

TECHNICAL

RESCUE

USAR/EXTRICATION • CON-SPACE • ROPE & WATER RESCUE • EMS • TACTICAL



ISSUE **84**
www.rescuemagazines.com



PETZL RESCUE SOLUTIONS

Whether day or night, on a rock face, or at the bottom of a cave, rescuers don't stop.

When facing these critical situations rescue workers know that powerful and robust lighting and high performance gear are an absolute necessity. Petzl brings its expertise with products that are completely adapted to the demands of your work.

A technical rescue solution including the new XENA® headlamp, FALCON harness, MAESTRO® Descender with integrated progress capture pulley and STRATO® VENT helmet. petzl.com



Access
the
inaccessible®

CONTENTS



COMMENT: This issue has part 2 of our 'Drones for USAR' article begun in issue 83. The inset pic above is a Mavic3 with blue/red lights and search lights - see ProdNews, and this is another drone's eye view of the tragic 2023 Turkish Earthquake but if there were even worse damage to the surrounding buildings, this scene of civilian destruction could just as easily have been a war-crime resulting from Russian bombing in Ukraine or Israeli bombing in Gaza since neither has been able to distinguish civilian from military targets. It has to be said that, despite the intervening 22 years of technological advancement, targeting skills must be rubbish these days because when we were in Gaza in 2002 during the 2nd Intifada, we were so confident of Israeli precision that we would stage a hundred yards from expected military targets safe in the knowledge that the Israelis would hit *only* that target and not our ambulance or hospital. *pic courtesy of London Fire Brigade*

CONTENTS

2 **ON-THE-COVER**
Harken Origin Rigging Plate

4 **PRODUCTS**
PPE-Helmets • USAR • Trauma
Rope Rescue • Water Rescue

18 **DRONES**
Drones in Urban Search & Rescue pt2
By Darryl Ashford-Smith & Lee Newman

22 **GEAR REVIEW**
Usafe Surface Water Drone
By Dr Steve Glassey & Geoff Bray

26 **EXTRICATION**
Hierarchy of Extrication
by Rich Denham & Nick Appleton

30 **GEAR REVIEW**
AWAH Z2-R Multi-Role 'Pulley'

36 **MARKET GUIDE**
Battery Rams

54 **ROPE RESCUE**
A Pirate's Guide to
Anchor Systems pt2
by Reed Thorne

66 **GEAR REVIEW**
AquaEye Underwater Sonar
By Dr Steve Glassey & Geoff Bray

ARTICLES not shown as authored are by Ade Scott and the Technical Rescue editorial team



ISSN: 1351-136X

EDITOR: Ade Scott
admin@rescuemagazines.com

RESEARCHERS:
Adam Jones
adam@rescuemagazines.com
Gary Cross
Brian Robinson

CONTRIBUTING EDITORS:
Rope Rescue: Reed Thorne (USA)
Extrication: Rich Denham (UK)
SAR/Tactical: Roland Curll (Australia)

CONSULTANTS/CONTRIBUTORS:
USAR/Extrication-UK: Nick Appleton
Rope/USAR-Canada: Greg Churchman
SWR-USA: Dr Mike Croslin, Mitch Sasser
Coastguard-UK: Rich Hackwell
Trauma/Tactical-UK: James Hutchens
USAR/Rope-UK: Adam Jones
Trauma/Heli-Oz: Cameron Edgar
Dive/Police-USA: Mark Phillips
Con-Space-UK: Brian Robinson
Boat Ops-UK: Chris Walker
SAR/Heli-RSA: Rob Thomas

EMAIL: admin@rescuemagazines.com
[Note the 's' in 'magazines' for the above]

#84CONTRIBUTORS/& ASSISTANCE:
Nick Appleton • Darryl Ashford-Smith
Geoff Bray • Rich Denham
• Lee Newman • Reed Thorne

PHOTOGRAPHY this issue:
Nick Appleton • Darryl Ashford-Smith
Geoff Bray • Steve Glassey
Lee Newman/LFB
Ade Scott • Reed Thorne

SUBSCRIPTIONS
3 PRINT issues including postage
UK/Ireland/USA/Canada \$20
Worldwide \$25 + \$5 postage
6 PRINT issues including postage
UK/Ireland/USA/Canada \$40
Worldwide \$40 + \$10 postage
DIGITAL/pdf versions are normally \$6 for 3
issues and \$10 for 6 issues but currently being
provided FREE until further notice

ADVERTISING: Kelly Matthews
rescuemagazine@aol.com

WEBSITE: www.rescuemagazines.com

FRONT COVER

Two for the price of one on this cover - the actual subject is the Harken Origin TT rigging plate with bi-lateral loading of components. It was originally intended to be blue but is now out in the Autumn/Fall in black. Also in evidence is the CMC/Harken Clutch in the now familiar twin-ropes mode. See p2&3



ON THE COVER

HARKEN ORIGIN TT Rigging Plate



The *OriginTT* rigging plate has been in our **BUYERS GUIDES** as 'pending' for quite some time along with two more regular 5 and 8-hole 'paw' style *Origin* plates. The *OriginTT* is now coming out later this year in black rather than blue and co-branded by Harken the owner of *SMC* and *Cascade Rescue*.

What the *OriginTT* has in common with its two brethren is pentagonal holes rather than the usual round or oval. How it differs is in having two anchor eyes that can open independently of each other to allow connection of twin descenders or other devices. This differs from *Rock Exotica's Bolt* where up to four devices can be fitted but they all need to be fixed at the same time through a common bolt. *OriginTT* allows you to add or release each device separately from the other. In the front cover example and the main image here you can see *CMC/Harken Clutch* devices used in tandem, a now common twin-rope mode for rescue used in place of the traditional main and belay though the difference can simply be in whether or not one or both ropes are actually taking load throughout the operation.



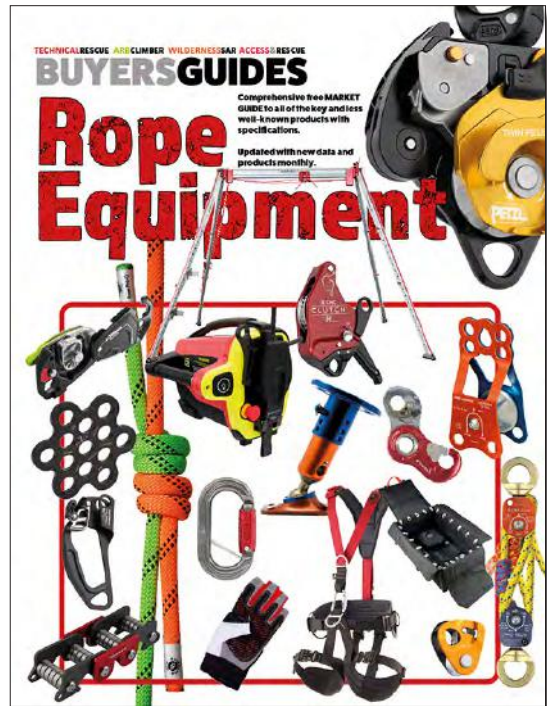
AVAILABLE: Late Summer 2024
MBS: 45kN / 10116lbf
WLL: 11kN / 2472lbf
STANDARDS: NFPA -G
 CE
 UKCA
WEBSITE: www.harken.com/safetyandrescue



COVER SHOT
 One operator can tend both of two ropes in modern twin rope systems where each rope takes load and is capable of taking the full load independently should one rope fail. Unlike a traditional belay, with twin-loaded ropes there is no risk of shock loading as there can be if there is slack in the belay when the main rope fails. *OriginTT* is designed specifically to cater for twin rope systems.

BUYERSGUIDES

The most comprehensive GUIDES to safety and access equipment ever produced and they're FREE



FREE-to-ALL BUYERSGUIDES to make better use of all the MARKET GUIDE articles we have in all of our magazines. Digital, page-turning publications that can be downloaded as a PDF but are **continually updated on the same link** so that readers can get the latest version whenever you want to take a look for something. These are sent to all readers and available from our website.

CONTINUALLY UPDATING prices, specifications and new or discontinued products updated weekly.

NEW & UPDATED PRODUCTS incorporated into the tables and introductions as they are released.

PRICES monitored and updated monthly



and currency conversions listed in GBPE, US\$ & Euro€
DISCONTINUED MODELS have a note to that effect before being removed altogether
300-500+ PAGES in each GUIDE

Arborist Equipment Rope Equipment
USAR/Extrication Water Rescue
Black Equipment PPE/Casualty Packaging



OLD-SCHOOL COMEBACK

GOLDTAIL/WHALETAIL-style VARIABLE-FRICTION DEVICE



[ED: Despite being an overtly rescue-oriented device (or, in its original form - caving) we featured CMI's re-imagining of this classic design in ARBCLIMBER#23 (pic CMIGT1 left) because it has uses for heavy-load lowering but bringing out a new version has given us a chance to cover it again for its primary market. The latest version top-right has 4 instead of 5 friction adjustment eyes and incorporates 3-terminal eyes instead of the single large eye increasing your connection options without cramming the one eye. This makes a versatile rigging plate as well as virtually bombproof descender/lowering device - not much that can break or bend on this! So, proving once again that nothing much is new, it's all recycled from the last century, CMI's GT descender/lowering device

is virtually identical to the SRTe GoldTail made by Sydney's finest, Boris Rogleja which was itself a variation on the other Australian classic, the WhaleTail. These devices had/have a huge heatsink and have easy to adjust, variable friction (you simply unscrew one of the two gates and add or subtract a rope wrap even under load. These are quite large which is why the half-size mini GoldTails were also popular. Despite being called 'Goldtails', the original SRTe versions were also available in black. CMI's fine resurrection is called the CMIGT which is presumably a nod to the GoldTail original and their latest variant is the more versatile CMIGTgen2.

These user-instructions for the Gen2 from CMI are equally applicable to the GT1]

CMIGT gen2

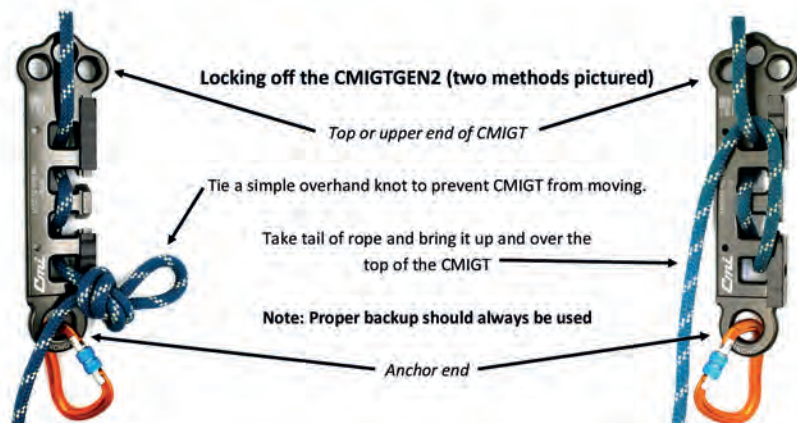
- The rope can be threaded in either direction into the device, which allows for more even wear.
- The CMIGTGEN2 has four holes which allows the user to increase or decrease friction. On long descents, 2-3 holes can be used. Once the weight of the rope decreases, friction can be added by threading rope in the extra hole.
- The CMIGTGEN2 should only be used with a locking carabiner. It should never be used with a non-locking carabiner or a non rated link.
- Do not allow the device to come into contact with sharp edges or surfaces that may cause damage to the device.
- The CMIGTGEN2 should not be used without a proper backup system for descending.

- When using this device as a descender, always maintain one hand on the rope below the device at all times.
- When locking the unit off and going completely hands free, this device requires a second backup system to ensure no movement can occur.
- When used for stunt rigging, once a person has been connected to the device, the rig operator must maintain constant contact with the line.
- When not in use, the CMIGTGEN2 should have a backup line/device connected to the person offering two safety points.
- When used in stunt rigging as a belay for fast descent, end marks should be placed into the system to ensure the person cannot go beyond the determined stop position. If unsure, please seek professional help or training on setting rigging end marks.
- Whenever possible, avoid shock loading the device
- Do not use this device to control descent or deceleration of vehicles of any kind.

SPECIFICATIONS

CMIGT	CMIGTgen2
Max Rope: 13mm / 1/2"	13mm / 1/2"
Weight: 726g / 1.6lb	703g / 1.55lb
MBS: 87kN / 19500lb	48kN / 10800lb
Width: 63.5mm / 2.5"	89mm / 3.5"
Height: 295mm / 11.625"	305mm / 12"
Depth: 22mm / 0.875"	22mm / 0.875"
Cost: \$212	\$275
Web: www.cmigearusa.com	

CAUTION: Always be sure slides are fully closed, ensuring that both slides fully cover the openings. Not doing so may cause serious injury or death!



XENA WARRIOR HEADLAMP

[ED: Bet we weren't the first with that headline! Petzl are probably the most innovative and active developer of headlamps and they've just done it again. Following on from the technically splendid Swift RL Pro, which has also just been updated, the Xena has the more universally available USB-C charging port and a huge on-off knob that doesn't tax the fat-fingered or gloved amongst us. Xena is brighter than Swift with a 1400 lumen 10sec BOOST or the occasional need for very long distance vision. Not too much in it cost-wise - maybe an extra tenner or so for the Xena...]



Battery is rechargeable via USB-C, and there is a battery charge indicator.



Powerful, lightweight, and headlamp featuring CONSTANT LIGHTING technology.

rechargeable, balanced

Designed for maintenance, industrial, inspection, and technical rescue professionals, the XENA headlamp offers an excellent weight-to-power ratio (185 grams / 1400 lumens). The battery pack is in the rear, making it balanced and comfortable to wear. Durable, it is fall and impact resistant. It is also waterproof and dustproof, making it

suitable for various work conditions. Three beam types and five lighting levels provide optimal visual comfort in a variety of situations. CONSTANT LIGHTING technology provides stable lighting intensity over time.

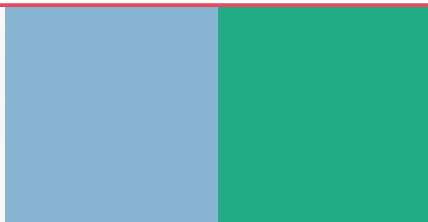
It features a rotating knob that is easy to use, even when wearing gloves. Wear the lamp on your head or mounted on a variety of helmet types using compatible accessories for a convenient solution. Rechargeable via USB-C, the battery is removable and replaceable.



The XENA headlamp comes with two SLOT ADAPT plates so it can be installed on a Petzl helmet.

- CONSTANT LIGHTING technology provides stable brightness over a given amount of time. Beam pattern: wide, mixed or focused up to 1400 lumens. Weight: 185g/6.5oz Certification(s): CE, UKCA.
- Suggested retail price:€115 (approx £105/\$130) plus tax

Website: www.petzl.com



FOR PROFESSIONALS WHO SAVE LIVES

TAKE YOUR TRAINING TO NEW HEIGHTS...

Specialist Working at Height manikins, perfect for **rope rescue training** to comply with GWO and IRATA regulations.

Available in **3 weight options** (30, 50 & 70kg) these manikins are constructed with additional rigidity in the trunk to sit in a harness.

Available world-wide through a network of distributors in more than 40 countries. Visit the stockist page on our website.

+44 (0) 1490 413 282 MAIL@RUTHLEE.CO.UK WWW.RUTHLEE.COM



KASK QUANTUM CABRIO

Multi-Role Rescue Helmet

ACRYLIC CHINSTRAP FR

Fire-resistant, low flammability, non-melting, and self-extinguishing.

CLICK-IN SYSTEM Attachment system that lets padding easily snap in and out.

ADAPTIVE FIT SYSTEM Size adjustment system that adapts for a personalized, secure fit.

ANTI-INTRUSION MESH Prevents debris from entering ventilation channels.

QUICK RELEASE FASTENER Enables quick, easy helmet removal with gloved hands.

SHELL: HD EPS INTERNAL SHELL + THERMOFORMED PS COVER Impact absorbing inner shell with cover for added durability.

DRY+ LINER Moisture-wicking fabric that enhances wearer comfort.

REFLECTIVE DECALS Designed for low visibility conditions.

EASY CLICK SYSTEM Integrated slots for eye and face protection.

VENTILATION Air intakes for enhanced breathability with sliding closure system.

[ED: The Quantum arrived last year as something of a change for Kask. Well known for their excellent safety and climbing helmets, this was their first foray into multi-role rescue helmets meeting standards that they had never before sought to meet - firefighting, technical rescue and mountaineering and before the end of 2024 we may even see water rescue added to the list.. As one of the lighter, broad-spectrum technical rescue helmets, the Quantum will be of particular interest to multi-role agencies with mixed terrain on their patch because it has the familiarity and relatively low bulk of a climbing helmet with the technical abilities of an urban fire-rescue multi-role. It already meets CE standards Technical Rescue EN 16473, wildland



Gain the advantage with CMC's new

CAPTO™



XX CMC™

cmcpro.com



uemagazines.com

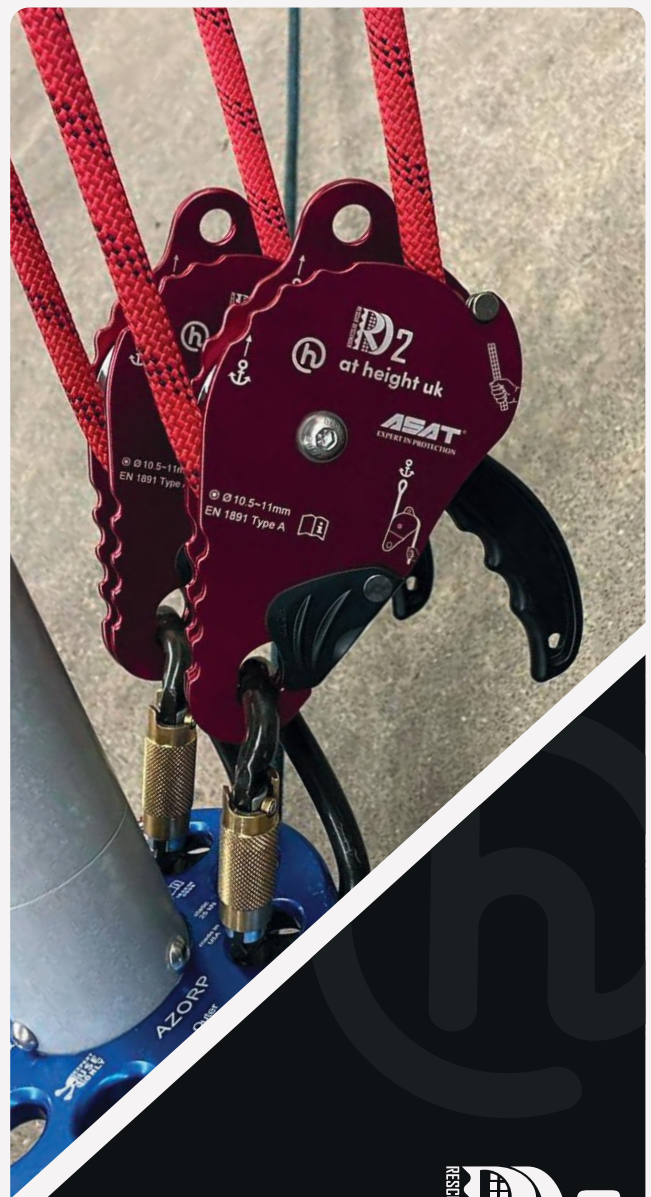
firefighting EN 16473 and 12492 as a mountaineering helmet but is also going for EN 1385, for

water rescue. Its actually the canoeing and whitewater standard rather than specifically water rescue but the extreme demands of whitewater sport are such that they should exceed anything undertaken in water rescue. It is the Quantum Cabrio version we are interested in (shown below in cyan blue) as it conforms fully to EN12492 for mountaineering helmets.

As usual there is a conflict between the requirements for industrial standards that don't want vent holes or a chin-strap that stays on should the climber become snagged whereas mountaineering helmets want plenty of venting and a chin strap that stays on after a top impact so that you still have a helmet in place to take the impact from the next falling rock - other than that and an extra 20g of weight for the Cabrio, the two Quantum variants are exactly the same! The Quantum can take virtually all of the Kask accessories including eyewear but the majority do NOT conform to fire standards - only Quantum's designated accessories and visors do so.]

COST: £220 \$275 €240
WEIGHT: 690g /1lb 8oz (670g/1lb 7oz)
PRODUCT CODE WHE00096 WHE00095
STANDARDS EN 16471 Helmets for wildland fire fighting
 EN 16473 Helmets for technical rescue
 EN 12492 Helmets for mountaineering
 EN 12492 except ventilation and chin strap
 EN1385 Whitewater/Canoeing (pending)
SIZE: Uni-adj from 52 to 63 cm
COLOURS: White♦Red♦Fluro Yellow♦ Fluro Yellow/Red,
 ♦White/Red♦Red/Fluro Yellow

www.kask-safety.com



Rescue Descender

Rope 11mm diameter max.
 Working load limit 140kg to 200kg
 High efficiency one-way bearing
 All metal construction



Distributed By
at height uk
www.theheightuk.com

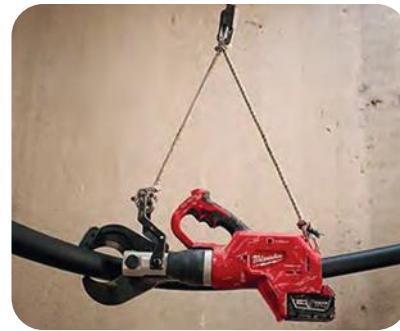
REMOTE CABLE-CUTTING

KEEP A SAFE DISTANCE WHEN CUTTING IN HAZARDOUS ENVIRONMENTS

ED: This interesting model, the 2776R-21, has cropped up from our forthcoming 'SPECIAL BATTERY TOOLS' guide and is part of Milwaukee's Force Logic range. It is intended as a cable cutter for utility workers so we're certainly not talking steel rebars but there are many rescue applications for which a 77kN cutting force will be more than adequate and indeed is stronger than some of the existing smaller rescue cutters. The downside is the blade hardness being designed more for power-workers cutting copper wire than steel rebar but we're thinking more of exotic materials so you'll need to experiment. The forward handle doubles as a stand for ease of blade placement and helps support the head-weight. The really interesting thing about these tools apart from their diminutive size is the remote activation capability. The 'R' part of 'Force Logic R' refers to Bluetooth connectivity enabling the tool to be placed and then activated remotely from at least 10m/30ft. Expect to see this appearing in rescue tools but for the time being, Milwaukee are more than tough enough for rescue having been used in rescue for decades (recip-saw) and adopted by many battery rescue tools manufacturers.

FORCE LOGIC™ hydraulic remote underground cable cutter cuts cables up to 75mm diameter cable in less than 10 seconds with 77.8 kN of force.

- **REMOTE CUTTING:** Wireless remote communicates with the tool via a mutually exclusive Bluetooth® connection, removing any physical connection to the tool and allowing you to make remote cuts wirelessly. The wireless remote communicates with the tool via a mutually exclusive connection, eliminating the potential for other smart devices to connect to the tool. After set-up, you can arm the remote cutter and move away from the cutting area. A green LED on the wireless remote gives positive indication that the tool is done cutting
- Balanced design, handle and hang hook enable easiest set-up in vaults
- Cuts aluminium & copper cables up to 75 mm
- Green LED light on wireless remote gives positive indication that the tool is done cutting
- Converts from Local to Remote cutting mode Open jaw design provides easiest access in trenches [ED: in its intended cable-cutting capacity]
- ONE-KEY™ tool tracking & security offers a free of charge cloud-based tracking network and inventory management platform for your tools. ONE-KEY™ also features a remote locking functionality. The reporting function delivers a complete tool activity and accuracy protocol
- Brushless motor, RED LITHIUM™ battery pack and REDLINK™ electronic deliver power, run time and durability.



Above: the tool can be lowered into position where the parrot-beak jaws can be easily swung into the target to capture the material and then remotely activated to complete the cut. Spare cutter blades are readily available.



SPECIFICATIONS

Kit* Cost:	Approx \$3800/£3600/€4000
Voltage:	18V
Battery Type:	18 Volt Lithium Ion
Battery	5Ah M18™ REDLITHIUM™
Length	528mm / 20.8"
Width	124.5mm / 4.9"
Weight	7.1kg / 15.7 lbs
Cutting Force:	77.8kN / 8.7 US tons
Battery Warranty:	2 Year
Tool Warranty:	5 Years
Website:	www.milwaukeetool.com

* Kit= battery, charger, remote, inverter, bag and carabiner

TECHNICAL RESCUE Training & Equipment



> Rope Rescue

- Responder
- Technician
- Advanced

> Professional Development

- Artificial High Directionals
- Workshops

> PPE Competent Person

> Prehospital Care

specialist-training.com

@specialisttraining

training@specialist-training.com

LEADER® MultiSearch

5 IN 1 MULTIFUNCTIONAL USAR SYSTEM

A SINGLE TOOL FOR ALL YOUR SEARCH AND RESCUE OPERATIONS!

- **Versatile:** Connect up to 5 interchangeable peripherals on a single control box!
- **Configurable:** Compose your kit according to your needs!
- **Scalable:** Complete your kit at any time by adding new peripherals!



WWW.LEADER-GROUP.COMPANY

LEADER®
 Fighting for performance

PELI-CASE MOLLE LID ORGANISERS

[ED: We have been users and fans of lid organisers for waterproof cases since their first introduction. The lid is such a large area and presents so well when the case is opened that it cried out for better use. However there have been three problems in the past, 1) you have to put gear where the pockets or pouches are and this does not always line up well with what is in the body of the case - I remember having problems with pressure gauges on airline mounted too near the top touching hard multi-gas monitors housed in the lid - you can't afford to have hard stuff in the lid coming into direct contact with sensitive or breakable stuff in the top of the case. 2) well-made lid organisers tend to have quite bulky fixed pocket/



pouch options that you may not even need and you often end up stuffing gear in there for the sake of it. And 3) without good labelling it's not obvious what is in the lid pockets as most are opaque leather or nylon. We tend to put a lot of small bits and small accessories in the lid so that they are light and easily to hand but even those can get lost in a plethora of pockets. So the Molle style system, where a grid enables you to attach whatever you like, wherever you like, is an obvious step forward. Not new obviously - some cases already have regular military Molle frames but this is Peli-s bespoke systems for the 1510, 1535 and 1560 cases and they can be easily toggled in and out if you want to switch a regular pocket organiser back in. Not cheap at between £57 and 81/\$ € but quality rarely is! Peli has this to say...

Our exclusive Peli™ EZ-Click™ MOLLE Panel is a lid organizer system on steroids- it's a durable panel that uses twist-cam locks to detach from your Peli™ case for a swift changeout. Now you can attach an unlimited combination of user-supplied MOLLE pouches and Velcro™ straps to the inside of your case lid. With additional panels you can even pre-configure your gear for each job or adventure. MOLLE Panel is compatible with 1510, 1535/Air & 1560 cases produced after 1/19/2018. www.pelican.com

Mavic 3 RESCUE LIGHTING

[ED: CZi is a specialist Chinese company making bespoke retrofit accessories for drones - this product is for the Mavic 3 but they also make gimbal search lights for the M30, M300 etc.]



CZi GL10 Gimbal Searchlight, with a lightweight design and the rated power 30W, can emit a sharp beam of 12.5°, effective search distance up to 100 meters, uniform brightness, high color consistency, effectively meets the requirements for small drones to undertake night inspection, location indication, search and rescue and other applications.

- Equipped with a new generation of dual-axis gimbal stabilization technology, GL10 can realize precise rotation and pitching movement, and further enhance the stabilization and anti-shake power; through the integration of AI algorithm smart technology, it can realize automatic centering of the light spot, and make the light beam changes with the angle;
- Integrated, alternating red and blue flashing light scan effectively identify emergency response or law enforcement identities and deter interference.
- Compatible with Mavic 3 Enterprise and Mavic 3 Thermal drones.



Weight:	≤150g		
Size:	L 121mm x W 130mm x H 64mm		
Total power:	≤28w		
LED power:	≤20w		
Supply voltage:	15v		
Luminous flux:	1800±3%lm		
FOV:	12.5°		
Illumination distance	150m	100m	50m
Spot diameter	34m	22.8m	11.4m
Illuminated area	917m²	407m²	102m²
Central Illumination	1.6 Lux	5.8 Lux	22.8 Lux
Range of rotation of gimbal	Pitch ±90° (theoretically)		
Design range of gimbal	Pitch ±90° (theoretically)		
	Horizon ±125° (theoretically)		
	Roll ±125° (theoretically)		
Temperature	-20°C~+50°C		
Cost:	Approx £/\$/€1400		
Website:	http://en.gzczzn.com		



MOVE QUICKLY. PLAN CAREFULLY. RIG UNIDEXTEROUSLY.

You have worked hard to get here...to a situation where you have one hand available to begin getting someone out. So get started. Pivot then press Apex's thumb lock. In the same motion and without looking, swing the side-plate open. Swing back and, "click" it relocks – anywhere in your rigged system. It's a solution so well devised just one question remains: What can you take on with the other hand?



WATCH THE APEX
IN ACTION NOW.

For ropes 11-13mm

APEX Swivel: NFPA CE UKCA

APEX Direct: CE UKCA

Made In USA



smcgear.com



KONG updated RAIZER WINCH

[ED: Kong's RAIZER winch system has a new adapter that allows it to be attached to regular scaffold poles so, together with its current 48-50mm/2" attachment capability it will fit pretty much any tripod or access frame on the market. Here's a catch up on the rest of the system...]

The RAIZER winch system consists of a winch*, an aluminum plate with multiple attachment points and a stainless steel mobile jaw which allows the system to be mounted on the most common tubular structures with a diameter from 48 to 50 mm (scaffolding and tubes/pipes), on the 4D Pole, as well as on the entire series of Kong tripods.

Thanks to the optional Raizer Adapter (pic above-right) , it can also be mounted on 60mm tubes/pipes including scaffolding.

The Raizer has been designed to facilitate load handling (inert or human, but not for mixed use) during work at height, rope access operations and technical rescue. It can be operated either with a double handle or a single handle, and in cases evaluated according to current regulations and using the appropriate adapter, also with motors.

The design of the winch allows the mounted system to be used against a wall or on a tree trunk, as the handle socket for the second handle can be removed,

thus rendering the back piece perfectly flat. Quick attachment without the need for tools thanks to the supplied handle nuts. The set must only be used by operators trained in its specific use since, although it is relatively simple to use, the complexity of the evaluations to be carried out require a high qualification.

Raizer works with textile ropes (static, semi-static and dynamic) with a diameter from 6 to 12 mm.

The plate is certified in accordance with RfU CNB/P/11.114 and tested in accordance with the standards:
EN 795:2012/A
CEN/TS16415
EN1496/B up to a maximum of 240 kg (150 kg when mounted on Tripode Base).

Raizer is supplied in a practical and compact bag (pics top) that can accommodate the kit and any accessories.

Equipped with NFC chip to facilitate traceability and periodic checks.

High quality product completely Made in Italy

www.kong.it

*The part defined as "winch" significantly reduces the force required to lift the load; the direction of rotation is clockwise with double speed, 12.8:1 for low load/high speed use and 40:1 for high load/low speed use.

Obelisk

for Technical Rescue teams



Designed and manufactured by Lyon Equipment specifically for emergency service work. Adjustable width cross-head with max height of 2200mm for a large, clear working area below the anchor points.

LYON
WORK & RESCUE

PRODUCTS- WATER RESCUE

ED: Powered rescue boards is a growing field of equipment as our updated guide to water rescue boards in our **Water Rescue Buyers Guide** can testify. This i16 model from South Korea takes an inflatable board rather than the solid foam on their two other powered boards and adds a removable marine water jet and rechargeable Lithium-ion battery powerpack making maintenance far easier than usual. It uses a joystick style controller on a dead-man cut-out leash for direction and speed with nine peripheral handles for victim pick-ups. Jetwake is a bespoke powered board producer so we can assume that they are well versed in this kind of technology. Here are the details from Jetwake



JETWAKE i16 Rescue Board

- With its own electric power, it is possible to concentrate on the person in need of rescue by saving the strength of rescuers when performing rescue operations.
- One rescuer can rescue multiple people using the fixed straps and handles.
- As the propellant is a module type, repair is easy and maintenance is excellent.
- Continuous use possible with detachable battery pack.
- Automatic stop system in the event that the user falls or leaves.
- The wired

controller does not require separate charging and the product is highly reliable.

- It is easy to operate by using a special fabric called high-quality space paper.
- UV protection and excessive heat, cold or moisture, chemical irritation, High durability against sunlight as well as external stimulation

SPECIFICATIONS

DIMENSIONS: 230 X 75 X 18.5cm
MAX SPEED: 30kmh
ENDURANCE: 45 minutes
WEIGHT: 19kg
MAX LOAD: 100kg / 220.4lb
POWER: 8,000W
MATERIAL: Inflatable PE,
ELECTRIC MOTOR
NATURAL COOLING / Underwater Waterproof Motor
VOLTAGE: Under 60v
PROPULSION: Jet Pump Direct Drive
BATTERY PACK
DIMENSIONS: 49.6 x 38.2 x 10cm
 19.5 x 15 x 3.9"

WEIGHT: 18kg / 39.6lb
CHARGE: About 2.5 hours
VOLTAGE: Under 60v
CAPACITY: 2,800Wh
CHARGE CYCLES: 500 ~ 1,000
WATERPROOF: IP X7

ANCILLARY

LED panel (power, charge/discharge, warning, error)
 Air circulation system (vent hole)
 BMS mounting
 Foot strap included
 Folds rather than rolls for transport unless the powersystem is removed.
WEBSITE: <https://jetwake.co.kr>

PUBLIC SAFETY INSTITUTE GLOBAL

ECHO RISK ASSESSMENT

New IOS App for swiftwater incidents by Dr Steve Glassey

Simple and quick to use
 Free version available
 Multi-hazard risk assessment
 Share risk assessment with notes, photos, videos, date/time, and location.*

Download on the App Store

* Not available on free version. Search for PSI on the App Store.

WWW.PUBLICSAFETY.INSTITUTE



PUBLIC SAFETY INSTITUTE GLOBAL

ONLINE LEARNING

Courses by Dr Steve Glassey include: River safety • Flood worker safety
 Swiftwater responder • ECHO risk assessment • TIPS incident planning system
 Dog bite prevention • Animal emergency management
 SRTV® and SWBA® coming soon



BUYERSGUIDES are **FREE-TO-ALL** as hyperlinked, digital, page-turning publications that are continually updated on the same link so that readers can get the latest version whenever they want to take a look for something. Our **WATER RESCUE BUYERSGUIDE** is compiling now and will be out in Summer 2024 although some of these categories are so detailed and complex that some will still be compiling when we launch it.

COMPILING NOW

OUT in SUMMER 2024

PREVIEW VERSION AVAILABLE NOW [CLICK](#) or [GET IT FROM.....](#)

www.rescuemagazines.com

- Water Rescue Helmets
- Water & Ice Rescue Drysuits
- Rescue PFDS
- Dog PFDS
- Water Rescue Drones & ROVs
- Water-Capable Aerial Drones
- Inflatable Platforms/Paths
- Inflatable Rescue Boats
- Inflatable Sleds
- Inflatable Rafts
- Inflatable & Solid Boards
- Inflatable & Solid Stretchers/Collars
- Lightweight PM Pulleys & Tandem Pulleys
- Mini Hauling Systems
- Water Rescue Rope
- Throwlines & Throwbags
- Water Rescue Knives
- Submersible lighting
- Water Rescue Manikins



This will be the link:
<https://accessandrescue.hflip.co/GuidetoWaterRescueEquipment>



Supporting professionals who care





RESCUE STRETCHERS

For the full collection, visit our website.

📞 01329 311 451
🌐 dsmedical.co.uk
✉️ info@dsmedical.co.uk





The last of our six BUYERS GUIDES will be mostly casualty packaging like stretchers, splints and collars plus medical/trauma packs together with personal protective equipment like goggles and boots. Helmets may well go into their respective BUYERS GUIDES instead of this one depending on how much space we have left after lighting/head torches, multitools/knives and training manikins have gone in. This is expected in late 2024 and will be on this link:

<https://accessandrescue.hflip.co/GuidetoPPEcasevac>

- Rescue (Climbing) Helmets
- Ski-Mountaineering Helmets
- Evacuation Triangles/Harnesses
- Rescue Stretchers/Litters
- Helicopter Stretchers/Litters
- Sled Stretchers (snow)
- Stretcher Bridles
- Spine Boards
- Cervical Collars
- Fracture Management
- Medical/Trauma Packs
- HeadLamps
- Hand torches/flashlights
- Area Lighting
- Training Manikins
- Helicopter Harnesses
- Gloves
- Service Footwear
- Paramedic Shears/scissors
- Multitools

HTI Trauma Sling Pack

[ED: a crowded field we know but the HighThreat Innovations systems, particularly the smaller leg-packs, while slightly more oriented towards combat medics, show a much better than average modularity of components and sub-packs - this larger sling-strap model is in red, black or 3xcamos.]

The SlingPAK TraumaPAK is the innovative result of an R&D collaboration between several first responders and industry leaders who sought to create a solution for carrying a bag that was extremely versatile, practical and modular. The SlingPAK is focused on speed, access and functionality. It allows you to treat and triage multiple casualties during a mass incident or can be customized to treat your entire team. It can be carried simply by one of its 3 large handles or comfortably as a sling. The cross magnetic buckle allows you to carry it on your back without it sliding forward when as you bend over. When you're ready to wear the SlingPAK crossbody, simply release the quick connect buckle and start working with your SlingPAK. On the sides of the Pak you have a row of 4 sorting strips on one side, and on the other side several rows of MOLLE so you can add accessories like magazines or fire extinguishers. The front of the SlingPAK has 6 Tourniquet Holders and 2 Velcro areas to secure your trauma scissors and cyalums, as well as any other accessory bags included in the SlingPAK. The back has a large compartment for a rescue stretcher or triage tags. The PAK is made from 1000 Denier Cordura fabric and is extremely resistant to stains and abrasions. The top of the PAK is equipped with an innovative non-slip padded handle that instantly opens the SlingPAK when pulled down. Easily close the PAK and move to another casualty by simply connecting the Velcro on the top. The interior of the PAK has 2 fixed rows of 6 elastic loops to store your bandages and wraps. The rest of the interior has velcro and allows you to customize 5 clear pockets and 1 needle release panel/pen holder. All zippers are water resistant YKK zippers and include paracord wrapped in red and black tubing. An innovative trauma scissor holder is also included and will allow you to store your scissors in 3 different ways on your PAK or on your person.

Size: 50 x 28 x 13cm/20 x 11 x 5.2". Purchase Empty for \$350 or with 3 fill-options Active Bystander \$1100, 1st Responder \$1250, Medic \$1450

1- The Active Bystander SlingPAK:

- Your choice of color and Patch
- 6 Tourniquets (Choose from SAM-XT, CAT or SOF-T)
- 6 QuikClot Rolled Gauze
- 6 Wound Packing Gauze
- 6 Twin Pack Vented Chest Seals
- 6 Elastic pressure wraps
- 6 Pressure Dressing (NAR or Israeli)
- 4 Pairs of medical Gloves
- 12 Hypothermia Blankets
- 2 Mini Duct Tapes
- 1 Trauma XSHEARS® & Holster
- 1 Gear Retractor
- 4 Triage Tape Rolls (Rd, Grn, Yllw B/W)
- 4 Chem Lights
- 1 High Threat Action Card
- 10 bandaids, 1 Black Sharpie

2- The First Responder SlingPAK:

- Your choice of color and Patch
- 6 Tourniquets (Choose from SAM-XT, CAT or SOF-T)
- 6 LE QuikClot Z-Fold Combat Gauze
- 6 Wound Packing Gauze
- 6 Twin Pack Vented Chest Seals
- 6 Elastic pressure wraps
- 6 Pressure Dressing (NAR or Israeli)
- 4 Pairs of medical Gloves
- 12 Hypothermia Blankets
- 2 Mini Duct Tapes
- 1 Trauma XSHEARS® & Holster
- 1 Gear Retractor
- 4 Triage Tape Rolls (Rd, Grn, Yllw B/W)
- 4 Chem Lights
- 1 High Threat Action Card
- 10 bandaids
- 1 Black Sharpie

3- The Medic SlingPAK:

- Your choice of color and Patch
- 6 Tourniquets (SAM-XT, CAT or SOF-T)
- 6 LE QuikClot Z-Fold Combat Gauze
- 6 Wound Packing Gauze
- 6 Twin Pack Vented Chest Seals
- 6 Elastic pressure wraps
- 6 Pressure Dressing (NAR or Israeli)
- 6 3.25" x 14g Needle Thoracostomy Kit
- 6 28 French NPA (Nasopharyngeal Airway) with lubricant
- 1 Micro BVM, 2 Mini Duct Tapes,
- 4 Pairs of medical Gloves
- 12 Hypothermia Blankets
- 1 Trauma XSHEARS® & Holster
- 1 Gear Retractor
- 4 Triage Tape Rolls(Rd, Grn, Yllw B/W)
- 4 Chem Lights
- 1 High Threat Action Card
- 10 bandaids, 1 Black Sharpie

web: highthreatinnovations.com





FOR THOSE WHO EXPECT THE BEST,

EQUIPMENT THAT EXCEEDS

YOUR EXPECTATION.

Cascade Rescue litters are purpose-built to function as a patient packaging and patient movement system that exceeds the expectations of rescue professionals. Our NFPA Steel Litters, CE Certified Titanium and Stainless Steel Professional Series Litters and UL Certified Litters are ideal for difficult access and confined space rescues. Built in the USA, competitively priced, and manufactured by a company that has been in business since 1962. Our Professional Series Litters are what rescue professionals require in demanding technical rescues.

Rescues can be dangerous.

It's best to get gear from a company who understands that.

844.414.RESQ
CASCADE-RESCUE.COM

part2

DRONES for USAR

by Darryl Ashford-Smith
& Lee Newman



Darryl, a veteran of USAR/ISAR in the London Fire Brigade is now a training officer in the Search & Rescue Aerial Association-Scotland, Scottish Mountain Rescue Training Support Officer, Scottish Cave Rescue Organisation Training officer and delivers technical rescue and disaster training worldwide for Technical Rescue International.



Lee is currently the RPAS Manager in the London Fire Brigade and has served many years as a USAR/ISAR Responder. He became project manager for the LFB's drone project after seeing drone technology being used at the Grenfell fire. He has used drones on 100's of occasions to survey fire incidents alongside showcasing the technology and its advantages to fire and rescue services.

UA = Uncrewed Aircraft

INTERNAL/VOID SEARCH

At a USAR incident there may be circumstances where it is too hazardous to commit responders into the risk area which could be on the rubble pile or inside the structure. In this case, it may be very beneficial to deploy a UA to carry out initial reconnaissance or search for example until a means of minimising the risk to responders is managed such as shoring the damaged structure.

There are various type of UA available on the market and it is always a balance between capability, affordability and portability. Some teams may have the finance to possess 'general' UA and those made for flying indoors whereas some teams may only have one for general use.

Although a 'general' UA is designed to be flown in open areas, some can be used very effectively indoors. The use of propeller guards is essential and the UA will have to have the sensors configured differently if flying close proximity to objects such



as walls and debris. In the image on the left showing a general UA with prop guards, it can be seen that these are not the fully 'caged' guards so will not be protective enough. The image on the right shows fully protected prop guards so reducing damage to a minimum. Even with this type of prop guard, the gap between the prop guards presents a snag hazard.



The image below shows a fully protected UA with a spherical cage but even this is still subject to intrusion and snagging between the rotors and the cage.



The next set of images show some examples which have a smoother profile with less snag hazards and additionally, some may have a facility to 'flip' the drone over and take-off

should it crash and land upside down. Some purpose built UA have other features such as glass breakers for use in vehicle accidents or building entry/egress.

With regards to lighting, for those UA that don't have a spot light fixed, or as part of its ancillaries, it may be possible to attach one by various methods including the ubiquitous cable/zip-ties, however, the manufacturing instructions with regards to payloads must be strictly adhered to and you need to ensure the balance does not adversely affect the pitch and roll of the UA .

The following principles are common to all UA search methodologies, inside compartments and voids:

- The reason for flying indoors will generally be because there is increased risk to responders so a 'stand-off' approach is desired or necessary, at least until the structure (or part of) has been declared safe or shoring has been inserted for example
- Flying indoors involves inherent risk to the UA. There is a definite chance of crashing, snagging and disorientation
- Pilots should be prepared to lose the drone if the building/structure cannot be entered to retrieve it or the UA does not have the capability to flip itself over and take-off again
- All electrical devices emit some sort of magnetic field, and this can disrupt the signals that are exchanged between the UA and the remote controller. The intensity of such magnetic fields may not be an issue in all premises however, large industrial equipment can emit much stronger magnetic fields
- The Pilot must be prepared for the UA to lose GPS signal and for the UA rely on its Vision Positioning Sensors (these work best where there is ample light available)
- The blades of the UA should have all round continuous protection
- Any collision sensors/obstacle avoidance that may affect indoor flight should be disabled including any Return To Home Function (normally HOVER can be selected instead)
- Some UA have an EXP Sensitivity Control setting which allows the sensitivity of the drones movements to be customised. Slowing the movements down may assist in keeping a stable flight indoors
- Any return to home facility should be disabled
- Consideration should be given to BEGINNER/TRIPOD/CINE Mode if available as this will make movements slower with less chance of an overreacting response
- Avoid flying too close to walls as the flow of air is impeded as it gets closer to a wall, which affects lift. Avoid flying too close to a ceiling as it will cause the UA to cling to it. In either case, the low-pressure zone created by the rotation of the propellers so close to a large surface results in a vacuum. This vacuum then affects the stability of the drone



DRONES for USAR



- The Pilot may or may not be able to observe the UA in flight. If not, they will be flying using the camera to negotiate their flight path
- For any search with the UA, or the camera in motion, either should be held static from time to time as any movement from the target may be the only thing that gives its position away
- The search areas should be illuminated by the UA using a bespoke, or add on lighting unit and the landing light (switched to permanently on)
- Any system the UA has that may facilitate a more effective search should be enabled such as the facility to allow the camera to pan up from its normal horizontal position
- It may in some circumstances be of use to have a spotter who is able to observe the drone in flight inside the structure
- This use of prop guards may significantly reduce battery life.

Situational awareness of the UA is key to maintaining stability and to carry out an

effective search however, this may seldom be possible when it comes to flying indoors. Below are some of the methods that line of sight (full or intermittent) may be achieved;

Strategically placed spotters located outside of the structure may be utilised to assist the Pilot in determining the position of the UA including the depth of penetration and distance from obstacles for example. Binoculars may be of use to achieve observation from the stand-off position. If the UA has lighting, this may make the task of the spotters easier especially at night.

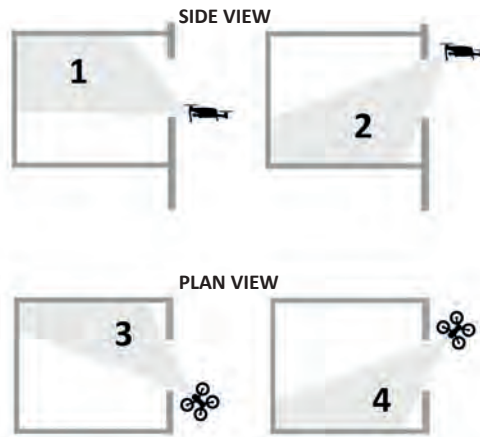
An aerial appliance may be used to position the pilot so that they are in line of site of the UA and to bring them to the height that the UA will be flown at, such as into an upper floor of a structure.

The pilot may be able to position themselves part way into the structure where it still may be deemed as safe whether by the integrity of that part of the building (on advice from the DSE) or within an area that has been shored.

Before entry into a compartment or void (which obviously puts the drone at risk from collision), an external search should be carried out. The drone should be positioned at an appropriate distance from the opening to see as much inside the void as possible. This usually means having the drone positioned very close to the entrance. Like searching with a search camera on an extended reach pole, a structured, methodical approach should be adopted.

USAR

A suggested sequence of searching the void externally shown on the right: Position the UA just short of the window and in a position to view as much inside as possible, searching sequentially up, down, left, and right. This first search allows the void to be searched externally therefore limiting the risk. The order of sequence itself does not matter but the search must cover all search positions.



void-search sequence.

If an internal search of the void is required, the drone is then flown into the opening of the void, central to the opening and into a position just past the entrance.

In simplistic terms, the search can then be broken to a six sided approach, just like physical search, searching each surface, all four walls, floor and as uppermost as is possible with the camera angle available. Obviously, this is in very simplistic terms and would be most appropriate in a compartment that still has the walls, ceiling and floor remaining intact.

In a damaged structure, or a structure that is more complex than just one with four walls, a similar strategy should be followed searching each surface or area methodically before moving onto the next.

It may be the case that the UA is then flown further into the structure with the search sequence repeated to complete the

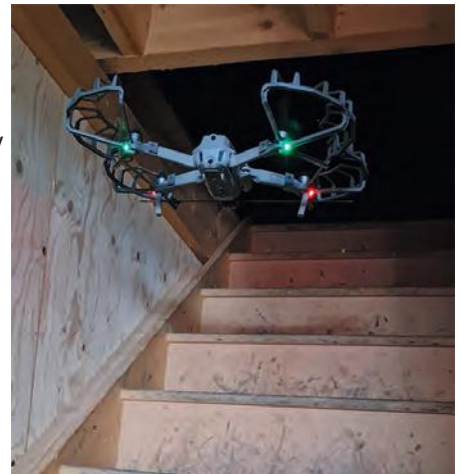
When entering doorways or openings, the UA should be positioned central and as far away from any surfaces as possible as this will affect airflow and may affect stability. The UA should be 'pushed' through the opening and into the compartment in one clean, swift movement.

The UA in the image below-left has been set so that the landing light is permanently on. It can be seen how effective it is even without a spotlight however, it obviously only aids search with the camera facing straight down.

In the image below-right, the UA is searching through a railway carriage that has crashed and settled at an angle. Pilots should train in as many realistic environments as possible to familiarise themselves what they could potentially come across at an incident.

SUMMARY

It can be seen that there are many effective uses a UA can be put to in a USAR environment however, it doesn't come without issue or difficulty. For well-funded teams that have the luxury of having UA specifically for both external and internal use, the process will be much easier however, for the less well funded teams, the use of standard off-the-shelf UA can still be used effectively. Although the technology required to carry out search in such environments is developing quickly and already we see UA designed specifically for the security services and in GPS denied environments, the basic principles still have to be followed to make the most effective use of the UA.

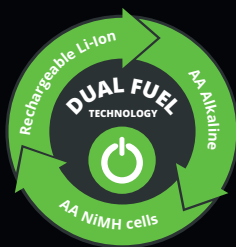




NEXT GENERATION
HYBRID LIGHTING



9050 UTILITY LIGHT



01457 869999

PELIPRODUCTS.CO.UK

USAFE

POWERED, R/C RESCUE 'BUOY'



by Dr. Steve Glassey PhD

Dr Steve Glassey has been teaching swiftwater rescue for twenty years and is a registered assessor for the International Public Safety Qualifications Authority (IPSQA) for swiftwater rescue, a WorkSafe New Zealand Occupational Diver and is a PADI Public Safety Diver™.



Geoff Bray

Geoff is a veteran police diver and military operator and with over 15 years experience as a swiftwater rescue instructor and commercial dive supervisor (ADAS).

INTRODUCTION

The USafe is a Portuguese self-propelled remote-controlled U-shaped lifebuoy. Reviews to date have focused on flat water and in surf, so we used the opportunity to see how it performed in swiftwater (Class III+).

SPECIFICATIONS

BUOY

- R/C LINE of SIGHT RANGE >300-500m /984-1640ft
- ENDURANCE: 5.9 km /3.2 nM
- WEIGHT: 13.7 kg /30.14 lb
- SPEED: 15 kph /8 knots / 9.3 mph
- DIMENSIONS: 960 x 780 x 255mm / 37.8 x 30.7 x 10"

REMOTE CONTROL

- BATTERY: Li ion
- ENDURANCE: 5 hours
- CONNECT: WiFi, Bluetooth - USAFE APP
- WATERPROOF: IP67



EASE OF USE

Operating the remote control is straightforward: forward (and speed), left, right. Individuals familiar with gaming consoles or drones will quickly adapt to the device. Notably, if the buoy flips over, it automatically signals resetting its orientation with the controller through its patented

“Flip and Move” feature. Turn it on, toss it into the water, and start using the controller—it’s that simple.

PERFORMANCE

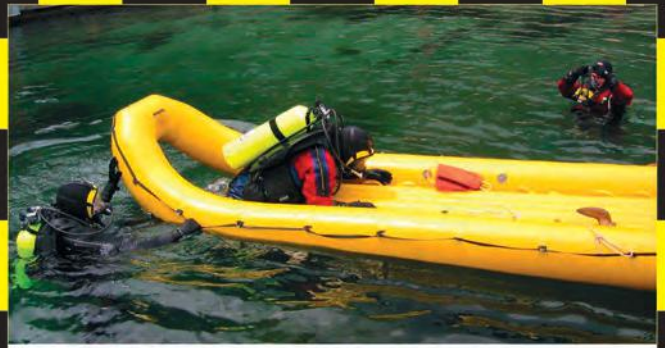
The USafe is user-friendly and performs exceptionally well on flat water, allowing operation as far as the eye can see. It demonstrated the power to retrieve both a victim and a rescuer (manikin) without significant difficulty. We even had it tow a small inflatable sled and carry a rope across the water. In calm waters, it met expectations without any surprises. However, the real test was in swiftwater conditions, an area where the device's performance remained uncertain. While there were numerous videos showcasing its use in flat water and maritime environments with oscillating currents, swiftwater presents unique challenges. To evaluate its capabilities, we took it into Class III+ rapids at the Vector Wero whitewater park in Auckland.



In our first scenario, using the device unmanned under remote control, it navigated through Class III rapids while enduring waves and frequent flips. Thanks to buoy's "Flip and Move" auto-correct feature, we could easily continue operating despite the flips.

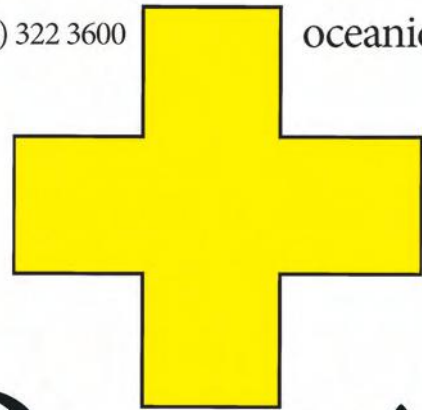
What became evident was that the operator needed to master using water currents to their advantage, employing ferry angles, and understanding hydrology, all of which amplified the device's effectiveness. We successfully used it to carry an 8mm water rescue line across the channel.

In more challenging flow conditions, it performed well but couldn't navigate up drops, a feat that even competent kayakers or rafters might struggle with. While we attempted a run-up, our limited experience might have been a limiting factor. To assess its suitability for retrieving a victim with minimal water experience from the other side, we placed a swiftwater rescue technician on the device, with another operator on shore controlling it. Together, they worked effectively, with the in-water technician providing kick propulsion and adjusting their body position, while the shore-based operator transmitted additional propulsion through the electric motors. However, in isolation, both had their challenges, highlighting the device's potential when used in combination.



+1 (208) 322 3600

oceanid.com



Oceanid™

WATER RESCUE CRAFT



One notable shortcoming was a lag in the remote control, which, while not critical in static water, posed challenges in swiftwater, especially as the device moved around in eddies. A few seconds of delay could mean the difference between being pulled into the flow or missing the ideal timing for a turn. We ran aground several times, and a reverse option would have been beneficial instead of relying on a surge of current to recover the device. The cause of the lag, whether due to aerated water affecting the controller signal or other factors, was unclear.

If intended for swiftwater use, it would be more effective in the hands of an experienced swiftwater technician. Future versions should consider incorporating controls on the device's handles for local activation while maintaining remote control. Additional power, achievable with next-generation batteries and motors, could make it a more viable option for swiftwater rescues against powerful currents.

The device's weight (13.7 Kg) allows for easy carrying and operation by a single person. It performs exceptionally well in static water environments, making it ideal for lakes, ponds, pools, and calm rivers or slack floodwater. It might also be a valuable tool for air rescue operators focusing on winching swimmers into the water. Offshore platforms could benefit from its quick deployment compared to an IRB crew.

SUPPORT

The USafe's intakes and internal battery are reasonably easy to remove and service as needed, although the most common requirement is simply recharging the battery through an induction charger, requiring no tools. The distributor network was responsive and provided good customer service. The device includes a two-year warranty. Something we didn't have available at the time of the review was the APP which gives real-time diagnostics relating to battery power and engine status and maintenance regimes (but not physical control of the buoy).

VALUE FOR MONEY

The device is priced at approximately USD\$10,000. Whether it provides good value for money depends on how you intend to use it. For the same price, one could purchase an IRB with



ABOVE: some important ancillary items (apart from the app) are a mounting bracket (top) and a 25.2v DC Induction charger for the Buoy's (and simultaneously the remote control's) Li-ion battery system.



a motor capable of rescuing multiple victims simultaneously. Therefore, its value is subjective and contingent on your specific needs and use-case. [ED: Its key advantage over an IRB is the ability to carry out a rescue without committing rescuers to the water and this is something that our US water rescue editor Dr Mike Crosslin would be pleased to see.]

LEGAL CONSIDERATIONS

While the Usafe is patented in 71 countries, the regulatory status of the USafe remains unclear in various countries. In the context of New Zealand, it's uncertain whether the USafe falls under the definition of a commercial vessel, given its motorization and use for transporting people. Users should seek their own legal advice regarding any regulatory requirements that may apply. Obtaining exemptions or approval for its use may be necessary.

ADVANTAGES

- Single-person carry and operation
- Operator remains out of the water during rescues
- Low training requirements (minimal)
- Robust and capable of withstanding impacts
- Highly buoyant
- Auto-correcting controller for flipped device

DISADVANTAGES

- Cost
- Unproven performance in real swiftwater conditions
- Remote controller lag
- Insufficient power for swiftwater rescues involving victims and/or rescuers
- Unclear regulatory framework for use
- No reverse function

CONCLUSION

The USafe is an excellent water safety product for flat water environments. While we lack expertise in surf conditions to evaluate its performance in such an environment, it holds promise for swiftwater scenarios. However, further testing, including comparisons with similar products like the *OceanAlpha Dolphin1*, is necessary. In our preliminary assessment, a next-generation device with increased power could be the game-changer needed for swiftwater rescues. In the meantime, it's a valuable addition to the toolbox, though legal considerations should be taken into account.

Overall Rating 3/5

Website: www.usaferescue.com

Acknowledgements: The authors would like to express their gratitude to Vector Wero, Auckland International Airport (Airport Emergency Service) and Fire & Rescue Safety New Zealand for their invaluable support during this review.

WRS WATER RESCUE BOOT



The WRS Water Rescue Boot is designed to give the user both **confidence** and **protection** in this **difficult** environment.

- Synthetic leather and Neoprene upper
- Nitrile rubber sole for added grip on wet smooth surfaces
- Multi directional tread pattern for slippery terrain
- Boa Lace System for a secure and quick fit.
- Fibreglass safety toe cap.
- Anti-perforation midsole
- Drainage holes
- Oil resistant sole
- Bright colour for under water identification
- Reflective detail on tongue
- Certified: EN ISO 20345: 2011 S1P SRC
- Sizes 36- 48

CONTACT

Krommebeekstraat 44
8930 Menen, Belgium
+32 56 21 38 62
contact@wrsinternational.com
www.wrsinternational.com

WRS[®]
INTERNATIONAL



A perfect tool to locate missing objects

the Pulse 8X u/w metal detector.



- Easy operation
- Detects ALL metals
- Use on land & underwater
- Audio and Visual output
- Commercial construction
- Ideal for evidence recovery
- In use by law enforcement agencies worldwide
- Starting at \$2,395



JW
FISHERS

JW Fishers Mfg., Inc.

(800)822-4744

(508)822-7330

Email: info@jwfishers.com

www.jwfishers.com



PATIENT-CENTRED RESCUE & THE HIERARCHY OF EXTRICATION



INTRODUCTION

Patient (casualty)centred rescue is an established concept when it comes to Motor Vehicle Collisions (MVC's). An accompanying defined hierarchy of extrication should also be an established concept but, as of March 2024, despite internet searches, trawls of fourteen 'Extrication' (space creation) books and various trauma manuals, no definition was found for either. We probably all have similar understandings of these concepts but formal standardization of both is needed to create a consistent approach within, and between, the medical and fire rescue teams. They should subsequently be better able to provide their patient with a rescue which is very necessarily centred on them.

So to help achieve that, this article aims to start a conversation on what a uniform definition for both of these vital concepts might look like. *NB: this article deals with extrication from cars only, LGV's//trucks/Big Rigs will be dealt with at a later date.*

BACKGROUND

The context here is that while there is a lot of tactical information and detailed procedures for patient assessment and space creation evolutions, there is a lack of strategic guidance



by Rich Denham &
Nick Appleton



TRM Extrication Editors:

Veteran London Firefighters and instructors, Rich is now consulting and training in Europe and Latin America and Nick is a lead instructor at Babcock PLC under contract to London Fire Brigade

with which to direct the selection and application of these. Such strategy exists in other technical rescue fields: water rescue, confined space rescue and working at heights, all of which have their own hierarchies of rescue, so it is both appropriate and necessary that such an approach is also taken with MVA's.

Before we look at a formal proposal for a **Hierarchy of Extrication**, we first need to define the patient centred rescue that enables it, and then review the information gathering process that it requires.

WHAT IS PATIENT CENTRED RESCUE?

Dr.Tim Nutbeam of the EXIT Project defines a Patient Centered Rescue as a bespoke, evidence-based extrication plan with the primary focus of minimising physical and psychological injury to the patient.

PREPARING FOR A PATIENT CENTRED RESCUE

Information about the patient's circumstances - the vital context of their rescue - must be rapidly gathered before a joint extrication plan, informed by the Hierarchy of Extrication, can be formulated by the inter-service medical and fire rescue team. This is achieved by evaluating the following elements :

- **Vehicle posture and surroundings/environment** – what is the vehicle type? is it upright, on its side or on its roof? Is access to it restricted by another vehicle, street furniture or a structure? (to help reduce patient entrapment time, can the restricting object be removed from their vehicle or vice versa?)
- **Patient access**, location and orientation – what external and internal access options are there in relation to where the Patient is within the vehicle? (how are they orientated in relation to the potential extrication path(s), and is internal space creation required to better facilitate the chosen path?)
- **Entrapment** - is the patient physically entrapped by the vehicle, and/or medically trapped by their injuries or are

they free and available for release? (how can an entrapment be swiftly managed to allow rapid extrication from the vehicle?)

- Is a **'snatch rescue'** necessary? – the EXIT Project defines this circumstance as where there is an immediate threat to life or the patient is unconscious and has absent or ineffective breathing – in which case the side door exit (see over page) is the quickest option.
- **Patient injuries and pain** – will these allow the patient to safely self-extricate, with assistance if necessary? (if they cannot self-extricate and a rescuer extrication is required, what is the minimum safe medical intervention necessary to facilitate the most rapid release?)
- **Patient emotional state** – if conscious, are they agitated? Do they feel that what they are saying about their condition is being taken into account? In this condition they could be problematic to manage during extrication (use a dedicated rescuer 'buddy' throughout to reassure and calm the patient, to advocate on their behalf and so help prevent potential interruptions which could extend the entrapment time)
- **Other local circumstances** that might affect the plan - (multiple patients, vehicle in precarious position, initially limited resources, etc). Note that the resulting extrication plan will have to be amended if there is a significant change to any of the circumstances listed above, to ensure that the rescue remains patient centred throughout its delivery.

Having rapidly gathered this necessary patient information, the rescue can now move swiftly into the extrication planning stage, with the focus on minimizing the entrapment time of the patient.

MINIMIZING ENTRAPMENT TIME

Within the planning process is the requirement, as defined by the EXIT Project, that patients are offered '..... a bespoke (patient centred) extrication plan with a primary focus on minimising entrapment time', and the following factors will all contribute to that aim.

The first is using the information gathered above, to enable the combined rescue team to rapidly identify and then importantly to initiate the quickest safe release, that being the most appropriate to their patient's current and anticipated needs. Also having a well-practiced fire crew to rapidly make the scene safe and then promptly resource and operate it as well as medical rescuers undertaking a safe necessary minimum of checks and interventions. Finally, a well-practiced and swift joint patient extrication will significantly contribute to reducing the time that the patient spends on scene.

However, creating only the minimum space necessary to allow the safe movement of both patient and rescuers will provide possibly the single largest saving of time at an incident. For instance a simple door displacement (to facilitate either self or rescuer extrication) rather than a full and likely unnecessary



Sharpwrap® FAST, SIMPLE AND SECURE

Sharpwrap makes sharp edges safe allowing faster access and less likelihood of damage to clothing or injury to firefighters.

- ◆ High Visibility
- ◆ Quick Application
- ◆ Leaving vehicle safe

Use with Packexe® SMASH for fast, safe extrication

Available in:
100mm x 30mtr roll
200mm x 15mtr roll

Packexe®
Protecting what matters



/packexe



@packexeslash



/packexe

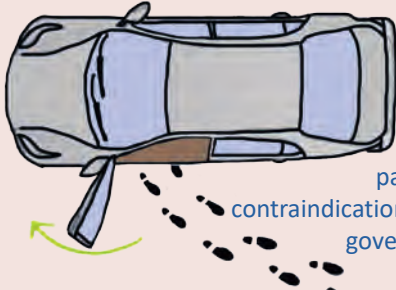
Tel: +44 (0)1392 438191 Email: info@packexeslash.com www.packexeslash.com



THE HIERARCHY OF EXTRICATION

1 Self-Extrication

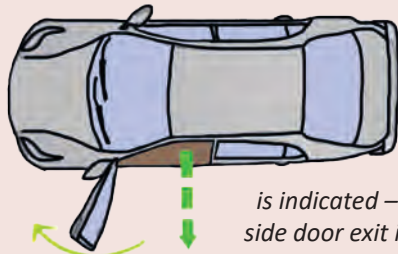
EXIT Project research shows that self-extrication takes the least time (example: <2 minutes with no physical restriction), is favoured by patients, leads to the smallest amount of spinal movement, and consumes the least operational resources. Self or minimally assisted extrication should be the primary option for all patients who do not have contraindications, as defined by the clinical governance of your organisation.



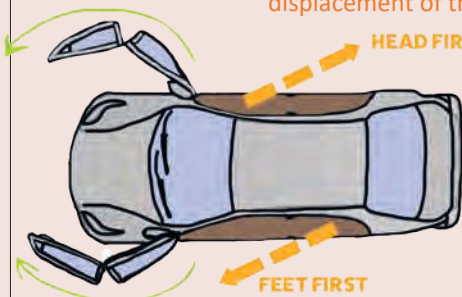
2 Rescuer Extrication

i. SIDEWAYS

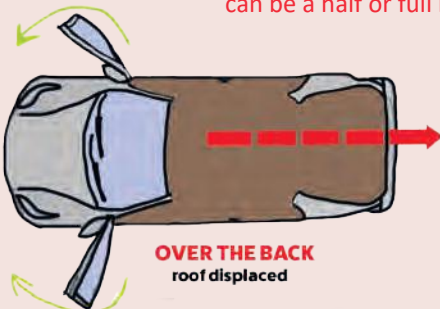
Laterally through a door or hatch opening (completion: 10 minutes?), created by manual or simple mechanical opening of the door, on the side of the vehicle identified as offering the best extrication path for the patient. If a 'snatch rescue' is indicated – see page 27 – then a side door exit is the quickest option



ii. **DIAGONALLY** Diagonally across the floor edge of a removed vehicle side (completion: 20 minutes?), created by displacement of the front and rear doors and the 'B' post, on the side of the vehicle which offers the best extrication path for the patient.



iii. **REARWARDS** Backwards over the rear, incorporating some form of roof displacement (completion: 40 minutes?), which can be a half or full roof flap or the 'classic' whole roof removal.



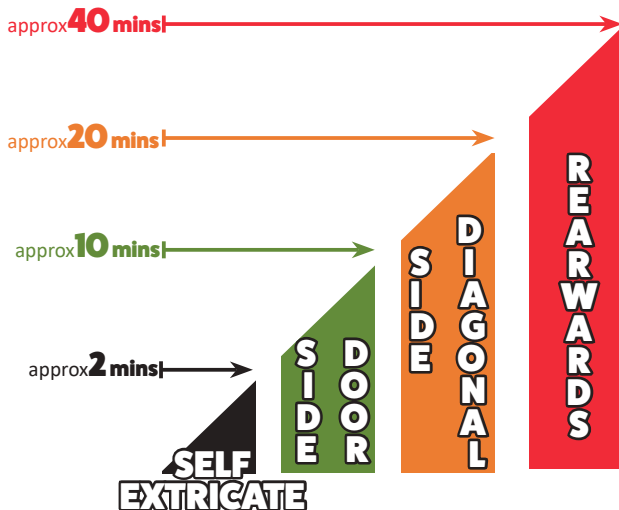
but 'classic', roof removal. And it is this composite time minimization approach which will enable the option that is selected from the *Hierarchy of Extrication* process opposite.

WHAT IS A HIERARCHY OF EXTRICATION?

A hierarchy is a classification of things according to their relative importance. In the *Hierarchy Chart* below, those things are generic MVA rescue options according to their relative speed of completion. They are ranked in increasing order of the typical times taken to achieve each of four sets of space creation and extrication alternatives.

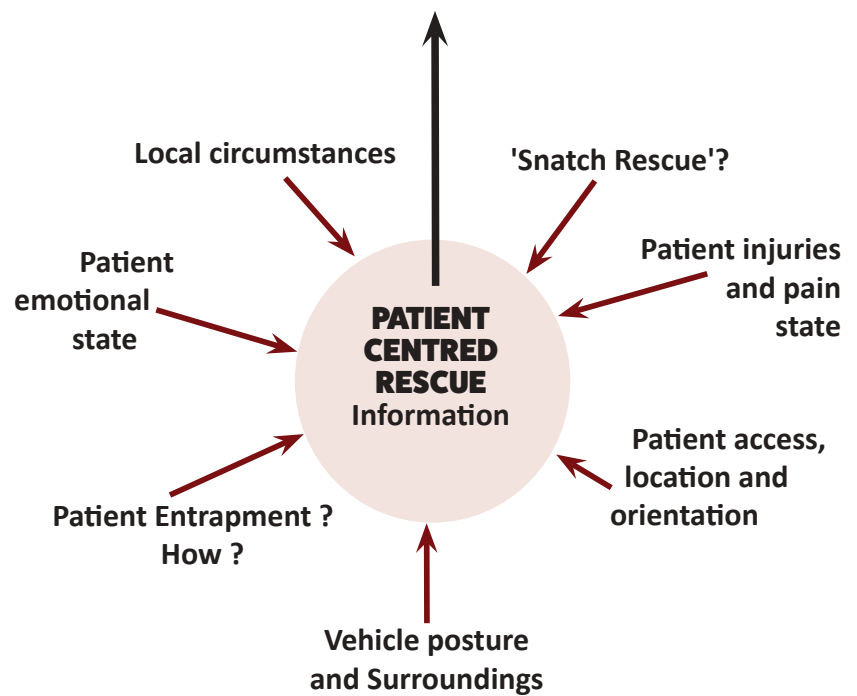
USING THIS HIERARCHY OF EXTRICATION

For context, each of the four Hierarchy options on the page opposite, comprises two phases; the first is the lengthier process of creating minimum safe access and manoeuvring space, (perhaps manually/mechanically opening an adjacent door) and then the significantly shorter (<2 minutes?) patient extrication itself.



Use of the *Hierarchy* requires identifying which of the paired options is the most suitable and timely available, given the patient's specific circumstances; always starting with the quickest (Self/Assisted Extrication) first and then working progressively through the others. In the chart above, the timings are for a standard passenger car (not truck/bus/minibus etc.) and are obviously approximate and subject to equipment and vehicle-material constraints but are a useful target figure.

HIERARCHY OF EXTRICATION (Minimizing Entrapment Time)



The utility of this *Hierarchy* is its recognition that there are effectively just four generic extrication (path) options, regardless of how or where the vehicle has come to rest, and simultaneously that reducing space creation activity to a safe minimum will always minimize entrapment time.

The Hierarchy is described opposite. It's simple and its time-ranked options can be remembered as a straightforward: 'Self Extrication, then Sideways, Diagonally and Rearwards' (see table)

Finally, at an incident and having selected the generic extrication option that best suits your patient and their circumstances, you would then identify and manage its specific delivery.

CONCLUSION

The formalization and widespread adoption of common definitions of both Patient Centred Rescue and a Hierarchy of Extrication, will meet the need for a dynamic and easy to use extrication planning tool. This will directly assist the joint rescue attendance to rapidly identify and implement the most appropriate strategic release option, the one which best meets the specific extrication needs of their patient, and so ensuring a definitive patient centred rescue.

AWAH Z2-R Multi-Role Pulley*

INTRODUCTION

This device is among a growing genre that uses a battery powered drill to provide the drive. There are a number of anchored winches /evacuation devices including *Skyhook* that use/used a drill but few, if any, that are travelling ascenders. We had a Japanese model in our **BUYERSGUIDE to Powered Ascenders** before they asked for it to be removed temporarily pending further development. This model from AWAH is definitely fully developed and extensively used across the world so it doesn't need to prove longevity to us although that does not mean that something couldn't crop up later as it could with ANY life-support product. We've been using it for 4 months and it's clear that any question of longevity is more about the drill/ battery than the Z2 itself.

AWAH stands for *Artisans Working at Height* and unlike many Chinese manufacturers paid less to produce the least expensive option, AWAH seem a class apart. They are actually a team of rope access technicians who install air conditioning units and needed something to assist in the hard work and tedium of getting heavy air-con units on and off at height. So they designed and built their own battery-drill assisted hauling device that also happens to function well as a powered ascender and MA system pulley. It's like a *Clutch* or *MPD* that can take one-way direct drive input from a power drill. *You will notice that the official description from AWAH is 'Multi-Role Pulley' which really plays down its true capabilities because the ability for one person to haul loads of 200kg (we have regularly hauled 220kg) instead of having 3 or 4 or more on a haul line, especially in a restricted



space, is priceless. The version we have been using is the Z2-R with 'R' meaning rescue-capable with a becket and a load range of 30 to 200kg instead of the regular 30 to 150kg. Remember that lower figure because that has a bearing on how easy (or not) it is to pull through slack when resetting.

With devices like the *Maestro* and *Clutch* for half the price and weight from trusted names *Petzl* and *CMC/Harken* there is realistically only one reason you will choose the Z2 or Z2-R and that is the power-assist option. This is otherwise much larger, heavier and way more expensive than the aforementioned devices and *CMC's MPD*. But at roughly

£1200/€1400 /\$1500 it is less than half the price of the smallest of the key battery-powered ascender brands and if you only need the basic function of moving a load (or rescuer/casualty) over a relatively short distance this could be your answer. You could argue that while the powered ascending element may not be as slick or powerful as an *Actsafes*, *Ronin* or *Atlas*, it can more easily be used as a progress capture hauling pulley and regular descender or MA system pulley so it provides more versatility. The scope for use includes effortless ascending and hauling of loads, tensioning (but not over-tensioning!) highlines, drag-hauling and towing, confined space rescue and equipment testing including the tedious hauling into place of the test load or your heavy-ass manikin.



ROPE & EQUIPMENT

FOR YOUR VERTICAL WORLD

11 MM EXTREME PRO™ (G) ROPE MBS = 42.9 kN

UNICORE® TECHNOLOGY

SHEATH – 100% POLYESTER

CORE - 100% NYLON 6

NFPA 1983: 2017 (G)



PMIROPE.COM



For those concerned about Chinese manufacture (despite the fact that half of the products you use and wear are made in China) and assuming that trade relations remain cordial, this device could have had *Rock Exotica* emblazoned on it and we wouldn't have been surprised or disappointed in the quality. Perhaps it would have had a little more design flare from *RE* but you can't say that it's a small and sleek device so it seems to be as well made as it could be within the confines of the job it's intended to do and how it can do it. Before we get the specifics of usage we'll look at the features and how the *RZ* is intended to be used.

FUNCTION

Rope should be 10 to 11mm in diameter but it will cope well with 9mm This is fed around the ratchet-pulley from the 'front' when the front swivel plate is rotated to one side. The usual diagrams show the rope entry and exit path around the chisel-tread pulley (see pics opposite). Once loaded, the plate is rotated back over the main eye in the casing and a carabiner is clipped through - this will be loaded in the same way whether you are ascending or anchoring the device. The width of that bottom connecting eye is a substantial



Increase your gear carrying options



PORTER XL



Patented large-volume material and tool carrier for work harnesses.

www.singingrock.com



32mm/1.25" so not many carabiners are going to fit well enough to limit cross-gate loading. More on that shortly. As with the *Maestro* and *Clutch*, the Z2 has a reassuring ratchet click as the sheave rotates anti-clockwise. In the case of the Z2, you can also rotate the drive shaft housing that you can see in the picture in the middle, in fact, if you had the patience you could winch with the handle of a socket set! Notice that this component has a bolted square housing that can be removed to replace the drive spindle should you need to (a spare one or two come with the device). The curved red bar that follows the contour of the black housing is the handle but, as we'll discover shortly, it's not a variable descent speed handle like an *ID* or a *Stop*, it simply releases the sheave to revolve clockwise and

you control speed on the trail/tail rope as if it were a manual descender but it will lock if you release the handle so it is an 'autolock'. The becket eye at the top allows the Z2-R to be incorporated into a pulley system as a progress capture pulley or as the powered element to perform the actual hauling or both! If you promise not to look too closely at the load-angles, the image overleaf shows the ZR2 lifting a quarter tonne of timber platform that had partially collapsed when a bolt sheared. With the rope running around the bearer joist and then back to the becket, it made very light work of it. Finally, there are two quite prominent friction hooks around which you place the trail rope in a variety of configurations that best suit the friction you need to impart to control your load.

Marlow®

SUPERIOR ABRASION RESISTANCE FOR LIFE ON THE EDGE



TOUGH, DURABLE WORK POSITIONING STATIC LINES & ACCESSORY CORDS

LEARN MORE



MARLOWROPES.COM

GEAR REVIEW

IN USE

There are three very key requirements that you need to fulfil in order to get the most out of your Z2-R:

1) CARABINER TYPE:

The carabiner needs to negotiate a very wide main attachment eye so regular asymmetrics and the few true D's that are still around are no use. You need a broad-topped oval or a more square topped HMS or klettersteig like this *Petzl Vulcan* on the right, but for low bulk we found the *Courant* oval fitted well.

2) ROPE DIAMETER and HANDLING:

Loading and unloading around the sheave is best with a less than 11mm softer-handling but tighter sheave 32 to 48 carrier. rope. The knobliier 12 and 16 carrier arborist climbing ropes are too soft and a well-used *HTP* is too stiff. It runs OK through the ZR but it's a pig to get in and out and general handling and knot tying is a mission - great, super-tough ropes for certain applications but taking rope in and out all the time isn't one of 'em. Having said that 32 and 48 carrier worked well, we actually settled on the white version of *Marlow's* 16 carrier *Black Marlow* intended more for the military but a great rope for this application. This was much easier to use than the 11mm 7/16th black Sterling HTP which is well used and now closer to 12mm. Trying to get a stiff rope into the narrow confines between the sheave and casing is often difficult even when the sheave is rotated. This is something you should do for loading and unloading - rotate the sheave as you pull it out or run it in. Even then there is the small matter of swivelling that top plate back into position - it's very good at letting you know that the rope is getting too large because you will struggle to get it all the way across in order to clip your carabiner. There is some question as to whether you can over-run a soft rope being taken in under power such that it ends up being dragged



back under the cover plate but we never managed to achieve that with the stated rope range. Smaller diameter ropes could well be the problem there - stick to 10 & 11mm and you won't go far wrong. The Z2 self-tails/self-tends very well so you can free up that right hand to tend the ASAP or similar mobile arrester which is a mandatory requirement for powered ascenders unless your agency uses a belay but you would need to be fast to keep up!

3) BATTERY POWERED DRILL:

You need a high-performance, pro brushless drill like the *Milwaukee* that we use or a *Makita* etc. with up to 150nm of torque. A 4Ah battery is the realistic minimum - we first used 5.5Ah but only because we were too cheap to get the higher 8Ah battery we should have been using*. You can get away with a bit less torque (ours is 82nm) but definitely go for the highest Ah battery your agency can afford. We don't need to tell you NOT to use a smaller DIY drill because you'll find it will burn out within seconds. We burnt out two types of *Bosch* just to be sure we weren't able to save some money!

AS A POWERED ASCENDER/Hauler

If you are used to a bespoke powered ascender like *Acstafe* or *Ronin*, the Z2 will feel mightily cumbersome once you add the drill hanging out the back. Just *Selotape* the price receipt to the face to remind you of the advantage. The thing about a drill though is that, even if your agency doesn't use a power drill (**NB: DO NOT use an impact or hammer drill**) the chances are you are using a pro battery system for your recip saw, disc cutter

figures EXCLUDE power drill	Z2	Z2-R
Cost	£1200	\$1500 €1400
Weight	2.34kg 5.2lb	2.37kg 5.2lb
Dimensions	170 x 106 x 100mm 6.7 x 4.2 x 4"	200 x 106 x 100mm 8 x 4.2 x 4"
Load Range	30 to 150kg 66 to 330lb	30 to 200kg 66 to 441lb
Endurance (M18)	175-300m	574-984ft
Gear Ratio	100:10	100:12
Rope Range	tight sheath Kernmantle 9-11mm	
Drill Torque	50 to 150Nm 450 to 1300lb	
Speed Up	approx because it varies with drill & battery 0-60m/min 0-196ft/min	
Speed Down	30-120m/min 98-328ft/min	
Op Temp	-15 to 45°C 5 to 113°F	
Waterproof	Dependant on drill	
Lifespan	6 years or 20,000m/65,600ft	
Standards	XF494-2004 Fire Rescue Industry standards of china	

chainsaw, blower etc. so you'll have the expensive bit, the batteries. If not, they are all readily available from your local building trade outlet.

Once the rope is loaded and you have connected your mobile arrester to a second rope, ensure your carabiner is done up and not adversely loading through that wide eye (it won't rotate easily in the eye). **The drill uses an 8mm (5/16") hexagonal bit** which is supplied but you might want to grab a few more for spares. Your drill will be lanyarded to your harness and this may be an additional fitting you need to buy or you can larks-foot a sling around the handle above the battery. Insert the drill into the drive shaft on the back face and you're ready to go. You have quite a wide profile and the drill won't appreciate being driven up into a ledge or against a hard obstruction so take care at all times to spot obstacles ahead. You don't need to tail the rope as it exits the Z2-R though you will initially want to. Quality drills give a proportional speed when you depress the trigger so you will soon get used to a slow controlled start building to full speed rather than zooming from the get-go. The ride is 'bumpy' because of the chiselled sheave. It's much squarer than the scalloping of the *Clutch*, *MPD* and *Maestro* so you feel the ridges as the rope rides over them, more-so at slow speed. It is a little difficult to give you anything other than a rough estimate about endurance because it will vary so much with the battery type and amp hours - oddly, nothing whatever to do with the actual device we're reviewing. On the plus side, it does mean that you can adjust the power element to your exact requirements by experimenting

*we subsequently did get the 8Ah battery with 25-35% greater longevity but speed is dictated more by the size of your drill's motor

with a range of drills and batteries. Our Milwaukee brushless M18 series drill with Red Lithium M18 5.5Ah battery gave us approx 200m ascending 118kg/260lb but that was with 10m/33ft resets (the height limit of our test rig) which gives the battery some recovery time. We got more run-time and grunt with the 8Ah battery, it gave around a third longer run-time but because of the motor limitations of the drill, the 8Ah and 12Ah we later tried, only improved duration over the 5.5Ah, not speed, at least not consistently. We did not test to destruction because the Z2 is a big mass to 'ping' if something fails given that you have to stand right next to it with the drill to impart the force. But we pushed it beyond its stated working load limit since our standard live rescue load was already 20kg over the devices stated SWL of 200kg. We used several different rope types and the Z2 lifted around 256kg of timber platform easily using a TNT strut as an AHD (pic opposite) Finally, it was repeatedly pulled against a fixed anchor up to 400kg before we backed off with no discernible rope damage. The handle released OK and it's always with a bit of

a 'pop' so you must ensure the tail rope is in max friction mode before release. In the real world, it is probably the drill not the Z2 that will fail you - it will burn out or run out if you don't set the torque to slip at a pre-determined point that you've tried out as being your max load.

AS A DESCENDER

The Z2-R **does not power down** with the drill, it is purely manual. It does NOT operate in the same way as cammed devices. The handle is not proportional it simply releases the sheave to rotate in the opposite (down) direction. Consequently you need to ensure that the rope is well threaded around the two friction hooks and you can then adjust the friction if it is too much - better too much than too little - because the handle effectively releases you into freefall the start always comes with a slight jump. Don't let go of the handle though, it still operates as an autolock in that if you let it go, it springs back to its parked position and you are safely held in the locked position. There are a few ways to thread the hooks and AWAH have protected all contact surfaces with steel to protect the

alloy casing. The ride is again like going over a rumble strip on the road, almost like a coarse vibration. We found the stiffer, 11-12mm rope quite unforgiving, starts were harsher and it was even harder to pull through with no load - (positional resets) -our preference was for a 10.5-11mm 'Goldilocks' kernmantle.

CONCLUSIONS

This is a large, heavy lump and it's certainly not cheap so the progress capture and pulley elements are bonuses but as a far less expensive and versatile powered ascender/hauler AWAH are definitely on to something and they've done an impressive job. It is well supported by the manufacturer with a year's warranty, a degree of self-replacement of components and a network of dealers - the US dealer *Why Not 2* is a particular favourite of ours and well worth checking out - we didn't quite get the same results as them but that's no surprise given the variables with rope and third-party power-sources. If you are allowed to buy it, the AWAH Z2-R is well worth trying with your various ropes and drills. [web: www.awah.cn](http://www.awah.cn)

4D POLE

KONG USA

www.kong.it

NFC READY

more info



- Part 1 Combi-Tools
- Part 2 Cutters
- Part 3 Spreaders
- Part 4 Rams
- Part 5 Special Tools

The image above is not an environment you would normally think of for a hydraulic ram but I can think of many an incident in the dim and distant past where such a tool would have been a literal life saver. We had manually operated hydraulics of course and these are indeed a fantastically reliable option even now but these dedicated battery tools are infinitely faster and with far greater reach or more accurately for rams, stroke which is the distance that you can physically move your target. The specifics of battery tools together with their advantages and disadvantages are covered in the previous three parts to this series so before we look at some ram-specific features, our co-extrication editor Nick Appleton gives some useful training and operational usage pointers for battery rams, some of which is just as relevant to any ram no matter the power source.

Top Tips from TR Extrication Co-Editor Nick Appleton:
Training with rams should be carried out on previously prepared vehicles that have been deformed to simulate various accident damage scenarios e.g. roof pushed down, B pillars pushed inwards etc. Rescuers will only understand the importance of moving the metal all the way back or past the position that the metal was originally formed if the vehicle has been deformed in this way. They will realise that only partially ramming the structure will cause it to spring back once the rams are retracted.

- Adding and extending a second ram with a longer extension piece placed adjacent to the first ram is

fully extended can help prevent the structure springing back to its original shape

- When extending the ram both ends of the ram should be continuously monitored to ensure that neither slips out of position
- Rescuers need to be 100% sure of the direction of travel before operating the ram as the consequences of housing the ram instead of extending it could bring the structure back onto the casualty
- A ram will always go towards the direction of the weaker end of the structure it's in contact with and so assess the push point and ensure it is stronger than the structure to be moved.
- If adding an extension piece to the ram then this end must always be positioned against the push point
- If the structure is in contact with the entrapped casualty then always move the structure away first with the ram before cutting it. Cutting the structure first can cause further structural movement towards the casualty [ED: and alter the way it reacts to being pushed including the possibility of a cut-end 'springing' off the end of the ram. When the structure is intact there are fewer jagged, loose ends to be concerned about].
- Casualty entrapment should be freed first before further space creation techniques are considered due to the requirement to have a viable emergency release plan in place should the casualties condition suddenly deteriorate
- When extricating from Electric Vehicles rescuers must



ensure they do not ram from or into any high voltage battery components or any high voltage areas – refer to the *Emergency Response Guide for the vehicle*

- When carrying out a dash roll manoeuvre cut the dash tie down from centre console if more space is required to carry out the extrication
- Ensure the structure has been peeled and revealed so that the ram does not inadvertently push through any hidden hazards

Advantages of battery operated rams:

- No set up time so immediately deployable
- Quicker to get to work
- Quieter when operating
- No hoses so no trip hazard
- Less stowage space required on fire appliance
- No emissions or fumes so can be used in confined and enclosed spaces

Disadvantages of battery operated rams:

- Dependent on good battery management
- Heavier because have own internal pump, oil reservoir and power source
- Bulky to get into restricted spaces
- Some cannot be used submerged under water – though they can all be used in wet weather .

RAM DESIGN

A simple ram consists of a tube being hydraulically (or in some shoring cases, pneumatically), pushed out of a bombproof tubular casing that can take high internal pressure. With traditional hose-fed rams, those tubes constitute a relatively small footprint with just the length of tube to contend with but battery power usually involves having the battery and motor on-board and this increases bulk considerably. Unlike cutters and spreaders where the battery doesn't add a huge amount to the bulk of the tool, rams do and therefore require more thought before purchasing. This is mitigated in most models by being able to rotate the motor assembly into free space or by having the ram tubes mounted at 90 degrees to the motor housing. So you'll still use them especially if you have other battery tools in the same series; not only for continuity of batteries but also because of the self-contained nature that we've discussed throughout this series of guides and Nick again mentions in the intro - minimal noise and no liquid fuel and exhaust fumes to contend with. In our tables we have two unpowered, stand-alone rams that don't quite fit the 'self-contained, battery-powered tool' description unless you introduce a spreader. We have included the *Powerhawk X* (& *P/X16*) compatible rams simply because they were the first to come up with an ingeniously simple alternative - a ram housing with a cutaway section that allows you to insert any spreader head that fits and do the pushing of tubes that way as a proxy power source. These things are not only a lot cheaper than a self-contained battery ram, you can set and leave them in situ



in complex extrication or USAR situations instead of tying up multiple battery units. The image on the left shows the legacy P16 that we used for many years and in fact the ram, although, long retired, is still going strong after more than 20 years.

SIZE MAY NOT MATTER

Rams are infinitely more extendible than their cutter and spreader counterparts. Not all manufacturers bother of course because 1) a 2-stage telescoping ram offers a wide size range albeit that the strength at longer lengths is very much reduced and 2) there

are useful regular lengths for rams that cover most eventualities. But some can take screw-on or clip-on extensions that might be over a metre long when the ram itself is only pushing 4 or 5 inches! *Resqtec's V4* has an adapter that enables it use extensions plus all 5 shoring struts as extensions! It's often about the bridging distance between the sill or support point and the target to be moved than it is the distance it needs to be moved. Two of the original *Ogura* tools continue to provide perhaps the most accessible rams because their power source is a diminutive *Makita* drill connected by a short hose so you can get that into smaller spaces than virtually any other ram in our selection. That's snot bad after over 30 years of development - you might have thought that by 2024 we would be taking a matchbox off the truck and deploying some microscopic nano-bots to do the heavy lifting.

(LACK OF) NOISE: Covered in the previous parts of this series and already reiterated in Nick's introduction - electric tools are silent when not in use so there is no tick-over noise as you get with a petrol engine tool or a generator driven, hose-fed hydraulic system. But there is still noise when the tool is doing its work and this can vary from a hum to a high pitched whirr that gets louder as the tool works harder. So they are not 'silent' but certainly far less noise pollution than a traditional petrol engine/generator-based system.

LED LIGHTS: Not so obvious as the cutters and spreaders but most of the battery rams have on-board LEDs for illuminating your immediate tool placement area. These are extremely useful because area lighting and even head and angled lighting can illuminate everything BUT the work area as a congested jumble of vehicle or building parts casts a dark shadow where you least want it. Having an LED that shines down the line of the tool negates this problem.

WiFi & BLUETOOTH DIAGNOSTICS & BATTERY MANAGEMENT

Holmatro, *Lukas/Hurst* and *Weber/Genesis* have continued with on-board control panels discussed in the other tool guides but we haven't mentioned much about the importance of battery management. For tools that use off-the shelf batteries from the likes of *Milwaukee*, *Makita* and *DeWalt* this is not so important but the more expensive bespoke systems from *Holmatro* and *Lukas* need to be looked after. Luckily their own charging and storage systems together with WiFi and/or Bluetooth diagnostics allows much easier and efficient management - *Holmatro's* on-vehicle multi-charger for instance will charge 6 to 18 batteries separately from a single power source or while on the tool and will prioritise on-tool charging over 'loose' batteries. That and the watertight batteries is why you pay the big bucks for the bespoke systems. Incidentally, *Lukas* and *Hurst* would not normally have had separate columns for their *E3* and Wifi capable *E3-Connect* series since they are the same tool aside from the extra cost of the Wifi version which is not shown anyway but the *Lukas* range was ratified with removal of the R421 E2, R520 E3/E3C and R522 E3/E3C models just before we went to print.

CHINESE & RUSSIAN TOOLS

As at 2024 Russia has become a North Korea style pariah state so we still don't have to consider Russian tools even if they were good enough to include. China, however, continues to produce quality products for big name companies around the world but there are



BAT

C

Replaceable tips for lifting



two problems associated with including their products in our GUIDES. The first is their propensity for copyright infringement via blatant copying of design and imagery, as an example, we have included *Aolai Rescue* because their battery tools are their own badged products and they are the only one to quote a price but they have other rescue products that may be very good but are clearly copied from market leading models, their

Paratech looking struts even have dark green and yellow livery while their *Arachnipod* looking Tripod/gantry frame has the same red and silver livery. If they could only shy away from this continual plagiarism of well known products and concentrate on their own considerable design skills the world would be a fairer and happier place!

E
UE TOOL.

WEBER RESCUE SYSTEMS

BATTERY DRIVEN COMBI TOOL FOR RAPID INTERVENTION TEAMS

Cutting, spreading, pressing and pulling with one device. For breaking doors and windows, cutting steel and security sections, lifting heavy loads, pulling obstacles or opening vehicles (extrication).



Weber Rescue UK
Essex CO9 2EX
rescue@weberuk.com



Genesis RESCUE SYSTEMS
Kettering, OH 45429
<https://genesisrescue.com>

www.weber-rescue.com



Discover more!

IN THE FOLLOWING TABLES.....

The tool length, width or height and weight are all WORKING spec so they **include the battery**. Many companies quote figures without the battery so at first glance seem lighter but when added has a significant affect on both the physical size and weight of a tool when in use. As with all cutting and spreading tools, the largest or highest figures are not necessarily the best for the job. Stroke power is highest at the shortest extension. **All force figures are given in KiloNewtons and US (short)tons**

Any use, feature, accessory or component that is inherent in the tool is shown as a solid coloured square ■■■■■ If it's an option it is shown as an outline square □□□□□ A circle ● in the 'USE' columns indicates that this feature is only partially present and/or is OK for that purpose but not ideal. A model variant is shown in cyan blue and any features or specifications that differ from the standard are also in cyan or will have a cyan outline to a black or orange square ■■■.

WiFi/Bluetooth-CAPABLE: The tool and/or battery are linked to a mobile device via Wifi &/or Bluetooth to manage functions, servicing and inventory.

TOOLS-IN-RANGE: refers to the other types of tool available in this specific series of tools using this specific battery type.

■= Cutter ■= Spreader ■= Combi ■= Special Tools

ORIGIN: The company's home country, not necessarily the country of manufacture which is indicated by an inset flag or two equally sized flags if the tool is made in both countries.

COST: This is clearly an official secret within the industry. This is because the cost of one tool is huge and vastly different to the cost of multiples that they sell to entire fire services. But this is the same situation for virtually every piece of equipment we ever have in **TECHNICALRESCUE** where we always quote the single item cost on the understanding that any bulk purchase will of course be a lower figure. Chinese Manufacturer *Aolai* have been confident enough to quote a range of \$3500 to \$4700 exc shipping and import duty to give some idea of the minimum you are likely to pay for a battery ram. The batteries are an expensive consumable as well - eg. a *Milwaukee* M18 8Ah battery costs £/\$/€150-200 though individuals could purchase through *Amazon* etc. and save a packet! Had we been able to include any prices they would have been a rough guide only & include local taxes/VAT. They would have varied with exchange rates, extra taxes etc. We usually round up to the nearest Pound£/US Dollar\$/Euro€. Cost is usually for a basic model with included accessories indicated by a solid square in the appropriate column (optional extras being an outline square). Our **USAR/Extrication BUYERS GUIDE** may be able to include prices as we find them but don't hold your breath.

WEIGHT IN HAND: Refers to the operational weight that the rescuer experiences in using the tool so it includes any on-board batteries but not backpack batteries and not necessarily any extras like clip-on lighting or different heads/feet.

WEIGHT of BATTERY: is for the default battery supplied or preferred by the manufacturer. Those that use 'off-the-shelf' brands like *Milwaukee* and *DeWalt* may well be able to use either higher Ah models for greater capacity/duration or lower Ah for decreased cost and perhaps weight but less duration.

BATTERY DURATION & RECHARGE TIME: Work-time or duration is much trickier as it depends on the resistance of the material being pushed/supported, the temperature, the age of the

battery and even how meticulously you follow the recharge guidelines. Consequently some won't quote a figure at all and others are generous to say the least - consider most to be the absolute maximum with minimal workload. Tools last much longer carrying out hundreds of short duration cuts like the Genesis figure of <45mins compared to a *Homatro's* minimum 11minute figure in like-for-like ramming their battery will match the highest time given by others.

Recharge time can be more specific though it varies wildly between basic and high speed chargers. The time shown is for the charger supplied or preferred by the manufacturer and may give a time-range if referring to different types of charger.

DIMENSIONS: The Length by width by depth/height of tool ready to store on the truck and/or ready to work. Rams are stored with the cylinders retracted so they are the least bulky of the 'hydraulic' rescue tools. Height is the 'thickness' of the tool off the ground if you lay the tool down and is usually dictated by either the handle or the battery if it is top-mounted.

PUSH FORCE: Is the maximum *theoretical* force that can be exerted and, like spreaders and cutters, is highest closest to the power unit. The strongest rams are the shortest, single-stage rams. Telescoping gives you much needed reach but the second stage is very much weaker than the first stage and this is extremely important to remember - you may have easily pushed your target material with the first stage but beware that you don't overwhelm it's capabilities when you extend into the second, telescoping stage. **It is also vital that you push in direct line with the power unit - if your target load starts to stray off-centre as it moves you could damage the ram's extending cylinders.** Our figures are in kN (KiloNewtons) and **US (Short) Tons**. There are 1.10 US short tons to a UK/metric ton (or more accurately tonne).

STROKE RANGE: If the ram has a telescoping section there will be two figures - the first, higher figure is for the first stage and the second, lower figure is for the telescoped section. If the ram is single-stage only this figure will be the same as the total stroke distance. Some rams can also pull using chains etc. in the same way as a spreader but this is not the norm and is written in the NOTES.

TOTAL STROKE DISTANCE: The maximum distance the target load can be pushed including any telescoping sections.

ROTATE HEAD/HANDLE: The handle can rotate around the cylinder for better access to in-line ramming of the target but most rams are relatively compact anyway.

LED LIGHTS ■: Integral lighting from the handle or housing to illuminate the area being cut/spread.

IN-WATER-CAPABLE: The tool/battery can be used underwater **TOOL/BATTERY IP**. Ingress protection for dust (first number) & water (second number) - IP54 resists water splashes, IP57 & 67 withstand inundation to 1metre, IP58&68 deeper than 1metre. Trade batteries like *Milwaukee* are **not** waterproof without a bespoke cover and tend not to quote an IP number because they are dependant on the tool to create an effective seal. Specialist batteries like *Holmatro* and *Lukas* are watertight (IP68) but regular trade batteries are no more than IP54 so they are splashproof but not submersible without a bespoke cover.

LUKAS

CROSSRAM

**Long, Longer,
CR 522 CROSSRAM!**

**Our new telescopic
cylinder CR 522 e³ /
CONNECT CROSSRAM
offers a wide range of
applications due to its
immense reach.**
















**Cross ramming to work
inside a vehicle, creating
a rescue opening in a truck
cab or tearing away the ve-
hicle pillars can be carried
out with ease thanks to the
large stroke and exceptional
power of the CR 522 CROSSRAM.**

**The LX Extension Set from LUKAS
can provide an additional 27cm
and thus can reach a total exten-
ded length of 180cm.**



A Trusted IDEX
Fire & Safety Brand

LUKAS

Images not exactly to Scale but comparative within their own series of tools.						
MODEL	ION ITR230	ION ITR500	GYCDD-A	GYDD-171-388/576C	MT730N-E	
SERIES WiFi Bluetooth capable	-	Compact	-	-	-	
VOLTAGE	54/60v	54/60v	28v	28v	54/60v	
COMPANY	AMKUS	AMKUS	AOLAI RESCUE	AOLAI RESCUE	EDILGRAPPA	
TOOLS IN RANGE						
ORIGIN						
COST inc tax / VAT	N/A	N/A	\$3500-4500*	\$3750-4700*	N/A	
RAM TYPE	2-Stage Telescoping	2-Stage Telescoping	1-Stage	2-Stage Telescoping	2-Stage Telescoping	
WEIGHT IN HAND inc BATTERY exc EXTENSION	17.9kg 39.4lb	15.8kg 56.9lb	19.8kg 43.6lb	20.4kg 45lb	17.9kg 39.4lb	
WEIGHT - DEFAULT BATTERY	1.2kg / 2.6 lb	1.2kg / 2.6 lb	0.9kg / 2 lb	0.9kg / 2 lb	1.2kg / 2.6 lb	
BATTERY Ah OPTIONS	DeWalt FlexVolt 9Ah	DeWalt FlexVolt 6Ah 9, 12Ah	5Ah	5Ah	DeWalt FlexVolt 9Ah	
BATTERY DURATION RECHARGE TIME	10-25mins 85mins	10-15mins 60mins	45-60mins 90mins	45-60mins 90mins	10-25mins 85mins	
DIMENSIONS LENGTH retracted/extended*	290mm/ 11.4" 574mm/22.6"	558mm/ 21.9" 1283mm/50.5"	560mm/ 22.3" 930mm/0"	565mm/ 22.2" 1355mm/53.3"	290mm/ 11.4" 574mm/22.6"	
HEIGHT/WIDTH	452mm / 17.8"	N/A	300mm / 11.8"	400mm / 15.8"	452mm / 17.8"	
DEPTH (max diam)	185mm / 7.3"	N/A	175mm / 6.9"	120mm / 4.7"	185mm / 7.3"	
EXTENSION(S) & OPTIONS	254mm/10" 457mm/18" 680mm/27" -	NO -	NO - -	NO --	254mm/10" 457mm/18" 680mm/27" -	
NORM EN <input checked="" type="checkbox"/> NFPA <input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> *	<input checked="" type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/>	
EN CLASSIFICATION	TR215/160-76.4/124-16.7	-	-	-	TR215/160-76.4/124-16.7	
STROKE PUSH FORCE(S for telescoping) t=US Ton	215-76.4kN 24.2-8.6 Ust	206-96kN 23.2-10.8 Ust	120kN 13.5 USt	145.7-75.5kN 16.4-8.5 Ust	215-76.4kN 24.2-8.6 Ust	
STROKE RANGE	160/124mm 6.3/4.9"	381/346mm 15/13.5"	370mm 14.6"	415/380mm 16.3/15"	160/124mm 6.3/4.9"	
TOTAL STROKE DISTANCE	284mm 11.2"	727mm 25.5"	370mm 14.6"	975mm 38.4"	284mm 11.2"	
WORKING PRESSURE (HYDRAULIC)	700 Bar 10.2K psi	700 Bar 10.2K psi	720 Bar 10.4K psi	720 Bar 10.4K psi	700 Bar 10.2K psi	
SPEED CONTROL ON-BOARD LED	Rotating Star Grip -	Rotating Star Grip -	Rotating Star Grip <input checked="" type="checkbox"/>	Rotating Star Grip <input checked="" type="checkbox"/>	Rotating Star Grip -	
IN-WATER USE BATTERY/TOOL IP	54 54	54 54	54 54	54 54	54 54	
NOTES	-	Motor & valve assembly can rotate out of the way. Also some ION ITR230 still available - same spec as Edilgrappa MT730N-E	*CE is listed but you will need to verify this refers to the correct standard. *FOB China	*CE & NFPA is listed but you will need to verify this refers to the correct standard. *FOB China	-	
WEBSITE	amkus.com	amkus.com	aolairescue.com	aolairescue.com	edilgrappa.com	

KEY: **COST:** Approx, **INCLUDES** local tax/VAT **OTHER TOOLS IN RANGE:** ■= Combi ■= Cutter ■= Spreader ■= Special Tools

21-36 E-Force SL3	21-36 E-Force SLI	31" Push-Pull E-Force SL3	41" Push-Pull E-Force SL3	22-54 E-Force SL3	22-54 E-Force SLI
28v	18v	28v	28v	28v	18v
GENESIS RESCUE	GENESIS RESCUE	GENESIS RESCUE	GENESIS RESCUE	GENESIS RESCUE	GENESIS RESCUE
N/A	N/A	N/A	N/A	N/A	N/A
1-Stage	1-Stage	1-Stage	1-Stage	2-Stage Telescoping	2-Stage Telescoping
17.3kg 38.1lb	18.4kg 40.6lb	18.2kg 40.1lb	21.6kg 47.6lb	20.1kg 44.3lb	21.6kg 47.6lb
1.4kg/1kg 3.2lb/2.3lb	1.1/1.7kg 2.33/3.74lb	1.4kg/1kg 3.2lb/2.3lb	1.4kg/1kg 3.2lb/2.3lb	1.4kg/1kg 3.2lb/2.3lb	1.1/1.7kg 2.33/3.74lb
Genesis/ Milwaukee 5Ah*	Milwaukee M18 8Ah/12Ah*	Genesis/ Milwaukee 5Ah*	Genesis/ Milwaukee 5Ah*	Genesis/ Milwaukee 5Ah*	Milwaukee M18 8Ah/12Ah*
<45mins 90mins	60/90mins 45-83mins	<45mins 90mins	<45mins 90mins	<45mins 90mins	60/90mins 45-83mins
540mm /21.3" 908mm /35.7"	540mm /21.3" 908mm /35.7"	553mm /21.8" 840mm /33.1"	653mm /25.7" 1061mm /41.8"	587mm /23.1" 1387mm /53"	587mm /23.1" 1387mm /54.6"
340mm / 13.4"	340mm / 13.4"	347mm / 13.7"	347mm / 13.7"	365mm / 14.4"	365mm / 14.4"
134mm / 5.3"	134mm / 5.3"	142mm / 5.6"	142mm / 5.6"	134mm /5.3"	134mm / 5.3"
76mm/3" 127mm/5" 254mm/10" Angled V-head Pull shackles, pins & adapters	50mm/2" 150mm/6" 270mm/10.6"	76mm/3" 127mm/5" 254mm/10" Angled V-head Pull shackles, pins & adapters	76mm/3" 127mm/5" 254mm/10" Angled V-head Pull shackles, pins & adapters	NO	NO
■	■	■	■	■	■
-	-	-	-	-	-
111kN 12.5 Ust	111kN 12.5 Ust	142 (47*) kN 16 (1.8*) Ust	142 (47*) kN 16 (1.8*) Ust	138(47kN*) 15.5 (1.8*) Ust	108/62kN 12.1/7 Ust
368mm 14.5"	368mm 14.5"	287mm 11.3"	408mm 16.1"	428/372mm 16.8- 14.7"	428/372mm 16.8- 14.7"
368mm 14.5"	368mm 14.5"	287mm 11.3"	408mm 16.1"	800mm 31.5"	800mm 31.5"
700 Bar 10.1K psi	550 Bar 7.9K psi	700 Bar 10.1K psi	700 Bar 10.1K psi	700 Bar 10.1K psi	550 Bar 7.9K psi
Rocker switch	Rocker switch	Rocker switch	Rocker switch	Rocker switch	Rocker switch
54 54	68* 58	54 54	54 54	54 54	68* 58
All E-Force tools can convert to hose. Length remaining markers on ram tube.	All E-Force tools can convert to hose. Length remaining markers on ram tube. *IP68 only with battery cover. IP54 splash cover for 12Ah	All E-Force tools can convert to hose. *PULL-FORCE	All E-Force tools can convert to hose. *PULL-FORCE	All E-Force tools can convert to hose. Length remaining markers on ram tube.	All E-Force tools can convert to hose. Length remaining markers on ram tube. *IP68 only with battery cover. IP54 splash cover for 12Ah
genesisrescue.com	genesisrescue.com	genesisrescue.com	genesisrescue.com	genesisrescue.com	genesisrescue.com

BATTERY

DIMENSIONS

NORM

(T)=Theoretical FEATURES: ● = PARTIAL FEATURE ■ = Option N/A = info Not available/not given

Images not exactly to Scale but comparative within their own series of tools.						
MODEL		28-59	28-59	PRA40	PTR40	PRA50
SERIES WiFi/  -capable		E-Force SL3	E-Force SLI	PENTHEON 	PENTHEON 	PENTHEON 
VOLTAGE		28v	28v	28v	28v	28v
COMPANY		GENESIS RESCUE	GENESIS RESCUE	HOLMATRO	HOLMATRO	HOLMATRO
TOOLS IN RANGE						
ORIGIN						
COST inc tax / VAT		N/A	N/A	N/A	N/A	N/A
RAM TYPE		2-Stage Telescoping	2-Stage Telescoping	1-Stage	2- Stage Telescoping	1-Stage
WEIGHT IN HAND inc BATTERY exc EXTENSION		21.7kg 47.8lb	22.7kg 50lb	14.1kg 31.1lb	15.5kg 34.2lb	18.2kg 40.1lb
WEIGHT - DEFAULT BATTERY		1.4kg/1kg 3.2lb/2.3lb	1.1/1.7kg 2.33/3.74lb	1.5kg / 3.3lb	1.5kg / 3.3lb	1.5kg / 3.3lb
BATTERY Ah OPTIONS		Genesis/ Milwaukee 5Ah*	Milwaukee M18 8Ah/12Ah*	Holmatro PBPA287 7Ah	Holmatro PBPA287 7Ah	Holmatro PBPA287 7Ah
BATTERY DURATION RECHARGE TIME		<45mins 90mins	60/90mins 45-83mins	30-90mins* 60mins	30-90mins* 60mins	30-90mins* 60mins
DIMENSIONS						
LENGTH retracted/extended*		700mm /27.6" 1500mm /59"	700mm /27.6" 1500mm /59"	385mm / 15.2" 600mm/23.6"	385mm/ 15.2" 792mm/31.2"	578mm/ 22.8" 985mm/38.8"
HEIGHT/WIDTH		365mm / 14.4"	365mm / 14.4"	443mm / 17.4"	443mm / 17.4"	443mm / 17.4"
DEPTH (max diam)		134mm / 5.3"	134mm / 5.3"	256mm / 10.1"	256mm / 10.1"	256mm / 10.1"
EXTENSION(S) & OPTIONS		NO	NO	220mm/8.7" (3.3kg / 7.3lb) 440mm/17.3" (4.6kg/10.1lb)	220mm/8.7" (3.3kg / 7.3lb) 440mm/17.3" (4.6kg/10.1lb)	220mm/8.7" (3.3kg / 7.3lb) 440mm/17.3" (4.6kg/10.1lb)
NORM						
EN  NFPA <input type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
EN CLASSIFICATION		-	-	R136/215-14.1	TR136/215-65/192-15.5	R136/407-18.2
STROKE						
PUSH FORCE(S for telescoping) †=US Ton		108/62kN 0Ust	108/62kN 0Ust	136kN 15.3 Ust	65-136kN 7.3-15.3 Ust	136kN 15.3 Ust
STROKE RANGE		428/372mm 16.8- 14.7"	428/372mm 16.8- 14.7"	-	215/192mm 8.5/7.6"	-
TOTAL STROKE DISTANCE		800mm 31.5"	800mm 31.5"	215mm 8.5"	407mm 16"	407mm 16"
WORKING PRESSURE (HYDRAULIC)		700 Bar 10.1K psi	700 Bar 10.1K psi	540 Bar 7.8K psi	540 Bar 7.8K psi	540 Bar 7.8K psi
SPEED CONTROL ON-BOARD LED		Rocker switch 	Rocker switch 	2speed throttle 	2speed throttle 	2speed throttle 
IN-WATER USE BATTERY/TOOL IP		54 54	 68* 58	 67 57	 67 57	 67 57
NOTES		All E-Force tools can convert to hose. Length remaining markers on ram tube.	All E-Force tools can convert to hose. Length remaining markers on ram tube. *IP68 only with battery cover. IP54 splash cover for 12Ah	Push-button ram ext. do not need original ram head to be removed. On-tool charging. tepless speed maximisation. *11mins at constant max force.	Push-button ram ext. do not need original ram head to be removed. On-tool charging. tepless speed maximisation. *11mins at constant max force.	Push-button ram ext. do not need original ram head to be removed. On-tool charging. tepless speed maximisation. *11mins at constant max force.
WEBSITE		genesisrescue.com	genesisrescue.com	holmatro.com	holmatro.com	holmatro.com

KEY: COST: Approx, INCLUDES local tax/VAT OTHER TOOLS IN RANGE:  = Combi  = Cutter  = Spreader  = Special Tools

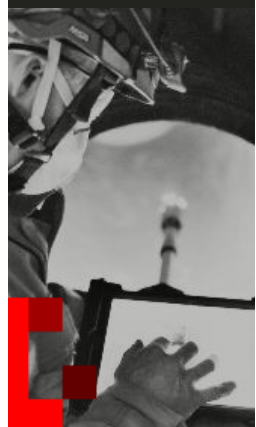


PTR50 PENTHEON	PTR51 PENTHEON	R320 E3/E3connect	R521 E3/E3connect	CR 522 E3/ E3connect
28v	28v	25.2v	25.2v	25.2v

HOLMATRO	HOLMATRO	HURST (IDEX)	HURST (IDEX)	HURST (IDEX)
N/A	N/A	N/A	N/A	N/A
2-Stage Telescoping	2-Stage Telescoping	2-Stage Telescoping	2-Stage Telescoping	2-Stage Telescoping
20.5kg 45.2lb	21.4kg 47.2lb	13.7kg 30.2lb	19.4kg 42.8lb	21.6kg 47.6lb
1.5kg / 3.3lb	1.5kg / 3.3lb	1.6 1.2kg / 3.5 2.7lb	1.6 1.2kg / 3.5 2.7lb	1.6 1.2kg / 3.5 2.7lb
Holmatro PBPA287 7Ah	Holmatro PBPA287 7Ah	Lukas 9Ah 9AhSaltWater, 5Ah	Lukas 9Ah 9AhSaltWater, 5Ah	Lukas 9Ah 9AhSaltWater, 5Ah
30-90mins* 60mins	30-90mins* 60mins	30-60mins 75-150mins	30-60mins 75-150mins	30-60mins 75-150mins
578mm/ 22.8" 1365mm/53.7"	713mm/ 28.1" 1500mm/59.1"	340mm /13.4" 640mm /25.2"	579mm /22.8" 1359mm /53.5"	657mm /25.9" 1533mm /60.3"
443mm / 17.4"	443mm / 17.4"	326mm / 12.8"	327mm / 12.9"	327mm / 12.9"
256mm / 10.1"	256mm / 10.1"	200mm / 7.9"	140mm / 5.5"	140mm / 5.5"
220mm/8.7" (3.3kg/ 7.3lb) 440mm/17.3" (4.6kg/10.1lb)	NO	50mm/2" 150mm/6" 270mm/10.6"	NO	50mm/2" 150mm/6" 270mm/10.6"
TR-136/405-65/382-20.5	TR136/405-65/382-21.4	-	-	-
65-136kN 7.3-15.3 Ust	65-136kN 7.3-15.3 Ust	60-127kN 6.74-14.27 Ust	60-127kN 6.74-14.27 Ust	60-127kN 6.74-14.27 Ust
405/382mm 15.9/15"	405/382mm 15.9/15"	164/136mm 6.5-5.4"	403/377mm 15.9-14.8"	451/425mm 17.75-16.7"
787mm 31"	787mm 31"	300mm 11.8"	780mm 30.7"	876mm 34.5"
540 Bar 7.8K psi	540 Bar 7.8K psi	500 Bar 7.2K psi	500 Bar 7.2K psi	500 Bar 7.2K psi
2speed throttle	2speed throttle	Rotating Star Grip	Rotating Star Grip	Rotating Star Grip
67 57	67 57	68 58	68 58	68 58
Push-button ram ext. do not need original ram head to be removed. On-tool charging, tepless speed maximisation. *11mins at constant max force.	Push-button ram ext. do not need original ram head to be removed. On-tool charging, tepless speed maximisation. *11mins at constant max force.	Can operate for 60min under water inc salt water with Saltwater battery. E3 Connect has WiFi connectivity. Side-mounted battery R421 E2 discontinued	Can operate for 60min under water inc salt water with Saltwater battery. E3 Connect has WiFi connectivity for tool management and remote status etc.	Can operate for 60min under water inc salt water with Saltwater battery. R421 E2 discontinued
holmatro.com	holmatro.com	jawsoflife.com	jawsoflife.com	jawsoflife.com



360° SEARCH & RESCUE CAMERA



www.firstlook.net

(T) = Theoretical FEATURES: ● = PARTIAL FEATURE = Option N/A = info Not Available/not given

Images not exactly to Scale but comparative within their own series of tools.						
MODEL		R320	R521	CR 522 CrossRam	RPR-370	HRS941
SERIES WiFi / capable		E3/ E3connect	E3connect	E3/ E3connect	RP	HR938 Ram
VOLTAGE		25.2v	25.2v	25.2v	18v	18v
COMPANY		LUKAS (IDEX)	LUKAS (IDEX)	LUKAS (IDEX)	OGURA	OGURA
TOOLS IN RANGE						
ORIGIN						
COST inc tax / VAT		N/A	N/A	N/A	N/A	N/A
RAM TYPE		2-Stage Telescoping	2-Stage Telescoping	2-Stage Telescoping	1-Stage	1-Stage
WEIGHT IN HAND inc BATTERY exc EXTENSION		13.7kg 30.2lb	19.4kg 42.8lb	21.6kg 47.6lb	14.1kg 31.1lb	4.2kg +3.1kg 9.3lb +6.8lb
WEIGHT - DEFAULT BATTERY		1.6 1.2kg /3.5 2.7lb	1.6 1.2kg /3.5 2.7lb	1.6 1.2kg /3.5 2.7lb	1-1.36kg 2.2-3lb	1-1.36kg 2.2-3lb
BATTERY Ah OPTIONS		Lukas 9Ah 9AhSaltWater , 5Ah	Lukas 9Ah 9AhSaltWater , 5Ah	Lukas 9Ah 9AhSaltWater , 5Ah	Makita 5-6Ah*	Makita 5-6Ah*
BATTERY DURATION RECHARGE TIME		30-60mins 75-150mins	30-60mins 75-150mins	30-60mins 75-150mins	<12mins 55-120mins	<12mins 55-120mins
DIMENSIONS LENGTH retracted/extended*		340mm /13.4" 640mm /25.2"	579mm /22.8" 1359mm /53.5"	657mm /25.9" 1533mm /60.3"	529mm /16" 899mm /27"	*219mm /8.6" 319mm /12.6"
HEIGHT/WIDTH		326mm / 12.8"	327mm / 12.9"	327mm / 12.9"	290mm / 11.4"	*290mm / 11.4"
DEPTH (max diam)		200mm / 7.9"	140mm / 5.5"	140mm / 5.5"	179mm / 7"	*179mm / 7"
EXTENSION(S) & OPTIONS		50mm/2" 150mm/6" 270mm/10.6"	NO	50mm/2" 150mm/6" 270mm/10.6"	200mm/7.9" 450mm/17.7" Flat surface and claw heads	*
NORM EN <input checked="" type="checkbox"/> N <input type="checkbox"/> F <input type="checkbox"/> P <input type="checkbox"/> A		<input checked="" type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/>	-	-
EN CLASSIFICATION		-	-	-	-	-
STROKE PUSH FORCE(S for telescoping) t=US Ton		127/60kN 14.27/ 6.74 Ust	127/60kN 14.27/ 6.74 Ust	127/60kN 14.27/ 6.74 Ust	66.6kN 0 Ust	36.6kN 4.1 Ust
STROKE RANGE		164/136mm 6.5-5.4"	403/377mm 15.9-14.8"	451/425mm 17.75-16.7"	370mm 14.6"	100mm 4"
TOTAL STROKE DISTANCE		300mm 11.8"	780mm 30.7"	876mm 34.5"	370mm 14.6"	100mm 4"
WORKING PRESSURE (HYDRAULIC)		500 Bar 7.2K psi	500 Bar 7.2K psi	500 Bar 7.2K psi	N/A	N/A
SPEED CONTROL ON-BOARD LED IN-WATER USE BATTERY/TOOL IP		Rotating Star Grip	Rotating Star Grip	Rotating Star Grip	Trigger	Trigger
NOTES		68 58 Can operate for 60min under water inc salt water with Saltwater battery. E3 Connect has WiFi connectivity. Side-mounted battery	68 58 Can operate for 60min under water inc salt water with Saltwater battery. E3 Connect has WiFi connectivity for tool management and remote status etc.	68 58 Can operate for 60min under water inc salt water with Saltwater battery. E3 Connect has WiFi connectivity for tool management and remote status etc.	54 54 Head can be switched between cutter, combi, spreader ram etc.*EU uses 5Ah, US tends to use 6Ah	54 54 *Ram dims only HRS941 Head can be switched between cutter, combi, spreader ram etc.
WEBSITE		lukas.com	lukas.com	lukas.com	ogurarescuertools.com	ogurarescuertools.com

KEY: COST: Approx, INCLUDES local tax/VAT OTHER TOOLS IN RANGE: = Combi = Cutter = Spreader = Special Tools
















































	HRS931 HR938 Ram	P25 (S-1601X) X	P40 (S-1601X) X	V4 V4x EDD	Ram SR GreenSpirit II	Ram TR GreenSpirit II
	18v	12v or 16v LIGHT	7.5/12v	43.2v	28v	18v/28v
	OGURA	POWERHAWK TECHNOLOGIES	POWERHAWK TECHNOLOGIES	RESQTEC	SCORPE	SCORPE
	N/A	N/A	N/A	N/A	N/A	N/A
	1-Stage	1-Stage+ hand-wind top section	1-Stage+ hand-wind top section	1-Stage	1-Stage	2-Stage Telescoping
	3.9kg +3.1kg 8.6lb+6.8lb	27kg 0lb	36kg 0lb	16.4kg 36.1lb	17.9kg	21.1kg 46.5lb
	1-1.36kg 2.2-3lb	1..36kg 3lb	1..36kg 3lb	1kg 2.2lb	1/1.1kg 2.2/2.33lb	1.1/1kg 2.33/2.2lb
	Makita 5-6Ah*	Powerhawk 7.5Ah or any 12v source	Powerhawk 7.5Ah or any 12v source	*Resqtec 2.6Ah	Milwaukee 5Ah M28 8Ah M18	Milwaukee 8Ah M18 5Ah M28
	<12mins 55-120mins	>30 mins <120mins/<15hr	>30 mins <120mins/<15hr	<45mins 60mins	60/80mins 45-90mins	60/80mins 45-90mins
	303mm /16" 899mm /27"	0mm /16" 0mm /27"	0mm /23" 0mm /41"	636mm /25" 936mm /37"	540mm /21.3" 908mm /35.7"	587mm /23.1" 1387mm /53"
	290mm / 11.4"	178mm / 7"	327mm / 12.9"	355mm / 14"	291mm / 11.5"	365mm / 14.4"
	179mm / 7"	100mm / 4"	100mm / 4"	133mm / 5.2"	167mm / 6.6"	167mm / 6.6"
	*	610mm/24" 1220mm/48"	610mm/24" 1220mm/48"	Multi-Adapter for.... 716mm / 28.2" 586mm / 23.1" 241.6mm / 9.5" 151.6mm / 6" 99.6mm / 4" Swivel & Power Plates	250mm/10" 350mm/14" 450mm/18" 100 & 180mm Heads Sill Support	250mm/10" 350mm/14" 450mm/18" 100 & 180mm Heads Sill Support
	-	■	■	■ ■	■	■
	-	-	-	-	R111/368-17.9	TR108/428-62/372-21.1
	36.6kN 4.1 Ust	31.6-52.5kN 3.5-5.9 Ust	31.6-52.5kN 3.5-5.9 Ust	89 /58.8kN 10 /6.6 Ust	111kN 12.47 Ust	108/62kN* 12.1/7 Ust
	100mm 4"	127/152*mm 5/6"	305/152*mm 12/6"	300mm 11.8"	368mm 14.5"	428/372mm 16.8- 14.7"
	100mm 4"	127mm (+152mm manual) 5" (+6" manual)	305mm (+152mm manual) 12" (+6" manual)	300mm 11.8"	368mm 14.5"	800mm 31.5"
	N/A	N/A mechanical	N/A mechanical	N/A mechanical	700 Bar 10.2K psi	550 Bar 7.9K psi
	Trigger	Rotating Star Grip	Rotating Star Grip	■	Rocker switch ■	Rocker switch ■
	54 54	54 54	54 54	54 54	54/68 54	■ 54/68* 68
	*Ram dims only *HRS941 Head can be switched between cutter, combi, spreader ram etc	RAMS can be joined with bespoke coupler and can be used with any spreader that fits 2.25"/58mm but is designed for the P16/P16X with spreader or combi heads. *Manually screwed telescoping top section adds 6"/152mm. Rams have locking nuts to follow the lift and hold without power unit. Both P16 (Legacy) &P16X can use a 12v car battery or any 12v power source		*10Ah powerpack also available. Ram compatible with all Resqtec shoring struts if using the Multi-Adapter.	Converter available for M28 & other batteries. * IP68 with M18 & waterproof cover (not shown)	*&36.9kN/4.1USt Pull force. Converter available for M28 & other batteries. * IP68 with M18 & waterproof cover (shown)
	ogurarescuetools.com	powerhawk.com	powerhawk.com	resqtec.com	scorpe.net	scorpe.net

BATTERY

DIMENSIONS

NORM

(T) = Theoretical FEATURES: ● = PARTIAL FEATURE ■ = Option N/A = info Not Available/not given

Images not exactly to Scale but comparative within their own series of tools.						
MODEL	ER40	ELS40	RZ1-910 -	RZ1-910 -	RZT2-1170 -	
SERIES  WiFi-capable	Storm Surge	Storm Surge	E-Force3	Smart-Force	E-Force3	
VOLTAGE	18v/20v	18v/20v	28v	18v	28v	
COMPANY	TNT RESCUE	TNT RESCUE	WEBER RESCUE	WEBER RESCUE	WEBER RESCUE	
TOOLS IN RANGE	  	  	   	   	   	
ORIGIN						
COST inc tax / VAT	N/A	N/A	N/A	N/A	N/A	
RAM TYPE	1-Stage	2-Stage Telescoping	1-Stage	1-Stage	2-Stage Telescoping	
WEIGHT IN HAND inc BATTERY exc EXTENSION	19.77kg 43.6lb	18.64kg 41.1lb	17.3kg 38.1lb	18.4kg 40.6lb	20.9kg 46lb	
WEIGHT - DEFAULT BATTERY	1.1kg /2.4lb 1.2[1.36]kg /2.6[3]lb	1.1kg /2.4lb 1.2[1.36]kg /2.6[3]lb	1.4kg/1kg 3.2lb/2.3lb	1.1/1.7kg 2.33/3.74lb	1.4kg/1kg 3.2lb/2.3lb	
BATTERY Ah OPTIONS	Milwaukee M18 8/9Ah./[Makita6Ah] DeWalt FlexV20 9Ah	Milwaukee M18 8/9Ah./[Makita6Ah] DeWalt FlexV20 9Ah	Weber/ Milwaukee 5Ah*	Milwaukee M18 8Ah/12Ah*	Weber/ Milwaukee 5Ah*	
BATTERY DURATION RECHARGE TIME	10-15mins 87 / 60mins	10-15mins 87 / 60mins	<45mins 90mins	60/90mins 45-83mins	<45mins 90mins	
DIMENSIONS	LENGTH retracted/extended*	647.7mm /25.5" 1041.4mm /41"	546.1mm /21.5" 1073.15mm /42.25"	540mm /21.3" 908mm /35.7"	540mm /21.3" 908mm /35.7"	543mm /21.4" 1170mm /44.3"
	HEIGHT/WIDTH	273mm / 10.75"	273mm / 10.75"	340mm / 13.4"	340mm / 13.4"	351mm / 13.8"
	DEPTH (max diam)	205.7mm/ 8.1"	205.7mm/ 8.1"	134mm/ 5.3"	134mm/ 5.3"	134mm / 5.3"
	EXTENSION(S) & OPTIONS	150mm/6" 300mm/12" 450mm/18"	150mm/6" 300mm/12" 450mm/18"	175mm/7" 250mm/9.8" 320mm/12.6"	175mm/7" 250mm/9.8" 320mm/12.6"	NO
NORM	EN  NFPA 			 	 	
	EN CLASSIFICATION	-	-	R111/368-17.3	R111/368-18.4	TR189/360-99/27020,9
STROKE	PUSH FORCE(S for telescoping) t=US Ton	164.6kN 18.5 Ust	169.3/58.2kN 19/6.5 Ust	111kN 12.47 Ust	111kN 12.47 Ust	189-99kN 21.2/11.1 Ust
	STROKE RANGE	368mm 14.5"	329/221mm 12.95/8.7"	368mm 14.5"	368mm 14.5"	360/270mm 13.2-10.6"
	TOTAL STROKE DISTANCE	368mm 14.5"	527mm 20.75"	368mm 14.5"	368mm 14.5"	630mm 24.8"
WORKING PRESSURE (HYDRAULIC)	722 Bar 10.5K psi	722 Bar 10.5K psi	700 Bar 10.1K psi	550 Bar 7.9K psi	700 Bar 10.1K psi	
SPEED CONTROL  ON-BOARD LED	 Rotating Star Grip	 Rotating Star Grip	 Rocker switch	 Rocker switch	 Rocker switch	
IN-WATER USE BATTERY/TOOL IP	54 54	54 54	54 54	 68* 58	54 54	
NOTES	TNT prices include 2 batteries and Dual Rapid charger. Storm2 series DISCONTINUED Mains adapter=option.	TNT prices include 2 batteries and Dual Rapid charger. Storm2 series DISCONTINUED Mains adapter=option.	All E-Force tools can convert to hose. Length remaining markers on ram tube.	All E-Force tools can convert to hose. Length remaining markers on ram tube. *IP68 only with battery cover. IP54 splash cover for 12Ah	All E-Force tools can convert to hose. Length remaining markers on ram tube.	
WEBSITE	tntrescue.com	tntrescue.com	weber.com	weber.com	weber.com	

KEY: **COST:** Approx, **INCLUDES** local tax/VAT **OTHER TOOLS IN RANGE:**  = Combi  = Cutter  = Spreader  = Special Tools

**PUSH IT
TO THE LIMIT.**



**THE NEXT-GEN
PENTHEON RAM.
MILES AHEAD.**





































For decades, first responders and patients alike have been able to count on us for life. To keep this promise we ceaselessly push the boundaries of technology and innovation. For the latest iteration of the Pentheon Rams, our engineers worked tirelessly to build tools that are miles ahead in terms of performance, usability, connectivity and serviceability. Ensuring that the path to a patient's safety is equally fast as it is controlled. Discover the next-gen Pentheon Rams.

FIND OUT MORE ON [HOLMATRO.COM/PENTHEON](https://www.holmatro.com/pentheon)



 **holmatro**
mastering power

Images not exactly to Scale but comparative within their own series of tools.						
MODEL SERIES WiFi/📶-capable	RZT2-1170 - Smart-Force	RZT2-1360 - E-Force3	RZT2-1360 - Smart-Force	RZT2-1500 - E-Force3	RZT2-1500 - Smart-Force	
VOLTAGE	18v	28v	18v	28v	18v	
COMPANY	WEBER RESCUE	WEBER RESCUE	WEBER RESCUE	WEBER RESCUE	WEBER RESCUE	WEBER RESCUE
TOOLS IN RANGE	   	   	   	   	   	  
ORIGIN						
COST inc tax / VAT	N/A	N/A	N/A	N/A	N/A	N/A
RAM TYPE	2-Stage Telescoping	2-Stage Telescoping	2-Stage Telescoping	2-Stage Telescoping	2-Stage Telescoping	2-Stage Telescoping
WEIGHT IN HAND inc BATTERY exc EXTENSION	21.8kg 48lb	20.5kg 45.2lb	21.5kg 47.4lb	21.7kg 47.8lb	22.7kg 50lb	
WEIGHT - DEFAULT BATTERY	1.1/1.7kg 2.33/3.74lb	1.4kg/1kg 3.2lb/2.3lb	1.1/1.7kg 2.33/3.74lb	1.4kg/1kg 3.2lb/2.3lb	1.1/1.7kg 2.33/3.74lb	
BATTERY Ah OPTIONS	Milwaukee M18 8Ah/12Ah*	Weber/ Milwaukee 5Ah*	Milwaukee M18 8Ah/12Ah*	Weber/ Milwaukee 5Ah*	Milwaukee M18 8Ah/12Ah*	
BATTERY DURATION RECHARGE TIME	60/90mins 45-83mins	<45mins 90mins	60/90mins 45-83mins	<45mins 90mins	60/90mins 45-83mins	
DIMENSIONS	LENGTH retracted/extended*	540mm /21.3" 1170mm /46"	587mm /23.1" 1387mm /54.6"	587mm /23.1" 1387mm /54.6"	700mm /27.6" 1500mm /59"	700mm /27.6" 1500mm /59"
	HEIGHT/WIDTH	351mm / 13.8"	365mm / 14.4"	365mm / 14.4"	365mm / 14.4"	365mm / 14.4"
	DEPTH (max diam)	134mm / 5.3"	134mm /5.3"	134mm / 5.3"	134mm / 5.3"	134mm / 5.3"
	EXTENSION(S) & OPTIONS	NO	NO	NO	NO	NO
NORM	EN <input checked="" type="checkbox"/> NFPA <input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	EN CLASSIFICATION	TR189/360-99/27021.8	TR108/428-62/37220.5-E-I	TR108/428-62/37221.5-E-I	TR108/428-62/37221.7-E-I	TR108/428-62/37222.7-E-I
STROKE	PUSH FORCE(S for telescoping) t=US Ton	189-99kN 21.2/11.1 USt	108/62kN 12.1/7 USt	108/62kN 12.1/7 USt	108/62kN 12.1/7 USt	108/62kN 12.1/7 USt
	STROKE RANGE	360/270mm 13.2-10.6"	428/372mm 16.8- 14.7"	428/372mm 16.8- 14.7"	428/372mm 16.8- 14.7"	428/372mm 16.8- 14.7"
	TOTAL STROKE DISTANCE	630mm 24.8"	800mm 31.5"	800mm 31.5"	800mm 31.5"	800mm 31.5"
WORKING PRESSURE (HYDRAULIC)	550 Bar 7.9K psi	700 Bar 10.1K psi	550 Bar 7.9K psi	700 Bar 10.1K psi	550 Bar 7.9K psi	
SPEED CONTROL ON-BOARD LED	Rocker switch <input checked="" type="checkbox"/>	Rocker switch <input checked="" type="checkbox"/>	Rocker switch <input checked="" type="checkbox"/>	Rocker switch <input checked="" type="checkbox"/>	Rocker switch <input checked="" type="checkbox"/>	
IN-WATER USE BATTERY/TOOL IP	<input checked="" type="checkbox"/> 68* 58	<input checked="" type="checkbox"/> 54 54	<input checked="" type="checkbox"/> 68* 58	<input checked="" type="checkbox"/> 54 54	<input checked="" type="checkbox"/> 68* 58	
NOTES	All E-Force tools can convert to hose. Length remaining markers on ram tube. *IP68 only with battery cover. IP54 splash cover for 12Ah	All E-Force tools can convert to hose. Length remaining markers on ram tube.	All E-Force tools can convert to hose. Length remaining markers on ram tube. *IP68 only with battery cover. IP54 splash cover for 12Ah	All E-Force tools can convert to hose. Length remaining markers on ram tube.	All E-Force tools can convert to hose. Length remaining markers on ram tube. *IP68 only with battery cover. IP54 splash cover for 12Ah	
WEBSITE	weber.com	weber.com	weber.com	weber.com	weber.com	weber.com

KEY: COST: Approx, INCLUDES local tax/VAT OTHER TOOLS IN RANGE:  = Combi  = Cutter  = Spreader  = Special Tools



POWER ASCENDERS - FOR PROFESSIONALS.

ActSafe Power Ascenders are an ingenious combination of a high-capacity rope winch in a compact, lightweight and user-friendly design. They simply redefine the possibilities for working in vertical environments.

skylotec.com



More Information



ActSafe PMX

- working load limit (WLL) of 250 kg
- 17 m / min at 100 kg
- suitable for 11 mm ropes



ActSafe ACX

- simplifies and accelerates work on complex or difficult to access structures
- power-saving use
- remote control up to 150m

~~PIRATE'S~~
A YOUNG PERSON'S GUIDE TO....

ANCHORS & ANCHOR SYSTEMS..

part 2

Our resident rope genius, Capt'n 'GreyBeard' Thorne started a new series in TR83 on anchoring covering Definitions and the specifics of 'Point Anchors' in part 1. Refer to part 1 for definitions and coming articles will include:

- ANCHOR LOADING
- BOMBPROOF ANCHORS
- FLOATING ANCHORS
- LINEAR ANCHORS
- MULTI-POINT ANCHORS

"Rigging" consists of carefully placed anchors allowing loads to be either held in place and kept from moving, or by where loads are meant to be moved through the use of compression/tension using both controlled friction and mechanical advantage at times it is needed



by **Reed Thorne**
Ropes that Rescue AZ, USA



FOCUSED SUBSTANTIAL ANCHORS

Each half of a two-rope system:

Definition:

An object (such as a tree, hand rail, post) in a favorable position proximal to the edge which is secured by one or more pre-tensioned back ties. This object becomes a "focused" anchor and may be higher off the ground affording a better angle yet needs no opposition..

Anchors may also be strengthened and held in place with linear pre-tensioned back tie anchors discussed later (see right). The acronym for a back tie is:

"A sub bt"
or
"A_{bt}"

When this occurs, the anchor is supported by the back tie and becomes a "focused" anchor. The acronym for the focused anchor is:

"A sub f"
or
"A_f"

The focused anchor is not considered the main anchor point if it is supported by a back tie or back ties (more than 1). At the rear of the back tie(s) is what is considered the main anchor for the focused anchor. These must be strong anchors or anchor systems of their own accord.



Above: A focused anchor with pre-tensioned back ties and interwoven W3P2 webbing on the tree.

Right: Two back ties from low on two trees to a focused anchor high in the tree in front.

Anchors #
Anchor Systems

SUBSTANTIAL FOCUSED ANCHORS

DEFINITION:
An object (such as a tree, hand rail, post) in a favorable position proximal to the edge which is secured by one or more pre-tensioned back ties. This object becomes a "focused" anchor and may be higher off the ground affording a better angle yet needs no opposition.

Rope That RESCUE

Anchors #
Anchor Systems

SUBSTANTIAL FOCUSED ANCHORS

NOTE:
Focused substantial anchors (including substantial focused floating anchors) with two or more pre-tensioned back ties will exhibit a "range of loading" witch is always pie shaped

Rope That RESCUE



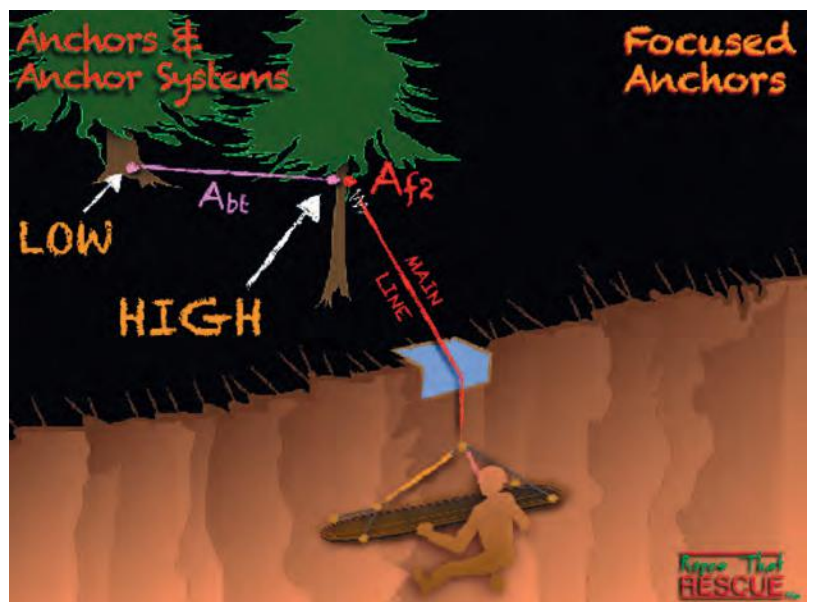
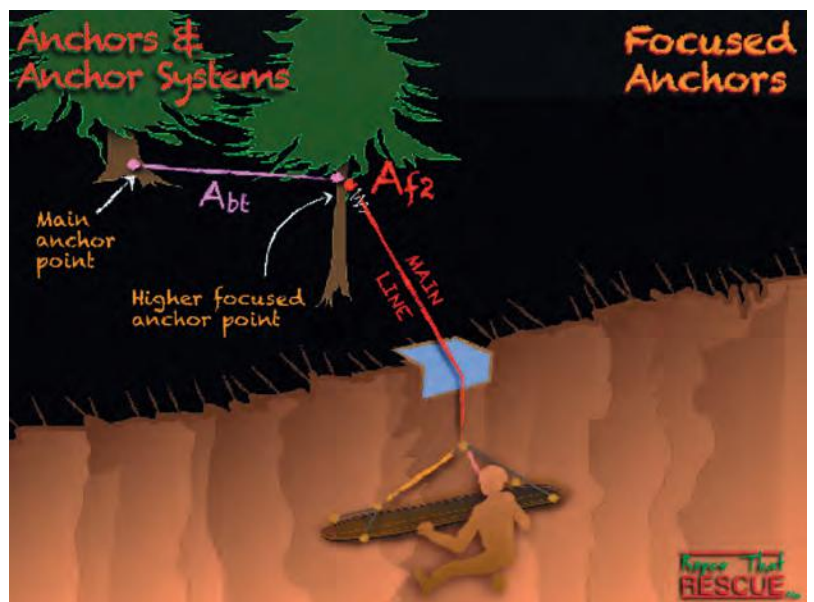
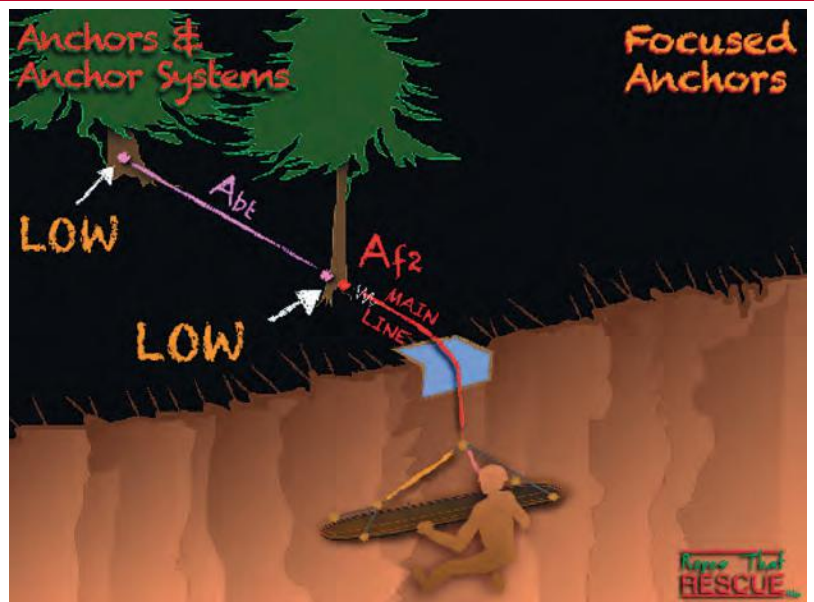
It is assumed that the base of a tree is the strongest part as it is lower to the ground and therefore there would certainly be less cantilever force there. So, remember this when back-tying any focused anchor your strongest position is low.

The problem with anchoring low on the focused anchor end of your back tie is that it is very hard to manage any rope rescue appliance or pulley system when on or near the ground. By elevating that attachment point, you alleviate this issue. Since the focused end is NOT the main anchor, it is perfectly acceptable to do this.

Above you can see two trees of similar girth back-tied together. The front tree is the focused anchor and the rear tree is the main anchor, however in this case since they are the same size, tying them in series together strengthens the entire anchor as a whole. In this case, low to low is acceptable.



Also, we know that the pre-tensioned back tie will apply force high up on this tree causing it to lean back away from the edge. This is actually a good practice as it compensates for the force towards the edge when the system is loaded in the future. The focused anchor is then pulled into a neutral position (essentially in balance) and the resulting force is then directed straight down into the ground. The focused anchor then has no cantilevered force on it and it acts as merely a compression member. Trees like that type of force. Straight down.





rock exotica
GEAR FOR THE Z-AXIS

ENFORCER

Take the guesswork out of your rigging with the lightweight and compact load cell designed for use in both training and the real world.

Monitor and record forces up to 20kN. Rated to 36kN MBS.

For detailed information, visit www.rockexotica.com/enforcer

MONITOR WIRELESSLY VIA BLUETOOTH

The Enforcer 2.0 Android and iOS app* lets you monitor forces in your rigging remotely in real-time, and download for later analysis. Now connects to multiple Enforcer load cells.

*App sold separately
Coming soon.



Weighs just 14oz. (397 gm) with batteries!



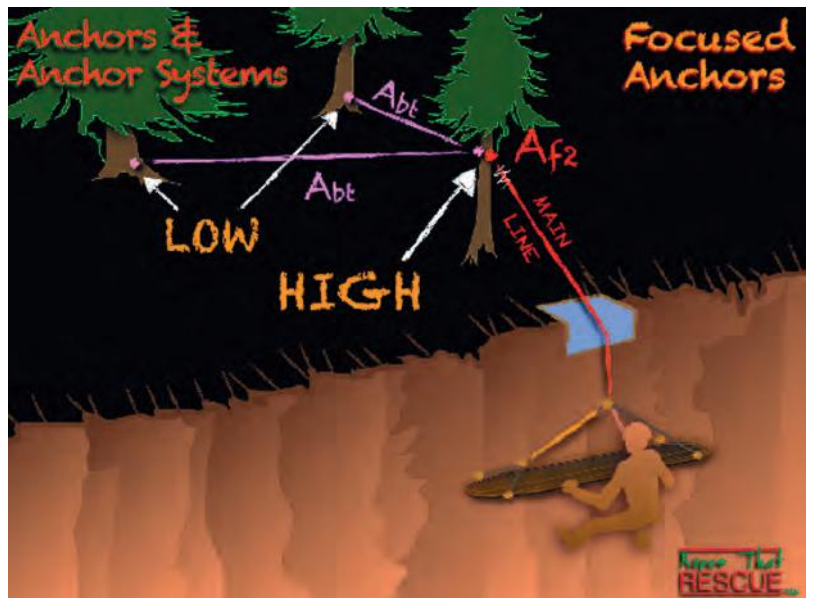
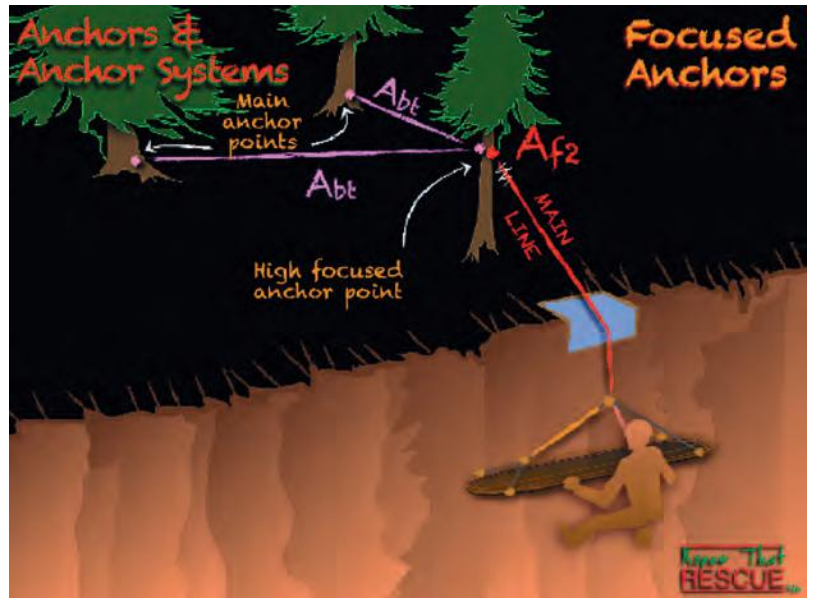
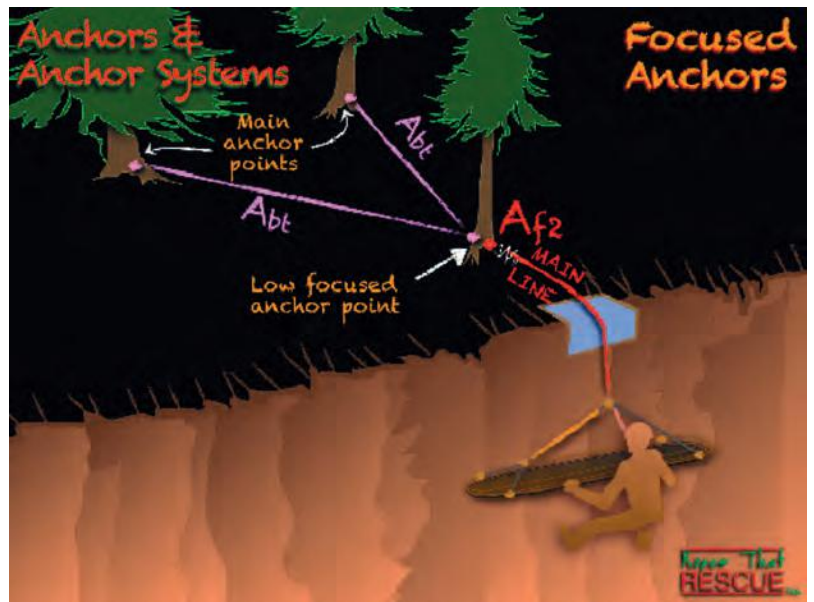
Many times, an adequate back tie anchor at the rear of the operation will not be in the correct position thus making two back ties required to cover the anticipated force on the focused anchor. Back tying low is the strongest position for both ends but it seems prudent to move the focused anchor to a favorable position on the forward tree, handrail, etc. so that it is higher off the ground.

The photo below shows this low back tie anchor on both linear anchors and a higher focused anchor on the tree where a friction appliance (the MPD®) can be operated with ease while standing.



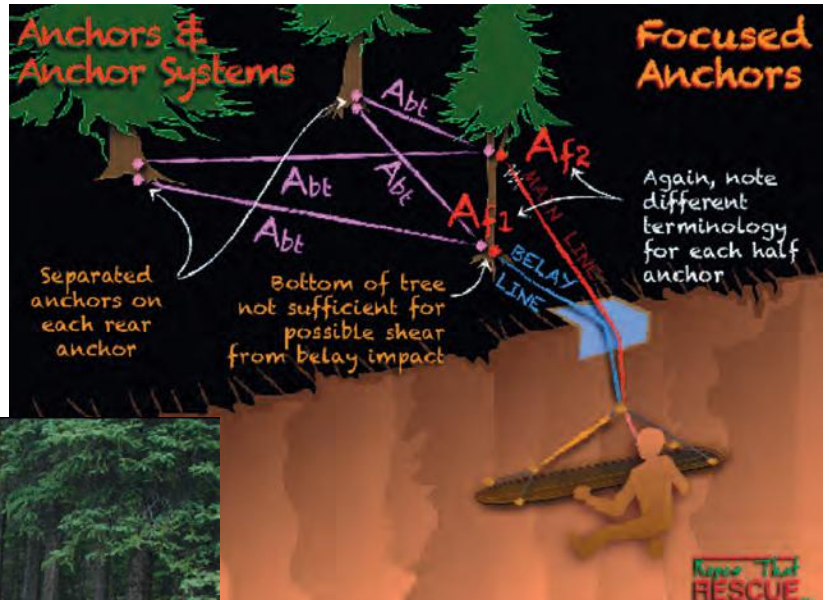
The illustration at right bottom shows the desired position for two back ties on a single focused anchor. Start low and move to high affording a better position at the edge.

Other options for back-tying weak trees or other structural members in industry is to back tie the base of that object as well. This can be done by applying two back ties in each direction on separate anchors to avoid a critical point in separating the main line from the belay. Then, the belay may be attached to the bottom focused anchor (A_{f1}) and the main line may be attached higher on the object (A_{f2}).



Each of the anchors on the same object are noted independently although in this case to the right they are both on the same tree.

The photo below shows how a small sapling was back tied about a meter up off the ground and also the bottom of the same tree was also back tied for the belay line (the belayer is kneeling).

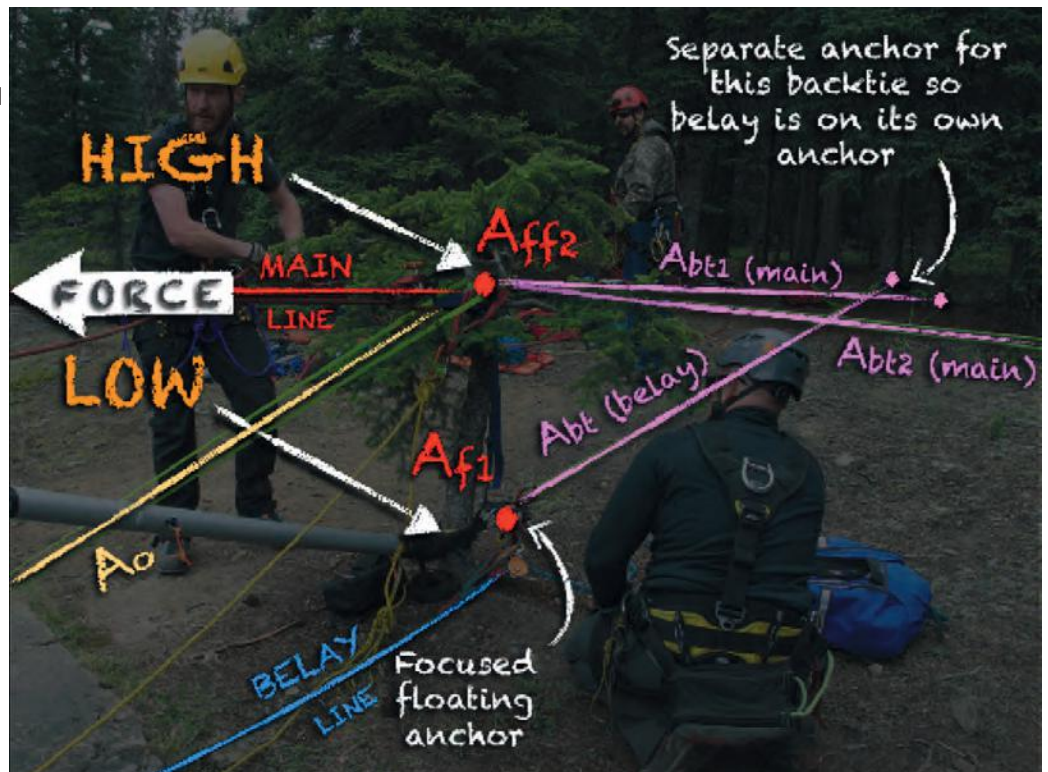


In the bottom photo, you can see the schematic of the operation using the acronyms.

The tree was so small that opposition (A_0) had to be applied to keep the back-tying force from breaking the tree.

This then makes the tree a focused floating anchor instead (A_{ff2}) and the base of the tree a focused anchor for the belay station (A_{f1}) (the base needing no opposition)

Again, notice the low to high arrangement of the focused floating anchor where the pulley system is attached.



RANGE OF LOADING

The so called “range of loading” on any focused or focused floating anchor with a minimum of two back ties, is a pie-shaped area distal of that anchor towards the edge.

In the photos right and opposite, you can see the full operation over an edge in a canyon where there is a prototype focused floating AZORP® head (A_{ff}) being used on the rock with two back tied (A_{bt}) off at angles to the rear with one opposition front tie (A_o) to the front.

The range of loading for this focused floating anchor is the area in front seen opposite in blue, which affords a more desirable place to build a pulley system for the haul. In this case, the rescuers used a compound 9:1 batwing pulleys system noted... (3:1)(1:1) (3:1).

Building on photos 1 & 2, this photo (3) is a different view of the same focused floating anchor system (A_{ff}) noting some more detail.

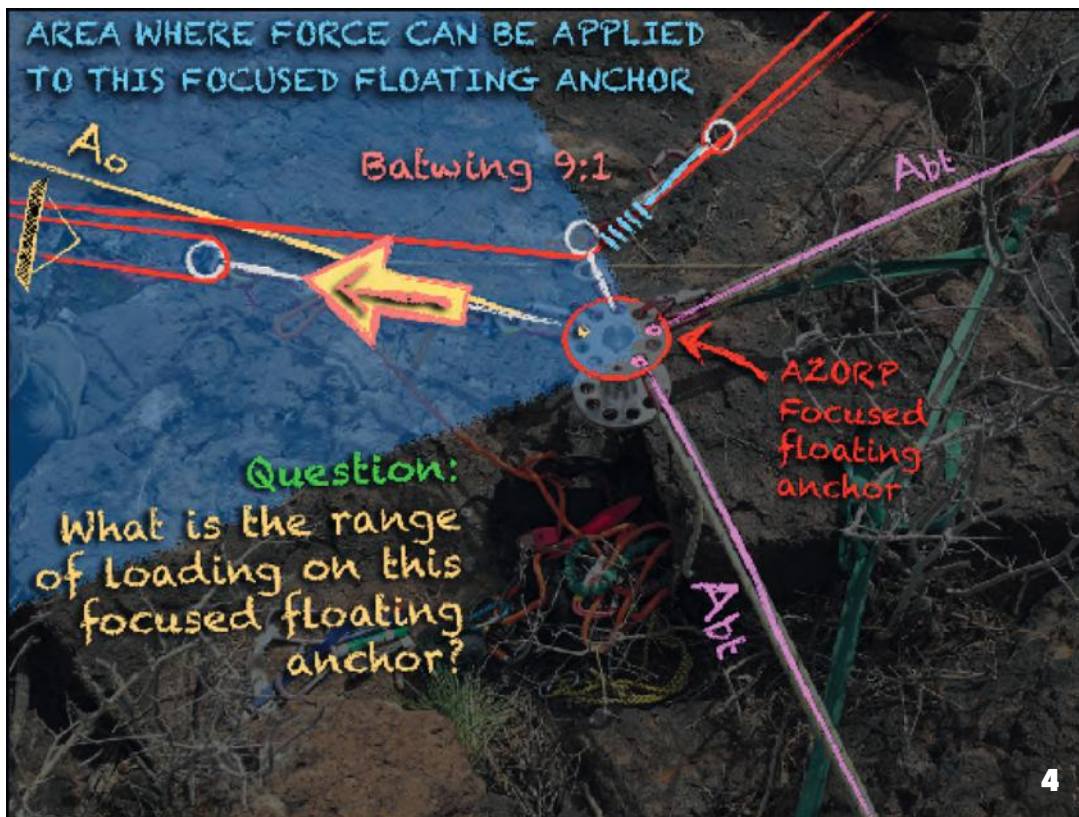
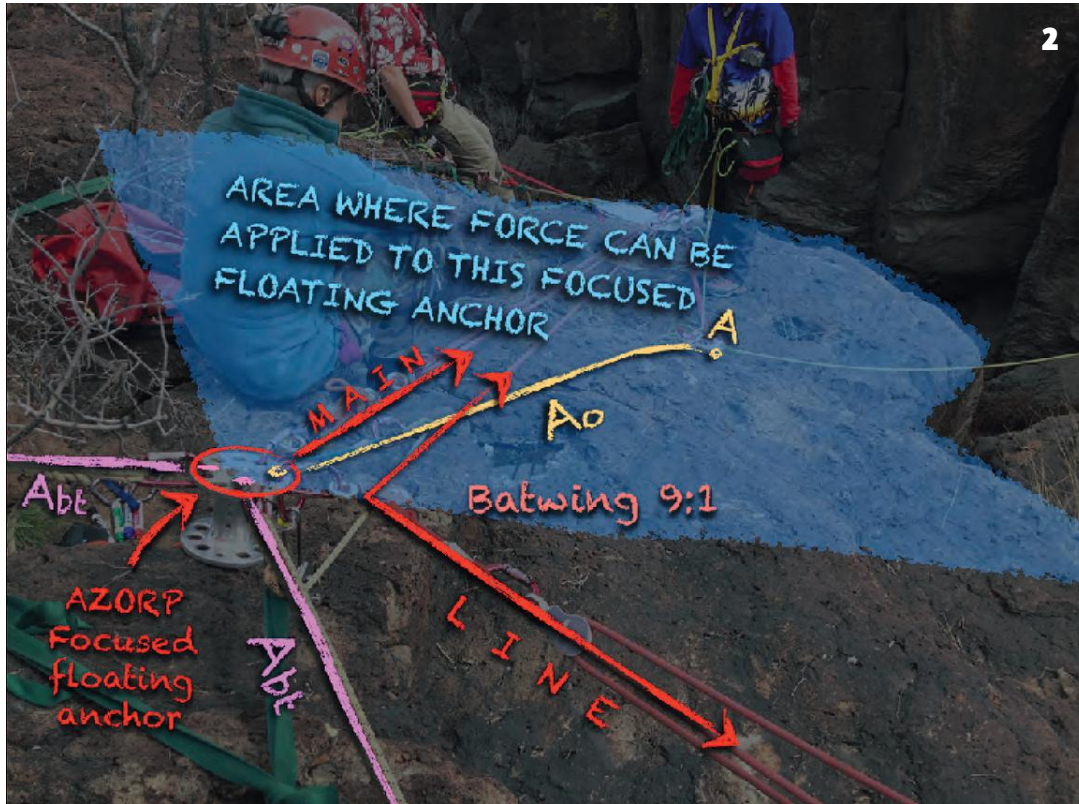
Notice the position of the two back ties (A_{bf}) and opposition front tie (A_o).



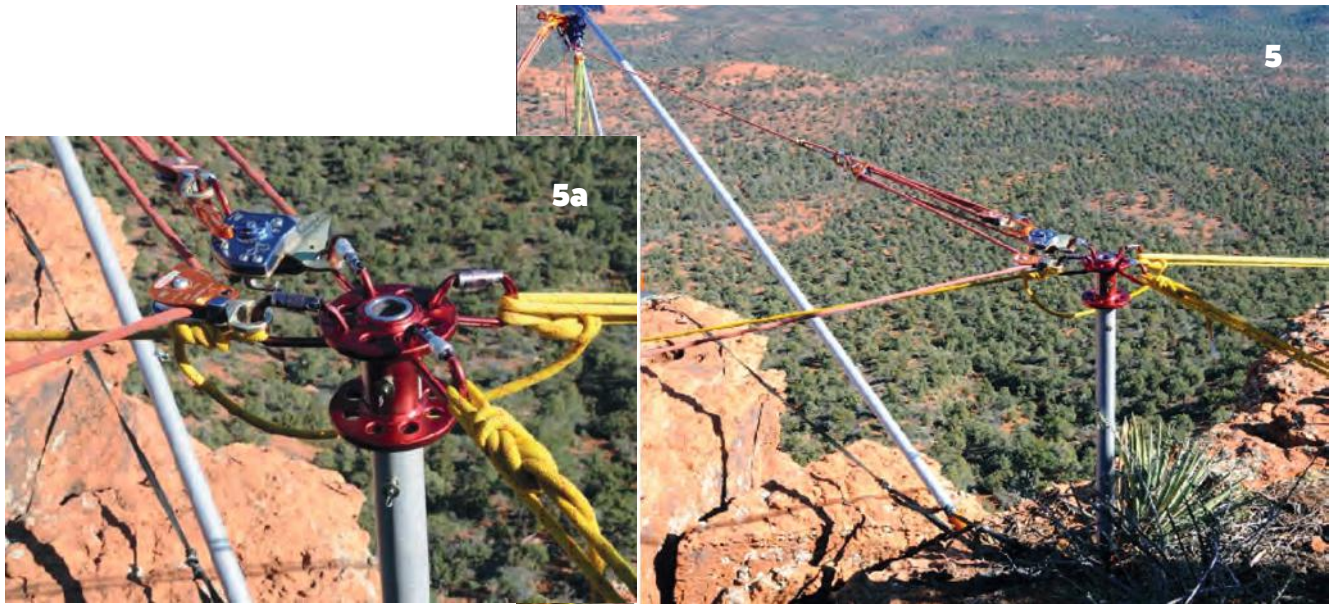
1



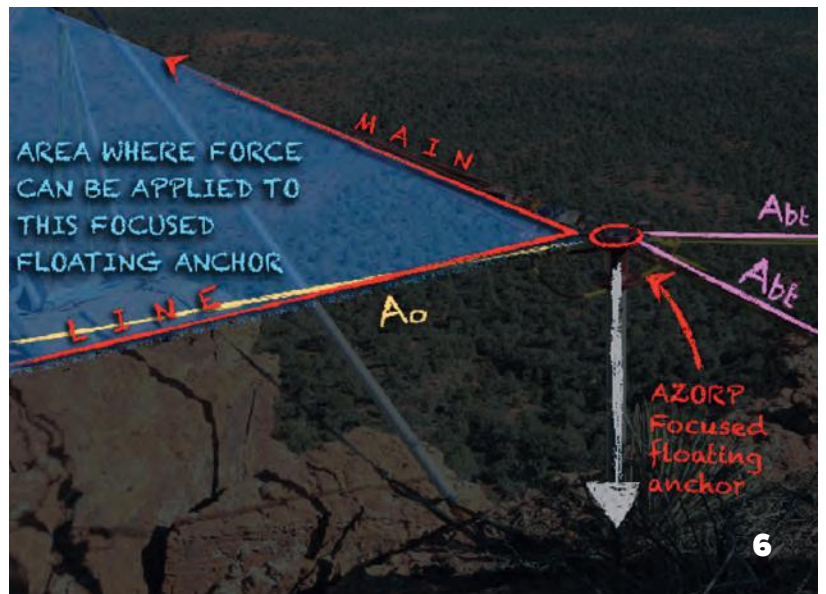
3



The two photos left (4) & opposite (3) show the schematic of the whole system and corresponding range of loading in the shaded area.



Another example (7 below) shows a frame (lazy leg sideways A-frame) anchored at the edge back to a focused floating anchor (A_{ff}) with a compression member (leg) holding it off the ground one meter. In photos 5, 5a and 6 you can see the full operation and batwing pulley system [compound 15:1 noted (3:1)(1:1)(5:1)] operating off the focused floating anchor. Two back ties can be seen to the right affording a wedge shaped range of loading in the blue-shaded area in photo 6.



Also note that both back ties (A_{bt}) and single opposition anchor (A_o) were constructed from one single rope. A slack "jumper" is seen below between the back ties (A_{bt}) on the right and the single opposition anchor (A_o) on the left.



TICK. TICK. TICK. TICK. TICK.

Do you ever get used to the urgency? To get to the site. To get to the injured. To get them stable and up and out NOW. Getting the compact grunt you need, to right where you need it, is why we build the Harken Lokhead winch. With two speeds of 14:1 and 40:1 mechanical advantage, and appropriate for 10mm-12.7mm rope, you won't find a more powerful, safer-to-use tool. One turn of the handle and it's clear. This is a revolution in portable mechanical advantage for rescue.

40:1



LEARN MORE ABOUT
LOKHEAD WINCH KITS

Fire Winch Kit: NFPA-Certified
Standard Kit : CE-Certified
Tellumount weighs just 3.2KGs



harken.com

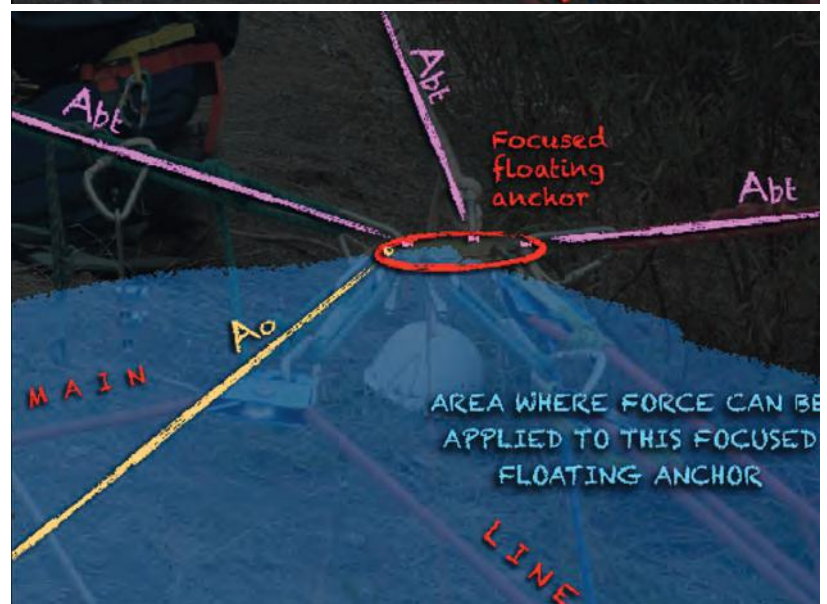
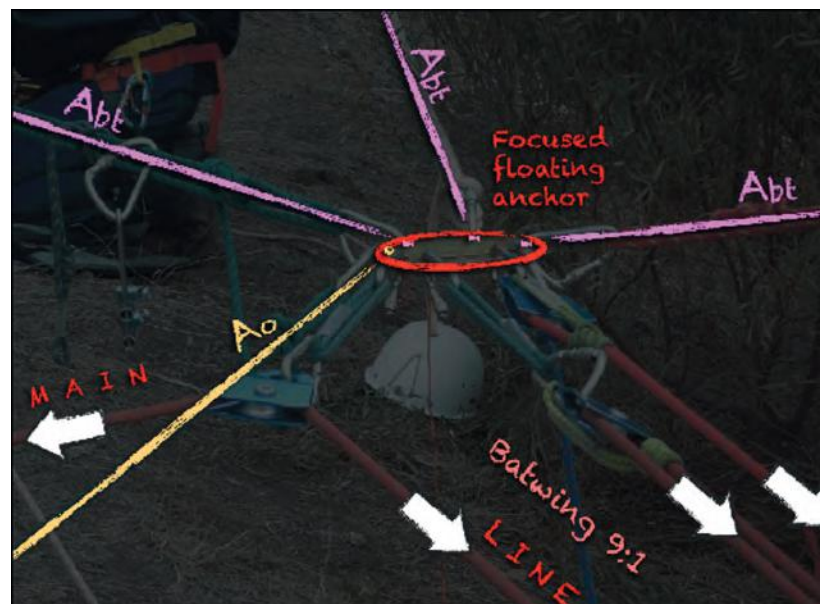
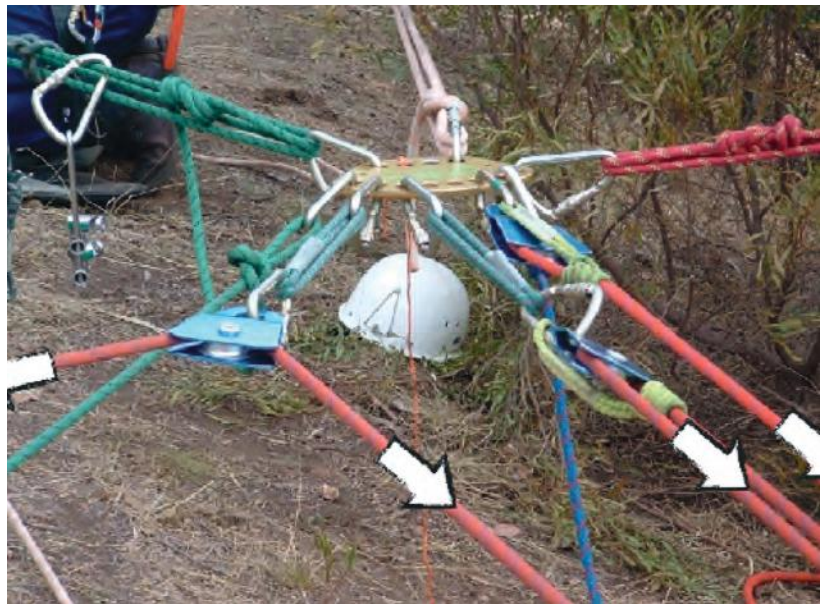
Moving to South Australia, we see a focused floating anchor being used for the main line and also a tracking line offset during training at Unkapringa Gorge near Adelaide.

Again, the top photo shows the set up and the white arrows show the direction of loading on this large rigging place. The left facing arrow is a 3:1 pulley system making this a batwing compound 9:1 noted (3:1)(1:1)(3:1).

Here, there are three back ties which is very unusual whereas two would normally be sufficient. The rear left and middle back ties are needed to resist the forces on the focused floating anchor towards the edge. Since the middle back tie is not in alignment with the direction of pull, the left back tie is required. Finally, the right back tie was needed to resist the batwing system pulling to the left.

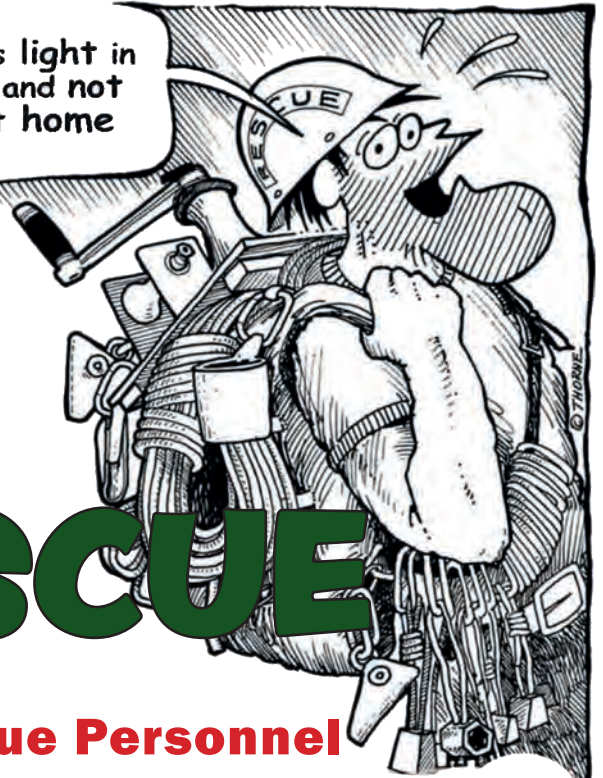
Consequently, the range of loading on this focused floating anchor (A_{ff}) is seen in the bottom schematic in the shaded area which mirrors the opposite of both far left and far right back ties.

Next time - Bombproof Anchors.



Ropes That RESCUE[®] Ltd.

Knowledge is light in the rucksack and not easily left at home



COMPREHENSIVE BOTTOM-UP TREE RESCUE workshops for Rescue Personnel



Trees present difficult rescue solutions as they are a foreign environment to emergency personnel. In a way, they are very much like tower rescue in that they begin at the bottom with the victim or casualty high up in the branches. How can a firefighter gain access from the ground to this elevated location and get the person needing rescue down? Even better than that, how can this be done safely and in a timely fashion? These are the basic components of the Tree Rescue Workshop— Firefighter.

The TRW-F is a rescue class for fire and emergency services—not for arborists. We employ techniques, rope and equipment that would be found on a rescue truck.

NEXT SCHEDULED TREE COURSE:

18TH-24TH NOVEMBER 2024

WORKSHOP or SEMINAR	STATE COUNTRY DATE & FLYER	TYPE	VENUES Classroom-Wilderness or Industrial	Req. Equip You will NEED	Duration Days	Physical exertion Easy 1 Hard 10	Prerequisites (if any), Program Liaison & Special Notes	Location & Sponsor See website for Flyer	Tuition (Other non-RTR costs may apply)	RTR Lead Instructor(s)
Tree Rescue Workshop- Firefighter	CA Nov 18-24 2024	Bottom Up Tree Rescue	Classroom & Wilderness ONLY	See website for kit list	Monday/ Sunday 7 days	10 tree climbing required	Prerequisite: Climbing Trees This program is specifically designed for responding tree emergency personnel in excellent fitness	California USA Nevada City See TRW-F Program Flyer	\$1,750	Keith & Reed Thorne

www.ropesthatrescue.com

VodaSafe

AQUA EYE HANDHELD 'SONAR'



by **Dr. Steve Glassey PhD**

Dr Steve Glassey has been teaching swiftwater rescue for twenty years and is a registered assessor for the International Public Safety Qualifications Authority (IPSQA) for swiftwater rescue, a WorkSafe New Zealand Occupational Diver and is a PADI Public Safety Diver™.



Geoff Bray

Geoff is a veteran police diver and military operator and with over 15 years experience as a swiftwater rescue instructor and commercial dive supervisor (ADAS).

INTRODUCTION

According to *VodaSafe*, *AquaEye* is an advanced underwater scanner that utilizes the latest sonar technology and artificial intelligence to identify human bodies underwater, even in conditions with poor visibility. While the device has undergone thorough testing in static water environments like ponds and lakes, its performance in moving water remains relatively undocumented.

FEATURES

- -50m /164ft range
- -Utilizes artificial intelligence to analyze potential victims in water
- Compact, lightweight (1.4 kg / 3.1lb), and easy to transport
- IP68 water protection (up to 5m)
- 12 hours of active search per charge

EASE OF USE

After completing eight open-access online learning modules, we took *AquaEye* to the Huia Pool during one of DiveHQ

Wellington's diving sessions to gain initial familiarity with the device. We then tested *AquaEye* at the Vector Wero

whitewater park in Auckland, evaluating its performance in both flat water and swiftwater conditions.

The device is submerged and slowly panned to scan an area, covering up to 180 degrees in an arcing left-to-right motion. High-probability targets are displayed as an "X" on the Target Display Mode, while low-probability targets are marked with an "O." The display can also be switched to Echo Map mode, providing raw sonar visualization.

PERFORMANCE

In static water, *AquaEye* impressively identified submerged objects likely to be human in most cases. It rapidly scanned and pinpointed probable targets that required further investigation. Having an operator with previous experience using sonar for body recovery proved invaluable. Using the Echo Map Mode, interpreting raw data proved more effective than relying solely on AI-powered analysis since some targets were not detected in Target Display Mode but were subtly identified through raw data.

It is essential to note that while AI can reduce operator workload, it should not be relied upon exclusively. Operator experience is crucial, and scanning from different locations is necessary to obtain an accurate understanding of the search area. The Echo Map Mode also offered the benefit that it would identify other in-water features such as piers which could help create reference points to aid in situational awareness.

AquaEye's limitations in moving water were acknowledged by its manufacturers, and we attempted to determine how fast water needed to be before it lost efficiency. In aerated swiftwater, sonar cannot penetrate to provide a signature, a limitation inherent to the laws of physics. It would be unfair to hold the manufacturer responsible for its unsuitability in swiftwater conditions.



AQUA EYE SONAR



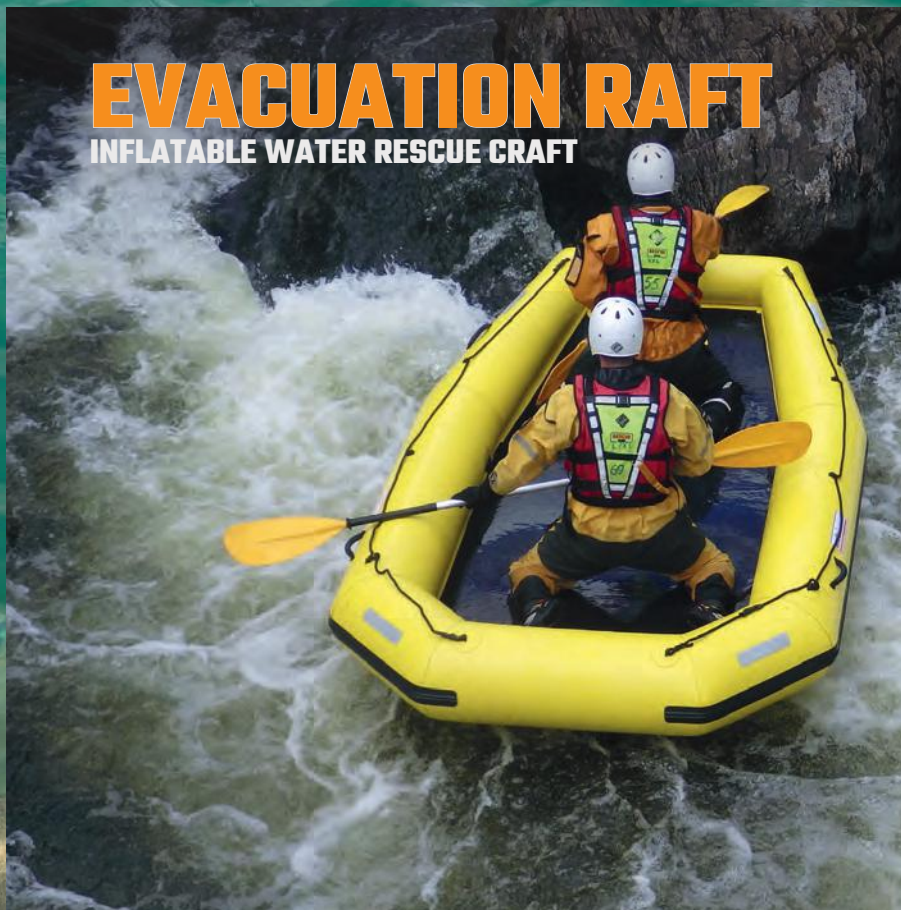
SUPPORT

The website offers a range of short online learning modules, culminating in a quiz and certificate upon successful completion. However, the online learning lacks context on survival rates for drowning victims. It mentions a 60-minute timeframe but should be revised to consider water temperature, as per Golden and Tipton's 6:30:90 protocol. For water warmer than 6 degrees Celsius, resuscitation is extremely unlikely if the victim is submerged for more than 30 minutes, or 90 minutes if the water is cooler than 6 degrees Celsius. This information is crucial for areas with water temperatures over 6 degrees Celsius, where time is limited for a successful rescue.

The distributor network was responsive and provided good customer service. The device comes with a two-year warranty.

VALUE FOR MONEY

The device's MRSP is priced at USD\$5,495 a subjective cost that depends on individual perspectives. However, efficient use of *AquaEye* could lead to cost and time savings for agencies using public safety dive teams. In shallow water, it may eliminate the need for such deployments if bodies can be recovered from the surface using devices like the Reach and Rescue Body Hook and/or Search Camera. This alternative approach can expedite recovery, reduce deterioration of the decedent, and offer more timely closure to affected families. For static water incidents up to 17m, a combination of *AquaEye* and Reach & Rescue pole tactics could eliminate the need for divers,



EVACUATION RAFT

INFLATABLE WATER RESCUE CRAFT



MFCInternational
by RESPIREX
ENGINEERED INFLATABLE PRODUCT SOLUTIONS

- Can be used in very shallow water (5cm or more)
- Closed stern to keep the deck dry and provides greater reassurance for casualties
- Can be paddled or pulled by hand
- Excellent stability
- 8 or 10 Person Capacities
- Available in Hypalon or TPU materials
- Extremely tough & durable
- Highly customisable
- Manufactured in the UK

W: mfc-international.com
T: +44 (0)1443 433 075
E: sales@mfc-international.com



reducing operational diving risks and response costs. However, divers remain necessary for scenarios involving trapped bodies or moving water.

ADVANTAGES

Numerous online reviews have reported successful deployments of the *AquaEye* in operational conditions. Users frequently mention ease of use, rapid area coverage, and reduced on-scene time for public safety divers, as probability areas can be identified before their arrival. In static water, it effectively identifies bodies.

DISADVANTAGES

In many situations, *AquaEye* serves as a recovery tool rather than a rescue tool. Except for frozen lakes or slow-moving alpine-fed rivers where survival time is extended, the 30-minute window for search, location, retrieval, and resuscitation is uncommon. Consequently, the device is more likely to be used in fatality cases, where the need to collect evidence for coroners or medical examiners arises. What's missing from the device to maximize its deployment potential is the ability to record sonar data. Logging and securely sharing this data, possibly through *Bluetooth* with a mobile tablet or phone, would be highly advantageous. It would enable analysts to review footage in near real-time during search operations, validating search decisions. We also found the device too buoyant and a small counter-weight, whilst still maintaining positive buoyancy may help prevent the scan paths from being affected.

If strategically positioned and deployed prior to a rescue, *AquaEye* has merit as a rescue tool by being able to search a large area in a short span of time, allowing rescuers to locate and retrieve victims within the short envelope of time available where resuscitation may be successful. By keeping divers and others out of the water or minimising their exposure, further lives may also be saved.

CONCLUSION

AquaEye holds promise for improving search and recovery operations in static water environments up to 50m in depth. However, to better serve its likely deployment scenarios involving fatalities and evidence collection, it should enhance its ability to log and share collected data. The next step for this device should involve collaboration with companies like Reach and Rescue to reduce the reliance on public safety divers, enabling fully remote, surface-based search and recovery operations. Overall Rating 4 /5

Website: www.vodasafe.ca

Acknowledgements: The authors wish to thank DiveHQ Wellington, Vector Wero, and Fire & Rescue Safety New Zealand for their support in conducting this review.

SONAR EMILY

- Easy Operation based Humminbird SONAR
- Real-time imagery for search and recovery missions
- Light weight (17 kg)
- Line of Sight technology
- GPS Accurate Mapping
- Navigation Lights for Night Missions
- Side scan, downward imaging and bathymetry
- SD cards for recording and post-processing
- Autonomy through easy waypoint entry
- SARHAWK Post Mission Processing Software

SWIFT WATER RESCUE EMILY

- Line of sight technology
- Battery powered, jet boat
- Fast and durable, 40 km/h
- Navigation Lights for Night Missions
- Easy to deploy off riverbanks, piers, bridges
- Self-righting technology for strong currents

HYDRONALIX

For UK: info@emilyrobotuk.co.uk
For US: info@hydronalix.com



Introducing

11mm Pro-G

Strong - Supple - Predictable

BlueWater's 11mm NFPA-G rated low elongation line features:

- < 48 carrier sheath
- < Designed to run well in all devices
- < Whopping 9,447 lbf. published tensile strength
- < Polyester sheath with Nylon core
- < Available in 2 highly visible contrasting colors

Diameter:	11mm
Tensile Strength:	9,447 lbf. (42 kN)
Grams Per Meter:	93

Elongation

@ 300 lbf. = 2.6%
@ 600 lbf. = 4.7%
@ 1000 lbf. = 6.8%



209 Lovvorn Rd, Carrollton, GA 30117
Tel: (770) 834-7515 > (800) 533-7673
www.BlueWaterRopes.com
email: Info@BlueWaterRopes.com