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7

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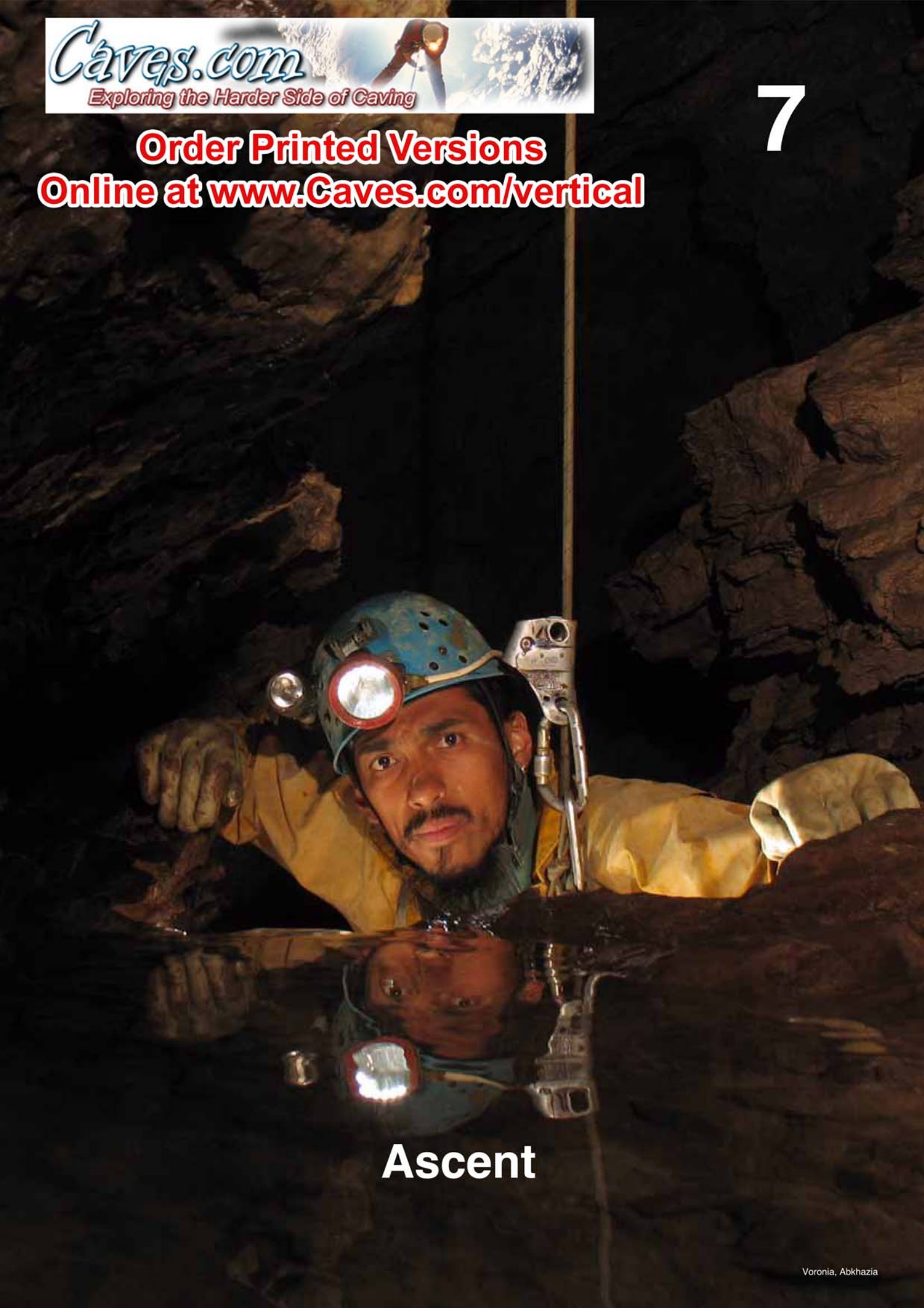


Ascent

Voronia, Abkhazia

Climbing a long thin rope is a hard way to get out of a cave so it makes sense to do it as efficiently as possible. The traditional method of using a pair of Prusik knots made of a thinner cord than the main rope works...slowly and is worth knowing for emergency use.

A few cavers still use Prusik knots for caves with only one or two isolated pitches because they represent the lightest, most compact prusik system available — a pocket-sized prusik system!

SRT now relies on the use of two or three mechanical ascenders attached to the caver in two basic ways.

Sit/Stand systems where you climb with a frog-like sit/stand motion.

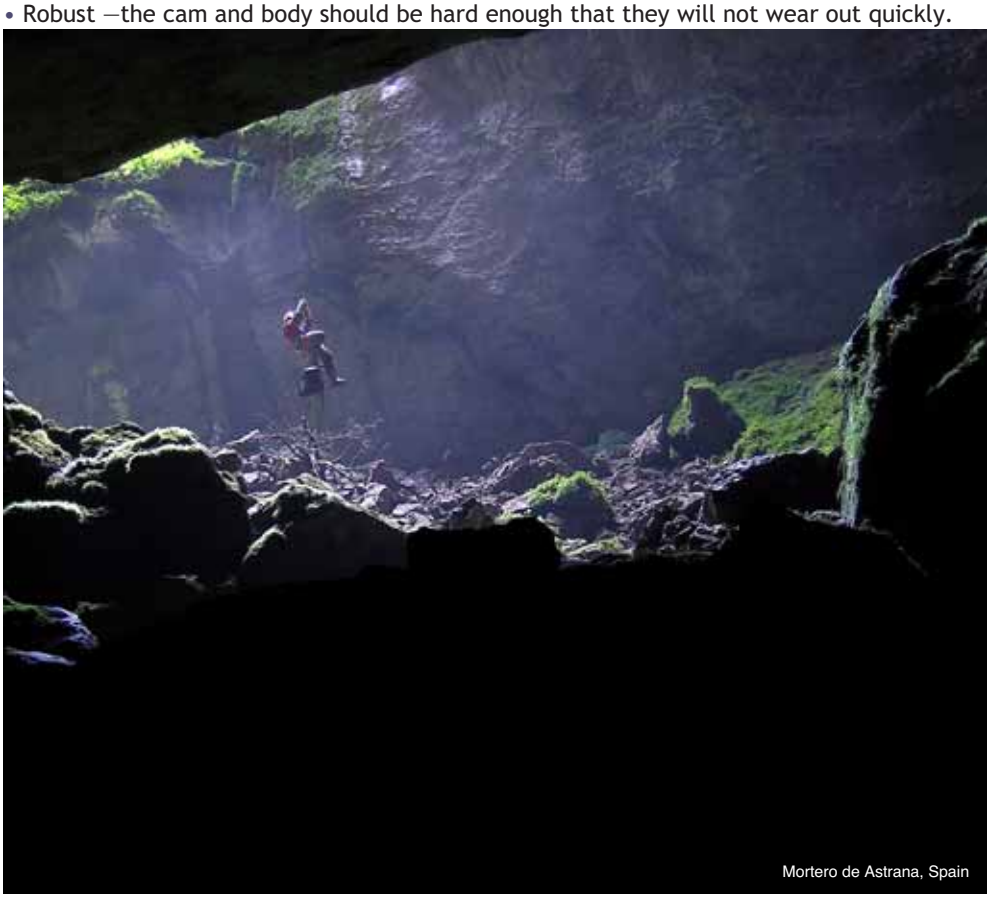
Ropewalking, where you use a more natural walking motion to climb the rope.

Mechanical ascenders

Mechanical ascenders work by means of a cam that jams the rope so that the ascender slides up the rope but not down. Most rely on a spring to keep the cam in contact with the rope and small teeth to give positive grip. Once the cam bites it holds more strongly as the load increases, so a strong spring is not necessary. Only Gibbs ascenders use the climber's weight to activate the cam via a lever. This gives the advantage that teeth are of minor importance so the device has good grip even on muddy or icy ropes. A second advantage is that non-spring ascenders have very little rope drag. They move up the rope more easily and last longer. Choose ascenders on the basis of suitability for a prusik system. As will be explained later, the relative strength of ascenders is of minor concern.

Desirable features

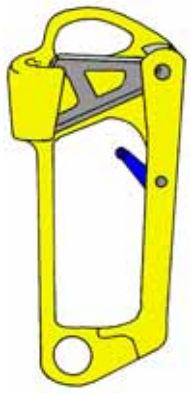
- Single-handed loading or lock-open cam that releases with one hand to close on the rope.
- Single-handed unloading.
- Shaped to fit comfortably in the hand, on the chest, knee or ankle.
- Cord attachment eyes in line with the rope. Attachment eyes away from the rope cause the ascender to twist when loaded.
- Simple streamlined shape with no bits and pieces hanging off to get snagged or damaged.
- Better than 400 kg breaking strain. Most ascenders cut the rope before they fail structurally. Attachment eyes must be strong enough to allow for wear.
- Robust —the cam and body should be hard enough that they will not wear out quickly.



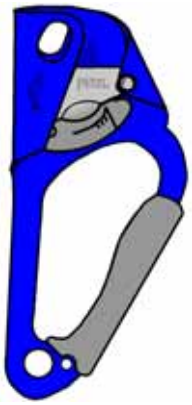
Mortero de Astrana, Spain

Handle ascenders

Many ascenders incorporate an integral handle in left and right versions to allow you to use them comfortably in either hand. While the handle may add to ease and comfort when using the ascender, especially on sloping pitches, it also adds to the weight and bulk of the device. A handle ascender is cumbersome when you are not using it in your hand, and while the handle is sometimes nice for a top ascender it is by no means essential.

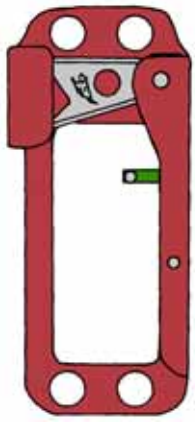


Jumar

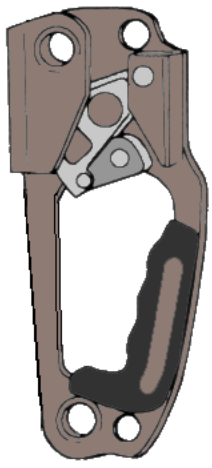


Petzl 'Ascension'

CMI 'Ultrascender'



SRTE 'Standard'



SRTE 'Explorer'

Table 7:1 Common handle ascenders

Ascender	Weight (g)	Length (cm)	One hand On	One hand Off	Cam open	Comfort*/ Ease	Durability*
Petzl Ascension	195	19	yes	yes	yes	1	3
Jumar	270	18	yes	yes	yes	2	2
CMI Expedition	275	20.3	yes	yes (just)	no	3	1
CMI Ultrascender	270	19	yes	yes (just)	yes	5	1
SRTE Standard	339	19.7	yes	yes	yes	3	1
Kong Lift	225	19.3	yes	yes (just)	yes	2	3

* Ratings 1 = best 5 = worst
It is not possible to show all available ascenders. Use this as a guide to other ascenders that in many cases are variations or copies of those described here.

Non-handle ascenders

Short, compact ascenders are useful for virtually any application. Some are especially designed as chest mounted ascenders and as such work exceptionally well. Others are less specific and you can mount them anywhere on a prusik rig, but they may not be as good as a specifically designed device.

Petzl 'Basic'

Petzl 'Croll'

CMI 'Small Ultracender'

SRTE 'Short Standard'

Petzl 'Tibloc'

Table 7:2 Common non-handle ascenders

Ascender	Weight (g)	Length (cm)	One hand On	One hand Off	Cam open	Comfort*/ Ease	Durability*
Prusik knots	60	-	no	no	no	9	6
Petzl Tibloc	39	5	no	yes+	no	5	3
Petzl Basic	140	10	yes	yes	yes	2	3
Petzl Croll	140	12	yes	yes	yes	1 (chest only)	4
Kong Cam Clean#	150	11.5	yes	yes	yes	1 (chest only)	3.5
CMI Small Ultrascender	180	13	yes	yes	yes	3	2
SRTE short Standard	221	13.5	yes	yes	yes	3	2
Petzl Pantin	112@	5	yes	no hands	no	2	1
Gibbs	175	10	no&	yes	no	6	1

* Ratings 1 = best 6 = worst

A copy of the Croll but slightly rougher and with no rivet to help it survive FF1 falls.

& Not even close! Unbelievers would say that it requires 3 hands.

@ Weight includes attachment tape.

+ But use an attachment string or you'll drop it.

It is not possible to show all available ascenders. Use this as a guide to other ascenders that in many cases are variations or copies of those described here.

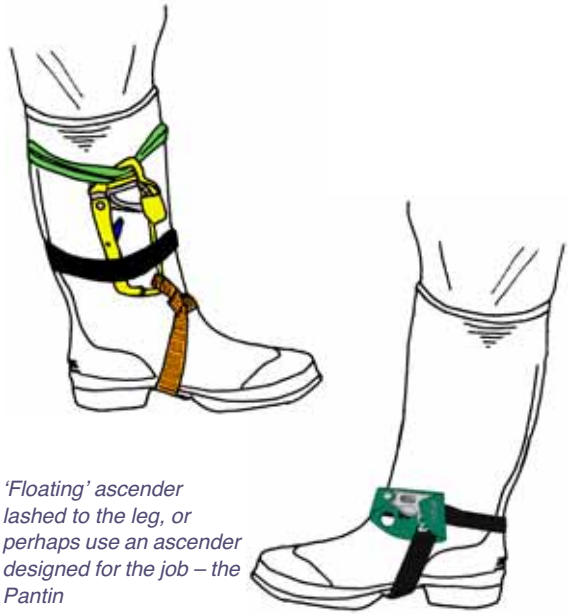
Foot ascenders

Petzl 'Pantin'

Gibbs

These ascenders are specifically suited for foot mounting. There are only two in common usage at the moment. The Pantin, that is a 'cut down' Petzl Basic or Croll with a weakened spring to reduce rope drag and no safety catch so that it is easy to remove from the rope (and impossible to keep on for the uninitiated!), and the Gibbs.

Gibbs ascenders are most suited to Ropewalk rigs and 7/16th inch (11 mm) rope where they work better than any other ascender. They are probably the surest ascenders on muddy or iced ropes but for anything else they are not worth the trouble – they need to be dismantled to get them on and off the rope and on 8 mm and 9 mm ropes they do not always grip immediately, making it difficult to maintain a good ropewalking rhythm.



'Floating' ascender lashed to the leg, or perhaps use an ascender designed for the job – the Pantin

Attachment

Connect chest mounted ascenders directly to your seat maillon or by a short link such as a 6 mm maillon. A tape or rope loop works, but is hard to tie short and can wear dangerously fast. The exact configuration you use depends on your harness, ascender and prusik rig. For example, Croll ascenders are shaped to sit flat against your chest when connected directly to a seat maillon that is also flat. When connected directly to a harness that has the seat maillon at 90° to your body a Croll sits badly, runs badly and may slip. A small maillon as an intermediate link cures the problem although the Croll then sits a little high for an efficient Frog system.

Attach your hand ascender with your long cowstail. If your rig calls for a permanent attachment, tie cords and tapes to the ascender directly to the eyeholes at the top and bottom or by using small maillons as intermediate links. Use light tape to cover 5 mm to 8 mm static cord and reinforce it at the ascender connection to make it last longer.

Use 8 mm or 9 mm dynamic rope for 'life support' safety cords and tie them to the bottom of the ascender separately from other attachments.

Ideal *Good (but high)* *Bad* *Bad*

Chest ascender orientation

Wear

Worn Croll

Your Croll will wear out long before any of your other ascenders. The top edge immediately in front of the cam usually wears to a razor-sharp edge. Not much good for either the rope or your fingers. This wear is usually exacerbated if you use a Pantin or other foot ascender as you tend to lean back against the rope that's tightened but the foot ascender as you move up.

Your hand ascender should last a lot longer. Mine wears out every five or six Crolls by wearing the bottom edge, just below the cam. I wear out handle ascenders faster than basic ascenders because I move them up holding the handle and twist them a little and that causes more wear on the lower edge.

Old spring ascenders begin to slip when their teeth become excessively worn or their springs become too weak. This usually becomes apparent when you're climbing muddy or clay covered ropes where the already blunt teeth become clogged. While it is possible to buy replacement cams and springs for most ascenders, the frame will probably also be sufficiently worn that it's better just to throw away the ascender and buy a new one. Ascenders require very little other maintenance apart from the obvious need to clean and oil them occasionally.

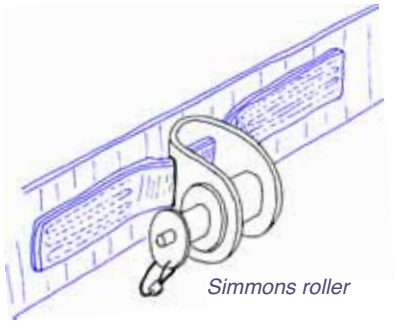
Mark wears out the bottom edge of his Croll. I wear out the top. On one expedition we were running short of Crolls and thought that it would be a good idea to trade Crolls to scratch out a bit of extra life from them. It didn't take long to realise that, having worn out one edge of the Croll, wearing out the other edge would leave....nothing.

Strength

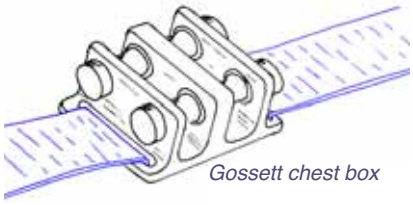
The connection point between ascenders and rope are the weakest points in any SRT system. Under static load tests, 'weak' ascenders usually fail when the wrap around channel unfolds or breaks enough to allow the cam to turn inside-out. In tests, 'Strong' ascenders typically fail by chopping the rope or sheath and sliding. Under FF1 shock-load tests however, most ascenders chop the rope sheath and slide down until stopped by the sheath binding or the bottom of the drop, leaving the ascender intact. In many tests however, the ascender has simply cut the rope in two. Thick ropes do not perform much better than thin ones in this respect. Many ascenders, or the rope you connect them to, begin to fail at loads as low as 450 kg, hardly a marvellous safety factor.

There is no mechanical ascender you can rely on to withstand a FF1, 80 kg shock load. Those that stand the best chance are prusik knots tied in 6 mm or thicker cord on 10 mm or thicker rope if they don't slip enough to melt. Petzl ascenders stop the cam from closing all the way that helps (but doesn't guarantee) to stop the rope from being cut completely. The obvious solution is to avoid shock loading ascenders. Don't climb above a belay point while your ascender is attached below and **NEVER** use ascenders as belay devices when rigging or climbing.

Chest box



Simmons roller



Gossett chest box

Chest boxes and rollers are not ascenders but guides to hold you close to the rope while using certain prusik systems. They are made from 'U' shaped pieces of aluminium channel. The most popular designs have the closed end of the 'U' mounted against the chest and the rope is inserted into the open end before a roller is slid into place to lock it. Chest boxes come with single or double rollers and a variety of closure mechanisms including wing-nuts, bolts and quick release pins. The double models are a large chunk of metal that is made even heavier when you add on the heavy chest harness they require.

Selangane, Papua New Guinea

Footloops

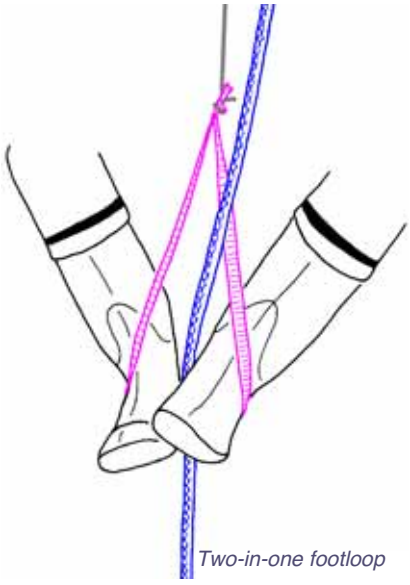
Footloops:
MTDE 'Siam doble' modified as a two-in-one
30 cm quickdraw – just too small for two feet + dyneema
MTDE 'Colectivo' adjustable

You can connect an ascender to one or both feet in a variety of ways. The main need is to provide a secure foothold in the right place. Any footloop is better if it's made from a low stretch cord. Dyneema is ideal—almost no stretch, long wearing and compact. Kevlar isn't bad except that the sheath will eventually wear through. 25 mm tape stretches, is bulky and heavy when wet. Don't even bother with thin accessory cord! You can make the entire footloop out of a single piece of cord, or make the loop at the bottom from a piece of spectra tape and use a length of dyneema cord to attach that to your ascender. Don't use tape, especially thin tape, on a Frog system. It slips into a chest ascender very easily, then you prusik up your own footloop, then you're stuck...

Tie your footloops tied in a fixed length that you determine by a personal fitting. If you need adjustability attach the footloops by tying an 8 mm rope tail to the ascender and attaching the footloop with a prusik knot, or buy one of the various adjustable footloops available. Adjustable footloops are not necessary unless you use a convertible prusik rig or it must fit different sized people.

For a Frog rig, tie a loop in the top of your footloop and clip it to your upper ascender with a small karabiner. This easily removable footloop can be very handy for passing a difficult rebelay in either direction—just unclip it from your ascender and clip it to the rebelay for a quick stand-in loop.

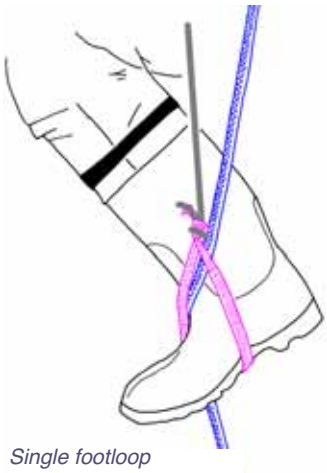
Two-in-one



Two-in-one footloop

By far the best footloop for sit/stand prusik rigs is a single loop about 90 cm in circumference into which you can slip one, both or no feet as required. Its size allows you to kick it off or put it on easily and with only a little practice it stays on while you are prusiking. Its biggest advantage over other footloops is that by placing the rope between your feet after you put them in the footloop you can give yourself 'bottom-weight'. It is only a matter of separating both feet slightly as you lift them, then allowing them to clamp the rope during the stand cycle.

Single loop



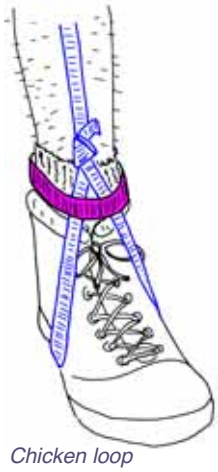
Single footloop

Rope walkers, lightweight fanatics or cavers who frequent tight caves with small pitches can tie a loop just big enough to take one foot. It can be a tight fit to keep it in place or loose so that it can be kicked off easily and for comfort can even incorporate an etrier step underfoot and completely lose any weight and bulk advantage gained by a single loop. For sit/stand systems it uses a minimum of cord and you can still use both feet by doubling your 'spare' foot on top of the instep of the other. While light, a single loop lacks comfort on long drops and makes it is difficult to give yourself bottom-weight.

Separate single loops

Separate small loops can be tied for each foot and connected independently to the ascender. The only advantage in sit/stand systems is some independence for your feet. An extension of single loops is to use small loops of tape or 'Foot Loops' that stay attached to your feet at all times and are held in place with shock-cord. On top they bear a small 'C' clip to attach the cords to the ascender or to be left unattached for walking. Foot Loops can be troublesome to detach at the top of pitches and have no advantage over other loops. Almost nobody uses separate foot loops anymore.

Chicken loop



Chicken loop

A chicken loop is a loop of car tyre tube or tape tied around your ankle. Before putting on a single foot loop thread it through the chicken loop then over your foot so as to firmly tie the loop in place. A tape chicken loop is only worth using for ropewalking where an accidentally detached or failed top ascender makes it possible to fall upside down or 'heel hang'. For sit/stand prusik systems chicken loops are a useless encumbrance that makes your footloops slow to get on and off. If you have trouble with your feet falling out of your footloops, practise coordinating moving your ascender up with lifting your foot, or use a smaller loop that doesn't fall off you foot so easily.

Prusik systems

You can arrange two or three ascenders in an endless variety of configurations, many of which provide an efficient means of climbing a rope, but as well as actually climbing the rope you must also consider how well a prusik system performs crossing knots, rebelays, angled ropes, getting on and off the rope, and all the varied obstacles that you may encounter in a vertical cave—even obstacles away from the rope like narrow passages.

I divide prusik systems into three groups:

- Sit/Stand,
- Ropewalking and
- Convertible Systems.

Each has its strong and weak points. Sit/Stand systems are light, simple, easy to use on complex rigging and relatively slow up the rope. Ropewalking systems are heavy, complicated, difficult to use on complex rigging and fast up the rope. Convertible systems are compromises between sit/stand and ropewalking.

Sit/Stand

Sit/Stand systems are characterised by the motion of lifting one or both feet and one ascender while sitting in a seat harness then standing to bring up the other ascender. Sitting back and lifting your feet completes the cycle. All lose a little height in the sitting back but are very powerful because both legs work together —especially useful when hauling a heavy sack or at the end of a long trip.

Frog system

The Frog or Ded System could well be the most popular prusik system in the world. It is almost the only system used in Europe.

To set up a Frog system, attach a chest ascender to your seat harness maillon low on your chest and hold it up with a chest harness. Attach your other ascender to the rope above your chest ascender with a footloop long enough so that when you are standing your chest ascender is 2 cm to 3 cm below the top one.

Run a safety cord from the top ascender to your seat maillon. Preferably use a long cowstail clipped into the bottom of the ascender or use a separate cord. The safety cord should be of such a length that the top ascender can never be out of reach. Make it just long enough so that it doesn't restrict the upward push in the 'sit' part of your sit/stand cycle.

The final choice of ascenders and trimmings is up to you but in any form the Frog is a system of unequalled versatility, being at home on any length and angle pitch. Both ascenders are within easy reach in front of the your body simplifying tricky movements and giving a fast on/off rope time. The position of the ascenders makes them easy to wear without getting in the way and many cavers wear them for the entire cave.

Climb by pushing up the top ascender with one or both hands and lifting your feet at the same time while in a sitting position hanging from your chest ascender.

Stand up with your feet tucked beneath you for maximum efficiency, and your chest ascender moves up automatically provided there is sufficient bottom weight on the rope.

If not, run the rope over your right foot and pull through with one hand, usually your left one, as you stand. This is not very efficient so only use it for short distances.

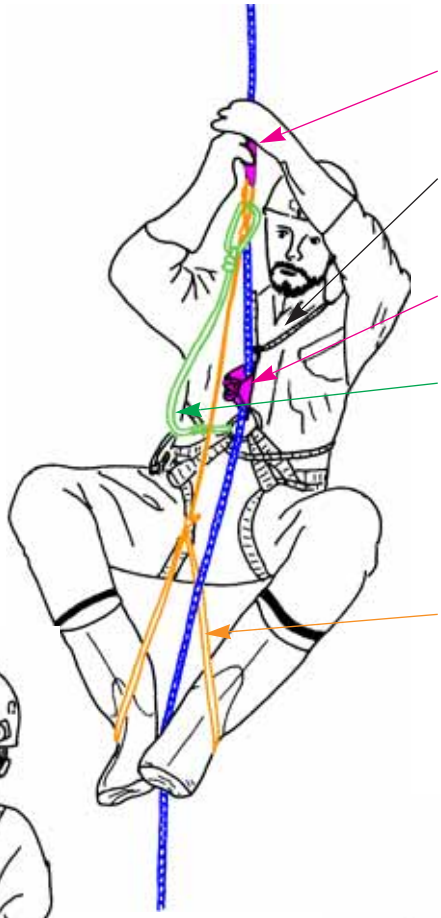
Running the rope between your feet with a 'Two-in-one' foot loop not only provides bottom-weight but also helps maintain your body and legs in an efficient prusik position. In the 'stand' part of the cycle your feet are tucked under you to reduce arm strain and your body moves up with no wasteful sideways movement.

The double leg action is slow and will set no speed records but it does moderate energy expenditure and allows you to climb further between rests than you could with a 'faster' prusik system. This and its versatility makes the Frog system the fastest and most energy efficient prusik system for multipitch caves.

A useful variation to the standard Frog is the Italian or Mao technique. Mount a pulley on the bottom of your top ascender with a cord footloop 50% longer than normal running through it. Tie a normal foot loop in one end, and attach the other end to the top of your chest ascender or seat maillon. This length is critical so set it by trial and error until you are satisfied with it.

Use a sit/stand motion as usual but as you move your hands up, your feet move up twice as far. During the stand motion your feet move downwards and help pull your body up. 'Stands' are only half the height as Frog stands and your feet slide annoyingly against walls but the mechanical advantage makes it possible to haul loads that would be very strenuous by other means.

Frog system



Foot ascender – Petzl Basic, SRTE short, Petzl Pantin

Chest harness – Neck loop, Sash, Wrap-around, Figure-8, Climbing Chest Harness

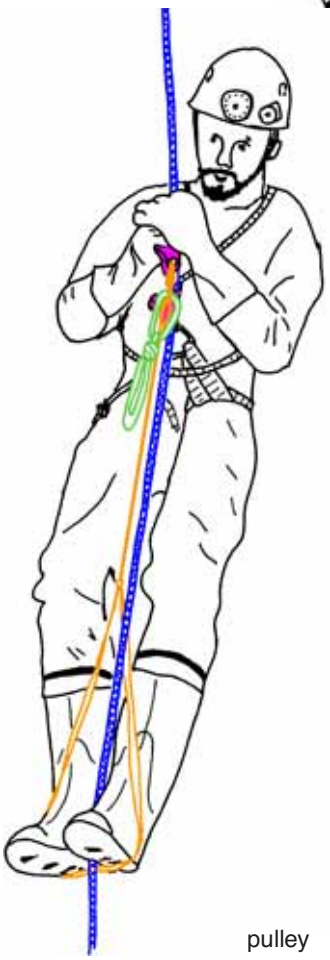
Chest ascender – Petzl Croll, Kong Cam Clean#

Long cowstail – Cowstail
or

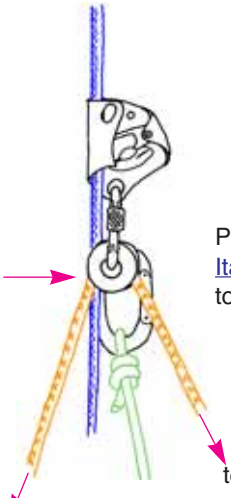
Safety cord – 1.5 - 2 m of 8 mm cord attached directly to the foot ascender

Footloop – Two-in-one, Single loop

See How I do it on page 139 for details of how I put my Frog system together.



Keep both feet underneath in a squatting position rather than a sitting position

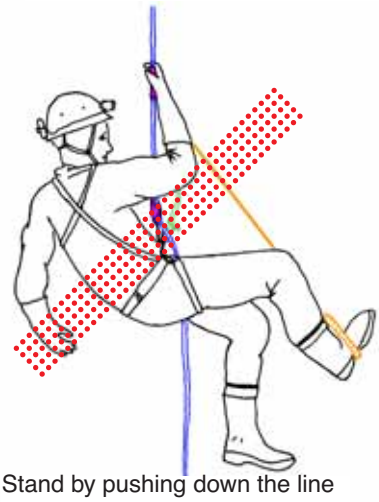


pulley

Pulley setup for the Italian or Mao variation to Frog legloops

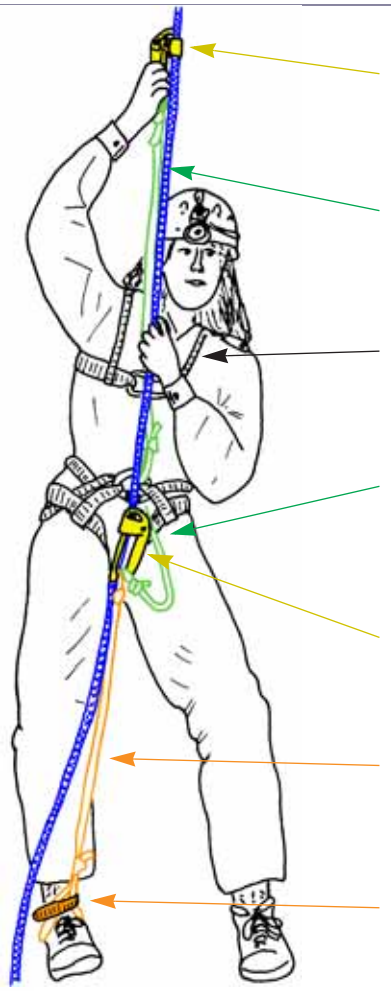
to seat maillon
or
top of chest ascender

footloop



Stand by pushing down the line of the rope, not outwards. Tired arms are a sign that they are working too hard

Texas system



Handle ascender – Jumar, Petzl Ascension, etc.

Attachment cord – 2 m of 25 mm tape or 8 mm cord

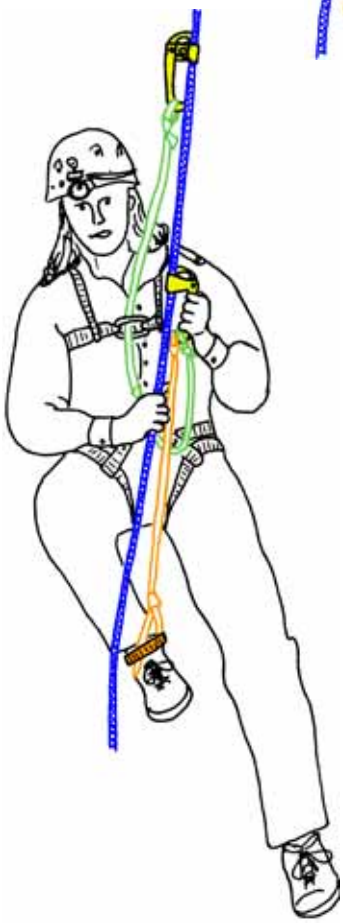
Climbing Chest Harness (optional)

Safety cord – 1.5 - 2 m of 25 mm tape or 8 mm cord

Handle ascender – Jumar, Petzl Ascension, etc.

Footloop – Single loop

Chicken loop – optional, 0.5 m (sewn) or 0.75 m (knotted) of 25 mm tape



The Texas system is almost an inverted Frog system. Attach an upper ascender on an arm's length sling to your seat maillon and the other ascender on a short footloop to one or both feet (usually one) such that when you stand, the ascender reaches to thigh level and is still within reach. Link the lower ascender to your seat maillon with a short safety sling.

To climb, push up your top ascender and stand simultaneously then sit back to rest and move up your lower ascender. When necessary, provide bottom weight with one hand while moving up the lower ascender with the other. Although the motions are simple enough they can be strenuous, especially on free drops. This and its lack of speed are the two main drawbacks of the Texas system.

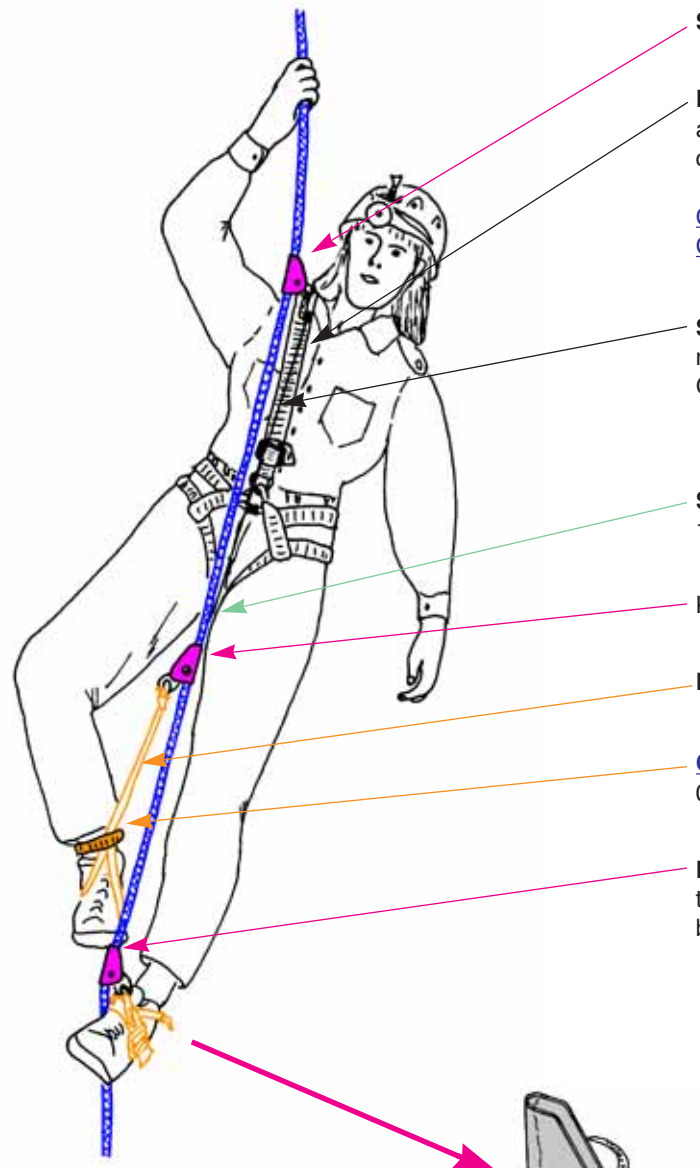
Texas is simple, light and versatile being good on sloping broken drops when used with one foot. Its popularity is probably due to the way it converts readily to a Mitchell system giving it the boost required for free drops—and force of habit. Proponents claim that it a superior system for sloping pitches. Opponents feel that it is so bad on freehanging pitches that it just feels like it's good on sloping pitches. It is also the best system for prusik knots.

A variation of the Texas system mounts a top chest ascender as in Frog and the leg ascender as a normal Texas. While this perhaps makes climbing less strenuous and faster, it makes changeovers and other on-rope manoeuvres problematic without an extra ascender (as with any system without a long legloop), and offers no convertibility to the Mitchell system.

Ropewalk systems

Ropewalk systems attach a separate ascender to each foot so that each leg moves independently, allowing you to 'walk' up the rope. As opposed to the Sit/Stand systems, the seat harness is hardly used, however the chest harness must be treated as a life support component. Their chief advantage is speed up the rope. Compared to Sit/Stand systems they are fast but complex and heavy.

3 Gibbs ropewalker



Shoulder Gibbs — sewn* to Butt strap

Butt strap — 2- 3 m of 50 mm tape, 2 buckles and 'D' ring
or

Chest box on
Climbing Chest Harness (not shown)

Shock cord — 1 - 2 m of 8 mm shock cord and micro-krab, runs from knee Gibbs shell to shoulder Gibbs attachment point

Safety cord — (knee Gibbs to seat, not shown) 1.5-2 m of 25 mm tape or 8 mm cord

Knee Gibbs

Footloop — 2 m of 25 mm tape

Chicken loop — optional, 0.5 m (sewn) or 0.75 m (knotted) of 25 mm tape

Foot Gibbs — sewn* to footloop, 0.7 m of 50 mm tape, buckle, 0.5 m of 25 mm tape, buckle or 'D' ring

Foot mounted Gibbs

*Sewn Gibbs fixtures require 0.5 m of 25 mm tape

The 'genuine' Ropewalker employs three Gibbs ascenders that have extremely low rope drag allowing maximum speed up the rope.

Instead of a chest harness, run an adjustable 'Butt-Strap' from your seat maillon up over your right shoulder and down to a fixture on the back of your seat harness at belt level. Sew the upper Gibbs to this strap at the point of your shoulder. Connect the other two ascenders one to each foot. One should float at thigh level with a shock-cord running from its shell to just below the shoulder Gibbs – a small clip will allow you to disengage it for walking. Fit a safety sling between this Gibbs and the seat maillon. Sew the bottom ascender to a foot loop and ankle strap and mount it on your other foot.

Once everything is on the rope it is easy to walk up it in a vertical position with both hands completely free to hold the rope above, fend off the wall or read the topo guide. For obstacles or slopes pop the Butt Strap off your shoulder to allow you to lean back from the rope. When starting, arrange bottom weight by passing the tail of the rope under the foot that has the lower Gibbs and holding it in one hand. This is only necessary for the first few metres and only possible if there is spare rope at the bottom of the pitch.

A variation of the 3 Gibbs Ropewalker replaces the top Gibbs with a chest roller on a climbing chest harness. This holds you more vertical than when using a Butt Strap, but allows no easy resting position.

The advantages of ropewalking are speed and the ease of ascent once on the rope. Disadvantages are complexity, weight and very slow on/off rope time because of the Gibbs ascenders used. On simple pitches it is merely slow but when the rope is diagonal at the bottom or hanging at the top it is difficult as well. For this reason Ropewalk cavers normally carry a cowstail ascender (QAS) for difficult pitch heads and sometimes even a spare Texas rig for short pitches or complex rigging.

Mitchell system

Fit an upper ascender with a long footloop so that it reaches to high chest level immediately above your chest box when you are standing upright. A safety cord should also run between this ascender and your seat maillon but many people do not bother. The half measure of tying a stopper knot in the long footloop below your chest box can be dangerous as the footloop wears where it passes through the box. A failure here or of the chest harness or box with no safety cord attached to the top ascender could leave the you hanging upside-down by your feet! Mount the other ascender as for Texas on a short footloop to reach high thigh level when you are standing and fit it with a safety cord.

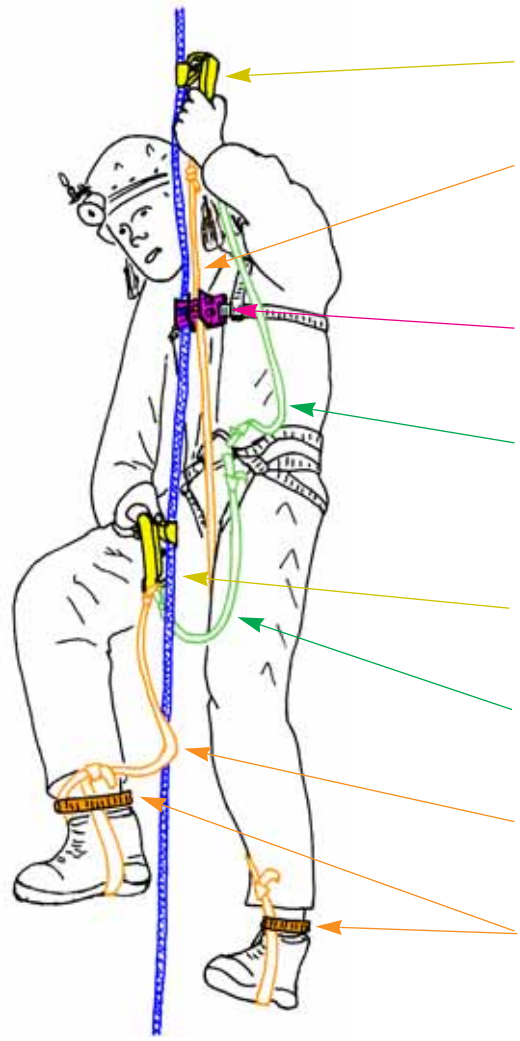
The chest box is to keep your body upright and ease arm strain. Run the rope in one channel and your long footloop in the other. Connect a single channel chest box to the rope only.

Climbing is a matter of walking up the rope with one hand on each ascender and moving your right hand up in time with your right foot and left hand with your left foot. A variation is to swap hands, some cavers claiming that the diagonal movement is easier as it is more akin to walking. The actions are easy and on freehangs or smooth walls you can climb very quickly. On slopes loosen your chest harness or undo your chest box and climb with your body vertical even though the rope is not.

The main drawback of the Mitchell system is that both your hands are always occupied operating the ascenders so it is not easy to fend off from a sloping wall and maintain a smooth ascent motion.

When starting, you need bottom weight to make the lower ascender run properly. When there is none, you need one hand on the lower ascender, another to pull the rope through for the first few metres and a third to operate the top ascender. With practise though, you can alleviate this by 'thumbing' open the cam on the lower ascender to make it run easier. The chest box is cumbersome in narrow passages, is slow to get on and off the rope and can be difficult to get onto the rope while you are on the pitch—you may be able to hang off your top ascender to do it, but not always.

Mitchell system



Handle ascender — Jumar, Petzl Ascension, etc.

Long footloop - 3 m of 8 mm cord
or 2 m of 8 mm cord and 1 m of 26 mm tape footloop

Chest box on Climbing Chest Harness

Safety cord - optional 2.5 m of 25 mm tape or 8 mm cord (or stopper knot in the long footloop below the chest box)

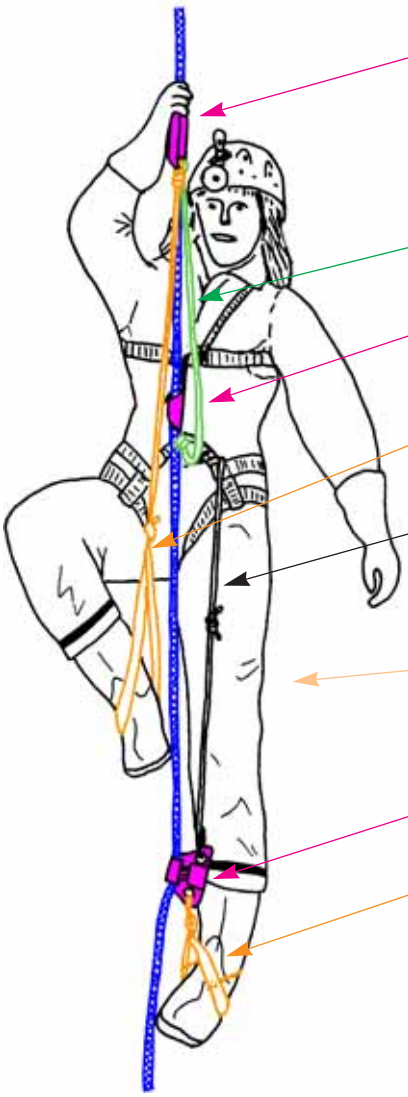
Handle ascender — Jumar, Petzl Ascension, etc.

Short safety cord - 2 m of 25 mm tape or 8 mm cord

Short footloop - 2 m of 25 mm tape

Chicken loops (2) - 0.5 m (sewn) or 0.75 m (knotted) of 25 mm tape (each)

A floating cam system



Handle ascender – Jumar, Petzl Ascension, etc

Safety cord - 2.5 m of 25 mm tape or 8 mm cord

or

Cowstail

Chest ascender (Petzl Croll), Chest box or roller on Climbing Chest Harness

Footloop – Single loop or Two-in-one

Shock cord - 1.5 - 2.5 m of 8 mm shock cord doubled from foot ascender to waist. Not necessary with a Pantin or other ascender firmly attached to your foot.

Chicken loop — (optional, not shown)

Foot ascender - Petzl Basic or Petzl Pantin*, CMI Small Ultrascender, Petzl Croll, Gibbs

Footloop - 0.5 m (sewn) or 0.75 m (knotted) of 25 mm tape, mini-krab or matching 'C' links
or
ascender permanently attached and mini-krab at other end of shockcord.

Held on with 0.3 m of shock cord or tape and buckle ankle strap

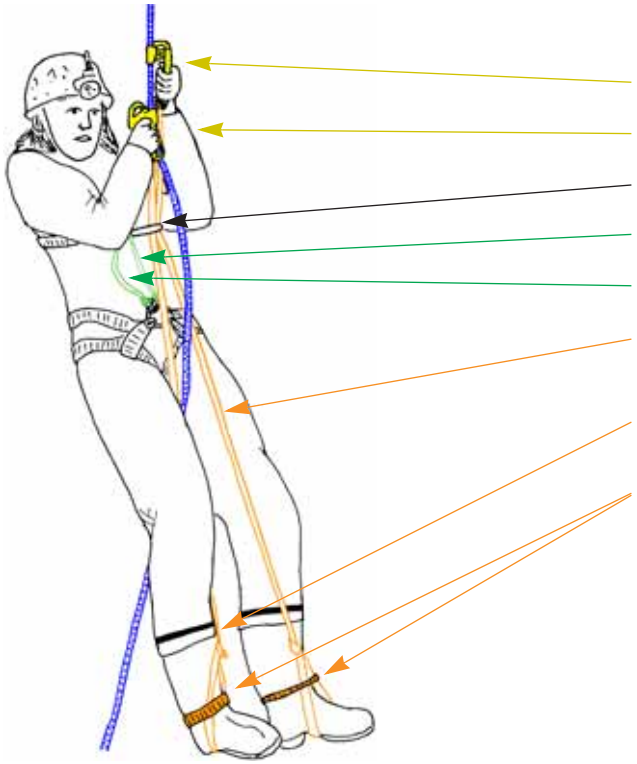
* A Pantin only works on your right foot.

Floating cam system

You can overcome some of the problems of the Mitchell system by making the lower ascender move up automatically or 'float'. Do this by running a length of shock-cord from the top of the lower ascender to your chest or seat harness or by the more complicated means of mounting a small pulley on your seat maillon or below the chest box. Run a shock-cord from the top of your lower ascender up through the pulley and down to your other foot. By design it is only loaded when it needs to be and the long length of the shock-cord gives a good lift action. A simpler, neater method is to lash the lower ascender to the inside of your calf using an adjustable strap or large rubber band, though it takes a peculiar leg action to make it run well (see page 113).

If you use a chest ascender instead of a chest box, the floating cam ascender is not a life support ascender so you can safely modify it to make it easier to use or run better. Unwind the spring on a sprung ascender a turn or two or replace it by a weaker spring so that the cam touches the rope lightly and therefore drags on the rope as little as possible. A Gibbs ascender cam can be mounted on a stud on one side of the shell and the other side cut away so the ascender no longer needs to be disassembled to get it on and off the rope. You can also mount a Pantin on your right foot and the long foot loop on your left foot.

Jumar system



Handle ascender – Jumar, etc. (left)

Handle ascender – Jumar, etc. (right)

Climbing Chest Harness with karabiner

Safety cord (L) - 2.5 m of 25 mm tape or 8 mm cord

Safety cord (R) - 2.5 m of 25 mm tape or 8 mm cord

Footloop (L) - 3 m of 8 mm cord or 2.5 m of 8 mm cord & 1 m of 25 mm tape footloop

Footloop (R) - 3 m of 8 mm cord or 2.5 m of 8 mm cord & 1 m of 25 mm tape footloop

Chicken loops (2) - 0.5 m (sewn) or 0.75 m (knotted) of 25 mm tape (each) (optional)

Jumar system

Jumars started it all and 'jumaring' is synonymous with prusiking even though many cavers have never even seen a Jumar. The ascent system as outlined on Jumar pamphlets works - but only just and few cavers seriously consider it for caving use. Connect a right ascender with a long footloop to your right foot so that it is about face level when you are standing. Mount a left ascender similarly so that it is just above the right one. To stay upright run the leg loops through a chest harness mounted karabiner. The footloop lengths require a little experimentation but it is possible to walk up the rope. Both hands are always busy above your head and there is no resting position.

Convertible systems

Variation is the essence of evolution. There is a myriad of minor changes and adjustments you can make to the basic systems in an effort to make them perform better. Ropewalkers are best on long free drops and Sit/Stand systems are best for crossing rigging obstacles and short pitches. No prusik system is the best in all situations. For cavers who want to try to capture the best of both styles there are convertible systems.

Mitchell-Texas

A Mitchell system with safety cords is a Texas system once you disengage the chest box and release your foot from the long leg loop. The two systems can be thought of, and are often used as, a pair. Texas on small drops and only engaging the chest box where the pitch is long enough to warrant it. You can remove or leave the chest box behind for a series of small, sloping or tight pitches.

Frog-Floating cam system

Convert a Frog system to a Ropewalk by mounting a floating ascender on one leg and using the usual two ascenders of a Frog system. Set up the Frog system to climb one-legged. Attach the floating cam to your other leg and with all three ascenders on the rope ascend with either a walking or a sit/stand action. To convert to a true Frog system disengage the floating cam.

While the system works well enough, in order to stay as upright as possible mount the chest ascender high on your chest. This increases the efficiency of the Floating Cam action at the expense of the Frog. The ideal Frog footloop is a little shorter than the ideal for ropewalking

so you need an adjustable footloop or one with two loops at different heights to overcome the problem. For efficient ropewalking use a climbing chest harness to stay close to the rope.

In the 90s, this system was 'discovered' in France and made popular by the release of the Pantin. The Pantin has become so popular that many, perhaps most, european cavers now use one. The Pantin is a simple and light addition to the standard Frog system and has all the advantages and disadvantages associated with the Frog-Floating Cam system described as well as a few of its own.

The Pantin is very neat and light. It won't weigh you down much and 'forces' you to carry a spare ascender that works well, unlike a Tibloc or knots. Many proponents prefer the freedom of separate leg movement, especially against walls. On freehangs, you either move your feet up simultaneously as for normal Frog, or quickly one after the other, followed by a normal stand motion. With the optimal low Croll attachment, very few cavers 'walk' with a Pantin, it's just too strenuous.

A Pantin requires very little bottom weight so one or two up moves pulling the rope through by hand is enough before you can attach one— still enough to be annoying when you have a lot of rebelays. On the down side, it is an annoying piece of metal attached to your foot when you are walking and climbing and is adept at clipping onto your pack haul cord in crawls. They also only work on you right foot while many of us prefer a foot ascender on our left. Possibly their biggest disadvantage is that by standing up against a rope tensioned by the Pantin (or floating cam) below, your Croll will wear out faster.

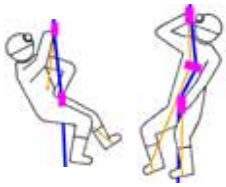
Strangely, Frog's original proponents are dabbling with ropewalking (of a sort) as fast as Americans have been abandoning their heavy rigs and moving to Frog.

Any convertibility to ropewalking adds to the complexity and weight of the basic Frog system and somewhere you must decide if it is worthwhile.

Long before the Pantin, I used a convertible floating cam system when I first went caving with Jean-Paul and his simple Frog system in New Zealand. At the end of the trip I threw out what seemed like a kilo of tapes, cords and ascender— other cavers were amazed that I could climb a rope with so little gear. Meanwhile, J-P took the Frog-Floating cam back to France and his friends were amazed at how fast he got up the rope...

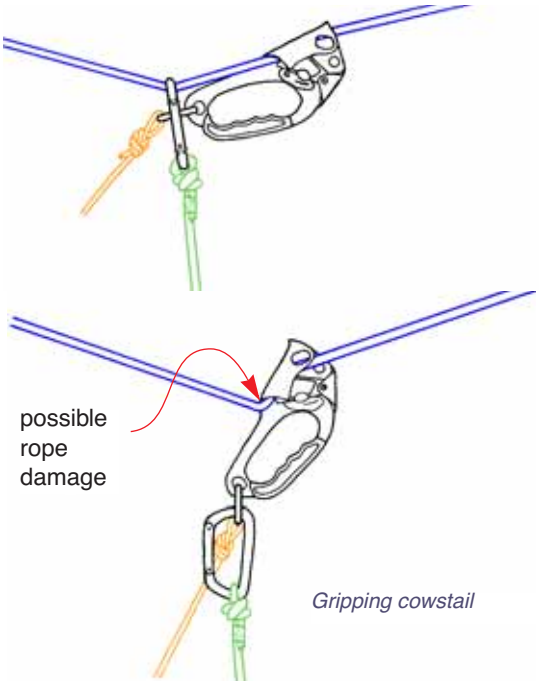
Harwood Hole, New Zealand

Table 7:3 Ascent systems

System	Acsenders	Extras	Weight* (g)	Advantages	Disadvantages
 Frog	2	cowstail	500	simple, light, easy to use, copes with any manoeuvre, fast on-off time	slow climb rate
 Texas	2	ascender on sling	800	simple, light, easy to use	slow climb rate, some manoeuvres may be difficult, strenuous
 3 Gibbs Ropewalk	3 Gibbs	ascender on sling	1100	fastest climb rate (up to 50 m/min.), both hands free	extremely slow on-off time, midrope manoeuvres very difficult, complex
 Mitchell	2 + box	ascender on sling or cowstail	1600	fast up rope	very slow on-off time, box cumbersome, difficult on manoeuvres, both hands busy, heavy
 Floating Cam	3, or 2 + box	ascender on sling	800	fast up rope, versatile, copes well with midrope manoeuvres, light (if using chest ascender)	slow on-off time, complex
 Jumar	2	ascender on sling	1100		strenuous, both hands busy above head, copes poorly with all manoeuvres, poor safety
 Frog/ Floating Cam	3	cowstail	800	light, fast up rope, versatile, copes well with all manoeuvres	convertibility not always useful, neither conversion works as well as its single use version
 Texas/ Mitchell	2 + box	ascender on sling or cowstail	1600	systems complement each other, versatile	slow on-off time, heavy, midrope manoeuvres difficult

* Includes ascenders, tapes/cords, chest harness usually employed. Does not include seat harness or 'Extras'. Add 280 g for a double cowstail and 350 g for ascender on sling/QAS.

Single ascender/Self belays



Gripping cowstail

One ascender on a cowstail is often enough to help you climb short slopes and steps where the consequences of a fall are minimal. For traverses, a karabiner linked into the bottom of an ascender or an ascender attached to a long cowstail gives a 'gripping cowstail' that can be useful for angled lines should you require a more positive grip than a simple cowstail provides. The karabiner would also take some of the load in a fall and acts as a backup for the single ascender.

While an ascender on a sling may provide a convenient portable handhold it also introduces a lot of slack into the system that could result in a shock load in the event of a fall.

When climbing a ladder, use a spring loaded ascender as a 'self belay' – non-sprung ascenders may slide before gripping. The simplest procedure is to mount the self belay ascender as if it were the chest ascender in a Frog system. The ascender has a tendency to catch on ladder but is adequate for the occasional use that an SRT caver would have. For more serious self belaying mount the ascender to one side so that it does not catch on the ladder.

A prerequisite for using a self belay is that you must be able to get 'unhung' if the ladder breaks or you fall off and are left hanging in space. Waiting on rope for rescue is more than inconvenient. It is dangerous in the extreme. A descender is all that you need to get down safely:

- Attach your descender to your seat maillon, then to the rope as high as possible below your ascender and lock it off.
- Take a Footlock high on the rope and stand.
- Your bobbin will invert and your ascender be unweighted enough for you to release it.
- A non-bobbin may not allow enough movement unless you connect it by a chain of karabiners.
- A prusik knot or ascender on a sling above your chest ascender to stand up in is easier to use than a footlock.

Safety

You must protect yourself from failure or accidental disengagement of an ascender. Back up any prusik system with safety cords so that if any one ascender in the system is undone or otherwise fails you will hang in a sitting position. This requires.....

at least two points of contact with the rope at all times

.....and that you use a cowstail to maintain these points during mid-rope manoeuvres.

Risking a heel-hang or worse is simple stupidity! The failure of the chest harness or box in Ropewalk systems will result in a heel-hang if you have no safety cords. Worse still, a Frog system with no safety to the top ascender puts you at risk of complete disengagement from the rope should your chest ascender fail or you remove it as you cross a rebelay.

The ascent - at the bottom

Rope bundled at the bottom

Do not start in a hole. Start climbing from the top of a rock or ledge so that you can save at least a few metres of prusiking. Take out the stretch in the rope in a standing position by clipping on and pumping the rope down with one leg before trying any true prusiking motion. When there is a pendulum start, make sure you have both ascenders on the rope before gently swinging out. Ascenders are easier to attach while standing rather than hanging and it is not safe to swing into a void on only one ascender.

Arrange some help with bottom weight by tying any excess rope in a bundle off the ground. On a long drop there may be several metres of stretch and a rope bundled to hang just off the ground under your weight may be out of reach once the rope is unweighted. If you are really desperate for bottom weight, tie a **small** rock to the rope. Never pull the rope tight and tie it off or it will be difficult to descend next time with no slack to clip a descender into. When waiting for someone to ascend the rope above, stay under cover as much as possible until you are called up or the pitch is clear.

On the way up

Prusik gently; violent prusiking can generate forces in excess of three times body weight and these forces are transmitted all the more effectively as the length of rope between you and the anchor decreases.

Crossing a rebelay (Frog system)

• Stop a centimetre or two below the knot. Most ascenders require a slight upward movement to release them and if crashed into a knot can be hard to undo.

1. Stand and clip your short cowstail to the belay. In the same stand movement undo your chest ascender.
2. Sit back onto your cowstail and reclip your chest ascender at your leisure (there **should** be enough slack rope above). If you are in balance or there is not enough slack rope above, reclip your chest ascender to the up rope before sitting back.
3. Change your leg ascender to the up rope.
4. Prusik until your cowstail is unloaded enough so you can retrieve it.

When there is insufficient slack in the up rope it is necessary to proceed as normal but change your foot ascender first and pull down enough slack (or stand up enough) to connect your chest ascender. If the up rope has a lot of stretch you will have to work a bit to pull the rope tight enough to allow you to unweight your chest ascender. In the worst case it is entirely feasible that you will have both ascenders equally weighted and unable to remove either.

There are three (at least!) ways out of this circumstance:

- Temporarily remove your footloop from your ascender and clip it to the rebelay, then stand in the footloop to unweight your Croll. You can only do this if you attach your footloop to your ascender with a karabiner rather than direct tie or maillon.
- Stand up on your Pantin to unweight your Croll.
- Tie/clip a sling to the anchor and stand in that to unweight your Croll.

Remember that the loose footloop, Pantin and sling are not secure, life support attachment points. Attach your cowstail before you attempt any method.

Deviations (redirections)

Deviations are only slightly more difficult to cross on ascent than descent.

- Prusik up to the deviation karabiner and push it up until its sling is horizontal and your top ascender is immediately below it.
- Push off the opposite wall to unload the deviation, then unclip it.
- Pull up a loop of rope from below and clip the deviation to it.

It is possible for an inexperienced or long legged rigger to place a deviation that is exceptionally difficult to pass on the way up. Typically, you can't reach a wall or suitable footholds to unload the deviation. The bend in the rope should have been rigged gentle enough for you to unload the deviation by pulling across on the sling with one hand while unclipping the karabiner with the other. If there is a danger of dropping a deviation or it is severe, clip a cowstail into it for safety. Never try clipping your ascenders past a deviation. Once you have been strung up with one ascender each side of a deviation you will never try it again!

Crossing knots

Passing a knot on ascent is a simple matter. Clip a cowstail into the safety loop that hangs out of the knot, then move each ascender past in turn. Once you have two ascenders past, undo your cowstail and continue. On ascent it isn't worth swinging onto a ledge to cross a knot.

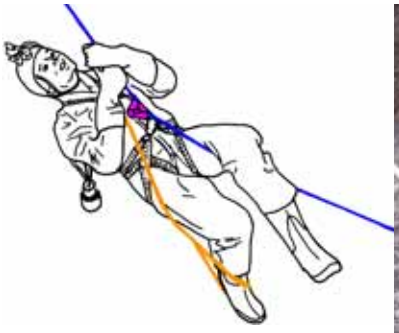
Rope protectors

Crossing flat rope pads is no problem, it is only a matter of making sure you leave the rope in the right position after passing. Brave people cross wrap-around protectors by clipping their ascenders past the protector and while it may leave them hanging on one ascender for a time it does ensure that the protector stays in place. More often, people untie the protector completely when they reach it, prusik a few strokes and replace it beneath them. At times the correct replacement position is hard to judge and it is common to arrive at a rope protector and find that the last person to cross it got it wrong and the protector is doing nothing. To reduce this possibility, only place rope protectors on unmistakable rub points and preferably where there is no need to cross them.

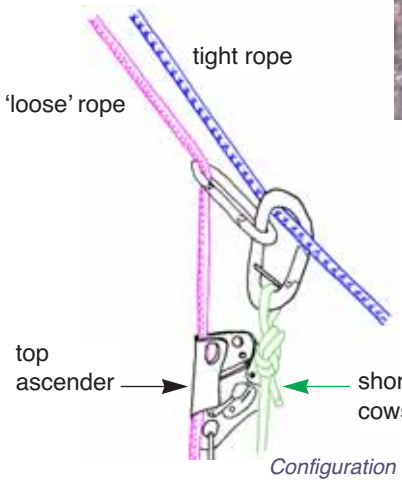
Grinding up

Some ascenders open more easily than others. What for some is a plus in the 'ease of use' columns in Table 7:1 on page 111 and Table 7:2 on page 112 may also be a negative when the ascender opens when you don't want it to. Climb with the open side of your hand ascender facing you and don't grind the open side over rocks or edges or it may open. Clearly, good rigging will avoid most situations where this could happen, but sometimes your ascender will touch rock. Make sure it is the back and not the front of the ascender that takes the beating and always use two attachment points. Be especially aware of this when you are negotiating an on-rope squeeze where you could conceivably lock your body, then accidentally unclip everything... The Pantin ascender doesn't even have a safety catch. It is not designed to be a life support ascender—don't use it as one. It does have a hole below the cam for a karabiner that you can both clip to and use to secure the cam. Use this attachment point in an emergency.

Diagonals



Prusiking a diagonal rope



Configuration for ascending a steep tyrolean

Ascending a diagonal rope such as a pendulum or tyrolean is a little more difficult than climbing a vertical rope. It is easiest to hang upside down below the rope and try to prusik more or less as normal. High mounted chest ascenders do not run well as they are a long way from your body's centre of gravity. Depending on the angle and tension in the rope, try one, or all of:

- Prusik one-legged with your free leg hooked over the rope so that your body runs parallel with the rope.
- Clip a karabiner or two between your seat maillon and the rope to give a straight run through your chest ascender and allow it to run more smoothly.
- Climb a tyrolean rigged with two ropes by clipping a cowstail to the tight rope and prusiking on the other. This manoeuvre is easier if you pass the prusik rope through a guide karabiner on the cowstail karabiner above your top ascender.

Take extra care when using Croll or similar chest ascenders. When the rope enters the ascender from the right it can depress the cam and stop it from gripping – the result for the unwary is a frightening zip back down the rope for half a metre or so.

Muddy rope

Ascender rigged for a muddy rope

Some types of mud and clay have the ability to clog ascender teeth so badly that the cams grip poorly or not at all. There are various solutions to the problem and some ascenders have slots in the cam-face to extrude mud away from the teeth. Wash your ascender cams and as much as possible of your boots, hands and clothing before ascending a muddy rope.

If ascenders do slip, try:

- Pushing the cam in by hand as you load the ascender to force it against the rope more strongly than the spring would. Once the ascender grips it will rarely slip again while you keep your weight in it.
- Wrapping your footloop around the rope once or twice then through its attachment karabiner before it goes to your foot.
- Tying overhand knots below your lower ascender and replacing them every few metres to limit the length of a slide.
- A toothbrush to clean mud-choked ascender cams.
- Making a special prusik rig for exceptionally muddy caves using Gibbs ascenders, that have excellent grip on muddy and icy ropes.

Sloping pitch

Fending-off on a sloping pitch

When a pitch is not vertical the problem of fending off the wall while pushing up your ascenders may arise. Too bad if your prusik rig requires both hands to operate. With one or two hands free a floating cam, or Ropewalk system tackles slopes with ease. Depending on the prusik rig it may be worth releasing or loosening your chest attachment to maintain an upright stance even though the rope is sloping.

Using a Frog and Texas rig you can tackle just off vertical slopes by pushing-off with one hand while moving your feet and other ascender up. On more pronounced slopes it is better to release one foot to fend-off with and prusik one-legged with the other. Two separate legloops make sloping pitches easier and a Pantin can help even more.

Tight pitch

Ropewalkers should have no special problems. The independent leg action is ideal and the lack of a chest ascender makes you as thin as possible. Chest-box users may have to remove the box and convert to Texas and Frog users will find it easiest one legged or with a Pantin. On extremely tight pitches a low, flat-mounted chest ascender will cause little problem as it pushes into your stomach whereas a high-mounted one could jam painfully against your rib-cage or make you too thick to fit through. For really tight pitches, remove your chest ascender and try just the leg ascender and jam your body between stand strokes, or use a Pantin or remount the ascender on your other foot using the now obsolete chest harness and ropewalk up. Keep in mind though, that while a 'hands free' ropewalk rig gets you through squeezes well, it may be impossible to reach your knee or foot-mounted ascender in order to release it or down prusik. Rearrange yourself before becoming jammed into the tight spot as it can be difficult to down-prusik and even easily kicked-off footloops may not be so easy to remove with no room to move.

Tandem prusiking

Two people climbing simultaneously can halve the total prusik time on big pitches. This may be the case for slow prusikers or cavers who like plenty of rests on the way up but those who climb quickly will find that they are hampered by the presence of the other person.

Tandem climbers should keep together. The usual practice is for the upper climber to prusik about 20 steps, then rest while the lower climber catches up. Two cavers prusiking simultaneously must be careful to climb out of step with each other so as not to generate a dangerously large harmonic bounce. When at a lip or against a wall tandem prusikers must stay within a few metres of each other as the lower caver will be directly below any rocks that the upper caver may dislodge.

Tandem climbing places more than twice the usual loads on a rope and so use only a good, well rigged 11 mm rope. As part of that rigging, a tail or rebelay will make life easier when the upper climber reaches the top of the pitch.

Down prusiking

You can make a slow descent of a rope by reversing the usual ascent movements; releasing each ascender with a slight upward push then holding the cam open for the move down. Take care to manipulate just the cam and not the safety latch or you may detach the ascender from the rope. It is easiest to take several small steps rather than few large ones. Remove excess ascenders until there are only two to manipulate. Prusiking down a pitch is very slow and for a descent of more than a few metres it is faster to change to abseil.

Ascent to descent

A changover from ascent to descent while on the rope is a similar manoeuvre to crossing Knots on descent. There is little problem with prusik systems that use a long footloop (Frog, Mitchell) but others (Texas, Ropewalk) do best with a spare ascender or prusik knot with a long sling to stand in.

While you are in a resting position, clip your descender to your seat maillon and onto the rope as high as possible and lock it off. Release any foot-mounted ascenders. Position your top ascender as low as possible but still high enough to stand in and release your chest ascender/box. Once you've released your chest ascender it is only a matter of sitting back onto your descender and releasing your top ascender.

If you normally attach your descender directly to your seat maillon it will either already be attached or if not, use a karabiner just this once.

Don't even think about undoing your seat maillon while hanging on it!

If you don't have a long leg loop to stand in, it may be possible to stand on a foot ascender attached below your descender and have enough slack in your descender attachment to release your chest ascender/box, however in less than ideal conditions you may also get stuck—practise in a safe place first.

Descent to ascent

Clip your top ascender high on the rope and then stand up in its footloop. Clip your chest ascender to the rope and remove your descender. If you use a long descender or foot-mounted ascenders you may find it necessary to hang from your top ascender and pull some slack through your descender so that you can clip on your lower ascender above it. Once you have two attachment points on the rope remove your descender.

You should always wear your prusik gear ready, or almost ready for use all the way down the cave. If you don't, make sure that it is always clipped onto your harness and never in a pack that you could leave behind, swap by accident or drop. If you do need to attach ascenders and/or safety cords, connect them to your seat maillon with your brake or a spare karabiner and strap on other ascenders as well as possible. You can arrange your prusik rig properly on safe ground.

Don't even think about undoing your seat maillon while hanging on it!

But do remember to check it occasionally–they do like to undo by themselves.

Gear sacks

On sloping pitches carry your sack on your back where it will not snag or drag against the rock. Anything but an empty sack on a your back for vertical pitches will move your centre of gravity back enough to tire your arms rapidly. Climbing is much easier if you connect your pack by its haul cord to one side of your seat maillon or by rigging a short 'V' of tape from your harness attachment points to hang it from. The pack's haul cord should be long enough so that the pack does not foul against your feet but still hangs within tiptoe reach so that you can free it should it become snagged on the way up. Light packs can develop an annoying harmonic swing when hanging below. Shortening the haul cord may help as well as running the haul cord over your leg or putting more weight in the sack! On wet pitches the open top of a sack may act as a funnel and fill the pack with water, unnecessarily slowing you down in a place where you want to move fast. Try suspending the pack upside down to put the biggest hole at the bottom and save needlessly hauling a sack of water up a pitch. After a swim, remember to drain your sack before starting up a pitch.

At the top

On arrival at the top of a pitch your first move is always to clip a cowstail to the tieback rope, anchor or knot loop. You are then free to get off the pitch in complete safety.

- Next, release your foot mounted ascender or one foot from a Sit/Stand rig and stand on your other foot and release your chest ascender.
- Step onto the lip and release your foot (top) ascender.
- If your cowstail is clipped to a tieback rope, walk away from the pitch and unclip it.
- If your cowstail is clipped directly to the belay or similar you must first attach your other cowstail or an ascender on a sling to the tieback and then unclip your first cowstail from the belay.

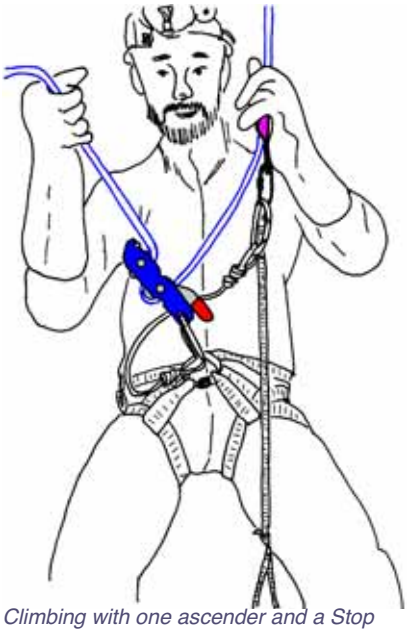
Swing-out pitch heads can be more difficult.

- Clip your short cowstail to the knot loop, rigging link or anchor, but not the tieback rope.
- Release restrictive foot and chest ascenders, hang back on the cowstail and transfer your long footloop ascender to the tieback rope so that you can use it as a handhold.
- Pull across to the lip.
- Once across and safely clipped in, lean back and release your long cowstail.

Generally you will negotiate a pitch head like a rebelay, always remembering to undo your chest ascender before attempting to leave the line of the rope.

Before you leave the pitch head, look back down the pitch or to the last rebelay and check that the rope hangs correctly and is not caught behind a flake or spike, give a call and move on. Take extra care when the pitch involves sideways movement or loose rock. If the next pitch is close, just walk those few steps with your ascenders in your hand. If it's any further, tidy everything up. Be careful to **always** close your Croll and other Petzl ascenders. The safety catch is fragile and if you catch it on something, you may damage it, and a Croll with no safety catch isn't worth much. Fold your legloop a couple of times and clip your ascender to it. Clip your cowstails to your chest or seat harness and get on your way.

Ascent problems - one ascender

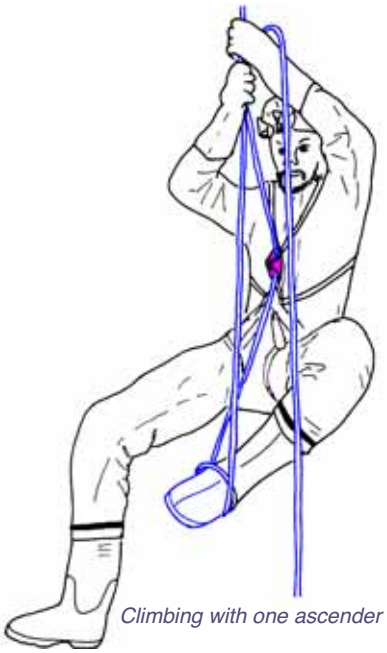


Climbing with one ascender and a Stop

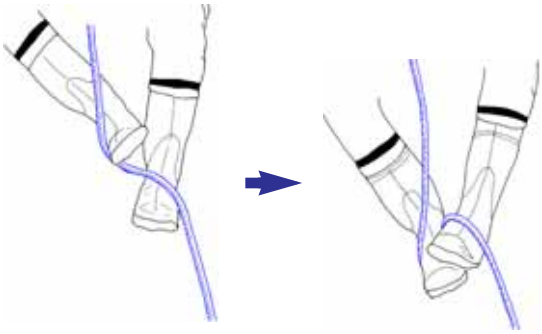
The situation is not too critical provided you still have one ascender. Connect your bobbin descender to your seat maillon as for descent and pull the rope backwards through it to make it act as a chest ascender. Use your one good ascender as a leg ascender for a Frog system with footloops fashioned from whatever is at hand —the end of the rope, pack haul cord or spare clothing. With a Texas system connect the bobbin to your feet and the real ascender to your chest. Pulling your rope through a bobbin descender only works for suitable descenders (Petzl, some Kong) and soft, supple rope. An ordinary bobbin slides back down unless you hold it well, so clearly, an autostop bobbin is preferable.

Without a bobbin, mount your ascender on your chest and use a prusik knot for a leg ascender in a Frog or Texas rig. To tie an effective prusik knot you need a length of cord that is thinner than the rope to be climbed and this may not be easy for 7 mm or 8 mm rope!

With nothing that will work as a prusik knot it is possible to climb 'Inchworm' style with a chest mounted ascender and footlocks for your feet but it isn't easy.



Climbing with one ascender



Footlock

No ascenders

If you have a bobbin, use it as described above but use a prusik loop instead of a leg ascender.

With no ascenders or autostop the only choice is to construct a prusik rig using knots. Texas is easier than Frog as both hands are free to manipulate the bottom knot. The main problem is finding cord for the prusik knots that is both strong and will grip. Some imagination may be required – a carbide lamp sling, pack cords, sheath or core stripped off the bottom of the rope. Should the situation be desperate enough for you to try 3 mm cord or boot laces for prusik loops, arrange a self belay by clipping in one or both cowstails to a figure-8 or figure-9 loop tied just below the bottom knot. In order to minimise the potential fall replace the knot every few metres you climb. Prusik knots on hard kernmantle ropes are often of dubious security and once they begin to slide they may continue to do so until they melt through. When security is in doubt a self belay is worth the extra time. You could also avoid the whole problem by always carrying a Tibloc wherever you go.

Footloop caught in chest ascender

With a Frog and similar systems it is possible to catch both the rope and the long footloop in your chest ascender. In the next stand move the chest ascender climbs the rope and footloop *et voila*! Stuck! Dangling knot tails and thin tape are the most likely offenders. To escape, the chest ascender must move up a little before you can release it and inclined cam teeth make this more difficult.

When you are jammed as high as possible you can gain extra height by tying a knot in your footloop to shorten it. It is then a matter of standing up hard and pulling down strongly on the ascender release at the same time. If that fails, escape may be possible using a separate stand-in sling to unweight the entire prusik rig or to carefully cut the offending footloop free and attach another. Avoid such incidents by using brightly coloured footloops and safety cords that do not look at all like prusik rope, by taping all knot tails out of the way and by using cord instead of tape footloops if your prusik style causes them to rub against your chest ascender.

Caballos-Valle, Spain

Ozto Ocotal/J2, Mexico