The Quest

It all began with the ISC Sarab. They sent me one because I was looking for a reversible descent control device, that would work with the NFPA "G" load which is 272 kg, or 600 lbs. Although not all the devices included in this test are rated for the NFPA weight, I was interested in other attributes they might have. Specifically, from a descent mode, can we ascend/raise without a changeover? How efficient is it compared to a normal pulley? Can we belay with it? What type of loads and sizes of rope will it handle? Can I replace three pieces of equipment with one? And of course these questions led to more.

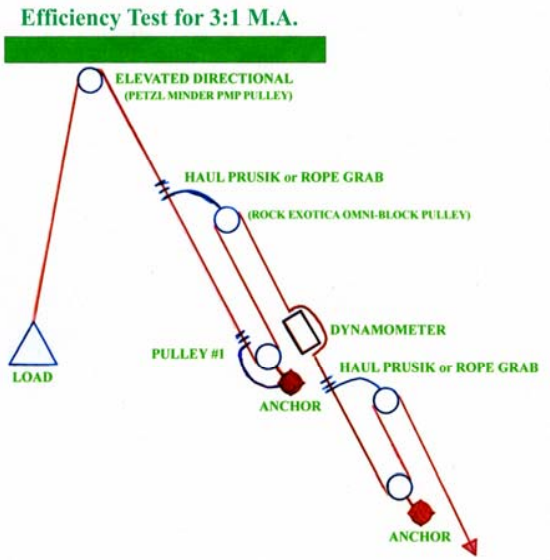
So, what would I consider the "Holy Grail" of rope rescue to be? My search, was for that device that will handle the NFPA "G" load, and allow me to raise, lower and belay.

Testing

Few of the devices tested meet the NFPA load rating. This is not of consequence, because first and foremost it is a comparison article, and the NFPA load is not applicable to rope access needs, or to many rescue teams around the world. Even in North America, although numerous teams adhere to the NFPA standard, many do not. So the testing was done with different loads. I began with simple rappels on all the devices looking for ease of rigging, smoothness on descent, effectiveness of the secondary or panic brake, effort needed to squeeze the handle to descend, the effects of different brands and types of rope, etc. We used four different ropes from Sterling and PMI for the rappels. The rappels were done with loads from 80 to 100 kg.

The next phase of testing was intended to ascertain how efficient the devices were when raising, and what effect increased loads had on them. We tested all devices with 100 kg and 200 kg loads, and some with 272 kg loads. If I thought the device could handle a load of 272 kg, and/or the 12.7 mm rope, we tried it.

The first thing that I needed to do was establish a benchmark for raising. To do this we took an oversized metal Hazardous Materials barrel, and filled it with water to the desired weight. To establish efficiency, we took each load separately, 100 kg, 200 kg and 272 kg, attached them to the mainline, which ran through a directional pulley on an overhead beam, back to an adequate ground level anchor. Here we installed a simple 3:1 inline haul system. To the 3:1 haul rope, we attached the dynamometer and behind that another 3:1 mechanical advantage. This allowed us to find out how efficient each initial 3:1 was, and compare that to the DCD's when we put them into the system, in place of the pulley.



The numbers in the chart that follows aren't to be taken as gospel. A system rigged with different equipment will give different results. This was meant only to establish the benchmark for this enquiry. As long as everything, other than the DCD's, remained the same, the results should be reasonably accurate. However, the testing method is fairly crude, and the numbers should be considered an estimate.

Devices	Raise 100 kg				Raise 200 kg				Raise 272 kg			
	Test 1	Test 2	Avg.	Avg. M.A.	Test 1	Test 2	Avg.	Avg. M.A.	Test 1	Test 2	Avg.	Avg. M.A.
3:1 Test	40 kgf	40	40	2.5	70	75	72.5	2.75	115 kgf	120	117.5	2.3
Anthron DSD												
30+25	N/A				N/A				N/A			
SRTE Rescue												
Stop	NA				N/A				N/A			
SMC Spider	50 kgf	60	55	1.8	100 kgf	100	100	2	N/A			
ISC Sarab	45 kgf	45	45	2.2	95 kgf	95	95	2.1	135 kgf	140	137.5	1.98
Heightec Prism	45 kgf	50	47.5	2.1	90 kgf	90	90	2.2	135 kgf	140	137.5	1.98
Heightec												
Powerlock	45 kgf	50	47.5	2.1	95 kgf	90	92.5	2.16	125 kgf	135	130	2.1
Heightec Quadra	45 kgf	50	47.5	2.1	95 kgf	90	92.5	2.16	No Test	No Test	No Test	
Petzl I'd (Red)	50 kgf	50	50	2	100 kgf	110	105	1.9	130 kgf	140	135	2
SRTE No Worries	50 kgf	50	50	2	110 kgf	100	105	1.9	150 kgf	145	147.5	1.84
ISC Pro Allp		50	50	2		105	105	1.9		145	145	1.88
Anthron Lori					90		90	2.2				
Petzl GriGri					100		100	2				

The weights in this chart are not the manufacturers published weights. All units were weighed on a small analogue scale.

The results were very interesting. I didn't expect the numbers for the DCD's in raise mode to be as consistent as they were. That's a good thing of course. I also found the mechanical advantages created with the DCD's in line, to be closer to each other in value than anticipated. So what did the numbers tell us? The first thing I noticed when charting the results was the high efficiency of the 3:1 test in the 200 kg category. Suspect, I think, but an average of the two results. The most efficient device was different in each weight class. I expected to have a most efficient device across the board, but not so. The mechanical advantages obtained with the most efficient device in each weight class, were surprisingly close, 2.1 to 2.2. So too were the results from the least efficient devices, 1.8 to 1.9.

So how much mechanical advantage are we willing to sacrifice to simplify the raise-lower sequence? Or does it really matter. The results, really weren't that far apart. So, what other attributes do these devices have that would tempt us to use one over another? That will depend on your needs.

Ropes Used:

The ropes used for the testing were donated by PMI and Sterling. As requested, PMI sent their new Access Pro 11mm rope, and Classic Professional 12.5mm.
From Sterling I received their new Safety Pro 11mm and some SuperStatic 13mm. The 11mm ropes from both companies worked very well in all the devices. The 12.5 and 13mm ropes worked quite well in devices that were designed to accept the larger rope, and some that weren't.

Terms

Belay: In this article it means, belaying by feeding the rope into, and drawing it out of the device, much like you would with a GriGri or Lori. If the device did not allow this technique then it was listed as, Belay: No.

Raise/Ascend: If the device would not allow you to ascend or raise, by simply drawing the rope back through the device, then it was not considered reversible.

Secondary (Panic) Brake: If you stop when you depress the handle completely, or on some models after passing a detent, then you have a secondary brake.

The Devices:

Anthron DSD 30+25
A well designed descender. Worked easily on all the ropes in the test. Nice descent control. Design of handle seems to reduce effort needed compared to some other units. Can't raise or belay with it.

SRTE Rescue Stop
A very robust piece of equipment, as all SRTE gear is. I'd like to see the handle shape adjusted to give more leverage. Works with a wide range of ropes.

SMC Spider
Very basic, straight forward design. Limited to lighter loads. It seems to prefer 12 mm and larger ropes. Can be used to ascend or raise, with a slight bump as the cam adjusts as you reset.

ISC Sarab

A robust and elegant design. A return spring was added to the handle on the latest model, to keep it against the body of the device when it is not loaded. This spring provides just enough tension, so that we can belay with 11 mm ropes. Although care must be taken to make certain that the handle is always free, to allow the belay to activate. Excellent descent control with one person load. The extension on the handle is to add leverage for heavier loads. Even with the extension, it was difficult, and the panic brake was hard to make work on 11mm. Very easy to ascend or raise.

Heightec Prism

A very nice descender from Heightec. Worked very well on 11 mm. Easy to reverse, no slippage when resetting. Panic brake needed a fair amount of pressure to activate. Doesn't like the thicker ropes.

Heightec Powerlock

A very tough, well built unit. Very easy to control descent with side handle. Lots of leverage. Panic brake very easy to engage. Can ascend or raise, but a loop must be taken from above the top bollard and pulled past the panic brake pin. Not really designed for reversing direction. Prefers 11 mm rope.

Heightec Quadra

The Quadra is another solid device. A very interesting design. Well suited to reversing, very easy to changeover. It has a unique pivoting release lever, which works best with single person loads. It worked well with the SwivaBiner, which allowed me to swivel the device and find the most comfortable position to work the pivoting handle. It does have a panic brake, but it is difficult to hold in position.

Petzl I'd

Another very well designed piece of equipment from Petzl. One which they seem to keep improving. Easy to rig, simple to reverse. Requires and second carabiner for friction if the load exceeds 150 kg. It has a unique safety which prevents rope movement if you rig it backwards. Very nice control with the handle, and an excellent panic brake which holds on its' own, and must be reset to proceed. Will handle NFPA 273 kg loads. Excellent belay function. Latest version has a button on the end of the handle which allows adjustments under very light loads.

SRTE No Worries

Heavy duty descender/ascender/ belay device. A beautiful piece of engineering. It handles the heaviest loads, and reversing is simple. The panic brake works very well and descent can continue by simply pushing the lever the other way. Or it can be reset, and descent continued. It belays very nicely with 11 mm rope. Another device where the SwivaBiner helps.

ISC Pro Allp

A solid beautifully crafted tool. I had a little difficulty making it work properly initially. It is not an intuitive design. Once you understand the procedure, it works very smoothly. Capable of using a wide variety of ropes and loads.

Anthron Lori

Anthron sent this with the larger descender. It is a very solid small descender/ascender/ belay device. Not meant for heavy loads, but did manage it at least once during the testing. I like the simplicity of the design. It has an excellent panic brake that holds until reset. Two models, one for fall arrest, the other for everything else. A very useful piece of gear that works very well.

Conclusions:

Many of these devices were designed to work with single person loads, but handle a two person load if necessary. With many of the devices the characteristics of the device do change under the heavier loads, and with the different ropes used. Some of the testing data was acquired while exceeding the devices designed loads, however, users should always adhere to the recommendations of the manufacturer.

All of the devices tested were more than adequate for their intended purpose. I did identify at least two devices that will meet the criteria that I set at the beginning. Are they the “Holy Grail”? Perhaps for now. I’d like to see a more efficient device in the future.

As with all testing, you start off with a goal in mind and end up with many more questions, which will have to be answered later. I could not have accomplished the testing without the help of a number of individuals. So I’d like to thank, Roland Curll, Polly Hadley, Cody, Ryan, Kurt and Chris for their time, the R.F.D. Technical Rescue crew from 3 Platoon for their time, and their dynamometer. And a very large thank you, to all the manufacturers that generously donated the equipment for testing.