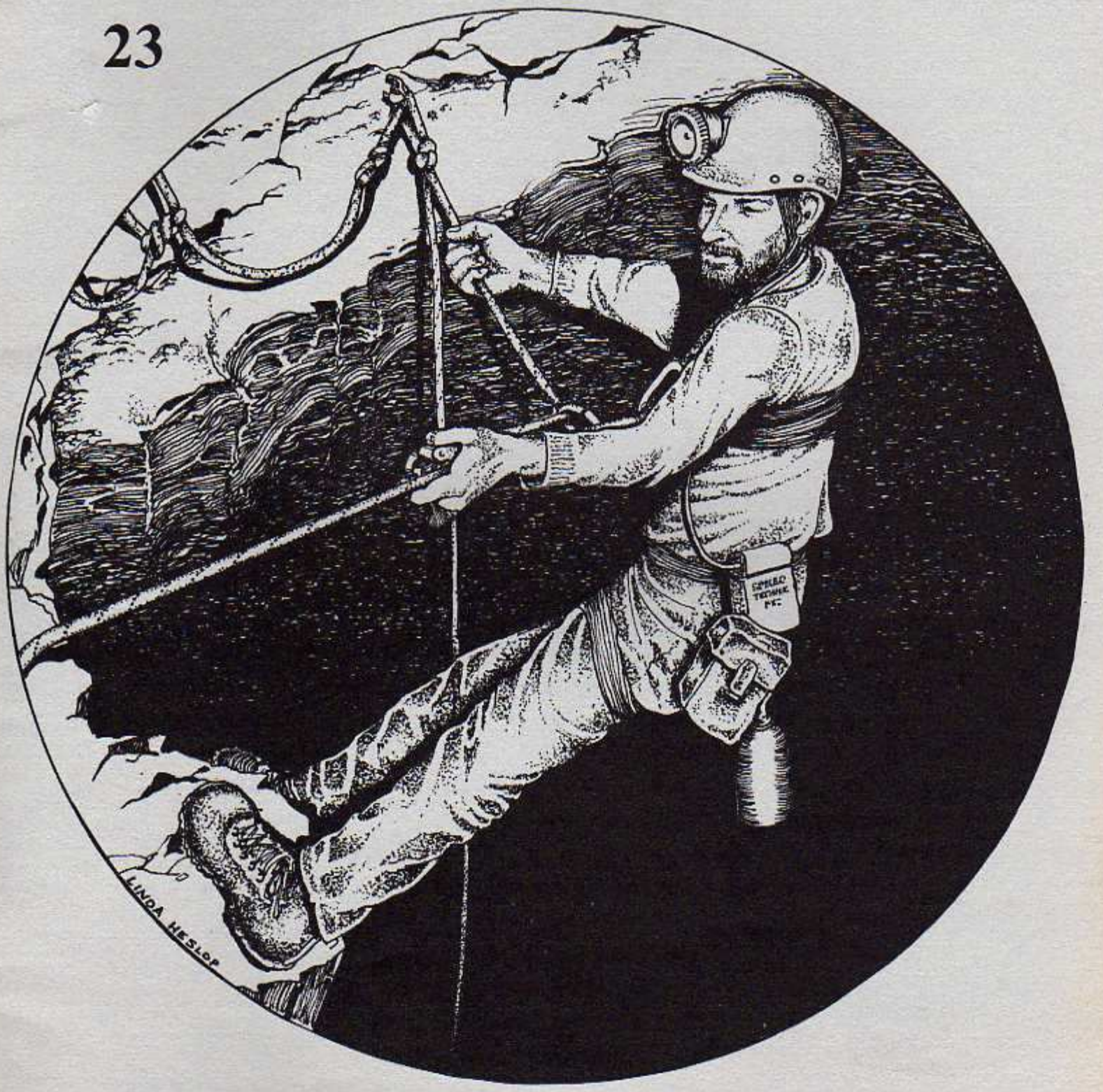
NYLON HIGHWAY

23



...ESPECIALLY FOR THE VERTICAL CAVER

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Bruce Smith, Editor
1822 Mountain Bay Dr.
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615-842-7885
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Bill Bussey
P. O. Box 3742
Gastonia, N. C. 28054
704-864-5071

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NYLON HIGHWAY

NO. 23

TABLE OF CONTENTS **Page.**

COVER "On the Wall" illustrated by Linda Heslop of Victoria, British Columbia, Canada.

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NEW CHICKEN LOOP DESIGN SOLVES COMMON PROBLEMS

By Jim Moore and Gayle Smart

Chicken loops are a pretty mundane topic, but are a necessity of life. They seem simple enough--but are they? How many times have you failed to use them, becuase it is only a 30 foot drop, they're lost in the bottom of your pack, or you didn't want to take your boot of at the bottom of a pit to put one on? These concerns have prompted the development of a new design which alleviates these and other chicken loop problems.

Chicken loops have two functions to perform: first, to keep foot loops from falling off while climbing, and second, to keep foot loops from falling off while failing. There are several styles of chicken loops in common use amoung cavers. Each seems to have disadvantages concerning their ability to meet the above stated function of a chicken loop.

One popular design consists of a small ankle-sized loop which is slipped over the ankle before the boot is put on. The main disadvantages of this design are:

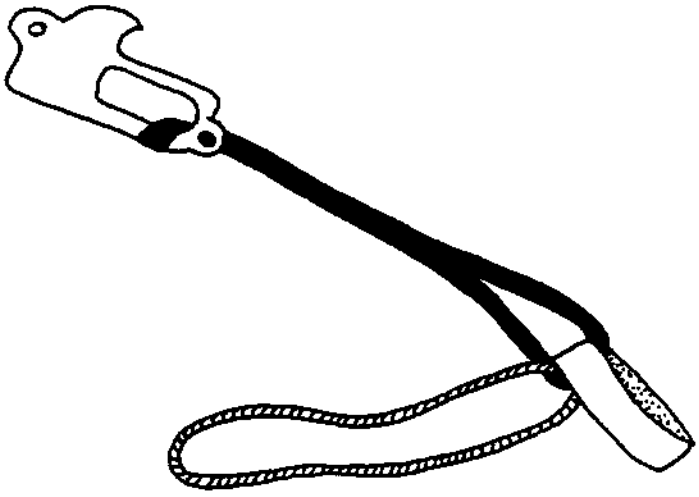


FIGURE 1

FIGURE 2

1. It is a separate item which may be lost.
2. There is a temptation not to use it due to required boot removal.
3. It does not work on foot-mounted ascenders.

Another popular variation of the first design uses a buckle and is often sewn onto the foot loop. This eliminates the possibility of loosing the loop, but introduces new problems of its own. These are:

1. Buckles often do not work well around a small radius such as an ankle.
2. The required stitching may introduce additional points of potential failure.
3. The buckle may itself cause injury during an uncontrolled flip upside-down.
4. Inadequate buckles are often used to save weight and bulk.

The new design consists of a much longer loop, approximately the length of the lower leg. For a knee ascender, the loop passes through the base of the sling connecting the foot loop and the ascender (figure #1).

To install the chicken loop, the foot loop is held above the ball of the foot while the chicken loop is passed behind the ankle (figure #2). The foot loop is then passed through the chicken loop (figure #3) and placed over the toe and onto the foot (figure #4).

The advantages of this new design are that it is always with the system and cannot be lost, and has no buckles or additional sewing. It has one clear advantage in that it may also be used as an extender when the ascender must be used in a non-standard way. For example, a knee ascender, using the chicken loop as an extender, can be used as a safety when working near a lip.

This chicken loop design (dubbed the "Smart Loop" by the Editor) can also be adapted for use with a foot Gibbs ascender. In this application the chicken loop passes forward through the eye of the Gibbs and back through the foot loop. The foot loop is placed on the foot with the chicken loop pulled straight back along the inside of the ankle. The chicken loop is then brought behind the ankle, forward on the outside of the ankle, over the instep, down over the Gibbs shell, and positioned under the eye of the Gibbs. When a climbing rope is installed in the Gibbs, the chicken loop cannot be removed without disassembling the shell.

Although this chicken loop was developed for a floating knee Jumar and foot mounted Gibbs, it should be easily adaptable to a variety of climbing systems. □

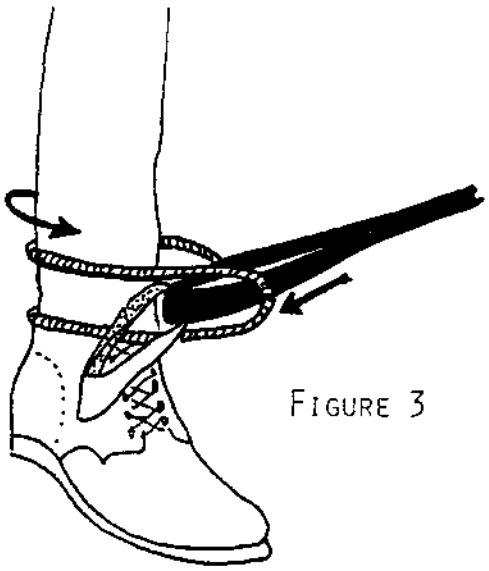


FIGURE 3

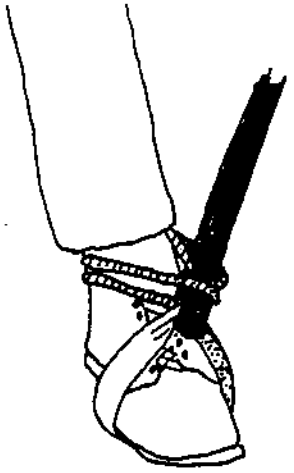


FIGURE 4

SECRETARY'S REPORT
NSS VERTICAL SECTION
June 19, 1986

Number of Single Members	288.
Number of Family Members (number of people	10.
Number of **Nylon Highway** Subscribers	16.
Number of **Nylon Highways** sent free	8.
Number of **Nylon Highways** exchanged	24.
Total number of **Nylon Highways** mailed	346.

Number of Members/Subscribers paid thru 1986	167.
Number of Members/Subscribers paid thru 1987	63.
Number of Members/Subscribers paid thru 1988	74.
Number of Members/Subscribers paid after 1988	10.
Total paid Memberships/Subscriptions	314.

Total number of Vertical Section Members	298.

THE VERTICAL CHALLENGE OF THE FUTURE

By Bruce Smith

Questionaires are a method of analysis that can and have often proven useful. The interpretation of the results must be carefully studied because too often figures can lie and liars often figure.

In 1971 I conducted a survey and sent a questionaire to dozens of grottos across the country. More than 2000 cavers responded. About 700 of those individuals confessed to be vertical cavers. Of these Grotto-affiliated cavers several pieces of information were obtained from the survey.

In 1986 Dave McClurg repeated a similar survey. His results also proved interesting. The survey's comparison shows that vertical cavers are evolving and using safer systems to rappel and prusik with.

Method of Rappelling	**1971**	**1986**	**±% Change**
Tandem Brake bars	63%	18%	-45%
Standard Rack	31%	96%	+65%
Body Rappel	5%	-%	- 5%
Super Rack	-%	2%	+ 2%
Figure 8	-%	37%	+37%
Petzl Stop	-%	2%	+ 2%

Method of Ascending	**1971**	**1986**	**±% Change**
Mitchell w/Jumars	45%	34%	-11%
Gibbs Ropewalker	18%	57%	+39%
3 Knots Exclusively	14%	4%	-10%
Ladders	13%	28%	+15%
Texas Prusik	9%	9%	-%

There exists a question in my mind as to whether the surveys are comparable. The sample from the 1971 survey represented vertical cavers that, for the most part, were NSS members. Obviously this sample included a general class of caver that participated in vertical caving, but probably didn't study the subject.

The 1986 sample included only Vertical Section Members, SRT people who take their subject seriously.

As I look at the results and see the reduction in those who use tandem brake bars, the increase of those using racks, the dominance of Gibbs ropewalker systems, the interesting Texas percents, and the tremendous decline of 3 knot "only" users, I have to wonder if these reflect the truth. Maybe more competent cavers respond to the questionaire.

My field work and exposure to the general vertical caving population leads me to conclude that the progress toward safer rappelling and climbing systems isn't as pronounced as McClurg's study indicates.

Continuously, I experience "knowledgable" vertical people who are still climbing and rappelling in the stone age. A surprising influence on the subject is the military. Every year, thousands of R.O.T.C. graduates learn the 1940 art of carabiner-wrap rappels. A week ago, an ROTC student whom I highly respected bragged to me that he was the top rappeller in his squad and was a "Certified Expert". He went on to tell me about his Australian rappels and many of the other macho activities that he and his friends have enjoyed. Last week during a cliff training session at Lookout Mountain a group of high school macho types threw a piece of Bluewater over the edge and proceeded to prove they were "certified experts" by Hot dog Australian rappelling.

The horror stories don't stop with non-NSS members. Late August, I had the pleasure to cave with some close friends whom I had not caved with for 12 or 14 years. To my surprise, they used the same techniques that we had used back in the late '60's--tandem brake bars, RBS knots, and antiquated climbing systems.

In New Mexico, at the NSS Tularosas Convention, I had the pleasure to be allowed to join a group that got to see the "Lake of the Clouds" room in Carlsbad. I was expecting to assume a low profile for I surely knew that I would be around all the "big leaguers". As it turned out, of the 18 that went, only 2 were wearing "approved" caving helmets. (I include the guides in the 18, they wore Fiber Metal helmets with the chin strap hooked over the bill). I'm not saying I never wore a Fiber Metal helmet (infact, I own 5), rather I'm suggesting that cave exploration has evolved and many of our most elite members have not. To get to the Lake of the Clouds required almost 300 feet of hand lining. Of the 18, no one knew how to do a "hasty" (double arm rappel), I had broken a rib a few weeks earlier and was the only one who brought any type of rappelling device, seat harness, safety Jumar and gloves in the event I would be unable to pull myself up the rope using only arm power. No equipment and even a less experience level resulted in a slow ponderous trip. Drops were not staggered so as each member finished the guide asked everyone to wait (all 18) until all were up the first drop before we started the next drop. Understand that my last intention of this paragraph is to condemn any member of that trip, rather point out that the great job of education and evolution that we (NSS) think we're doing and that we (NSS) think is happening_____Ain't happening!!!!!

OUR CHALLENGE

The surveys say we're making progress, moving toward safer and more reliable systems. I'm sure to some degree this is true. But for the most part, I feel the vertical veterans of the Vertical Section have three major goals.

1. **Stay current and educated.** Keep an open mind to new ideas, methods, and techniques. "It was good enough for my grandpa, so it's good enough for me..." mentality has no place in an organization that prides itself on its strength, its people and their competance.

2. **Teach and educate.** Learn and practice how to tactfully suggest more reliable or safer methods to others. Get involved with your local rescue group, ROTC group, SWAT team, EMS group. Become an active deciple of the Vertical Section and carry the current teachings to those without the same access.

3. **Experiment, Practice and document.** This group (The Vertical Section) is the core group, the pacesetters, the cutting edge of tomorrows technology, the group that will make the difference in the years to come. It won't happen if you wait for the next guy to do it. Ask yourself, what things do I do that I watch other people do also with great success that you've never found anywhere in writing. If you don't write, offer to dictate or tape record to an interested publishing editor. Lately, I've been keeping up with the European technological vertical pace and it appears as if apathy is not one of their strong suits.

Recently, a prominent European caver taunted North Americans on their lack of published

Continued. See **Vertical Challenge** Page 12.

ROPERCIZOR

By Darrel Tomer

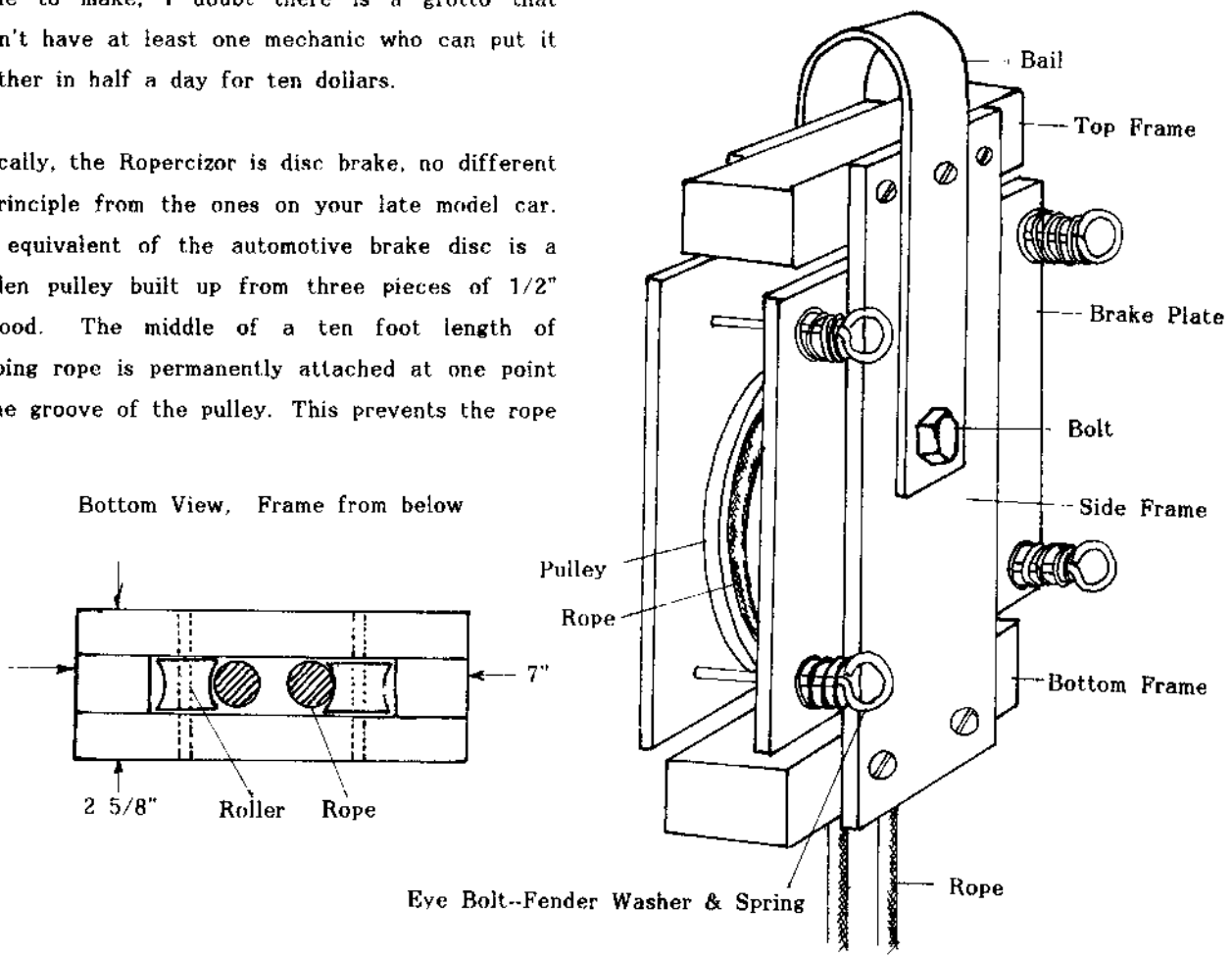
When a crowd of cavers all have to go up the same rope, it can mean hours of boring delay. This wasting time could be greatly reduced if all members are physically fit and adept at using ascenders. So, why not equip your groto with a convenient rope climbing practice system?

Many **Nylon Highway** readers have already seen and tried the Ropercizors exhibited at the Tularosa NSS Convention. For others, the following is a description of the device. It is small enough to hang in your garage or basement. One person can exercise on it alone without assistance. It is so simple to make, I doubt there is a grotto that doesn't have at least one mechanic who can put it together in half a day for ten dollars.

Basically, the Ropercizor is disc brake, no different in principle from the ones on your late model car. The equivalent of the automotive brake disc is a wooden pulley built up from three pieces of 1/2" plywood. The middle of a ten foot length of climbing rope is permanently attached at one point in the groove of the pulley. This prevents the rope from sliding in the pulley so there is virtually no wear on the rope. The wear is concentrated on the outside of the pulley disc and on the brake pads, just like in a car brake. As in an auto brake, potentially there is a heat problem, but so far it hasn't happened.

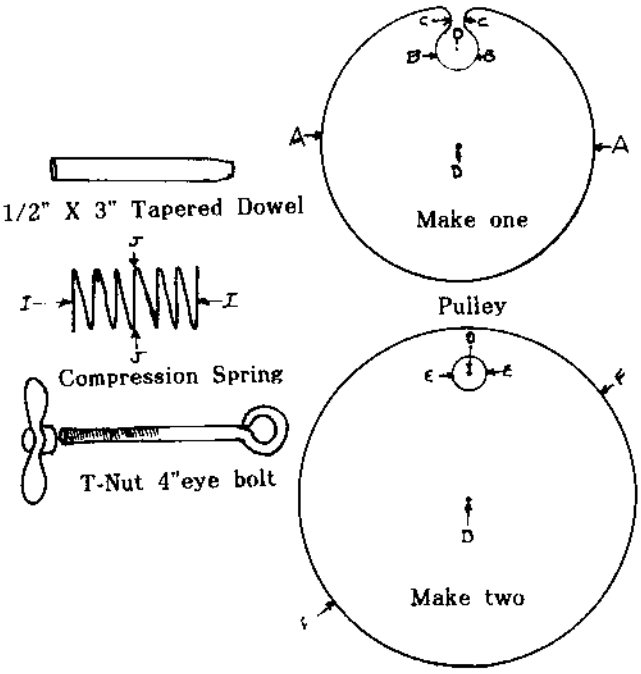
The equivalent of the automotive brake pads and caliper is the assemblage of two square plates of plywood held together by four spring-loaded eye bolts that allow adjustment to the weight of cavers of all common sizes.

Figure #1 Ropercizor



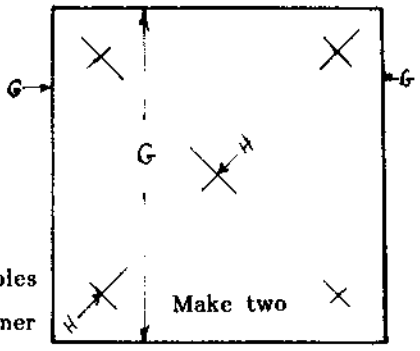
Simplicity of construction and safety in use are achieved by having all major parts mount co-axially on the pulley spindle shaft (bolt) (figure #1). Note that the rope drapes down around the pulley groove and exits through a slot in the bottom frame piece.

Figure #2 Construction Details



A. 6" D. 1 1/2" G. 8" I. 1 1/2"
B. 1 1/2" hole E. 1/2" hole H. 4" J. 1"
C. 1" cut out F. 7"

All Boards are one-half inch plywood



Note: The compression spring is strong enough that it gives only 1/4" when squeezed between thumb and finger.

Assembling The Pulley

Please read this entire article before starting any construction. You may want to modify the plans. The parts needed are specified in figure #2, except for fender washers and the spindle bolt (1/2 X 4 1/2 inches).

Carefully drill at 90 degrees to the surface a 1/2" hole at the center of each pulley disc and square brake plate. An inch and a quarter from the edge of the six inch disc drill a 1 1/2 inch hole and cut a 1 inch channel between it and the edge. See figures #2 & #4. Prepare a three inch long 1/2 inch diameter wood dowel tapered a bit at one end. This assumes you are using a 1/2 inch dia. rope. At any rate see how sharply you can bend the rope you are using and design this embayment or cavity, so you can get your rope to fit snugly into it. Avoid using a stiff rope.

Place the three pulley discs in the proper order on the spindle bolt. Bend the rope at its middle and push it into the cavity in the middle disc. Insert the tapered dowel and drive it in flush, with the tapered end sticking out the other side. The dowel has to go through the rope-bend tightly enought to squeeze the rope against the sides of the cavity. Clamp the pulley assembly in several places around its edge and after removing the dowel and rope, set it aside for the glue to harden.

When the glue has set, re-insert the mid-point of the rope and the dowel. Cut the tapered end of the dowel off flush with the pulley surface.

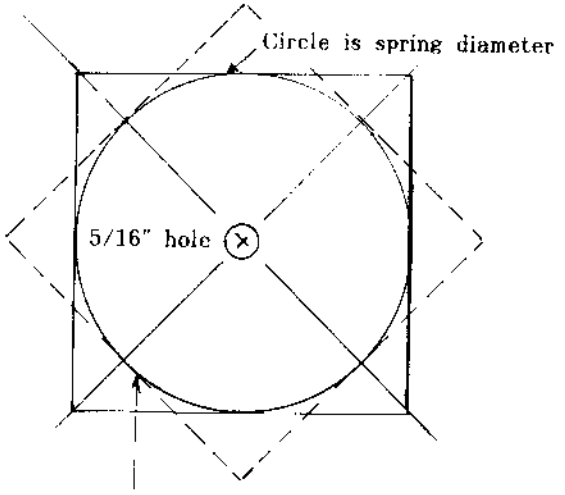
Assembling the Brake

Drill the center holes for the spindle bolt and the corner holes for the eye bolts. Hammer the T-nuts into the outside corner holes of one of the square

brake plates. Assemble the pulley and brake plates on the spindle bolt. Put the eye bolts through the fender washers, springs, and the corner holes of the second brake plate. Screw them into the T-nuts of the the first brake plate, and tighten until the springs remain perpendicular to the plate and concentric with the bolts. If they tend to slip to one side and get out of smooth control, remove them and make cup washers from light one-inch square pieces of light sheet metal. (Tin can mettal is too thin). Drill 5/16" holes at their centers and bend up the corners as in figure #3. Re-assemble the brake with cup washers on the ends of each spring.

The pulley and brake assembly must fit loosely into the wooden frame. Top and bottom frame members are spaced apart by 1/2" more than the width (8") of the square brake plates. This permits a few degrees of free rotation of the brake at the beginning of each step. The purpose of this is to make it easy for the climber to overcome the tendency of the brake plates to sieze on the pulley at the end of the previous step.

Figure #3 The Brake



Making the Frame

The side pieces are 1" X 4" boards, eleven or more inches long, depending on the thickness of the top and bottom pieces. 3/4" plywood could be used instead of 1" X 4". The top and bottom pieces are of thicker wood (1 1/2" X 2 5/8" X 5") to provide strength and stabilty. If you don't have the tools to cut out the big slot for the bottom piece, you could instead build it up by glueing together smaller pieces. See figure #1.

I used Gossett Block rollers in the bottom piece, but you could use wooden spools. Brass bushings, small V-belt pulleys or even small ball bearings. Some building supply houses stock rollers used for sliding glass doors.

The Bail is strap iron 1/8" X 1" X 21". It could be 3/32" X 1 1/4" strap which is easier to bend and drill. Drill holes at each end to fit the spindle bolt. Drill holes for screws about five inches above the bolt hole. Put heavy wood screws through these holes into the top frame pieces.

Using The Ropercizor

Since the rope is permanently attached to the pulley at one point, balanced equal height symmetrical steps can be assured only if the climber starts with the point of attachment at its top position. This condition cannot readily be observed, so place marks on the rope halves as follows: Relax the spring tension and slowly pull one rope out until it comes to the end of its range of motion. Then make a mark on the other rope where it comes out of the slot in the bottom frame piece. Repeat the procedure on the other half of the rope and you will have a mark on each. When the attachment point is at its top position, these alignment marks will be together at the same height.

There are two main ways to set up for practice. The most convenient, as it requires no personal equipment, is illustrated in figure #4. The climber simply buckles into the strap, puts his feet into the loops and begins.

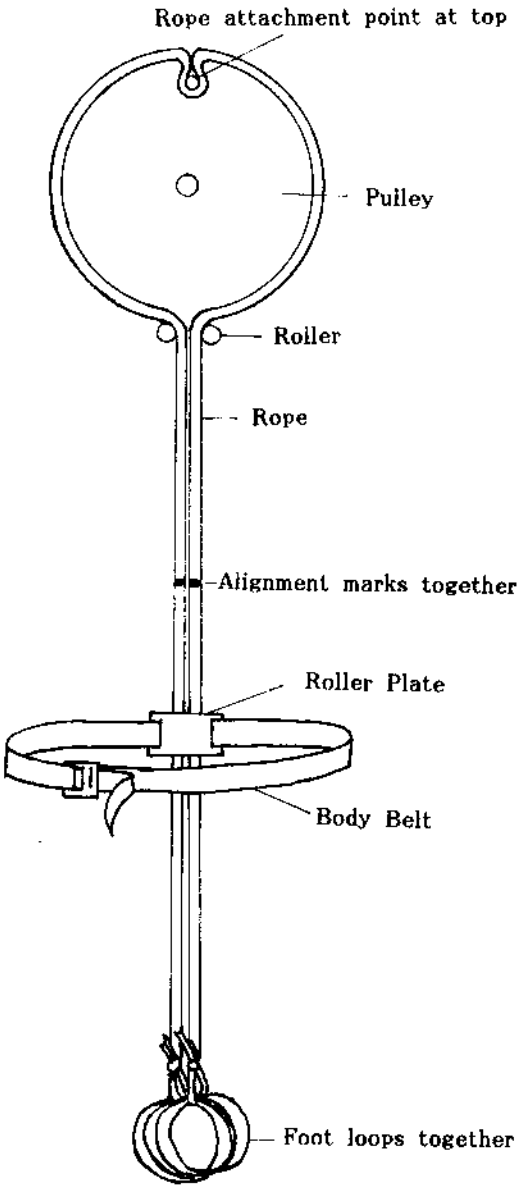
Note that the foot loops must be adjusted to hang evenly side-by-side when the point of rope attachment to the pulley is at the top position. By removing the body strap and ignoring the foot loops, the climber can attach his own gear for practice. He must remember to get his gear placed on the ropes so when he holds his legs straight with his feet together, the alignment marks on the rope are together. He also has to remember that his ascenders and hands don't progress up the ropes, but remain in fixed positions on the rope. The rope does the moving.

Miscellaneous Notes

Figure #2 specified a 6" diameter for the middle disc of the pulley assembly. This the minimum practical size. It permits the climber to take steps up to 17" and seems to adequately dissipate the heat. To allow for a high stepping individual, sloppy climber set-up, and to increase life of wearing parts, it might be better to scale up the system to accomodate an eight inch or larger diameter pulley to prevent the eventual wearing out of the pulley spindle hole, obtain a brass or steel bushing of an inside diameter that permits a slide-on fit to the spindle bolt. Increase the size of the pulley spindle holae such that the bushiing can be press-fitted into it. In any case a little lubrication of the spindle will help.

Rapid wearing and heating of the braking surfaces is a lesser problem the larger the pulley diameter. The life of these parts could also be extended by making them thicker. Wear-out time increases directly thickness and at least as the square of the diameter doubling the diameter multiplies the area by four so the pressure is reduced to one fourth. Since the heat energy is also spread out, lower temperature must also contribute to longer life.

Figure #4 Rope Attachment



The seperation of the two ropes where they come out of the bottom frame piece is a matter of compromise. To close and your knuckles scrape, too far apart and at some speeds you may swing wildly

Continued. See **Ropercisor** on Page 16.

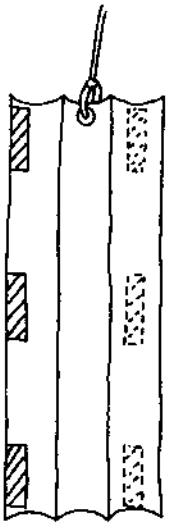
A ROPE PAD FOR DIFFICULT SITUATIONS

By Ron Simmons

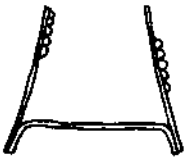
The following is a description of the construction and use of what I believe to be an improved rope pad. It can be used successfully in situations where most normal pads will leave the rope unprotected.

This design for a rope pad came out of the 1981 expedition to System Huautla in southern Mexico. Almost all of the drops in the upper ridge caves are against the wall. There is also a lot of chert in the walls. We have always had several rope abrasion problems. On many drops one has to go back and forth across the wall. This action rakes the rope back and forth across the wall chert blades and all. Rope pads that we had tried really never worked very well. Ordinary pads of some material that laid under the rope never would stay in place even when tied to the main line with a helical knot. The difficult places to pad are always in the middle of the drop. A garden hose slit down one side was also tried but didn't work either. A helical knot held the hose in place but unfortunately, the hose always rotated around so that the rope could still rub the wall through the slot in the hose.

Since we were losing a lot of rope, there were a number of tries at effective rope pads. With British, Australian and American caving minds at work what finally emerged was the prototype of the pad described below. It consisted of three pieces of two inch webbing sewn together at the edges. What we didn't have at Huautla was velcro. Even without the velcro, the pads seemed to be just the thing. After returning home I made up a few of the pads to try out. They were just the thing for mid rope padding situations. When tied onto the main line with a helical knot and the velcro holding it shut, the pad stays right with the rope, padding it all times. This pad does take a little time to pass. One must undo the pad and untie the helical knot and then redo thme when passing the spot to be padded. It doesn't take all that much practice to become proficient with this pad and it sure does beat having a rope core staring you in the face on the way up. I have found that I can pass a pad up to two foot long without too much hassle. Also an added benefit of this pad is its small size. It occupies a very small space in a pack.



Top View



End View

End View With Rope

A Rope Pad

Sewing the rope pad is very easy. Probably a home machine will do fine or it can always be made with a hand sewing awl. Cut three pieces of two inch webbing to the desired length. Sew the velcro onto the side pieces of the webbing first. Then sew the webbing pieces together at the edge. One side of the velcro is sewn to the middle of the webbing and the other side of the velcro is sewn next to edge as shown in the diagram. This is to allow for the space that the rope takes up. The amount of velcro that I use depends on length; the longer more velcro. More velcro is also handy when there is a lot of mud. Also it is a good idea to sew back and forth across the ends of the webbing. This will help reinforce the ends and keep them from fraying. A grommet is then set in the end of the pad end so that a cord can be tied to it. The pad cord length can be whatever you want.

I have found this type of rope pad to be very useful. It takes a little practice to use it effectively but I think that the effort is more than made up for in unchewed rope. I hope that if you try it out it will be of help to you also. □

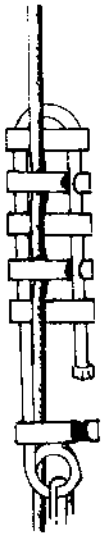
LETTER TO THE EDITOR

Got my issue of **Nylon Highway #21** and the cover reminds me of something I wanted to ask you. Like the cover, my rope always rides to one side on the top bar, no matter how I position it to start, it goes to the hinge side. This has never really mattered except that this weekend we did a pit and the rope jammed completely along one side of the rack and stopped my rappel completely.

1. Has this ever happened to you? 2. What causes rope to ride to one side on the top bar even when there is a training groove?

Thanks, Larry Smith Larry Smith
637 Watson
Memphis, TN 38111

Editor reply Personally, I have never had my rack jam with the rope rubbing up against the long leg. Although I have experienced the rope not tracking down the middle of my bars. This happens when I failed to incorporate a training groove in the top two bars. The second bar is more important than the top bar because of the amount of rope contact around the second bar compared with that of the first. The second bar is by far more influential in the final performance of your rack than any other brake bar. Gary Storrick, noted vertical caver, even suggests that the larger one-inch pregrooved commercially available bars reccommends it be positioned in the second position, although other schools of thought suggest that positioning this larger bar in this second position may yield too much friction and render the rappeller with an inability to easily slide down the rope.



Complete Stop

Thinking out loud, if the second bar groove does not solve your problem, experimenting with a second connnecting seat harness carabiner which will rotate your rack 90 degrees may make a difference. This in my estimation will only cause a difference when rappelling at an angle against a wall. Anyone else like to answer Larry?

Bruce Smith, Editor

THE SYMPLEX HARNESS SYSTEM

By John Markwell

Adjustability in harnesses has historically been dependent upon buckles of one type or another. There are many commercial and home-made harnesses out there with adjustable waist belts and leg loops. What they all have in common is buckles and the attendant stitching required to attach them. Stitching is prone to wear and thus any stitching in a harness system is a potential weak point.

For those seeking an adjustable harness, there is now an alternative. The **Symplex Harness System**. For the purpose for this discussion the seat harness will be the focal point.

Finding a seat harness that will fit many different people or fit one person wearing different volumes of clothing depending on conditions has, in the past, entailed purchasing one or more combinations of waist belts, leg loops or even more than one harness. The unique webbing used in the **Symplex Seat Harness** is woven with integral transverse slots spaced approximately 8 inches on centers. The leg loops of the harness are formed by passing the webbing through these slots leaving an 8 inch central "crotch piece" between the leg loops. The waist belt parts extend upward from either side of this crotch piece and are wrapped around the waist in opposite directions. The leg loops and the waist belt are one continuous piece and the leg loops adjust pulling upward on the waist belt straps coming up through the slots on either side of the crotch piece. Most folks are familiar with the standard Chouinard harness. This seat has exactly the same one piece configuration as the **Symplex** except that in the Chouinard the leg loops are formed by sewing on either side of the crotch

Every 7 1/2" a 2" slot exists in the webbing.

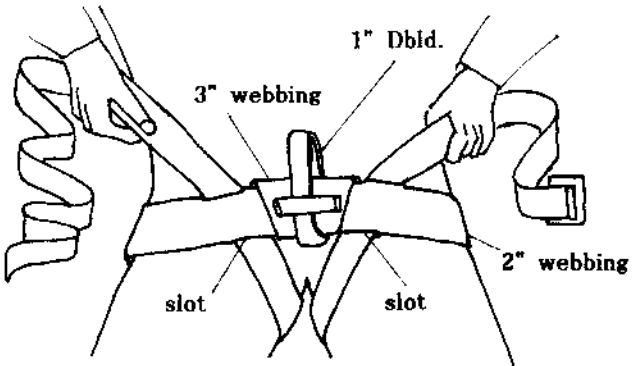


Figure #1 Getting Started.

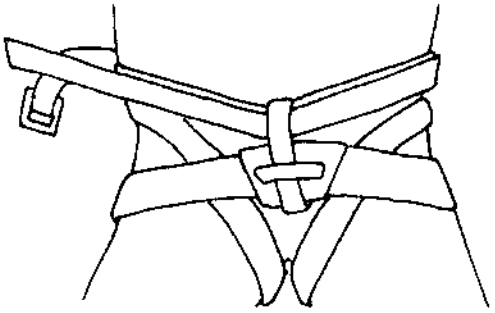


Figure #2 Wrap the long belt making sure to insert it through the rigging loop and the leg loop hold-up straps each pass.

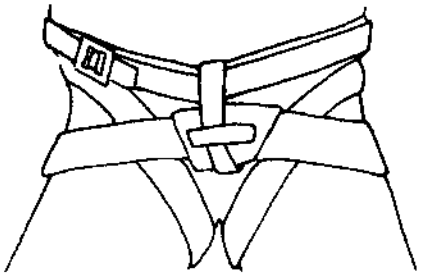


Figure #3 The Buckling Procedure.

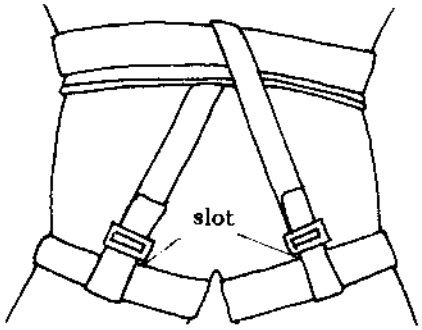


Figure #4 Back View showing the leg loop hold-up straps.

piece, thus you have to buy the harness by size, or, buy the adjustable model which utilizes buckles on the back of the leg loops to vary their circumference.

To provide a rigging point for rappelling or ascending, the **Symplex** seat harness is fitted with a double thickness 8 inch diameter clip in loop which floats on the crotch piece. This loop is pulled up and the waist belt is passed through it at the front of the harness as the waist wraps are made. Loops of this type are standard features on many climbing harnesses. The **Symplex** rigging loop tests at 9000 ibs. Also provided are leg loop hold-up straps to keep the leg loops in place when the leg is raised.

After stepping into the leg loops and adjusting them by pulling up on the waist belt straps, and wrapping the waist belt around the body above the hips, the one and only buckle of this harness system is fastened. The forged buckle is of the double pass variety and is attached with three bar tacks each testing at 2700 lbs. in the slotted webbing.

All of this sounds rather complicated, but in reality is quite straight forward. The **Symplex harness** has been on the market for almost two years now and has found great favor with climber, cavers, tactical teams, schools and outdoor programs. It is hard to believe that one harness will fit anyone from little kids to adults with about a 42 inch waist (bigger harnesses can be special ordered) but the **Symplex** will do it.

Editor: This is the same harness that has been referred to as the "Slot Harness", "Tactical Harness", and the "Symplex Tactical Slot Harness". Having the opportunity to use the harness on several occasions, I find all John's claims to be completely true. It is very comfortable, although I wouldn't want to hang in it for two or three hours. The claim that it is simple to use tends to be somewhat exaggerated upon first use. Everytime I've pulled it out of my pack I had to reacquaint myself and often heard comments that it was more complex than symplex. If there is a drawback, it would be only that and after repeated usage I'm sure it will become as famaliar as any other well used piece of equipment.

Symplex harnesses are manufactured by Rescue Systems Inc. and sell for about $32.00. They are available from from The Gendarme, Seneca Rocks, WV. 26884, 304-567-2600. Contact John Markwell. □

Vertical Challenge from page 4.

information on the subject of ropework. He asked where our "book" was. (It's coming very soon). As a self evaluative group, I feel we should look real hard at the European challenge. **On Rope**, the book, is not the only answer. Allen and I have been working on it for 2 1/2 years. Someone, somewhere should be putting together the skeleton of the next SRT book right now.

If safe rope travel is important to us we all need to take another look at what we are doing to perpetuate our interest. Learning, Teaching, Practicing, Educating, Growing, Writing, Documenting, Experimenting and Staying current with ropework is our vertical challenge of the future.

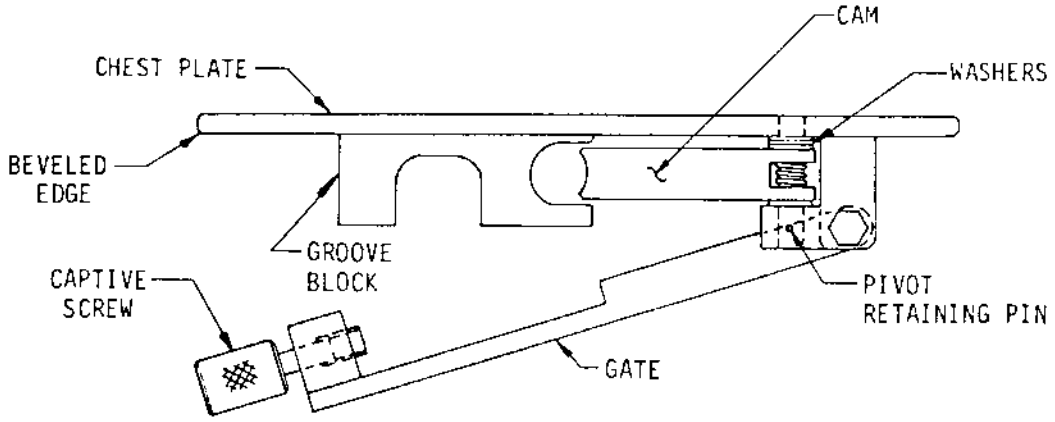
REFERENCES

McClurg, David. Vertical Equipment Questionaire Totals, Tularosa NSS Convention Paper, 1986.

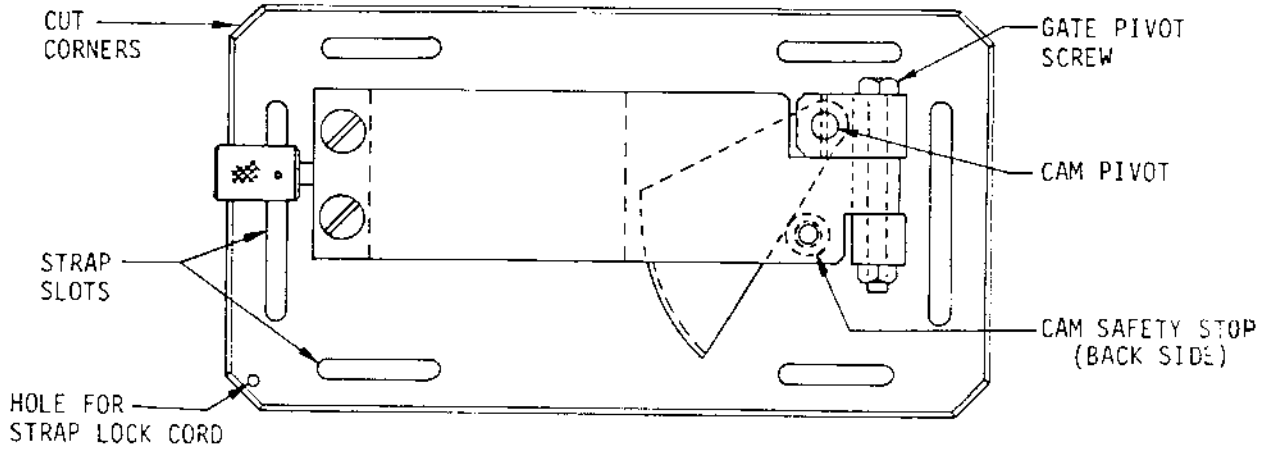
Smith, Bruce. Statis of Vertical Caving, **Nylon Highway #1**, NSS Vertical Section, 1972, p. 2. □

THE CAM BOX ASCENDER

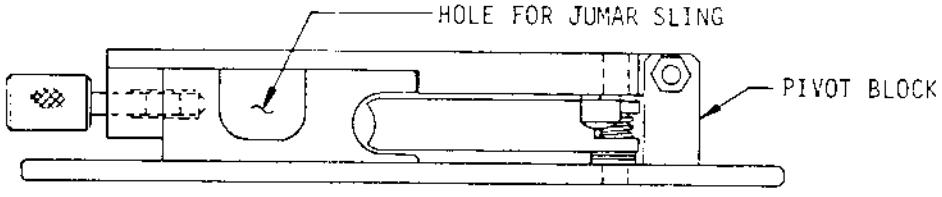
By Lang Brod



TOP VIEW, SHOWING GATE PARTIALLY OPEN



FRONT VIEW, SHOWING CAM AGAINST SAFETY STOP



BOTTOM VIEW, SHOWING GATE CLOSED

CAM BOX ASCENDER, PRIOR TO ATTACHING SUPPORTING STRAPS

Cam Box

Sometime in 1974 I went to a climbing practice session in which I had an opportunity to try out a 2-Jumar ascending system, with the upper Jumar sling passing through a chest carabiner. Being a somewhat reluctant vertical caver and cautious by nature, I was not overly impressed with this ascending system. I simply did not feel safe or confident while using this system.

In thinking about the problem, I visualized a potential solution: a chest utilizing a Jumar cam to grip the rope. I constructed a prototype box using this principle and took it to the 1975 NSS Convention, where it was evaluated by several people who pointed out some minor defects. Returning home, I built a second revised box, which I subsequently used on a number of occasions with complete success. I recently built another box of the revised type for a friend who tried it at the 1984 NSS Convention, where it aroused some interest. I had heard reports of apparent similar devices but had not seen any published reports. Therefore, I decided to write this article in the hope that it might elicit comments and criticism and to document the device.

The cam box ascender in its present form consists of a 3/16" thick alloy aluminum chest plate, 6 3/4" inches wide by 3 1/2" high. Vertical slots to accommodate 2 inch wide nylon webbing are cut in each side, and pairs of one inch long slots are cut both in the top and the bottom for auxiliary slings, with the upper pair for shoulder straps and the lower pair for seat sling attachment. (See illustrations of the cam box ascender for construction details.) The cam is mounted parallel to chest plate; the camming end bearing the teeth rests in a U-shaped groove in a metal block. This same block has a second vertical groove to hold (loosely) a Jumar foot sling. I refer to this block as the groove block. The cam pivots about a stainless steel shaft, one end of which is seated in the chest plate. The other end of the shaft is held in place by an aluminum block fastened to the chest plate, which is termed the pivot block. A 3/16" diameter steel aircraft screw passing through the upper part of this block serves as a pivot for the gate, a metal plate which, when closed, passes over both the cam and the groove block. Gate closure is maintained during climbing by a captive thumbscrew which is manually screwed into the groove block prior to ascent. A cylindrical screw head on the inner side of the gate, the safety stop, prevents excessive opening of the cam when the gate is closed.

For use, the cam box ascender is strapped on the body at chest level with two-inch wide nylon webbing. Two one-inch slings are used to attach the chest box to the seat harness, to prevent the chest box from being pulled excessively high during climbing. Two shoulder straps are used to keep the box from sliding downward but should not receive any tension during climbing. When all straps are securely fastened, the climber attaches the foot Jumar which has two loops, one for each foot. A second Jumar for ascending over lips is clippped to the climber's harness at some convenient point. The climber then opens the gate of the ascender, pushes down the cam, and inserts the climbing rope. The foot Jumar sling is then passed through the second groove in the groove block, the gate is closed and locked by screwing in the thumbscrew, and the climber is ready to ascend, using an inchworm technique or some other system if desired.

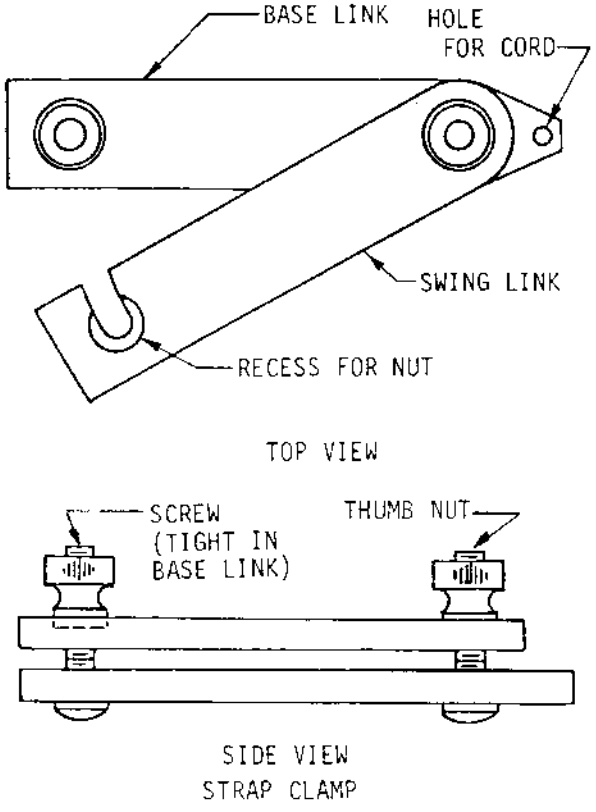
The cam box ascender has number of advantages. As in a conventional chest box, the climber is held close to the rope, in an almost upright position. similarly, the climber is held to the rope and can

never fail off of it. With the cam box ascender, there is the added advantage--the motion of the rope through the box is undirectional, unless the climber deliberately actuates the cam for descent. Thus, if the climber slumps, there is no tendency for the rope to slide up through the box; the cam catches and the climber and is left hanging from the chest strap and seat harness. Because the climber's center of gravity is below the ascender, it is vertually impossible to turn upside down. With this system, failure of a foot sling would be a minor problem repairable on the spot, rather than a potentially serious, life threatening situation. The foot sling Jumar, of course, is at eye level, where it can be inspected and cleaned, if necessary.

If the chest cam should begin to slip because of wear on the cam surface, the spare Jumar can be attached, and the ascender box can be used in the manner of a conventional chest box. The spare Jumar can also be attached for passing over a knot. In order to open the gate, it is necessary to remove side loading by either the main rope or the first Jumar sling.

The critical item in this system is the chest strap, which must not fail. Consequently, much care has been exercised in its design and fabrication. The chest strap should be of high quality, preferably seat belt material, all stitching should be made with strong, high quality thread, of a color contrasting with the color of the chest strap. I use heavy white buttonhole thread in a black nylon strap so that any incipient stitch failure is readily apparent. The buckle should be strong, with the basic frame stamped from heavy sheet metal, with no joints. Although a buckle may be strong, a slick nylon strap may slip through it. I avoid this possibility by attaching a strap clamp consisting of two metal bars with thumbscrews on each end to the doubled strap just beyond the buckle. After placing the clamp upon the doubled strap, the two thumbscrews are tightened, and the strap cannot slip.

The entire cam box ascender has been fabricated with the primary objective of safety, both during use and over a long term period. All surfaces which can touch either the rope, the Jumar sling, or the attachment straps are rounded. All parts are machined from hgh quality aluminum alloy, type 6061-T6, or stainless steel. Both the chest Jumar pivot shaft and the knurled knob on the locking screw are held in place with steel pins. The pivot block, the groove block, and the block on the gate are held in place by coarse thread size 10-24 flat head screws. The gate pivot screw is a high tensile aircraft bolt which is held in place by a self-locking stainless steel nut. When the gate is closed and locked, the rope and cam are enclosed in a complete screwed-together metal framework in which loading resulting from rope tension is essentially balanced.



Cam Box

The cam box ascender has a few minor problems. The chief problem as I see it, is that it is somewhat complex and consequently rather expensive. Machining and assembly took me about 20 hours. Like a Jumar, the ascender is laterally asymmetric; my version is right handed because I am right handed. The cam is spring loaded and thus is constantly in contact with the rope, which could wear on the cam in muddy situations. The design will not accomodate a Gibbs cam, though a cam with Gibbs-type teeth could readily be fabricated for this purpose. The system is inherently an inchworm system, though it could be modified by using a second Jumar. Most important, the cam box ascender has not received extensive usage in a wide range of environments, which would uncover potential problems and suggest modifications. □

SPECIAL THANKS Take careful notice of the names listed under each Feature Article in the Table of Contents on the inside of the cover. These are the movers and the shakers of the vertical world. These are the people that feel being current about vertical stuff is important. Their concern keeps this publication alive and I truly appreciate their contributions. Words cannot express my gratitude. Thank you!

ALWAYS LOOKING FOR GOOD ARTICLES

OUR REPRINTING POLICY We have always felt that it can only benefit everyone if the vertical procedures as described in the **Nylon Highway** be reprinted in every publication that will do it. We only request that the Author receive credit for his/her work and the **Nylon Highway** receive credit as being the original publication.

LETTER TO THE EDITOR

I read that article on the bowline knot in **N. H. #22**, and I found it very interesting. Do you think the **NYLON HIGHWAY** could publish a permanent column named "Myth to Rest" (or something of that sort) and keep us informed regarding so many ???????'s of the vertical world?

Myrna Diaz Mundo

REPLY As I run across them I'd love to. Any help from the reading audience? If you don't want to write just call me and tell me and I'll transcribe our phone call. Editor. □

Ropercisor from page 8.

like a pendulum. If you have a high ceiling, you can reduce the pendulum effect by hanging the ropercizor from a long rope.

Jim Hall has made the suggestion that the pulley disc parts should not be glued, but should be held together by 2 additional dowels spaced 120 degrees around the pulley from the dowel that secures the rope bend in its cavity. This would make it easy to replace the two outside discs when they wear thin.

Walter Olnick has suggested that this outside 7" wooden pulley discs should be replaced with steel discs and 2 pairs of regular disc brake pads be set into the square wooden brake plates. This way there would likely never be a need to replace brake parts.

Cricket Deane suggested the name "Ropercizor".

Ideas for improvements of this device or plans for entirely different prusik practice devices are hereby solicited. □

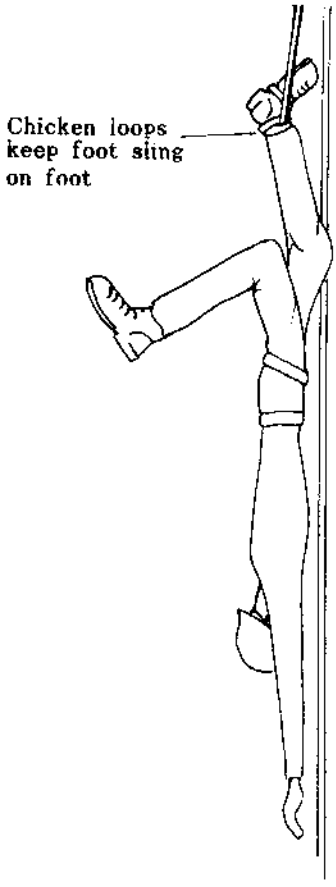
RECOVERING FROM A HEEL-HANG

By Bruce Smith

It is very unusual, but that rare time when all upper safeties, ascenders, chest boxes and tethers fail, resulting in probably one of the worst situations, except falling, the heel-hang. The jury hasn't fully decided, but it is believed that a double heel hang is worse than a single heel-hang. Let's look at the worst case.

CHICKEN LOOPS

To insure that a climber will at least survive an inversion, (catastrophic failure of all upper connections resulting in a heel-hang), requires the use of chicken loops (fig. #1). These can be attached to the climbing system or as sewn anklets put on before the climber's boots are placed on. Fastex buckles, shoe laces or other flimsy materials should not be used as the forces that are involved must often bear the climber's entire weight and more.



FALLING INTO A HEEL-HANG

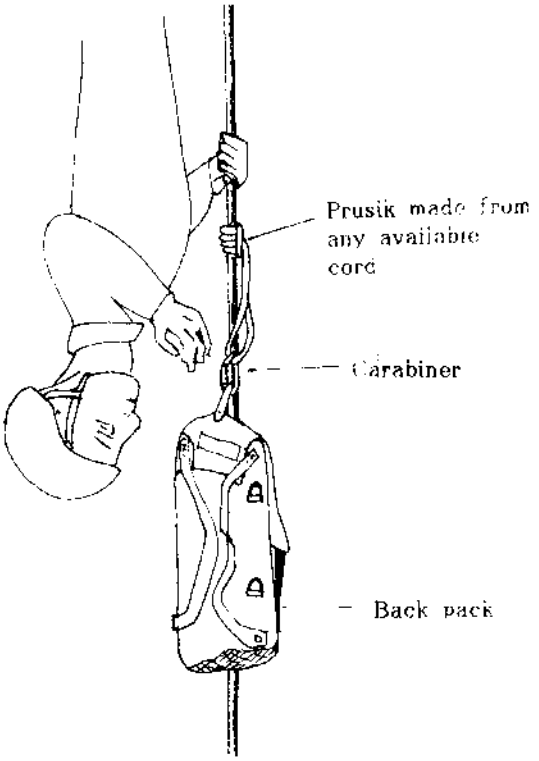
Unfortunately, falling into a heel-hang is castostrophic and finds the head of the climber falling sometimes as far as 12 feet. A good helmet with an exceilent side impact rating is necessary. The boots must be tight, so the loops remain on the ankles ultimately insuring that the climber remains on the rope as well. A good helmet with a four point suspension chin strap is essential. The reasons for high priced equipment and high impact ratings are for times just like these.

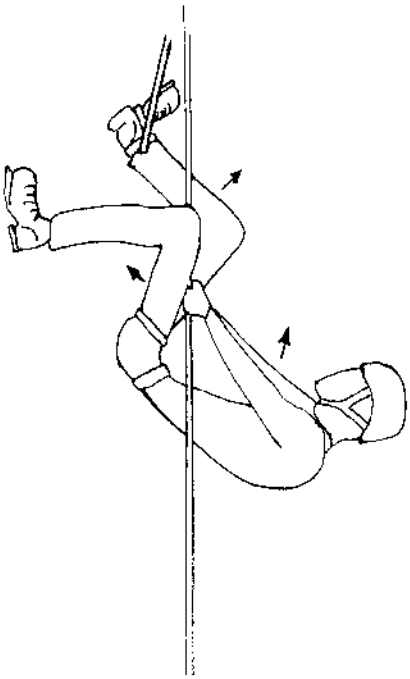
RIGHTING YOURSELF

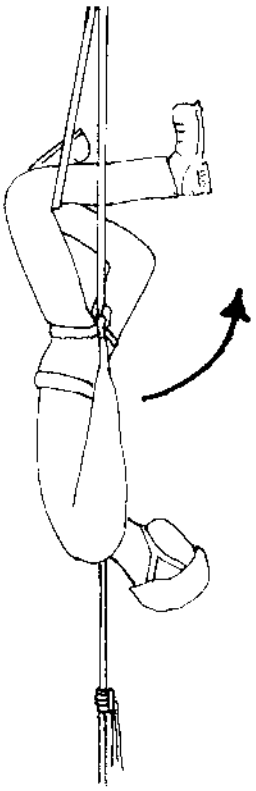
Realize that to right oneself takes a lot of effort and each movement should be carefully planned and deliberately executed. Rarely will a climber have two opportunities to make this work. Practicing is a must. Keep in mind that if you're muddy, wet, injured tired, and possibly hanging in a waterfall, you could have a whole new set of problems to overcome that weren't a part of the practice session. Bottom line, be successful on the first attempt:

1. If you're wearing a back pack or toting a heavy rope which caused the problem in the first place, either drop it or remove it from yourself and reattach it to the rope with an ascender or knot or anything. Remember, you've only got about 3 minutes before exhaustion and blackout may occur (fig. #2).
2. Bend both knees, bend at the waist and pull the body up about 10 to 12 inches (fig. #3).
3. Take the weaker of your two legs and hook it over the top of the opposite foot. A right

handed person often seems comfortable hooking their left leg atop their right foot (fig. #4).



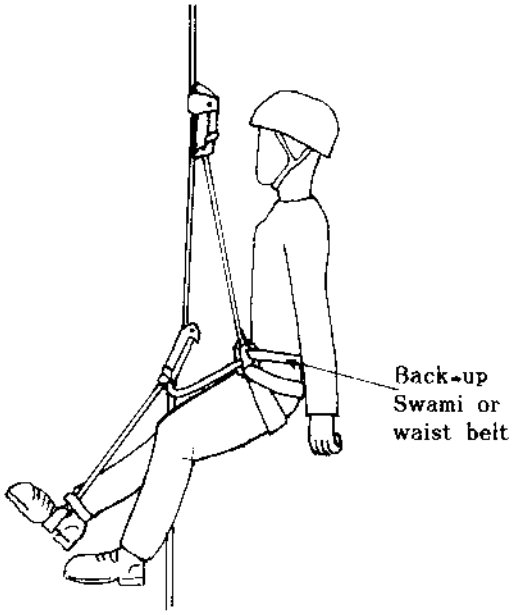




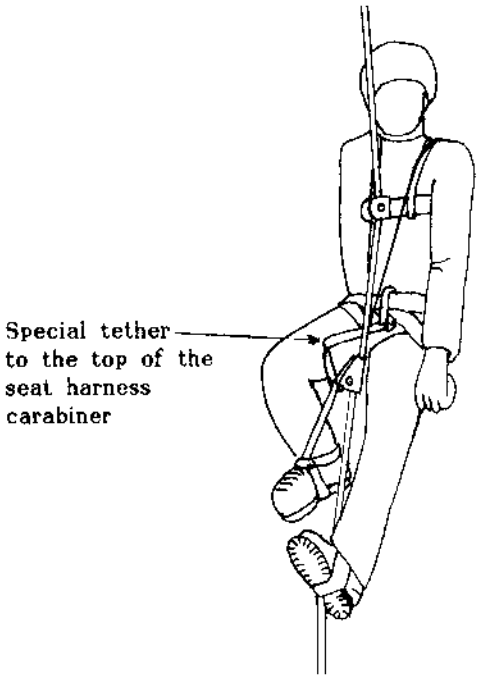
4. At this point all the balance points, counter balance forces and pivot points are in place to right the climber. A simple rocking motion forward assisted by the pull of the arms will raise the climber and find him/herself sitting on their left foot (fig. #5).
5. Clip into the rope with a safety Jumar.

PREVENTION

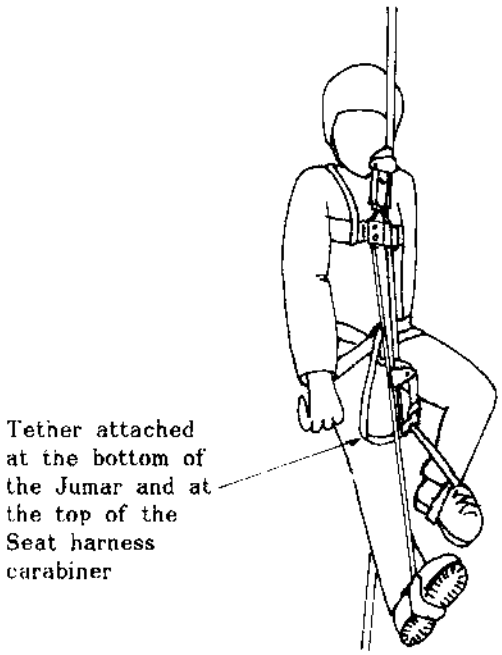
The best remedy for a heel-hang is prevention. Prevention can be easily arranged with a short tether from one's seat harness to one of the foot ascenders.



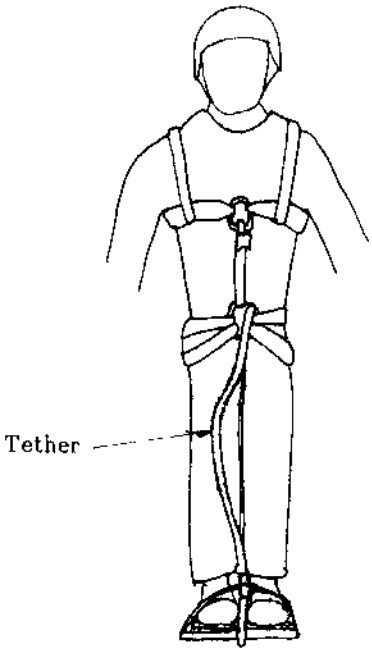
Texas System requires a small tether between the lower ascender and the seat harness (fig. #6).



Gibbs Ropewalker Systems require a small tether from the knee cam ascender to the seat harness (fig. #7).



Mitchell System requires a tether from the short foot ascender to the seat harness (fig. #8).



Inchworm requires a tether from the Mar-bar to the seat harness (fig. #9).

Gary Storrick once stated during the 1985 NSS Convention in Kentucky, that in the event of catastrophic failure of a system, a climber should never be allowed to fall and never be allowed to fall upside down. I agree. □

1986 MINUTES

The 1986 meeting of the NSS Vertical Section was held Monday, June 23,in Tularosa, NM at Tularosa High School. Executive Committee Members present were Bill Cuddington, Kirk MacGregor, and D. C. Province. **Nylon Highway** Editor Bruce Smith substituted for Secretary/Treasurer, Bill Bussey, who was delayed.

Because Richard Schreiber could not make it to Convention, Kirk MacGregor chaired the meeting. MacGregor called the meeting to order at about 12:30 pm.

Old business was first on the agenda. Editor Bruce Smith discussed the appropriation of **$300.00** for a "Headliner" to aid in the production of **Nylon Highway**; made during last year's Section meeting. Smith said that he had not purchased a "Headliner" because he could get any necessary typesetting done far less expensively at a local print shop. Typesetting for **Nylon Highway #22** cost $10.73. Thus he felt that the "Headliner" was not economically justified. Smith moved that the "Headliner" not be purchased. Allen Padgett seconded. The vote was unanimously in favor of the motion.

Next, Kirk MacGregor opened discussion on the Job Descriptions as discussed at last year's meeting and printed in **Nylon Highway #21**. Bruce thought an addition to the Job Descriptions should be that someone or some board should make money making, or money spending decisions for the Section. Such spending questions have come about in the past year with the decision to reimburse the illustrator of **On Rope** with Section funds until the NSS reimburses the Section. Another was the decision to reprint several issues of Nylon Highway. Smith asked, "Who tells us its Okay to spend these funds?"

Allen Padgett noted that having a specified ceiling amount above which approval from the board was needed was a possible idea. Kirk MacGregor thought that a "controversial" expenditure provision was needed. Smith moved:

> That the Vertical Section adopt the Job Descriptions proposal as printed in **Nylon Highway #21** with the addition of this amendment:
> That any purchase of over $100.00 or purchase that might be considered controversial in regard to Vertical Section activities, be approved by the Vertical Section Executive Committee.

Allen Padgett seconded.

Discussion then followed as to what would be considered "unusual" or "controversial".

After discussion, a vote was held on the amendment. The amendment passed unanimously. A vote to adopt the Job Descriptions as amended also passed unanimously.

Last year's motion that the Executive Committee look into a symbolic device for the Section was next discussed. Nothing had been done by the committee on this. Allen Padget moved that:

> The Section continue to search for a logo for Symbolic device use and appoint Karen Padgett as ad hoc committee chairperson.

The motion passed unanimously.

Next, Bill Bussey, who had arrived at the meeting during the previous discussion, gave the Secretary's

and Treasurer's Report. These can be found elsewhere in this issue. Bruce Smith noted that we are sustaining a high level of membership from year to year. Bussey noted that an unusual expenditure this year was reimbursement of Pandra Williams drawings for **On Rope**. Allen Padgett clarified that this would be reimbursed by the NSS when the book is ready to sell.

Kirk MacGregor wanted to know how much of the balance was committed or reserved due to multi-year memberships. The figure was $723.00 reserved for future issues of **Nylon Highway**.

Bruce Smith and Allen Padgett then passed out outlines of their book, **On Rope** to members present. While this was going on, Smith commended publisher Terry Raines on his good job on printing **Nylon Highway #'s 21 & 22**. They also showed examples of the work of illustrator, Pandra Williams. Discussion followed on illustration costs, critique costs, proofreading, publishing cost and date. Padgett noted that they are expecting the book to be published in time for Christmas at a hardcover cost of around $20.00.

Next, new business was discussed. Bill Cuddington asked for help during the Climbing Contest starting Tuesday. Cuddington thanked Delbert Province for fixing the contest pulley. Cuddington then brought up a change in the rules of the Classic 3 Knot climbing rig. These knots are normally each connected to a foot. The three knots will have to be moved one at a time just like most do in the field. Cuddington noted that Prusik knots are dangerous when moved two at a time. Cuddington said that he went on and made this change as contest coordinator.

Discussion followed on clarification of exactly what action the rule prohibited. One member asked for a demonstration. Without the time or facilities for that, Bruce Smith asked for a vote on the rule change. Kirk MacGregor noted that this was not required as the contest coordinator is appointed by the Section and as such can make such rulings.

After this further New Business was discussed. Bruce Smith made the motion that:

> The minutes of the Vertical Section meeting be typed up and distributed to the Executive Committee Members no later than thirty days after the official, annual meeting.

Gary Storrick seconded.

In discussion, Bruce noted that the primary issues or old business did not get done this past year because the minutes were not available to the Executive Committee Members, until two weeks before convention.

The vote on the motion passed unanimously.

Bill Bussey then asked the membership for a consensus on whether we should let **Nylon Highway** issues go out of print, or continue to reprint them as stock quantities dictate.

Discussion followed with majority opinion being that the Executive Committee should continue to reprint **Nylon Highway's** as needed for the forseeable future.

With no further new business, Kirk MacGregor called for elections. Before starting, MacGregor announced that he was resigning from the Executive Committee due to job demands. He noted that he originally got on the Executive Committee to try and change a trend of the Section becoming a closed group, setting certain standards and rules,

saying things must be done in a certain way, and not being open to people from all parts of North America. He feels he has accomplished this change, as the Vertical Section is very much open, continually spotlights new ideas, moves forward with leading edge technology, and has a international interest.

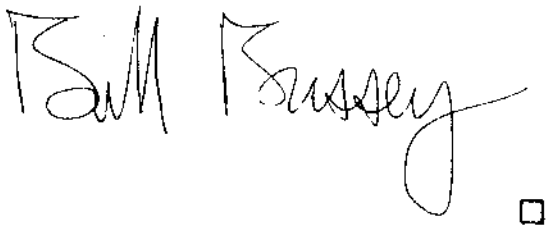
The meeting concluded with elections. Those elected were:

Bill Bussey	Secretary/Treasurer.
Bruce Smith	Editor **Nylon Highway**.
Bill Cuddington	Executive Committee Member.
Shari Lydy	Executive Committee Member.
Allen Padgett	Executive Committee Member.
Daryl Tomer	Executive Committee Member.

The meeting was adjourned at approximately 2:30 p.m.

Later during the week, the Executive Committee met and selected Shari Lydy as Chairwoman.

Respectfully Submitted,



□

DEALERS and MANUFACTURERS The **NYLON HIGHWAY** has always reserved space for any article about a piece of equipment that you may manufacture and/or sell at **NO CHARGE**. This is meant to be a one time offer for each piece of equipment. For example, Russ Anderson could write an article about his figure 8 in one issue and his pulley's in another issue, etc. until he covers every item in his catalog. The second time he wants something published about the same piece of equipment comes under the category of advertising. This free service is offered for obvious reasons, to inform the public as to attributes of various pieces of equipment. Very few dealers have taken advantage of this service which confuses the hell out of me. The Editor.

Aging Rope

Your rope may be too old. That 1500' piece you used in 1975 to do El Sotano may have outlived its useful life. There is a lot of mystery surrounding aging nylon. What do we know about it? Not much. Nylon is a plastic of sorts. Does it last forever? Preliminary studies of some old rope samples indicate that the abrasion resistance has deteriorated and that the breaking strength may have diminished to 50-70% of its orginally advertised strength. Furthermore, it appears as if repeated washing and drying, though recommended, adds to the shortening of rope life. It appears as if repeated drying tends to cause the tiny fibers to become somewhat brittle and prone to a condition similar to "dry-rot" (though no such thing supposedly exists with nylon products).

HELP make our study more complete by sending 10 feet off the end of each of your old ropes. Include the history of the rope. Important details to include would be the purchase date, storage (on the floor, on a hook, in a bag, in the trunk, etc.), type of usage (heavy cave, mud, cliff, clean, never used, etc.), washing methods, (soaps and frequency), and anything else that may be particularly interesting. **SEND TO**

Bruce Smith
1822 Mountain Bay Drive
Hixson, TN 37343

I have every intension of sending a report of the test results of each rope back to its contributor. □

Administrative

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For Spouse memberships add $1.00. Please insure that these payments are in U.S. dollars. Frequency of the publication is based on the availability of material. All material that is submitted must be readable. The Editor is able to arrange, upon request relatively quality drawings explaining your topic. As many of the articles published in the **Nylon Highway** are experimental, the NSS, Vertical Section, the Editor as well as any and all authors whos names appear in the **Nylon Highway** absolve themselves of all responsibility. It should be understood by the reader that the responsibility lies with those who choose to experiment further with the information contained here. The **Nylon Highway** attempts to screen and publish reliable high quality material that in the Author's and Editor's best judgement appears to be sound in principle and is backed up with supportive testing or facts. The science of SRT is ever changing because cavers and climbers are constantly finding better safer and more efficient ways of acheiving our goals. Always experiment using good judgement and adequate caution. ...**THE EDITOR** □

Treasurer's Report

June 19, 1986

INCOME:	
Memberships	$1234.00
Subscriptions	56.00
Back Issue Sales	1133.40
Bank Interest	133.89
Vertical Techniques Workshop	160.00
Advertising	20.00
Other	10.75
Total Income	**$2748.04**
EXPENSES:	
Editor:	
Postage Permits	$50.00
Mailing **Nylon Highway #21**	64.53
Printing **Nylon Highway #21**	363.50
Mailing **Nylon Highway #22**	96.37
Printing **Nylon Highway #22** (projected)	500.00
Typsetting	10.73
Other Postage	48.19
Mailing Envelopes	80.33
Other Supplies and Materials	33.90
Total Editor Expenses	**$1247.55**
Secretary-Treasurer:	
Postage	$148.00
Vertical Contest Supplies	28.98
Vertical Techniques Workshop Supplies	38.43
Supplies	69.59
Advertisements	68.00
Reprinting **Nylon Highway #13**	213.18
Reprinting **Nylon Highway #10**	144.47
*Pandra Williams, Illustrator	424.51
Total Secretary/Treasurer Expenses	**$1161.76**
Total Expenses	**$2409.31**
Balance as of June 21, 1985	$1859.73
Net Income	338.73
Cash Balance as of June 19, 1986	**2198.46**
Accounts receiveable *NSS On Rope	424.51
Cash Position as 6-19-86	**$2622.97**

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THE McINTYRE BLUFF HIGHLINE
THE "BIG MAC"

By Phil Whitfield

Carabiner gates and pulley sheaves buzzed uncannily with the wind vibration of the 1471 foot highline as members of the team prepared Wolfgang for his stretcher descent 975 vertical feet from the crest of McIntyre Bluff and 1101 horizontal feet to far side of the Okanagan River below. The critical moment of the record setting highline project was at hand, but this was only a one day operation in the week long Seventh Annual Cliff Rescue Seminar, organized by the Provincial Emergency Program (PEP) of the British Columbia Ministry of Environment.

The Cliff Rescue Seminars grew out of a need to develop, test and standardize safe technical rescue procedures for use by the approximately twenty Provincially sponsored cliff rescue teams in communities throughout British Columbia. In addition, the seminars provide an opportunity to hone instructional techniques and train new instructors. I had only become involved in 1985 when, after three years of participation in National Cave Rescue Commission (NCRC) seminars in the States, I had approached PEP Search and Rescue Co-ordinator Bjarne Torshaug, about trying to integrate the rescue capabilities of British Columbia cavers with the formal Provincial program.

At the March 1985 Cliff Rescue Seminar, I was impressed to find that PEP's safety margins were considerably wider than those I had become accustomed to working with in cave rescue. A major reason for this situation is the program's extensive use of 7 mm and 8 mm tripple wrap prusik slings in place of mechanical ascenders at all critical points in lowering, raising and highline systems. Seminar drop-tests graphically demonstrated that shock-loaded cam ascenders regularly produced rope failure in situations where equally shock-loaded tandem prusiks might slip and even partially melt, but would hold firm without serious rope damage. The day before our record-setting "Big Mac" highline project, our 1986 Seminar team put the prusiks to a highly relevant test. A 100 foot long highline suspending a 235 lb. weight was severed and the load plunged down for 16 feet, but was held comfortabley by the connected taglines, both of which had been belayed through tandem 8 mm prusiks. Rope and sling stretch had absorbed the shock to such a degree that the prusiks did not slip, were easy to untie and left no mark on the 11 mm taglines.

In 1985, Seminar leader Arnor Larson, a mountain guide and rescue consultant from Invermere, B. C., had organized a number of exercises to evolve a versatile and reliable "Kootenay Highline" system. After a week of successfully testing high tension, low clearance, multiple mainline highlines, and other variations of the systems, Arnor suggested that the 1986 Seminar team consider going for a final test: a record setting highline span. Having in mind that transportation was the theme of British Columbia's Expo '86 World's Fair in Vancouver, I contacted fellow caver Steve Hudson of PMI and obtained the generous donaton of an unspliced 1800 foot length of 1/2" PMI 9000 EZ Bend rope for the attempt. Arnor spent much of February having the site distances checked by survey and engineering the system to ensure its safety margin and detailed rigging requirements. The week before the

operation, Arnor, Zan Mautner and Jim Coe strung a light pilot line from the top of McIntyre Bluff to the landing site below. When the other ten Seminar members arrived by the evening of Sunday, March 9th, all that was needed was co-operative weather for the next day.

The snow had recently melted from our operational area, but Monday the 10th dawned cloudy and cold, with a distinct threat of rain or snow. Arnor, Seminar members from Vancouver Island were on the bottom site alongside Highway 97 by 6:05 am, but the other nine team members, laden with over 2000 feet of rope, took until 7:40 to hike up the sloping back of the Bluff to the top rigging point. In light snow and an icy wind, top team leader Zan Mautner co-ordinated setup of the boulder and small tree anchor systems, the preparation of the light polypropylene messenger line, and the erection of the 8 foot high long A-frame at the cliff edge. By 9:50 the messenger line had been hauled down to the bottom site quad-pod and drill steel picket anchor system (after a slight altercation with a tree). Twenty minutes later, the first of three 600 foot spools of 7/16" Bluewater II comprising the top tagline started down the cliff, attached to the end of the messenger line. To strengthen the double clove hitch knots joining the three tagline sections, an 8 mm sling was prusiked across the knots to help absorb any initial shock loading.

At 10:55, well into the third spool, the top tagline reached the bottom. The PMI mainline, the two knot-passing pulleys of the stretcher suspension, and the lower tagline (also three 600 foot spools) were all attached to the end of the upper tagline and started up at 11:12, pulled with a 2:1 system by the top team. Although the lines reached the top station in only 40 minutes, the mainline and tagline were not threaded through the A-frame and tensioned until 12:41. By 1:16 pm, however, a 235 lb. test load of logs was on its way down the highline. In another of Arnor's shock absorbing innovations, the suspension system was rigged with the top tagline running through the higher pulley carabiner and attaching to the lower pulley carabiner, to maintain tension. The lower tagline was rigged correspondingly, effectively eliminating the need for the usual connecting sling between the two suspension pulleys, and offering again the advantage of the prusik "slipping clutch" effect in event of shock loading.

The logs took 62 minutes to lower, with various bugs being worked out on the way. We found that the 6 bar rack somewhat overheated on a fast lower, and, lacking spare water for cooling the rack, we opted for a relatively slow descent. Each tagline knot was passed smoothly around the brake in less than 30 seconds, and the tagline was suspended from pulleys or carabiners on the mainline at roughly 300 foot intervals to avoid excessive bellying or twisting of lines. The pretest with the logs proved relatively flawless, though as someone remarked, we would never make much profit in the highline logging business!

We hauled the empty stretcher up in 45 minutes, and Wolfgang Scholz of Chilliwack was carefully packaged for his solo ride down. Several small Z-rigs were used to assist the edge crew in raising Wolfgang and attaching the stretcher to the mainline. This phase was particularly thrilling to watch, as the suspension gear was outboard of the A-frame, which itself actually overhung the sheer 971 foot drop. All went smoothly, however, and by 4:19 pm, Wolfgang was on his way. The lowering operation went like clockwork. Fifty-seven minutes later, Wolfgang was lowered to the ground at the bottom quad-pod. A number of bystanders had collected from the adjacent highway, and one remarked to Wolfgang: "You must have a lot of

guts to do that" "Not really," grinned Wolf modestly, "I just trust my friends up top!"

Our timing had been close: dusk began to settle within half an hour of Wolfgang's descent, but we managed to pack up the entire system in only 90 minutes, finishing at 7:00 pm by the light of headlamps. By 9:00 pm, we were all back at the Penticton SAR hall, weary, but satisfied at having achieved our objective. The entire operation had taken the 13 of us 13 hours (169 man-hours). Obviously, such a major highline is not a practical rescue system in the age of helicopter longlining, but our project, like the 825 foot Devil's Tower highline in 1984, provided a diverting practical exercise, as well as being a successful test of Kootenay Highline system principles taken to an extreme.

"Big Mac" Participants Bottom Team: Arnor Larson, Bjarne Thorshaug, Andrew Spray, Don McInnes; Top Team: Zan Mautner, Jim Coe, Bob Mackie, Gordon Meakin, Brian Nuttall, Wolfgang Scholz, Reg Thompson, Don Torry, Phil Whilfield.

"Big Mac" Specifications Total span - 1471 feet, Vertical drop - 975 feet, Horizontal extent - 1101 feet, slope 41 32'30", Mainline - 1/2" PMI 9000 EZ Bend, Taglines - 7/16" Bluewater II, Stretcher - Cascade Toboggan Model 200, Pulleys - Russ Anderson knot passing (special design for Arnor Larson), top tagline brake - SMC welded eye rappel rack with 6 aluminum brake bars.

Editor: There is a lot to be said for tilted tyroleans like these. They, in many cases, may be the only method of patient evacuation over difficult terrain. Helicopters are often unavailable and a highline can solve transportation problems that have no other solution. Also, "Big Mac's" use of triple wrap prusik knots in place of mechanical ascenders has a lot of merit. The dynamics of these mega challenges may end up ruling out the safe use of cam type rope attachments for end attachments or tensioning. Under high tensioning with mechanical ascenders the rope fails first do to the pinching that takes place.

Since the "Big Mac" in March another even longer tilted tyrolean has been done by key personal from from PMI in cooperation with many of the Toronto Rescue people off the top of the CN tower using 7/16" rope over a distance exceeding 4200 feet. More on this in a future issue. □