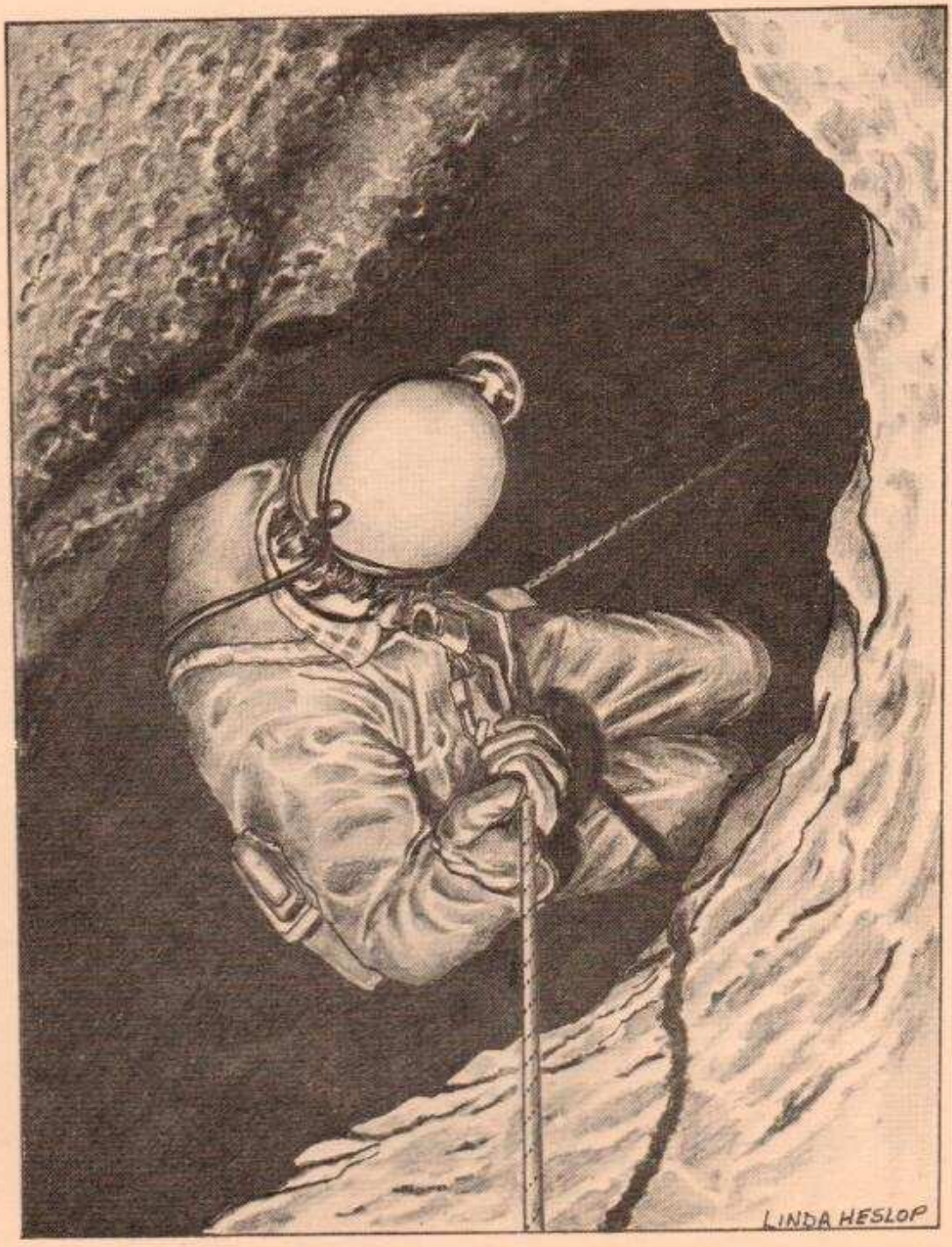
NYLON HIGHWAY NO. 24



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JUNE 1987

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Cover Drawing from a photograph of Steve Logan in Nakimu Cave, British Columbia. Linda Heslop

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PETZL'S FIVE BAR RACK

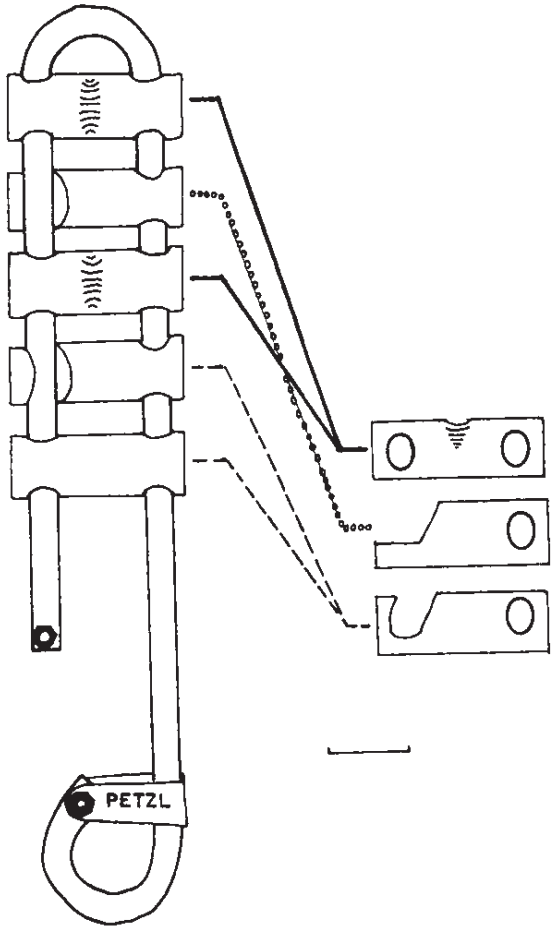
By Allen Padgett

The European equipment manufacturer Petzl is now producing a version of the rappel rack. Their design is for five bars so this rack is not recommended for light people and long descents. The Petzl rack is 11 1/2 inches long with seven inches of bar-travel distance. The standard American rack is 14 inches long and has 10 inches of bar-travel distance. The stainless steel frame is slightly narrower than a normal rack (1 1/8" vs. 1 3/8"). The aluminum bars are built narrower to fit this frame. The downsized Petzl rack in its five bar configuration has serious limitations for North American style rope work, but it has several innovative design ideas.

To prevent rigging in backwards the Petzl rack utilizes two slotless red anodized bars in the top and third positions. These bars also have built in training grooves to keep the rope wear in the bar centers. The second bar has no lip so it cannot be engaged from the wrong side. This arrangement makes the Petzl an almost idiot proof device.

Slotless bars cannot be threaded onto a standard rack frame. Petzl solved this problem by forming the rack eye in a hook shape and uses a "U" shaped metal piece to complete the eye. With the metal piece removed, one hole of the slotless bar is threaded onto the hook shape and then moved upward. The short leg of the rack frame is threaded through the other hole. The bar can then be slid into place. All other regular bars are loaded via the hook and arranged on the long leg of the rack. The "U" shaped metal piece is replaced and locked into position with a locking bolt that passes through each side of the metal piece and the rack frame.

The Petzl rack is well made five-bar rack with several innovative safety fetures. It would be ideal if they simply made it with standard 6-bar-rack dimensions. The Petzl rack is available from any PMI distributor and retails for $54.00. □



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.

ANOTHER ROPE PAD

By Shari Lydy

If you've ever gone "scenic mountain" rappelling with Bill and Miriam Cuddington, then you know about Bill's custom made rope pads. These canvas pads are very durable and protect ropes well from granite rock abrasion. They were the inspiration for my scaled-down caver version of the canvas rope pad. Traditionally cavers use old carpet scraps for rope pads. This material tends to soak up water and mud in caves and makes the pad a real hassle to drag around and use. And quite frankly, I've never trusted the mix of nylon rope on nylon rug. I've tried slit rubber hose pads, old packs, mailbags, etc. without satisfaction.

When Bill Bussey supplied me with some scrap heavy duty canvas and 2" Velcro, I took to the sewing machine. The result was a rope pad that is lightweight yet durable, versatile, and compressible. My original pad has been in use for two years now and is still going strong. One can make several pads in an afternoon using a basic Kenmore sewing machine. Here's how!

Materials

-Cotton or army duck canvas - 7 or 10 oz. weight fabric.

-9 inches of 2" velcro.

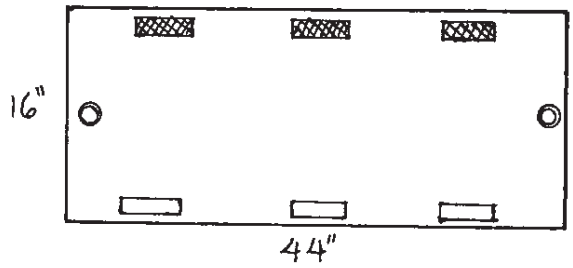
-Size 4 (half-inch) brass grommets.

-25' of small 1/8" diameter utility cord.

Directions

1. Cut canvas 20" X 48". Zigzag raw edges, fold under, and finish seams to keep material from raveling.
2. Sew on 3" strips of Velcro--three per side and evenly spaced.
3. Set grommets at both ends of the pad.

The size of the pad is not critical. These dimensions were chosen to accomodate padding situations I've encountered. The Velcro keeps the pad under and around the rope and allows the pad to be easily passed on descent or ascent. Small diameter cord is tied to one end of the pad for rigging. Other pads can be pigtailed from the lower grommet. The tight weave of heavy duty canvas tends to repel water and mud, so the pad remains pretty lightweight and folds to 7" X 5" X 2", thus easily fitting into one's pack. Cotton canvas can be obtained from tent and awning or fabric stores, and the Campmor catalog. Try to get canvas that is water and mildew resistant. Also, weight-wise, canvas heavier than 7-10 oz. will be more bulky and difficult to sew. □



Rebelays continued from page 6

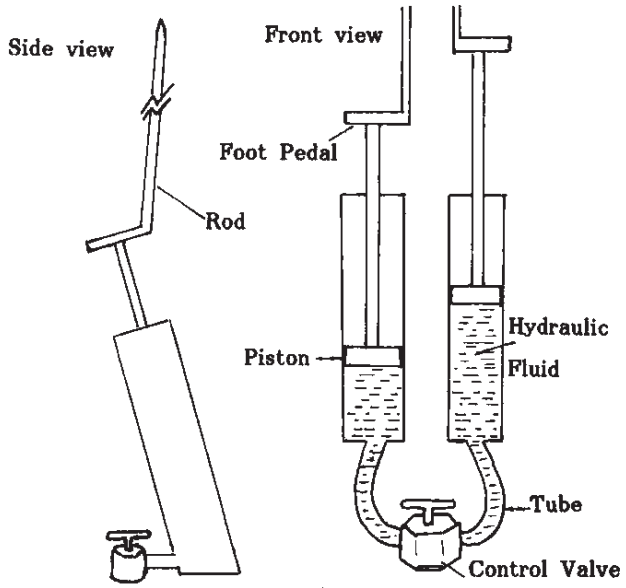
Editor Recently, I have been hearing reports (rumors) that the cave rescue groups in Europe work overtime answering to dozens upon dozens of calls a week. The Walker Co. rescue squad nestled in the heart of big vertical cave country has averaged 2 vertical cave emergencies per year for the last 2 years. If the rumors are infact true perhaps there is an answer after all David. I would like to see a European Accident report similar to those published by the NSS to compare if in fact rebelays are a safety concern. □

GOSSETT APPROACH TO PRUSIK PRACTICE

By Darrel W. Tomer

In **Nylon Highway #22** I asked vertical cavers to originate ideas for a rope climbing practice device. On the last day of the Tularosa Convention, who should knock on my door, but Jim Gossett. He said my practice device was too hard to get into and he wanted to make one that didn't hang from the ceiling, but sat on the floor and the cavers could just stand on it and start exercising. He envisioned two vertical acting pedals connected somehow that when one went down it forced the other one up.

Together we worked on the idea and came up with the following:



Tilted to get action more realistic.

To use it, you grasp the metal rods in each hand, put your feet on the pedals and start stepping up and down. The motion is much like actual rope climbing and should be a big help in getting into condition for a rope climb.

What I like about Jim's idea is that it's a radical departure from the fixed idea that a rope has to be employed in a rope climbing practice device. That's good thinking, even if it turns out to be an impractical approach. □

PRUSIKING IS WEIGHT LIFTING
or
Is Pushing 40 Exercise Enough?

By Cricket Haygood

First day of spring! You haven't been caving since last fall, but your friends have found this neat 100 foot pit and you run off to yo-yo it with them. Now you're at the bottom of the pit, all rigged, and ready to show off your macho rope climbing skills.

You fly up for the first 35 feet and your legs stop functioning. You rest, promise your legs a beer, and brute force your way up another 20 feet. Now your arms are wasted, since they've been helping the legs, but you grit your teeth, promise your arms they can have a beer too, and forge ahead. Another 13 feet. At this point you can hardly breathe because your chest harness is so tight. You promise all your tired muscles thay can each have their own beer, choclolate, pizza, anything! Then you look at the last 32 feet and push the Jumar up...

Yes, you get out, and no, none of your friends noticed that your body died somewhere between 60 and 70 feet. and if you're like me, you sit at the top of that pit catching your breath, knowing that tomorrow those aching muscles will hurt WORSE!!

What happened? Well, if you, plus all your gear weigh 150 pounds, you expended a minimum of 100 X 150 foot pounds of energy using muscles that have spent the past six months watching TV. Specifically, if you gained one vertical foot for each prusik cycle, you did 100 cycles of weight-lifting exercises that equalled much more than 150 pounds per cycle.

Prusiking is weight lifting. I'll analyze the body from the top down.

NECK How much does your helmet and lamp weigh? Say 5 lbs. Plus you are always twisting your head, looking around, and trying not to burn the rope. Give yourself credit for something like 100 neck presses at 5 lbs. each. (Ever wonder why your neck hurts the day after a caving trip?)

ARMS AND SHOULDERS Lifting your Jumar, Gibbs, or Prusik knot is roughly equivalent to a dumbbell overhead press. You did 100 of those for each arm. If all you lift is the prusik device, give yourself credit for a 2 lb. weight in each hand. (Take a 2 lb. soup can in each can and see if you can do 100 overhead lifts without stopping. You probably can.) If your arms are actually dragging the remainder of your body up the rope, give yourself credit for a 75 lb. weight in each hand. (Take a 75 lb. soup can in each hand...)

ABDOMINALS To raise your leg for each step up the rope you use your lower abdominal and hip flexor muscles. This exercise is called a vertical knee-up. To simulate the abdominal work of prusiking, hang from a bar and bring your knees to your chest 100 times. Now put on your caving boots and do it 100 more times. (If you can't do this at all, build up to it by sitting on the edge of a chair, toes touching the floor, and bring your knees to your chest 20 times.) Your legs represent about 45 percent of body weight, so give yourself credit for 100 vertical knee-ups at 68 lbs.

LEGS Your legs are what should be doing most of the work of prusiking. They are used to walking around and carrying your body weight (think of all the miles you hiked going from the TV to the refrigerator...). The specific exercise that the legs do in prusiking is the squat. Squats are very good for you and not very hard for most people to do. (We all climb stairs, and even just a little of that will make your legs strong enough for prusiking squats.) If all goes well, give yourself credit for 100 squats, lifting 150 lbs. Unfortunately, to attain the squat starting position, you had to do 100 vertical knee-ups.

100 neck presses	5 lbs. each
100 dumbbell lifts (2 hands)	4 lbs. each
100 vertical knee-ups	68 lbs. each
100 squats	150 lbs. each
100 cycles	227 lbs. each
Total	**22700 ft lbs of energy.**

Just to get you up that pit.

So what exactly happened on that 100 feet of rope? First, your abdominal muscles failed after 35 vertical knee-ups. That's why your legs stopped. Then you climbed for another 20 feet, demanding that your legs take over the functions of the abdominal muscles. (This is not physically possible, but we all try.) Then your legs gave out for real. So you bravely pushed on for another 13 feet, hoping your arms could do what your legs and abdominals could not. And of course your chest harness didn't fit, because you gained a couple of pounds watching Monday Night Football. Then your neck started to cramp. What a disaster!

Worst of all, I am speaking from experience. this kind of disaster happens to me at least once a year, and everytime, I say "Next time, I'll get in shape first!" So I haven't been pitting for awhile, but maybe next time.... ❑

ARE REBELAYS SAFE?

By David R. McClurg

Rebelay Rigging. The French system of vertical caving (single rope techniques) apparently takes as an article of faith that rope must never contact the cave wall. Mike Meredith in his booklet Vertical Caving (which despite the title, deals principally with French techniques) says:

> Taking into account the weaknesses of our equipment and the rock itself, it is necessary to rig pitches so that:
> -the rope does not rub against the rock;
> -only samll shocks are possible (e.g. if an anchor gives away);
> -all doubtful anchor points, and that includes all 8 mm bolts, are backed up with an independent anchor.

I certainly have no quarrel with points two and three about avoiding shock loading and backing up anchors. However, in my view his point number one is an unwarranted assumption. Our style of rigging is different (we pad lips not smooth surfaces), and oour ropes do not suffer abrasion in normal cave use. Apparently, European ropes need rebelays (intermediate anchors), to keep their ropes from becoming abraded. Before getting into specifics, let's review a few facts about American vertical techniques.

25 Years of Proven Safety. During the past 25 years, American vertical techniques have become highly developed and have proven themselves safe, simple, and versatile. They have enabled us to explore both the deep free-fall pits (150 to 1000 plus feet), and the complex multi-pit cave systems of the United States, Mexico, and elsewhere. They are also very versatile which makes them equally useful for simpler drops in more conventional caves.

Integral to the growth of our vertical techniques has been the development of static American caving ropes. These are ropes of superb quality with several important characteristics:

-Excellent abrasion resistance.
-High strength
-Low stretch
-Freedom from spin
-Relatively low cost.

Don't mistake me. I'm not saying American ropes are made of iron. But with proper padding, they don't abrade and they don't break in normal cave use. The enviable safety record of American vertical cavers is the most eloquent proof of this and of the quality and safety of our ropes and techniques in general.

Padding the Lip. To protect ropes from abrasion, we regularly pad the top of the drop where the rope bends over the lip. We will also pad all other places when there is a sharp edge or other rope cutting surface (like lava). But we do not routinely pad every spot where the rope touches the surface, unless that surface is sharp or abrasive. The fact is, by following these rigging principles, our ropes don't suffer undue abrasion. So, despite Meredith's warning and a similar one echoing Meredith by Roger Mortimer (in the June 1986 Devil's Advocate), ouur ropes don't suffer. Mortimer states, "If a rope can't rub, it can't fray." While this is probably true, it's also true that our ropes don't fray even though they do rub against smooth rock surfaces.

Does this mean that European ropes do fray? I guess they must. In any event, French cavers have come up with this elaborate system of intermediate anchors or rebelays to protect their

ropes. To go with this system of rigging they have devised some really ingenious (but potentially dangerous) techniques to pass around their multiple anchors.

And what about rebelays for our ropes? With their excellent abrasion resistance, our ropes don't seem to need rebelays. Remember the old saying, if it ain't broke, don't fix it. Our ropes and our techniques work for our pits, so we'll continue to use them here. Their ropes and their techniques work for their pits, so by the same token, I'm sure they'll continue to use them there. I'm going to say one is better than the other, just that each meets the needs of the cavers and the conditions where they're used.

Are Rebelays Safe? On the question of safety, however, I do have some opinions. I've heard the claim that rebelays are somehow safer than other methods.

Actually, It can easily be argued that the opposite is true. For one thing, the procedure for getting around rebelays is complicated. It calls for a sequence of steps very much like crossing a knot or changing over between rappel and prusik. It also takes extra energy to make these mid-rope maneuvers, energy which often can be in short supply by the end of a cave trip. Admittedly, European cavers seem very adept at crossing rebelays and have excellent gear for this purpose.

However, the point is that every time you have to take your descender or ascender off the line and reattach it, there's the chance for error. And it's the kind of error that could be very unforgiving. The kind that could make you come off the line or turn upside down.

It brings to mind the old quality control maxim that the simpler a thing is the more reliable it's going to be. More parts, more complexity, less reliability. That's the way I view the procedure for passing these rebelays. Everytime you have to do it, there's one more chance to make a mistake and get yourself into trouble.

Rope Weight vs. Bolt Weight. As to the weight advantage claimed for the smaller diameter ropes now deemed safe if rebelayed to eliminated abrasion, let's put that in perspective. How much do bolts and a bolt kits weight compared to the extra weight of 10 or 11 mm PMI or Blue Water versus 9 mm European rope?

We're taking only a pound or two per hundred feet of rope. Sure, cavers on a push trip into a river system would like to carry as little weight as possible for the 12 to 15 drops and swims they may run into before returning to base camp tha day. But I'll bet the bolts, bolt driver, and piton hammer will weigh about as much as the extra weight of the 10 or 11 mm American caving rope. And a further safety advantage of abrasion resistant ropes is not having to expend the energy of setting all those bolts, not to mention the time it takes (ten to 20 minutes each), which also contributes to fatique.

What's the Answer? Clearly, there are at least two ways to skin the cat. As I said, European ropes and methods work well in their pits and don't seem to kill anybody. Ours work well for our pits and we don't lose people either. Of course, In both cases, equipment and techniques have to be used properly. We can't get sloppy about padding edges and they need to be careful when going around multiple anchors. But in the end, I guess it's all in what you're used to and have been trained for. What do you think?

Rebelays continued on page 2

LET'S MAKE A MITCHELL SYSTEM THAT WORKS

By Bruce W. Smith

Items Necessary

2 right handed Jumars
1 left handed Jumar
1 Gosset Box (or any 2 wheeled chest box)
1 60 inch 2" chest box strap
1 2" cinch strap buckle
4 1" welded D-rings
1 70" one inch tubular webbing (shoulder straps)
2 5" one inch tubular webbing (D-ring holders)
2 17" one inch tubular webbing (chicken loops) (20" required if alternate method is used)
2 21" two inch seat belt straps (foot loops)
20 feet of 5/16" flexible kernmantle rope, use conservatively, you'll need all of it.
15-20 9" pieces of stiff non-rusting wire. To be used as rope clamps similar to metal straps used as cable clamps.
1 Seat harness (low attachment style)
1 30" piece of 1" webbing for a safety Jumar.

Alternative items

4 one inch D-rings for alternate chicken loops
2 20" pieces of webbing rather than 17" for chicken loops.
3 cable thimbles if Petzls will be used instead of Jumars.

Read all instructions first, observe the options and different methods of attachment and needed equipment. Then determine your final design and system configuration.

STEP ONE

Fabricate the Chicken Loops (fig. #1)

Take the two 17" pieces of 1" tubular webbing and determine the proper diameter of loop.

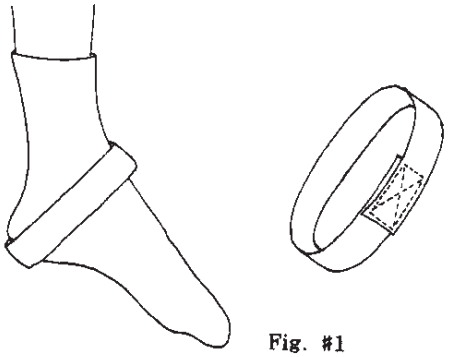


Fig. #1

1. Wear a wool sock (or what you climb in).
2. Circle the loop around your foot at the heel.
3. Leave about 2 fingers of room.
4. Mark the loop with a pencil.
5. Sew securely the two loops with your awl or sewing machine.
6. You'll discover about 2 1/4" to 2 1/2" of overlap.

Alternate Chicken Loops

If you choose to attach your chicken loops to your foot loop skip this first activity and fabricate the chicken loop when you fabricate the foot loops.

STEP TWO

Fabricate the chest harness (fig. #2)

1. Take the 60" two inch strap and 2-inch buckle.
2. Overlap the 2" strap through the 2" buckle about 6" and sew securely. (PMI pre-fabricates this strap and buckle)
3. Take one of the 5" pieces of tubular webbing and two 1" D-rings and sew 1/2" from the buckle as shown in the diagram.
4. Sand or file any sharp edges on the Gossett Box and slide the Gossett Box in place on to the 2" strap.

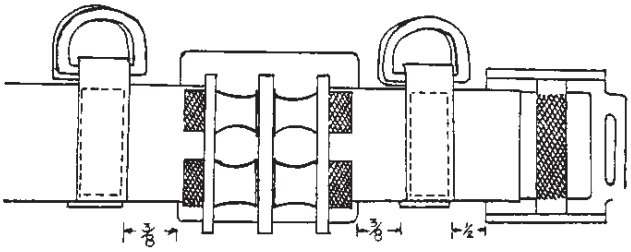


Fig. #2

5. Take the other 5" piece of 1" tubular and 2 more 1" D-rings, space the Gossett Box as shown in the diagram and sew the second ring holder securely to the chest strap.
6. Take the 70" piece of 1" tubular webbing, fold in half and sew a bar-tack 2 1/4" up from the folded end as shown in figure #3.

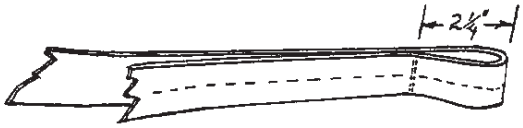


Fig. #3

Chest Box Alternatives A large following of people profess that a wide chest plate on a chest box helps maintain chest cavity air space which in turn aids the climber in maintaining an arobic balance. Tests have also shown that a stiffener (either a couple of 8" long pieces of 2" webbing or a piece of aluminum secured on the back of the strap where the shoulder harness strap passes through can help the harness maintain its fit and comfort (fig. #4).

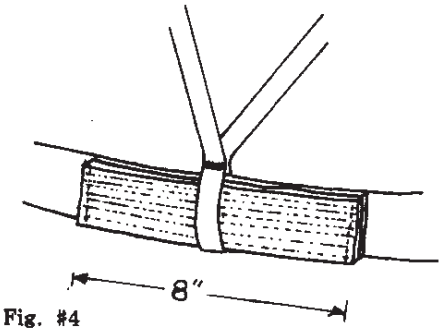


Fig. #4

STEP THREE

Fabricate the Foot Loops and Long Ascender

1. Take both 21" two-inch straps with your boots on, encircle the insteps of your boots (fig. #5).

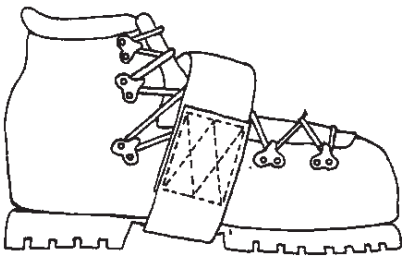


Fig. #5

2. Leave about 2-inches of space, mark and sew securely.
3. Put one aside and concentrate on finishing the long ascender. The length of this ascender is critical to efficient climbing.
4. Tie a bowline with the 20' of 5/16" rope through one of the foot loops as shown in the diagram (fig. #6).

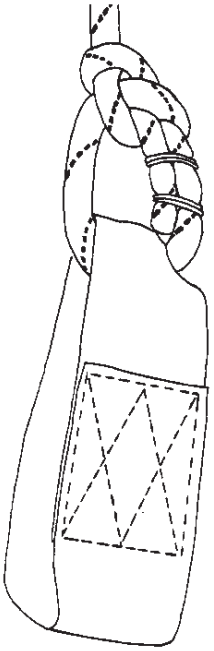


Fig. #6

5. With 2 pieces of wire, double-wrap each piece around the loose end and bowline loop and twist securely (similar to a cable clamp).

Alternate Tie-off Use a Yosemite tie-off and secure the loose ends above the knot with two wire rope clamps (fig #7). The advantage with the Yosemite tie-off is that the inside of the loop remains uncluttered and the additional wrap acts like an overhand knot or other securing knot.

Fig. #7

6. Put the chest harness on and position it securely high on your chest.
7. Decide which leg you wish associated with the long ascender. Bill Cuddington claims the power leg or stronger leg should be attached to the shorter strap. I have always climbed just the opposite. Your choice. An advantage to choosing the Cuddington preference arises when you wish to change over to a Texas climbing system. You'll find it unnecessary to transfer the short climbing strap to the other leg.

   Let's assume your right leg will be associated with the long strap.
8. Secure the foot loop over the right boot and thread the rope thru the right side of the chest box.
9. Securing the 5/16" rope to the right handed Jumar is probably the most important attachment in the entire system. The length of the long cord is critical to efficient climbing. The objective is to get the bottom of the ascender as close to the top of the ascender box as possible. (1 inch or less should be the expected goal).
10. After securing the ascender to the rope, hook it to a secured 7/16" mainline and stand in it (fig. #8). Pulling all the stretch out of the system and setting the foot knots, step down off the rope and retie the upper ascender to achieve this minimum distance. Continue doing this until the optimum length is achieved.

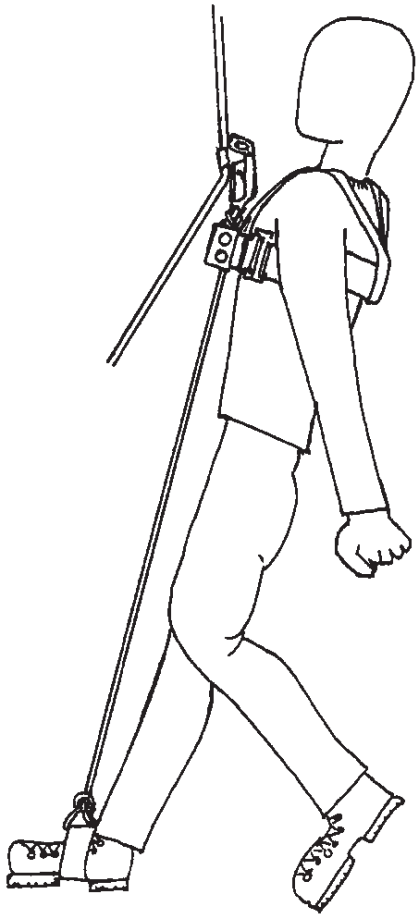


Fig. #8

After the optimum distance has been achieved, cut the 5/16" rope excess. Seal with a flame or hot knife and secure with wire rope clamps. Any distance between the box and the ascender works against the climber by tiring the upper arm prematurely and a loss in step length. It has been my experience that this is the number one problem with home-made Mitchell climbing systems.

Alternative Tie-offs If using a Petzl it would be helpful to use a cable thimble. Modify the hardware store variety and make it more like a cable ring. Use a bowline and secure with wire rope clamps (fig. #9).

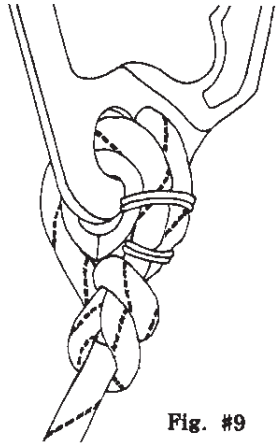


Fig. #9

Allen Padgett suggests melting a large nylon button on the end of the 5/16" rope, and forming your bowline. Once the bowline is dressed and set, the enlarged end of the rope will prevent the bowline from coming untied (fig. #10).

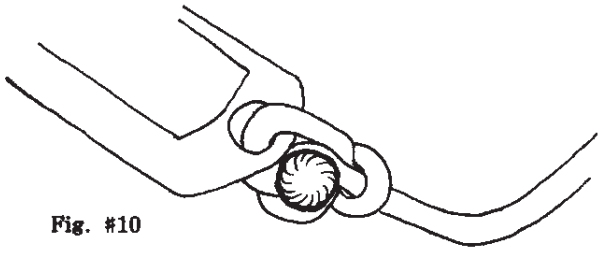


Fig. #10

STEP FOUR

Fabricate the Short Ascender.

1. With the remainder of the 5/16" rope, tie one end onto the other foot strap similar to the manor when the long ascender was fabricated.
2. Secure the left-handed Jumar so that when standing erect with the left arm dropped loosely the index finger can easily reach the top hole of the Jumar (fig. #11).
3. Secure the knot, cut off any excess of rope, seal with heat and fasten securely with wire rope clamps.

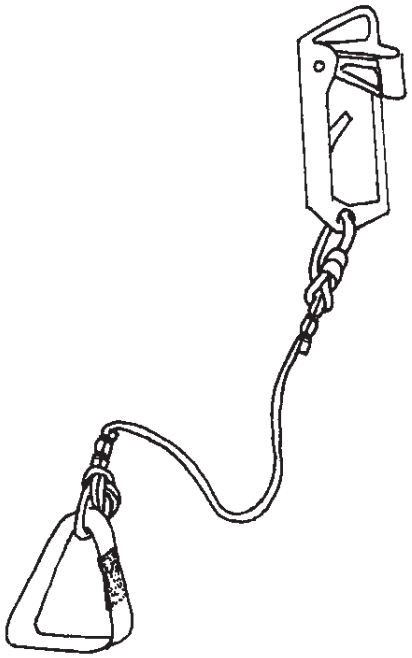


Fig. #11

Alternate Chicken Loops If you opt to fasten your chicken loops right to the foot loops you'll need 4 additional 1" welded D-rings.

1. Cut 5" off each 20" piece of 1" tubular webbing ear-marked for chicken loops.
2. Fold 2 D-rings in each and sew securely to the instep of the foot loop as shown (fig. # 12). Be sure it's on the inside of the foot.

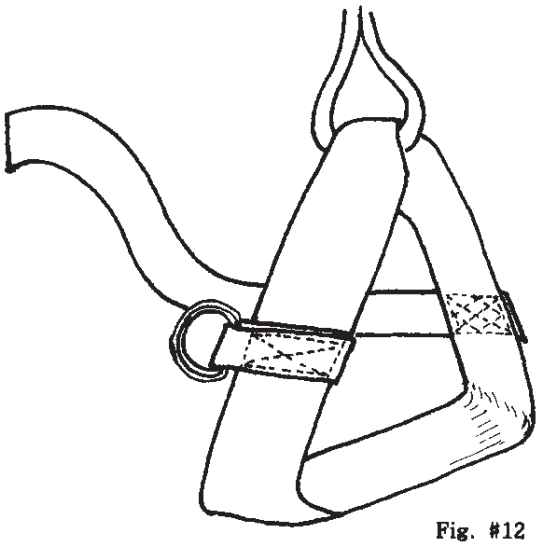


Fig. #12

3. With the remaining 15" sew on the outside of the foot loop a 2" long seam.

STEP FIVE

Fabricate the Safety Jumar (fig. #13)

1. Put on your seat harness and chest harness. Secure them both.
2. Using either the remaining 5/16" rope or a 30" piece of 1" piece of 1" tubular webbing, form an endless loop through the remaining right-handed Jumar.

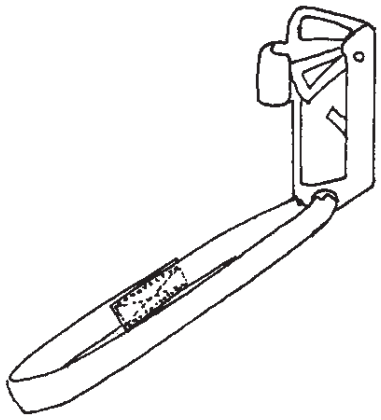


Fig. #13

3. If the rope is used a follow-through-figure-eight is best, while webbing is best attached with a sewn seam.
4. When hanging from the Jumar (attached in your seat sling) it should be just long enough to comfortably reach over the top of the chest box. This distance ultimately becomes perfect: 1) In the event a Texas prusik system becomes necessary. 2) Resting while Mitchell climbing and 3) Its the perfect length when reaching above a rack during changeover. □

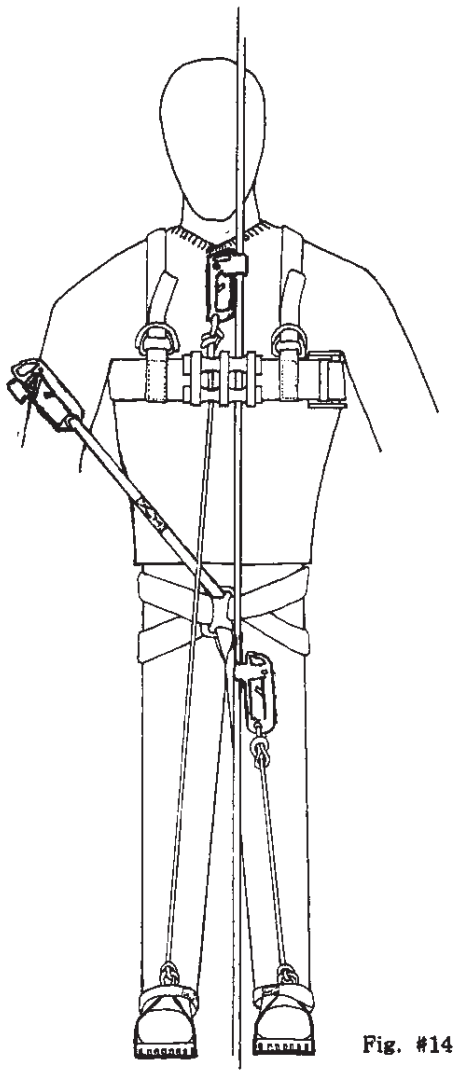


Fig. #14

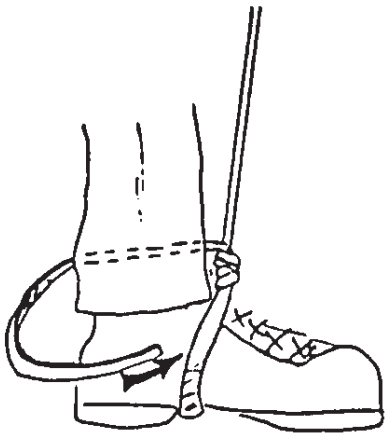
RANDOM CEREBRAL PONDERINGS

By George Dasher

While reading my copy of **Nylon Highway #23**, I suffered uncontrollable urges and desires to share my thoughts on several of the articles.

First--Chicken Loops. These are something like automatic cameras--I have never understood the need for either. Now its not that I can't comprehend why you don't want your feet to slip out of the foot loops. What I don't understand is why people come up with all these complicated methods and sytles of chicken loops. In short, I feel I have a better way. I might not, but with these highly sophisticated "lets share my knowledge" articles, you have to assume that there is some worth to the author's madness and methods.

When I tie a permanent foot loop into a piece of inch wide webbing, I always leave about five inches of extra webbing on the end of the knot. Then I tie about fifteen inches of 3/8 inch wide webbing into the tail of the inch wide webbing. When caving, after sticking my foot in the old foot loop, I bring the extra webbing around my ankle and tie it into the loop below the knot. This is a real simple method of containing one's foot in the foot loop, so I like it. I have a well-versed theory that the 3/8 inch webbing saves weight and space in the cave pack.



Now I only use this with the foot loops on my Texas system and on the knee Gibbs to my Ropewalker system. On the foot Gibbs, I use a sewn harness--everything else seems to come untied or twists my poor little old foot sideways. Sideways slippage causes me to whine, cry, and moan, which seriously detracts from the stature of a caver of my reputataion. Cavers who have never caved with me spend a good deal of time--before the caving trip--being impressed with this reputation. Cavers who have caved with me spend a lot of time saying, "Watch Dasher fall!" "Watch Dasher drop his camera equipment, or "Watch Dasher slip into the next deep pool!".

On to better stuff--Ron Simmons describes a rope pad that wraps around itself. Once upon a time in an earlier lifetime, I went on a caving trip where some poor benigned soul brought a pad similar to Ron's. We rigged the pad right at the top of the drop, where things were overhung. Fortunately--from my point of view--the owner of the pad went up the rope first. What had happened was that the part of the pad with fasteners had somehow gotten under the rope and, with the climber's weight on rope, he could not get the thing open and his ascenders over the lip. His predicament did not appear too enjoyable and afterwards he swore off the use of the pad. His language was also a whole lot more colorful than mine.

The problems with our pad may have resulted from the fact that it was very stiff and very

narrow. Also, our fasteners were not velcro. There are a lot of good points to Ron's pad, but nothing is perfect, so--as with any pad--it seems like a person should be very careful with placement. Of course being stuck at the bottom of a rope pad is a whole lot beter than falling the length of the drop and then being smacked in the face with the end of a worn-thru rope.

Now, the real reason I deteriorated to writing this here article is in regard to Bruce Smith's Vertical Challenge of the Future. I think Bruce had some excellent points. I wonder if he has been talking to burning bushes.

Now right off, I want to say there are some damn good vertical cavers who really know their stuff. and somehow, the first people who come to mind are Ron Simmons and three of his fellow Shenandoah Valley Grotto members who came over into West Virginia a few years ago and did a really difficult body recovery. I certainly wasn't going down either of the two drops on that day.

I also think--especially for volunteers--that the NSS does an excellent job of managing its standards of excellence. Quality vertical people can be found thoughout the continent. The January issue of the NSS NEWS displayed several people on rope and enjoying vertical work. the techniques and equipment shown in these drawings could have been used by an competent vertical caver anywhere in North America. Finally, I don't feel it is necessary for each and every vertical caver to be able to rig hauling systems, set bolts, and do other non-standard vertical-type things.

However, the first of Bruce's good points is that we--the experienced hotshot "organized" cavers--can stand improvement. And some of us can use quite a lot of improvement.

It is a very satisfying experience to work with a vertical caver you have never met and discover that both of you know your stuff. He or she can keep up with you and you don't embarrass yourself too much. But how often do you expect an experienced person to do a basic ascent--and it sudenly becomes apparent that this caver is a bit short on the knowledge.

I know most of us have our own personal bitches of what people don't know so I am not going to harp on more than a couple of points. Actually, I wouldn't harp at all, but part of purpose of this article is for me to have a good time.

First, I feel that every vertical caver should know how to lower a disabled caver to the bottom of a drop when the only rope available is the one the incapacitied caver is on. Second, I think all cavers should carry a small pulley. A pulley would serve two purposes: 1) It would help in lowering the aforementioned incapacitied caver and 2) If three cavers equalled three pulleys, you would have some chance of getting the incapacitied caver to the top of the drop.

Rigging is another example--on how many occasions have you rigged a drop while one person watched, five people stared at the wall, and one person checked leads? I wouldn't mind so much if they would at least look at the rigging before getting on rope. People take my knots and rigging for absolute granted without even a first glance. Now let me get behind the wheel of a car and everyone screams bloody murder--you would think 55 mph is the maximum people are supposed to drive.

To really mix up caving groups you need a rescue. When you are caving with your own people, it seems like everyone is usually up to

snuff. But on rescues... No, I have changed my mind, I am not going into rescues. I would be here all day. The only thing I am going to say is that all caving organizations should require all their members to be able to tie three to six good knots.

In short, I want to agree with Bruce that a lot of our educational system ain't happening. A vertical caver should know more than how to go up and down a rope. And although SRT might have evolved in North American, the Australians wrote the book. We are not documenting a lot of our work--and that is just losing it into a Black Hole of time!!!

On military rappelling. Now if I am unfortunate enough that I have to start hauling 60 to 80 pounds of military equipment around on my back, I am probably going to start using a carabiner wrap. If someone is ever shooting at me while I am on rope, I am probably going to bounce. I may also do some other things that are non-SRT related. However, until that time I'm going to stay with the fancy caving hardware.

Even in combat, somebody is going to have to explain this Australian face-first rappelling anyway. Seems like preceeding your rappel with a couple of hand grenades would do more good than rappelling face down to shoot your rifle. Or one person rappels, the other shoots. The trick to shooting and hitting the target is to cncentrate. Can you do that while rappelling?

Another thing I cannot understand is why people think rappelling is "macho". Ascending is the hard thing to do, emotionally and physically. Rappelling is damn simple--about the only thing easier is falling. I think what we need is more young women who cave. Nothing takes the macho out of macho faster than a girl who can do it better. And let's face it, if there was more women caving then I could go to OTR and dance instead of talking to old cavers.

Bruce did have three very good ideas: 1) Stay current and educated, 2) Teach and educate, and 3) Experiment, practice and document. I hate to be jumping on his bandwagon, but I wanted to re-stress these three points.

Now to really deteriorate, there is a couple of bones I would like to pick with Bruce. First of all have you ever tryed to tell a bunch of experienced cavers not to stagger their drops. Obviously, the persons he was caving with in the unmentioned National Park were not that um, uh, err; maybe I just better not say that. I went on a guided off-tour trip into Wind Cave once. Now those people where good and we staggered all our vertical. They went up first and by and by I followed. Very patient chaps, those Wind Cave people.

Anyoldway, once upon a time, I told a bunch of cavers not to stagger the vertical. There were two whole drops--and one person was having trouble. After a bit I untwisted my arms and legs from around my body, and then after I crawled out from underneath the breakdown block they had set on my head, and after I found my lamp, turned it on, and discovered that I was alone with "Having Trouble", I made the enlightened observation that it was obvious my ernstwhile caving companions had decided they were going to stagger the drops. They went with the first stagger, I and "Trouble" were the second. Such respect for the distinquished trip leader.

And another thing, Bruce--I wear a Fiber Metal helmet and I like it. □

LOW ATTACHMENT SEAT HARNESSES FOR CAVING ARE THE BEST

By Bruce Smith

There exists some confusion with regards to the best and proper seat harness to use for caving and especially prusiking. Unfortunately, the bulk of those harnesses sold in climbing shops are for just that--rock climbing. Their attachment point ends up high on the climber's torso. In the event of a fall this type of harness assists in maintaining the up-rightness of the climber and helps to prevent back injury.

For rappelling and prusiking, remaining securely up-right, is a small advantage to the multitude of dissadvantages this type of harnesss provides. Although no seat harness is perfect for everyone the best seems to be one that:

1. Pulls and lifts equally from legs, buttocks and waist.
2. Has a seperate integral waist belt section.
3. The attachment point should not be from the same carabiner that is used to attach racks, safety Jumars, etc. Invariably, this results in 3-way loading which almost always ends up with loading against the gate section, the weakest part of a carabiner. A delta Maillon rapide (fig #1) is an advisable alternative.

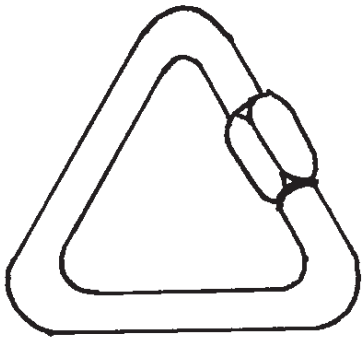


Figure #1 Delta Maillon Rapide

4. Has an attachment point midway between your waist and your crotch.
5. Lightweight. Full body harnesses may be ideal in the long run, but they fall down in the lightweight category.

The book "ON ROPE" compares all the homemade and store bought harnesses against these criteria, however, the focus of this discussion is on criteria #4. A caving harness should provide a low attachment point.

WHY IS A LOW ATTACHMENT NECESSARY?

A rack can be used properly

A low attachment seat harness allows a rack to end up at a point that is easily accessible. Even if there is a connecting locking carabiner (fig. #2) the top of the rack still ends up at about eye level. A rock-climbing harness situates the rack considerably higher forcing awkward usage and lack of effective control.

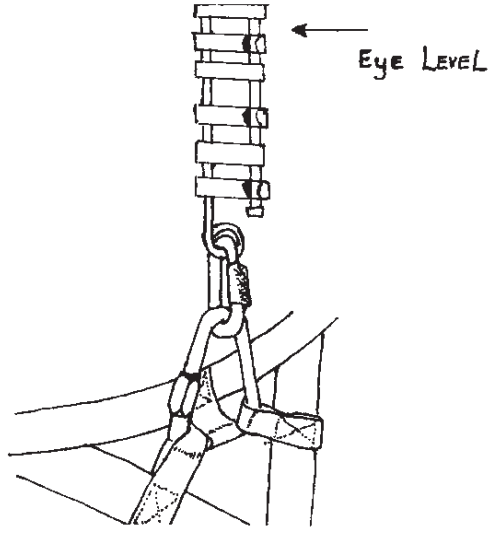


Figure #2 Operational ease can be maintained even with a carabiner link between the seat harness and the rack.

A safety Jumar can be used effectively

A safety Jumar should second as an effective top ascender when Texas prusiking. This safety Jumar cord length is critical for optimum progress when Texas prusiking, when changing over from rappel to prusik or visa versa, resting and for use when used in conjunction with a haul system. **If it is too long** it will prematurely wear out a climber's shoulder muscles during Texas climbing, be ineffective when using it in conjunction with the Cuddington Third Phase and be out of reach and totally ineffective if used with a high attachment seat harness.

If it is too short it will afford only short upward progress when Texas prusiking, won't reach over a rack while resting or changing over and won't reach over a box or chest roller while resting or changing over.

If a safety Jumar, tailored to the proper length, (able to reach over a rack etc.) is used in conjunction with a high-attachment seat harness, the positioning of the Jumar ends up being too high on the rope for effective use.

There is one more situation when a low-attachment seat harness is necessary. When using a long rack (18", 20", 22" or 24") it is absolutely necessary to have the rack attached low. Any other attachment will place the rack's operational brake-bars out of reach for convienent adjustments and smooth operation.

It may be easier to buy a ready-made high-attachment harness, but my recommendation is to search out the low-attachment varieties or fabricate your own. □

ALWAYS LOOKING FOR GOOD ARTICLES

ADMINISTRATIVE

NYLON HIGHWAY: is published by the NSS Vertical Section, and is available to Subscribers and Vertical Section Members for $3.00 per year. For Delivery outside North America add $4.00 to the subscription rate for postage.

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 Auther'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 effecient ways of acheiving our goals. Always experiment using good judgement and adequate caution. ...**THE EDITOR**

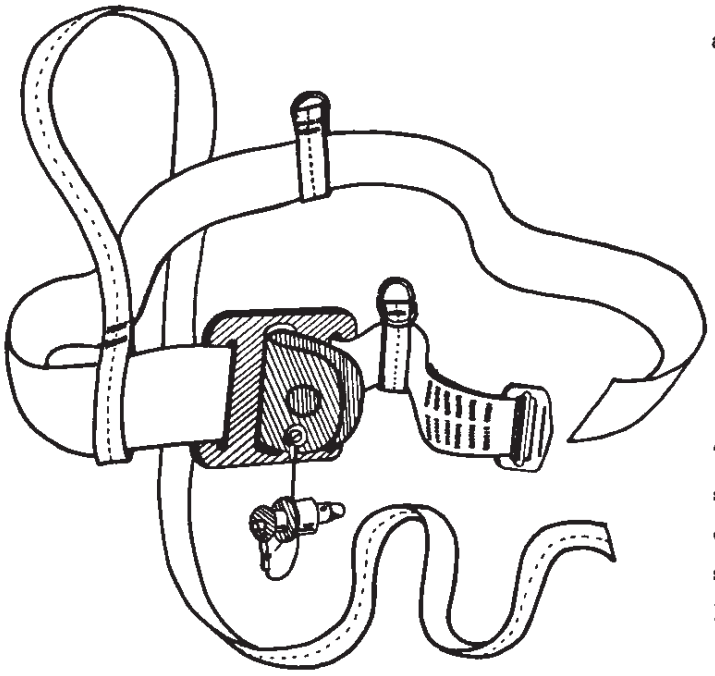
Dealers and Manufacturers The **Nylon Highway** has always reserved space for any article about a piece of equipment that you may manufacture and/or sell. This space is available at **No Charge.** This free service is offered for obvious reasons, to inform the public as to attributes of various pieces of equipment. We thank John Weinel for his following contribution to the **Nylon Highway.**

WEINEL ROPEWALKER GEAR

By John Weinel

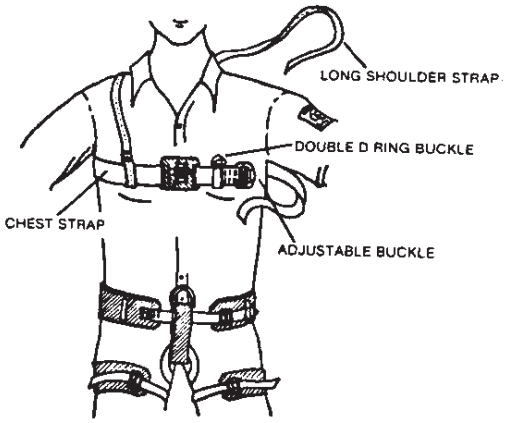
J.E. Weinel, Inc. has put together some comprehensive information regarding the pre-sewn harness rigs utilizing Gibbs ascenders. As John has been gracious enough to pass on this information along with some terrific artwork, the **Nylon Highway** takes advantage of the opportunity and reprints John's harness information and its suggested uses.

Chest Harness

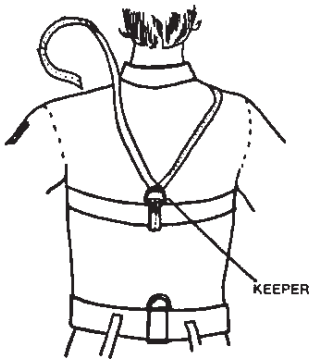


Suggested use:

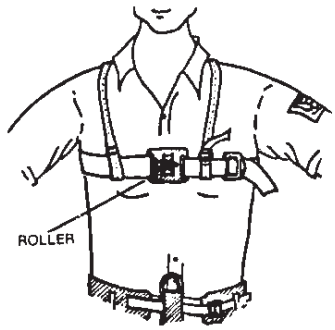
Place the Chest Harness on upper chest and buckle up tightly. See Detail A. Rotate buckled harness around chest until the buckle is on your side. The long shoulder strap is put over the shoulder. Keep webbing flat and neat. folded webbing is very uncomfortable.



The keeper with one D-ring is moved around to the center of the back. The long shoulder strap is threaded through the single D-ring on the keeper. The loose end of the long shoulder strap goes up and over the opposite shoulder.

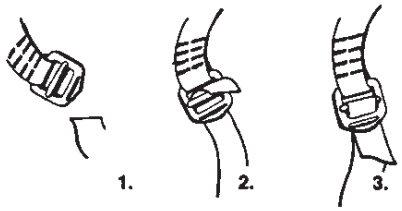


The long shoulder strap is brought over the shoulder (opposite from where it started) and down to the double D-ring buckle on the front side of the chest. Buckle off at the double D-rings as shown in detail B.



CAUTION: Never use a Chest Harness by itself. Chest Harnesses must always be used in conjunction with a Seat Harness.

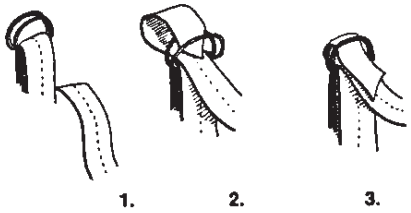
DETAIL A



Using the Adjustable Buckle

1. Pass the running end of the 2-inch webbing through the buclkle between the sewn portion and the movable metal bar.
2. Bring the running end up and over the movable metal bar.
3. Feed the webbing through the buckle, between the movable metal bar and the unsewn side. Pull until tight and secure.

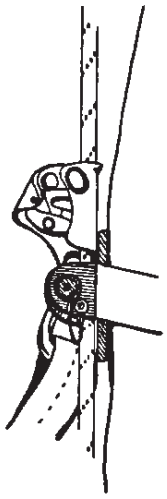
DETAIL B



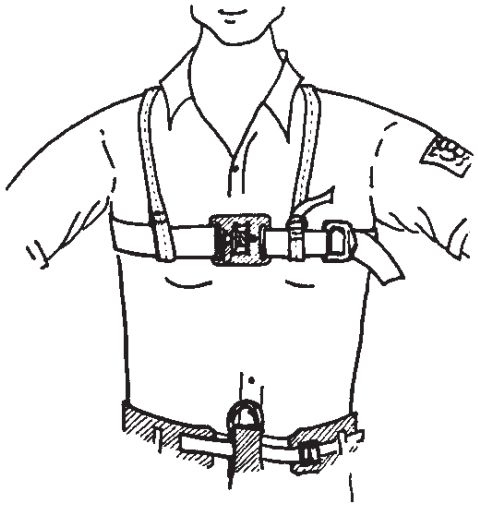
Using the Double D-Ring Buckle

1. Pass the running end of the 1-inch webbing through both D-rings.
2. Bring the running end over top of the first D-ring and under the second.
3. Pull on running end until tight and secure.

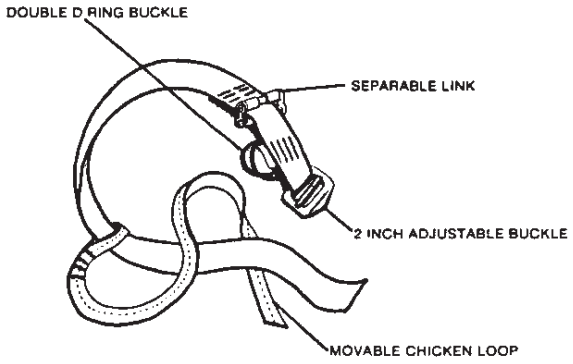
NOTE: D-ring buckles are not suitable in life supporting applications. This buckle and strap are only used to maintain the chest harness in the correct position.

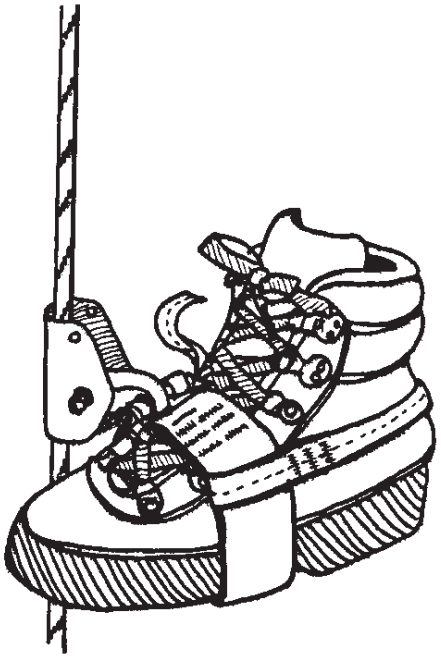


In use, the rope you are climbing will be placed inside the roller on the chest. An ascender of your choice is put on the rope above the roller. Attach a short strong sling between the ascender and the front tie-in point on your seat harness. We recommend using screw links or locking D-carabiners. The length of the sling should be adjusted so that the roller will push the ascender up the rope as you ascend.



Foot Harness

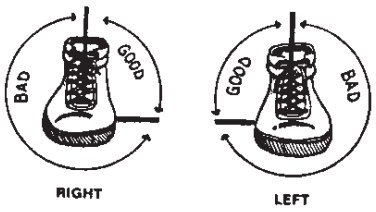


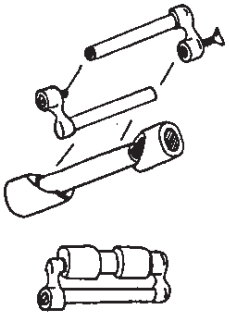


Suggested Use:

The climber forms a loop using the 2-inch adjustable buckle. See Detail A above. Slip the loop over the foot and position the ascender as shown in Detail C. Tighten the 2-inch strap as much as possible. The chicken loop goes around the ankle, behind the heel and forward to the double D-ring buckle. Buckle as shown in Detail B above.

DETAIL C





Setting up the Separable Link

1. Disassemble the link. Loosen both screws. Place link on end with one screw on a solid surface. Lightly tap the top screw with the handle of a screw driver until the link separates. Remove screws and separate pieces.
2. Slip the long thin plastic sleeve and one plastic bushing onto one leg of the disassembled link.
3. Slip a Gibbs ascender onto the sleeve and then put on the second bushing. The ascender should be sandwiched between the two bushings.
4. Put the unused connector link leg through the pocket on the harness. Align the leg with the ascender, with the leg in the pocket and insert and tighten both screws Inspect and retighten screws (if necessary) before each use.
5. The orientation of the ascender determines whether it is right or left footed. Reverse the ascender to change from one to the other.

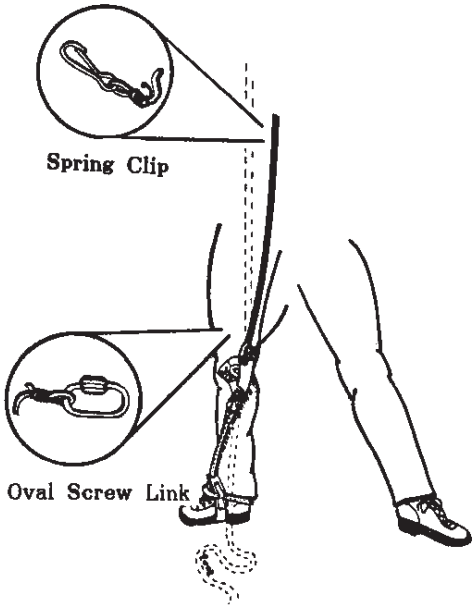
Knee Harness

Suggested Use

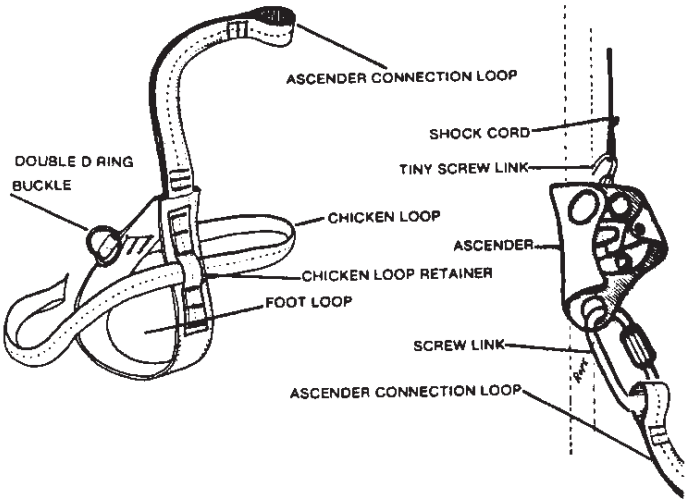
The climber slips his/her foot into the large foot loop. The chicken loop passes around the back of the ankle, through the chicken loop retainer and buckles to the double D-rings. See Detail B above.

The ascender is then put on the rope. The shock cord wich is attached to the ascender is clipped to either the chest harness or to the back side of the seat harness. The length of the shock must be adjusted by the climber so that the ascender is pulled up the rope by the shock cord each time the knee is lifted.

The shock cord is terminated on both ends with a figure eight knot on a bight. One end is attached to a tiny screw link connected to the ascender. The other end is attached to a spring clip which is used to connect the shock cord to the Chest Harness or the back side of the Seat Harness. Note: if connecting to the back side of the Seat Harness, the shock cord will go from the ascender all the way up the climber's front to the shoulder, over the shoulder and down the back and then connected to the Seat Harness.



Note: An oval screw link is also a Maillon Rapide.



An ascender of the climber's choice is attached to the ascender connection loop with either a locking D-carabiner or an oval screw link.

The ropewalker's long step and easy balance are a direct result of the floating knee cam principle and the special Chest Harness. The knee cam is not connected to the leg. It floats on a non-stretch stirrup and a stretchy shock cord tether. The shock cord tether must be attached to the ascender shell near the top.

An optional non-stretchy safety lanyard may be attached between the knee ascender and the Seat Harness. If you elect to use a safety lanyard make sure it is of adequate strength and length so that it does not impair the climber's motion.

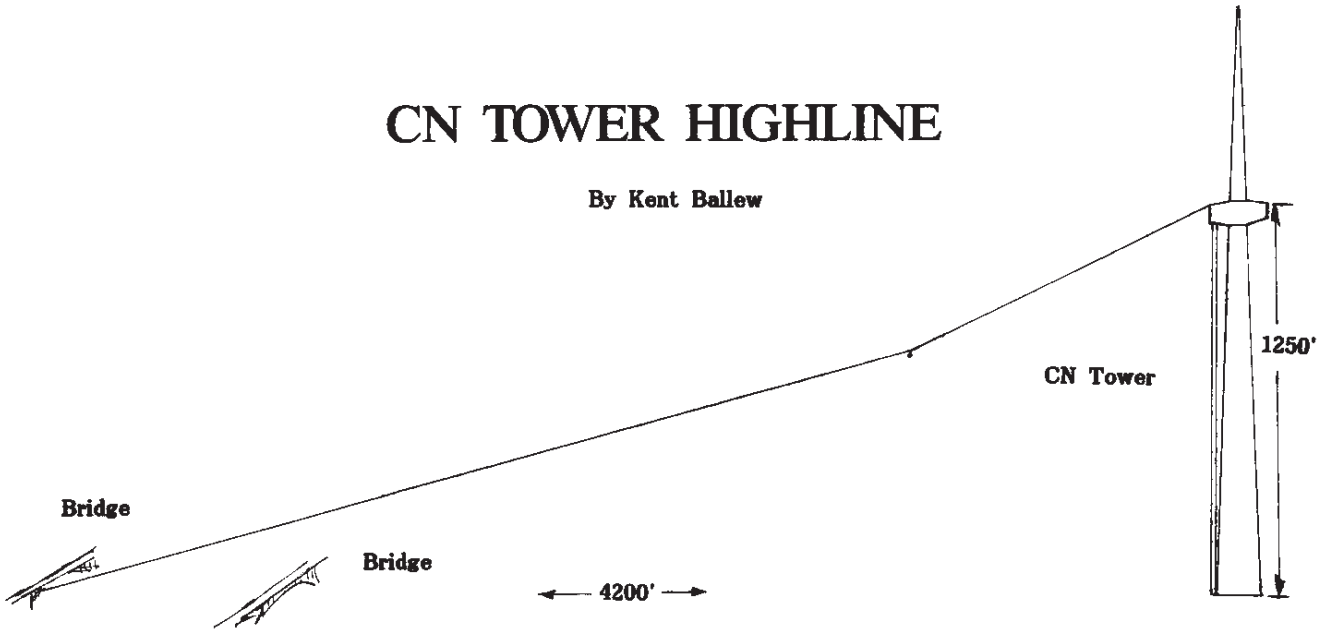
John claims that all his harnesses are:

Easy to Use
One size fits all
Long wearing
Made in the U.S.A.
Field ready

J.E. Weinel, Inc. P.O. Box 213, Valencia, PA 16059 U.S.A. 412-898-2335 or Outside PA 1-800-346-7673 □

CN TOWER HIGHLINE

By Kent Ballew



Manufacturing rope at Pigeon Mountain Industries has proven to be one of the most interesting jobs I've ever had. Working there has afforded me the opportunity of gathering information and meeting people in related fields that I never would have met in the normal course of events. When I was beginning my vertical experience, I had the rare good fortune to be living in an area concentrated with cavers who had a grasp of vertical technique unsurpassed anywhere--"Know what I mean...Vern?"

Working at PMI put me in contact with one of the most rope-wise individuals I've ever met, Larry (Smokey) Caldwell. If a person wants to get involved with rope-work, then Smokey is the one to hang around. I have been able to participate in unique haul systems and never before used rigging techniques. If there is any flaw in Smokey's system, it is the fact that a large portion of his accomplishments and techniques go unreported or even recorded, but sometimes things occur around here with such rapidity that there is little time for recording the event.

This time, one year after I began with PMI, I find it necessary and important give an account of the highline traverse off the CN Tower in Toronto, Ontario, Canada.

The Adventure Begins

On June 28, 1986, a crew of four people left Lafayette, GA with just under 16,000 feet of 7/16" rope and headed for Toronto, Canada. Once in the city of Toronto, we spotted our objective, the 1800 foot spire known as the LA TOUR CN. Standing on the northern edge of Lake Ontario, this tower reputed to be the tallest "free standing" structure in the world, was definitely an awesome sight.

On the morning of June 31st Smokey and some Canadians managed to establish line gun cord to the ground from a 1250 foot platform high on the tower. This took some work becouse of the high winds blowing at the time. We secured the line and pulled in the main line as Smokey paid it out. When we had the main line in hand three people took the line out approximately 900 feet from the base of the tower. At this time we were able to Attach the line to Smokey's Chevy Blazer and provide tension required to keep rope away from obstacles along the way. We had a dynometer mounted in-line behind the Blazer and were in constant radio contact with the top crew.

Line deployment went smoothly with one obstacle between us the anchor point, a four lane bridge

that the highline would have to pass over. With the help of city electric utilty trucks and their crews we were able to over come this obstacle with ease.

Soon we were on the other side of the bridge and arriving at another bridge which was to serve as the lower anchor. We transferred the line from the Blazer to the bridge, tensioned it with a 2 to 1 advantage with 4 people and ended up with a knotless rig with one directional.

Smokey secured the top end using a clove hitch on the tower as the main anchor. He attached the dynometer to the clove hitch and main line with a Bowline on a bight.

Test Descent

Late in the afternoon we sent a stokes basket loaded with 330 pounds of concrete dwon the highline. The load was lowered down the highline with a PMI 7/16" static descent control line. Everything worked perfectly, so we secure the rig for the evening.

First Descent

The morning of July 1st was beautiful and clear. A second crew of people rigged two standing lines from under the observation deck at 1100 feet on the tower. A third crew was preparing the highline for its first live load. A single individual, a young canadian, was sent down the highline achieving a distance of about 3200 feet of angular descent.

During the next several hours, 17 people, as singles and pairs, rode the highline off the tower. The method of descent control line retrieval was changed once early in the day and when I finally had a chance to go topside, I was amazed at how quickly the control line was brought in after a lowering.

Statistics

At the end of the day the statistics looked like this:

-42 people were involved in the event.
-17 people rode the highline.
-Fastest descent was 6 min. 30 seconds.
-Fastest line retrieval 10 min. 30 seconds.
-Highline was anchored at the 1250' point on the tower.
-Bottom end of the highline was anchored at ground level.
-Length of line used in highline was 4200 feet.
-Length of ride was 3000 to 3300 feet.
-Maximum load on the line top end 890 pounds.
-Maximum load on the line bottom end 350 pounds.
-Rig at the top end--bowline on a bight.
-Rig at the bottom end--knotless wrap.
-The highline violated Toranto's airspace.

Personal Reflections

There were several schools of thought concerning techniques and safety factors associated with the highline. There were a few calculations that even predicted doom for us in Toronto.

I'm not too good with mathematical equations, but I can tell you that Smokey's methods proved to work extremely well with totally acceptable readings on the system and its load. The highline worked like a Swiss watch and was kept simple enough for the average person to comprehend. I personally think that if anyone can make highline rescue available and compatible with rescue squads, it will be Smokey Caldwell or someone using his techniques. □

SRT ON HALF DOME

By Kent Ballew

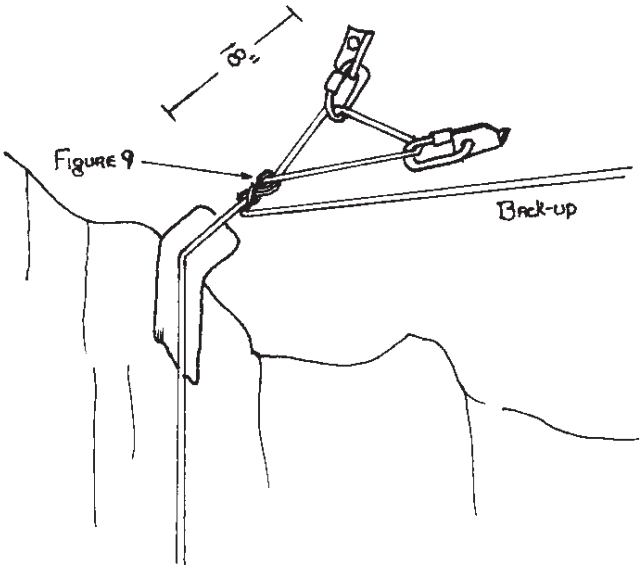
As we rolled into Yosemite Valley in Britt Thompson's pickup, I strained to catch a glimpse of one of the mighty walls that supposedly hang around there. We were driving in from Reno and had just made the Yosemite Park entrance by night fall. I peered into the gathering gloom trying to spot a cliff, but it was too dark. Unusually dark, in fact, for a cloudless night. I leaned forward to get a better look and suddenly realized there were stars directly overhead. The dark sky I thought I had been looking at was actually the "Salathe" wall on El Capitan, Holy precipice!!! This place is going to be a real void!

This was my first contact with Yosemite Valley and what turned out to be a fantastic vertical cruise.

On October 1st, six SRT specialists departed the valley floor and arrived at the Half Dome campsite, one hour behind the pack mules carrying 2700 feet of 7/16" PMI MAXIMUM static kernmantle rope. We established camp and ran a short reconissance of the summit approach only to find storm clouds, 30 mph winds and a 50 to 60 degree slope approximately 700 feet in length.

The next day, under a beautiful Sierran sky, Steve Davis, David Young, Jimmy Fuller, and I carried 4 questionably matched 700 foot coils of rope to the summit. This ordeal took all afternoon to accomplish making it necessary to put off rigging for a day.

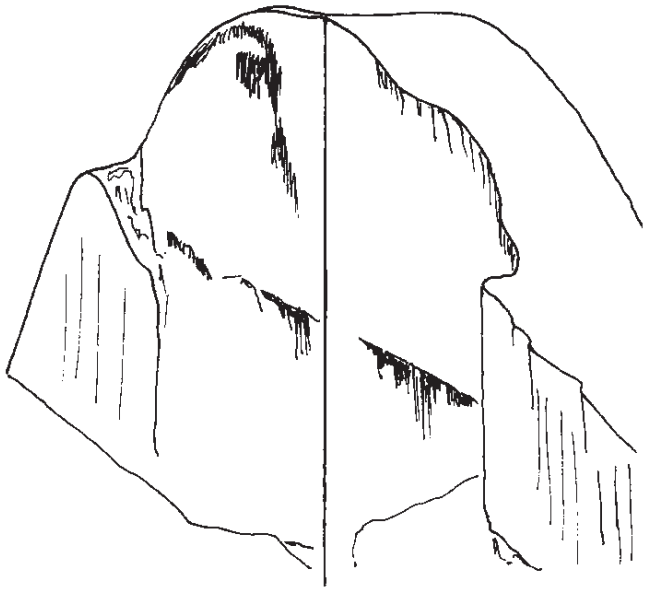
The next morning we arose early and quickly gained the summit. I set two 1/2" bolts 18" from the edge and approximately 200 feet to the left of the visor, on the northwest face (fig. #1). We used a simple loop and a figure nine knot for the primary anchor, backing up this undoubtedly bombproof rig with an equally unmoveable boulder. The nature of the Sierra granite warranted secure padding.



We lowered 1000 feet by hand, finishing the last 800 feet with the use of a rack as a braking device. With the rig secured, Dan Twilley and I prepared for the first descent. The rope made contact with the rock about 150' down the face. It was apparent that the drop was going to be against the wall for most of the way.

My rappel was extremely enjoyable due to the unbelievable scenery and the awesome exposure the face had to offer.

The drop was only 1800 feet but you were hanging 4000 feet above the valley floor.Dan met me on the bottom and we celebrated for a few minutes, finally getting back to the task at hand.



I got on rope and climbed about 100 feet, stopping to allow Dan to get on rope below me. Before Dan left the bottom, he tensioned and anchored the bottom end of the rope. We would leave the rope rigged for several days and anchoring the rope minimized abrasion recieved when it was blown around on the face. Even with the bottom anchor the rope made contact with the drop in several places, so we decided to alternate climbing. I would climb 60 feet, then Dan would climb to me. This method provided the least amount of wear due to bounce or stretch in the rope.

The climb was uneventful until the sun struck the face. At this time sheets of ice 60 feet long 7 to 10 feet in width which had formed previous night began to peel off the face and rain in large chunks down the drop. The problem with the flying ice was not too severe, but it gave Dan and I some anxious moments.

Other than the ice problem the climb was beautiful and I stopped several times near the top to take in the view.

In the days following several people rappelled and prusiked the drop. The people involved in rigging Half Dome returned to the valley floor and dropped by El Capitan to sample a beautiful 2650 foot climb and rappel set up by Dan and his crew.

One week after rigging Half Dome a crew of six (Britt Thompson, Mike, Bob Runser, myself and two valley rock climbers) returned to the summit and with a 2:1 haul system, derigged the drop and split the rope into 6 coils. We then retreated from the top and hiked the 8.8 miles back to the valley.

The most difficult task that faced us in rigging Half Dome was carrying the rope up the last 700 feet of trail on the Dome itself. Although we did have the rope carried by mule for 7 of the 8.8 miles of trail to top.

Getting on rappel proved easy enough as we had about 40 feet of tail hanging down the drop. One had only to rappel the tail with a second descender, lock off and rig into the main line with your long rack. Some chose to down climb the tail and transfer over to the main rope once below the edge.

The tail also facilitated negotiating the lip when climbing out as you could transfer to it and avoid dealing with the 100 plus pounds on the main rappel line.

I don't imagine Half Dome will see very many SRT occurances, because of the logistics involved and the ease in accessing the North American Wall on El Capitan. Half Dome does not have quite the drop of El Capitan, but it is definitely one of the most striking granite features I've ever seen and the view up Tenaya Canyon from midway up the drop is incredible. □