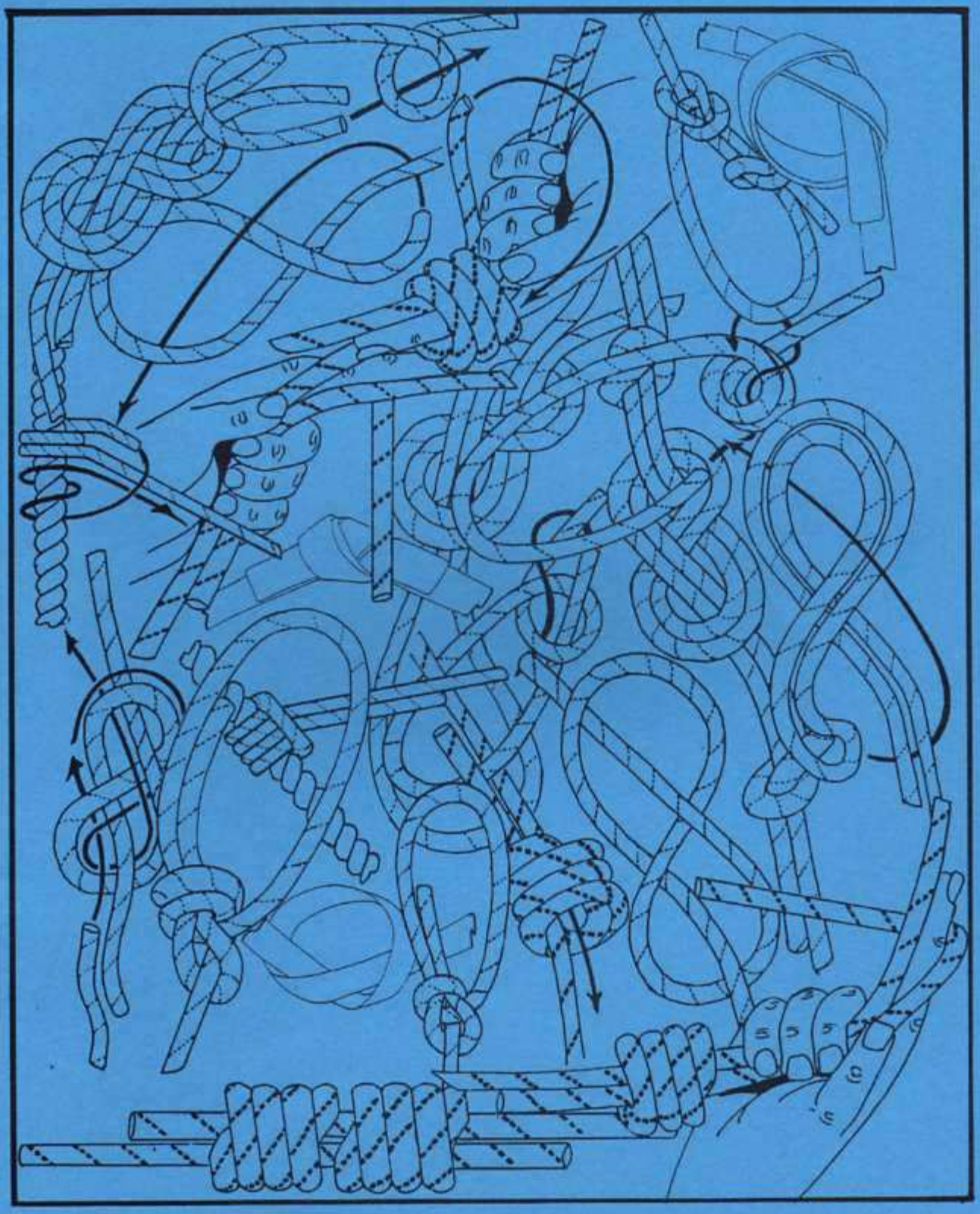
# NYLON HIGHWAY 19



...Especially for the Vertical Caver

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# NYLON HIGHWAY #19

# NOVEMBER 1984

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THE COVER! "Caving Knots" by the Editor. Can you sort out the eight knots (which are all in some stage of completion)? Can you name the knots? and discuss when would you most likely used them? Answers found on page 23.

# MOTORIZED ASCENDING DEVICE

# MAD

By Nevin Davis

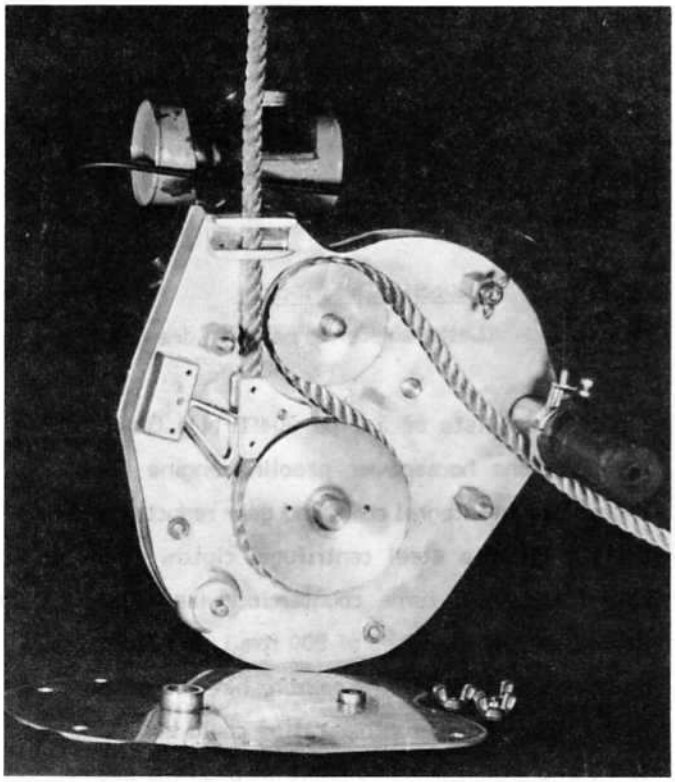


Figure #1 Overall view of MAD showing the rope threading and the cover plate (O). Notice that the cover plate is secured with wing nuts.

MAD was developed for those of us who do not view vertical caving as end in itself but instead want only to visit the cave at the pit bottom and then exit in the most comfortable manner. Along with the comfort, MAD is a vehicle which could be useful in certain rescue situations.

MAD consists of a one-horsepower, two-cycle gasoline engine with an intergral centrifugal clutch and gearbox in conjunction with a homebuilt transmission which drives a specially designed "Vee" groove pulley. The rope to be climbed is threaded through a rope guide, through a safety device similar to a Jumar ascender, around the "Vee" drive pulley, over an idler pulley, and out of the device (fig. 1). Threading MAD is much like threading a movie projector and like a projector it can be fastened and unfastened at any point along the rope. (ED. Author is referring to projectors built prior to the automatic threading projectors of today)

A carabiner is clipped to a bar on the underside of MAD and is also clipped to a sling or similar securing device on the operator (fig. 2). The controls are a hand throttle and an instant stop button. When the throttle is turned on, the

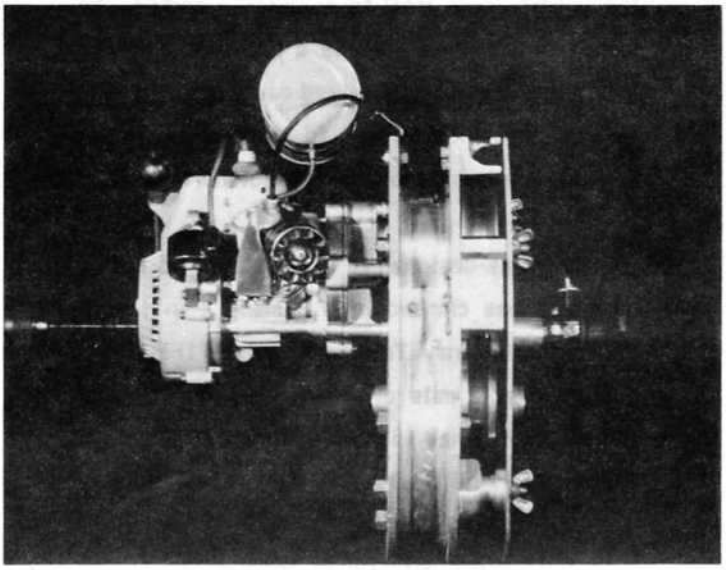


Figure #2 Overall view of MAD with the cover plate (O) on. This is the direction of veiw of a person using MAD.

clutch engages and the "Vee" drive pulley rolls (climbs) up the rope, carrying the device and the caver with it. The built in Jumar cam prevents MAD from descending when the clutch is not engaged. In the event of a Jumar cam failure, catastrophic descent can be halted by using the throttle and slipping the clutch. If the engine is not running the Jumar cam fails (an unlikely event), a terminal downward velocity will be rapidly reached. The velocity will be determined by the amount and viscosity of the lubrication and the total reduction in the gearbox. I recommend that a set of Jumar ascenders be clipped to the climber in the anticipation of any unexpected failure.

When insufficient rope is hanging below MAD, or when MAD is being started up the rope, a weight of approximately 10 pounds must be suspended from the bottom of the rope so that the "Vee" pulley has sufficient friction to lift the device and the load.

By simply securing the suspension bar on the underside of MAD to a suitable anchor, the device can also be used as a portable winch to lift the rope and or an injured caver out of a pit. It was used in this way to remove our water soaked rope from Sotano de las Golondrinas.

MAD was designed to climb 7/16" and 1/2" rope and has climbed both Samson 2 in 1 and Plymouth Goldline. To date (about 1971) MAD has climbed over a mile of rope including two trips out of Golondrinas with no failures. The general specifications of MAD are:

Gasoline consumption

2 miles/gal. (150 lb. load at 37 ft./min.)

Weight

23 lbs. Model II (handlebars and twist grip motorcyle throttle)

21.5 lbs. Model III (hand throttle)

Load and rate of ascent

400 lbs. max. at 37 ft./min.

200 lbs. max. at 74 ft./min. with a gear change.

Parts cost

$120 (1971)

## Specific Description

(Letters refer to parts on drawing.)

MAD consists of a type 204(T-111) Olsen and Rice one horsepower gasoline engine (This engine has an integral compound gear reduction of 6.921 : 1 and a steel centrifugal clutch. The output shaft (T) turns counterclockwise at a maximum governed speed of 900 rpm.) coupled to a homemade gear box. The gearbox has two ratios at present, (although other ratios could be used), 12 : 1 and 24 : 1, made possible through the use of lathe change gears (K, L, and M). The output of the gearbox is coupled through a 3/4 inch shaft (Y) to a hand made "Vee" groove pulley (E) which has an included angle of 30 degrees. This angle is critical, and if it is made greater than 40 degrees the pulley will not grip the rope. If the angle is less than another undetermined angle, the rope will have excess friction upon entering and leaving the pulley.

The rope to be climbed is threaded through a rope guide (A), through a safety device (B, C, and D) similar to a Jumar ascender (trade name), around the "Vee" pulley (E), over an idler pulley (F), and out of the device. A carabiner is clipped

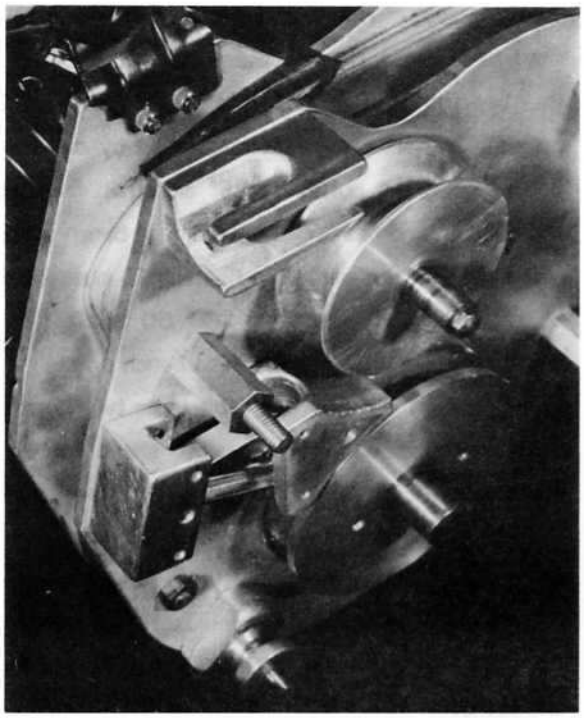


Figure #3 Closeup showing the rope guide (A) and the Jumar cam safety device (B, C, and D).

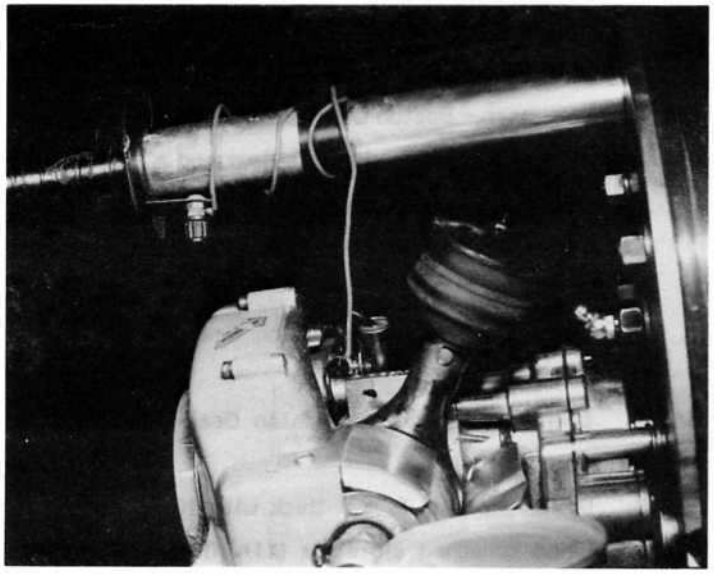


Figure #4 The instant stop switch.

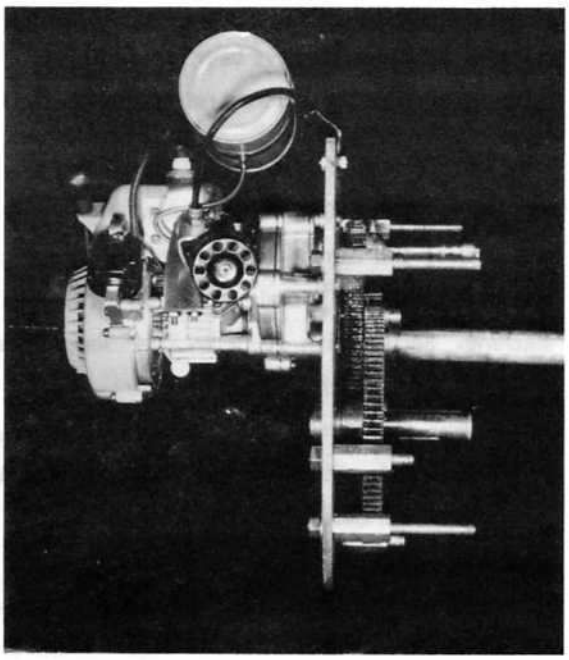


Figure #5 Inside view of the gear box.

Figure #6 The gear box.

onto a bar (H) on the underside of MAD and is also clipped to a sling or similar securing device on the operator.

A twist grip throttle (G and G1 cable) and an instant stop button are the controls. The operator must start the gasoline engine; turn up the throttle, at which time the clutch will engage and the device will ascend the rope. The Jumar safety device engages and holds onto the rope when the throttle is backed off. This permits MAD to easily be repeatedly stopped and started on the rope.

With a 24 : 1 gearbox ratio, the vertical speed of MAD is 37 feet/min.

MAD weighs 23 pounds and should theoretically lift 400 pounds.

Parts List for MAD

(All letters and numbers refer the drawings.)

(Note: All drawings have been reduced...Ed.)

(Note: All prices mentioned reflect about 1971)

A. Rope guide, 6061-T6 aluminum, dimmensions not critical and can be scaled from the drawing. Suggested machine tools: drill press and milling machine. Secure with 10-32 by 3/4" long Allen head cap screws with lock washers.

B. Jumar cam pivot block, 6061-T6 aluminum, dimensions not critical except that the slot to receive the cam should have an opening of 0.50". Secure with 2 10.32 by 3/8" long cap screws and 1 1/4-20 by 1 1/4" long cap screw as a pivot. Secure all screws with wire( see Figure 5 and 3). Suggested machine tools: drill press and milling machine.

C. Jumar cam $2.50(swing gate).

D. Cam backing block, 6061-T6 aluminum, dimensions can be scaled from the drawing. The slot must pass a 1/2" rope freely. Round all corners in contact with the rope (See Figures 1 and 3). Secure all screws with wire (Figure 5).

E. "Vee" drive pulley, 6061-T6 aluminum, the dimensions can be scaled from the drawing. The critical dimensions are the 30 degree included angle of the "Vee", the thickness of 1.000", and the mounting on the 3/4" dia. drive shaft. The 3/16" x 7/8" Woodruf keys (11) must be accurately mounted using a keycutter for the shaft and a key broach for the pulley. Assembly onto the shaft should be a tight fit. The pulley is secured with two 6-32 Allen head set screws, one on top of the other. The outermost one has its end ground flat so as not to destroy the Allen socket on the top of the lower set screw. Loctite can be used on the set screws. Machine tools: lathe and drill press.

F. Idler pulley, 6061-T6 aluminum, thickness 1.000" $\pm$ .005. The 1/2" ID sleeve bearing (2) must be a press fit into the pulley. The OD of the bearing is 0.6895"; this is 11/16 + .002 inches. The fit can be accomplished by drilling and reaming the pulley 11/16" and then freezing the bearing and heating the pulley. A bench press will assemble the two. The bearing ID must then be reamed to fit freely a 1/2" OD shaft (W). Machine tools: lathe, drill press bench press.

G. Twist grip throtle and cable. The twist grip throttle to fit on a 1" diameter shaft can be purchased for $3.95 (1972 price) and the cable can be manufactured from an old broken motorcycle control cable.

H. Suspension bar, aluminum 1.260" long threaded for 5/16 x 18. Machine tools: drill press and lathe.

I. Spacer bars, steel. Outside bars - 3 required 1.260" long; inside bars - 6 required 1.385" long, manufactured from threaded rod couplers (5/16-18 thread), $.30 each.

J. Spur gear - Boston Gear #NB16B, $3.17. A keyway must be broached in this gear and a 10-32 set screw used to fasten it to shaft (W).

K. Lathe change gear - Boston gear #GB80, $12.20.

L. Lathe change gear - Boston Gear #GB20, $4.35.

M. Lathe change gear - Boston Gear #GB96, $14.30.

N. Collar - brass, 0.562" thick with 10-32 set screw and broached slots for (11). This collar should be a press fit onto the shaft. The set screw can be secured with Loctite.

O. Rope cover plate - 1/8" thick 6061-T6 aluminum, $2.64.

P. Intermediate gearbox cover plate, 1/4" thick 6061-T6 aluminum.

Q. Outside gearbox cover plate, 1/4" thick 6061-T6 aluminum (P & Q cost $7.92 combined).

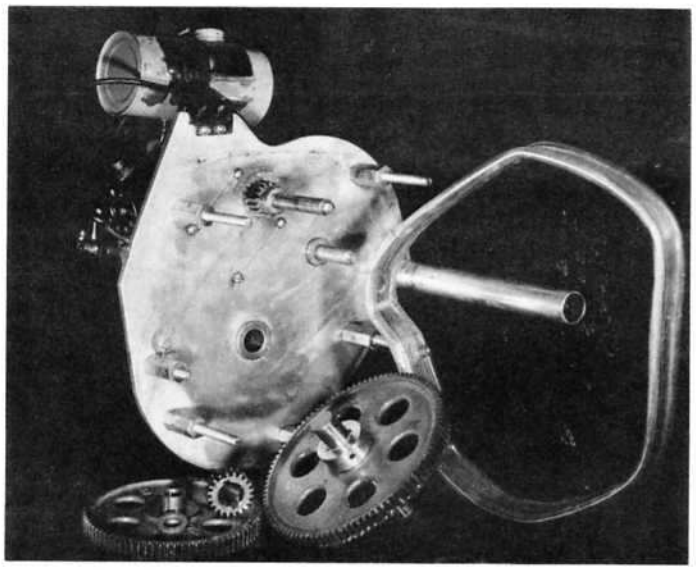


Figure #7 Gear box grease seal, lathe change gears, thrust washer and compound steel bushing.

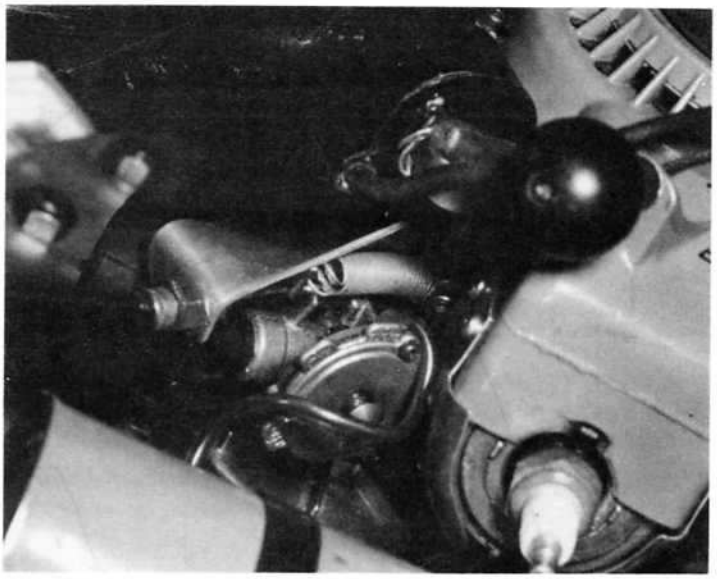


Figure #8 Detail of throttle assembly.

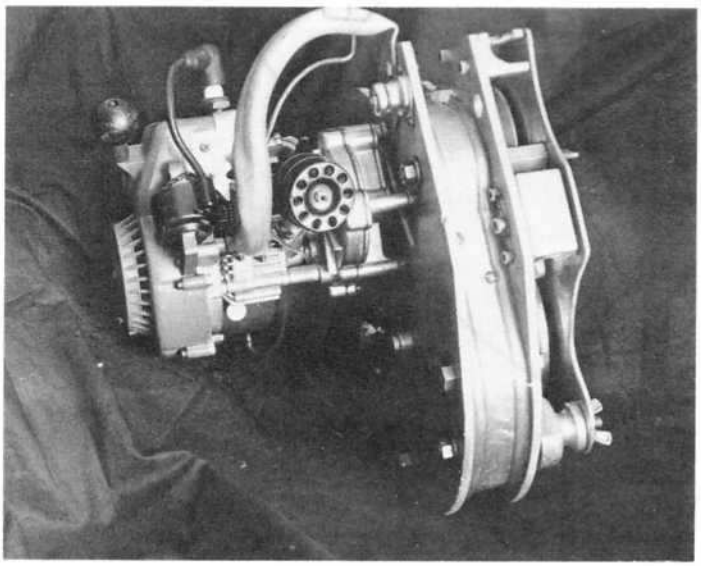
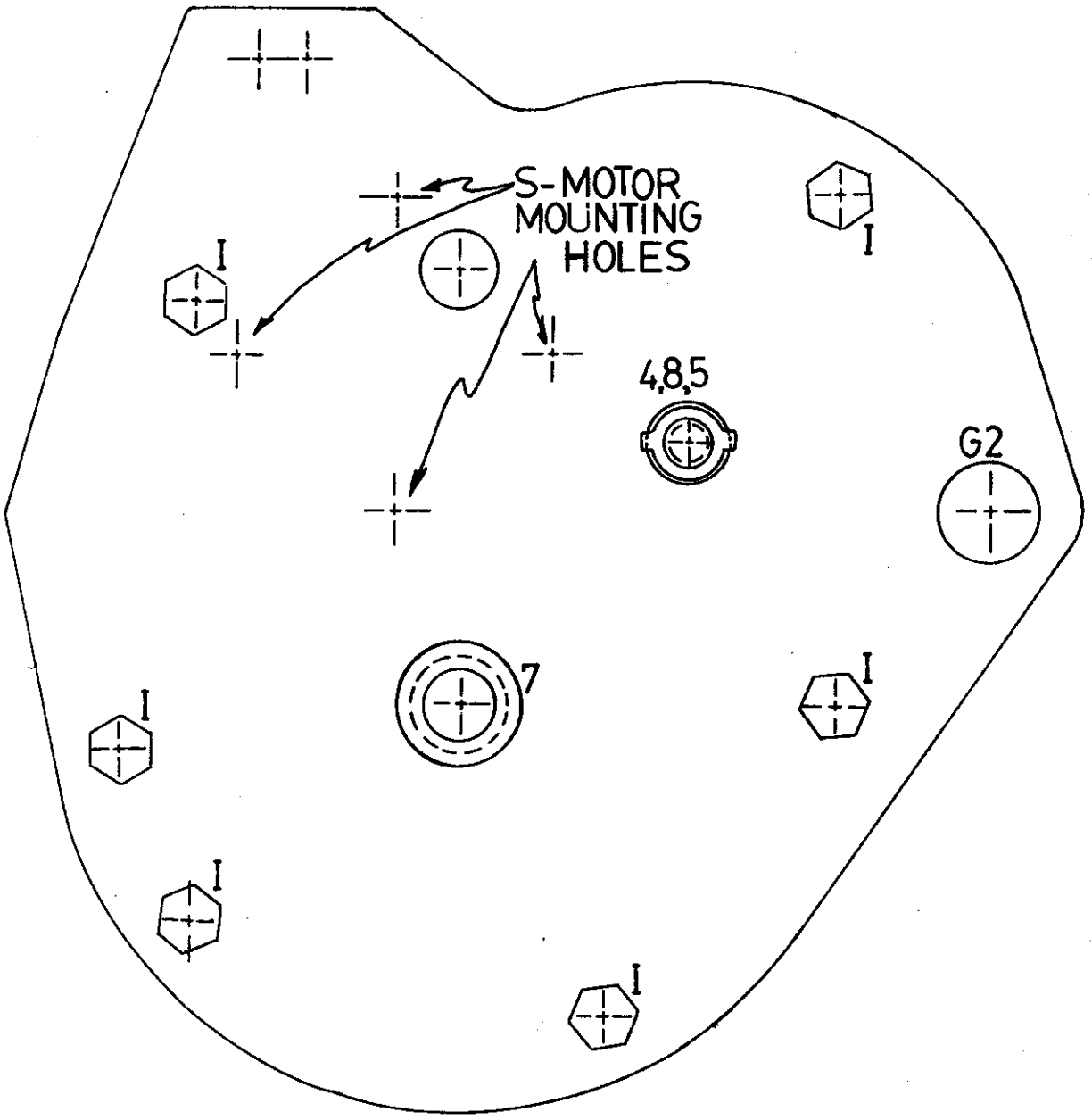


Figure #9 Modification of MAD eliminating the handle bars and replacing them with a handle with a squeeze type throttle. The gas tank has been fitted up under the engine and the instant stop switch is mounted on plate Q for operation by the thumb.

Figure #10 This illustrates the use of a modified MAD in ascending. Note that the climber is secured with a seat sling and an auxiliary sling around the chest to hold her vertical. Both the throttle and stop controls are operated with the left hand.




DETAIL OF PLATE Q

0 1 2 3 4 5

SCALE (inches)

O, P, and Q, are the most difficult pieces to manufacture. The three plates can be bolted together through three of the 5/16" (I) holes and can be machined as one piece. The hole centers for shafts Y, X, and W are very critical. Here are the specs...

Holes for 6-32 set screws must be drilled and tapped from the edge of plates P and Q to hole G2 in order to hold the handle bar. The exact layout can best be done on a vertical milling machine table. Holes for W, X, Y, and the rest of the I holes can be drilled at one time. After this is done the individual holes can be sized for the bearings: 1.000 dia. for 7,8, and 9; 11/16(.6875) for 1 and 3; and 0.375 and 0.500 for shaft X in Q and P, respectively. The outside edges of the plates can be formed on a rotary table on a vertical milling machine. For a less professional job a bandsaw and file will suffice.

R. Tank mounting bracket - O. & R. Engines, Inc., p/n 97-11 (comes with motor).

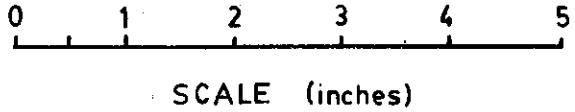
S. Motor mounting holes - use dimensions from drawing.

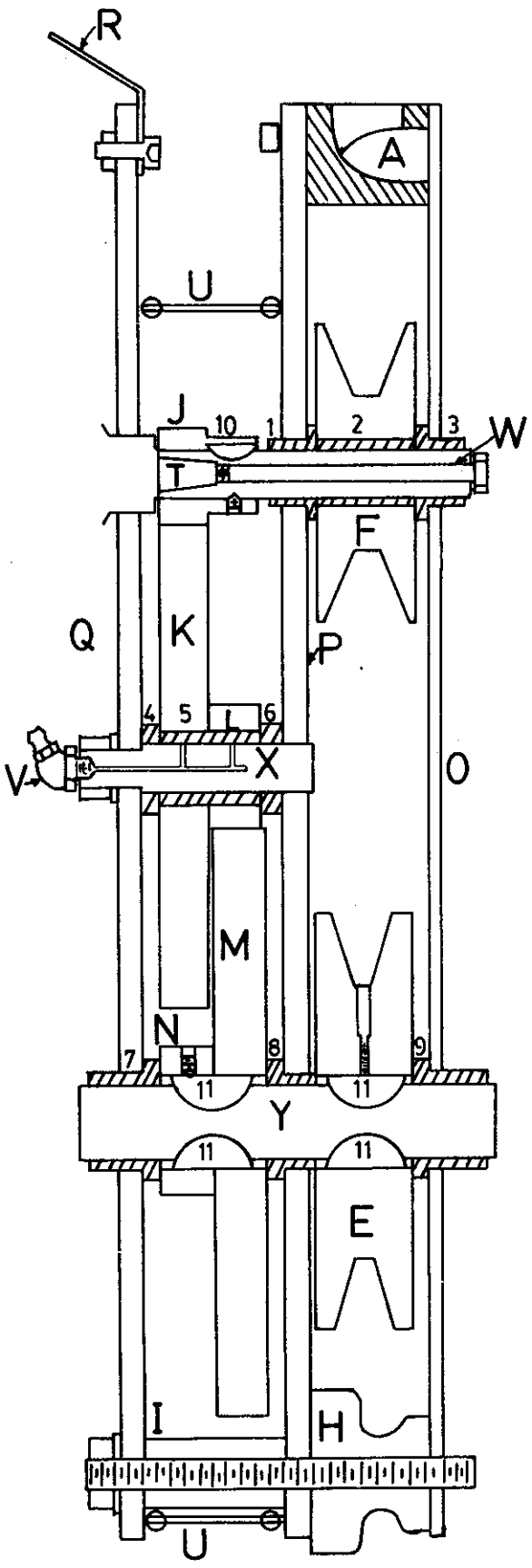
T. Motor output shaft.

U. Gearbox grease seal - 1/16" thick, 5053 aluminum. To make this part, cut a strip of aluminum 1.320" wide and bend it around the (I) spacers on plate Q. Be sure to allow room for the gears. Allow for about 2" overlap and cut the strip to length and bolt it together, forming a hoop. Cut 3/8" dia. Tygon tubing lengthwise to make the seals for the two edges (Figure 7). A large metal shear makes cutting the strip easier.

V. Angled grease fitting - $0.10.

W. Drive shaft, 1/2" dia. steel drill rod. As shown on the drawing, this shaft must be tapered to fit over the motor output shaft(T) and a bolt must be manufactured to fasten it to (T). A woodruf key slot (1/2" X 1/8" key) must be machined in the shaft. Machine tools: lathe, milling machine and key cutter.




Section through the gears and drive pulley. (The motor has been ommitted from this drawing.)

X. Intermediate idler shaft, 1/2" dia. naval bronze. The 1/2" dia. shaft is drilled as shown for grease. Shallow grooves are cut around the outside diameter of the shaft at the points where grease exudes. A shoulder is cut in the shaft. It is secured with a nut and lock washer. Machine tools: lathe, drill press.

Y. Output shaft, 3/4" dia. drill rod. Four woodruf keys 7/8" X 3/16" must be mounted in this shaft. A milling machine and a key cutter are a must.

1,3. Flanged bearing - Boston Gear #FB-811-4, $1.26 each.

2. Straight sleeve bearing - Boston Gear #B811-8, ID 1/2", OD .620", L = 1.000".

4,6. Thrust bearing - Boston Gear #TB-814, $1.73 each.

5. Compound steel bushing - Boston Gear #GBB-16, $6.55.

7,8,9 Flanged bearing - Boston Gear #FB-1216-6, $1.66 each. Bearing 8 length cut to 0.500".

10. 1/8" x 1/2" woodruf key.

11. 3/16" x 7/8" woodruf key.

Motor: O. and R. Engines, Inc., 3340 Emery Street, Los Angeles, California 90023. Type 204 (T-III) Engine - $62.75 plus shipping.

1 piece of Do-it-Yourself aluminum, 1" dia., 20" long for handlebars.

Motorcycle handlebar grip.

2 ft. 5/16 X 18 threaded rod - $0.40.

## Possible Simple Modifications

It is desirable that MAD be made smaller. This could be done in two ways. The handlebars could be omitted and a handle over the engine substituted. This smaller handle would contain the throttle and instant stop controls. Also, the gasoline tank could be mounted under the motor, reducing the height.

## Assembly Hints

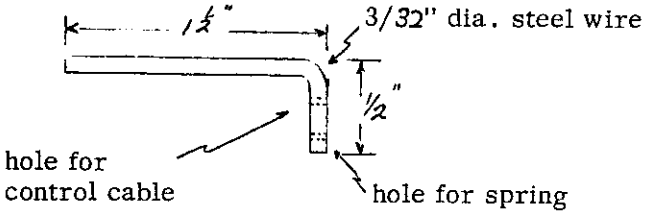
Vibration from the motor will loosen almost any bolt or set screw that is not properly fastened. Be sure to wire the engine mounting bolts and all the machine bolts on the Jumar safety (B,D). All other screws and set screws should be assembled using Loctite (tradename). Do not permit Loctite to get on the bearing surfaces. Lubriplate 630-AA lubricant can be used for shaft (X) and for the gear mating surfaces (use liberally).

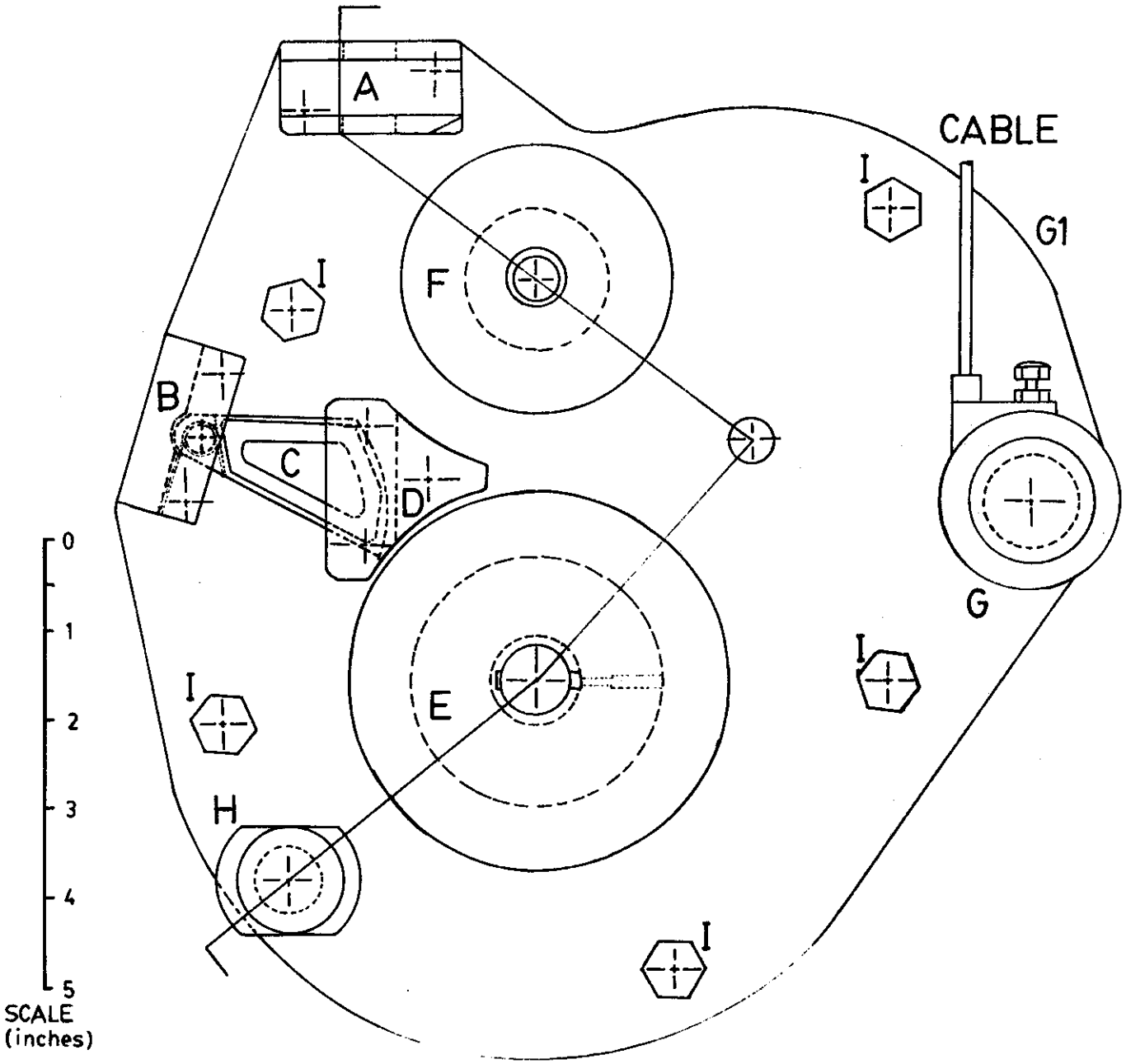
All the bearings in plates O, P, and Q need to be mounted by shrink fits; i.e., cool the bearing and heat the plates. Upon assembly the bearings may need to be sized. An expansion reamer does this job well. The bearings may not hold in the cover plate (O) so that a 1/4" plate may need to be bolted around the hole and the bearing pushed through a hole in it.

Notice that bearing (8) has been cut in length to 0.500. Be sure that when this is done a 3/4" shaft is inserted in the bearing when it is chucked in the lathe. This will prevent crushing the bearing.

The instant stop switch is built from a broken hacksaw blade and a machine screw. As shown in Figure 4, the hacksaw blade is taped to the handgrip.

The throttle assembly is shown in Figure 8. The hole along the side of the intake manifold is enlarged to 3/32" diameter and a steel wire through these holes pushes on the throttle leaf.






VIEW WITH ROPE COVER PLATE 0 REMOVED

A solder blob or ferrule on the end of the cable prevents it from pulling through the hole.

A piece of 1/16" thick aluminum 1" wide is drilled for mounting on the side of the engine. It is then drilled (1/4" dia. hole) to receive the control cable and given a 90 degree twist along its axis (see Figure 8). The assembly is completed by taking a 1" long 1/4 x 20 cap screw and drilling a hole along its axis for the control cable. An enlargement in the center of the cap of the screw holds the cable sheath. Two nuts, one on each side of the aluminum arm, hold the assembly together and provide adjustment of the throttle.

Hint! Be certain that after each use the gasoline is emptied from the tank and the engine is run until the carburetor is dry. □

# WORLD'S RECORD HOLDERS

PRUSIK CONTEST

COMPILED BY
BILL AND MIRIAM CUDDINGTON

MENS MECHANICAL
100 FEET (30 METER)

| AGE GROUP | TIME | NAME | YEAR SET |
|---|---|---|---|
| 0 TO 12 | 1:01.5 | BILLY STUCKLIN | 84 |
| 13 TO 16 | 0:54.9 | MICK FOOT | 80 |
| 17 TO 19 | 0:33.8 | PETER SPROUSE | 73 |
| 20 TO 29 | 0:28.1 | BILL STONE | 77 |
| 30 TO 39 | 0:34.1 | DICK GRAHAM | 83 |
| 40 TO 49 | 0:44.3 | JIM HALL | 84 |
| 50 TO 59 | 1:09.9 | CHUCK WILKINSON | 82 |
| 60 & UP | 1:22.6 | VANCE NELSON | 84 |
| OVERALL | 0:28.1 | BILL STONE | 77 |

MENS CLASSIC 3-KNOT
100 FEET (30 METER)

| AGE GROUP | TIME | NAME | YEAR SET |
|---|---|---|---|
| 0 TO 12 | 18:05.0 | JEFF FRANTZ | 84 |
| 13 TO 16 | 4:15.0 | PETER SOUTHAM | 79 |
| 17 TO 19 | 1:34.7 | PETER SIRUCEK | 76 |
| 20 TO 29 | 1:18.5 | MIKE VAN NOTE | 75 |
| 30 TO 39 | 2:16.6 | RICHARD SCHREIBER | 82 |
| 40 TO 49 | 2:57.1 | BILL CUDDINGTON | 79 |
| 50 TO 59 | 2:45.7 | BILL CUDDINGTON | 84 |
| 60 & UP | 6:42.7 | JOHN VAN SWEARINGEN | 82 |
| OVERALL | 1:18.5 | MIKE VAN NOTE | 75 |

MENS MECHANICAL
400 FEET (120 METER)

| AGE GROUP | TIME | NAME | YEAR SET |
|---|---|---|---|
| 0 TO 12 | 8:26.0 | BILLY STUCKLIN | 84 |
| 13 TO 16 | 7:28.8 | MICK FOOT | 80 |
| 17 TO 19 | 5:55.4 | PETER SPROUSE | 73 |
| 20 TO 29 | 5:51.0 | RON SIMMONS | 80 |
| 30 TO 39 | 4:50.5 | BILL CORLEY | 82 |
| 40 TO 49 | 6:33.7 | BILL CUDDINGTON | 82 |
| 50 TO 59 | 6:31.5 | BILL CUDDINGTON | 84 |
| 60 & UP | 7:27.1 | DARREL TOMER | 78 |
| OVERALL | 4:50.5 | BILL CORLEY | 82 |

MENS CLASSIC 3-KNOT
400 FEET (120 METER)

| AGE GROUP | TIME | NAME | YEAR SET |
|---|---|---|---|
| 0 TO 12 | | | |
| 13 TO 16 | | | |
| 17 TO 19 | 10:51.9 | JOHN BASSETT | 70 |
| 20 TO 29 | 10:01.6 | MIKE VAN NOTE | 75 |
| 30 TO 39 | 10:16.6 | MARION O. SMITH | 79 |
| 40 TO 49 | 10.56.5 | MARION O. SMITH | 83 |
| 50 TO 59 | | | |
| 60 & UP | | | |
| OVERALL | 10:01.6 | MIKE VAN NOTE | 75 |

WOMENS MECHANICAL
100 FEET (30 METER)

| AGE GROUP | TIME | NAME | YEAR SET |
|---|---|---|---|
| 0 TO 12 | 1:44.5 | SUSAN MEDVILLE | 84 |
| 13 TO 16 | 1:29.7 | KIM STEVENER | 83 |
| 17 TO 19 | 0:50.6 | NORA WHITE | 72 |
| 20 TO 29 | 0:44.6 | PATTY MOTHES | 81 |
| 30 TO 39 | 0:56.3 | DONNA MROCZKOWSKI | 81 |
| 40 TO 49 | 1:05.4 | MIRIAM CUDDINGTON | 84 |
| 50 TO 59 | 1:25.1 | AVIS VAN SWEARINGEN | 83 |
| 60 & UP | 13:22.3 | SARA CORRIE | 81 |
| OVERALL | 0:44.6 | PATTY MOTHES | 81 |

WOMENS CLASSIC 3-KNOT
100 FEET (30 METER)

| AGE GROUP | TIME | NAME | YEAR SET |
|---|---|---|---|
| 0 TO 12 | 9:32.3 | GINGER McPHEE | 84 |
| 13 TO 16 | | | |
| 17 TO 19 | 2:42.2 | DENA HAWES | 73 |
| 20 TO 29 | 2:50.0 | NANCY BRIDGES | 73 |
| 30 TO 39 | 2:05.0 | MARTHA CLARK | 84 |
| 40 TO 49 | | | |
| 50 TO 59 | 6:12.6 | AVIS VAN SWEARINGEN | 83 |
| 60 & UP | | | |
| OVERALL | 2:05.0 | MARTHA CLARK | 84 |

WOMENS MECHANICAL
400 FEET (120 METER)

| AGE GROUP | TIME | NAME | YEAR SET |
|---|---|---|---|
| 0 TO 12 | 14:12.1 | SUSAN MEDVILLE | 84 |
| 13 TO 16 | | | |
| 17 TO 19 | | | |
| 20 TO 29 | 5:59.0 | NANA BAIN | 82 |
| 30 TO 39 | 8:05.8 | SHERRY ENGLER | 81 |
| 40 TO 49 | 10:56.9 | MIRIAM CUDDINGTON | 84 |
| 50 TO 59 | 11:11.1 | AVIS VAN SWEARINGEN | 83 |
| 60 & UP | | | |
| OVERALL | 5:59.0 | NANA BAIN | 82 |

WOMENS CLASSIC 3-KNOT
400 FEET (120 METER)

| AGE GROUP | TIME | NAME | YEAR SET |
|---|---|---|---|
| 0 TO 12 | | | |
| 13 TO 16 | | | |
| 17 TO 19 | | | |
| 20 TO 29 | | | |
| 30 TO 39 | 12:29.3 | MARTHA CLARK | 84 |
| 40 TO 49 | | | |
| 50 TO 59 | | | |
| 60 & UP | | | |
| OVERALL | 12:29.3 | MARTHA CLARK | 84 |

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COMPILED BY BILL BUSSEY

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NYLON HIGHWAY NO. 2 JULY 1974



NYLON HIGHWAY NO. 3 DECEMBER 1974



NYLON HIGHWAY NO. 4 MAY 1975

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NOTE: The pages listed adjacent issue # 1 reflect the reprinted version...Originally there were 40 pages in the first NYLON HIGHWAY # 1. □

# SPELEAN SHUNT

BY BILL CUDDINGTON*

Fell off a horse last summer...I got up on that thing and it didn't have a saddle or a bridle and like a fool I got up on that thing, I'm no horseman...and sure enough I ended up fallin' off of that thing. You know, you don't even want to fall 4 or 5 feet. Like horses cavin' can be dangerous. We tend to be relaxed sometimes on the shorter drops,but it seems those are the ones that try to get ya.

The Spelean Shunt is a device that can maintain safe control during a rappel. Mike Fischesser was the person who really got me to use it. I had tried it before with just an oval biner...(see figure # 1)...Once you set it, its hard for me and a lot other people, cause it takes so much arm and upper body strength to release. You could put a sling in the far side of it and step your foot into it and break it loose. But

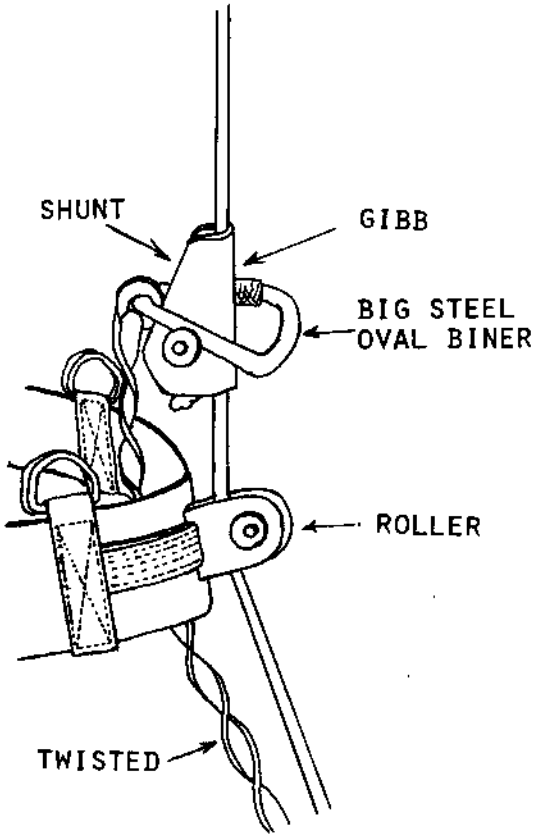
Mike pointed out a modification where, rather than using a standard oval carabiner use a Steel Locking Offset "D" carabiner. Stubai makes a good one. This carabiner allows you enough room to grasp your hand and enough leverage so that you can release yourself easily.

Success in using a Shunt will require that you rappel very slow with it. This will allow you a safe smooth descent. I've attached my Shunt directly to my seat harness, but rather hook directly to my seat biner I've added a light piece of webbing as a backup that follows the same path as my seat carabiner...not that my seat carabiner is going to break, but you might as well back up everything you can. By twisting the webbing that connects the Shunt to your seat harness you can stop the tendency it has to grab when you don't want it to. In the days of the prusik safety you had to inch down with them. People said you'd never let go of them in an emergency, but the way we used them it was almost like prusiking down and looking back still seems to be a pretty safe way...The problem was that it was so slow that rappelling wasn't any fun. The Spelean Shunt offers you an opportunity to rappel safely and smoothly.

A couple of items remain to be covered. First it's important to use a steel biner in that the weight of the carabiner keeps the Shunt from activating prematurely. Also caution should be used to ensure that the straight side of the carabiner rocks on the push button end of the quick release pin. (see figure # 2) If the carabiner is accidently put on the opposite side, the small end of the quick release pin can easily be bent, distort the hole and make it impossible to remove the quick release pin when you're finished.

CAUTION Feedback from some to the Speleo Venders has revealed that some people are using Fastex and/or plastic buckles for their harnesses. These buckles should in no way be considered climbing quality. The 2 inch Fastex buckle tests at about 400 lbs. If it has mud in it, it will release sooner. They have been designed for packs and gear where lives were never to depend on their integrity. Please be cautious that you have not inadvertently incorporated one of these buckles in your harness where your life may depend on it.

Allen Padgett*




SPELEAN SHUNT

*This text was transcribed and placed in readable sentences by the editor who recorded the proceedings from the NSS Vertical Session at the 1984 NSS Convention in Sheridan, Wyoming. □

# A LETTER

Editor,

I was interested to see McClurg's(NH #18) excellent article on a self-starting technique when using Gibbs. One thing disturbs me about the article, however. It sounds to me like the only time anyone needs a self-start is when they are the last one out of a pit (i.e. a person holds the rope for others climbing out to keep the rope from riding up with the ascenders). I have routinely climbed with a self-start because I have this hangup about being self sufficient. The last time I climbed a pit, about 40' off the floor I shifted my weight and some how or other the nonlocking carabiner I was using to attach my pack (the fissure was too tight to wear my pack) to my seat harness opened and my pack plummeted to the ground.* If the woman who offered to hold the rope for me actually had, she could have been injured. I moved the nonlocking carabiner to a temporary location while readjusting my rig. I forgot about it until I climbed to 80' where it fell off and also plummeted to the bottom. And we all know the danger of falling rocks dislodged by climbers.

So what can we learn from this? In my estimation the rope should never be held for someone so they can avoid a self-start (except when climbing indoors on a pulley or similar situation). If you have trouble with a self-start, perfect your technique during practice sessions, or modify your rig according to McClurg and below.

The other thing I learned is to avoid nonlocking carabiners. I routinely avoid them when it comes to life support situations. I will now avoid them in almost all situations.

McClurg indicated the location of the carabiner used for the self-start is not critical. His diagram appears to have the carabiner simply looped around the shoulder strap of a chest harness. I'd like to suggest a slight improvement (not worth the effort to modify an existing harness, but easy to incorporate when constructing a new one). I've already done it to my chest harness as an attachment place for my spelean shunt. When sewing the shoulder straps on the harness, simply leave a little extra webbing for a loop (figures 1 and 2).

A note I might add about the laterally positioned carabiner. I have found it not to be uncomfortable as an attachment for a spelean shunt. However, to use it (looped around the shoulder strap or in the special loop just described) as a self-start sounds rather painful for women. So far I haven't been able to come up with an alternative. If anyone does think of one, please let me know.

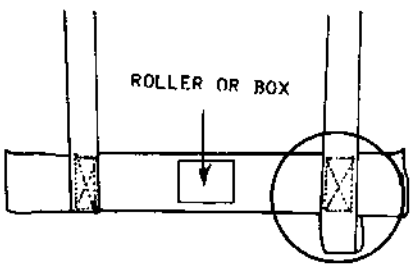



FIGURE # 1 CHEST HARNESS SHOWING LOOP ON ONE SHOULDER STRAP FOR A CARABINER

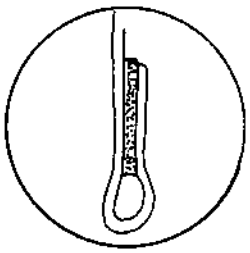


FIGURE # 2 END VIEW OF SHOULDER STRAP

*When my pack fell, it contained a 35mm camera. The only damage done was a small fleck of dirt (paint, or something) dislodged and stuck on the inside of my viewfinder. I'm very happy with the Lowe-Pro camera pack I had it in. The Lowe-Pro was just big enough for one camera and is made of nylon cordura with 3/8" closed cell foam padding.

Barbara

Barbara am Ende

# CHANGING OVER

By Bruce Smith

Changing over to rappel while you're prusiking or changing over to prusiking in the middle of a rappel is a critical skill and very necessary if one intends to involve themselves in any serious type of vertical caving.

An interesting note! The two events <u>are not</u> the reverse of each other.

RAPPEL to PRUSIK

A great technique to know when you discover the rope's too short, you have to descend over a knot, the bottom is flooded and you forgot your swim trunks, you discover a cave dragon flame's licking the bottom of the rope, etc....

PROCEDURE!

1. Stop your descent. (Locking off is not necessary if step 2 happens immediately).
2. Attach your seat (safety) Jumar (or some other appropriate ascender) above your rappel device. NOTE! A critical length criteria for your seat Jumar sling...It must be long enough to reach the rope above your rappel device.
3. Connect your knee and/or foot ascender(s) to the rope. (Assuming that they're already fastened to the climber).
4. Stand up--putting tension on your feet/foot ascender(s), and push your safety Jumar up. Now sit back down.

This move should have relieved all the tension from your rappelling device.

NOTE! In many cases the need to perform step 4 is not necessary. As soon as you proceed with step 5 and remove the rappel device you'll slip down the rope affording your seat Jumar the opportunity to support all your weight.

5. Remove the rappelling device from the rope. If you're using a Figure 8 it should have been attached to another locking carabiner that was attached to your seat harness carabiner. The same applies to a rack if you're Texas prusiking.

*Remember Safe Caving Rule # 33...Never open your seat harness carabiner while hanging from it.

6. If you're using a box, roller or shoulder Gibbs, attach those at this time and the exchange process is complete. Remove the rappel device and clip it to your side equipment loop or put it back in your pack. If it's a rack be sure to close the bars onto the legs.

*Remember Safe caving Rule # 26...Never have straps, gear, ascenders, descenders, belay ropes, etc. hanging from a climber that are not being used...Invariably they complicate the vertical process and often times get tangled or other wise inhibit the use of the equipment that's intended for use.

7. Changing from rappel to prusik is now complete.

PRUSIK to RAPPEL

Another very important skill is the ability to changeover from prusik to rappel. Practicing in a tree on a fixed rope would require such a skill. Half way up a drop you develop climbing system problems. Unable to repair the problems while on

rope you changeover...and rappel to the bottom to correct the problem...Another example and of course when you've finished climbing down over that knot...changeover and finish your rappel.

PROCEDURE:

1. Attach your Jumar safety if it's not already being used (i.e. for Texas prusiking) and sit down. Attach it above your chest roller or box if you're using one of those.

2. Remove the rope from any box or chest attachment device.

3. Lower your foot and/or knee ascenders about 2 feet. If you're using a bungie cord, this needs to be disconnected or your lower ascenders will just keep popping up the rope. (This 2 feet frees up the rope required to fasten to the rappel device).

4. Attach your rappel device to your seat harness with a locking carabiner. It is critical that this second carabiner be incorporated into your system. Verify that your seat(safety) Jumar is clipped into your seat harness carabiner while the rappel device is clipped into the second carabiner. (See the diagram) Of course, if your using a figure 8, attach it to the rope first and then to the second carabiner.

5 Connect the rappel device to the rope. Insure that there is minimal space between your safety Jumar and the top of your rappel device. In other words, take up all the slack. If it's a rack use all the brake bars and lock it off. It is important to lock off the device if possible.

6. Remove all but one of your lower ascenders. Keep the knee ascender it you have a choice.

7. Raise the knee ascender.

8. Stand up in that lower ascender and remove your Jumar safety.

9. As you sit back down transferring your weight to the rappel device keep tension and weight on the knee ascender. This will prevent any slippage in the rope through the rappel device.

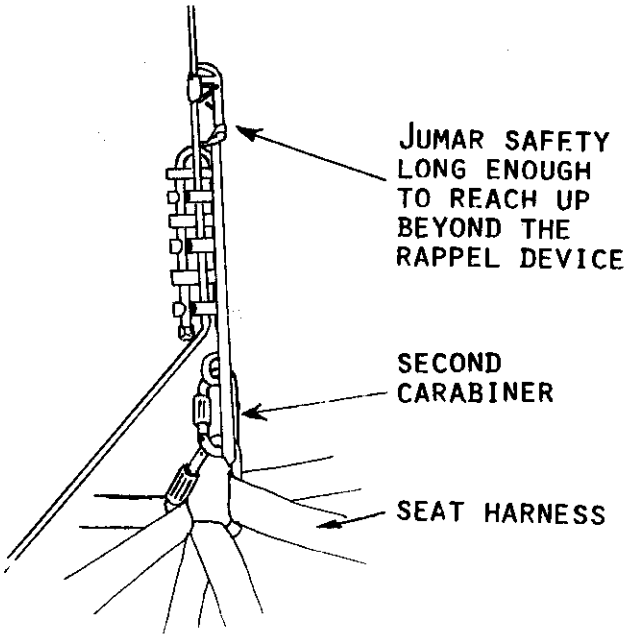
NOTE: If slippage were to occur it is very likely that the rappel device could slide into your lower ascender causing both units to jam together... resulting in a rappel device that won't move and an ascender that can't be moved or removed on/from the rope.

10. Replace the tension that your knee ascender is providing to the rope with tension from your hand.

11. Remove the lower ascender from the rope and your foot. Rule # 26

12. Changeover is complete.

GLOVES: Often times heated discussion can be generated regarding the subject of gloves. Whether to wear them or not. During changevoer, nimble fingers and their ability to insert pins, pull safety releases, remove, replace etc. are essential. I recommend not wearing gloves during changeover. In fact, I feel that all rappels should be controlled enough that gloves shouldn't be used at all. I guess it's a mind set. If I discover that I truly needed gloves to do a rappel then I feel that I was out of control and going too fast. The question still remains...Should you wear gloves during a rappel? My answer is "Yes", but for safety and backup purposes only. □



# THE QEST ROPE WASHER

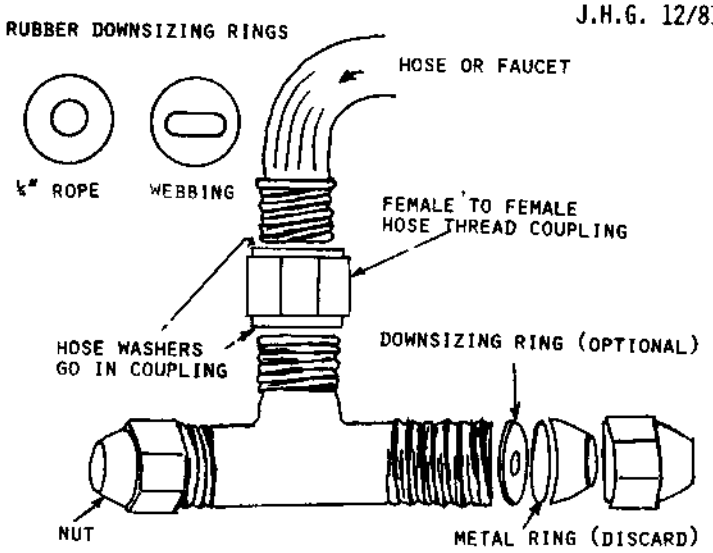
By John Ganter

Few would argue that nylon caving ropes need at least an occasional automatic washing with a good detergent (like Tide) and fabric softener (like Downy). But there are times when a quick rinse-off or pre-wash is needed. Also, with really long ropes it may be impossible to find a large enough machine. To help with this awkward job, PMI Industries markets a clever device which concentrates the flow of a garden hose onto a small segment of rope. The rope is pulled back and forth through the device and much of the dirt is removed. This PMI Rope Washer, constructed of heavy brass and steel pipe fittings, sells for about $20. (not including postage) It weighs 1.5 pounds and is available from most caving suppliers. Of course, you can make your own copy for less than half that, but you need a drill press and pipe threading or brazing equipment. So, most cavers have had to buy the washers ready-made.

Fortunately, industry has responded enthusiastically to consumer's demands for "do-it-yourself" plumbing supplies. Among the vast array of devices they have produced is one very strange plastic fitting, the only use of which I can think of this is to make a rope washer. This washer costs under $5 and requires no tools to assemble.

The part you want is a Qest plastic Tee with a 5/8" by 5/8" by 5/8" outside diameter tube size. (Part number QCT 333) I found mine in Murphy's Mart; it cost $2.77 and was part of a large display of other Qest products. If you have difficulty locating a local dealer, write to: US Brass, P.O. Box 37, Plano, TX. 75074. Next, you need a 3/4" female Hose Thread Coupling, made of brass, and available for about $1.70 at any good hardware or plumbing supply. (Murphy's didn't have them.) In addition, you'll need two "hose washers" (donut-like seals). You may be able to find these around the house; otherwise you can get 6 for less than 50 cents at the hardware.

J.H.G. 12/83




Now you assemble the parts; I suggest removing the metal ring in each side of the Tee; they may abrade the rope. The diameter of the "nozzles" are 5/8"; a little large for most caving rope. If you want to downsize the nozzles, just cut appropriately-sized rings from inner tube rubber or something similar and seat them between the cone and nut. This will keep the water from spraying out so quickly and wash the rope better.

It's still possible for those of you who live in efficiency apartments (or the like) and don't have access to an outside faucet or a washtub to use this washer. Portable dishwashers also use a 3/4" hose connection. Since portable dishwashers

are indispensable to the American Dream, chances are your local plumbing salesperson can figure out a way hook you up to anything. Then put your Qest washer in the tub or shower and make mud!! (I know people who do this.)

So there you have it! a very cheap rope washer. It weighs 4 ounces, about 1/6th the weight of the PMI. While very rugged, it's still not as strong as the all-metal PMI. It also has no provision for the "tiny jets of water in a swirling pattern" that PMI advertises. And it may wear out a little faster. But at 1/4th the price, I think it's a bargain. □

# NEGOTIATING TRICKY LIPS

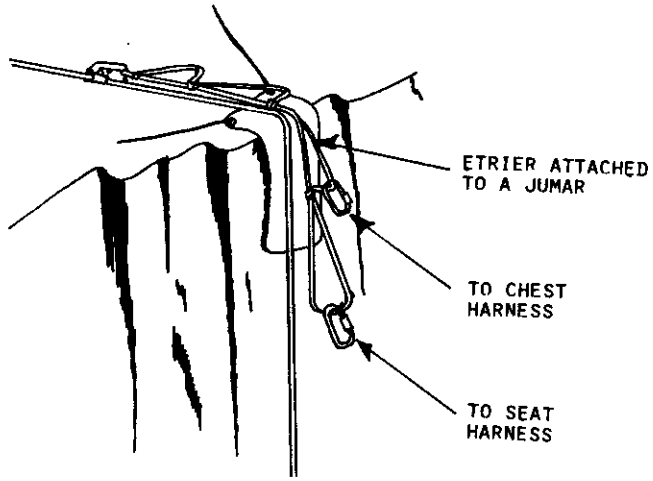
BY JANET MCCLURG*

Carrying a Jumar with a 2-5 step etrier is probably nothing new. Probably most vertical people do.

To ask a tired person to climb an etrier when the risk of falling is present doesn't seem to be the best option. Helping a kicking struggling climber over an edge is much different than assisting a tired perhaps sick or unconscious person over a lip.

This became most apparent during a cave trip with my children. My concerns, of course, centered around a person's balance if and when a person were to disengage from their box or upper ascender in an effort to negotiate a nasty or difficult lip.

We discovered by accident and later through extensive testing that a simple and faciliative way of negotiating a lip was with that Jumar with an etrier with a few subtle modifications. Attach a carabiner to the second loop of the etrier. The last person over the edge attaches the Jumar to the rope and flops the etrier over the lip. As each person approaches the lip and before any lip negotiations begin, clip the




lower etrier loop in a seat harness carabiner and the second loop carabiner into a chest harness.

You're now in a safe position to basically do anything necessary to get over that lip...Pull off a shoulder Gibb, remove a top Jumar, come out of the box or a roller. No mattter what may happen you will be safe, as well as upright...do to the chest carabiner. The length of the etrier (5 feet or so) gives a lot of freedom to do all that's necessary to get over the lip while securing you safely to the rope.

*This text was transcribed and placed in readable sentences by the editor who recorded the proceedings from the NSS Vertical Session at the 1984 NSS Convention in Sheridan, Wyoming. □

# CHANGING ROPES ON THE BIG ONE

By Bruce Smith

It has become interesting to me as to the actual problems one can encounter when changing ropes. Often times, we find ourself in a position where we need to transfer from a pigtail to the mainline or visa versa or we're involved in a rescue where it is essential that we change ropes or we're informed there's a serious cut in our rope 100 feet above us. A rope suddenly appears at our side and we're told to "Carefully transfer ropes." The opportunity as well as the need to transfer ropes has happened to me dozens of times. Too many of them, I'm sorry to say just about tore me in half not to mention flipping me upside down. Whether it's a rescue situation, practice, or a tandem drama, transferring ropes is a skill that needs practicing and fine tuning.

Changing ropes that don't stretch on short drops all have a very logical and important sequence of events that should take place as well as the big ones where rope stretch becomes the primary factor. One truly helpful aid to pull this event off will be a Jumar safety. For some Stand-up Sit-down systems this may require two...depending on your skill and confidence.

Let's consider two situations...

1. When there is no(minimal as in inches) stretch in either rope.
2. When there is a dynamic rope involved (stretchy) or a long drop where 2 or more feet of stretch are involved or will be involved when the weight of a person is added or removed from the rope.

SITUATION # 1 is pretty straight forward.

PROCEDURE: Assuming you're ascending...

1. Attach your Jumar safety to the rope you're hanging from (call it rope # 1) above your roller or box if you're using it.
2. Sit down and apply weight to that safety Jumar.
3. Remove your chest box/roller or shoulder cam.
4. Remove your foot ascender(s) from rope # 1 and reattach them/it to rope # 2 (the rope you're transferring to).
5. Slide the foot ascender(s) up in preparation to climb.
6. Stand up. This move should have instantly transferred your weight from rope # 1 to rope # 2.
7. Carefully, but quickly remove the Jumar safety from rope # 1 and reattach it to rope # 2. This step requires a firm grasp on rope # 2 to maintain the climber's upright orientation.

When you're just learning or if you lack confidence in the move a second Jumar safety can be attached to rope # 2 between steps 4 and 5. When you stand up in step 6, simply slide that Jumar safety up rope # 2. Step 7 will only require a simple removal of safety Jumar # 1 from rope # 1. The transfer is now complete. The second Jumar safety tends to be impractical because most people don't carry two.

If you find you can't remove the Jumar from rope # 1 when you stand up as described in step 6 and 7, you're probably dealing with dynamic forces that require a close look at our next discussion...Situation # 2.

Let's consider SITUATION # 2.

There are some dramatic solutions that I wouldn't recommend such as transferring all your gear to rope # 2 while hanging from your spelean shunt...then release the spelean shunt. Prepare youself for a leaderfall. Moves like this should be methodical that involve minimal sudden moves.

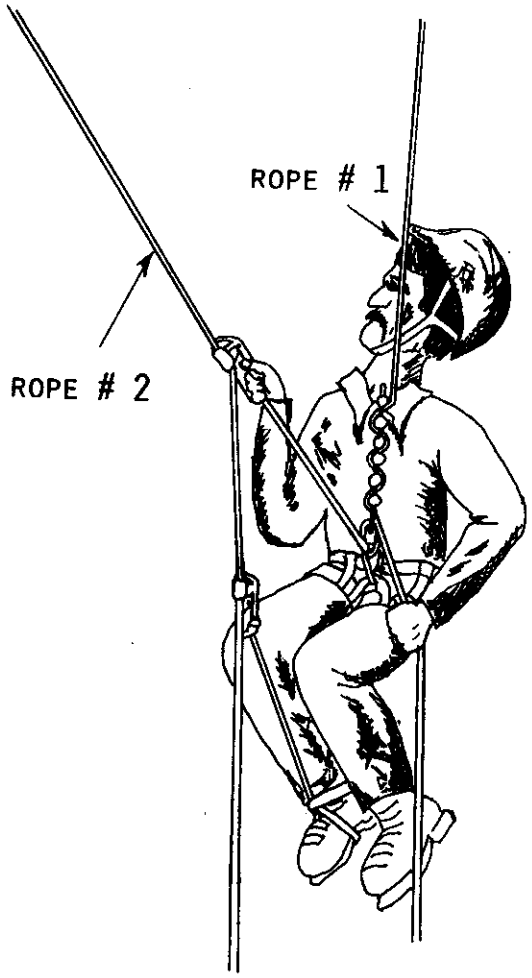
PROCEDURE:

1. Transfer from prusik to rappel and lock off. (See the article "Changing over" in this issue of N.H. if you're unfamiliar with this procedure).
2. Attach your ascending gear to rope # 2... foot ascender(s) first. Seat, chest and shoulder equipment last.
3. Unlock your rappelling device and rappel all the tension out of the rope # 1 thus transferring all your weight to rope # 2.
4. Remove your rappel device from rope # 1 as well as from your seat harness unless you have to open your seat harness carabiner to do it. Remember Safe Caving Rule # 33...Never open your seat harness carabiner while hanging from it.

There is a second way of dealing with this dynamic move, but requires a second Jumar safety.

PROCEDURE: Assuming you're ascending...

1. Attach Jumar safety # 1 above your box or roller.
2. Sit down.
3. Remove rope # 1 from box or roller if being used.
4. Remove foot ascender(s) from rope # 1 and reattach to rope # 2.
5. Attach Jumar safety # 2 to rope # 2.
6. Attach all chest devices to rope # 2. Bungie cords?



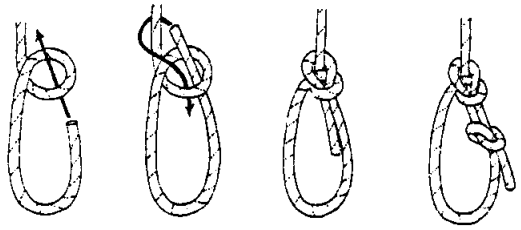

7. Assuming you're totally ready to ascend on rope # 2, pretend you're on the ground and climbing rope # 2. Prusik the slack out of rope # 2 and diminish the tension in rope # 1.
8. When Jumar safety # 1 hangs limp on rope # 1 remove it and continue on your way on rope # 2.

There are a couple of important points that I feel are represented in this article. I feel:

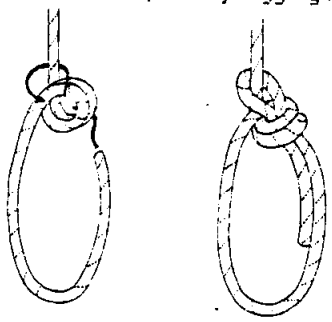
1. It's important to always transfer your foot ascender(s) first. This allows you to bend over to attach them as well as use the key ascenders that can reduce tension in seat or chest harness attached equipment.
2. Your rappelling device is a great piece of equipment that can slowly and not catastrophically transfer your weight from one piece of rope to another. □

# THE COVER

Bowline Primary end-line knot used for a multitude of purposes. Should be backed up with a overhand knot.



Mountaineering Bowline A form of a bowline. Its internal holding power is superior to that of a bowline and an excellent primary rigging knot.



Prusik knot The great grand-daddy of them all. Used for ascending, a safety as well as a shunt in the olden days. Basically your "will not (should not) slide on the rope when tension is applied."

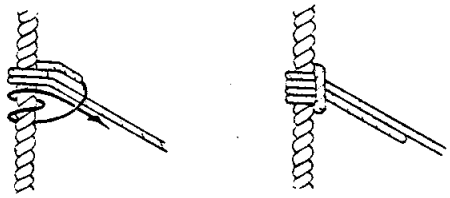


Figure 8 knot Commonly placed at the end of a rope to avoid rappelling off the end.

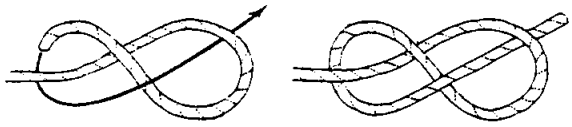


Figure 8 on the bight An excelent knot for mid-line activity such as carabiner clip-in's, trolley line hook-ups and primary riggings from the middle of the rope.

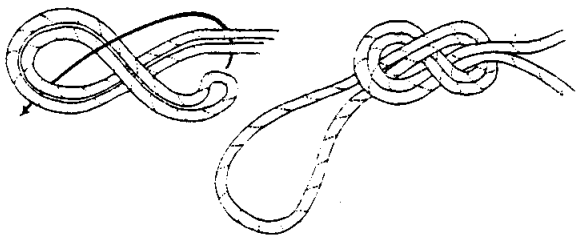
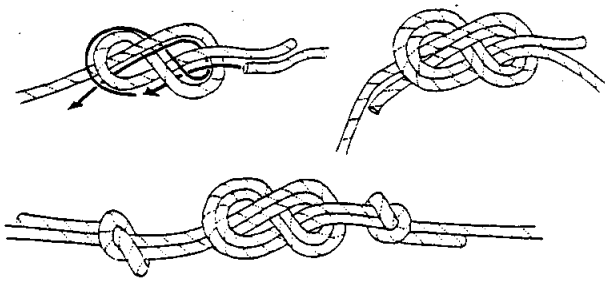
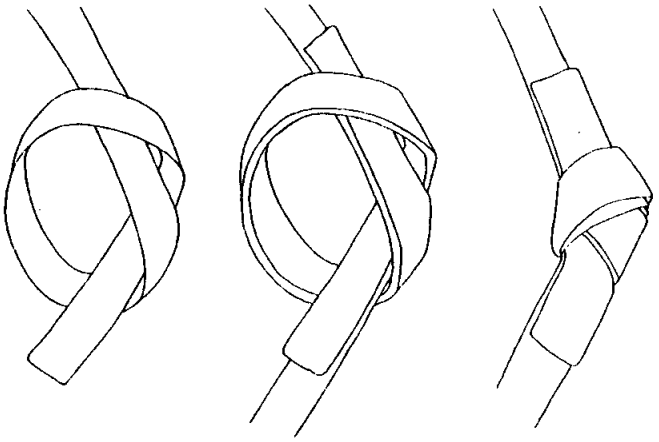


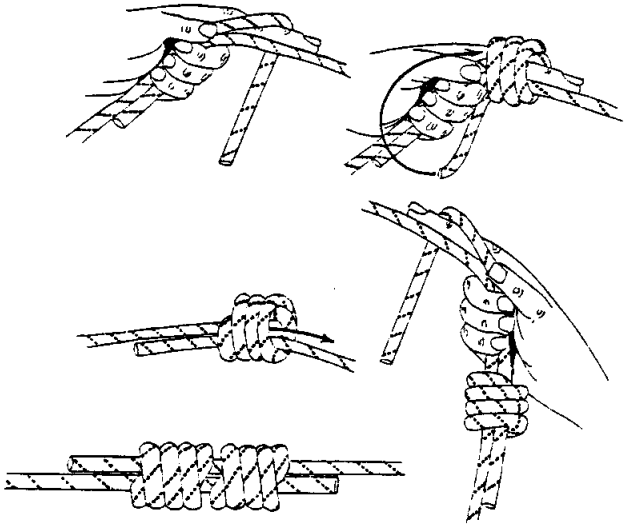
Figure 8 Bend, Flemish Bend, Figure 8 Grapevine etc. It is a great knot for tieing 2 ropes together or 2 slings together.



Water knot, Overhand bend, Grapevine knot, Blood knot, Ring bend, Follow Through knot...all the same knot. A common knot for joining two ends of slings. Often used for making endless loops.



Barrel knot or Triple Fisherman's A superior knot for joining 2 ropes forming endless loops, ascender cords and the like.



# ADMINISTRATIVE

SPECIAL NOTICE From all indications the Editor's present address will be changing very soon. Please make all inquiries to Bill Bussey.

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GREAT VERTICAL EVENTS is a NYLON HIGHWAY feature. From time to time great vertical achievements take place utilizing rope techniques commonly used in a cave. Often times these events require special talent, equipment, money and sacrifice. It is our intent to bring you those stories as they happen with all the significant details. Got any you want to share...?

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 can not express my gratitude. Thank you...

ISSUES #1 #2, #3, #4, #5, #6, #7, #8 REPRINTED

YUP! You read it right. 1984 has been a busy year for reprinting. Back issues are NOW AVAILABLE. Make your set complete. Back issues cost $2.00, write today for those you're missing. Write to Bill Bussey or Bruce Smith for your missing issues.

NORTH AMERICAN SINGLE ROPE TECHNIQUES BOOK BEING WRITTEN...Dateline July 1, 1984, Sheridan, Wyoming... The NSS has asked the NSS Vertical Section to supply the talent/horses needed to put together a complete book on North American SRT. Allen Padgett and the N.H. Editor are doing the coordinating and the leg work. The working title is "On Rope" and has a rough draft completion date of NSS Convention 1985.

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ISSUE # 20 will feature an artical about Vertical Cave Surveying by Bob Thrun.

ILLUSTRATIONS by the Editor

ALWAYS LOOKING FOR GOOD ARTICLES