

NYLON HIGHWAY

NO. 30



...ESPECIALLY FOR THE VERTICAL CAVER

NYLON HIGHWAY

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EDITOR COMMENT: With this issue, the Vertical Section is more than 850 members strong, making us the largest section in the NSS. As Editor, with an audience this large, I feel particularly responsible for providing meaty, substantial, and responsible articles in your *Nylon Highway*; I have found myself in an "Editorship" role more than ever before. I am not, nor claim to be an expert, but proven unsafe practices that appear in my mail with a wish for publication, I find it necessary to edit or send back. Likewise, I feel it is more important now than ever before that "filler" type articles find their way to a grotto publication. These are my intentions and self direction that I have tried to accomplish during the 1989-90 VS year.

OPINIONS expressed herein are credited to the author and do not necessarily agree with those of the Vertical Section or its Executive Committee. Reprinted material must give credit to the author and source. Some material is designated © copywritten. Letters to the editor are welcome.

COVER: Linda Heslop enhances another terrific photograph. This Jim Smith photograph originally appeared in the AMCS Newsletter. Thank you Linda and Jim.

MAY 1990

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THE ALL PURPOSE SLING

by Heath Many

On a recent multi-drop caving trip, I tried out a new Mitchell system. (Usually I use a Gibbs ropewalker, but because of the many drops, I switched.) The problem was I lacked a safety Jumar, so I couldn't rest. I searched my pack and found a sling I used for rappelling with heavy loads. It is a 5/16 diameter rope, but tubular webbing works just as well. I shortened the sling so that it stretched from my seat carabiner to the top of the upper Jumar. I then clipped the sling to my seat harness.

After climbing a little while, I slipped the sling up over the top of my Jumar and sat in my seat harness. PERFECT! At the top of the drop, there was a fairly difficult lip. Once again I pulled out my trusty sling (still clipped to my seat harness), put a 'biner on the end, and attached it to the ascender. I then removed my chest block.* PERFECT! I had enough room to move around, without going inverted. (The only problem I could find is it threw me off balance when I stepped up with the upper Jumar.)

After getting home I tried out some more ideas with the sling. There are many. These aren't to say that a safety Jumar wouldn't be better. However, when switching systems, using the same equipment, the sling would work perfect! Also having a sling handy could be used for many different things:

1. Less expensive and lighter than an ascender
2. By attaching a sling to a chest harness while rappelling, it becomes a safety in case of seat harness failure.
3. Resting
4. Getting over difficult lips
5. The sling I use is 5/16 static rope, so it's smaller than my 7/16 main climbing rope, so if there was an emergency, you could make a handy dandy prusik knot.
6. Attaching the sling to the seat and upper ascender while climbing provides an additional safety for preventing heel-hangs.

But of course, with any ideas, there are always disadvantages:

1. While resting, the sling will slip off of CMI or Petzel ascenders, without using an additional carabiner.
2. It's not as convenient as an ascender.

All in all, it works well for me in certain situations, but it's always there if I need it.

*The sling has to be a little longer for leg movement.

Editor's Note: I only recently observed this upper tether from the seat harness to the upper ascender on a Mitchell rig while caving in Mexico. The Mexican Mitchell climbers use both; this upper tether and a lower tether from the lower ascender to the seat harness. I was most impressed at the versatility that the Mexicans were able to use their Mitchell rigs. Heath has brought out several of the advantages of such a modification. My only suggestion might be to attach this tether to the ascender rather than just loop it over the top of a Jumar.

Cmi

P.O. Box 535, Franklin, West Virginia 26807 USA (304) 358-7041

RECALL NOTICE

CMI has discovered that one of our ascenders was inadvertently subjected to excessive heat during the painting process. While we have recovered this one ascender, it is possible that other ascenders may have been subjected to these same high temperatures. That temperature to which they may have been exposed is high enough to anneal the material, possibly reducing it's strength. This error occurred after March 1, 1989. CMI requests that any ascenders purchased after March 1, 1989 be returned to us for strength testing. All ascenders shipped by us after June 22, 1989 have received a final strength test and are being labeled appropriately; they are not subject to this recall.

VERTICAL ELITE

by Dave Shurtz

As I have been reading in the *Nylon Highway* and other places lately, I have begun to notice the use of the phrase "Vertical Elite." The phrase seems to be used mainly by those who, for some reason, are not vertically skilled or are mainly horizontal cavers (at least that's the impression I am getting). Based mainly on the way the phrase is used, I get the impression that those using the phrase are either trying to belittle those spoken of, or else to give the reader the idea that those being spoken of are snobs (think themselves above or better than others).

Elite, as found in my dictionary, means to choose, or the choice part, a superior group, a powerful minority.

I can visualize how in T.A.G. country there may be major divisions between those who are vertically capable and those who are not. Now, if one group is unhappy with the other, for some reason, I guess it is possible to imagine some name calling, including insinuating use of this phrase.

I suppose if there are vertical elite, then maybe those calling the names could be considered the horizontal elites, or the wet passage elites, or the armchair caver elites, or the political elites.

I live in Utah, and things are different out here. Our cavers consist of the vertically capable and those who are learning, as a large number of our caves involve vertical work. In Utah, those who are vertically oriented aren't considered elite, but are teachers for those who are learning. However, we have had our problems in the past. There was a time when the old timers were considered elite, and the newcomer was considered a threat to caves and the conservation of the same. During this period of time it was very difficult for a "would be" caver to get anyone to tell him anything about caving, much less where a cave was. But in the long run (as with all elitist attitudes) these problems are self-eliminating. Pretty soon the old timers found it increasingly difficult to get people to go on cave trips because the new blood wasn't coming in to replace the dropouts (and let's face it, there will always be those giving up active caving for armchair caving). At present, there is a very healthy attitude developing in Utah about beginner cavers.

I give this example only to illustrate the way others outside of T.A.G. country may see this. As a vertically competent caver I do not consider myself elite, nor do I consider those with greater skills than mine elite. Truly, all cavers (horizontal and vertical) could not be considered elite due to the fact that we are not a powerful minority, but just a minority, and considered crazy by a majority of the rest of the world.

I guess the point of my little article is that I hope we can all understand that as cavers we can't afford divisions. We need to all stick together and build on each others talents rather than tearing each other down (especially for their skills). I love caves and caving and hope to be involved till the day I die. It makes me sad to read such things in periodicals dedicated to caving, and it distracts me from the information I am trying to gather.

Personally, my hat is off to the leaders of the NSS and all its diverse organizations. Let's treat them with the respect they deserve for all their dedication to the sport. My parents taught me a small saying that seems to apply here, and I hope you'll forgive me for quoting it. "If you don't have something nice to say, don't say anything at all."

WALL HAULER

By Rock Exotica, Inc.
530 South 4th East
Centerville, UT 8401
(801) 295-9241

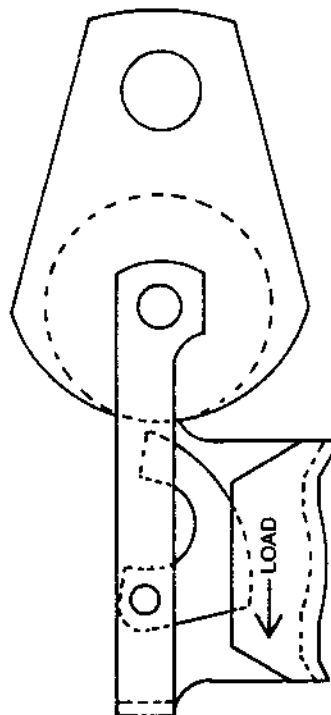
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Lighter and more compact than the traditional pulley/ascender combination, the Camming Hauling Pulley is quick to rig and makes a simpler, more reliable hauling system.

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- Rope sizes: 7—12 mm.
- Approximate strength: Pulley, 5000 lbs., Camming Unit, 700 lbs.

Editor's Note: Rock Exotica, Inc. has many new products on the market for the climber and vertical type. Write for a free catalog.



THE PARNELL 4-POINT

by Jeff Parnell

As climbing systems have evolved over the years, many improvements have been made. Safety standards have been set, and speed records have been broken, but the systems themselves have become anything but standardized. Climbing systems seem to be as individual as fingerprints.

After trying numerous techniques, I combined several of the features I found favorable in the most popular systems, and have been very pleased with the results. If you haven't found your perfect system, you might give it a try.

Starting from the bottom my system looks like the floating cam system. A Gibbs or Petzl Croll is secured to the right foot. On the left foot, one-inch webbing is used to stirrup the foot, and allow a Gibbs to ride just below the knee. From this Gibbs a shock cord is run to a Petzl triangle screw link hooked into the left of the chest harness.

At the seat harness I have a Gibbs free-running on a carabiner. I use a Petzl Chouchas harness.

The main difference can be seen at the chest harness level. I have done away with the chest box or roller concept and replaced it with yet another Gibbs. This gives you the hands-free ease of a floating cam system, and the comfort of the typical Mitchell systems. I use a Petzl D screw link for this attachment.

Now for the pros and cons.

It is slow attaching to the rope, but no slower than most other systems.

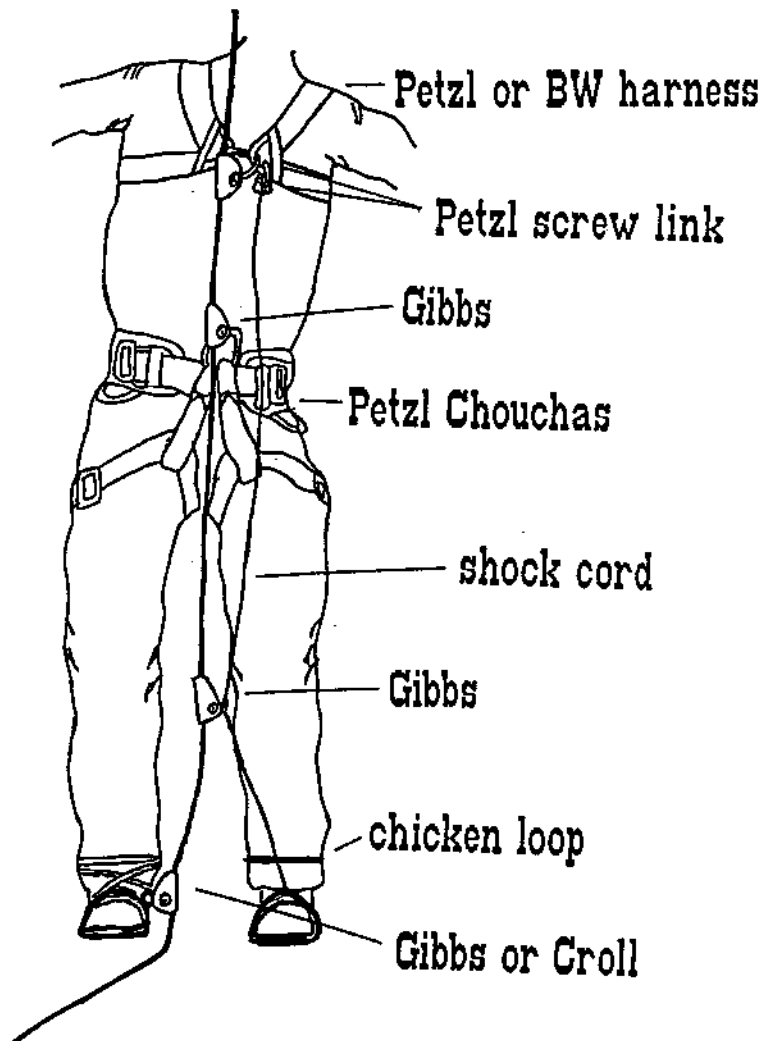
It is a fast system. I am no speed demon, but I can climb faster with this than with any other rig.

It is **EXTREMELY** comfortable. Since you can rest with your weight on your seat, chest, feet, or a combination, you have a lot of weight distribution options while resting. It is important that the chest harness is adjusted snugly.

You do end up with four ascenders. Many would say this is overkill, but instead of having three ascenders and a chest box, I use four ascenders. Price is about the same either way, and the extra ascender gives safety and comfort advantages.

On ledges, I have found the chest attachment to be very good. Since your arms are level with the ledge, it is easy to push away, allowing the chest ascender to overcome the obstacle.

There are two things I do not like about the system. One, it is not easy to down-climb, although it is easy to switch to a descending device from this system. And two, it does require an ascender on the foot. I have tried many ways of attaching an ascender to the foot, and have found that it is almost impossible to connect an ascender to the foot without getting some slipping of the ascender, and rolling inward of the foot. I am currently experimenting with a Petzl Croll and would welcome any advice from others ahead of me in these trials.



FALSE SECURITY

by Allen Padgett

The Spelean Shunt is designed to be used as a backup safety device while on rappel. The shunt, consisting of the Gibbs ascender with its carabiner rig, is attached to the seat harness and rides above the rappel device (Figure #1). Its function is to protect the rappeller from either a rappel device failure or an out of control rappel. To do this the shunt is simply released, and it grabs the rope to save the caver—Right? WRONG!

The efficiency of shunts has been tested by some Australian cavers using the following experiment from a bridge over water (Figure #2). Two ropes were rigged close together. One rope reached the water. To this rope the spelean shunt was attached. The other rope was short-rigged and did not reach the water. To this short rope the rappel device was rigged. The rappeller was then blindfolded and instructed to save himself with the shunt when he rappelled off the short rope. In numerous attempts, shunt activation was achieved only very rarely. The rappeller hit the water most of the time! The test was repeated with the blindfold, and it was still evident that it was extremely difficult to activate the shunt before crashing. Using a shunt creates a false sense of security that depends upon a system that is basically flawed by its application.

Years ago the supposed answer to the rappel safety question was the Prusik safety. A simple test years ago by the VPI Grotto in design to the Australian experiment proved that the Prusik safety was a flawed idea. Why do both the shunt and Prusik safety fail to perform as expected when

tested? A basic human instinct is to grasp tightly when the body thinks its failing. This instinctive reaction occurs without conscious thought. It kept our ancestors from falling out of the trees. But as a rappel safety we have designed a system that requires the human operator to initiate a positive action of releasing the device when a crisis is perceived. What this means is that the rappeller must, in the middle of a serious crisis, think to open his hand and release the device. Because this opposes the instinct of grasping it requires a considerable amount of mental activity, which takes time and consideration which are in short supply in the middle of a rappelling crisis.

What is the answer to protecting the rappeller? People could simply learn how to PROPERLY use their rappel device. They could also practice procedures for solving rappel emergencies ahead of time so the correct response would already be known. We should take advantage of the natural grasping instinct and learn procedures that utilize this to add friction to the system. One bobbin type descender, the Australian made SRT descender utilizes a handle that must be kept in a neutral position to rappel. If grasped tightly or released the device automatically stops the rappel.

Shunts and Prusik safety should be considered psychological safety devices and used when appropriate. Hopefully, reliance on a psychological belay will not give some rappeller a false sense of security causing harm. Learn to rappel without a crutch!

Padgett, Smith. On Rope NSS Vertical Section.

Webb, J. 1978 "The Spelean Shunt: A Discussion." ASF Newsletter #82 p. 6.

Warild, Alan 1988 Vertical The Speleological Research Council Ltd., Sydney, pp 73-79.

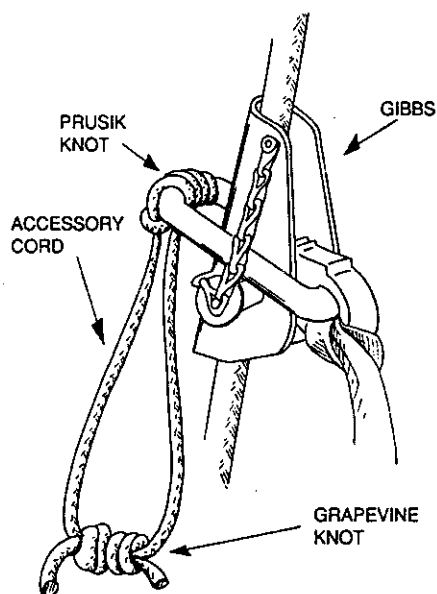


Figure #1 The Spelean Shunt

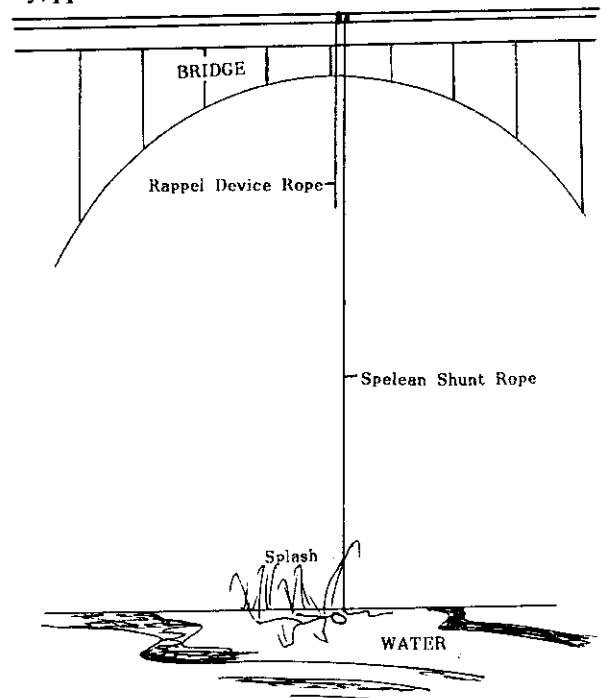


Figure #2 The Test

THE RACK HANDLE FOR IMPROVED DESCENTS

by Peter Grant

Ever since my Great Safety Crusade in the 60's against Single Brake Bar Rappelling, I have been thinking of safer and easier ways to go down a rope. The rack is a great improvement, as long as one uses steel bars that won't color the rope, but one still had to hold a rope that is sliding through a hand. This means a glove is needed to avoid rope burn. I usually forget gloves until I am at the top of a rope, looking down. A better way is needed. From a human factors, ergonomics specification, we need something like a simple handle. When one gets in a panic, one tends to fold up, hands tighten, arms go down, head to knee, etc. These reactions should be used in the design of the better rappelling device.

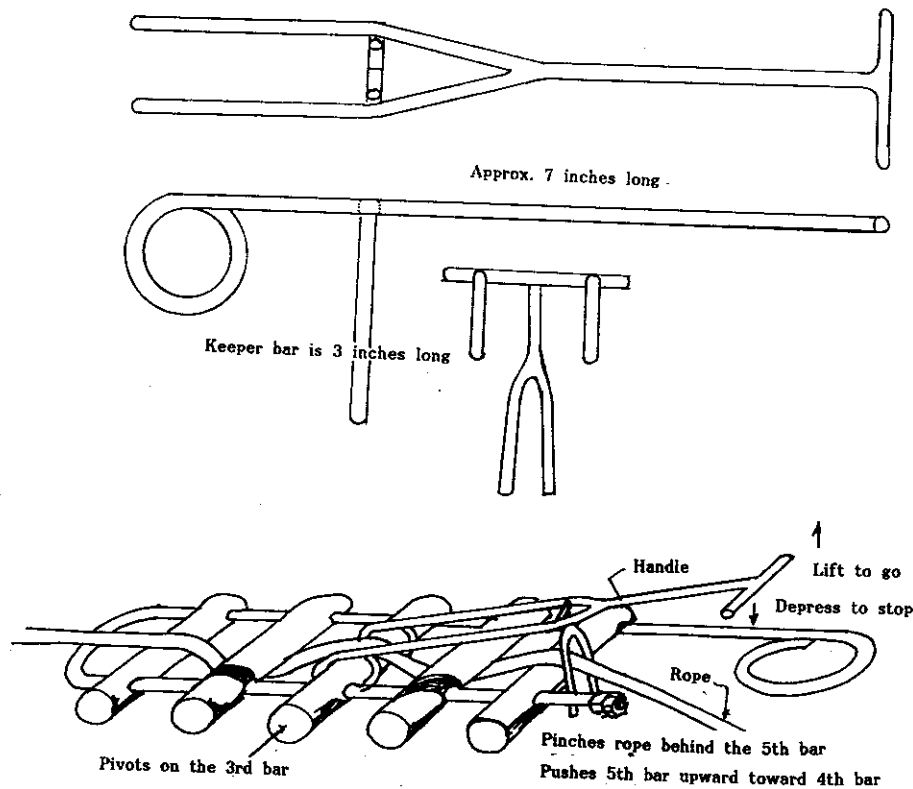
Part of the problems with the single brake bar, is that users used a "Prusik safety." A rope sling went under armpits and to a Prusik knot on the main rope. The descender pulled down the knot during a good ride and "should" let go in an emergency. It didn't happen. The Prusik safety was abandoned as unsafe, too, since the panicked person grabbed tight, not letting the Prusik stop them (see human factors, above).

The Spelean Shunt has the same problem. It works the opposite of the way human reaction needs it to work. The

same with the Petzl Auto-stop.

So, can a descent method be designed with human factors? Maybe. At the convention, I showed a Rack Handle that may do the trick. The user raises the handle to go and pushes it down to stop. That is what people do naturally, especially the hand down in a panic part. The Handle fits on a standard rack and swivels around the third bar. The handle is a bar with a "T" bar at the end for hand control. In the middle of the bar is a fork that does two things. The rope goes between the fork tines, so that as the handle is pushed down, the fork pinches the rope. The fork also slides below the fifth bar. As the handle is pushed down, the fifth bar is pushed up the rack, and the rope is given more friction by the bars being closer together. To stop altogether, the rope can be wrapped around the handle.

Here we have an ergonomic safety descent system that also eliminates rope burn. Problems: The model I made could use a longer handle, since it just seems short. The fork needs to be longer so that the rope won't come out of it if hands are removed from it. Anyone want to work on this further?



BUCKLES, A COUPLE OF ANSWERS TO JOHN GANTER'S "COMMENT AND QUESTIONS ON VERTICAL HARDWARE"

by Robert Elron

First, all comments herein refer to the behavior of the buckles when used with the webbing for which they were made, as use of a different size (width or thickness) results in different behavior. The two buckles in John's article, MS22040-1 and MS22007-1, are designed for #6 and #7 Parachute webbing; not Seat Belt webbing.

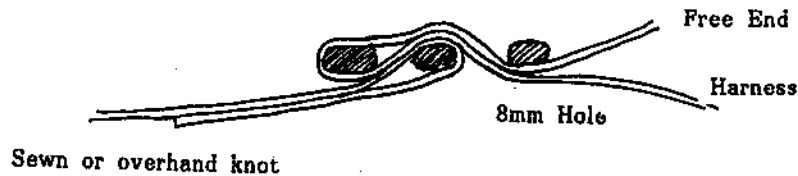
In buckles, there is a trade-off between easy (quick) on/off, and no slippage. The "Quick-Fit Adapter" (MS22040-1), and its several variations, is the standard Parachute harness adjuster for places where the harness is being constantly adjusted when it is put on (e.g., chest straps, leg loops). Any jumper will tell you (occasionally in a soprano voice) that they are prone to slippage. In fact, there are small leaf spring devices available to try to prevent this slippage; unfortunately, they are easily jammed by mud. The slippage problem is inherent in any moving bar "quick fit" buckle, and there are several solutions; stopping and retightening, wrapping the extra webbing around the harness, and back threading. The best is Velcro, but must be kept clean, and can be pulled apart in tight spots.

For static (infrequent) adjustment points on a harness, the quick fit feature is not needed, and solid buckles will

work better. The MS22014-1 is a standard static adjustment buckle on parachute harnesses. It can be threaded the same as the "threadback" configuration in John's article. There also is a smaller (lighter) buckle, the MS22047-1 which is almost the same, but it is significantly weaker. Strong buckles of this design are also made for two-inch (seat belt) and one-inch webbing. Properly used, anyone can prevent slippage even when the webbing is taken off.

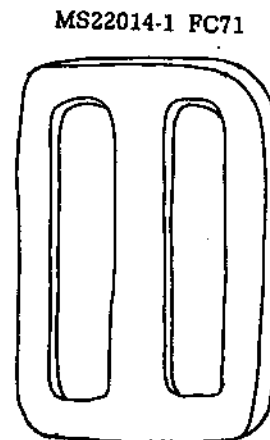
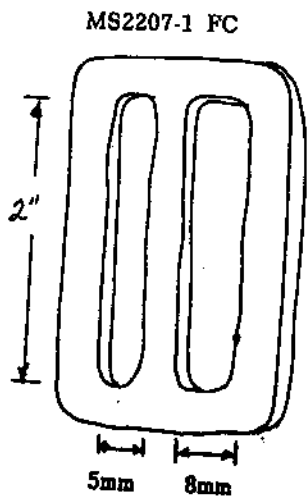
The "Seat-Belt Adjuster" (MS22007-1) has a small hole on one side, and is designed to be threaded so that this hole is on top of the webbing. A four-inch to 7-inch strap is usually connected to this hole to provide leverage when breaking it loose. This should work under muddy conditions, but be forewarned, the buckle will dig into the wearer, and a little padding might be nice.

Finally, these comments are not an endorsement of "sewing your own" for the general vertical person. There are more than enough commercial harnesses and custom harness makers around for obtaining good gear. Sewing harnesses should only be done by those who are willing to take the time to learn the basics before trying to sew even the least critical part of a harness.



"Locking" Threading of Webbing

Note: Reversing the holes will not work
(Using #6 or #7 parachute webbing)



AN IMPROVED FLOATING FOOT CAM

by Brian Thorndyke

A floating foot cam is an arrangement that has an ascender attached a short distance above the foot. A shock cord, or some other type of elastic material, is used to raise the ascender up the rope as the climber's foot is raised. The upper attachment for the elastic, is usually the seat harness or a higher point.

There are three major advantages of these "floaters." The first and most important is that they twist and pinch the foot considerably less than arrangements which have the ascender strapped directly to the foot. For this reason, prusiking is much more comfortable. Second, the ascender can be removed from or attached to the rope with relative ease, particularly when the climber is off the ground, with weight holding the rope down below him (or her). And finally, they do not have the annoying tendency of loosening while the climber ascends.

However, to their advantage, floating foot cams are often too awkward and inconvenient when used in caves. This has greatly restricted their use, and most cavers will only use them in caves that have a single long drop, and for such things as high cliffs, bridges, etc.

Since I was very impressed with a "floater" that I had used for a long drop, and because I did not want to have different foot cams for different situations, I decided to try making a floating foot cam which would be practical for all vertical rope work. What I came up with, is a slightly modified free running Gibbs which is attached above the foot loop, and has an adjustable upper attachment to a short length of shock cord. The top of the shock cord is attached to a strap which goes around the climber's leg, above the calf and below the knee.

With this new set-up, the whole arrangement stays down on the lower half of the leg, and remains independent of the rest of the climbing system. In this way, the foot cam does not further complicate the system, and it is not awkward for the climber while he moves through the cave. As a result, this "floater" is not only practical for long drops, but also for short drops, multi-pit caves, and anywhere that a non-floating foot cam would be used.

How To Make It:

To make this foot cam, start by sewing a length of two-inch webbing into a loose fitting foot loop. There should be above an inch or so of free play above the foot, which will minimize pinching. If a variety of people with widely varying foot sizes will be using your equipment, you should make the foot loop adjustable, by sewing on a strong metal, three bar buckle. A chicken loop is also optional.

The next step is to attach the foot loop to the cam, as in Figures #1 and #2, by simply tying it on with a length of Perlon, or other strong nylon rope. Tie them as close and as tightly as possible, because when the foot cam is used for the first time, the know will slip considerably before it will set to the point where no further slipping will occur. Ideally, the foot loop should end up a little less than, or slightly over an inch from the cam. This will result in the cam riding about two-and one-half to three inches above the foot, which is

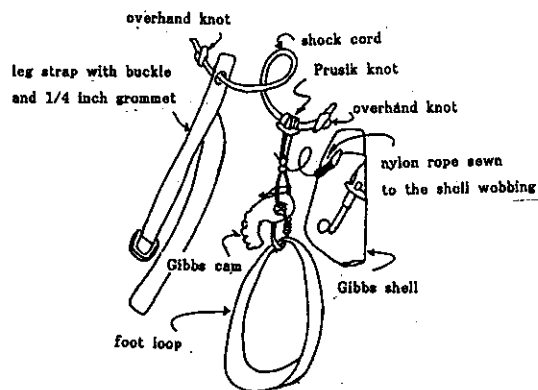


Figure #1

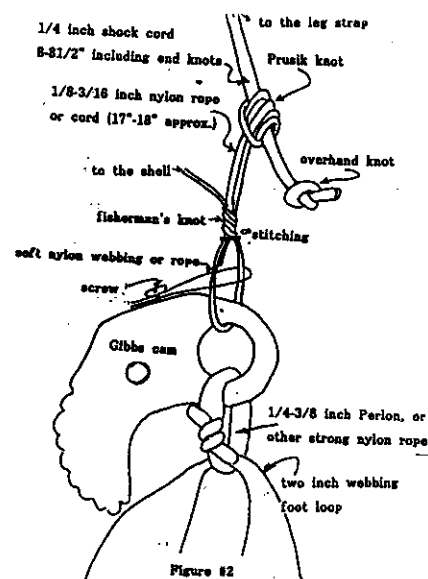


Figure #2

high enough to practically eliminate all foot twisting.

If you are using one of the newer model Gibbs that has a length of blue webbing holding the shell to the cam, separate the shell by cutting the webbing about one inch from it. The shell will be reconnected later. The remaining piece of webbing that is held to the cam by a screw can be discarded, but keep the screw—it will also be needed later.

While the shell is disconnected, it is a good idea to use a file to smooth down the inside bottom edge, where the rope touches. Since this is the point that drags on the rope when the ascender is raised, friction, and therefore self starting, will be reduced.

The next step is to join the cam, the shock cord, and the shell, using roughly 17 to 18 inches of 1/8-3/16-inch nylon rope. Climbing stores often sell 1/8-inch rope, and hardware stores sell thin nylon rope or cord. Keep in mind the greater the diameter of this rope, the more soft and flexible it will need to be. This is because it will be used to form a Prusik knot around the shock cord, and these features will result in better gripping. Slipping is not normally a problem because of the soft flexible nature of the shock cord itself, but if it

should occur, try tying the Prusik knot with an extra loop. If suitable nylon rope is not available, round boot lace can be substituted.

Use the nylon rope (or the boot lace) to attach the shock cord to the cam, as shown in figure #2. After the knots have been tightened, the Prusik knot should be about one-and-one-half inches above the cam, which will result in it riding level with, or just above the top of the shell. The fisherman's knot should be about half way between the cam and the Prusik knot, and it should not be able to shift up or down. Although there is not a strong tendency for this knot to shift, it's best to ensure that it can't by sewing the two sides of the loop (formed from the Prusik knot, through the eye of the cam) together, just below or just above the fisherman's knot. The purpose of this is to ensure that there will be enough rope available to loosen the Prusik knot, and it will keep consistent—an adjustment that will be done later. As shown in figure #1, the end of one of the tails coming from the fisherman's knot should be about three inches long. Sew the end of it to the length of webbing that was left attached to the shell.

At this point, a leg strap should be attached to the top of the shock cord, as shown in figure #1. A ski strap with a one-fourth inch grommet makes a good leg strap, but it will probably need to be lengthened to fit around a large person's leg, if he or she is wearing a wet suit or heavy clothes.

All that is left to do now is an adjustment that will result in the teeth of the cam riding close to, or lightly touching the rope, as the ascender is raised. This is necessary because otherwise the upward pull from the shock cord would tend to hold the Gibbs open around the rope, and a sideways push out with the foot while taking a step, may be needed to force the ascender to catch.

Make the adjustment, using a thin, loosely woven length of nylon webbing or rope. Place one end of it over the screw hole on the top of the cam. Loop the other end around the rope, which attaches the shock cord to the cam, and pull it over a little towards the cam teeth. The two ends of this loop can be secured to the cam, using the screw which use to anchor the webbing from the shell. This is illustrated in figure #2.

Care should be taken not to move the positioning of the upward pull from the shock cord over too far towards the cam teeth, because it would result in the rope being pinched tightly in the ascender. A tight adjustment is used for the more common, floating Gibbs knee cam, but not for the foot cam which is the lowest ascender, because it would cause the rope to lift when the ascender is raised.

To check that the adjustment is correct, hold the foot cam up in front of you by the shock cord, and pull straight down on the foot loop. With the cam in the shell, and the pin in place, pivot the shell so that it's longest side is straight vertical. If half to all of the second lowest tooth is visible below the shell, and the third tooth cannot be seen, the adjustment is good. This is because the distance between the cam teeth and the inside of the shell will be in the ideal range.

How It Works:

When the foot cam is strapped on, the Prusik knot should be adjusted so there is tension on the shock cord. The top of the shock cord should be positioned so it is on the side

of the leg, close to the rope. For the first few feet of the climb, after having self started for a short distance, efficiently-minded climbers should lift the toe of their boot when raising their foot, and hold their foot normally when pushing down. The resulting change in shock cord tension will help the ascender to slide up the rope easier. This will reduce self starting.

Once the climber has passed the point where self starting is needed, in most respects this foot cam operates the same as a non-floating foot cam. The exception is when the climber needs to remove the ascender, or attach it to the rope, when there is weight holding the rope down below him. In this situation, he will find the ascender easier to reach, because it is attached up to three inches above the foot. If necessary, the foot can be removed from the foot loop, and the Gibbs slid even higher up the rope. This is feasible because the leg strap will hold the unit to him. In other aspects, this "floater" operates similar to all other foot cams.

Some Further Notes On Self Starting:

It is possible for a climber to fine tune the shock cord adjustment and refine his climbing techniques, so that practically no self starting is needed, but this kind of efficiency is only possible under fairly ideal conditions. To help ensure that self starting is kept to a minimum under more adverse conditions, I have a few suggestions:

If possible, use a new or reasonably new Gibbs when making your foot cam. This is because in muddy conditions, older ascenders with the teeth badly worn, have more of a tendency to lift the rope. Although not a necessity, a new Gibbs or a new cam for an old one would be a good investment, and with the adjustment his ascender has, it will last a very long time.

Another good way to reduce self starting is to keep the rope as clean as possible. This will help the ascender to slide easily up the rope, and will, of course, increase rope life. However, I would like to point out that if you are using a rope bag to keep mud and grit away, be certain to use one that is large enough. If the rope is stuffed very tightly into a bag that is too small for it, kinking will result. Under conditions where the rope is badly kinked, and/or very muddy, a climber who is inexperienced, or unfamiliar with the self starting method which I described earlier, may want to have someone available to hold the rope down at the beginning of the climb, in case needed.

Also on the subject of self starting, there have been write-ups on the European techniques of climbing with 9mm rope. I have climbed up this rope several times, and I find this foot cam works fine, but I must self start more than usual. This is because the ascender is adjusted for the more standard 11mm caving rope, and because the smaller diameter rope has less weight to hold itself down.

Conclusion:

Wow! This must seem like a lot of instructions for a small piece of climbing gear, but after you have collected the materials, which is the hardest part, the rest of it is really quite simple.

I have used several of these "floaters" for a couple of years now, and I recommend them to anyone who would like to have the advantages of a floating foot cam, whenever Prusiking.

RELEASE KNOTS

by Art Fortini

I read with great interest, Arnor Larson's article on the load release hitch in Highway #29. It reminded me a great deal of the Mariner's knot described by Frank and Smith in their Rope Rescue Manual. Both of these "release knots" are designed so that they can be undone while holding a load. They became especially useful, for example, when you realize that you have to change your hauling system to a lowering system. A brief review of each knot is given below.

My experience with the Mariner's knot is that, in spite of tight wraps around the standing loop and having tucked the working loop through the standing loop, tension still manages to get transferred through the system to the "keeper" biner. I have always been able to get the binder unclipped, but never without a struggle.

The load release hitch, on the other hand, seems to be much less prone to this problem because of the Munter hitch which is built into it. In my brief experience, the load release hitch is much better than the Mariner's knot at not slipping or settling, but of course, neither is perfect.

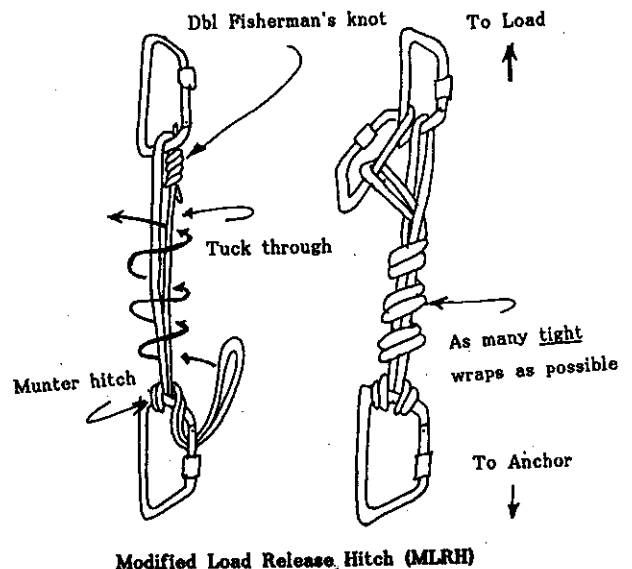
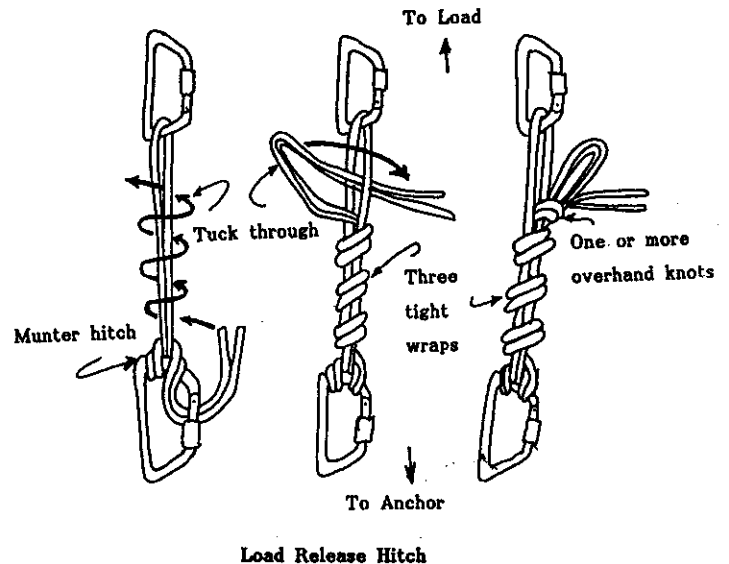
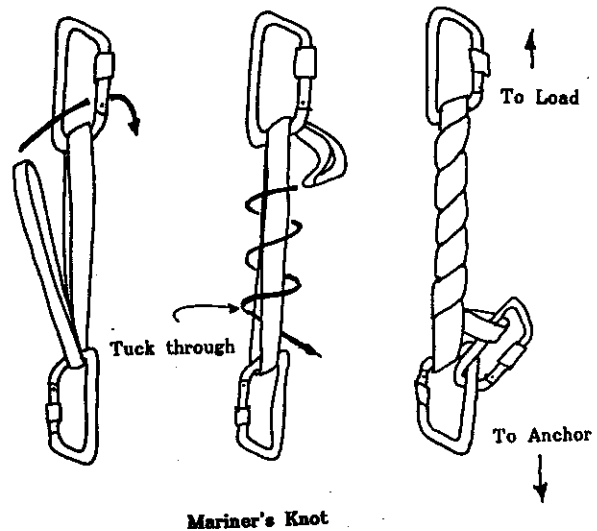
One of the features of the load release hitch is that once the keeper knot is untied, one can undo the wraps and lower the load easily because of the integral Munter hitch. The Mariner's knot, on the other hand, affords very little controlled travel. For most applications, six to twelve inches of travel is more than enough.

The problem with the load release hitch is that it is finished with "one or more overhand knots" (from Arnor Larson's article in Nylon Highway #29 page 4, 1989). If the release knot is used in a situation where it is repeatedly loaded and unloaded (such as when it is used as the attachment to the safety cam in a hauling system; i.e., where it probably gets used the most), some settling will occur. If this settling causes the keeper knot to come undone, the entire system can fail catastrophically. Using a more trustworthy keeper knot will help little; once it becomes loaded, getting it untied to release the load release hitch will be virtually impossible.

The Mariner's knot, on the other hand, uses a biner in place of a knot. Unclipping a biner with a moderate load on it is much easier than untying a knot with a moderate load. Furthermore, a locking biner is much less likely to accidentally come undone than a knot (overhand or otherwise) which is intended to be easily untied.

In an attempt to combine the useful features of each release knot, I propose the modified load release hitch (MLRH) as shown below. It combines the security of the Mariner's knot while minimizing the amount of settling that takes place. Although I have not tested it thoroughly, my proof of concept tests with the MLRH show it to work better than either the Mariner's knot or the load release hitch (with either rope {as shown} or webbing).

Since the MLRH has not been extensively evaluated, I cannot recommend its use for anything other than testing. I'm relying on those who read this article to evaluate the MLRH and provide feedback (good and bad) to the Highway's editors for publication.



TEST OF SPEED, WEBBING TYPE, AND RAPPEL DEVICE AS VARIABLES IN WELD ABRASION OF SEAT HARNESS WEBBING DURING RAPPELS

The knowledge that seat harness webbing can be damaged by contact with the rope during a rappel has been known for many years. And, is the source of the "Don't let nylon contact (or rub against) nylon." The damage usually reported is that of "melted" or "cut" harness, with only occasional mention of any damage to the rope, and has been referred to as "Weld Abrasion." Weld Abrasion will be defined here as: The wearing away of a material by melting caused by friction. Thus, the Weld Abrasion applies only when friction is sufficient to melt the material and move it (i.e., wear it away).

Investigation into the area of weld abrasion shows that little is known about the variables involved. Reports are usually brief accounts with little detail. A review of reports of weld abrasion in American Caving Accidents (1969 - 1987), and discussions of undocumented occurrences with vertical cavers was done. The recorded and remembered cases of weld abraded seat harnesses all indicated or stated a high speed rappel (average eight feet per second or greater), and, that in no case did the rope cut the webbing in two. An initial test demonstrated that high speed was not a necessary variable in weld abrasion, as abrasion did occur during slow speed rappels (two feet or less per second). Also, the test indicated that the type of webbing was also a variable. The test conditions, however, were contrived to produce a "worst case" situation where the webbing/rope contact was at the point of maximum friction (1). In reality, the rope usually contacts the webbing only after it leaves the rappel device where the maximum friction occurs. A further test was designed to attempt to determine the importance of some of the variables of seat harness weld abrasion. In theory, speed, webbing type, rappel device, distance, weight (of the rappeller), and rope type all present themselves as probable, important variables. Of these, the test was designed to test speed, webbing type and rappel device, keeping the distance and weight constant. Also, the test was designed for realistic conditions so as to observe if there were other variables involved.

The rope used was a 60-foot Blue Water II that had seen little use and had no glazed marks on it. The drop was a 54-foot free fall, that resulted in actual rappel of 50 feet (+/- two feet). The "weight" was a rappeller who weighed 200 (+/- 5 pounds), including gear. Two single rappel devices were used; a Russ Anderson Rescue 8 (with ears), single wrap; and a (Carabiner) one-and-one-half Break Bar, as the tester did not trust a Single Break Bar setup. One attempt was made using a Double Carabiner Break Bar; however, this created too much friction to allow stopping by bringing the rope in contact with leg loop (tesbt) webbing. The seat harnesses were one-inch Tubular, two-inch Seat Belt, and #6 Parachute webbing, with no wear marks, and triple redun-

dant, so that if a leg loop broke, the rappeller could still control his descent. Thick pants and gloves were worn to prevent rope burn. Also, emergency procedures were in place in case of injury. WARNING: Most of the rappels were faster, and with faster lock-offs then is necessary or safe for normal rope work. All rope and webbing were retired after testing.

(1) Elron, R., Damage to Webbing Due to Rope Contact During

Rappels; Initial Test; Nylon Highway #21, March 1986

The webbing was passed from the rappel device around the hip directly on the harness leg loop, across the back lower hip and directly on to the opposite leg loop. Lock off had the rope continue around the leg loop to the rappeller's front center. Movement had the rope held from about where it ceased to make contact with the second leg to about one foot below that point (Figure #1). The rappels were done by the rappeller on rappel and locked off. The timer would command "Ready, Set, GO" and on "GO" start the stopwatch. The rappeller would then attempt a smooth rappel at the wanted speed. The rappeller then yelled, "STOP" when he locked off at the bottom, and the timer then stopped the stopwatch. Timings were rounded to the nearest tenth of a second, even though the timing method was less accurate.

The glazed areas on webbing pieces were measured with a Plainometer (+/- .1 cm²). Thickness within glazed areas, and maximum and minimum thickness were measured with a spring type thickness gauge (+/- 1/1000 inch) mounted on a milling machine to obtain uniform pressure for all the measurements.

Table 2 shows the results of twenty-four of the thirty-one rappels. Rappels 1 through 5 were each in excess of 30 seconds and produced no observable marks, and were not included. Also, Rappel 20 was excluded as the watch did not stop on the first press of the stop button. The rappels were listed by Webbing Type, Rappel Device, and speed (to tenth of second) for comparison purposes. The Glazed Area (to tenth of square centimeters) consists of all the glazed area regardless of the thickness, and excludes any frayed area around the glazed area. The Glazed Area Maximum Depth thickness in the glazed area subtracted from the webbing type's Minimum Thickness provided in Table 1. The Percentage of Glazed Area Less Than Minimum Thickness is the percent (to the nearest 25%) of the glazed area, from the Glazed Area column, in which the thickness was less than the Minimum Thickness for that webbing from Table 1. Measurements preceded by a less than sign (<) indicate the area was definitely smaller than the quarter indicated. This column also includes notes on those rappels which had no glazing.

All glazing and fraying occurred on the side of the rappeller where the rope came from the rappel device and first made contact with the webbing before preceding around the back. The parts of the glazed areas that were thinner than the Minimum Thickness of the webbing were all at this point. Although not noted on the Table, there were some samples where the glazed area slightly exceeded the Maximum Thickness of the webbing. No damage marks were observed on the opposite (breaking) side. Also, the glazed webbing remained quite pliable, and the glazed areas only cracked lengthwise when the webbing piece was twisted. Surface rope damage due to weld abrasion was limited to glazing on the crowns of the weave only. The rope was still pliable though stiffer. When held four feet above the ground, pointed up, the damaged rope made a 9 inch (average) curve to where it pointed down, while an unused section made a 6 inch (average) curve.

The results indicate that the variables tested are factors in weld abrasion. The different types of webbing showed different susceptibility to weld abrasion with 2" seat belt webbing being most susceptible, and #6 parachute webbing the least. There were differences between the two types of rappel devices used. However, as there is no accepted method of comparing the relative friction of rappel devices, the only inference that can be drawn is that the Figure 8 provides more friction than one and one half brake bars. Speed appear to be a variable, with the results suggesting that for drops up to 50 feet, weld abrasion may not be a concern for rappel speeds less than 4 feet per second. However, rappel pairs 23 & 29, 17 & 18, and 13 & 14 all go against the expectation that the faster one goes the more damage will occur. Inaccuracy in the timing method could have caused these discrepancies, but observations during the test suggest that the quickness of the lock off was the cause.

The most interesting result is not the effect of the variables but the evidence of what happens when the weld abrasion occurs. The abrasion appears to occur only in the area of the initial point of contact (Figure 1), which indicates that most of the friction (breaking force) is concentrated in a small area. The abraded, nylon is then smeared by the moving rope on to the webbing immediately after the melted area, thus making a large glazed area that looks abraded, but is not. This area accounts for at least 50%, usually more than 75% of the total glazed area. The size of this area, and lack of marks (glazing or fraying) elsewhere, also indicates that rope contacting the harness, even providing some of the controlling friction, is insufficient to cause weld abrasion at accepted safe rappelling speeds. Note that test rappels 1, 2, 3, 4, 5, 6, 11, 12, & 19 had no observable marks, despite the fact that control and breaking was done against the webbing. It appears that the force of a sudden stop, at the point of initial contact is required to cause weld abrasion on the harness.

These findings are gross in nature, but they do provide some initial quantitative parameters on harness weld abrasion during rappels, some of which contradict some popular "fact" about weld abrasion during rappels. This, of course, will provide for some good discussion, and some more testing. This testing is needed, not only to duplicate and answer questions raised by this test, but to dispute it. As the only conclusion that can be made from this test is that vague, dramatic, and most times undocumented reports can no longer be used as arguments. Arguments must be based on quantitative, documented observation that can be duplicated.

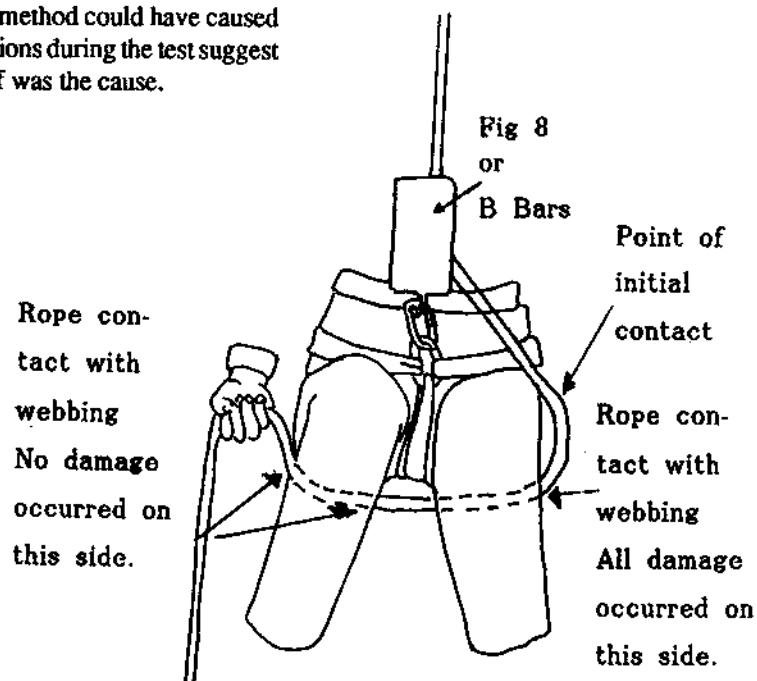


Figure #1 Rope Location for Rappels

Note the additional biner attached to the harness carabiner which lifts the friction device and rope, so that the initial point of contact is on the side of the leg.

TABLE 1 NORMAL (UNDAMAGED) WEBBING THICKNESS

TYPE	THICKNESS (inches 1/1000th)			WIDTH (inches)
	Minimum	Maximum	Variance	
1" Tubular	0.078	0.083	0.005	1
2" Seat Belt	0.070	0.075	0.005	1 7/8
#6 Parachute	0.078	0.083	0.005	1 25/32

TABLE 2

RAPPEL RESULTS

Rappel Number	Webbing Type	Rappel Device	Time Sec.	Glazed Area CM/sq.	Glazed Area Maximum Depth Inches	Percent of Glazed Area Thinner than Minimum Thickness %
15	1" Tube	B Bars	10.7	0.2	.000	0 %
16	1" Tube	B Bars	9.*	1.7	.001	< 25 %
17	1" Tube	B Bars	4.3	3.1	-	To Close To edge
18	1" Tube	B Bars	4.3	2.3	.001	< 25 %
19	1" Tube	Fig 8	19.2	-	-	No Observable Mark
21	1" Tube	Fig 8	9.4	-	.000	Slight Fray - No Glaze
25	1" Tube	Fig 8	8.5	-	.000	Slight Fray - No Glaze
22	1" Tube	Fig 8	5.3	0.8	.000	0 %
26	1" Tube	Fig 8	5.2	0.9	.000	0 %
12	2" Seat	B Bars	16.0	-	-	No Observable Mark
11	2" Seat	B Bars	12.6	-	-	No Observable Mark
9	2" Seat	B Bars	11.7	0.6	.002	< 50 %
10	2" Seat	B Bars	8.9	3.7	.002	< 50 %
13	2" Seat	B Bars	5.2	4.4	.005	< 25 %
14	2" Seat	B Bars	5.2	10.8	.013	< 25 %
24	2" Seat	Fig 8	14.1	-	-	No Observable Mark
27	2" Seat	Fig 8	9.2	-	.000	Slight Fray - No Glaze
28	2" Seat	Fig 8	7.1	-	.000	Slight Fray - No Glaze
23	2" Seat	Fig 8	4.8	3.7	.000	0 %
29	2" Seat	Fig 8	4.1	2.6	.008	< 25 %
6	#6 Para	B Bars	10.*	-	-	No Observable Mark
7	#6 Para	B Bars	6.*	3.3	.008	< 25 %
8	#6 Para	B Bars	5.*	4.5	.007	< 25 %
30	#6 Para	Fig 8	5.8	-	-	Slight Fray - No Glaze
31	#6 Para	Fig 8	4.2	4.8	.010	< 25 %

* Recorded to nearest second

Fig 8 = Russ Anderson Rescue 8
 B Bars = One and One Half Break Bar

ROPE USE ON BUILDINGS

by Bruce W. Smith

Using static kernmantle ropes in, around, and on man-made structures requires special care and understanding of the products a cleaner is using and some of the pitfalls that he/she should attempt to avoid. Many cleaners have graduated from hemp, block and tackles, and platforms and are now using non-stretch or low-stretch nylon ropes. There are several brands on the market and whichever brand is chosen the same special care must be taken to maintain the integrity of the rope.

BEFORE USE

Store ropes carefully. Ropes should be stuffed in rope bags or coiled and hung off the floor in a place that will not harm the rope. Chose a peg rather than a nail to hang the rope on. Transport ropes in bags out of direct sunlight. Ultraviolet light has shown to be detrimental to nylon. Never place ropes in a vehicle where the sun can bake the rope through a window pane.

Keep your ropes clean. make a special effort to clean ropes between uses. Aluminum particles from rappel devices along with other grit and dirt and causes the rope to loose strength from the inside-out. There are specific rope-washers available but often a commercial front-end loader washing machine along with a mild soap can thoroughly clean a rope. Never use chlorine bleach.

Inspect your rope often. After every use a rope should be inspected over its entire length. If at any point 50% of any area of the sheath appears cut, either make two ropes at that point or retire it altogether.

DURING USE

Protect rope from damaging chemicals. It is important to know what chemicals a window cleaner might be using as many could be extremely damaging to a rope. It appears as if any compound that includes hydrogen, including water, weakens rope. A water-soaked rope will be 8 to 15% weaker than when dry. Apparently the hydrogen in the water has an affinity to the hydrogen in the nylon polymer chain and actually changes the chemical structure.

Avoid the use of materials containing benzene, phenol, carbon tetrachloride, formaldehyde, and bleaches. Battery acid is deadly to a nylon, so be careful during transport in the trunk of a car. Petroleum products and their derivatives can all damage rope to some degree.

Tar getting on a rope can be a troublesome problem. I would recommend dissolving the tar from the rope with a mild distillate and then immediately washing the distillate off the rope with a mild detergent and water. When dry the rope will regain its former strength.

Consider rappelling with the rope in a protected bag. Attach the rope bag to the bottom of the sit harness or Bosun's chair, out of harm's way. As you rappel to each level, simply pay out the rope as you need it. This process keeps the cleaning chemicals dripping where the rope isn't.

Never walk or stand on a rope. This action tends to grind dirt deep into the inner fibers and cuts them.

Place ropes on well rounded surfaces. Pulleys should have diameters of at least 4 times the rope diameter. (1/2" rope requires at least a 2" pulley.) Any bending of a rope over a sharper diameter tends to rapidly weaken the rope at that point. A rope stretched over a 90 degree corner may be 4 to 10 times weaker at that point. Use edge rollers or rope pads to protect the rope around corners.

The cut-resistance of rope is negligible. For years climbers have been talking abrasion resistance. Consider cut-resistance for a moment. Make this test for yourself. Take a piece of rope and tension it with approximately a person's body weight. Two cars tensioning a short piece of line may provide the approximation. Now, lay a knife on the tensioned rope. It will not be necessary to cut or saw the knife back-and-forth as the rope will literally explode into two pieces. This could easily simulate a sharp rock protruding from a building or a piece of roof flashing. Do not take this point lightly as a loaded rope has literally no resistance to a sharp object. People hanging from ropes should sheath their knives and leave them there.

Place ropes in the shade if possible. Ultraviolet light degrades nylon and causes it to age prematurely.

Do not overload a rope. Establish a standard as to what your margin of safety will be. Many rescue organizations have adopted a 15 to 1 safety margin on all soft wear (nylon products). That means that if you use a rope that tests new at 6000 pounds, you should never suspend more than 400 pounds from it. This often covers you for all the knot-weakings, the unpadded corners, and the chemicals that have been spilled on the rope by accident. Never use a life support rope after it has towed a vehicle.

Ropes age, but care of the rope is a far greater factor when determining an expected age. Ropes used occasionally and cared for can maintain a life of 7 to 10 years. Busy window cleaners tend to go through several ropes in only one year. Ropes are not cheap and their constant repurchase can cut deep into a window cleaner's profits. Protecting your ropes using these outlined tips can go a long way to extend profits and a long career on skyscrapers.

Rope care should never be taken lightly. Even the OSHA required safety belay needs the same attention as the line you're hanging from. Avoid abrasion, chemicals, and abuse. The elements literally determine the future of your business.

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PERSONAL VERTICAL TRAINING FOR THE NOVICE CLIMBER

by Gary Bush

Developing the skills of Single Rope Techniques (SRT) is similar to learning rock climbing, SCUBA diving, hand gliding, or skydiving. All of these require a combination of physical aptitude and technical know-how. All skills, mental and physical, must be learned: that is SRT requires work and practice.

How do I learn the skills? Is there an easy way? Where do I go? Who can help me? How do I learn all this? Am I doing it right? The questions come easily. The Vertical Section hopes to provide some of the answers. But, ultimately, you'll do all the work!

With this article, I'll try to provide some help in your search for the information you'll need, including:

- (1) Where to go for instruction.
- (2) What equipment you'll need to start,
- (3) Why and how to use Ropes and Knots.
- (4) How and where to practice:
 - a) Safety information;
 - b) Using a Tree Stand;
 - c) Starting with Prusik knots; and
 - d) Mechanical systems.

Your initial interest may have led you the purchase of one or more books on SRT. The Vertical Section recently commissioned ONROPE for the NSS. Although we feel it's the latest compilation of basic SRT, there are many other fine books on the subject, available from the Bookstore.

But, you CAN'T properly learn SRT from a book! Note, I said, "PROPERLY". Personal instruction from someone skilled in the art is the best way to SAFELY master single rope climbing. And, SAFETY is the primary consideration in developing SRT skills!

A book won't show you the nuances of adjusting your rig, so you climb comfortably and with minimal strain. Nor will it show you the movement patterns to best avoid abrasion on the rope and on your rig. Negotiating overhanging lips is only learned with practice, under the step-by-step instructions of someone who knows how. Common mistakes, change-overs, and safety practices will most effectively be learned through personal instruction.

Danger!

Another word about Safety: SRT is dangerous! You'll be constantly exposing yourself to falling. Any fall of 10 meters (30 feet) or more is considered a Fatal Fall, i.e., more than half of them kill the person. That doesn't mean lesser falls aren't dangerous, too. People die tripping on the sidewalk.

SRT isn't necessarily as dangerous as Hang-Gliding or Sky-Diving, but there are risks. The ways to minimize those risks are by supervision, care, and practice.

Instruction

Your search for instruction should start with your local grotto. It may offer a formal vertical training program. If not, suggest they start one. The Vertical Section is currently working on a Training Outline to guide the basic instruction of SRT. Many grottos already have excellent programs in place.

Other grottos are equally effective, while less formal. They get the experienced climbers together with the fledgling climbers for one-on-one instruction. Unfortunately, however, there are still grottos where training takes place "on the job", so the speak. You learn while doing your first pit. This method isn't as desirable as training done in a controlled environment, away for the additional hazards of a cave.

For those living where there's no accessible grotto, the Vertical Section does conduct a Vertical Techniques Workshop (VTW) at each NSS Convention. While not lengthy, it does serve to reinforce the instruction available from a book. Consequently, the VTW is preferable to no personal instruction at all.

Equipment

As you prepare to begin learning ropework, don't run out and buy a lot of gear. Before investing in any rig, or rappel device, borrow several types, from friends, instructors, or at the Workshop. Each rig has its own benefits and each of us has our own preferences. Find the rig you'll prefer for your needs.

There is some basic gear you should purchase initially, as you'll have use for it, regardless of your final rig:

- 12' to 16' of 2" seat webbing to tie a simple seat harness;
- 20', or so, of 1" webbing for chest harness and slings;
- 15' of 8mm nylon rope for slings to prusiks; and 12' to 15' of 5mm or 6mm rope for three prusik loops.

Carabiners (locking oval D's) will be required eventually. Whether you need them at your first practice, depends on the availability of gear at the session. Generally, at least 3 carabiners are needed for your personal rig: two for your seat and one for your chest harness.

Your instructor will help you assemble a basic rig, consisting of seat harness, chest harness, foot slings, a safety sling, and prusik loops. A suitable rappel device can also be discussed with your instructor, before you buy one.

Ropes and Knots

You'll find there are many types of rope available, differing in size, material, and construction. Each has its own uses, limitations, advantages, and disadvantages. Before you buy any rope, make sure it's what you need.

Furthermore, understand the care and handling of all ropes. Improper storage or exposure to certain chemicals will ruin a rope. The damage may not be readily apparent, making its use very dangerous.

No rope is ever used straight. Tying a knot in it immediately alters its strength. Learning the effect each knot has on the rope will teach you the proper knots for each application.

You must learn a few knots completely, before you finish your initial instructions. Your instructor will have his/her own list of preferred knots. There are many excellent knots used in ropework. But, there are several "workhorses" knots everyone should know. Learn them forwards, backwards, upside-down, and, especially, in the dark. Knots are easy to learn. The correct knot in any situation can save you untold grief.

My preferred elementary list of knots includes: Bowline (simple and On-A-Coil), Figure Eight, Water Knot, Prusik, and Barrel Knot (Double Fisherman's). The Overhand Knot is used as a safetying knot for the others. You should know the difference between it and a Half-Hitch, just so you don't confuse them. Additionally, I always recommend to new climbers to FORGET how to tie a Square Knot, if you know it. There's no place in vertical work for the Square Knot, as it's too easily mis-tied, making it useless . . . and dangerous.

The ready availability of many mechanical ascenders, combined with their obvious benefits, would seem to make prusiks unnecessary. However, besides the obvious benefit of their low cost, I feel Prusiks serve as an excellent self-rescue tool.

Learning the use of prusik loops helps you readily understand the principles behind rope climbing in a very graphic, and personal, way. Spending several training sessions becoming acquainted with Prusiks is time well spent for all climbers.

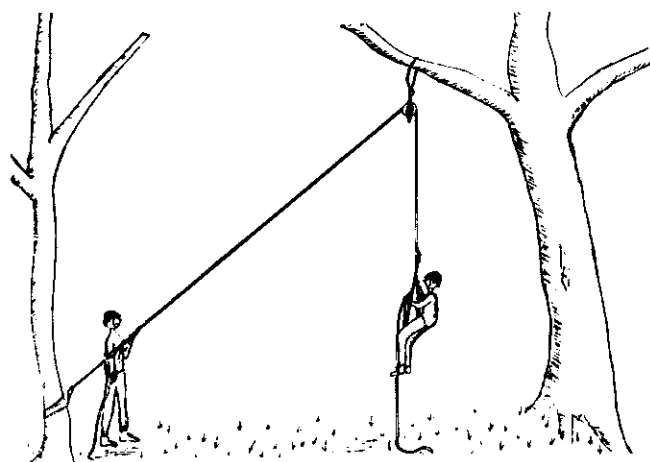
Where to Practice?

Once you've completed your initial instructions, you'll need to practice your skills . . . before you're ready to cave with them. You'll want to feel comfortable on the rope. Capable

of dealing with problems, as they arise. Where and how to practice ropework is a difficulty faced by all climbers, novice and accomplished. Without practice, your skills will soon fade.

Most grottos have a favorite practice site. Individual climbers may not. Ideally, your site will have secure tie-off points, ready access to the top of the drop, easily negotiated lips, an obstruction-free landing site, and be free of the weather. Realistically, you'll be glad to have a few of these in actual practice. Indoor sites are ideal for learning, but liability concerns have made most indoor locations unavailable.

Cliff faces and bridges are favorites. Don't use Interstate highway bridges, as there's a Federal law against pedestrians on Interstate Right-of-Ways (even if they're on a rope). A preferable solution is to build a "tree stand". A pulley can be suspended high in a sturdy tree. Your climbing rope is fed through the pulley, while you climb one end. The other end is fed through a rappel rack that's anchored to a solid point. If you've been to one of the Vertical Contests, you know exactly how it works (see Figure 1).



Obviously, using a tree stand requires the help of someone to control the rack. However, you weren't going to practice alone, were you? If there's no local grotto, you'll need someone else to help you. For safety reasons, you should never practice alone. Even if you're the only one climbing, have a friend or two with you to help in an emergency.

Using a tree stand allows you to safely climb the length of your rope, without ever getting more than 10 or 12 feet off the ground. And, if you have a serious gear malfunction, you can be lowered to the ground to fix it, without hanging in your harness.

Likewise you can practice change-overs, uprighting from heel-hangs, or other more tedious tasks, knowing you can be lowered if it all goes wrong.

Using a tree stand, however, requires the necessary equipment: a climbing rope, a sturdy pulley, a rappel rack, and

rope or webbing for tie-offs. If there's no local grotto or climbers nearby, you'll have to purchase these items yourself. What I said before about not buying a lot of gear only holds true, if there's someone else around to borrow it from.

Once it's operational, your tree stand can be used to master climbing with a simple prusik system, i.e. using Prusik Knots as your attachment to the main rope. After becoming comfortable with them, you can move on to the mechanical climbing rigs: Gibbs Ropewalker, Jumar Mitchell, Double Bungie, Etc. More climbers prefer mechanical climbing, as it's quicker on and off the rope, easier to climb with, less tiring, and easier to negotiate over lips.

Dedication

Continual practice will make your SRT skills develop to the

level needed to perform safely in a pit. The general motion must be automatic, so you don't waste energy. You must be able to spend less mental time doing the climb, so you can be alert to hazards and problems you may encounter along the way. As in any other sport, practice is the key to becoming adept at SRT.

Innovations in SRT, as in other technical endeavors, evolve constantly. As new techniques develop, you'll want to try them. You'll be looking, as we all are, for easier and safer rigs. Be open to new ideas, but question and experiment to make sure they're for you. Keep your skills honed by practice and your equipment in constant repair. Accidents happen more readily to the unwary and complacent climber.

THE JOY OF CAVING, CHAPTER SEVEN, INSTANT CAVE

by Anonymous

I read the article about cordless rotary hammers (CRH) in the Nylon Highway # 28 issue with great interest and would like to commend Peter Ludwin on a fine article. I have some additional technical information which may be helpful. Ethics are not included in his article nor in this one.

BOLTING

With the ease of drilling holes with a CRH, consideration can be given to over-drilling a hole. Then, once the climb is made and fixed line is in place, the hanger can be removed and the bolt can be pounded in flush with the rock surface for minimal visual impact.

DRILLING BLASTING HOLES

The energy required to drill holes in rock is proportional to the cross sectional area of the hole. CRH's become very inefficient with bits larger than 3/8". Also, longer bits become inefficient due to the mass of the bit oscillating forward and back. 3/8" SDS bits are available up to 22" in length. For narrow fissures with a free face to blast to, 3/8" holes work excellent and are far superior to shaped charges and surface mudcapping techniques. The Bosch CRH with one battery pack will drill two 3/8" holes 14" deep on one full charge. Be careful not to deep discharge (and ruin) the battery. Use high velocity explosives (greater than 7,000 m/s or so) to shatter the rock such as PETN used in 25 grain detinating cord. The sheath of the detonating cord can be

removed and 4 strands of core can be taped together with electrical tape and loaded. Three strands are cut to the hole depth less 2 to 4 cm for tamping with modeling clay, the 4th strand functions as the downline. Three strands with the cover left intact will fit in a 3/8" hole. This charge is almost as effective and much easier to prepare and load than the 4 bare strand charge. Binary compounds such as Kinepack are effective but difficult to load. Bamboo chopsticks work well for tamping and splinter less than wood. When multiple holes are loaded, they should all be detonated at the exact same time to obtain the best rock breakage ("opposing charges"). This is done by ensuring that the branchlines are all the exact same length. Avoid sharp bends and keep the detonating cord separated by a least 6" to avoid cutoffs.

One drill hold 30 cm from a narrow crack will usually result in a parallel fracture following the "grain" of the rock, resulting in passage large enough to get through. Smoke generation is much less with the much smaller amounts of powder than with the inefficient mudcapping and shaped charges. Be careful of smoke in exhaling caves. Blasting caps should be connected to the charge at the very last step. Never drill a hole that has had explosives places in it unless you are ready for the final surprise.

Don't mess with this unless you have a real good feeling about it. You usually don't get the luxury of a "close call". What fun.

New Rescue Product

THE PRUSIK MINDING PULLEY

by Arnor Larson

The Prusik Minding Pulley has been in use in Canada since 1985 and this production model incorporates the refinements resulting from four years of rugged field use involving Fire, Industrial, Military, Mountain, Cave, River and Mine rescue services. This Rock Exotica edition of the Prusik Minding Pulley (PMP) was designed by Arnor Larson to allow prusik hitches to be used efficiently as pulley system ratchets. During the raising of a heavy rescue load a second PMP can form a simple and easy to operate belay system when used in conjunction with two prusik hitches in tandem. An LR Hitch (load releasing hitch) connected between the prusiks and the anchor can simplify releasing tensioned prusiks and provides some energy absorption during shock loading.

The side plates of the PMP are made of 2024-T3 aluminum, a stronger material than used in most other rescue pulleys. A permanently lubricated sealed ball bearing ensures that the pulley is efficient and long-lasting. There should be no need to do so, however if the pulley is taken apart, use LOCTITE® or an equivalent thread locking agent when reassembling. The PMP's mass is 310 gm (11 oz) and minimum breaking strength is kilonewtons (8100 lbf).

The pulley is made symmetrical so that either edge may be used for minding prusiks. This is particularly useful in some advanced techniques where prusiks are used on both the incoming and outgoing ropes, which at times may reverse direction. An example is the English reeve variation of the Kootenay Highline System which is used to reach into deep narrow canyons.

The PMP has a sheave tread diameter (smallest diameter at the center of the grooved wheel) of 52 mm (2 inch) which is 4 times (or more) the 11.1 mm (7/16") to 12.7 mm

(1/2") ropes it is designed for. Don't be confused by other manufacturers whose quoted 2 inch diameter is actually the sheave's rim diameter, leaving in the center only 1 1/2" or even 1 1/4" (!) as their true tread diameter. The hole in the PMP will accept up to 3 carabiners to simplify complex rigging.

It is suggested that prusiks for use on 11 mm to 12.7 mm diameter rescue ropes be made of 8 mm nylon kernmantle low-stretch accessory cord and that 3 wrap (6 coil) prusik hitches be used. (Cord less than 7 mm dia. and stiff material that does not work as well as prusiks should not be used.) When used correctly, one prusik is adequate for a haul or ratchet prusik whereas two prusiks in tandem should be used for shock loading as can occur in belay systems.

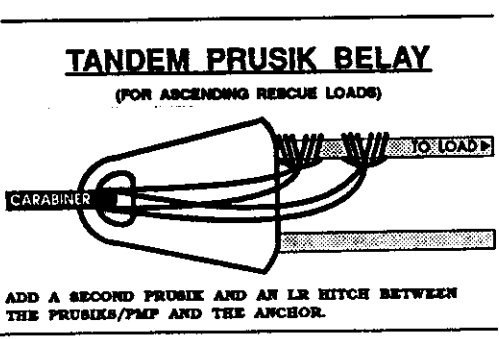
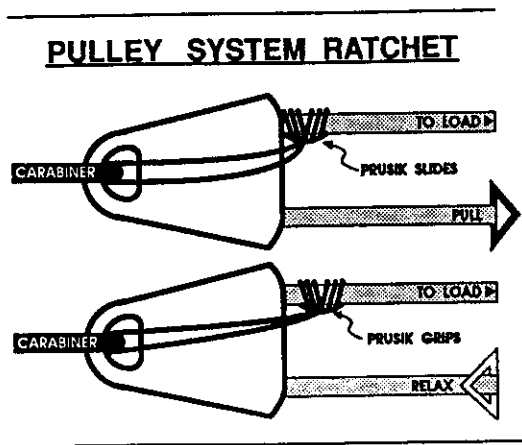
A 135 cm length of 8 mm material, tied together with a double overhand bend (double fisherman or grapevine), is usually adequate for the ratchet prusik and the shorter of the tandem belay set. Since there are variations in the diameter of manufactured ropes and cords you may need to adjust the length for optimum operation. The ideal is to have the prusik close to the pulley side plates so that the backward movement encountered when the prusik grips kept to a minimum.

The Prusik Minding Pulley is available from leading rescue suppliers or direct from the manufacturer:

Rock Exotica, Inc., 530 South 4th East,
Centerville, Utah, USA 84014, (801) 295-9241
US \$45.00 each + \$3.00 shipping

For information on prusiks in rescue work or to give your opinion on the use of prusiks or the PMP contact:

Rigging for Rescue
Box 399
Invermere, British Columbia
Canada VOA 1K0



SHOCK ABSORBING SYSTEM

by Michael G. Brown

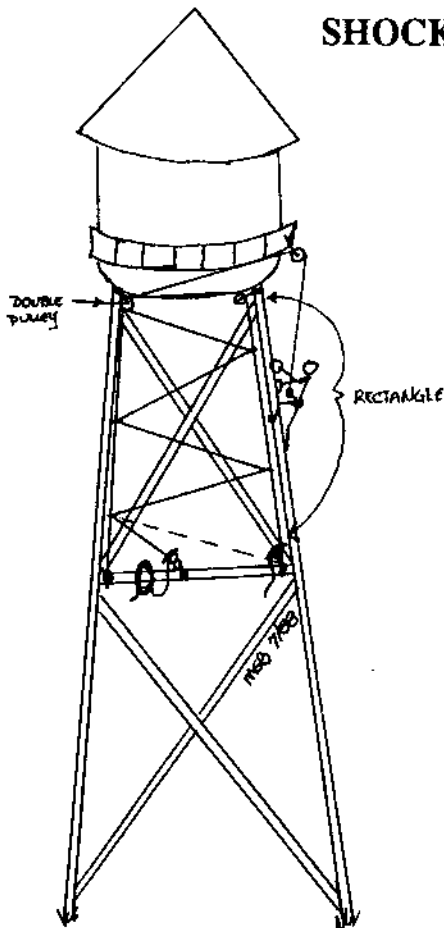
The original idea for the design of the grid type shock absorbing system came from the "catch" cable concept that is used on aircraft carriers to halt rapidly landing aircraft. We have spent many hours trying to perfect a method of evacuation for a large number of people from a highrise building fire or other disaster. The method that seems to be the quickest and simplest (stupid proof) is what we call an Evacuation Telfer System, E.T.S.. Very simply, it involves anchoring a rope to the top of the building and extending the rope to a dynamometer that is attached to a heavy (fire/rescue) truck on the ground and some distance from the bottom of the building. This, angled tyrolean is the tightened to a predetermined tension as judged from a computerized graph accounting for height, available horizontal distance and catenary requirements.

Normal belay techniques for the evacuates were too slow and cumbersome for the rapid removal of a lot of people. Therefore we designed the grid type shock absorbing system to, in effect catch them near the ground.

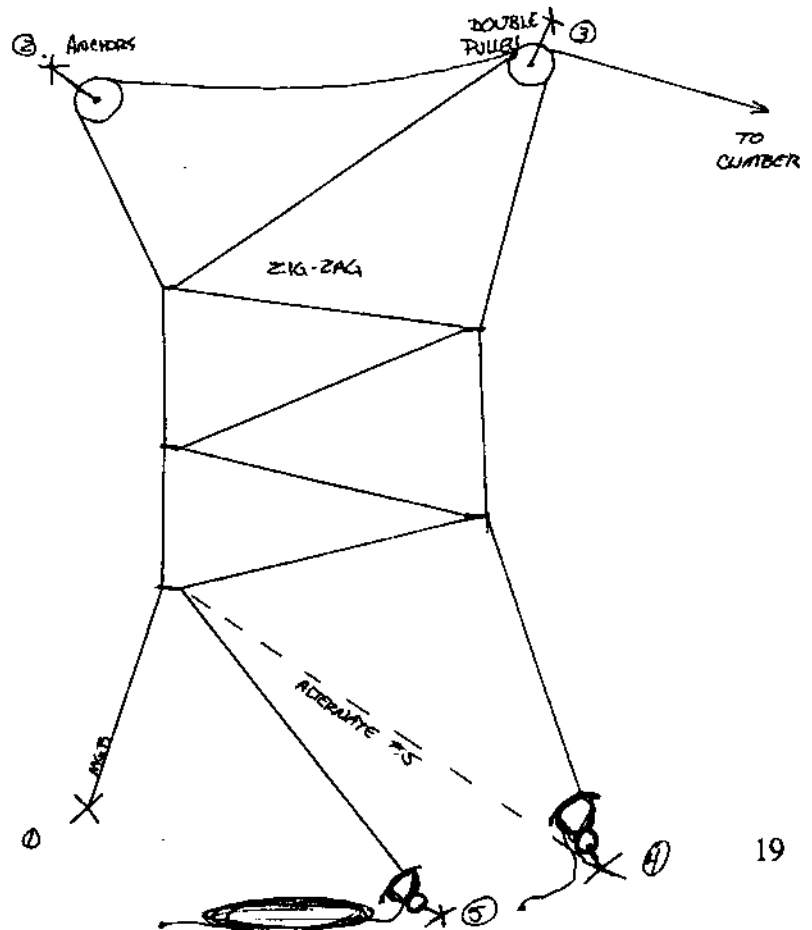
We then expanded use of the grid type shock absorbing system to other potential shock inducing scenarios. The most advantageous of them involves climbing protection. In the fire service we are blessed with tons of modern but heavy and bulky gear; this is fine with us because in a majority of

our tactical rescue situations we do not have very far to hike with all of this stuff, and it allows us to build really strong rope systems and load them with redundancy. Most of the modern and progressive fire departments today carry only static, rescue quality ropes that offer little in the way of fall protection. So the logical choice was to incorporate a shock absorbing system that could be fairly quickly built using the equipment on hand.

The fall protection idea necessitates having a good location to set up the four main anchors of the shock absorber grid. In the urban jungle, bombproof, anchors are not too hard to find, and the same goes for many rural applications where there are a lot of trees around. Basically all that is required is to lay out a piece of rope, we use 1/2" static kernmantle, in a large rectangle where the size of the grid is enlarged as the potential fall height is increased (a 25' x 50' rectangle for free falls of 10' feet or less for a 200 pound load). Next, static tie-off one end of the rope rectangle to one of the anchors, stretch the rope to form one of the long sides of the grid (rectangle) and run it through a pulley that has been attached to the anchor and towards (short side) the next anchor/pulley. Continue the rope through the second pulley (a double pulley if possible) and go to the fourth anchor. Now take the fourth corner or end of the rope and rig it through an



SHOCK ABSORBING GRID SYSTEM



eight plate descender for quick adjustments of the grid. Pull the grid rectangle as tight as possible (2 men) and lock it off with the eight plate. Note: this rectangle can be at any height off the ground, 3 or 4 feet seems to be the easiest to work with, and it works equally as well if it has to be set up vertically like a spider web in a tree.

Once the rectangle has been tightened and secured the "zig-zag" arrangement can be added. Take another section of rope and position it near where it will be used for climbing protection. Feed the rope towards the established rectangle using change of direction pulleys where necessary. Now work that rope through the other sheave of the double pulley/anchor and to the opposite long side of the rectangle, there attach it to a carabiner (or small pulley if you have enough) and back to the double pulley side. Continue to zig-zag this line 4 or 5 times and at equal intervals along the rectangle. Terminate this line at a separate anchor, near the far side of the grid, with an eight plate for further adjustment capabilities. If this eight plate termination is rigged with plenty of extra rope, the fallen climber can be lowered, through the eight plate, to a safer location like the ground after a fall arrest.

In effect what happens to the system grid during a sudden deceleration is that as the zig-zag is pulled tight compressing the grid rectangle, the force of the falling climber is transferred to the large rectangle and spread along the length of the grid.

The first tests we did with this system were, as stated earlier, in catching a person (load) as it rode the angled tyrolean toward the ground. The catch line, an extension of the zig-zag line, was attached at a right angle to the telfer with a carabiner, much like the aircraft carrier's landing cable. This line was rigged high enough to allow for an adequate stopping distance while the grid was compressing. The subsequent tests involved rigging the grid to absorb free falls. Initially I set up a small, very tight system and did some short (2-5) foot jumps. With more confidence in the system I was able to rig the system where the grid was 25' x 50'. Now I weight 265 pounds and the fall force on a 1/2" static rope from a 10 foot free fall is tremendous. I have jumped on 11mm dynamic ropes that were rigged through rigging racks from this height and turned the rope into glazed webbing. With the 25' X 50' grid I can take a ten foot free fall and enjoy a comfortable deceleration to a complete stop in about 20 feet, (30 feet total descent). The absorption of the load is smooth and even over the distance of the fall. At the termination of the fall the zig-zag rope can then be released through its eight plate anchor and the load slowly lowered to the ground through the shock absorbing grid.

A few critical points need to be understood at this point. First there is much more research necessary to document all of the possible idiosyncrasies of the system. Second, the system takes a good team of two well practiced men about 10 minutes to set up and adjust. The first time you rig it may take more time. Third, it is important to understand the relationship between the weight of the potential falling load as compared with the size of the grid. We are currently working on 20 and 30 foot free falls that require a 50' X 100' foot grid, and keep in mind that the free fall distance is multiplied by roughly 2 to give the additional falling distance necessary to absorb the load, (i.e. 20' free fall + 40' shock absorption distance = 60' total fall). These figures are based entirely on my experimentation. Your results can easily be different due to the differing tensions that are built into the rectangle and the zig-zag and the weight of the load.

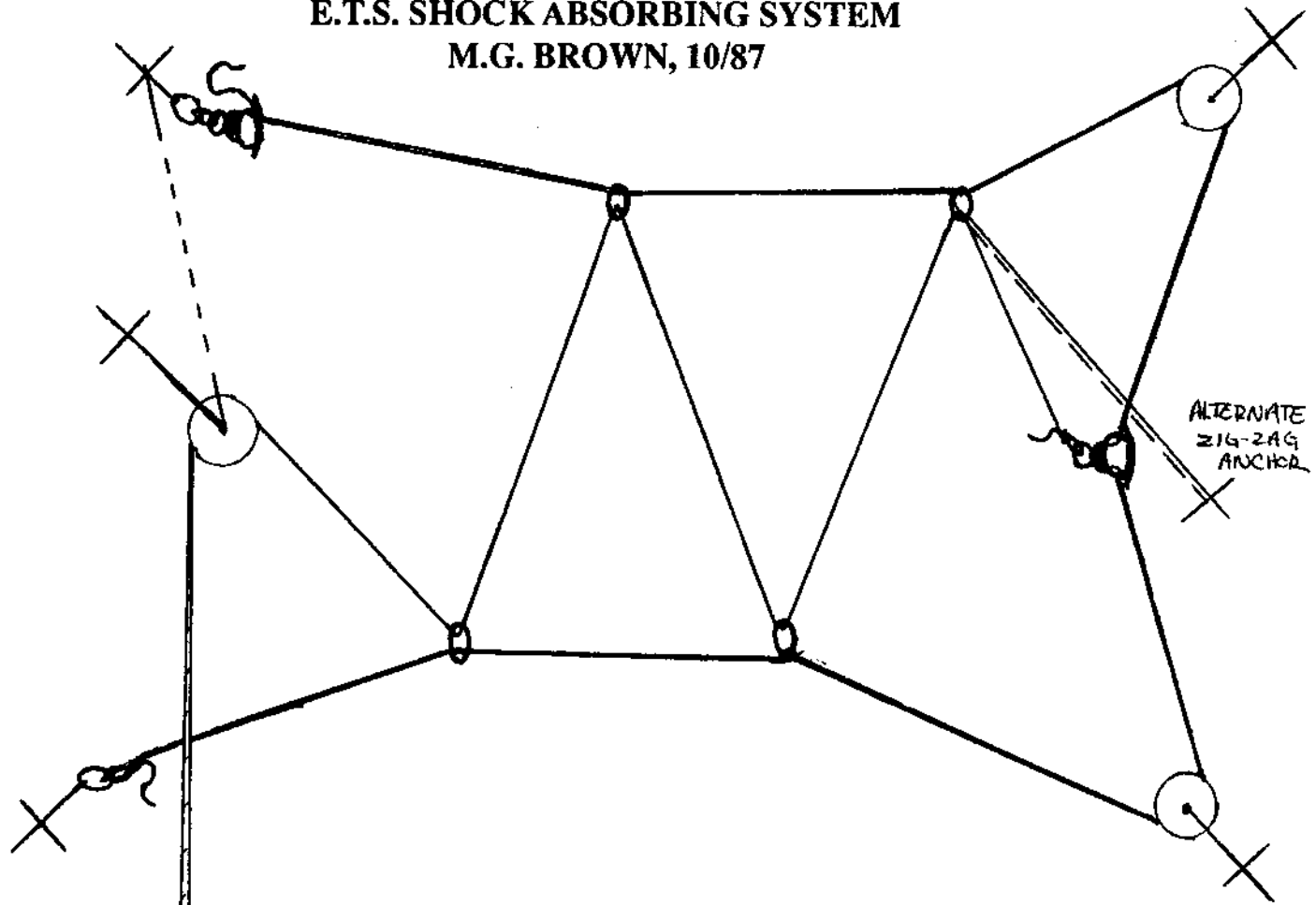
In summary, my team has enjoyed very good results from our experiences with the shock absorbing grid. It prevents the necessity of carrying expensive and delicate dynamic ropes and is much more versatile. The system is much more dynamic then any other system that we have worked with and therefore easier, in the event of a fall, on the equipment and the people on the rope.

If you get a chance to experiment with the shock absorbing grid please let me know of your comments, pro or con. And please share the idea with others that may need an improved fall protection system and with any luck that life it saves may be yours!

Michael G. Brown
550 Princess Anne Road
Virginia Beach, Virginia 23457
804/426-5130 • 804/428-8559

Captain V. B. F. D. and Technical Coordinator,
Virginia Department of Fire Programs,
Heavy and Tactical Rescue Team

E.T.S. SHOCK ABSORBING SYSTEM
M.G. BROWN, 10/87



ALTERNATE
ZIG-ZAG
ANCHOR

← HIGH
TO LOW →

HIGH LINE (TELNER)

EDITOR CALLS FOR NEW BLOOD—EDITOR BLOOD!

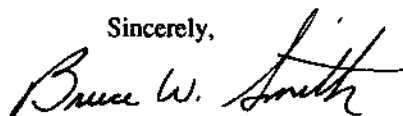
Several years ago Kirk MacGregor stepped down from the Vertical Section as its President and active member of the Executive Board. Kirk felt about the board as many of us feel about the NSS Board and limiting the terms of leadership.

In 1973 I served the first term as Nylon Highway Editor, Cheryl Jones and Sherry Graham both served short editorships and in 1982, I resumed the editorship. It has been one of the most rewarding services I've ever had the privilege of performing for those who held the same interests as I. Make no mistake, working alone, serving in this capacity, has been incredibly time consuming. In the old days it took up to 500 hours as issue. I've reduced this substantially over the years, however, preparing the mailing alone now takes two days. One of the best moves the Section ever did was to divide up the duties of the Secretary/Treasurer/Editor. The teamwork that Bill Bussey has been able to provide to me has been the driving momentum behind the success of the Nylon Highway. I wish to publically thank him for all his hard work and support. I have always invited anyone who desires the challenge and notoriety of the Editorship to please step forward.

The recent questionnaire pinpointed the stepping down of the "old guard" and I feel personally the time is right. Twelve years of editorship, 21 issues and I am stepping down with the publication of issue number 30.

I encourage other members of the "old guard" to do the same as I'm feeling the hot breath of young vertical cavers with new progressive ideas. The questionnaire that was just completed, I feel provides some great sign posts and direction that the Vertical Section needs to move forward. This massive accumulation of data is an excellent resource and I feel should not be ignored. I encourage the future "hopefully new" leaders of the Vertical Section to use the questionnaire to further the good works that the Vertical Section can do. As always, I volunteer myself and support the purpose and cause of the Vertical Section and will help the Section whenever I can. Thank you all for the years of support and Editorships by acclamation.

Sincerely,



Bruce W. Smith
Editor

1990 NSS CONVENTION CALL FOR PAPERS

This years' Vertical Section Papers Session will be held on Monday, July 9th at 2 o'clock in the "Poultry Barn" at the NSS Convention in Yreka, California. If you would like to present a paper, with abstract published in a later NSS Bulletin, please send the abstract to Maureen Handler, Vertical Section Papers Chair, 4827 Jersey Pike, Apartment 904, Chattanooga, TN 37412, (615) 892-3939 as soon as possible. Any advance notice of paper(s) you desire to present, regardless of abstract, would be appreciated. Of course, our Session will include more informal show-and-tell discussions, so bring your goodies!

DUES FOR 1990-1991 NOW DUE!

With this issue our annual business meeting at the 1990 NSS Convention; Vertical Section dues are due. Check your mailing label on this issues' envelope NOW before you throw it away. If it says "1990" above your name, please send \$3.00 per year of membership to the Secretary/Treasurer NOW. This will insure that you will not miss *Nylon Highway* #31. If you aren't sure, send \$3.00 per year of membership desired, and the Secretary/Treasurer will credit you to the correct year. Continue to enjoy *Nylon Highway* by renewing your membership today!

SECRETARY'S REPORT

NSS VERTICAL SECTION

JULY 21, 1989

Number of Single Members	739
Number of Family Members (Number of People)	69
Total Number of Vertical Section Voting Members	803
Number of Nylon Highway Subscribers	69
Number of Nylon Highways Sent Free (ex. libraries)	10
Number of Nylon Highways Exchanged	25
Total Number of Nylon Highways to be Mailed	875
Number of Members or Subscribers Paid through 1989	387
<i>(This number of 1988 members or subscribers have NOT YET renewed)</i>	
Number of Members or Subscribers Paid Through 1990	213
Number of Members or Subscribers Paid Through 1991	173
Number of Members or Subscribers Paid Through 1992	37
Number of Members or Subscribers Paid After 1992	23
Number of Members who desire the Vertical Section to represent them at the NSS Congress of Grottos Meeting	108

TECHNICAL ROPE TACTICS

by B.C. Council of Technical Rescue—Canada

The International Rope Science Workshop (IRSW '90) will be held November 5-9, 1990 in Centerville, Utah near Salt Lake City. It immediately precedes the North American Technical Rescue Symposium scheduled for Salt Lake November 8-11 and will allow test designers and systems analysts the opportunity to meet regarding technical testing issues. IRSW '90 is a specialized inquiry into the physics and engineering of rope/rope systems and the testing thereof and is open to those with technical experience or interest in this field.

The IRSW '90 theme is: "The testing of systems that use fibre ropes for life support." Participation is sought in the form of papers, panel discussions, test equipment demonstrations, etc. Supporters of this workshop include representatives from the rope equipment industry, educational institutions, and fall protection specialists in addition to mountain rescue organizations and similar rope rescue groups.

The program is designed to stimulate discussions on the areas of uncertainty in conducting testing under simulated conditions and to identify the measures that should be taken to improve the repeatability of test results. Issues to be addressed include, but are not limited to: test methods, validity and reporting, systems analysis, recording instrumentation, terminology, etc. This workshop should be of interest to anyone who is doing basic research in fibre rope technology as well as those involved in standards issues relating to the use of fibre ropes for life support.

Those interested in contributing to this workshop should write:

IRSW '90—Arnor Larson—Research Section
British Columbia Council of Technical Rescue
Box 399
Inbermere, B.C. Canada V0A 1K0

NSS VERTICAL SECTION —T-SHIRTS, SWEATSHIRTS, PATCHES, STICKERS & PINS

Items featuring the Vertical Section logo are available from the Secretary/Treasurer. Logo colors: Gold background, Dark Blue figure, Red letters and hardware, Orange formations.

		Shipping
T-Shirt (50/50 Cotton/Polyester) in S, M, L, & XL	\$ 7.00	\$ 1.00
T-Shirt Limited Edition! "I survived the '89 V-Section Meeting" (50/50) in L & XL	8.00	1.00
Long Sleeve T-Shirt Red Only! (100% Cotton Preshrunk) in L, XL	9.00	2.00
Sweatshirt (50/50) in M, L, & XL	14.00	2.50
Hooded Sweat (50/50) in M, L, & XL	17.00	2.50
4" Embroidered Patch	3.00	.50
1" Cloisonne Type Pin	3.00	.50
3" Refrigerator Magnet	3.00	.50
3" Vinyl Sticker	2.00	.50
22" Bandana (50/50) New Item! Imprint style may vary	3.00	1.00

Fine Print: Prices for Vertical Section members only. Non-members add \$3.00.
 Allow four (4) weeks for delivery. S/T will inform if out of stock or other delay.
 Item specifications may change without notice. Money back if not delighted.
 Checks payable to NSS Vertical Section. Inquire about availability of XXL and larger sizes.

To order, send check (don't forget shipping!) to:
Bill Bussey, NSS Vertical Section Secretary/Treasurer
 120 Manhattan Court • Cary, NC 27511 • (919) 460-8968

TO: VERTICAL SECTION MEMBERS FROM: ALLEN PADGETT & THE VERTICAL EXECUTIVE BOARD

The Vertical Section, in agreeing to host a delegation of Soviet cavers, has undertaken a monumental yet exciting task. The section will sponsor these cavers for two weeks in late August of this year and then had the group over to other NSS sponsoring groups. Until the Soviets establish a convertible world currency, sponsorship is the only way to exchange cavers back and forth. This exchange of vertical caving technology is possible only through the efforts of the entire vertical section membership.

Our guests in August will be: EUGENIJ SINENKO, Vice President of the Ukrainian Society of Nature Conservation, ALEXANDER KLIMCHOOK, President of the Ukrainian Speleological Club, DMITRIJ JUJNENKO, Vice President of the Ukrainian Speleological Club, JOSEF ZIMEL'S, President of the Ternopol Speleological club, MIRON SASAVCHIN, President of the Lvov Speleological Club, KONSTANTIN TSURIKOV, Vice President of Crimean Speleological Club. These people are real cavers with extensive experience in both the very long and very deep caves of the Ukrainian Republic. We are fortunate that they are coming to share their experience and technology with us.

We need your help to make this exchange possible. First, we need a commitment from you to go vertical caving with the Soviets in this country and share our vertical skills. But the most important this each one of us can do is to help raise the money necessary to allow the Soviets to visit the caves and travel to the pits we all love. Our goal is to raise \$3,000.00 to cover our basic expenses, We now have just over 41,000.00. We ask each of you to contribute whatever you can to enable this exchange program to work. To those of you who share the spirit of global caving and can afford it, send \$25.00, \$50.00 or even more. Hopefully, in our small effort we can all realize that at least underground we are one world.

The purpose of the Vertical Section is to promote the exchange of information on vertical caving and we hope that the membership will recognize the importance of this project in meeting our stated purpose. Your help is truly appreciated.

Please send donations to Vertical Section NSS earmarked for the "Soviet Exchange Program" care of:
 Billy Bussey, V.S. Treasurer, 120 Manhattan Court, Cary, NC 27511

For information on how you can help, write: Allen Padgett, Chairman V.S. Executive Board, Rt. 3, Box 3478, Cleveland, GA 30528

THE BINDING DOCUMENTS

Over the years many pieces of business have transpired and as such change the way we operate these become our by-laws. Gary Bush graciously, in an effort to organize us, compiled all the business that remains current and pertinent and consolidated this into a set of proposed by-laws. These proposed by-laws will be voted on at the meeting in California. Please review these documents and be prepared to vote on their adoption. Votes by mail will be graciously received by Bill Bussey if received before the convention in California.

CONSTITUTION OF THE VERTICAL SECTION OF THE N.S.S.

I. Name

The name of this organization shall be the Vertical Section of the National Speleological Society.

II. Purpose

The purpose of this organization shall be the same as those of the National Speleological Society, with the additional purposes of encouraging the development of safe vertical caving techniques and their application in the exploration of vertical caves.

III. Executive Committee

1. The Vertical Section shall be governed by an Executive Committee made up of a Chairman, a Secretary-Treasurer, an Editor, and three Committee Members At-Large.
2. The Executive Committee members shall be elected annually by secret ballot at the Vertical Section meeting at the NSS Convention. In the event that an NSS Convention is not held, the election shall be held by mail in September of that year.
3. Only members of the Vertical Section may vote in the election or hold positions on the Executive Committee.
4. The Executive Committee shall have complete power to manage the business, to formulate By-Laws, to raise funds in any manner not inconsistent with the policies of the N.S.S., and to perform all other necessary functions.
5. Decisions or actions of the Executive Committee may be overruled by a 2/3 majority vote of the members.

IV. Meeting

The Vertical Section shall have a meeting at the annual N.S.S. Convention.

V. Membership

Full membership is limited to members of the N.S.S.

VI. Subordination

The Constitution and By-Laws of the N.S.S. shall be binding on the Vertical Section. Any action inconsistent therewith shall be null and void.

VII. Dissolution

Any property of the Vertical Section shall revert to the N.S.S. in the event of dissolution.

VIII. Amendments

Amendments to the Constitution shall be made by a 2/3 favorable vote of those present at any meeting called by the Executive Committee expressly for the purpose, or by written consent of a majority of the total membership.

BY-LAWS of the VERTICAL SECTION of the N.S.S.

1) MEMBERSHIP:

(A) Membership Classifications:

- (i) **REGULAR MEMBER:** NSS members who have paid Regular SECTION Member dues will receive all rights and benefits of SECTION membership. Regular members can vote and hold office.
- (ii) **FAMILY DEPENDANT MEMBER:** NSS members who have paid Family Dependant Member dues will receive all rights and benefits of SECTION membership, except a separate subscription to NYLON HIGHWAY. Family members can vote and hold office.
- (iii) **SUBSCRIBER:** Non-NSS members, or groups, who have paid Subscriber's dues are entitled only to receive a subscription to NYLON HIGHWAY.

(B) Annual Dues:

Dues for all membership classes shall be set by the Executive Committee, subject to approval by a majority vote of the members present at the annual SECTION meeting.

2) EXECUTIVE COMMITTEE:

(A) An Executive Committee member must remain a member of the SECTION to remain on the Committee.

(B) Primary Duties & Responsibilities of Officers:

(i) ALL COMMITTEE MEMBERS:

- maintain a complete listing of duties of each Officer, to be available to new or prospective Committee members to guide them in fulfilling their requirements of office;
- perform other duties as required or designated by the members of the Committee;
- shall produce one substantial article for NYLON HIGHWAY annually. This can be done by persuading someone else to write it. The Secretary-Treasurer is exempt from this responsibility;
- shall conduct all business of the SECTION in a fair and impartial manner; and
- shall maintain open communications with both Committee and SECTION members, as well as other interested parties, as needed to conduct the business of the SECTION.

(ii) CHAIRMAN:

- preside over all meetings of the SECTION;
- lead the Committee in the conduct of all business;
- ensure the proper conduct of all business of the SECTION.

(iii) SECRETARY-TREASURER:

- tape record the proceedings of all meetings;
- keep, read, and distribute minutes of all meetings of the SECTION;
- shall distribute the Minutes of all SECTION meetings to the Committee members within thirty (30) days;
- answer inquiries and prepare the general correspondence of the SECTION;
- have charge, custody, and responsibility for all funds of the SECTION;
- maintain the SECTION's bank account(s);
- disburse funds as required to conduct the proper business of the SECTION;
- maintain an accurate, up-to-date ledger of all financial transactions of the SECTION's funds;
- maintain an up-to-date listing of the SECTION's members, subscribers, and exchanges; and
- prepare the annual Secretary's Report, Treasurer's Report, and Report to the NSS Internal Organization Committee, in a timely fashion.

(iv) EDITOR:

- assemble, prepare, edit, publish, arrange for suitable printing of, and distribute NYLON HIGHWAY;
- shall publish at least two issues of NYLON HIGHWAY annually;
- maintain and distribute a library of back issues;
- shall publish the Minutes of all SECTION meetings exactly as received from the Secretary-Treasurer, as they represent the only record of meeting business;
- shall avoid derogatory and/or political articles;
- shall send controversial articles to at least one other Executive Committee member before printing for review and recommendation as to the appropriateness for publication;
- acquire a Non-Profit mailing permit;
- maintain an accurate, up-to-date ledger of all financial transactions pertinent to the Editor's office; and
- submit all receipts for expenditures annually to the Secretary-Treasurer.

(v) AT-LARGE MEMBERS:

- provide necessary assistance to the Chairman, Secretary-Treasurer, and Editor in the conduct of SECTION business; and
- conduct the business of any Committee member who becomes incapacitated during the year.

(C) Election of Officers:

- (i) **Terms of Office** - shall run until closure of the annual meeting at the NSS Convention. Terms and Duties of officers elected at the meeting will not commence until after that meeting.
- (ii) **Order of Election** - Elections for the Secretary-Treasurer and the Editor will be held first. Elections for the At-Large Committee Members will then be held, with unsuccessful candidates from the first contests eligible to run.
- (iii) **Chairman** - The Chairman shall be selected by secret, written ballot, by the new Executive Committee from the At-Large Committee Members.

3) SPECIAL COMMITTEES:

(A) Convention Vertical Coordinator:

The Executive Committee will appoint annually a Coordinator for the NSS Convention. Any suitable SECTION member may be selected for this position. The duties of the Convention Vertical Coordinator shall include inspecting the site of the next NSS Convention and communicating with both the NSS Convention Committee and the various VERTICAL SECTION event chairpersons to ensure that proper facilities and equipment are available for all SECTION activities and that the event chairpersons are adequately informed about facilities, etc.

(B) SECTION Representatives:

The Executive Committee may appoint interested members in good standing as VERTICAL SECTION Representatives. Representatives are expected to attend regional meetings and other local events to talk to vertical cavers and to sell SECTION memberships and back issues of NYLON HIGHWAY. Representatives are appointed and dismissed by the Executive Committee, acting as a whole, and may resign at any time by notifying the Committee.

(C) Vertical Contest Committee:

The Vertical Contest Committee will have complete authority over, and responsibility for, the annual NSS Convention vertical contests, subject to the following conditions:

- (i) The VERTICAL SECTION Executive Committee will appoint the Contest Committee Chairman annually.
- (ii) The Contest Committee Chairman will appoint the other members of the Contest Committee annually.
- (iii) All procedures developed by the Vertical Contest Committee are subject to approval by the Executive Committee.

The functions of the Vertical Contest Committee will include, but not be limited to, establishing and publishing the rules of the contest, organizing and running each annual contest, publishing the results of each contest, and maintaining complete contest records.

(D) Vertical Techniques Workshop Committee:

The SECTION may organize and hold a Vertical Techniques Workshop at the annual NSS Convention. This Workshop is to give novice participants hands-on experience with basic vertical practices. It also provides SECTION members an opportunity to improve their own instructional skills.

- (i) The VERTICAL SECTION Executive Committee will appoint the Vertical Techniques Workshop Coordinator annually.
- (ii) The Vertical Techniques Workshop Coordinator will plan, organize, and conduct the Workshop. The Coordinator will appoint qualified SECTION members to serve as instructors for the Workshop.
- (iii) All procedures and curricula developed for the Vertical Techniques Workshop are subject to approval by the Executive Committee.

(E) Vertical Training Committee:

The VERTICAL SECTION shall establish a recommended standard written lesson plan for use in training novice ropework classes. An additional plan will be established for intermediate ropework classes. The Executive Committee will appoint a Project Editor and the Project Committee members.

4) CONDUCT & PRACTICES:

- (A) The SECTION will use all legal avenues available to urge producers of speleo equipment to ensure that all their products are safe.
- (B) The VERTICAL SECTION does not endorse equipment.
- (C) Advertisements are allowed in the NYLON HIGHWAY, provided that all potential advertisers are treated fairly, no advertiser is allowed more than one page of ad per issue, and all ads are clearly distinguishable as such.
- (D) All VERTICAL SECTION contest lengths shall be in meters.
- (E) Any purchase of over \$100.00 or a purchase that might be considered controversial in regards to SECTION activities must be approved by the SECTION's Executive Committee.

5) AWARDS:

The VERTICAL SECTION shall, as it sees fit, present an award to a person, persons, or group for outstanding contributions to the development of vertical technology and/or techniques. The SECTION Executive Committee will decide the recipient of this award, to be presented at the annual NSS Convention awards banquet.

6) FISCAL YEAR and AUDIT:

The SECTION's Fiscal Year shall run from January 1 to December 31. The Executive Committee shall conduct an audit of the Treasurer's Accounting of the SECTION's finances after the close of the Fiscal Year, no later than the end of the NSS Convention. The Audit Committee shall consist of the Treasurer and at least one other Executive Committee member, as designated by the Chairman. Results of the audit will be reported in the next available issue of NYLON HIGHWAY.

1989 VERTICAL SECTION MEMBER POLL RESULTS

By Gary Bush

The results of the membership poll of the NSS Vertical Section are in. Of 875 polls mailed, I received 360 back. That's a 41% return . . . astounding for such a mailing. Usually a 10% return on such mailings is average. Obviously, you wanted to let us know your feelings. The Executive Committee of the Vertical Section heartily appreciates your response.

I can assure each of you, your responses were read and tabulated. All six Board members received a detailed print-out (50 pages long) of the results, including all pertinent comments. The original sheets will be retained and further analyzed, as we discuss individual issues.

Because of all your additional comments, the tabulation of the poll became more of a job than I had anticipated. Considering the complexity, and length, of the poll, your response is really heart-warming. Because of that, I've made a point of making sure the other Board members benefit from all your comments.

A criticism frequently directed at our Board, as well as Board members of other Sections, and even at the NSS BOG members, is that we act on how WE feel, rather than how the membership feels. Lacking any input, that may be true. How else could we act? I can speak certainly only for myself, but I really believe the others will agree, we want to run the Section the way the MAJORITY of the membership wants it run.

Equally important, however, is to listen to those dissenting the majority opinions. Their points need to be heard and considered. Our responsibility as Board members is to weigh all considerations, lest we make hasty decisions. Generally, though, determining what everyone wants is tough to do.

After the 1989 Vertical Section meeting, the Board was discussing the controversy over the contest. To a person, we agreed to follow the wishes of the majority of the Section. That's one reason this poll was taken. The other pending issues were added, so we could feel your "pulse". I think you'll all agree, the effort and expense were well rewarded.

With these thoughts in mind, let's discuss the results. Since I can't detail every single question in this article, I'm going to just hit the main points.

• **Demographics:** Polls were returned mainly from the U. S. (97%) and Canada (2%). Once came from England and two couldn't be determined. Most (59%) came from the

Eastern/Southeastern quadrant of the U. S., as most of our members do. 85% were male, 12% female, and 3% didn't tell. Almost all respondents have been in the NSS longer than they've been in the Vertical Section.

• **General Satisfaction:** 78% of you feel the Section provides what it should. 90% feel you get your \$3.00 worth. Most of you who are dissatisfied want more publications, education, training, or regional activities. 78% like the symbolic devices.

• **Meetings:** Only 45% of the membership has ever attended a Section meeting. 42% don't attend the NSS Convention. Of those attending, almost 60% like the meetings as they are. Many of you voiced against "too much politics". You repeatedly asked for more structure, clarification of issues, and order at the meeting. You commented you want to hear about new developments, techniques from all over the world, research, and safety issues. Recurring comments about elitism, stuffy, and time wasting were mentioned about the meetings.

• **Executive Board:** 60% of you "don't know" if the Board adequately serves the membership, or if your voice is being heard. Looking just at those who attend meetings, that number still sits at about 50%. There's an almost even split whether you feel the Board should be expanded. 70% of you don't want to serve on the Board.

• **Publications:** Most of you (95%) read the NYLON HIGHWAY and 83% are satisfied with it. 84% have never written anything for it. In fact, a number were surprised you were allowed to write for it. Many interesting topics were suggested for inclusion. The editor will be very interested in those. 57% want more "How To" articles and 39% want NH published quarterly. 86% are willing to pay more for improvements. 76% think we should publish other books or information on vertical topics, and will pay more dues to fund that task.

• **Training:** More training opportunities were requested frequently throughout the poll. 72% want us to adopt a Lesson Outline for vertical training. More help to Regions and Grottos to carry out training was continuously mentioned. Certification was a "hot" topic. Over half felt instructors, local or national, should be certified. Certifying vertical cavers was approved by 47% (basic) and 39% (advanced). However, many of you voiced a concern over the liability or appropriateness of certifying anyone.

• **Convention Workshop:** Only 38% of you have attended the Workshop. Of those having attended the Convention Vertical Section meeting, 68% have also attended the

LETTERS TO THE EDITOR

Dear Editor,

On a recent Alabama caving trip, I chanced to "bounce" Neversink twice. I used an alloy triangular screw link to close my seat harness. After only two rappels and two climbs, I noticed significant wear on the two inside corners of the screw link. The screw link joins two steel "D" rings to close the seat harness. Where the "D" rings rubbed the screw link flat areas had worn on the surface, where it used to be round. Granted my seat was tight, but not too tight, and I'm certainly not going to wear it looser. Needless to say, I now use a steel screw link for my seat. I thought someone might be interested in this.

Sincerely,

Ken Leppold

Workshop in some capacity. Of those attending, 95% felt it was worthwhile and should be continued. In fact, 86% of everyone felt it should be continued, even though most obviously hadn't ever been to one. 78% want the Section to continue running the Workshop rather than an NSS committee (only 3%). The other 19% refrained from comment.

Almost 80% of you would like to see a "Vertical Camp", up to a week long. 67% want such camps to be held regionally. Only 9% want a national camp. Of those with an answer, 67% want the camps to be held yearly.

• **Vertical Contest:** 57% of you have attended at least one Convention contest. 88% of those attending feel it was worthwhile. 76% want to continue, 4% don't, and the other 20% don't know, care, or didn't answer. 76% want the contest to be run by the Vertical Section, rather than an NSS Committee (4%). The other 20% didn't know, care, or answer. There doesn't seem to be much interest, either way, in changing the current racing contest. The addition of other groups to the current speed contest doesn't have strong support.

However, 62% feel a "Vertical Obstacle Course" should be added. Only 11% are against this addition. Many suggestions, such as timing on and off the rope, crossing knots and rebelays, and change-overs were included. Obviously, the logistics of adding such a contest to the existing one are difficult. But, over half of you said you'd help.

58% want to continue giving both Prizes & Certificates for the contest winners. 21% said Certificates only. 40% want to "sanction" contests at non-Convention events. 22% are against that. Most feel Section reps should mark the ropes and monitor all contests. 56% want the distances to remain metric; 10% don't.

The Board will use this information to help decide the course the Vertical Section will take in the next year. Those of you with opinions differing from the majority should let us know how you feel. Those who didn't mail in their poll can still write letters (no more polls, please). We really want to hear from you.

I believe the poll will serve its purpose. It should trigger a continuing dialogue between the members and the Board. We can't count on running a poll every year to test the "pulse". We may never run another one. But, you can see, I hope, that the Board needs you continuing input to help guide our decisions. Without input, we'll have to do it the way we feel is best.

Then you'll call it "politics" !!!

Thanks, again, for all the effort.

Please keep it coming.

Dear Editor:

After finishing your excellent book On Rope, the chapter on knot tying nomenclature (Chapt. 3) expressed an opinion on this subject that warrants a response.

Specifically, the naming of knots is not as confusing as chapter three asserts. Nor is it open to the whim of any enthusiast who cares to give a name to already existing knots out of temerity or ignorance. Knot names are well documented, including recent innovations such as the Hunter's Bend introduced in 1978.

The Hunter's Bend is a recent innovation when the age other 'knots' is taken into consideration. The rolling hitch is dated back to 1808 by Cyrus L. Day in his The Art of Knotting and Splicing 4th ed. p. 90. The rolling hitch is also described in Day as the magnus hitch (p. 100) and in Clifford W. Ashley's The Ashley Book of Knots as the magnus and/or magners hitch.

Unlike Day, Ashley did not provide a date to the origin of the rolling/magnus hitch, but like Day, he did provide several detailed illustrations on how to tie this hitch and its applications.

There is a belief, as held by On Rope, that the main contribution the art of mountain climbing has contributed to the increase of the world's inventory of knots is that invented by Dr. Karl Prusik of Germany in the 1930's. Strangely, there is no mention of the "Prusik Knot" in either Ashley, Day, or in any of the other books devoted to nautical ropemanship.

After researching this omission, it can only be surmised, after careful comparison of the instructions given in On Rope with Ashley and Day's instructions on tying the Prusik 'Knot' and rolling hitch respectively, that Dr. Karl Prusik re-discovered the rolling hitch but did invent a new application for it.

Technically speaking, a hitch is not a knot, and the Prusik 'Knot', based on the instructions on how to bend it to a line, is in reality a rolling hitch.

It isn't uncommon for individuals to reinvent or rediscover an already existing device when isolated from the main-stream source of innovation. History is filled with examples of such coeval discoveries.

Perhaps Dr. Prusik may have been inadvertently credited for inventing a rolling hitch, rather than his unique application of it, by some of his landlocked mountaineering colleagues.

In any event, the tone of criticism towards The Ashley Book of Knots found in Chapter three of On Rope is inconsistent with the professional manner which the subject of rope is handled in the remaining chapters. Especially in view of Ashley's being the only book on nautical ropework mentioned, and this was also motivation for a response.

Finally, I would like to suggest a 'knot' which might be of use to the mountain climbing community: the Zeppelin Bend. Instructions on tying this device can be found in Brion Toss's The Rigger's Apprentice, International Marine Publishing Company, Camden, Maine 04843, page 47.

Thank you.

Yours truly,

Brian A. Glennon

xc: Small Boat Journal
WoodenBoat Magazine

Dear Editor:

I'm enjoying my issue of **Nylon Highway 29!**

It's no big deal, but since this publication is the best of its kind, and just for future reference, etc, I thought you'd like to know the correct spelling for the name of the creator of the knot mentioned on page 3, "Heddon Knot." It's actually "Hedden". It's almost exactly 30 years since I first described that knot in print (Summit Magazine, April 1960).

I'm pleased to find it's still useful, especially to cavers.

Sincerely,

Chet Hedden

Dear Editor:

I'd like to comment on your article in **Nylon Highway 28, Gloves and Prusiking Don't Mix**".

For the first two years that I caved, I always used those thick, loosely fitting work gloves. During those two years, I always felt myself to be a poor climber, unable or unwilling to do climbs that others did routinely.

Then, one day, I accidentally left my gloves in the car, and decided to cave without them. Suddenly climbs that were previously awkward became as easy as pie. I also discovered that vertical work was much easier and quicker without gloves. I was suddenly convinced that climbing and gloves did not mix.

However, another year of caving without gloves convinced me that another solution. I'd come home after a trip with my palms torn and cut from the rocks. Because of the dirt and mud in caves, the cuts would not always heal as quickly as I would like, and this was beginning to interfere with my enjoyment of caving.

In addition, I realized that gloves provided thermal protection, preventing the loss of some heat through the hands.

My solution became fingerless, Kevlar Watersport gloves. You can buy them in any sail or dive shop (Campmor also sells them). Being fingerless, they leave my fingers free to do the delicate work necessary to climb. Also, since they are a tight fit and not very thick, they do not interfere with the normal use of the hand.

Because they are made of Kevlar, they are stronger than anything else I have tried. They just do not wear out, protecting my hands from the worst a cave can give them.

To make the gloves even more indestructible, I coat the heel of the palm with Aquaseal, also found in any dive or sail shop. The stuff is also incredibly strong, very flexible, and protects the one spot on the gloves that receives the most wear.

The gloves do not absorb water, so they do not get waterlogged like some leather and cotton gloves. Because they dry quickly, they do not rot like other gloves. In addition, they do provide some warmth for the hands.

I have used them on rappels, on ascents with knots and mechanical systems, and in all sorts of climbing situations. They provide my hands with sufficient protection for almost every situation, yet allow me to work with my gear without any difficulty.

Because the gloves just do not wear out, I have found them to be a cheaper investment than any other gloves sold on the

market. They last, and last, and last. For those cheap of poor people out there, this alone is a reason to use them.

My experience the last few years is that neither you nor I will ever convince anyone to cave without gloves. People just can't imagine exposing their hands to that wear and tear. These gloves are a simple alternative that we might actually be able to get people to use.

Yours sincerely,

Bob Zimmerman
NSS #27633

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Dear Editor,

While I imagine that **Nylon Highway Number 29** already contains more about old Jumars than most reader want to know, perhaps they would be interested in a few words about some even older than the oldest described by Gary Storrick. I bought the Jumars I still use from REI about 1965 for \$18.50 a pair (if memory serves).

My gray Jumars differ from the "gray series version A" of Storrick in two respects. First, the safety gates were not color coded, but were gold in color on both the left-handed and right-handed ascenders. The gate was also somewhat less thick. (Incidentally, I have shortened the safety gates on both my original Jumars and the one version A that I own. When I started vertical caving, half-inch ropes were still in occasional use, and when they were dirty and fuzzy, the gates did not the cams open widely enough for drag-free operation.)

The second and more major difference was in the cams themselves, which were color-coded, one being blue and the other red. The purpose of the color-coding escapes me, as the left- and right-hand models are certainly not hard to tell apart. Anyway, I suspect the cams might have been anodized aluminum, based on the appearance of the colors and the speed with which the teeth wore out. The instruction sheet did refer, however, to cams of "rostfrei Stahl". Unfortunately, I do not have the original cams, because I sent the Jumars back to REI for new cams after a few years. The replacements are identical to the version-A cams, and they have worn much better.

Good caving,

Bill Mixon

Dear Editor:

This is a letter to the editor of the **Nylon Highway** and after a few comments I'll get to the main subject. The information I have comes from listening to others talk, if you decide to publish I'd ask you to have it reviewed by someone of authority on the subject (such as Steve Hudson or Tom Vines).

The **Nylon Highway** is looking great, I like the mix of articles although some of the technical stuff is way beyond me. When I see articles such as Bill Storage's "Can We Improve the Bobbin" I start thinking that there must be more PhD's in the section than I'm aware of.

Keep up the good work, I'm sure editing the **Nylon Highway** is not easy, but you are doing an excellent job. The professional appearance is setting a standard for other section publications to follow.

I have reservations about the praise given to Hiatt and Stubai carabiners in John Ganter's "Comments and Questions on Vertical Hardware". His comments about aluminum carabiners having weaker gates (vs. steel) is true, but I have seen more blown steel carabiners than aluminum. The remains of a big beefy steel carabiner that failed under load is a scary sight. One should not relax just because you're using steel.

Stubai carabiners are one such steel carabiner subject to failure due to design. They work fine with the gate locked, but are worthless if you fail to lock the gate. Due to the design of the "claw" used at the open end of the gate, it can begin to slide open under load with as little as 600 pounds.

As for Hiatt steel carabiners, they are subject to failure due to the manufacturing process. I disagree with John's statement saying the quality is outstanding. These carabiners are plated after assembly, and if the corrosive chemicals used in the plating process are not completely removed they will stay behind and slowly destroy the gate from the inside out. Failure of the internal spring is your first warning.

After learning about these problems, the Hiatt was retired to my junk box, never to be used again. I still use the Stubias, but I worry that in an emergency situation someone will forget to lock the gate.

Despite the fact that the SMC steel carabiners may rust, and the locking collar doesn't come off the aluminum ones, I trust them for their design and manufacturing strengths. I don't expect my gear to last forever and replacing gear because it's no longer serviceable is much better than replacing it after failure in the field with a life on the line.

Sincerely,

Kenneth Huffines

AN EASTERN EUROPEAN ASCENDING CAM

By Burt Ashbrook

In Eastern Europe, the vertical gear that we are accustomed to is often unavailable. Still, necessity is the mother of invention, and cavers there have invented some interesting gear. This report describes an ascending cam from Eastern Europe which will be new to most Americans.

I first saw this type of ascender in 1988 while caving with Romanian cavers in Transylvania. It was a homemade affair, made by cavers from the Romanian city of Cluj-Napoca. A year later, Hungarian cavers were selling similar (presumably manufacturing) devices at the International Congress in Budapest.

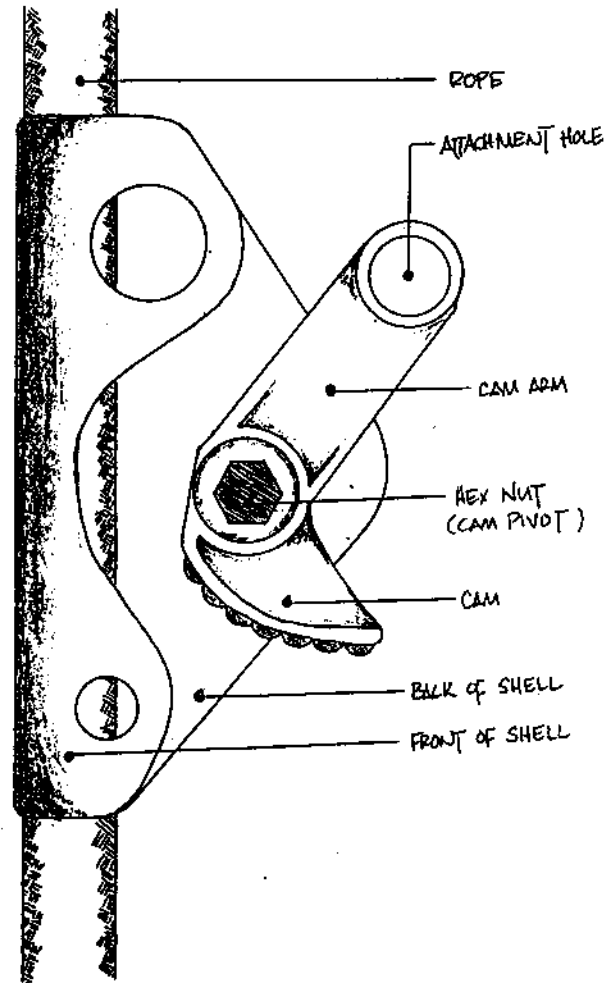
The Eastern European ascender is similar to a free-running Gibbs. It is the same size and operates in the same manner, but it is heavier because the shell is made of steel. However, the most obvious and important difference is that the cam is only attached to one side of the shell; the other side is cut away (see the figure). This allows the ascender to be attached to and removed from the rope without removing of the cam; hence, there is no need to line up the shell and the cam so the quick release pin will fit. Like a Jumar, the device can be attached to the rope quickly and even with one hand.

To attach the Eastern European ascender to a slack rope, the cam arm must start fully down. Then, the rope can be admitted to the top half of the shell. As the cam arm is moved up, the rope is bent and admitted around the cam. When the cam arm is all the way up, the rope may enter the bottom half of the shell. The dimensions of the shell and cam are such that the device can only be attached or removed deliberately; it cannot accidentally come off the rope. Nevertheless, it is quite easy to do with a little practice. To remove the device, simply reverse the procedure.

However, because the rope must be bent to attach or detach the ascender, it can only be put on or taken off a slack rope. Although this is not a problem for a foot ascender, use as a knee or shoulder ascender could potentially pose problems if it were necessary to remove the device from the rope (to cross a knot, rebelay, or lip). The device is impractical for some other uses (i.e., as a safety, for the top climber if climbing tandem, etc.)

Another minor problem is the length of the cam arm. Because the arm is so long, the ascender is at an angle when weighted instead of being almost vertical. This means the ascender does not run up the rope as easily as a Gibbs. However, a shorter, curved cam arm (as found on a Gibbs) would correct this problem.

In conclusion, a different type of ascending cam is in use in at least two Eastern European countries. The Eastern European ascender is similar to a Gibbs, but is more easily attached to a slack rope. However, because it cannot be attached to or removed from a tensioned rope, its usefulness may be limited.

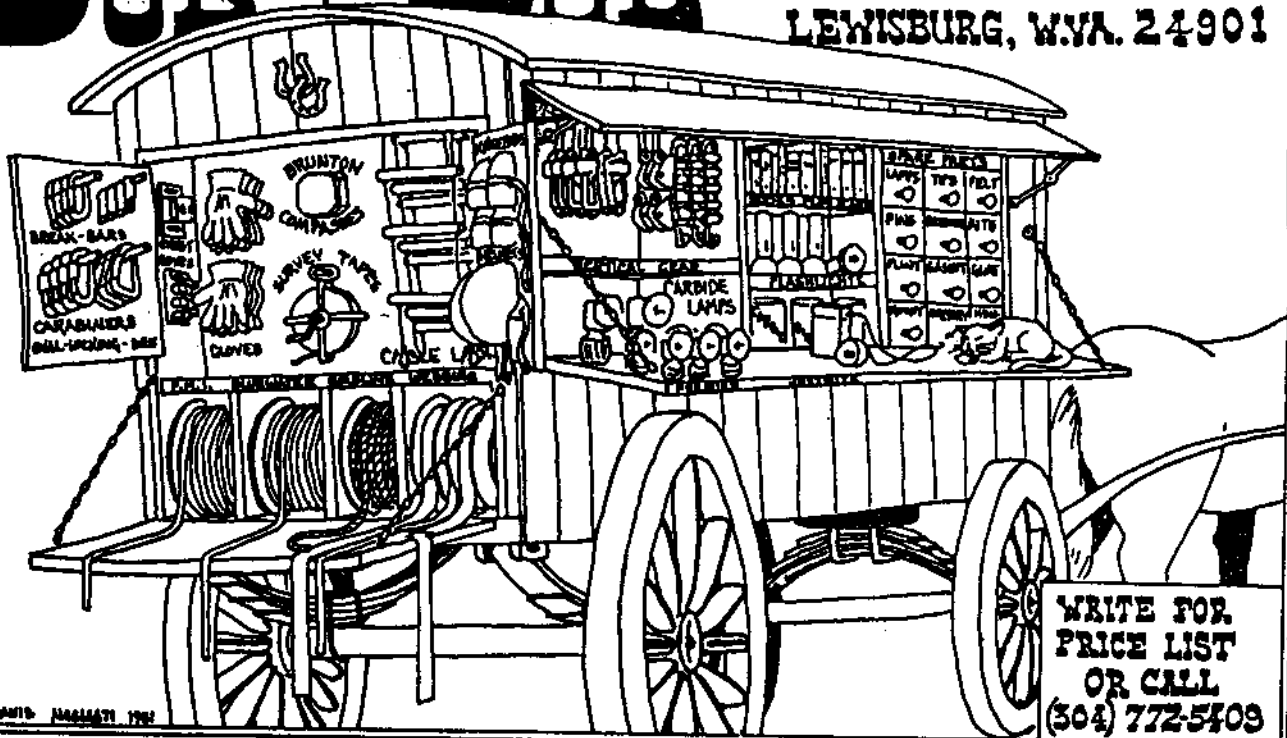


Bob & Bob

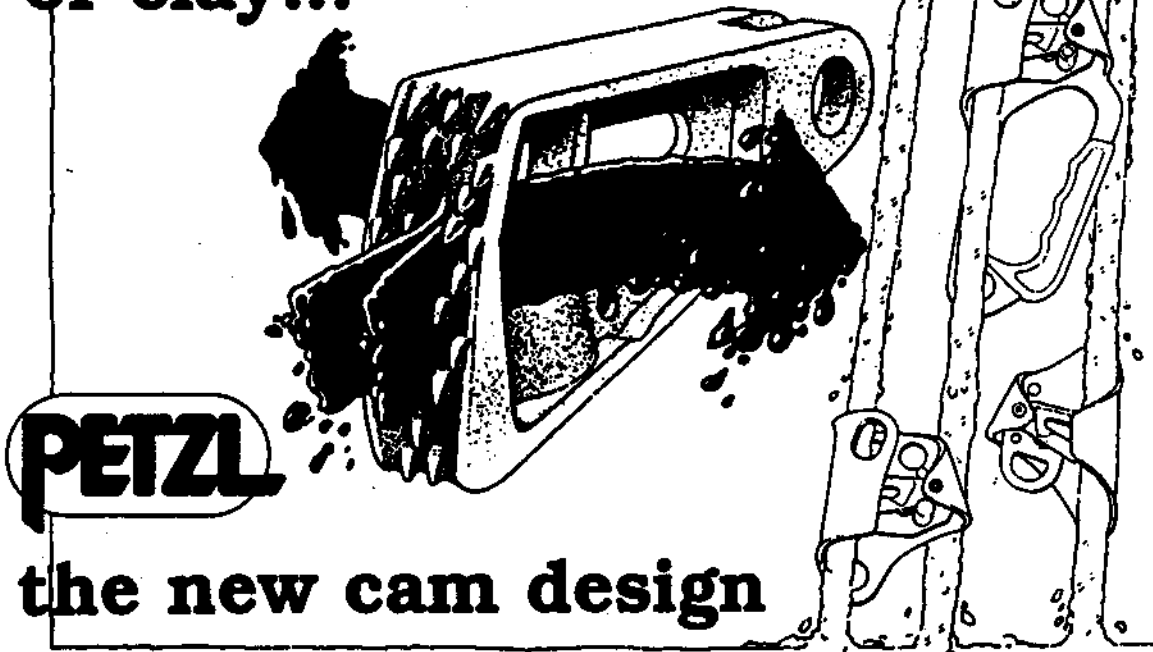
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