

The Single Rope Technique

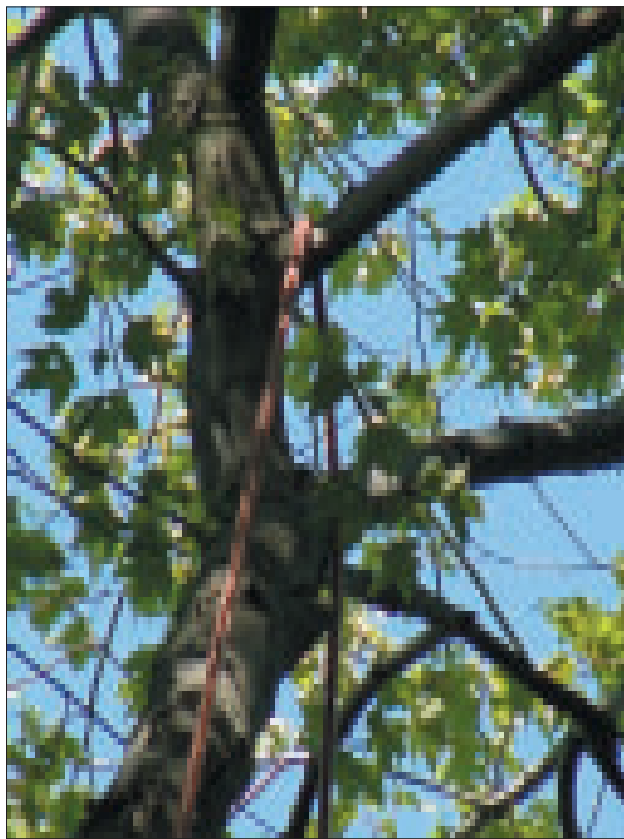
By Tom Dunlap

The work order for the morning calls for pruning a 70-foot tall red oak. This tree has never been maintained, so the inside of the crown is full of dead limbs that are a lot like barbed wire to climb through. During the pre-climb inspection, a limb off to the side of the crown is spotted that would make a really nice tie-in. This tie-in will eliminate working up through the mess and can get the climber to the top in short order. A line is set after several tosses and a lot of work getting the tie-in limb isolated. After attaching ascenders to the doubled rope, the climber starts up. On the way into the tree, the climber meets his worst nightmare: hornets! The climber is trapped and must attempt to change over to a descent system while the hornets are expressing their frustration with the intruder. This time, the climber is able to escape with only stings from the attack.

There are systems for entering the crown of the tree that are quicker to set up and also have an escape system (or back door) built into them. Single rope technique [SRT] is a system that cavers have developed for long, free-hanging entries and exits. As usual, in arboriculture, the technique has been adapted and modified to fit our unique place in the vertical rope world. SRT is a system that requires a few new tools. The ease of setup and quick canopy access will offset any of the gear expenses. There are many other advantages to using SRT that will make the system efficient and safe for arborists.

History of SRT

Current practice in arboriculture is to use a throwline to set a climbing line into a high limb and ascend to the tie-in position. In order to use this tie-in point, the climber needs to spend time isolating the limb by using the stick trick or by eliminating interfering limbs by attaching a throwbag onto both ends of the throwline and manipulat-



The single rope technique is especially effective when limbs are hard to isolate.

ing the bags. This takes a lot of time and can be quite frustrating when the tree has many limbs in the crown. Cavers, search-and-rescue personnel and other vertical rope workers have developed the SRT to enter and exit long drops. By using less energy to ascend the rope, more energy is left to climb and work.

For many years, arborists have used a technique where a rope is draped over a limb and both ends of the rope are climbed. This system has been referred to as double rope technique, but this term is not accurate. True double rope technique [DRT] is popular with rock climbers in Europe. The climber is attached to two separate ropes and uses two separate belay systems. If one rope fails, there is redundancy. A more accurate name for the arborist system would be to call it a doubled rope technique [DdRT], since one rope has been doubled over a limb. If one leg of the rope fails in this system, the whole system could fail. This is an important point and needs to be

remembered in order to differentiate between SRT and DRT.

Like any new climbing technique, SRT needs to be learned and practiced “low and slow.” Find a tree with an access limb that is about 12 feet off the ground. Working close to the ground keeps the whole system visible. The climber can make adjustments and fine-tune all the components while on the ground. Once the climber is completely familiar with the system, it’s time to set the ropes in the canopy of the tree.

Inspection

As usual, the climber needs to do a thorough pre-climb inspection of the equipment, tree and work site. A top-to-bottom inspection of the tree and surrounding area should bring any hazards to the climber’s attention. While completing the canopy inspection, look for limbs that could be used for setting the rope to access the tree. Sometimes the access limb isn’t the limb that will be used as a final tie-in for working in the tree. By finding a limb that is away from the center of the canopy, the climber may have an access path free of brush and interfering limbs.

Rope choices

The basis for SRT is the rope. Arborist rope can be used for SRT, but is not the best choice. Since arborist ropes are labeled half-inch diameter but most are actually larger, they aren't compatible with many ascending and descending tools that have been developed for other rope disciplines. Another consideration is the amount of stretch built into arborist ropes. If the rope stretches during ascent, the climber loses efficiency. Rather than all of the climber's energy being used to move up the rope, some is wasted by bouncing on the rope. Static lines have much less stretch. Smaller diameter static lines can be used as access lines because they are stronger than arborist ropes. A typical 7/16-inch diameter static line will have a breaking strength of over 8,000 pounds. Using a bright-colored access line keeps the line visible and the climber can easily differentiate between the access line and a working line.

ANSI Z133.1-2000 states that: "Arborist climbing lines shall have a minimum diameter of 1/2-inch (12.5 mm) and be constructed of a synthetic fiber, with a minimum nominal breaking strength of 5,400 pounds (24kn) when new. Maximum working elongation shall not exceed 7 percent at a load of 540 pounds (2.4kn). Arborist climbing lines shall be identified by the manufacturer as suitable for tree climbing.

"EXCEPTION: In arboricultural operations not subject to regulations that supersede Z133.1, a line of less than 1/2 inch diameter (12.5 mm) may be used, provided the employer can demonstrate it does not create a safety hazard for the arborist and they have been instructed in its use. The strength and elongation ratings of the line selected shall meet or exceed that of 1/2-inch arborist climbing line." (3.5)

Installation

The time to choose the best location for the access line is before you set a throwline in the tree. If the climber chooses to isolate the access limb, the limb must be very sturdy. Since the climber will be doubling the load on the limb after the standing end of the rope is secured, the limb will be subjected to larger loads than with DdRT or in traditional climbing systems. If the climber bounces on the rope during ascent, the

load will increase in the same way as slam dunk rigging, or dynamic loading. Bouncing on the ascent line also increases the chance of hanging limbs or dead branches falling. With SRT it's no longer necessary to isolate the limb. If the throwline runs through several limbs before coming to the ground, it is acceptable with a few considerations. As Mark Chisholm wrote in his April 2000 *TCI Magazine* article, "by rigging through

multiple crotches, we can change the loads on individual limbs if the rope runs through the limbs at increasing angles." The length of the rope chosen for SRT must be three times the distance from the ground to the access limb. The reason for this is that if the climber needs to be lowered out of the tree on the access line, the line needs to go from the ground to the access limb and back to the belay device. There must be enough line left

to lower the climber back to the ground. A 200-foot piece of 7/16-inch diameter static line will allow the climber access to limbs about 65 feet in the tree. As a comparison, the 200 feet of 7/16-inch line will have the same volume as about 100 feet of 1/2-inch climbing line. If the access limb is above 65 feet, two ropes can be tied together using a double fisherman's knot. The knot must be kept on the climber's side of the access limb to allow the rope to be lowered in case of an emergency.

Anchor

Now that the rope is set in the tree, it's time to set up the anchor. The access line can be anchored to the same tree or another tree nearby. By running the access line through a belay device, the climber can be lowered out of the tree from the ground in an emergency. The Gri Gri is an excellent tool to be used in this situation. The Gri Gri is a very good belay tool, but the rope must be threaded in the correct path on the Gri Gri. By following the icons on the tool and testing the rope before ascent, the climber can be assured of a safe climb. Before starting the ascent, lock off the Gri Gri using a half hitch on a bight or a mule knot. Find the end of the ascent line and tie a figure 8 stopper knot about 10 feet from the end. This will prevent the end from passing through the belay device.

Ascent

Now it's time to climb! Many climbers ascend with only one ascender. Most manufacturers and rope technicians recommend some kind of backup. This can be accomplished by several means. Using another mechanical ascender or an ascender hitch tied with suitable accessory cord works. Closed-shell ascenders like the Micro Cender or Gibbs are better choices than handled ascenders. The environment that tree climbers work in is much different than in caves or on rock. Our work area is full of twigs, leaves and limbs that can accidentally jam the ascender's cam, which could lead to a fall.

(There are three earlier articles on ascenders, *The TreeWorker*, January and February 2002; and *TCI Magazine*, June 2002. These articles discuss in some detail the application and limitation of some mechanical ascenders.)

Occasionally, when ascending, there



The access line is anchored with a Gri Gri and backed up with a Munter Mule knot.

are branches in the ascent path. Getting in the habit of using a flipline before doing any pruning is the best practice. If there isn't a branch nearby to safety to, be sure to tie a lock off or stopper knot below the ascender. Do not allow the

ascender to be pushed against any part of the tree. Letting the ascender touch the tree could get a bark flake or twig jammed in the camming mechanism. The climber can push off from the tree to clear any interfering limbs.

Multiple uses

Besides being a quick and safe means of entering the canopy of the tree, there are several other uses for an access line. After the climber has changed over to his or her working line, the line can also be used by a second climber to gain entry to the canopy. If the climber is unable to ascend, he or she can be lowered by someone on the ground. This would be very important if the climber were to tangle with bees or hornets. Once the climber has ascended and tied into the working rope, the access line can be used to haul tools and supplies into the tree. Sometimes trees need to be re-entered when the climber comes out for breaks or lunch. If the access line is repositioned before the climber leaves the crown, it will be set to work on the next portion of the tree. In the case of an aerial

rescue, the access line is already set for the rescue. After the tree is pruned, the access line is the last line to be cleared from the tree. In case there was something missed in the tree, the climber can easily re-enter.

Descent

The access line can be used for descending as well. The choice of descending technique is left to the climber's preference. When choosing a descent system, it's best to have one that holds when the climber lets go of the descender. Since we work in climbing systems that stop our descent when we let go, that protocol should follow in the descent system. If a figure 8, rack or similar tool is chosen, the climber MUST have a backup that automatically catches when the climber lets go of the tool. The decision to install a rappel backup above or below the descent device has arguments in favor of both sides. The backup must not interfere with the descent device. There are several rappel tools that have a "panic mode" so that the release arm will lock off if the climber lets go or squeezes the handle. There is a "sweet

For more information on SRT ...

On Rope: North American Vertical Rope Techniques, by Bruce Smith and Allen Padgett; National Speleological Society; January 1997.

High Angle Rescue Techniques, by Tom Vines and Steve Hudson; Mosby-Year Book; January 1999.

The Tree Climber's Companion, by Jeff Jepson.

Vertical Devices, <http://storricksnchost.com/VerticalDevicesPage/VerticalHome.shtml>

Rappelling Safety, <http://web.ukonline.co.uk/Members/nca/abseil.htm>

spot" in the middle of the range that allows the climber to control the speed of his or her descent. (See the end of this article for references containing information on SRT, some of which have more detailed descriptions of back-ups.)

Choosing to use SRT will pay off for the progressive climber in a short time. There are some trade-offs that must be considered, though. SRT does require a few new pieces of equipment. But that is generally considered a "good" thing! SRT is quicker to install in the tree and requires less time spent with the throwline isolating the "perfect" access branch. There can be more load on the access limb but, if the line is

set through a number of limbs through the crown, the load could be decreased. Probably the most important reason to consider using SRT is the safety and efficiency of the climber during ascent.

Rescuing an ascending climber with an SRT system without putting a second climber in the tree can decrease the time involved to do the rescue. Having a secure access line available to a rescuer, in case of a rescue needed after the climber has changed lines, will also save critical time.

Tom Dunlap is the owner of Canopy Tree Care in Robbinsdale, Minn. 