pounds. Because each leg of the loop bears only half the load, each leg has to have a minimum strength of 2,700 pounds (2,700 × 2 = 5,400). Thus, the cord or rope that is used to form a Prusik loop has to have a minimum strength of only 2,700 pounds. But all of the tethers shown here use only a single piece of line rather than a doubled line (loop).

The entire load (the weight of the climber, plus all of his or her gear) is on a single leg of the line, so the line must have a minimum strength of 5,400 pounds.

Figure 1A shows a 1/2-inch, 16-strand tether that has a small, spliced eye for the upper attachment; a scaffold knot (also often incorrectly called a double fisherman's knot) for the lower attachment; and a webbing sling as an adjuster. This can be used only with ascenders. The climber can clip into the lower attachment and/or the adjuster, and the lower attachment could be used to lock off the stopper knot below a floating false crotch. The webbing adjuster is difficult to move after it has been loaded, and the bury of the eye splice makes it difficult to move the adjuster any closer than about 12 to 14 inches below the carabiner.

Figure 1B shows a 1/2-inch, 16-strand tether that has a spliced eye for the upper attachment; a double overhand stopper knot (also often incorrectly called a double fisherman's knot) on the bottom; and a webbing sling as an adjuster. This can be used only with ascenders. The climber clips into the adjuster, and the double overhand knot is left free or can be clipped to the saddle to keep it out of the way. The webbing adjuster is difficult to move after it has been loaded, and the eye splice makes it difficult to move the adjuster any closer than about 12 to 14 inches below the carabiner.

Figure 1C shows a 1/2-inch, 16-strand tether that has a scaffold knot for the upper attachment; a double overhand stopper knot on the bottom; and a Micrograb as an adjuster. This can be used only with ascenders. The climber clips into the adjuster, and the double overhand knot is left free or can be clipped to the saddle to keep it out of the way. The Micrograb adjuster is very easy to move even after it has been loaded, and the scaffold knot allows the Micrograb to be moved right up under the carabiner.

Figure 1D shows an 8-mm, double-braid tether that has a large, stitched eye for the upper attachment; a small, stitched eye for the lower attachment; and no adjuster. This tether can be attached directly to the doubled climbing line with a Prusik or Klemheist, or the large eye could be girth-hitched to a carabiner and used with ascenders. The small eye is clipped directly to the saddle. A Micrograb cannot be used as an adjuster with this particular cord, but a compatible webbing sling could be used. A Micrograb could be used if the line were larger (a Micrograb must be used on a line with a minimum diameter of 9 mm). If an adjuster is used, the tether could be moved only as far as the stitching that forms the eyes.

Figure 1E shows a 3/8-inch hollow braid tether that has a large, spliced eye for the upper attachment; a small, spliced eye for the lower attachment; no adjuster; and a built-in elastic cord. This tether can be attached directly to the doubled climbing line with a Prusik or Klemheist, or the large eye could be girth-hitched to a carabiner and used with ascenders. The small eye is clipped directly to the saddle. An adjuster cannot be used with this type of tether because of the elastic cord. When there is no tension on the tether, the elastic pulls the loose tether together (indicated by the brackets { } in the photo). When the climber raises his or her legs to take a lock on the line, there is less slack that could potentially get tangled in the saddle. When the climber stands up on the lock, the elastic easily stretches, allowing the tether to be extended to its full length.

These photos show just some of the components that can be used and the combinations that are possible when assembling a tether for ascending a tree. When trying new combinations, always make sure that all of the components of the system are compatible (for example, do not use a Micrograb on an 8-mm cord).

Figure 1. Five different types of tether setups, each of which uses a single length of line or cord. Because these tethers use only a single piece of line rather than a doubled line, the line must have a minimum tensile strength of 5,400 pounds.

Static Versus Dynamic DdRT

In both static and dynamic DdRT, both legs of the rope can move. The disadvantage of this is that if one of the cams in the doubled system fails and there is no backup, then the climber will fall to the ground. The advantage, however, is that when using ascenders, the climber may perform either a static ascent on both legs of the doubled line or may pull down on one leg of the line and perform a dynamic ascent. This dynamic ascent is very similar to body-thrusting except that the climber does not have to advance a climbing hitch—the ascender(s) moves up as the climber pulls down. Thus the climber can easily alternate between footlocking, when there is a clear path of ascent, and body-thrusting, when ascent is hindered by branches or the trunk of the tree. This type of dynamic ascent can be accomplished with the double-handled ascender (the Kong Twin), which was shown in the first article, or with two single-handled ascenders.

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Note: This is ***not*** possible and should ***not*** be attempted with a Prusik, a Klemheist, or any other type of friction hitch. The hitch will fail and the climber may fall to the ground.

Single-Handled Ascenders

Figure 2 shows the left and right, single-handed Petzl Ascension ascenders on the two legs of a doubled line. In Figure 3A and 3B, the ascenders are still on the two legs of a doubled line but have been placed next to each other and connected with a single carabiner. That carabiner has a tether attached to it, and the other end of the tether attaches to the saddle of the climber. This setup functions just as the Kong Twin, but the handles are next to each other rather than 180 degrees to each other as they are on the Twin. A backup system is still recommended, such as the Rock Exotica Dualcender. (Note: Petzl sells the gold as the left ascender and the blue as the right ascender so that the cams can be manipulated with the thumb of the respective hand. This works when the ascenders are placed one above the other on a single line, but when they are placed side by side, the cams face and interfere with each other. When used on a doubled line, as here, the blue Ascension should be on the left and the gold Ascension should be on the right.)

Other single-handled ascenders, such as the CMI Expedition, can also be used in this manner. But when two single-handled ascenders are placed side by side, only one hand will fit in the handles. Therefore, the grip is rather awkward, and there is excess movement between the two ascenders. Another available option is a type of frame that joins two single-handled ascenders securely together to create a single unit. A system that uses this setup is the Mar-Bar, which was created by longtime climber Paul Sisson. Unlike the Kong Twin, which is manufactured as a double-handled ascender, Mar-Bars use two single-handled CMI Ultracenders to form a single, double-handled upper ascender for the hands and two more Ultracenders to form a single lower ascender for the feet (Figure 4). The climber is attached to the upper ascender only and uses the lower ascender simply to assist in his or her inch-worm progression to the top. Because the climber is attached only to the upper Mar-Bar, it is recommended that another system be used as a backup.

Figure 2. The left and right Petzl Ascension single-handled ascenders on the two legs of a doubled line.

One difference between the Mar-Bars and the Kong Twin is the position of the hand grip. The Mar-Bars have a horizontal grip, while the Twin has an angled grip.

Figure 3B. Different view of Figure 3A.

Figure 3A. The left and right Petzl Ascension single-handled ascenders placed next to each other on the two legs of a doubled line and connected with a single carabiner. That carabiner has a tether attached to it (here a Prusik loop), and the other end of the tether attaches to the saddle of the climber. This setup functions just as the Kong Twin, but the handles are next to each other rather than 180 degrees to each other, as they are on the Twin.

Figure 4. Mar-Bars use two single-handled CMI Ultracenders to form a single, double-handled upper ascender (with yellow strap) for the hands and two more Ultracenders to form a single lower ascender for the feet. The climber is attached to the upper ascender only and uses the lower ascender simply to assist in his or her inch-worm progression to the top. Because the climber is attached only to the upper Mar-Bar, it is recommended that another system be used as a backup.

If a climber prefers the angled grip of the Twin and still wants to use the lower Mar-Bar for his or her feet, the upper Mar-Bar can be easily exchanged for the Twin (Figure 5). Some type of backup system is recommended.

There are many options available for ascending into a tree. There are many different types of components for tethers, ascenders, and backups, and many of these may be interchanged in various ways. Ascent systems can make tree climbing safer, more efficient, and more ergonomic. Arborists need to learn how the components of these systems were intended to be used and to integrate them into their work in appropriate ways. Because these tools are so useful, it is hoped that there will be more discussion and consideration of these devices in future revisions of the Z133.1. These tools are like any other tool. If used properly, they can be a great asset, but if misused and misunderstood, they can fail.

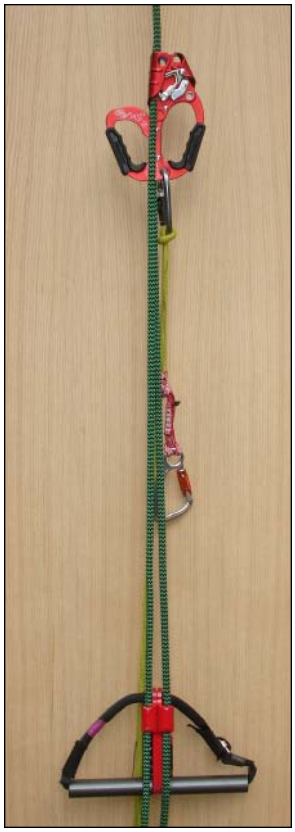

Figure 5. If a climber prefers the angled grip of the Kong Twin and still wants to use the lower Mar-Bar for his or her feet, the upper Mar-Bar can be easily exchanged for the Twin. Some type of backup system is recommended. Here the tether attached to the Twin is a Prusik loop with a webbing sling as an adjuster.

The safe use of a certain piece of gear is not simply a matter of tensile strength but knowing that the item is "fit for the purpose." The user must thoroughly understand how the item works and how it functions as a component in different types of climbing (and rigging) systems. Please climb and work safely.

Credits

The acronym DdRT for "doubled rope technique" was suggested six or eight years ago by Tom Dunlap on the (now defunct) discussion forum of ISA's Web site.

The acronym THADS for "Tie, dress, and set; Hands away from the knot; Ascending only; Debris; and Spread" is often used by ArborMaster Training as a mnemonic for tying the Prusik loop to the host line. THADS was suggested to ArborMaster by Tom Green when he was a student in one of their classes. I added the second D, for Descender, and applied the same acronym to ascenders.

Training Resources

Arboriculture Canada Training and Education: www.arborcanada.com
ArborMaster Training: www.arbormaster.com
North American Training Solutions: www.northamericantrainingsolutions.com

References

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Smith, Bruce, and Allen Padgett. 1989. *On Rope.* National Speleological Society, Huntsville, AL.

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Figure 4 courtesy of SherrillTree. All other photos courtesy of the author.