

## **A STUDY OF TWO WAY STOP RAPPELLING DEVICES**

**The Arizona Department of Public Safety Air Rescue section has recently begun conducting tests of the available two way stop rappelling devices. Tested were Petzl's STOP (not a two way stop), Petzl's I.D., SRT's "NO WORRIES" and DMM's DOUBLESTOP".**

**DPS's technical rescue program has utilized the traditional rescue 8 device in their program since its inception. At the encouragement of Sedona Fire Department we began to look at other "safer" options. Soon after we began our testing, we quickly determined that as a group, their increased safety features could not be ignored. Our challenge has been to find a reliable, (Garrison proof) device that could be easily learned. Additional challenges to be worked through during evaluation were the dislike of ground troops to a heavier, more expensive and unfamiliar piece of equipment, as well as determining if the device will be personal equipment or become a cache item that will be carried by the helicopter.**

**At the conclusion of this study, DPS is expected to begin training on one of the devices with program incorporation to follow shortly.**

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## A STUDY OF "TWO WAY STOP" RAPPELLING DEVICES

The Arizona Department of Public Safety's, Air Rescue section, first began serving the State's needs of rural EMS provision in 1969. This was a joint venture between the Federal DOT and the University of Arizona. The state legislature assigned the program to the Highway Patrol, which later became the DPS. In the original mandate, besides the primary EMS function we were to secondarily provide service to SAR and tertiary to the Law Enforcement community. Since that time we have grown to four bases throughout the state and continue to service in this multi-faceted, priority based mission profile.

During this time, one of the ways we have grown and expanded our service, has been in the area of Heli-Technical Rescue. Our Technical Rescue program is made up of two parts: Heli-Rappel, and Short-Haul. The Short-Haul program is really a long line operation that simply accents the fact that we will fly the victim and rescuer the shortest possible distance while they are on the end of the line.

DPS began working with various aspects of a technical rescue program as far back as 1985. This usually was in the form of one individual or sometimes a whole unit working with some local agency to try and improve our service to that region. As DPS has never had it's own expertise in ground based rescue we were totally dependent, and appreciative, of that community. With that background we found ourselves using climbing ropes, learning to tie knots, and attempting to construct systems that were otherwise foreign to us. What we found was since everyone had a favorite "safest" way to do this, we found it difficult to find a statewide method that would satisfy everyone.

These sporadic attempts continued on and off until the early 90's, when we really began to take note of the Parks Canada and our own USNPS programs, in particular our neighbors at Grand Canyon National Park.. In late 1991 we undertook the project as a whole aviation section and began to develop a uniformed, manueled program that we could carry throughout the state. We very soon discovered specialized equipment designed for our nature of work that solved a magnitude of problems for us. March of 1993 found us testing the Heli-Dyne equipment that we still use in our Short-Haul program, and installing Aeronautical Accessories STC'ed rappel hard points on our aircraft.

DPS's technical rescue program has utilized the traditional rescue 8 rappel device in our program since it's inception. However, at the challenge of Sedona Fire, we recently began to look at other rappel devices that might offer safer options. Sedona first presented us with a SRTE "D1DBa", the SRTE "No Worries" and the Petzl "Industrial Descender" (ID). Later the DMM "Double Stop" was also evaluated.

Soon after we began our testing, we quickly determined that as a group, the two way stops gave increased safety features that could not be ignored. Having both a "deadman" function, and a "panic" function, are extremely beneficial. While documented cases of actual rescue rappel accidents were hard to come by, I know as a trainer, spotter and observer I was very interested in finding the safest method to providing our services.

Once we acknowledged their increased safety, our challenge has been to find a reliable device that would fit into our program. Additional challenges to be worked through during evaluation were the dislike of ground troops to a heavier, more expensive

and unfamiliar piece of equipment. Also deciding if this type of rappel device would continue to be considered personal equipment or could it become a cache item that would be carried by the helicopter.

Early on in the evaluation, it appeared that the SRTE - D1DBa did not come close to meeting our expectations. We initially never even got off the 3' ladder in our testing, and quickly discarded this device for multiple reasons.

Fortunately or unfortunately, I also learned quite a bit about testing of equipment during this time, and later on in the whole evaluation process, I went back over this device and solved some of the original problems. However in retesting the device we still discovered it not to be real user friendly. Constant attention must be paid to the rope adjustment nut. This nut had to be very fine tuned for the rope size and I found that it would continue to loosen during even with easy use. Testing with this device were never moved to a tower or under the aircraft. In the time I spent with it, it never became interesting enough to continue to pursue.

The Petzl ID is a great looking device that has some really nice features. The first device that we acquired, was a prototype that Petzl France had sent to Reed Thorne who shared it with us. Lightweight and easy to load, the device will handle both 7/16 and 1/2" ropes. The deadman and the panic stops worked flawlessly. Once in the deadman function, you can completely let go of the device and line. Starting from the deadman (beginning position) is fairly fast and must be carefully modulated. Once on rappel, the speed is easy to control. The panic stop also works immediately and is easy to engage. Again, you can let go in this position and you will stay in place on the rope. To start from the panic stop, the handle ratchets back up to the deadman position so you begin all rappels from the same position each time. The deadman function takes the place of the lock-off with a Rescue 8 and the finishing tie-off with this device is very simple. The landing with this device is not as vertical as with the rescue 8. You have a tendency to land leaning way back and you will usually not land on you feet using the DPS rappel guidelines. This device, like all of them, is designed to be used with the brake hand in place at all times.

The durability of the device quickly became a concern. Even under our very light evaluations up to this point, considerable wear was noted along the rope path, and in fact one rope had to be placed out of service due to composite transfer.

Later in the evaluations, a plastic piece in the internal ratchet broke. Interestingly, the device appeared to still operate in both stop functions after this incident, even though the handle would now rotate 360 degrees. The device was sent back to France where we learned that they too had broken the same piece on their prototype. This piece was re-engineered and is now steel in the production model that is on the market. Re-evaluation of the production model was later conducted. The device's functions still operated perfectly, but the evaluation was stopped after 700' (from the helicopter) due to excessive wear along the rope path.

The No Worries device when you first look at it, appears to be a bulky, awkward looking device, and is the heaviest of the devices. However the more one uses it, the more the ruggedness and dependability comes out. Both the deadman and panic functions worked perfectly. Either of these functions will stop you immediately with no slippage along the rope. No rope damage was ever observed either. The device is very smooth to operate. This increased control seems to be related to the fact that the device is operated with small muscle groups.

Coming out of the panic stop into a smooth rappel is a little difficult to do smoothly, but if you come out of the panic, straight into the deadman, and then begin, it works very nicely. This device again is expected to be used with the brake hand in place, and again landed you leaning very far back using the DPS guidelines.

One needs to be careful when disconnecting too. While the device is designed to stay on your host carabiner, sometimes it is easier to disconnect from your harness prior to derigging the device from the rope. Remember your anchor in heli-rappel is moving! A sudden updraft while carelessly derigging, could cost you some fingers. We were able to develop a relative simple technique that keeps your fingers free if the slack goes out of your line suddenly.

One word of caution, this device is difficult to learn off an edge; either a tower wall or a cliff. Slack control is difficult when you were standing and have the device under just a small amount of tension. Once you are in a free rappel this device is very comfortable. While awkward in the beginning, just a little practice, brings a real comfortable feeling, and provides all the safety features we wanted.

While waiting for the new ID, I came across information on the DMM "Double Stop". Since this is the carabiner company that we use, I contacted them and they graciously sent me one of their devices through Steve Petro of Excalibur Distribution.

This device was the smallest and lightest one evaluated. The device functioned well off the ladders in the hanger. Rigging of the rope at first looked awkward but was very easy to learn.

Right out of the box, one disadvantage for DPS, is that the device is for 7/16 rope only. We decided to evaluate the device anyway due to some of the other advantages that it appeared to have, and hoping that they might come out with a 1/2" sometime..

The deadman function worked immediately and held the line well with no apparent rope damage. According to the literature, the panic stop is functioned by increasing pressure on the handle, and the descent will stop when the pressure is high enough. At the speed and height of the hanger practice, the panic stop did display a minimal amount of slippage before it stopped. No rope damage or device deterioration was noted in 1800' of rappelling.

Unfortunately, "While further evaluating the DMM DSD-25 "Double Stop", the Arizona Department of Public Safety (Air Rescue section) had an incident in which we sustained an injury. Our evaluation was immediately terminated." The incident is currently under investigation.

At this time the recommendation of the Technical Rescue Instructors committee is that the Air Rescue section purchase the SRT "No Worries" and immediately begin DPS familiarization and training, with full introduction to the team in the very near future.

The on rope safety advantages of such a device over a Rescue 8 are without question. We also found that exiting the Aircraft with these devices is easier and safer. We are quickly moving into a fleet of Bell 407's and due to their skid configuration, being able to have both hands free to exit the AC will be a great advantage. The No Worries proved to be easy to use in the helicopter environment and is proving to be Garrison proof. It also increases our safety margin in the emergency procedures. Either the deadman mode or panic mode is equal to a lock-off, without having to manipulate the rope. The tie off, if needed, remains the same as with a Rescue 8.

Some of the issues that came up during the evaluation, are shaping up as follows. Several very tradition ground based rescue personnel took part in different phases of the evaluation of the device. So far to a person, they have seen the advantages and after just a little orientation, felt that the device is easy enough to learn and offers the increased safety advantages that they are willing to incorporate it into the system.

Again to a person, everyone has expressed the feeling that this device is a specialized piece of rescue equipment and certainly qualifies as a cache item. The added weight and expense will be borne by the helicopter that will carry it to the scene. It would be maintained by the Air crews just like the other ropes, lines and other hardware that are used in our program.

<u>Action</u>	<u>I.D.</u>	<u>No Worries</u>	<u>Double Stop</u>	<u>R8</u>
Loading (Rigging rope)	7	4		5
Control (Ease of op's, modulation of speed)	5	8		5
Deadman stop (Letting go of device, "whistle test")	10	10		0
Panic stop (Tightening down)	10	9		5
Unloading (De-rigging rope)	8	4		5
Slack control	8	4		5
Movement in AC	10	10		5
Exiting AC (Moving onto skid)	10	10		5
Beginning rappel (Moving through skid)	4	8		5
Landing (Into vertical position)	2	4		5
Durability	0	5		5
Weight		2902	10g	
Cost	120	235		45
FAA approval	No	Yes		OAS

Ptezl ID

Loading	stays on caribiner, caribiner hook hard to do with gloves, easy to thread rope, very confident with rigging when done	7
Control	starts fast, less very slow control (>skid), longer control area, large muscle controlled	5
Deadman	instantaneous, no rope damage	10
Panic	instantaneous, no rope damage, handle ratchets back to deadman to start (Very nice)	10

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Unloading	rope disengages very easily, device hook hard with gloves	8
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Slack Control	easy to take up slack, difficult to let out if not under tension (never needed)	8
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Movement	free hand movement possible, no spotter needed thought of handle catching, but never did	10
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Exiting AC	both hands free	10
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Begin rappel	starts fast, hard to make smooth slow start weight dependent (?)	4
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Landing	difficult to land verticle, must pull yourself into rope with brake hand, NOT RECOMMENDED	2
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Durability	DC'ed at 700' from AC, excessive wear Reed's also wearing	0
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Weight

Cost            Approx 120

FAA approval No

Did damage rope  
nice control feeling  
feels lightweight (ruggedness ?)  
wish more durable

SRTE "No Worries"

Loading	Only slightly harder than R8	4
Control	more controlability, fine muscle control due to grip designed for two hand control, 1 handed OK, NRBM!!	8
Deadman	Instantaneous, no rope damage, release is always the same	10
Panic	Instantaneous, no rope damage, release is difficult to be smooth, easy to slam into deadman	9
Unloading	designed to stay on carabiner, harder to get off with gloves can catch fingers, RX simple pinch technique	4
Slack	slightly harder RX turn device 90^	4
Movement	no hands required, no lock off, no spotter	10
Exiting AC	excellant, no hands required	10
Begin rappel	Smoothest beginning of all devices	8
Landing	Hard to land vertical, no fear to pull self into rope with brake NRBM !!!!!	4
Durability	very rugged, (compared to R8)	5
Weight		
Cost	\$235	

FAA approval Yes

Difficult to teach off edge.