SINGLE ROPE TECHNIQUE

A Guide for Beginners

Introduction and moralising

This is not intended as a comprehensive guide to all aspects of S.R.T. It does not cover pitch rigging, emergency & rescue techniques or any system other than the 'OUCC standard' Frog set-up. It is intended only as a back-up to practice sessions above and below ground. The OUCC library has copies several books on the subject: Marbach and Tourte's "Alpine Caving Techniques" is the most up-to-date and comprehensive.

The basic advantages of using S.R.T. rather than ladder & lifeline or self-line techniques are:

a) Long pitches can be more easily tackled; resting *is* easy and safe on the ascent.

b) The equipment is relatively light, so that small parties can tackle larger systems.

c) One is not so dependent on other cavers' strength and alertness for safety.

On the other hand:

d) Short and broken pitches can be awkward to rig for S.R.T. The gear cannot just be lobbed down like a ladder; abrasion of the rope must be avoided.

e) Each caver is essentially alone, and cannot rely on the lifeline for a boost in times of trouble. S.R.T. users **must** be completely confident and competent in the use of their equipment, in unexpected as well as normal situations.

The last point does not imply that S.R.T. cavers do not function as part of a team. Each caver must keep an eye on the others, and be ready and able to rescue them if trouble arises. 'Trouble' may mean light failure or route-finding difficulties, as well as rope tangles. These can and do happen to anyone, no matter who, so one should always keep the others in earshot, if not in sight.

S.R.T. is only a part of caving. The ability to zoom up and down long bits of rope, and do complicated knitting with them, is not 'caving', fun though it is. It is no more or less than a means of tackling vertical drops; these are often the easiest bits of the cave (especially if S.R.T. is being used). Make sure you are generally fit and able to cope with the rifts, traverses, squeezes, crawls, climbs which are the rest of the caving trip!

The equipment

Sit Harness	You sit in this for long periods of time, so it must be comfortable. You should be able to cave reasonably normally with it on, in all but the tightest places. You may also need to get it off in a hurry! Basically there are two types: those based on 'leg loops' and those based on a 'bum strap'. It is best to experiment to find your personal preference.
'Central Maillon"	This large maillon is the thing that holds the harness together,

	and into which all the other bits of gear are clipped. A karabiner is *not* suitable for this, as they are not designed for multiple off-axis loading. Some people prefer a steel maillon; others, aluminium. I think the steel ones are less likely to distort and so are easier to do up and undo, though some disagree. Some prefer a D-shaped one, others a triangular ("delta") maillon; this seems to be entirely a matter of personal preference.
Cows-Tails	These are safety cords, and should be worn at all times, descending and ascending. A 3m piece of dynamic (shock-absorbing, i.e. climbers') rope is knotted at each end, and in the middle, so as to form a short (as short as possible) and a long (just long enough so as to be in easy reach at full stretch) length. The middle knot is then slid onto the central maillon [1], and krabs are fitted at either end. More details later, but basically the short cows-tail is used on downward manoeuvres, and the long cowstail on upward ones. Both are used together on traverses.
Descender	Only those that do not have to be detached from the harness to unclip from the rope, and that can be locked off to prevent descent even with both hands off, are suitable. Figure eight, etc, descenders are not safe for S.R.T. Basically the choice is between a rack and a Petzl 'bobbin' or 'stop'. The rack is the most controllable and versatile, though it is large, heavy, and tends to snag on things; also the brake bars wear out quickly. They are considered a bit old-fashioned in European caving these days. The 'stop' is designed to fail-safe, so that ''hands-off' is 'stop', not 'go' (on thin or flexy ropes, it sometimes goes nonetheless). The bobbin is a no-stop "stop", which some consider safer – as you have both hands free to control the rope, and as you are not tempted to place reliance on the stop mechanism. All types need practice, so that the correct techniques are second nature. Most S.R.T. accidents happen on the descent; you are dependent on the single piece of gear and your handling of it, so you must get it right. The descender is clipped to the central maillon with a karabiner on descent, and kept clipped well out of the way on the ascent!
Braking krab	After passing through the descender, the rope passes through another karabiner. This gives a much greater amount of control on the descent, and also allows the rope to the threaded so as descender to be locked off completely.
Chest Ascender	Only the Petzl 'Croll' is really suitable, as it is designed to sit flat to the chest, and to be easily engaged with and detached from the

1 It is a matter of personal preference whether you attach the cows-tails and foot-loop safety cord to the central maillon directly (by threading their knots over the maillon) or indirectly (using small karabiners or maillons). Direct threading saves weight and complexity; use of an intermediate link allows you to attach or detach the gear without undoing the central maillon.

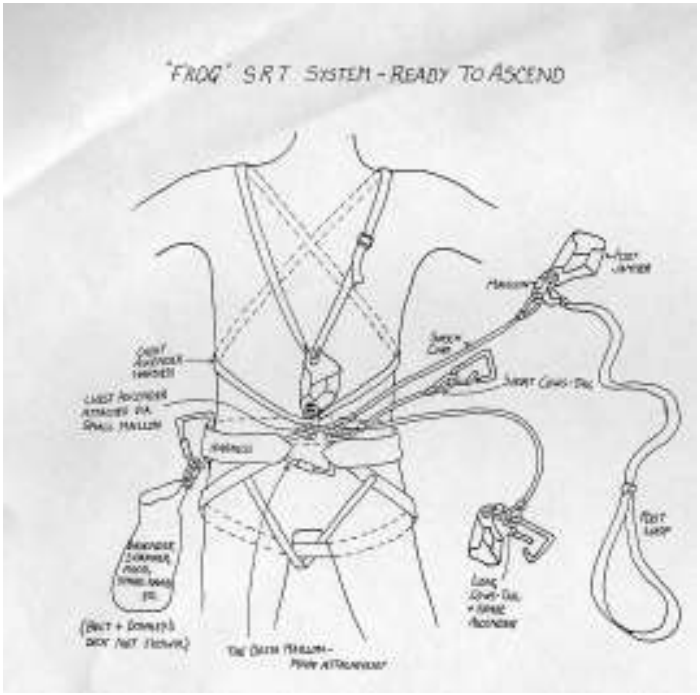
	rope with one hand; this is essential on passing rebelays. Other ascenders could be made to do, but in an emergency only. The Croll is usually attached directly to the central maillon. Some prefer to use an intermediate small maillon, finding that it helps the rope run more freely.
Chest harness	A chest harness is needed to hold the chest ascender upright and to pull it up the rope when prussiking. The simplest form of chest harness is a simple tape strap with a sliding buckle; this holds the ascender in tightly, and is easily adjustable. Many find this works fine; others prefer various arrangements of tape and buckles that generally resemble an inverted S&M bra.
Foot Ascender	Either a Petzl 'standard', or its handled variant. In practice, most people have found that the handle isn't a lot of use, and can get in the way. This is attached via a safety cord (of dynamic rope) to the central maillon (via a small krab or maillon if you prefer). The foot-loops are attached to it. The fine-tuning of the lengths of the safety cord and footloops is vital to the efficient use of the system - more on this later. It is useful to have the safety cord and the foot loops attached to the jammer via maillons, rather than tied in directly. They can then be transferred easily to other bits of gear - you may need to do this if in a tangle.
3rd Ascender	This is not often needed, but it may be useful if in some dire tangle, or at a nasty pitch-heads - or even if one of the other ascenders packs in or gets lost. The most useful place to have it is on the end of the long cows-tail (attached via a maillon; reasons as above). I no longer use one, as I prefer a lightweight approach to S.R.T. and have never found it useful; your choice.
S.R.T. Bag	Clipped to your harness with a krab, this holds any gear not in use at the time - e.g. footloops and possibly long cows-tail (still attached to the central maillon), odd spare krabs, etc, and the vital extras listed below. Also contains food!
Extras	Essential extras, that is. A small adjustable spanner, for bolts and reluctant maillons - attached to your bag via a bit of string with “snoopy loop” [2] at the end, for attaching to your arm. A pulley - for gear hauling, and vital if you have to rescue someone. Spare krabs - you always need them for something! On long (expedition) trips, a tin opener is vital.
Donkey's Dick	The traditional OUCC term for the gear-carrying cord, about 2-3m of tape or rope with a krab at each end (it is vital to be able to release the tackle bag(s) in an emergency).

Although it is tempting ('just to make sure') to use 11mm rope for the safety cords, this is very bulky, particularly when knotted. 9mm dynamic rope is absolutely safe, and very much more compact. Likewise, the footloops should be of tape or thin rope with a single large loop for both feet at the end; individual loops for each foot don't

2 Cavers’ term for robust large rubber band usually made by cutting up an old motorcycle inner tube.

seem to have any great advantages. These bits of rope and tape should be discarded and replaced if at all suspect; the knots in particular are prone to abrasion.

How it all fits together



See the diagram, which leaves off only the descender and braking krab (for clarity). The full rig, with all ascenders on, should always be worn on the descent if in doubt - e.g. if rigging pitches, if the pitch is very wet or broken, or if you are not feeling too confident. If you need to come back up, and haven't got your chest ascender on, it is not a good idea to try to work out how to do it while being knocked half senseless by a waterfall / in the dark / at the end of a rope that's too short / dangling in a loop below a rebelay or deviation you have gone too far past.

As a minimum, have cowstails attached, and probably also the footloops (put away in your bag, or attached to your side).

Lengths: The system will not work properly if the various bits are not the right length for you; getting it right makes an amazing difference. Bear in mind that settling of knots will cause cowstails and safety cords to stretch quite a lot the first few times they have weight put on them. The short cowstail should be as short as possible. The long cowstail and the foot-jammer safety cord should be just long enough so that you can easily reach or release the krab or jammer at the end, even when the cord has been at full stretch with your weight on it (BIG problems can arise if you can't do this). The footloops should be adjusted so that the foot-jammer is pulled down close to the chest ascender as you 'stand', and rises not too far above eye-level when you 'sit' (any higher and your arms will get tired very quickly).

Going down (no obstacles - straight hang)

Approach the pitch-head, cowstail in hand. Clip on to the line to the back-up belay or traverse line as soon as you can. Get hold of the main rope and clip on your

descender, as close as possible to the top. Lock the descender off [3]. Look at it - is it right? If it is, lower your weight onto the descender, checking it stays locked off. Good, the descender, belay and rope have taken your weight. Now unclip the cowstail, carefully unlock the descender and begin to descend. The ultra-cautious may prefer to unlock the descender, making sure they are still in control, before unclipping the cowstail.

Control of the descent: Unless the descender is locked off, the controlling hand(s) (one hand fro a stop, two for a bobbin or rack) should be on the rope below the descender. Clinging on to the rope above the descender, or to the descender itself, will not help at all. For all descenders, increasing the tension on the rope will slow you down and eventually stop you. For a bobbin or 'stop', feeding the rope through the braking extra krab is vital for safe control. Do not attempt to fine-control a 'stop' by tweaking the handle – it should be used as an on-off control only; it is the tension on on rope applied by your other hand that controls the descent. For a rack, clipping extra bars in will slow the descent; as a fine control, increasing the spacing of the bars will speed you up. Using thick rubber gloves stops you burning your hands and losing control that way!

Speed of descent varies markedly with the type, thickness and age of the rope. At one extreme, old, thick, mud-encrusted rope will often need feeding into the descender to move at all; at the other, new 9mm rope might require every last bit of braking you've got.

Note that on longer pitches, the weight of the rope will tend to slow you down at the top of pitches. As you get nearer the bottom, you will speed up; it is possible to get out of control. If this starts to happen, lock off. For bobbin or 'stop', wrap the rope round the braking krab again. On a rack, clip in another bar. As a last resort, fit an extra braking krab, or wrap the rope round your leg as an extra friction brake.

Going up (no obstacles - straight hang)

Clip chest ascender onto rope. Jump up and down a few times, or fit the foot jammer and use your foot to pull the rope down, until the stretch in the rope is taken up, and you start to lift off. Sit down on your harness, then tighten the chest tape/harness as much as you can (note that the loose end of the chest tape should be tucked well out of the way of the ascender, or it might get caught; alternatively, you could fit the tape so the buckle is by your side rather than over the shoulder). Clip in the foot ascender, put your feet in the footloops, behind the rope. Stand up. Sit down (lift up the foot jammer!). Stand up....

It helps, for efficient prussiking, if:

a) You make a conscious effort to tuck your feet under your bum, and push down, rather than out, as you stand up. Use your legs, not your arms, to stand up.

b) The length of the foot loop is such that the foot ascender nearly meets the chest jammer on 'stand', and does not rise above the top of your head during

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3 "Lock the descender off". How? There are good pictures of how it's done in Marbach and Tourte, but I don't want to bust copyright by reproducing them. If anyone feels like drawing some nice diagrams, I'll add a section, but it's hard to describe in words alone! Locking off is perhaps best learnt by coming to a training session.

'sit'.

c) At the bottom of pitches, you pinch the rope between your feet on standing, so as to help it feed through the chest jammer. Or get someone to hold the rope for you.

Difficulties at pitch heads.

Many SRT pitches don't have very straightforward take-offs, as the primary concern must be to get a free-hang, to prevent rope abrasion. Most of these problems are best dealt with by experience, as there are far more than can be listed in detail. Types of problem might be:

Traverse to Pitch

In this case, there should be a traverse line, which may be rebelayed. Clip on a cows-tail, and make your way out to the main rope (this may be easier said than done – but remember, the belays and rope *will* take your weight). At traverse line rebelays, use both cows-tails, so that you are never unclipped.

On the return, clip onto the traverse line with your long cowstail before you do anything else. It may be useful to transfer the spare jammer or foot-jammer to the line to give you a pull onto the traverse. Unclip the chest ascender first, and as soon as you can (though it usually feels awful to do so!) otherwise the weight of the main rope will tend to drag you back off the traverse.

Long reach to rope

Clip onto something - the line between the main belay and the back-up (which should be in a less preposterous place). Then, as for traverses - you may end up penduling onto the pitch. In this case, feed your descender up the rope until the last awful moment when you let go. On the return, use your cowstails (maybe with the spare jammer) and your foot ascender to haul you into a safe stance.

Rebelays

These are put in to give a free-hang, to keep pitches clear of water, etc. This will normally mean there is some rock around that you can stand on or brace against to assist you in the manoeuvres 'Flyers', hung in free space by wire or tape from something way above, present extra problems. The basic methods are the same in all cases.

Going down

As soon as the belay comes within reach, clip the short cows-tail into it -either into the maillon (best - easier to get out again) or the knot. Keep on abseiling until your weight is fully on the cowstail. Take the descender off the upper rope, attach it to the lower rope and lock it off. Now you have to get the weight off the cowstail and unclip it. Usually a bit of climbing or pulling up assisted by ledges will be all that is needed. If this won't work, standing or kneeling in the loop of rope from the upper section is usually effective. In the last resort, clip the foot-jammer into the upper rope and stand up on it. Sit back down on the descender, unclip the foot jammer (beware putting it so high up that this is difficult) and away…

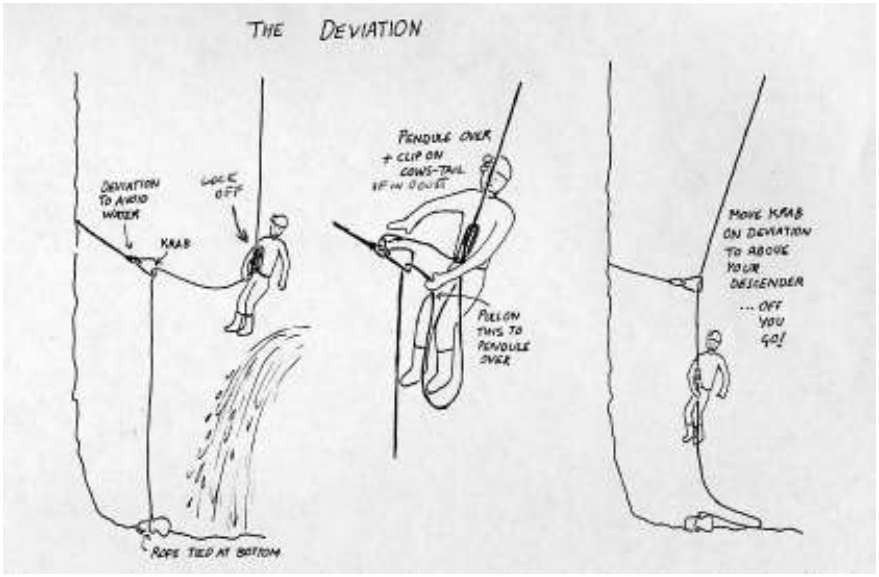
Going up

Even easier. Clip in the long cows-tail as soon as you can. Transfer the ascenders, one at a time, from the lower to the upper rope. Stand up on the foot loop, unclipping the chest jammer as you rise; clip it onto the upper rope. You sit down onto (probably) the cows-tail. Then transfer the foot-jammer and prusik till the slack is taken up. It can be done the other way round, foot ascender first, but this may involve a lot of heaving on the rope to remove slack.

In all cases, be very wary of tangling safety cords, etc, with the various loops of rope. It is all too easy to find part of your gear on one side and the rest on the other of a tight loop of rope, when it is too late to do anything about it. The best way to avoid this is to be meticulous about checking the run of all bits of rope and tape every time you remove or reclip something. Despite this, everyone has at least one 'great SRT cock-up' story, often involving a tackle bag.

Deviations

This is where the rope runs through a krab, to alter the line of the hang to avoid a rub point or water. Unlike a rebelay, a deviation is not supposed to be load-bearing to any great extent. Passing one is, in principle, easy. In practice, wide deviations can require quite a lot of strength.



Going down

(see diagram) Abseil down to the level of the deviation (preferably slightly above it), and lock off. Pendule over; if it's a long deviation, the rope should have been tied off at the bottom so that you can use the rope to haul you over. You will probably be too high; drop a bit, lock off and try again. Don't go too far down! It is safest to clip a cows-tail into the wire or tape of a wide deviation, so that if you let go you don't swing all the way back again. Unclip the deviation krab from the rope and clip it on again above your descender. Unclip your cowstail and away!

Going up

Easy peasy. Prusik up to the krab. With most deviations, you can push it up the rope a bit and prusik up a bit more. Clip in, just to be on the safe side. Unclip the

deviation krab and put it back on the rope below your ascenders. Unclip the cowstail and pendule over (controlled by holding on to the lower part of the rope). Carry on up.

Rope Protectors

These sheaths, put round the rope to avoid abrasion, are now very old-fashioned. Re-belays or deviations are far preferable. You may sometimes find them at pitch-heads or rebelays to protect the first few feet of rope near the rock. In this case, simply unzip the velcro that holds them together, use the rope as normal, and zip up the velcro again when past.

Knots

Nasty, and best well avoided. All knots in ropes should have a safety loop included, to clip into. Going up is easy (ish); just move each ascender in turn past the knot. Going down is more problematic; the most effective method is essentially to clip on the ascending gear, remove the descender and put it on below the knot, then to prusik downwards. When the foot ascender is low enough, unclip the chest ascender and sit down on the descender, unclip the foot ascender and the cows-tail, and away. I never said it was easy... it needs practice.

…It **all** needs practice! - preferably before you find yourself hanging upside down by one cowstail threaded through an ascender in a waterfall over a 40m pitch in Spain...

Useful Books in the OUCC Library

Lyon	*Venturing Underground: The New Speleo's Guide*. Basic.
Meredith	*Vertical Caving*. Covers most everything useful, though rather terse.
Judson (editor)	*Caving Practice and equipment*. Good, if brief, chapters of S.R.Y., rigging, rescue and indeed most aspects of caving.
Marbach and Tourte	*Alpine Caving Techniques*. The business, and very up to date. Every home should have one.

Steve Roberts

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