SUSS SRT Skills Matrix Descriptions

A guide to skill levels and competencies for Single Rope Technique

1 Purpose

To standardise the Single Rope Technique (SRT) protocols and procedures amongst SUSS members to improve safety during caving activities and to transparently understand another member's competencies.

1.1 Scope

This document is a list of competencies, not an instruction manual on how to teach those competencies. It describes competencies for SRT only; other cave-based skills, including other 'vertical' techniques such as laddering and climbing, are not described here.

2 Levels of ability

Trainee: Somebody who has not yet met all competencies of Level A: Beginner. Trainees will not yet have demonstrated all the competencies to abseil unsupervised. Their participation in SRT activities must only be in a supervised manner, preferably via a SUSS SRT training days.

A: Beginner level: Able to descend single pitches. No rebelays, no multi-pitch. Not necessarily in-cave experience, but more aimed at cliffs/canyons. Minimum standard to attend an abseiling trip.
Example: Empress Falls Canyon

B: Intermediate level: Self-sufficiency on rope, including ascent but not rigging. Minimum standard to be able to borrow an SRT kit in their own name. Minimum standard to attend a trip involving ascent up a rope. Must already have met competencies of the Beginner level.
Example: Dip Cave (Wee Jasper), Bottomless Pit (Jenolan), Blowfly (Bungonia)

C: Advanced level: Able to rig multi-pitch abseils for a group to safely descend. Minimum standard to be able to borrow an SRT kit on behalf of somebody else for an activity where you are the trip leader. Minimum standard to sign off lower or equal levels. Minimum level you need to be a SUSS Trip Supervisor, in addition to other Trip Supervisor specific skills (see Trip Supervisor documentation for full details). Must already have met competencies of Intermediate level.
Example: Rigging any of the above examples.

D: Rescue level: For the advancement of skills for people who have already met competencies for the Advanced level and are SUSS TSs.

3 Descriptions of competencies

The following are the competencies of each level. A participant is considered to have attained Level X only when all competencies of Level X (i.e. all X.n) are met. The competencies within a given level can be attained in any order. They are not intended to be sequential.

Level A

A1 Edge awareness
Description: Awareness that the edges of pitches are hazardous. They can be slippery, leading to falls; may have loose rock, which could fall onto other participants; or equipment might be irretrievably dropped down a pitch.
Justification: This is a core safety principle.
Example of use: Edge awareness is relevant around any pitch, but also around climbs in excess of head height, where the consequence of falls or dropped equipment becomes major.

A2 Basic rope care
Description: Core principles of looking after a rope. Don't step on the rope, be mindful of ropes where they rub across sharp edges or rock. Abseil along the vertical line of the rope, not off to one side where you could swing across the rock face.
Justification: Good abseil habits. Caring for the equipment extends its longevity and improves trip safety.
Example of use: Abseiling over a cliff edge.

A3 Basic rope types
Description: Know the difference between static and dynamic ropes, and that ropes used for abseiling should be rated for that. Know that ropes have a core and a sheath, and what each part does. Know that ropes come in different sizes, and what diameters are appropriate for caving use. Recognise slings, tapes, and cords, and their common widths.
Justification: Static vs dynamic is very important for safety. Any rope that may catch a fall should be dynamic, including a cow's tail. Ascending a dynamic rope is very inefficient because of the degree of stretch, and exacerbates rub points.
Example of use: Rope selection for personal gear.

A4 Communication calls
Description: Understand and use the various calls made during SRT procedures. Know that whistles are sometimes used for canyoning. Understand the conditions in which you may not be able to communicate.
Justification: Communication is critical to safety and efficient movement of a party through a cave.
Example of use: Calling 'off rope' when you have completed the abseil *and* established it is safe for the next person to descend (e.g. no foul air).

A5 Abseil unassisted on a bar rack
Description: Ability to confidently thread a rack and use it to safely descend a rope (either double or single rope). Understand how threading extra or fewer bars affects the friction

(descent speed). Understand how pushing the bars up or spacing them affects the friction. Know how to soft and hard-lock a rack, and how to unlock to continue descending. Be able to cross a rope protector. Be aware of loose clothing, hair, beard, etc. that can get caught.
Justification: Racks are common and inexpensive descenders used in caves and canyons. Safe and independent descent is a requirement for abseiling in caves.
Example of use: Abseiling in a cave or canyon.

A6 Abseil unassisted on a Petzl Stop
Description: Ability to confidently thread a Stop and use it to safely descend a rope. Understand how to adjust the friction (descent speed) using a brake carabiner. Know how to lock off a Stop, and how to unlock to continue descending. Be able to cross a rope protector. Be aware of loose clothing, hair, beard, etc. that can get caught.
Justification: Stops are common and popular descenders because of their auto-stop function and ease of attaching/detaching from the rope. Safe and independent descent is a requirement for abseiling in caves.
Example of use: Abseiling in a cave.

A7 Belaying 1
Description: Provide a bottom belay (AKA fireman's belay). Understand when a bottom belay might be inappropriate (e.g. falling debris) or impractical (abseil into a pool).
Justification: Being able to provide a bottom belay will assist trip leaders in keeping a party moving at a safe and reasonable speed through a cave or canyon.
Example of use: Belaying an abseiler down a cliff.

A8 Identify basic gear
Description: Be able to name and describe the use of each piece of gear in a standard SUSS SRT kit. (Note that in caving, what we usually call a cow's tail, is otherwise known as a lanyard.)
Justification: If you don't know what it is and what it does, you shouldn't use it.
Example of use: Borrowing a club SRT kit.

Non-assessable extras at Level A:

- Be aware of the different types of 'safeties' and their limits. Some to look up would be lanyard, a true cow's tail, daisy chain, links, Dyneema, multi-strand, etc.

Level B

B1 Prusik up a rope
Description: Tie a French Prusik (and optionally a Klemheist) knot around a rope and use it for ascent. Understand how the lengths of the loops affect biomechanical efficiency. Know that there is a narrow range of suitable prusik cord diameter for a given rope diameter. Understand the implications of ascent for rope care.
Justification: This is a core skill for rope ascent and safety on rope. Prusik cord is cheap and readily available.

Example of use: Ascending a rope without mechanical ascenders. Prusik cord is also useful as a self-belay when abseiling, and has many uses in rescue scenarios.

B2 Ascend a rope with mechanical ascenders
Description: Attach mechanical ascenders to rope and use them to safely ascend. Understand how the lengths of leg loops affect biomechanical efficiency, and adjust accordingly. Understand the implications of ascent for rope care (rope rub, and ascender teeth). Understand how they can get jammed and how wear and tear affects their performance.
Justification: Mechanical ascenders allow rapid ascent of rope, but are much more expensive than prusik cord.
Example of use: Ascending a rope quickly and with less effort. Mechanical ascenders are also useful progress capture devices (PCD) at more advanced levels.

B3 Tie and recognise certain knots
Description: Tie and recognise the following knots: figure 8 (bight and rethreaded), figure 9, karash double loop (fusion / bunny ears), European death knot (EDK)/overhand, bowline on a bight, fishermans/barrel/stopper knot, double fishermans, French Prusik, tape/water knot, Italian/Munter hitch, clove hitch, alpine butterfly.
Justification: Tying these knots is a stepping stone to rigging, and recognising them allows you to learn from others' rigging as you navigate a pitch. It also improves safety, because someone else's incorrect knot may be unsafe.
Example of use: There are myriad uses, not limited to rigging. For instance, a figure 8 can be tied into your harness or seat maillon to attach yourself to a rope for belay. An Italian/Munter hitch can be used to add extra friction to a brake carabiner.

B4 Cross a rebelay and a redirect (ascent)
Description: Safely and efficiently cross a rebelay unsupervised during ascent. Safely and efficiently cross a redirect unsupervised during ascent.
Justification: Rebelays are a common feature on SRT pitches as they help to minimize rope rub over an edge. Redirects are less common, and simpler to pass.
Example of use: The pitches in Bottomless Pit (Jenolan), Blowfly (Bungonia), Devil's Pot (Mole Creek) are just three examples of these widespread features.

B5 Cross a rebelay and a redirect (descent)
Description: Safely and efficiently cross a rebelay unsupervised during descent. Safely and efficiently cross a redirect unsupervised during descent.
Justification: Rebelays are a common feature on SRT pitches because the line of an abseil may not be purely vertical. Rebelays also permit multiple simultaneous users of the same rope. Redirects are less common, and simpler to pass.
Example of use: The pitches in Bottomless Pit (Jenolan), Blowfly (Bungonia), Devil's Pot (Mole Creek) are just three examples of these widespread features.

B6 Switch from descent to ascent mid-rope.
Description: Safely and efficiently stop descending and begin ascending a rope.
Justification: Being able to switch from descent to ascent is a key skill, as per example below.
Example of use: You might descend into a layer of foul air and need to rapidly ascend out of it.

B7 Switch from ascent to descent mid-rope.
Description: Safely and efficiently stop ascending and begin descending a rope.
Justification: Being able to switch from ascent to descent is a key skill, but is less commonly an emergency than doing it the other way around.
Example of use: Maybe communication was poor and you started ascending a rope, only to realise that someone has begun descending on the other side of the rebelay.

B8 Crossing a knot
Description: Be able to cross a knot in a rope, in either direction.
Justification: Rarely required, but occasionally there's a knot in the rope, and unlike a rebelay crossing where there's an anchor, here you don't have one. It's a different skill.
Example of use: For a very long pitch it can be necessary to combine two ropes, which means there's a knot in the middle of your abseil.

B9 Cross from one rope to another
Description: Be able to cross from one rope to another, mid rope (i.e. no anchor present). This is a variant on a rebelay crossing, but without using the anchor.
Justification: Some circumstances favour switching from one rope to another over the presence of a rebelay.
Example of use: A 200-m pitch can be rigged with both a 100-m and a 200-m rope so that participants start on the 100-m rope then switch. The excessive weight of a 200-m rope is then no longer an impediment to the start of the abseil, and once the first caver switches to the longer rope, a second cavers can descend the 100-m rope. Essentially this permits two abseilers at once, for greater efficiency.

B10 Traverse a route using pull-through techniques
Description: Use a hand or chest ascender as a progress capture, and pull the rope through to traverse a route.
Justification: This is a common method of securing a traverse of a narrow horizontal ledge.
Example of use: Walking up a steep slope that is not inclined enough to require standard rope ascent techniques.

B11 Belaying 2
Description: Provide a self-belay, e.g. with Prusik cord, when descending.
Justification: There's not always a bottom belay available, such as when there is loose debris on an edge. A Prusik is not always convenient, but does sometimes come in handy, hence this is a useful skill to know.
Example of use: Any descent that does not end in water.

Non-assessable extras at Level B:
- Consider the fitness requirements for ascending several tens of metres in addition to any horizontal caving and walk-in.
- Identifying the appropriate use cases for the knots you have learned, and their performance under load

Level C

C1 Advanced rope types and inspections
Description: Be aware of advanced rope types (e.g. speleo rope, floating rope), and their performance limitations. Inspect a rope for damage.
Justification: It is important to know the limitations of gear that you rig with, including spotting a deteriorating or damaged rope.
Example of use: Attempting to abseil on a dry canyoning rope may cause it to melt.

C2 Rigging an abseil
Description: Can qualitatively assess anchors for their suitability (redundancy, strength, environmental impact). Can place and equalise anchors, whether using bolts, natural anchors (stalagmites, pillars, trees), or similar (bollards, rails). Removes hazards where possible. Attaches rope to anchors in a suitable manner, and ensures alignment with the natural abseiling line as well as is practicable. Employs a rope protector if required. Ensures that a knot is put in the end of a rope where appropriate. Be able to derig afterwards.
Justification: While the need to find strong anchors is obvious, back-up and equalisation are also important to avoid shock-loading an anchor, or catastrophe, if one fails. Careful placement of rope with respect to the abseiling line enhances safety in the short term, and helps to maintain equipment in the long term.
Example of use: Using a sliding-X and/or a karash double loop (fusion / bunny ears), to equally distribute weight across (redundant!) anchors. Setting a rope over a smooth edge to avoid a sharp one.

C3 Placement of rebelays
Description: Places a rebelay with a bowline on a bight (or with a fusion knot if there are two bolts), allowing a suitable amount of slack in the loop before the rebelay.
Justification: The amount of slack in the loop is important, so that it has enough to abseil slightly below the level of the bolt and to easily cross the rebelay. If there is too much slack, participants will no longer be able to stand in the loop, and the fall factor increases if an anchor fails.
Example of use: This is common across all rebelays.

C4 Belaying 3
Description: Provide a belay using a belay device, such as an ATC, Grigri, or a carabiner and suitable hitch (e.g. Italian/Munter hitch). This should be from either the bottom or the top of a pitch, and the belayer should be extractable from the system.
Justification: It may occasionally be necessary to belay somebody up or down a pitch, as per examples below.
Example of use: A climber using a ladder who requires a belay. Belaying someone who is aid-climbing a pitch.

C5 Ascending a rope with a Stop
Description: Using a hand ascender and a Stop (or other descending device), be able to effectively ascend a rope over a short distance by pulling slack out of the descent line.
Justification: Occasionally one descends slightly out-of-reach of an anchor and/or safety (e.g. Cow's tail), and this method is quicker than switching to full ascent whilst not requiring removal of the descender from the rope.

Example of use: Forgot to detach long Cow's tail or daisy chain from a rebelay before beginning to descend. Or somehow got caught up with the trailing loop at a rebelay.

C6 Fit equipment correctly to others
Description: Fits equipment correctly to others, including ensuring a harness is tight and secure, ensuring their safety is the right length, and ensuring foot loops are of an appropriate length (potentially including demonstration of length adjustment).
Justification: Incorrectly fitting harnesses are dangerous. Foot loops of the wrong length hamper efficiency.
Example of use: Set-up on an SRT training day.

C7 Set up a haul with mechanical advantage
Description: Set up a haul with 3:1 mechanical advantage, and describe how it could be modified for greater advantage.
Justification: Ensures that everybody can exit a cave safely.
Example of use: Hauling an injured or exhausted caver up a pitch.

C8 Pick-off an unconscious victim
Description: Can ascend or descend to an unconscious victim mid-rope. Can safely remove them from the system and abseil with them to the ground. Be aware of the dangers of hanging in a harness for a long period (harness hang syndrome).
Justification: Situations where someone gets stuck on rope and needs assistance (albeit without loss of consciousness) are surprisingly common.
Example of use: A participant's Prusik cord foot loop snaps, and they cannot unweight their croll.

Non-assessable extras at Level C:

- Familiarisation with non-standard gear (things not in a standard SRT kit, such as ATCs, Grigris, shunts, etc)
- Ways in which a conscious victim can assist in their pick-off (or haul).
- Consider picking up a book on anchor building. Consider static vs dynamically equalised anchors (karash double loop / fusion / bunny ears vs. sliding X)

Level D

At level D, it is not intended that the competencies get 'signed off', but are there to expand your rescue skills. Best practice is to stay well practiced.

Since the competencies here are somewhat more difficult to describe, their descriptions here are minimal, and it is recommended that rescuers obtain a vertical rescue manual to read up on techniques.

D1 Rescue a victim via rope cut (using a second rope)
Description: Ascends or descends on a separate rope to a victim mid-rope, transfers the victim's weight to the rescuer, and cuts the victim's rope above their ascender.
Justification: A rope cut from a separate rope is a faster and less strenuous way to get a victim down than a pickoff.
Example of use: A participant has been stuck on rope for a dangerously long time, and you just need to get them down. Or when the victim is stuck in a waterfall and hypothermia or drowning is an acute risk.

D2 Rescue a victim via rope cut on the same rope
Description: The process involves using a hand ascender above the victim as a new anchor, and tying the bottom end of the rope to this, effectively creating a new strand to abseil down.
Justification: If a victim has fallen onto their croll, it may be impossible to release. This method is also viable if the victim is too heavy for the rescuer to lift.
Example of use: A participant is stuck on rope, their croll is completely jammed, and you don't have a spare rope.

D3 Mechanical hauls mid-rope
Description: Can implement a mechanical haul mid-rope to lift a victim.
Justification: Makes lifting the victim to deweight their croll much easier.
Example of use: If the victim is much heavier than the rescuer, it might be otherwise difficult for the rescuer to free them.

D4 Rig a Tyrolean
Description: Can rig a weight-bearing Tyrolean between two anchors with a reasonable amount of slack.
Justification: Can be used to transport heavy equipment or personnel across a chasm or river.
Example of use: This is the standard rescue technique to transport a stretcher up the entrance pitch in Mammoth Cave, Jenolan.

D5 Instruct someone in trouble from the ground
Description: Can maintain calm clear communication with a victim who is stuck on a rope, despite the distance and anxiety involved in the situation.
Justification: It can be much quicker than fetching a second rope; less messy, strenuous, and interpersonal than a pickoff, and the victim may learn from the process.
Example of use: The cause of 'trouble' could be rather trivial, such as a hand ascender pushed too high up to a rebelay knot, and a calming reassuring voice with instruction can be sufficient.

D6 Use a releasable set-up for rescue practice
Description: Can use a locked-off descender as a releasable anchor when practising vertical rescue.
Justification: Practice rescues often highlight gaps in competence, and can take too long to be safe (harness hang syndrome) or can result in two people being stuck on rope. Being able to release them gently to the ground is a safety requirement.
Example of use: Any pick-off practice.

D7 Lifting from the top
Description: Can lift a participant on a taut rope from a position of safety at the top of a rope (as described on page 165 of *Vertical* by Warild).
Justification: This technique allows the rescuer to haul from a position of safety, there is no need to double-load the rope, and lifting can start immediately.
Example of use: An exhausted caver is hanging on the rope and needs assistance to finish their ascent.

D8 Counterbalance systems
Description: Can orchestrate a counterbalance lift, including rigging and instruction to participants involved (as described on page 166 of *Vertical* by Warild).
Justification: Occasionally a substantial lift is required, and one option for this is a counterbalance lift.
Example of use: Raising a stretcher with a victim from the bottom of a large chamber.